



**REVISED  
CITY DEVELOPMENT PLAN  
FOR BANGALORE**



**Jawarharlal Nehru National Urban Renewal Mission**



**REVISED  
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VOLUME I**



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## TABLE OF CONTENTS

1.	INTRODUCTION .....	10
1.1.	PURPOSE .....	10
1.2.	OVERVIEW OF JNNURM .....	10
1.2.1.	<i>Process of Formulation of CDP</i> .....	11
1.3.	STRUCTURE OF THE REPORT .....	12
2.	ORGANISATION FRAMEWORK FOR THE CDP PROCESS.....	13
2.1.	CDP POLICY COMMITTEE .....	13
2.2.	CDP TECHNICAL COMMITTEE .....	13
2.3.	ROLES AND RESPONSIBILITIES OF CONSULTANTS/ TECHNICAL EXPERTS .....	13
2.3.1.	<i>Roles and Responsibilities of Consultants</i> .....	14
3.	INITIATION OF CDP PLANNING PROCESS.....	15
3.1.	CONSTITUTING CDP POLICY AND TECHNICAL COMMITTEES.....	15
3.2.	IDENTIFYING STAKEHOLDER GROUPS .....	15
3.3.	CONDUCTING WORKSHOPS FOR CDP PREPARATION .....	15
3.3.1.	<i>Multi-pronged Approach</i> .....	15
3.3.2.	<i>Consultation Schedule</i> .....	16
3.4.	PROFILE OF STAKEHOLDER GROUPS.....	18
3.5.	FEEDBACK & PRIORITIES .....	18
3.5.1.	<i>Key Priorities – Direct Consultations</i> .....	19
3.5.2.	<i>Key Priorities – Web Feedback</i> .....	20
3.6.	STAKEHOLDER MEET FOR THE NEWLY ADDED AREAS .....	21
4.	CITY ASSESSMENT .....	23
4.1.	BACKGROUND .....	23
4.1.1.	<i>Topography</i> .....	23
4.1.2.	<i>Climate</i> .....	23
4.2.	POPULATION TRENDS.....	25
4.2.1.	<i>Decadal Growth</i> .....	25
4.2.2.	<i>Composition of Population Growth</i> .....	25
4.2.3.	<i>Key Population Indicators</i> .....	26
4.3.	LAND USE .....	26
4.4.	SOCIAL SECTORS .....	27
4.4.1.	<i>Health Institutions</i> .....	28
4.4.2.	<i>Services Offered</i> .....	28
4.4.3.	<i>Other Programmes</i> .....	29
4.5.	URBAN POOR.....	30
4.6.	INFRASTRUCTURE STATUS.....	32
4.7.	INSTITUTIONAL FRAMEWORK.....	33
4.7.1.	<i>Institutions in Bangalore</i> .....	33
4.7.2.	<i>Public Participation in Governance</i> .....	35
4.7.3.	<i>Public-Private Participation in Infrastructure</i> .....	37
4.8.	SWOT ANALYSIS.....	38
4.9.	INDUSTRIAL GROWTH .....	39
4.9.1.	<i>Planning for Industry</i> .....	40
4.10.	SPATIAL GROWTH .....	41
4.10.1.	<i>Spatial Development Scenarios</i> .....	42
4.11.	POPULATION GROWTH.....	47
4.11.1.	<i>Basis for Population Projection</i> .....	47
5.	CITY VISION, DEVELOPMENT GOALS AND STRATEGIES .....	59
5.1.	APPROACH.....	59
5.2.	VISION AND MISSION STATEMENTS .....	59
5.3.	FORMULATION OF VISION STATEMENT .....	61
5.3.1.	<i>Setting Objectives</i> .....	62
5.3.2.	<i>Characteristics of Statements</i> .....	62

5.4.	BACKGROUND TO THE VISION EXERCISE.....	62
5.4.1.	<i>The City Context.....</i>	62
5.4.2.	<i>Assessment of Status .....</i>	63
5.4.3.	<i>Vision Statement of Key Agencies.....</i>	63
5.4.4.	<i>Coverage Area for the CDP.....</i>	63
5.5.	THE VISION STATEMENT .....	63
5.5.1.	<i>Initial Formulation of Vision Statement .....</i>	64
5.5.2.	<i>The Final Vision Statement .....</i>	64
5.5.3.	<i>Mission Statements .....</i>	64
5.6.	DEVELOPMENT GOALS AND STRATEGIES .....	65
6.	WATER SUPPLY AND SEWERAGE.....	68
6.1.	OVERVIEW.....	68
6.1.1.	<i>Existing Situation.....</i>	69
6.2.	STRATEGY FOR IMPROVED SERVICE DELIVERY.....	73
6.2.1.	<i>Characteristics of the Sector .....</i>	73
6.2.2.	<i>Initiatives &amp; Studies .....</i>	73
6.2.3.	<i>Needs of Urban Poor.....</i>	76
6.3.	PROJECT IDENTIFICATION AND COSTING.....	76
6.3.1.	<i>Key Areas Proposed to be Addressed.....</i>	76
6.3.2.	<i>Status of Projects.....</i>	77
6.3.3.	<i>Service Delivery Targets .....</i>	81
6.3.4.	<i>Investment Plan for Water Supply &amp; Sewerage.....</i>	82
6.4.	IMPLEMENTATION FRAMEWORK .....	87
6.4.1.	<i>Urban Water Supply and Sanitation Policy .....</i>	87
6.4.2.	<i>Institutional Arrangements .....</i>	88
6.4.3.	<i>Projects Approved under JNNURM Scheme .....</i>	88
6.4.4.	<i>Public Private Partnerships.....</i>	88
7.	URBAN DRAINAGE SYSTEMS.....	91
7.1.	OVERVIEW.....	91
7.1.1.	<i>Existing Situation.....</i>	91
7.1.2.	<i>Key Issues of Urban Drainage Systems.....</i>	92
7.2.	STRATEGY FOR IMPROVED SERVICE DELIVERY.....	92
7.2.1.	<i>Characteristics of Sector .....</i>	92
7.2.2.	<i>Service Delivery Targets for Storm Water Drains .....</i>	92
7.2.3.	<i>Proposed Implementation for Urban Drainage.....</i>	92
7.3.	PROJECT IDENTIFICATION & COSTING .....	93
7.3.1.	<i>Investment Plan for Urban Drainage Improvement .....</i>	93
7.4.	IMPLEMENTATION FRAMEWORK .....	94
7.5.	PROJECTS APPROVED UNDER JNNURM SCHEME.....	94
8.	MANAGEMENT OF SOLID WASTE.....	96
8.1.	OVERVIEW.....	96
8.1.1.	<i>Existing Situation.....</i>	96
8.1.2.	<i>Key Issues in SWM.....</i>	99
8.2.	STRATEGY FOR IMPROVED SERVICE DELIVERY.....	100
8.2.1.	<i>Characteristics of Sector .....</i>	100
8.2.2.	<i>Proposed Implementation Plan for MSW Management .....</i>	100
8.2.3.	<i>Needs of Urban Poor.....</i>	101
8.3.	PROJECT IDENTIFICATION & COSTING .....	101
8.3.1.	<i>Service Delivery Targets .....</i>	101
8.3.2.	<i>Investment Plan for Solid Waste Management.....</i>	102
8.4.	IMPLEMENTATION FRAMEWORK .....	104
9.	COMPREHENSIVE MOBILITY PLAN.....	107
9.1.	OVERVIEW.....	107
9.1.1.	<i>Existing Situation.....</i>	107
9.1.2.	<i>Transport Studies for Bangalore .....</i>	112
9.2.	STRATEGY FOR IMPROVED SERVICE DELIVERY.....	120
9.2.1.	<i>National Urban Transport Policy.....</i>	121
9.2.2.	<i>Priority to Public Transport .....</i>	121

9.2.3.	<i>Priority to Non-motorized Transport</i> .....	122
9.2.4.	<i>Use of Cleaner Technologies</i> .....	122
9.2.5.	<i>Need for Public Awareness &amp; Cooperation</i> .....	122
9.2.6.	<i>The "Big Picture" of Interventions</i> .....	122
9.3.	PROJECT IDENTIFICATION .....	128
9.3.1.	<i>Ring Roads</i> .....	129
9.3.2.	<i>Improvements to Key Roads</i> .....	129
9.3.3.	<i>Railway over Bridges &amp; Railway under Bridges</i> .....	130
9.3.4.	<i>Bus-based Transport Systems</i> .....	130
9.3.5.	<i>Bengaluru New International Airport</i> .....	134
9.3.6.	<i>Airport Rail Link</i> .....	137
9.3.7.	<i>Road Connectivity to International Airport</i> .....	137
9.3.8.	<i>High Speed Rail Connection</i> .....	138
9.3.9.	<i>Development of Commuter Railway System</i> .....	141
9.3.10.	<i>Bangalore Metro Rail</i> .....	142
9.4.	PROJECTS APPROVED UNDER JNNURM SCHEME.....	143
9.4.1.	<i>Other Road/Transport Related Projects</i> .....	144
9.5.	INVESTMENT PLAN FOR ROADS AND TRANSPORTATION .....	145
9.6.	IMPLEMENTATION FRAMEWORK .....	146
9.6.1.	<i>Unified Transport Authority</i> .....	147
10.	HOUSING AND BASIC SERVICE TO URBAN POOR .....	151
10.1.	BACKGROUND .....	151
10.2.	ISSUES .....	153
10.2.1.	<i>Focus on delivering basic services to the poor</i> .....	153
10.2.2.	<i>Core issues</i> .....	154
10.3.	CITY DEVELOPMENT PLAN - GUIDELINES .....	154
10.3.1.	<i>Livability</i> .....	155
10.3.2.	<i>Bankability and sustainability</i> .....	155
10.3.3.	<i>Competitiveness</i> .....	155
10.3.4.	<i>Governance</i> .....	156
10.4.	IN DEPTH ANALYSIS .....	156
10.4.1.	<i>Growth of Bangalore Urban Agglomerate</i> .....	156
10.4.2.	<i>Coverage of Slums in Greater Bangalore</i> .....	157
10.4.3.	<i>Projections for slums</i> .....	157
10.4.4.	<i>Provision of basic services</i> .....	158
10.4.5.	<i>Challenges in providing BSUP</i> .....	160
10.4.6.	<i>Current Problems of Bangalore slums</i> .....	161
10.4.7.	<i>Role of BBMP</i> .....	161
10.4.8.	<i>Role of KSCB</i> .....	162
10.5.	DEVELOPMENT OF A PERSPECTIVE AND A VISION OF THE CITY .....	162
10.5.1.	<i>Vision for the City</i> .....	162
10.5.2.	<i>Objectives of Sub-mission BSUP</i> .....	163
10.5.3.	<i>Objectives of GoK in providing BSUP</i> .....	163
10.5.4.	<i>Benefits of upgrading the Existing Slums</i> .....	163
10.5.5.	<i>Benefit to the Urban Poor</i> .....	164
10.5.6.	<i>Prevent Creation of New Slums</i> .....	164
10.5.7.	<i>Strengthen Institutional mechanism</i> .....	165
10.5.8.	<i>Functional Domains of Agencies</i> .....	165
10.6.	PROPOSED INVESTMENT PLAN FOR BSUP .....	166
10.6.1.	<i>Projects Eligible for Assistance under JNNURM</i> .....	166
10.6.2.	<i>Schemes Covered in Investment Estimates</i> .....	166
10.6.3.	<i>Basic Assumptions in investment estimation</i> .....	166
10.6.4.	<i>Funding Pattern</i> .....	169
10.7.	MULTI STAKEHOLDER CONSULTATION .....	169
10.8.	CRITICAL FACTORS FOR SUCCESS .....	170
10.8.1.	<i>Governance</i> .....	171
10.8.2.	<i>Participation</i> .....	172
10.8.3.	<i>Rule of Law</i> .....	172
10.8.4.	<i>Transparency</i> .....	172
10.8.5.	<i>Responsiveness</i> .....	172
10.8.6.	<i>Consensus oriented</i> .....	172

10.8.7.	<i>Equity and Inclusiveness</i> .....	172
10.8.8.	<i>Effectiveness and Efficiency</i> .....	173
10.8.9.	<i>Accountability</i> .....	173
10.9.	OPTIONS FOR IMPLEMENTATION .....	173
10.9.1.	<i>PPP Model</i> .....	174
10.10.	STATUS OF PROJECTS UNDER JNNURM .....	175
10.11.	ACKNOWLEDGEMENTS.....	177
11.	<b>PRESERVATION AND REJUVENATION OF WATER BODIES</b> .....	179
11.1.	OVERVIEW.....	179
11.1.1.	<i>Status of Lakes</i> .....	179
11.2.	MAJOR LAKES IN BANGALORE.....	180
11.3.	KEY ISSUES .....	180
11.4.	STRATEGIES FOR IMPROVED SERVICE DELIVERY .....	181
11.5.	INVESTMENT PLAN FOR WATER BODIES.....	181
12.	<b>URBAN ENVIRONMENT</b> .....	183
12.1.	URBAN ENVIRONMENT IN THE JNNURM CONTEXT.....	183
12.2.	OVERVIEW OF THIS CHAPTER .....	183
12.2.1.	<i>Existing Situation</i> .....	183
12.2.2.	<i>Key Issues</i> .....	185
12.3.	STRATEGY FOR IMPROVED SERVICE DELIVERY.....	185
12.3.1.	<i>Proposed Implementation Plan</i> .....	186
12.4.	PROJECT IDENTIFICATION & COSTING .....	187
12.4.1.	<i>Investment Plan for Urban Renewal</i> .....	187
12.5.	IMPLEMENTATION FRAMEWORK .....	189
13.	<b>CULTURE &amp; HERITAGE CONSERVATION</b> .....	190
13.1.	CULTURAL AND HERITAGE CONSERVATION UNDER JNNURM CONTEXT.....	190
13.2.	OVERVIEW.....	190
13.2.1.	<i>Existing Situation</i> .....	190
13.3.	STRATEGY FOR IMPROVEMENT .....	193
13.4.	PROJECT IDENTIFICATION & COSTING .....	193
13.4.1.	<i>Project Identification</i> .....	194
13.4.2.	<i>Estimated Capital Investment Requirement</i> .....	195
13.5.	IMPLEMENTATION FRAMEWORK .....	197
13.5.1.	<i>Heritage Management Plan</i> .....	197
14.	<b>LOCAL ECONOMIC DEVELOPMENT</b> .....	198
14.1.	LOCAL ECONOMIC DEVELOPMENT UNDER JNNURM CONTEXT.....	198
14.2.	EXISTING SITUATION.....	198
14.2.1.	<i>Contribution to Karnataka's Economy</i> .....	199
14.2.2.	<i>Industrial Scenario</i> .....	199
14.3.	LOCAL ECONOMIC DEVELOPMENT PLAN .....	201
15.	<b>DISASTER PREVENTION AND MANAGEMENT PLAN</b> .....	202
15.1.	OVERVIEW.....	202
15.2.	EXISTING SITUATION.....	202
15.3.	DISASTER PREVENTION AND MANAGEMENT PLAN .....	202
15.4.	INVESTMENT ESTIMATES .....	203
15.5.	TRAINING AND OTHER PROGRAMS .....	204
15.6.	INFORMATION MANAGEMENT SYSTEM .....	205
15.7.	IMPLEMENTATION PLAN.....	207
16.	<b>CITY INVESTMENT PLAN &amp; FINANCIAL SUSTAINABILITY</b> .....	209
16.1.	INVESTMENTS IN URBAN INFRASTRUCTURE .....	209
16.1.1.	<i>Investments in JNNURM Period</i> .....	209
16.1.2.	<i>Investments during Vision Period</i> .....	210
16.1.3.	<i>Agency-wise Breakup of Investments</i> .....	210
16.1.4.	<i>Prioritization of Projects</i> .....	211
16.2.	FINANCIAL SUSTAINABILITY ANALYSIS .....	212
16.2.1.	<i>Status of BBMP Finances</i> .....	212

16.2.2.	<i>Status of BWSSB Finances</i> .....	213
16.2.3.	<i>Status of BMTC Finances</i> .....	215
16.2.4.	<i>Status of BDA Finances</i> .....	216
16.3.	THE FINANCING PLAN .....	218
16.3.1.	<i>Project Cost and Means of Finance</i> .....	218
16.4.	CONCLUSIONS .....	219
17.	URBAN GOVERNANCE FRAMEWORK .....	220
17.1.	INSTITUTIONS IN BANGALORE .....	220
17.1.1.	<i>BBMP</i> .....	220
17.1.2.	<i>BDA</i> .....	221
17.1.3.	<i>BMTC</i> .....	221
17.1.4.	<i>BWSSB</i> .....	221
17.1.5.	<i>LDA</i> .....	221
17.1.6.	<i>KUIDFC</i> .....	221
17.1.7.	<i>KSCB</i> .....	221
17.1.8.	<i>BMRDA</i> .....	221
17.1.9.	<i>BIAAPA</i> .....	222
17.1.10.	<i>BMLTA</i> .....	222
17.1.11.	<i>BTRAC</i> .....	222
17.2.	PLANNING & DEVELOPMENT LAWS .....	222
17.2.1.	<i>Issues Arising from Functional Overlaps</i> .....	225
17.2.2.	<i>Options for Addressing Functional Issues</i> .....	226
17.3.	METROPOLITAN GOVERNANCE .....	226
17.3.1.	<i>The Planning Needs of Metropolitan Region</i> .....	227
17.4.	LINKAGE OF REFORMS TO PROJECTS .....	227
18.	GOVERNANCE STRUCTURES & REFORM AGENDA .....	230
18.1.	OPTIONS FOR INSTITUTIONAL REORGANIZATION .....	230
18.1.1.	<i>Option 1 Greater Bangalore Concept</i> .....	230
18.1.2.	<i>Option 2 Greater Bangalore Metropolitan Council</i> .....	230
18.1.3.	<i>Option 3 Replicating Rural Governance Structures</i> .....	231
18.2.	LINKING REFORM UNDER JNNURM TO DEVELOPMENT .....	232
18.2.1.	<i>Implementing, Sequencing and Prioritizing Reforms</i> .....	232
18.2.2.	<i>Reforms already underway</i> .....	233
18.2.3.	<i>JNNURM Reform Timelines</i> .....	234
19.	BIBLIOGRAPHY .....	237

**LIST OF TABLES**

TABLE 1: STAKEHOLDER GROUPS & ROLES .....	15
TABLE 2: SCHEDULE OF STAKEHOLDER CONSULTATIONS .....	17
TABLE 3: PROFILE OF RESPONDENTS – BY GENDER .....	18
TABLE 4: PROFILE OF RESPONDENTS – BY AGE .....	18
TABLE 5: PROFILE OF RESPONDENTS – BY PROFESSION .....	18
TABLE 6: FEEDBACK ON CONTENT OF VISION STATEMENT .....	18
TABLE 7: FEEDBACK ON MISSION STATEMENTS .....	19
TABLE 8: KEY PRIORITIES STATED BY STAKEHOLDERS .....	19
TABLE 9: CONSOLIDATED WEB RESPONSES OF PARTICIPANTS .....	20
TABLE 10: PRIORITIES OF DIFFERENT STAKEHOLDER GROUPS.....	20
TABLE 11: DATE AND TIME OF THE STAKEHOLDER MEETINGS.....	21
TABLE 12: PRIORITY SECTORS IN EACH ZONE .....	21
TABLE 13: BANGALORE AT A GLANCE .....	21
TABLE 14: COMPOSITION OF POPULATION GROWTH.....	26
TABLE 15: LAND USE PATTERN IN BDA.....	27
TABLE 16: DETAILS OF SLUMS .....	31
TABLE 17: ACCESS OF SLUM DWELLERS TO BASIC SERVICES .....	31
TABLE 18: STATUS OF ENVIRONMENTAL SERVICES .....	33
TABLE 19: FUNCTIONAL RESPONSIBILITIES OF VARIOUS AGENCIES .....	35
TABLE 20: PPP IN URBAN INFRASTRUCTURE .....	37
TABLE 21: SWOT ANALYSIS OF BANGALORE’S POSITION .....	39
TABLE 22: PROJECTED LAND NEEDS AT BANGALORE METROPOLITAN AREA LEVEL .....	42
TABLE 23: PROPOSED TOWNSHIPS .....	44
TABLE 24: POPULATION GROWTH .....	47
TABLE 25: POPULATION GROWTH - CORE BMP AREA & NON-CORE AREA (SUSTAINED SCENARIO) .....	48
TABLE 26: POPULATION FORECAST - SCENARIO ADOPTED IN COMPREHENSIVE DEVELOPMENT.....	49
TABLE 27: COVERAGE AREA FOR THE CDP.....	63
TABLE 28: MAIN FEATURES OF WATER SUPPLY SYSTEM.....	68
TABLE 29: WATER SUPPLY COVERAGE IN ULBS .....	69
TABLE 30: NUMBER OF WATER SUPPLY CONNECTIONS IN BBMP CORE AREA .....	70
TABLE 31: CITIZEN SURVEYS ON WATER SUPPLY.....	70
TABLE 32: COST RECOVERY SITUATION IN WATER & SEWERAGE .....	70
TABLE 33: KEY ISSUES IN WATER SUPPLY .....	71
TABLE 34: KEY ISSUES IN SEWERAGE .....	72
TABLE 35: SUMMARY OF STUDIES IN WATER & SEWERAGE.....	74
TABLE 36: PROJECT COST FOR PROVISION OF WATER SUPPLY TO BBMP REGION.....	78
TABLE 37: PROJECTION OF DEMAND, WATER & SEWERAGE .....	82
TABLE 38: SERVICE DELIVERY BENCHMARKS FOR WATER SUPPLY.....	82
TABLE 39: SERVICE DELIVERY BENCHMARKS FOR SEWERAGE .....	82
TABLE 40: INVESTMENT PLAN FOR WATER SUPPLY AND SEWERAGE – JNNURM PERIOD .....	85
TABLE 41: INVESTMENT PLAN FOR WATER SUPPLY & SEWERAGE – VISION PERIOD .....	86
TABLE 42: BWSSB PROJECTS UNDER JNNURM.....	88
TABLE 43: PPP MODELS IN WATER SUPPLY & SEWERAGE .....	89
TABLE 44: SERVICE DELIVERY BENCHMARKS FOR STORM WATER DRAINS.....	92
TABLE 45: INVESTMENT PLAN FOR URBAN DRAINAGE FOR MISSION PERIOD .....	93
TABLE 46: INVESTMENT PLAN FOR URBAN DRAINAGE FOR VISION PERIOD .....	94
TABLE 47: PROJECTS APPROVED UNDER JNNURM SCHEME.....	94
TABLE 48: MSW GENERATION IN CORE AREA .....	96
TABLE 49: PREVAILING MSW MANAGEMENT PRACTICES IN BBMP AREA .....	96
TABLE 50: COST RECOVERY SITUATION IN SWM .....	97
TABLE 51: MSW GENERATION IN FORMER CMCs/TMC.....	98
TABLE 52: BIO-MEDICAL WASTE GENERATION.....	98
TABLE 53: SERVICE DELIVERY BENCHMARKS, MSW .....	101
TABLE 54: INVESTMENT PLAN FOR MSW – JNNURM PERIOD .....	103
TABLE 55: INVESTMENT PLAN FOR MSW – VISION PERIOD AND BEYOND .....	104
TABLE 56: FRAMEWORK IN PPP FOR MSW .....	105
TABLE 57: DETAILS OF URBAN ROADS UNDER BBMP.....	108
TABLE 58: EXISTING ROAD WIDTHS.....	108
TABLE 59: VEHICLE POPULATION (MARCH 2008).....	109



TABLE 60: MODAL SPLIT FOR TRAVEL TRIPS .....	110
TABLE 61: COST RECOVERY SITUATION IN PUBLIC BUS SERVICES.....	110
TABLE 62: AIR POLLUTION LEVELS.....	110
TABLE 63: STANDARDS FOR NOISE POLLUTION .....	111
TABLE 64: NOISE POLLUTION LEVELS .....	111
TABLE 65: VOLUME - CAPACITY RATIOS OF ROADS .....	112
TABLE 66: MASS TRANSPORTATION SYSTEMS - CTTTP.....	118
TABLE 67: COST ESTIMATES.....	120
TABLE 68: STANDARDS FOR ROAD INFRASTRUCTURE.....	128
TABLE 69: COST PHASING FOR B-TRAC.....	134
TABLE 70: KEY FACTS PERTAINING TO THE BIAL .....	135
TABLE 71: PROJECTS APPROVED UNDER JNNURM SCHEME.....	144
TABLE 72: INVESTMENT PLAN UPTO JNNURM PERIOD .....	145
TABLE 73: INVESTMENT PLAN VISION PERIOD JnnURM.....	146
TABLE 74: POPULATION PROJECTION OVER THE YEARS OF ERSTWHILE BMP .....	157
TABLE 75: DETAILS OF SLUMS IN BANGALORE.....	159
TABLE 76: INVESTMENT PLAN JNNURM MISSION PERIOD (RS. CRORES) .....	168
TABLE 77: INVESTMENT PLAN JnnURM VISION PERIOD .....	168
TABLE 78: DETAILS OF PROJECTS FOR BSUP UNDERTAKEN BY KSCB.....	175
TABLE 79: KSCB BSUP PHASE 1 (28-11-2006).....	175
TABLE 80: KSCB BSUP PHASE 2 (28-11-2007).....	176
TABLE 81: KSCB BSUP PHASE 3 (JANUARY 2009) .....	176
TABLE 82: INVESTMENT PLAN FOR PRESERVATION OF WATER BODIES – MISSION PERIOD.....	181
TABLE 83: INVESTMENT PLAN FOR PRESERVATION OF WATER BODIES – VISION PERIOD.....	182
TABLE 84: STREET LIGHT SITUATION IN THE CURRENT BBMP AREA.....	184
TABLE 85: INVESTMENT PLAN FOR URBAN RENEWAL PROJECTS – JNNURM PERIOD.....	188
TABLE 86: INVESTMENT PLAN FOR URBAN RENEWAL PROJECTS – VISION PERIOD.....	188
TABLE 87: INVESTMENT PLAN FOR CIVIC INFRASTRUCTURE - JNNURM PERIOD.....	188
TABLE 88: INVESTMENT PLAN FOR CIVIC INFRASTRUCTURE – VISION PERIOD .....	188
TABLE 89: INVESTMENT PLAN FOR CULTURE & HERITAGE - JNNURM PERIOD .....	195
TABLE 90: INVESTMENT PLAN FOR CULTURE & HERITAGE – VISION PERIOD .....	196
TABLE 91: INDUSTRY TURNOVER AND EMPLOYMENT .....	200
TABLE 92: OCCUPATIONAL DISTRIBUTION.....	200
TABLE 93: INVESTMENT ESTIMATE FOR DISASTER MANAGEMENT FOR MISSION PERIOD .....	204
TABLE 94: INVESTMENT ESTIMATE FOR DISASTER MANAGEMENT FOR VISION PERIOD.....	204
TABLE 95: SUMMARY OF SECTORAL INVESTMENTS - JNNURM PERIOD (IN RS.CRORE) .....	209
TABLE 96: INVESTMENT ESTIMATE- CATEGORY WISE .....	209
TABLE 97: SUMMARY OF SECTORAL INVESTMENTS – VISION PERIOD (IN RS. CRORE).....	210
TABLE 98: SUMMARY OF INVESTMENTS-AGENCY WISE BREAKUP (IN RS. CRORES).....	214
TABLE 99: STATUS OF BBMP FINANCES (RS. CRORES) .....	212
TABLE 100: FORECAST OF BBMP FINANCES (IN RS. CRORES) .....	213
TABLE 101: STATUS OF BWSSB FINANCES (IN RS. CRORES) .....	213
TABLE 102: FORECAST OF BWSSB FINANCES (IN RS. CRORES) .....	214
TABLE 103: STATUS OF BMTc FINANCES (IN RS. CRORES) .....	21
TABLE 104: FORECAST OF BMTc FINANCES (IN RS. CRORES) .....	216
TABLE 105: STATUS OF BDA FINANCES (IN RS. CRORES).....	216
TABLE 106: FORECAST OF BDA FINANCES (IN RS. CRORES) .....	217
TABLE 107: FINANCING PLAN .....	218
TABLE 108: FUNCTIONAL AREAS OF VARIOUS INSTITUTIONS.....	224
TABLE 109: TIMELINES FOR MANDATORY REFORMS .....	235
TABLE 110: TIMELINES FOR OPTIONAL REFORMS.....	236

**LIST OF FIGURES**

FIGURE 1: SNAPSHOT OF CONSULTATION WEB PAGE..... 16  
FIGURE 2: POPULATION GROWTH ..... 25  
FIGURE 4: INTEGRATED URBAN SCENARIO ..... 51  
FIGURE 5: MASTER PLAN 2005-2015..... 52  
FIGURE 6: LOCATION OF BMRDA TOWNSHIPS ..... 53  
FIGURE 7: POPULATION DENSITY..... 54  
FIGURE 8: GROWTH OF BANGALORE ..... 54  
FIGURE 9: STRUCTURE PLAN ..... 56  
FIGURE 11: EXISTING LAND USE PLAN ..... 58  
FIGURE 12: FLOW CHART ON CDP METHODOLOGY ..... 59  
FIGURE 13: PROCESS FOR DEVELOPING VISION STATEMENT ..... 60  
FIGURE 14: SCHEMATIC REPRESENTATION OF VISION EXERCISE ..... 61  
FIGURE 15: WATER SUPPLY ..... 90  
FIGURE 16: PROPOSED TRANSFER STATIONS FOR SWM..... 106  
FIGURE 17: GROWTH OF TRAFFIC..... 109  
FIGURE 18: HIGH DENSITY TRAFFIC CORRIDOR ..... 148  
FIGURE 19: OVERVIEW OF CITY TRANSPORT SYSTEM ..... 148  
FIGURE 20: ROAD SYSTEM BMRDA..... 150

## 1. INTRODUCTION

### 1.1. Purpose

The City Development Plan (CDP) was prepared and approved for the city of Bangalore in 2006 as a prerequisite for availing financial assistance under the Jawaharlal Nehru National Urban Renewal Mission (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 JNNURM. 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 still a 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 Comprehensive Development Plans that were prepared by all cities, under the provisions of the Town and Country Planning Acts, 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
- Clear estimates of financial investments and sustainability.

Since the CDP's approval by the Ministry of Urban Development, Government of India in 2006, Bangalore city has seen numerous changes with respect to new infrastructure projects, changes in governance structure such as formation of the Bruhat Bengaluru Mahanagara Palike (BBMP) along with the addition of 110 villages to the city area. Therefore, it was felt appropriate to revise the CDP to incorporate these changes and provide an update of the investment plan based on the inclusion of the new areas under the jurisdiction of the ULB (BBMP) since 2006.

### 1.2. 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 65 important cities (the plan was initially set out for 63 cities, Porbandar and Tirupathi were added to the list subsequently in 2009) in the Country, with a substantial financial outlay. JNNURM has two sub-missions addressing different critical needs:

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

This revision of CDP has been carried out in accordance with the JNNURM guidelines 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-statal, industry, non-governmental organizations, and citizens) in ensuring that the common vision is attained and within a specified timeframe.

### **1.2.1. 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)
- 50% from the institutions concerned (which include BBMP, BDA, BMTC, BWSSB, KSCB, etc.).

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, street lighting, tourism and heritage. Detailed Project Reports (DPRs) for various projects have been prepared/ are under preparation by the institutions concerned, for availing financial assistance under the provisions of JNNURM.

The methodology adopted for preparation and revision of the CDP comprised:

- Review of existing literature, which included:
  - Comprehensive Development Plan (Master Plan 2015) prepared for BDA (required as per the statute and primarily a land use directional document)
  - City Development Strategy Plan prepared for erstwhile BMP
  - Infrastructure Development & Investment Plan for Bangalore, prepared by STEM (for KUIDFC)
  - Crisil report on Bangalore city's capital investment needs (prepared for KUIDFC)
- Stakeholder Consultations setting out the Vision and priorities (including those with representatives from newly added areas)
- Data Analysis.

A broad-based consultative process was undertaken spanning the cross section of stakeholders – citizens (including the urban poor), elected representatives (Councilors, MLAs, and MPs), government agencies, non-governmental organizations, industry groups 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.

Around sixty 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.

### **1.3. 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 two volumes:

- Volume I: Urban Infrastructure, Urban Governance & Basic Services to Urban Poor
- Volume II: Annexes to Volume I
- 

#### **Volume 1 - Urban Infrastructure & Governance**

Volume I of the report discusses 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.

It also has an account of the key urban infrastructure sectors and basic service for urban poor, 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. The aggregated Capital Investment Plans, Financial Sustainability, the Governance Structure for the city is discussed in this volume.

#### **Volume 2 - Annexes to Volume I**

The summary of the stakeholders consultations, maps of BBMP and its zones, project list of ABIDE, analysis of existing financial health of individual institutions, assumptions for projections of their finances of the ULB are presented in Volume 2 of the CDP.

## 2. ORGANISATION FRAMEWORK FOR THE CDP PROCESS

### 2.1. CDP Policy Committee

The Policy Committee/ Group would provide all the guidance and strategic support for the implementation of the CDP. The Policy Committee should have the support of all the city level institutions namely the ULB, Development Authorities and Para-statals.

The CDP Policy Committee in the city would be headed by the Mayor who would be Chairperson. Other members in the Policy Committee would comprise the Municipal Commissioner, heads of other agencies such as BDA, BWSSB, etc. In addition to the heads of the various governmental agencies, the heads of technical committees would also form part of the Policy Committee.

The indicative roles and responsibilities of the Policy Committee is set out below;

- Ensuring compliance to the CDP preparation process as per the guidelines, by all working Committees/Groups
- Ensuring the preparation of CDP in line with the Master Plan of the city and the District Plan, Metropolitan Plan and other Regional Plans affecting the City/Urban Agglomeration Area, in line with the State Vision.
- Ensuring participatory approach in CDP preparation and inclusive planning and balanced development of all groups, especially the urban poor and other socially disadvantaged
- Advising and directing the Technical Committee for conducting the stakeholders meeting backed by appropriate awareness campaigns and sensitization initiatives
- Ensuring that the feedback received from the stakeholders' are duly taken care if and properly addressed in the CDP
- Responsible for project prioritization according to the resource committee/ availability and timelines drawn as per the CDP
- Drawing up time frame for the Implementation and Revision of CDP
- Ensuring the implementation and the revision of CDP as per the agreed timelines
- Approving the CDP prior to approval by the state level authorities
- Any other policy guidance necessary for preparation of the CDP

### 2.2. CDP Technical Committee

The CDP Technical Committee/Group will work under the overall guidance and advice of the CDP Policy Committee and shall co-ordinate with all other stakeholder groups as necessary.

### 2.3. Roles and Responsibilities of Consultants/ Technical Experts

The CDP preparation requires a multi-disciplinary team with sectoral and technical expertise and such a team is being constituted by the ULB. The role of consultants and experts should complement the expertise available within the various urban agencies and should not be seen as a substitute. One of the critical success factors for formulating high quality CDPs is the synergy between the local knowledge and experience of the

functionaries in the urban local bodies and the expertise of the consultants. It should also be noted that involving consultants/ experts in the CDP preparation process should not absolve the ULB of the responsibility of owning the CDP. Any involvement of a consultant shall also bear an aspect of capacity building. The consultants should work closely with the city administration.

The CDP Policy Committee and the CDP Technical Committee have a critical role in clearly defining the contours of engagement of the consultants/ experts, as well as monitoring and overseeing their work. In turn, the consultants/ experts should be clear about their respective roles and responsibilities during the CDP preparation process. The following section lists some of these roles and responsibilities.

### **2.3.1. Roles and Responsibilities of Consultants**

The role of consultants in the CDP preparation is to;

- Act as facilitators of the planning process and not as sole drivers of the planning process
- Ensure that all the inputs and analysis for the Policy Committees and Technical Committees are presented and facilitated
- Collate and submit drafts/ appraisal noted to the concerned committees for further action

## 3. INITIATION OF CDP PLANNING PROCESS

### 3.1. Constituting CDP Policy and Technical Committees

For Bangalore, the formulation of Vision exercise was undertaken prior to formation of the CDP Policy and Technical Committees. The Vision exercise and the formulation of the development goals and strategies for every sector has been an outcome of multiple stakeholder meets/ consultations that were conducted in the city to comprehend the requirements of the city and develop a shared Vision.

### 3.2. Identifying Stakeholder Groups

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. The table given below lists the various stakeholder groups and their role in the City's functioning.

**Table 1: 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	BBMP 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

### 3.3. Conducting Workshops for CDP Preparation

#### 3.3.1. 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, ULB, 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 BBMP, (which includes the former 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 1.

**Figure 1: Snapshot of Consultation Web Page**

**Your Suggestions Are Important!**  
Send It Before 31 May 06

**Please Fill The Details Below :**

Feedback/Suggestion On Behalf Of  Individual  Organization

Name: Mr. [ ] Age: [ ] Sex: Male [ ]

Profession: Government Employee [ ]

Telephone Number: [ ]

Contact Address: [ ]

E-Mail ID: [ ]

**(1) Does the vision statement truly reflect Bangalore's long term objectives? If no, comment.**  
*"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."*  
 Yes  No

**(2) Do the following mission statements align with the city's vision? If no, comment.**

**(2a)** *"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."*  
 Yes  No (comment if no)

**(2b)** *"Reinforcing Bangalore's image as the most livable city by ensuring the safety of the community, creating the ambience and facilities for catering to the physical, mental and spiritual well being of its residents."*  
 Yes  No (comment if no)

**(2c)** *"Economic development built around Bangalore's brand equity as a 'knowledge hub,' based on eco-friendly, hi-tech industries, R&D and global services."*  
 Yes  No (comment if no)

**(2d)** *"Focused development and sustenance of high quality urban services such as water supply, sewerage, municipal solid waste management, sanitation, roads, and power systems."*  
 Yes  No (comment if no)

**(2e)** *"Developing Bangalore's physical and communication connectivity, commensurate with its role as a global investment destination."*  
 Yes  No (comment if no)

**(2f)** *"Establishing Bangalore as a hub for healthcare & wellness facilitiesOrganizing the City's governance framework to ensure that urban services are rendered promptly in a participative, transparent, and accountable manner."*  
 Yes  No (comment if no)

**(3) In your opinion what strategy should be adopted to reach the vision?**  
 Example : Vertical growth V/S Horizontal growth, Satellite towns, Relocation of congested areas Etc.  
 [ ]

**(4) Do you have any comments on the capital investment plan proposed? If yes, please**  
 [ ]

### 3.3.2. Consultation Schedule

The table given below sets out the consultation schedule that was held prior to the preparation of the CDP

**Table 2: Schedule of Stakeholder Consultations**

<b>Date</b>	<b>Agencies</b>	<b>Venue</b>	<b>Purpose</b>
<b>15/03/06</b>	Government Agencies - BMTC, BDA, BBMP, BWSSB, KSCB, ITBT, BMRDA, KSRTC, Heritage Board, KHB, Janaagraha, BIAAPA, Tourism	Conference Room, KSRTC	Developing a vision Statement for the City
<b>25/03/06</b>	BSUP – KSCB, KHB, BBMP, KUIDFC	Conference Room, KHB	Discussion on project proposals for the urban poor – includes housing, sanitation, etc
<b>01/04/06</b>	Government Agencies – BMTC, BDA, BBMP, BWSSB,	PS, UDD Chamber	Developing & refining the vision Statement for the City Key projects for inclusion in the CDP
<b>07/04/06</b>	NGOs	Conference Room, KSRTC	Developing & refining the vision Statement for the City Inputs to the CDP
<b>21/04/06</b> <b>24/04/06</b> <b>26/04/06</b> <b>27/04/06</b> <b>28/04/06</b>	Former ULBs RR Nagar & Kengeri Mahadevapura & KR Puram Yelahanka & Byatarayanapura Bommanahalli Dasarahalli	In respective zones	Inputs for Vision Statement Inputs for finalizing the CDP
<b>06/05/06</b>	BBMP	In 30 wards / ARO ranges across the city	Comments on vision statement Comments on project proposals Inputs to CDP
<b>09/05/06</b>	Elected representatives	KRISHNA CM's Residence Office	Approval of Vision statement Indicative Capital Investment Plan
<b>10/05/06</b>	Trade associations	Hotel Atria	Comments on vision statement Comments on project proposals Inputs to CDP
<b>25/05/06</b>	Government Agencies - BMTC, BDA, BBMP, BWSSB, ULBs, KSCB, ITBT, BMRDA, KSRTC, Heritage Board, KHB, Janaagraha, BIAAPA, Tourism	KUIDFC	Overall CDP, content and process, priorities of the project

Date	Agencies	Venue	Purpose
27/05/06	NGOs	Hotel Atria	Basic services to urban Poor Vision, strategies and plans

### 3.4. Profile of Stakeholder Groups

In addition to the workshops, a specific section on JNNURM was created at the website [www.kuidfc.com](http://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 3 to Table 5.

**Table 3: Profile of Respondents – By Gender**

Gender	Number	Percentage
Male	186	89
Female	24	11
<b>Total Respondents</b>	<b>210</b>	<b>100</b>

**Table 4: Profile of Respondents – By Age**

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

**Table 5: 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
<b>Total Respondents</b>	<b>139</b>	<b>100</b>

### 3.5. 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 6. Suggestions were also given on the form and construct of the Vision Statement.

**Table 6: Feedback on Content of Vision Statement**

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

Similarly, Table 7 gives the feedback on the Mission Statements.

**Table 7: Feedback on Mission Statements**

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

### 3.5.1. Key Priorities – Direct Consultations

The table below highlights the key priorities, which emerged during consultations.

**Table 8: Key Priorities Stated by Stakeholders**

Sector	Key Priorities
<b>SWM</b>	<ul style="list-style-type: none"> <li>Importance of efficient Solid Waste collection and transportation</li> <li>Higher capacity transportation vehicles for SWM</li> <li>Create garbage dumping yard and landfill facilities</li> </ul>
<b>Roads &amp; Transportation</b>	<ul style="list-style-type: none"> <li>Develop Ring road &amp; construct flyovers to ease traffic congestion</li> <li>Improve strength of roads for HTV</li> <li>Improve Panchayat Roads &amp; local roads</li> <li>Develop service roads next to ORR</li> <li>Speedy completion of national highway works</li> <li>Develop roads in accordance to the requirement of multi-storied buildings (apartments)</li> <li>Provide service roads along NH4</li> <li>Provide Skywalks</li> <li>Develop inner roads and link roads that connect to the ring road</li> <li>Provide Multi-storied parking on all main roads to ease traffic congestion</li> <li>Widen Mysore road till Kengeri</li> <li>Provide bus terminals in the outskirts of the City</li> <li>Provide subways at Railway gates for pedestrians</li> <li>Improve footpaths</li> <li>Tarring of all street roads</li> <li>Provide bus shelters</li> <li>Not to write on the window panes of BMTC and BTS buses</li> </ul>
<b>Urban Poor</b>	<ul style="list-style-type: none"> <li>Housing for poor</li> <li>Develop slums</li> <li>Provide education and health facilities for the poor</li> <li>Improve basic services to urban Poor with clear plans</li> </ul>
<b>Water supply, sewerage, and drainage</b>	<ul style="list-style-type: none"> <li>Ensure regular water supply &amp; distribution</li> <li>Improve storm water drains</li> <li>Provide proper UGD facility, cleaning of road side drains</li> <li>Regular supply of drinking water</li> <li>Construct overhead tank for drinking water</li> <li>Improve drainage system – create box type drainage</li> <li>Water distribution pipeline to be provided from Hessarghatta</li> <li>Provide proper drainage &amp; road widening in Dasarahalli village</li> <li>Improve storm water drains</li> </ul>

Sector	Key Priorities
<b>Other civic infrastructure, reform &amp; participation</b>	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

### 3.5.2. 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. The below table given below states the consolidated responses of the participants in the web feedback.

**Table 9: Consolidated Web Responses of Participants**

Sectors / Areas	Number	Percentage
<b>Road Network</b>	70	20
<b>Water Supply</b>	45	13
<b>Urban Transport</b>	44	13
<b>Sewerage &amp; Sanitation</b>	44	13
<b>Improvement of drains / drainage</b>	33	10
<b>Re-development of inner city areas</b>	25	7
<b>Infrastructure</b>	20	6
<b>Basic services to urban poor</b>	13	4
<b>Development of bus terminals</b>	12	3
<b>Preservation of water bodies</b>	12	3
<b>Solid Waste Management</b>	12	3
<b>Integrated development of slums</b>	7	2
<b>Development of heritage areas</b>	4	1
<b>Street lighting</b>	3	1
<b>Total</b>	344	100

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

**Table 10: Priorities of Different Stakeholder Groups**

	Priorities
<b>Citizens</b>	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.
<b>NGOs</b>	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

	Priorities
	JNNURM
<b>Industries</b>	Specific infrastructure in relation to the user groups such as road connectivity, urban drainage systems, water supply and sewerage sectors

### 3.6. Stakeholder meet for the newly added areas

As part of the revision of CDP, stakeholder meets were organized for all the erstwhile CMC areas. When BMP transformed into BBMP, not just the CMCs and the TMC, but also 110 villages formed a part of it. Five stakeholder meets were held in five of the newly formed zones. The purpose of the stakeholder meet was to assess the requirements of the citizens representatives in those villages. The Vision statement was to be followed as is. Inputs from the stakeholder meets and subsequently in the revision of the Capital Investment Plan.

The table below sets out the date and time for the stakeholder meet held at zonal headquarters in the villages that form a part of the five zones viz; Raja Rajeshwari Nagar, Dasarahalli, Mahadevapura, Bytarayanapura and Bommanahalli.

**Table 11: Date and time of the stakeholder meetings**

Sl. No.	Zone	Date	Time
1	Raja Rajeshwari Nagar	29-06-09	11:00 am
2	Dasarahalli	30-06-09	3:00 pm
3	Mahadevapura	01-07-09	3:00 pm
4	Bytarayanapura	02-07-09	3:00 pm
5	Bommanahalli	03-07-09	3:00 pm

All stakeholder meets were chaired by their respective zonal Commissioners or in their absence by other officers of BBMP, were attended by personnel from KUIDFC, the nodal agency for JNNURM projects in the State and representatives from iDeCK. The priority sectors in infrastructure for the villages that form a part of the five zones are given in the table below;

**Table 12: Priority sectors in each zone**

Sl. No.	Zone	Rank	Priority Sectors
1	Raja Rajeshwari Nagar	1	Sewerage
		2	Water Supply
		3	Storm Water Drains
		4	Roads
		5	Solid waste Management
2	Dasarahalli	1	Water Supply
		2	Sewerage
		3	Roads
		4	Storm Water Drains
3	Mahadevapura	1	Sewerage
		2	Water Supply
		3	Roads
		4	Lake development
4	Bytarayanapura	1	Sewerage

Sl. No.	Zone	Rank	Priority Sectors
		2	Water Supply
		3	Solid Waste Management
		4	Roads
<b>5</b>	Bommanahalli		
		1	Sewerage
		2	Storm Water Drains
		3	Roads
		4	Lake development

It was evident from the meetings that all the newly added areas primarily faced issues of water supply and sewerage followed by drainage and roads. Annexure 2 provides details of each of the Stakeholder meetings.

## 4. CITY ASSESSMENT

### 4.1. Background

Bangalore, the Capital of Karnataka, is the fifth largest metropolitan city in the country in terms of population. BBMP was formed in 2007, by amalgamating the erstwhile Bangalore Mahanagara Palike (BMP), surrounding eight smaller urban local bodies and 110 villages. BBMP now spans over an area of 800 sq km.

Bangalore 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 have led to this rapid development. It is divided into 198 wards owing to the delimitation regulations. Table 13 shows some salient details of Bangalore.

#### 4.1.1. Topography

Bangalore is situated in the southeast of Karnataka, at an average elevation of 920m above mean sea level, and is positioned at 12.97°N, 77.56°E. 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 among them are Madivala Tank, Hebbal Lake, Ulsoor Lake, and Sankey Tank.

#### 4.1.2. Climate

Due to its elevation, Bangalore enjoys a pleasant climate throughout the year, with temperatures ranging between 16°C and 33°C and 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 13: Bangalore at a Glance**

Parameters	Erstwhile BMP	Erstwhile CMC and TMC								Erstwhile BMP+CM C+TMC	Villages	GRAND TOTAL
	BMP	Bomma nahalli	Byataray anapura	Dasara halli	KR Puram	Mahadevapura	RR Nagar *	Yelaha nka	Kengeri	TOTAL	110 villages	
<b>Area (sqkm)</b>	226.2	43.6	47.0	38.0	21.3	46.2	66.0	38.8	34.0	561.0	239	800.0
<b>Population (2001)</b>	4303033	243870	210007	309956	198991	163486	111553	99993	44995	5685884	304855	5990739
<b>Gender ratio (female population per 1000 male)</b>	915	867	908	844	911	866	879	863	936	906	NA	-
<b>Literacy levels (%)</b>	86	81	82	96	87	83	78	84	84	86	NA	-
<b>Number of households</b>	1225307	65885	52813	91071	50186	44927	30073	28953	14319	1603534	NA	-
<b>Developed Properties</b>	521939	41371	25800	26759	44824	18186	16715	24110	6009	725713	NA	-
<b>Vacant land (ha)</b>	57993	37193	10167	20689	15176	24575	27300	7555	5115	205763	NA	-

Source: CDP 2006, Values in red are newly added

\* RR Nagar was formerly known as Pattanagere.

## 4.2. Population Trends

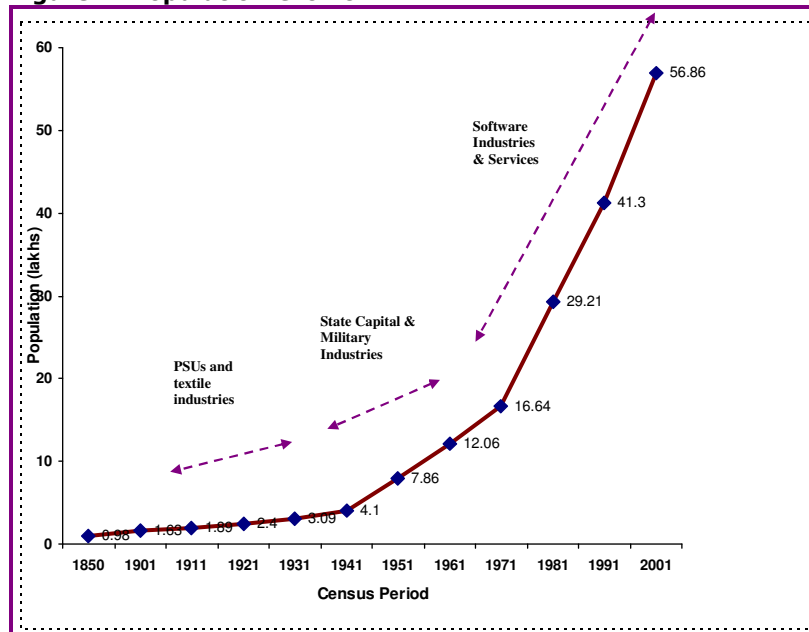
The city experienced rapid growth in the decades 1941-51, and by 1961 Bangalore became the fifth largest city in India. Employment opportunities - initially in the public sector, and then in textile and high technology industries - resulted in migration of people to Bangalore. The 2001 census population of erstwhile BMP was 56.86 lakhs, but the population of BBMP presently is estimated at 68 lakhs. 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
- Development of Information Technology/ITES/Biotech based industries.

### 4.2.1. Decadal Growth

In the decade of 1991-2001, the growth rate of 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 2 displays the population growth and illustrates sharp spurts in population growth in the decades 1941-51 and 1971-1981.

**Figure 2: Population Growth**



### 4.2.2. 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’s urban agglomeration. Adjusting this factor, the net increase in population during 1991-2001 was approximately 22%. The table given below shows the growth composition of population.

**Table 14: 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
<b>Total increase</b>	<b>12.09</b>	<b>100</b>	<b>15.57</b>	<b>100</b>

Source: Master Plan 2015 - BDA

### 4.2.3. 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 7

## 4.3. Land Use

As can be seen from Figure 8, Bangalore city has developed spatially in a concentric manner. However, the economic development has occurred in a different manner in different sectors of the city. The current urban structure is a factor of these aspects. Five major zones can be distinguished in the existing land occupation, indicated in Figure 4 **Error! Reference source not found.**.. The details of each of the zones are listed below:

- 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 5-7 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 5 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 BBMP. The table given below shows the land use pattern in the BDA area, while Figure 11 shows the existing land-use situation.

**Table 15: Land use pattern in BDA**

Category	Area in hectares	% Use
Residential	16042	14.95
Commercial	1708	1.59
Industrial	5746	5.36
Park and open spaces	1635	1.52
Public semi-public	4641	4.33
Transportation	9014	8.40
Public utility	192	0.18
Water sheet	4066	3.79
Agricultural	64243	59.88
<b>Total</b>	<b>107287</b>	<b>100</b>

Source: Master Plan 2015 of BDA

#### 4.4. Social Sectors

The areas of Health and education come under the social sector. Therefore providing the health and education benefits to its people is the duty of a nation or government. With this concept in mind, BBMP has always proven to be successful. Bangalore is one among the fastest growing city in the world & therefore we share the city with a lot of migrants & job seekers. Consequently, the regional government must provide all infrastructure facilities to its citizens at a larger scale. BBMP strives to administrate health, hygiene and education to its citizens. Social sector is a clear indicator of the development status of a county, state or a city.

Health is defined by World Health Organisation (WHO) as “being “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”.

Providing and maintaining of better health facilities to the city dwellers is a core responsibility of the BBMP. But considering the existing population, the infrastructure available is quite insufficient to render services to the masses. Presently the area being covered by BBMP in providing social sector services is around 100 wards consisting of 30 lakh population in

Bangalore of an area of 150 sqkm. With the formation of BBMP, the facilities which exist currently needs to be escalated in terms of increase in the number of hospitals, doctors and other infrastructure facilities.

#### **4.4.1. Health Institutions**

The Health Institutions in BBMP are as follows:

- 6 Referral Hospitals
- 24 Maternity Homes
- 29 Health Centers
- 19 UFWCs
- NGO Centers
- 2 Govt UFWCs
- 17 Dispensaries
- 3 Mobile Dispensaries
- 15 Not Sanctioned Hospitals
- 1 Ayurvedic Hospital
- 1 Unani Treatment Centers

#### **4.4.2. Services Offered**

The services offered by BBMP include:

- Reproductive Child Health program.
  - Antenatal care
  - Postnatal care
  - Family welfare program
  - Post natal kit
- Immunization against seven preventable diseases
- Reproductive track infection and sexually transmitted diseases screening
- HIV / AIDS screening / awareness
- Cancer detection screening / awareness
- Family planning counseling
- School health program
- Tuberculosis screening (Revised National Tuberculosis Control Program) and treatment (DOTS)
- Treatment of Dog bites
- Malaria screening program
- Family health awareness campaign
- In addition to the out patient services as mentioned under health centre, services offered in maternity hospital is as follows:
  - Normal deliveries
  - Sterilization by way of tubectomy, laparoscopic sterilization, no scalpel vasectomy, medical termination of pregnancy
- Prevention of mother to child transmission of HIV during labour.
- Management of high risk pregnancies
- Gynecological surgery
- Advance endoscope surgery

- Sonography and colposcopy in RH
- Treatment of ARI and GE cases
- Measles and AFP surveillance
- H1N1, Dengue, Chikun gunya, treatment and awareness
- Training of nursing students
- Training centre for LSAS (Life saving anesthetic skills)
- Minimum Lab Facilities
  - HB estimation
  - Blood grouping and RH typing
  - Pregnancy tests
  - VDRL tests
  - Urine routine
  - Blood sugar urea

#### **4.4.3. Other Programmes**

Other Programmes of BBMP include:

- RNTCP (Revised National Tuberculosis Control Program)
- HIV / AIDS
- NTCP (National Tobacco Control Program)
- NICD
- BHUP (Bangalore Healthy Urbanization Program)
  - Nutrition
  - Yoga
  - School Health Program (Communicable and Non communicable diseases)
- CDC (Cancer Detection Clinics)
- IDSP
- School Health Program
- Family Health Awareness Campaign
- Malaria Screening Program
- Preventive Health Care Project
- CAMHAD- Preventive Cardiology Program
- Madilu Yojane
- Janani Suraksha Yojane
- BHAGYALAKSHMI Yojane
- Managed Health Care

BHUP is a partnership collaborative program with the WHO, KOBE centre (WKC) Japan, the World Health Organization (SEARO and INDIA) and BBMP. The project was inaugurated on 4<sup>th</sup> December 2006. The main objective is to optimize the impact of social determinants of health on exposed population in urban setting. It is a research project involving service organizations, different stake holders, non governmental agencies, social workers and medical college representatives. After completion of this project, BBMP has taken initiatives to mplement the recommendations.

