CITY DEVELOPMENT PLAN FOR BANGALORE

2006

Jawaharlal Nehru
National Urban Renewal Mission

JnNURM

VOLUME - 1 Urban Infrastructure and Governance

VOLUME - 2 Annexures to Urban Infrastructure and Governance

VOLUME - 3 Basic Services to the Urban Poor

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Chapter I Introduction

1 Purpose

This City Development Plan (CDP), prepared for the city of Bangalore, is a prerequisite for availing financial assistance under the JNNURM. The CDP is a 6-year policy and investment plan (2007-12) designed to articulate a vision of how Bangalore will grow in ways that sustain its citizens' values. The CDP makes basic policy choices and provides a flexible framework for adapting to real conditions over time. Through the CDP, the City residents share a vision for the future and identify key issues facing the City in the short, medium, and long-term. By providing clear directions for the future, the CDP establishes priorities through a consultative process, and facilitates investment decisions in the context of their desired future outcomes.

The Government of India has selected Bangalore, a metropolis, as a "Category A" city, for assistance under the Jawaharlal Nehru National Urban Renewal Mission. Bangalore, in the recent past, has been a favored destination for most high technology industries and has consequently witnessed a significant in-migration. While the City has embarked on initiatives such as construction of flyovers, construction of a Metro-rail system, developing a new international airport, remodeling of storm-water drains, augmenting water supply, and development of waste management facilities, there is substantial need for improvements in urban infrastructure.

The CDP seeks to address the needs and challenges of the City in a systematic manner with the participation of all its stakeholders and citizens. While the CDPs that were prepared by all cities in the earlier context were largely land-use regulation and monitoring documents, this CDP for the JNNURM has wider objectives that seek, *inter-alia*:

- Guided growth of the City;
- Citizen's participation;
- Reform in governance leading to a well-managed society; and
- Clear estimates of financial investments and sustainability;

2 Overview of JNNURM

Recognizing the critical importance of rapid urban development and growing contribution of the urban sector to the Country's GDP, the Government of India through the Ministry of Urban Development (MoUD) launched the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in December 2005. JNNURM is a "reform-driven and fast track project, planned at developing identified cities by focusing on efficiency in urban infrastructure/services delivery mechanism, community participation, and accountability of Urban Local Bodies/Para-statals towards its citizens". The proposed duration of the Mission is seven years (2005-12), and it covers 63 important cities in the Country, with a substantial financial outlay. The JNNURM has two sub-missions addressing different critical needs:

- Infrastructure & Governance; and
- Basic Services to the Urban Poor.

This CDP has been prepared in accordance with the JNNURM toolkits, to consider the City needs in an integrated and participatory manner, and prioritize investments in urban infrastructure and basic services for urban poor. This CDP attempts to set out a common vision shared by City-level stakeholders determining how the City should grow, the quality of life citizens expect, and the role of stakeholders (government, Para-statals, industry, non-governmental organizations, and citizens) in ensuring that the common vision is attained and within a specified timeframe.

2.1 Process of Formulation of CDP

Based on analytical information on the City's infrastructure and a consultative process undertaken by Bangalore's institutions, the CDP has been prepared in line with JNNURM requirement. According to JNNURM norms, the sub-projects shall be financed in the following proportion:

- 35% (GoI);
- 15% (GoK); and
- 50% from the institutions concerned (which include ULBs, BDA, BMTC, BWSSB, and KSCB).

The sub-projects constituting the CDP cover water supply, sewerage, storm water drainage, solid waste management, civic amenities (lakes and parks, fire services, etc), poverty alleviation/slum upgradation, traffic management, road improvement and street lighting, and tourism & heritage. Detailed Project Reports (DPRs) for various projects are under preparation by the institutions concerned, and will be submitted after the approval of the CDP.

The methodology adopted for preparation of the CDP comprised:

- Review of existing literature, which included:
  - Comprehensive Development Plan prepared by Group SCE for BDA (required as per the statute and primarily a land use directional document);
  - City Development Strategy Plan prepared by UrbanFirst for BMP; and
  - Infrastructure Development & Investment Plan for Bangalore prepared by STEM for KUIDFC.
- Stakeholder Consultations; and
- Data Analysis.

Bangalore city also embarked on a broad-based consultative process spanning across the cross section of stakeholders – citizens (including the urban poor), elected representatives (Councilors, MLAs, and MPs), government agencies, non-governmental organizations, and resident welfare associations. In order to reach a wider audience, a multi-modal consultation framework was adopted, comprising workshops, one-to-one interviews, review meetings, feedback questionnaires and internet based response collection.

More than fifty stakeholder meetings/workshops were held, from which emerged the vision for the City, the strategies to achieve the vision, the policies required to provide an enabling environment for change and finally the projects and plans to realize the vision.

3 Structure of the Report

This CDP document has been prepared as per the toolkits provided by the Ministry of Urban Development and Ministry of Urban Employment and Poverty Alleviation, Government of India. The CDP is presented in three volumes.

- Volume I: Urban Infrastructure & Governance
- Volume II: Annexures – Urban Infrastructure
- Volume III: Basic Services to the Urban Poor

VOLUME 1 - URBAN INFRASTRUCTURE & GOVERNANCE

Volume I, the urban infrastructure component, is structured into four sections, each addressing a particular facet of the CDP.

- Section 1: This section covers the introductory framework, city profile, the consultation process undertaken to formulate the vision and strategy, the evolved vision & mission statements, the growth characteristics and growth drivers.
- Section 2: This section is structured in chapters that cover the key urban infrastructure sectors, with each chapter analyzing the existing situation in the sector, examining sectoral issues and strategies, and then setting out the estimated investment plans in the JNNURM period and in future block years.
- Section 3: The aggregated Capital Investment Plans and Financial Sustainability aspects are outlined in this Section.
- Section 4: The Institutional Reform Agenda for the City is delineated in this Section.

VOLUME 2 - ANNEXURES TO URBAN INFRASTRUCTURE & GOVERNANCE

The summary of the stakeholders consultations, analysis of existing financial health of individual institutions and assumptions for projections of their finances are presented in Volume 2 of the CDP.

VOLUME 3 – BASIC SERVICES TO THE URBAN POOR

The report on the second sub-mission of JNNURM, namely, Basic Services to the Urban Poor is set out as Volume 3 of the CDP. Diagnosis of the existing situation, challenges in providing equitable urban infrastructure services, investment plans, and financing strategies for the urban poor are set out in this volume.

Chapter II City Profile

1 Background

Bangalore, the Capital of Karnataka, is the fifth largest metropolitan city in the country. It comprises the Bangalore Mahanagara Palike (BMP) with an area of 226 sq.km, seven City Municipal Councils (CMCs) covering an area of 300.9 sq. km, and peripheral villages. It is well known – nationally and internationally – as a destination of choice for high-technology industries, particularly in the IT/ITES and Biotechnology sectors. It is a city that has transformed itself from a "pensioners' paradise" to a modern thriving cosmopolitan metropolis. The pleasant climatic conditions and the "garden city" image, as well as the availability of academic institutions and skilled workforce, led to this rapid development. Table 1 shows some salient details of Bangalore.

1.1 Topography

Bangalore is situated in the southeast of Karnataka, at an average elevation of 920m above mean sea level. It is positioned at 12.97°N, 77.56°E and covers an area of 2,190 sq.km. Bangalore Urban District borders with Kolar District in the northeast, Tumkur District in the northwest, Mandya District in the southwest, Chamarajanagar District in the south and the neighboring state of Tamil Nadu in the southeast. The Bangalore Urban District is divided into three taluks: Bangalore North, Bangalore South, and Anekal. The Bangalore North taluk is a relatively level plateau, while the Bangalore South taluk has an uneven landscape with intermingling hills and valleys.

The topography of Bangalore is flat except for a ridge in the middle running NNE-SSW. The highest point in Bangalore is Doddabettahalli, which is 962 m and lies on this ridge. There are no major rivers running through the City. The river Arkavathi (a tributary of the Kaveri) passes near Nandi Hills, 60 km north of Bangalore, while the river Kaveri has its nearest approach near Srirangapatnam, southwest of Bangalore. Bangalore has a number of freshwater lakes and water tanks, the largest of which are Madivala Tank, Hebbal Lake, Ulsoor Lake, and Sankey Tank.

1.2 Climate

Due to its elevation, Bangalore enjoys a pleasant climate throughout the year, with temperatures ranging between 33°C and 16°C, with an average of 24°C. The summer heat is moderated by occasional thunderstorms and squalls. Bangalore receives adequate rainfall of about 860 mm from the Northeast Monsoon as well as the Southwest Monsoon. The wettest months are August, September and October.

Table 1: Bangalore at a Glance

Parameters	BMP	Bommanahalli	Byatarayanapura	Dasarahalli	KR Puram	Mahadevapura	RR Nagar*	Yelahanka	Kengeri	TOTAL
Area (sq.km.)	226.2	43.6	47.0	38.0	21.3	46.2	66.0	38.8	34.0	561.0
Number of wards	100	31	31	35	35	31	31	31	23	232
Population (2001)	4303033	243870	210007	309956	198991	163486	111553	99993	44995	5685884
Gender ratio (female population per 1000 male)	915	867	908	844	911	866	879	863	936	906
Literacy levels (%)	86	81	82	96	87	83	78	84	84	86
Number of households	1225307	65885	52813	91071	50186	44927	30073	28953	14319	1603534
Developed Properties	521939	41371	25800	26759	44824	18186	16715	24110	6009	725713
Vacant land (ha)	57993	37193	10167	20689	15176	24575	27300	7555	5115	205763

* RR Nagar was formerly known as Pattanagere.

2 Population Trends

The City experienced rapid growth in the decades 1941-51, and by 1961 Bangalore became the sixth largest city in India. Employment opportunities - initially in the public sector, and then in textile and high technology industries - resulted in migration of people to Bangalore. The 2001 census population of Bangalore was 56.86 lakh, but the (new draft) City Development Plan of BDA has included population in the peripheral villages and estimated the metropolitan area population as 61.70 lakh.

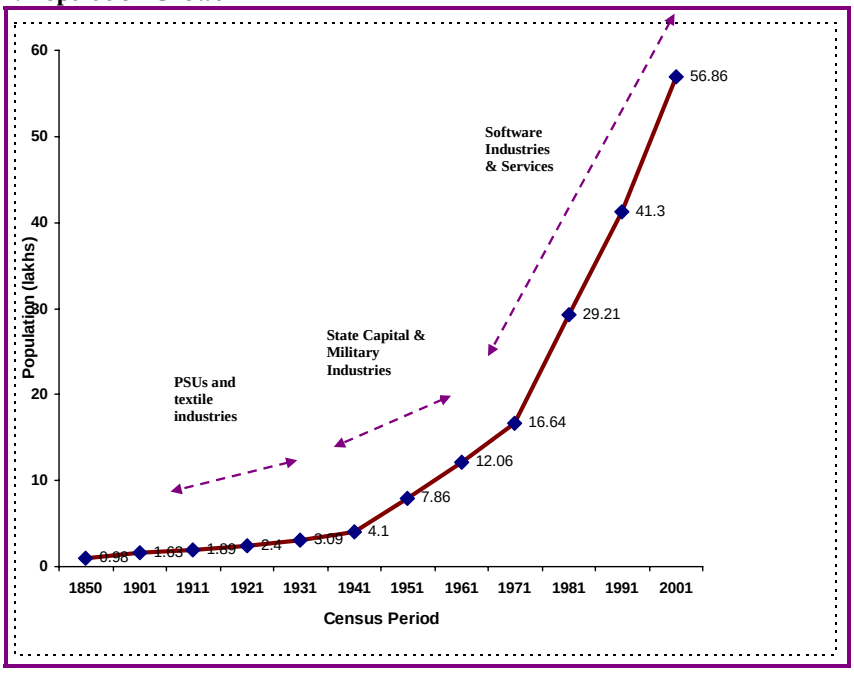
The growth of Bangalore from a town to a metropolis has been a result of five growth events:

- Shifting of the State Capital from Mysore;
- Establishment of the Cantonment;
- Setting up Public Sector Undertakings/Academic Institutions;
- Development of Textile Industry; and
- Development of Information Technology/ITES/Biotech based industries.

2.1 Decadal Growth

In the decade of 1991-2001, the growth rate urban population in Karnataka was 28.85%, as against the aggregate population growth rate of 17.25%. Bangalore grew at a much faster rate, and the population of Bangalore increased from 41.30 lakh to 56.86 lakh during the decade 1991-2001, representing a decadal increase of 37.7%, which made Bangalore one of the fastest-growing Indian metropolises, after New Delhi (51.93%). Figure 1 shows the population growth and illustrates sharp spurts in population growth in the decades 1941-51 and 1971-1981.

Figure 1: Population Growth



2.2 Composition of Population Growth

About one third of the population increase in the Bangalore region is attributed to the fact that new areas were added to the Bangalore urban agglomeration. Adjusting this factor, the net increase in population during 1991-2001 was approximately 22%. Table 2 shows the growth composition of population.

Table 2: Composition of Population Growth

Composition	1981-91 (Lakhs)	% of total	1991-2001 (Lakhs)	% of total
Natural increase	2.66	22%	3.42	22%
In-migration	5.44	45%	7.00	45%
Jurisdictional change	4.03	33%	5.19	33%
Total increase	12.09	100%	15.57	100%

Source: City Development Plan for Bangalore - BDA

2.3 Key Population Indicators

As per the 2001 census:

- The literacy rate is 86%
- The sex ratio is 906
- The population density across the urban agglomeration is indicated in Figure 2.

3 Land Use

As can be seen from Figure 3, Bangalore city has developed spatially in a concentric manner (The area indicated in Figure 3 (530.85 sq. km) for the Year 2001 is an approximation, the actual area is 561 sq. km.). However, the economic development has occurred in a different manner in different sectors of the City. The current urban structure results from the interlocking of these two developments. Five major zones can be distinguished in the existing land occupation, indicated in Figure 4.

- **1st Zone - The core area** consists of the traditional business areas, the administrative centre, and the Central Business District. Basic infrastructure (acceptable road system and water conveyance), in the core areas is reasonably good – particularly in the south and west part of the city, from the industrial zone of Peenya to Koramangala. This space also has a large distribution of mixed housing/commercial activities.
- **2nd Zone – The Peri-central area** has older, planned residential areas, surrounding the core area. This area also has reasonably good infrastructure, though its development is more uneven than the core area.
- **3rd Zone – The Recent extensions** of the City (past 3-5 years) flanking both sides of the Outer Ring Road, portions of which are lacking infrastructure facilities, and is termed as a shadow area.
- **4th Zone – The New layouts** that have developed in the peripheries of the City, with some vacant lots and agricultural lands. During the past few

years of rapid growth, legal and illegal layouts have come up in the periphery of the city, particularly developed in the south and west. These areas are not systematically developed, though there are some opulent and up-market enclaves that have come up along Hosur Road, Whitefield, and Yelahanka. The rural world that surrounds these agglomerations is in a state of transition and speculation. This is also revealed by the "extensive building of houses/layouts" in the green belt. Both BDA and BMRDA are planning to release large lots of systematically developed land, with appropriate infrastructure, to address the need for developed urban spaces.

- **5th Zone – The Green belt and agricultural area** in the City's outskirts including small villages. This area is also seeing creeping urbanization.

While the core area has been the seat of traditional business and economy (markets and trading), the peri-central area has been the area of the PSU. The new technology industry is concentrated in the east & southeast. These patterns are obviously not rigid –especially with reference to the new technology industry and services that are light and mobile, and interspersed through the City, including the residential areas. Figure 4 shows a map of the urban area, indicating the patterns of these five zones.

Bangalore Development Authority (BDA) Area is indicated in Figure 5 and covers Bangalore Mahanagara Palike, seven City Municipal Councils (CMCs) and one Town Municipal Council (TMC). Table 3 shows the land use pattern in the BDA area, while Figure 6 shows the existing land-use situation.

Table 3: Land use Pattern in BDA Area

Category	Area in hectares	% Use
Residential	16,042	14.95
Commercial	1,708	1.59
Industrial	5,746	5.36
Park and open spaces	1,635	1.52
Public semi-public	4,641	4.33
Transportation	9,014	8.40
Public utility	192	0.18
Water sheet	4,066	3.79
Agricultural	64,243	59.88
	107,287	100

Source: CDP of BDA

4 Economy

Bangalore has a strong and balanced economy, with stimulated by light and heavy engineering (automobiles, earthmoving, and aeronautics), textiles, and high technology (IT, ITeS, Biotech, R&D). The United Nations Human Development Report 2001 has ranked the City fourth along with Austin (USA), San Francisco (USA), and Taipei (Taiwan) as the top "Technology Hubs of the World."

Public Sector Undertakings and the textile industry initially drove Bangalore's economy, but the focus in the last decade has shifted to high-technology service industries. Bangalore's US$ 47.2 Billion economy makes it a major economic

centre in India, and as of 2001 Bangalore's share of US$ 3.7 Billion in Foreign Direct Investment made it the 3rd highest recipient of FDI for an Indian City.

With over 103 Central and State research and development institutions, Indian Institute of Science (globally ranked as one of the best universities), National Law School of India, 45 Engineering Colleges, world class health care facilities, medical colleges and institutions, and a host of other institutional infrastructure, Bangalore is a much sought-after destination for education and research.

Bangalore has also enjoyed a favorable positioning that has created job opportunities and rising income levels in excess of population growth. In effect, the annual growth percentages are about:

- 3% for the total population;
- 6% for employment; and
- 9% for the incomes.

> *Between the longing for a Bangalore of a bygone era and the futuristic visions of the Singapore-in-the-making through a unique "Private-public partnership' lies a complex history of a city that has been marked by national, regional, and global forces and interests in its passage to a metropolitan status. In the five decades since Independence, a small and unremarkable town was transformed into an internationally known metropolis… No single metaphor adequately describes the new metropolitan experience, for Bangalore is not quite the industrial district, the technopole, the international city, nor the Silicon Valley of Asia that have been used to describe processes elsewhere… No other contemporary Indian city allows us to track the passage from small town to metropolitan status within a few decades as well as does Bangalore.*
>
> The Promise of the Metropolis – Bangalore's Twentieth Century (Oxford University Press 2005), Janaki Nair.

4.1 Contribution to Karnataka's Economy

The city of Bangalore is a key contributor to the economic growth of the State. Its contributions are substantial and its potential even greater. Salient features of Bangalore's economy comprise:

- While the area of metropolitan Bangalore is less than 0.5% of the area of the State, it contributes 75% of the corporate tax collections, 80% of sales tax collections, and 90% of luxury tax collections in the State.
- More than 11% of the FDI in the country is in Bangalore, which ranks only next to Delhi and Mumbai as an investment destination.
- In 2004-05, more than 110 new foreign owned firms were established in Bangalore.
- The city has seen a five-fold growth of state tax revenues during the period (1990-2003), which is unparalleled in the country. While tax revenues, as a ratio to GDP of most States have remained constant, there has been an increase in Karnataka, primarily because of Bangalore.

4.2 Industrial Scenario

Bangalore is headquarters to several public manufacturing heavy industries such as Hindustan Aeronautics Limited (HAL), National Aerospace Laboratories (NAL), Bharat Heavy Electricals Limited (BHEL), Bharat Electronics Ltd. (BEL), Bharat Earth Movers Limited (BEML), and Hindustan Machine Tools (HMT). In June 1972, the Indian Space Research Organization (ISRO) was established under the Department of Space and headquartered in the City.

Bangalore is called the "Silicon Valley" of India because of the large number of Information Technology companies located in the City, which form the largest contributor to India's US$12.2 Billion (Rs.54,000 Crore) IT and software export market. Bangalore's IT industry is divided into three main "clusters" — Software Technology Parks of India, Bangalore (STPI); International Technology Park Ltd. (ITPL); and Electronics City. Infosys and Wipro, India's 2nd and 3rd largest software companies are headquartered in Electronics City. As headquarters to 38% of global SEI-CMM[1] Level 5 Companies, Bangalore's place in the global IT map is prominent. Today Bangalore is home to 66 Fortune 500 companies, 682 MNCs, 1,685 IT/ITES and 131 Biotech companies.

Biotechnology is also a rapidly expanding field in the City. Bangalore accounts for half of the approximately 260 biotechnology companies in India. Biocon, headquartered in Bangalore, is the nation's leading biotechnology company and ranks 16th in the world in revenues.

Jack F. Welch Technology Research Center in Whitefield, Bangalore, is the second largest research facility of GE in the world. Spread over an area of 14.5 Ha, the research is carried out in the fields of nanotechnology, biotechnology, photonics, and advanced propulsion systems. Founded in 2000, the Research Center employs around 1600 employees, including more than 1000 doctorates.

4.2.1 Employment & Economic Base

In addition to prominent industry names and Fortune 500 companies operating out of the City, there are a large number of small and medium size industries that contribute significantly to the economic base of Bangalore. Industry turnover and employment base in various categories of industry is illustrated in Table 4.

Table 4: Industry Turnover and Employment

Size	Number	Investment (Rs. Crores)	Job Opportunities
Small-scale	55,162	1,682	5,78,000
Medium & Large Scale	546	4,725	2,24,287
Mega	17	3,808	33,830

Source: Bangalore Darshana – 2003-04

[1] Software Engineering Institute – Capability Maturity Model

Given the above scenario, industrial/commercial employment is obviously the highest, at over 90%, while employment avenues in the rest of the sectors are relatively minor, which is illustrated in Table 5.

Table 5: Occupational Distribution

	No. of workers (lakhs)	% of total
Primary sector	0.05	0.80%
Manufacturing	2.54	43.36%
Electricity, gas and water supply	0.08	1.40%
Construction	0.06	0.99%
Transport, storage and communication	0.43	7.29%
Banking and insurance	0.65	11.07%
Trade and business	0.21	3.59%
Services	1.84	31.51%
Total	5.85	100.00%

Source: Department of Employment & Training, GoK (2002)

5 Urban Poor

While Bangalore's employment increased twice as much as the population and incomes increased three times faster than the population, the inequality of this latest growth leads to the increased difficulties for the urban poor. However, the key challenge remains growth devolution to all sections of the society. As per the 2001 census, the slum population in the BMP area is 4.30 lakh, which is about 10% of the total BMP population of 43.01 lakh.

The increase in number of slums in Bangalore is a problem that has not yet been completely addressed. However, growth in poverty levels is mitigated to some extent due to availability of jobs provided by the growing Services sector. KSCB has focused on improving the amenities in slums to address basic issues relating to urban poor. The CDP has taken into account all slums spread throughout Bangalore (encompassing area under the control of BMP, 7 CMCs, and 1 TMC). The total number of slums captured in the survey is 542 and the number of households proposed to be redeveloped is estimated to be 217,257. Table 6 shows the details of slums, while Table 7 shows the access levels of the urban poor, to infrastructure services.

Table 6: Details of Slums

Agency	No of slums	No of Households	Remarks
Karnataka Slum Clearance Board (KSCB)	218	106,266	Declared
BMP			
East zone	65	33,990	
South zone	65	28,926	
West zone	39	10,132	Undeclared
Total	169	73,048	

Agency	No of slums	No of Households	Remarks
CMCs			
Byatarayanapura	38	7,062	
Krishnarajapura	19	1,020	
Mahadevapura	22	8,547	139 Undeclared
Bommanahalli	40	3,764	& 14 Declared
R Nagar	15	1,351	
Dasarahalli	16	13,497	
Yelahanka	3	2,589	
Total	153	37,830	
TMC			
Kengeri	2	113	Undeclared
Grand Total	542	217,257	

Table 7: Access of Slum Dwellers to Basic Services

Year	Percentage of slum dwellers having access to			
	Water supply	Drainage system	Waste service collection	Toilets
1991	N A	N A	N A	NA
2001	17.1	17.1	17.1	34
2005 (E)	17.0	17.0	17.0	Assumed to be same

Source: Infrastructure Development and Investment Plan for Bangalore 2006 - 30, STEM And NSS 58th Round 2002

6 Infrastructure Status

Economic growth is welcome to the City and the State, and the institutions concerned make every effort to see that the attractiveness of the City as an economic destination is maintained and increased. Growth brings prosperity to the citizens, improves the standard of life, and gives better avenues. At the same time, growth places greater strain on basic infrastructure and services, which have not been designed to cope with such growth. In many instances, economic growth may also not be equitable, and may create islands of prosperity and poverty. One key objective of this CDP is to ensure that the growth is sustainable – both in terms of infrastructure & services, and in terms of equity.

While infrastructure in the City is reasonably good in some aspects (water and sewerage, for instance), it is under stress in other aspects, particularly urban transport. Qualitatively, the urban infrastructure situation is profiled in the following:

- **Water supply**: The availability of raw water at about 140 lpcd is adequate, though the draw distances are increasing progressively. UFW is high, and distribution is uneven – being better in the BMP areas and poor in the peripheral areas.

- **Storm water Drainage**: Drainage is an area of concern, with the natural drainage system (Valleys) being built upon.
- **Transport**: Rising traffic congestion is one of the key issues in the City. Though the length of roads available is good, the problem lies with the restricted widths. BMTC is one of the best bus transport corporations in the country, but the absence of a rail-based commuter system compounds the problem.
- **SWM**: Collection and transportation coverage is very good, but proper and adequate treatment/ disposal facilities are lacking.
- **Green Areas & Water bodies**: The City has a tradition of being a "Garden City" with plenty of green spaces and water bodies. However, the very high growth rate in the past two decades is having an adverse impact on these.

While Table 8 quantitatively summarizes the infrastructure situation, specific environmental related services are summarized in Table 9.

Table 8: Summary of Infrastructure Status

No.	Sector	Parameters	Service Delivery Levels
1	Water	Coverage	BMP 100%
			CMCs & TMC 20%
		Quantum of water supply available	995 mld
		Average daily per capita water supply	73 lpcd
		Frequency of water supply	3-5 hrs on alternate days
2	Sewerage & Sanitation	Coverage	225 sq. km area (mainly BMP)
			40% of total area
		Disposal (sewerage capacity)	408 mld
		Present operating capacity	306 mld (3/4 of capacity)
		Wastewater generated daily	721 mld
3	Municipal Solid Waste Management	Coverage	100 % in BMP Area
		Waste Generated	3,395 TPD
		Waste Collected	2,715 TPD
		Collection Efficiency	80%
		Segregation	10% (practiced in few locations)
		Treatment & disposal facilities	Treatment facilities for 1,000 TPD / landfill facilities being constructed
4	Roads	Quality	80 % tarred
		Length of roads in BMP area	3500 km
		Length of arterial	250 km

No.	Sector	Parameters	Service Delivery Levels
		roads	
		Length of NH and SH	100 km
		Length of roads in ULBs	2400 km
		No. of Streetlights	2.5 lakh
5	Transport	No. of registered vehicles	23 lakh
		No. of buses (BMTC owned)	3,300
		Daily passenger trips	32 lakh
		Congestion	Exceeds 1, in 52 corridors/links
		Noise decibels	Above 80 in most areas (beyond permissible levels)
		Average speed of vehicles	12-18 kmph
		No. of accidents	7,575 (in 2005) 3,654 (upto 30-06-06)
6	Parks	Coverage area	14%
		Four important parks	Lalbagh
			Cubbon Park
			Bannerghatta National Park
			Dhanvantarivana
		Small Parks	365
		Well developed	55
		Partially developed	105
		Not developed	180
7	Lakes	Coverage Area	3% of the total CDP area

Table 9: Status of Environmental Services

Environmental services	Quality
Air	Air quality in Bangalore is deteriorating as reported by KSPCB. Pollution levels at select locations in Bangalore, based on a study by KSPCB are presented in Table A below.
Water	Periodic tests indicate drinking water supplied meets CPHEEO standards. However, these tests are only for testing the bacteriological quality. Tests for other parameters including turbidity, tirhalomethane (THM), aluminum and pesticide residues are required to be carried out.
Waste water	Treatment capacity to treat 93% of estimated waste water generated is currently available.
Solid Waste	There is 100% coverage for door - to - door collection. Currently treatment plants with capacity adequate to treat 34% of waste generated are available. There are no scientific disposal facilities. Treatment and disposal facilities of 2000 TPD capacity are being developed and are expected to be operational by 2007.

Nevertheless, Bangalore continues to be one of the most livable cities, and a residential and investment destination. The challenge of the future is in sustaining the growth and the quality of life.

7 Institutional Framework

There are a number of institutions performing municipal and urban development functions in the Bangalore Metropolitan Area. These institutions can be categorized as Urban Local Bodies (ULB), Statutory Authorities, & Government departments. The functional responsibilities of various agencies are set out in Table 10.

7.1 Institutions in Bangalore

ELECTED ULBS

i. BMP (City Corporation)
ii. Bommanahalli (CMC)
iii. Byatarayanapura (CMC)
iv. Dasarahalli (CMC)
v. KR Puram (CMC)
vi. Mahedevapura (CMC)
vii. RR Nagar (CMC)
viii. Yelahanka (CMC)
ix. Kengeri (TMC)

While the ULBs surrounding BMP share about 60 per cent of Greater Bangalore's area of 560 sq. km, their share of total population is only about 22 percent. The five-fold density levels of BMP (19016 persons/sq.km) compared to surrounding ULBs (3600 persons/sq.km) is indicative of the concentration of population and activity in BMP. However, all the ULBs have shown a significant population growth (many have more than doubled in size) in the last decade.

STATUTORY AUTHORITIES

1. Bangalore Development Authority
2. Bangalore Metropolitan Region Development Authority
3. Bangalore Water Supply & Sewerage Board
4. Bangalore Metropolitan Transport Corporation
5. Lake Development Authority
6. Karnataka Slum Clearance Board
7. Karnataka Urban infrastructure Development and Finance Corporation
8. Bangalore International Airport Area Planning Authority

GOVERNMENT DEPARTMENTS

A number of regulatory and development departments, including the Police Department, Public Works Department, Health Department, Education Department, Revenue Department, Town Planning Department, Horticulture Department, Motor Vehicles Department, et-al, also have an interplay in the metropolitan area. The multiplicity of organizations, operative laws, and overlapping jurisdictions has created conflicts in their functions and difficulties in governance.

Table 10: Functional Responsibilities of Various Agencies

Urban infrastructure	Planning and design	Construction	Operation and maintenance
Water supply	BWSSB, ULB	BWSSB, ULB	BWSSB, ULB
Sewerage	BWSSB, ULB	BWSSB, ULB	BWSSB, ULB
Storm water drainage	ULBs	ULBs	ULBs
Solid waste disposal	ULBs	ULBs	ULBs
Municipal Roads (incl. flyovers)	BDA, PWD, ULBs	BDA, PWD, ULBs	BDA, PWD, ULBs
Street lighting	ULBs	ULBs	ULBs

Source: STEM - Infrastructure Development & Investment Plan for Bangalore

7.2 Public Participation in Governance

The formal (legislated) mechanism for public participation is through the "Ward Committees," while there are also other semi-formal and informal mechanisms. Bangalore has a number of active and well-known NGOs that work in various areas of urban infrastructure, urban governance, urban poor, heritage, and environment. These include CIVIC Bangalore, Janaagraha, Public Affairs Center, *et.al*. Apart from the NGOs, there have been some attempts to improve citizen/ industry participation in urban affairs. Some of these are initiatives are mentioned in this section.

7.2.1 Ward Committees

With an objective to decentralize the functioning of the ULBs, The Constitution (74th Amendment) Act, 1992 mandated the setting up of ward committees in cities with population of more than 3 lakhs. The Karnataka Municipal Corporations (Ward Committee) Rules, 1997 set out the operating procedures for the ward committees. These rules mandate the ward committees to meet at least once every month and that they shall be open to public participation.

Accordingly, Government of Karnataka and BMP set up 30 ward committees in June 2003. Each committee comprises 3-4 wards with the Assistant Revenue Officers as conveners. The functions to be discharged include:

1. Collection and removal of garbage;
2. Removal of accumulated water on streets, public places due to rain and other caused;
3. Health immunization services;
4. Improvement of slums including its clearance wherever necessary in accordance with the established law;
5. Redressal of public grievances pertaining to the Ward Committee;
6. Maintenance of essential statistics;
7. Organizing people's participation with regard to the functions allocated to the Ward Committee; and
8. Numbering of streets and premises.

In addition, the Ward Committees are responsible for supervision and monitoring the implementation of the decisions by BMP, in specified matters.

7.2.2 Semi-formal Mechanisms

Attempts have been made to involve industry/ prominent citizens in a partnership framework with the Government, and two such mechanisms are mentioned below.

BANGALORE AGENDA TASK FORCE

The Government constituted the BATF by an order in 1999, as a task-force comprising of eminent industrialists, professionals, and citizens. The BATF conceived projects at the city level and involved other authorities as and when required. The M.D of Infosys was the Chairman, with eleven other members, including Commissioner of BMP as Member Secretary. The BATF sought to secure greater involvement of citizens, elected representatives, industry, and institutions in the orderly development of the City.

The BATF went about developing and applying partnership models with participating service delivery agencies such as, BDA, BWSSB, BSNL, Police Commissioner, BMTC, BMP, and BESCOM. Though was no formal accountability structure, a structure was also evolved in the form periodic public summits. However, the absence of space for elected local representatives was a possible lacuna that impeded BATF from keeping pace with changing political scenarios, and it is not functioning currently.

CITY INFRASTRUCTURE REVIEW COMMITTEE

This committee, Chaired by the Chief Secretary, operates under a Government-industry format. Senior officers of the Government/ Government Agencies, BMP, and Industry/ Industry Associations, are members. The Committee identifies key infrastructure issues in the City, and attempts to coordinate strategies to address these issues.

7.2.3 JNNURM Consultations

The consultation process and citizen's interest in the JNNURM has provided a significant opportunity for various stakeholders to participate and give their opinion/ feedback. Apart from the consultation initiated by the ULBs and other agencies such as BMTC, NGOs such as Janaagraha, and Newspapers such as Deccan Herald, also initiated a consultation/ feedback process. A wealth of archived material is now available, which the City intends to use in defining the projects and creating the DPRs.

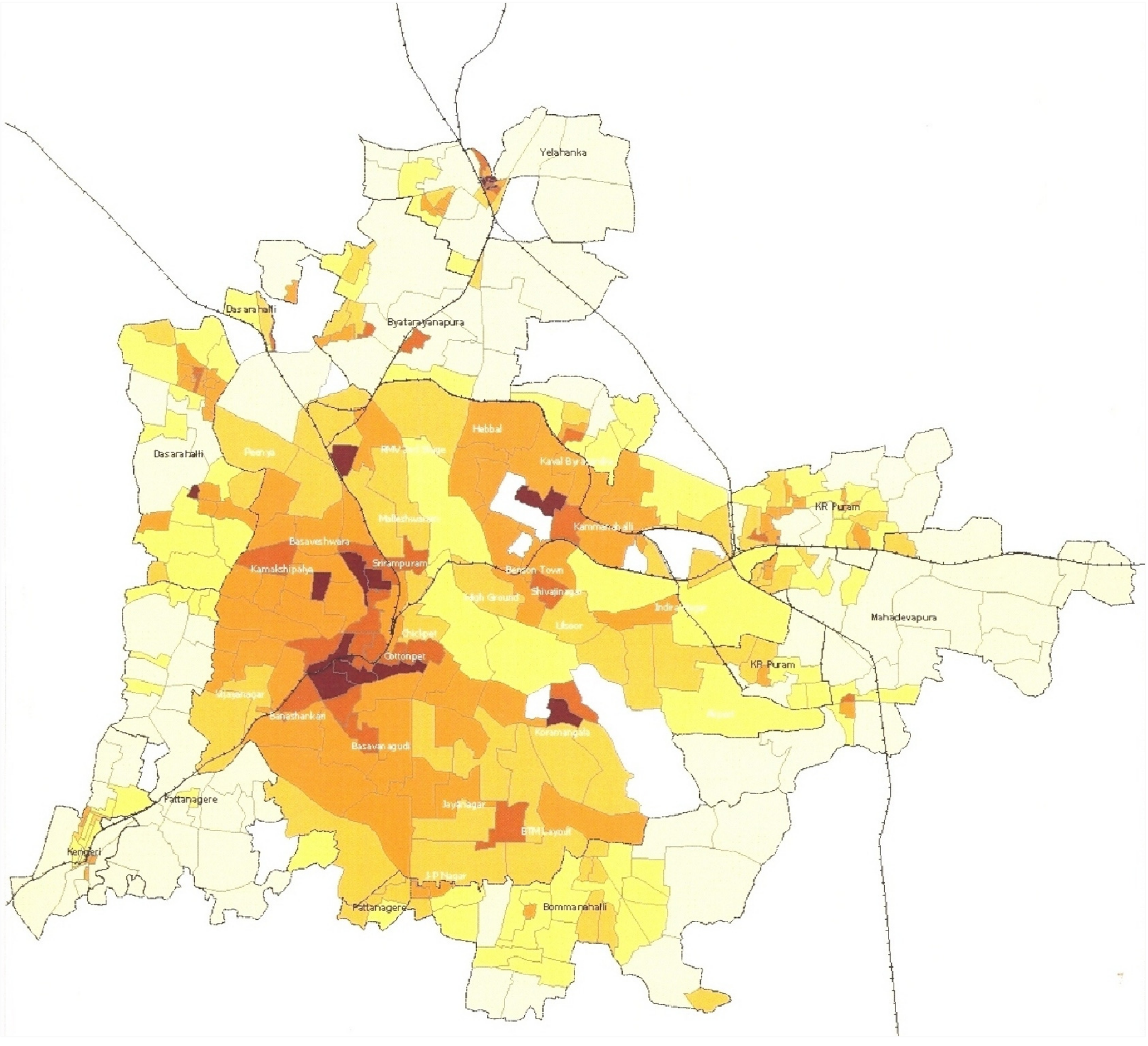
7.3 Public-Private Participation in Infrastructure

The new Bangalore International Airport stands testimony to the City's experience in implementing large infrastructure projects on a PPP format. A number of

transport & road related projects are also being taken up on the PPP format – these include elevated roads, inter-modal exchanges, parking complexes, and the proposed airport rail link. However, as far as urban infrastructure is concerned, the City has been able to attract private sector participation only in a limited manner, (Table 11).

Table 11: PPP in Urban Infrastructure

Urban infrastructure	Role of the private sector (specify)
Water supply	Private sector is involved only in selected areas such as WTP maintenance. BWSSB is responsible for planning of water supply networks and supply of water for the whole of Bangalore, besides Operation and maintenance of existing infrastructure
Sewerage	No role of private sector in sewerage and related infrastructure, BWSSB is the sole Agency responsible for planning and execution, Operation and maintenance of sewerage system for the whole of Bangalore
Drainage	No role of Private sector, respective ULBs are responsible for planning and laying, Operation and maintenance of drainage system in their concern jurisdiction.
Storm water drainage	No role of Private sector, respective ULBs are responsible for planning and laying SWD infrastructure, Operation, and maintenance of drainage system in their area of jurisdiction.
Solid waste disposal	Private Developers have taken up and operated a number of projects in this sector on concession (BOT) basis. The spectrum of their involvement ranging from Primary to secondary collection to Transportation to setting up , O& M of landfills and other related infrastructure for Solid waste disposal.
Municipal Roads (incl. flyovers)	No role of Private sector, respective ULBs are responsible for roads falling within their jurisdiction.
Street lighting	Private sector role in street lighting has been limited construction and O&M of street lights in small segments/ roads falling within ULBs, however, respective ULBs have major role in providing street lighting infrastructure, Operation, and maintenance of the same.