## 4.5. 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 erstwhile BMP area was 4.30 lakh, which was about 10% of the total erstwhile BMP population of 43.10 lakh. The present population of urban poor in BBMP is estimated to be over 7 lakh which is again 10% of the present population of BBMP which is approximately 68 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 BBMP). The total number of slums taken into account is 640 and the number of households proposed to be redeveloped is estimated to be 136486 of which developments are underway by BBMP and KSCB. Table 16 lists the details of slums, while Table 17 shows the access levels of the urban poor, to infrastructure services.

**Table 16: Details of Slums**

No.	Zone	Declared slums				Undeclared slums				Total No. of slums			
		No. of slums	Area	No. of households	Population	No. of slums	Area	No. of households	Population	No. of slums	Area	No. of households	Population
1	East	48	35.14	8724	48638	29	46.03	10821	45003	77	81.17	19545	93641
2	West	99	188.31	20661	120221	40	67	13166	89978	139	255.31	33827	210199
3	South	51	116.76	14822	80781	70	161.13	19327	117740	121	277.89	34149	198521
4	Dasarahalli	2	17.2	533	4490	33	61.2	17069	70293	35	78.4	17602	74783
5	Bommanahalli	2	13.37	80	625	38	0	715	3221	40	13.37	795	3846
6	Mahdevapura	25	69.45	6154	25688	46	59	6074	32789	71	128.45	12228	58477
7	Yelhanka	13	35.84	3297	18696	108	13.58	9313	42901	121	49.42	12610	61597
8	Rajarajeshwari nagar	1	0	250	1723	35	0.27	5480	250	36	0.27	5730	1973
		241	476.07	54521	300862	399	408.21	81965	402175	640	884.28	136486	703037

Source: BBMP- BSUP Division

Note: Area details are available for 431 slums, Household details are available for 505 slums and population details for 495 slums are available.

**Table 17: 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



## 4.6. 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 present level water supply in the BBMP area is about 143 lpcd against the norm of 180 lpcd. Though the supply is satisfactory, it is not uniform throughout the city. The core BBMP area gets a supply of 205 lpcd; among ULBs, the supply varies from 17 lpcd in Dasarahalli to 76 lpcd in Kengeri. Finally, the average daily per capita supply in villages is 25 litres. To bring in uniformity in water supply, an investment of about Rs. 5,986 crores is needed to be made by 2011-12; this estimated sum would cover water augmentation by 476 MLD, construction of a 601 MLD capacity treatment plant, extension of the distribution network and the construction of about 416 ML capacity storage reservoirs.
- **Sewerage:** Under Ground Drainage (UGD) facility is available in all areas except in KR Nagar and 110 villages; however, the network coverage is not uniform. It is estimated that the Bangalore Water Supply and Sewerage Board (BWSSB) needs to develop a sewage treatment plant of the capacity of 446 MLD by 2012 and a sewer network of about 4,862 km. Also, it needs to carry out refurbishment and rehabilitation in the existing network. This will require an investment of about Rs. 2,203 crores by 2011-12.
- **Comprehensive Mobility Plan:** The comprehensive mobility plan mostly includes the road network which is underdeveloped in terms of size, structure, continuity and connectivity. Nearly 82% of the total existing road network of 1763 km (taken for travel demand modeling purposes) is with 2-lane carriageway. Length of roads with carriageway of 4 lanes and above is only 290 km. Thus most of the roads have inadequate carriageway widths to cater to growing traffic at an acceptable level of service. Most of the roads in the city are also used for on-street parking facility which even reduces the effective carriageway width available for traffic. Most of the major roads in Bangalore have V/C ratios > 1.0 indicating high congestion, low speeds and high delays. The intersections are also spaced quite closely which further increases the problem of traffic. Many of the intersections in core area are with five legs. BBMP needs to invest in flyovers, roads, over-bridges, traffic management, junction improvement, commuter-based systems, rolling stock, Bus Rapid Transit System (BRTS) systems, and other road-related infrastructure. It is assumed that about 60% of this additional infrastructure can be taken up using the

public-private partnership route, which will reduce the total amount needed from BBMP for the purpose.

- Storm Water Drains: At present, about 50% of BBMP is covered by storm water drains, indicating coverage of 107% of the roads against the norm of 136%; 12% of these storm water drains are kutcha drains. By the year 2012, BBMP needs to construct 3,841 km of new drains and upgrade 2,734 km of existing drains, which will call for an investment of about Rs. 1,127 crores.

Apart from these main core services, other infrastructure like rainwater harvesting, beautification of gardens, lake development, fire system, urban renewal, and urban governance will need to be developed.

The table given below sets out the status of environmental services in BBMP

**Table 18: Status of Environmental Services**

Environmental services	Quality
<b>Air</b>	Air quality in Bangalore is deteriorating as reported by KSPCB.
<b>Water</b>	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, trihalomethane (THM), aluminum and pesticide residues are required to be carried out.
<b>Waste water</b>	Treatment capacity to treat 93% of estimated waste water generated is currently available.
<b>Solid Waste</b>	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.

## 4.7. 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 19.

### 4.7.1. Institutions in Bangalore

Urban Local Body

BBMP (City Corporation)

The BBMP includes the formerly elected bodies viz.

- Bommanahalli (CMC)
- Byatarayanapura (CMC)
- Dasarahalli (CMC)

- KR Puram (CMC)
- Mahedevapura (CMC)
- RR Nagar (CMC)
- Yelahanka (CMC)
- Kengeri (TMC)
- 110 villages (VP)

While the erstwhile BMP shares 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 core area (erstwhile BMP area which is about 19,016 persons/ sqkm) compared to surrounding former ULBs areas (3600 persons/sq.km) is indicative of the concentration of population and activity in the core area. However, all of the former ULBs have shown a significant growth in population in the last decade.

Volume 2 of the CDP consists of political map of BBMP (ward wise) and zonal maps of BBMP.

### **Formation of Bruhat Bangalore Mahanagara Palike**

The Bruhat Bangalore Mahanagara Palike is the newly created administrative body overseeing the activities related to and responsible for the civic and infrastructural assets of the city of Bangalore. It was formed in 2007 by merging 100 wards of erstwhile BMP, along with the 7 City Municipal Councils (CMCs) viz. Rajarajeshwari Nagar, Dasarahalli, Bommanahalli, Krishnarajapuram, Mahadevapura, Byatrayanapura, and Yelahanka; 1 Town Municipal Council, Kengeri; and 110 villages around the Bangalore region.

Government of Karnataka (GoK) on November 2, 2006 officially notified for creation of Greater Bangalore (Bruhat Bangalore Mahanagara Palike). In January 2007, GoK issued a notification to merge the fore mentioned areas with the erstwhile BMP, and rechristening of the body to Bruhat Bengaluru Mahanagara Palike. The process was completed by the month of April-May 2007 and BBMP came into existence.

GoK has constituted an expert committee to suggest strategies to ensure the planned growth of Bangalore agglomerate. This committee is headed by eminent space scientist and Rajya Sabha MP, Dr. K Kasturirangan. The committee is working on a new comprehensive legislation that would deal with the development and regulation of the Bangalore Metropolitan Region (BMR), which is witnessing rapid economic and demographic growth. This is a significant development that has not been addressed in the CDP prepared in 2006.

The area under greater Bangalore now extends to about 791 sq km with the total number of wards being 145. Additional 110 villages have been added to Greater Bangalore, which was not accounted for in the erstwhile CDP.

From the governance point of view, BBMP represents the third level of government (after the central and state governments respectively). BBMP is provided to be run by a set of elected officials collectively comprising the city council. Each of the elected members is designated as a 'corporator'; a corporator represents one ward of the city. Elections are held every five years and the member is elected by a popular vote.

## Statutory Authorities

The statutory authorities in the city are listed below:

- Bangalore Development Authority
- Bangalore Metropolitan Region Development Authority
- Bangalore Water Supply & Sewerage Board
- Bangalore Metropolitan Transport Corporation
- Bangalore Metropolitan Land Transport Authority
- Lake Development Authority
- Karnataka Slum Clearance Board
- Karnataka Urban Infrastructure Development and Finance Corporation
- 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 19: Functional Responsibilities of Various Agencies**

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

Source: STEM - Infrastructure Development & Investment Plan for Bangalore

### 4.7.2. 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 Non-Government Organizations (NGO) 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.

#### 4.7.2.1. Ward Committees

With an objective to decentralize the functioning of the local administrative bodies, 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 the erstwhile 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:

- Collection and removal of garbage
- Removal of accumulated water on streets, public places due to rain and other caused
- Health immunization services
- Improvement of slums including its clearance wherever necessary in accordance with the established law
- Redress public grievances that pertain to the Ward Committee
- Maintenance of essential statistics
- Organizing people's participation with regard to the functions allocated to the Ward Committee
- Numbering of streets and premises.

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

#### **4.7.2.2. 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 Bangalore Agenda Task Force (BATF) by an order in 1999, as a task-force comprising of eminent industrialists, professionals, and citizens. BATF conceived projects at the city level and involved other authorities as and when required. The former Managing Director of Infosys was the Chairman, with eleven other members, including Commissioner of erstwhile BMP as Member Secretary. BATF sought to secure greater involvement of citizens, elected representatives, industry, and institutions in the orderly development of the city.

BATF went about developing and applying partnership models with participating service delivery agencies such as, BDA, BWSSB, BSNL, Bangalore Police, BMTC, BESCO, and with erstwhile BMP. 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, BBMP, and industry/ industry associations, are members. The Committee identifies key infrastructure issues in the City, and attempts to coordinate strategies to address these issues.

## ABIDe

Agenda for Bengaluru Infrastructure and Development Task Force (ABIDe) is an initiative by the Honourable Chief Minister Dr. B.S. Yeddyurappa and GoK to build a better Bengaluru for its citizens by adopting a new urban planning model, upgrading infrastructure, improving social facilities to create a better environment for a good quality of life. The task force will deliberate upon the challenges facing the city, develop blueprints for possible solutions to these, consult with city agencies, the public and other stakeholders, and provide recommendations for the way forward. Wherever needed, ABIDe will also facilitate the work of agencies and departments by resolving bottlenecks. ABIDe has formulated several draft reports and action plans and blueprints in the areas of Governance, Road Traffic Management & Transportation, Urban Poor, and Public Security. A list of all the ABIDE projects are set out in Volume 2 of the CDP.

## 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 BMTCL, 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 Detailed Project Reports (DPR).

### 4.7.3. 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 High Speed Rail Link to the airport. However, as far as urban infrastructure is concerned, the City has been able to attract private sector participation only in a limited manner. The table given below sets out the status of PPP across sectors of urban infrastructure;

**Table 20: PPP in Urban Infrastructure**

Urban Infrastructure	Role of the private sector
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

<b>Urban Infrastructure</b>	<b>Role of the private sector</b>
<b>Drainage</b>	No role of Private sector, BBMP is responsible for planning and laying, operation and maintenance of drainage system in its concern jurisdiction.
<b>Storm water drainage</b>	No role of Private sector, the BBMP is responsible for planning and laying SWD infrastructure, operation, and maintenance of drainage system in their area of jurisdiction.
<b>Solid waste disposal</b>	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 and setting up , O& M of landfills and other related infrastructure for Solid waste disposal.
<b>Municipal Roads (incl. flyovers)</b>	No role of Private sector, the BBMP is responsible for roads falling within their jurisdiction.
<b>Street lighting</b>	Private sector role in street lighting has been limited to construction and O&M of street lights in small segments/ roads falling within BBMP limits, however, BBMP authority has a major role in providing street lighting infrastructure, operation, and maintenance of the same.

#### 4.8. 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. The table given below displays a SWOT analysis of Bangalore’s position.

**Table 21: SWOT Analysis of Bangalore’s Position**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Salubrious climate</li> <li>• Water availability in Cauvery Basin</li> <li>• Presence of a rich bio-diverse lakes/tanks</li> <li>• Academic Institutions</li> <li>• Availability of a pool of talent/skill base</li> <li>• Cosmopolitan culture</li> <li>• Diverse and balanced industrial base – manufacturing to high-end services</li> <li>• Administrative and structural differences between former BMP and CMCs has been remedied with the formation of BBMP</li> <li>• Experience in building large infrastructure projects on PPP formats</li> </ul>	<ul style="list-style-type: none"> <li>• Land use/ Planning issues – absence of clear CBD, locked up land (defense and railways)</li> <li>• Infrastructure “shadow areas” and under equipped outskirts</li> <li>• Increasing economic disparity in the society</li> <li>• Shortage of middle and low income housing stock</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Continuing upwards on the value curve – in academics and in eco-friendly, high-technology industries and R&amp;D (biotechnology, nano-technology, high end outsourcing, logistics)</li> <li>• Capacity for planned unlocking of land in the city and its periphery</li> <li>• Utilizing the citizen’s/NGOs willingness and ability in participative governance of the city</li> <li>• Building upon experience gained in formulating infrastructure projects on a PPP format</li> </ul>	<ul style="list-style-type: none"> <li>• Growth of infrastructure seriously lagging growth of economy &amp; population</li> <li>• Competition from other cities (both metropolises and tier 2 cities), especially from those in Southern India</li> <li>• Delays in policy formulation and implementation in the area of urban governance/management</li> </ul>

## 4.9. 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, silk, 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:

- Diffusion of technology
- Dominant anchor firms
- Building up fundamental human capital/skill base
- Dominant focus on “speed-to-market”
- Moving up the value chain in services.



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

- IT/ITES and Bio-technology
- Education
- Healthcare

#### **4.9.1. 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
- Basic infrastructure, including water supply and transportation to be strengthened.

##### **4.9.1.1. IT/ ITES and Biotechnology**

Bangalore has already been the international focus of development for Information Technology, Bio-Technology 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 like Chennai and Hyderabad or tier-2 cities such as Mysore, Pune or Visakhapatnam.

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

##### **4.9.1.2. 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, which needs to be further strengthened. Premier institutions in Bangalore include Indian Institute of Science, Indian Institute of Management, National Law School, and many engineering and medical colleges. 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

- Creating land banks for educational institutions.

#### **4.9.1.3. Healthcare**

Bangalore’s natural advantages, connectivity, and climate form an excellent base to develop the hub of healthcare/medical facilities/tourism. The City would build upon the base of excellent hospitals, 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
- 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
- Availability of excellent transportation facilities.

### **4.10. 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 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 beginning to see an exponential growth as the new airport is located in that direction (Devanahalli).

The projected land-use in 2015 has been assessed in the Master Plan 2015 of BDA, and is indicated in the table given below.

**Table 22: Projected Land Needs at Bangalore Metropolitan Area Level**

Usage	Area (sq.km)	Percentage
<b>Existing Urbanized Area</b>	512	39
<b>Proposed area to be urbanized as:</b>		
<b>Housing</b>	300	23
<b>Hi-Tech development</b>	135	
<b>Other Industries</b>	25	
<b>Logistics</b>	15	
<b>Large scale facilities</b>	13	
<b>Office spaces</b>	24	
<b>Other facilities</b>	2.5	
<b>Inside peripheral road</b>	85.5	
<b>Outside peripheral road</b>	270	
<b>Green belt</b>	30	
<b>Inside peripheral road</b>	270	20.7
<b>Outside peripheral road</b>	40	
<b>Agricultural land</b>	402	
<b>BMICPA</b>	174	13.5
<b>TOTAL</b>	50	3.8
	<b>1306</b>	<b>100</b>

Source: BDA Master Plan 2015

#### 4.10.1. 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.

##### 4.10.1.1. 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.”

##### 4.10.1.2. IT Corridor Scenario

In this scenario (Figure 3), 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.

#### **4.10.1.3. Urban Integrated Scenario**

This scenario (Figure 8) 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.

#### **4.10.1.4. Satellite Township Scenario**

The rapid growth of Bangalore over the past decades has resulted in growth beyond the erstwhile BMP area into Bangalore Urban and Bangalore 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.

The advent of large metropolises sporting population of several million has given rise to a spectrum of problems. These problems stress on the need for enhanced infrastructure especially in the domain of waste management, water supply, electricity supply, and transportation.

Some of the commonly observed problems due increase in population density includes the following:

1. In a city where single use zoning plan has not been undertaken citizens will face numerous difficulties due to cross-commutation between zones. Since the primary activity areas are not demarcated suitably (e.g. there is a loose juxtaposition between various zones such as residential, commercial, industrial etc.) citizens of the city would be required to cross traverse between zones on a priority basis for work.
2. Densification of various commercial and industrial zones has put excessive stress on the need for parking space for motorized vehicles. This translates into need for sophisticated planning for land use in high density areas. This also impairs the flexibility overall plans for organized development.
3. Regular water supply and distribution could be affected due to heterogeneous composition of the city. It could also impact the quality of waste management of the city as densification increases.
4. Large metropolises are generally endowed with high income population and a large number of motorized vehicles (of which personal transport comprises a significant portion) which have a cumulative, pernicious effect on the ecology. Due to rising vehicle population in metropolis the quality of air deteriorates over a period of time due to rising pollution. This leads to poor quality of life.
5. Due to extreme concentration of economic activity at the metropolis, and little economic recourse available to nearby rural population, large cities are often subject to the phenomenon of rural exodus. As the rural population aspires for better economic prospects, working in the city could lead to the formation of

ghettos (and sometimes slums). Formation of ghettos and slums has an unfortunate side effect of lack of hygiene, potential increase in crime rate, political disenfranchisement, rise in anti-social activities etc. The formation of economically backward ghettos is mostly around the periphery<sup>1</sup> of the city as high real estate value in the core area prevents this economic class from accessing the mainstream housing.

These are only few of the major problems likely to be faced by a large, fast growing city like Bangalore. Unless proper steps are taken for promoting organised growth of the city, there would be excessive stress on city's infrastructure assets due to burgeoning population. However, since the population influx into the city cannot be controlled, alternative means of promoting sustainable growth have to be considered. One such alternative is the development of Satellite Townships around the metropolis.

### The Concept of Satellite Townships

The concept of a Satellite city / Satellite town in urban planning involves design of smaller towns governed under different municipalities that are adjacent to a major city which is the core of the metropolitan area. These markedly differ from suburbs<sup>2</sup>, subdivisions and layouts. Conceptually, satellite cities could be self-sufficient communities outside of their larger metropolitan areas. However, functioning as part of a metropolis, a Satellite city experiences cross-commuting. It may involve consciously planned cities to act as spillover city.

The following Satellite cities are planned for design around Bangalore city:

1. Bidadi Integrated township
2. Ramanagara township
3. Sathanur township
4. Solur township
5. Nandagudi township

Details of the proposed townships are given below in Table 23;

**Table 23: Proposed townships**

Satellite Township	Pvt. Land (in acres)	Govt. Land (in acres)	Total (in acres)
<b>Bidadi Integrated Township</b>	6959	2725	96843
<b>Ramanagara Township</b>	3621	392	4013
<b>Sathanur Township</b>	5891	10341	16232
<b>Solur Township</b>	9661	2864	12525
<b>Nandagudi Township</b>	13762	4745	18507

<sup>1</sup> Several economically backward slums were formed bordering centers of high economic activity in cities such as Mumbai and Delhi.

<sup>2</sup> Satellite towns are different from suburbs due to the fact that they governed by a different municipality which is free from direct influence of the metropolitan governing body.

<sup>3</sup> Area of Bidadi Integrated Township (BITP) subsequently revised to 9178.29 acres vide Govt. Order: UDD 30 BMR 2007 dated 11-06-2007

Satellite Township	Pvt. Land (in acres)	Govt. Land (in acres)	Total (in acres)
<b>Bidadi Integrated Township</b>	6959	2725	96843
<b>Ramanagara Township</b>	3621	392	4013
<b>Sathanur Township</b>	5891	10341	16232
<b>Total</b>	39894	21067	60961

Source: BMRDA

## Vision

To develop a self contained, integrated work, live & play infrastructure with minimum additional transportation load.

## Development & Approach

This section gives an overview of approach to development of proposed new integrated townships. It is proposed that each town be developed on basic 'thematic premise' that suits it the best. That is, each town shall be developed to suit the requirements of envisioned economic activity. While some townships could be developed to house advanced technology centres (such as electronics, IT, bio-tech, automotive, R&D etc.), others could be developed for housing, manufacturing and agro based industries.

The development of these townships is slated to be carried out in partnership with the private sector through a competitive bid process. The development project shall be awarded to the preferred bidder who meets all the criteria set out in by the Government. The role of Private Partner is given as follows:

### Role of Private Partner

The Private Partner shall finance and develop the entire internal project infrastructure (including commercial and residential establishments, civic amenities such as storm water drains, water supply, drainage, power and electrical connectivity, solid waste disposal, street lighting, roads etc.). The Private Partner shall take on the task of designing, financing, and development of townships. The Developer shall prepare and propose a Master Plan for township; the same shall be approved by a competent authority.

The Developer shall shoulder the task of bringing potable water and power up to the periphery through BWSSB and BESCO. This would require planning for the supply of the water and electrification needs and coordinating with the authorities. Cost of land acquisition and rehabilitation shall be borne by the Developer.

In addition, the role of Developer will extend to the following<sup>4</sup>:

- Marketing to attract other Tier-II developers and tenants

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<sup>4</sup> The scope under this section is proposed for development of BITP; and is intended to serve as indicative of the Developer's scope. The same may vary for each Township and Developer.

- Land development and internal infrastructure development such as road network, street lighting, parks and public spaces, gardening and beautification
- Provision of necessary services including telecommunication, water and power supply, effluent treatment, piped gas, steam, transportation and security
- Social amenities as may be required to make BITP a stand alone, self contained integrated township
- Operation and maintenance of infrastructure, provision of emergency services (fire fighting, healthcare etc.)
- Sub-leasing of developed land (after providing basic infrastructure) to Tier-II developers
- Administration and management of Township
- Provision of various types of facilities including: ready-built factories, residential apartments, multi-storied office buildings, commercial complex, institutional space etc.
- Developed plots may be provided to the Tier-II developers for further development into built space. Developed plots may also be provided to actual users (in industrial, commercial, institutional, and recreation categories)
- Developer to comply with rules and regulations as laid down by various legal and regulatory authorities
- Role of the Developer would include performance of municipal maintenance/service functions on behalf of BMRDA during the construction/development phase of Township and till Township is formally notified as a municipal area
- Any other activities that may be required for the successful planning, development and operationalisation of Township and meeting the user needs of the tenants
- The Developer may enter into agreements with service providers for provision of services including power, telecom, sewerage systems etc. to the tenants.

### **Role of BMRDA**

The role of BMRDA would be to extend support activities to the development of townships by Private Partner. BMRDA would provide external infrastructure by way of access roads, development of Satellite Township Ring Roads (STRR), Intermediate Ring Road (IRR), and radial roads to provide speedy access to downtown Bangalore and to the new International Airport. Role of BMRDA would include monitoring of implementation of township development and ensure compliance with the project objectives.

### **Approach to Bidder Selection**

The selection process for the selection of Developer of townships would follow the legally prescribed process and would be transparent in nature. For the Bidadi Integrated Township (BITP), the Developer has been selected through a transparent, two stage competitive bid process. For development of other townships a similar process may be adopted or, as a JV route may also be considered depending on the requirement<sup>5</sup>.

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<sup>5</sup> Selection of JV Partner would be carried out through a transparent, competitive process.

Participation of foreign based firms is not restricted. However for foreign firms to participate, the same has to be done through an Indian subsidiary or through a JV/ Consortium with Indian firms and would be subject to relevant FDI norms/ regulations. An innovative and inclusive approach is to be evolved for integration of project affected persons (mainly those who have relinquished land and local residents of the nearby places). Comprehensive land compensation, rehabilitation and resettlement package has been brought out on the same by the government<sup>6</sup>.

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.

#### 4.11. Population Growth

As can be seen from Table 24, population growth has surged in the decade 1971-81, and slowed down in the subsequent two census decades.

**Table 24: 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.

##### 4.11.1. 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.

<sup>6</sup> Vide Government Order No. UDD 30 BMR 2007, dated 11-06-2007.



#### 4.11.1.1. 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 erstwhile BMP area and adjoining areas (CMCs and TMC), which have different characteristics. Aggregating these and using constant terms for growth may not be appropriate. If the population figures are disaggregated for BBMP core area and former peripheral CMC/TMC areas, and the same logic for growth forecast (linear extrapolation) is followed, the projected numbers are as given in Table 25

**Table 25: Population Growth - Core BMP area & Non-Core area (Sustained Scenario)**

	1991	2001	2011	2021
<b>BMP – Core Area</b>	33.02	43.03	56.06	73.03
<b>Former CMCs</b>	8.28	18.67	42.10	94.92
<b>Core Area Growth</b>		2.68%	2.68%	2.68%
<b>CMCs Growth</b>		8.47%	8.47%	8.47%
<b>Total</b>	41.30	61.70	98.15	167.94
<b>Total Growth</b>		<b>4.10%</b>	<b>4.75%</b>	<b>5.52%</b>

Source: CDP 2006

The forecast population<sup>7</sup> in this case is much higher – since the erstwhile CMC/TMC growth has been much higher during 1991-2001, and using the same growth number to go forward under newly formed BBMP 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.

#### 4.11.1.2. Reduced Growth Rate Scenario

The Master Plan 2015 of BDA considers the constraints of land and infrastructure, and based on these parameters, it estimates the necessary surface area to be created in the new Comprehensive Development Plan framework that amounts to 300-350 sqkm. 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

<sup>7</sup> 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.

The draft Comprehensive Development Plan estimates that there is a likely saturation of the current space dedicated to urbanization. Only 82 sqkm are available within the 1995 Comprehensive Development Plan 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-II 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) Comprehensive Development Plan forecasts the population, which is shown in Table 26. Since the BDA Comprehensive Development Plan 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.

**Table 26: Population Forecast - Scenario Adopted in Comprehensive Development**

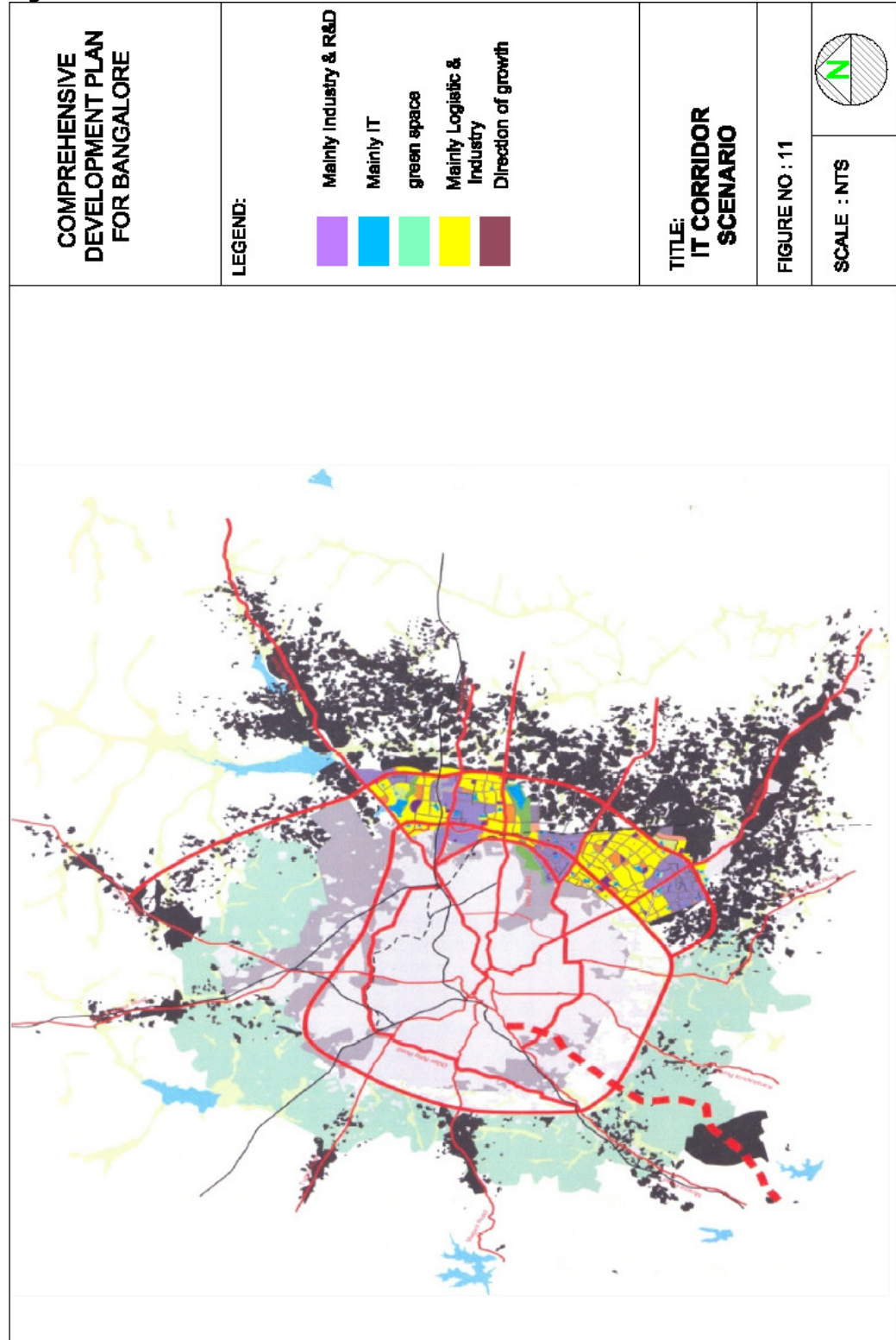
	1991	2001	2011	2021
<b>Former BMP (core) area</b>	33.02	43.03	51.43	55.59
<b>Former CMC areas</b>	8.28	18.67	28.72	44.09
<b>Core area growth rate</b>		2.68%		
<b>Peripheral area growth rate</b>		8.47%	2.65%	2.22%
<b>Total BBMP</b>	41.30	61.70	80.15	99.68
<b>Total Growth</b>		<b>4.10%</b>	<b>2.65%</b>	<b>2.20%</b>

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

#### **4.11.1.3. 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 former CMC areas. Aggregate growth has been declining after the 1971-81 decade. As discussed earlier, 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 Comprehensive Development Plan of BDA, on account of the constraints mentioned. In the circumstances, a higher-than-current scenario has not been considered.

**Figure 3: IT Corridor Scenario**



**Figure 4: Integrated Urban Scenario**

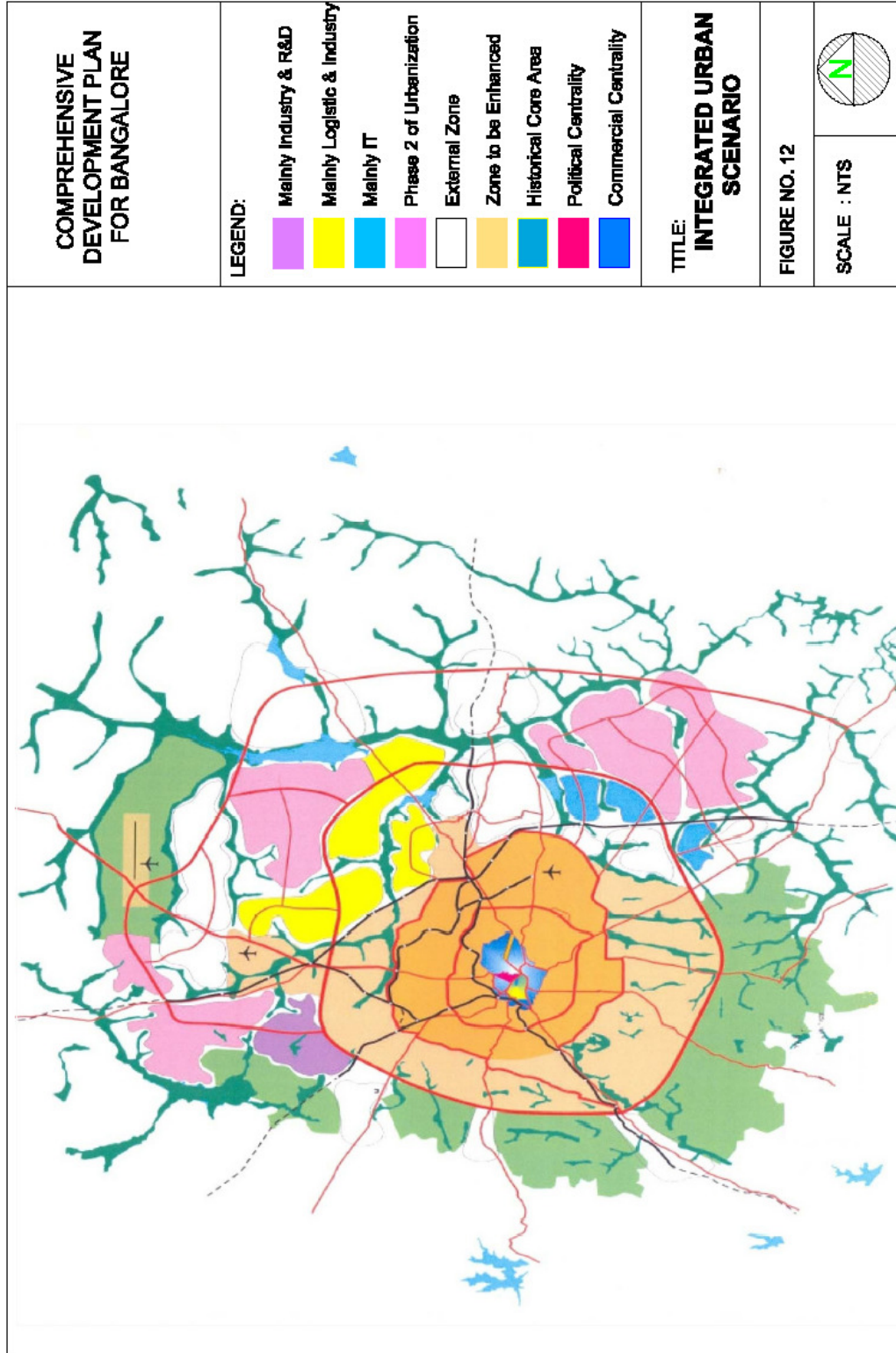
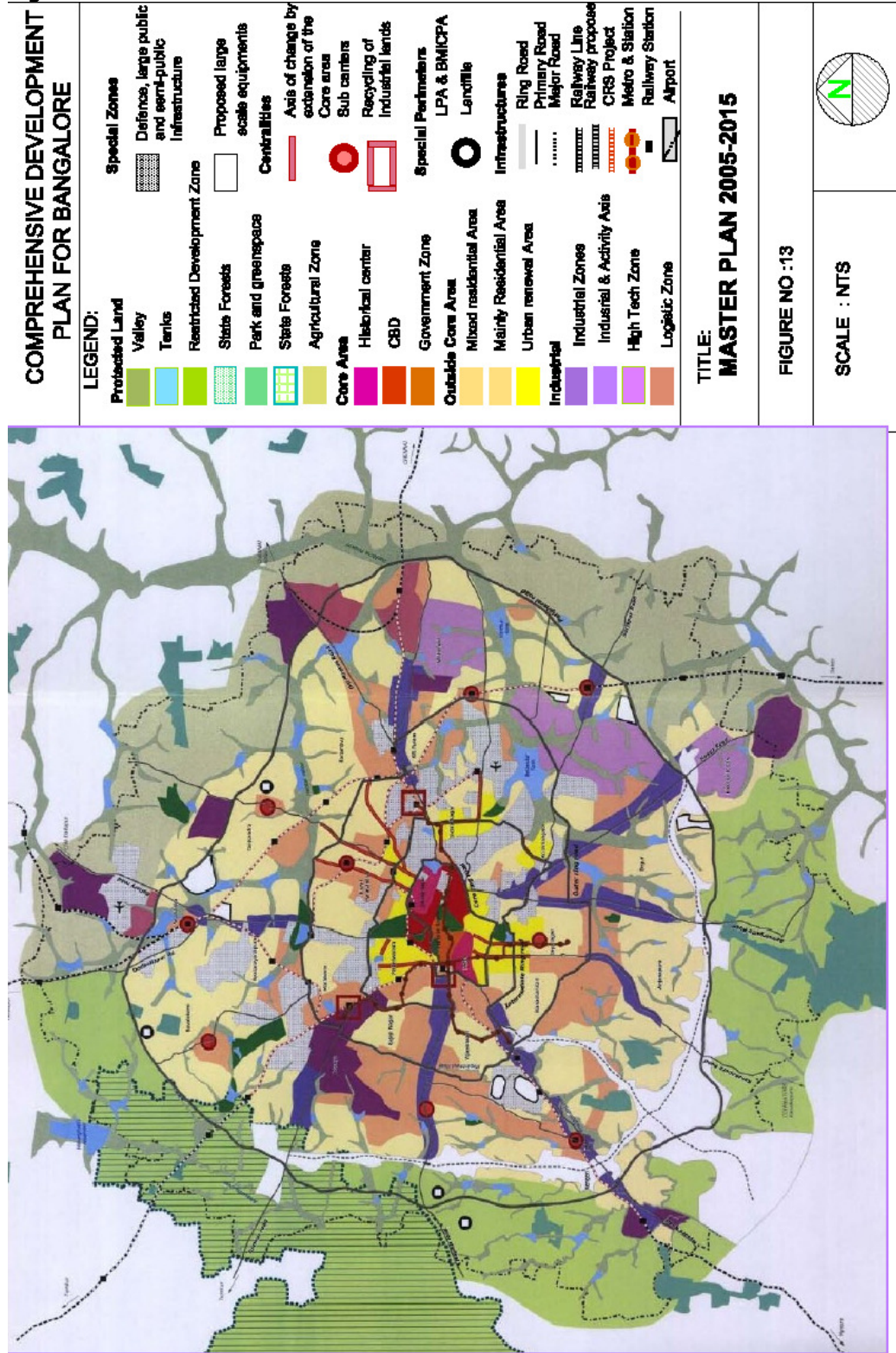
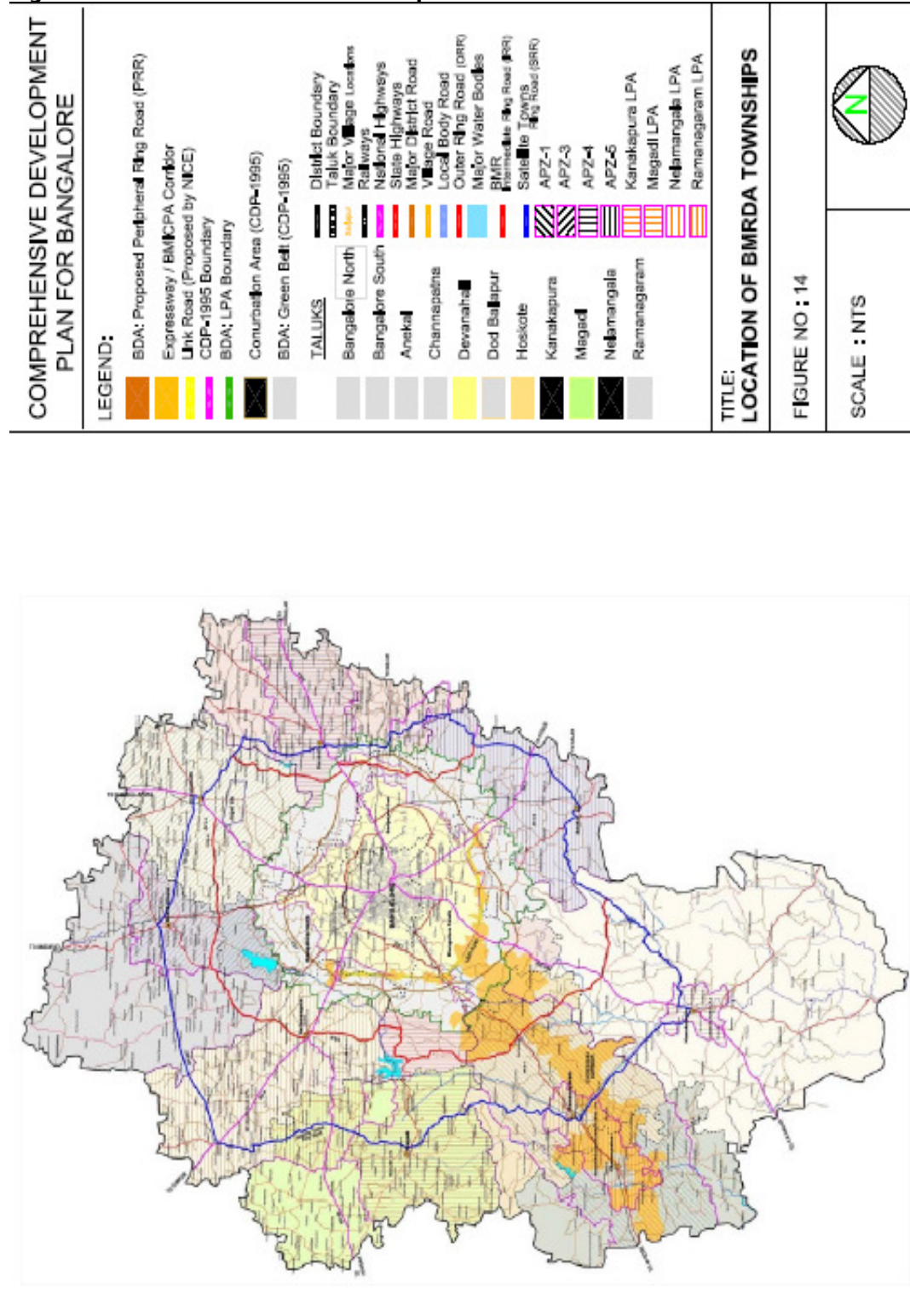


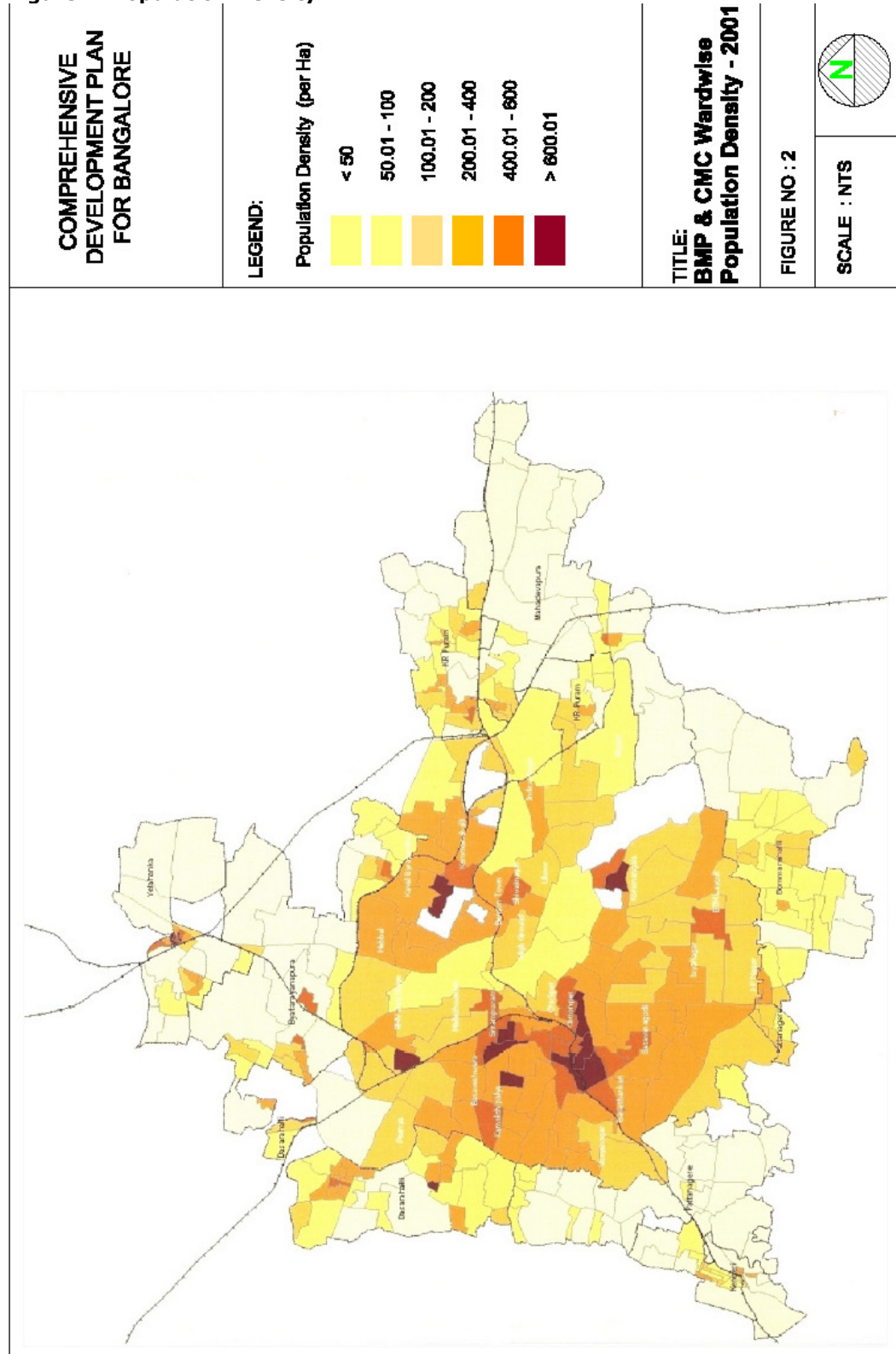
Figure 5: Master Plan 2005-2015



**Figure 6: Location of BMRDA Townships**



**Figure 7: Population Density**



**Figure 8: Growth of Bangalore**

# COMPREHENSIVE DEVELOPMENT PLAN FOR BANGALORE

## LEGEND:

- TOWN 1537
- TOWN 1882
- MUNICIPALITY 1941
- BANGALORE URBAN AGGLOMERATION 1971
- BANGALORE URBAN AGGLOMERATION 1981
- BANGALORE URBAN AGGLOMERATION 1981
- BANGALORE URBAN AGGLOMERATION 2001

## TITLE: GROWTH OF BANGALORE (1937 TO 2001)

FIGURE NO : 3



SCALE : NTS

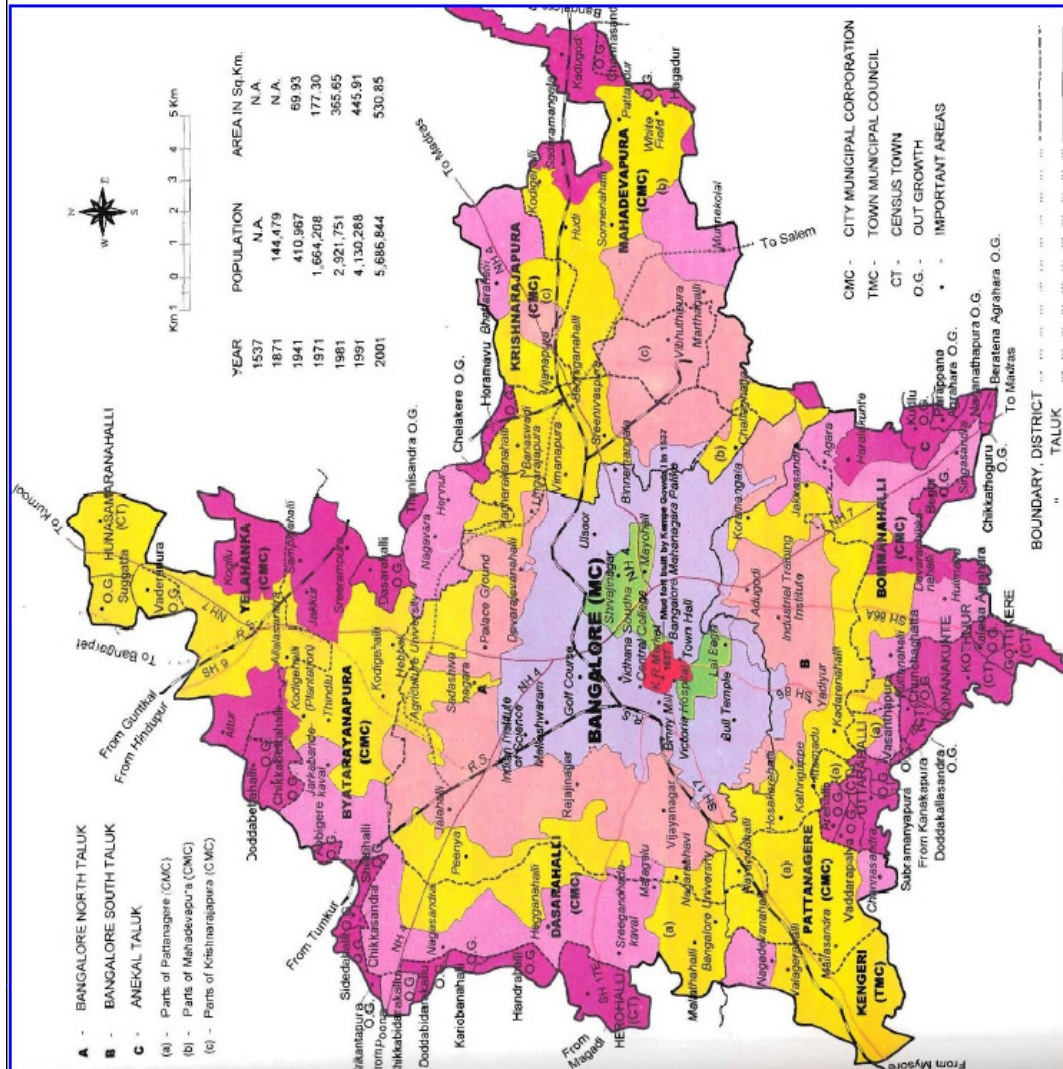




Figure 9: Structure Plan

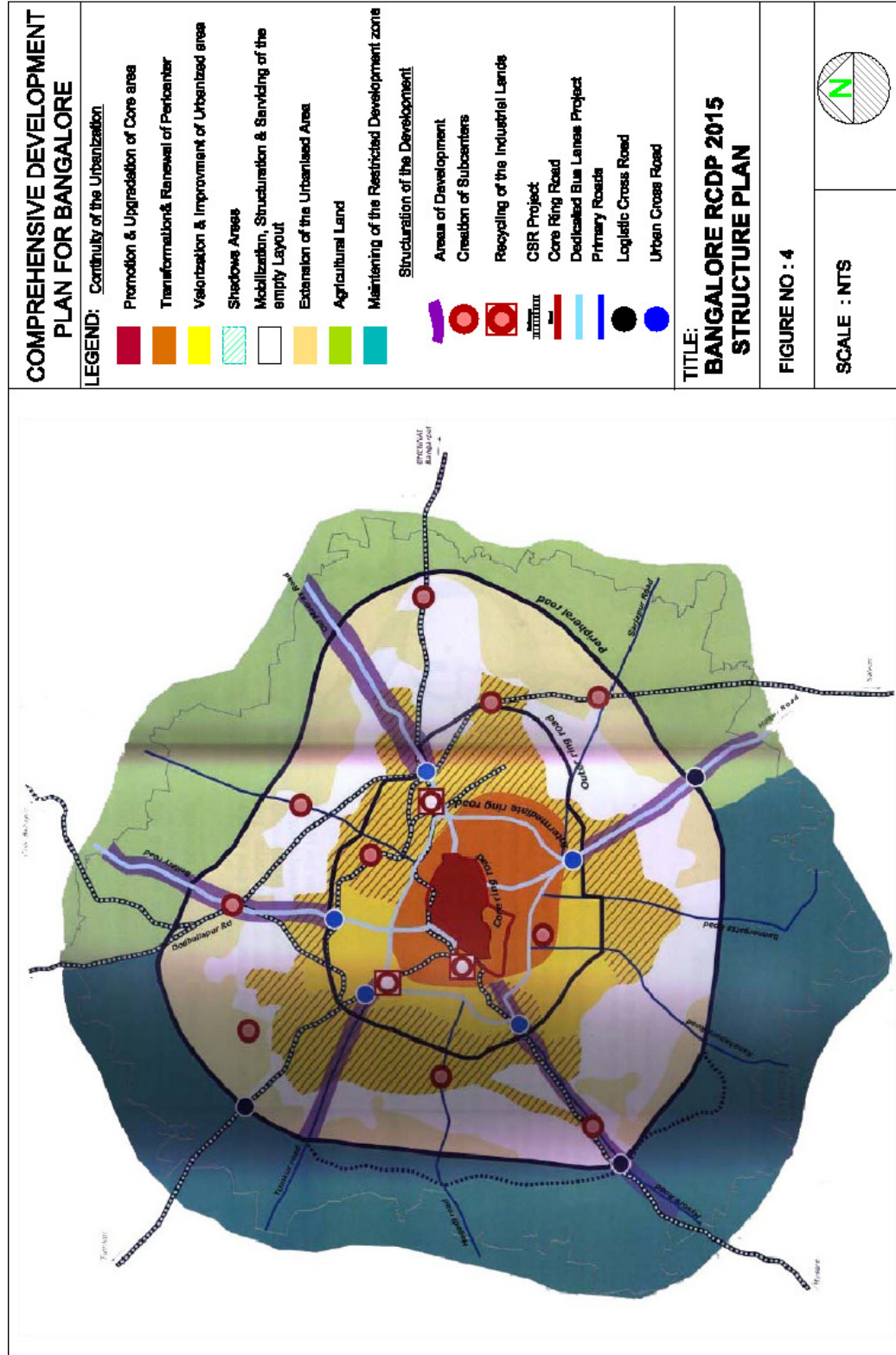
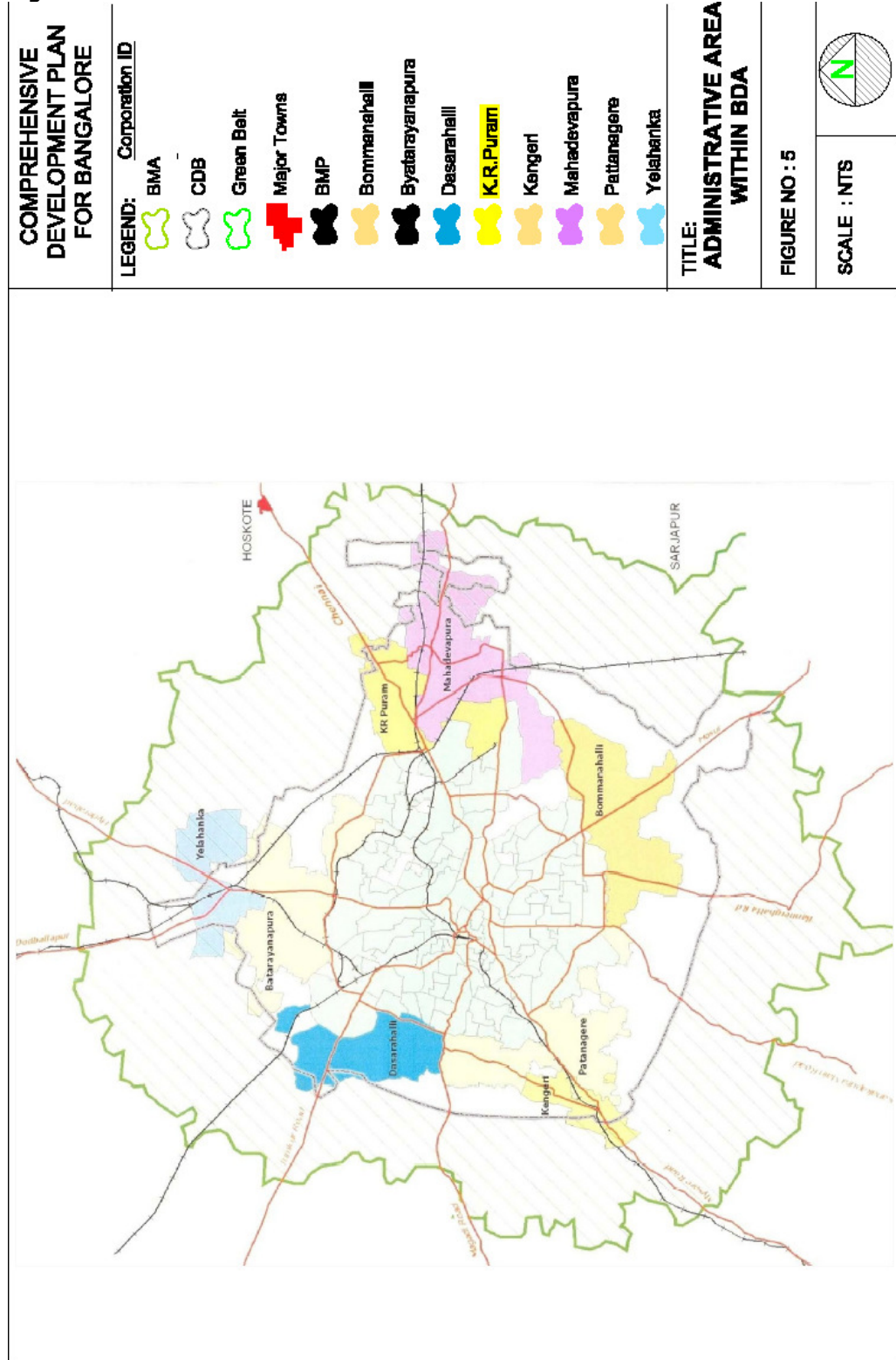
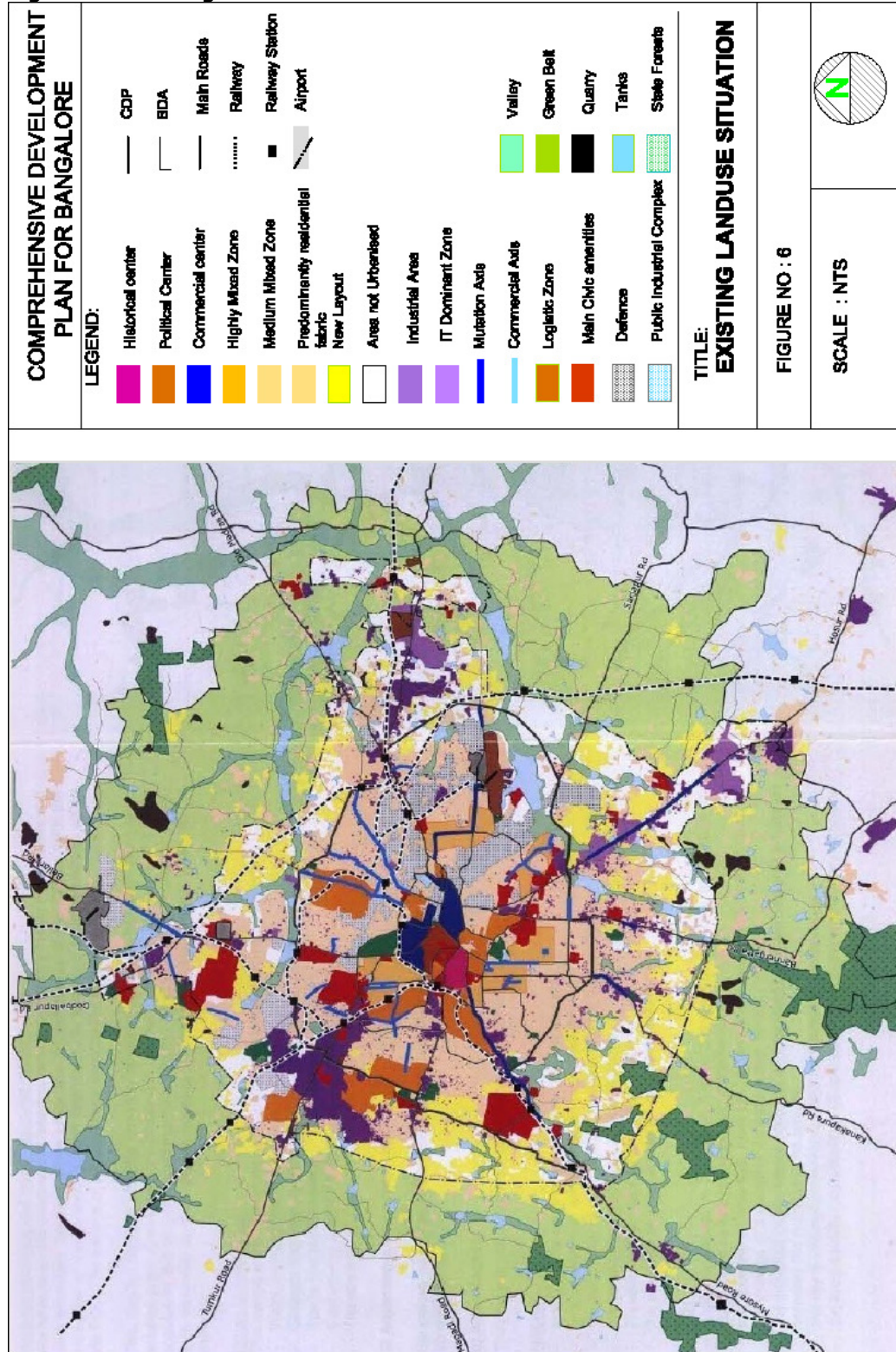


Figure 10: Administrative Area



**Figure 11: Existing Land Use Plan**

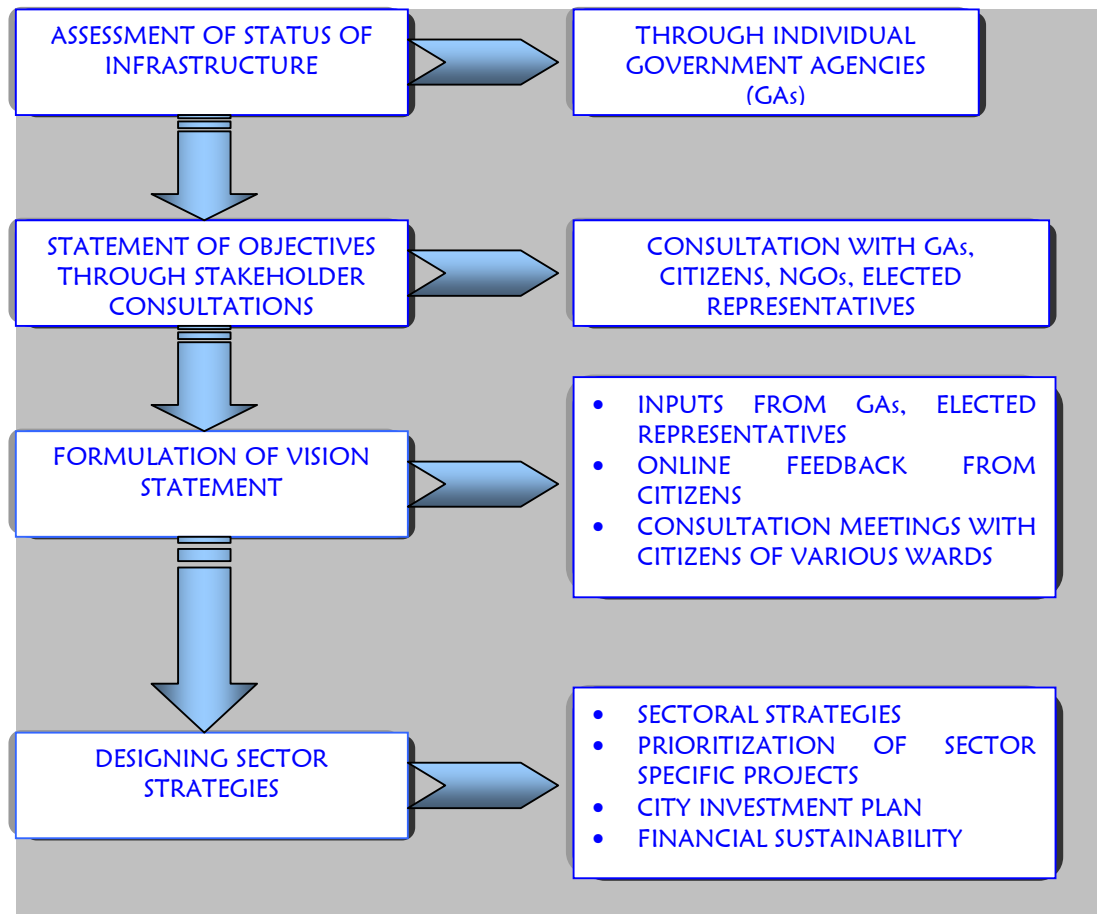


## 5. CITY VISION, DEVELOPMENT GOALS AND STRATEGIES

### 5.1. Approach

Preparation of the CDP under the JNNURM has been through a process of consultation as discussed in chapter 3 of the plan, 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 12 depicts the methodology adopted for formulation of CDP.

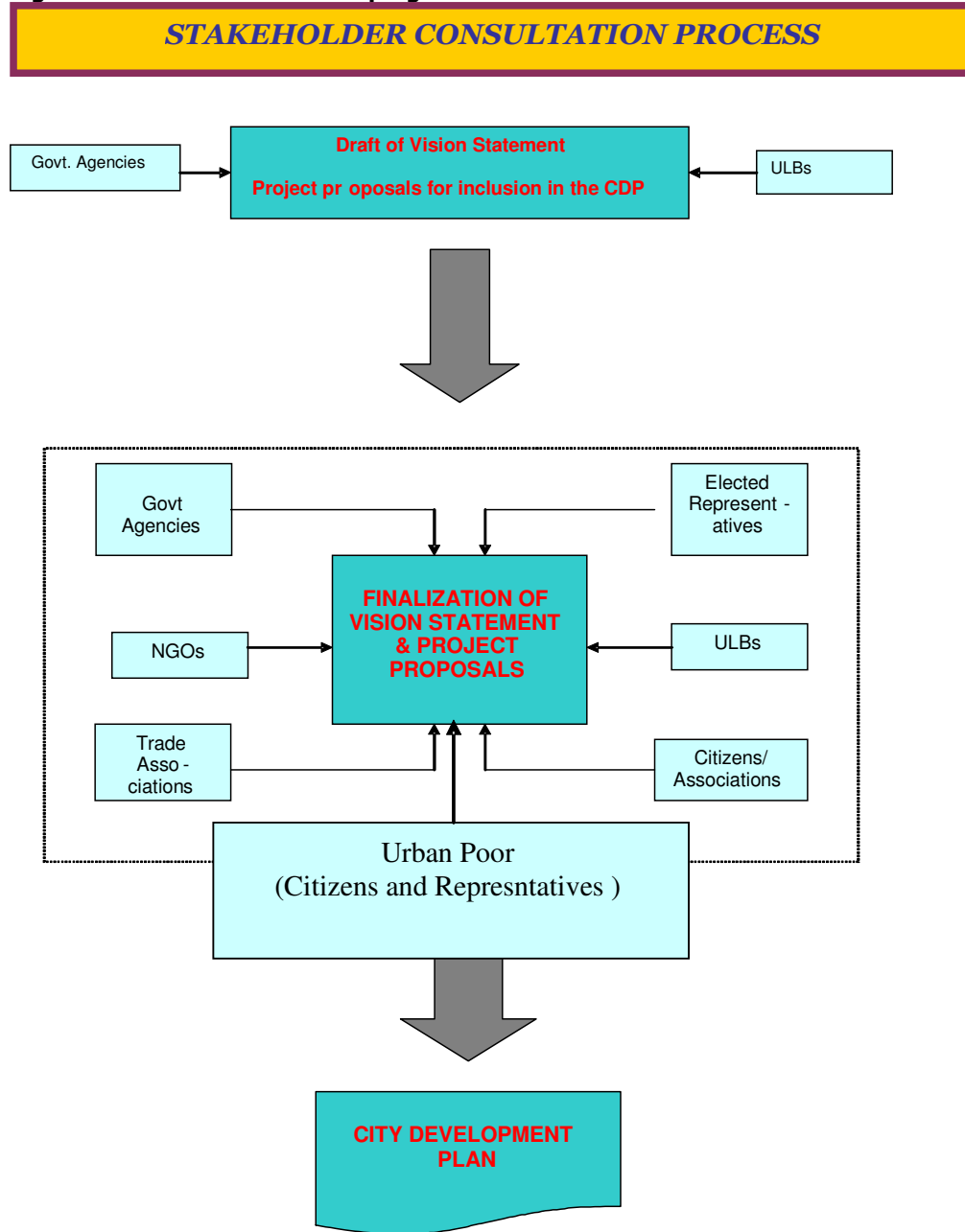
**Figure 12: Flow Chart on CDP methodology**



### 5.2. Vision and Mission Statements

Figure 13 indicates the process adopted for finalization of the Vision and Mission statements.

**Figure 13: 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.

### 5.3. Formulation of Vision Statement

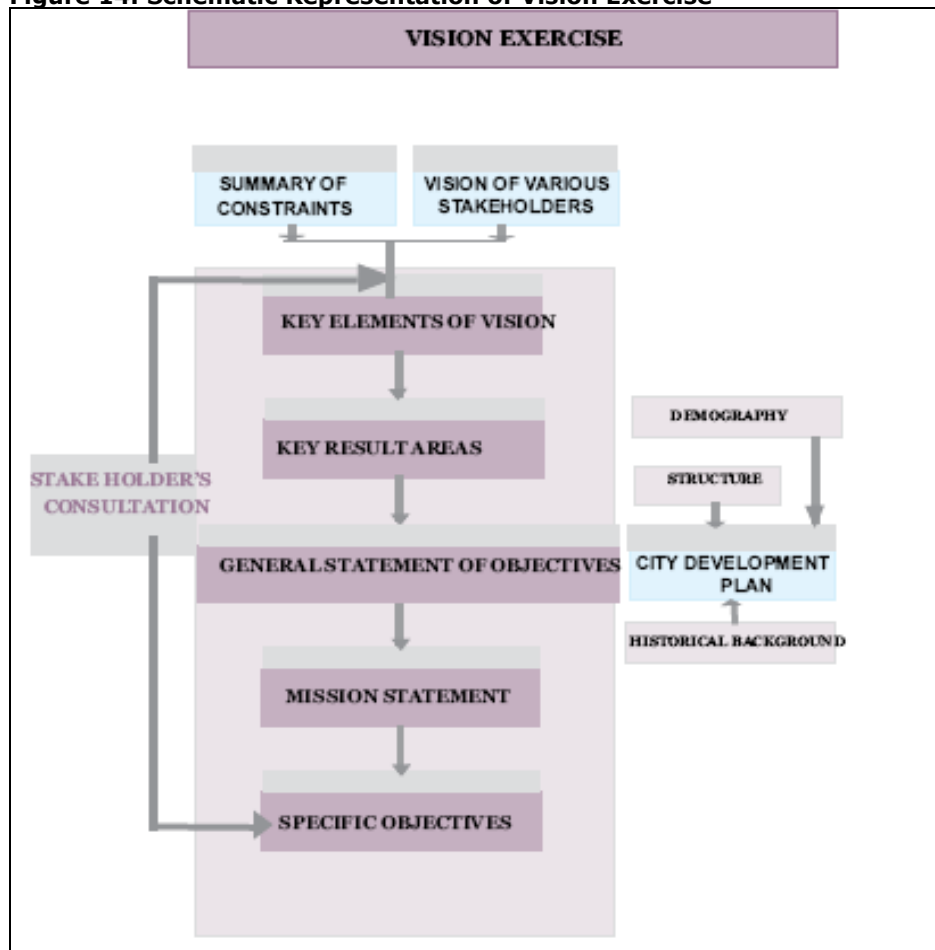
The consultation process and citizen feedback formed the key input basis to formulating the Vision and Mission Statements, and formulating the strategy for the CDP. Since the formulation of the Vision and Mission Statements has been through a process of consultation, there were various choices for the 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 14 shows the schematic representation of the process.

**Figure 14: Schematic Representation of Vision Exercise**



### 5.3.1. 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.

### 5.3.2. 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.

## 5.4. Background to the Vision Exercise

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

### 5.4.1. 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.

### 5.4.2. 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.

### 5.4.3. Vision Statement of Key Agencies

Almost all the key agencies, including BDA, BBMP, 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.

### 5.4.4. Coverage Area for the CDP

The table given below sets out the region considered for the CDP for Bangalore covers;

**Table 27: Coverage Area for the CDP**

Zones	Area (sq.km)
<b>Erstwhile BMP area</b>	226.2
<b>Erstwhile CMCs/TMC area</b>	
<b>Bommanahalli</b>	43.6
<b>Byatarayanapura</b>	47.0
<b>Dasarahalli</b>	38.0
<b>KR Puram</b>	21.3
<b>Mahadevapura</b>	46.2
<b>RR Nagar</b>	66.0
<b>Yelahanka</b>	38.8
<b>Kengeri</b>	34.0
<b>Total BBMP area (excl. 110 villages)</b>	561.1
<b>BIAAPA</b>	792.0
<b>Total</b>	<b>1353.1</b>

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.

## 5.5. 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.

### 5.5.1. 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.”

### 5.5.2. 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.”

### 5.5.3. Mission Statements

4. 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;
5. 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;
6. Putting in place appropriate, comfortable, integrated, multi-modal public transport system for the region, based on efficiency and affordability.
7. Developing Bangalore’s physical and communication connectivity, commensurate with its role as a global investment destination;
8. 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;
9. Providing focused development and sustenance of high-quality urban services such as water supply, sewerage, municipal solid waste management, sanitation, roads, and power systems;

10. Providing housing for all sections of the population, with special focus on developing low-cost and budget housing;
11. 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;
12. 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
13. Organizing the city’s governance framework to render urban services promptly in a participative, transparent, and accountable manner.

## 5.6. Development Goals and Strategies

Extensive consultation and expert inputs are both critical in developing goals and strategy options. Primarily, the City Vision and the SWOT analysis need to be reviewed and based on that, a number of simple, measurable, realistic, and time bound development goals are to be set. The next step is to identify potential strategy options to achieve the development goals. This is perhaps the most tangible point in the planning process – where “thinkers” and “doers” need to connect, where specific actions are envisioned.

Developing a common vision requires significant effort of consensus building in order to balance the competing demands arising from different economic infrastructure sectors as well as from different interest groups within the city. In order to achieve an understanding on a common vision, it is useful to choose milestones and targets such as provision of a minimum level of services to all, public disclosure and transparency in the formulation of budget proposals, introduction of single window of matters of service delivery and management. It is important that when cities define outcomes and milestones they must ensure that these are measurable and have a defined time frame.

Every sector has a few key performance indicators that are understood by most stakeholders in that sector. Similarly, in the urban sector too, there have been a number of performance indicators related to urban management and service delivery that have been defined, measured and reported. It is in this context, that the Ministry of Urban Development (MoUD) has initiated an exercise to define Service Level Benchmarks (SLBs). The MoUD constituted a ‘Core Group for Service Level Benchmarking,’ comprising experts from various institutions to arrive at the SLBs. Drawing on the experiences of various initiatives in measuring service level performance, the Core Group narrowed down the exercise to four basic urban services to begin with, and arrived at sets of indicators in each. After much deliberation, the indicators, their definitions, means of measurement, frequency and jurisdiction of measurement and reporting, etc., were finalized.

Service level performance parameters have been identified for four basic urban services:

- a. Water Supply;
- b. Sewage;
- c. Solid Waste Management (SWM); and
- d. Storm Water Drainage

In other words, the parameters highlight the performance as would be monitored by the leadership / management of ULBs or other civic agencies. These performance measurements will need to be carried out by the service delivery agencies themselves, reported to higher levels of management and also disseminated widely.

The framework encompasses 28 performance indicators as follows:

**A. Water Supply:**

1. Coverage of water supply connections
2. Per capita supply of water
3. Extent of metering of water connections:
4. Extent of Non-Revenue Water
5. Continuity of water supply
6. Efficiency in redressal of customer complaints
7. Quality of water supplied
8. Cost recovery in water supply services
9. Efficiency in collection of water supply related charges

**B. Waste water management:**

1. Coverage of toilets
2. Coverage of waste water network services
3. Collection efficiency of waste water network
4. Adequacy of waste water treatment capacity
5. Quality of waste water treatment
6. Extent of reuse and recycling of waste water
7. Extent of cost recovery in waste water management
8. Efficiency in redressal of customer complaints
9. Efficiency in collection of sewerage related charges

**C. Solid Waste Management:**

1. Household level coverage of Solid Waste Management services
2. Efficiency of collection of municipal solid waste
3. Extent of segregation of municipal solid waste
4. Extent of municipal solid waste recovered
5. Extent of scientific disposal of municipal solid waste
6. Extent of cost recovery in Solid Waste Management services
7. Efficiency in redressal of customer complaints
8. Efficiency in collection of SWM related user related

**D. Storm water Drainage:**

1. Coverage of Storm water drainage network
2. Incidence of water logging / flooding

To encourage and facilitate adoption of the SLB framework outlined, the MoUD launched an SLB Pilot Initiative in February 2009. The initiative involved provision of technical support for implementation of the framework in 28 pilot cities across 14 states and one union territory viz.

Andhra Pradesh, Kerala, Tamil Nadu, Karnataka, Maharashtra, Gujarat, Madhya Pradesh, Chhattisgarh, Orissa, Jharkhand, Manipur, Punjab, Himachal Pradesh and New Delhi.

The overarching aim of the SLB Pilot Initiative has been to take the SLB framework forward from concept to practice. Moreover, it aims to establish the link between benchmarking and internal performance improvement efforts. By doing so, it is expected that ULBs/ utilities would be encouraged to integrate the benchmarking process and its outputs into their decision processes

## 6. WATER SUPPLY AND SEWERAGE

### 6.1. Overview

The Bangalore Water Supply & Sewerage Board (BWSSB) provides water supply and sewerage services in Bangalore. Though initially restricted to the area under the erstwhile BMP's jurisdiction, BWSSB is progressively increasing its services coverage area to the entire Bangalore Metropolitan Region. The former CMC areas currently manage drinking water and sewerage needs on their own; however BBMP has taken over the same since its formation. Table 28 presents the main features of the water supply system in Bangalore.

**Table 28: Main Features of Water Supply System**

Parameter	Unit	Amount	Comments
<b>Water Availability</b>			2009-10 estimates
<b>Installed Capacity</b>	MLD	Cauvery – 810 Arkavathi – 184	
<b>Daily release</b>	MLD	900	
<b>Daily demand</b>	MLD	1125	
<b>Estimated ground water extraction</b>	MLD	200	Decreasing levels of ground water (especially post monsoon)
<b>Source of Water Supply</b>	Km	98 km from Bangalore	
<b>Water Supply Coverage and metering</b>			
<b>Consumption Domestic</b>	%	52	
<b>Non-domestic/ others</b>	%	9	
<b>Estimated UFW</b>	%	39	20,000-30,000 unauthorized connections
<b>Availability</b>	lpcd	110	Complaints of non-uniform supply & low residual pressure in outlying areas
<b>Wastage of water</b>	%	47	
<b>Area Coverage</b>		100 % in core area Between 10% and 60% for none-core areas	
<b>Sewerage</b>			
<b>Tertiary Capacity</b>	MLD	72	At V-Valley & Yelahanka
<b>Proposed Additional Capacity</b>	MLD	339	From the major and minor STPs
<b>Estimated usage of</b>	MLD	4	

Parameter	Unit	Amount	Comments
<b>treated water in Industries</b>			
<b>Estimated capacity utilization</b>	%	75	
<b>Area covered through sewer system</b>	%	40	About 245 sq.km
<b>Consumer Redress</b>			Established system is in place, though there are occasional reports of delays

Source: BWSSB

### 6.1.1. Existing Situation

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

#### 6.1.1.1. 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 is 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 core BBMP, groundwater is mainly for augmenting the supplies at households. Non-availability of Cauvery water supply in surrounding non-core area (former 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 29 shows the coverage of piped water supply coverage.

**Table 29: Water Supply Coverage in ULBs**

ULBs	Water Supply Coverage (% Area)
<b>Erstwhile BMP</b>	100
<b>Erstwhile CMC areas</b>	
<b>Yelahanka</b>	60
<b>Rajarajeshwari Nagar</b>	25
<b>Mahadevapura</b>	20
<b>KR Puram</b>	20

ULBs	Water Supply Coverage (% Area)
Bommanahalli	Yet to be covered
Dasarahalli	10
Byatarayanapura	10
Erstwhile TMC-Kengeri	60

Source: CDP Bangalore 2006

Table 30 presents the number of water supply connections in the core area.

**Table 30: Number of Water Supply Connections in BBMP Core area**

Parameter	Unit	Amount
Domestic piped water connections	No.	344376
Non-domestic connections	No.	10882
Authorized public fountains	No.	6350

Source: CDP Bangalore 2006

## 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 31 shows the results of surveys carried out in the past by independent agencies and NGOs.

**Table 31: 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 32 indicates the cost recovery situation in the provision of water & sewerage services, which is around 80% on the average.

**Table 32: 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

Source: CDP Bangalore 2006

## Key Issues in Water Supply

Table 33 gives the key issues of the Water Supply System in Bangalore.

**Table 33: Key Issues in Water Supply**

<b>Parameter</b>	<b>Description</b>
<b>Inadequacy of resource for Augmenting future growth</b>	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
<b>Groundwater</b>	Indiscriminate drawal Sub-standard water quality
<b>Water quality issues (in distribution network and raw water)</b>	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
<b>Uneven Distribution and Intermittent Supply</b>	Parts of the City receive a higher quantum of 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
<b>Non-availability of Water to meet National Standards of 150 lpcd</b>	Relatively high UFW Non-availability of distribution system in former CMCs/TMC and new added BMP wards Arkavathi source gradually depleting
<b>High UFW</b>	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
<b>Water Wastage</b>	The measures undertaken by BWSSB to avoid wastage of water are: <ul style="list-style-type: none"> <li>• Replacing the frequently leaking pipes by DA pipes</li> <li>• Installation of bulk-flow meters to monitor equitable distribution to identify division wise losses</li> <li>• Rehabilitation of ground level reservoirs</li> <li>• BWSSB has taken up pilot study executed by Thames Water, England JV with L&amp;T; in Vasasnthnagar to identify the reasons to reduce the wastage of water. The study revealed that 5% of leakage is attributed to faulty meters. Hence, the board has taken policy decision to replace the meters that are more than seven years old</li> <li>• Another pilot project was taken up in the Bangalore South division (having 1 lakh connections for distribution), with an objective to reduce NRW from 47% to 16% and to stabilize the same over a period of seven years. On the basis of the results of this project, the same would be replicated in other five divisions.</li> </ul>

Source: CDP Bangalore 2006



### 6.1.1.2. 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 34 shows the key issues for the Sewerage System.

**Table 34: Key Issues in Sewerage**

Parameter	Description
<b>Inadequate Coverage</b>	Covers only 40% of the area
<b>Environmental Concerns</b>	Pollution of lakes Mosquito Growth
<b>Sewage entering drains and lakes</b>	Health problems Nuisance to Public Environmental and Bio-diversity problems Measures taken to avoid sewage from entering the storm water drains are as follows: <ul style="list-style-type: none"> <li>• Re-aligning the sewage line</li> <li>• By-passing storm water drains</li> </ul>
<b>Insufficient capacity of sewers (Trunk and Mains) both primary and secondary</b>	Overflows from manholes Public Nuisance
<b>Increased sewage flows in rainy season (due to mixing of storm water)</b>	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
<b>Damaged sewers</b>	Public nuisance Mosquito problem
<b>Silting up of sewers</b>	Sewage flow from man-holes Complete stoppage of sewage and back-up
<b>Direct connection of sewers from slums and low-lying areas to (primary and secondary drains) storm water drains</b>	Flooding in slums and low areas Back flows during rainy season when storm water drains are full
<b>Silt, grease and floating debris (Plastics, papers, etc) into open drains and into treatment plants</b>	Problem in primary and secondary treatment, O&M problems Accessibility problems for manholes
<b>Encroachments on sewer lines and manholes</b>	Sewage over-flows into residential areas (slums, low-lying areas) Sewer cleaning and removing silt difficult Nuisance and mosquito growth

Source: CDP Bangalore 2006

## **6.2. 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.

### **6.2.1. 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.)
- 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.

### **6.2.2. 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.

#### **6.2.2.1. GBWASP & Cauvery Stage IV**

The project Greater Bangalore Water Supply and Sanitation Project (GBWASP) was originally conceptualised as a means to provide water and sanitation services to residents in the region of Greater Bangalore. The project envisages providing fresh water and, drainage and waste management services in phased manner to the 250 wards across eight zonal regions. The project had two components namely provision of Water Supply with an estimated cost of Rs.450 crores; and the second component which encompasses the provision of sanitation services with an estimated cost of Rs.753 crores.

The first component of the project i.e. supply of fresh water to targeted wards has taken off. The project on-ground implementation commenced from December 2007 and around 72 wards (out of 250) have been brought under its scope. Currently, the work on the main Feeder Line is being completed subsequent to which new wards will be brought under for provision of water.

#### **6.2.2.2. Bulk Supply to Large Condominiums**

Due to the rising demand for housing and growing labour pool in the city, several development projects have been undertaken to develop real estate for residential purpose. This has led to construction of large sized condominiums across several parts in the city. Salient features of such buildings are:

- Large scale construction of apartments/condominiums which involve construction of several hundred houses
- Consumption of power, water, and waste management resources on a significantly large scale basis vis-à-vis an individual house
- Generally designed and intended for use by residents of higher economic strata

Water is supplied in bulk by BWSSB to such facilities. The general practice is to supply water to the entire set of apartments as a whole<sup>8</sup>. The facility is metered on a whole and water tariff is collected from the management. The management divides the total tariff among the house owners (or occupants/tenants). BWSSB is charging the apartments on the same tariff slab as individual houses. However, a change in the same is being contemplated in moving the large apartments to a different tariff slab.

### 6.2.2.3. 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

### 6.2.2.4. Studies

BWSSB and other agencies have commissioned various studies to improve the service delivery standards, adopt contemporary technologies, and improve last mile connectivity. Table 35 summarizes the studies conducted.

**Table 35: Summary of Studies in Water & Sewerage**

Agency/Reports	Study Scope and Recommendations
<b>KUIDFC/Samaj Vikas Report on Urban Poor Strategy for UGD component in eight ULBs around Bangalore under GBWASP</b>	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
<b>KUIDFC/World Bank Report on Demand assessment for improved water and sewerage services in 8 ULBs</b>	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 New revenue sources suggested (a) tax on ground water extraction by large industries & commercial establishments (b) sewerage tax on non-domestic

<sup>8</sup> Piping to individual apartments is done by the developer. BWSSB provides water to the premises of the developer, from whereon water is distributed to individual houses as per requirement.

Agency/Reports	Study Scope and Recommendations
<b>KUIDFC/STEM</b>	consumers that do not take piped water connection from the new scheme 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
<b>BWSSB/AUSAID Bangalore Water supply &amp; Environmental Sanitation Master plan Project</b>	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 with modern best practices SP to be managed carefully
<b>BBMP/Urban First</b>	Recommendations are same as those proposed by AUSAID

Source: CDP Bangalore 2006

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

### **6.2.3. 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

## **6.3. Project Identification and 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.

### **6.3.1. 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.

### **6.3.2. Status of Projects**

#### **6.3.2.1. Water Supply for 110 Villages and Sewerage for 8 ULBs and 110 Villages**

Provision of adequate water supply to the newly added areas of the BBMP has been earmarked as a key requirement by BWSSB. As a step towards the same, BWSSB has initiated the preparation of a DPR for the fore mentioned project. Under this, the project is planned and designed for providing water supply system for 110 villages and sewerage system for 8 erstwhile ULBs and 110 villages.

The design horizon for design of water supply system for 110 villages is 2026, whereas the design horizon for providing sewerage system is taken as 2036 (considering design period as 30 years as per CPHEEO manual and 2006 as base year). For the purpose of planning for providing sewerage system to the BBMP area (other than core area), the total project area is divided into 8 drainage zones based on the topography.

Initially the scope of work was to plan a comprehensive sewerage system for 8 ULB areas surrounding core area (erstwhile BMP area). The sewage flow of some villages which are coming in old CDP boundary (as per CDP 1995) were considered for collection, convey and treatment for sewage generated in those area. Subsequently due to formation of Bruhat Bangalore Mahanagar Palike (BBMP), the PMC were initially informed to plan a comprehensive sewerage system for 8 ULBs only. Subsequently informed PMC to plan a comprehensive sewerage system for 110 villages are included in the planned drainage zones. It is observed that the sewage generated in some villages (out of 110 villages) is flowing by gravity towards the drainage zone and sewage from rest of the villages is flowing out of the planned drainage zones. The sewage of part of the villages which is flowing out of these planned drainage zones is proposed to be collected and pumped to the nearest ridge manhole of CDP area.

There is no systematic UGD system in 110 villages. It is reasonable to start service level analysis at zero level as the infrastructure of the 110 villages needs to be completely integrated with BBMP area. The work of providing water supply to 8 erstwhile ULBs is already taken up under GBWASP and is nearing completion. The work of providing sewerage system to 8 erstwhile ULBs is partly taken up under CWSS, Stage-IV, Phase I & II, which is funded by JBIC. The component includes planning, design and construction of few trunk sewers, sewage pumping stations and sewage treatment plants). Phase I of the project is already completed and the works under phase II is under progress. The rest of the work of sewerage system, which includes comprehensive collection system, providing trunk sewers and construction of new intermediate sewage pumping station(s) will be taken up under KMRP<sup>9</sup> funded by World Bank.

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<sup>9</sup> Karnataka Municipal Reforms Program

The work of providing water supply, sewerage system and other infrastructure facilities to 110 villages is proposed under JNNURM.

### Service Provision to Urban Poor

While it is the objective of the Government to provide access to affordable potable water and sanitation facilities, such facilities continued 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. Scheme would need to be customized suitable 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 campaign. Some of the services proposed could include following.

- 100% coverage of water and sewerage systems
- Individual pipe connections
- Bulk metering
- UGD connectivity

### Cost Estimate

Basic cost estimate for various components includes proposed sewerage system, Road Restoration, works for Urban Poor and sewer cleaning equipments for the project area is arrived based on the prevailing Schedule of Rates of BWSSB, KUWS&DB, PWD and rate analysis based on the market rate for the items which are not available in any of the mentioned SRs. The cost for various packages under KMRP is given Table 36.

**Table 36: Project Cost for provision of water supply to BBMP region**

Sl. No.	Description	Amount (Rs.)
1	Providing Sewerage System and Road Restoration for erstwhile Yelahanka CMC	20.22
2	Providing Sewerage System and Road Restoration for erstwhile Bytarayanpura CMC	155.82
3	Providing Sewerage System and Road Restoration for erstwhile Mahadevpura CMC	103.47
4	Providing Sewerage System and Road Restoration for erstwhile K.R. Puram CMC	109.39
5	Providing Sewerage System and Road Restoration for erstwhile Bommanahalli CMC	165.46
6	Providing Sewerage System and Road Restoration for erstwhile R.R. Nagar CMC	47.36
7	Providing Sewerage System and Road Restoration for erstwhile Kengeri TMC	24.13
8	Providing Sewerage System and Road Restoration for erstwhile Dasarahalli CMC	127.92 <sup>10</sup>
	<b>Total</b>	<b>753.81</b>

Source: KUIDFC

Note: Cost of the project 110 villages is yet to be assessed

<sup>10</sup> Cost is based on the preliminary design report and subject to change after detailed estimate.

The cost includes providing sewerage system, road restoration, sewer cleaning equipments, restoration of storm water drains, urban poor component and contingencies at the rate of 3% and administrative charges at the rate of 0.5%.

BWSSB intends to take up this project through the assistance from Jawaharlal Nehru National Urban Renewal Mission (JNNURM) grants from GoI. It is proposed to integrate this project with KMR Project funded by World Bank and CWSS stage IV Phase II project funded by JBIC.

### **6.3.2.2. Water Reuse in Vrishabhavati Valley**

BWSSB has initiated a project for the promoting water treatment and recycling which can enhance the quantum of water supplied to the newly added areas<sup>11</sup> under BBMP. BWSSB plans to reuse the treated sewage after appropriate advanced treatment in respect of the Vrishabhavati Valley by harnessing 200 mld (million litres per day) by 2011. However, as a first stage, the reuse will be for 135 mld; based on the performance of this stage, further tuning will be carried out to make the operation more feasible and the second phase will be taken up for next 65 mld.

Accordingly, the scheme could comprise of allowing the treated sewage from STPs located in the valley to flow down the Vrishabhavati valley for further natural self-purification, freshening and oxygenation besides attaining an environmental aquatic equilibrium and thereafter intercepting it for further treatment to remove suspended & dissolved impurities and water borne enteric pathogenic organisms before impounding the treated water in a natural water reservoir and finally conditioning it in a conventional water treatment plant and chlorination before distribution to the city. This is possible as the TG Halli reservoir with a volume of 95 million cu m is lying underutilized due to poor monsoons and the water treatment plant attached to it.

#### **Components of Water Reuse Project**

The STPs in this valley are Vrishabhavati valley STP, Mailasandra STP Kengeri STP and Chodenapura STP. Their combined discharge is presently 155 mld and will reach 355 mld by 2011. This sewage will be treated and will flow down along Vrishabhavati river valley for 18 km before being intercepted at Ampapura with no habitations around it and characterised by solid rocky outcrops which will permit the construction of a pick up and diversion.

#### **Treatment of Sewage at the STPs**

The existing facility at Mailasandra STP of 75 mld can process and carry out removal of BOD, COD and nitrogenous compounds. This plant is proposed to be supplied with phosphorous removal to eradicate algae growth upon discharge of treated sewage. In addition, the treated sewage will be chlorinated before discharge as per the guidelines of CPCB to eradicate the enteric pathogenic organisms.

#### **Benefits of Water Treatment**

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<sup>11</sup> Newly added areas include the: 7 CMCs, 1 TMC and 110 villages.



The water treatment will be carried out:

- To remove stray organic matter that could ingress from river course travel
- To remove stray suspended matter that could ingress from river course travel
- To precipitate stray phosphorous that could ingress from river course travel
- To liberate nitrogen, stray ammonia that could ingress from river course travel
- To remove and chance odour that might ingress from river course travel
- To chlorinate the treated water for continued disinfection in onward pumping.

The proposed Water Treatment Plant (WTP) comprises the following unit operations:

- Collection well with screens
- Flash mixing
- Coagulation-flocculation
- Rapid sand filtration
- Chlorination

The Ultra Filtration (UF) plant at Tavarekere would utilise water pumped from Ampapura which will be discharged into an underground reservoir of 2 hours capacity. The essential aspect of the water treatment at this location is to be re-emphasised as enteric pathogen removal, and not hardness removal.

### **Upgradation of WTP at T G Halli**

The existing WTP of 135 mld will be rehabilitated on the following lines:

- Dismantling the old settling tanks, filter houses and treated water tanks which have served their life cycle and which can be potential health hazard with leakages if continued in use.
- 2 new 22.5 mld clariflocculators with tube/plate settlers in lieu of settling tanks.
- Construction of 135 mld capacity filter house in place of existing filter house.
- Construction of 15.75 ML capacity treated water tank.
- Water recovery from clariflocculator underflow & filter back wash by filter process.
- Rehabilitation of 5 clarifloccutors with Mechanical & Electrical equipment.
- Installation of PLC, SCADA & Telemetry for auto operation of treatment plant.
- Replacing existing 530 HP pumps 6 numbers with 3 numbers of 1100 kW pumping machineries of 1620 m<sup>3</sup>/hr, 160/170 m head at TG Halli and Tavarakere respectively.
- Replacing of 24" and 27" existing CI pumping main 1000 mm dia MS pumping main including all civil works to a length of 16 km.
- Providing surge-suppression device at TG Halli and Tavarekere for the protection of proposed 1000 mm diameter pumping main during power failure.
- The water treatment plant sludge will be handled in secure landfill.

### **Project Sustainability**

The proposed treatment scheme is sustainable in the light of the following:

- The expertise and proven track record for the design & implementation is available within the country and has been well established for over 15 years by way of the

functioning of the sewage renovation plants of M/s MFL, M/s MRL, M/s GMR Chennai, and M/s RCF Mumbai, which are all yielding a consistent degree of recovered water over the period and managed by locally available staff

- There are no imported equipments other than the ultra filtration membranes, which also are produced by at least one manufacturer in India. These are hollow fibre and not spiral wound unlike RO membranes
- The ability to operate the plants is also easily available. Also, the reliability of UF membranes for removal of hepatitis virus has been verified and endorsed by National Virological Institute (in 2004). Also, there are no dependencies from abroad in terms of procuring technologies or expertise in sustaining treatment operations.

### **Project Costs, Time Horizon & Funding**

The cost of the project is estimated to be about Rs. 474.12 crores (BWSSB estimate), and Rs.471.33 crores (CPHEEOO estimate). The O&M cost of the project is estimated at Rs.15.64 per kilo litre of water recovered. The project is scheduled to be implemented over a 24 months period.

Since the proposed project is the first of its kind in India it may pave way for more such projects in other parts of the country. As BWSSB is willing to take up the costlier issue of O&M this project could be grant funded up to 80% through the central government. The rest of the financing would be met by JBIC / World Bank.

### **6.3.2.3. Environmental Action Plan 'C'**

Through this project, efforts to improve the environment will be the focus with rehabilitation of existing sewer network as well as new construction in core area including laterals. It is proposed to take up work in four major valleys and three minor valleys in the core area of Bengaluru, and the sizes of sewer lines will range from 450 to 2400 mm for a length of 135 km. The project cost is Rs.260 crores.

### **General Treatment Scheme & Benefits**

- Sewage Treatment Plant – BOD, Organic matter reduced, dissolved oxygen improves.
- Blending with Lake Water – Diluted with fresh water for improving palatability
- Water Treatment with Coagulation and Microfiltration – removal of colour and odour; BOD reduced to zero; bacterial load is zero
- Reverse Osmosis – TDS reduced to 250 mg/L from 600 to 1000 mg/L; 100% removal of pathogens and virus.

### **6.3.3. Service Delivery Targets**

Table 37 indicates projected demand based on the projected population, delivery targets, and the status.

**Table 37: Projection of Demand, Water & Sewerage**

Parameter	Quantum
Additional population to be covered by 2012	16.5 lakh
Bulk water requirement in 2012	1167 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

Source: CDP Bangalore 2006

Service delivery benchmarks for Water Supply have been listed out in Table 38.

**Table 38: Service Delivery Benchmarks for Water Supply**

Sl.No	Parameter	Benchmark
1	Coverage of Water Supply connections	100%
2	Per Capita Supply of Water	135 lpcd
3	Extent of Non-revenue Water	15%
4	Extent of Metering	100%
5	Continuity of Water supplied	24 Hours
6	Efficiency in redressal of customer complaints	80%
7	Quality of Water Supplied	100%
8	Cost Recovery	100%
9	Efficiency in Collection of Water Charges	90%

Source: Ministry of Urban Development

Service delivery benchmarks for Sewerage have been listed out in Table 39.

**Table 39: Service Delivery Benchmarks for Sewerage**

Sl.No	Parameter	Benchmark
1	Coverage of Toilets	100%
2	Coverage of Sewerage Network	100%
3	Collection efficiency of Sewerage Network	100%
4	Adequacy of Sewage Treatment Capacity	100%
5	Quality of Sewage Treatment	100%
6	Extent of Reuse and Recycling of Sewage	20%
7	Extent of cost recovery in waste water management	100%
8	Efficiency in redressal of customer complaints	80%
9	Efficiency in Collection of Sewage Water Charges	90%

Source: Ministry of Urban Development

#### 6.3.4. 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.

##### 6.3.4.1. 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.

**6.3.4.2. Investment Requirement**

The estimated capital investment plan for BBMP area during the implementation period is set out in Table 40.

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

Bangalore Water Supply and Sewerage Board	Total	2007-08 (Rs. Cr)	2008-09 (Rs. Cr)	2009-10 (Rs. Cr)	2010-11 (Rs. Cr)	2011-12 (Rs. Cr)
Water Supply	5986.00	540.05	795.05	1535.26	1465.28	1650.36
Source augmentation	1905.32	0.00	0.00	571.60	571.60	762.13
Treatment capacity	150.16	0.00	0.00	45.05	60.06	45.05
New distribution Network	931.17	279.35	279.35	186.23	186.23	0.00
Elevated Storage capacity w.r.t Supply	207.95	0.00	0.00	62.39	62.39	83.18
Refurbishment of old Distribution net work	600.00	180.00	240.00	180.00	0.00	0.00
Additional Source Augumentation JBIC	1750.00	0.00	175.00	350.00	525.00	700.00
Refurbishment reservoirs	200.00	60.00	80.00	60.00	0.00	0.00
Reuse of Water (dual pipeline and treatment facility)	200.00	0.00	0.00	80.00	60.00	60.00
Metering System	41.39	20.70	20.70	0.00	0.00	0.00
Underground Drainage	2203.37	264.98	339.93	636.93	452.22	509.31
New Sewer Network	972.30	0.00	0.00	291.69	291.69	388.92
Refurbishment of old sewer	749.49	224.85	299.80	224.85	0.00	0.00
Sewerage Treatment (against generation)	401.32	0.00	0.00	120.40	160.53	120.40
Inter Mediate Pumping Stations, Pumping machines	80.26	40.13	40.13	0.00	0.00	0.00
<b>Total</b>	<b>8189.37</b>	<b>805.03</b>	<b>1134.98</b>	<b>2172.19</b>	<b>1917.5</b>	<b>2159.67</b>

Source: Crisil Report, 2007

The estimated capital investment plan for BBMP area during the vision period is set out in Table 41.

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

<b>(In Rs. Crores)</b>	<b>2013-17</b>	<b>2018-22</b>	<b>2023-27</b>	<b>2028-31</b>	<b>Total</b>
<b>Water Supply</b>	2198	2721	3133	3487	11539
<b>Source augmentation</b>	700	866	997	1110	3673
<b>Treatment capacity</b>	55	68	79	87	289
<b>New distribution Network</b>	342	423	487	542	1795
<b>Elevated Storage capacity w.r.t Supply</b>	76	95	109	121	401
<b>Refurbishment of old Distribution net work</b>	220	273	314	350	1157
<b>Additional Source Augumentation JBIC</b>	643	795	916	1019	3373
<b>Refurbishment reservoirs</b>	73	91	105	117	386
<b>Reuse of Water (dual pipeline and treatment facility)</b>	73	91	105	117	386
<b>Metering System</b>	15	19	22	24	80
<b>Underground Drainage</b>	809	1001	1153	1284	4247
<b>New Sewer Network</b>	357	442	509	566	1874
<b>Refurbishment of old sewer</b>	275	341	392	437	1445
<b>Sewerage Treatment (against generation)</b>	147	182	210	234	774
<b>Inter Mediate Pumping Stations, Pumping machines</b>	29	36	42	47	155
<b>Total</b>	6015	7444	8572	9542	31572

## 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/BBMP. Given the increasing financial constraints, strategies for optimum utilization and management of existing resources would be needed.

### 6.4.1. 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
- 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
- Encourage private sector participation to achieve the sector goals, promote economic and commercial viability of water sector services, allowing the former 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 up-gradation of technical and managerial skills.



### 6.4.2. Institutional Arrangements

BWSSB/BBMP would continue to retain the principal responsibility of service provision. The Policy envisages a redefinition of institutional roles to enable better service provision by BBMP, 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.

### 6.4.3. Projects Approved under JNNURM Scheme

The table given below sets out the project that have been approved under the JNNURM scheme and are promoted by BWSSB.

**Table 42: BWSSB Projects under JNNURM**

No.	Project Undertaken	Investment Estimate (Rs. Cr)
1	Augmentation of 100 MLD Water	12.26
2	Bulk Flow Metering System	15.31
3	EAP (Part B)	176.75
4	Integrated Water Management at Vrishabhavati Valley	474.00
	Total	678.32

Source: KUIDFC

### 6.4.4. 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 local body 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/BBMP would assume the tariff or revenue risk till such time tariffs are adequate to recover full cost of service provision.

BWSSB/BBMP 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/BBMP 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

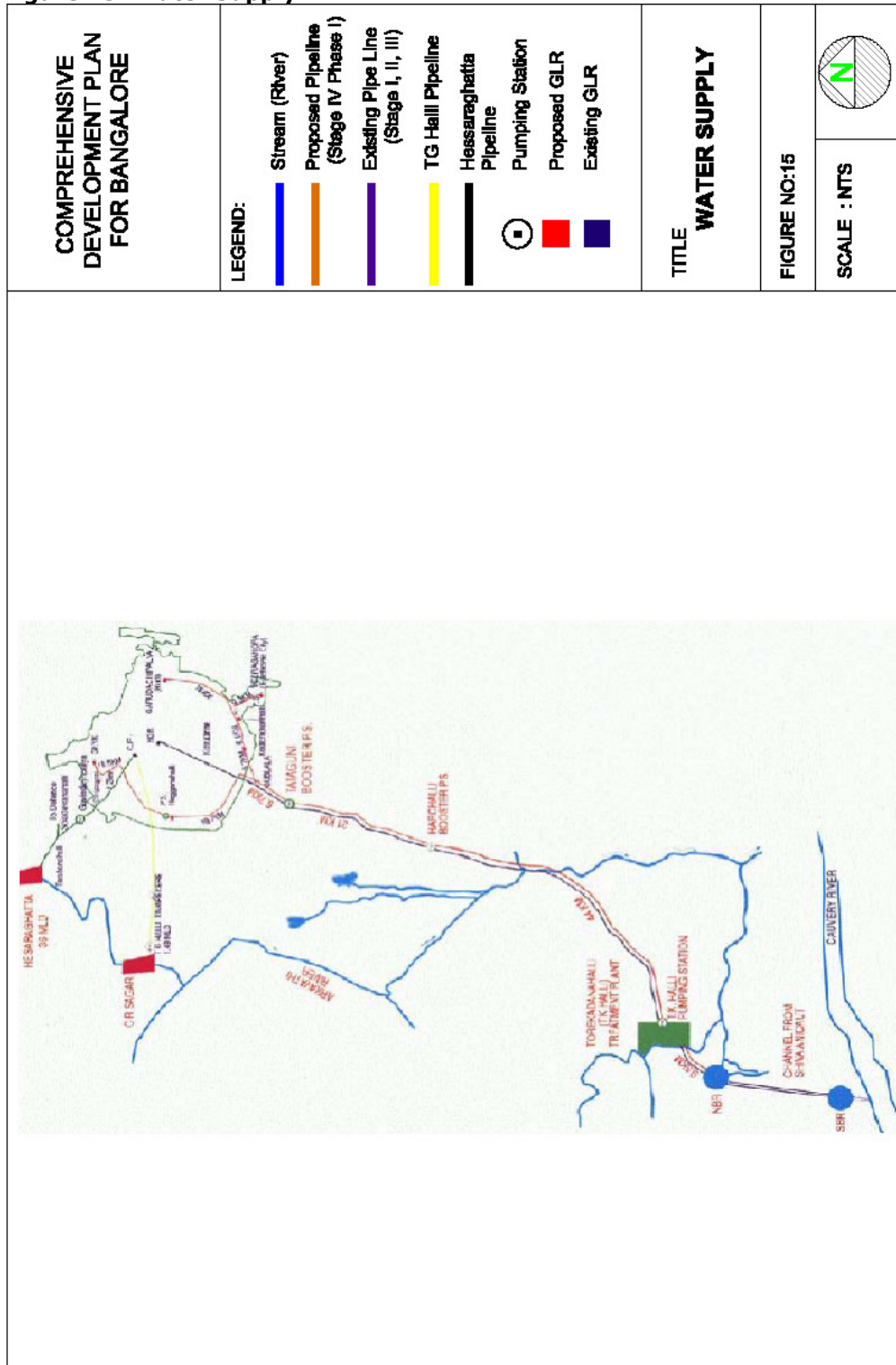
passed on to the private developer/operator, while the revenue risk could be retained by the government until such time the tariffs are able to meet full cost recovery. Table 43 indicates activities for various PPP models.

**Table 43: 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.

Figure 15: Water Supply



## 7. Urban Drainage Systems

### 7.1. 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.

#### 7.1.1. 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. With the formation of the BBMP, the newly added areas which include the erstwhile ULB and the 110 villages do not have appropriate storm water drain facilities. At present only 50% of the total BBMP area is covered with drains. 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 – Vrishabhavathi Valley on Mysore Road (180 MLD), Koramangla Challghatta Valley near HAL Airport (163 MLD), and Hebbal Valley on Bellary Road (60 MLD)
  - Incomplete sewerage systems results in sewage being let out into storm water drains or lakes, polluting the water.

### 7.1.2. 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.

## 7.2. Strategy for Improved Service Delivery

### 7.2.1. 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, 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.

### 7.2.2. Service Delivery Targets for Storm Water Drains

Service delivery benchmarks for Storm Water Drainage have been listed out in the Table below:

**Table 44: Service delivery benchmarks for storm water drains**

Sl.No	Parameters	Benchmarks
1	Coverage	100%
2	Incidence of Water Logging	0 Numbers

### 7.2.3. Proposed Implementation for Urban Drainage

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
- Green area development.

## 7.3. 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.

### 7.3.1. Investment Plan for Urban Drainage Improvement

#### 7.3.1.1. Projects in Implementation Period

- Constructing 1500 km of roadside drains (cost of construction assumed at Rs.30 lakh per km for a 5-metre drain)
- Extension of the SWD network to entire BBMP area; including the former CMCs
- 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.

#### 7.3.1.2. Estimated Capital Investment Requirement

Table 45 gives the estimated investment requirement in the JNNURM period, while Table 46 gives the estimated investment in future blocks.

**Table 45: Investment Plan for Urban Drainage - JNNURM Period**

Description	2010-11	2011-12	Total
<b>Carrying Capacity Improvement</b>	1075.8	717.2	1793.0
<b>Rehabilitation/ Strengthening</b>	9.5	6.3	15.7
<b>Culverts/ Bridges</b>	124.0	82.7	206.7
<b>Allied Drain Works</b>	728.9	485.9	1214.9
<b>Decentralised STPs</b>	172.2	114.8	287.0
<b>Non-Structural Works</b>	195.2	130.1	325.4
<b>Total</b>	2305.6	1537.1	3842.7

The investment estimate for Mission period would include the investments for development of primary and secondary drains for BBMP area (based on the study undertaken by BBMP). However, an investment estimate for tertiary drains in BBMP area (data provided by BBMP) to the extent of Rs.3000 Crores have been included in the estimates for the Vision period.

**Table 46: Investment Plan for Urban Drainage for Vision Period**

Description	2013-17	2018-22	2023-27	2028-31	Total
Capital expenditure	821.1	0.00	0.00	0.00	821.09
Rehabilitation expenses	82.1	184.1	308.4	430.6	1005.2
O&M expenses	246.3	248.5	308.4	370.5	1173.7
<b>Total</b>	<b>1149.4</b>	<b>432.7</b>	<b>616.8</b>	<b>801.1</b>	<b>3000.0</b>

## 7.4. Implementation Framework

One of the critical issues to be addressed relates to the fact that inadequate drainage in a particular area may not have the impact in the same zone but elsewhere. Coordination and continuity in action of BBMP is of critical importance.

- The importance of Agency coordination:
  - Inadequate drainage in a peripheral areas may impact drainage in BBMP 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 BBMP is coordinating the "Valley projects" and is carrying out the works in coordination with other agencies, facilitated by the GoK.

## 7.5. Projects Approved under JNNURM Scheme

Table 47 sets out the projects that have been approved under the JNNURM scheme and is promoted by BBMP and BWSSB.

**Table 47: Projects approved under JNNURM scheme**

Sl. No.	Project Undertaken	Investment Estimate (Rs. Cr)
1	Remodelling of SWD in Hebbal Valley	184.74
2	Remodelling of SWD in Vrushabhavathi Valley	228.26
3	Remodelling of SWD in Koramanagala Valley	111.49

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<b>Sl. No.</b>	<b>Project Undertaken</b>	<b>Investment Estimate (Rs. Cr)</b>
<b>4</b>	Remodelling of SWD in Challaghatta Valley	118.57
<b>5</b>	Under Ground Drainage system & Road Restoration for Yelahanka Drainage Zone-I	15.01
<b>6</b>	Under Ground Drainage system & Road Restoration for Kengeri Drainage Zone-I	18.76
	Total	676.83

Source: KUIDFC



## 8. Management of Solid Waste

### 8.1. 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 newly formed BBMP, separate statutes and institutional frameworks address hazardous wastes, and biomedical wastes.

#### 8.1.1. Existing Situation

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

##### 8.1.1.1. Municipal Solid Waste Management in BBMP Area

BBMP area is divided into health wards for the purpose of MSW management. The per capita residential waste generation is estimated at around 380 gm per capita per day<sup>12</sup>. While no accurate current assessment of MSW exists, Table 48 shows studies of a waste quantification survey carried out in 2001 by the erstwhile BMP.

**Table 48: MSW Generation in core Area**

Source	Quantity (TPD)
Residences	1562
Markets	84
Hotels and Restaurants	96
<b>Total</b>	<b>1742</b>

*Source: MSW Master Plan, 2008*

Table 49 indicates the prevailing management practices in BBMP area.

**Table 49: Prevailing MSW Management Practices in BBMP Area**

Component	Features	Issues
<b>Collection</b>	Near 100% collection efficiency in core area 100% door to door collection in residential localities of core area	Segregation practiced only in few areas

<sup>12</sup> MSW Master Plan for BBMP (2007-08)

Component	Features	Issues
	Private participation in several wards	
<b>Transportation</b>	Private participation in 182 wards of core area Covered vehicles being used in most areas Compactors and mechanical sweeping of roads proposed	No transfer station available
<b>Treatment</b>	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 2008  Waste currently dumped on roadsides and low lying areas

### Institutional Framework

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

### Finances

The MSW Management Master Plan (2008) for Bangalore city recommends budgetary allocation for SWM which is estimated at Rs. 553.35 Crores, of which Rs. 333.63 Crore is towards contractor payment for collection and transportation.