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

Population Density (per Ha)

- < 50
- 50.01 - 100
- 100.01 - 200
- 200.01 - 400
- 400.01 - 600
- > 600.01

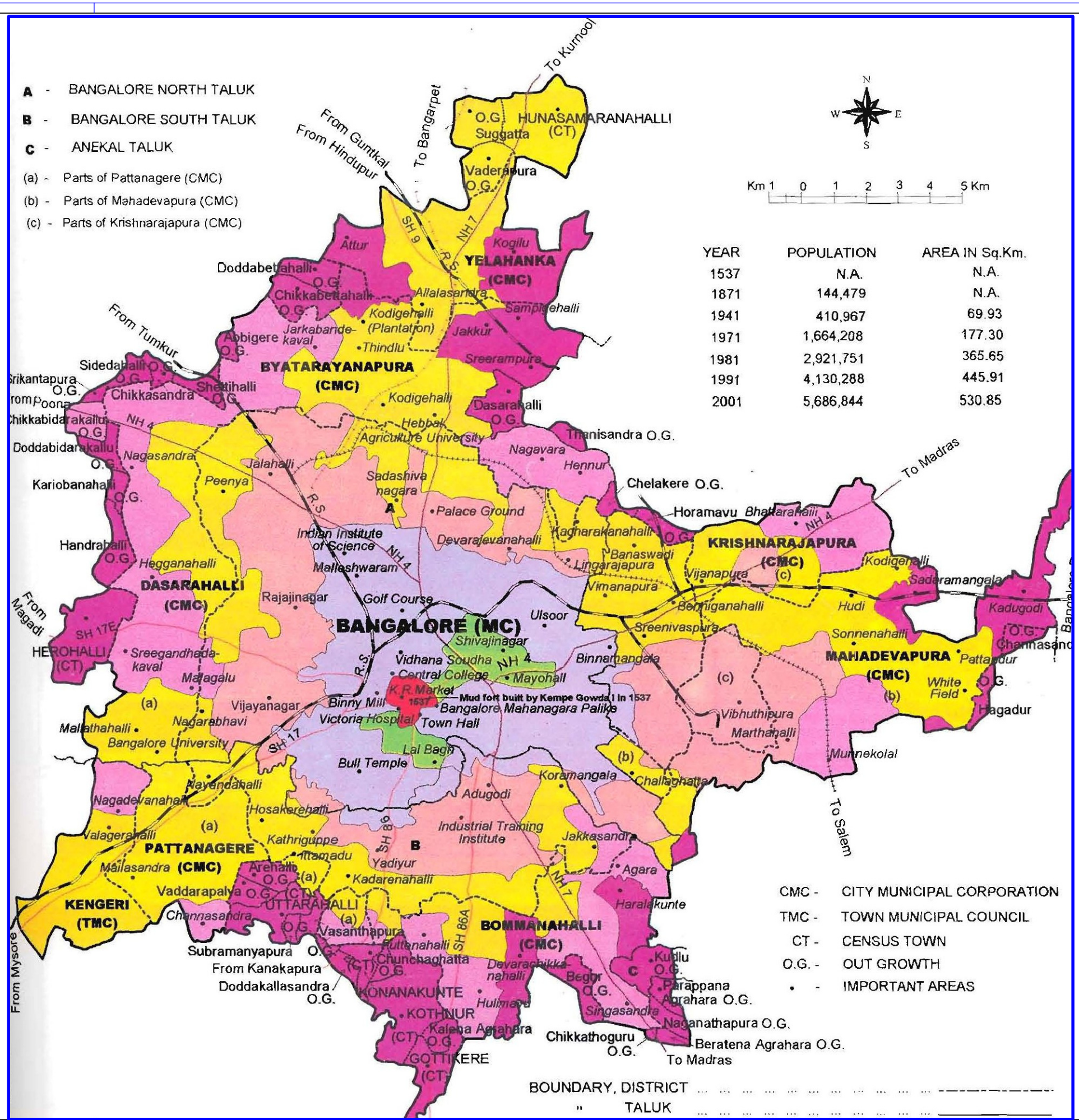
TITLE:

BMP & CMC Wardwise Population Density - 2001

FIGURE NO : 2

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

- TOWN 1537
- TOWN 1862
- MUNICIPALITY 1941
- BANGALORE URBAN AGGLOMERATION 1971
- BANGALORE URBAN AGGLOMERATION 1981
- BANGALORE URBAN AGGLOMERATION 1991
- BANGALORE URBAN AGGLOMERATION 2001

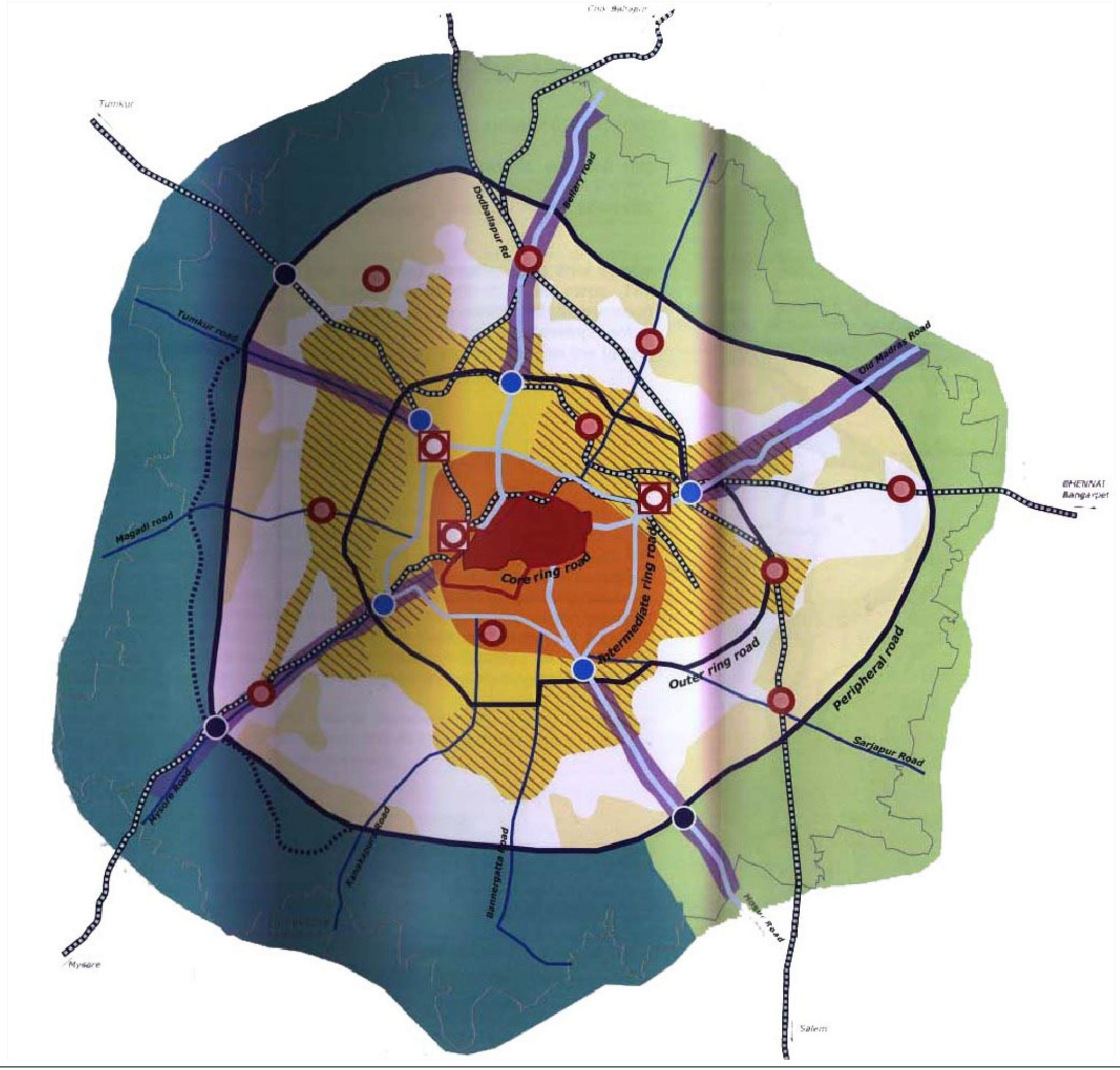
TITLE:

GROWTH OF BANGALORE (1537 TO 2001)

FIGURE NO : 3

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND: Continuity of the Urbanization

- Promotion & Upgradation of Core area
- Transformation& Renewal of Pericenter
- Valorization & Improvment of Urbanized area
- Shadows Areas
- Mobilization, Structuration & Servicing of the empty Layout
- Extension of the Urbanised Area
- Agricultural Land
- Maintening of the Restricted Development zone

Structuration of the Development

- Areas of Development
- Creation of Subcenters
- Recycling of the Industrial Lands
- Railways — CSR Project
- Road — Core Ring Road
- Dedicated Bus Lanes Project
- Primary Roads
- Logistic Cross Road
- Urban Cross Road

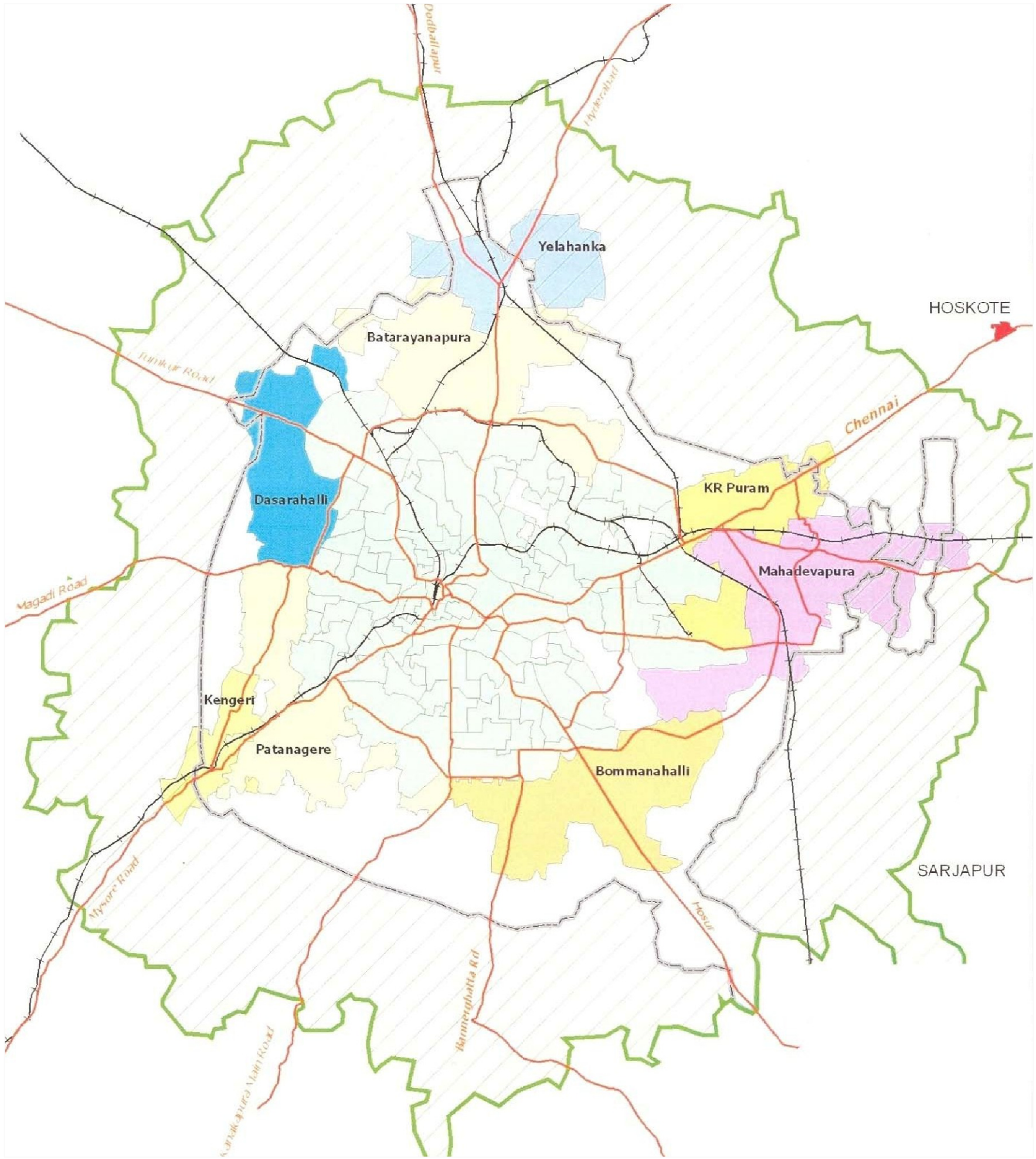
TITLE:

BANGALORE RCDP 2015 STRUCTURE PLAN

FIGURE NO : 4

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND: Corporation ID

- BMA
- CDB
- Green Belt
- Major Towns
- BMP
- Bommanahalli
- Byatarayanapura
- Dasarahalli
- K.R.Puram
- Kengeri
- Mahadevapura
- Pattanagere
- Yelahanka

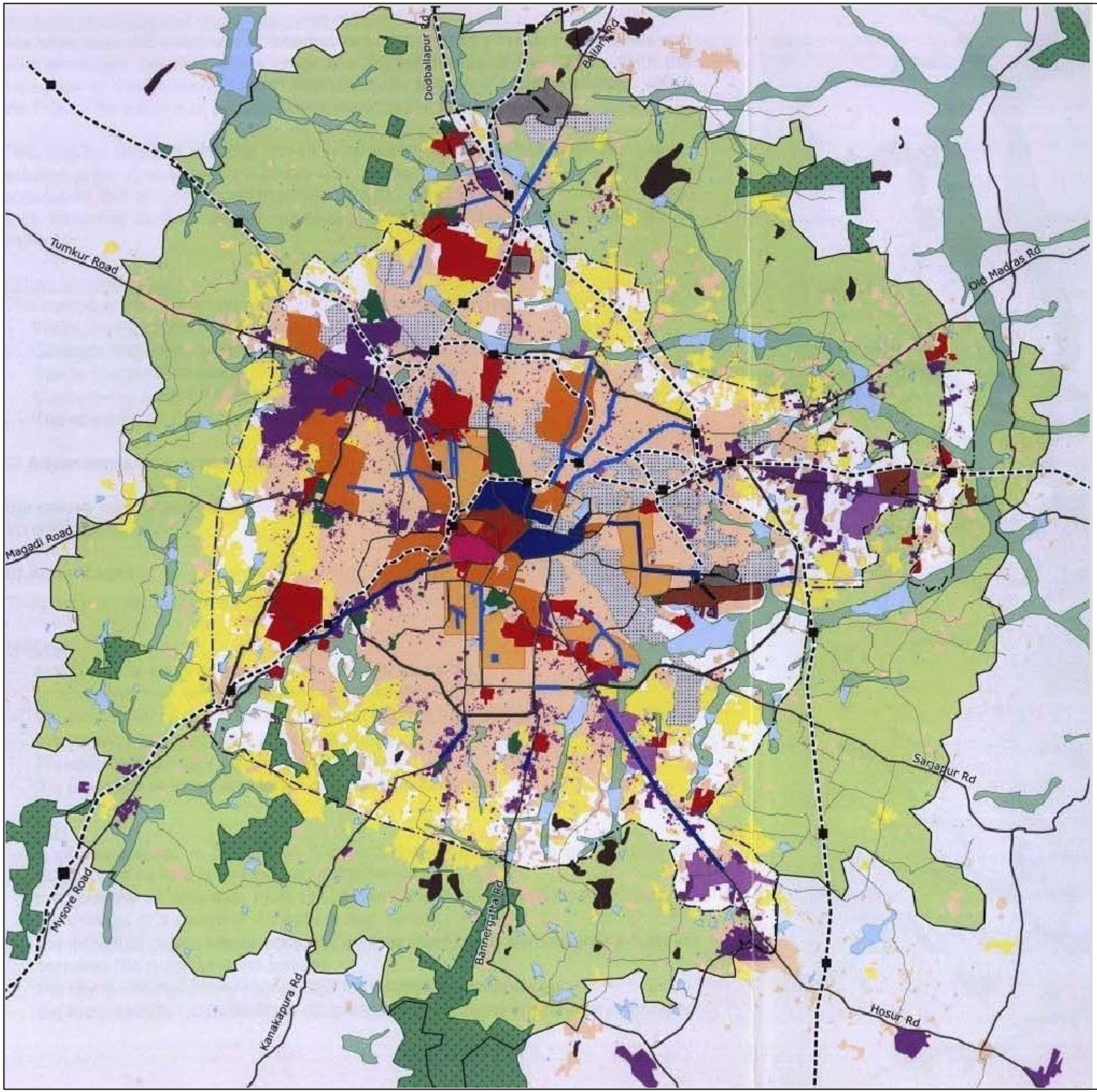
TITLE:

ADMINISTRATIVE AREA WITHIN BDA

FIGURE NO : 5

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

- Historical center
- Political Center
- Commercial center
- Highly Mixed Zone
- Medium Mixed Zone
- Predominantly residential fabric
- New Layout
- Area not Urbanised
- Industrial Area
- IT Dominant Zone
- Mutation Axis
- Commercial Axis
- Logistic Zone
- Main Civic amenities
- Defence
- Public Industrial Complex
- CDP
- BDA
- Main Roads
- Railway
- Railway Station
- Airport
- Valley
- Green Belt
- Quarry
- Tanks
- State Forests

TITLE:

EXISTING LANDUSE SITUATION

FIGURE NO : 6

SCALE : NTS

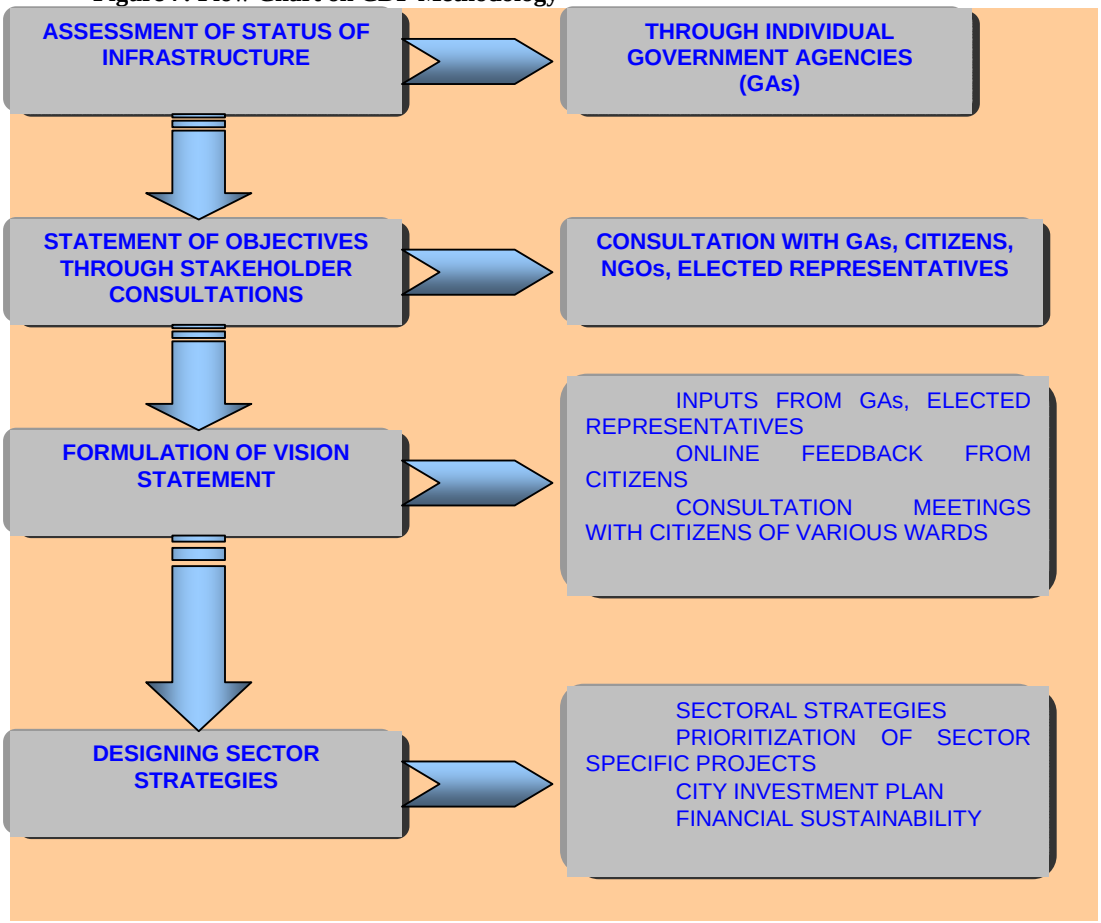
N

Chapter III Stakeholder Consultations & Vision

1 Approach

Preparation of the CDP under the JNNURM has been through a process of consultation, which has enabled the preparation of a document that charts the direction of development in Bangalore. The consultation process focused on the Vision and Mission Statements, but also provided a forum for discussion of various initiatives being taken by the government institutions and other stakeholders to meet the growing infrastructure needs of Bangalore. Figure 7 depicts the methodology adopted for formulation of CDP.

Figure 7: Flow Chart on CDP Methodology



1.1 Need for Stakeholder Consultations

Diverse stakeholders participate in the City's growth, and the impact of such growth on each stakeholder varies. Each stakeholder group has its own priorities and requirements, which in some instances may be at variance with those of the other groups. In order to arrive at a preponderance of opinion among all the stakeholders, it was essential that all groups discuss their needs, expectations, and priorities to chart out the development plan. This has been the spirit of the CDP

preparation process as envisaged in the toolkits provided under JNNURM. Table 12 shows the various stakeholder groups and their role in the City's functioning.

Table 12: Stakeholder Groups & Roles

No	Group	Members	Role
1	Citizens		¤ Receivers of the services ¤ Advice the Government on Vision, development issues and way forward.
2	Government	BMP BDA BWSSB BMTC KSCB KHB KSRTC	¤ Enabler, Regulator & Provider of civic services ¤ Develop a vision and strategy ¤ Prepare development plans ¤ Implement policies & plans
3	Elected Representatives	Councilors MPs MLAs	¤ Voice the opinion of people ¤ Framing of policies & local level projects
4	Representatives from Citizen groups	NGOs RWAs	¤ Voice the opinion of people ¤ Take up local issues
5	Institutional Stakeholders	Trade Industry Associations	¤ Inform the Government on policy issues

1.2 Multi-pronged Approach

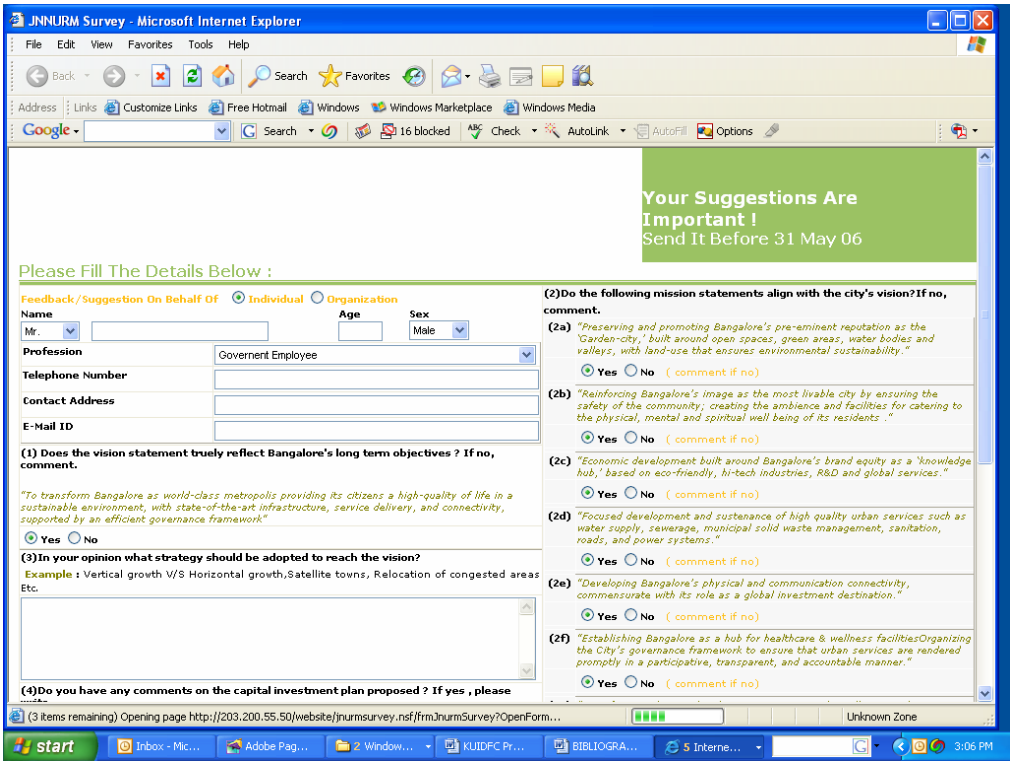
Given the diverse nature of the stakeholder group it was imperative that the consultation process be as broad based and participative as feasible. To ensure maximum participation, the following methods were adopted.

- **Workshops** were held to involve multiple stakeholders in the plan process. It proved to be an efficient and effective way of obtaining a range of public opinions on the CDP. More than 50 stakeholder consultation workshops were conducted across the city during March and June 2006. The profile of stakeholders included Government Agencies, ULBs, NGOs, elected representatives, trade associations and the public.
- **One-on-one Meetings** were held with prominent citizens, officials of different Government Agencies, and policy makers, to discuss the vision statement and the project proposals to be included in the CDP.
- **Structured Questionnaires** were used to obtain feedback on the CDP from various stakeholders.
- **Consultations by Other Agencies/NGOs**: Other than BMP, the CMCs, and TMC carrying out the consultation process, BMTC and certain NGOs such as Janaagraha also carried out focused consultations with user groups and citizens. Newspapers such as Deccan Herald also ran a month-long forum, soliciting views of readers about the JNNURM. A very large amount of archival feedback information is available with the City. A very large quantum of this material pertains to specific local issues and

suggestions, which would be used by the agencies for designing specific projects.

- **On-line Feedback** was another method used to obtain feedback from the public. A web page was created on KUIDFC's web site for this purpose and a feedback form was included to enable citizens to post their views and opinions on the Vision and Mission Statements, as well as on any other areas of interest. A screenshot of the web page is shown in Figure 8.

Figure 8: Snapshot of Consultation Web Page



1.3 Consultation Schedule

Table 13 shows the schedule of the consultations.

Table 13: Schedule of Stakeholder Consultations

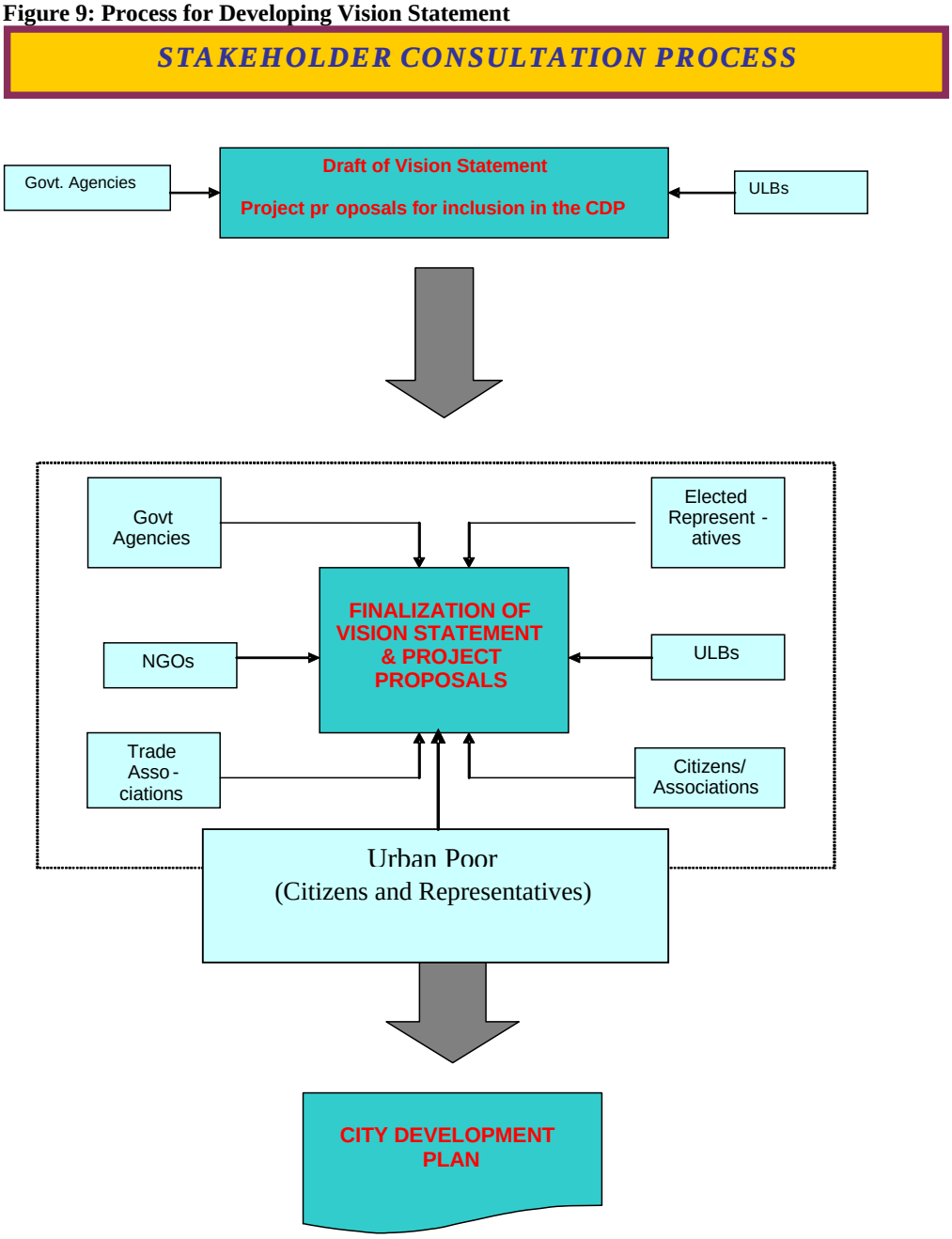
Date	Agencies	Venue	Purpose
15/03/06	Government Agencies - BMTC, BDA, BMP, BWSSB, ULBs, KSCB, ITBT, BMRDA, KSRTC, Heritage Board, KHB, Janaagraha, BIAAPA, Tourism	Conference Room, KSRTC	Developing a vision Statement for the City
25/03/06	BSUP – KSCB, KHB, BMP, KUIDFC	Conference Room, KHB	Discussion on project proposals for the urban poor – includes housing, sanitation, etc

Date	Agencies	Venue	Purpose
01/04/06	Government Agencies – BMTC, BDA, BMP, BWSSB, ULBs	PS, UDD Chamber	Developing & refining the vision Statement for the City Key projects for inclusion in the CDP
07/04/06	NGOs	Conference Room, KSRTC	Developing & refining the vision Statement for the City Inputs to the CDP
21/04/06 **24/04/06** **26/04/06** **27/04/06** **28/04/06**	ULBs RR Nagar & Kengeri Mahadevapura & KR Puram Yelahanka & Byatarayanapura Bommanahalli Dasarahalli	In respective ULBs	Inputs for Vision Statement Inputs for finalizing the CDP
06/05/06	BMP	In 30 wards / ARO ranges across the city	Comments on vision statement Comments on project proposals Inputs to CDP
09/05/06	Elected representatives	KRISHNA CM's Residence Office	Approval of Vision statement Indicative Capital Investment Plan
10/05/06	Trade associations	Hotel Atria	Comments on vision statement Comments on project proposals Inputs to CDP
25/05/06	Government Agencies - BMTC, BDA, BMP, BWSSB, ULBs, KSCB, ITBT, BMRDA, KSRTC, Heritage Board, KHB, Janaagraha, BIAAPA, Tourism	KUIDFC	Overall CDP, content and process, priorities of the project
27/05/06	NGOs,	Hotel Atria	Basic services to urban Poor Vision, strategies and plans

1.4 Vision and Mission Statements

Figure 9 indicates the process adopted for finalization of the Vision and Mission statements.

Figure 9: Process for Developing Vision Statement



The key results areas, which emerged during the consultation process, were used to set out the decision parameters. These formed the basis for formulation of the Vision and mission statements. Multiple rounds of discussions and consultations were held to draft the statement in order to convey the intent and purpose. Stakeholder feedback was also given on the form and construct of the Vision Statement, based on which the statement was refined.

2 Profile of Stakeholder Groups

In addition to the workshops, a specific section on JNNURM was created at the website www.kuidfc.com. Questionnaires were circulated to various participants of the workshops. The profiles of citizens, who participated in the web-based feedback process is set out in to Table 14 to Table 16.

Table 14: Profile of Respondents – By Gender

Gender	Number	Percentage
Male	186	89
Female	24	11
Total Respondents	210	100

Table 15: Profile of Respondents – By Age

Age	Number	Percentage
< 30 years	32	17
30 – 60 years	128	67
Above 60 years	31	16
Total Respondents	191	100

Table 16: Profile of Respondents – By Profession

Profession	Number	Percentage
Business	21	15
Housewives	9	6
Engineers	6	4
Retd Govt Servants	15	11
Students	6	4
Doctors	3	2
Private employee	38	27
Self employed	9	6
Others	32	23
Total Respondents	139	100

3 Feedback & Priorities

The consultations provided inputs on the Vision and Mission statements and on the priorities of the stakeholders groups and citizens. The feedback on the content of the Vision Statement is given in Table 17. Suggestions were also given on the form and construct of the Vision Statement.

Table 17: Feedback on Content of Vision Statement

Response	Number	Percentage
Yes (Agree)	207	96
No (Disagree)	7	4
Total Respondents	214	100

Similarly, Table 18 gives the feedback on the Mission Statements.

Table 18: Feedback on Mission Statements

Response	Number	Percentage
Yes (Agree)	205	95
No (Disagree)	9	5
Total Respondents	214	100

3.1 Key Priorities – Direct Consultations

Table 19 highlights the key priorities, which emerged during consultations.

Table 19: Key Priorities Stated by Stakeholders

Sector	Key Priorities
SWM	¤ Importance of efficient Solid Waste collection and transportation ¤ Higher capacity transportation vehicles for SWM ¤ Create garbage dumping yard and landfill facilities ¤
Roads & Transportation	¤ Develop Ring road & construct flyovers to ease traffic congestion ¤ Improve strength of roads for HTV ¤ Improve Panchayat Roads & local roads ¤ Develop service roads next to ORR ¤ Speedy completion of national highway works ¤ Develop roads in accordance to the requirement of multi-storied buildings (apartments) ¤ Provide service roads along NH4 ¤ Provide Skywalks ¤ Develop inner roads and link roads that connect to the ring road ¤ Provide Multi-storied parking on all main roads to ease traffic congestion ¤ Widen Mysore road till Kengeri ¤ Provide bus terminals in the outskirts of the City ¤ Provide subways at Railway gates for pedestrians ¤ Improve footpaths ¤ Tarring of all street roads ¤ Provide bus shelters ¤ Not to write on the window panes of BMTC and BTS buses
Urban Poor	¤ Housing for poor ¤ Develop slums ¤ Provide education and health facilities for the poor ¤ Improve basic services to urban Poor with clear plans
Water supply, sewerage, and drainage	¤ Ensure regular water supply & distribution ¤ Improve storm water drains ¤ Provide proper UGD facility, cleaning of road side drains

Sector	Key Priorities
	¤ Regular supply of drinking water ¤ Construct overhead tank for drinking water ¤ Improve drainage system – create box type drainage ¤ Water distribution pipeline to be provided from Hessarghatta ¤ Provide proper drainage & road widening in Dasarahalli village ¤ Improve storm water drains
Other civic infrastructure, reform & participation	¤ Provide more libraries ¤ Develop lakes, parks, playgrounds, slums & burial ground ¤ Provide UGD and street lights ¤ Provide Health services in all wards ¤ Curb unauthorized land encroachments and constructions ¤ Provide "kalashetras" for conducting cultural programs ¤ Provide health facilities, PHC ¤ Construct stadiums & commercial complexes ¤ Stop registration of sites in green belt area ¤ Rainwater Harvesting to be made compulsory ¤ Stop further development of unauthorized layouts and regularize the existing unauthorized layouts ¤ Plant trees & control mosquito menace to protect environment ¤ Provide police stations ¤ Involve citizens in reforms

3.2 Key Priorities – Web Feedback

The analysis of the individual responses on the website and the filled up questionnaires present a set of priorities, as perceived by citizens. Table 20 states the consolidated responses of the participants in the web feedback.

Table 20: Consolidated Web Responses of Participants

Sectors/Areas	Number	Percentage
Road Network	70	20
Water Supply	45	13
Urban Transport	44	13
Sewerage & Sanitation	44	13
Improvement of drains / drainage	33	10
Re-development of inner city areas	25	7
Infrastructure	20	6
Basic services to urban poor	13	4
Development of bus terminals	12	3
Preservation of water bodies	12	3
Solid Waste Management	12	3
Integrated development of slums	7	2

Development of heritage areas	4	1
Street lighting	3	1
Total	344	100

The key priorities as envisaged by different stakeholder groups are summarized in the table below.

Table 21: Priorities of Different Stakeholder Groups

	Priorities
Citizens	Primarily focused on urban infrastructure services such as roads, sewerage and sanitation, parks etc Most of the suggestions are localized in nature i.e. in relation to the wards they reside and nearby localities.
NGOs	Apart from basic services, the attention was on basic services to the urban poor There were ward level plans prepared by the group and the same were also highlighted Issues relating to the efficacy and conduct of JNNURM
Industries	Specific infrastructure in relation to the user groups such as road connectivity, urban drainage systems, water supply and sewerage sectors

4 Formulation of Vision Statement

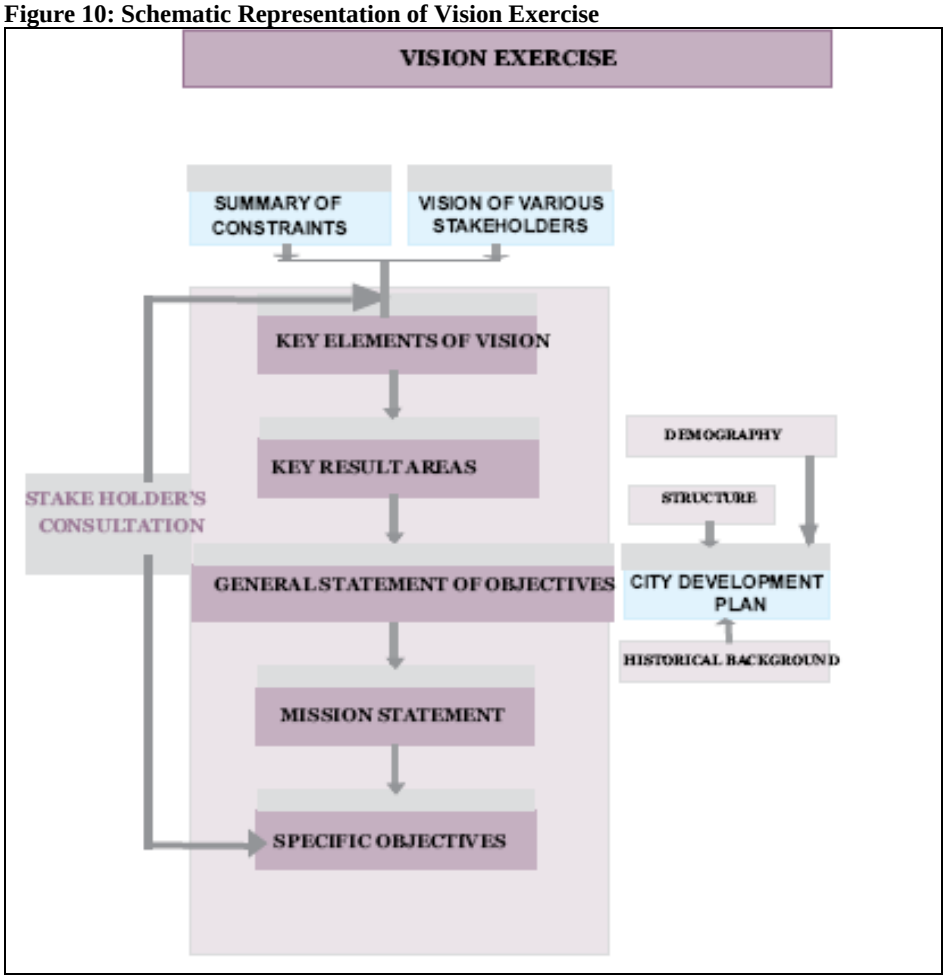
The consultation process and citizen feedback formed the key input basis to formulating the Vision and Mission Statements, and formulating the strategy for the CDP. Since the formulation of the Vision and Mission Statements has been through a process of consultation, there were various choices for the form and content of the statements.

- Whether the statements could be long or short versions;
- What substance and essence was to be included; and
- The sectors that would be covered.