### Cost Recovery

Table 50 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 50: 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

Source: CDP Bangalore 2006

### 8.1.1.2. MSW Management in former CMC Areas

Earlier the respective ULBs carried out MSW management activities in their areas, with support from GoK agencies. However since the formation of BBMP and the annexation of the ULBs has placed the responsibility of MSW with BBMP. Table 51 shows the estimated MSW generation.

**Table 51: MSW Generation in former CMCs/TMC**

Area	Waste Generated (TPD)	Collection Efficiency (%)
Yelahanka	61	80%
Byatarayanapura	75	80%
KR Puram	75	80%
Bommanahalli	141	80%
Dasarahalli	131	80%
R R Nagar	38	79%
Mahadevapura	81	80%
Kengeri	30	80%
	Total: 632	Average: 80%

Source: CDP Bangalore 2006

### 8.1.1.3. Biomedical Waste

Table 52 indicates the typical quantities of biomedical waste generated in Bangalore.

**Table 52: Bio-medical Waste Generation**

Type of Institution	Number of Institutions	Number of Beds	Waste Generated (Kg / day)
Major Hospitals (500 and Above beds)	12	7533	3766
Major Hospitals (200 to 499 beds)	15	4868	2434
Less than 200 beds	608	5849	2924
Non Bedded Health Care Establishments such as Clinics, Lab, Blood Banks, Dispensaries, medical Centers	683	0	100
<b>Total</b>	<b>1318</b>	<b>18250</b>	<b>9224</b>

- 40-70% of the biomedical waste comprise kitchen, office, uninfected non-hazardous waste
- Hazardous chemicals and drugs form only a minor portion
- 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.

#### **8.1.1.4. 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
- On the treatment and disposal side:
  - 75% is reprocessed
  - Nearly 10% is incinerated
  - 10% is being stored
  - Approximately 5% is being treated/disposed of by other methods.

#### **8.1.1.5. 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
- 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.

### **8.1.2. 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
- Absence of capacity building for Pourakarmikas regarding waste handling.

## **8.2. Strategy for Improved Service Delivery**

Given the population growth in Bangalore, the key challenge for the BMMP is to provide adequate MSWM services within its limited finances. MSWM services would require universal coverage since it has a direct bearing on the City's environment and citizens' health. 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 4002 TPD in 2013 and to 7372 TPD in 2023, 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.

### **8.2.1. 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
- Coordination issues between different contractors/agencies for system design, collection, transportation, and landfill management.

### **8.2.2. Proposed Implementation Plan for MSW Management**

The MSW Master Plan, 2008 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
- Efforts for conversion of waste to energy should be made

- 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
- Providing flexibility in MSW management for addressing local issues
- Leveraging the existing initiatives including Swachha Bangalore and experimentation on mechanical sweeping
- Development of scientific MSW treatment (including waste to energy projects) and disposal facilities, and possible common facilities for BBMP area.

### 8.2.3. Needs of Urban Poor

Ensuring that the development policies of the BBMP reach the urban poor is critical to the inclusive growth. 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

## 8.3. 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 BBMP and best practices in MSWM. Though BBMP has undertaken many initiatives for MSWM in its areas, service levels need to be constantly upgraded to cater to the projected population. Best practices would also need to be implemented by the authority for improved service delivery.

### 8.3.1. Service Delivery Targets

Based on the above circumstance and strategies discussed .Table 53 shows the service level benchmarks for the sector:

**Table 53: Service Delivery Benchmarks, MSW**

Sl.No	Parameters	Benchmarks
1	Household Level Coverage	100%
2	Efficiency in Collection of Solid Waste	100%
3	Extent of Segregation of MSW	100%
4	Extent of MSW Recovered	80%
5	Extent of Scientific Disposal of MSW	100%
6	Extent of Cost Recovery	100%
7	Efficiency in Collection of SWM Charges	90%
8	Efficiency in Redressal of Customer Complaints	80%

### **8.3.2. Investment Plan for Solid Waste Management**

#### **8.3.2.1. 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.

#### **Preparation of MSW Master Plan for BBMP**

BBMP has undertaken the initiative of preparing a Master Plan for management of MSW in the areas under its purview. The task of preparing the Master Plan was awarded to M/s iDeCK and M/s MACE in 2007. The Master Plan is slated to be prepared under the JNNURM scheme for which the brief Scope of Work is detailed as follows:

#### **Study of MSW generation and sources.**

This includes study of living standards of citizens, types of waste generated (classified according to zones/wards), types of waste generators (such as households, institutional, commercial etc.). The Master Plan also necessitates the preparation and submission of maps.

The Master Plan shall include a detailed analysis of existing system of MSW collection, transportation, processing and final disposal. Details of ongoing activities related to SWM in and around areas of Bangalore city taking into account the deficiencies in the current system.

The project requires the assigned Consultants to carry out field surveys, provide estimation of Quantities, and projections of waste generation. Suitable methods of treating/disposing of the MSW shall be recommended by clients considering the available technological options and economic feasibility.

Preparation of DPR, engineering drawings, implementation methodology, bid documents and preparation of Tender documents include Bid Schedules and Agreements.

Other tasks in the MSW Master Plan preparation include exploration of potential for Clean Development Mechanism (CDM) technologies. The Consultants shall formulate legal provision and draft byelaws for protection of city environment through good SWM practices. The rules shall be drafted in consideration with State and BBMP policy.

#### **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/D, 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.

#### **8.3.2.2. Estimated Capital Investment Requirement**

BBMP 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. BBMP 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.

The estimated investment as per CDP 2006 was Rs.800 Crores for the BMP area. The Master Plan prepared by BBMP for Integrated Solid Waste Management for BBMP was estimated at Rs.562 Crores. Hence, the investment estimates that were have been retained for this CDP. Table 54 shows the estimated capital investment plan for BBMP area during the implementation period.

**Table 54: Investment Plan for MSW – JNNURM Period**

<b>Description</b>	<b>Upto 2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>Total (Rs. Crore)</b>
<b>CAPEX towards Equipment</b>	70	42.6	45.1	45.1	47.6	250.3
<b>Rolling stock –</b>	60.5	36.8	39.0	39.0	41.1	216.4



Description	Upto 2007-08	2008-09	2009-10	2010-11	2011-12	Total (Rs. Crore)
<b>Vehicles</b>						
<b>OPEX</b>	13.2	39.6	65.9	65.9	79.1	263.7
<b>Land Acquisition</b>	7.4	4.5	4.8	4.8	5.0	26.5
<b>Installation of GIS System</b>	2.6	1.5	1.6	1.6	1.7	9.0
<b>Tipping Fee for existing landfills</b>	9.5	5.8	6.1	6.1	6.5	34.1
<b>Grand Total</b>	163.3	130.7	162.5	162.5	181.0	800.0

Source: CDP Bangalore 2006

The actual requirement would be set out in individual DPR which are to be prepared for each activity of which the Master Plan is already prepared by BBMP. The management of SWM would also require vast lands to the extent of 2000 acres hence, the investment required for the purchase of land would be approximately Rs.1000 Crores (at the rate of Rs.50 lakhs per acre). The investment for land requirements would not be funded under JNNURM and as such is not included in the Mission period estimate. The purchase of land would be undertaken by BBMP.

Table 55 indicates the investments required in future blocks which are again the investment estimates retained from CDP 2006.

**Table 55: Investment Plan for MSW – Vision Period and beyond**

Description	2013-17	2018-22	2023-27	2028-31	Total by 2031 (Rs. Crores)
<b>Capital Expenditure towards Equipment</b>	307.8	356.9	413.7	479.6	1808.3
<b>Rolling stock - Vehicles</b>	266.1	308.5	357.7	414.6	1563.3
<b>Operation and Maintenance Expenses</b>	324.3	375.9	435.8	505.2	1904.9
<b>Land acquisition</b>	14.5	20.1	23.3	21.3	105.7
<b>Installation of GIS system</b>	0.0	0.0	0.0	0.0	9
<b>Tipping Fee for existing landfills</b>	35.8	37.6	39.5	41.5	188.5
<b>Grand Total</b>	948.6	1099.0	1270.0	1462.2	5579.8

Source: CDP Bangalore 2006

## 8.4. Implementation Framework

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

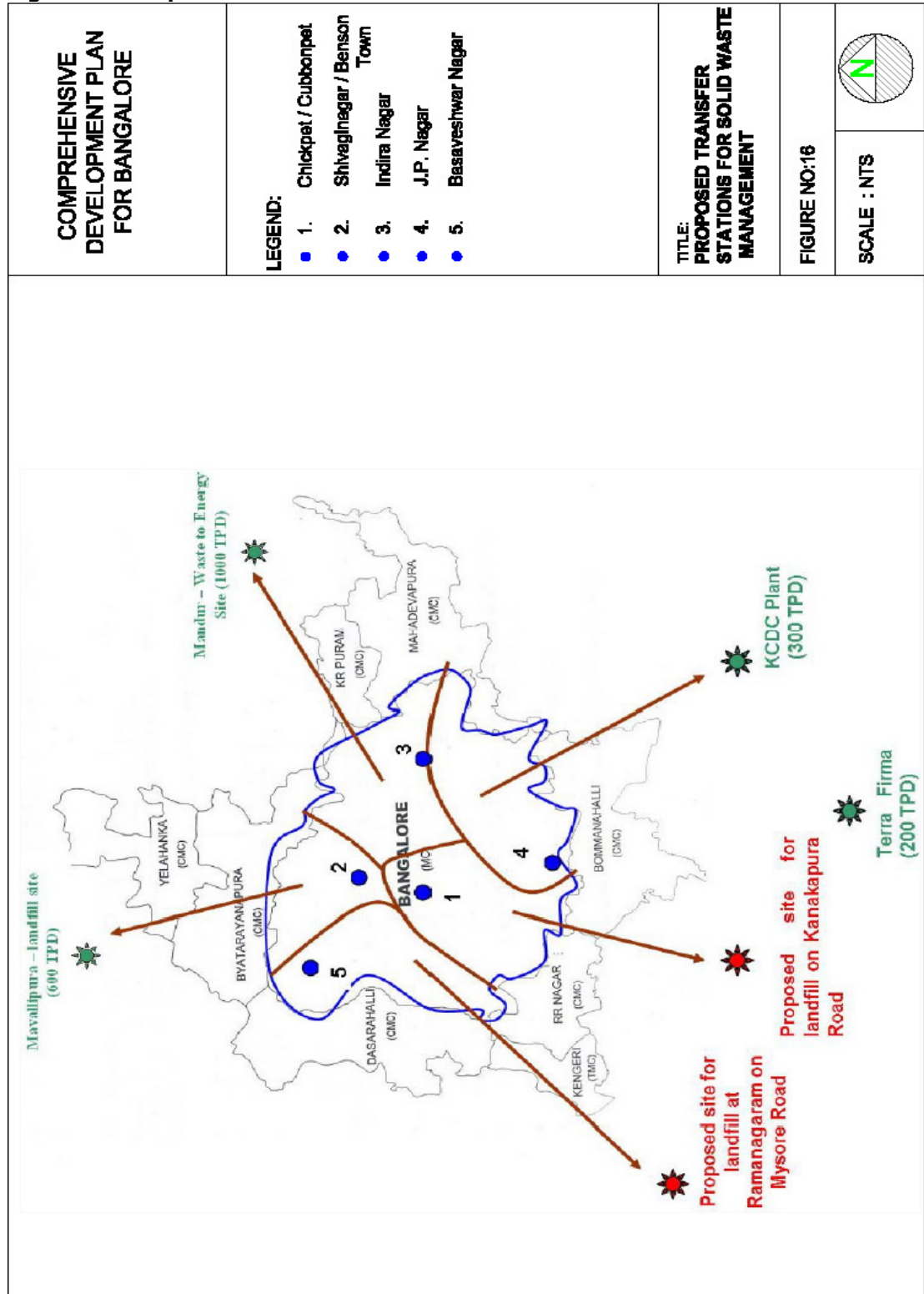
On the MSW side, BBMP has implemented projects with private sector participation in collection, transportation, treatment, and disposal. While treatment and landfill facilities are being developed under BOT framework, collection and transportation in 60% of health wards has been contracted out. Private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

BBMP would explore more performance based service/management contracts for collection and transportation. BBMP would also participate in the integrated treatment-cum-disposal facilities developed across its area. An indicative framework for private participation is presented in Table 56.

**Table 56: Framework for PPP in MSW**

<b>Activity</b>	<b>Key Characteristics</b>	<b>Contract Type</b>
<b>Collection &amp; Transportation</b>	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
<b>Street Sweeping</b>	Labour oriented Minimal investment No requisite skills / technical skills Logistics intensive	Service contracts
<b>Treatment</b>	Technology intensive More capital intensive Ongoing O&M	Concession Contracts
<b>Disposal</b>	Capital intensive Technically skilled manpower required Ongoing O&M	Concession Contracts

Figure 16: Proposed Transfer Stations for SWM



## 9. Comprehensive Mobility Plan

### 9.1. 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 in the City. Roads and transportation infrastructure is probably the area where the most critical and immediate interventions are required. The comprehensive mobility plan for the city discussed in this chapter is largely on the basis of the Comprehensive Traffic and Transportation Plan (CTTP) for Bangalore which has been developed to resolve the issues pertaining to congestion in traffic and lack of transport infrastructure in the City. This section of the CDP deals with the roads/urban transport situation, the strategy forward, the “big picture” of interventions, and finally specific interventions.

#### 9.1.1. 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).

##### 9.1.1.1. 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 running from Mumbai to Chennai
- NH7 from Varanasi to Kanyakumari
- NH209 connecting Kanakapura and Kerala
- SH17 connecting Bangalore to Mysore.

BBMP has about 5900 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 existing urban road system is summarized in Table 57.

**Table 57: Details of Urban Roads under BBMP**

Zone	Area (sq. km)	Proposed Norms (km per sq.km)	Normative Road Length Reqmt (km)	Existing road length (km)
Core area	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
<b>Total BBMP</b>	559.66		6498	5922

Source: CDP Bangalore 2006

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 58. Any transport intervention would therefore need to consider this constraint. For instance, this could imply that bus service would be self-limiting thereby, 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 58: 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
<b>Total</b>	100.00

Source: CDP Bangalore 2006

#### 9.1.1.2. 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

**9.1.1.3. Vehicle Statistics**

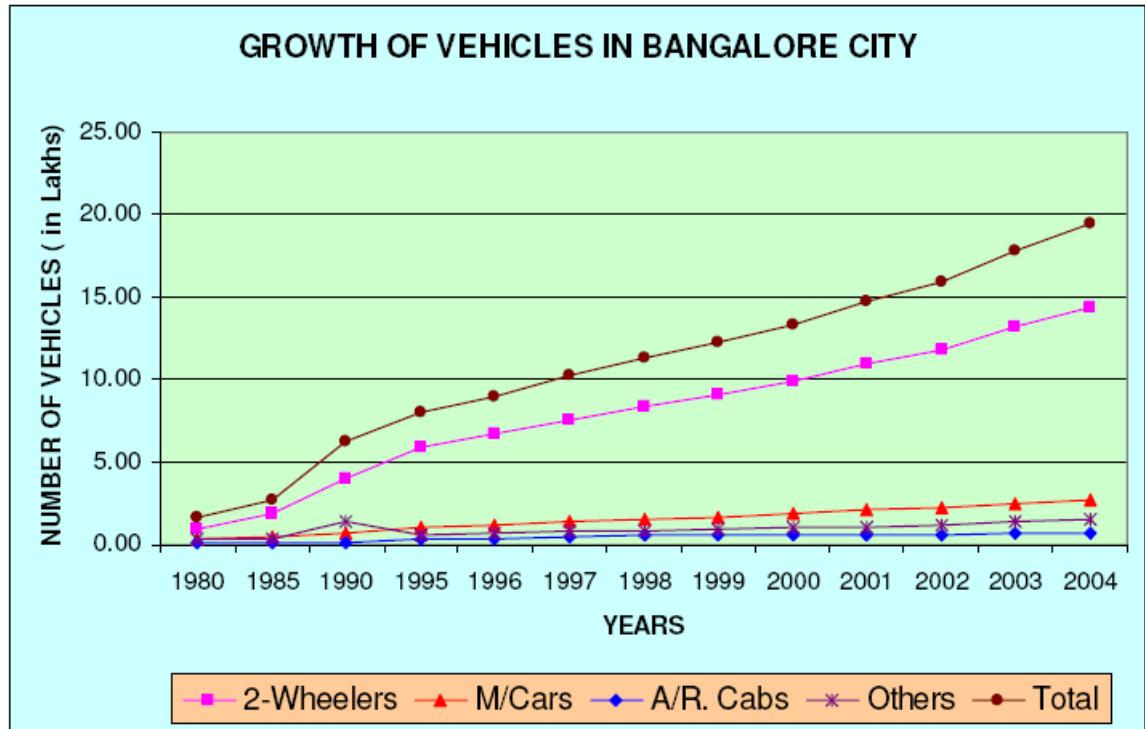
The number of registered vehicles in Bangalore has increased rapidly from 4 lakh (1987) to 23 lakh (2005). The CAGR was over 10%, and the growth rate of 2-wheelers, in particular, was around 17%. The average number of vehicles per household has increased six-fold in the last 25 years i.e. approximately 0.3 (1980) to 1.7 (2005). Table 59 shows the vehicular population, and the vehicular growth is illustrated in Figure 17.

**Table 59: Vehicle Population (March 2008)**

Vehicle Type	(in Lakh)
Two Wheeler	22.83
Light Motor Vehicle	5.05
Auto-rickshaws	0.92
HTV	NA
HGV	NA
Others	2.91
<b>TOTAL</b>	<b>31.29</b>

Source: Transport Department, GoK

**Figure 17: Growth of Traffic**



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.

#### 9.1.1.4. Modal Split

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

**Table 60: Modal Split for Travel Trips**

Mode	With walk trips (%)	Without walk trips (%)
Public Transport	41.91	45.72
Car	6.62	7.22
2-Wheeler	29.36	32.03
IPT	11.56	12.61
Cycle	2.22	2.42
Walk	8.33	0.00
TOTAL	100.00	100.00

Source: CTPP, 2007

#### 9.1.1.5. Mass Transport

Bangalore Metropolitan Transport Corporation (BMTTC) is currently the only provider of urban mass transport services. BMTTC 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 61 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 BMTTC - 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 61: Cost Recovery Situation in Public Bus Services**

Cost incurred in service provision (Rs. Lakhs)			Direct recoveries (Rs. Lakhs)		
2005 - 06	2006 - 07	2007 - 08	2005 - 06	2006 - 07	2007 - 08
58,851.8	66,326.56	79957.83	62,333.68	70,743.59	80,148.93

Source: BMTTC

#### 9.1.1.6. Environment

The rapid increase in vehicular traffic has clearly impacted environmental parameters. Reports by KSPCB mobile laboratories in Table 62 show that pollution levels in some places are above standard values.

**Table 62: Air Pollution Levels**

Stations	O3 (mog/m)	SO2 (mog/m)	NOX (mog/m)	CO (mog/m)	SPM (mog/m <sup>3</sup> )
Yeshwanthpur, NH4 (O)	3.4	3.9	58	3.18	141.9

Stations	O3 (mog/m)	SO2 (mog/m)	NOX (mog/m)	CO (mog/m)	SPM (mog/m <sup>3</sup> )
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

Source: CDP Bangalore 2006

Table 63 gives the Central Pollution Control Board (Environment Protection Act, 1986) prescribed noise standards in different areas.

**Table 63: Standards for Noise Pollution**

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

Source: CDP Bangalore 2006

Table 64 gives the noise levels measured in about ten areas of the City on April 23, 2006, which are beyond permissible limits.

**Table 64: 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

Source: CDP Bangalore 2006



### 9.1.1.7. 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<sup>13</sup> 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 65 gives V/C ratios of some key roads.

**Table 65: 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
M.G Road	2.76
Chord Road	2.51
Tumkur Road	2.62
Sankey Road	1.52

Source: CDP Bangalore 2006

## 9.1.2. Transport Studies for Bangalore

### 9.1.2.1. 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. It 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:

- 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.
- 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.

<sup>13</sup> iDeCK and RITES, November 2005

- 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.

#### **9.1.2.2. Comprehensive Traffic and Transportation Plan for Bangalore**

The study for preparing the Comprehensive Traffic and Transportation Plan (CTTP) was awarded to RITES Ltd. by UDD through KUIDFC. The primary reason for undertaking the study was to assess the pattern and growth traffic in Bangalore city and draw up a comprehensive plan to meet the needs of the future.

The CTTP was submitted by RITES in October, 2007. Key findings and recommendations from the CTTP has been given below;

The primary objective for the preparation of a Comprehensive Traffic & Transportation Plan (CTTP) for the city of Bangalore was shed light on the key issues, problems faced by the citizens in the domain of intra-city transportation. The CTTP makes a comprehensive study of transport infrastructure in the city, and projections are made based on city and economic growth.

#### **Development Trend**

There have been significant changes that have taken place with respect to traffic and transportation scenario in Bangalore. The general trend depicts a movement of traffic away from modes of public transport in favour of two wheelers, four wheelers and intermediate means of transport (IPT).

A major cause for such a shift is the rising per capita income levels which Bangalore city has witnessed over the past decade. However, there are several other reasons which have contributed to this switchover to means of private transport. These include:

- Longer access distance, low frequency and high travel time combined with longer waiting times have caused lower patronage of bus transport
- Majority of customers are reluctant to walk more than a quarter kilometre to the bus stop or from bus stop to destination
- Lack of availability of rapid transport modes for the public has caused the move towards use of personal 2 wheelers, which are mostly pursued for point-to-point commuting and flexibility
- Patronage of intermediate public transport (IPT) owing to fact that there is inadequate integration between various modes. As such the commuters do not have the opportunity for seamlessly switching over from one mode of public transport to another

- Of late 2 wheeler users have been switching over to cars due to rising income levels. Share of public transport has declined to some extent although in terms of absolute numbers it has increased.

## **Problems and Issues**

The CTPP prepared by RITES has uncovered several problems which could be pernicious to overall development of Bangalore city. These issues are as follows.

- Road network capacity is grossly inadequate. Most of the major roads are with four lanes or less with small scope of widening. This indicates the need for judicious use of available road space.
- The junction spacing are with small length on many roads. Many junctions in core are with 5 legs. This makes traffic circulation difficult. There is need to optimise the available capacity by adopting transport system management measures and by making use of intelligent transportation system.
- Traffic composition on roads indicates very high share of 2 wheelers. The share of cars is also growing. This indicates inadequate public transport system.
- V/C ratios on most of the roads are more than 1. Overall average traffic speed is about 13.5 kmph in peak hour. This not only indicates the need of widening of the roads but the also the need to plan high capacity mass transport systems on many corridors.
- Outer cordon surveys indicate high through traffic to the city. This point to the need for road bypasses not only for BMA but also for BMRDA area. High goods traffic also indicates the need for truck terminals at the periphery of the city.
- Household surveys indicate high household incomes. So the vehicle ownership levels are increasing. In the absence of adequate and comfortable public transport system, people are using their personal modes creating congestion problems but also environmental pollution.
- The household surveys indicate high share of work trips. This segment of travel demand needs to be mostly satisfied by public transport system. considering the large employment centres being planned in the BMA, the public/mass transport system needs to be upgraded substantially.
- Modal split in favour of public transport is about 46%. The trends show a decline in this share over the last two decades. This is further expected to fall unless adequate and quality public transport system is provided to the people of Bangalore. Share of two wheelers and cars in travel demand is disturbingly high. This trend needs to be checked.
- There is high pedestrian traffic in core area and some other areas in Bangalore. Footpath facilities are generally not adequate and their condition is deteriorating. Therefore up-gradation of these facilities is important.
- Parking is assuming critical dimensions in Bangalore. Parking facilities need to be augmented substantially. In the long run, city-wide public transport system needs

to provide not only to reduce congestion on roads but also to reduce parking demand.

- Share of cycle traffic has declined over the years. This mode of transport needs to be promoted by providing cycle tracks along the roads.
- Area of the BMA has been increased as per Revised Master Plan (2015). This plan has provided for densification of existing areas, mutation corridors, hi-tech areas etc. in various parts of the city. This is likely to have a major impact on the traffic demand. The transport network including mass transport system needs to be planned taking the proposed development in to consideration.
- Large areas are being planned by BMRDA in the BMR. This is likely to increase interaction between Bangalore and suburban towns. There will be need to provide commuter rail services to these towns from Bangalore.
- Opinion surveys indicate most of respondents will prefer to Metro system. They may also be willing to pay slightly extra for the improved services.

### **Recommendation on Land Use Integration**

A team consisting of urban planners and transportation planners preferably led by an urban planner with a holistic understanding of urban transport issues should put together an integrated land use – transport strategy for Bangalore. This strategy should incorporate modern concepts in land use planning, urban transportation, planning road network and street design in a complementary manner.

No such body exists as of today which has a statutory backing as such. Therefore for this strategy to be implemented, it should be mandated by an overarching body which can sway all the stakeholders concerned. Therefore a possibility of an Integrated Land and Transport Management Authority for Bangalore may be considered to mandate the preparation and operationalization of this strategy.

Other steps which can be taken to promote land use integration are as follows:

- Revised Land Use Plan and Development Controls-The land use and density component of the above strategy can be implemented via revisions in the master plan. High traffic generating activities and high density (high FSI) zones should be realigned around mass transport nodes along major transportation corridors. Such a strategy may require land appropriation for implementation of developmental projects such as improvement of road network, street design and supporting infrastructure.

In new growth areas, a mechanism for micro level planning (such as Town Planning Schemes in Gujarat) will need to be introduced to ensure that all new development is adequately served by primary, tertiary and secondary road network with provision for public transport facilities. These would also essentially have to be translated into land management process.

- Road Network & Street Design: In many places, particularly in the already developed areas, these modifications can be realised only through carefully

structured redevelopment projects as the missing links in the primary road network will have to go through existing development.

- Pockets of economic activities like Hi-Tech & Electronic City having very large employment potential are planned. Of course a large part of the human resources to be engaged in these activities is expected to come from within the BMA, but a significant number is also expected from BMR and even from towns like Hosur, Tumkur, etc. This will require special High capacity mass transport system connecting these work centres with the living areas within Bangalore as well as meeting the needs of the long distance / suburban commuters, especially along the corridors leading to these centres.
- The present radial network is bringing the entire load of traffic to the ORR & core areas causing congestion. The trend needs to be checked through the use of:
  - Dispersal of traffic at the periphery by completing the PRR, & the other Ring Roads planned at the Regional level like the Intermediate Ring Road & Satellite Town Ring Road.
  - Creating Transport Hubs for goods traffic and the junctions of PRR & selected Radials
  - Banning the entry of Heavy vehicles at the Transport hubs & allowing only LCV to transport the goods from the Transport Hubs to the inner city areas and that too during the non-peak hours (i.e. No Entry between 9 am to 9 pm)
- The core areas inside the core ring road are proposed to be fully traversed by the Metro. Therefore the vehicular movement inside this area should be minimized & if possible completely avoided during working hours for 9am to 9pm through:
  - Complete pedestrianisation of narrow commercial streets.
  - Providing adequate parking along the CRR and running dedicated BRT on the lower level of the CRR and restricting all private vehicles on the elevated portion thereof.
  - Smooth & free flow of emergency vehicles like Ambulance, Fire Engines etc in side the core area.
  - The goods feeder services like LCV be allowed to come in only doing 9 PM to 9 AM to unload materials etc.
  - Attempts may be made to decentralize certain trades requiring bulk carriage like heavy machinery, hardware, building material etc in organized markets beyond the ORR and preferably near the PRR.
  - On a few of the wide roads inside the core area the feasibility of running BRT etc. may be examined.

Based on the above observations it is clear that the already planned network will be insufficient to cope up with the future requirements especially after the target year of 2015. As such in order to prepare the Comprehensive Transport Plan the following policy measures are required to be taken based on which the CTP will be finalized.

- Extension of mass transport system to provide wide coverage and interchange facilities with other modes of transport
- Provide substantially large network of medium level mass transport system such as BRT to cover the areas beyond the Metro network and on over loaded corridors
- Land use adjustments and densification of corridors along mass transport corridors where possible
- Extension of commuter rail system upto the BMRDA's New Townships & beyond upto Tumkur, Hosur etc. to act as sub-urban services
- Introducing BRT and wherever possible dedicated bus lanes
- Rationalisation of Local Bus system and its augmentation
- Improvement in traffic management through TSM measures
- Special facilities for pedestrians within the entire network especially in the core areas; pedestrianisation of selected shopping streets in side the core area going to be served by underground sections of Metro. Provision of pedestrian sky walks, under passes, footpaths and other road furniture along the roads where necessary
- Diverting through traffic on Peripheral Ring Road. Providing transport hubs at the junctions of Peripheral Ring Road with important radials such as; the National Highways and other heavily loaded roads
- Improving Primary, Arterial and other important roads by providing grade separation, junction improvements, adding missing links, widening and other road side facilities wherever necessary. The Arterial roads outside the PRR need to be improved up to the New BMRDA townships in order to take the increased load of commuters. Transport integration of various modes

### **Future Demand Analysis and System Selection**

The evaluation of various scenarios<sup>14</sup> reveals that the public/mass transport system has to be extensive with high capacity mass transport systems on major corridors in order to achieve a modal split of more than 70% in favour of public/mass transport.

Provision of citywide extensive public/mass transport is the only way to solve the mobility problem of Bangalore. The mass transit system should be aimed at catering to the travel demand of 2025 and beyond. The hiatus in the demand can be met by augmentation of road system in the form of new roads, road widening, provision of grade separators, pedestrian facilities, traffic management measures etc.

### **Choice of System Selection**

The choice of system selection could be based on the following criteria:

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<sup>14</sup> Carried out in detail in the CTPP prepared by RITES.

- Choice of mode will depend mainly on demand level on a corridor, available road right-of-way (ROW) and the capacity of the mode. Other considerations are the land-use along the corridor, the location of building lines, and the potential for increasing the ROW. Cost of the same mode of transport can vary at different locations depending on engineering constraints. It is therefore important that the final choice of mode is based on techno-economic considerations.
- In choosing a mode for a corridor, first priority should be given to at-grade services and BRT. It offers convenience to commuters particularly the short distance users. Commuters do not have to walk up and down to use the services. The construction cost is low. It offers the best financial sustainability. If road ROW is inadequate and it cannot be widened, and/or the route is congested, an elevated mode needs to be proposed.

### Suggested Mass Transport Systems for Bangalore

On the basis of expected traffic demand for 2025 on the proposed mass transport corridors, available RoW on the corridors, capacity of various mass transport modes and already available mass transport system along a corridor, the mass transport systems on various corridors have been suggested in Table 66.

**Table 66: Mass transportation systems - CTPP**

No.	Corridor	Expected Maximum Traffic (PHPDT)	Available RoW (m)	System Recommended
1	Mysore Road to Baiyyappanahalli	75,000		Metro
2	Peenya to RV Road	75,000		Metro
3	Baiyyappanahalli to Benniganahalli	25,000	25	Metro
4	RV Terminal to PRR	25,000	25	Metro
5	Yelahanka Road to junction of Hi-tech corridor and Hosur Road via Nagavara, Electronic City	45,000	30	Metro
6	Indiranagar to Whitefield Road	35,000	25	Metro
7	Devenahalli Airport to MG Road via Bellary Road (New Airport)	20,000	24	Metro
8	Hebbal to Bannerghatta Road along Western portion of ORR	20,000	20	Monorail / LRT
9	PRR to Toll Gate along Magadi Road	12,000	22	Monorail / LRT
10	Katriguppe Road / Ring Road Junction to National College	14,000	18	Monorail / LRT

No.	Corridor	Expected Maximum Traffic (PHPDT)	Available RoW (m)	System Recommended
11	Hosur Road to PRR along Bannerghatta Road	18,000	22	Monorail / LRT
12	Hebbal to Bannerghatta Road along Eastern portion of ORR	15,000	40	BRT
13	Benniganahalli (ORR) to PRR along Old Madras road	10,000	30	BRT
14	From ORR to Hosur Road along Hi-tech corridor	12,000	60	BRT
15	Hosur Road to Tumkur Road along PRR	8,000	100	BRT
16	Tumkur Road to Hosur Road along eastern side of PRR	6,000	100	BRT
17	Along Core Ring Road	12,000	25	BRT
18	Vidyaranya pura to Nagavarapaya	12,000	25	BRT
19	Kengeri Satellite Town to JP Nagar along Uttarahalli Road, Kodipura	12,000	30	BRT
20	Banashankari 3rd Stage to Banashankari 4th Stage Extension along Ittamadu Road, Turahalli, Thalaghattapura	9,000	35	BRT
21	Domlur Extension to Koramangala along inner Ring Road	10,000	25	BRT
22	PRR to Maruti Nagar (up to Hi-tech Corridor) along Sarjapur Road	15,000	25	BRT
23	Peenya to PRR along Tumkur Road	12,000	30	BRT
24	Old Madras Road near Indranagar to ORR near Banaswadi along Baiyyappanahalli Road – Banaswadi Road	10,000	22	BRT
25	Commuter Rail Corridors (10	10,000	-	Commuter Rail System



No.	Corridor	Expected Maximum Traffic (PHPDT)	Available RoW (m)	System Recommended
	Corridors)			

Source: CTPP

Considering the various proposed schemes and unit rates, cost estimates of these schemes have been worked out at 2007 prices and are given for proposed mass Transport Corridors, City Bus System, Road Infrastructure, Grade Separators, Pedestrian Facilities, Parking Facilities, Integrated Freight Complexes and Transport System Management Measures. The entire transport development plan is not required to be implemented in one go.

Considering the existing problems, expected traffic demand levels and schemes already under implementation/ active consideration of the Government, phasing of implementation of various projects has been suggested in three phases (2007- 12, 2013-18 and 2019-24).

Cost estimates for each project to be implemented in the three phases have also been given in the table below.

**Table 67: Cost estimates**

No.	Transportation Projects	Implementing Agency	Length (km)	Total Cost (Rs. Cr)
1	Commuter Rail System	Railways / GoK / BMRDA	204	3060
2	BRT System	BMTC / BBMP / BDA	291.5	3498
3	City Bus System & IMTCs	BMTC / KSRTC	--	5721
4	New Roads	BBMP / BDA	209.17	5192
5	Outer Ring Road Re-alignment	BBMP	16.6	311
6	Road Improvements (inside ORR)	BBMP, BDA/ NHAI	--	141.73
7	Road Improvements & Feeder Roads	BBMP, BDA	502.75	433.31
8	Grade Separators-Roads	BBMP / NHAI /BDA	--	713
9	Road over Bridges / Road under Bridges	BBMP	--	990
10	Skywalks & Subways	BBMP	68	281
11	Parking Facilities	BBMP	--	380
12	Integrated Freight Complexes	BDA	--	270
13	Transport System Management	BBMP / Traffic Police	--	500

Source: CTPP

## 9.2. Strategy for Improved Service Delivery

Transport interventions can broadly be classified as under:

- Roads and Road Related Infrastructure
- Bus based Mass Transit Systems
- 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.

### **9.2.1. 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.”

### **9.2.2. 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

### **9.2.3. 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.

### **9.2.4. 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.

### **9.2.5. 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.

### **9.2.6. 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 and shows the general concept of the proposal – ring roads, metro, monorail/LRT, and the grid routes of BMTC.

#### **9.2.6.1. 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 19:

- 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, Tattakere, Hosakote, Aradeshahalli, 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.

#### **9.2.6.2. 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
- Implementing high-capacity bus systems in corridors such as the Outer Ring Road, where widths allow dedicated bus lanes.

#### **9.2.6.3. 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 COTP

- The third proposal (under consideration) is the option of Monorail<sup>15</sup> or Light Rail Transit as feeder routes to the Metro Rail. The exact configuration shall be finalized as part of the CTPP.

#### **9.2.6.4. 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)

#### **9.2.6.5. 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:

1. 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
2. The second interchange is proposed at Byappanahalli, which will have the BMTC, KSRTC, Railways, BMRC, and the Airport Rail Link.

#### **9.2.6.6. 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.

#### **9.2.6.7. 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.

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<sup>15</sup> Monorail is not strictly rail-based, but has the characteristics of a fixed-guide following train system.

**9.2.6.8. 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 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.

**9.2.6.9. 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**

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

**2. Public Transport Infrastructure**

<b>Passenger Info System-service users are provided information about the arrival time of the buses</b>	5 major routes
<b>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</b>	50 nos. so that buses do not block the main traffic
<b>Relocation of Auto Stands-specific place for auto parking such that they do not obstruct the movement of other vehicles</b>	50 nos.
<b>Relocation of Bus Stands-relocation of bus stops or stands which are obstructing the free flow of traffic</b>	100 nos.
<b>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</b>	Outer Ring Road based on the feasibility study report
<b>Prepaid Auto stands-for facilitating the travel by auto passengers</b>	50 nos.

**3. Parking Management**

<b>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</b>	10 Nos.
<b>Restriction of On-Street Parking-Identifying roads/road stretches where on-street parking is to be prohibited</b>	50 Locations
<b>Mini Parking lots/At-grade parking-Setting up of parking lots on vacant lands owned by various government agencies/BMP etc.</b>	25 Nos.

**4. Pedestrian Facilities**

<b>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</b>	100 Km.
<b>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</b>	10,000 m
<b>Raised Crosswalks/Pelican Signals-the</b>	50 Locations

<b>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</b>	
<b>Pedestrian Walkovers-to be provided at high pedestrian activity links and zones</b>	10 Locations

**5. Traffic Control and Regulation**

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

**6. Traffic Management**

<b>Traffic Management Plans-controlling the traffic, imposing regulatory measures and enforcing traffic management techniques like one ways etc.</b>	Central area review and Improvement
<b>Banning of Right and U-turns</b>	30 Locations
<b>Banning of entry of certain types of vehicles</b>	50 Locations
<b>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</b>	6 areas: Rajajinagar, Jayanagar, Indiranagar, Koramangala, BTM Layout, RT Nagar
<b>Dedicated Auto Lanes-To restrict movement of autos to left lane so that other vehicles can ply smoothly</b>	20 Roads

**7. Traffic Enforcement**

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

**8. Traffic Education & Publicity**

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

**9. Public Interface**

<b>Traffic Help Desk-setting up of a modern help line which is a citizens' grievance redressal forum</b>	To function on the lines of a professional customer relationship management center
<b>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</b>	In the 35 traffic police station areas
<b>Public Private Partnership-Projects to improve traffic conditions to be taken up through Public Private Partnership</b>	Involvement of the private sector as partners in traffic improvement

**10. Road Safety**

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

Indicative service delivery targets, specific to roads and road infrastructure, are given in Table 68.

**Table 68: Standards for Road Infrastructure**

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

Source: CDP Bangalore 2006

**9.3. 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.

### 9.3.1. 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 and 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.

### 9.3.2. Improvements to Key Roads

#### Access Controlled Highway along NH4

The NH-4 stretch from the city limits of Bangalore (near km 10) to the Nelamangala (near km 29.5) is an important section of the National Highway on the Golden Quadrilateral. The traffic volume in the entire stretch (of Nelamangala section) of NH-4 is very high, thereby creating congestion on the existing 4-lane divided highway.

NHAI proposes to construct a 19.5 km long, access controlled highway, out of this length, about 4.35 km length is 4-lane elevated highway and 15 km length is access controlled stretch. NHAI also proposes to widen the existing 4-lane section (from 14.5 to 29.5 km) to 6-lanes.

It is proposed to toll the traffic using the highway. The brief scope of work is as under:

- Elevated highway approx. 4.35 km long
- Ground level improvement of existing highway
- Toll collection system including six toll plazas, related structures, toll collection hardware and software
- Six vehicular underpasses and one flyover
- Illumination system for elevated highway, interchange, highway at ground level, for the underpasses and toll plazas
- Service roads improvement including construction of missing links

The construction work for the project has commenced in November, 2007 and is scheduled to be completed in 24 months.

### **Other Improvement Projects**

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.

### **9.3.3. Railway over Bridges & Railway under Bridges**

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
- 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.

### **9.3.4. Bus-based Transport Systems**

#### **9.3.4.1. 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.475 Crore.

#### **9.3.4.2. 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.

#### **9.3.4.3. Other Initiatives of BMTC**

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)
- Big 10 buses under ABiDe

Strengthening of Depots-BMTC shall strengthen its workshops for preventive maintenance.

New Depots-BMTC proposes to add 24 new depots taking the strength to 51.

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.

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.

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.

Skywalks on ORR: BMTC proposes to build Skywalks (pedestrian overpasses) at about 144 places.

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.

Rain Water Harvesting at Depots-BMTC proposes to establish 25 rainwater-harvesting plants at depots and workshops.

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.

Solar Lighting Systems-BMTC proposes to install solar lighting systems at all Depots and Bus Stations, thereby reducing electricity consumption in its facilities.

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.

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).

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.

Electronic Ticketing System-A high-tech ticketing system using smart cards or electronic ticketing system (automatic fare collection system) is proposed to be provided.

Computerization of Depots-All 24 depots have been computerized and BMTC intends to computerize other activities like administration, traffic, etc.

Computerization of Corporate Office-It is planned to implement projects like file tracking system, local email, and data server, etc.

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.

TTMC (Traffic and Transit Management Centre) was planned by the Bangalore Metropolitan Transport Corporation (BMTC) under the Union Government's Jawaharlal Nehru National Urban Renewal Mission (JNNURM). The TTMC's would offer passenger amenities such as Bangalore One centres, ATMs, shopping, park-and-ride facilities, and internet café. It would provide parking space for cars and two-wheelers.

#### **9.3.4.4. 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.

#### **9.3.4.5. 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.

### **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
  - 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.)
- Strengthening of the traffic police force by augmenting officers and staff, provision of civil and communication infrastructure.

Benefits would include:

- 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
- State of the art traffic policing and regulation will lead to substantial compliance.

The table given below sets out the estimated costs for B-TRAC activities over the years.

**Table 69: Cost Phasing for B-TRAC**

No.	Components	Nos.	Unit Cost (in Rs. Crores)	Total Cost (in Rs. Crores)	Phase 1 (2007-2012)
1	Junction Improvements	250	0.7	175	175
2	Street Furniture and Road making			100	100
3	Intelligent Transportation System including ATC, VMS etc for 250 intersections			150	150
4	Surveillance/ monitoring and enforcement cameras etc			50	50
5	Education and Training and others			25	25
				500	500

Source: CDP Bangalore 2006

### 9.3.5. Bengaluru New International Airport

Bengaluru International Airport<sup>16</sup> is a 4,050-acre (16.4 km<sup>2</sup>) international airport that is built to serve the city of Bangalore. The airport is located in Devanahalli, which is 30 km from the city. Construction of the airport began in July 2005, after a decade long postponement. It is expected to be completed and operational by March 30, 2008. It is then expected to take all the commercial flights (domestic and international) that are currently operating out of the HAL Airport.

<sup>16</sup> Data for the section is sourced from

BIAL official website, Project Reports and Consultant studies (as secondary data).

Future plans for the airport site envisage expansion of the terminal and runways and generous commercial development, including business centers, tax-free shops, entertainment centers, malls and office space.

**Construction & Design**

The new Airport was originally planned to accommodate 3.5 million passengers a year, but this has now been redesigned to handle 11 million passengers. The redesign will see an increase in the size of the terminal, number of aircraft stands, new taxiway layouts and supporting infrastructure. However, the redesign was to be incorporated into the project schedule of BIAL.



A plan is also being processed for a direct rail service from Bangalore Cantonment Railway Station to the Basement Rail terminal at the new International Airport. Access on the National Highway is being widened to a six lane expressway, with a 3 feet (0.91 m) boundary wall, construction is moving ahead. A new expressway is planned to connect the International Airport to the City's Ring Road. The Expressway, expected to be a tolled road, would begin at Hennur on the Outer Ring Road. The table given below sets out the key facts pertaining to BIAL;

**Table 70: Key facts pertaining to the BIAL**

<b>Owner &amp; Operator</b>	<b>Bangalore International Airport Ltd.</b>
<b>Location</b>	Devanahalli, Bangalore, Karnataka
<b>Length of Runway</b>	4000 m (13,123 feet) (fully asphalted surface)
<b>Traffic Projections for BIAL (estimate for 2010)</b>	8.54 million passengers 234,017 metric tonnes Movement for peak hours = 27 Total movements = 106,191
<b>Start of Operations</b>	March 30 <sup>th</sup> , 2008
<b>Design Capacity</b>	About 11 million passengers per annum
<b>Aircraft Stands</b>	45
<b>Aero Bridges / Gates / Check-in Counters</b>	9 Bridges / 16 Gates / 54 Counters
<b>Approximate Cost of Project</b>	Rs.28 billion

Source: BIAL



**Layout**

The passenger terminal is proposed as a single, fully air-conditioned, two-level building capable of accommodating international and domestic operations. The basement houses the retail storage, rest areas and services. The arrival and departure areas are separated vertically with a modern, simple, straight-ahead flow system. The domestic and international departure lounges, and the majority of the retail outlets are located on level 2 (first floor). The check-in facilities and baggage reclaim are located on level 1 (ground floor). The terminal is designed for ease of operation and minimum maintenance.

**Capacity**

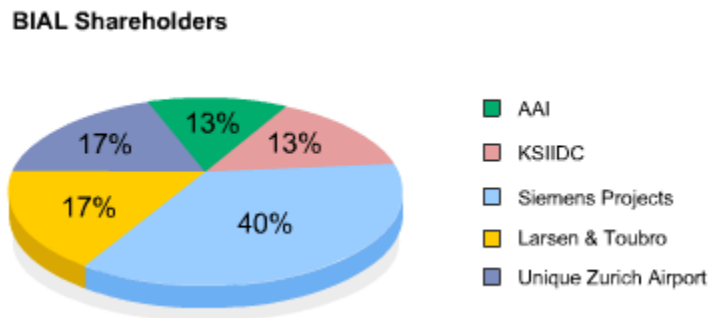
The total floor area planned is approximately 71,000 square metres. The terminal building is designed to accommodate 2733 passengers at peak hour. The design reflects the best industry practice and caters for 24-hour-operations, under all weather conditions. All facilities provided will meet IATA standards.

**Terminal parking**

In the first phase of development, a car park for 2,000 cars in front of the terminal building at the ground level will be developed for the convenience of passengers and visitors to the airport.

**BIAL Ownership Structure**

The BIAL shareholding pattern consists of private promoters holding 74% equity stake and the state holding the remaining 26%. The private promoters include Siemens Projects Ventures, Larsen & Toubro and Unique Zurich Airport.



The two state promoters are the Karnataka State Investment and Industrial Development Corporation and the Airports Authority of India.

### **Water Supply to New International Airport**

Water supply arrangement has been made for the New International Airport coming up near the Devanahalli area. The Bangalore Water Supply and Sewerage Board (BWSSB) and BIAL have entered into a formal arrangement wherein BWSSB would provide potable water to the International Airport facility by laying a dedicated pipeline. The dedicated pipeline is a necessary step as the International Airport is located beyond the administrative limits of BWSSB.

The airport is equipped with an in-house water recycling facility which can be used to treat and recycle used water. This combination of utilizing both recycled and fresh water lends greater efficiency to the overall operations of the facility. Currently the facility is utilizing approximately 1 to 1.2 MLD of water supplied by BWSSB. However the quantum of water supply can be increased depending on the utilisation at the facility.

### **9.3.6. 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 Delhi Metro Rail Corporation Ltd (DMRC) was commissioned by the State Government of Karnataka for preparing a Detailed project Report (DPR) for a High Speed Rail Link to the International Airport, with check-in facilities at the city end. Accordingly, DMRC undertook necessary studies and investigations and has prepared this DPR.

DMRC is joint venture of Government of India and Government of Delhi. The Detailed Project Report (DPR) for the Bangalore Metro Rail Project has also been prepared any DMRC proposing two lines, the East West line (18.10kms – 18stations) and the North- south line (14.90kms – 14 Stations) consisting of elevated and underground sections.

### **9.3.7. Road Connectivity to International Airport**

At present the primary connectivity to the Bangalore International Airport is under construction, is through the NH-7. Traffic from the city to the Airport has to reach this road and then proceed towards the International Airport. As NH-7 is a divided dual carriageway with 3 lanes in each direction. As NH -7 is a busy highway, connecting Bangalore to Hyderabad, the traffic volume on it is about 50,000 vehicles (each way per day, with the peak hour traffic being about 5,000 vehicles per hour each way. As on date the temporary access to the Airport area is taking off from the NH-7 about 5kms short of the airport, which is purely for the construction purposes only. The BIAL is building the main access road connecting NH-7 at

the proposed trumpet interchange on the south western side. The total distance to be covered from City Centre (M.G. Road) to the new Airport will be about 33.41 km.

The Government of Karnataka (GoK) has proposed a new Access Express Way from Bangalore North, starting from Horamavu accessible from the Ring Road. This will be a Toll Highway with three lanes each way. After traversing about 21 kms it will join the main access road of BIAL in a loop and proceed to reach the Airport. This Expressway is also proposed to be continued beyond the crossing of the BIAL MAIN access road towards Devenahalli to join NH-7. The Express way will also link the Aero City of BIAL. This road is proposed to be taken up on BOT basis and land acquisition by the Govt. (KRDCL) is being launched. When this toll Expressway will be ready cannot be stated at present.

GOK is also planning a Peripheral Ring Road for Bangalore, about 6km beyond the Ring Road and 16 kms short of BIAL main access road. This Road also crosses the Expressway giving access to the Airport in a loop from this point. The Peripheral Road crosses the NH-7, beyond Yelahanka which might also give connection to BIAL access road through NH-7. This project, being executed by BDA, is in the initial stages as only land acquisition has been launched so far.

### **9.3.8. High Speed Rail Connection**

Keeping the new International Airport far away from the City about 35 kms from Centre of the City has many advantages but equally many disadvantages. While land availability for such an Airport is easy and would be cheap and the Airport can be expanded as the traffic grows, the real sufferers are the air travelers and Airport employees who have to cover this long distance to reach the Airport employees who have to cover this long distance to reach the Airport. Apart from the high cost of travel to reach the Airport from the City, the time taken for the travel will be more than an hour and uncertainties due to traffic hold-ups enroute will have to be reckoned with. On the other hand, a High Speed express Rail Connection will make such a travel comfortable, hassle free cheap and reliable. Therefore, even when the proposed access Express way materializes, the majority of the travelers to the Airport would prefer a fast and reliable rail journey.

Advantages of Rail Connectivity over road access:

- The rail journey will take less than 25 minute as against more than one hour by road.
- Rail journey will be in air-conditioned comfort. Very safe and reliable. There will be no uncertainty in regard to traffic hold-ups.
- The energy needed for a passenger km. by rail is only 1/5th of the energy needed by road. Therefore, there will be considerable fuel saving if bulk of the travelers choose rail journey.
- Air travelers can have check-in facilities at the City itself. Would be available both for international and Domestic travelers and would reduce the congestion at the

check- in counters at the Airport as also the need for parking facilities at the Airport end.

- By rail, there will be no pollution, can have a relaxed travel without any tension and passengers can be sure of the time by which they can reach the Airport.
- The travel by rail would be far cheaper than the road journey apart from being very safe.
- A rail Connection has flexibility of increasing the capacity by reducing the headway between the trains.
- The need for many visitors to reach the Airport for seeing off or meeting the relatives can be considerably reduced since this activity can take place at the City Air Terminal itself.

Despite the above it has to be reckoned that many of the rail travelers may still have to take another mode of journey to reach the City Air Terminals.

### **Route Alignment**

The High Speed Rail Link to the new International Airport starts from the Police Grounds situated between M.G. Road and Cubbon Road. Police Grounds represents practically the city centre well connected on all sides to the entire city and its outskirts. The ramp of the Bangalore Metro is also located in this area. The structure of the City Airport Terminal (CAT) is being planned in such a way that the needs of Bangalore Metro are fully met while at the same time the remaining area is utilized for the CAT. The proposed Bangalore Metro Rail crosses police Grounds diagonally as a ramp from the underground station of Minsk square to the elevated station on the M.G.Road. it is possible to accommodate in the Police Grounds the requirements of both the Bangalore Metro and CAT of the Airport Rail Link. The CAT structure will be put up around the Bangalore Metro Ramp.

In other words the Metro ramp structure will go through the CAT Building the two systems totally isolated, at the same time integrated together.

### **Train Operation Plan**

The train operation plan (headway and train composition) planned for year 2011 and 2021 is given as under:

### **Cost Estimates**

Cost estimates have been prepared based on the price levels prevailing in June, 2007. it has been assumed that land owned by Government / Municipal Corporation will be provided free of cost to the project. It has been further assumed that cost of civil works of the airport line including the terminal stations located within BIAL premises will be provided as one time grant to the owner of the Airport Rail Link. The length of the Rail Link up to terminal – I inside BIAL

premises comes to 3.57 kms and its estimated costs at June 2007 price level is 148 crores (i/c taxes). This cost does from part of the completion cost of the project.

• Estimated cost (excluding land cost)	:Rs.2677 Crores
• Estimated cost (including land cost)	:Rs.2832 Crores
• Estimated Central & State Taxes	:Rs.344 Crores
• Estimated cost (including Taxes)	:Rs.3176 Crores
• Completion cost by March,2012 with Taxes and land	:Rs.3716 Crores

### **Financing of the Project**

For funding of this project, two options, namely:

1. Public Private Partnership (PPP) model
2. Build Operate and Transfer (BOT) model

with a concession period of 30 years are examined as under:

Under PPP Model, the civil construction job will be done by SPV with funds to be made available by GOI & Government of Karnataka (GoK) and the systems and O&M works will be down by the concessionaire by bringing required funds in the debt equity ratio of 2:1. Under BOT model the BOT operator will construct the project and run the system for 30 years including construction period. To attract concessionaire to implement the project on BOT basis a minimum post tax return of 14% on his equity has been assured. It is further assumed that concessionaire will be able to arrange loans at the rate of 12% interest. Land is to be provided free of cost (Rs.155 Crores) in both the options.

Since, under the PPP model, the governments' outflow will be Rs.978 Crores (Rs.1328 Crores-Rs.350 Crores from Property Development) and under the BOT model the VGF is only Rs. 50 Crores, the latter is recommended for adoption. The Request for Qualification (RFQ) for Project was issued and bids from five bidders were received in response to it and are being evaluated.

### **Institutional Arrangements**

The State Government of Karnataka (GoK), Government of India (GoI), and Bangalore International Airport Limited (BIAL) will set up a joint Venture which will own the proposed high Speed Express Rail link to the International Airport. The initial share capital of this Joint Venture will be International Airport. The Initial share capital of this Joint Venture will be international Airport. The initial share capital of this Joint Venture will be international Airport. The initial share capital of this Joint Venture will be contributed by GoK, GoI and BIAL in the proportions of 45:45:10. The initial share capital of Joint Venture will be Rs.300 crores. An additional amount of Rs.300 crores will be raised by SVP. The land required for the project will be acquired by the GoK at its own cost. Whereas the land owned by the State Government/ Municipal Corporation will be made available free of cost, cost of private land acquired by the GoK will count towards its equity contribution to the Joint venture BIAL premises. This cost will be treated as one time grant by BIAL to the Joint Venture.

The proposed Rail Link will be implemented on BOT basis. With a concession period of 30 years including the construction period. To supplement the revenues, the Concessionaire will be given full property development rights within the following areas:

- Depot area
- Hebbal station
- Yelahanka station

The concessionaire will also have full advertising rights within trains and stations. Property development at the City Air Terminal CAT will be done by the owner of this rail link i.e. the Joint Venture. Property development rights at the terminal station which will be within the limits BIAL area will be with BIAL. The Joint Venture will have Directors, the number of Directors of the three partners being the proportion of their share capital of Joint Venture. The executive Chairman of the Joint Venture will be nominee of the state Government.

In brief:

• Concessionaire equity	Rs.1004 Crores
• Viability gap funding after adjusting for Up front of Rs.350 Crores as PD Receipt	Rs.50 Crores
• Post tax return on concessionaire equity	14%
• Completion cost without Land cost but with taxes	Rs.3561 crores

It is expected that the project will be financially viable. The concession agreement shall, therefore provide for sharing of revenues between the Concessionaire and the Joint Venture after the actual traffic on the proposed Rail Link exceeds 120% of the projected traffic. To assist in the implementation of the project, the joint Venture will engage Consultants.

The role of the consultants will be:

- To finalise the Concession Agreement
- To monitor implementation of the project by the concessionaire including Contract management.

### **9.3.9. 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.

### 9.3.10. 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.

Out of Rs.19,921 crore of investment for the 137 km of Metro, financing for Rs.5605 crore corresponding to the present phase I corridors under implementation now (about 34 km) has already been arranged and the project is implemented by BMRCL, a company incorporated for the purpose. Balance investment for Metro would also be mobilized by the company through a combination of contributions from Government of India, Government of Karnataka and debt financing. It is also recommended that JNNURM funding from Government of India to an extent of Rs.532 crores be sought to finance the balance Rs 1521 crores for the Phase I.

The recommended funding pattern for Rs.1521 crores for Phase I is as follows:

- Government of India (JNNURM) funding: Rs.532 Cr
- Government of Karnataka (JNNURM) funding: Rs.228 Cr
- BMRCL / Debt funding: Rs.761 Cr

The Bengaluru Metro will be integrated with railways and other mode of transport at Byappanahalli Railway Station in the East, Yeshwantpur railway station, and Jalahalli in the North, Mysore Road Terminal in the West, Banashankari in the South and Bengaluru City Railway Station / Kempegowda Bus Stand in the central part of the city.

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 from 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 and shows the map of the proposed metro system.

## Schedule and Train Headway

The Metro rail construction work on the first elevated section from Bayappanahalli to Cricket Stadium (7km i.e. Reach 1) has begun in January, 2007, and is expected to be completed by December, 2010. The full network is expected to be commissioned by December 2011. BMRCL is seeking to minimize public inconvenience during the construction period.

The frequency of the Metro trains will be every four minutes initially. This would increase to three minutes by 2021. The travel time from end to end on the E-W corridor will be 33 minutes, and on the N-S corridor will be 28 minutes. The system is designed for maximum operational speed of 80 kmph.

## Carrying Capacity

The Metro has been designed for a capacity of 40,000 PHPDT. The number of passengers expected to travel on the metro everyday is estimated at 10.20 lakhs in 2011 and 16.10 lakhs in 2021. With expected addition of the extension to NS corridors in the course of implementation of the project, it is estimated at 12.22 lakhs in 2011 and 19.72 lakhs in 2021.

Some of 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.

## 9.4. Projects Approved under JNNURM Scheme

Table 71 given below set outs the projects have been approved under the JNNURM scheme and are individually being promoted by BMTC, BDA, and BBMP.



**Table 71: Projects approved under JNNURM scheme**

No.	Project Undertaken	Investment Estimate (Rs. Cr)
1	Passenger amenity centre at Jayanagar	8.90
2	Development of TTMC at Shanthinagar	84.68
3	Development of TTMC at ITPL (Whitefield)	26.56
4	Development of TTMC at Vijayanagar	38.12
5	Development of TTMC at Koramangala	50.58
6	Development of TTMC at Banashankari	22.24
7	Development of TTMC at Bannerghatta	3.93
8	Development of TTMC at Kengeri	21.13
9	Construction of Grade separator at Agara junction	38.10
10	Construction of Grade separator at Iblur Junction	18.74
11	Construction of Under Pass along Chord Road at the Junction of Magadi Road and Chord Road	27.82
12	Construction of Grade separator at Malleshwaram	12.45
13	Construction of Grade separator at R V College	13.49
14	Construction of Grade separator at Tagore Circle	17.56
15	Improvement of Roads - MG Road	43.61
16	Improvement of Roads - Koramangala	50.45
17	Construction of Bridge at Gali Anjaneya Junction	31.93
18	Construction of Grade Separator at Yeshawathpur circle	21.58
19	Construction of Underpass at Hennur Bansawaadi Junction	25.44
20	Construction of Underpass at Ring Road & Nagavara Road Junction	21.63
	Total	578.94

Source: KUIDFC

#### 9.4.1. 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
- Asphaltting of 1,500 km of internal roads
- 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.

## 9.5. Investment Plan for Roads and Transportation

Table 72 shows the estimated investment for transport infrastructure projects in the Mission period and table 73 sets out the investment estimate for transport over the Vision Period.

### Cost Estimates and Financing

Considering the various proposed schemes and unit rates, cost estimates of these schemes have been worked out at 2007 prices and are given for proposed mass Transport Corridors, City Bus System, Road Infrastructure, Grade Separators, Pedestrian Facilities, Parking Facilities, Integrated Freight Complexes and Transport System Management Measures. The entire transport development plan is not required to be implemented in one go.

Considering the existing problems, expected traffic demand levels and schemes already under implementation/ active consideration of the Government, phasing of implementation of various projects has been suggested in three phases (2007- 12, 2013-18 and 2019-24). The inputs in the table below are taken from CTPP.

**Table 72: Investment Plan Upto JnNURM period**

Proposed Developments	2011-2012
<b>Metro System</b>	15000
<b>Mono Rail/ LRT System</b>	3825
<b>Commuter Rail System</b>	690
<b>BRT System</b>	1866
<b>Improvement in City Bus System</b>	4401
<b>New Roads</b>	5192
<b>Outer Ring Road Alignment</b>	311
<b>Road improvement (Inside ORR)</b>	142
<b>Road Improvement (Outside ORR)</b>	433
<b>Graded Separators Roads</b>	713
<b>Rail over Bridges/ RUB</b>	432
<b>Elevated Roads</b>	990
<b>Pedestrian Facilities</b>	281
<b>PARKING (No. of CAR space)</b>	380
<b>Integrated Freight Complexes</b>	135
<b>B TRAC</b>	500
<b>High Speed Rail Link</b>	6000
<b>Road on road project to BIAL</b>	700
<b>Hebbal Elevated Expressway</b>	10000
<b>Total (in Rs. Crores)</b>	51991

Source: CTPP, Bangalore

**Table 73: Investment Plan Vision period JnNURM**

Item	Phase 1	Phase 2	Phase 3	Total
	2007-12	2013-18	2019-24	
<b>Mass Transport Corridors</b>				36658
<b>Metro System</b>	15000	10000	0	25000
<b>Mono Rail/ LRT System</b>	3825	1275	0	5100
<b>Commutor Rail System</b>	690	1620	750	3060
<b>BRT System</b>	1866	1632	0	3498
<b>Improvement in City Bus System</b>				5721
<b>Improvement in City Bus System</b>	4401	660	660	5721
<b>Road Infrastructure</b>				6078
<b>New Roads</b>	5192	0	0	5192
<b>Outer Ring Road Alingment</b>	311	0	0	311
<b>Road improvement (Inside ORR)</b>	142	0	0	142
<b>Road Improvement (Outside ORR)</b>	433	0	0	433
<b>Grade seperators</b>				2135
<b>Graded Separators Roads</b>	713	0	0	713
<b>Rail over Bridgs/ RUB</b>	432	0	0	432
<b>Elevated Roads</b>	990	0	0	990
<b>Pedestrian facilities</b>	281	0	0	281
<b>Parking (No. of CAR space)</b>	380	0	0	380
<b>Integrated Frieght Complexes</b>	135	135	0	270
<b>B TRAC</b>	500	0	0	500
<b>High Speed Rail Link</b>	6000	0	0	6000
<b>Road on road project to BIAL</b>	700	0	0	700
<b>Hebbal Elevated Expressway</b>	10000	0	0	10000
<b>Total</b>	51991	15322	1410	68723

## 9.6. 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.

### 9.6.1. Unified Transport Authority

The previous CDP recommended the creation of a unified transport authority for coordinating the land transport efforts for Bangalore city. Direct service providers are the BMTC and BMRCL (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 Statutory Authorities for basic infrastructure, Traffic Police, and the Transport Department of GoK.

It was clear that there had to be very strong coordination between various agencies, not only in initial investments in creating a system, but also in its operations. The GoK was previously 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.

Such an authority was created in the name of Bengaluru Metropolitan Land Transport Authority (BMLTA). At present the Directorate of Urban Land Transport would act as the secretariat for BMLTA which is created as unified metropolitan transport authority.

#### 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. BBMP 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:

- Airport Rail Link
- Inter-modal exchanges
- Parking complexes
- 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.

Figure 18: High Density Traffic Corridor

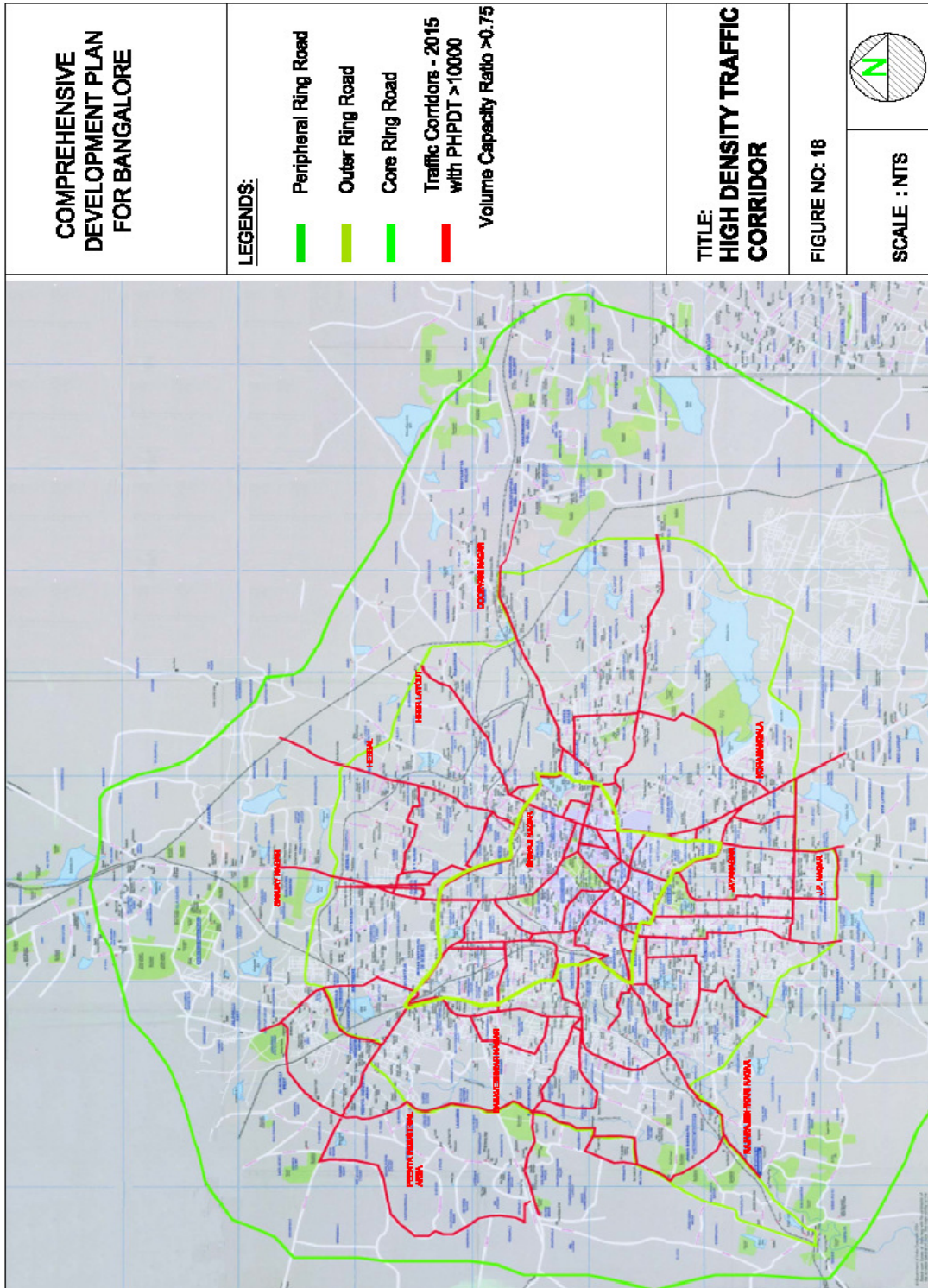


Figure 19: Overview of City Transport System

**COMPREHENSIVE  
DEVELOPMENT PLAN  
FOR BANGALORE**

**LEGEND:**

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

**TITLE:  
OVERVIEW OF CITY  
TRANSPORT SYSTEM**

**FIGURE NO: 19**

**SCALE : NTS**

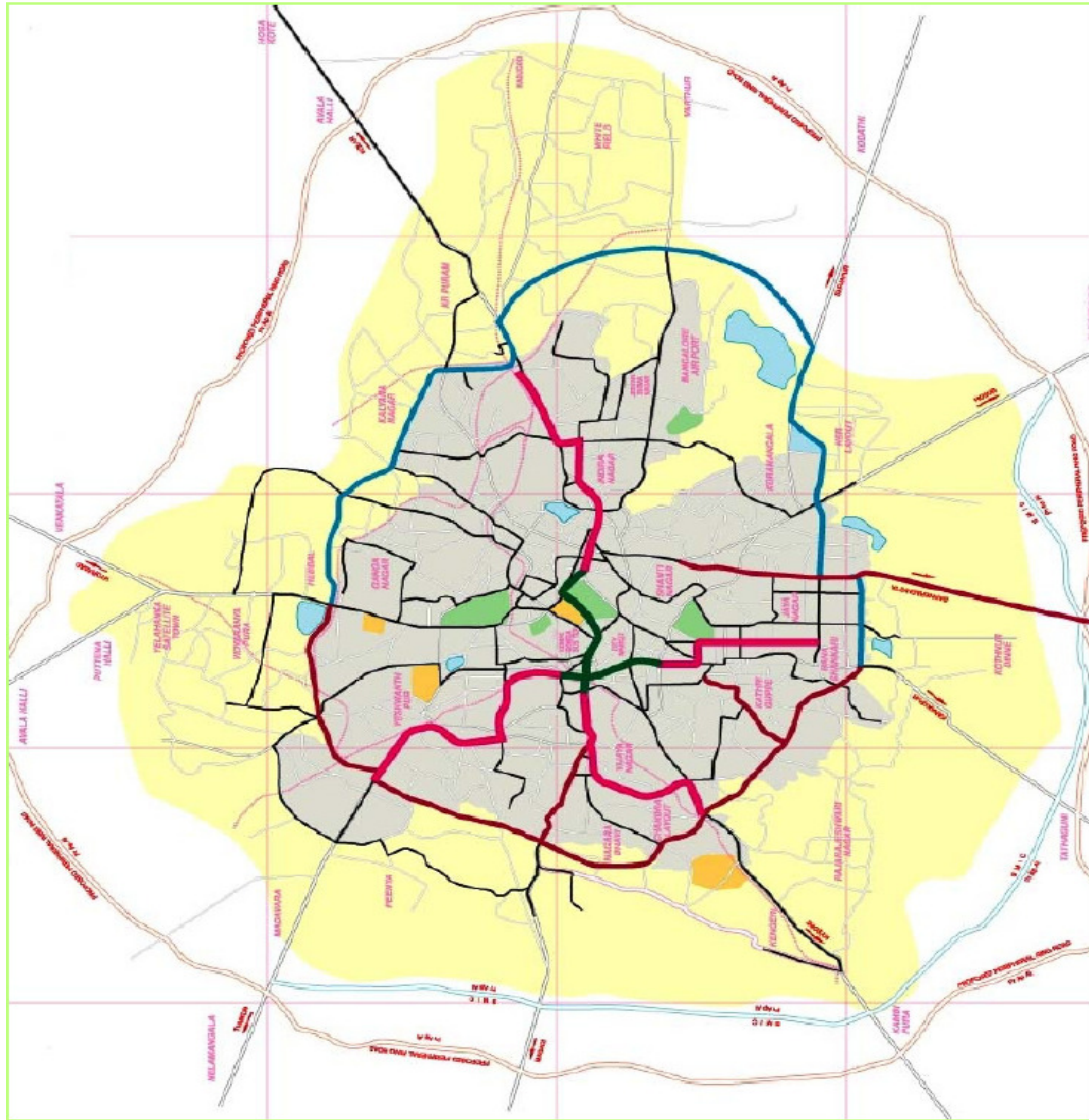
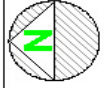
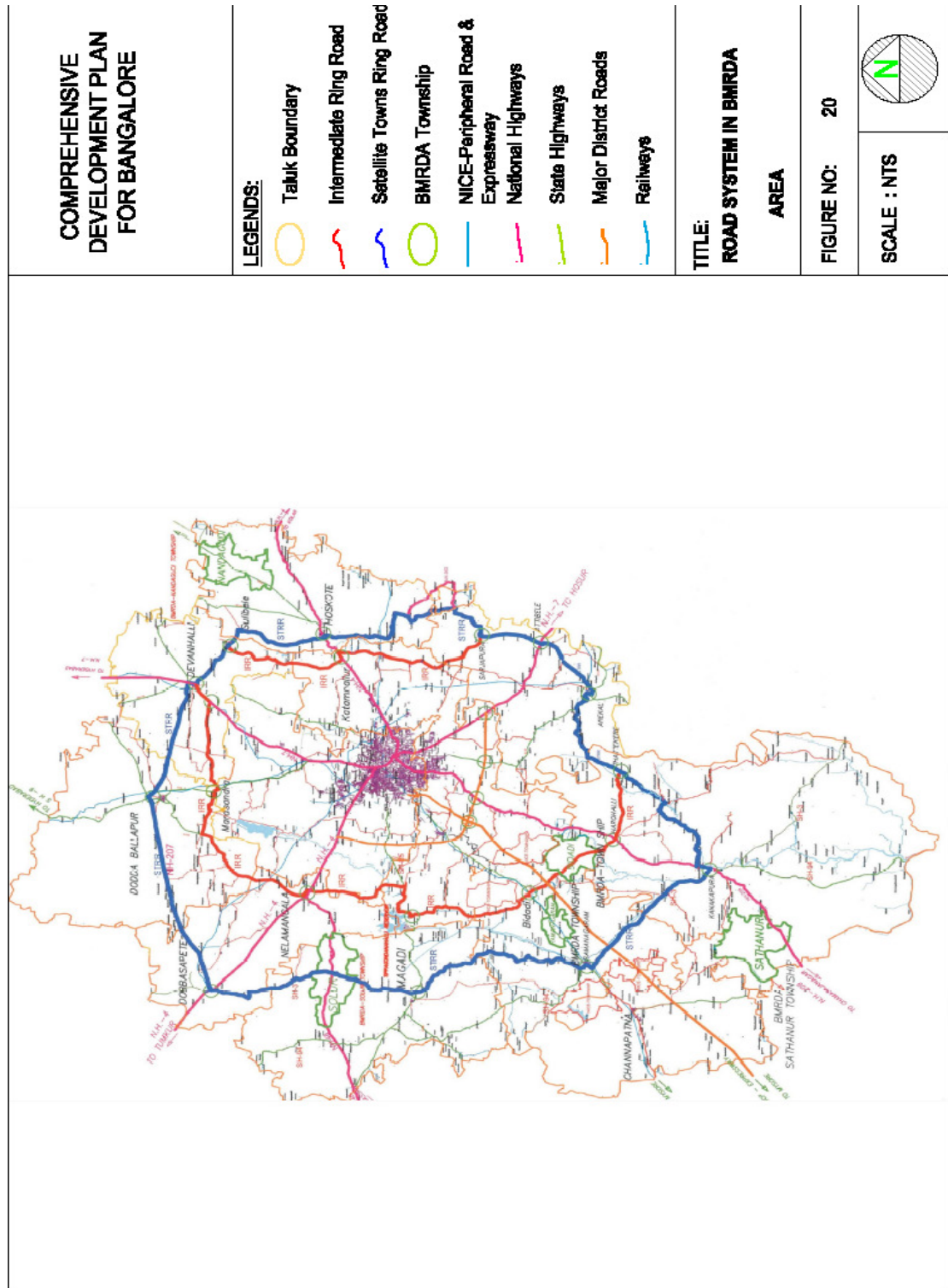


Figure 20: Road System BMRDA



## 10. Housing and Basic Service to Urban Poor

### 10.1. Background

Government of India (Ministry of Urban Development) launched Jawaharlal Nehru National Renewal Mission (JNNURM) on December 3, 2005 with a primary aim to revitalize the urban infrastructure linked to an agenda of reforms. The scheme has been designed to provide the urban local bodies mandated to provide various citizen services along with their respective State Governments to implement programmes and initiatives that would ensure good governance and create an environment for sustainable development of urban infrastructure and provision of basic services to urban poor.

JNNURM as formulated by the Government of India has two sub missions:

- Urban Infrastructure & Governance
- Basic Services to Urban Poor (BSUP)

The first sub-mission addresses the requirements of infrastructure gap of the cities and revamping the provision of citizen services. Basically the mission aims at funding through grants a priority list of detailed projects of the city that would help it achieve realisation of its vision. The second sub mission focuses on provision of basic services to urban poor. These fundamentally are housing, water supply, drainage, storm water drains, solid waste management, street lighting, community toilets and community halls. Having recognized the need to extend the provision of basic services to all strata of population the scheme propounds initiatives that would evolve sustainable programs and projects.

A City Development Plan (CDP) is mandatory among other initiatives to seek funding through JNNURM. The CDP document shall serve as the blueprint for the city capturing its vision, mission, goals and objectives with a clear identification of priority programs and initiatives. The CDP shall incorporate the requirements of various stakeholders of the city and present a common shared blueprint for the city. CDP is designed to introduce new perspectives on the city's problems and change the practice of urban management. In the case of Bangalore the CDP focuses on arresting the fast degradation of the environment and cleanliness of the city. stakeholder participation in planning and urban management is a new feature for municipal administration but has been emphasized in the JNNURM. This would ensure active engagement of resources from multiple stakeholders and achievement of milestones as per scheduled time and cost estimates, when participatory approach is involved.

UrbanFirst Systems Private Limited was engaged to prepare the CDP for Basic Services to Urban Poor by Bangalore Mahanagara Palike (BMP) in coordination with the Housing Department, Government of Karnataka. UrbanFirst had earlier prepared and submitted a CDP for the sub mission infrastructure and governance before the formal announcement of the JNNURM. UrbanFirst conducted consultations with four major players in the city who are responsible for providing housing and related infrastructure to urban poor. They are:



- Karnataka Housing Board (KHB)
- Karnataka Slum Clearance Board (KSCB) – organization empowered to deal with slums that are declared.
- Bangalore Mahanagara Palike (BMP) – the principal ULB entrusted to deal with all slums in the city that are not declared (an administrative process)
- District Urban Development Cell (DUDC) overseeing the functioning of City Municipal Corporations (CMCs) and Town Municipal Corporations (TMCs)

KHB takes care of housing requirements of all sections of society and is not directly responsible for providing basic services to urban poor. Since the agency has the knowledge and the organizational strength to deal with housing and related infrastructure, Government of Karnataka, Housing Department nominated KHB to coordinate preparation of the CDP engaging all the stakeholders.

Consultations with the Karnataka Housing Board (KHB) were held, who coordinated the preparation of the CDP for basic services to urban poor having been nominated by the Housing Department, Government of Karnataka. KHB has experience and expertise in provision of housing and related infrastructure in the State. KHB is also embarking on redevelopment of slums with the engagement of private sector through a public private partnership model that would provide housing and infrastructure to existing slum dwellers and an opportunity for the private sector to exploit the adjoining land for commercial purposes.

Three major workshops were conducted, involving all stakeholders including non government organizations (NGOs) to evolve the common and shared vision for the city in respect of providing basic services to urban poor.

- A stakeholders' meeting was conducted at Karnataka Housing Board premises on 26th November 2005 defining the scope of the assignment and the methodology for data collection and involvement of various entities in evolving the CDP.
- The visioning exercise conducted on December 9, 2005 was attended by Joint Secretary, Poverty Alleviation, Ministry of Urban Development, Government of India, in which many NGOs representing communities actively participated.
- A draft presentation of the summary findings was made on March 25, 2006 detailing the vision, coverage and investment estimates.

The Government of Karnataka (GoK) on November 2, 2006 officially notified for creation of Greater Bangalore (Bruhat Bangalore Mahanagara Palike "BBMP"). In January 2007, the Karnataka Government issued a notification to merge the fore mentioned areas under the BMP, and rechristening of the body to Bruhat Bengaluru Mahanagara Palike. The process was completed by the month of April-May 2007 and BBMP came into existence.

The area under greater Bangalore now extends to about 791 sq km with the total number of wards being 198. An additional 110 villages have been added to Greater Bangalore, which is not accounted for in the erstwhile CDP. Hence, this report shall include the status and

investment requisite with regard to Basic Services to Urban Poor (BSUP) for those areas which were not a part of the earlier CDP.

## 10.2. Issues

Bangalore has been witnessing an exponential growth in terms of population (current estimated population 5.7 million) coupled with matching high-technology business activities in the last two decades. It is the fifth largest city in the country and amongst the fastest growing cities. It is now recognized as a Global city, a preferred choice of many global corporations to position their businesses. It has indeed been a challenge to the government agencies including the urban local bodies to meet up with these unprecedented demands and challenges of the global companies and its citizens demanding international class 'citizen services'. Traditionally, the city of Bangalore has been a global destination for business in Information Technology (IT), Bio Technology, and BPO sectors. The city, which still hosts major public sector corporations of the nation, has now become home for global IT players. The city is fast emerging as world technological centre in recognition of which the Government of India has announced the construction of modern International Airport and a Metro Mass Transport System. The composition of the city population is fast becoming cosmopolitan international in nature and their expectations on quality of services provided by civic authorities is raising, demanding high quality and certainty in provision of services. The demographics are changing too in favor of younger population groups; this brings in its wake demand for new services and consequently, the infrastructure needs for them.

Along side the high tech and industry profile the proliferation of slums and attendant problems co-exist in Bangalore. Availability of jobs has attracted large migrant population to the city who have established settlements in available land space ignoring regulations and approvals. In the past, rural-urban migration and urbanization were seen as an obstacle to national development and the forces behind poverty, unemployment, crime, social disorder, slums and squatter settlement and degradation of the urban environment. Today's free-market paradigm sees urbanization as a positive process facilitating the move of labour, capital and goods to places where they can be most productive, and cities as engines of growth. Bangalore presents typical urban agglomerate subject to the problems of rapid urbanisation and unplanned growth in all directions.

Unplanned development of the city especially in the last two decades has left the city falling far below accepted norms for service levels in delivering citizen services be it good roads or clean environment. Multiplicity of organizations vested with authority to plan and implement infrastructure schemes and lack of coordination among them is one of the prime causes for the falling level of service delivery today.

### 10.2.1. Focus on delivering basic services to the poor

The urban poor are inadequately covered by public services. These can be classified as:

- Universal access services: Services such as education, healthcare, water supply and sanitation, and electricity. Among these services, water supply and sanitation, and electricity are examples of Networked Services.
  - Service delivery quality today is so poor that those who can afford to, opt out of the delivery system, leaving behind only the poor with poor access and poor quality delivery. Historically, there has been a “project-based” approach to solve these issues. These are typically in the form of pro-poor schemes, which do not adequately benefit the targeted group due to delivery inadequacies. Further, these are not integrated into the institutional context in which these services are demanded, nor do these leverage the potential of providing networked services. If the argument of universal access is adopted, we need fundamental “institutional and governance” change, from which better quality services will follow. Services like education, healthcare, water supply and sanitation will begin to work for all citizens, including the poor. Here, the economies of scale and networked connections can be leveraged for the benefit of all stakeholders. Even in situations of universal access, pro-poor measures like subsidies and preferential pricing can be structured and delivered, so long as efficient mechanisms of beneficiary identification are available.
- Exclusive services: In addition to universal access services, the poor clearly need additional services and activities that address issues of social justice: housing and public distribution systems are two examples. The delivery challenge of proper identification of beneficiaries and channelisation of support / subsidy is a real one in the efficient provision of these services.

### 10.2.2. Core issues

The real challenge for the city administration is to balance the resources available in bridging the gap in infrastructure for Bangalore which is already in dire state; besides, the administration has to deal with provision of basic services to the urban poor. Since JNNURM has identified these two as distinct components for city renewal programme, the administration would benefit by integrating and sharing the resources in implementing the projects on a shared basis.

### 10.3. City Development Plan - guidelines

The key steps that have been adopted in the preparation of the CDP are:

- In-depth analysis of the existing situation, covering the demographic, economic, financial, infrastructure, physical, environmental and institutional aspects
- Development of a perspective and a vision of the city
- Formulating a strategy for bridging the gap between where the city is and where it wishes to go
- Preparing a City Investment Plan (CIP) and a financing strategy

These are factors recommended for analysis under JNNURM guidelines and are primarily applicable in respect of infrastructure and governance submission. For the CDP on basic services to urban poor the plan is directed to realize the outcomes identified under the vision and mission statements for Bangalore (e.g. No more new slums).

CDP for Bangalore focuses on the following basic issues:

### **10.3.1. Livability**

The condition and environment for all citizens of the city should be conducive for peaceful and normal living. The disparity in living conditions that is available to urban poor and other strata of society is to be bridged to ensure that minimum basic services are provided to urban poor. The congestion in the living environment could be eased only with massive programmes to provide housing to individual household along with associated basic infrastructure. Besides, the government needs to provide facilities for public health and basic education to urban poor by establishing public health centres and schools in the nearby areas.

### **10.3.2. Bankability and sustainability**

In the case of basic services to urban poor the issue of Bankability or financial viability is not an appropriate criterion for seeking funding. The dire state of the slums and non-provision of basic services have been the result of subjecting these initiatives to financial viability. It is the obligation of the government to devise mechanisms to recover operation and maintenance expenditure of the projects established through the schemes. Even these costs need to be recovered after an initial period of five years so that the affordability of the beneficiaries are enhanced and credibility of the government in providing uninterrupted services is established. More importantly, sustainability is the key factor in evaluating schemes for basic services to urban poor. To this end the CDP addresses issues like education and awareness programs, participation of ward councils in the implementation of the initiatives and engagement of local population in the operation and maintenance of assets to the extent permissible. To this end the CDP provides for operation and maintenance of assets created for a period of five years to be funded through the capital programme itself.

### **10.3.3. Competitiveness**

Bangalore's competitiveness is quite profound evidenced by its attraction of major industries including the high technology segment. To sustain the competitiveness the city has to meet with the challenges of its citizens. With the citizens demanding more and quality services the urban local bodies find it very difficult to meet with the challenges since the municipal administration and decision making of the urban local bodies is not yet galvanized to the extent of responding to the fast changing and high demanding needs of the citizens. In fact, there has been a gradual deterioration in the level of services and upkeep of the environment in Bangalore in the last two decades. The CDP identifies components of initiatives to reverse

this trend and investments made in right time would help Bangalore regain its competitiveness nationally as well as globally.

#### **10.3.4. Governance**

Citizen services require both certainty and speed of delivery. These are ensured by a system of governance and inter-play among all urban local bodies involved in planning, implementation and up keeping. The multiplicity of organizations and lack of definition of role and responsibility for a given service being unclear, Bangalore is suffering from inaction affecting the basic infrastructure and provision of citizen services. A unified organization vested with planning and another unified organization vested with delivery of citizen services would help tide over the situation. The CDP recommends revamp of the institutional mechanism in the administration of the city planning and implementation functions in order to evolve a more responsive and effective municipal administration. The reforms agenda recommended as part of the JNNURM shall be adopted by the State Government to create an efficient and effective municipal administration function.

### **10.4. In Depth Analysis**

Bangalore has become globally competitive, offering infrastructure (basically knowledge base and buildings), services and human resources that are comparable with the best. However, at the same time the problems of traffic congestion, air and noise pollution, surface water contamination and solid waste disposal still exists. Despite the rapid economic growth, urban poverty is still widespread and large sections of the urban population lack employment earn very low incomes and have inadequate access to proper housing, infrastructure and services.

Slums are an integral part of urban areas and contribute significantly to their economy both through their labour market contributions and informal production activities. The government has recognized the contribution of these urban poor in helping to build urban prosperity and make sufficient provision for them to have access to affordable land, house sites and services. The planning and development framework should be inclusive of slums and informal settlements.

The slums are occupied by poor people who cannot afford legal forms of shelter. Large numbers of people from rural areas and small towns migrate to big cities in search of employment. The shelter in the form of buildings with supporting infrastructure is priced beyond their reach and hence they find alternative informal and illegal shelter. These areas are characterized by substandard housing conditions within a locality. In a relative social sense a slum is an overcrowded poverty stricken area having lack of open spaces and presence of unhealthy residential structures impairing health and happiness.

#### **10.4.1. Growth of Bangalore Urban Agglomerate**

The table given below sets out the population growth and population estimate of the Bangalore Urban Agglomerate which is the erstwhile BMP.

**Table 74: Population projection over the years of erstwhile BMP**

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%

Analysis of increase in population has revealed that in the case of Bangalore there is a significant in-migration from nearby towns and villages to the city as compared to natural increase of population. There has been an abysmally low performance of all urban local bodies in meeting the demands of citizens in the last two decades where there has been significant growth in population.

The increase in number of slums in Bangalore is a growing problem and has not stabilized yet. This is primarily due to the lack of any action from government either to arrest the in-migration or plans to provide housing to economically weaker sections on a large scale. However, the poverty levels are declining due to availability of jobs provided by the growing service sector.

#### **10.4.2. Coverage of Slums in Greater Bangalore**

The survey carried out by KSCB and their consultants has established that urban poor live in slums and focus on slums and the inmates would basically address the issues relating to urban poor. The CDP has taken in to account all the slums spread through out Bangalore (encompassing areas under the control of BBMP). The total number of slums captured in the survey is 640 and the number of households that are proposed to be redeveloped under JNNURM scheme is estimated to be 1,36,486.

#### **10.4.3. Projections for slums**

The CDP has clearly identified as one of the vision statements that Bangalore will have no more new slums. The Governemnt after careful consideration wishes to redevelop all the existing slums in Bangalore within a period of 15 years

#### **10.4.4. Provision of basic services**

Adequate urban basic services such as water supply, sanitation, waste management and providing the means of mobility, particularly to the urban poor, are central to promoting environmentally sustainable, healthy and livable human settlements. Rapid urban growth in Bangalore has outpaced the capacity of urban local bodies to provide and maintain basic civic services including urban poor. The result is a lowering of the quality of life, reduced urban productivity, and increased burden of health care and unmitigated environmental pollution.

Peri-urban settlements (areas under the control of city municipal corporations and town municipal corporations in Bangalore), comprising the inner-city slums and squatter settlements outside the regulatory boundaries of the formal city, are growing at nearly double the rate of the city proper. Currently, these settlements accommodate around 50 percent of city population. But more importantly, between 75 and 90 percent of future urban growth are likely to take place in these settlements under the five zones of BBMP. The low-income households inhabiting the peri-urban settlements live in the most polluted and inaccessible areas, frequently at risk from flooding and landslides, or in areas contaminated with wastes. With uncertain or illegal land tenure, these low-income, high-density settlements lack the most basic infrastructure and services. Thus the focus of the CDP will be on the inhabitants and infrastructure facilities that are available to urban poor in the five zones. The table given below sets out the details of the slums in Bangalore;

**Table 75: Details of Slums in Bangalore**

No.	Zone	Declared slums				Undeclared slums				Total No. of slums			
		No. of slums	Area	No. of household	Population	No. of slums	Area	No. of household	Population	No. of slums	Area	No. of household	Population
1	East	48	35.14	8724	48638	29	46.03	10821	45003	77	81.17	19545	93641
2	West	99	188.31	20661	120221	40	67	13166	89978	139	255.31	33827	210199
3	South	51	116.76	14822	80781	70	161.13	19327	117740	121	277.89	34149	198521
4	Dasarahalli	2	17.2	533	4490	33	61.2	17069	70293	35	78.4	17602	74783
5	Bommanahalli	2	13.37	80	625	38	0	715	3221	40	13.37	795	3846
6	Mahdevapura	25	69.45	6154	25688	46	59	6074	32789	71	128.45	12228	58477
7	Yelhanka	13	35.84	3297	18696	108	13.58	9313	42901	121	49.42	12610	61597
8	Rajarajeshwarinagar	1	0	250	1723	35	0.27	5480	250	36	0.27	5730	1973
	Total	241	476.07	54521	300862	399	408.21	81965	402175	640	884.28	136486	703037

Source: BBMP, BSUP division

Note: Area details are available for 431 slums, Household details are available for 505 slums and population details for 495 slums are available.



Urban poor communities in Bangalore are characterized by:

- Poor sanitation with over 50 per cent of the households without latrine or drainage;
- High illiteracy rates which are three times as high as in non-slum areas;
- Higher infant and child mortality rates than the urban averages;
- A higher proportion of especially disadvantaged groups;
- A low level of utilization of existing services (such as maternal and child health care);
- High initial enrollment in primary education, but a high drop-out rate (20-50 per cent) in particular among the girls

#### **10.4.5. Challenges in providing BSUP**

- Divisiveness of Urban Population: Higher the heterogeneity of income, ethnicity and religion more the risk
- Rapid Population growth: Higher growth in already densely populated areas
- Insufficient Economic Opportunities: Growing number of well educated, unemployed youth
- Lack of life sustaining essentials: Potable water, sewage system, basic health and education
- Weak management: Ability of urban administration to address, manage and fund growth

However, like other informal markets, the informal land and housing market is exploitative and has several negative impacts. First and foremost, informal settlements are often located on marginal land (along storm water drains, railway lines, steep slopes and on or near garbage dumps) and are prone to natural and man-made disasters. They are also often illegal and those living there do not have security of tenure. Because of their illegal status, they are often not provided with formal basic infrastructure and services such as piped water, electricity, wastewater disposal and solid waste collection by urban local bodies. They have to purchase these in informal markets, often paying much more than higher-income groups. A sample survey of the slums has shown that the poor end up paying two to five times as much for informal access to public goods and services than higher-income groups.

Because there is often no security of tenure in illegal settlements and the fear of imminent eviction exists, the poor do not invest in improving either their housing or their settlements. The lack of basic environmental infrastructure and locations on marginal land often translate into higher rates of disease and lower life spans. The consequent higher medical bills, lost working days and early demise of income earners further expropriate their marginal income and propel the cycle of poverty.

Similarly, children of the poor are unable to access good education. Often the standards and facilities of the educational institutes they can afford are lower than those available to children

of higher-income groups. Moreover, poor children often drop out of school earlier to support their families. Poor education also contributes to entrenchment of the cycle of poverty.

#### **10.4.6. Current Problems of Bangalore slums**

Slum and squatter settlements in Bangalore are growing at alarming rates. Rapid urbanisation and job opportunities in Bangalore attract unskilled labour in large numbers to Bangalore. Slums are the products of failed policies, bad governance, corruption, inappropriate regulation, dysfunctional land markets, unresponsive financial systems, and a fundamental lack of political will.

Each of these failures adds to the toll on people already deeply burdened by poverty and constrains the enormous potential for human development that urban life offers. Some of the common issues faced by people are:

- Basic municipal services-water, sanitation, waste collection, storm drainage, street lighting, paved footpaths, roads for emergency access.
- Schools and clinics within reach, safe areas for children to play.
- Community toilets
- Places for the community to meet and socialize.
- As the average age of people in Bangalore is increasing, the average age of slum dwellers is decreasing, so the youth suffer most from unhealthy conditions.
- Visible disparities between slums and better-off neighborhoods increase the social tensions in poorer areas.
- Unplanned growth of settlements makes conventional service provision complicated

The major environmental problems being experienced by the slums is water logging (49%) and dumping of garbage (32%), a small proportion of slums is also affected by industrial waste disposal especially in the five zones of BBMP.

#### **10.4.7. Role of BBMP**

BBMP, the Bangalore City Corporation, a local self Government, has the statutory commitment to the citizens of Bangalore to provide good roads, sanitation, street lighting, development and maintenance of parks, establishing markets and shopping areas, providing safe drinking water, etc. Apart from the above, the BBMP also undertakes poverty alleviation, cultural developmental activities and other social obligations. It also aims at further elevating the status of Bangalore by providing all amenities that raise the quality of life index. The BBMP is making continuous effort to provide better health to its citizens.

The up gradation of declared slums in Bangalore comes in the domain of KSCB. All the undeclared slums where the properties may belong to BBMP, Bangalore Development Authority (BDA) or private owner are managed by BBMP. Improvement of quality of life along

with the provision of all the basic civic amenities to the rest of the slums (i.e. undeclared slums) is the social obligation of BBMP. Thus BBMP becomes the principal ULB vested with the responsibility to upgrade and provide basic services to urban poor in Bangalore. The same has been focused from decades but with the multiple growths of these slums, the patience and the intensive efforts put by BBMP are unable to respond to this situation effectively. BBMP has the full fledged institutional mechanism to deal with large initiative like slum improvement and redevelopment and thus would be able to deploy the funds made available through JnNURM by creating special purpose project implementation and monitoring units within its organization. The review of ongoing schemes for BSUP is set out as Annex 8.

#### **10.4.8. Role of KSCB**

KSCB would deal with all declared slums in the city in coordination with BBMP and the Housing Department of Government of Karnataka. It has the institutional framework to engage consultants and contractors to build houses, community halls and toilet blocks and is likely to handover the establishment of infrastructure to BBMP and other urban local bodies (BWSSB). The operation and maintenance of the assets created will have to be dealt with by the respective urban local bodies.

### **10.5. Development of a perspective and a vision of the city**

Vision for Bangalore in respect of Basic Services to Urban Poor has been formulated after a series of consultations with all the stakeholders including the beneficiaries and their representatives. As a matter of policy, the Government of Karnataka has indicated that the CDP shall be very pragmatic and contain statements that are achievable based on economic viability and political sustainability. Based on these criteria the consultative processes were conducted.

#### **10.5.1. Vision for the City**

- No more new slums
- Redevelop existing slums and surroundings to enable Bangalore regain its lost glory without endangering the lives of the urban poor
- During planning and implementation of various initiatives engage the citizens, NGOs, community groups to help the government sustain its programme of providing basic services to Urban Poor
- Bangalore to emerge as high tech knowledge city treating its less fortunate brethren in a humane manner through effective municipal administration

Revamp the existing institutional framework to effectively implement projects / schemes identified under the basic services to urban poor CDP

### **10.5.2. Objectives of Sub-mission BSUP**

- Focused attention to integrated development of Basic Services to the Urban Poor in the cities covered under the Mission.
- Provision of Basic Services to Urban Poor including security of tenure at affordable prices, improved housing, water supply, sanitation and ensuring delivery through convergence of other already existing universal services of the Government for education, health and social security.
- Care will be taken to see that the urban poor are provided housing near their place of occupation.
- Secure effective linkages between asset creation and asset management so that the Basic Services to the Urban Poor created in the cities, are not only maintained efficiently but also become self-sustaining over time.
- Ensure adequate investment of funds to fulfill deficiencies in the Basic Services to the Urban Poor.
- Scale up delivery of civic amenities and provision of utilities with emphasis on universal access to urban poor.

### **10.5.3. Objectives of GoK in providing BSUP**

- Provide everyone with the opportunity to live in a decent home
- Promote communities which are inclusive, healthy, safe and crime free, whilst recognizing the diverse and special needs of those communities
- Improve provision and access to community facilities
- Reduce Poverty and Social Exclusion
- Conserve and enhance the landscape, visual quality and character of living quarters including slums of urban poor
- Maintain and enhance biodiversity, flora and fauna with the available resources
- Conserve and where appropriate enhance the historic environment
- Reduce land contamination and safeguard soil quantity and quality.
- Improve water and air quality and reduce pollution of air, water and soil
- Maintain and strengthen the living condition of urban poor, including employment opportunities.
- Maintain and improve disease free environment

### **10.5.4. Benefits of upgrading the Existing Slums**

- The benefits are simply that people obtain an improved, healthy and secure living environment without being displaced.
- The investments they have already made to their properties remain and are enhanced - this is significantly better than removing them to costlier alternatives that are less acceptable to them.

- Recognizing title and security of tenure makes a positive contribution to both the economic prospects of the poor, as well as to the national economy.
- Experience has shown that slum upgrading projects are associated with social and economic benefits that are particularly high.
- Formulating a strategy for bridging the gap between where the city is and where it wishes to go

#### **10.5.5. Benefit to the Urban Poor**

- Funding that accompanies JNNURM guidelines can be specifically targeted for pro-poor outcomes
- Institutionalizing citizen participation in local decision-making will ensure equitable outcomes
- Urban poor actually end up paying more than the stipulated cost of services by the government; this anomaly would be removed when the services are brought under respective ULB's control that provide the designated services (e.g. water supply and sanitation)

#### **10.5.6. Prevent Creation of New Slums**

A series of well planned changes are needed in the legal and regulatory framework, particularly with regard to land markets and land acquisition, including land registry, land valuation, and legal instruments to facilitate land acquisition. The CDP recommends adoption of a State legislation by which at least 20% of the developed land in all housing projects (both public and private agencies) would be earmarked for Economically Weaker Section (EWS) as well as Low Income Group (LIG) categories. As this provision figures among the optional reforms agenda, the State Government may use the opportunity to formulate a legal provision.

It is also recommended to review the housing finance system, including the access of the poor to credit and targeted subsidies for housing, which would create opportunities for the poor

It is suggested that the Government consider making it mandatory on major construction contracts seeking large scale employment of unskilled labour to provide temporary housing and infrastructure. This has been a significant contributing factor for the in migration of poor in to the Bangalore city. While the construction workers seeking temporary employment move in with their families during the course of the construction activity they remain and stay in the city seeking new employment opportunities. The employers shall be made to share the cost of infrastructure including housing so that the Government would need only to plan for providing major services like education and health care for these people.

### **10.5.7. Strengthen Institutional mechanism**

From the perspective of institutional mechanism, there needs to be a concerted effort to devolve powers to urban local bodies in order that they cope with the challenges of citizens including that of urban poor. A key set of recommendations are:

- As far as possible, local generation and utilization of money needs to be encouraged (reflecting both the need for fiscal decentralization as well as financial constraints at Union and State levels)
- Urban Local Governments needs to be strengthened in every respect: capacities, responsibilities and systems. This will require process reengineering at all levels in local governments
- Ensuring that institutional reforms survive beyond short-term political and administrative leadership is critical to sustaining long-term positive outcomes in urban governance
- Given the level of urban poverty, it is critical to ensure a greater likelihood of equitable outcomes in decisions. The needs of the poor must be addressed.
- Transparency and accountability in all activities is a must, starting with all issues related to money. However, for this to be meaningful, coherent information management is critical, so that ultimately, decision-making can be related to data quality.

### **10.5.8. Functional Domains of Agencies**

KSCB is the nodal agency in the State to undertake development measures to rehabilitate and redevelop slums. However, KSCB would be obliged to develop only those slums which are notified and declared by the State Government as Slums. There normally is a significant time gap by which slums get notified and declared and until then these are under the administrative control of the respective municipal bodies. Thus in Bangalore city BBMP has to take care of the requirements of the slums that have cropped up in their administrative limits.

Both BBMP has no special skills in slum redevelopment and rehabilitation and hence the slums in these areas suffer inadequate attention and also budgetary support. It would be efficient to speed up the process of notification once the living conditions of the tenements where living conditions fall below the standards. Care should be taken that speedy notification does not itself promote fast establishment of new slums in all available lands. It is suggested to form an inter-institutional committee for the purpose of slum redevelopment and provision of basic services to urban poor in Bangalore:

- Principal Secretary, Housing – Chairperson
- Commissioner, Karnataka Housing Board
- Commissioner, KSCB
- Deputy Commissioner, Welfare, BMP
- Project Director, Directorate of Urban Development (representing the CMCs)

## 10.6. Proposed Investment Plan for BSUP

Based on the in-depth analysis of living conditions of the urban poor in Bangalore City and the adjoining areas an assessment has been made to improve the basic infrastructure in terms of housing, water supply, sanitation, internal roads and the environment. Following have been considered accordingly.

### 10.6.1. Projects Eligible for Assistance under JNNURM

- Integrated development of slums, housing and development of infrastructure projects in the slums
- Projects involving development/ improvement/ maintenance of basic services to urban poor
- Slum improvement / rehabilitation projects
- Projects on water supply / sewerage / drainage, community toilets / baths etc
- Houses at affordable costs for slum dwellers / urban poor / EWS / LIG categories
- Construction / improvement of drains / storm water drains
- Environment improvement of slums and Solid Waste Management
- Street lighting
- Civic amenities like community halls, child care center etc
- Operation and Maintenance of assets created under this component
- Convergence of health, education and social security schemes for the urban poor

### 10.6.2. Schemes Covered in Investment Estimates

Housing – wherever the condition of the housing is good or better than the minimum criteria used for determining the requirement these have been left as it is. These isolated houses are constructed by the inmates themselves and they are in need of provision of basic infrastructure like:

- Water supply and sanitation
- Roads (internal)
- Solid waste management
- Storm water drains
- Street lighting
- Community Toilets
- Community Halls
- Operation & Maintenance of assets

### 10.6.3. Basic Assumptions in investment estimation

It has been decided to adopt uniform rates of costs while estimating the investment requirements across Bangalore i.e. same standard unit rates have been considered in the city area as well as peri-urban areas. This decision is based on the examination of schedule of

rates and the recently tendered rates for house constructions and other civil works. The schedule of rates prevailing as of 2007-08 has been considered and revised to reflect the actual tendered cost. Following are the rates adopted for the investment estimates:

- Cost of construction of a house : Rs.3.25 lakhs
- Cost of construction of a toilet block : Rs.9.25 lakhs
- Cost of construction of a community centre : Rs.24.5 lakhs
- Infrastructure requirement per household : Rs.35,000/-

No cost of land acquisition is considered in the cost estimates. Also the programme is planned for a period of seven years from the year 2006. It is estimated that there would be an escalation of around 8 % per annum in the cost of basic inputs (material and labour). The escalation is not considered in the investment plan as the real cost of implementation would be subject to tendering and other contingencies.

The community centres and community toilet blocks will have to be located in each of the slums where there is a provision for under ground drainage facility (UGD). The cost of providing the UGD is not considered in the cost estimates under community centre and community toilet blocks. However, under infrastructure provisioning adequate sums have been allocated for drainage and water supply and it is estimated that no additional investment would be required for the purpose of making water and drainage facilities for the community centres and toilet blocks. The type of construction of these would be functional with reinforced concrete type construction.

The layouts and schematic details of the community centre, typical household and toilet block are attached as Annexes 5, 6 and 7.

The CDP also strongly recommends carrying out a series of educational awareness programme across the slums to propagate the message of clean living and benefits of disease free environment. The cost estimates however does not include establishment of schools and health centres and these recommended to be financed by the respective departments of the ministries through available schemes.

It is recommended that 640 schools and public health centres (one school and one public health centre for each slum) be established by the Government in the slums identified to cater to the need of the primary education and basic health services. These public health centres can co-exist with community centres so that common facilities like electricity and water could be shared. The on-going expenditure of these facilities could be supported by the budget allocations of BBMP.

The list of slums proposed to be developed is set out as Annex 9. The cost of developing housing and related infrastructure in the 640 slums in BBMP area is estimated to be Rs.6189 Crores over the Mission Period. The details of the investment estimates over the Mission and the Vision period are given in the tables below;



**Table 76: Investment Plan JnNURM Mission Period (Rs. Crores)**

Zone	No. of slums	Area	No. of households	Housing	Community Centres	Community toilet blocks	Infrastructure Development	Total Capex	Investment already made	Total
East	77	81.17	19545	635	5	74	68	783		
West	139	255.31	33827	1099	9	129	118	1355		
South	121	277.89	34149	1110	7	130	120	1367		
Dasarahalli	35	78.4	17602	572	2	67	62	703		
Bommanahalli	40	13.37	795	26	2	3	3	34		
Mahdevapura	71	128.45	12228	397	4	47	43	491		
Yelhanka	121	49.42	12610	410	7	48	44	509		
Rajarajeshwari nagar	36	0.27	5730	186	2	22	20	230		
<b>Total</b>	<b>640</b>	<b>884.28</b>	<b>136486</b>	<b>4436</b>	<b>39</b>	<b>520</b>	<b>478</b>	<b>5473</b>	<b>522.23</b>	<b>5995</b>

**Table 77: Investment Plan JnNURM Vision Period**

Basic Services to Urban Poor	2013-17	2018-22	2023-27	2028-31	Total
Rehabilitation and Infrastructure improvement	2570	1028	1028	514	5140

More than two thirds of the costs estimated cover housing which is the major concern of the urban poor in Bangalore.

The total investment required for BSUP upto 2031 is Rs. 11,135 Crores as referred to in the erstwhile CDP. The future blocks of investments are set out in tables above;

#### **10.6.4. Funding Pattern**

As per JNNURM guidelines the ULBs implementing the schemes would be eligible to obtain Central Grants to the extent of 50% of the project cost; the balance 50% has to be funded through State/ULB/Parastatal share, including Beneficiary contribution. The split among the agencies in the second category is left to the determination of the State Government in consultation with the concerned urban local bodies implementing the projects.

In the case of KSCB the ULB contribution will have to be provided through budget allocations of the Government only since it has no recourse to revenue generation. In case of BBMP its budget allocations should support their contribution.

KSCB, has no revenue stream and is supported solely by the budget allocations made by the Housing Department of the Government of Karnataka. The budget allocations of KSCB towards slum redevelopment have been very modest and guided by the schemes announced by the Central Government from time to time. KSCB has been finding it difficult to meet its expenditure on pay & allowances and such a situation has greatly affected its ability to plan and execute major capital expenditure programmes to redevelop slums and infrastructure.

### **10.7. Multi stakeholder consultation**

As envisaged in the JNNURM guidelines stakeholder consultations at various levels were held during the CDP preparatory phase. The first consultation involved the policy making level of the Government and the meeting provided the essential inputs for the development of the vision statement and the methodology for the study. This was chaired by the Principal Secretary, Housing Department, Government of Karnataka and set the guidelines for further stakeholder consultative processes. The meeting took place in last week of November when the JNNURM was not yet formally announced. The minutes of the first stakeholder consultative meeting is attached as Annex 1.

JNNURM guidelines were formally released on December 3, 2005. The guidelines envisage consultation with non governmental organizations (NGOs) as well as direct beneficiaries of the scheme.

UrbanFirst conducted a full fledged second stakeholders' consultation meeting on December 9, 2005 at the Karnataka Housing Board premises. The meeting was attended by the Joint Secretary, Ministry of Urban Employment and Poverty Alleviation and all the stakeholders engaged directly and indirectly in the functions of providing basic services to urban poor. The views of the beneficiaries were aired by the representatives of the NGOs gathered during the meeting. The NGOs queried about the difference between the existing multiple schemes of Government of India in providing housing to slum dwellers and the scheme envisaged through

JNNURM. They emphasized the need to build-in sustainability as part of the planning exercise so that assets once created are not allowed to impoverish over a period of time. They shared the view that the people who would occupy the houses made available through the scheme would be willing to pay for the operation and maintenance costs after a period of time (five years). The minutes of the second stakeholders' consultative meeting is attached as Annex 2.

The third consultative meeting with the stakeholders was held on March 25, 2006, wherein UrbanFirst made a formal presentation of the draft report in respect of the CDP for basic services to urban poor in Bangalore. The need to unify assumptions and standardize type of constructions were discussed and agreed upon during the meeting. The key vision statement suggested by UrbanFirst viz. 'No more new slums in Bangalore' was adopted after a detailed discussion on the viability and political acceptability issues. It was suggested that building bye-laws require suitable modification to promote earmarking up to 20% of the built up area in major housing complexes exclusively for economic weaker sections. JNNURM includes such a provision in its optional reforms agenda and it would be quite appropriate for the Government of Karnataka to pursue the recommendation to help realize this vital vision for the city. The minutes of the third stakeholders' consultative meeting is attached as Annex 3.

In addition, a comprehensive consultation involving exclusively citizens for a, Non-Governmental Organisations (NGOs) was also held to seek the buy-in of the representatives of citizens. They unanimously agreed that public participation and involvement shall be mandatory in both development of plans involving slums and their redevelopment as well during the implementation phase. There was a request to structure the participation of citizens in slum redevelopment and impact that it would have on their livelihoods. They are keen to know the plans in advance and requested for programmes that address the special requirements of women and employable youth living in the slums.

It also very clearly emerged during the stakeholders' consultation that the households are willing to provide the beneficiary contribution envisaged in the JNNURM funding pattern.

## **10.8. Critical factors for success**

It is just not enough if the city administration seeks funds under JnNURM and deploys the same to create the assets identified under the CDP. The city along with the State needs to implement the reforms agenda and strengthen the institutional mechanism and more particularly the system of governance encompassing planning, formulation, monitoring and implementation.

At the most general level, it is possible to say that there are three types of factors which affect the outcome of poverty reduction initiatives:

- Those related to participation, engagement, and ownership
- Those related to the capacity of both individuals and institutions
- Those related to the decision-making process.

Experience shows that without the active involvement of local authorities, projects are likely to fail and local governments alone cannot ensure the success of a programme. Partnerships with other stakeholders are needed in some manner or other. Social inclusion is an essential factor for success especially in programmes involving urban poor, slum redevelopment and poverty

alleviation. Frequently the interest and needs of certain groups of urban dwellers are not sufficiently taken into account. However, the nature of this partnership should be one of “equal partners” and not one based on dependency or political patronage.