Possible formats, statements and areas, including the vision statements of other cities in the country and abroad, were examined, and an elaborate consultation exercise was carried out to arrive at the final Vision and Mission Statements.

By choice, Bangalore came out with a shorter Vision Statement and a more detailed set of Mission Statements. By the very nature of the process, it is clear that these cannot be all encompassing and completely satisfying every stakeholder, but the dominant feedback from stakeholders was very positive. Figure 10 shows the schematic representation of the process.

Figure 10: Schematic Representation of Vision Exercise



4.1 Setting Objectives

A clearly articulated Vision sets out the reasons for City's activities and the "ideal" position that the City aims to achieve. The Mission identifies major goals and performance objectives. Both are defined within the framework of an overarching philosophy and as a context for development and evaluation of intended and emergent strategies. In principle, the process of setting objectives is relatively straightforward; however, in practice the process is complex, particularly in a large metropolis like Bangalore.

The sequence of activities includes:

- Identification of the City's current position, including service delivery;
- A statement of environmental, political, inter-departmental, and government factors affecting the functioning;
- Agreement among the stakeholders as to objectives and vision; and
- Factoring in the reality of available resources.

4.2 Characteristics of Statements

It was envisaged that the Vision and Mission Statements should exhibit certain characteristics, principally:

- Focus on distinctive values rather than upon every opportunity that is likely to exist;
- Espouse the underlying role of the City Government under the Plan; and
- Emphasize the major policies that the City Government has to pursue.

The City Development Plan represents a dynamic process, and there is a need for redefinition either when its appropriateness is lost or when it no longer defines the optimal course desired by the citizens. The Vision and Mission Statements are currently made available to the public through the KUIDFC website.

5 Background to the Vision Exercise

The Vision exercise depended on certain basic principles and information that is summarized in the following sections.

5.1 The City Context

Bangalore is a unique city. It used to be called a "Pensioners' Paradise," where land was cheap, and so were fruits and vegetables that were available in abundance. The British set up a cantonment, and built beautiful villas to live in the comfort of the "Garden City." As the city began to expand, and industry, institutions of research and education, trade, commerce, and finally high-technology industry came in, Bangalore become a bustling metropolis with all the attendant charms and ills. The question before the City is to reconcile the compulsions of growth with the need to preserve the character of Bangalore, as the **most livable city**.

5.2 Assessment of Status

As discussed in Chapter II, the high growth being experienced in the City, and the changing profile of its economy, has put stress on the City's infrastructure. The status of the City's infrastructure and the urban poor issues has been detailed in subsequent chapters. Citizens and other stakeholders (Government and NGO) are well aware of the overall situation, and are striving to address these issues in their own capacity.

5.3 Vision Statement of Key Agencies

Almost all the key agencies, including BDA, BMP, BMTC, and BWSSB, have their own Vision and Mission Statements. These statements are sector oriented, but also address "quality of life," citizen participation, and sustainability. The available vision statements of these key agencies were analyzed for drawing the City's priorities.

5.4 Coverage Area for the CDP

The region considered for the CDP for Bangalore covers the following areas

Table 22: Coverage Area for the CDP

ULB/CMC	Area (sq.km)
BMP	226.2
BDA	
¤ **Bommanahalli**	43.6
¤ **Byatarayanapura**	47.0
¤ **Dasarahalli**	38.0
¤ **KR Puram**	21.3
¤ **Mahadevapura**	46.2
¤ **RR Nagar**	66.0
¤ **Yelahanka**	38.8
¤ **Kengeri**	34.0
BIAAPA	792.0
Total	1353.1

Bangalore International Airport Area Planning Authority is the nodal agency for development of the international airport and the surrounding areas. With large scale development expected in the region, BIAAPA would be one of the prominent authorities propelling development. In light of the same, area covered under BIAAPA's jurisdiction has been considered as a coverage area for CDP. However, as the development is in nascent stage, while the Vision Statement developed would extend to BIAAPA areas also, listing of projects / activities and estimation of investment requirement has not been carried out.

6 The Vision Statement

The Vision Statement for Bangalore had an initial formulation, which the stakeholders debated and discussed during the consultations. The previous sections have outlined the feedback obtained during the process of consultations, and this feedback was largely in agreement with the coverage of objectives in the vision statement. However, there were various suggestions on the actual construct of the statement, particularly with reference to some subjective clauses in the formulation. Based on these suggestions, the construct of the vision statement has been recast, and finalized.

6.1 Initial Formulation of Vision Statement

"To transform Bangalore as world-class metropolis providing its citizens a high-quality of life in a sustainable environment, with state-of-the-art infrastructure, service delivery, and connectivity, supported by an efficient governance framework."

6.2 The Final Vision Statement

"Bangalore has evolved as a cosmopolitan and livable City, with a global presence. To retain its pre-eminent position as a *City of the future*, the City shall enable and empower its citizens with:

- Growth opportunities to promote innovation and economic prosperity;
- A clean and green environment;
- High-quality infrastructure for transport and communication;
- Wide-ranging services aimed at improving the quality of life for all;
- Conservation of its heritage and diverse culture; and
- Responsive and efficient governance."

6.3 The Mission Statements

1. Developing the economy around Bangalore's balanced economic base of its traditional industry and its brand-equity as a 'knowledge hub' based on eco-friendly, hi-tech industries, R&D and global services;
2. Preserving and promoting Bangalore's pre-eminent reputation as the "Garden City" built around open spaces, green areas, water bodies, and valleys, with land-use that ensures environmental sustainability;
3. Putting in place appropriate, comfortable, integrated, multi-modal public transport system for the region, based on efficiency and affordability.
4. Developing Bangalore's physical and communication connectivity, commensurate with its role as a global investment destination;
5. Transforming the peripheral areas into integrated satellite townships, interspersed with ample green spaces, with requisite human resources, thus enabling all the residents to benefit from the growth and opportunities afforded;
6. Providing focused development and sustenance of high-quality urban services such as water supply, sewerage, municipal solid waste management, sanitation, roads, and power systems;
7. Providing housing for all sections of the population, with special focus on developing low-cost and budget housing;
8. Caring for the needs of the urban poor, while ensuring their participation in the economic growth in an equitable manner, and ensuring their access to housing and other basic services;
9. Reinforcing Bangalore's image as the most livable City by conserving its heritage and diverse cultures, revitalizing its traditional business districts, ensuring the safety of the community, and creating the ambience and facilities for catering to the physical, mental, and spiritual well-being of its residents; and
10. Organizing the city's governance framework to render urban services promptly in a participative, transparent, and accountable manner.

Chapter IV Growth Drivers for Bangalore

1 SWOT Analysis

The transformation of Bangalore into a metropolis has been a result of a combination of factors including climate, academic strengths, skill base, and industrialization, particularly in high-end services. Bangalore has some impressive and incontestable advantages, which have propelled the City into a "brand" on its own. However, it is imperative to ensure that the infrastructure needs of the mega-city are met, and that the social fabric is coherent, on a sustainable basis. Table 23 presents a SWOT analysis of Bangalore's position.

Table 23: SWOT Analysis of Bangalore's Position

Strengths	Weaknesses
¤ Salubrious climate ¤ Water availability in Cauvery Basin ¤ Presence of a rich bio-diverse lakes/tanks ¤ Academic Institutions ¤ Availability of a pool of talent/skill base ¤ Cosmopolitan culture ¤ Diverse and balanced industrial base – manufacturing to high-end services ¤ Experience in building large infrastructure projects on PPP formats	¤ Land use/ Planning issues – absence of clear CBD, locked up land (defense and railways) ¤ Infrastructure "shadow areas" and under equipped outskirts ¤ Increasing economic disparity in the society ¤ Shortage of middle and low income housing stock ¤ Administrative and structural differences between BMP (the core city) and CMCs
Opportunities	**Threats**
¤ Continuing upwards on the value curve – in academics and in eco-friendly, high-technology industries and R&D (biotechnology, nano-technology, high end outsourcing, logistics) ¤ Capacity for planned unlocking of land in the city and its periphery ¤ Utilizing the citizen's/NGOs willingness and ability in participative governance of the city ¤ Building upon experience gained in formulating infrastructure projects on a PPP format	¤ Growth of infrastructure seriously lagging growth of economy & population ¤ Competition from other cities (both metropolises and tier 2 cities), especially from those in Southern India ¤ Delays in policy formulation and implementation in the area of urban governance/management

2 Industrial Growth

Bangalore has outstanding advantages in terms of climate, reasonably good infrastructure, and human resources. Bangalore has acquired the brand of being a "Technology Capital" of the Country, and from an international perspective, Bangalore is now clearly associated with IT/ITeS. However, the City also has dominant presence in the areas of Engineering, Automobiles, Aeronautics, Machine Tools, Apparel & Textiles including Silk, and Gems and Jewelry. The economic position is therefore very balanced, and this is one of the key strengths of the City. In the future, it is anticipated that the resources fuelling the economy will flow from human capital. The new economic paradigm will include:

(i) Diffusion of technology;
(ii) Dominant Anchor firms;
(iii) Building up fundamental human capital/skill base;
(iv) Dominant focus on "speed-to-market"; and
(v) Moving up the value chain in services.

Key sectors, which are envisaged to contribute to the growth of Bangalore, include the following:

1. IT/ITES & Bio-technology
2. Education
3. Healthcare

2.1 Planning for Industry

Industry is not necessarily 'invited' but gets established because of base infrastructure, skilled manpower, and communication facilities. Industrial development is focused on the provision of good support infrastructure, as well as availability of suitable land. It is also important to caveat industrial growth – unless proper planning and zoning is done, the development may result in economic growth at the cost of lowering the quality of life by congestion and infrastructure stress. The imperatives for development of industry are, therefore:

- To maintain and enhance Bangalore's status as hub for eco-friendly, high technology industry and services;
- Industrial development shall be in sequestered to planned zones;
- Such areas to be designed to be self-sustained with basic infrastructure; and
- Basic infrastructure, including water supply and transportation to be strengthened.

2.1.1 IT/ ITES/ Biotechnology

Bangalore has already been the international focus of development for IT/BT and other high-technology industries. However, in the face of land constraints (availability and price), and strain on basic infrastructure, most of the large 'anchor companies' are looking at expansion in other metropolises (Chennai or Hyderabad), or tier-2 cities such as Mysore, Pune or Visakhapatnam.

The key issues that need to be addressed for encouraging high-technology industry relate to land and basic infrastructure.

2.1.2 Education

Developing human capital is the key to improving standards of living and economic growth. Bangalore is already at the forefront of education and research, and this position needs to be further strengthened. Premier institutions include Indian Institute of Science, Indian Institute of Management, National Law School, and many engineering colleges, medical colleges, etc. The objective would be:

- To promote Bangalore as a centre of excellence in education;
- Strengthen existing institutions to cater to future requirements;
- As before, the City shall play the role of a facilitator to catalyze the development of educational institutions, while the actual education infrastructure can come from private finance. In some cases the City may also be able to lobby with the State or Central Governments to locate specific centers of excellence in Bangalore;
- Provision of land in urban corridors for enhancing the number of players that can enter the domain of education; and
- Creating land banks for educational institutions.

2.1.3 Healthcare

Bangalore's natural advantages, connectivity, and climate form an excellent base on which to develop a base of healthcare/medical facilities/tourism. The City would build upon the base of excellent hospitals and medical care already available, and undertake some of the possible developments enumerated here:

- Clean environment, with green spaces, parks, and gardens;
- Revival of lakes and water bodies; and
- Focus on developing special areas/facilities for medical care and rehabilitation.

Here again, the City would play a facilitator's role by setting the base infrastructure and planning/zoning. The private sector would be encouraged to invest in the actual projects/facilities. To make Bangalore a centre for healthcare, there are certain imperatives:

- Affordable medical facilities;
- Promotion of alternate therapies;
- High quality ambience;
- High quality infrastructure amenities;
- Emergence of budget accommodation;
- Availability of low rental/budget accommodation; and
- Availability of excellent transportation facilities.

3 Spatial Growth

Bangalore is characterized by a radial system formed by the axes, which converge towards the centre of the city:

- Mysore Road and Old Madras Road (South, South-West, North, North-East);
- Bellary Road and Hosur Road (North, South-East); and
- Tumkur Road (North-West).

In addition, five other secondary roads complete the main framework:

- Magadi Road (West);
- Kanakapura Road and Bannerghatta Road (South); and
- Varthur Road and Whitefield Road (East).

The city today stretches in all the directions and along these major road corridors. The growth of urbanization along these areas seems to be determined by the industry while the inhabitants occupy the intermediary spaces.

- Urbanization in the South is driven by services sector (Electronic City and Bommasandra) and the resultant boom in the real estate market.
- There has been a slowdown in the West (Dasarahalli, Magadi Road, and Tumkur Road) with the losing momentum of development in the Peenya Industrial Zone.
- Urbanization has increased in a substantial manner in the Northeast and East, again due to services sector (Whitefield and ITPL), and the current airport being within the city.
- North side of Bangalore is now expected to see an exponential growth as the new airport is being located in that direction (Devanahalli).

The projected land-use in 2015 has been assessed in the (draft) CDP of BDA, and is indicated in Table 24.

Table 24: Projected Land Needs at Bangalore Metropolitan Area Level

Usage	Area (sq.km)	percentage
Existing Urbanized Area	512	39
Proposed area to be urbanized as:	300	23
¤ Housing	135	
¤ Hi-Tech development	25	
¤ Other Industries	15	
¤ Logistics	13	
¤ Large scale facilities	24	
¤ Office spaces	2.5	
¤ Other facilities	85.5	
Inside peripheral road	270	

Usage	Area (sq.km)	percentage
Outside peripheral road	30	
Green belt	270	20.7
Inside peripheral road	40	
Outside peripheral road	402	
Agricultural land	174	13.5
BMICPA	50	3.8
TOTAL	1306	100

3.1 Spatial Development Scenarios

The future spatial growth of the city can take form in many ways, or "scenarios." This section examines some of the possible spatial growth scenarios, which are illustrated in the referenced figures. Realistically speaking, the actual growth may be a hybrid of these scenarios, depending heavily on attractors and availability of base infrastructure.

3.1.1 Current Trends Scenario

This scenario envisages growth as per existing trends, with the existing major road corridors serving as the de-facto growth corridors. As can be seen from Figure 3, in this scenario, Bangalore will grow in all possible directions – "Sprawl."

3.1.2 IT Corridor Scenario

In this scenario (Figure 11), the growth is concentrated in the southeast quadrant, with some spillover into the northeast quadrant. This scenario depends on the fact that growth will be concentrated in a pattern that reflects the current spread of the IT Industry. However, given the fact that there are attractors elsewhere – north for the new airport, and south-west for the Bangalore-Mysore axis, this may not be very probable scenario.

3.1.3 Urban Integrated Scenario

This scenario (Figure 12) envisages growth along sectoral lines, depending on specific attractors. The developments in the south-east are IT and technology related, north draws logistics and general industry on account of the new airport, and south-west draws general industry, academic and other institutions along the Bangalore-Mysore axis.

3.1.4 Satellite Township Scenario

The rapid growth of Bangalore over the past decades has resulted in growth beyond the BMP area into Bangalore Urban and Rural districts. With increasing population, stress on the urban services and an objective to spread the growth around Bangalore, BMRDA is planning to set up five satellite townships and self-sustainable cities. The objective of developing these townships is to have a more

rational and better use of land and water resource, and more equitable and efficient distribution of communication and technical facilities. The townships would have modern transport linkages to Bangalore to facilitate efficient transport. With the development of these townships, the pattern of growth would become “hub-and-spoke” based with decentralized development.

Figure 14 indicates the proposed locations for these townships.

In addition to these BMRDA townships, the private sector is also in the process of planning and developing large, self-sufficient townships, particularly along the Bangalore-Mysore corridor.

4 Population Growth

As can be seen from Table 25, population growth has surged in the decade 1971-81, and slowed down in the subsequent two census decades.

Table 25: Population Growth

Year	Population	Decadal Growth	CAGR
1901	1.63		
1911	1.89	15.95%	1.49%
1921	2.40	26.98%	2.42%
1931	3.10	29.17%	2.59%
1941	4.11	32.58%	2.86%
1951	7.86	91.24%	6.70%
1961	12.06	53.44%	4.37%
1971	16.64	37.98%	3.27%
1981	29.22	75.60%	5.79%
1991	41.30	41.34%	3.52%
2001	**56.86**	**37.68%**	**3.25%**
2011	78.28	37.68%	3.25%
2021	107.79	37.68%	3.25%

Source: Census Data upto 2001, projected at same rate for 2011 and 2021.

4.1 Basis for Population Projection

It is projected that in each scenario, the growth of population in absolute number will anyway continue – given the fact that the City continues to enjoy a strong economic base and a reasonably good quality of life. There are three possible scenarios for projecting population growth:

1. The rate of growth sustains at the present level;
2. The rate of growth slows down from the existing rate – possible reasons being reducing competitiveness of the city, for its economic growth and quality of life; and
3. The rate of growth is sustained at higher levels – possible reasons being the converse of the above.

4.1.1 Current Growth Scenario

On a straightforward extrapolation basis for the aggregated population of the urban agglomeration, if the growth in the 2001-1991 is maintained in the subsequent (future) decades, the population of shall reach about 108 lakh by 2021. Table 25 shows the population growth based on a simple linear extrapolation upto 2021.

The above method is simplistic, since the population growth depends on the aggregation of growth in the BMP and the peripheral CMC/TMC areas, which have different characteristics. Aggregating these and using constant terms for growth may not be appropriate. If the population figures are disaggregated for BMP and peripheral CMC/TMC areas, and the same logic for growth forecast (linear extrapolation) is followed, the projected numbers are as given in Table 26.

Table 26: Population Growth - BMP & Non-BMP (Sustained Scenario)

	1991	2001	2011	2021
BMP	33.02	43.03	56.06	73.03
Non - BMP	8.28	18.67	42.10	94.92
BMP Growth		2.68%	2.68%	2.68%
Non - BMP Growth		8.47%	8.47%	8.47%
Total	41.30	61.70	98.15	167.94
Total Growth		4.10%	4.75%	5.52%

The forecast population[2] in this case is much higher – since the CMC/TMC growth has been much higher during 1991-2001, and using the same growth number to go forward may not be realistic. The lacuna here is that the constant growth rate assumption relies on sustaining the high economic growth levels, land availability, and infrastructure availability.

4.1.2 Reduced Growth Rate Scenario

The (draft) CDP of BDA considers the constraints of land and infrastructure, and based on these parameters, estimates the necessary surface area to be created in the new CDP framework that amounts to 300-350 sq.km. These figures have been arrived at by taking into consideration the above parameters as well as an improvement in the management of the new urban layouts. Apart from these, the following elements have also been considered:

- The land demand corresponding to the needs of the economical players
- The land needs for housing as well as major amenities
- The ongoing as well as future infrastructure project needs

The (draft) CDP estimates that there is a likely saturation of the current space dedicated to urbanization. Only 82 sq km are available within the 1995 CDP perimeter. This phenomenon is found to be exerting a visible stress on the agglomeration. This stress is already leading to a trend in economic investment moving to tier-2 cities, such as Mysore.

Based on this assessment, the Comprehensive Development Plan (Master Plan) prepared by the BDA assumes that the rate of growth cannot be sustained at the current rates, but will reduce. The population is estimated to reach a level of about 100 lakh by 2021. Based on these planning considerations and analysis, the (draft) CDP forecasts the population, which is shown in Table 27. Since the BDA CDP is a document that has been widely discussed and is now being finalized, it appears appropriate to adopt the same basis for the population growth for this CDP.

[2] It may be noted that in this table the total population in 2001 is larger than the census 2001 figure of 56.86 lakh, by 4.84 lakh. This has been done in the new (draft final) CDP of BDA, to factor in the peripheral villages that are going to be drawn into the Urban Agglomeration, and maintain consistency in going forward. Since the CDP is the "master-plan" document for Bangalore, the same figures have been assumed here as well.

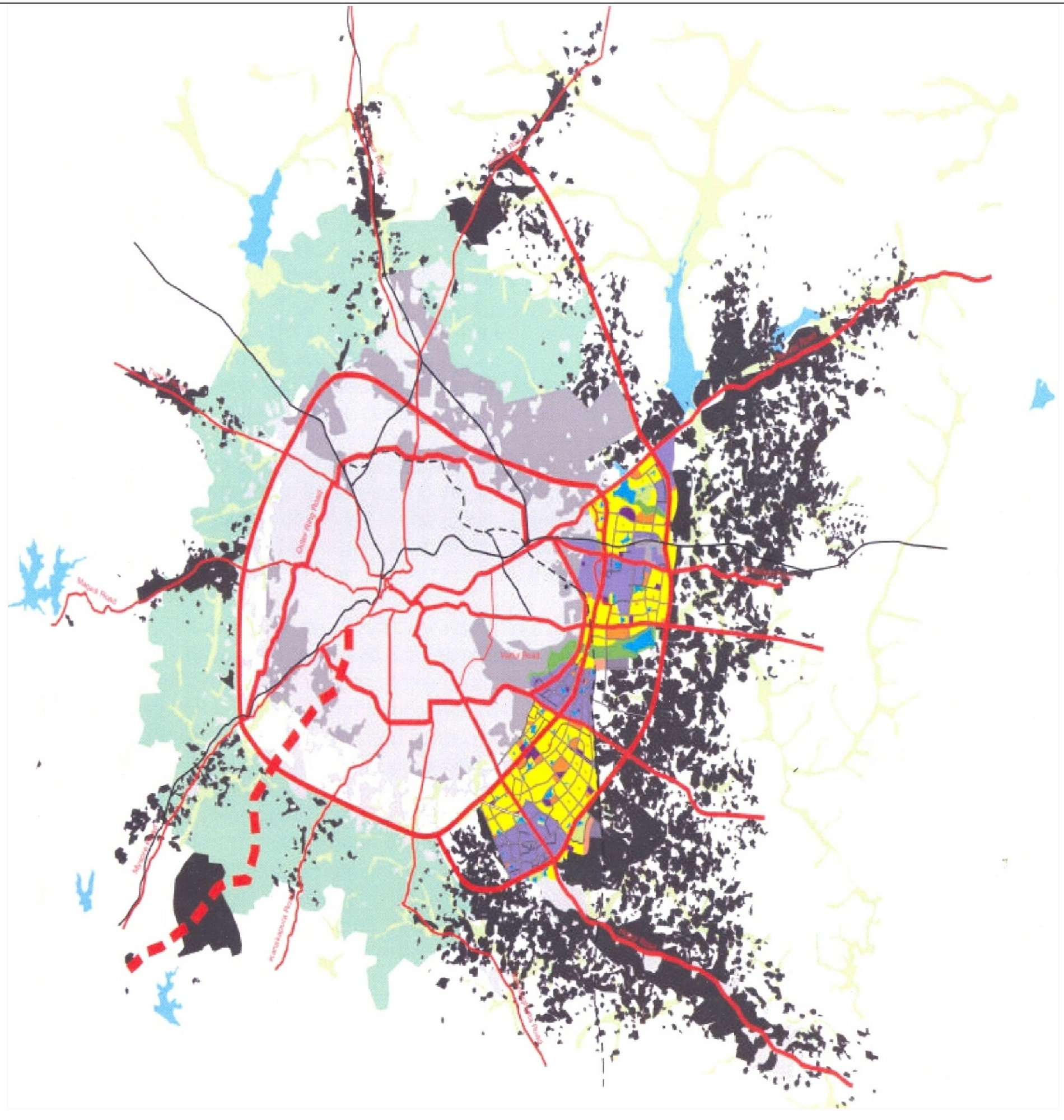
Table 27: Population Forecast - Scenario Adopted in CDP

	1991	2001	2011	2021
BMP	33.02	43.03	51.43	55.59
Non – BMP	8.28	18.67	28.72	44.09
BMP Growth		2.68%	1.80%	0.78%
Non – BMP Growth		8.47%	4.40%	4.38%
Total	41.30	61.70	80.15	99.68
Total Growth		4.10%	2.65%	2.20%

The above projections are used as the basis for service assessment and delivery for all infrastructure sectors considered in the subsequent sections.

4.1.3 Higher Growth Rate Scenario

The growth rate appears to have peaked in the 1971-81 decade on an aggregate, and 1991-2001 decade in the non-BMP areas. Aggregate growth has been declining after the 1971-81 decade. As discussed in section 4.1.2 above, there are constraints on land availability and infrastructure. Even in the current growth rate scenario, the population will reach 98 lakh by 2011 and 170 lakh by 2021 – which has been considered unsustainable in the draft City Development Plan of BDA, on account of the constraints mentioned. In the circumstances, a higher-than-current scenario has not been considered.



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

- Mainly Industry & R&D
- Mainly IT
- green space
- Mainly Logistic & Industry
- Direction of growth

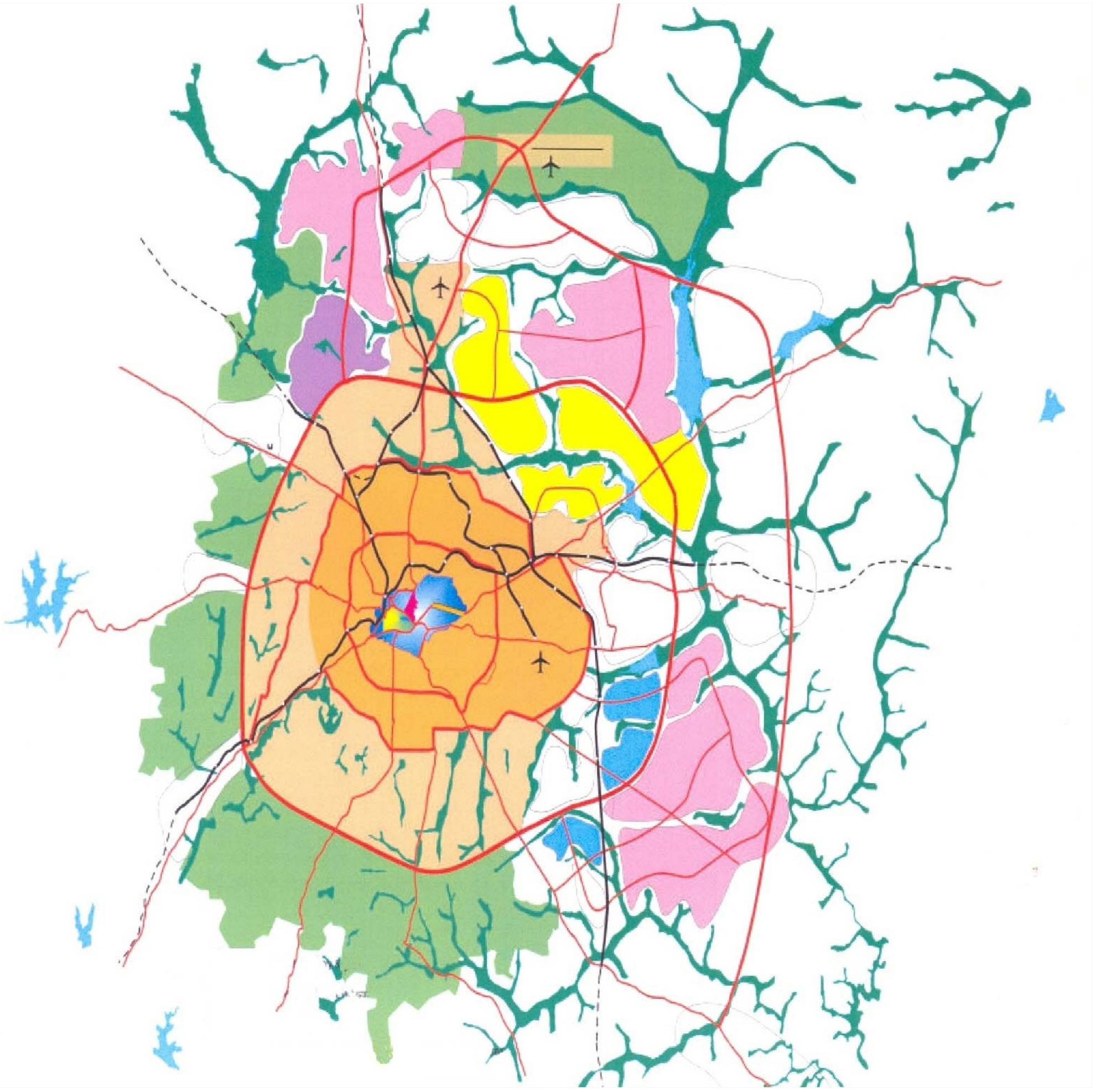
TITLE:

IT CORRIDOR SCENARIO

FIGURE NO : 11

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

- Mainly Industry & R&D
- Mainly Logistic & Industry
- Mainly IT
- Phase 2 of Urbanization
- External Zone
- Zone to be Enhanced
- Historical Core Area
- Political Centrality
- Commercial Centrality

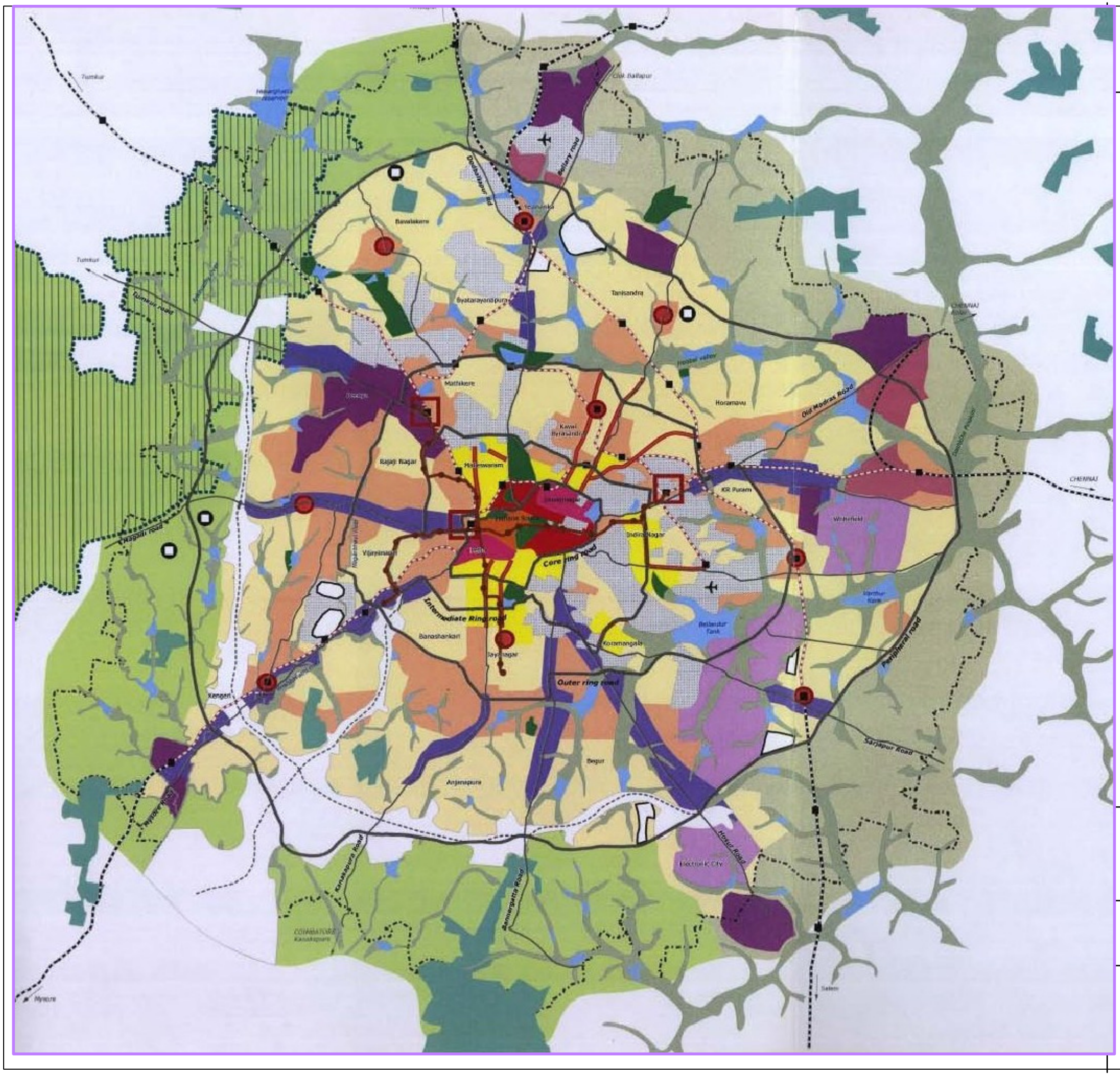
TITLE:

INTEGRATED URBAN SCENARIO

FIGURE NO. 12

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

Protected Land

- Valley
- Tanks
- Restricted Development Zone
- State Forests
- Park and greenspace
- State Forests
- Agricultural Zone

Core Area

- Historical center
- CBD
- Government Zone

Outside Core Area

- Mixed residential Area
- Mainly Residential Area
- Urban renewal Area

Industrial

- Industrial Zones
- Indusrial & Activity Axis
- High Tech Zone
- Logistic Zone

Special Zones

- Defence, large public and semi-public Infrastructure
- Proposed large scale equipments

Centralities

- Axis of change by extension of the Core area
- Sub centers
- Recycling of industrial lands

Special Perimeters

- LPA & BMICPA
- Landfills

Infrastructures

- Ring Road
- Primary Road
- Major Road
- Railway Line
- Railway proposed
- CRS Project
- Metro & Station
- Railway Station
- Airport

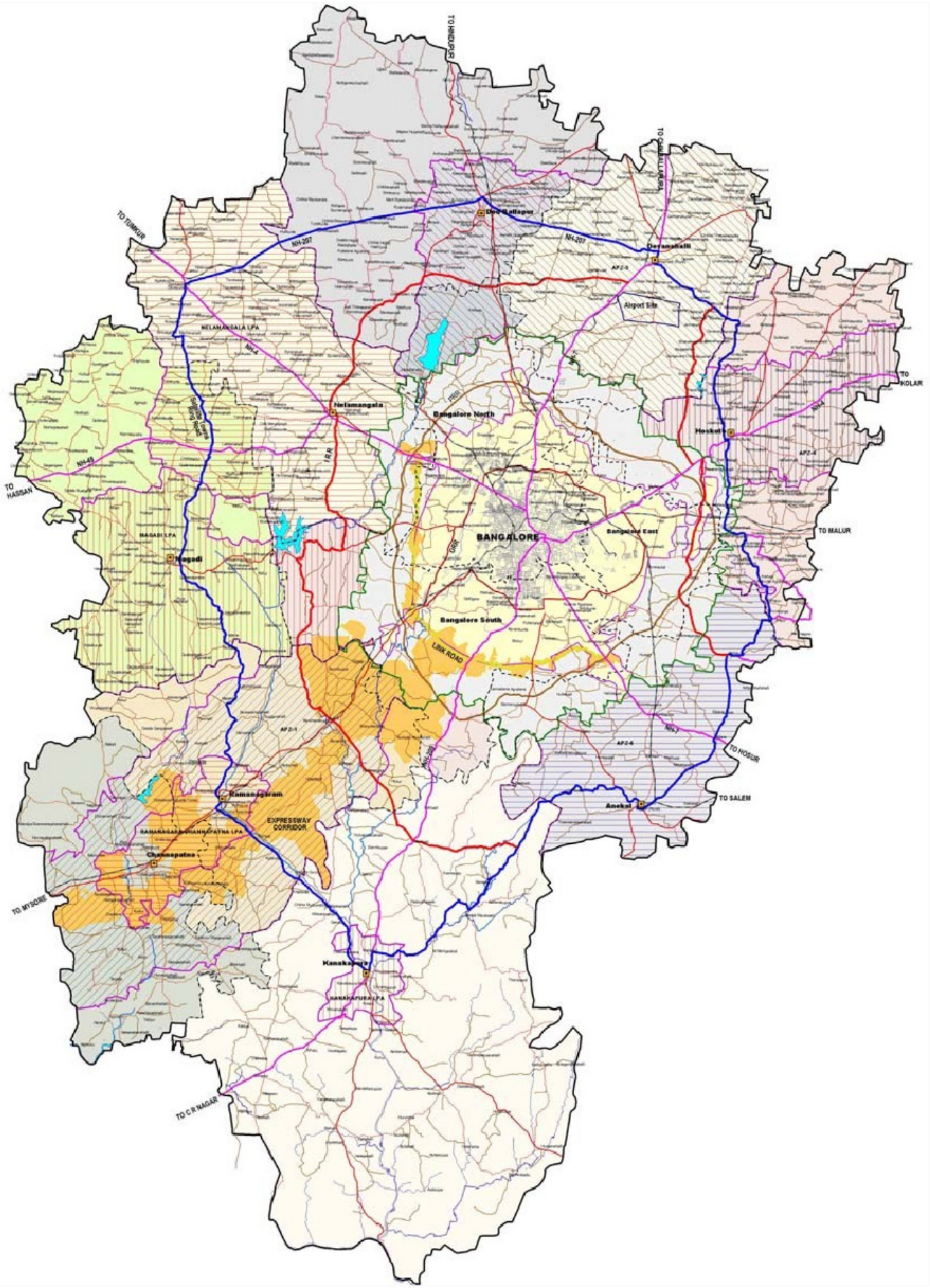
TITLE:

MASTER PLAN 2005-2015

FIGURE NO :13

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

- BDA: Proposed Peripheral Ring Road (PRR)
- Expressway / BMICPA Corridor
- Link Road (Proposed by NICE)
- CDP-1995 Boundary
- BDA: LPA Boundary
- Conurbation Area (CDP-1995)
- BDA: Green Belt (CDP-1995)

TALUKS

- Bangalore North
- Bangalore South
- Anekal
- Channapatna
- Devanahalli
- Dod Ballapur
- Hoskote
- Kanakapura
- Magadi
- Nelamangala
- Ramanagaram

- District Boundary
- Taluk Boundary
- Sarjapur — Major Village Locations
- Railways
- National Highways
- State Highways
- Major District Road
- Village Road
- Local Body Road
- Outer Ring Road (ORR)
- Major Water Bodies
- BMR Intermediate Ring Road (IRR)
- Satellite Towns Ring Road (SRR)
- APZ-1
- APZ-3
- APZ-4
- APZ-5
- Kanakapura LPA
- Magadi LPA
- Nelamangala LPA
- Ramanagaram LPA

TITLE:

LOCATION OF BMRDA TOWNSHIPS

FIGURE NO : 14

SCALE : NTS

N

SECTION - II Urban Infrastructure Services

Urban Renewal
Water Supply and Sewarage
Management of Solid Waste
Urban Drainage Systems
Roads and Transportation
Civic Amenities
Tourism and Heritage Conservation

2006

Jawaharlal Nehru
National Urban Renewal Mission

Chapter V Urban Renewal

1 Urban Renewal in the JNNURM Context

In the JNNURM context, the term renewal refers to the entire spectrum of urban services, institutional frameworks, and governance. There is a close linkage of each of these factors, and the totality of the quality of urban life. From this perspective, the entire CDP refers to 'renewal' – renewal of the perspective and the vision, renewal of infrastructure, and renewal of the institutional frameworks. Each infrastructure sector in the subsequent chapters is in the same context of renewal – where existing systems are renewed, gaps are identified, and action is proposed to fill those gaps. The City footprint increases, and not only does the core get denser, but also large peripheral areas get included into the City. The objective is to reduce congestion, and provide better infrastructure services across the entire extent of the City.

Following from the above, while this Chapter covers only the specific issues related to the traditional core areas, all the further chapters on infrastructure sectors are extensions of the same theme.

2 Overview of this Chapter

Each city has its "traditional" core, and so has Bangalore. Since Bangalore's establishment in 1537, the traditional areas have played a key role in the city's development. These areas are still the centers of conventional trade and economic activity, albeit constrained by inadequate infrastructure facilities, primarily due to lack of space and burgeoning population.

Improving basic infrastructure in the City will obviously have a beneficial impact on the traditional areas as well, and therefore the projects discussed in various sectors are relevant to these areas. However, this chapter deals with the specific issues related to infrastructure in traditional areas.