Ideally, there should be a four-step process to involve communities and other stakeholders in the process of decision-making:

- Consultation, which involves telling communities what governments intend to do to implement certain policies and projects
- Participation, which involves asking communities and other stakeholders what they want and taking their views into consideration in the formulation of policies and projects
- Engagement, which allows communities and civil society to make limited decisions about matters that affect local or national interests, and to become involved in the implementation of projects under the umbrella of governments
- Co-governance, which devolves functions and powers of governments to communities and businesses to take actions on behalf of government

From an administrative/policy aspect, projects are often initiated without clear objectives or impact analysis. Furthermore, seldom is there an attempt to frame poverty reduction programmes within the context of a general development planning strategy. Thus, projects lack proper project planning and management framework including analysis of objectives and impacts, problem analysis, stakeholder analysis, benchmarking, monitoring and evaluation. This “isolation” of project from development planning is related to a tendency for the implementation of projects that focused on only one sector.

Interventions that focus on a single sector in support of community development and poverty reduction in urban areas are less likely to succeed in achieving the desired impacts. Instead, multi-sectoral approaches are needed in order to overcome poverty in urban areas. This again will require strong coordination of activities between the various actors involved.

The inclusion of sustainability as a part of the criteria to measure the success of a project or initiative results in the need to examine the “manner” in which a particular issue is tackled. Undoubtedly, poverty and its many facets remain the most pressing issue facing government. However, it is becoming more evident that long-term solutions are also dependent on the nature and quality of the mechanisms and process utilized, i.e., how things are done is as important as (and sometimes inseparable from) what is done. This attempt to examine the “quality” of decision-making and the process by which decisions are implemented has brought the notion of governance to the forefront of poverty reduction efforts.

### **10.8.1. Governance**

Good governance is central to any effort to reduce poverty and programmes directed at urban poor. Good governance implies a progressive leadership provided by local authorities, functional partnerships that enable cities to tap community resources, and participation to ensure long-term sustainability by generating broad based stakeholder and community ownership over local undertakings. Good governance has eight major characteristics. It is participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive

and follows the rule of law. It assures that corruption is minimized, the views of minorities are taken into account and that the voices of the most vulnerable in society are heard in decision-making. It is also responsive to the present and future needs of society.

### **10.8.2. Participation**

Participation by both men and women is a key cornerstone of good governance. Participation could be either direct or through legitimate intermediate institutions or representatives. It is important to point out that representative democracy does not necessarily mean that the concerns of the most vulnerable in society would be taken into consideration in decision-making. Participation needs to be informed and organized. This means freedom of association and expression on the one hand and an organized civil society on the other hand.

### **10.8.3. Rule of Law**

Good governance requires fair legal frameworks that are enforced impartially. It also requires full protection of human rights, particularly those of minorities. Impartial enforcement of laws requires an independent judiciary and an impartial and incorruptible police force.

### **10.8.4. Transparency**

Transparency means that decisions taken and their enforcement are done in a manner that follows rules and regulations. It also means that information is freely available and directly accessible to those who will be affected by such decisions and their enforcement. It also means that enough information is provided and that it is provided in easily understandable forms and media.

### **10.8.5. Responsiveness**

Good governance requires that institutions and processes try to serve all stakeholders within a reasonable timeframe.

### **10.8.6. Consensus oriented**

There are several actors and as many viewpoints in a given society. Good governance requires mediation of the different interests in society to reach a broad consensus on what is in the best interest of the whole community and how this can be achieved. It also requires a broad and long-term perspective on what is needed for sustainable human development and how to achieve the goals of such development. This can only result from an understanding of the historical, cultural and social contexts of a given society or community.

### **10.8.7. Equity and Inclusiveness**

A society's wellbeing depends on ensuring that all its members feel that they have a stake in it and do not feel excluded from the mainstream of society. This requires all groups, but particularly the most vulnerable, have opportunities to improve or maintain their well being.

### **10.8.8. Effectiveness and Efficiency**

Good governance means that processes and institutions produce results that meet the needs of society while making the best use of resources at their disposal. The concept of efficiency in the context of good governance also covers the sustainable use of natural resources and the protection of the environment.

### **10.8.9. Accountability**

Accountability is a key requirement of good governance. Not only governmental institutions but also the private sector and civil society organizations must be accountable to the public and to their institutional stakeholders. Who is accountable to who varies depending on whether decisions or actions taken are internal or external to an organization or institution. In general an organization or an institution is accountable to those who will be affected by its decisions or actions. Accountability cannot be enforced without transparency and the rule of law

## **10.9. Options for Implementation**

The guidelines under JNNURM recommend consideration of public private partnership models where it is appropriate while considering various for implementation. While PPP models are suitable where there is scope for recovery of investment through an assured revenue model such is not the case with the provision of housing and infrastructure facilities while dealing with the provision of basic services to urban poor. However the significant cost that is not reflected anywhere in the CDP is the cost of land which is absolutely scarce today in Bangalore. Some of the slums in the city are occupying prime areas where the market rate for the land is very high. The land ownership on analysis reveals that Government and its agencies are the owners of most of the land where the slums are located slums under BBMP control. Thus it is possible to implement some of the slum redevelopment programmes on Government lands on a PPP model. This scheme would involve construction of a multi storied households for the slum dwellers on half of the land area presently occupied and leasing the balance half of the land to the private sector partner to construct commercial buildings. This model would ensure high quality construction for the households and provide the right type of incentive to recover the capital and part of the operation and maintenance costs (for the first five years) by commercial exploitation of the adjoining land.

The CDP while evaluating the options for implementation has considered the following:

- In-situ development of housing where the slums are located currently:
- G+2 type
- Multi-storey in a PPP model (part housing and part commercial development involving private sector partner)
- Identifying new areas in the outskirts and providing houses either on G+2 type or multi storey construction (may pose problems of finding jobs nearby for the people)

The entire programme is tailored to be carried out in a phased manner spanning five years from the disbursement of funds. The creation of infrastructure would be simultaneously taken up with the construction of new buildings so that new households with required infrastructure

become functional within eighteen months of individual project commencement. It is recommended to split the entire programme in to three distinct phases and each phase of work would be completed in eighteen months time.

Since the City Municipal Corporations have no resources that could be deployed to undertake such a massive and concerted programme like the one proposed for redevelopment, the Government of Karnataka is designating Karnataka Slum Clearance Board (KSCB) as the nodal agency that would oversee the implementation of the slum improvement and redevelopment programmes proposed under the CDP.

### **10.9.1. PPP Model**

Karnataka Housing Board (KHB) has drafted a policy for redevelopment of slums in Bangalore under a joint venture basis. KHB has experience in slum redevelopment in both conceptualization and inviting tenders for award of contracts. It is recommended that wherever PPP model is considered KHB be designated as the agency to manage the programme. This recommendation is subject to Government’s consideration and approval.

This essentially is a public private partnership model wherein the participation of private sector is encouraged to finance the housing scheme for the poor concurrently with commercial exploitation of approximately 50% of the land available. The brief of this policy outline are:

- The lands required for the redevelopment of the slums are normally the area occupied by the slum itself. If the land occupied by the slum is owned by the government, the same shall be utilized for redevelopment purposes. The area maybe declared as slum under section 11 and as per the definition given in Karnataka Slum Act, 1973
- If the lands occupied falls under private ownership, and if the government determines and is satisfied that for the purpose of redevelopment it is necessary to acquire the land within, then the same shall be done under section 17 of Karnataka Slum Act, 1973
- For the purpose of slum redevelopment the KSCB shall procure the lands under the provisions of the Act therein and handover the lands to identified Project Implementing Agency
- If the government determines it is necessary based on reports from KSCB and or KHB that the clearance of an area created as slum is required, then the Deputy Commissioner, BBMP shall make it available from suitable government lands for the purpose of rehabilitation to the Project Implementing Agency
- The Project Implementing Agency has requisite rights to utilize the lands for the redevelopment purposes and to meet the cost of construction and development.
- The remaining vacant land after the clearance of the slum would be utilized for commercial exploitation
- The developer would also need to provide temporary shelter to the beneficiaries in the interim until their new homes are built and ready for occupation.

## 10.10. Status of Projects under JnNURM

Ever since the approval of the erstwhile CDP in 2006, there have been DPRs submitted to JNNURM for provision of BSUP in Bangalore. KSCB has been undertaking developmental works in three phases. Under the first phase it has developed 11603 dwelling units for the urban poor whereas in the second Phase a total of 3151 dwelling units were developed. The third phase is being implemented which is planned for a total of 3426 dwelling units. The project costs for all the three phases are discussed in the table below;

**Table 78: Details of Projects for BSUP undertaken by KSCB**

Details	Phase 1	Phase 2	Phase 3
Date	28-11-2006	28-11-2007	21-1-2009
Total number of dwelling units	11603	3151	3426
Cost per dwelling unit (in Rs. Lakhs)	1.8	2.5	2.9
Housing Cost	20885.4	7877.5	9652.6
Infrastructure Cost	4332.0	3420.43	2797.2
IEC & A & OE	900.0	1129.79	1243.6
Total Project Cost (in Rs. Crores)	261.17	124.27	136.93

Source: KSCB

The table given below sets out the KSCB's Action Plan for JnNURM Phase 1 – BSUP Projects in Bangalore City

**Table 79: KSCB BSUP Phase 1 (28-11-2006)**

No.	Name of the Project	No. of Houses	No. of Floors	Project Cost (in Rs. Lakhs)
	NIRMITHI KENDRA			
1	A D Hally	282	G+3	611.94
2	Arundattinagar	120	G+3	260.40
3	Vinayaka Badavane Gulbarga Huts	160	G+3	347.20
4	Gangondanahally	236	G+1	512.12
5	Nellur Puram	250	GF	542.12
6	Byrasandra	90	G+5	195.30
7	Desiya Nagar	112	G+3	243.04
8	Laxmanrao nagar	920	G+3	1996.4
9	Saniyasikunte – 2	Infrastructure	-	61.2
	Sub Total	2170		4770.10
	Empanelled Contractors			
10	Sadaramangala	560	G+3	1215.20
11	Bheemashakthi nagar	96	G+3	208.32
12	Kudlu Sy No. 148 (Shifted from Laggare Sy. No. 9/2)	544	G+3	1180.48
13	Saniyasikunte	208	G+1	451.36
14	Kudlu Sy No. 148 (Shifted from SDS Sanitorium)	512	G+3	1111.04
15	Pantrapalya	896	G+3	1944.32
16	Singapura (Shifted from Laggare Sy. No. 11 & 12)	672	G+3	1458.24
17	Rajendranagar	628	GF	1362.76
18	Ragigudda	1500	G+3	3255.00
19	Gangondanahally	1164	GF	2525.88
20	Kanaka nagar - Maranahally	107	GF	232.19
21	Govindaraja nagar slum	305	GF	661.85



No.	Name of the Project	No. of Houses	No. of Floors	Project Cost (in Rs. Lakhs)
22	Rajeev nagar slum	103	GF	223.51
23	Mahakalammathota	64	G+3	138.88
	Sub-Total	7359		15969.03
	Design Build & Transfer Basis (DBT)			
24	Muneshwara Block	252	GF	546.84
25	Behind Vinayaka Tiles	100	GF	217.00
26	Indhira Colony	150	GF	325.50
27	Kadapa Matt	24	GF	52.08
28	Varthur Sy. No. 115	200	G+3	434.00
29	Channasandra Sy. No. 119	250	G+3	542.50
30	Chamundi nagar	396	G+3	859.32
31	Shivanagar	64	G+3	138.88
32	Parvathipuram	50	G+3	108.50
33	Gowthamnagar	32	G+3	69.44
34	Laggare 9/1	496	G+3	1076.32
35	Tank Mohalla	60	G+3	130.20
	Total	2074		4500.58
	Grand Total	11603		25239.71

Source: KSCB

The table given below sets out the Action Plan of KSCB BSUP Phase 2 – Projects in Bangalore City.

**Table 80: KSCB BSUP Phase 2 (28-11-2007)**

No.	Name of the Slum	No. of Houses	No. of Floors	Project Cost (in Rs. Lakhs)
1	Srinivaspura	320	G+3	1145.60
2	Chikkabommasandra Block B	48	G+3	171.84
3	Gajanana	64	G+3	229.12
4	Chokkenahalli	192	G+3	687.36
	Sub-total	624		2233.92
	Design Build & Transfer Basis (DBT)			
5	Vasanthpura Block A	150	GF	537.00
6	Vasanthpura Block B	128	G+3	458.24
7	Rajagopala nagar	149	GF	533.42
8	MRS Palya	248	G+3	887.84
9	Chikkabommasandra Block A	144	G+3	515.52
10	Ambedkar Brindavan	10	GF	35.80
11	Rajeshwarinagar	340	G+3	1217.20
12	Munirayappa Garden	32	G+3	114.56
13	Laxman Rao nagar	364	GF	1303.12
14	Laggare 11 and 12	480	G+3	1718.40
15	Venkataramana huts	482	G+3	1725.56
	Sub-total	2527		9046.66
	Grand Total	3151		11280.58

Source: KSCB

Table 81 sets out the Action Pan of BSUP Phase 3 – Projects in Bangalore City

**Table 81: KSCB BSUP Phase 3 (January 2009)**

No.	Name of the Slum	No. of Houses	No. of Floors	Project Cost (in Rs. Lakhs)
	Bangalore City			

No.	Name of the Slum	No. of Houses	No. of Floors	Project Cost (in Rs. Lakhs)
1	Challaghatta	464	G+3	1919.45
2	Roshanagar	320	G+3	1499.55
3	Nagareswaranagenahalli	208	G+3	984.52
4	Bhuvaneshwarinagar	880	G+3	3767.63
5	Hakkipikki Colony	208	G+3	1002.77
6	Veerabhadranagar	256	G+3	1183.95
7	Kanteeravanagar	680	GF	2071.96
8	Mahalingeshwarapura	310	GF	944.58
9	Bhove Colony and AK Colony	100	GF	304.70
	Total	3426		13679.11

Source: KSCB

## 10.11. Acknowledgements

The CDP has been ably guided by the leadership of Shri Subir Hari Singh, Principal Secretary, Housing Department, Government of Karnataka and Shri. K Jothiramalingam, Commissioner, Bangalore Mahanagara Palike. They have reviewed all the aspects of the process and provided directions for the preparation of the CDP in line with the expectations of the JNNURM devised by Government of India. The commissioner, BMP took necessary actions to commission consultants to prepare detailed feasibility reports for slum redevelopment so that the same could be integrated with the CDP. Shri P K Srihari, Additional Director, Finance, BMP guided the orientation in preparation of funding pattern for the initiatives considered under the CDP.

Shri M Lakshminaryana, Commissioner, Karnataka Housing Board, is the Chairman of the steering committee to coordinate the preparation of the CDP. He coordinated efforts to seek and arrange collection of information from the CMCs and TMC. KHB commissioner also promoted the concept of slum redevelopment in Bangalore based on PPP models. The commissioner arranged the first two stakeholders' meetings at his offices.

Shri Chandramohan, Executive Director, Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC), provided valuable inputs for the visioning exercise and format of the CDP.

Shri A M Ranganath, Chief Engineer, Projects is the principal officer who spearheaded the entire initiative from BMP. He coordinated the collection of information and validation among various consultants and also arranged for the stakeholder consultative meetings.

Shri Sivasankar, Commissioner, Karnataka Slum Clearance Board organized provision of information on declared slums in Bangalore.

Shri Shantappa, Project Director, District Urban Development Cell (DUDC) along with Shri. Prasad coordinated the efforts in provision of information from all the CMCs and TMC.

The Commissioners and chief officers of all the city municipal corporations and town Municipal Corporation took active part in the stakeholders' consultative process and contributed significantly to the development of the CDP.

## 11. Preservation and Rejuvenation of Water Bodies

### 11.1. Overview

Bangalore has been synonymous with its extensive greenery and lakes. Lakes, which have been an inherent part of the ecosystem, also have traditionally served the function of meeting water requirements of the populace. Apart from this lakes are also known to recharge ground water, channelize water flow to prevent water logging and flooding. These water bodies are also host to a wide variety of flora and fauna.

Given a large number of lakes in Bangalore, it was imperative they are maintained on an ongoing basis. This role over a period of time has been being performed by numerous governmental bodies such as the Forest Department, Minor Irrigations Department, BBMP, BDA and Horticulture Department

The Government of Karnataka in 2002, set up the Lake Development Authority (LDA) a autonomous regulatory body whose objective was to work for the regeneration and conservation of lakes in Bangalore district as well as other cities, municipal corporations in the state of Karnataka.

The functions of the LDA are listed out as follows:

- Restoring lakes and facilitation of restoration of depleting ground water table.
- Diverting/treating sewage to generate alternative sources of raw water and preventing contamination of underground aquifers from wastewater.
- Environmental Impact Assessment studies
- Environmental mapping and GIS mapping of lakes and surrounding areas.
- Improving and creating habitat for water birds and wild plants. Reducing sillage and non-point water impacts.
- Improving urban sanitation and health condition especially of the weaker section living close to the lakes.
- Impounding run-off water to ensure recharge of ground water aquifers and revival of bore wells.
- Monitoring and management of water quality and lake ecology.
- Utilising the lake for the purpose of education and tourism.
- Community participation and public awareness programmes for lake conservation.

Since the formation of the LDA, the Authority has drawn up the plans for the conservation of various lakes in Karnataka especially in Bangalore. This has resulted in the Government of India providing a grant for the conservation of major lakes namely Bellandur Lake, Hebbal Lake and others.

#### 11.1.1. Status of Lakes

The city boasted of nearly 280 lakes but the number has declined drastically to about 81 lakes. The decline in the number of lakes has been mainly due to migration of people, encroachment of these lakes for urbanization and industrialization. Due to these factors, the number and quality of the lakes have decreased contributing to various changes in the ecological system.

Understanding the urgent need to restore and protect the lakes attempts are being taken by various agencies to restore and revive these water bodies.

Around 25 lakes have been developed by initiatives taken by BDA, BBMP 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
- BBMP has developed four lakes.

## 11.2. Major Lakes in Bangalore

Of the several freshwater lakes and water tanks, the notable one’s are Madiwala Lake, the Hebbal Lake, the Ulsoor Lake and the Sankey Tank. The prominent lakes are listed below:

- Ulsoor lake : Located in Halasuru near M G Road. It is one of the biggest lakes in the city. It is spread over 126 acres and has several islands.
- Sankey tank: Renovated lately, Sankey Lake is located in the middle of the suburbs of Malleshwaram, Vyalikaval and Sadashiva Nagar. The lake is spread across 37.1 acres.
- Madiwala Lake: Madiwala lake is one of the biggest lakes, is situated in BTM layout and spread over 276.8 acres with an island sporting bamboo bushes at the center attracts rare birds during the post monsoon season. There is also a beautiful park with a nice childrens play area.
- Lalbagh lake : The Lalbagh lake is situated in Lalbagh garden. The Lalbagh lake is by far the most beautiful water body in the city. It does not have any boating facility.
- Hebbal Lake - Located in Hebbal, is spread over 185 acres created by Kempa Gowda.

## 11.3. Key Issues

The key issues in the sector are as follows;

- Pollution of water bodies (lakes) owing to discharge of domestic sewage, industrial and chemical effluents.
- Underground drains carrying sewerage leading to lakes, thus polluting the lakes.
- Pollution owing to certain religious practices
- Encroachment of water bodies
- Overflowing/ flooding of lakes due to excess flow of storm water into lakes

## 11.4. Strategies for Improved Service Delivery

The strategies for preservation and rejuvenation of water bodies in the city would include the following;

- Water bodies would be prioritised for preservation and rejuvenation on the basis of their natural, cultural and social heritage in addition to their value in terms of quality of water, its use and public space around the water body
- Awareness programmes and campaigns on eviction of encroachments around the water bodies would be organized to educate people on the possible ecological hazards owing to encroachments. Relocation and resettlement plans for the temporary settlements in and around the lakes would be determined in consultations with affected parties.
- Studies would be undertaken to identify and prioritise lakes that require preservation and rejuvenation measures.
- Ensure that the sewerage is not discharged into the water bodies thereby polluting them
- Linking of water bodies so as to distribute the collected storm water equally reducing the chances of overflow and flooding
- Reconstruction of recharge wells at the bottom of water bodies that would lead to better ground water recharge
- Water front development such as development of walk ways, cycle tracks, boating facilities, amusement parks, open air theatre, etc. wherever feasible in compliance with the environmental legislations protecting the social and cultural sanctity of the place.

## 11.5. Investment Plan for Water Bodies

The investment plan proposed for preservation and rejuvenation of water bodies include undertaking technical studies to assess the current condition of the water bodies, feasibility studies to analyse the possibilities in developing the waterfront and actual water front/ lake front development.

Table 82 indicates the estimated investment in preservation and rejuvenation of water bodies, during the JNNURM period.

**Table 82: Investment Plan for preservation of water bodies- JNNURM Period**

(In Rs. Crores)	2007-08	2008-09	2009-10	2010-11	2011-12	Total
<b>Preservation and Rejuvenation of Water Bodies</b>	25.9	25.9	25.9	25.9	25.9	129.7

Table 83 indicates the estimated investment in preservation and rejuvenation of water bodies, during future blocks.

**Table 83: Investment Plan for preservation of water bodies – Vision Period**

<b>(In Rs. Crores)</b>	<b>2013-17</b>	<b>2018-22</b>	<b>2023-27</b>	<b>2028-31</b>	<b>Total</b>
<b>Preservation and Rejuvenation of Water Bodies</b>	79	59	39	20	196

*Source: Crisil, 2007*

## 12. Urban Environment

### 12.1. Urban Environment in the JNNURM Context

In the JNNURM context, the term urban environment refers to the social, economic and environmental needs of the city. It would include the entire spectrum of urban services, institutional frameworks, and governance. There is a close linkage of each of these factors with 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. As the city footprint increases, 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.

In addition to the above, the city has to provide certain "quality of life" civic amenities/facilities, apart from the basic urban infrastructure. "Civic Amenities" includes parks, streetlights, markets, crematoria, etc.

This chapter outlines these infrastructure/amenities, covers the specific issues related to the traditional core areas and identifies investments required to improve the same in Bangalore. The further chapters on infrastructure sectors are extensions of the same theme.

### 12.2. 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.

In addition to the above, it also discusses providing a better quality of life to the people in the city by providing for parks, slaughter houses, crematoria, markets, stadia, rain water harvesting, etc.

#### 12.2.1. Existing Situation

##### 12.2.1.1. Urban Renewal

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 that is 3-4 times higher than the average of BBMP 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
- Narrow roads that constrain provision of services such as water supply, drainage, and solid waste management.

### 12.2.1.2. 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
- 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 BBMP and BDA
- The Forest Department has raised plantations of around 130 sq. km by planting around 35 lakh plants
- BBMP 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.

### 12.2.1.3. Street Lights

In all, there are 2.5 lakh streetlights in Bangalore, XX% of which are in the BBMP 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 84.

**Table 84: Street Light Situation in the current BBMP Area**

Zone	Total	Streetlight Per km
Core area	1,75,019	50
Bommanahalli	12,786	25
Byatarayanapura	12,860	38

Zone	Total	Streetlight Per km
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
<b>Total</b>	<b>2,49,567</b>	<b>42</b>

#### 12.2.1.4. BBMP Markets

The City has created, under the BBMP 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 BBMP 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 BBMP.

### 12.2.2. Key Issues

#### 12.2.2.1. 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.

#### 12.2.2.2. 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 the former 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.

## 12.3. Strategy for Improved Service Delivery

### Urban Renewal

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.

### **Civic Amenities**

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.

### **12.3.1. Proposed Implementation Plan**

#### **12.3.1.1. 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
- 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
- Improvement of civic services.

#### **12.3.1.2. Implementation Plan for Civic Amenities**

### **Development of Existing & New Parks – Beautification of Gardens**

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 BBMP to set up a modern slaughterhouse outside the City. For this

purpose, BBMP 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**

BBMP 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

## **12.4. 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.

### **12.4.1. Investment Plan for Urban Renewal**

#### **12.4.1.1. Estimated Capital Investment Requirement for Urban Renewal**

Table 85 sets out the estimated investment requirement on projects of urban renewal, during the implementation period of JNNURM. Table 86 sets out the estimated investment requirement on projects of urban renewal, in future blocks. It is to be noted that the investment estimates for Urban Renewal has been retained the same as was projected in CDP 2006 for the reason that it pertains to the investments within the core BBMP in particular.

**Table 85: Investment Plan for Urban Renewal Projects – JNNURM Period**

Description	Upto 2007-08	2008-09	2009-10	2010-11	2011-12	Total (Rs. Crore)
Capital Expenditure	3.3	2.0	2.2	2.2	2.3	12.0
O & M Expenses	0.0	0.5	0.6	0.6	0.7	2.4
<b>Total</b>	3.3	2.5	2.8	2.8	3.0	14.4

Source: CDP 2006

**Table 86: Investment Plan for Urban Renewal Projects – Vision Period**

Description/ (in Rs Crores)	2013-17	2018-22	2023-27	2028-31	Total upto 2031
Capital Expenditure	12	12	12	12	60
O & M Expenses	5	7	10	12	36.4
<b>Total</b>	17	19	22	24	96.4

Source: CDP 2006

#### 12.4.1.2. Estimated Capital Investment for Civic Amenities

Table 87 indicates the estimated investment in Civic Infrastructure projects, during the JNNURM period.

**Table 87: Investment Plan for Civic Infrastructure - JNNURM Period**

(In Rs. Crores)	2007-08	2008-09	2009-10	2010-11	2011-12	Total
Parks/ Play grounds	1.9	1.9	1.9	1.9	1.9	9.6
Fire System	27.7	27.7	27.7	27.7	27.7	138.6
Slaughter House	9.6	9.6	9.6	9.6	9.6	48.1
Sports/ Stadium Improvements	6.4	6.4	6.4	6.4	6.4	32.0
Office Building	3.2	3.2	3.2	3.2	3.2	16.0
Street Lighting	35.2	35.2	35.2	35.2	35.2	176.2
Markets	16.0	16.0	16.0	16.0	16.0	80.1
Crematoria	9.6	9.6	9.6	9.6	9.6	48.1
<b>Grand Total</b>	109.7	109.7	109.7	109.7	109.7	548.6

Table 88 indicates the estimated investment in Civic Infrastructure projects, during future blocks.

**Table 88: Investment Plan for Civic Infrastructure – Vision Period**

(In Rs. Crores)	2013-17	2018-22	2023-27	2028-31	Total
Parks/ Play grounds	6	4	3	1	15
Fire System	84	63	42	21	210
Slaughter House	29	22	15	7	73
Sports/ Stadium Improvements	19	15	10	5	48
Office Building	10	7	5	2	24
Street Lighting	107	80	53	27	267
Markets	48	36	24	12	121
Crematoria	29	22	15	7	73

(In Rs. Crores)	2013-17	2018-22	2023-27	2028-31	Total
<b>Parks/ Play grounds</b>	6	4	3	1	15
<b>Fire System</b>	84	63	42	21	210
<b>Slaughter House</b>	29	22	15	7	73
<b>Grand Total</b>	332.1	249.1	166.1	83.0	830.3

Source: Crisil, 2007

## 12.5. 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.

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.

## 13. Culture & Heritage Conservation

### 13.1. Cultural and heritage conservation under JNNURM context

The urban cultural heritage of the city includes both the tangible and the intangible elements. It is closely linked to the natural environment and must be looked at with its strong connection in mind. The urban cultural heritage comprises not only the archaeological sites, remains, ruins and monuments protected by the Archaeological Society of India and the State Archaeology, but also the natural and man-made water systems, the ghats, ponds, tanks, water harvesting systems, the street patterns, pathways, bazaars and chowks, the private and public buildings, gates and walls, birdfeeders and statues, the parks and gardens, the temples, mosques and churches, the cared geography underlying its physical fabric and the related yatras, pilgrimages ways and congregation places, the trees, the views to and from the city.

Urban conservation deals with the living environment, multiple ownership, variety of legal and planning provisions, different layers of governance, administration and management. It must be focused on the socio-economic development, regeneration of the historic city, on housing and mobility, the linkages to the other areas of the town, etc, while keeping alive the natural, social and historic resources. Urban conservation is closely intertwined with urban regenerating. It must balance the needs of modernization and investment in historic cities and city centres without compromising the historic character and identity.

### 13.2. Overview

Bangalore is one of the most visited destinations – primarily due to its economic growth, but also as a cultural and heritage 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. Due to these reasons preservation and conservation of historical monuments becomes imperative. In the sub-sections below, the monuments and destinations of cultural and heritage significance are discussed.

#### 13.2.1. Existing Situation

##### 13.2.1.1. Culture and 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. Over the years, Bangalore has transformed into a cosmopolitan city with the influx of people from across the world in search of better career opportunities.

### 13.2.1.2. 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 and 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.



## 13.3. 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
- Build the capacity of implementing agencies and service providers.

## 13.4. 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.

### **13.4.1. 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.6000 per sqm.

### 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.

### 13.4.2. Estimated Capital Investment Requirement

The estimates for the Mission period is listed in Table 89.

**Table 89: Investment Plan for Culture and Heritage - JUNNURM Period**

Description	Upto 2007-08	2008-09	2009-10	2010-11	2011-12	Total Cost (Rs. Crore)
<b>Capital Expenditure</b>						
<b>Cultural Centre</b>	3.2	1.6	1.6	2.2	2.2	10.8
<b>Local tourist shuttles / circuits / Heritage walks / ticketing</b>	1.2	0.6	0.6	0.8	0.8	3.9
<b>Facilitation centre for tourists</b>	0.4	0.2	0.2	0.2	0.2	1.2
<b>Toilets</b>	6.4	3.2	3.2	4.3	4.3	21.6
<b>Parking Spaces</b>	10.6	5.3	5.3	7.1	7.1	35.3
<b>Information Kiosks/ centers/drinking water</b>	0.4	0.2	0.2	0.2	0.2	1.1
<b>Signage conforming to international tourist norms</b>	1	0.5	0.5	0.7	0.7	3.3
<b>Renovation of heritage buildings</b>	8.2	4.1	4.1	5.4	5.4	27.0
<b>Convention Centers</b>	2.8	1.4	1.4	1.9	1.9	9.6
<b>Budget Hotel</b>	6.4	3.2	3.2	4.3	4.3	21.6
<b>Development of Bannerghatta Biological park</b>	10.6	5.3	5.3	7.0	7.0	35.0
<b>Total-CAPEX</b>	51.2	25.6	25.6	34.1	34.1	170.4
<b>Operation and Maintenance Expenses</b>	0					
<b>Cultural Centre</b>	1.1	1.7	2.3	2.8	3.4	11.3
<b>Local tourist shuttles/circuits/Heritage walks/ticketing</b>	0	0.0	0.1	0.1	0.1	0.3
<b>Facilitation centre for tourists</b>	0	0.0	0.0	0.0	0.0	0.1
<b>Toilets</b>	0.2	0.3	0.4	0.5	0.5	1.8
<b>Parking Spaces</b>	0.3	0.4	0.6	0.7	0.9	2.9
<b>Information Kiosks/ centers/drinking water</b>	0	0.0	0.0	0.0	0.0	0.1
<b>Signage conforming to international tourist norms</b>	0	0.0	0.1	0.1	0.1	0.3
<b>Renovation of heritage buildings</b>	0.2	0.3	0.5	0.6	0.7	2.3
<b>Convention Centers</b>	0.1	0.1	0.2	0.2	0.2	0.8
<b>Budget Hotel</b>	0.2	0.3	0.4	0.5	0.5	1.8

Description	Upto 2007-08	2008-09	2009-10	2010-11	2011-12	Total Cost (Rs. Crore)
Development of Bannerghatta Biological park	0.7	1.1	1.4	1.8	2.1	7.0
<b>Total-OPEX</b>	2.9	4.3	5.7	7.2	8.6	28.7
<b>Land Acquisition</b>	0					
<b>Cultural Centre</b>	0.6	0.3	0.3	0.4	0.4	1.8
<b>Toilets</b>	0	0.0	0.0	0.0	0.0	0.2
<b>Parking Spaces</b>	1.4	0.7	0.7	0.9	0.9	4.5
<b>Convention Centers</b>	0.6	0.3	0.3	0.4	0.4	2.0
<b>Budget Hotel</b>	1.4	0.7	0.7	0.9	0.9	4.5
<b>Total-LA</b>	4	2.0	2.0	2.6	2.6	13.0
<b>Grand Total</b>	57.9	31.8	33.2	43.9	45.3	212.1

Source: CDP Bangalore 2006

Table 90 gives the estimated investment requirement in future blocks.

**Table 90: Investment Plan for Culture & Heritage – Vision Period**

Description	2013-17	2018-22	2023-27	2028-31	Total by 2031
	In Rs.. Crore				
<b>Capital Expenditure</b>					
<b>Cultural Centre</b>	12.6	6.8	14.0	18.0	62.2
<b>Local tourist shuttles / circuits/Heritage walks/ticketing</b>	4.6	2.9	5.5	6.9	23.8
<b>Facilitation centre for tourists</b>	1.4	0.9	1.7	2.1	7.3
<b>Toilets</b>	14.4	31.0	34.6	42.5	144.1
<b>Parking Spaces</b>	41.2	71.9	83.6	109.5	341.5
<b>Information Kiosks/ centers/drinking water</b>	1.3	1.4	2.1	2.5	8.4
<b>Signage conforming to international tourist norms</b>	3.9	23.8	26.0	27.2	84.2
<b>Renovation of heritage buildings</b>	31.5	19.8	37.8	47.7	163.8
<b>Convention Centers</b>	11.2	7.0	13.4	17.0	58.2
<b>Budget Hotel</b>	25.2	7.2	18.0	21.6	93.6
<b>Development of Bannerghatta Biological park</b>	35.0	0.0	0.0	0.0	70
<b>Total- CAPEX</b>	182.1	172.7	236.8	295.0	1057
<b>Operation and Maintenance Expenses</b>					0
<b>Cultural Centre</b>	12.2	3.2	13.5	14.5	54.7
<b>Local tourist shuttles/circuits/Heritage walks/ticketing</b>	0.7	1.6	1.1	1.5	5.2
<b>Facilitation centre for tourists</b>	0.2	0.5	0.3	0.5	1.6
<b>Toilets</b>	2.7	13.0	6.3	8.5	32.3
<b>Parking Spaces</b>	5.9	13.1	17.6	24.7	64.2

Description	2013-17	2018-22	2023-27	2028-31	Total by 2031
Information Kiosks/ centers/drinking water	0.2	1.0	0.3	0.4	2
Signage conforming to international tourist norms	0.6	22.7	0.9	1.3	25.8
Renovation of heritage buildings	4.5	10.8	7.7	10.4	35.7
Convention Centers	1.6	3.8	2.7	3.7	12.6
Budget Hotel	3.6	5.6	6.1	8.3	25.4
Development of Bannerghatta Biological park	14.0	14.0	14.0	14.0	63
Land acquisition	17.4	0.0	0.0	0.0	46.1
Cultural Centre	1.8	0.0	0.0	0.0	14.8
Toilets	0.1	0.0	0.0	0.0	1.9
Parking Spaces	9.0	0.0	0.0	0.0	9.2
Convention Centers	2.0	0.0	0.0	0.0	6.5
Budget Hotel	4.5	0.0	0.0	0.0	6.5
<b>Total-OPEX</b>	<b>46.1</b>	<b>89.3</b>	<b>70.6</b>	<b>87.6</b>	<b>298.1</b>
<b>Grand Total</b>	<b>245.6</b>	<b>262.0</b>	<b>307.3</b>	<b>382.7</b>	<b>1409.7</b>

Source: CDP Bangalore 2006

## 13.5. 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.

### 13.5.1. Heritage Management Plan

The ULB is also in the course of preparing for the city, a Heritage Management Plan which shall serve as outline of the heritage values in the city and develop policies to guide their conservation, restoration, future use and development. The plan would include details about the list of cultural and natural heritage places, urban open spaces, water bodies and any other element of heritage value in the city. It also discusses the condition assessment of the tangible and intangible heritage of the city, grading of heritage values, identification of heritage zones and precincts, defining the importance of urban heritage in the socio-economic and cultural profile of the city, determining the legal and statutory framework for conserving urban heritage, identifying the institutional set-up, identifying and prioritizing projects to maintain, conserve, restore, use and develop heritage assets and heritage areas, including the infrastructure needed for servicing assets and areas of urban heritage.

The projects and developmental requirements discussed under this chapter and also under the chapter on urban environment would form an integral part of the Heritage Management Plan.

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## 14. Local Economic Development

### 14.1. Local Economic Development under JNNURM context

Local economic development would refer to the outcome based on local initiative, driven by local stakeholders. It involves identifying the local resources, local skill sets and seeks to generate ideas so as to initiate and identify activities involving full utilization of the available skills so as to stimulate economic growth and development. It aims to create employment opportunities, improve the standard of living of the residents, especially the poor, and redistribute resources and opportunities to the benefit of all citizens.

The local economic development plan should focus on the institutional, regulatory and infrastructure initiatives that should be undertaken by the ULBs

### 14.2. Existing Situation

Bangalore has a strong and balanced economy, stimulated by light and heavy engineering (automobiles, earthmoving, and aeronautics), textiles, and high technology (IT, ITES, Bio-tech, 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 USD 47.2 billion economy makes it a major economic centre in India, and as of 2001 Bangalore's share of USD 3.7 billion in Foreign Direct Investment made it the 3rd highest recipient of FDI for any 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
- 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.

### **14.2.1. 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, the following:

- 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.

### **14.2.2. 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-CMM17 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 ranked 16th in the world in revenues in 2003-04.

John 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.

#### 14.2.2.1. 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 below.

**Table 91: Industry Turnover and Employment**

Size	Number	Investment (Rs. Crores)	Job Opportunities
Small-scale	55162	1682	578000
Medium & Large Scale	546	4725	224287
Mega	17	3808	33830

Source: Bangalore Darshana – 2003-04

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 listed in Table 92.

**Table 92: 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)

<sup>17</sup> Software Engineering Institute – Capability Maturity Model

### **14.3. Local Economic Development Plan**

A local economic development plan would be prepared for the city which would be framed around three themes which are given below;

1. Regulation – deals with the role of the ULB as a regulator and seeks to identify ways in which the ULB can improve transparency in its regulatory function and reduce transaction costs, time and harassment while undertaking its role as regulator.
2. Targeted infrastructure and Basic Services – with a focus on providing quality infrastructure and basic services to existing businesses within the ULB and also to work with higher levels of government to attract investment into the ULB.
3. Facilitation and Promotion – with promoting local arts and crafts and small scale enterprises, provide market linkages for small scale industry and access to finance through partnerships and linkages with financial institutions.

Prior to formulation of the local economic development plan, the key economic activities/ industrial sectors in the ULB which would include both the formal and the informal sectors would be identified and all other economic stakeholders in the city would be considered to suggest the developmental plan.

## 15. Disaster Prevention and Management Plan

### 15.1. Overview

Every city is vulnerable to natural disaster on account of its geo-climatic conditions. For a city like Bangalore it is required to have a disaster prevention and management plan which would equip the administration and the people to handle the outcome of the same. The disaster prevention and management plan as prescribed under JNNURM is required to avoid extreme and severe damage to the environment and economy of the city.

### 15.2. Existing Situation

Over the years, Bangalore has been prone to minimal disaster that is caused due to its geo-climatic conditions. However, it is in the interest of the city to have a plan in place to deal with disasters such as earthquakes, floods, droughts, landslides, terrorist attacks, etc. The terrorist attacks in the city in the year 2008 and the floods during rainy season due to clogging of drains/ improper drainage are some disasters that people in the city have experienced.

India has an integrated administrative mechanism for management of disasters at the National, State, district and Sub-district levels. The National Disaster Management Authority (NDMA), headed by the Prime Minister of the country, is the Apex body for disaster management in India. The setting up of the NDMA and the creation of an enabling environment for institutional mechanisms at the State and district levels is mandated by the Disaster Management Act, 2005

As per the enactment, the National and State authorities are responsible for laying down the policies, plans and guidelines for disaster management. The district authority shall act as the district planning, coordination and implementing body for all disaster management related functions. These functions include mitigation and preparedness measures also besides response, relief and rehabilitation.

A key role has been assigned to the local authority for ensuring training of its officers and employees; maintenance of resources so that these are readily available for use in the event of a disaster and ensuring that all construction projects in their area of jurisdiction conform to the prescribed standards and specifications. The local authority shall also carry out relief, rehabilitation and re-construction activities in the affected areas.

### 15.3. Disaster Prevention and Management Plan

At present, the basic responsibility of undertaking rescue, relief and rehabilitation measures in the event of natural disasters is the concern of the State government. The Central government supplements the efforts of the States by providing financial and logistic support. The Chief Secretary of the State heads a state level committee which is in overall charge of the relief operations in the State and the Relief Commissioners who are in charge of the relief and rehabilitation measures in the wake of natural disasters in their States function under the overall direction and control of the state level committee. In many states, Secretary, Department of Revenue, is also in-charge of relief. State governments usually have relief manuals and the districts have their contingency plan that is updated from time to time.

The Disaster Management Act, 2005 provides that there shall be a Disaster Management (DM) plan for every state. It outlines the broad coverage of the plan as well as the requirements of consultation in the preparation of the State plans. It also provides for annual review and updating of the State plan, and enjoins upon the State governments to make provisions for financing the activities to be carried out under the State plans. It provides for the departments of the State governments to draw up their own plans in accordance with the State plan. The State plans shall be prepared by the SEC in conformity with the guidelines to be issued on related matters by the State DMA having regard to the guidelines laid down in this regard by the NDMA, and after such consultation with local and district authorities and the people's representatives as the SEC may deem fit. The State plan prepared by SEC shall be approved by the State DMA.

Currently, the Karnataka State Disaster Management Authority is headed by the Chief Minister and is entrusted with the task of finalizing and implementing a comprehensive disaster management plan. Along with this, the State has pioneered in setting up a disaster monitoring through its Karnataka State Natural Disaster Monitoring Centre (KSNDMC), an autonomous body under the Department of Science and Technology, Government of Karnataka. The KSNDMC has the major responsibility to monitor and pro-actively provide advanced information on natural disasters in the State of Karnataka.

The ULB in the city also is in the course of formulating a disaster prevention and management plan for Bangalore to safeguard the city against the possible disasters/ threats in future.

#### **15.4. Investment Estimates**

The policy arrangements for meeting relief expenditure related to natural disasters are, by and large, based on the recommendations of successive finance commissions. The two main windows presently open for meeting such expenditures are the Calamity Relief Fund (CRF) and National Calamity Contingency Fund (NCCF). CRF is generally used for meeting the expenditure for providing immediate relief to the victims of cyclone, drought, earthquake, fire, flood and hailstorm.

Expenditure on restoration of damaged capital works should ordinarily be met from the normal budgetary heads, except when it is to be incurred as part of providing immediate relief, such as restoration of drinking water sources or provision of shelters etc., or restoration of communication links for facilitating relief operations. Of the total contribution required, the Government of India contributes 75 per cent of the total yearly allocation in the form of a non-plan grant, and the balance amount is contributed by the State Government concerned.

The Disaster Response system would include the information management system required to efficiently carry out disaster prevention and management in the city and the equipments/rolling stock required for the same.

The table given below sets out the investment estimates for Disaster Prevention and Management over the Mission Period

**Table 93: Investment estimate for disaster management for Mission Period**

Parameters	2010-2011 (in Rs.Cr)	2011-2012 (in Rs.Cr)
Disaster Response System	80.48	84.50
Capacity Building for Disaster Response	2.00	2.00
<b>Total</b>	<b>82.48</b>	<b>86.50</b>

The table given below sets out the investment estimates for Disaster Prevention and Management for the Vision Period

**Table 94: Investment estimate for disaster management for Vision Period**

Investment	2013-2031 (in Rs.Cr)
State Disaster Response Fund	279.72
Capacity Building for Disaster Response	6.00
<b>Total</b>	<b>285.72</b>

## 15.5. Training and other programs

To attain an effective and efficient Disaster Response System, the pressing need is identification of specific disaster response training courses and devising a unified, structured and uniform course module as well syllabus for these specific disaster response training courses. With this objective, the National Disaster Management Authority (NDMA) commissioned a systematic study to identify the training needs of personnel of National Disaster Response Force (NDRF), State Disaster Response Forces (SDRF) and other stakeholders

The following institutions have been established by an administrative order of the Government of India to impart necessary training:

- a. National Fire Service College:** The National Fire Service College (NFSC) at Nagpur is a national level institution mandated to train the personnel of state fire services/brigades in all spheres of fire engineering. A scheme for upgradation of NFSC was launched in June 2010 to enhance the capacity of the College to meet the requirements of specialized professional training in all aspects of emergency management, especially fire.
- b. National Civil Defense College:** The National Civil Defense College (NCDC) at Nagpur is one of the main centres for disaster relief and management training and a nodal centre for radiological, nuclear, biological and chemical emergency response. The College has been upgraded to an Institution of Excellence at National Level in order to train a professional cadre of trainers for Disaster Response & Recovery Management.
- c. National Centre for Disaster Management (NCDM):** Training facilities for government personnel involved in disaster management are conducted at the national level by the National Centre for Disaster Management (NCDM) at the Indian Institute of Public Administration, in New Delhi which functions as the nodal institution in the country for training, research and documentation of disasters. At the State level, disaster management cells operating within the State Administrative Training Institutes (ATIs) provide the necessary

training. Presently, 24 ATIs have dedicated faculties. There is a need for strengthening specialized training, including training of personnel in disaster response

**d. Community Level Initiatives:** The goal of any disaster management initiative is to build a disaster resistant/resilient community equipped with safer living and sustainable livelihoods to serve its own development purposes. The community is also the first responder in any disaster situation, thereby emphasizing the need for community level initiatives in managing disasters. To encourage such initiatives, the following are required:

(a) Creating awareness through disaster education and training and information dissemination are necessary steps for empowering the community to cope with disasters.

(b) Community based approach followed by most NGOs and Community Based Organizations (CBOs) should be incorporated in the disaster management system as an effective vehicle of community participation.

The ULB would require to spearhead imparting training and creating awareness about the disaster prevention and management system in the city.

## 15.6. Information Management System

It has been experienced that a prompt, well-coordinated and effective response mounted in the aftermath of disasters not only minimizes loss of life and property but also facilitates early recovery. The important ingredients of an effective response system are integrated institutional arrangements, state of the art forecasting and early warning systems, failsafe communication system, rapid evacuation of threatened communities, quick deployment of specialized response forces and coordination and synergy among various agencies at various levels in dealing with any disaster. Most importantly, all the agencies and their functionaries must clearly understand their roles and responsibilities and they specific actions they have to take for responding to disaster or threatening disaster situations. For this purpose Standard Operating Procedures (SOP) have been down a comprehensive manner on the specific actions that need to be taken by various Ministries and Departments of Government of India and Organizations under the control of Government of India at the National level and concerned State Governments and the district administration for responding to natural disasters of any magnitude and dimension.

**a. Emergency Operation Centres/Control rooms** will be set up at National, State and district levels with requisite facilities. The EOCs/Control Rooms already in existence at these levels will be suitably upgraded. The EOCs/Control Rooms at National, State and District levels will be the nerve centres for coordination and management of disasters. The objectives of the EOCs shall be to provide centralized direction and control of any or all of the following functions:

- Receive and process disaster alerts and warnings from nodal agencies and other sources and communicate the same to all designated authorities.
- Monitor emergency operations
- Facilitate Coordination among primary and secondary Emergency Support Functions (ESF) Ministry/Departments/Agencies.
- Requisitioning additional resources during the disaster phase

- Issuing disaster/incident specific information and instructions specific to all concerned;
- Consolidation, analysis, and dissemination of damage, loss and needs assessment data;
- Forwarding of consolidated reports to all designated authorities.

**b. Incident Command System (ICS):** ICS has been set up as a management system to organize various emergency functions in a standardized manner while responding to any disaster. Under ICS an incident commander and officers trained in different aspects of incident management, such as logistics, operations, planning, safety, media management, etc. form a specialist incident management team and manage the disaster/emergency.

As per the Government of India policy on disaster management ICS will be integrated into the existing system and Incident Command Teams shall be put in place in each district by imparting training in different facets of incident management to district level functionaries. The emphasis will be on the use of technologies and contemporary systems of planning and execution with connectivity to the joint operations room at all levels

**c. Incident Command Teams (ICTs):** ICTs are constituted at National level by the MHA. The State Governments constitute one Headquarter team in each State Capital. Further State Governments will constitute ICTs for the State and at each District. The members of these teams will be imparted specialized training in the ATIs/designated Training Institutes. These Teams will be deployed at the district level by the concerned District Magistrate or designated authority.

**d. District Level Preparedness For Response:** Each district will make its vulnerability assessment and identify potential hazards. While making such assessment, the risk involved and capacity to respond will be taken into account. The local community will be informed about their vulnerability to potential hazard/disasters through the representatives of Panchayati Raj Institutions/Local Self-Government and NGOs.

**e. Contact Details:** A comprehensive directory of officers involved in disaster management at various levels will be prepared for National and State levels giving their names, addresses, telephone numbers, mobile numbers, email address, Fax numbers. Such directory will be widely circulated and updated annually

**f. Awareness Generation:** A Nationwide multi-media awareness campaign will be carried out by the Government of India. Similarly State Governments will also carry out awareness campaigns in their State right up to village level. To create awareness among new generation, inputs on disaster management will be included in the school syllabus all over the country. Seminars/workshops will be conducted specifically for media personnel and public representatives viz. M.Ps, and MLAs, Members of Municipal Councils, Zila Parishads etc. The States will ensure appropriate awareness programme to solicit community response, which will in turn reduce the burden on administration to a considerable extent.

## 15.7. Implementation Plan

The Private sector and Voluntary Agencies play a vital role in the shaping and implementation of an effective disaster management system. They have been contributing immensely towards various development programs, VOs provide innovative and alternative cost effective models for development. They can mobilize people for constructive community work and often reach the most marginalized and vulnerable sections of society and contribute to the socio-economic development of the country, with much wider outreach.

Capacity building of all three tiers of Panchayats and local community's task forces and volunteers of organized institutions like Redcross, NSS, NCC, Scout and Guide are very important. NGOs can play a great role for Coordination, Collaboration and Networking amongst themselves Government and community. The good practices needs to be documented and disseminated well so that replication and up-scaling becomes possible.

The voluntary sector has a significant presence in almost all regions of the country and its role as an important partner of the Government in development is being increasingly recognized. In May 2007, the Government of India approved a National Policy on the Voluntary Sector which was prepared by the Planning Commission of India in consultation with VOs, concerned Departments/Ministries and State Governments.

A National NGO Task Force on Disaster Management set up by the National Disaster Management Authority (NDMA); Government of India has set up a Core Group on the Role of NGOs in Disaster Management.

The corporates in every country have always played a major role in post-disaster relief, rehabilitation and reconstruction efforts in the affected regions. The industrial and corporate organizations like the Confederation of Indian Industry (CII), the Federation of Indian Chambers of Commerce and Industry (FICCI), the PHD Chambers of Commerce and Industry and other industry and area-specific manufacturers and traders associations have been in the forefront of providing much-needed succor to the affected populace for ameliorating their sufferings.

The Confederation of Indian Industry (CII), with a direct membership base of nearly five thousand industrial and corporate houses and an indirect associate membership of around fifty thousand companies from 283 national and regional sectoral associations, was the first industry organization to constitute a Disaster Management Committee in May 2001 as part of its corporate set-up to advise and assist its member industries in initiating disaster risk reduction steps to insulate industrial establishments, infrastructure and processes from the vagaries and damaging potential of natural and man-made (industrial/technological) disasters.

Apart from addressing natural disasters, CII has established an Environment Management Division (EMD) involved in research and propagation of environmentally sound industrial systems and processes. It has been deeply involved in advising and developing systems and methodologies for safer and disaster-free handling of chemicals and other hazardous substances in production processes and procedures. The EMD has also been assisting the industries in development and implementation of on-site and off-site disaster management



plans for ushering into an environment friendly industrial scenario, especially in the light of experience of the Bhopal Gas Tragedy. In addition, many area-specific industrial and commercial associations have also been contributing towards the well-being of the community around them by adopting socioeconomic practices aimed at improving the living conditions and generally benefiting the people at large.

The corporate sector possesses huge resources – human, material, technical and financial – and has significant presence in every region in the country. It also works and interacts with the community very closely and has an important stake in the well-being and prosperity of the community as its own progress and viability is largely dependent upon a resilient and safe community. The accountability of the corporate sector in terms of its Corporate Social Responsibility (CSR) has also increased as the value and reputation of a company is being increasingly adjudged by its social behavior and by its contribution to the economic well-being and development of the communities in which it operates.

However, in keeping with the change in focus to the pre-disaster aspects of prevention, mitigation and preparedness to mount an allround assault on vulnerabilities and building of capacities at all levels, a lot of emphasis has been laid on integrating the disaster risk reduction and risk management aspects into the functioning and processes of industries. Moreover, the corporate sector organizations have linkages with other similar organizations in different countries and regularly exchange and supplement each others' information and resources in times of need. It is, therefore, imperative for the success of initiatives in the area of disaster risk management that corporate sector organizations and their networks are associated with different facets of disaster management.

The corporate sector is an integral part of the society. As a member of the community, it is its responsibility to contribute to sustainable development and to integrate social and environmental concerns in its business operations as well as in its interaction with other stakeholders. It can play a leading role in supporting and building the knowledge, capacity and skills of the community in comprehensive risk-based disaster management activities ranging from prevention, mitigation and preparedness to response and recovery. It can offer human and financial resources and can also be a precious source of technical know-how, as for example in the case of identification and research on technological solutions to prepare for and respond to natural disasters.

Therefore, recognizing the daunting proportions of the challenge posed by recurring incidence of natural catastrophes, association and involvement of corporate sector and their representative nodal organizations for initiating disaster risk management measures has been considered as integral to success of disaster management initiatives.

## 16. City Investment Plan & Financial Sustainability

### 16.1. 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.

#### 16.1.1. 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 below.

**Table 95: Summary of Sectoral Investments - JNNURM period (In Rs.Crore)**

Item	Upto 2007-08	2008-09	2009-10	2010-11	2011-12	Total
Water Supply and Sewerage	805	1135	2172	1918	2160	8189
Solid Waste Management	164	131	162	162	181	800
Urban Drainage	-	-	-	2306	1537	3843
Urban Environment	139	139	139	139	139	695
Culture and Heritage Conservation	58	32	33	44	45	212
Preservation of Water Bodies	26	26	26	26	26	130
Comprehensive Mobility Plan	20796	10398	10398	5199	5199	51991
Disaster Management Plan	-	-	-	82	87	169
Basic Services to Urban Poor	385	137	1915	1915	1642	5995
<b>Total</b>	<b>22374</b>	<b>11998</b>	<b>14846</b>	<b>11791</b>	<b>11015</b>	<b>72024</b>

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 95 sets out the estimated investment requirement in these categories.

**Table 96: Investment estimate- Category wise**

Item	Capital Expenses	O&M	Land Acquisition	Rolling Stock	Total
Water Supply and Sewerage	2835	5331	23	-	8189
Solid Waste Management	293	264	27	216	800

Item	Capital Expenses	O&M	Land Acquisition	Rolling Stock	Total
Urban Drainage	3128	715	--	-	3843
Urban Environment	280	62	353	-	695
Culture and Heritage Conservation	170	29	13	-	212
Preservation of Water Bodies	32	32	32	32	130
Comprehensive Mobility Plan	39420	3205	3191	6175	51991
Disaster Management Plan	80	9	-	80	169
Basic Services to Urban Poor	4827	1168	-	-	5995
<b>Total</b>	<b>51065</b>	<b>10815</b>	<b>3640</b>	<b>6503</b>	<b>72024</b>

### 16.1.2. Investments during Vision Period

While the above tables set out the estimated investment requirements for the JNNURM period (2007-2012), 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 96.

**Table 97: Summary of Sectoral Investments – Vision Period (In Rs. Crore)**

Item	2013-17	2018-22	2023-27	2028-31	Total
Water Supply and Sewerage	6015	7444	8572	9542	31572
Solid Waste Management	949	1099	1270	1462	4780
Urban Drainage	1149	433	617	801	3000
Urban Environment	428	327	227	127	1109
Culture and Heritage Conservation	246	262	307	383	1198
Preservation of Water Bodies	79	59	39	20	197
Comprehensive Mobility Plan	51991	15322	1410	0	68723
Disaster Management Plan	72	72	72	72	286
Basic Services to Urban Poor	2570	1028	1028	514	5140
<b>Total</b>	<b>63499</b>	<b>26045</b>	<b>13541</b>	<b>12920</b>	<b>116005</b>

### 16.1.3. 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 below.

**Table 98: Summary of Investments – Agency-wise Breakup (In Rs. Crore)**

Agency	Water Supply & Sewerage	Solid Waste Management	Roads, transport and traffic	Preservation of Water Bodies	Urban poor slums improvement*	Other Projects	Total
<b>BBMP</b>	-	800	8630	-	5995	3985	19410
<b>BWSSB</b>	8189	-	-	-	-	-	8189
<b>BDA</b>	-	-	879	40	-	-	919
<b>BMTC</b>	-	-	6267	-	-	-	6267
<b>DoT</b>	-	-	-	-	-	212	212
<b>LDA</b>	-	-	-	93	-	130	223
<b>Other Agencies</b>	-	-	36215	-	-	589	36804
<b>Total</b>	8189	800	51991	133	5995	4916	72024

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

#### **16.1.4. 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.

##### **16.1.4.1. 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.

## 16.2. Financial Sustainability Analysis

This section presents the financial operating plan for each agency (BBMP, 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.

### 16.2.1. Status of BBMP Finances

The below table presents status of finance of BBMP

**Table 99: Status of BBMP Finances (Rs. Crores)**

Item	2005-06	2006-07	2007-08	2008-09
<b>Revenue Account</b>				
<b>Income</b>	611.98	759.05	1341.97	1410.52
<b>Expenditure</b>	389.31	367.28	584.04	677.58
<b>Surplus (Deficit)</b>	222.67	391.77	757.93	732.94
<b>Capital Account</b>				
<b>Receipts</b>	211.33	447.00	592.37	877.79
<b>Payments</b>	439.68	633.37	1053.52	1511.77
<b>Surplus (Deficit)</b>	(228.35)	(186.37)	(461.15)	(633.98)
<b>Net</b>	(5.68)	205.4	296.78	98.96

Source: BBMP

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

- Property tax comprises approximately half of the operating income and about 30% of total receipts (revenue and capital receipts).
- Increase in property tax due to various measures including SAS scheme and widening of tax base
- Decline in revenues from stamp duty due to the downward revision of the same
- Corresponding increase in salaries and general administrative expenses has resulted in a deficit.
- 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.
- Grants have increased by 137% primarily due to the increase in SFC devolutions.
- There is a drop of 96% in user fee due to the withdrawal of the pay and park system
- Increase in administrative expenses is primarily due to the 10 - fold increase in electricity charges.

#### 16.2.1.1. Forecast of BBMP Finances

The forecast of BBMP finances are set out in the table below;

**Table 100: Forecast of BBMP Finances (in Rs. Crores)**

Item	2009-10	2010-11	2011-12	2012-13
<b>Revenue Account</b>				
<b>Income Surplus</b>	1863.20	2461.16	3251.03	4294.39
<b>Expenditure</b>	815.05	980.40	1179.30	1418.56
<b>Surplus (Deficit)</b>	1048.16	1480.76	2071.73	2875.84
<b>Capital Account</b>				
<b>Receipts</b>	1411.022	2268.177	3646.029	5860.886
<b>Payments</b>	2281.754	3443.91	5197.982	7845.448
<b>Surplus (Deficit)</b>	-870.731	-1175.73	-1551.95	-1984.56
<b>Net</b>	177.42	305.03	519.78	891.27

Source: BWSSB

#### 16.2.2. Status of BWSSB Finances

The status of BWSSB finances is set out in the table below;

**Table 101: Status of BWSSB finances (in Rs. Crores)**

Item	2005-06	2006-07	2007-08	2008-09
<b>Revenue Account</b>				
<b>Income Surplus</b>	437.29	487.21	486.94	536.48
<b>Expenditure</b>	451.01	509.31	529.22	594.32
<b>Surplus (Deficit)</b>	(13.72)	(22.1)	(42.28)	(57.84)
<b>Capital Account</b>				
<b>Receipts</b>	44.32	94.37	200.94	427.86
<b>Payments</b>	92.1	46.12	164.18	155.4

Item	2005-06	2006-07	2007-08	2008-09
<b>Surplus (Deficit)</b>	(47.78)	48.25	36.76	272.46
<b>Net</b>	(61.5)	26.15	(5.52)	214.62

Source: BWSSB

- 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)
- 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.

#### 16.2.2.1. Forecast of BWSSB Finances

- 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.
- Key growth drivers include the following:
  - 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
  - Implementation of cost - recovering tariffs
  - Reduction of unaccounted for water quantum
  - Implementation of energy efficiency programs which would reduce the energy cost which account for 50% of the expenses
  - Capital receipts are expected to increase due to increased capital expense for increased service coverage and supply augmentation. For the purpose of projections of the receipts under capital account, the rate of escalation is stagnated at 10%

Table 102 shows the financial projections for BWSSB, based on the indicated growth drivers.

**Table 102: Forecast of BWSSB finances (in Rs. Crores)**

Item	2009-10	2010-11	2011-12
<b>Revenue Account</b>			
<b>Income Surplus</b>	574.31	614.81	658.17
<b>Expenditure</b>	651.58	714.35	783.17
<b>Surplus (Deficit)</b>	(77.26)	(99.54)	(125.00)
<b>Capital Account</b>			
<b>Receipts</b>	492.04	565.85	650.72
<b>Payments</b>	185.00	220.25	262.21
<b>Surplus (Deficit)</b>	307.04	345.60	388.52
<b>Net</b>	229.77	246.06	263.52

Source: CDP Bangalore 2006

### 16.2.3. Status of BMTC Finances

Table 103 presents the finances of BMTC.

**Table 103: Status of BMTC Finances (in Rs. Crores)**

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

*Source: CDP Bangalore 2006*

- The final details of BMTC for the year 2007 - 08 were not available at the time of preparation of this report.
- Traffic revenues accounting for 90% of revenues have increased due to increase in tariffs, number of services and coverage.
- The increase in number of services and coverage has resulted in corresponding increase in salaries and fuel expenses.
- 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.
- 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.

#### 16.2.3.1. Forecast of BMTC Finances

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

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

Table 104 presents the financial projections based on the above drivers.



**Table 104: Forecast of BMTC Finances (in Rs. Crores)**

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
<b>Receipts</b>						
<b>Traffic Revenue</b>	749	911	1109	1349	1641	1997
<b>Other Revenue</b>	138	201	292	424	615	892
<b>Total Receipts</b>	888	1113	1401	1773	2256	2889
<b>Expenses</b>						
<b>Salaries</b>	165	179	193	210	227	246
<b>Fuel</b>	236	302	387	496	635	813
<b>Other Consumables</b>	24	27	30	34	38	42
<b>General Administration</b>	26	34	44	57	73	95
<b>Others</b>	263	325	402	498	616	762
<b>Total Expenses</b>	715	868	1058	1295	1591	1960
<b>Surplus / (Deficit)</b>	172	244	342	477	665	928

Source: CDP Bangalore 2006

#### 16.2.4. Status of BDA Finances

The table given below presents the summary of finances of BDA;

**Table 105: Status of BDA Finances (in Rs. Crores)**

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

Source: CDP Bangalore 2006

- The financial details of BDA for the year 2007 - 08 were not available at the time of preparation of this report.

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

#### 16.2.4.1. Forecast of BDA Finances

- Revenues of BDA have been increasing rapidly (in excess of 40% CAGR) due to the:
  - Demand for sites
  - Corresponding deposit flow into BDA
  - Increasing real estate prices
- Key growth drivers in the future include:
  - Growth in natural and migratory population
  - Release of additional land (189 sq. km.) for urban development by the proposed CDP
- Inventory of corner sites and other sites located in prime location likely to fetch increased revenues through commercial exploitation

Table 106 shows the financial projections based on the above drivers.

**Table 106: Forecast of BDA Finances (in Rs. Crores)**

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
<b>Opening Balance</b>	1,347	1,780	2,269	2,821	3,449	4,165
<b>Revenue Receipts</b>	218	262	314	377	453	543
<b>Revenue Expenses</b>	37	39	41	43	45	48
<b>Capital Receipts</b>	347	382	420	462	508	559
<b>Capital Expenses</b>	281	309	340	374	412	453
<b>Other Receipts</b>						
<b>Loans / Advances</b>	50	52	54	57	60	63
<b>Deposits</b>	1,034	1,065	1,097	1,130	1,163	1,198
<b>Other Expenses</b>						
<b>Loans / Advances</b>	26	27	28	29	31	33

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
<b>Deposits</b>	870	896	923	951	980	1,009
<b>Revenue Surplus / (Deficit)</b>	181	222	273	334	407	496
<b>Capital Surplus / (Deficit)</b>	65	72	79	87	96	106
<b>Other Surplus / (Deficit)</b>	188	194	200	207	212	220
<b>Closing Balance</b>	1,780	2,269	2,821	3,499	4,165	4,987

Source: CDP Bangalore 2006

### 16.3. 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:

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

The financing plan has been prepared and is as set out in the table below;

#### 16.3.1. Project Cost and Means of Finance

Table 107 presents the summary Project Cost and Means of Finance in this scenario.

**Table 107: Financing Plan**

	2010-2011	2011- 12
<b>Total Project Cost</b>	11791	11015
<b>Amount to be funded under JNNURM (Share of Central Government and State Government). This amount includes only the eligible costs, excluding land, rolling stock, etc.</b>	5895	5508
<b>Share of Central Government in eligible amount</b>	4414	4102

	2010-2011	2011- 12
<b>Total Project Cost</b>	11791	11015
<b>Share of State Government in eligible amount</b>	1481	1406
<b>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.</b>	5895	5508
<b>Budgetary Surplus of BBMP and other agencies carried forward over the years</b>	5538	6988

## 16.4. 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:

- The budgetary surplus indicated above table is the summation of all the agencies as stated in the respective projections.
- 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.
- 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.
- 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 DPR. The fund requirement would be substantiated in the financial sustainability analysis in the DPR prepared for projects being posed for JNNURM funding.

## 17. Urban Governance Framework

In the Indian context, there is no clear “owner” department or ULB for the metropolises/ megacities, 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.

### 17.1. Institutions in Bangalore

Institutions in the City are:

1. Local Authority / Elected ULB
2. Statutory Authorities and
3. Government Departments.

#### Elected ULB

BBMP (City Corporation)

#### Statutory Authorities

1. Bangalore Development Authority (BDA)
2. Bangalore Metropolitan Region Development Authority (BMRDA)
3. Bangalore Water Supply & Sewerage Board (BWSSB)
4. Bangalore Metropolitan Transport Corporation (BMTC)
5. Lake Development Authority (LDA)
6. Karnataka Slum Clearance Board (KSCB)
7. Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)
8. Bangalore International Airport Area Planning Authority (BIAAPA)
9. Bangalore Metropolitan Land Transport Authority (BMLTA)
10. Bengaluru Traffic Improvement Programme (B-TRAC)

#### 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.

#### 17.1.1. BBMP

The Bruhat Bangalore Mahanagara Palike (BBMP) (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 erstwhile BMP was merged with the 7 CMCs, 1 TMC and 110 villages to form the Bruhat Bangalore Mahanagara Palike in 2007. The Corporation area is divided into 198 wards, with elected “Councilors.”

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**17.1.2. BDA**

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.

**17.1.3. BMTC**

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.

**17.1.4. BWSSB**

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 village areas. It maintains about 6000 km. of existing water distribution lines and 4000 km. of underground sewerage lines.

**17.1.5. LDA**

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.

**17.1.6. KUIDFC**

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.

**17.1.7. KSCB**

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 in the State.

**17.1.8. BMRDA**

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.

#### **17.1.9. BIAAPA**

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.

#### **17.1.10. BMLTA**

The BMLTA was created to co-ordinate all land transport matters in Bangalore Metropolitan Region (BMR). GoK through KUIDFC initiated a Comprehensive Traffic and Transportation Plan (CTTP) for Bangalore and its peripheral areas. The Directorate of Urban Land Transport would act as the secretariat for BMLTA which is created as unified metropolitan transport authority. From the review of the CTTP and the rising demands towards easing mobility and accessibility of the BMR, the need is felt to initiate independent studies to fill certain gaps are not captured in CTTP.

#### **17.1.11. BTRAC**

B-TRAC was created to improve the traffic management in Bangalore. Since many of the arterial roads and intersections are operating at over-capacity and average journey speeds on some of the key roads in the central area is less than 10 kmph in the peak hour. Overall objective of the B-TRAC program is to reduce traffic congestion in the core area, abate the number of accidents, reduce pollution, monitor compliance of laws, and provide emergency services.

### **17.2. 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 108 shows the functional areas of various institutions, and the overlaps.

**Table 108: Functional Areas of Various Institutions**

<b>Functions</b>	<b>Agency</b>	<b>Accountability structure</b>	<b>Entries in the Lists II and III of the Seventh Schedule</b>
<b>Urban Planning including town planning</b>	BDA, BMRDA	State Government, Board	Entry 18 of List n
<b>Regulation of land-use and construction of buildings</b>	BDA, BMRDA, BBMP	State Government, Board, BBMP	Entry 18 of List II Entry 20 of List II
<b>Planning for economic and social development</b>	State Government	State Government	Entry 20 of List m
<b>Roads and bridges</b>	BDA, BBMP	State Government, Board, BBMP	Entry 13 of List II
<b>Water supply for domestic, industrial and commercial purposes</b>	BWSSB	State Government, Board	Entry 17 of List II
<b>Public health, sanitation conservancy and solid waste</b>	BWSSB (Sewerage), BBMP	State Government, Board, BBMP	Entry 6 of List II
<b>Fire services</b>	Fire Department	State Government	Entry 6 of List II
<b>Urban forestry, protection of the environment and promotion of ecological aspects</b>	Deputy Conservatory of Forests (Urban), Bangalore. Forest Department	State Government	Entry 17 of List III
<b>Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded</b>	Department of Social Welfare, Directorates	State Government	Entry 9 of List II Entry 16 of List m
<b>Slum improvement and upgradation</b>	KSCB, BDA, BBMP	State Government, Board, BBMP	Entry 6 of List II
<b>Urban poverty alleviation</b>	DMA, BBMP	State Government, BBMP	Entry 11 of List III
<b>Provision of urban amenities and facilities such as parks, gardens, playgrounds</b>	BBMP, BDA (New Layouts)	BBMP, State Government	Entry 18 of List II Entry 20 of List III
<b>Promotion of cultural, educational and aesthetic aspects</b>	Department of Kannada & Culture, Department of Education	State Government	Entries 12, 33 Of List II Entry 25 of List III
<b>Burials and burial grounds, cremations, cremation grounds and electrical crematoriums</b>	BBMP	BBMP	Entry 10 of List II

<b>Functions</b>	<b>Agency</b>	<b>Accountability structure</b>	<b>Entries in the Lists II and III of the Seventh Schedule</b>
<b>Cattle pounds: prevention of cruelty to animals.</b>	BBMP	BBMP	Entry 15 of List n Entry 17 of List III
<b>Vital statistics including registration of births and deaths.</b>	BBMP	BBMP	Entry 30 of List III
<b>Public amenities including street lighting parking lots, bus stops and public conveniences.</b>	BBMP, BDA (New Layouts)	BBMP, State Government, Board	Entry 5 of List II Entry 20 of List III
<b>Regulation of slaughter houses and tanneries.</b>	KAMPCO, BBMP	BBMP, State Government, Company	Entry 15 of List II

### 17.2.1. 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 BBMP, 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 BBMP carries out the obligatory functions to meet the related expenditure, the functioning of lights and supply of power is with the BESCO, 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 BBMP.
- Road Maintenance: Maintenance of roads is the responsibility of BBMP, 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 BBMP, 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.

### **17.2.2. 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 BBMP, 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
- 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.

## **17.3. 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.

### 17.3.1. 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.

### 17.4. 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 zonal 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
- Engineering applications.

Once these systems are in place at the 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 and 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 and 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
- The capacity of the staff engaged in the maintenance is generally lower
- 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.

## 18. Governance Structures & Reform Agenda

### 18.1. 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 which had been mooted and debated in the original CDP, are outlined in the following sections. The actual framework for implementing the Greater Bangalore concept and structure had been debated at all levels, and decided at the highest political and administrative levels. The following sections set forth four different options for institutional reorganization.

#### 18.1.1. Option 1 Greater Bangalore Concept

GoK had proposed the concept of “Greater Bangalore” – and the Bill in this regard was passed in the Legislature. The BBMP area and the 110 villages around Bangalore are 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 is 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 BBMP 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.

#### 18.1.2. Option 2 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 BBMP), 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:

1. 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
2. Promote decentralization and public participation in management of civic affairs
3. 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-statal 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.

### **18.1.3. Option 3 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:

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

## 18.2. Linking Reform under JNNURM to Development

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

- 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.
- 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.
- 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.

### 18.2.1. Implementing, Sequencing and Prioritizing Reforms

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

### **18.2.2. 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:

- BBMP 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
- Introduction of a system of e-governance using IT applications, such GIS and MIS for various services has been implemented
- Local bodies have provisionally implemented internal earmarking, budgets for basic services to the urban poor
- 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
- Urban Land Ceiling Regulation Act has been repealed
- Rent Control Laws have been reformed/modified
- Reduction of Stamp Duty is being progressively done
- Rain-water harvesting is being promoted and has been made mandatory in certain structures
- 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

### **18.2.3. JNNURM Reform Timelines**

Table 109 and Table 110 indicate the timelines for carrying out the reforms under the JNNURM program.

**Table 109: Timelines for Mandatory Reforms**

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

Source: CDP Bangalore, 2006

**Table 110: 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						

Source: CDP Bangalore, 2006

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**REVISED  
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VOLUME II**



**Jawarharlal Nehru National Urban Renewal Mission**



## ANNEXURE 1: MINUTES OF the MEETING PART A: KEY PRIORITIES OF STAKEHOLDERS

This part summarizes various meetings held among stakeholders and their key priorities;

Date	ULB	Stakeholders	Key Priorities
21-04-06	RR Nagar CMC & Kengeri TMC	<ul style="list-style-type: none"> <li>• DMA</li> <li>• KUIDFC</li> <li>• iDeCK</li> <li>• Resident Associations</li> <li>• All India Consumer Panchayat Welfare Association</li> </ul>	<ul style="list-style-type: none"> <li>• Develop road connecting to Metro Rail Station</li> <li>• Develop Ring road &amp; construct flyovers to ease traffic congestion</li> <li>• Ensure regular water supply &amp; distribution</li> <li>• Solid Waste Management &amp; Environment Protection</li> <li>• Higher capacity transportation vehicles for SWM</li> <li>• Develop lakes, parks, playgrounds, slums &amp; burial ground</li> <li>• Provide UGD and street lights</li> <li>• Improve storm water drains</li> <li>• Provide Health services in all wards</li> <li>• Provide All civic facilities for unauthorized layouts</li> <li>• Curb unauthorised land encroachment</li> <li>• Provide kalashetras for conducting cultural programmes</li> <li>• Construct stadium &amp; super market</li> </ul>
24-04-06	KR Puram CMC & Mahadeva pura CMC	<ul style="list-style-type: none"> <li>• DMA</li> <li>• KUIDFC</li> <li>• iDeCK</li> <li>• Resident Associations</li> </ul>	<ul style="list-style-type: none"> <li>• Flyover near Hanging Bridge</li> <li>• Provide health facilities, PHC</li> <li>• Provide proper UGD facility, cleaning of road side drains</li> <li>• Improve strength of roads for HTV</li> <li>• Improve Panchayat Roads &amp; local roads</li> <li>• Metro rail from Whitefield</li> <li>• ROB at Hoody</li> <li>• Stop unauthorized constructions</li> <li>• Environment Protection – Plant more trees &amp; develop parks</li> <li>• Under pass at KR Puram</li> <li>• Develop service road next to ORR</li> <li>• Regular supply of drinking water</li> <li>• Develop Ramamurthynagar Lake</li> <li>• Provide High school building &amp; fire station</li> <li>• Housing for poor</li> <li>• Stop registration of sites in green belt area</li> <li>• Stop land encroachment around lakes</li> </ul>

			<ul style="list-style-type: none"> <li>• Efficient SWM collection and transportation</li> <li>• RWH to be made compulsory</li> <li>• Speedy completion of national highway works</li> <li>• Construct overhead tank for drinking water</li> <li>• Develop slums</li> <li>• Construct commercial complexes</li> <li>• Awareness creation through NGOs</li> </ul>
26-04-06	Byatarayanapura CMC & Yelhanka CMC	<ul style="list-style-type: none"> <li>• DMA</li> <li>• KUIDFC</li> <li>• iDeCK</li> <li>• Resident Associations</li> </ul>	<ul style="list-style-type: none"> <li>• Develop roads in accordance to the requirement of multi-storied buildings (apartments)</li> <li>• Improve SWM, UGD and storm water drains</li> <li>• Create garbage dumping yard and landfill facilities</li> <li>• Develop slums</li> <li>• Provide education and health facilities for the poor</li> <li>• Stop further development of unauthorized layouts and regularize the existing unauthorized layouts</li> <li>• Develop &amp; maintain small lakes around CMC</li> <li>• Plant trees &amp; control mosquito menace to protect environment</li> <li>• Provide bus shelters, police stations &amp; playgrounds</li> </ul>
28-04-06	Dasarahalli	<ul style="list-style-type: none"> <li>• DMA</li> <li>• KUIDFC</li> <li>• iDeCK</li> <li>• Resident Associations</li> <li>• Press</li> </ul>	<ul style="list-style-type: none"> <li>• Improve SWM collection &amp; transportation</li> <li>• Improve drainage system – create box type drainage</li> <li>• Develop parks in residential areas</li> <li>• Construct flyover on NH4 and near Jalahalli circle</li> <li>• Provide service road along NH4</li> <li>• Water distribution pipeline to be provided from Hessarghatta</li> <li>• Stop encroachment of Government land</li> <li>• Develop Dasarahalli Lake – desilt</li> <li>• Provide proper drainage &amp; road widening in Dasarahalli village</li> <li>• Stop registration of sites in green belt area</li> <li>• Provide police security for the area</li> <li>• Improve GIS &amp; MIS system</li> <li>• Involve citizens in reforms</li> </ul>
06-05-06	Kasturiba Nagar	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Storm water drains</li> <li>• Housing for the poor</li> <li>• Library</li> <li>• Sanitation</li> <li>• Skywalks on Mysore Road</li> <li>• Drinking water</li> <li>• Develop inner roads and link roads that connect to the ring road</li> <li>• Provide Multi-storied parking on all main roads to ease traffic congestion</li> <li>• Widen Mysore road till Kengeri</li> <li>• Provide bus terminals in the outskirts of the City</li> </ul>

06-05-06	Bharathi Nagar	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Improve infrastructure in Government schools</li> <li>• Improve facilities at Government Hospitals</li> <li>• Family planning programmes must be imparted in all wards</li> <li>• Open yoga and Meditation Centres across all the wards</li> <li>• Address beggar's problem</li> <li>• Introduce a mini-bus exclusively for school children</li> <li>• Traffic police required near school zones</li> <li>• Improvement of roads</li> <li>• Better transportation services</li> <li>• Improve Sanitation</li> <li>• Upliftment of the poor</li> <li>• Greater transparency in implementation of projects</li> <li>• Playground for the children and youth</li> <li>• Improve garbage collection</li> <li>• Storm water drainage facilities</li> <li>• Maintenance of public toilets</li> <li>• Provide street lights</li> <li>• Improve footpaths on all roads</li> <li>• Painting the curbing stone with better quality of paints</li> <li>•</li> </ul>
06-05-06	Hombegowda Nagar	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Development of parks</li> <li>• Improve quality of roads</li> <li>• Provide better sanitation facilities</li> <li>• Storm water drains</li> <li>• Solid waste management</li> </ul>
06-05-06	Hebbal	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Improvement of roads/ footpaths</li> <li>• Maintenance of playgrounds</li> <li>• Tarring of all inner roads in the area</li> <li>• Provide road name plates</li> <li>• Mud to be removed from storm water drains</li> <li>• Provide adequate drinking water</li> <li>• Garbage pit to be removed from 10<sup>th</sup> cross (near the chewing gum factory)</li> <li>• Provide overhead roads instead of flyovers</li> <li>• Curb stray dog menace</li> <li>• Construct bridge near HMT temple</li> <li>• Pruning and cutting of trees</li> <li>• Tarring of roads in Anandanagar</li> <li>• Provide zebra crossing in Bellary road</li> <li>• Cover open drains</li> <li>• Provide water supply to all areas in the locality</li> <li>• Health officers to visit the area periodically</li> </ul>
06-05-06	Jayanagar	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Desilt all drains in the area</li> <li>• Debris on the roads should be cleared off regularly</li> <li>• Provide overhead tank for 4<sup>th</sup> T Block</li> <li>• Jayanagar General Hospital to be upgraded into a super speciality hospital</li> <li>• Removal of encroachments</li> <li>• Sulabha Shuchalayas to be provided at the north-East corner of Jayanagar General Hospital</li> <li>• BMTC Bus terminal to be constructed at the</li> </ul>

			<ul style="list-style-type: none"> <li>existing bus terminal at 4<sup>th</sup> block</li> <li>• Curb unauthorized parking of tempos and trucks on MM Industries road</li> <li>• Stop open defecation</li> </ul>
06-05-06	Banaswadi	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Subway on the ring road, 9<sup>th</sup> Main to take 2 wheelers/ pedestrian traffic</li> <li>• Provide entry and exit lanes for ring road</li> <li>• Provide service road upgradation in Rammurthy nagar, Horamvu, Babusapalya JVV junctions</li> <li>• Bus stand on 9<sup>th</sup> main ring road junction to be shifted</li> <li>• Effective waste management system – number of corporation vans to be increased</li> <li>• Mercury / sodium vapour lights on all streets and one in the corner</li> <li>• Major junctions to have multiple halogen lights</li> <li>• Humps to be painted</li> <li>• Decongesting the Banaswadi temple area</li> <li>• Make the Anjaneya temple and surrounding an important place and avoid large vehicular traffic</li> <li>• Improve OMBR road so that people use this road instead of the ring road to go to NGEF area</li> <li>• Service road near Pizza hut to be asphalted</li> <li>• 2<sup>nd</sup> cross road to be made as a bus route – some trips to be diverted</li> <li>• setting up a horticultural – nursery for plants in the area</li> <li>• Parallel movement of vehicles on ring road</li> <li>• Increase bus services to and fro Kalyan Nagar I Block</li> <li>• Widening of all roads</li> <li>• Footpaths to be provided on all major roads</li> <li>• Construction of right turn towards city on the Benninganahalli flyover</li> <li>• Linking of East and West part of Kasturinagar through under of Hyderabad Railway line</li> <li>• Development of playground and parks</li> <li>• Development of Channasandra tank &amp; Banaswadi Tank</li> <li>• Provide shopping complexes and bus shelters</li> </ul>
06-05-06	Sanjaynagar	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Provide bus stand at Bhoopasandra</li> <li>• Provide playground in Bhoopasandra / surrounding area</li> <li>• Community hall to be provided</li> <li>• Community borewell required</li> <li>• Cover rain water drains</li> <li>• Provide foot path for 60' road "Kalpana Chawala Road"</li> <li>• Clearing of construction debris</li> <li>• Drain cleaning drive to be undertaken</li> <li>• Water meters and readers can be eliminated as only minimum water is supplied</li> <li>• Road repair quality should be ensured.</li> <li>• Publicise standards, tests prescribed etc to ensure quality which can be assisted by citizens forums</li> </ul>

			<ul style="list-style-type: none"> <li>• Widen roads</li> <li>• All apartments should have their own parking spaces</li> </ul>
06-05-06	Sarvagna nagar (Cox Town)	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Tarring of colony roads</li> <li>• Desilt storm water drains and clear it of construction debris</li> <li>• Restore colony park</li> <li>• Make provision for displaying the number and Route of buses on the side as well</li> <li>• Repair connecting roads to Banaswadi main road</li> <li>• Parking for private vehicles to be provided within the company premises</li> <li>• Footpaths and drains to be improved</li> <li>• Apartment constructions should be as per approved plans</li> <li>• Give as much incentive as possible for those who harvest rain water</li> <li>• Rejuvenate borewell and also surface water levels</li> <li>• Encourage rainwater harvesting</li> <li>• Sagging wires from electric polls to be attended to</li> <li>• Public service of BTS service required from Kemanahalli – Kalyan Nagar to Indiranagar via Cox Town</li> </ul>
06-05-06	Giri Nagar	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Hospital, Market, Bus terminus, Library, Playground are essential infrastructure required for the area</li> <li>• Provide approach road from Nehru road to Banashankari</li> <li>• Storm water drains from T Block to Girinagar</li> <li>• New culverts required</li> <li>• Good quality of roads</li> <li>• Footpaths and streetlights required</li> </ul>
06-05-06	Chandra Layout	Representatives of resident groups, BMP, IdeCK, members of public agencies	<ul style="list-style-type: none"> <li>• Provide water supply to all areas</li> <li>• Improve drainage system</li> <li>• Garbage collection methods to be enhanced</li> <li>• Periodic de-silting of drains is a must</li> <li>• Approach roads to be provided</li> <li>• Arrack shops to be removed</li> <li>• Drainage to be cleaned and slabs to be put</li> <li>• Civic amenities to be provided – BMTCL, Bus / Shelter stop, Hospital, Market, Library, Reading Room</li> <li>• Provide street lights</li> <li>• Improve sanitation</li> <li>• Ensure cleanliness of drainage</li> </ul>

## **PART B: PROCEEDINGS OF VARIOUS MEETINGS**

This part highlights Proceedings of the Stakeholders' Meeting held on 21.04.2006 at 4.00 P.M. in Subhash Bhavan for Rajarajeswari Nagar CMC & Kengeri TMC.

### **PROCEEDINGS OF THE STAKEHOLDERS' MEETING HELD ON 21.04.2006 AT 4.00 P.M. IN SUBHASH BHAVAN FOR RAJARAJESWARI NAGAR CMC & KENGERI TMC.**

#### **Officials Present from DMA, KUIDFC & iDeCK.**

#### **Questions posed and suggestions given by Residents & Members.**

1. *Manjunath, Member, Kengeri TMC.*

Will you develop Slums around lakes & develop lakes?

*Reply by Nandan kumar:*

There are 2 types of slums. One is a declared slum & another is undeclared slum. In this scheme only the declared slums will be developed.

2. *Sathyannarayana, Member, Kengeri TMC.*

How will TMC contribute the 50% of the fund required? When will these schemes be implemented? It is good to make information public.

1. *Reply by Shivshankar*

This project can be successfully implemented if the public pays their taxes promptly.

3. *Shantappa.*

Will the fund provide for land acquisition?

4. *SK Baig, Member, Nagarabhavi Resident Association*

SWM & Environment protection will not be successful without Public participation. To involve public it is necessary to conduct awareness programmes.

5. *Smt Lalitha Prasad, Member, Kengeri TMC*

At present the connecting road between Magadi and the Ring Road is not being developed and maintained. Can this be included in the project?

2. *Reply by Shivshankar*

Yes. This can be taken up in the project.

6. *J B Naik, Member, Nagarabavi Resident Association*

At the time of forming the Layout in 1994, BDA had promised to provide water and develop the roads, but unfortunately nothing has been done so far. Even in the five year plan a lot was promised but nothing has materialised.

3. *Reply by*

Yes. This will be taken up in this scheme.

7. *Devandra Jain, President, Nagarabavi Residents' Association.*

4. The projects under this scheme should include development of lakes, parks and preventing encroachment of vacant Government land.

8. *Sheshadri, Member, All India Consumer Panchayat Welfare Association*

Bangalore is referred to as a Hi-tech city and should be upgraded to that status. To commute a distance of 50 km the Metro project should be sanctioned. The Metro Rail is an important project. I request you to make Bangalore a truly international City.

9. *Sushilendra Kumar, Secretary, Child Organization, BEML layout.*

People's participation is crucial for the success of developmental programmes, GIS should be used as a means to provide timely and accurate information to the people. Improvement of burial grounds and development of slums should form a part of this project.

10. *Kashinath Sastry, Member, Udaya Nagar Resident Welfare Association.*

GBWS – is it included in NURM? The water distribution network needs to be improved. Will there be any other corporations for water distribution?

11. *Narayana Swamy, People Awareness Stage, Kengeri.*

There is no playground, park, market or good roads in our locality. Will they be developed under this scheme?

12. *Sudhir, Member, Kengeri TMC*

The private layouts that are coming up around Bangalore grossly violate Government norms by not leaving any space for parking & developing roads, which are not to the prescribed norms. Also there are no burial grounds & playgrounds being planned now. After 20 years there will be no place available in the City, so what is the action being taken in this programme to deal with this situation?

13. *Ramachandra, Member, RR Nagar CMC*  
Construct stadiums, flyover, super markets and provide garbage dumping site & storm water drains.
14. *Mallikarjuna, People Awareness Stage, Ullala*  
Implementation of a one-time taxation can be considered (i.e. all the taxes to be collected by single agency - CMC).
15. *MR Narendra Babu, Chickkalasandra, Bank Colony, Resident Association*  
Request you to provide all facilities for unauthorized layouts. This includes UGD, water, etc. SWM transportation vehicles with larger capacity need to be provided. Security for residents needs to be ensured by providing streetlights. People's participation should be encouraged in all activities.
16. *Padmanabha Rao, Ideal Homes Resident Welfare Association*  
Satellite towns may be planned around Bangalore.
17. *Meera Rao, Secretary, Ideal Homes Resident Welfare Association*  
Provide ward-wise health services (Hospitals to be provided).
18. *Krishnappa*  
Improve storm water drains in the valley.



**PROCEEDINGS OF THE STAKEHOLDERS' MEETING HELD ON 24.04.2006 AT 4.00 P.M. AT SATHYA KALYANA MANTAP, OF MAHADEVAPURA CMC & KRISHNARAJAPURAM CMC.**

**Officials Present from DMA, KUIDFC & iDeCK.**

**Questions posed and suggestions given by Residents & Members.**

1. *Prasad, Member, CMC Mahadevapura*

Metro Rail should start from Whitefield. A flyover needs to be constructed near the Hanging Bridge ROB at Hoody. Also Panchayat Roads need to be improved. The strength of the roads needs to be improved to withstand heavy goods traffic. The amount collected by way of stamp duty should be made available to the CMC.

National Highway works have been started but when is it likely to be completed? Building of houses in the Green belt area should not be encouraged. An approach road is required from KR Puram to Mahadevapura. (Flyover may be built near the Hanging Bridge).

2. *Ramappa*

Unauthorized construction should be stalled. More trees should be planted and parks should be developed to protect our environment.

3. *Shivaraj*

When is this scheme going to be launched and when is it likely to be completed? An underpass needs to be constructed at KR Puram. A service road is also required along the Outer Ring Road.

4. *Anjanappa*

Health facilities need to be developed. Drinking water and UGD should be provided. Develop Ramamurthy Nagar Lake.

5. *Shama Rao*

Decentralization of power is recommended. Primary Health Center & High Schools need to be constructed.

6. *Amrutharaj*

Registration of sites should be stopped in the green belt area.

7. *Baburao Nekundi*

Roads need to be developed. A fire station and Bus shelter should be provided. Drainages need to be widened.

8. *Prakash Reddy*

Develop UGD and Lakes. New roads need to be developed in new layouts (Unauthorised). New schemes should be developed for the benefit of poor people, like providing houses. Encroachment of land near lakes should be stopped.

9. *Rama Rao*

Rain water harvesting needs to be made compulsory. Awareness classes can be conducted through NGOs. Local roads leading to main roads need to be developed. Drainages along roads need to be cleaned regularly and the waste needs to be transported. SWM collection and transportation needs improvement.

10. *I.S.Patil*

Land ceiling act to be brought back.

11. *Sumati Bai.*

Valleys and UGD need to be developed. An overhead tank needs to be constructed for drinking water. Improvement of Slums & construction of commercial complexes needs to be undertaken.

**PROCEEDINGS OF THE STAKE HOLDERS MEETING HELD ON 26.04.2006 AT 4.00 P.M.  
AT GANGADARESHWARA KALYANA MANTAP, FOR BYATARAYANAPURA CMC &  
YELHANKA CMC.**

**Officials Present from DMA, KUIDFC & iDeCK.**

**Questions posed and suggestions given by Residents & Members.**

1. *SV Gururaj, Yelahanka*

Roads need to be developed according to the requirements of Multistoried buildings (Apartments). UGD and storm water drains need to be improved. An agency needs to be Create an agency to coordinate with all service providers (KPRTCL, BWSSB, DOT etc...). This could help in preventing the digging of newly laid roads.

2. *Ramesh Yelhanka*

Further development of un-authorized layouts need to be stopped. CMCs need to be given more administrative powers. Basic infrastructure facilities need to be provided even to un-authorized layouts. As the CMCs are short of funds for implementing development project, all the money accrued from stamp duty needs to be passed on to the CMCs.

3. *Ganesh, Byatarayanapura*

Improvement of SWM & UGD to be included in the project.

4. *Ramesh Byatarayanapura.*

Education and health services need to be provided for the poor.

5. *Gururaj*

SWM, drinking water and landfill facilities need to be provided. A separate agency may be created to coordinate with various service providing departments i.e road cutting , cleaning of drains & transportation of waste materials. Mobile squads can be deputed to check road cutting. Education and basic services need to be provided to the slum dwellers and at the same time the growth of slums need to be checked. Small lakes surrounding this CMC can be developed and maintained. More trees need to be planted in the layout. Unauthorized layouts may be regularized. Collected taxes can be passed on to the CMCs for carrying out developmental activities. Mosquito menace has to be controlled.

6. *Manjula, Vice President*

Lakes need to be maintained properly as it contaminates the bore well around the lake. The flow of sewerage water to the lakes should be stopped.

7. *Parvathamma Rajagopal*

Storm water drains need to be cleaned regularly. Drinking water to be provided for all.

8. *Jagannath*

Bus shelters and police stations need to be provided. Encroachment of government land should be stopped. Playgrounds need to be developed.

**PROCEEDINGS OF THE STAKEHOLDERS' MEETING HELD ON 28.04.2006 AT 4.00 P.M.  
AT PEENYA INDUSTRIAL ASSOCIATION AUDITORIUM, PEENYA FOR DASARAHALLI CMC,  
BANGALORE**

**Officials Present from DMA, KUIDFC & iDeCK.**

**Questions posed and suggestions given by Residents & Members.**

1. *M Srinivas, Press Editor*

Revolving fund mentioned in the presentation to be clarified. When will this scheme start? Is it after 7 years? Details of Rent Control Act to be provided.

2. *G. Ganapathy, NGO*

Residential layouts to be developed for persons working in industrial areas. SWM to be provided. Parks need to be developed. Water distribution pipeline to be provided from Hessarghatta. Encroachment of government land needs to be stopped. A flyover is required to be constructed on NH4. Service road is required along NH4.

3. *K. Lakshman Rao, Bank Manager, Indian Bank, Peenya*

Development of roads, parks and lakes. SWM and transportation facilities needs to be improved. Social Committees may be formed to oversee all development activities.

4. *Gangaraju*

Dasarahalli and Nagasandra lakes needs to be developed. Proper drainage facilities to be provided for Dasarahalli village. Roads need to be improved in the village to ease traffic jams. A flyover is required near Jalahalli Circle. Construction activities need to be stopped in the radius of 2.5 km around the lake.

5. *Narasimhaiah, Secretary, Lions' Club, Peenya*

Details of this programme can be disseminated by way of hand bills. Registration of sites should be stopped in the green belt area.

6. *S.V. Narayanan, President, Lions' Club International, Peenya, Dasarahalli*

Create box type drainage to avoid road cuttings. Drainage system needs to be improved. Good planning is required for efficient utilization of funds provided in this scheme.

7. *Ashok, Chairman, Dasarahalli CMC*

Dasarahalli lake can be developed by way of desilting the lake. Markets, parks, playgrounds and satellite townships need to be developed. Roads and satellite towns should be developed to decongest Bangalore. Improve security (police department) facilities. GIS and MIS systems are to be put in place. Citizens must be involved in developing reforms.

**PROCEEDINGS OF STAKEHOLDER MEETING HELD ON 26-06-09 AT 11:00 AM AT BBMP ZONAL OFFICE AT RAJARAJESHWARI NAGAR**

**Officials of BBMP, KUIDFC and iDeCK present**

**Questions posed and suggestions given by Residents and members**

**Hanumantha, Uttarahalli Panchayat**

What are the developments undertaken by the government for housing of the BPL/ slums?

An amount of Rs. 3 lakhs per house has been earmarked for development of houses for the BPL and slum population. The plan is to make available houses in (G+3) model. The beneficiary is to invest 10% of the total cost of development. The Central government would invest 50% of the costs and the balance 40% cost would be borne by the State government. Such model has been already adopted in Kalyani Nagar slum.

**Ramesh, Subramanyapura Gram Panchayat**

Would all the population in the slum adhere to the plan? How would the government handle all the chaos?

There would be chaos in removal of slums and construction of new houses for the inhabitants. The slum population would be given an option whether they would want to inhabit the new houses constructed in the same area of the slums or would they be willing to relocate to some other place. Based on the feedback, action would be taken accordingly. This would reduce the chaos

**Siddappa, Srinivasapura Colony**

Are title deeds required for verification for being a part of the slum population?

A biometric card is being proposed for the all the slum population on the basis of which they would be identified. The slum board would otherwise have all the information which is required for identification. Title deeds are not always mandatory to be produced for verification.

**Srinivas, Uttarahalli Gram Panchayat**

Please provide clarity on property tax.

The property tax for any property would depend on the category of property whether it falls under A, B, C, D or E

**Vijayakumar, STP Member**

The overhead tanks in the area will have to be cleaned periodically. Action ought to be taken in this regard.

The same was made note of by the BBMP authorities.

**Ramamurthy, Hulikere Gram Panachayat**

There is not sewerage facility in the area and it is of utmost significance. The sewerage water is drained into the lakes and on the streets.

For development of storm water drains for the entire RR Nagar area, a DPR has been prepared and is submitted to Centre for its approval. On approval of the same, Rs. 1.42 Crores would be sanctioned for the said purpose. Plans are to connect the storm water drains to the Vrushabhavathi valley.

**Nanjappa, R R Nagar**

There is an immediate requirement to stop the illegal constructions in the area. The BBMP is required to take proactive action and restrain such developments rather than go for demolishing the construction on development.

BBMP is taking proactive actions in this regard and shall not allow the illegal constructions to come up in the area.

**Bassappa, Former Panchayat Member**

Is it possible that all the undertaken projects by agencies, its status of development, proposed plan, investments made with regard to the same be displayed for the benefit of the public?

The display of information on ongoing projects can be displayed for the benefit of the common public.



**PROCEEDINGS OF STAKEHOLDER MEETING HELD ON 30-06-09 AT 3:00 PM AT BBMP ZONAL OFFICE AT DASARAHALLI**

**Officials of BBMP, KUIDFC and iDeCK present**

**Questions posed and suggestions given by Residents and members**

**Udayakumar, Dasarahalli**

What are the plans for slums under JnNURM?

This is covered under the category of basic services to the urban poor. The JnNURM scheme provides the urban poor/ slums with houses.

**Krishnappa, Bagala Gunte**

The CDP is to be made available for the villages

It is a public document hence is to be made available at the BBMP office

**Dasappa, Shivapura**

Clarity on housing for slums

50% funding by Central government, 40% by the State and the balance 10% to be contributed by the beneficiary

**Dr. Vijayakumar, Rajagopalnagar**

The priority sectors in the order are:

Water Supply

Sewerage

Roads

Stormwater Drains

**L N Singh, Laggare**

Roads are prime issue in the area, connectivity being the prime problem

**Prassanna Kumar, Dasarahalli lake**

Rejuvenation of the Dasarahalli lake to be taken into account

**Dayananda, Chikkasandra**

Water conservation is of significance, in spite of having borewells, there are no laid pipeline connections in the area.

**PROCEEDINGS OF STAKEHOLDER MEETING HELD ON 1-07-09 AT 3:00 PM AT BBMP  
ZONAL OFFICE AT MAHADEVAPURA**

**Officials of BBMP, KUIDFC and iDeCK present**

**Questions posed and suggestions given by Residents and members**

**Venugopal, Ramagundahalli**

Drinking water is the prime issue in the area especially with regard to bulk water supply

**Marappa, Vidyanagar**

Storm water drains and UGD is issue

**Geetha, Annasandrapalya**

Sanitation and Sewerage is an issue

**Naveen Prakash**

UGD is the prime issue

**Srinivasa, Chennasandra**

Drinking water and UGD

**Laxmi Reddy**

Roads, water supply and UGD. Demand for a flyover towards the Airport Road required in the area

**Shanthamma. Ashwathnagar**

UGD is an issue

**Narayanaswami, Mahadevpura**

Rejuvenation of lakes required in the area

**Pilla Reddy, Marthahalli**

What are the plans for slums under JnNURM?

This is covered under the category of basic services to the urban poor. The JnNURM scheme provides the urban poor/ slums with houses.

**Devaraj, Mahadevapura**

Clarity on housing for slums

50% funding by Central government, 40% by the State and the balance 10% to be contributed by the beneficiary

**PROCEEDINGS OF STAKEHOLDER MEETING HELD ON 2-07-09 AT 3:00 PM AT BBMP  
ZONAL OFFICE AT BYTARAYANAPURA**

**Officials of BBMP, KUIDFC and iDeCK present**

**Questions posed and suggestions given by Residents and members**

**Lokesh, Aananthapura**

What are the plans for slums under JnNURM?

This is covered under the category of basic services to the urban poor. The JnNURM scheme provides the urban poor/ slums with houses.

**Satish, Basavalingappanagar**

Clarity on housing for slums

50% funding by Central government, 40% by the State and the balance 10% to be contributed by the beneficiary

**Shivkumar, Nagenahalli, Yelhanka**

Solid waste management is the issue

There are 39 lakes in the area. The prime issues are

UGD

Water Supply and Sanitation

**Dasappa, Saariapalya**

Sanitation and sewerage is the major issue

**Rajanna, Puttenahalli**

Rejuvenation of Puttenahalli tank

**Anappa, Kenchanahalli**

Priorities are:

UGD and Sanitation

SWM

Water Supply system

Rejuvenate the Yelahanka lake

**Sunil Kumar, Dasarahalli**

Lake development and road development. Then, UGD

**Theertha Prasad, Doddaettahalli**

The key issues are UGD, roads, park development, play grounds and SWM

**PROCEEDINGS OF STAKEHOLDER MEETING HELD ON 1-07-09 AT 3:00 PM AT BBMP  
ZONAL OFFICE AT BOMMANAHALLI**

**Officials of BBMP, KUIDFC and iDeCK present**

**Questions posed and suggestions given by Residents and members**

**K. Jagannath, Bellandoor**

Issues are UGD, clogging of lakes and contaminated water supply

**Janardhan Reddy, Bellandoor**

Roads are prime requirements and lake rejuvenation is required

**Chikkamainappa, Kudlur**

UGD and water supply required

**MB Shenoy, Lobonangar, Bankers Colony**

The priority wise infrastructure requirements are the following;

UGD

Storm water drain

Road

Park Development

**M. Ravindra, Doddakalasangra**

UGD, Sewerage and roads required. Burial grounds are also required, free from encroachments

**Sampangi, Bommanahalli**

Lake development and stop clogging of sewerage in the drains

**Keshavaraju, Parappanagar**

The requirements in the zone are Storm water drains, roads and provision for burial grounds required

**Rajgopal, Doddakenahalli**

Water supply, UGD, stray dog menace and development of lakes

**Vasantharaju, Gottigere**

Issues of improper land survey

**Laxmeendra, Jeevasandra**

Water supply and lake development and restoration

## ANNEXURE 2: CITIZEN’S PERSPECTIVE

### II Citizen polls

A series of polls were conducted by the Bangalore Agenda Task Force during 2001 - 2004. These were third party researches, carried out by a professional research agency and the results of the poll were a barometer of the success of various initiatives and whether there was an overall impact on the development of the city. Initially the polls were conducted six monthly, and around two years into the initiative, it was felt that a larger period between polls was needed to gauge the improvements over a larger span of time to remove bias due to ongoing projects. Thus after September 2001, a poll was conducted in February 2003, which gauged the improvement in the city with respect to the last poll, and also over the last three years.

The results of the polls provide an insight into the way citizens perceived the problems and agency performance. This section provides a summary of the various polls.

#### 1.1.1 a. Baseline Poll - January 2000

##### Problem Priority Index (PPI)

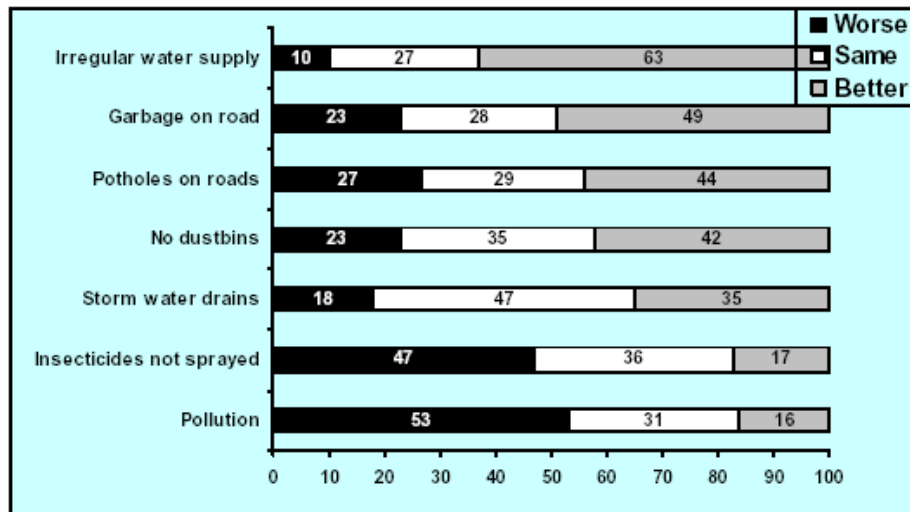
A study was undertaken in January 2000 to prioritize the various Bangalore City problems from the viewpoint of the public. The study sought to identify few critical problems solutions, which would substantially reduce public dissatisfaction with Bangalore City, BMP and other civic agencies. The problems that were prioritized for immediate action are presented in the table below:

Citizen's Perspectives – Problem Priority Index (PPI)		
S.No	Problems	PPI
1	Potholes on road	27
2	Insecticide not sprayed	26
3	Garbage on road	25
4	Storm water drainage	25
5	No dustbins	23
6	Pollution	19
7	Public toilets	19
8	Inadequate water supply	17
9	Water supplied not good	16

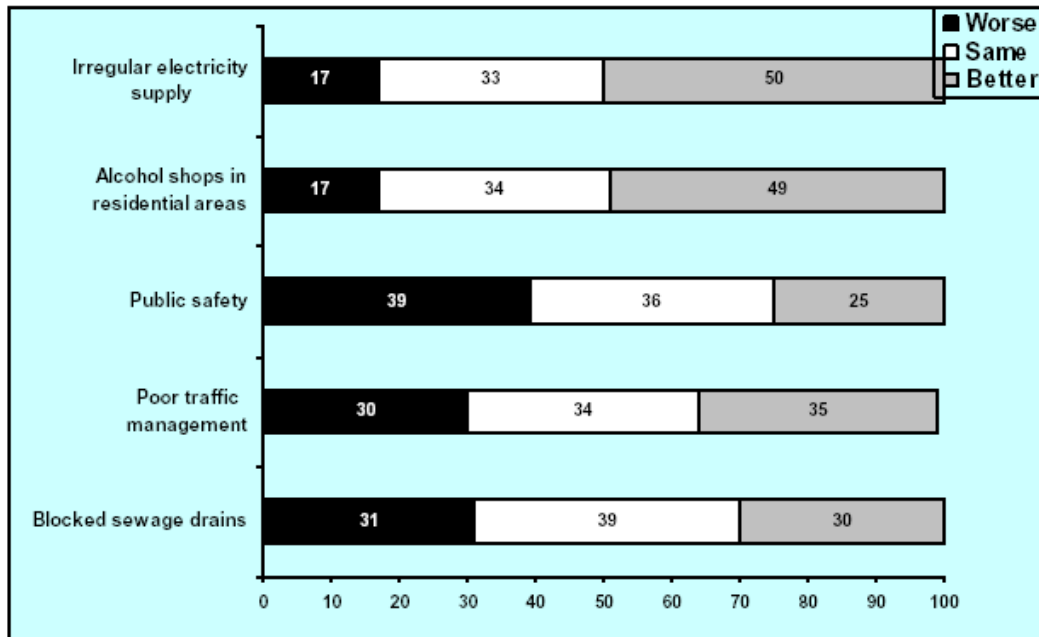
10	Stray dogs on roads	13
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b. *Poll - July 2000*

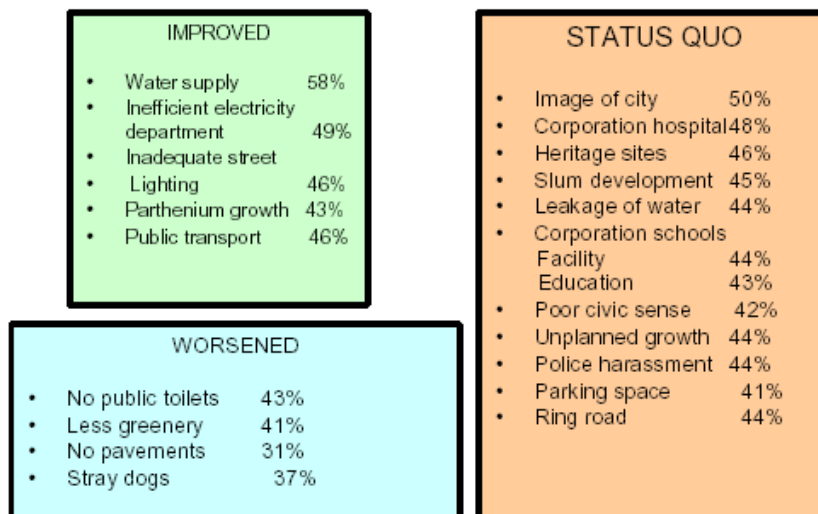
A follow-up survey to the baseline poll mentioned above was conducted in July 2000. About 613 residents of Bangalore were spoken to in this survey. Their opinion on improvement (or worsening) on various infrastructure and civic amenities related problems in the past six months was ascertained. The specific problems and the perceived changes are shown in the graph below:

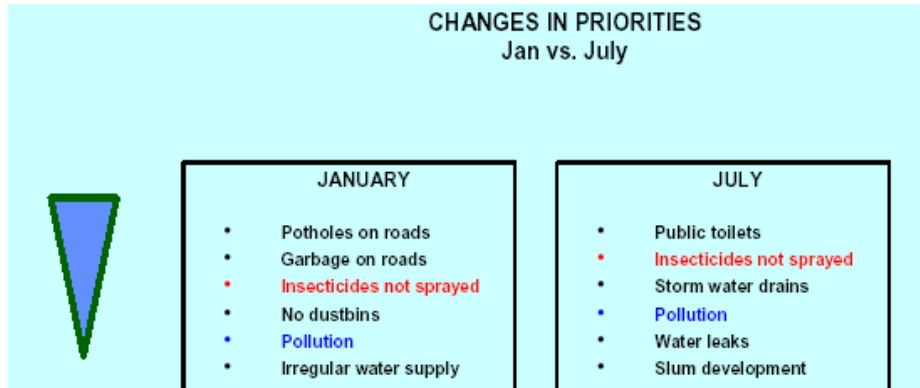


The changes perceived in other problems are shown below: Except for better electricity supply and fewer alcohol shops in residential localities, citizens see little improvement in critical problems.