2.1 Existing Situation

2.1.1 Key Features

Old/traditional areas in Bangalore comprise Chickpet, Cubbonpet, Cottonpet, Majestic, Gandhi Nagar, Vasanth Nagar, Shivaji Nagar, Richmond Town, and Chamarajpet. These areas are characterized by:

- Dense population with a density 3-4 times higher than the average of BMP area;
- Economy that is primarily dependent on trading activities;
- Highly mixed land use;
- Dotted with historic properties;
- Slow transformation to accommodate new developments and changing culture; and

- Narrow roads that constrain provision of services such as water supply, drainage, and solid waste management.

2.2 Key Issues in Urban Renewal

While these areas continue to be centers of trade and commerce, proper infrastructure facilities would need to be provided along with preservation of the area's traditional flavor. However, constraints of space congestion would continue to play a part in the extent that such infrastructure improvement could take place. Social issues would also have a key part to play in attempting any large-scale intervention.

3 Strategy for Improved Service Delivery

Given the physical constraints and social issues that are likely to come up, the key challenge is to improve infrastructure service delivery. While the general sectoral infrastructure improvement that has been discussed in other Chapters is also relevant to traditional areas, there are certain specific interventions that are required.

3.1 Proposed Implementation Plan for Urban Renewal

The redevelopment of traditional areas would include the following activities:

- Diversion of traffic in these areas by introduction of "one-ways";
- Enforcement of new parking regulations;
- Ban on entry of heavy goods vehicles in such areas;
- Widening of roads;
- Removal of encroachments;
- Provision of appropriate transport system for the commuters to reduce the use of vehicles in these areas;
- Development of pedestrian walkways;
- Construction of cycling zones;
- Demarcation into transport and utility zones;
- Maintenance of open spaces; and
- Improvement of civic services.

4 Project Identification & Costing

While the overall nature of the projects envisaged has been defined, specific projects shall be formulated on the basis of the DPR that are prepared by the concerned agencies. The following sections outline the investment requirement for projects on urban renewal.

4.1 Investment Plan for Urban Renewal

4.1.1 Estimated Capital Investment Requirement

Table 28 sets out the estimated investment requirement on projects of urban renewal, during the implementation period of JNNURM. Table 29 sets out the estimated investment requirement on projects of urban renewal, in future blocks.

Table 28: Investment Plan for Urban Renewal Projects – JNNURM Period

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total (Rs. Crore)
Capital Expenditure	1.6	1.7	2.0	2.2	2.2	2.3	12.0
O & M Expenses	0.0	0.0	0.5	0.6	0.6	0.7	2.4
Total	1.6	1.7	2.5	2.8	2.8	3.0	14.4

Table 29: Investment Plan for Urban Renewal Projects – Vision Period

Description	2013-17	2018-22	2023-27	2028-31 (Rs. Crore)
Capital Expenditure	12	12	12	12
O & M Expenses	5	7	10	12
Total	17	19	22	24

5 Implementation Framework

Though located in prime localities, it might be difficult to evince private participation in such redevelopment due to the politico-social issues involved. It is therefore envisaged that redevelopment of old areas would be undertaken by the concerned GoK agencies, after proper project design and citizen consultation.

Chapter VI Water Supply & Sewerage

1 Overview

The Bangalore Water Supply & Sewerage Board (BWSSB) provides water supply and sewerage services in Bangalore. Though initially restricted to the area under BMP's jurisdiction, BWSSB is progressively increasing its services coverage area to the entire Bangalore Metropolitan Region. CMCs and TMC currently manage their drinking water and sewerage needs on their own. Table 30 presents the main features of the water supply system.

Table 30: Main Features of Water Supply System

Parameter	Unit	Amount	Comments
Water Availability			2004-05 estimates
Installed Capacity	MLD	Cauvery – 810 Arkavathi – 184	
Daily release	MLD	882	
Estimated ground water extraction	MLD	70	Decreasing levels of ground water (especially post monsoon)
Source of Water Supply	Km	98 km from Bangalore	
Water Supply Coverage and metering			
Consumption Domestic	%	52	
Non-domestic/ others	%	9	
Estimated UFW	%	39	20,000-30,000 unauthorized connections
Availability	lpcd	73	Complaints of non-uniform supply & low residual pressure in outlying areas
Area Coverage		100 in BMP area Between 10 and 60 for other ULBs	
Sewerage			
Tertiary Capacity	MLD	70	At V-Valley & Yelahanka
Proposed Additional Capacity	MLD	328	From the major and minor STPs
Estimated usage of treated water in Industries	MLD	4	
Estimated capacity utilization	%	75	
Area covered through sewer system	%	40	About 225 sq.km
Consumer Redress			Established system is in place, though there are occasional reports of delays

1.1 Existing Situation

The existing situation of the water supply system, and the sewerage system, are summarized in this section.

1.1.1 Water Supply

SOURCES

Arkavathi River and TG Halli reservoir located at 18 km and 4.28 km from Bangalore, respectively, were the traditional surface water sources. However, increased demand necessitated the reliance of water supply source on Cauvery River. Water supply from Cauvery River being implemented in Stages (Stages 1, 2 and 3 and Phase 1 of Stage 4 have been completed) from a distance of 98 km over a head of 490 m. While the Cauvery scheme assets are relatively new and in good condition, Arkavathi system requires rehabilitation. Figure 15 is a map depicting the source and the transmission network for water supply.

Ground water also plays an important role in meeting the needs of Bangalore. In BMP, groundwater is mainly for augmenting the supplies at households. Non-availability of Cauvery water supply in surrounding ULBs has resulted in increased reliance on ground water.

COVERAGE

Cauvery schemes feed southern regions of the city, while Arkavathi schemes feed the northern part. Table 31 shows the coverage of piped water supply coverage.

Table 31: Water Supply Coverage in ULBs

ULBs	Water Supply Coverage (% Area)
BMP	100
CMCs	
Yelahanka	60
Rajarajeshwari Nagar	25
Mahadevapura	20
KR Puram	20
Bommanahalli	Yet to be covered
Dasarahalli	10
Byatarayanapura	10
TMC- Kengeri	60

Table 32 presents the number of water supply connections in BMP area.

Table 32: Number of Water Supply Connections in BMP

Parameter	Unit	Amount
Domestic piped water connections	No.	3,44,376
Non-domestic connections	No.	10,882
Authorized public fountains	No.	6,350

QUALITY

BWSSB monitors the bacteriological quality in the piped water system regularly. Periodic results have indicated that the drinking water meets the standards set out by WHO and CPHEEO. Table 33 shows the results of surveys carried out in the past by independent agencies and NGOs.

Table 33: Citizen Surveys on Water Supply

Aspect of Quality	Percentage of Respondents Finding Services to be of Acceptable Levels	
	Piped Water	**Public Taps**
Convenience of Water Supply Timings	79	26
Adequacy of Water	70	64
Accuracy of Billing	90	-
Convenience of Timings of Bill Payments Counters	100	-
Clarity of Water	98	99
Odor-free Water	81	83

COST RECOVERY

Table 34 indicates the cost recovery situation in the provision of water & sewerage services, which is around 80% on the average.

Table 34: Cost Recovery Situation in Water & Sewerage

Cost incurred in service provision (Rs. Lakhs)			Direct recoveries (Rs. Lakhs)		
2002 - 03	2003 - 04	2004 - 05	2002 - 03	2003 - 04	2004 - 05
38403	44464	38670	31152	32483	33303

KEY ISSUES IN WATER SUPPLY

Table 35 gives the key issues of the Water Supply System in Bangalore.

Table 35: Key Issues in Water Supply

Parameter	Description
Inadequacy of resource for Augmenting future growth	¤ Limited availability of water from Cauvery (after utilization of 600 cusecs) ¤ No water available from adjoining river sources such as Hemavathy, Netravathi, etc ¤ Changing land use pattern
Groundwater	¤ Indiscriminate drawal ¤ Sub-standard water quality
Water quality issues (in distribution network and raw water)	¤ Cross connections/back-siphon in distribution resulting in water borne diseases ¤ Raw water deterioration due to pesticides and chemical pollutants from industries and sewage from upstream
Uneven Distribution and	¤ Parts of the City receive a higher quantum of

Parameter	Description
Intermittent Supply	water and for a longer duration when compared to certain other areas which receive a lesser quantum and only for a short duration ¤ Erratic Growth ¤ Assets needing rehabilitation ¤ Some areas get water only for 3-5 hours on alternate days
Non-availability of Water to meet National Standards of 150 lpcd	¤ Relatively high UFW ¤ Non-availability of distribution system in CMCs/TMC and new added BMP wards ¤ Arkavathi source gradually depleting
High UFW	¤ Absence of reliable source production (bulk metering) on all major water sources ¤ Absence of metering on public fountain consumption ¤ Poor accuracy and serviceability of consumer metering ¤ High non-physical loss due to consumption from unauthorized connections and inaccurate / inoperable meters

1.1.2 Sewerage

While sewerage networks were available from 1922, treatment of sewage began in 1974. The features of the sewerage system include:

- ¤ Secondary treatment capacity - 721 MLD
- ¤ Tertiary treatment capacity - 70 MLD
- ¤ Proposed additional capacity - 328 MLD
- ¤ Estimated capacity utilization - 75%
- ¤ Estimated usage of treated water - 4 MLD (industries)
- ¤ Sewer systems exist in pockets with a coverage of 40% of total area

KEY ISSUES IN SEWERAGE

Table 36 shows the key issues for the Sewerage System.

Table 36: Key Issues in Sewerage

Parameter	Description
Inadequate Coverage	¤ Covers only 40% of the area
Environmental Concerns	¤ Pollution of lakes ¤ Mosquito Growth
Sewage entering drains and lakes	¤ Health problems ¤ Nuisance to Public ¤ Environmental and Bio-diversity problems
Insufficient capacity of sewers (Trunk and Mains) both primary and	¤ Overflows from manholes ¤ Public Nuisance

Parameter	Description
secondary	
Increased sewage flows in rainy season (due to mixing of storm water)	¤ Some sewage has to be let out without treatment to river downstream thereby polluting the system (Arkavathi and Cauvery) ¤ Sewage flows on to roads and into low-lying areas
Damaged sewers	¤ Public nuisance ¤ Mosquito problem
Silting up of sewers	¤ Sewage flow from man-holes ¤ Complete stoppage of sewage and back-up
Direct connection of sewers from slums and low-lying areas to (primary and secondary drains) storm water drains	¤ Flooding in slums and low areas ¤ Back flows during rainy season when storm water drains are full
Silt. grease and floating debris (Plastics, papers, etc) into open drains and into treatment plants	¤ Problem in primary and secondary treatment, O&M problems ¤ Accessibility problems for manholes
Encroachments on sewer lines and manholes	¤ Sewage over-flows into residential areas (slums, low-lying areas ¤ Sewer cleaning and removing silt difficult ¤ Nuisance and mosquito growth

2 Strategy for Improved Service Delivery

The following sections outline the strategy for improving service delivery for water supply and sewerage services in Bangalore. The strategy also has to take into account the forecast growth in population given in Chapter 5.

2.1 Characteristics of the Sector

The characteristics of water supply and sewerage systems, which dictate the strategy, are set out below:

- ¤ Considered as a "free good" by citizens; while the costs of delivery are spiraling without adequate recovery;
- ¤ Service provision and asset utilization remains sub optimal;
- ¤ Preventive maintenance is not diligently practiced;
- ¤ Under pricing of water provided and high commercial inefficiencies;
- ¤ Sewerage system not amenable to levy of user fees, and hence investments need to be recovered as a part of other taxes, user charges and Cess (property tax, water charges, etc.); and
- ¤ Not many examples of successful private participation in procuring services – reasons for the same include inadequate project development, financial viability issues, socio-political risks, and lack of adequate and reliable information.

2.2 Initiatives & Studies

To address the issues in water supply and sewerage, a number of initiatives are already under way. These are summarized in the following section.

2.2.1 GBWASP & Cauvery Stage IV

Recognizing the need to increase the coverage in the surrounding ULBs, Greater Bangalore Water and Sanitation Project (GBWASP) is being implemented by BWSSB and KUIDFC. Since the financial close for the project has been achieved, this project is not included under the JNNURM. Similarly, the current low frequency of water supply translating into 73 lpcd would require augmentation of the bulk water supply. Cauvery Stage IV, Phase II project is being implemented by BWSSB to achieve the same. Since the financial close for the project has been achieved, this project is not being included in the JNNURM.

2.2.2 Other Initiatives

With an objective to improve the service delivery, BWSSB has been carrying out other measures, which include:

- Leak reduction project being implemented by Larsen & Toubro and Thames Water
- GIS mapping
- DBOT contracts for treatment plants
- Wastewater recycling
- IEC campaigns

2.2.3 Studies

BWSSB and other agencies have commissioned various studies to improve the service delivery standards, adopt contemporary technologies, and improve last mile connectivity. Table 37 summarizes the studies conducted.

Table 37: Summary of Studies in Water & Sewerage

Agency/Reports	Study Scope and Recommendations
KUIDFC/Samaj Vikas Report on Urban Poor Strategy for UGD component in eight ULBs around Bangalore under GBWASP	¤ Improve Latrine coverage ¤ Create awareness through IEC activities ¤ Dovetail present sanitation activities ¤ Support poor in accessing sanitation facilities ¤ Involvement of women, poor, NGOs & CBOs ¤ Construction of community latrines, new latrines
KUIDFC/World Bank Report on Demand assessment for improved water and sewerage services in 8 ULBs	¤ Introduction of slab-wise tariff structure linked to consumption ¤ Option of group connection among LIG/slums for better coverage ¤ Cross-subsidize the poor and vulnerable through charging appropriate rates from better-off residents and non-domestic consumers

Agency/Reports	Study Scope and Recommendations
	¤ New revenue sources suggested (a) tax on ground water extraction by large industries & commercial establishments (b) sewerage tax on non-domestic consumers that do not take piped water connection from the new scheme
KUIDFC/STEM	¤ Energy audit study ¤ Reduction of unaccounted for water ¤ Rain water harvesting, aquifer recharging, ground water recharge ¤ Rehabilitation, replacement and extension of water supply ¤ Augmentation of source ¤ Computer network analysis ¤ Efficient management of water by re-zoning ¤ Removal of public taps/fountains ¤ Water saving plumbing fixtures
BWSSB/AUSAID Bangalore Water supply & Environmental Sanitation Master plan Project	¤ Planning ¤ Timing of future development works to be planned as per actual development ¤ Reduction of NRW to 15% at the end of plan period from the present levels ¤ Water Resources ¤ Resource monitoring, population growth, demand measurement ¤ Reduction of UFW, Groundwater regulations for controlling abstraction of water ¤ Effluent reuse and rainwater harvesting ¤ W/s system to be sub-divided into sub zones to simplify operations ¤ Compliance with appropriate design standards ¤ Demand Management ¤ Water supply duration and timings need to be improved and regularized to reduce in-house storage ¤ Present tariff schedule to be regularly reviewed for eventual full cost recovery ¤ Environmental Management ¤ BWSSB to adopt draft Environmental Management Plan for ensuring implementation of all future works in an environmentally acceptable manner ¤ Social & Gender Issues ¤ Special attention to be given to women and lower socio-economic group ¤ Institutional change ¤ Donor assistance to be utilized for follow on capacity building plan ¤ Progressive restructuring of the BWSSB to better meet future needs ¤ BWSSB to inculcate a HRD strategy in line

Agency/Reports	Study Scope and Recommendations
	with modern best practices ¤ SP to be managed carefully
BMP/UrbanFirst	¤ Recommendations are same as those proposed by AUSAID

The common themes of these reports are as follows:

- ¤ Provision of water supply and sewerage facilities to the urban poor
- ¤ Community participation and IEC
- ¤ Tariff restructuring and lowering of slabs
- ¤ Developing alternative sources of revenue
- ¤ Reduction of Non-revenue Water and Unaccounted for Water
- ¤ Water conservation, recycling and rain water harvesting
- ¤ Use of information technology for planning and control
- ¤ Freshwater source identification
- ¤ Energy Audit at regular intervals
- ¤ Improve monitoring mechanism and surveillance
- ¤ Replacement and rehabilitation

2.3 Needs of Urban Poor

While it is the objective of governments to provide access to affordable potable water and sanitation facilities, such facilities continue to remain outside the access of the urban poor. It is well known that the urban poor spend a considerable portion of their income on getting access to such services.

Schemes would need to be customized suitably for effective universal service provision. This would include providing services based on affordability, devising suitable subsidies and increasing the participation of urban poor in service provision through IEC campaigns. Some of the services proposed could include:

- ¤ 100% coverage of water and sewer system
- ¤ Individual pipe connections
- ¤ Bulk metering
- ¤ UGD/low cost sanitation

Specific projects have been addressed in Volume III – Basic Services for Urban Poor, of this CDP.

3 Project Identification & Costing

Taking the strategy forward requires both capital investments and institutional reform. The key aspects addressed, specific initiatives/projects, and the required investments are covered in the following section.

3.1 Key Areas Proposed to be Addressed

The rapid economic growth of Bangalore in the last decade has resulted in a higher-than-national average annual growth of 3.25%, and Chapter 5 indicates the

forecast population. Broadly, the activities/projects that are proposed for meeting the gaps in the service delivery levels are:

- Repairs and maintenance of bulk water supply system
- Rehabilitation/creation of distribution network and piped water supply connections
- Provision of water supply connections to uncovered areas
- Construction/rehabilitation/expansion of underground drainage system including service connections to all the households
- Construction/rehabilitation of STPs for treatment of raw sewage
- Development and management of testing facilities and customer services
- Safe disposal of treated effluent at specified locations
- Operation and maintenance of the water supply system
- Operation and maintenance of sewerage system and STP as per specifications
- Billing and collection activities of water connection and consumption charges
- Aquifer recharging and rain water harvesting
- Development and updating of the database and mapping of the system from time to time
- Institutional development and public awareness campaigns

3.2 Service Delivery Targets

Table 38 indicates projected demand based on the projected population, delivery targets, and the status.

Table 38: Projection of Demand, Water & Sewerage

Parameter	Quantum
Additional population to be covered by 2012	16.5 lakh
Bulk water requirement in 2012	1,167 MLD
Additional requirement based on current availability	183 MLD
Additional water connections	11.4 lakh
Additional sewer connections	11.5 lakh
Additional STP capacity	279 MLD

Service delivery targets have been set out in Table 39.

Table 39: Service Delivery Targets, Water & Sewerage

Parameter	2012
Coverage (Area)	100 %
Frequency of Water Supply	8 hours per day
Metering	100% metering
UFW	20%
Sanitation coverage	75%
Consumer redress system	Response time of less than two days

3.3 Investment Plan for Water Supply & Sewerage

Based on the parameters outlined above the capital investment and operating expenses have been estimated as set out below.

3.3.1 Proposed Projects in Implementation Period

REHABILITATION OF BULK WATER SUPPLY TRANSMISSION LINES:

- Rehabilitation of head works;
- Installation / rehabilitation of bulk meters; and
- Plugging of leakages in the main transmission line to reduce UFW.

The rehabilitation expenses have been estimated at a normative standard of Rs. 2 Crore per kilometer length of the main transmission line (98 km). 75% of the rehabilitation works are proposed to be completed in the implementation period.

REHABILITATION / EXTENSION OF DISTRIBUTION SYSTEM

- Rehabilitation of the existing connections (15% of 3.6 lakhs existing water connections); and
- Provision of new connections in the uncovered areas.

The cost of rehabilitation and installation of new connections has been assumed at Rs. 6,500 and Rs. 8,000 per connection.

REHABILITATION/EXTENSION OF SEWERAGE SYSTEM & SETTING UP OF SEWAGE TREATMENT PLANTS

- Rehabilitation of the existing connections (40% of the existing connections); and
- Provision of new connections in the uncovered areas.
- Laying of sewers to prevent entry of sewage into storm water drains and avoiding inter-connection of SWD & sewers. Detailed studies would be taken up to identify the specific locations for laying separate sewers and for developing mechanisms for preventing the inflow of sewage into SWDs. The project cost would be estimated based on the studies undertaken.

The cost of rehabilitation and installation of new connections has been assumed at Rs. 6,500 to 8,000 per connection. It is proposed to set up a sewage treatment plant with a capacity of 6 MLD at an estimated cost of Rs. 6 Crore.

OTHER IMPORTANT WORKS

- Development of alternative water source
- Aquifer recharging
- Computer network analysis
- Efficient management of water by rezoning
- Public awareness campaigns

- Dual water systems
- Supply recharge
- Quality monitoring
- Energy audit studies
- Studies towards determination of UFW

These capital investment estimates for these works have been based on previous studies conducted by the concerned departments/agencies.

3.3.2 Investment Requirement

The estimated capital investment plan for BMP area and the neighboring seven CMCs and TMC during the implementation period is set out in Table 40.

Table 40: Investment Plan for Water Supply & Sewerage – JNNURM Period

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total cost (Rs. Crores)
Capital Expenditure							
Bulk Supply including WTPs	19.1	22.1	25.0	26.5	26.5	27.9	147.0
Distribution System	23.0	26.5	30.1	31.8	31.8	33.6	176.9
Sewerage including laying of separate sewers for storm water	61.4	70.8	80.3	85.0	85.0	89.7	472.3
Sewage Treatment Plants	3.6	4.2	4.7	5.0	5.0	5.3	27.9
Others	18.1	20.9	23.6	25.0	25.0	26.4	139.0
Total-CAPEX	**125.2**	**144.5**	**163.7**	**173.4**	**173.4**	**183.0**	**963.1**
O&M Expenses	0.0	90.5	271.7	452.8	452.8	543.3	1,811.1
Land Acquisition	1.1	1.3	1.4	1.5	1.5	1.6	8.4
Grand Total	**126.3**	**236.3**	**436.8**	**627.6**	**727.9**	**528.7**	**2,782.6**

Table 41 shows the investments required in water and sewerage projects, in future blocks.

Table 41: Investment Plan for Water Supply & Sewerage – Vision Period

Description	2013-17	2018-22	2023-27	2028-31 (Rs. Crores)
Capital Expenditure				
Bulk Supply including WTPs	49.0	98.0	98.0	98.0
Distribution System	590.8	815.4	1085.4	1238.6
Sewerage	741.5	935.6	1128.1	1307.0
Sewage Treatment Plants	37.2	51.8	70.2	45.9
Others	296.0	412.0	254.0	209.0

Total-CAPEX	**1,714.4**	**2,312.8**	**2,635.6**	**2,898.5**
Operation and Maintenance Expenses	2,492.3	2,891.3	3,354.6	3,778.4
Land Acquisition				
Land acquisition towards water supply	0.0	0.0	0.0	0.0
Land acquisition towards sewerage	11.2	15.5	21.1	13.8
Total-LA	**11.2**	**15.5**	**21.1**	**13.8**
Grand Total	**4217.9**	**5,219.6**	**6,011.3**	**6,690.6**

4 Implementation Framework

The population growth in Bangalore has necessitated significant improvement in service delivery levels. Appropriate measures to maintain the sustainability would include conservation and harvesting of water (including measures to reduce UFW), and enhancing the financial and institutional capacities of BWSSB/ULBs. Given the increasing financial constraints, strategies for optimum utilization and management of existing resources would be needed.

4.1 Urban Water Supply and Sanitation Policy

GoK has announced an Urban Drinking Water and Sanitation Policy, with the following objectives:

- To ensure universal coverage of water and sanitation services that people want and are willing to pay for;
- To provide such services in a manner that preserves the sustainability of the precious water resources of the State, protects and enhances the commercial and economic sustainability of the operations at the same time; and
- To ensure a minimum levels of service to all citizens.

To achieve these objectives, GoK would:

- Continue to formulate policies, set the standards for provision of water services, provide resources for capacity creation, regulate, monitor and evaluate the efficiency of the operations;
- Prepare a demand driven urban water action plan for making capital investments based on the principles of optimal utilization of water, water systems and financial sources;
- Propose a new tariff structure that would help recover O & M expenses, debt servicing, and ensure a reasonable return on capital; and
- Encourage private sector participation to achieve the sector goals, promote economic and commercial viability of water sector services, allowing ULBs the choice of providing the services directly through public bodies or through such appropriate private sector participation arrangements.

The main strategic drivers identified for achieving these objectives, could broadly be categorized as:

- Financial Management Practices – streamlining and adopting prudent financial practices; and
- Institutional Framework and Governance – setting out the systems, procedures and guidelines and upgradation of technical and managerial skills.

4.2 Institutional Arrangements

BWSSB/ULBs would continue to retain the principal responsibility of service provision. The Policy envisages a redefinition of institutional roles to enable better service provision by the ULBs, under the same operating framework. A State-level nodal agency is being considered to be set up to govern, facilitate, and regulate performance of the various stakeholders in the sector to ensure the Policy is implemented.

Institutionalizing professional governance also necessitates appropriate capacity building initiatives. The primary objective of capacity building measures is to enhance the financial and operational capabilities of institutional stakeholders, through structured training programs for personnel, both for technical and administrative staff.

4.3 Public Private Partnerships

Large-scale private sector participation is not anticipated in the short-term, given the prevailing sector constraints. The lack of sufficient private sector interest, hitherto, is also indicative of the need for structural readjustment (primarily ULB reforms and tariff rationalization), as a prerequisite for encouraging PPP. It is expected that tariff rationalization would also not adequately ensure cost-recovery in the short and medium term. In such a scenario, GoK/ULB would assume the tariff or revenue risk till such time tariffs are adequate to recover full cost of service provision.

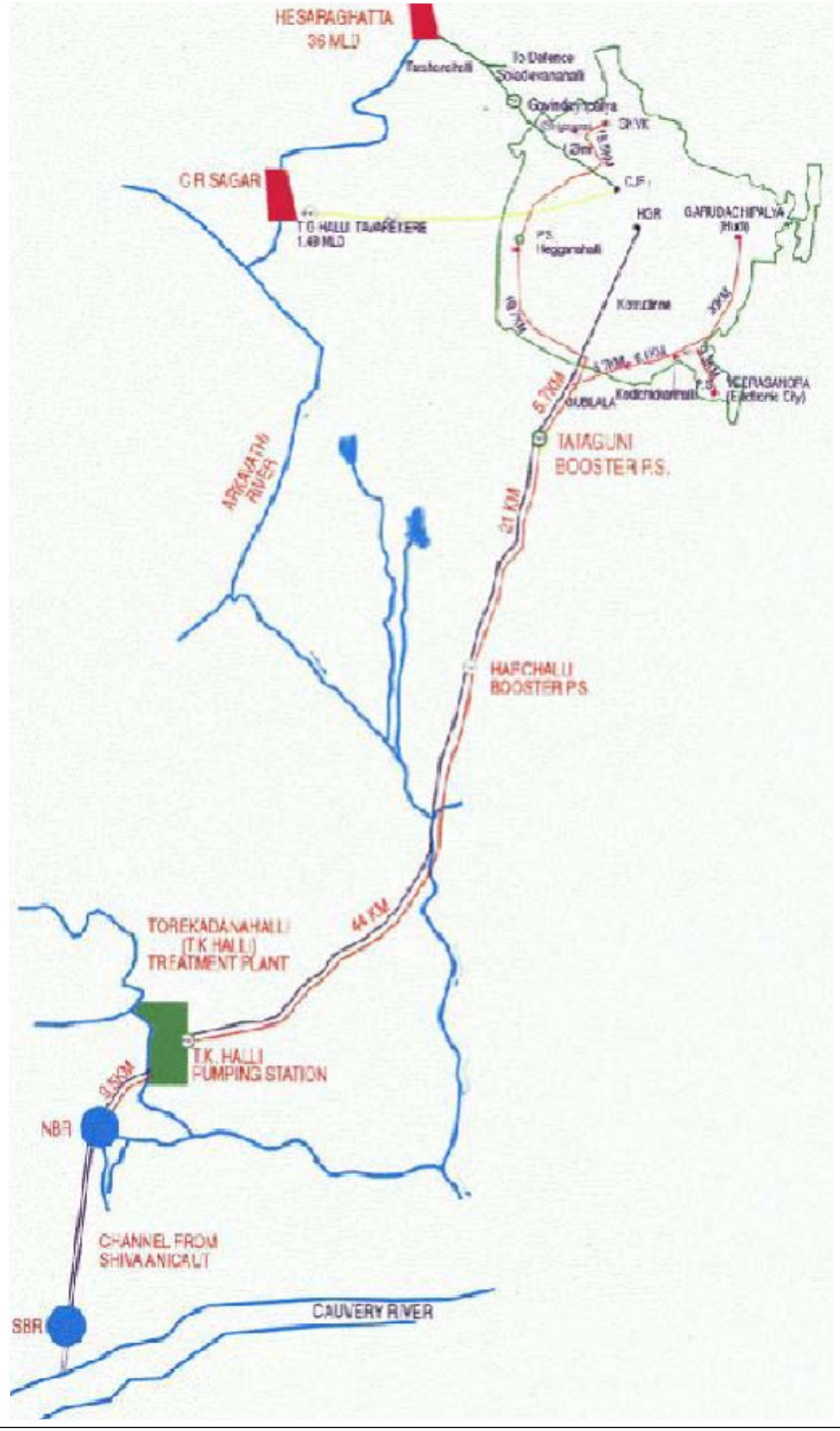
BWSSB/ULBs would review options of procuring specific private services to improve the quality and efficiency of service provision and administer the same through limited service contracts (say, metering and collection, distribution mapping) in select areas, on a pay-per-task basis. BWSSB/ULBs would consider entering into contracts of varying tenure depending on the nature of service provision, where the risks of construction, financing and O&M could be passed on to the private developer/operator, while the revenue risk could be retained by the government until such time the tariffs are able to meet full cost recovery. Table 42 indicates activities for various PPP models.

Table 42: PPP Models in Water Supply & Sewerage

No.	PPP Model	Indicative Activities
1.	Service Contract	Consumer census Metering Regularization of billing Network mapping Billing & collection
2.	Operating Contract	Reduction in UFW

		Increase in service levels
3.	Management Contracts	Improve service levels Reduction in UFW
4.	Lease / Concession	Improve service levels Reduction in UFW

The choice of the implementation framework would be made after a detailed due-diligence of all options available; including those set out above, and based on consultations with stakeholders.



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

- Stream (River)
- Proposed Pipeline (Stage IV Phase I)
- Existing Pipe Line (Stage I, II, III)
- TG Halli Pipeline
- Hessaraghatta Pipeline
- Pumping Station
- Proposed GLR
- Existing GLR

TITLE

WATER SUPPLY

FIGURE NO:15

SCALE : NTS

N

Chapter VII Management of Solid Waste

1 Overview

The rapid growth of population in Bangalore metropolitan area, and changing lifestyles, has resulted in increased waste generation. Consequently, waste management has become a key issue needing be addressed. The various waste streams include municipal solid waste (households, commercial establishments), biomedical waste (hospitals, dispensaries), industrial waste (industries) and electronic waste (discards from electronic equipments including PCs). While handling of MSW is the responsibility of the respective ULBs, separate statutes and institutional frameworks address hazardous wastes, and biomedical wastes.

1.1 Existing Situation

The service delivery status of MSW and other waste streams in BMP and non-BMP areas is set out below. A map depicting location of the existing and proposed treatment and disposal facilities is in Figure 16.

1.1.1 Municipal Solid Waste Management in BMP Area

BMP area is divided into 294 health wards for the purpose of MSW management. The per capita residential waste generation is estimated at 363 gm per capita per day. While no accurate current assessment of MSW exists, Table 43 shows studies of a waste quantification survey carried out in 2001 by BMP.

Table 43: MSW Generation in BMP Area

Source	Quantity (TPD)
Residences	1,562
Markets	84
Hotels and Restaurants	96
Total	**1,742**

Table 44 indicates the prevailing management practices in BMP area.

Table 44: Prevailing MSW Management Practices in BMP Area

Component	Features	Issues
Collection	¤ Near 100% collection efficiency ¤ 100% door to door collection in residential localities ¤ Private participation in 182 wards out of 294 wards	Segregation practiced only in few areas
Transportation	¤ Private participation in 182 wards ¤ Covered vehicles being used in most areas ¤ Compactors and	No transfer station available

Component	Features	Issues
	mechanical sweeping of roads proposed	
Treatment	¤ Existing treatment capacity of 700 - 800 TPD (biggest plant KCDC - 350 TPD) ¤ Compost plants of 1000 TPD and Waste - to - energy plant of 1000 TPD being developed with private participation on BOT basis	Treatment capacity inadequate (shortfall of more than 1000 TPD) to treat entire waste generation
Disposal	¤ Engineered sanitary landfills being developed with private participation on BOT basis	Expected to be operational only by 2007 Waste currently dumped on roadsides and low lying areas

INSTITUTIONAL FRAMEWORK

The Health Department of BMP currently manages the SWM activities; however, recognizing the need for better MSWM activities, BMP has constituted an SWM cell.

FINANCES

- ¤ The budget allocation for SWM is Rs. 70 Crore, of which Rs. 38 Crore is towards contractor payment for collection and transportation.
- ¤ With the development of composting and landfill facilities, an estimated additional annual outgo of Rs. 3-4 Crore would be paid as tipping fees.
- ¤ Based on the finances, the estimated cost of delivery is Rs. 1,400/tonne.

COST RECOVERY

Table 45 indicates the cost recovery situation for SWM services. Since there is no explicit charge for the provision of these services, the cost recovery is 0%.

Table 45: Cost Recovery Situation in SWM

Cost incurred in service provision (Rs. Lakhs)			Direct recoveries (Rs. Lakhs)		
2002 - 03	2003 - 04	2004 - 05	2002 - 03	2003 - 04	2004 - 05
3258	4207	4773	0	0	0

1.1.2 MSW Management in Non-BMP Areas

The respective ULBs carry out MSW management activities in their areas, with support from GoK agencies. Table 46 shows the estimated MSW generation.

Table 46: MSW Generation in Other ULBS

ULB	Waste Generated (TPD)	Collection Efficiency (%)
Yelahanka	61	80%
Byatarayanapura	75	80%
KR Puram	75	80%
Bommannahalli	141	80%
Dasarahalli	131	80%
R R Nagar	38	79%
Mahadevapura	81	80%
Kengeri	30	80%
	TOTAL: 632	**AVERAGE: 80%**

1.1.3 Biomedical Waste

Table 47 indicates the typical quantities of biomedical waste generated in Bangalore.

Table 47: Bio-medical Waste Generation

Type of Institution	Number of Institutions	Number of Beds	Waste Generated (Kg / day)
Major Hospitals (500 and Above beds)	12	7,533	3,766
Major Hospitals (200 to 499 beds)	15	4,868	2,434
Less than 200 beds	608	5,849	2,924
Non Bedded Health Care Establishments such as Clinics, Lab, Blood Banks, Dispensaries, medical Centers	683	0	100
Total	**1,318**	**18,250**	**9,224**

- 40-70% of the biomedical waste comprise kitchen, office, uninfected non-hazardous waste;
- Hazardous chemicals and drugs form only a minor portion; and
- Private medical institutions include such as Malleswaram Health Care Waste Management Project, scientific waste management system by St. John's Medical College Hospital and MS Ramaiah Medical College have taken multiple initiatives to scientifically manage biomedical waste stream.

1.1.4 Industrial Waste

- Industrial waste generated by more than 200 industrial premises in Bangalore;
- Estimated annual generation: 3,100 MT (additional discarded hazardous waste containers and liners-3,222 numbers);
- Accumulated waste stored-6,300 MT;
- Waste oil and oil emulsions account for nearly 70% of hazardous waste; and

- On the treatment and disposal side:
  - 75% is reprocessed;
  - Nearly 10% is incinerated;
  - 10% is being stored; and
  - Approximately 5% is being treated/disposed of by other methods.

1.1.5 E-waste

Bangalore, with its dominant IT industry, has accumulated electronic waste in excess of 6,000 MT which could result in the following hazards:

- Chemicals such as beryllium, found in computer motherboards, and cadmium in chip resistors and semiconductors are toxic and can lead to cancer; and
- Chromium in floppy disks, lead in batteries & computer monitors, and mercury in alkaline batteries and fluorescent lamps poses severe health risks.

E-parisara is India's first eco-friendly recycling unit, located in Dobaspet (about 50 km north of Bangalore). It processes obsolete computers and electronic gadgets and brings most of it back into applications by industries. Other end products where recycled e-waste is used include flowerpots and birdhouses, plastic screens, and uses in casting industry. There are proposals to develop more such similar facilities.

1.2 Key Issues in SWM

The key issues facing the sector include the following:

- Lack of awareness and absence of comprehensive segregation of waste at source, resulting in large quantities of non-biodegradable waste being collected and sent to the facilities for biological processing;
- While in most cases the waste is being transported in covered vehicles, it has been observed that in some areas waste is still being transported by open vehicles resulting in spilling of waste during transportation;
- Absence of transfer stations for transferring MSW into bigger vehicles for transportation to the treatment and landfill facilities;
- Inadequate waste treatment capacity when compared to the quantum of waste generated;
- Dumping of MSW in drains, along the roads and in low-lying areas;
- Absence of policy and regulations to promote waste reuse and recycling and a favorable environment to promote manufacture of reusable material;
- Limited participation of the community in sharing the costs for SWM; and
- Absence of capacity building for Pourakarmikas regarding waste handling.

2 Strategy for Improved Service Delivery

Given the population growth in Bangalore, the key challenge to the ULBs is to provide adequate MSWM services within their limited finances. MSWM services would require universal coverage since it has a direct bearing on the City's

environment and citizens' heath. The requirements for collection and transportation equipment and the estimate of tipping fee for composting and landfill are based on the waste generated and in turn the projected population as set out in Chapter 5.

The estimated waste generation is expected to increase to 2829 TPD in 2012 and to 5000 TPD in 2031, based on the population growth forecasts. While the per capita waste generation is expected to increase (~600 gm) with economic growth, various initiatives for segregation, recycling and reduction are proposed to be implemented. As a result, the per capita generation coming into the municipal stream is estimated to be approximately 400 gm/day.

The strategy for improved service delivery would need to be concurrence with the MSW Rules 2000 while addressing the issues constraining the sector and its impact on the urban poor.

2.1 Characteristics of Sector

The characteristics of the MSW sector comprise:

- Significant involvement of waste generators, local communities, and NGOs for effective segregation, collection, and transportation of waste;
- Substantial investments required in treatment and disposal technologies;
- Success of these projects depends on adequate project development and off-take structures (compost market, power purchase agreements, etc.);
- Strict environmental conditions need to be adhered to and the facilities should operate for a longer periods; and
- Coordination issues between different contractors/agencies for system design, collection, transportation, and landfill management.

2.2 Proposed Implementation Plan for MSW Management

The MSW strategy is set out in compliance with MSW Rules, 2000 and the accepted waste hierarchy principles of reduction, reuse, recovery, and disposal. The other key principles include the following:

- Waste minimization at source
- Waste management closest to generation
- Generator to pay for management
- Adherence to statutory guidelines
- Addressing social and environmental aspects

The contours of the proposed strategy include:

- Door to door collection at household level;
- Transportation to treatment and disposal facilities;
- Leveraging the existing initiatives including Swachha Bangalore and experimentation on mechanical sweeping; and
- Development of scientific MSW treatment (including waste to energy projects) and disposal facilities, and possible common facilities for BMP and the other ULBs.

2.3 Needs of Urban Poor

Ensuring that the development policies of the ULBs reach the urban poor is critical to the inclusive growth of the ULBs. Given the socio economic strata, schemes would need to be customized suitably for effective universal service provision. The services proposed to be provided include:

- 100% coverage
- SHG involvement in collection and transportation
- Specific / custom made vehicles including tricycles
- Dumper bins at community locations
- Free service / subsidized user fees

Details of specific projects are given in Volume-III of this CDP, "Basic Services for Urban Poor."

3 Project Identification & Costing

The projects identified would need to address the entire chain of service delivery and other aspects including financial management, capacity building of ULBs and best practices in MSWM. Though BMP has undertaken many initiatives for MSWM in BMP areas, service levels need to be constantly upgraded to cater to the projected population. Best practices would also need to be implemented by the ULBs for improved service delivery.

3.1 Service Delivery Targets

Based on the above circumstance and strategies discussed, Table 48 shows the indicative targets for the sector:

Table 48: Service Delivery Targets, MSW

Parameter	2012
Coverage	100% for entire Bangalore Region
Collection Efficiency	100% of waste generated
Segregation	85% of waste generated
Capacity of Treatment and Disposal Facilities	100% of waste generated in Bangalore Region
Recovery of Costs	100% of collection and transportation costs
Training	100% staff trained
Standardisation of Procedures	Standardisation of guidelines and pilot implementation

3.2 Investment Plan for Solid Waste Management

3.2.1 Projects in Implementation Period

The estimated quantum of MSW is based on projected population during the implementation period as set out in Chapter 5, and the normative per capita MSW generation standards.

An estimated 1,000 TPD of existing generation would need to be treated and disposed scientifically. In addition, based on the proposed targets, an additional waste generation of 400 TPD needs to be collected, transported, and treated by 2012. An estimated 200 TPD of the additional waste would be land-filled. The capital and operating expenses for handling the additional waste and streamlining the existing mechanisms have been estimated based on normative standards and prevailing practices.

COLLECTION AND TRANSPORTATION OF MSW

Tools and equipment for MSWM would need to be continuously upgraded to meet the increased demands and performance requirements.

- Capital expenditure would include:
  - Procurement of plant and machinery for treatment and disposal facilities; and
  - Collection and transportation equipment (primary collection vehicles - auto tippers and pushcarts, transportation vehicles)
- O&M expenses would include:
  - Repairs and maintenance of the vehicles
  - Fuel expenses
  - Salaries
- Collection and transportation expenses have been estimated on a cost per MT basis and MSW generated. The components of expenses include:
  - Equipment - 35%
  - Vehicles - 30%
  - O&M - 35%

DEVELOPMENT OF TREATMENT AND DISPOSAL FACILITIES

The City has treatment and disposal facilities with combined capacity of 2,000 and 1,600 MT, respectively. It is proposed to develop new facilities based on the increased quantum of MSW generated (unmet demand of 1,000 TPD and additional generation of 400 TPD) during the implementation period. The costs for development of treatment and disposal facilities have been estimated at Rs. 2 lakh per MT and Rs. 8 lakh per MT of waste, respectively.

3.2.2 Estimated Capital Investment Requirement

BMP is developing engineered sanitary landfills with private participation. These integrated waste processing and landfill facilities at Kannahalli & Mavallipura are being implemented under a build-operate-transfer concession framework. A waste-to-energy plant is also being developed by the private developer. BMP has also been incurring expenditure for provision of MSW management services in wards being serviced by its employees. The investments required for these projects and expenses have not been included in the estimated capital investment requirements.

Table 49 shows the estimated capital investment plan for BMP area and the neighboring seven CMCs and TMC during the implementation period.

Table 49: Investment Plan for MSW – JNNURM Period

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total (Rs. Crore)
CAPEX towards Equipment	32.5	37.5	42.6	45.1	45.1	47.6	250.3
Rolling stock – Vehicles	28.1	32.5	36.8	39.0	39.0	41.1	216.4
OPEX	0.0	13.2	39.6	65.9	65.9	79.1	263.7
Land Acquisition	3.4	4.0	4.5	4.8	4.8	5.0	26.5
Installation of GIS System	1.2	1.4	1.5	1.6	1.6	1.7	9.0
Tipping Fee for existing landfills	4.4	5.1	5.8	6.1	6.1	6.5	34.1
Grand Total	69.7	93.6	130.7	162.5	162.5	181.0	800.0

The actual requirement would be set out in individual DPRs which are to be prepared for each activity. Table 50 indicates the investments required in future blocks.

Table 50: Investment Plan for MSW – Vision Period

Description	2013-17	2018-22	2023-27	2028-31
	Rs. Crore			
Capital Expenditure towards Equipment	307.8	356.9	413.7	479.6
Rolling stock - Vehicles	266.1	308.5	357.7	414.6
Operation and Maintenance Expenses	324.3	375.9	435.8	505.2
Land acquisition	14.5	20.1	23.3	21.3
Installation of GIS system	0.0	0.0	0.0	0.0
Tipping Fee for existing landfills	35.8	37.6	39.5	41.5
Grand Total	948.6	1099.0	1270.0	1462.2

4 Implementation Framework

The responsibility for managing the MSW sector is squarely with the ULBs, while the sectors of industrial and biomedical waste are governed by other statutes, and are the responsibility of the industry.

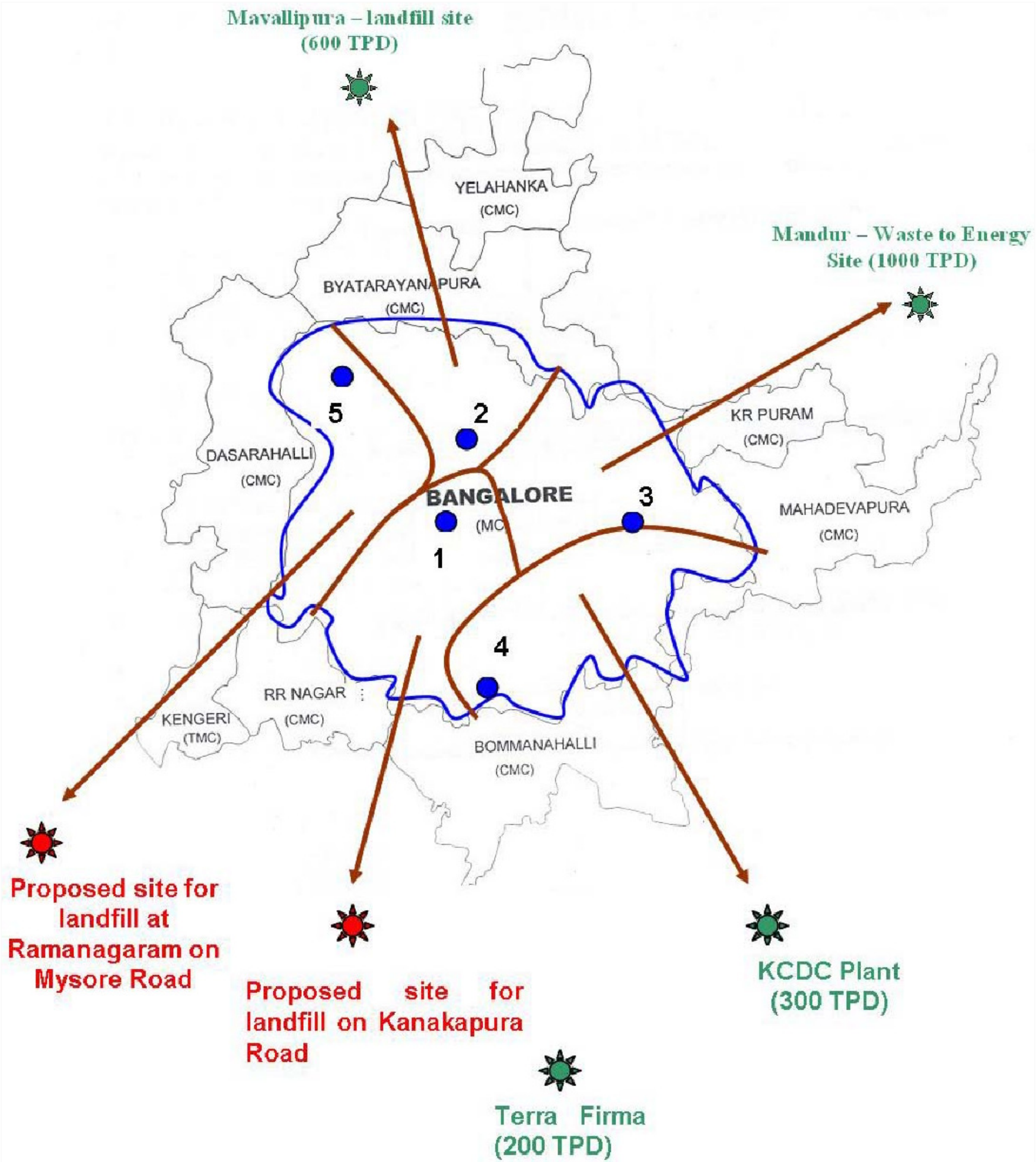
On the MSW side, BMP has implemented projects with private sector participation in collection, transportation, treatment, and disposal. While treatment and landfill facilities are being developed under BOT framework, collection and transportation in 60% of health wards has been contracted out. Private participation in non-BMP areas is limited to contracting out collection and transportation activities.

BMP and ULBs in non-BMP Area would explore more performance based service/management contracts for collection and transportation. ULBs in non-BMP area would also participate in the integrated treatment-cum-disposal facilities

developed by BMP. An indicative framework for private participation is presented in Table 51:

Table 51: Framework for PPP in MSW

Activity	Key Characteristics	Contract Type
Collection & Transportation	Large number of employees and informal workforce Logistics intensive Citizen interface Investment depends widely depending on scope of work	Service contracts, Management contracts and Concession
Street Sweeping	Labour oriented Minimal investment No requisite skills / technical skills Logistics intensive	Service contracts
Treatment	Technology intensive More capital intensive Ongoing O&M	Concession Contracts
Disposal	Capital intensive Technically skilled manpower required Ongoing O&M	Concession Contracts



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGEND:

- 1. Chickpet / Cubbonpet
- 2. Shivaginagar / Benson Town
- 3. Indira Nagar
- 4. J.P. Nagar
- 5. Basaveshwar Nagar

TITLE:

PROPOSED TRANSFER STATIONS FOR SOLID WASTE MANAGEMENT

FIGURE NO:16

SCALE : NTS

N

Chapter VIII Urban Drainage Systems

1 Overview

The growing geographic spread of Bangalore and accompanying construction activity has interrupted the natural valley system of the region. Construction has also resulted in filling up small water bodies and low-lying areas. The flooding of drains during each monsoon exposes its poor state and their inadequate capacity, and impacts the City's overall infrastructure. Therefore, improving the drainage system is a key and critical element in the City's infrastructure.

1.1 Existing Situation

The City built by Kempegowda, 468 years ago, has a well-developed natural drainage system. Bangalore had more than 400 lakes, interlinked by a system of canals that followed the natural gradient of the land in which excess water from one lake would flow through waste-weirs into the next lake/tank, thereby preventing flooding. This system could be maintained for a long time, through the colonial period, till more recent times. The features of the existing system comprise:

- Naturally undulating terrain of Bangalore City:
  - Ideally suited for development of lakes that can capture and store rainwater;
  - Each valley at the ridge top gives rise to small streams which cascade down to form major stream systems;
- Lakes form chains of reservoirs in each of the three valley systems in Bangalore:
  - Flow of the water runs from North to South-east as well as South-west along the natural gradient of the land;
  - The lakes harvest rainwater from their catchments, and the surplus flows downstream spilling into the next lake in the chain;
  - This connectivity ensured that additional water is continuously transferred to other lakes;
  - The system serves as an excellent flood controller and storage for rainwater;
- Pipe networks carry the collected wastewater to treatment plants – V Valley on Mysore Road (180 MLD), KC Valley near HAL Airport (163 MLD), and Hebbal Valley on Bellary Road (60 MLD); and
- Incomplete sewerage systems results in sewage being let out into storm water drains or lakes, polluting the water.

1.2 Key Issues of Urban Drainage Systems

With the growth of the City, the number of lakes has reduced to 64, and small lakes and tank beds have vanished because of encroachment and construction activities. This has resulted in storm-water drains reducing to gutters of insufficient capacity, leading to flooding during monsoon. Dumping of MSW in the drains compounds the problems, leading to blockages. To control floods, it is important to

remove silt and widen these storm water drains to maintain the chain flow and avoid water from stagnating at one point.

2 Strategy for Improved Service Delivery

2.1 Characteristics of Sector

Urban drainage has a direct impact on the City's image, citizens' life, and health. If the system does not work properly, it leads to environmental hazards. However, the status is that urban drainage has become a victim of rapid urbanization.

Improving the urban drainage system requires not only capital infusion, but also ongoing funding for operation and maintenance. A single point obstruction in a storm-water drain would have a cascading overall impact. Citizen awareness is therefore a critical issue, and citizens and NGOs can play a key part in monitoring development in the region to ensure that drainage is not obstructed, and dumping of debris and MSW in drains does not occur.

2.2 Proposed Implementation Plan for Urban Drainage Improvement

The proposed plan includes:

- Construction/remodeling/rehabilitation of storm water drains and road side drains;
- Removing silting;
- Constructing retaining walls;
- Laying of beds;
- Provision of enabling and awareness information architecture; and
- Green area development.

3 Project Identification & Costing

The “Valley Projects” as they are called, are the most critical element of the system. Improvement of storm water drainage system and roadside drainage and breaking the interconnectivity of sewerage and storm-water are crucial elements of the project.

3.1 Investment Plan for Urban Drainage Improvement

3.1.1 Projects in Implementation Period

- Constructing 1,500 km of roadside drains (cost of construction assumed at Rs. 30 lakh per km for a 5-metre drain);
- Extension of the SWD network into CMCs and TMC areas;
- Clearing all encroachments that come in the way of the storm water drain network in the city;
- Aligning the drain network and checking blockage and overflowing of drains;

- Reviewing existing storm water drains, ensuring connectivity of primary, secondary and tertiary drains;
- Redesigning for current load conditions along with building barriers between roads and open drains at crossings; and

3.1.2 Estimated Capital Investment Requirement

Table 52 gives the estimated investment requirement in the JNNURM period, while Table 53 gives the estimated investment in future blocks.

Table 52: Investment Plan for Urban Drainage - JNNURM Period

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total (Rs. Crore)
Vrishabhavathi Valley	120	86	18	16	11	0	251
Challaghatta Valley	66	42	10	10	9	0	137
Hebbal Valley	120	74	12	12	11	0	229
Koramangala Valley	72	42	12	10	9	0	145
Tertiary drains	6	6	4	4	2	0	22
Road side drains	0	17	64	69	71	85	306
O&M Expenses	72	66	30	30	28	21	249
Total	**456**	**333**	**150**	**151**	**141**	**106**	**1339**

Table 53: Investment Plan for Urban Drainage – Vision Period

Description	2013 - 17	2018 - 22	2023 - 27	2028 – 31 (Rs. Crore)
Capital Expenditure	370	0	0	0
Rehabilitation Expenses	37	83	139	194
O&M Expenses	111	112	139	167
TOTAL	518	195	278	361

4 Implementation Framework

One of the critical issues that is to be addressed relates to the fact that inadequate drainage in a particular ULB jurisdiction may not have the impact in that ULB but elsewhere. Coordination and continuity of action between the ULBs is of critical importance.

- The importance of inter-ULB and Agency coordination:
  - Inadequate drainage in a peripheral ULB may impact drainage in BMP areas;
  - Improper drainage of BWSSB's system may pollute the valley system and impact quality of life across the City; and
  - Improper roadside drainage and cross-connectivity may similarly impair system performance;
- Citizens to be involved to monitor contractor's activity on clearing of drain systems in their area:
  - Citizens who dump debris into storm water drains could be penalized; and
- Removing silt to be a regular activity before the monsoons starting with the main (primary) drain.

The City is proposing to have a coordinated action plan to address the issue of urban drainage. At present BMP is coordinating the "valley projects," and is carrying out the works in coordination with other agencies, facilitated by the GoK.

Chapter IX Roads & Transportation

1 Overview

When citizens and visitors refer to the infrastructure in Bangalore being "under stress," a large part of such reference is to the transportation infrastructure and congestion in the road and transport system. Roads and Transportation infrastructure is probably the area where the most critical and immediate interventions are required. This section of the CDP deals with the roads/urban transport situation, the strategy forward, the "big picture" of interventions, and finally specific interventions.

1.1 Existing Situation

The status of various elements that constitute the urban transport system of the City is examined in the following sections. This section also discusses studies on which the strategies for improving the delivery of urban transport services are based. The population projections, provided in the earlier sections, form the basis for the trip assignment models in the studies that are being undertaken (under the Comprehensive Traffic and Transportation Scheme being prepared for Bangalore).

1.1.1 Road Network

NH7 and NH4 (part of North South Corridor and Golden Quadrilateral, respectively) and NH209 pass through Bangalore forming five important radial roads within the Bangalore Metropolitan Area. State Highways linking Bangalore with Mysore, Bangalore with Bannerghatta, and Bangalore with Magadi form other major radial corridors. Developed as a radial town, Bangalore does not have a strong circumferential road system, except for the Outer Ring Road, despite the intervening space between the corridors developed. The main highways include:

- NH4 (National Highway 4) running from Mumbai to Chennai;
- NH7 from Varanasi to Kanyakumari;
- NH209 connecting Kanakapura and Kerala; and
- SH17 connecting Bangalore to Mysore.

BMP has about 3,500 km of road (including 250 km of arterial roads and 100 km of NH and SH), 38,000 intersections, 41,000 small roads, 162 signalized intersections, and 600 manual intersections. The ULBs (around Bangalore) have around 2,400 km of road network. The existing urban road system is summarized in Table 54.

Table 54: Details of Urban Roads in ULBs

ULB	Area (sq. km)	Proposed Norms (km per sq.km)	Normative Road Length Reqmt (km)	Existing road length (km)
BMP	226.16	17.33	3919	3500
Bommanahalli	43.27	8.00	349	518
Byatarayanapura	47.00	8.00	376	337
Dasarahalli	38.00	8.00	304	412
KR Puram	21.25	8.00	170	362
Mahadevapura	45.18	8.00	361	275
RR Nagar	66.00	8.00	528	217
Yelahanka	38.80	8.00	310	190
Kengeri	34.00	5.33	181	111
Total	559.66		6498	5922

While the standards of "length" are more or less in order, the problem relates more to the fact that the width of roads is inadequate, which is apparent from Table 55. Any transport intervention would therefore need to consider this constraint. For instance, this could imply that bus service would be self-limiting and reach saturation at some stage, and that higher quality wide-bodied buses would be difficult to run. Consequently, the importance of having other rail-based systems that use a different or elevated right-of-way, such as a Metro or Light Rail Transit (LRT) system, is therefore established.

Table 55: Existing Road Widths

Road Type	Percentage
Two lane	02.24
Three lane	25.09
Four lane divided	38.49
Four lane undivided	13.91
Six lane divided	06.50
Six lane undivided	13.78
Total	100.00

1.1.2 Rail

Bangalore is also served by five broad-gauge radial rail corridors. Attempts are being made to use the existing lines and capacity (with some augmentation), as a "Commuter Rail System." However, these do not presently serve as commuter corridors.

- Chennai on the East
- Mumbai (Pune) on the Northwest
- Guntakal on the North
- Salem/Thiruvananthapuram on the East
- Mysore on the Southwest

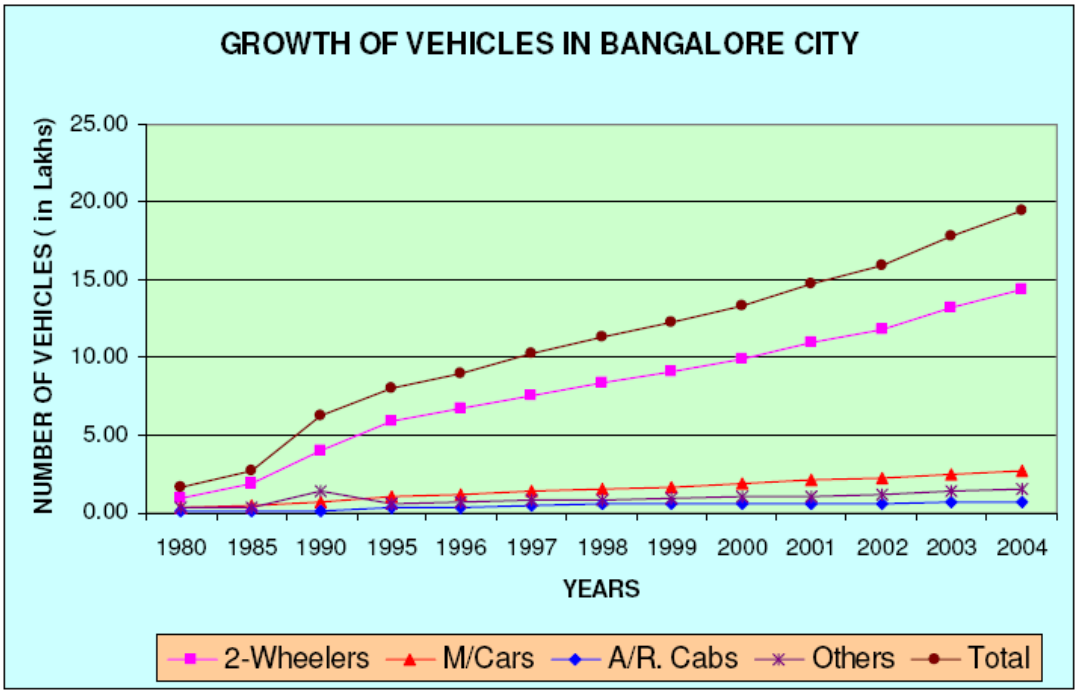
1.1.3 Vehicle Statistics

The number of registered vehicles in Bangalore has increased rapidly from 4 lakh (1987) to 23 lakh (2005). The CAGR was over 10%, and the growth rate of 2-wheelers, in particular, was around 17%. The average number of vehicles per household has increased six-fold in the last 25 years i.e. approximately 0.3 (1980) to 1.7 (2005). Table 56 shows the vehicular population, and the vehicular growth is illustrated in Figure 17.

Table 56: Vehicle Population (March 2006)

Vehicle Type	
Two Wheeler	18,96,907
Light Motor Vehicle	4,05,622
Auto-rickshaws	81,502
HTV	24,126
HGV	97,801
Others	11,407
TOTAL	25,17,365

Figure 17: Growth of Vehicles in Bangalore



Private vehicular transport constitutes a very sizeable proportion. Of the 21.4 lakh registered vehicles, 15.83 lakh vehicles account for 2-Wheelers, and 3.04 lakh vehicles are cars – 88% of total vehicles are personal vehicles. 2-wheelers, which constitute about 72% of total vehicles, are growing at about 17% per annum. Considering that 2-wheelers occupy between 0.4 to 0.7 PCU, this is a critical issue needing to be addressed.

1.1.4 Modal Split

The modal split for travel trips is given in Table 57, and this again illustrates the fact that 2-Wheeler trips are high.

Table 57: Modal Split for Travel Trips

Mode	With walk trips (%)	Without walk trips (%)
Car	4.56	5.44
2W	30.40	36.31
Auto-rickshaw	5.77	6.90
Bus	40.96	48.91
Walk	16.26	---
Cycle	1.68	2.00
Others	0.37	0.44
TOTAL	100.00	100.00

1.1.5 Mass Transport

Bangalore Metropolitan Transport Corporation (BMTC) is currently the only provider of urban mass transport services. BMTC operates a fleet of about 4,185 buses undertaking 60,621 trips, to service over 40% of the trips (35 lakh passenger trips) daily in the metropolitan area. Table 58 indicates the cost recovery situation in provision of bus transport services, which is full recovery. In any transport model scenario, it can be seen that BMTC - public bus services - would continue to play the central role in urban public transport systems, even if other mass rapid transit systems are introduced.

Table 58: Cost Recovery Situation in Public Bus Services

Cost incurred in service provision (Rs. Lakhs)			Direct recoveries (Rs. Lakhs)		
2002 - 03	2003 - 04	2004 - 05	2002 - 03	2003 - 04	2004 - 05
34569	40608	49218	34197	44116	50619

1.1.6 Environment

The rapid increase in vehicular traffic has clearly impacted environmental parameters. Reports by KSPCB mobile laboratories in Table 59 show that pollution levels in some places are above standard values.

Table 59: Air Pollution Levels

Stations	O3 (mog/m)	SO2 (mog/m)	NOX (mog/m)	CO (mog/m)	SPM (mog/m3)
Yeshwanthpur, NH4 (O)	3.4	3.9	58	3.18	141.9
M.G Road (O)	2.3	4.6	26.8	5.1	96.5
Town Hall (O)	2.4	4.8	38.2	4.8	154.1
K.G Circle (O)	2.4	4.4	47.2	4.6	164.5
Peenya Indl Area (I)	2	4.8	19.4	3.5	153.7
Victoria Hospital (S)	2.1	3.6	3.1	2.5	65.2
Jayanagar Residential Area (R)	1.7	3.9	10.7	3.3	72

Opp. B.C.G.H.S Residency Road (S)	1.9	4.6	24	4.8	115
Indian Express (O)	2.2	4.5	79.3	4.5	147.9

Table 60 gives the Central Pollution Control Board (Environment Protection Act, 1986) prescribed noise standards in different areas.

Table 60: Standards for Noise Pollution

Area	Permissible levels (in decibels)	
	Day	Night
Residential	55	45
Commercial	65	55
Silent zones	50	40

Table 61 gives the noise levels measured in about ten areas of the City on April 23, 2006, which are beyond permissible limits.

Table 61: Noise Pollution Levels

Area	Noise levels (in decibels)
Jayanagar 4th Block	82
South end circle	82
JC Road	80
Mekhri Circle	100
KH Road	95
Wilson Garden	82
BTM Layout	79
Forum Mall	78
Brigade Road	98

1.1.7 Traffic Congestion

Given the congruence of lesser road widths and high personal modes, it is clear that congestion would be a direct consequence. A recent study[3] has shown that over 52 corridors/links could be classified as "congested," with V/C over 1. The average speed of vehicles in Bangalore varies between 12-18 kmph, in peak hours, with clear start-stop and obstructed flows on many corridors. Congestion indicators at major intersections are greater than 1.5 (against a standard of 0.8 for free movement). Introduction of one-ways and construction of grade-separated intersections have only served as a palliative. Table 62 gives V/C ratios of some key roads.

Table 62: Volume - Capacity Ratios of Roads

Name of road	Volume/Capacity Ratio
Nrupantunga Road	3.62
District office Road	2.51
K.G Road	2.51
Lalbagh Fort Road	2.67
Puttanna Chetty Road	2.45
Richmond Road	2.26

[3] iDeCK and RITES, November 2005

M.G Road	2.76
Chord Road	2.51
Tumkur Road	2.62
Sankey Road	1.52

1.2 Transport Studies for Bangalore

1.2.1 CTTS

Though a number of older studies exist, these are based on secondary data, or are for specific purposes (e.g. for the Bangalore Metro Rail Corporation). There is no systematic study based on primary data that takes into account recent developments in traffic growth and incorporates planned interventions such as the ring roads (core, outer and peripheral), BMRC, BRTS, etc. KUIDFC has commissioned a Comprehensive Traffic & Transportation Study (CTTS) for Bangalore, the first such exercise of this kind, the report for which is due by the end of 2006.

This CDP, therefore, relies on earlier studies and papers. There is clear recognition that detailing of some of these initiatives can be done only after the CTTS is completed. However, projects such as Metro-Rail and High-capacity Buses on Outer Ring Road are clearly possible interventions based on specific studies and decisions, and these are actually inputs to defining the CTTS.

1.2.2 Rapid Traffic Study

iDeCK and RITES carried out a study to identify the high-density and medium density corridors, taking into account the Commuter Rail System (CRS) and the Metro-Rail. The study is based on 2005 data, and estimates traffic demand by 2015, the horizon year, under a "Do Minimum" scenario, and a "CRS & Metro-Rail" scenario. Figure 18 shows the identified high and medium density corridors in the horizon year, with the metro-rail and CRS in place.

RITES has used a traffic assignment model for the analysis, and the key conclusions are:

1. Despite introduction of the Metro-Rail (Phase-I) and the CRS, 52 key road corridors would have Volume/Capacity ratios of 0.75 and above. Of these, 21 high-density corridors would have Peak Hour Peak Direction Trips (PHPDT) > 20,000 and 31 medium density corridors would have PHPDT between 10,000 and 20,000.
2. Free flow speeds of private transport modes are 1.75 to 2.0 times that using public transport, and there is a clear need to remedy this.
3. The BMTC would continue to be the key public transport facility, and will continue to carry over 40% of the trips, while the Metro-Rail and CRS together will cater to about 20% of the trips in the horizon year. Private modes (car and 2-wheeler) would account for about 35% trips.

2 Strategy for Improved Service Delivery

Transport interventions can broadly be classified as under:

1. Roads and Road Related Infrastructure
2. Bus based Mass Transit Systems
3. Other Mass Transit Systems

For Bangalore, it is proposed to configure the urban transport systems on the basis of the recently formalized National Transport Policy, the key elements of which are highlighted in the subsequent section.

2.1 National Urban Transport Policy

The National Urban Transport Policy, seeks to encourage integrated land use and transport planning in cities and focus on greater use of public transport and non-motorized modes by offering central financial assistance. The policy incorporates urban transportation as an important parameter at the urban planning stage. It emphasizes on integrated land use, transport planning to minimize travel distance, access to livelihood, education and other social needs, especially for the marginal segments of the urban population. 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.

Keeping in line with the proposed National Urban Transport Policy, Bangalore City shall strive to provide a good public transport system that allows seamless travel between one mode and another as between systems managed by different operators. Besides an integrated public transport system, the following initiatives would be helpful to ensure safe, affordable, quick, comfortable, reliable, and sustainable access for the growing number of city residents to jobs, education, recreation and other such needs within the city. It is desired to make the Bangalore transport system "NUTP Compliant."

2.2 Priority to Public Transport

Not only does public transport occupy less road space per passenger, but also aggregate operating costs, including environmental impacts, are lower. Public transport also serves the needs of the urban poor, who can be subsidized if the direct fare for the mode is beyond their affordability. To achieve this objective, public transport and mass transport have to be encouraged, and private modes discouraged. This can be achieved by:

- Increasing public transport modes (coverage and quality)
  - Expansion and improvement of bus systems
  - Introduction of new modes such as Metro-Rail, LRT/Monorail systems

- Discouraging private modes
  - Higher costs: initial and operations, including parking
  - Congestion pricing
  - Lower right of way

2.3 Priority to Non-motorized Transport

Non-motorized modes of transport such as bicycles are gradually losing their importance as they are exposed to a greater risk of accidents as they share a common right of way with motorized vehicles. However, non-motorized modes are environmentally friendly and have to be given their due share in the transport system of the city.

Safety concerns of cyclists and pedestrians have to be addressed by encouraging the construction of segregated rights of way for bicycles and pedestrians. Apart from improving safety, the segregation of vehicles moving at different speeds would help improve traffic flow, increase the average speed of traffic, and reduce emissions resulting from sub-optimal speeds.

2.4 Use of Cleaner Technologies

Cleaner technologies like CNG, Electric Trolley Buses, Electric Vehicles need to be encouraged so that the problem of vehicular pollution can be more effectively dealt with. Besides, renewable sources need to be tapped as a measure of sustainable development and in recognition of India's energy security concerns.

2.5 Need for Public Awareness & Cooperation

Urban transport polices cannot succeed without the fullest cooperation of all the city residents. It is therefore, necessary to launch intensive awareness campaigns that educate people on the ill effects of the growing transport problems in urban areas – especially on their health and well-being. Encouraging use of public transport (after creating adequate infrastructure), use of vehicle pooling, conversion of some modes to CNG, etc., are some of the measures to mitigate the associated problems.

2.6 The "Big Picture" of Interventions

While the strategy outlined in the previous section sets the direction forward, it is important to develop some "vision" of what the major interventions in the city's transport infrastructure are going to be. Figure 19 shows the general concept of the proposal – ring roads, metro, monorail/LRT, and the grid routes of BMTC.

2.6.1 Ring Roads

The City would be looking at significantly altering the radial, "through the core" traffic pattern by improving/developing key "rings," in the BMP, BDA, and BMRDA jurisdictions. A map of the ring road system (existing and proposed) is given in Figure 20:

- **Core Ring Road (CRR)**: Of about 30 km length, in the BMP periphery, this would form the primary "bypass" to the inner core BMP area. This road may be constructed as an elevated corridor, to reduce land acquisition.
- **Outer Ring Road (ORR)**: Is at a radius of 7 to 10 km from the city center. The project was successfully completed in just 8 months at a total cost of Rs.182 Crore. The outer ring road covers a total length of 62 km and connects all major roads and highways in and around Bangalore. However, by efflux of time, the ORR has almost become a city road, with local traffic and many signaled intersections, and development all around.
- **Peripheral Ring Road (PRR)**: BDA is in the process of acquiring land for implementing a peripheral ring road. The total length of the peripheral ring road proposed to be constructed is 114 km around Bangalore at a radial distance of 2.80 to 11.50 km from the existing outer ring road.
- **Intermediate Ring Road (IRR)**: BMRDA is planning this ring to connect Nelamangala, Bidadi, Harohalli, Tattekere, Hosakote, Aradeshanahalli, and Mylenahalli, which would have a length of 188 km. The estimated cost of the project is Rs. 750 Crore. The roads would be constructed as per IRC Standards and would have eight lanes including two service roads.
- **Satellite Township Ring Road (STRR)**: Beyond the IRR, BMRDA is planning a set of satellite townships, which would be connected by the STRR. Surveys for the IRR and STRR are in progress.

2.6.2 Bus-based Mass Transport

BMTC shall continue to provide a vital and leading role in public transport, in any scenario of the City's development. To meet this challenge, BMTC has plans for over 20 initiatives, including, *inter-alia*:

- Increasing fleet capacity;
- Bringing in newer and higher quality bus systems, to cater to all sections;
- Introducing the grid-route concept to provide one-change bus services that avoid the city centers where possible;
- Setting in place automation and modernization of systems; and
- Implementing high-capacity bus systems in corridors such as the Outer Ring Road, where widths allow dedicated bus lanes.

2.6.3 Rail-based Systems

Bangalore's road network configuration has constraints because of the fact that most roads do not have adequate widths. To overcome such a limitation, and to enable rapid intra-city transport, the Government has already taken up two initiatives, and is seriously considering the third. The initiatives comprise:

- The Metro Railway, being implemented by the BMRC, details of which are provided in subsequent sections;
- The Commuter Rail System, which uses existing at-grade railway system to serve intra-city and suburban needs. The exact configuration shall be finalized as part of the CTTS; and

- The third proposal (under consideration) is the option of Monorail[4] or Light Rail Transit as feeder routes to the Metro Rail. The exact configuration shall be finalized as part of the CTTS.

2.6.4 Elevated Corridors

To reduce traffic on key at-grade corridors, the city is planning to put in place a number of elevated corridors. One of these has already been bid out on a PPP basis, while others are in the planning stage. The corridors comprise:

- Electronic City – Silk Board junction (already bid under PPP)
- Madivala – Shoolay Circle (connecting Core Ring Road to Silk Board)
- Mosque road – Bagalur Road – Hennur Road (connecting CRR to ORR)
- Yeshwantpur – Peenya (Connecting CRR to ORR)
- KR Puram – Murphy Road – Ulsoor Lake (Connecting CRR to ORR)

2.6.5 Inter-modal Interchanges

The proper integration of modes – bus, MRTS, and railway – is a vital need for the future. The city is planning two such inter-modal interchanges.

- The first such interchange is already under bid – the Kempe Gowda bus terminus at Subhashnagar is proposed to be converted into an interchange that accommodates the BMTC, KSRTC, BMRC, and a "city center" complex.
- The second interchange is proposed at Byappanahalli, which will have the BMTC, KSRTC, Railways, BMRC, and the Airport Rail Link.

2.6.6 Parking

Creation of parking facilities – on street and off street – is a clear need. Levy of a parking fee that truly represents the value of the land occupied shall be considered as a means to make the use of public transport more attractive. A graded scale of parking fee, that recovers the economic cost of the land used in parking, shall be adopted.

2.6.7 Amenities for Freight Traffic

In addition to bypasses, facilities for the parking of freight vehicles, outside city limits, such as truck terminals are being proposed through Public-Private Partnerships.

2.6.8 Other Interventions

Apart from the above project-type key interventions, many initiatives would be taken by the City Government and its citizens. These initiatives would make a

[4] Monorail is not strictly rail-based, but has the characteristics of a fixed-guide following train system.

significant impact on the quality of life, by way of sustainable urban transport systems, and would include:

- Pedestrian walkways/skywalks;
- Cycle paths and cycle facilities;
- CNG based vehicular systems;
- Reduction of emissions and introducing eco-audit;
- Technology Up-gradation in public transport systems to increase load factors and speeds;
- Measures to reduce the level of accidents – target 50% reduction.
- Reduce two-wheelers and cars population growth by 50%.
- Increase modal share of BMTC from 56%, or 35 lakh passengers carried per day to 50 lakhs;
- Enhance average speed of buses from 17.5 km per hour to 22.5 km/hour;
- Clean Development Mechanism:

While it is difficult to specify and cost these interventions with any exactitude at the level of the CDP, the concerned agencies would detail the specific projects and prepare the DPRs.

2.6.9 Specific Targets - CM's 10 Point Program

To give a clear direction and target for improving the urban transportation scenario, the Chief Minister has charted a 10-point program covering various aspects, including citizen interface comprising the following:

1. ROAD ENGINEERING

Drain Improvement-Removal and diversion of surface water from the roadway and adjoining land	30 Locations
Junction Redesign-Widening of the mouth of the intersections, etc.	At 50 junctions to facilitate faster traffic clearance
Asphalting-to provide smooth surface for driving	200 km
Medians-longitudinal cement blocks separating dual carriageways to separate the opposing streams of traffic	To provide 0.2m ready to fix concrete median blocks on 10 km of road, at junctions, to facilitate smooth traffic
Road Marking-made of lines, patterns, words, symbols of reflectors on the pavement, kerb, sides of islands, etc.	To provide for clear delineation and guidance for road users to facilitate compliance and smoother traffic on 300 km of arterial roads
Right of Way clearance-clearing of obstructing trees, utilities such as electric poles, telephone poles, transformers etc.	100 km of arterial roads to be cleared of all obstructions for safe and smooth traffic movement

2. PUBLIC TRANSPORT INFRASTRUCTURE

Passenger Info System-service users are provided information about the arrival time of the buses	5 major routes

Construction of Bus Bays-specially designed or designated locations on the road at which a bus stops to allow passengers to board and alight without the buses blocking the stream of traffic on the carriage way	50 nos. so that buses do not block the main traffic
Relocation of Auto Stands-specific place for auto parking such that they do not obstruct the movement of other vehicles	50 nos.
Relocation of Bus Stands-relocation of bus stops or stands which are obstructing the free flow of traffic	100 nos.
Bus Rapid Transit System-bus systems such as dedicated bus ways that have their own rights-of-way to bus services that utilize HOV lanes and dedicated expressway lanes to limited stop buses on pre-existing routes	Outer Ring Road based on the feasibility study report
Prepaid Auto stands-for facilitating the travel by auto passengers	50 nos.

3. PARKING MANAGEMENT

Park and Ride-providing parking facilities at bus depots at periphery and induce the motorists to park there and travel to the center of the city by public transportation	10 Nos.
Restriction of On-Street Parking-Identifying roads/road stretches where on-street parking is to be prohibited	50 Locations
Mini Parking lots/At-grade parking-Setting up of parking lots on vacant lands owned by various government agencies/BMP etc.	25 Nos.

4. PEDESTRIAN FACILITIES

Restoration of footpaths-Improvement of old/worn out footpaths and restoration of footpaths where they do not exist and removal and relocating utilities that are present on footpath to provide right of way to pedestrians	100 Km.
Barricading of footpaths-Footpaths to be barricaded with openings only at strategic locations to regulate pedestrian movement, to improve traffic safety and also pedestrian safety	10,000 m
Raised Crosswalks/Pelican Signals-the pavement is raised by a smooth gradient such that the vehicles have to slow down when they encounter them and in the meanwhile the pedestrians can safely cross the road, particularly with the help of pelican signals	50 Locations
Pedestrian Walkovers-to be provided at high pedestrian activity links and zones	10 Locations

5. TRAFFIC CONTROL & REGULATION

Tubular Cones-for ensuring Lane Discipline	10,000 Nos.
Deployment of additional manpower-for better regulation	500 Home Guards
Vehicle Actuated (VA) and synchronized traffic system-to reduce congestion through efficient movement of vehicles	VA for all existing RTS (160) Synchronization of 5 corridors
Traffic Signage-for proper guidance of vehicular traffic	300 Km of arterial roads
Traffic Control center, Monitoring Cameras and Variable Message Systems (VMS)-Application of Intelligent Transport Systems (ITS)	Control center at P.U.B 50 Cameras 50 VMS

6. TRAFFIC MANAGEMENT

Traffic Management Plans-controlling the traffic, imposing regulatory measures and enforcing traffic management techniques like one ways etc.	Central area review and Improvement
Banning of Right and U-turns	30 Locations
Banning of entry of certain types of vehicles	50 Locations
Local Area Traffic Management Plans-Formulating traffic management plans for residential or local areas with scientific approach for the safety of the residents, particularly senior citizens and children	6 areas: Rajajinagar, Jayanagar, Indiranagar, Koramangala, BTM Layout, RT Nagar
Dedicated Auto Lanes-To restrict movement of autos to left lane so that other vehicles can ply smoothly	20 Roads

7. TRAFFIC ENFORCEMENT

Automated Enforcement-Issue of computerized challans to offenders for better enforcement and deterrence	Use of 200 simputers for enforcement Issue 5,000 challans per day
Suspension/revocation of DLs/Permits	For repeat offenders

8. TRAFFIC EDUCATION & PUBLICITY

Education Campaigns-to educate the road users for the various precautionary measures to use the roadway facilities with safety and to follow road rules	Various interventions including hoardings, media, meetings, etc.

9. PUBLIC INTERFACE

Traffic Help Desk-setting up of a modern help line which is a citizens' grievance redressal forum	To function on the lines of a professional customer relationship management center

Local Area Committees/Public Suggestions-To be set up to voice the problems faced in the respective residential/local areas and to find local solutions with citizen participation	In the 35 traffic police station areas
Public Private Partnership-Projects to improve traffic conditions to be taken up through Public Private Partnership	Involvement of the private sector as partners in traffic improvement

10. ROAD SAFETY

Accident Analysis and Reduction Program-systematic identification, analysis and treatment of hazardous locations on roads commonly termed as black spots	100 most accident prone locations to be treated
School Area Safety-to improve Road Safety of Children around schools.	50 Schools

Indicative service delivery targets, specific to roads and road infrastructure, are given in Table 63.

Table 63: Standards for Road Infrastructure

Parameter	Current Status	Short Term	Medium Term	Long Term
Length of good quality roads	80% tarred	All	All	All
Pavements	Only on main roads	All	All	All
Absence of potholes, depressions and waves		70% of the roads	70% of the roads	90% of the roads
Signage and markings on main roads		All	All	All

3 Project Identification

Projects envisaged to be taken up are based on the strategy outlined in the previous section, and are delineated in the following sections under various categories.

3.1 Ring Roads

The projects envisaged comprise construction, operation, and maintenance of the following:

- **Elevated Core Ring Road**: It is proposed to develop an elevated Core Ring Road along with key axial roads, with the objective of decongesting the city. The proposed length of the elevated core ring road is 29.5 km, with an equivalent length proposed for axial roads, which would be connecting the elevated core ring road to different parts of the City. The project is proposed to be developed in 2007-2012 and the costs of construction of the elevated core ring road and the axial roads have been assumed at Rs. 50

Crores per km and Rs. 10 Crores per km respectively. Figure 18 indicates the alignment of the CRR.

- **Peripheral Ring Road:** It is proposed to construct a Peripheral Ring Road, for a length of 114 km around Bangalore, at a radial distance of 2.80 to 11.50 km from the existing ORR. The proposed road would be a 6-lane bi-directional divided carriageway. The road will be on par with IRC standards with 1.5-meter central median on a 100 meters right-of-way. The project is proposed to be developed in two equal phases spanning over the implementation periods of 2007-2012 and 2013-2017. The cost of construction is assumed at Rs. 10 Crore per km of road length. The alignment of the PRR is indicated in Figure 20.

3.2 Improvements to Key Roads

Other than the ring roads and associated axial roads being improved, it is proposed to improve other key roads in the City:

- **Arterial Roads:** These roads include the roads connecting important roads like National Highways and State Highways, those leading to well developed commercial centers and important entry and exit points to and from the city, like the Airport, the Railway Station etc. Arterial Roads also include the roads that run along the periphery of the city.
- **Sub-arterial Roads**: These roads connect the arterial roads.
- **Link Roads:** These roads include local roads that take off from the residential layouts and join the sub-arterial roads.

It is proposed to undertake rehabilitation of a part of the city roads in 2007-12. The normative standards assumed for rehabilitation are Rs. 80 lakh/km, Rs. 60 lakh/km and Rs. 40 lakh/km of arterial roads, sub-arterial roads and link/collector roads, respectively. The lengths of the roads proposed to be rehabilitated are 5% of the total road length under each of the three categories.

3.3 Railway over Bridges (ROB) & Railway under Bridges (RUB)

ROB and RUB are proposed to be constructed at key locations in the City. The projects are proposed to improve the connectivity and the indicative locations are listed below:

- Nehru Circle Seshadripuram RUB;
- Cantonment Station RUB;
- Frazer Town RUB;
- ROB at ITC factory level crossing;
- ROB at Lingarajapuram level crossing; and
- ROB at crossing of outer ring road and Chennai railway line.

These ROB and RUB are proposed to be constructed at an estimated cost of Rs. 160 Crores.

3.4 Bus-based Transport Systems

3.4.1 High-capacity Buses on ORR

A proposal to develop a high-capacity bus system on the Outer Ring Road is under development. The bus system would have a dedicated corridor in contiguous stretches where width is available, and operate new technology buses designed for urban environment. The fare would be affordable and worked out on the basis of route zones, with higher fare for points more distant from the terminal points. Both the BMTC and commuters will benefit, while the City as a whole will have a better image with reduced congestion, lesser air pollution, and a better public transport system.

The project involves infrastructure such as bus lanes, road improvement, upgrading bus terminals, traffic signals, and bus stops. The buses shall have two-way radio communication facility. The estimated cost of the first phase of the High-capacity Bus System is Rs.40 Crore. The expenditure involves 25 articulated buses, specially designed for City routes with seating capacity up to 250 and additional room for standing passengers.

3.4.2 The Grid-route Concept

BMTC at present operates services on 1,726 routes by utilizing 4,185 buses. 25 high-density trunk corridors have been identified for increased frequency of services, and providing direction-oriented services in place of the present destination oriented services. These 25 routes are more or less straight-line routes moving from South to North, East to West, and also diagonally from South-East to North-West and South-West to North-East. Two circular routes one in the central CBD area and the other at the outer ring road area are planned. BMTC has started operation of buses on these 25 grid routes.

3.4.3 Other Initiatives of BMTC

1. **Augmentation of Schedules and Fleet**: BMTC has planned to augment 2,407 new schedules taking the schedule strength to 6,234 by March 2010. It is proposed to add 2,528 new vehicles exclusively for augmentation by inducting new type of buses. It is planned to replace 1,415 old buses to maintain service standards. These buses will be used for providing specific services as proposed below:
   - 1000 peak hour split services leads to peak hour decongestion (BMTC)
   - 1000 state of the art buses for ladies, children and senior citizens and others in BRTS and grid routes (GOK and BMTC)
   - 1020 layout rounds with battery operated mini buses (BMTC)
   - Euro-III buses (BMTC)

2. **Strengthening of Depots:** BMTC shall strengthen its workshops for preventive maintenance.

3. **New Depots**: BMTC proposes to add 24 new depots taking the strength to 51. BMTC shall also
4. **New Bus Stations**: Currently four major bus stations and 27 sub-nodal bus stations are operating to which BMTC plans to add another 23 bus stations.
5. **Commuter's Amenity Centre**: This is necessary for the benefit of commuters. The corporation proposes to construct 45 Commuters' Amenity Centres in Bangalore city by utilising the present depot land area. All facilities required for commuters such as banking facilities, various reservation counters, pass issue counters, medical assistance etc., will be made available. Parking facilities can also be created at multi-floor spaces, which facilitate and promote park and ride concept BMTC proposes to construct 45 such centers by utilizing the present depot area.
6. **Bus Shelters on the ORR**: BMTC has proposed to construct 288 bus shelters along the Outer Ring Road at every half kilometer apart on either side of the road.
7. **Skywalks on ORR**: BMTC proposes to build Skywalks (pedestrian overpasses) at about 144 places.
8. **Establishment of Training Centers**: BMTC proposes to procure 50 acres of land, for including all high technology activities in the building of a training institute. BMTC is proposing to establish well-designed employee training activities, for developing the skill base.
9. **Rain Water Harvesting at Depots**: BMTC proposes to establish 25 rainwater-harvesting plants at depots and workshops.
10. **Works Related to Environmental Concerns**: Environmental aspects include protecting the environment by reducing air pollution, water pollution, and noise pollution. For this, BMTC is proposing environmental activities at 45 locations. BMTC is also proposing to introduce Depot-wise emission checking (BMTC), and obtain ISO 9001 and 14001 certification.
11. **Solar Lighting Systems:** BMTC proposes to install solar lighting systems at all Depots and Bus Stations, thereby reducing electricity consumption in its facilities.
12. **On-Line GPS System**: BMTC has gained experience in the usage of GPS technology for monitoring and tracking of vehicles and has now planned to implement on-line GPS technology on all vehicles on a BOOT format.
13. **Online PIS and IVRS system**: In order to provide commuter friendly information, BMTC proposes to transfer the GPS generated positional details of the buses to commuters in the form of Passenger Information System (PIS) and Interactive Voice Response System (IVRS).
14. **Electronic Destination Boards**: BMTC proposes to introduce electronic display systems with three multilingual destination boards, at the front, back, and the side of the bus.
15. **Electronic Ticketing System**: A high-tech ticketing system using smart cards or electronic ticketing system (automatic fare collection system) is proposed to be provided.
16. **Computerization of Depots**: All 24 depots have been computerized and BMTC intends to computerize other activities like administration, traffic, etc.
17. **Computerization of Corporate Office**: It is planned to implement projects like file tracking system, local email, and data server, etc.

18. **Surveillance System:** For improving security, it is proposed to install Closed Circuit TV (CCTV) at depots and bus stations, and establishment of a Central Control Room.

3.4.4 Club-pyramid Project

There are proposals to use the right-of-ways adjacent to large storm-water drain systems, and the air-space over such drains, to create elevated new bus corridors that can benefit the commuting public, including the urban poor, in an affordable and non-congesting manner. These elevated bus lanes would open new corridors, and thereby bypass the constraints of road widths on existing corridors. The costing and feasibility for this project shall be done after the CTTS for Bangalore is completed.

3.4.5 Inter-modal Interchanges

Two inter-modal interchanges are planned to be developed on a PPP basis. The first such interchange is already under bid – the Kempe Gowda bus terminus at Subhashnagar is proposed to be converted into an interchange that accommodates the BMTC, KSRTC, BMRC, and a "city center" complex. The second interchange is proposed at Byappanahalli, which will have the BMTC, KSRTC, Railways, BMRC, and the Airport Rail Link.

3.5 B-TRAC 2010

Bangalore City Police have envisaged the Bangalore Traffic Improvement Program (B-TRAC 2010), with an estimated cost of about Rs. 350 Crore, and for the financial year 2006-07, the Government has set apart Rs. 44 Crore. The objectives of B-TRAC 2010 would be two-fold:

- Operational Objectives:
  - Reduce traffic congestion by 30% in the central area of Bangalore City;
  - Reduce accidents by 30% in the city of Bangalore;
  - Achieve significant reduction in pollution;
  - Achieve substantial compliance of Traffic Laws and Rules; and
  - Set up an effective Trauma Care System.

- Institutional Objectives:
  - Coordinated traffic management by developing mechanisms for the same, like institutionalizing Traffic Task Force, Road Safety Committee, Traffic Action Committee, etc;
  - Robust revenue model (traffic funds to pay for traffic management infrastructure and maintenance);
  - Legal and Institutional reforms;
  - Capacity Building (modernizing and upgrading of Traffic Training Institute etc.); and
  - Strengthening of the traffic police force by augmenting officers and staff, provision of civil and communication infrastructure.

- Benefits
  - Traffic congestion will be reduced by 30% in the Central Area of Bangalore City;
  - Accidents will be reduced by 30%;
  - There will be significant reduction in pollution;
  - Substantial compliance of Traffic Laws and Rules will be achieved
  - Effective Trauma Care System will be set up;
  - Coordinated traffic management will be achieved;
  - Level of traffic and road safety awareness will be enhanced; and
  - State of the art traffic policing and regulation will lead to substantial compliance.

Table 64 shows the estimated costs for B-TRAC activities over the years.

Table 64: Cost Phasing for B-TRAC

Component	2006-07	2007-08	2008-09	2009-10	2010-11	Total Cost (Rs. Crore)
Junction Improvement	2.00	7.00	7.00	7.00	7.00	30.00
Street Furniture and Road Marking	5	23.75	23.75	23.75	23.75	100
Intelligent Transport System including ATC, VMS etc for 250 intersections	30.00	30.00	30.00	30.00	30.00	150.00
Surveillance / Monitoring and enforcement cameras etc	5.00	11.25	11.25	11.25	11.25	50.00
Education, Publicity and Training / Others	2.00	4.50	4.50	4.50	4.50	20.00
TOTAL	**44.00**	**76.50**	**76.50**	**76.50**	**76.50**	**350.00**

3.6 Airport Rail Link

The Airport Rail Link (ARL) project envisages commencement of dedicated high-speed airport rail service between the city and the new international airport. The project is proposed to be developed under a public private partnership framework with Infrastructure Development Department (IDD) of GoK being the nodal agency.

The ARL shall link the Bangalore International Airport to Bangalore city at Byappanahalli, by rail. The project also proposes to have check-in facility at the

railway station itself for the air passengers. The preliminary studies for the project have been completed, and the preparation of detailed project reports is underway.

The airport rail link is proposed to be constructed during the period 2007-12 at an estimated capital expenditure of Rs. 600 Crore. The land requirement for the project is approximately 78 hectares, which has been assumed to be acquired at a cost of Rs. 0.8 Crore per hectare. The rolling stock comprises 18 wagons at a cost of Rs. 7 Crore per wagon.

3.7 Development of Commuter Railway System

The CRS project is been viewed as an option in improving the City infrastructure and reducing road congestion. The process comprises of integrating the commuter rail project providing connectivity on existing surface railway lines in Bangalore with the proposed metro rail project. The commuter rail project envisages providing a mass urban transportation system along the existing railway lines covering 62 km on the north-south and east-west axis of the City — from Kengeri to Bangalore City Railway Station, to Yeshwantpur, and Whitefield via Cantonment and Yeshwantpur to Byappanahalli via Hebbal.

The project is proposed to be developed in two equal phases spanning over the implementation periods of 2007-2012 and 2013-2017. The estimated capital expenditure for the total project is Rs. 650 Crore, with Rs. 325 Crore being incurred in each block. The land requirement for the project is approximately 62 hectares, which has been assumed to be acquired at a cost of Rs. 3.2 Crore per hectare. The rolling stock comprises 26 wagons at a cost of Rs. 10 Crore per wagon.

3.8 Bangalore Metro Rail

The Metro-Rail Project is proposed as a mass transport system to decongest the traffic in the City roads. Planning commission of India has accorded its “In-principle” approval in February 2004. The Karnataka State Cabinet approved the project on 03-03-2005 and gave its go-ahead to land acquisition, preliminary works like short listing of vendors/contractors and identification and shifting of utilities. The Project Investment Board has (PIB), and the Cabinet Committee in Economic Affairs (CCEA) has approved the project, and the Japanese Bank for International Cooperation (JBIC) has accorded its approval for debt finance to the project. The implementation period will be 5 years.

The metro system is configured on two busy corridors of the City-East-West and North-South on similar lines as the Delhi Metro Railway. The East-West corridor is to start at Byappanahalli and end at Mysore Road/Ring Road junction, a total length of 18.1 km. The North-South corridor is to start form Yeshwantapur in the North and extend up to JP Nagar in the South, a total length of 14.9 km. The two lines would be crossing each other at Majestic, close to the City Railway station, where a rake interchange line connecting the two corridors is proposed. Figure 19 shows the map of the proposed metro system.

The Project highlights are:

- North-South Corridor - 18.40 km
- Total - 36.50 km
- Elevated - 29.15 km·
- At Grade - 00.65 km
- Underground - 6.70 km
- Gauge - Standard Gauge
- Traction - 750 V dc Third Rail
- No. of Stations - 35
- Travel Time -33 Mins. (End to end)

Based on the construction cost estimates provided in the DPR, the completed cost of the Project is estimated at Rs. 5,605 Crore. However, since the financing for this project is by a different means, and has been tied up, the CIP does not include this project.

3.9 Other Road/Transport Related Projects

There are other projects in the sector, that are smaller but critical, and these include:

- Construction and rehabilitation of footpaths and medians;
- Construction of subways, skywalks;
- Development of pedestrian/ cycling zones;
- Rehabilitation and installation of street lights;
- Multistoried car parking facilities;
- Improvement of junctions and traffic management systems;
- Asphalting of 1,500 km of internal roads; and
- Construction of flyovers and grade separators.

The projected investments for these projects have been estimated on benchmark costs by the concerned agencies, and indicated in the CIP.

4 Investment Plan for Roads & Transportation

Table 65 and Table 66 show the estimated investment for transport infrastructure projects, in the JNNURM and Vision Periods.

Table 65: Investment Plan for Transport Infrastructure – JNNURM Period

Description	2006-07	2007-08	2008-09	2009-2010	2010-2011	2011-2012	Total (Rs. Crore)
Capital Expenditure							
Roads	492.5	568.2	644.0	681.9	681.9	719.7	3,788.1
Inter-modal transit centers	65.0	75.0	85.0	90.0	90.0	95.0	500.0
Commuter rail system	42.3	48.8	55.3	58.5	58.5	61.8	325.0
Other mass transit system	94.1	108.6	123.1	130.3	130.3	137.6	724.0
ROBs / RUBs	20.8	24.0	27.2	28.8	28.8	30.4	160.0
Total-CAPEX	**714.6**	**824.6**	**934.5**	**989.5**	**989.5**	**1044.5**	**5,497.1**
Operation and Maintenance Expenses							

Description	2006-07	2007-08	2008-09	2009-2010	2010-2011	2011-2012	Total (Rs. Crore)
Roads	24.4	28.2	32.0	33.8	33.8	35.7	188.0
Inter-modal transit centers	32.5	37.5	42.5	45.0	45.0	47.5	250.0
Commuter rail system	4.1	4.8	5.4	5.7	5.7	6.1	31.9
Other mass transit system	8.2	9.5	10.7	11.4	11.4	12.0	63.2
ROBs / RUBs	4.2	4.8	5.4	5.8	5.8	6.1	32.0
Total-OPEX	**73.5**	**84.8**	**96.1**	**101.7**	**101.7**	**107.4**	**565.1**
Land Acquisition							
Commuter rail system	12.9	14.9	16.9	17.9	17.9	18.8	99.2
Other mass transit system	8.1	9.4	10.6	11.2	11.2	11.9	62.4
Total-LA	**21.0**	**24.2**	**27.5**	**29.1**	**29.1**	**30.7**	**161.6**
Rolling Stock	170.6	196.8	223.1	236.2	236.2	249.3	1,312.1
Grand Total	**979.7**	**1,130.4**	**1,281.1**	**1,356.5**	**1,356.5**	**1,431.8**	**7,536.0**

Table 66: Investment Plan for Transport Infrastructure – Vision Period

Description	2007-12	2013-17	2018-22	2023-27	2028-31
Capital Expenditure					
Roads	3,788.1	8,034.7	10,671.6	14,982.0	17,816.0
Inter-modal transit centers	500.0	500.0	0.0	0.0	0.0
Commuter rail system	325.0	325.0	0.0	0.0	0.0
Other mass transit system	724.0	124.0	0.0	0.0	0.0
ROBs / RUBs	160.0	64.0	0.0	0.0	0.0
Total CAPEX	5,497.1	9,047.7	10,671.6	14,982.0	17,816.0
Operation and Maintenance Expenses					
Roads	188.0	380.3	555.2	765.0	974.9
Inter-modal transit centers	250.0	250.0	250.0	250.0	250.0
Commuter rail system	31.9	63.7	63.7	63.7	63.7
Other mass transit system	63.2	75.6	75.6	75.6	75.6
ROBs / RUBs	32.0	44.8	44.8	44.8	44.8
Total OPEX	565.1	814.4	989.3	1,199.1	1,409.0
Land Acquisition					
Commuter rail system	99.2	99.2	0.0	0.0	0.0
Other mass transit system	62.4	0.0	0.0	0.0	0.0
Total Land Acquisition	161.6	99.2	0.0	0.0	0.0
Rolling Stock	1,312.1	130.0	0.0	1,056.1	0.0
Grand Total	**7,536.0**	**10,091.4**	**11,660.9**	**17,237.2**	**19,225.0**

Table 67 and Table 68 show the estimated capital investment for projects related to other transport amenities and facilities, in the JNNURM and the Vision periods.

Table 67: Investment Plan for Related Facilities – JNNURM Period

Description	2006-07	2007-08	2008-09	2009-2010	2010-2011	2011-2012	Total (Rs. Crore)
Capital Expenditure							
Road related infrastructure	36.4	41.9	47.6	50.4	50.4	53.2	279.8
Bus / Truck	136.3	157.2	178.2	188.7	188.7	199.2	1048.3

terminals							
Commuter's amenity centers	159.2	183.6	208.1	220.4	220.4	232.6	1224.3
Sky walks	0.7	0.8	0.8	0.9	0.9	0.9	5.0
Training Centers / Development Centers	100.3	115.8	131.2	138.9	138.9	146.6	771.8
Rain water harvesting	0.6	0.7	0.8	0.8	0.8	0.9	4.6
System upgradation	63.9	73.8	83.6	88.5	88.5	93.5	491.8
Miscellaneous[5]	19.7	22.8	25.8	27.4	27.4	28.9	152.00
Total CAPEX	517.1	596.6	676.2	715.9	715.9	755.7	3977.5
Operation and Maintenance Expenses							
Road related infrastructure	8.4	9.7	11.0	11.7	11.7	12.3	64.9
Bus / Truck terminals	5.4	6.2	7.1	7.5	7.5	7.9	41.6
Commuter's amenity centers	4.0	4.6	5.2	5.5	5.5	5.8	30.6
Sky walks	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Training Centers / Development Centers	2.5	2.9	3.3	3.5	3.5	3.7	19.3
Rain water harvesting	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Miscellaneous	0.4	0.5	0.6	0.6	0.6	0.7	3.4
Total OPEX	20.8	24.0	27.2	28.8	28.8	30.4	160.1
Land acquisition	92.6	106.8	121.1	128.2	128.2	135.3	712.2
Grand Total	**630.5**	**727.5**	**824.5**	**873.0**	**873.0**	**921.5**	**4849.8**

Table 68: Investment Plan for Related Facilities – Vision Period

Description	2007-12	2013-17	2018-22	2023-27	2028-31 (Rs. Crore)
Capital Expenditure					
Road related infrastructure	1449.4	639.9	392.4	365.9	440.2
Bus / Truck terminals	758.7	424.5	754.7	525.4	562.6
Commuter's amenity centers	886.1	443.1	443.1	443.1	132.9
Sky walks	3.6	1.8	1.8	1.8	0.5
Training Centers / Development Centers	558.6	279.3	279.3	279.3	83.8
Rain water harvesting	3.3	1.7	1.7	1.7	0.5
System upgradation	356.0	0.0	0.0	0.0	0.0
Miscellaneous	110.0	10.0	10.0	10.0	10.0
Total CAPEX	4125.8	1800.2	1882.9	1627.2	1230.5
Operation and Maintenance Expenses					
Road related infrastructure	139.5	168.6	194.7	231.8	268.9
Bus / Truck terminals	30.1	48.7	78.2	96.8	115.3
Commuter's amenity centers	22.2	38.1	38.1	60.3	82.5
Sky walks	0.1	0.2	22.3	22.4	22.5

[5] "Miscellaneous" includes works related for solar lighting at bus depots and junctions, online GPS system, electronic ticketing system, etc

Description	2007-12	2013-17	2018-22	2023-27	2028-31 (Rs. Crore)
Training Centers / Development Centers	14.0	12.4	12.5	26.4	40.4
Rain water harvesting	0.1	0.5	14.5	14.6	14.7
Miscellaneous	2.5	2.5	2.6	2.6	2.6
Total OPEX	208.5	271.1	362.9	454.8	546.8
Land acquisition	515.5	257.8	0.0	0.0	0.0
Grand Total	**4849.8**	**2329.0**	**2245.7**	**2082.0**	**1777.3**

5 Implementation Framework

Road and transportation related investments constitute the largest portion of infrastructure investment in the City, even excluding very large investments in the Metro-Rail. It is therefore vital to have adequate institutional capacity, frameworks, and coordination, to ensure that such investments can be mobilized and the projects implemented. Two important aspects of the framework are addressed in the following section, and these pertain to having a Unified Authority to coordinate between city agencies and implement the projects, and having capacity to carry out projects on a PPP format.

5.1 Unified Transport Authority

Currently a number of agencies directly or indirectly deal with urban transportation issues. Direct service providers are the BMTC and BMRC (when operational), Indian Railways (for CRS, when operational), and any operational agencies for other systems such as ARL or LRT/Monorail. Indirect service providers are the ULBs and Statutory Authorities for basic infrastructure, Traffic Police, and the Transport Department of GoK.

It is clear that there has to be very strong coordination between various agencies, not only in initial investments in creating a system, but also in its operations. The GoK is currently doing such coordination. However, GoK has recognized the clear need, also articulated in the National Urban Transport Policy, for a separate Urban Transport Authority. Such Authority will provide the necessary planning, coordination, and skill base that is needed to implement the critical and specialized urban transport function.

GoK has already passed a Government Order nominating a nodal officer to set in place the necessary frameworks for creating and empowering such an Urban Transport Authority for Bangalore.

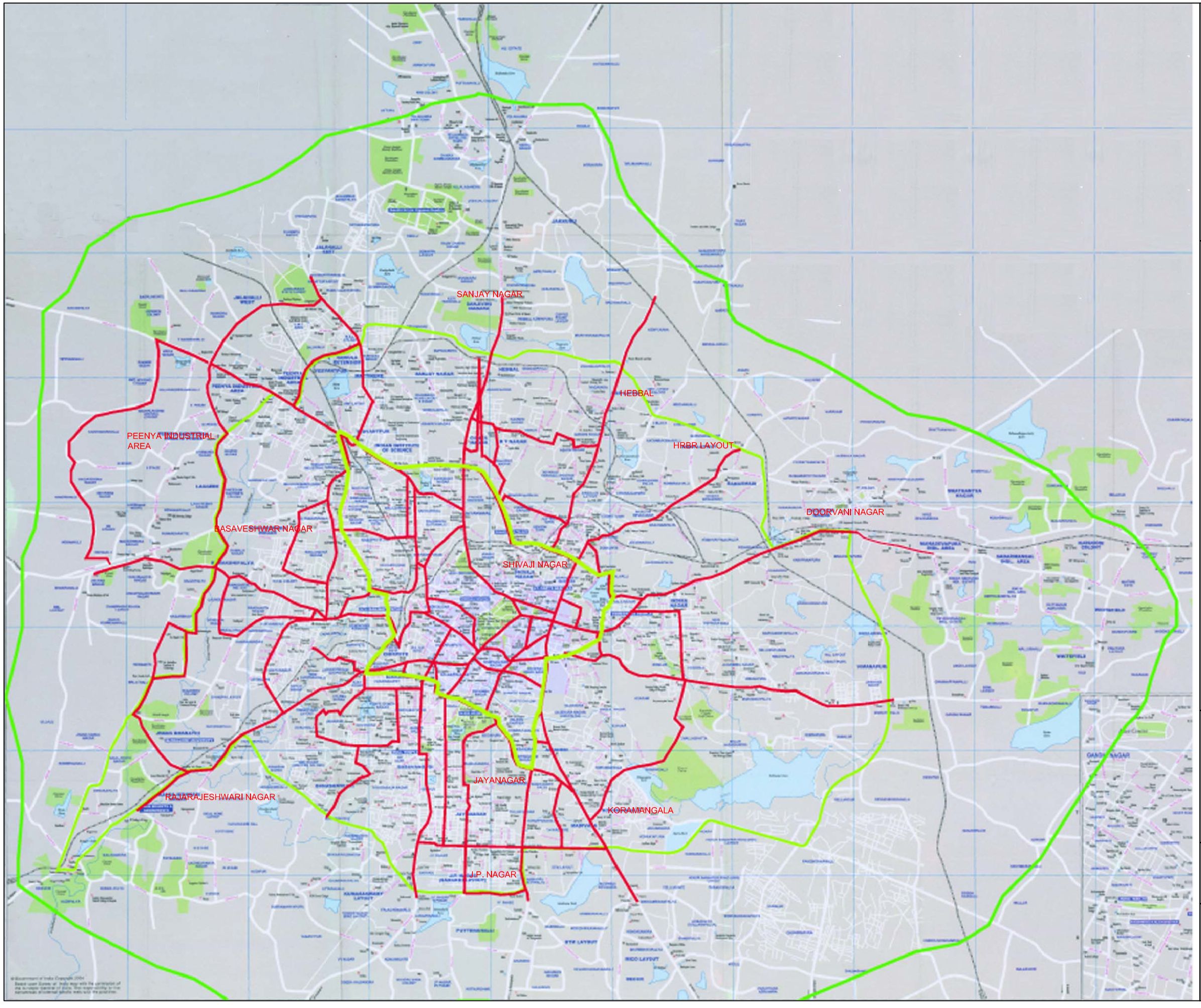
5.2 PPP Frameworks

Some of the projects discussed above may be funded on a PPP basis, where the entire cost would be met by the private sector partner, or through a viability grant support. Bangalore already has experience in setting in place several projects on a PPP format – notably, the new Bangalore International Airport and the elevated expressway from Electronic City to Silk Board Junction. BMP has also implemented projects for development of parking facilities/bus and truck terminals under appropriate PPP frameworks.

Going forward, some of the projects that are being contemplated on a PPP format are:

1. Airport Rail Link
2. Inter-modal exchanges
3. Parking complexes
4. Bus/truck terminals

GoK is currently revising its Infrastructure Policy to take into account the need for developing infrastructure projects on PPP basis, and setting in place the requisite policy framework.



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGENDS:

- Peripheral Ring Road
- Outer Ring Road
- Core Ring Road
- Traffic Corridors - 2015 with PHPDT >10000

Volume Capacity Ratio >0.75

TITLE:

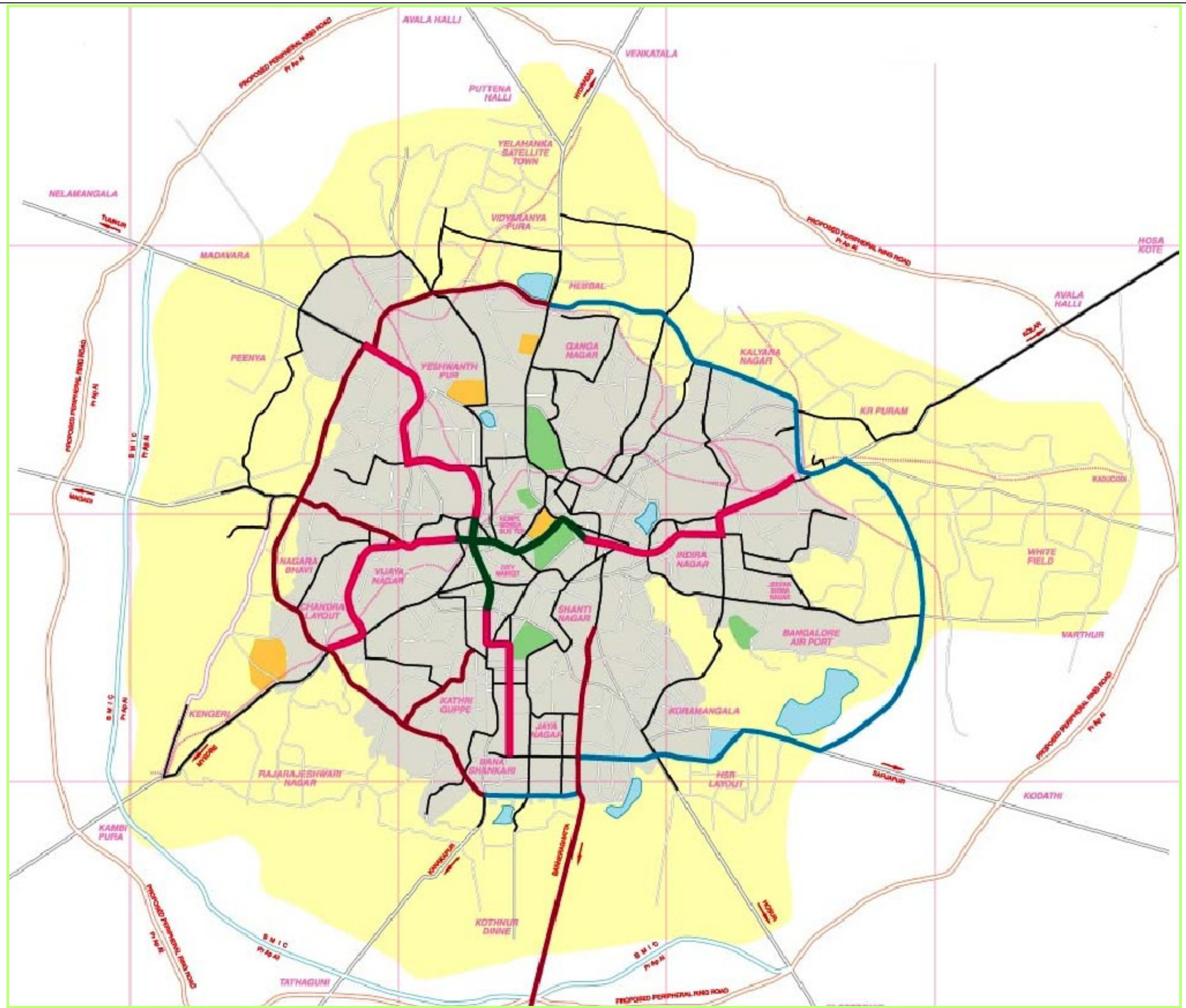
HIGH DENSITY TRAFFIC CORRIDOR

FIGURE NO: 18

SCALE : NTS

N

COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE



LEGEND:

- Metro above ground
- Metro under ground
- Monorail alignment
- Bus Rapid Transit system
- BMTC Grid routes
- Peripheral RR
- Outer RR
- Highway
- Arterial Road
- Street
- BMP Area
- Outer City

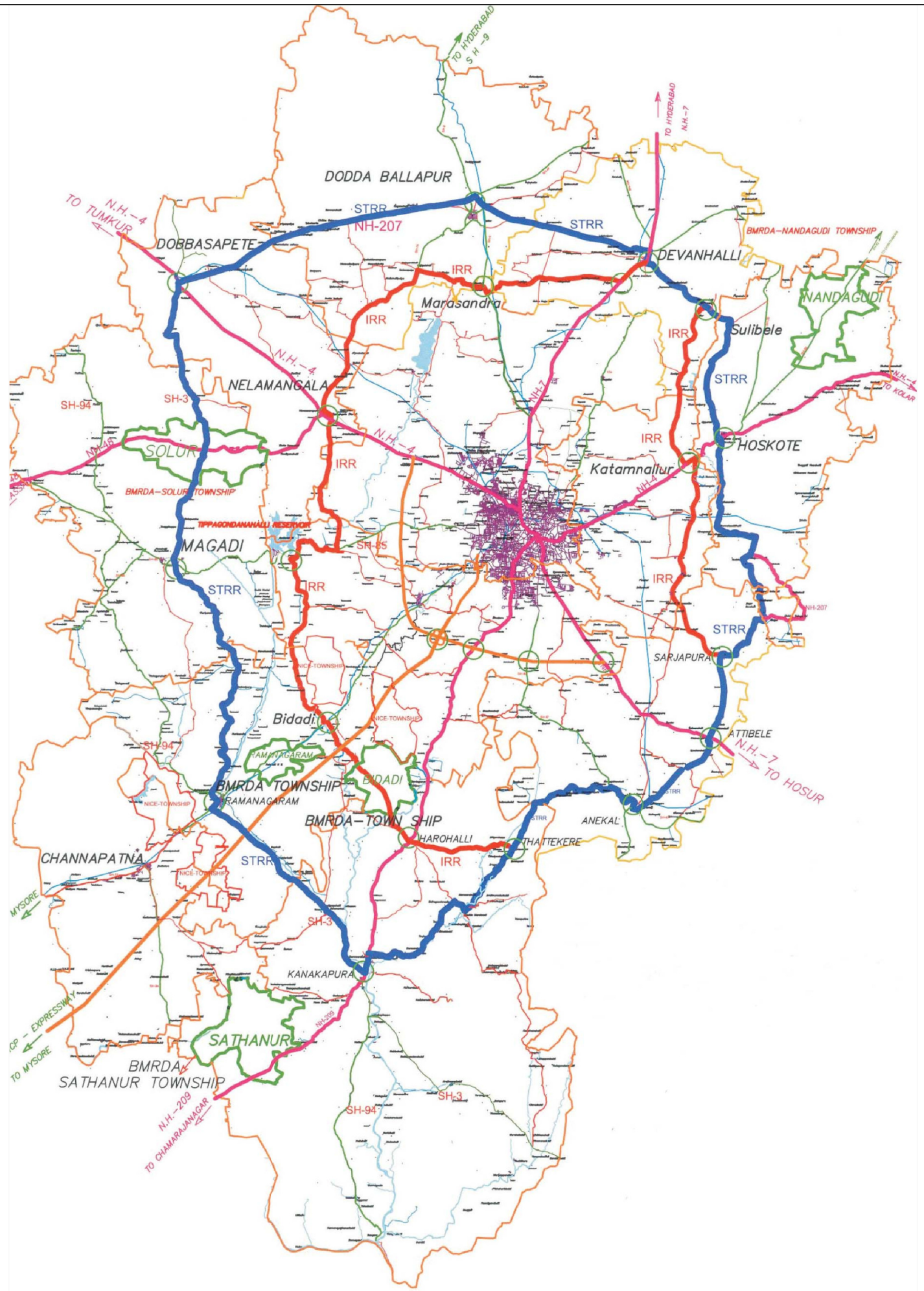
TITLE:

OVERVIEW OF CITY TRANSPORT SYSTEM

FIGURE NO: 19

SCALE : NTS

N



COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

LEGENDS:

- Taluk Boundary
- Intermediate Ring Road
- Satellite Towns Ring Road
- BMRDA Township
- NICE-Peripheral Road & Expressway
- National Highways
- State Highways
- Major District Roads
- Railways

TITLE:

ROAD SYSTEM IN BMRDA AREA

FIGURE NO: 20

SCALE : NTS

N

Chapter X Civic Amenities

1 Overview

The City has to provide certain "quality of life" civic amenities/facilities, apart from the basic urban infrastructure. "Civic Amenities" includes parks, lakes, streetlights, ULB-owned markets, etc. This chapter outlines these infrastructure/amenities and identifies investments required to improve the same in Bangalore.

1.1 Existing Situation

1.1.1 Parks

Important parks in Bangalore are:

- Lalbagh Botanical Garden (area - 97 acres, 1854 species, 673 gene and 890 cultivars of plants);
- Cubbon Park (68 genera, 96 species, total of 6000 plants/trees);
- Bannerghatta National Park, located 25 km from the city houses important flora and fauna;
- Dhanvantarivana at Jnana Bharathi, spread over 37 acres is a garden of medical plants and consists of 414 species; and
- Parks maintained by Department of Horticulture - 365 (well developed - 55, partially maintained - 130, undeveloped - 180).

There are other regulations and initiatives for open spaces and green areas:

- Land earmarked for park and open spaces in CDP, 1995: 77.9 sq. km. (14%);
- Requirement under BDA – not less than 15% of the area for parks and open spaces in any newly formed layout;
- 22 theme parks and 16 tree parks under "Greener Bangalore" being implemented by BMP and BDA;
- The Forest Department has raised plantations of around 130 sq. km by planting around 35 lakh plants; and
- BMP has developed 48% of the 560 parks in the City.

The budget for development of park and gardens is about Rs.59 Crore for 2005-06, out of which Rs.6 Crore is earmarked for maintenance.

1.1.2 Lakes

Around 25 lakes have been developed by initiatives taken by BDA, BMP and Lake Development Authority:

- Perceiving the imperative need to conserve the lakes in and around Bangalore, GoK constituted the "Lake Development Authority" in 2002. LDA so far has developed five lakes in Bangalore using funding from the National Lake Conservation Program fund;

- BDA has developed three lakes including the Lalbagh Lake;
- The Forest Department has also taken initiatives for development of 17 lakes, planned for maintenance of 11 lakes, and developed a Master Plan for five lakes; and
- BMP has developed four lakes.

1.1.3 Street Lights

In all, there are 2.5 lakh streetlights in Bangalore, 70% of which are in the BMP jurisdiction. Majority of the streetlights illuminating the roads are fluorescent and sodium vapor lamps. The provision of streetlights is in line with planning standards, which indicate 30 m spacing between streetlights, i.e. 33 streetlights per km of road. The position of available streetlights is shown in Table 69.

Table 69: Street Light Situation in ULBs

ULBs	Total	Streetlight Per km
BMP	1,75,019	50
Bommanahalli	12,786	25
Byatarayanapura	12,860	38
Dasarahalli	9,310	23
KR Puram	7,610	21
Mahadevapura	6,845	25
RR Nagar	13,296	61
Yelahanka	9,077	48
Kengeri	2,764	25
Total	**2,49,567**	**42**

1.1.4 BMP Markets

The City has created, under the BMP jurisdiction, several markets in the past. Among these are Malleswaram Market, Johnson Market, Russel Market, and KR Market. There are a number of other old properties owned by BMP at strategic locations. These can also be redeveloped to unlock value and provide better services to citizens. Such properties also require rehabilitation due to lack of maintenance, and surplus space to be commercially exploited with little or no investment from BMP.

1.2 Key Issues in Civic Amenities

The key issues in each of the aforesaid themes comprise:

- The main problems faced by lakes are eutrophication, mud lifting, brick making, and tile making, lake conversion and the encroachment of lakebeds, land-filling, garbage dumping and immersion of idols.
- While the existing parks suffer from lack of maintenance, development of parks and open spaces in new layouts would need to be actively enforced.
- Due to increase in working hours and economic activity during the night, and in order to ensure law and order and prevent crime, provision of street lighting is necessary in all areas.

- While ULBs have developed markets with an effort to provide improved commercial facilities, lack of marketing and proper maintenance have left the markets in poor conditions, in spite of being situated in prime locations.

2 Strategy for Improved Service Delivery

Bangalore has been a witness to the decline in the number of lakes and inadequate maintenance of parks, which are the symbols of Bangalore. Recognizing the need to revive the same, the City proposes to adopt a systematic approach to the creation and maintenance of civic infrastructure.

For Bangalore to retain its position as a "Green City," creation of urban spaces becomes imperative. The city envisages improving the quality of life for its citizens by implementing the following projects:

- Developing/redeveloping markets;
- Creating green spaces and social forestry, and efficient maintenance of its existing parks/green assets; and
- Introducing pedestrian only/cyclist only zones.

3 Project Identification & Costing

The concerned agencies have proposed certain projects that are to be taken up in this sector, and these are indicated in the following section.

3.1 Investment Plan for Civic Amenities

3.1.1 Projects in Implementation Period

DEVELOPMENT OF EXISTING & NEW PARKS

Parks, playgrounds, urban forestry, etc., cover an area of approximately 14% of the total area of the city vis-à-vis the norm of 20%. The cost of development has been assumed as Rs. 50 lakh and Rs. 25 lakh, for parks in BMP area and ULBs, respectively.

DEVELOPMENT OF MODERN ABATTOIR

At present, there are slaughterhouses at Yeshwanthpur, Frazer Town and Tannery Road – these do not have modern facilities and are located within the City. Subsequently, the High Court of Karnataka obligated BMP to set up a modern slaughterhouse outside the City. For this purpose, BMP has identified land for developing a modern abattoir at Iggalur in Anekal taluk. The estimated capital investment is Rs. 30 Crore.

FIRE SYSTEMS

Fire systems in the City are proposed to be upgraded to reduce the response time for emergencies. The stations are to be located in zones formed on a scientific basis, with modern equipment. The project components proposed include:

- Expansion of services in areas not covered;
- Procurement of plant and machinery;
- Modernization of the system and functions; and
- Capacity building and skill enhancement.

REDEVELOPMENT OF LAKES & URBAN AFFORESTATION

The projects proposed include development of recreational spots, fencing, desilting of lakes, diversion of sewage, prevention of garbage dumping in the lakes and initiation of activities such as gardening.

DEVELOPMENT OF MARKETS

BMP proposes to develop the following markets under a PPP format:

- Cox Town Market
- Johnson Market
- Krumbigal Road Market
- Malleswaram Market
- Seshadripuram Market
- Cubbonpet Market
- Ulsoor Market
- Yediyur Market

3.1.2 Estimated Capital Investment Requirement

Table 70 indicates the estimated investment in Civic Infrastructure projects, during the JNNURM period. Table 71 indicates the estimated investment in Civic Infrastructure projects, during future blocks.

Table 70: Investment Plan for Civic Infrastructure - JNNURM Period

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total (Rs. Crore)
Capital Expenditure							
Existing and new parks	0.8	0.9	1.0	1.1	1.1	1.1	**6.0**
Fire system	11.2	13.0	14.7	15.6	15.6	16.4	**86.5**
Lake redevelopment and afforestation of valleys	10.5	12.2	13.8	14.6	14.6	15.4	**81.0**
Development of Markets	6.5	7.4	8.5	9.0	9.0	9.5	**50.0**
Development of modern Abattoir	3.9	4.5	5.1	5.4	5.4	5.7	**30.0**
Total-CAPEX	**32.9**	**38.0**	**43.1**	**45.7**	**45.7**	**48.1**	**253.5**
O&M Expenses							

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total (Rs. Crore)
Existing and new parks	0.0	0.0	0.2	0.3	0.3	0.4	**1.2**
Lake redevelopment	0.0	0.0	3.2	4.1	4.1	4.9	**16.2**
Fire system	0.0	0.0	3.5	4.3	4.3	5.2	**17.3**
Development of Markets	0.0	0.0	2.0	2.5	2.5	3.0	**10.0**
Development of modern Abattoir	0.0	0.0	1.2	1.5	1.5	1.8	**6.0**
Total-OPEX	**0.0**	**0.0**	**10.1**	**12.7**	**12.7**	**15.3**	**50.7**
Land acquisition	**0.4**	**0.5**	**0.5**	**0.5**	**0.5**	**0.6**	**3.0**
Existing and new parks	0.4	0.5	0.5	0.5	0.5	0.6	**3.0**
Total	**33.3**	**38.5**	**53.7**	**58.8**	**58.8**	**63.9**	**307.2**

Table 71: Investment Plan for Civic Infrastructure – Vision Period

Description	2013-17	2018-22	2023-27	**2028-31 (Rs. Crore)**
Capital Expenditure				
Existing and new parks	6	6	6	**6**
Fire system	86	40	24	**25**
Lake redevelopment and afforestation of valleys	81	81	81	**81**
Development of Markets	100	150	100	**100**
Development of modern Abattoir	0	0	0	**0**
Total-CAPEX	**273**	**277**	**211**	**212**
Operation and Maintenance Expenses				
Existing and new parks	2	4	5	**6**
Lake redevelopment	16	16	16	**16**
Fire system	17	8	5	**5**
Development of Markets	30	60	80	**100**
Development of modern Abattoir	6	7	7	**7**
Total-OPEX	**71**	**95**	**113**	**134**
Land acquisition	**3**	**3**	**3**	**3**
Existing and new parks	3	3	3	**3**
Total	**348**	**374**	**327**	**349**

4 Implementation Framework

The projects to be implemented in the area of Civic Infrastructure shall be developed by the respective agencies. As far as possible, the projects shall be structured on a PPP basis. In some cases, sponsorship by private agencies, such as "Adopt a Lake/Park" scheme will also be adopted.

Chapter XI Tourism & Heritage Conservation

1 Overview

Bangalore is one of the most visited destinations – primarily due to its economic growth, but also as a tourist spot and as a transit hub for other tourist destinations in South India. The City also has heritage buildings and sites that reflect its culture and heritage. The emergence of Bangalore on the global technology map coupled with the increasing number of visitors would need translation into enhanced tourism potential for the city, while conserving its heritage.

1.1 Existing Situation

1.1.1 Tourism in Bangalore

Bangalore, which is known as the "Garden City" due to its gardens and parks, is one of the fastest growing cities in Asia. Bangalore has now transformed into a bustling metropolis providing numerous options for visitors, and in addition to its parks and gardens, now provides a multitude of modern attractions for the visitors - including global cuisine and a contemporary shopping experience.

1.1.2 Heritage Aspects

Bangalore is endowed with numerous heritage landmarks given its rich history including Vidhana Soudha, Tipu's Palace, Bangalore Palace, High Court Building and others as shown below.

BANGALORE PALACE

The palace is considered an architectural splendor in Tudor architecture. It was built by Chamaraja Wodeyar, Maharaja of Mysore in 1887.

TIPU'S FORT PALACE

The Fort was built by Chikkadeva Raya and was later extended, dismantled and rebuilt by Haider Ali and Tipu Sultan.

TIPU SULTAN'S SUMMER PALACE

Built all in wood, this elegant palace is situated to the west of Kote Venkataramana temple in the present Albert Victor Road. The construction of the palace was started by Hyder Ali Khan, but was completed by his son in 1791.

VIDHANA SOUDHA

The Vidhana Soudha houses the State Legislature, and is the largest Secretariat in India. Kengal Hanumanthaiah, Chief Minister of the then Mysore State was responsible for the concept, the structure and the setting of this building. Built entirely from Bangalore granite in the Dravidian style, it has floral motifs on stone carvings drawn from the celebrated temple craft of South India.

CUBBON PARK

In 1864, Lord Cubbon, the then viceroy of India, laid out 300 acres of verdant tranquility. Complementing the natural beauty of the park are the red Gothic structures of the State Central Library and the High Court.

ATTARA KACHERI (HIGH COURT)

Attara Kacheri literally means "eighteen offices" or departments. In 1864, Commissioner Bowring conceived and prepared the plans for setting up a full-fledged courthouse building. It is an impressive two-storied building of stone and brick, red in color and has been built in the Greco-Roman style.

SESHADRI IYER MEMORIAL HALL

The red building with gables, in Cubbon Park, was built to commemorate Sir K.Seshadri Iyer, who was the Dewan of Mysore State from 1883 to 1901. The building with the statue in front forms a focal point of a long avenue coming from Hudson Circle

MUSEUM

The State Archeological Museum is also a red Greco-Roman building. The original block was designed and built by Colonel Sankey, in 1876. Several wings have been added in the later years, all of which conform to the parent style. The original collection in the museum belonged to B. L. Rice of the Mysore Gazetteer.

LALBAGH GARDENS

Hyder Ali and Tipu Sultan laid out the 240-acre gardens during the 18th century. They contain a large collection of rare tropical and sub-tropical plants, century-old trees, fountains, terraces, lotus pools, rose gardens, and a deer park. Lalbagh has a magnificent glass house built in 1840, on the lines of London's Crystal Palace.

VISVESVARAYA INDUSTRIAL & TECHNOLOGICAL MUSEUM

The museum is a tribute to Sir M. Visvesvaraya, one of the architects of modern Karnataka. There is a comprehensive range of exhibits on electronics, motor power, and the uses and properties of wood and metal, with display of an airplane and steam engine in its compound.

JAWAHARLAL NEHRU PLANETARIUM

Founded in the year 1989, to commemorate the birth centenary of Jawaharlal Nehru, the Planetarium aims to introduce an awareness of astronomy. The sky theater with a dome of fifteen meters in diameter has a seating capacity of 225. It also has an observatory with a professional six-inch code refractor telescope.

BULL TEMPLE

The Bull Temple is famous its awesome monolithic deity of Nandi, the celestial bull, carved out in the typical Dravidian style of architecture. The size of the structure is 4.57 meters in height and 6.10 meters in length.

ST. MARY'S BASILICA

The Church situated opposite the Russel Market Square was built as a small chapel in 1818 by Abbe Dubois, but was later converted into an ornate Gothic style Church by Rev. L.E.Kleiner. By 1882 a large number of stained glass windows from Paris adorned the Basilica, but these were

removed during World War II. These were restored in 1947.

ULSOOR LAKE & SANKEY TANK

Ulsoor lake is centrally located, extended over an area of 125 acres and was constructed by Kempe Gowda during the second half of the second century.

Sankey tank was one of the tanks that played an important ecological role in maintaining the health and beauty of Bangalore. Major Sankey, the architect of the High Court, built it more than 100 years ago. A picturesque expanse of green lined, sky blue water and the surrounding park makes it a tourist attraction.

2 Strategy for Improvement

Tourism, when promoted efficiently, would be a growth engine for the entire State, with proven examples across the world of economies thriving only on this sector. At the same time, it is imperative that the heritage structures are preserved from the impacts of rapid urbanization. Key activities include:

- Branding and "top-of-the-mind" recall;
- Promotional activities for establishing the image of the city as a tourist destination;
- Developing the image of the city as a health and wellness centre;
- Promotion of theatre festivals, Bangalore Habba, museums in the city;
- Promotion of Meetings, Incentives, Conventions and Exhibitions (MICE) related tourism;
- Setting in place efficient support infrastructure including key transport linkages – air, road and rail;
- Promotion of theme based tourism, travel circuits, and new attractions;
- Private participation in provision of infrastructure facilities;
- Develop adequate support infrastructure viz., basic amenities, transportation facilities and information kiosks; and
- Build the capacity of implementing agencies and service providers.

3 Project Identification & Costing

Many tourism projects can be developed by the private sector – particularly with reference to hotels and resorts. However, there are projects in the basic tourism infrastructure area, which may not be directly viable, or may need to be developed as “catalysts” or boosting other tourism related outcomes. The projects taken up in the following section refer to this latter category.

3.1 Project Identification

RENOVATION OF HERITAGE BUILDINGS

It is proposed to renovate the 300 heritage buildings in the City in two equal phases at an estimated expense of Rs. 15 lakh per building for renovation.

DEVELOPMENT OF CULTURAL CENTERS, CONVENTION CENTERS, BUDGET HOTELS

- It is proposed to develop nine cultural centers during the JNNURM implementation period at an estimated expenditure of Rs. 1 Crore for each cultural centre.
- It is proposed to develop four convention centers during the JNNURM implementation period at an estimated expenditure of Rs. 4 Crore for each convention centre.
- It is proposed to develop four budget hotels the JNNURM implementation period at an estimated expenditure of Rs. 2 Crore for each hotel.

CONSTRUCTION OF TOURIST FACILITATION CENTERS

It is proposed to develop twenty tourist facilitation centers during the JNNURM implementation period at an estimated expenditure of Rs. 5 lakh for each centre.

LOCAL TOURIST SHUTTLES

It is proposed to procure Volvo buses under the project at a cost Rs. 65 lakh per unit.

INFORMATION KIOSKS/ CENTERS

It is proposed to develop nine such projects during the JNNURM implementation period at an estimated expenditure of Rs. 10 lakh for each project.

CONSTRUCTION OF TOILETS

It is proposed to develop ninety public-use toilets during the JNNURM implementation period at an estimated expenditure of Rs. 2 lakh for each toilet block.

DEVELOPMENT OF MULTI-STORIED PARKING FACILITIES

It is proposed to develop five parking places during the JNNURM implementation period in an area of approximately 1 acre. Permissible Floor Space Index has been assumed at 2.5 at an average construction cost of approximately Rs. 6,000 per sq. m.

SIGNAGE ADHERING TO INTERNATIONAL STANDARDS

The number of signs required has been estimated as one per 0.75 km stretch of main road at an average construction cost of Rs. 10 lakh per sign.

3.2 Estimated Capital Investment Requirement

Table 72 shows the estimated investment during the implementation period.

Table 72: Investment Plan for Tourism & Heritage - JUNNURM Period

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total Cost (Rs. Crore)
Capital Expenditure							
Cultural Centre	1.6	1.6	1.6	1.6	2.2	2.2	10.8
Local tourist shuttles / circuits / Heritage walks / ticketing	0.6	0.6	0.6	0.6	0.8	0.8	3.9
Facilitation centre for tourists	0.2	0.2	0.2	0.2	0.2	0.2	1.2
Toilets	3.2	3.2	3.2	3.2	4.3	4.3	21.6
Parking Spaces	5.3	5.3	5.3	5.3	7.1	7.1	35.3
Information Kiosks/ centers/drinking water	0.2	0.2	0.2	0.2	0.2	0.2	1.1
Signage conforming to international tourist norms	0.5	0.5	0.5	0.5	0.7	0.7	3.3
Renovation of heritage buildings	4.1	4.1	4.1	4.1	5.4	5.4	27.0
Convention Centers	1.4	1.4	1.4	1.4	1.9	1.9	9.6
Budget Hotel	3.2	3.2	3.2	3.2	4.3	4.3	21.6
Development of Bannerghatta Biological park	5.3	5.3	5.3	5.3	7.0	7.0	35.0
Total-CAPEX	**25.6**	**25.6**	**25.6**	**25.6**	**34.1**	**34.1**	**170.4**
Operation and Maintenance Expenses							
Cultural Centre	0.0	1.1	1.7	2.3	2.8	3.4	11.3
Local tourist shuttles/circuits/ Heritage walks/ticketing	0.0	0.0	0.0	0.1	0.1	0.1	0.3
Facilitation centre for tourists	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Toilets	0.0	0.2	0.3	0.4	0.5	0.5	1.8

Description	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total Cost (Rs. Crore)
Parking Spaces	0.0	0.3	0.4	0.6	0.7	0.9	2.9
Information Kiosks/ centers/drinking water	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Signage conforming to international tourist norms	0.0	0.0	0.0	0.1	0.1	0.1	0.3
Renovation of heritage buildings	0.0	0.2	0.3	0.5	0.6	0.7	2.3
Convention Centers	0.0	0.1	0.1	0.2	0.2	0.2	0.8
Budget Hotel	0.0	0.2	0.3	0.4	0.5	0.5	1.8
Development of Bannerghatta Biological park	0.0	0.7	1.1	1.4	1.8	2.1	7.0
Total-OPEX	**0.0**	**2.9**	**4.3**	**5.7**	**7.2**	**8.6**	**28.7**
Land Acquisition							
Cultural Centre	0.3	0.3	0.3	0.3	0.4	0.4	1.8
Toilets	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Parking Spaces	0.7	0.7	0.7	0.7	0.9	0.9	4.5
Convention Centers	0.3	0.3	0.3	0.3	0.4	0.4	2.0
Budget Hotel	0.7	0.7	0.7	0.7	0.9	0.9	4.5
Total-LA	**2.0**	**2.0**	**2.0**	**2.0**	**2.6**	**2.6**	**13.0**
Grand Total	**27.5**	**30.4**	**31.8**	**33.2**	**43.9**	**45.3**	**212.1**

Table 73 gives the estimated investment requirement in future blocks.

Table 73: Investment Plan for Tourism & Heritage – Vision Period

Description	2013-17	2018-22	2023-27	2028-31
	Rs. Crore			
Capital Expenditure				
Cultural Centre	12.6	6.8	14.0	18.0
Local tourist shuttles / circuits/Heritage walks/ticketing	4.6	2.9	5.5	6.9
Facilitation centre for tourists	1.4	0.9	1.7	2.1
Toilets	14.4	31.0	34.6	42.5
Parking Spaces	41.2	71.9	83.6	109.5
Information Kiosks/ centers/drinking water	1.3	1.4	2.1	2.5
Signage conforming to international tourist norms	3.9	23.8	26.0	27.2
Renovation of heritage buildings	31.5	19.8	37.8	47.7
Convention Centers	11.2	7.0	13.4	17.0
Budget Hotel	25.2	7.2	18.0	21.6
Development of Bannerghatta Biological park	35.0	0.0	0.0	0.0

Description	2013-17	2018-22	2023-27	2028-31
Total- CAPEX	**182.1**	**172.7**	**236.8**	**295.0**
Operation and Maintenance Expenses				
Cultural Centre	12.2	3.2	13.5	14.5
Local tourist shuttles/circuits/Heritage walks/ticketing	0.7	1.6	1.1	1.5
Facilitation centre for tourists	0.2	0.5	0.3	0.5
Toilets	2.7	13.0	6.3	8.5
Parking Spaces	5.9	13.1	17.6	24.7
Information Kiosks/ centers/drinking water	0.2	1.0	0.3	0.4
Signage conforming to international tourist norms	0.6	22.7	0.9	1.3
Renovation of heritage buildings	4.5	10.8	7.7	10.4
Convention Centers	1.6	3.8	2.7	3.7
Budget Hotel	3.6	5.6	6.1	8.3
Development of Bannerghatta Biological park	14.0	14.0	14.0	14.0
Land acquisition	17.4	0.0	0.0	0.0
Cultural Centre	1.8	0.0	0.0	0.0
Toilets	0.1	0.0	0.0	0.0
Parking Spaces	9.0	0.0	0.0	0.0
Convention Centers	2.0	0.0	0.0	0.0
Budget Hotel	4.5	0.0	0.0	0.0
Total-OPEX	**46.1**	**89.3**	**70.6**	**87.6**
Grand Total	**245.6**	**262.0**	**307.3**	**382.7**

3.3 Implementation Framework

The projects shall be implemented by the concerned agencies, using appropriate PPP frameworks. DoT would act as a facilitator for promoting tourism related activities, promoting Habba, and attracting private players.

SECTION - III City Investment Plan & Financial Sustainability

2006

Jawaharlal Nehru
National Urban Renewal Mission

Chapter XII City Investment Plan & Financial Sustainability

1 Investments in Urban Infrastructure

The following section summarizes the investments in urban infrastructure, over the JNNURM period, as well as the vision period. Investments are also categorized under various heads – expense related and agency related.

1.1 Investments in JNNURM Period

Following from the sector-wise investment analysis in the previous section (Section 2), the summary of the estimated investment requirements for the sectors during the JNNURM period is set out in Table 74.

Table 74: Summary of Sectoral Investments - JNNURM Period

Description	2006-07	2007-08	2008-09	2009-2010	2010-2011	2011-2012	Total (Rs. Crores)
Water Supply and Sewerage	126	236	437	628	628	728	2,783
Solid Waste Management	70	94	131	162	162	181	800
Roads	906	1046	1,298	1,396	1,396	1,494	7,536
Road related infrastructure	441	509	600	640	640	680	3,510
Urban Drainage	456	332	151	152	142	106	1,339
Urban Renewal	2	2	3	3	3	3	14
Other civic amenities	33	38	54	59	59	64	307
Tourism	28	30	32	33	44	45	212
Basic Services for Urban Poor	784	905	1,026	1,086	1,086	1,146	6,034
Grand Total	**2,847**	**3,193**	**3,730**	**4,159**	**4,160**	**4,447**	**22,536**

The investments set out in the above table have been estimated based on normative standards. The actual cost of the projects proposed to be implemented would be finalized at the time of preparation of DPRs, which would be posed for financial assistance under the JNNURM scheme.

The investment requirements for the projects have been categorized into four groups namely, capital expenditure, operations and maintenance expenses, costs towards land acquisition, and expenditure on rolling stock. Table 75 sets out the estimated investment requirement in these categories. The detailed breakup is provided in the Annexures.

Table 75: Breakup of Investments – Category of Expense

Sector	Capital Expense	O&M	Land Acquisition	Rolling Stock	Total (Rs. Crore)
Water Supply and Sewerage	963	1,811	8	-	2,783
Solid Waste Management	293	264	27	216	800
Roads	5,497	565	162	1312	7,536
Road related infrastructure	2,879	116	516	-	3,510
Urban Drainage	1,090	249	-	-	1,339
Urban Renewal	12	2	-	-	14
Other civic amenities	254	51	3	-	307
Tourism	170	29	13	-	212
Basic Services for Urban Poor	4,827	1,207	-	-	6,034
Grand Total	**15,986**	**4,293**	**728**	**1529**	**22,536**

1.2 Investments during Vision Period

While the above tables set out the estimated investment requirements for the JNNURM period (2007-12012), the development activities would continue in future years and the Vision for the City has been accordingly envisaged for a period of 25 years (till 2031). The capital investment requirements for the Vision period are set out in Table 76.

Table 76: Summary of Sectoral Investments – Vision Period

Description	2007-12	2013-17	2018-22	2023-27	2028-31 (Rs. Crore)
Water Supply and Sewerage	2,783	4,218	5,220	6,011	6,691
Solid Waste Management	800	949	1,099	1,270	1,462
Roads	7,536	10,091	11,661	17,237	19,225
Road related infrastructure	4,850	2,329	2,246	2,082	1,777
Urban Renewal	14	17	19	22	24
Other Civic Amenities	307	348	374	327	349
Tourism	212	246	262	307	383
Basic Services for Urban Poor	6,034	1,099	1,209	1,330	1,463
Grand Total	**22,536**	**19,296**	**22,090**	**28,586**	**31,374**

1.3 Agency-wise Breakup of Investments

The projects identified under the sectors shall be implemented by different agencies, and the summary of investment requirements for different agencies is set out in Table 77.

Table 77: Summary of Investments – Agency-wise Breakup

Agency	Water Supply & Sewerage	Solid Waste Management	Roads and Transport	Urban Renewal & Civic Amenities	Tourism	BSUP	Total (Rs. Crore)
BMP	0	582	4,529	210	0	6,034*	11,355
CMCs & TMC	0	218	431	0	0	0	649
BWSSB	2,783	0	0	0	0	0	2,783
BMTC	0	0	5,668	0	0	0	5,668
BDA	0	0	1,758	0	0	0	1,758
DoT	0	0	0	14	212	0	226
LDA	0	0	0	97	0	0	97
Total	**2,783**	**800**	**12,386**	**322**	**212**	**6,034**	**22,536**

*The expenditure towards BSUP component has been assumed to be funded by BMP. However, BMP, Karnataka Slum Clearance Board, Karnataka Housing Board, and the other concerned ULBs would actually source the fund requirements for the project.

1.4 Prioritization of Projects

Cities exist for its citizens, and the governance structure has to serve the citizens based on their needs and expectations. As discussed earlier, multiple stakeholder consultations were conducted, each commencing with a perspective of the vision of the City. The summary of the discussions and the inputs obtained from feedback forms (circulated physically, and made available on the internet) have provided a basis for the prioritization of projects.

1.4.1 Stakeholder Discussions

The City needs simultaneous interventions on various urban services to upgrade the quality of life. The emphasis on these interventions could be varied with some sectors yielding significant gains with appropriate governance frameworks, while most others would need infusion of capital. In a metropolis like Bangalore, these issues are always on the forefront, resulting in a competitive dynamics of various service providers. However, given the constraints imposed by available finances, ability to collect user fees, and prevailing governance structures, the interventions would need to be prioritized.

The following emerge as the priorities from these consultations:

STORM WATER DRAINS

The key activities include construction & rehabilitation of roadside drains, remodeling and strengthening, clearing silt, constructing of walls, laying of beds, provision of enabling & awareness information architecture and green area development.

IMPROVEMENT OF ROAD AND RELATED INFRASTRUCTURE

These include ring roads, improvements in key existing roads, railway over/under bridges, road drainage system, high capacity bus systems, grid route systems, dedicated bus lanes, rail link to international airport, development of commuter railway system and the metro rail.

REHABILITATION OF URBAN POOR

The rehabilitation of urban poor includes the provision of basic services including housing, internal roads, solid waste management, street lighting, community toilets and halls

WATER SUPPLY & SEWERAGE

The key priorities would be rehabilitation of bulk, transmission and distribution systems, and increase in service coverage.

MUNICIPAL SOLID WASTE MANAGEMENT

MSWM would include improvement in collection and transportation coverage and efficiency and development of treatment and disposal facilities.

2 Financial Sustainability Analysis

This section presents the financial operating plan for each agency (ULBs - BMP, 7 CMCs and 1 TMC, BDA, BWSSB, and BMTC) comprising the status of finances, drivers of growth, and the projections for the plan period. The analysis is based on discussions with respective officials and estimated benefits to the agencies due to reforms, resource mobilization, improved revenues, and implementation of efficient practices. The growth rate assumptions are presented in the Annexure.

2.1 Status of BMP Finances

Table 78 presents the finances of BMP.

Table 78: Status of BMP Finances

Item	2002 - 03	2003 - 04	2004 - 05	2005 - 06 (Rs. Crore)
Revenue Receipts				
Property Tax	191	198	227	258
Other tax revenues	76	24	3	11
Total Tax revenues	268	222	230	270
Non tax revenues	61	71	73	266
Operating Income	329	294	304	536
Revenue Grants	117	110	114	140
Total Revenue Receipts	**447**	**405**	**419**	**677**
Revenue Expenses				
Salary Expenses	106	105	112	122
Employee Retirement Benefits	23	27	32	34

Item	2002 - 03	2003 - 04	2004 - 05	2005 - 06 (Rs. Crore)
General Admin Expenses	26	13	22	74
General Expenses	13	17	23	21
Public Health	31	35	49	52
Roads and Maintenance	26	41	21	58
Others	10	5	9	68
Operating Expenses	237	247	272	431
Interest Payments	22	25	32	35
Total Revenue Expenses	**259**	**273**	**305**	**467**
Capital receipts				
Loans	69	171	220	205
Grants	45	24	23	0
Others	0	0	3	29
Total Capital Receipts	**115**	**196**	**246**	**235**
Capital Expenses				
Capital Expenditure	229	275	299	403
Loan Repayments	58	44	51	77
Other Expenditure	5	10	14	0
Total Capital Expenses	**293**	**330**	**365**	**480**
Revenue Surplus / (Deficit)	**188**	**132**	**114**	**210**
Capital Surplus / (Deficit)	**(178)**	**(134)**	**(119)**	**(245)**
Overall Surplus / (Deficit)	**10**	**(2)**	**(5)**	**(35)**

i. Despite an overall deficit, BMP maintains a cash surplus because of its resource base taking into account the changes in current assets and liabilities.

ii. BMP's operational income comprises property tax, Cess on the same, penalty payments, improvement charges, charges for khatha certificate, stamp duty, rents from leased properties and parking fees.

iii. BMP raises debt from financial institutions by escrowing property tax from relevant circles. BMP has already escrowed property tax from 16 of the 30 circles for raising a debt of Rs. 550 Crores towards capital works.

iv. Property tax comprises approximately half of the operating income and about 30% of total receipts (revenue and capital receipts).

v. Increase in property tax due to various measures including SAS scheme and widening of tax base

vi. Decline in revenues from stamp duty due to the downward revision of the same

vii. Corresponding increase in salaries and general administrative expenses has resulted in a deficit.

viii. Given that grants from GoK are being used primarily used for salaries, BMP continues to rely on loans from financial institutions for implementing capital works compared to internal funds.

ix. Grants have increased by 137% primarily due to the increase in SFC devolutions.

x. There is a drop of 96% in user fee due to the withdrawal of the pay and park system

xi. Increase in administrative expenses is primarily due to the 10 - fold increase in electricity charges.

xii. Marginal increase in revenues along with a significant increase in expenses has resulted in finances indicating a deficit.

2.2 Status of Finances of CMCs and TMC

Table 79 indicates the summary of finances of the 7 CMCs and the TMC. The individual finances of the ULBs are presented in the Annexure.

Table 79: Status of CMC & TMC Finances

Aggregate for CMCs & TMC	2000 - 01	2001- 02	2002 - 03	2003 - 04	2004 - 05*	2005 – 06 (Rs. Crore)
Opening Balance	-29	16	-14	-7	-1	15
Tax Receipts	200	66	19	35	76	80
Non - Tax Receipts	19	16	29	17	20	21
Grants	5	10	9	8	7	8
Total Revenue Receipts	**224**	**92**	**57**	**60**	**103**	**109**
Salaries	15	16	11	10	13	14
Other expenses	118	85	29	26	61	63
Total Revenue Expenses	**133**	**101**	**40**	**36**	**74**	**77**
Revenue Surplus / (Deficit)	91	(9)	17	24	29	32
Capital Receipts	**1**	**0**	**0**	**1**	**1**	**1**
Capital Expenses	**47**	**21**	**10**	**19**	**14**	**25**
Capital Surplus / (Deficit)	(46)	(21)	(10)	(18)	(13)	(24)
Overall Surplus / (Deficit)	45	(30)	7	6	16	8
Closing Balance	16	-14	-7	-1	15	23

i. The final financial details of the ULBs for the years 2004-05 and 2005-06 were not available at the time of preparation of this report, and are based on estimates.

ii. Over the past decade, the CMCs and the TMC have witnessed tremendous growth in economic activity primarily due to the IT / ITES industry coupled with real estate growth.

iii. Reasons for the same include availability of area, real estate costs, and development of self-contained residential / commercial enclaves.

iv. This has resulted in an increased tax collection, capital expenditure, and surpluses.

v. The receipts and expenses are characterized by sudden increases which are primarily due to ad-hoc collection drives in property and water taxes, surcharge on stamp duty etc. as witnessed in all ULBs in 2001 - 02.

2.3 Forecast of ULB Finances

i. Augmentation of revenues is likely to happen due to increase in assessed properties due to transfer of properties from BDA, widening of assessment base, levy of other Cess including solid waste management Cess, in addition to reform measures.

ii. It has been assumed that with the implementation of the reforms in the ULBs (viz., double entry accounting system, property tax reforms, levy

of user charges, internal earmarking for services to urban poor), there is likely to be an overall improvement in the revenues and surplus, and a decrease in expenses.

iii. In addition, the natural and migratory increase in growth would result in the more taxable properties and corresponding potential increase in property taxes which is a primary source of revenues to the ULBs.

iv. Key drivers of growth would include the following:
- population growth
- corresponding increase in number of properties
- progressive revision of property taxes
- reforms implementation
- implementation of capital works on need based approach
- user fees for full cost recovery

v. It is assumed that the past decade annual growth is likely to continue given the economic growth of Bangalore which would, coupled with periodic revision of tax rates, result in a corresponding increase in property tax and related revenues.

vi. Other events that are would affect revenue improvement include proposed GIS mapping of revenues, commercial exploitation of vacant sites, possible increase in commercial / residential space due to proposed increase in floor area ratio (FAR) by the proposed new Comprehensive Development Plan, and the proposed progressive increase in SFC devolutions.

vii. The surrounding CMCs and TMC are also likely to maintain the growth given the area availability and lower costs.

viii. The estimated finances of BMP and the aggregate of 7 CMCs and the TMC are presented in Table 80 and Table 81. ULB-wise projections are presented in the Annexure.

Table 80: Forecast of BMP Finances

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12 (Rs. Crore)
Opening Balance	(35)	(227)	1,026	2,245	3,453	4,719
Tax Revenues	436	640	644	649	653	809
Grants	129	129	129	129	132	252
User Fees	55	75	75	75	75	75
Receipts From Properties	24	24	24	24	24	24
Fees & Fines	85	97	100	109	119	130
Cess Collected on Property Tax	136	204	204	204	204	255
Deposits, Statutory Deductions etc	123	294	204	204	204	210
Total Revenue Receipts	**988**	**1,463**	**1,380**	**1,394**	**1,411**	**1,755**
Administrative Expenses	337	363	392	423	456	493
Health and Sanitation	69	72	76	80	84	88
Welfare Activities	44	44	44	44	44	44
Education Promotion Activities	9	9	9	9	9	9

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12 (Rs. Crore)
Financial Expenses - Interest on Loans	73	73	73	73	73	73
Repayment of Long Term Loans	0	0	0	0	0	0
Other Payments	96	196	196	253	253	291
Total Revenue Expenses	**628**	**757**	**790**	**882**	**919**	**998**
Capital Receipts	614	675	743	817	899	989
Capital Expenditure	1,165	124	117	120	124	127
Revenue Surplus / (Deficit)	360	706	590	512	492	757
Capital Surplus / (Deficit)	(551)	551	626	697	775	862
Overall Surplus / (Deficit)	(191)	1,257	1,216	1,209	1,267	1,619
Closing Balance	(227)	1,026	2,245	3,453	4,719	6,336

Table 81: Forecast of CMC & TMC Finances

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12 (Rs. Crore)
Opening Balance	23	32	44	58	76	97
Tax Receipts	84	88	92	97	102	107
Non - Tax Receipts	22	23	24	26	27	28
Grants	8	9	9	9	10	10
Total Revenue Receipts	**114**	**120**	**125**	**132**	**139**	**145**
Salaries	14	15	15	16	16	16
Other expenses	65	67	69	71	73	75
Total Revenue Expenses	**79**	**82**	**84**	**87**	**89**	**91**
Capital Receipts	1	1	1	1	1	1
Capital Expenses	26	27	28	29	30	30
Revenue Surplus / (Deficit)	35	38	41	45	50	54
Capital Surplus / (Deficit)	(25)	(26)	(27)	(28)	(29)	(29)
Overall Surplus / (Deficit)	10	12	14	17	21	25
Closing Balance	32	44	58	76	97	121

2.4 Status of BWSSB Finances

Table 82 presents the finances of BWSSB.

Table 82: Status of BWSSB Finances

Particulars	2000 – 01	2001 - 02 (RE)	2002 - 03	2003 - 04	2004 - 05*	2005 - 06 (Rs. Crore)
Opening Balance	116	66	68	135	107	97
Total Revenue Receipts	298	314	368	432	518	622
Total Revenue Expenses	300	305	373	434	500	575
Revenue Surplus / (Deficit)	(2)	8	(5)	(2)	18	47
Total Capital Receipts	247	253	233	187	206	227
Total Capital Expenses	280	258	209	237	261	287
Capital Surplus / (Deficit)	(32)	(5)	23	(50)	(55)	(60)
Debt, Deposit and Suspense Account						
Receipts	71	85	192	211	233	256
Payments	86	86	144	187	206	227
Surplus / (Deficit)	(15)	(1)	48	24	26	29
Overall Surplus / (Deficit)	(50)	2	67	(28)	(10)	16
Closing Balance	66	68	135	107	97	113

i. The final financial details of BWSSB for the years 2004 - 05 and 2005 - 06 were not available at the time of preparation of this report, and are based on estimates.
ii. Water revenues have increased due to revision of tariffs over the past years (44% for domestic connections over last 3 years on a weighted average).
iii. Power charges accounting for 45 - 50% of expenses have also increased due to increase in pumping capacity coupled with increase in power tariffs. Increase in expenses is also due to increased debt servicing.

2.4.1 Forecast of BWSSB Finances

i. BWSSB has been implementing water supply and sewerage schemes in Bangalore with multilateral assistance and capital receipts are likely to increase with increased demand due to population growth and growth drivers mentioned below.
ii. Key growth drivers include the following:
   a. Proposed increased role of BWSSB to provide water supply and sewerage services in Bangalore metropolitan region and thereby increased coverage, Increased consumer base and number of connections
   b. Implementation of cost - recovering tariffs

c. Reduction of unaccounted for water quantum

iii. Implementation of energy efficiency programs which would reduce the energy cost which account for 50% of the expenses

iv. Capital receipts are expected to increase due top increased capital expense for increased service coverage and supply augmentation.

Table 83 shows the financial projections for BWSSB, based on the indicated growth drivers.

Table 83: Forecast BWSSB Finances

Particulars	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12 (Rs. Crore)
Opening Balance	113	163	261	420	658	999
Revenue Receipts	746	896	1,075	1,290	1,548	1,857
Revenue Expenses	661	760	874	1,005	1,156	1,330
Capital Receipts	249	274	302	332	365	402
Capital Expenses	316	348	383	421	463	509
Receipts - Suspense Account	282	310	341	375	413	454
Expenses - Suspense Account	249	274	302	332	366	402
Revenue Surplus / (Deficit)	85	136	201	285	392	527
Capital Surplus / (Deficit)	(67)	(74)	(81)	(89)	(98)	(107)
Suspense Surplus / (Deficit)	33	36	39	43	47	52
Overall Surplus / (Deficit)	51	98	159	239	341	472
Closing Balance	163	261	420	658	999	1,472

2.5 Status of BMTC Finances

Table 84 presents the finances of BMTC.

Table 84: Status of BMTC Finances

	2002 - 03	2003 - 04	2004 - 05	2005 – 06 (Rs. Crore)
Receipts				
Traffic Revenue	341	441	506	615
Other Revenue	31	42	66	95
Total Revenue	**373**	**483**	**572**	**710**
Expenses				
Salaries	120	132	141	153
Fuel	87	101	144	185
Other Consumables	15	15	19	21
General Administration	9	12	15	20
Others	112	145	171	212
Total Expenses	**345**	**406**	**492**	**591**
Surplus / (Deficit)	28	77	80	119

i. The final details of BMTC for the year 2005 - 06 were not available at the time of preparation of this report, and are based on estimates.
ii. Traffic revenues accounting for 90% of revenues have increased due to increase in tariffs, number of services and coverage.
iii. The increase in number of services and coverage has resulted in corresponding increase in salaries and fuel expenses.
iv. The increase in fuel expenses (68% over last 3 years and 40% over the last 2 years) over the past years has resulted in the same becoming the largest component in expenses.
v. BMTC financial statements are in the form of a balance sheet and profit and loss account and hence do not have opening and closing balances.

2.5.1 Forecast of BMTC Finances

The key aspects likely to impact the future growth include the following:

i. The increasing population would necessitate the increase in bus services and coverage
ii. Key growth drivers include:
   a. Various measures being implemented including the introduction of Volvo bus services and grid – services
   b. Growth in population resulting in more users
   c. Possible feeder services upon implementation of mass rapid systems
iii. The growth in traffic revenues is assumed to follow the past trend and so are fuel expenses and salaries.

Table 85 presents the financial projections based on the above drivers.

Table 85: Forecast of BMTC Finances

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12 (Rs. Crore)
Receipts						
Traffic Revenue	749	911	1,109	1,349	1,641	1,997
Other Revenue	138	201	292	424	615	892
Total Receipts	**888**	**1,113**	**1,401**	**1,773**	**2,256**	**2,889**
Expenses						
Salaries	165	179	193	210	227	246
Fuel	236	302	387	496	635	813
Other Consumables	24	27	30	34	38	42
General Administration	26	34	44	57	73	95
Others	263	325	402	498	616	762
Total Expenses	**715**	**868**	**1,058**	**1,295**	**1,591**	**1,960**
Surplus / (Deficit)	**172**	**244**	**342**	**477**	**665**	**928**

2.6 Status of BDA Finances

Table 86 presents the summary of finances of BDA.

Table 86: Status of BDA Finances

	2001 – 02	2002 - 03	2003 - 04	2004 – 05	2005 – 06 (Rs. Crore)
Opening Balance	120	294	695	611	959
Revenue Receipts	40	58	84	151	182
Revenue Expenses	42	34	33	33	35
Capital Receipts	223	398	384	286	315
Capital Expenses	148	225	300	232	255
Other Receipts					
Loans / Advances	67	113	42	45	47
Deposits	129	316	444	974	1,004
Other Expenses					
Loans / Advances	17	18	116	23	24
Deposits	78	205	588	820	845
Revenue Surplus / (Deficit)	(2)	24	51	118	147
Capital Surplus / (Deficit)	75	173	84	54	60
Other Surplus / (Deficit)	101	206	(218)	176	182
Overall Surplus / (Deficit)	174	403	(83)	348	389
Closing Balance	294	695	611	959	1,347

i. The financial details of BDA for the year 2005 - 06 were not available at the time of preparation of this report, and are based on estimates.

ii. ICRA Ratings Limited has published a credit perspective for Bangalore Development Authority. The key strengths identified include authority to acquire and develop land in Bangalore metropolitan region, inventory of high value auction sites and existing healthy cash and bank balances, key concerns include rising land acquisition and development cost, increasing capital works being funded by BDA's internal funds and sensitivity of managerial autonomy to political environment.

iii. BDA's site development activity has renewed again post resolution of dispute regarding Arkavathi Layout. BDA's strength also lies in the inventory of corner sites it retains for auction in future. While, reducing supply of land is likely to impact BDA, the proposed Master Plan 2015 of BDA intends to make available 189 sq. km. for urban development. BDA also proposes to develop sites on joint venture basis and augment revenues from commercial complexes.

iv. Growth in capital receipts has been due to the implementation of large infrastructure projects including site / layout development and construction of flyovers, grade separators and other urban infrastructure projects.

v. A large increase in deposits has resulted due to increased demand of sites, which is likely to continue in the future.

2.6.1 Forecast of BDA Finances

i. Revenues of BDA have been increasing rapidly (in excess of 40% CAGR) due to the:
   a. Demand for sites
   b. Corresponding deposit flow into BDA
   c. Increasing real estate prices

ii. Key growth drivers in the future include:
   a. Growth in natural and migratory population
   b. Release of additional land (189 sq. km.) for urban development by the proposed CDP

iii. inventory of corner sites and other sites located in prime location likely to fetch increased revenues through commercial exploitation

Table 87 shows the financial projections based on the above drivers.

Table 87: Forecast of BDA Finances

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12 (Rs. Crore)
Opening Balance	1,347	1,780	2,269	2,821	3,449	4,165
Revenue Receipts	218	262	314	377	453	543
Revenue Expenses	37	39	41	43	45	48
Capital Receipts	347	382	420	462	508	559
Capital Expenses	281	309	340	374	412	453
Other Receipts						
Loans / Advances	50	52	54	57	60	63
Deposits	1,034	1,065	1,097	1,130	1,163	1,198
Other Expenses						
Loans / Advances	26	27	28	29	31	33
Deposits	870	896	923	951	980	1,009
Revenue Surplus / (Deficit)	181	222	273	334	407	496
Capital Surplus / (Deficit)	65	72	79	87	96	106
Other Surplus / (Deficit)	188	194	200	207	212	220
Closing Balance	1,780	2,269	2,821	3,499	4,165	4,987

3 The Financing Plan

The CIP sums up the investment requirements for the City in the period of the CDP horizon. This investment ('Project Cost') will be financed through various sources ('Means of Finance'). The means of finance will, *inter-alia*, be:

i. Funding under the JNNURM in the JNNURM tenure (the first block period), will be 35% of the project cost. For Basic Services for Urban Poor projects, the eligible funding is 50%. There are certain excluded

items such as land, which are not considered under the JNNURM finance for Urban Infrastructure Projects.

ii. State contribution, which is 15% of the eligible project cost;
iii. State contribution, beyond the JNNURM co-financing, i.e., over 15%;
iv. Surpluses of the implementing agencies, which have been estimated in the previous section;
v. Private sector finances, or PPP projects;
vi. Borrowings by the implementing agencies/other stakeholders from banks and institutions;
vii. Capital market borrowings by the implementing agencies;

The financing plan has been prepared considering the following two scenarios:

Scenario 1 - Project cost including expenditure towards rolling stock (comprising vehicles such as buses, wagons, auto tippers, lorries and other transportation vehicles)
Scenario 2 - Project cost excluding expenditure towards rolling stock

3.1 Scenario 1 - Project Cost including Expenditure towards Rolling Stock

Table 88 presents the summary Project Cost and Means of Finance in this scenario.

Table 88: Financing Plan - Scenario 1

	2006-07	2007-08	2008-09	2009-2010	2010-2011	2011-2012 (Rs. Crore)
Project Cost						
Total Project Cost including costs towards Rolling Stock and Land Acquisition	2,847	3,193	3,730	4,159	4,160	4,447
Amount to be funded under JNNURM (Share of Central Government and State Government). This amount includes only the eligible costs excluding land.	1,376	1,542	1,803	2,014	2,014	2,154
Share of Central Government in eligible amount	1,081	1,215	1,416	1,573	1,573	1,680
Share of State Government in eligible amount	295	327	387	441	441	474
Amount to be funded by BMP and other agencies, which includes the co-financing share of 50% of the eligible amount, as well as ALL other costs towards land acquisition, rolling stock, etc.	1,471	1,651	1,927	2,145	2,146	2,293
Means of Finance						
Budgetary Surplus of BMP and other agencies	1,920	3,844	5,886	8,163	10,645	13,844

3.2 Scenario 2 - Project cost excluding expenditure towards rolling stock

The summary Project Cost and Means of Finance, excluding expenditure towards rolling stock has been set out in Table 89.

Table 89: Financing Plan - Scenario 2

	2006-07	2007-08	2008-09	2009-2010	2010-2011	2011-2012 (Rs. Crore)
Project Cost						
Total Project Cost including costs towards Rolling Stock and Land Acquisition	2,847	3,193	3,730	4,159	4,160	4,447
Amount to be funded under JNNURM (Share of Central Government and State Government). This amount includes only the eligible costs, excluding land and rolling stock.	1,277	1,427	1,673	1,877	1,877	2,009
Share of Central Government in eligible amount	1,011	1,135	1,325	1,477	1,477	1,578
Share of State Government in eligible amount	265	292	348	400	400	431
Amount to be funded by BMP and other agencies, which includes the co-financing share of 50% of the eligible amount, as well as ALL other costs towards land acquisition, rolling stock, etc.	1,570	1,766	2,057	2,282	2,283	2,438
Means of Finance						
Budgetary Surplus of BMP and other agencies	1,920	3,844	5,886	8,163	10,645	13,844

4 Conclusions

For Bangalore, the funding structure under JNNURM is 35% from GoI, 15% from State Government, and 50% from ULB/para-statal own sources or from commercial capital/ borrowings. There is a clear connection between the aspect of reform and the ability to raise commercial finances and deliver infrastructure services:

i. The budgetary surplus indicated above table is the summation of all the agencies as stated in the respective projections.

ii. On an aggregate basis, it appears that financing requirements as projected in the CDP could be met by the surpluses of the implementing agencies, and that there is no requirement of market borrowing. These projections assume significant structural and operational reform implementation.

iii. However, the entire surplus would not be available for projects under JNNURM, as each agency could be implementing projects outside of JNNURM. Moreover, each agency may need to look at market borrowings to finance the respective projects also.

iv. As cross-subsidization of financing of the projects being implemented by different agencies is not envisaged, the actual fund surpluses for

each of the implementing agencies for the projects being developed by them would need to be detailed out during the process of preparation of DPRs. The fund requirement would be substantiated in the financial sustainability analysis in the DPRs prepared for projects being posed for JNNURM funding.

SECTION - IV Institutional Reform

Urban Governance Framework
Governance Structures & Reform Agenda

2006

Jawaharlal Nehru
National Urban Renewal Mission

Chapter XIII Urban Governance Framework

In the Indian context, there is no clear "owner" department or ULB for the metropolises/ mega-cities, and the same situation exists in Bangalore. This chapter discusses the institutional and legal framework in the city's governance, and the functional areas and overlaps.

1 Institutions in Bangalore

Institutions in the City are (a) Elected ULBs (b) Statutory Authorities and (c) Government Departments.

ELECTED ULBS

i. BMP (City Corporation)
ii. Bommanahalli (CMC)
iii. Byatarayanapura (CMC)
iv. Dasarahalli (CMC)
v. KR Puram (CMC)
vi. Mahedevapura (CMC)
vii. RR Nagar (CMC)
viii. Yelahanka (CMC)
ix. Kengeri (TMC)

STATUTORY AUTHORITIES

1. Bangalore Development Authority
2. Bangalore Metropolitan Region Development Authority
3. Bangalore Water Supply & Sewerage Board
4. Bangalore Metropolitan Transport Corporation
5. Lake Development Authority
6. Karnataka Slum Clearance Board
7. Karnataka Urban infrastructure Development and Finance Corporation
8. Bangalore International Airport Area Planning Authority

GOVERNMENT DEPARTMENTS

A number of regulatory and development departments, including the Police Department, Public Works Department, Health Department, Education Department, Revenue Department, Town Planning Department, Horticulture Department, Motor Vehicles Department, et-al, also have an interplay in the metropolitan area.

1.2 Bangalore Mahanagara Palike

The Bangalore Mahanagara Palike (BMP) (City Corporation) as it exists today represents the traditional form of local government. The City Municipality and Cantonment Municipality were amalgamated to form the Corporation of the city of Bangalore in December 1949. The Corporation area is divided into 100 wards, with elected "Councilors."

1.3 Bangalore Development Authority

Bangalore Development Authority (BDA) was constituted on 16 January 1976 under the Act of State Legislature. The mission of BDA is to control, monitor, and facilitate urban development in Bangalore Metropolitan Area to ensure sustainable and orderly growth. Its brief is to develop plans, create quality infrastructure, provide sites, and integrated urban environment improvement.

1.4 Bangalore Metropolitan Transport Corporation

BMTC was incorporated in 1997 as a separate entity having been bifurcated from its parent body KSRTC. Apart from ferrying lakhs of Citizens from home to work and back in the City proper, BMTC operates its bus services in 400 villages in a 25-km radius around the City.

1.5 Bangalore Water Supply and Sewerage Board

BWSSB was constituted under the Act of the Karnataka State Legislature on 2nd October 1964. BWSSB is responsible for providing drinking water to the City and the surrounding CMC and TMC. It maintains about 6000 km. of existing water distribution lines and 4000 km. of underground sewerage lines.

1.6 Lake Development Authority

The Lake Development Authority (LDA) is an autonomous regulatory, planning and policy body for protection, conservation, reclamation, restoration, regeneration, and integrated development of lakes, whether natural or man-made in the state of Karnataka. It is a non-profit organization working solely for the regeneration and conservation of lakes within BMRDA jurisdiction.

1.7 Karnataka Urban Infrastructure Development and Finance Corporation

KUIDFC was set up in 1993 to assist the urban agencies in the state in planning, financing, and providing expertise to develop urban infrastructure. KUIDFC is the nodal agency for the externally aided projects and the centrally sponsored Mega City Scheme.

1.8 Karnataka Slum Clearance Board

The KSCB was constituted in July 1975 under the provisions of the Karnataka Slum Areas (Improvement and Clearance) Act 1973. The functions of the

Karnataka Slum Clearance Board include rehabilitation of all the declared slum areas in the jurisdictions of the City Corporation, City Municipalities, Town Municipalities, and Town Panchayats in the State.

1.9 Bangalore Metropolitan Region Development Authority

BMRDA is an autonomous body created by the Government of Karnataka under the BMRDA Act 1985 for the purpose of planning, coordinating, and supervising the proper and orderly development of the areas within the Bangalore Metropolitan Region (BMR) which comprises Bangalore urban district and Bangalore rural district.

1.10 Bangalore International Airport Area Planning Authority

Sanction of land-use of the airport area is vested with the BIAAPA, an authority set up for the Devanahalli new international airport project. BIAAPA is expected to review the construction plans, land-use planning, building plans, and other parameters, and ensure that safety norms are followed.

2 Planning & Development Laws

A number of Acts and Legislations govern the planning and development in the Bangalore Metropolitan Region. These are briefly outlined in the following section.

THE KARNATAKA TOWN & COUNTRY PLANNING ACT 1961

The Karnataka Town & Country Planning Act aims at providing for planned regulation of growth, development, and land use, for formulation and execution of town planning schemes.

THE BANGALORE DEVELOPMENT AUTHORITY ACT, 1976

The Bangalore Development Authority Act was primarily aimed at establishing a Development Authority for the city of Bangalore and its adjoining areas. However, by an amendment to the Karnataka Town & Country Planning Act, the BDA has been made the Local Planning Authority for the Local Planning Area comprising the city of Bangalore & adjoining areas. The BDA thus functions as the Planning Authority in addition to being a Development Authority.

THE BANGALORE METROPOLITAN REGION DEVELOPMENT AUTHORITY ACT, 1985

The objective of the Bangalore Metropolitan Region Development Authority Act are to establish an Authority for the purposes of planning, coordination, and supervision of the proper and orderly development of the areas coming under the Bangalore Metropolitan Region, which covers the Bangalore District. The main functions of the BMRDA are to carry out a survey of the region, and to prepare a structure plan for the development of the Bangalore Metropolitan Region. It may

also formulate schemes to implement the Structure Plan, and entrust to any Local Authority the task for execution of any Town Planning Scheme.

MUNICIPAL LAWS

- The Karnataka Municipal Corporation Act, 1976
- The Karnataka Municipal Councils Act, 1964

LAW RELATING TO LAND & ACCOMMODATION

- The Land Acquisition Act, 1894
- The Karnataka Land Reforms Act, 1961
- The Karnataka Land Revenue Act, 1964
- The Urban Land Ceiling & Regulation Act, 1976 - REPEALED vide Urban Land (Ceiling & Regulation Act 1999)
- The Karnataka Housing Board Act, 1973
- The Karnataka Rent Control Act, 1962 - AMENDED by the Karnataka Rent Act 1999
- The Karnataka Slum Areas (Improvement and Clearance) Act, 1973
- The Karnataka Apartment Ownership Act, 1972
- The Karnataka Public Premises (Eviction of Unauthorized Occupants) Act, 1971
- The Karnataka Industrial Areas Development Act, 1966

POLLUTION CONTROL LAWS

- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention & Control of Pollution) Act, 1981
- The Environment (Protection) Act, 1986

OTHER LAWS

- The Indian Registration Act, 1908
- The Karnataka Police Act, 1963
- The Motor Vehicles Act, 1939
- The Cinematography Act, 1952
- The National Highways Act, 1988
- The Karnataka Stamp Act, 1957

As discussed in Chapter 2, there is plethora of legislations and a number of institutions that operate in the Bangalore Metropolitan area, which impact the process of urban management. Since the jurisdictions, legislative frameworks, and functional areas of the institutions overlapping in many cases, there are issues of discord and lack of clarity. Table 90 shows the functional areas of various institutions, and the overlaps.

Table 90: Functional Areas of Various Institutions

Functions	Agency	Accountability structure	Entries in the Lists II and III of the Seventh Schedule
Urban Planning including town planning	BDA, BMRDA	State Government, Board	Entry 18 of List n
Regulation of land-use and construction of buildings	BDA, BMRDA, BMP	State Government, Board, BMP	Entry 18 of List II Entry 20 of List II
Planning for economic and social development	State Government	State Government	Entry 20 of List m
Roads and bridges	BDA, BMP	State Government, Board, BMP	Entry 13 of List II
Water supply for domestic, industrial and commercial purposes	BWSSB	State Government, Board	Entry 17 of List II
Public health, sanitation conservancy and solid waste	BWSSB (Sewerage), BMP	State Government, Board, BMP	Entry 6 of List II
Fire services	Fire Department	State Government	Entry 6 of List II
Urban forestry, protection of the environment and promotion of ecological aspects	Deputy Conservatory of Forests (Urban), Bangalore. Forest Department	State Government	Entry 17 of List III
Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded	Department of Social Welfare, Directorates	State Government	Entry 9 of List II Entry 16 of List m
Slum improvement and upgradation	KSCB, BDA, BMP	State Government, Board, BMP	Entry 6 of List II
Urban poverty alleviation	DMA, BMP	State Government, BMP	Entry 11 of List III
Provision of urban amenities and facilities such as parks, gardens, playgrounds	BMP, BDA (New Layouts)	BMP, State Government	Entry 18 of List II Entry 20 of List III
Promotion of cultural, educational and aesthetic	Department of Kannada &	State Government	Entries 12, 33

Functions	Agency	Accountability structure	Entries in the Lists II and III of the Seventh Schedule
aspects	Culture, Department of Education		Of List II Entry 25 of List III
Burials and burial grounds, cremations, cremation grounds and electrical crematoriums	BMP	BMP	Entry 10 of List II
Cattle pounds: prevention of cruelty to animals.	BMP	BMP	Entry 15 of List n Entry 17 of List III
Vital statistics including registration of births and deaths.	BMP	BMP	Entry 30 of List III
Public amenities including street lighting parking lots, bus stops and public conveniences.	BMP, BDA (New Layouts)	BMP, State Government, Board	Entry 5 of List II Entry 20 of List III
Regulation of slaughter houses and tanneries.	KAMPCO, BMP	BMP, State Government, Company	Entry 15 of List II

2.2 Issues Arising from Functional Overlaps

Following the discussion on functional areas in the previous section, the issues related to overlaps and lack of clarity are presented in the following:

- **Slums**: The improvement and clearance of slums is governed by the Karnataka Slums (Improvement & Clearance) Act 1973. In Bangalore, there are three organizations dealing with this matter - the BMP, the KSCB, and the BDA. Though each of them is expected to take care of the slums coming under its jurisdiction, this arrangement has led to confusion, particularly in areas of doubtful jurisdiction.
- **Street Lighting**: In respect of street lighting, while the BMP carries out the obligatory functions to meet the related expenditure, the functioning of lights and supply of power is with the BESCOM, which leads to divided responsibility.
- **Traffic Management**: The area of traffic management, which is a problem in the city, is with the Traffic Police department. However, the funds for installation of traffic signals, lane marking, etc., are provided by the BMP/ULB.
- **Road Maintenance**: Maintenance of roads is the responsibility of BMP, BDA, or PWD, depending on the location/ jurisdiction.
- **Special Institutions**: The managerial responsibility in "special areas" that were formed for specific purposes is also an area of concern. For instance, the HAL Sanitary Board and the ITI Notified Area Committee are two non-

elected bodies constituted under the Karnataka Municipalities Act 1964. Technically, they function outside the jurisdiction of the BMP, and were meant to take care of the civic needs of the industrial areas. However, today there is a considerable non-industrial load, and a number of unauthorized constructions coming up because of the weak monitoring and enforcement ability of these bodies.

- **Management of Fringe Areas:** There are several legal complexities in the management of fringe areas. Several laws operate here - the Land Revenue Act, the Land Reforms Act, and the KTCP Act. Enforcement of these laws is done by different authorities like the Revenue Department, the Special Deputy Commissioner, and the BDA. While the citizen is put to hardship to obtain approvals from these Authorities, the Authorities also face problems in complying with the many legal provisions, particularly against those who transgress the law.

2.3 Options for Addressing Functional Issues

In the context of these inconsistencies, overlaps, organizational conflicts, managerial voids, and legal complications, there are several options that are being considered.

- Redefining the roles of the major urban authorities in the Bangalore Metropolitan Area, with particular reference to the BMP, BDA, and BMRDA, to meet the challenges of future metropolitan management;
- Tackling the managerial voids in the peri-urban/ suburban areas of Bangalore;
- Introducing necessary legal reforms to meet the new planning and developmental needs of the Bangalore Metropolitan Region; and
- Ensuring transparent processes, with citizen participation, in the City's planning & governance.

The details of some of these options are discussed in the subsequent chapter.

3 Metropolitan Governance

The term *Local Self Government* implies an important role for people in governing their local affairs. However, as the City has grown, so has the authority of the Government/ Statutory Agencies. The citizen is thus at a distance from the governing bodies. It is also true that local governance has become more complex, and that Governmental agencies may not be in a position to find solutions for all local problems. Hence, there is a need for initiatives from people, and non-Governmental Organizations.

The cities are managed by Local Self Government historically. At the time of 74th CA, many out of 18 services were being delivered by para-statals such as boards, authorities, companies, and State departments. These para-statals, which were created for efficient service delivery, do not have local elected representatives at board level for consultations and decision-making. This arrangement has resulted in a peculiar accountability structure where local representatives of the City Corporation along with Corporation Administration stand accountable to the user citizens for the services offered by para-statals - in which they have no role to play.

In India, traditionally, the Municipal Acts listed the functions of ULBs under two categories, namely, "Obligatory Functions" and "Discretionary Functions." The 74th CAA, however, has listed 18 (illustrative) functions and proposed that the State Legislatures may specify, by law, those which they choose to include in their respective municipal enactments. The Twelfth Schedule of 74th CAA provides the basis for State Legislatures to assign functions to the municipalities in their respective States.

Managing a modern metropolis and "mega-city" is an extremely complex function. The structure of the Government in metropolitan cities envisages an entirely new scheme of things, and may need a comprehensive legislative basis under the 74th CAA. This could be a separate legislation in respect of Bangalore, which can incorporate all aspects of municipal government, the political and administrative structure, the functional domain, and the fiscal arrangements.

3.1 The Planning Needs of Metropolitan Region

The City Development Plans (Master plan) exercises of planning bodies such as BDA and BMRDA are related largely to land-use plans. In future, the objective should be to achieve integration of spatial, economic, social, transportation, and ecological planning. It should include new concepts relating to town planning, land-use controls, and management of urban fringes.

- The KTCP is nearly 30 years old and is out of tune with modern developments, to meet the future needs of urban growth. It is, therefore, necessary to have a single comprehensive legislation which deals with all aspects of urban planning including regional planning.
- The hierarchical relationships between various institutions (municipal and non-municipal) should be brought out with a view to eliminating overlapping jurisdictions and conflicts.
- Necessary legal support must also be provided to implement the new strategy proposed to overcome the deficits in economic, social, and civic infrastructure. This would involve amendments to certain existing laws like the Land Acquisition Act.
- Management of ecology/environment should also form part of planning a metropolis. Although there are separate central laws to deal with pollution air, water, and environment it would be useful to include suitable provisions in the State Planning Act, as it would make the implementation of these laws more effective.
- Similarly, policies relating to industrial location, including phasing out obsolete industries, and recycling of industrial lands, must form part of planning legislation.

The aim is to integrate these fragmented components, into the urban planning process, so that there is a unified approach to planning of the Bangalore Metropolitan Region.

4 Linkage of Reforms to Projects

For Bangalore, the funding structure under JNNURM is 35% from GoI, 15% from State Government, and 50% from ULB/para-statal own sources or from commercial capital/ borrowings. There is a clear connection between the aspect of reform and the ability to raise commercial finances and deliver infrastructure services. While the details of JNNURM specific reforms are discussed in the subsequent chapter, some of the linkages are outlined here.

CREATION OF DECENTRALIZED CAPACITY

The unique challenge for the Urban Sector stems from the capacity required at the decentralized levels to successfully implement projects and provide the services. As extensively discussed in the vast body of literature on decentralization and economies of scale, administrative convenience often has veered towards centralized administration, as it is easier to create capacity. However, with the real requirement being at the local government level, the challenge is to create capacity at the ULB level.

AUTOMATION OF MUNICIPAL FUNCTIONS & E-GOVERNANCE

To improve management, it is useful to design operational manuals on municipal functions such as administration and engineering (apart from accounts and computer applications), defined systems and provided software support in certain core areas.

- Birth and Death registration;
- Building Plan Registration/Approval;
- Licenses;
- Financial Management: Financial Accounting System, Inventory Control, Movable Property, Vehicle Inventory, Immovable Property;
- Revenue Management: Non-Tax, Professional Tax, Water Charges, Property Tax;
- Others: Census, Personal Management System, Electoral rolls, Family Enumeration, Solid Waste management, Hospital Information; and
- Engineering applications.

Once these systems are in place at the ULBs/ para-statal agencies' level, the public can access them for direct queries and services, over a suitable e-governance platform.

CONTINUING STAKEHOLDER INTERACTIONS

The consultation process with stakeholders has to be institutionalized and kept as an ongoing exercise.

- Periodic stakeholder meetings with the officers/ elected representatives, to review the progress of various initiatives and to iron out any wrinkles need to be conducted.

- Interactions could be organized by specific NGO's with the Urban Poor; and
- Developing a process of periodic reports/ feedback/ score-card on key performance parameters.

TRANSPARENCY & ACCOUNTABILITY

Karnataka State has always been ahead in terms of setting in place processes to ensure transparency in public dealings. The Karnataka Transparency in Public Procurements Act 1999, and the Karnataka Right to Information Act 2000, form the cornerstone of the legal framework under which Government departments and agencies have to operate. Karnataka also has the Fiscal Responsibility Act, to encourage planning and prudence in the process of budgeting.

However, it is clear that going forward, the objective is not to have mandated transparency, but to have open and participative governance. This can be set in place only through an institutionalized and sustained process of interaction, as mentioned in the previous section.

PPP INFRASTRUCTURE PROJECTS

Karnataka has encouraged private sector participation in projects in the infrastructure areas, with first-time projects in the country illustrated by the Bangalore International Airport Project, and the Hassan – Mangalore railway line. In projects such as KUWASIP, Karnataka has also amended rules of employment to enable employees to proceed on deputation to the private sector. In addition, Karnataka has pioneered an innovative public private partnership initiative, which involves setting up of a citywide task force in Bangalore for effective delivery of urban Infrastructure services.

LAND-USE & PLANNING

BDA prepares a Comprehensive Development Plan for the city, at an interval of 10 years, while BMRDA prepares a "Structure Plan." Based on these plans, the development regulation is done by way of plan approvals and land-use. However, given the rate of urbanization, 10 years is a long time frame, and this leads to the issue of periodic land-use reclassification and the concomitant problems and issues. It is therefore imperative to:

- Review the master plan periodically, to incorporate demographic and economic changes as they occur
- Have a realistic and flexible master plan, where the emphasis is on a zone and sector, rather than on the exact use of a particular lot of land
- Resolve the function/ organization overlap/ conflict issues that have been discussed in the previous sections

ASSET MANAGEMENT

Government and its agencies have been generally efficient in asset creation, but the real issues arise in maintenance of these assets. This leads to situations where the

facility does not perform its intended function properly. Potholed roads, leaking water systems, non-functional sewage treatment plants – many of these situations occur because:

- Poor construction quality, leading to higher maintenance requirements;
- The life-cycle aspect of the infrastructure asset is not considered;
- The contracting entity that constructs the facility has no stake in ensuring that it functions;
- Finances for operation and maintenance are not earmarked/available; and
- The capacity of the staff engaged in the maintenance is generally lower.

Addressing this issue is more of a management and training paradigm shift, than one requiring large investments. The measures required to take care of asset management are the virtual converse of the issues mentioned before:

- Ensure construction quality requirements
- Consider life-cycle aspect of the infrastructure asset
- Tie-in the contracting entity to a longer maintenance, or back-ended payment structures, to ensure that it has a stake in the functioning of the asset
- Include costs for operation and maintenance, and keep aside in an ear marked fund
- Build up capacity/ training of the staff engaged in the maintenance.

Chapter XIV Governance Structures & Reform Agenda

1 Options for Institutional Reorganization

To manage the diversity of institutional issues that come up in managing a metropolis, a new perspective is needed for the metropolitan management of Bangalore. While the general imperatives for the City – in terms of requirement and service delivery are simple to outline, assess, and debate – the fundamental issue is that of setting up the organizational set-up for ensuring that these objectives can be met.

Various governance structures have been mooted and debated, and some possibilities are outlined in the following section. At this stage, the CDP can only outline these as non-exclusive possibilities. The actual framework and structure would need to be debated at all levels, and decided at the highest political and administrative levels. The following sections set forth four different options for institutional reorganization.

1.1 Option 1: Retain Existing Frameworks

The previous chapter has outlined the situation with respect to organizational and legal overlaps in functions and jurisdictions. One possibility is to let these agencies and legal frameworks to largely be in status-quo, and only alter/modify their jurisdictions and legal frameworks to reduce conflicts and overlaps. This option would certainly be sub-optimal, for the reason that limited change could possibly not address the dual problems of participative governance, and service delivery. BDA and BMRDA are Statutory Authorities, but with no elected representatives. The peri-urban ULBs (7 CMC and 1 TMC) would not be properly integrated into the system of metropolitan governance, and the lacunae in these fringe areas would need to be addressed by the Government through the Statutory Agencies – as is the case now. As an option, the possibility of inducting some elected representatives into BMRDA/ BDA could also be considered.

1.2 Option 2: Greater Bangalore Concept

GoK has proposed the concept of "Greater Bangalore" – and a Bill in this regard is proposed to be introduced in the Legislature, shortly. The BMP areas, the seven CMCs and one TMC around Bangalore will form part of the new Authority, which will have wide powers in matters pertaining to development and maintenance of infrastructure. It will have about 150 wards under it.

The concept of Greater Bangalore would be a step forward in addressing the issue of integrated development of the fringe areas, and ensuring a unified governance approach. It also offers an opportunity to clear functional and jurisdictional overlaps in the BMP and BDA areas, since the Greater Bangalore geographical jurisdiction is virtually the BDA area, and this would bring in the participation of elected representatives.

The issue of the integrated development of the Bangalore Metropolitan Region, in its entirety, would still not be addressed completely. For instance, the planning authority for the new international airport – BIAAPA, would not be part of this development. An added issue is that the functional jurisdiction may become too big, and there are therefore proposals to separate the area into two or three functional jurisdictions. The above limitation notwithstanding, this is a clear step forward in recognizing the growth of the city, and the fact that the fringe areas need to be systematically integrated.

1.3 Option 3: Greater Bangalore Metropolitan Council

A proposal has been mooted to set up a Greater Bangalore Metropolitan Council (GBMC) with the Chief Minister as Chairman, and functional/political heads of civic bodies (the BMP and CMC/ TMC), and service agencies such as BDA, BWSSB, BMTC, as members. Representatives from the Government of India, Ministry of Urban Development, and representatives of civil society, the industry, and academia, would also be on the Council. A very senior officer would be the Secretary of GBMC.

The GBMC's functions would include overall development of the metropolitan region including its economy, city/regional planning, capital budgeting, including sanction of large-scale infrastructure projects, coordination and monitoring. Each of the local authorities will continue to perform its assigned functions, while inter-agency issues will be resolved by the GBMC. There would actually be decentralization to the City Corporation and agencies, making them more effective and accountable. The ward committees would be strengthened to enable effective public participation. The institutional framework proposed would achieve three objectives:

- Provide an apex body, with appropriate political and administrative backing, which will act as a planning, coordinating, and monitoring authority for all operating urban agencies and activities in the entire Bangalore metropolitan area.
- Promote decentralization and public participation in management of civic affairs.
- Involve both the state and central governments in city development.

The proposed structure for City Government needs to be established in stages. The existing boards of para-statals such as BWSSB, BDA, BMRDA, may need to be abolished. The state government officers on the existing boards **may not** continue to be members of the City board. This is necessary to separate the City board from the state and central government following the spirit of 74th CA. Once the City Council starts working on the functions assigned under the 74th CA, the State Government may relinquish its powers under the Municipal Act to the Council, and make it a true third tier Government.

1.4 Option 4: Replicating Rural Governance Structures

One other possibility is to replicate the rural governance structure, set in place under the 73rd CA, 1992. The salient features of the Act are to-

- Provide 3-tier system of Panchayat Raj for all States having population of over 20 lakh;
- Hold Panchayat elections regularly every 5 years;
- Provide reservation of seats for Scheduled Castes, Scheduled Tribes and women (not less than 33%);
- Appoint State Finance Commission to make recommendations as regards the financial powers of the Panchayats; and
- Constitute District Planning Committee to prepare draft development plan for the district as a whole.

Janaagraha Centre for Citizenship & Democracy has mooted a similar three-tier structure for urban areas: Area Sabha (Gram-sabha equivalent), Ward Committee, and the ULB. The construct is for giving citizens a greater say in urban governance. The construct would necessarily have to be accompanied by urban decentralization and a credible coordination mechanism between civic agencies. The following are in brief, are some of the action items for this framework:

1. Permanent Metropolitan Planning Committee with coordination powers
   - Constitution with Elected Representatives and Experts
   - Master Planning Procedures and Technical Groups
   - Completely revamped Municipality Law

2. City Government stands as a guarantor.
   - Direct Election to Mayor
   - 3-tier structure of Municipality/ Ward Committee/Area Sabha
   - Formal Citizen Participation in Municipal affairs
   - Mandatory quarterly disclosure of performance

3. Co-ordination mechanisms on all Municipal Services as per Schedule XII (and Schedule XI) of the Amendment to the Constitution of India
   - Alignment of Jurisdictions based on Ward Boundaries
   - Joint Budgeting/ Reporting cycles

2 Linking Reform under JNNURM to Development Projects

Development of projects has a strong linkage to reform in governance.

i. An assessment of ULBs/ para-statal agencies' current financial situation will illustrate that unless there are key financial reforms, it may not be in a position to raise budget surpluses, and use those surpluses in implementing its CIP.

ii. Further, even if the financial situation improves, the size, number, and type of projects that need to be implemented, will place a significant strain on the capacity of the ULBs/ para-statal agencies staff, and on the governance system as a whole. For instance, even small urban transport projects like the High Capacity Bus, need a very high skill level to implement and administer.

iii. Finally, if private or commercial finance is required to be brought in, the legal and financial capacity required to handle such transactions, has also to be created.

There is a clear and imperative need to ensure those reforms on the financial and capacity aspects of ULBs/ para-statal agencies and the other stakeholders, moves in tandem to the project development process.

2.1 Implementation, Sequencing & Prioritization of Reform

Some of the key reform areas lie in the purview of the State Government, while some of them are in the jurisdiction of the City. Issues such as determining Stamp Duty are clearly in the State's purview, while introduction of accrual-based double-entry systems are in the domain of ULBs/ para-statal agencies. At the next level, there are also issues where the ULBs/ para-statal agencies have to depend on the discretion of Government of Karnataka. The devolution of State grant to a particular ULB is a matter of such discretion. Finally, in situations such as the JNNURM, the Central Government is also a key participant.

- The important aspect of urban infrastructure is that the objectives will be met only if all the tiers of Government work in concert. The JNNURM guidelines therefore rightly envisage a tri-partite agreement between the Central Government, the State Government, and the ULB.
    - Many of the mandatory & optional reforms are in the jurisdiction of the State's legal and administrative domain, and would be committed at the State level.
    - The role of ULBs/ para-statal agencies and Government of Karnataka, vis-à-vis the reform process that is agreed upon, will be set out in such an agreement, and will determine the duties/ responsibilities that each party has to perform, to make a reality of the vision envisaged in this CDP.
- Public Sector Undertakings and Defense Authorities have significant land in the core area of Bangalore City. A platform could be created to enable consultations with such authorities.
- Various initiatives have been taken in past by urban local bodies to improve the quality of life of the citizens. The service delivery levels even after implementation of such projects have been suboptimal primarily due to lacunae in implementation and operation maintenance. A Project Implementation Unit/ Project Management Unit could be set up to facilitate implementation of projects.
- To address this specific issue, there is discussion on the possibility of setting up a separate SPV for implementing and maintaining infrastructure projects in the City

2.2 Reforms Already Underway

In order to efficiently manage and implement the infrastructure projects, a primary requirement is capacity building and instituting reforms. In concurrence with the above, the stakeholders of Bangalore are in consensus that reform in urban governance and service delivery is a must. These would help in cost efficient delivery of infrastructure projects.

The question in debate is the form and time-scale required to achieve these reforms. JNNURM has specified certain mandatory and optional reforms and the State Government and ULBs of Bangalore have expressed their commitment for achieving the same. These reforms have been categorized as Mandatory reforms and Optional reforms.

The following reforms, which have been mentioned in the JNNURM guidelines, have already been implemented by the Government of Karnataka. These are as follows:

1. BMP has adopted modern accrual-based double entry system of accounting, while other ULBs and para-statal agencies are in the process of implementing the same.
2. Introduction of a system of e-governance using IT applications, such GIS and MIS for various services has been implemented.
3. Local bodies have provisionally implemented internal earmarking, budgets for basic services to the urban poor.
4. Subsequent to the 74th Amendment to the Constitution of India, the Karnataka Municipal Corporations Act 1976 was amended (vide Karnataka Act No. 35 of 1994) on October 5, 1994.
5. Urban Land Ceiling Regulation Act has been repealed
6. Rent Control Laws have been reformed/modified
7. Reduction of Stamp Duty is being progressively done
8. Rain-water harvesting is being promoted and has been made mandatory in certain structures
9. The Government agencies are actively encouraging PPP in infrastructure.

In tandem with the JNNURM reforms, there are certain other structural and operational reforms, which also need to be implemented. Some of these are outlined as below:

- GIS mapping
- Reducing Non revenue water/unaccounted for water
- Preparation of best practice toolkits
- Preparation of action plans for revenue improvement
- Framework for benchmarking investments
- Analysis of new financing mechanisms
- Tariff rebasing mechanisms

2.3 JNNURM Reform Timelines

Table 91 and Table 92 indicate the timelines for carrying out the reforms under the JNNURM program.

Table 91: Timelines for Mandatory Reforms

PREREQUISITES FOR FUNDING – MANDATORY REFORMS (ULBS & PARA-STATAL AGENCIES)	CURRENT STATUS	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Adoption of modern accrual based double entry system and accounting in Bangalore	Being implemented						
Introduction of the system of e-governance using IT applications, such as GIS and MIS for various services provided by Bangalore	Being implemented						
Reform of property tax with GIS so that collection efficiency reaches at least 85 percent within the next seven years.	Being implemented						
Levy of reasonable user charges by Bangalore with the objective that the full cost of O& M recurring cost in collected within the next seven years	To do						
Internal earmarking within local bodies, budgets for basic services to the urban poor	To do						
Provision of basic services to the urban poor including security of tenure at affordable prices, improved housing, water supply and sanitation	To do						

Table 92: Timelines for Optional Reforms

PREREQUISITES FOR FUNDING – OPTIONAL REFORMS	CURRENT STATUS	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Revision of byelaws to streamline the approval process for construction of buildings, development of site, etc.	To do						

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