The changes in priorities of various problems as perceived by the public between January 2000 and July 2000 are depicted below (from more important to less important):



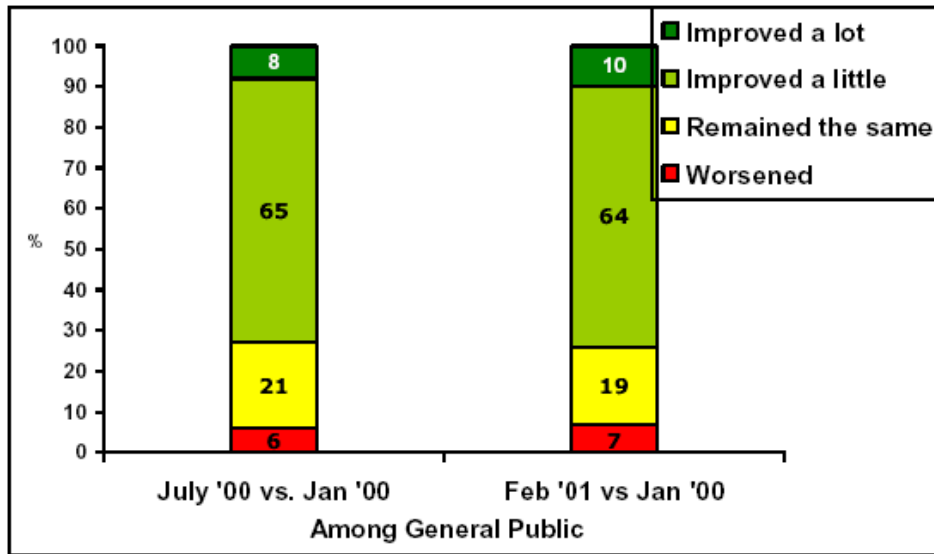


*Poll results showing the improvements on several critical services*



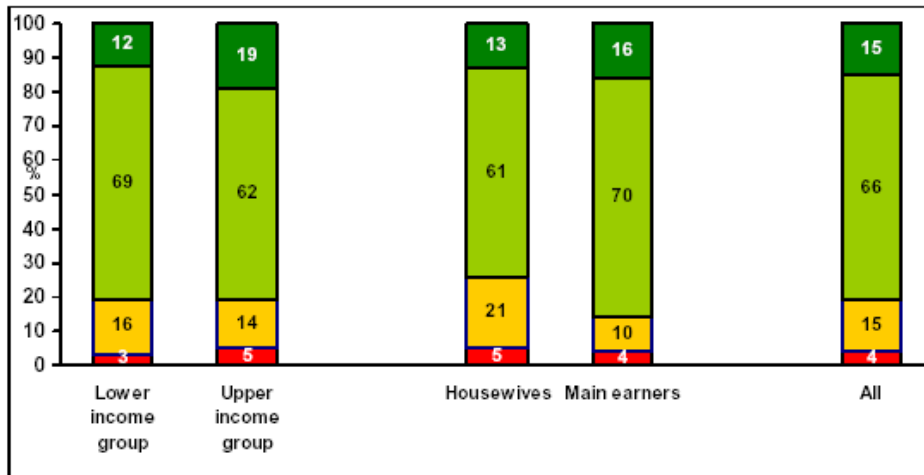
The chart below depicts an overall comparative status of civic services. Public perception of “a little improvement” has been sustained over six months, between July 2000 and February 2001.





c. *Poll – February 2001*

The following table shows the prime public concerns to be addressed in the future.



d. *Poll – September 2001*

This Report Card brought out in September 2001, indicates that Bangalore is moving forward continuously and steadily.

Citizens' concerns on various civic agencies and problems in 2001 are listed below:

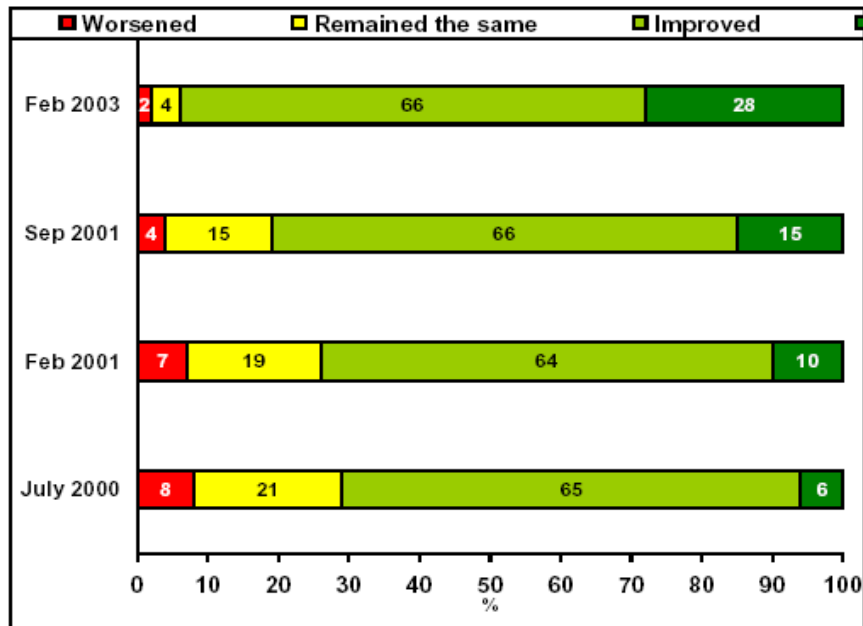
## CURRENT CITIZEN CONCERNS

<b>BMP</b>	Insecticides not sprayed, No slum improvement	<b>42%</b>
<b>BDA</b>	Insufficient road width & inadequacy of civic amenities in new layouts	<b>50%</b>
<b>BMTC</b>	Polluting buses, Irregular bus timings	<b>33%</b>
<b>BWSSB</b>	Irregular water supply, Water quality	<b>47%</b>
<b>KPTCL</b>	Irregular power supply, queues for bills	<b>38%</b>
<b>Police</b>	Increase in crime rate, poor traffic management	<b>31%</b>
<b>Telephones</b>	Delay in getting connections, lines not working	<b>43%</b>

e. Poll – February 2003

Ninety four per cent of the respondents indicated that Bangalore was better off in 2003 than earlier. They stated that there was an improvement in the city's infrastructure and civic amenities compared to a year ago. Of the 94%, 28% said there had been "a lot of improvement". The public has noticed "strong and steady improvement" over three years.

In July 2000, 71% of those polled had stated there was improvement, in Feb 2001 the figure was 74% and in September 2001, it was 81% (as compared to the 94% in Feb 2003).

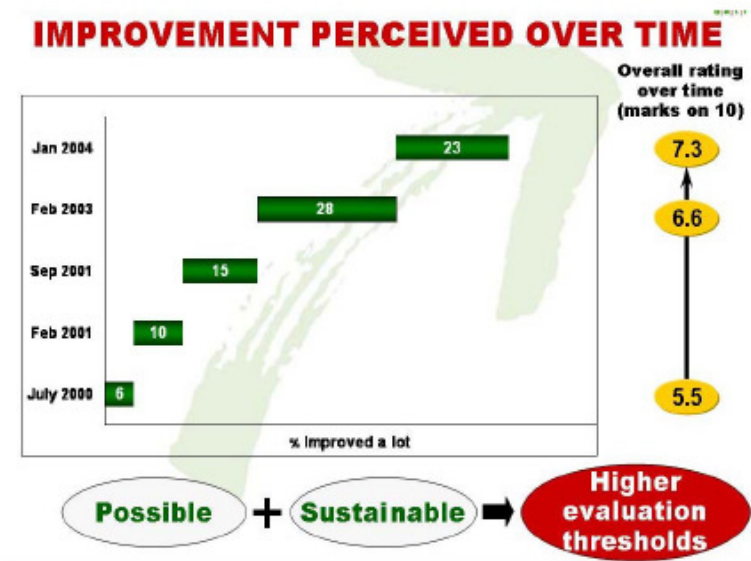


## THE VISIBLE IMPROVEMENTS



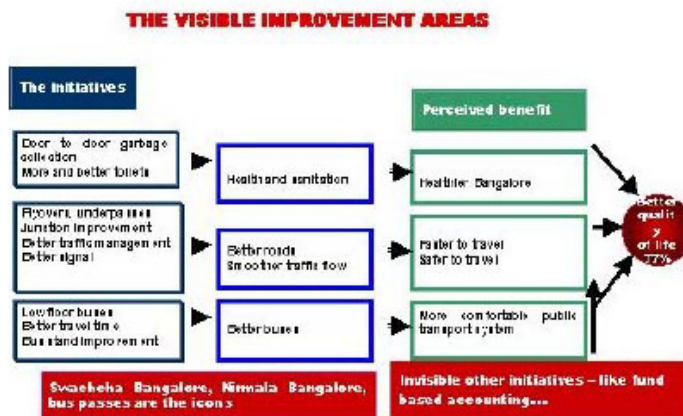
Simultaneously, the percentage of respondents who felt that the city has “improved a lot” has also been increasing, from 6% in July 2000 to 28% in Feb 2003. The following is a progress chart depicting the perceptions of the public between July 2000 and February 2003. Bangaloreans see an increased pace in progress.

The visible improvement areas and services as perceived by the public are shown in the chart below:



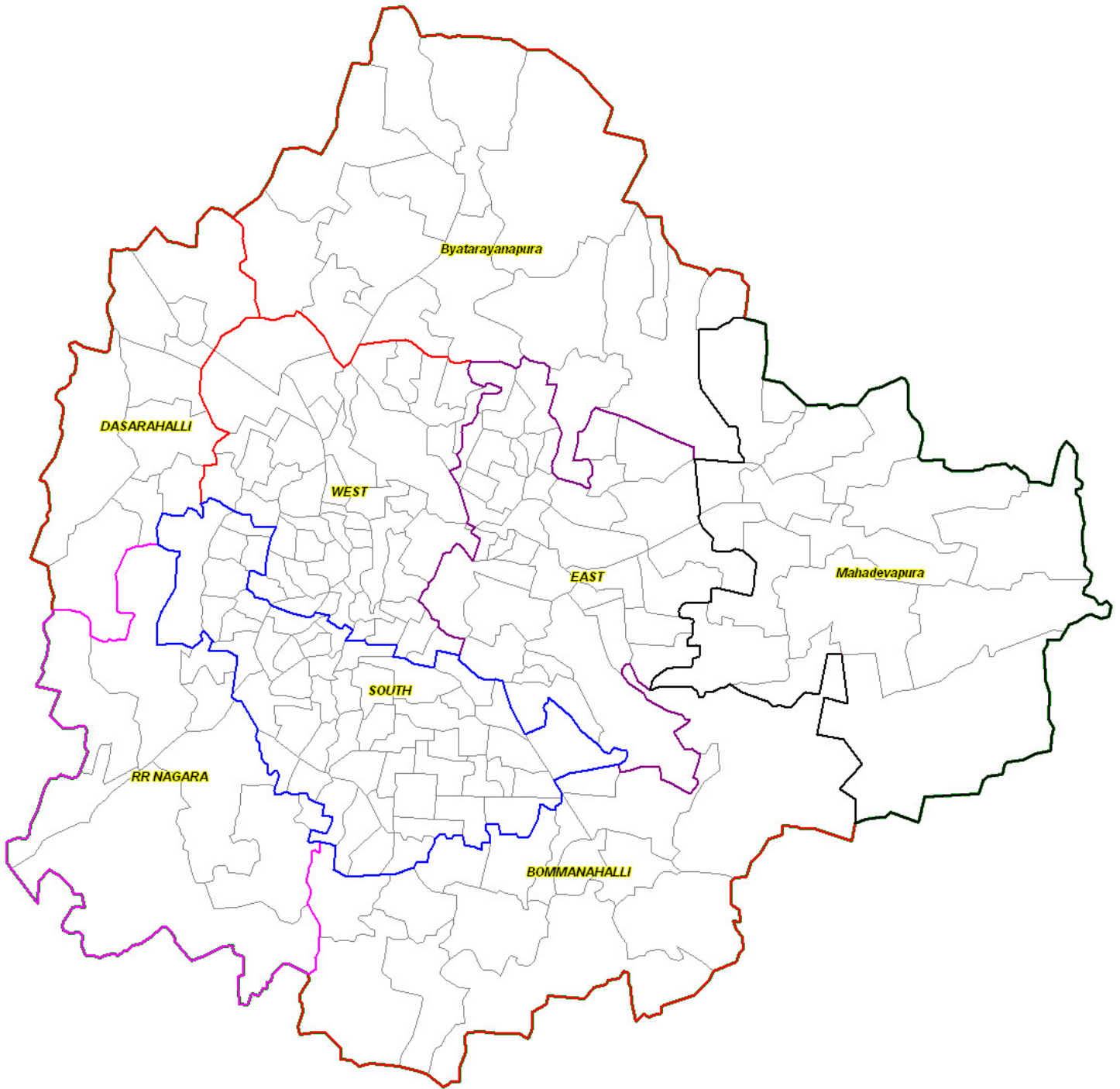
f. Poll – January 2004

The Bangalore City Report Card brought out in January 2004 tracks the improvement in perceptions of the public between July 2000 and January 2004. The overall rating (marks on 10) has gradually improved from 5.5 in July 2000 to 7.3 in January 2004.

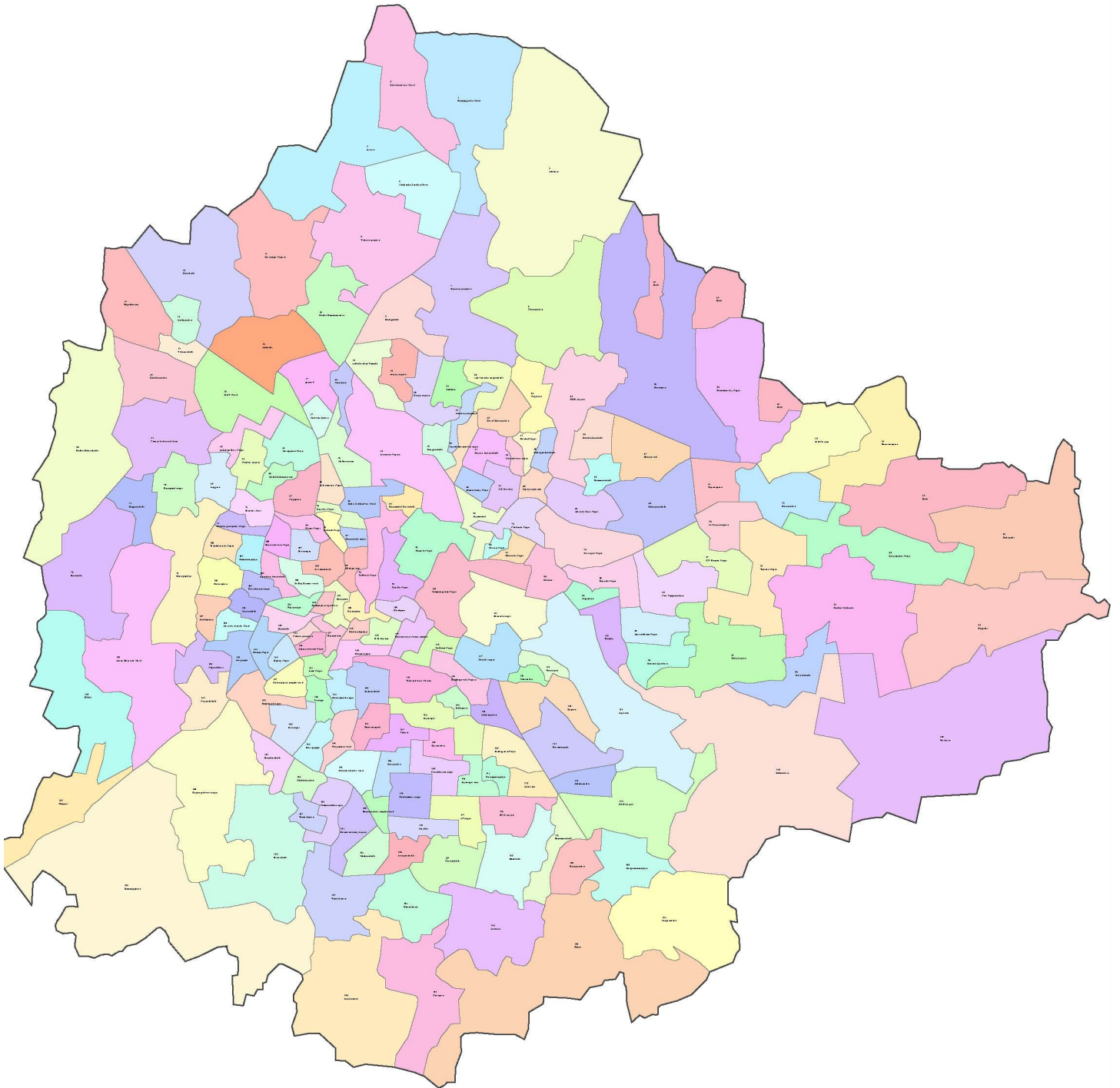


About 77 per cent of the surveyed public seem to agree that there is an improvement in the quality of life in the City. The various initiatives of the civic agencies, the improvement areas and the perceived benefits that have contributed to an improved quality of life for the city residents are depicted in the chart below:

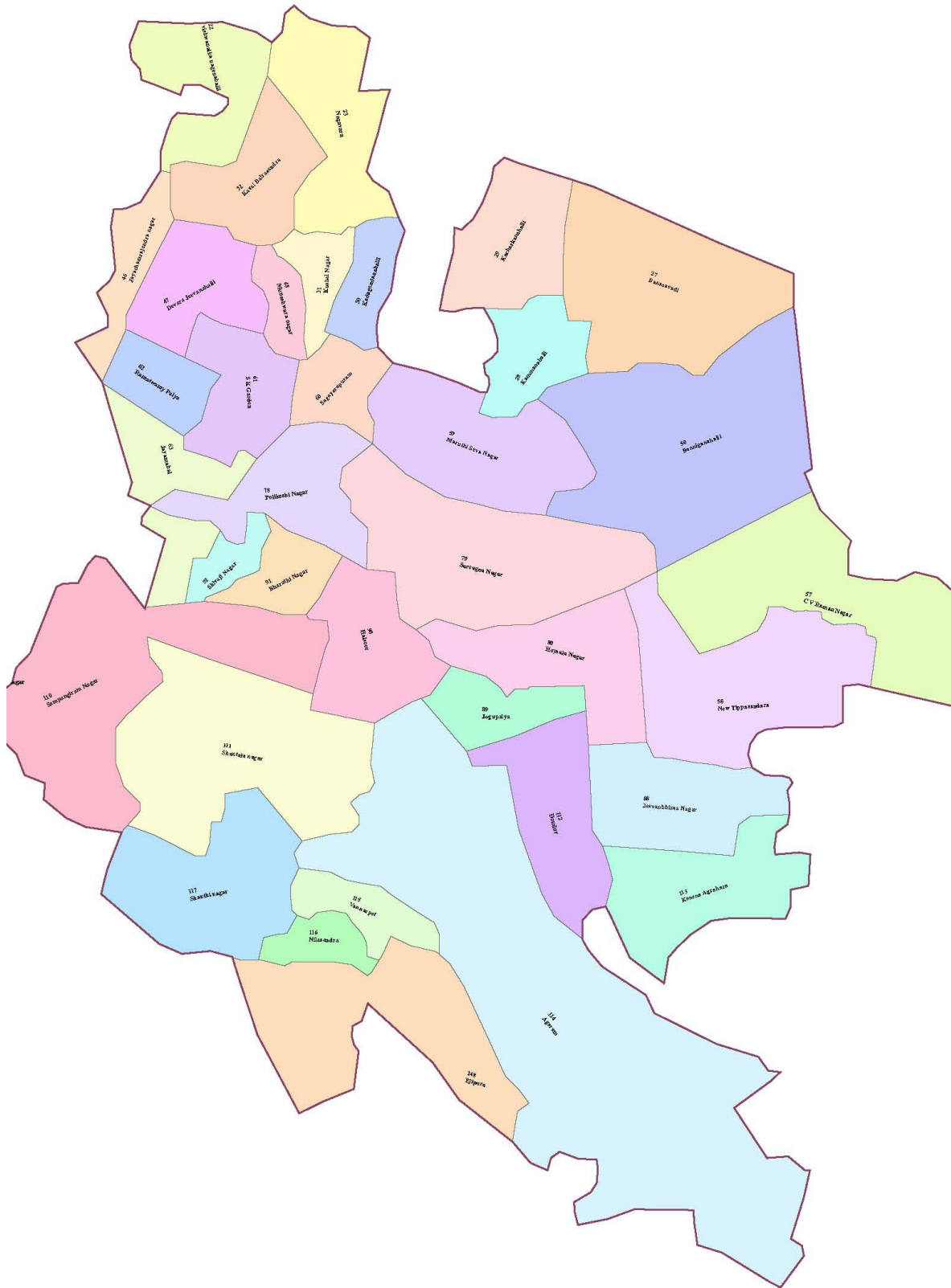
### ANNEXURE 3: MAPS OF BBMP BBMP ZONAL MAP



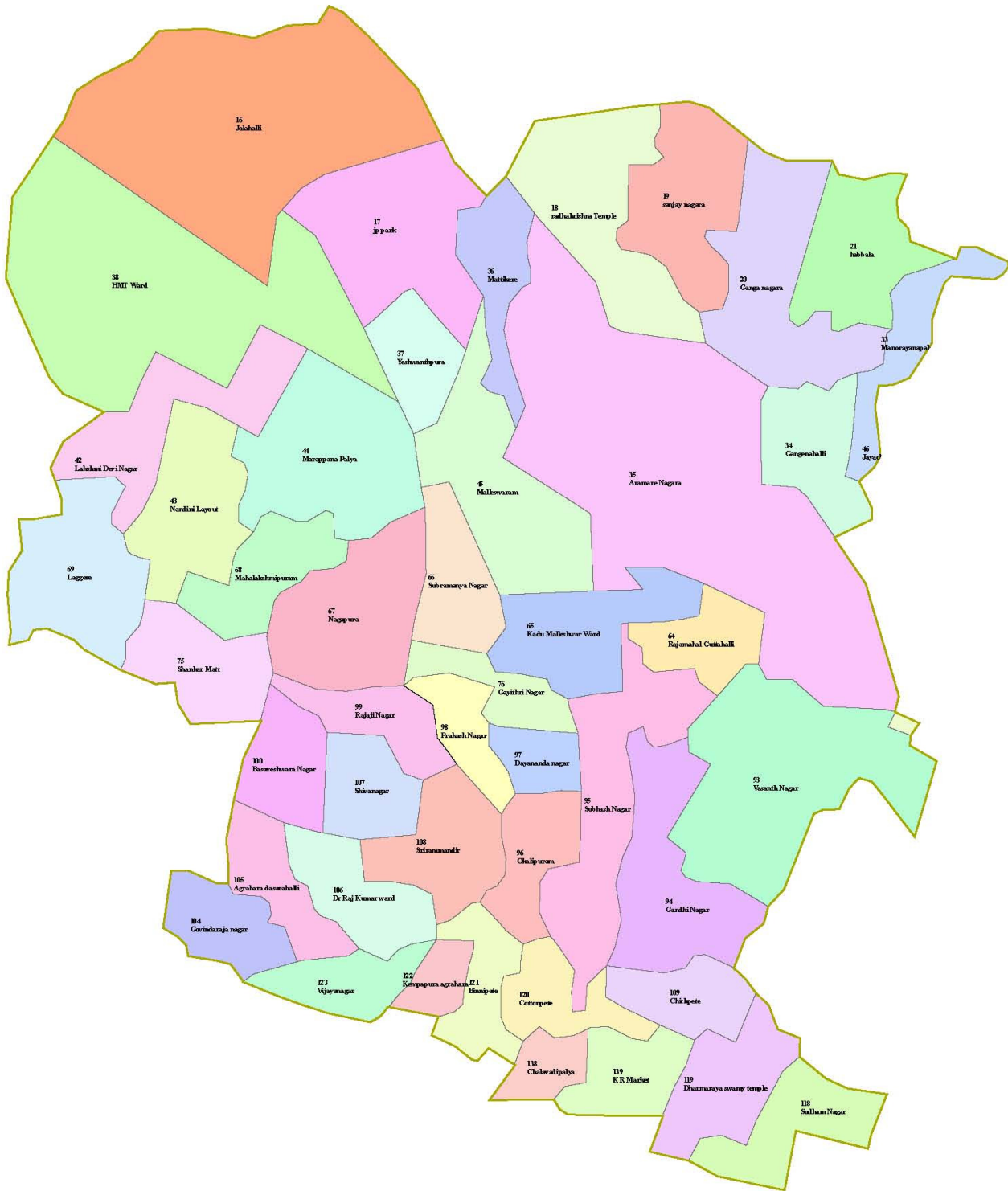
## BBMP WARD MAP



## BBMP - EAST ZONE

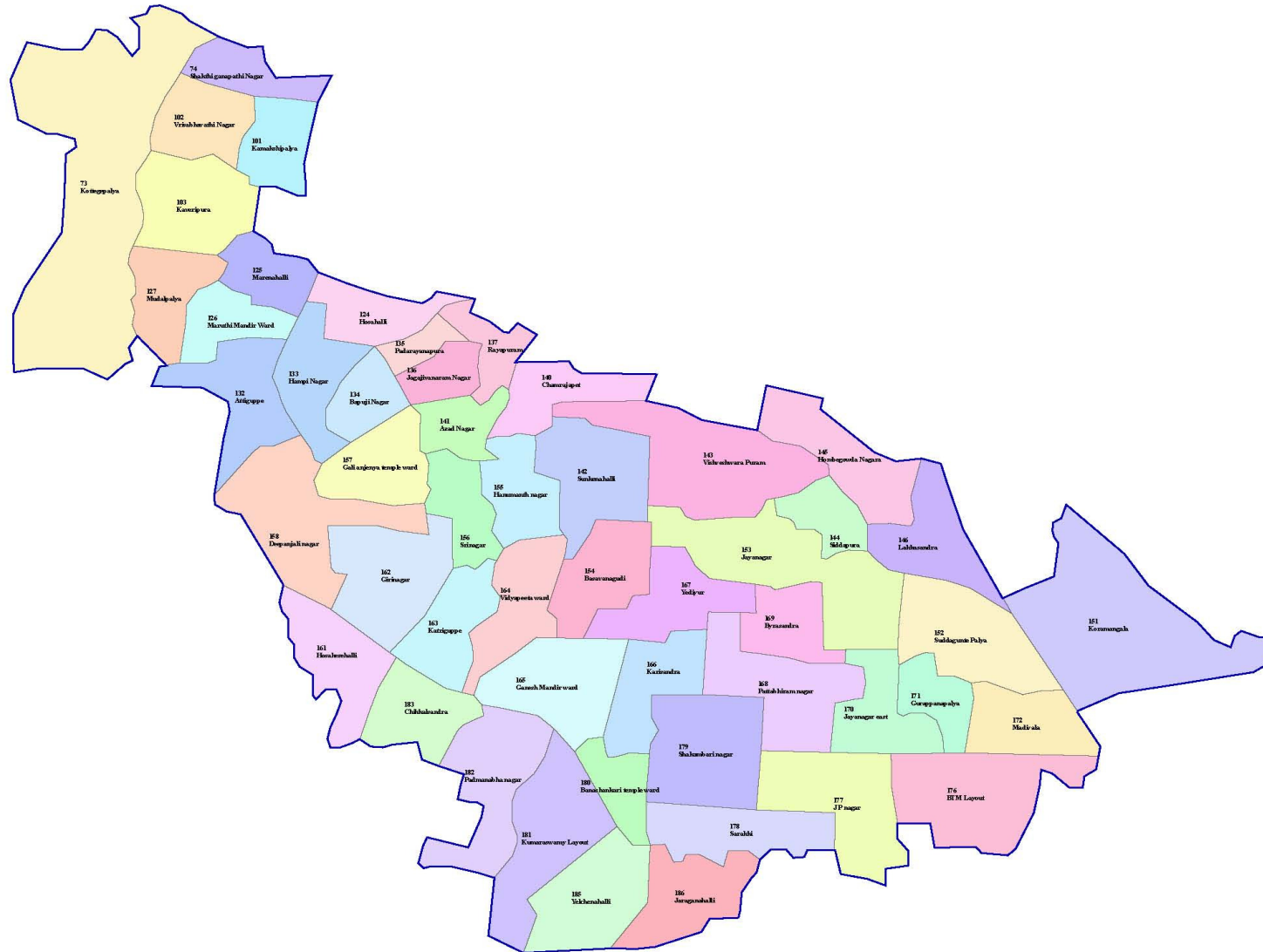


## BBMP - WEST ZONE

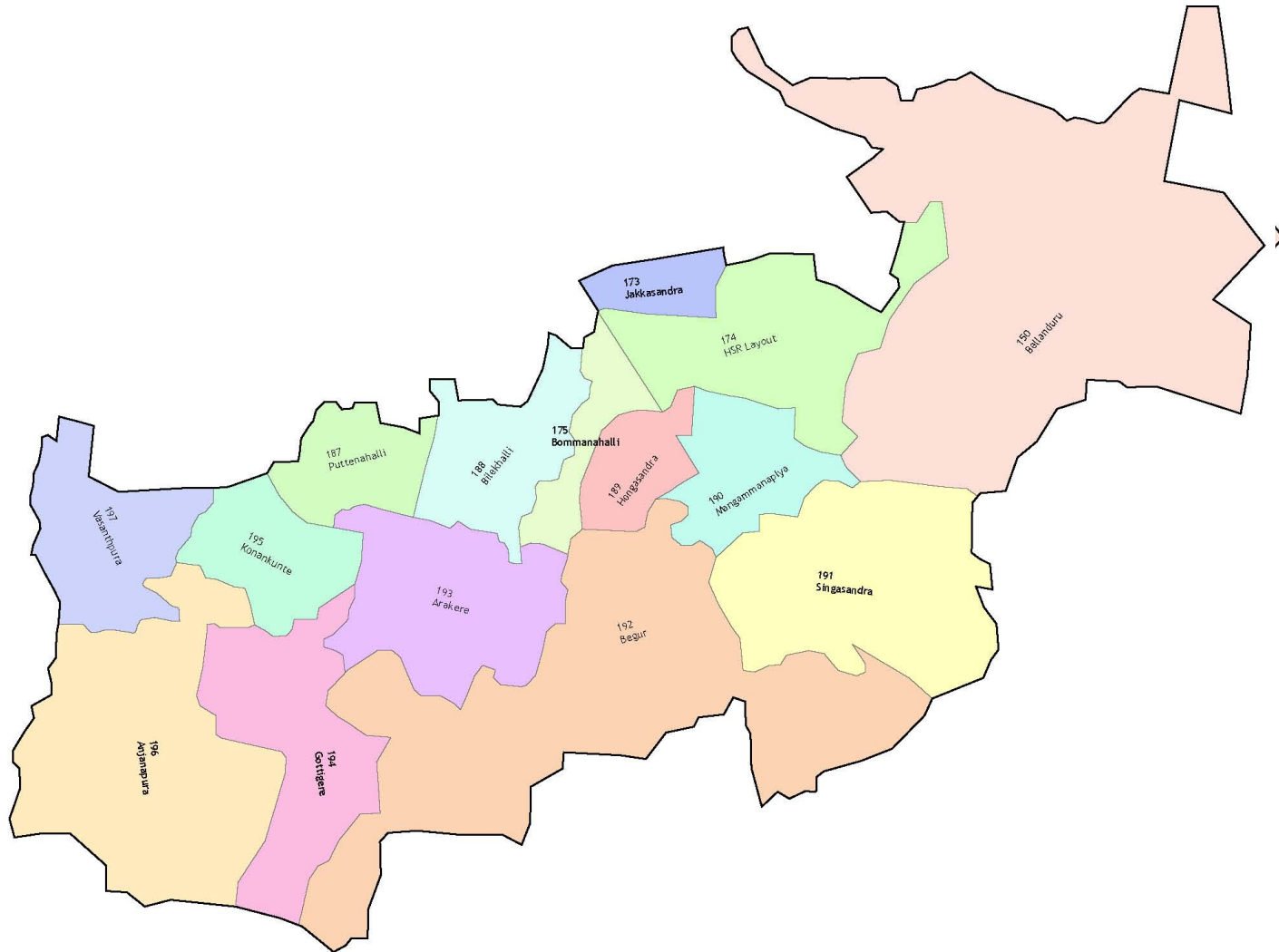




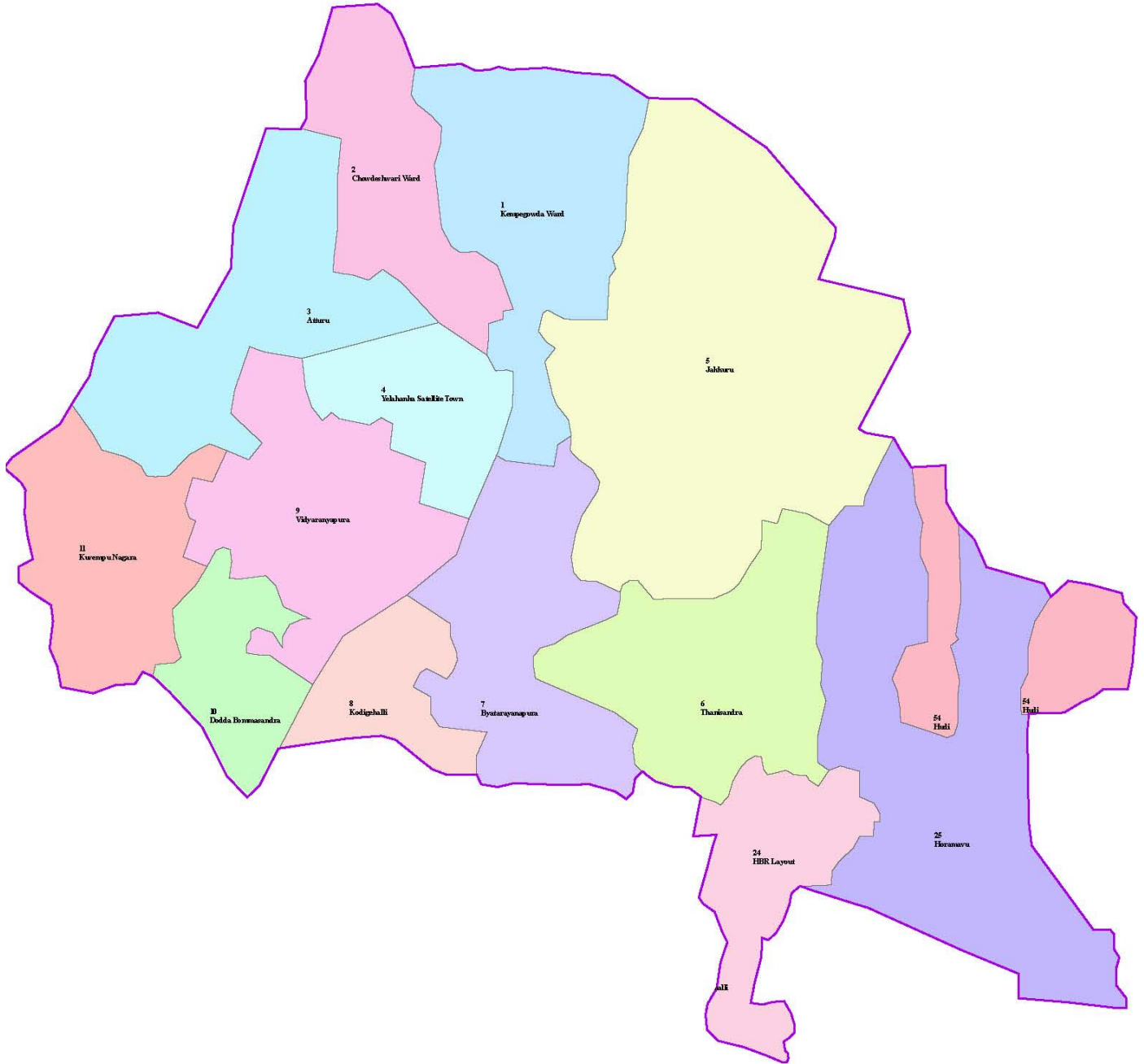
## BBMP – SOUTH ZONE



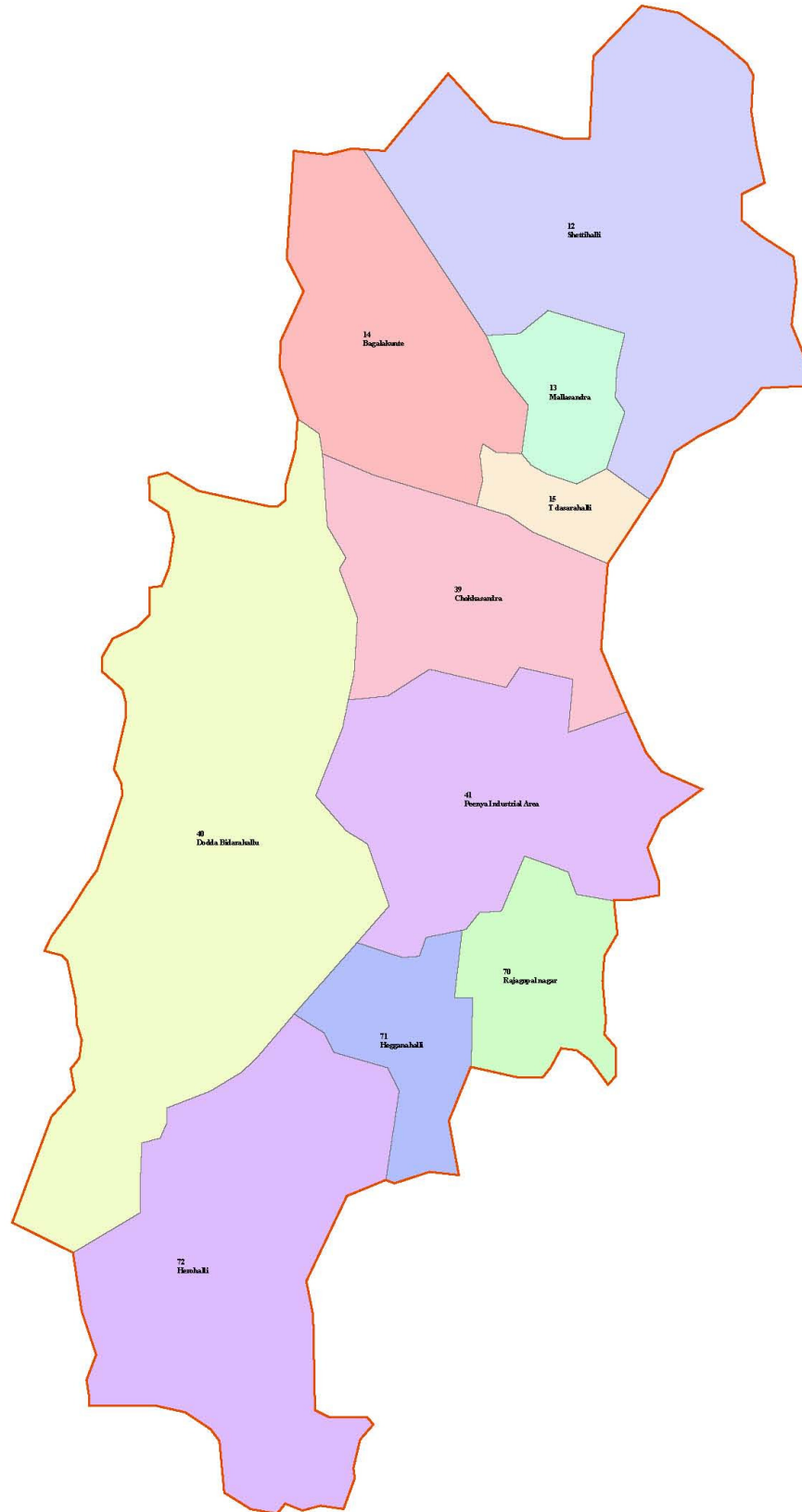
## BBMP - BOMMANAHALLI



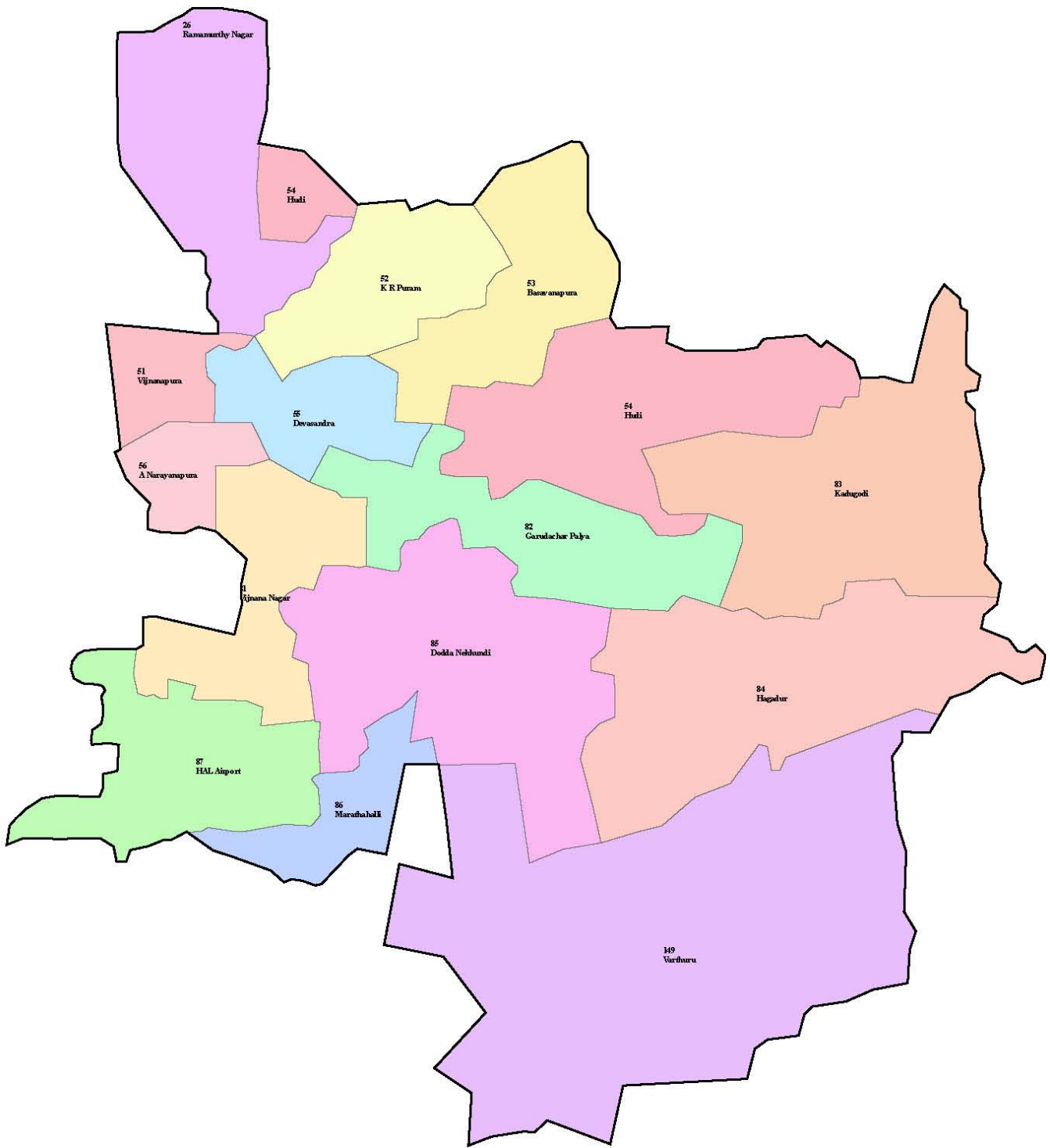
## BBMP – BYATARAYANAPURA



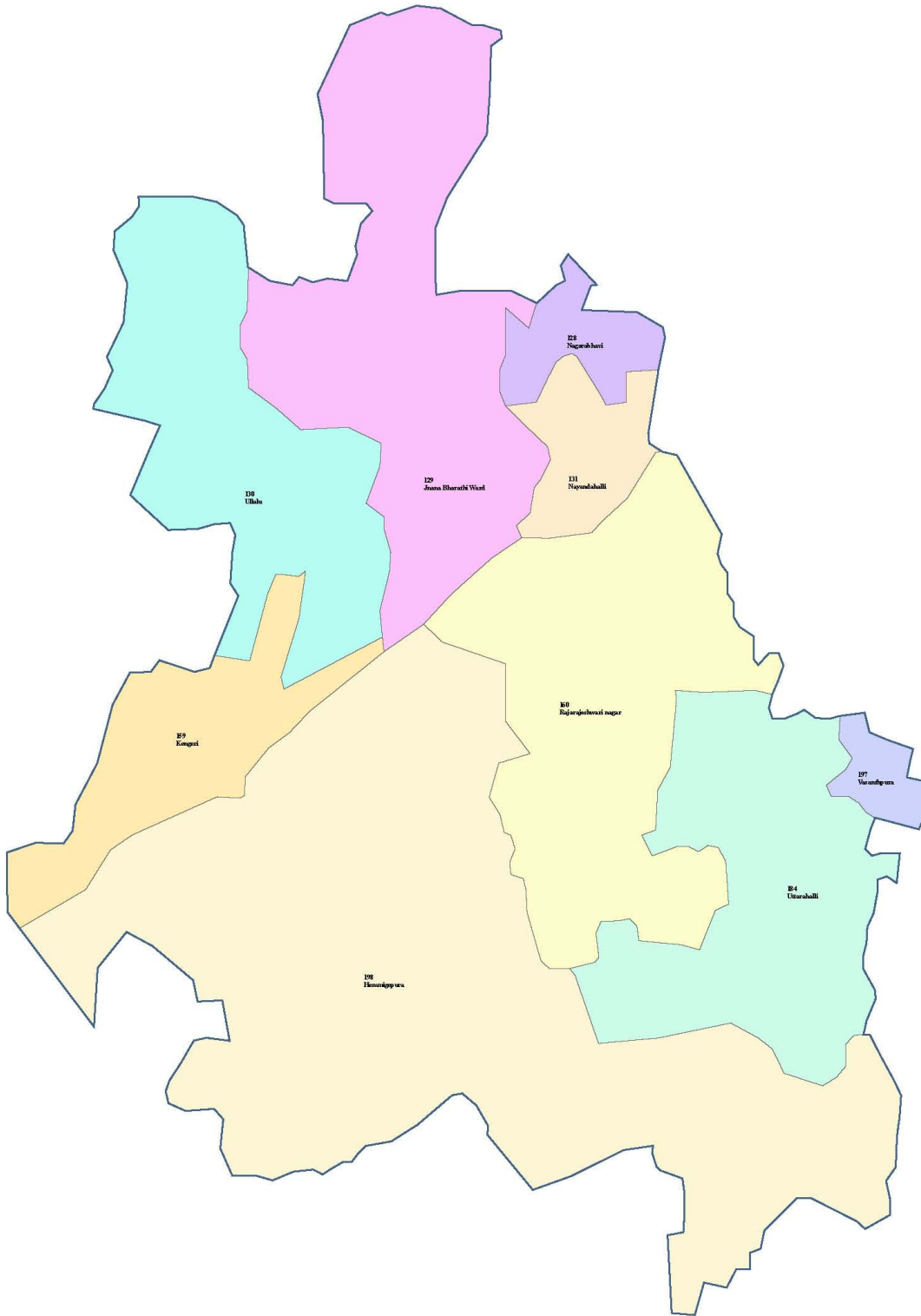
## BBMP – DASARAHALLI



## BBMP - MAHADEVAPURA



## BBMP – RAJARAJESHWARI NAGAR



## ANNEXURE 4: ABIDE PROJECTS

Sl. No	Projects	Concerned Agency
<b>Planning and City blueprint</b>		
	UDD and all agencies to note and align to region wise development model/plan	UDD
	Structure Plan, CTTS to be aligned to ABIDe recommendations	BMRDA
	BBMP budget to incorporate all recommendations of ABIDe TF	BBMP
	All plans for Private townships to be in line with ABIDE blueprint and to be approved by ABIDe	UDD
<b>Governance and Delivery of Public services</b>		
	BBMP to be nodal agency for all projects in BBMP area	UDD
	BMRDA to be nodal agency for all projects in outside BB and within BMR region	UDD
	All 198 wards in BBMP region to have a ward office and service center	BBMP
	Set up a call center 3 digit number for BBMP, BWSSB, BMTC & BESCOM	
	City agencies to all adopt Namma Bangalore Branding for all advertisements, communications and signage	UDD
<b>Transportation</b>		
	Finalize CIIP 2009-2011 (Comprehensive Integrated Implementation Plan) for next 2 years as an interagency plan with milestones (with help of ABIDe)	UDD
	Finalize Road/Corridors Standards/ Specifications on recommendations of ABIDe TF	BMLTA
	Launch 6 corridor roads after getting designs approved by ABIDe TF: Hosur Road (CSB-Vellara Jn) Bannerghatta Road (Jayadeva Hospital-NICE Road Jn) Old airport road (Vellara Jn-Hope farm-Kadugodi-Hoskote NH-4) Mekhri Circle-Hope farm (Mekhri circle-Ulsoor-KR Puram-Hope farm) Dr. Rajkumar Road Magadi Road	BBMP
	Launch Signal free and model ORR from Central Silk Board to Mysore Road	BBMP
	Identification and refurbishing of CBD – Existing Roads, pedestrians access, Bus bays etc.,	BBMP
	Establish five grade metered parking locations, in CBD	BBMP
	Launch 100 to 200 surface parking along BIG 10 roads Continues Traffic Simulation Model	BBMP
	Prepare a model package for multi year city road maintenance and repair and invite pilot offers for same	BBMP
	Complete PRR with nice connectivity subject to commercial negotiation	BDA
	Launch the Signal free and Model ORR from CSB to Hebbal	BDA
	Complete widening of ROB on ORR near Kengeri with ABIDe TF	BDA
	Launch East and West side access to Bangalore International Airport East side – from NH4 to BIAL via Budhigere West side – from BIEC(Bangalore International Exhibition Center) on Tumkur Road to Bellary Road	BDA/PWD/IDD
	Develop bus transit stations at ORR junctions with Big 10 roads	BMTC
	Expedite the production of Big 10 and Big circle buses	BMTC
	Launch Local Loop service to cover neighborhood	BMTC

Sl. No	Projects	Concerned Agency
	Installation of GPS on all Big 10 and Big circle vehicles should be make universal	BMTC
	Launch destination ticketing	BMTC
	Development of Metro Zone	BMRCL
	Adequate parking facility should be provided at each Metro Stations	BMRCL
	From each Metro Station a minimum of 500 meters high quality pedestrian access should be provided in all directions	BMRCL
	Presentation of non-motorized transportation plan to ABIDe TF	BMLTA
	Launch of pilot cycling project	BMLTA
	Introduce mobile patrolling on ORR and BIG 10 Roads after discussing with ABIDe	BTP
	Complete of development of decision-support system in TMC (Traffic Management Center)	BTP
	Update the status of integration of the database with BMTC & RTO	BTP
<b>Water Sanitation</b>		
	24 x 7 Water Supply to locality/wards in North, South, East and West Zone	BWSSB
	To frame guidelines for regulations of quality and taxation of water supply through tankers	BWSSB
<b>Urban Poor</b>		
	Finalize and enact new state policy for Urban Poor (Karnataka State Urban Poor Policy) KSUPP	UDD
	Strengthen BBMP Urban Poor Cell	BBMP
	Expand Attal Sarige	BMTC
	Implement street vendor policy	UDD
	Significantly increase Urban Poor Housing Development through slum development	UDD
	Health Insurance for Urban Poor	
	To constitute ABIDe Urban Poor working committee	
	Social Audit to be conducted	
	To bring proper amendments to the existing laws to plan non lapsable pool for urban poor development	
	Plan PPP (Public People Participation) to construct house for Urban Poor	
<b>Heritage</b>		
	Set up a Bengaluru Heritage Commission with committed members. Approval of Bengaluru Museum near Indira Gandhi Musical Fountain	GoK
	Bengaluru Heritage Cell to be set up in BBMP consultation with ABIDe TF	BBMP
	Implement three pilot Heritage projects	BBMP
	Announce Namma Bengaluru Day, Namma Bengaluru Habba	UDD/Ministry of Tourism
<b>Secure Bangalore</b>		
	Bangalore City Police to establish a protocol of year long communication and outreach to citizens through advertisements (with help from ABIDe TF) Women, Children, Elderly safety Anti-Terrorist Measures Crime Branch Cyber Crime Related Festivals Related	BCP



Sl. No	Projects	Concerned Agency
	General IT initiatives of Delhi Police Licensing Related Passport Related Safety at Homes Senior Citizens Schemes Traffic Related	
Health		
	Launch monthly Health bulletin	BBMP
Technology and Namma Bengaluru Website		
	Expedite the registration of <a href="http://www.nammabengaluru.gov.in">www.nammabengaluru.gov.in</a> domain	e-governance
	Establish timelines with CISCO to complete the website and pilot urban technology project	GoK
Food Security		
	Implement food security for Old people	
Others		
	Urban Infrastructure Investors Meet	UDD

## ANNEXURE 5 INDICATIVE LIST OF ROADS/ ROAD RELATED INFRASTRUCTURE

### Outer RING ROAD RE-ALIGNMENT

No.	Stretch	Length (in km)
1	Elevated road along the University Road	2.5
2	Re-aligning ORR between Magadi Road and Pipe Line Road	1.9
3	Re-aligning ORR at Tumkur Road through CMTI	1.2
4	Re-aligning ORR from Kasturi Nagar to Mahadevapura along the Selam railway line	5
5	Elevating ORR along common portion with Sarjapur Road	2
6	Elevating ORR along common portion with the Bannerghatta road	1
7	PESIT to Janabharti Entrance Bangalore University	3
	Total	16.6

### NEW ROADS/ MISSING LINKS

No.	Stretch	Length (in km)
1	Core Ring Road (CRR) Elevated	30
2	Arterial Roads crossing CRR	30
3	Peenya Industrial Area to Bangalore Mysore Expressway	2.2
4	Peripheral Ring Road (PRR)	114
5	Air Port Link Road (Expressway) Upto ORR	26
6	Link from Tigalarapalaya Main Road to Nelagadaranahalli (included in Item 42 of Parallel Ring Road)	1.23
7	Link from Hesarraghatta Main Road to Shettihelli and Madarahelli to Mohammed Sabi Palaya (included in Item 43 of Parallel Ring Road)	4.02 (1.38+2.64)
8	Link from Sampigehalli to CRPF parade ground (included in Item 25 Parallel Ring Road)	1.72
	Total	209.17

### ROAD IMPROVEMENTS

No.	Stretch	Length (in km)
<b>ROAD IMPROVEMENTS (INSIDE ORR)</b>		
1	Bellary Road	7.60
2	Palace Road	1.75
3	Sheshadri Road	0.50
4	Nrupatunga Road	1.10
5	Vidhana Veedhi	0.20
6	Mission Road	1.00
7	Devanga Hostel Road	0.50
8	Sankey Road	3.40
9	Lalbagh Road	0.41
10	Jaymahal Road	2.80
11	Hosur Road	1.60
12	Hosur Laskar Road	4.30
13	Victoria Road	1.60

No.	Stretch	Length (in km)
14	Lower Agaram Road	2.40
15	Sarjapur Road	3.35
16	Hosur Road	4.30
17	Bannerghatta Road	4.11
18	80' Koramangala	4.00
19	Dickenson Road	0.30
20	Ulsoor Road	0.60
21	Kensington Road	0.32
22	Murphy Road	1.70
23	Old Madras Road	1.70
24	Richmond Road	5.20
25	Airport Road	5.20
26	Goods shed Road	1.35
27	Cottonpet Main Road	1.20
28	17th Main J C Nagar in Ward 13	1.50
29	5th Cross Malleshwaram	1.00
30	Commissariat Road	0.74
31	A M Road	0.75
32	Lalbagh Fort Road	1.35
33	Race Course Road	1.66
34	Kasturba Road	0.77
35	A S Char Street & BVK Iyengar Road	1.21
36	Vanivilas Road	0.85
37	Suranjan Das Road	3.85
38	Mysore Road	3.90
39	Mt Joy Road & Kattriguppe Main Road via Vidyapeeta Circle	3.00
40	Mahalakshmi Layout & Nandini Layout Road via Ayyappa Temple & Singapore Layout	2.70
41	Dinnur Main Road and Kavalbyrasandra Road (via Ganganagar Sulthan Palya)	4.50
42	Hoskerhalli Main Road	2.05
43	Vansanth Nagar Main Road	0.62
44	K R Road	1.16
45	Sulthan Road	0.42
46	1st Main Chamrajpet	0.15
47	3rd Cross Chamrajpet & Bull temple Road	1.00
48	Link Road	0.63
49	Padarayanapura Main Road	1.86
50	Bull temple Road via N R Colony, Chennamma Tank bed & 30th Main BSK 3rd Stage	1.10
51	Infantry Road	1.83
52	Park Road	0.50
53	Hospital Road	1.10
54	Dispensary Road	0.50
55	K Kamraj Road	1.25
56	Dharmraj Road	0.40
57	Chandini Chowk	0.45
58	Meenakshi Koli Street	0.60
59	Thimmaih Road	2.10
60	Old Poor House Road- Haine's Road	1.00
61	Millers Tank Bund Road	0.52
62	Station Road	1.30
63	Queen's Road	0.95
64	Miller's Road	1.42

No.	Stretch	Length (in km)
65	Cunningham Road	0.80
66	Road in front of Russel Market	0.25
67	Dr. Ambedkar Road (Tannery Road)	4.43
68	Hennur Road	3.62
69	Banaswadi Road & Wheelers Road (via Banaswadi)	6.35
70	Hare Krishna Road	0.70
71	HMT Road	2.10
72	Magdi Road	2.40
73	Baiyyappanahalli Main Road	3.35
74	Bapujinagar Cross Road	0.80
75	Kumaraswamy Layout Main Road	1.75
76	South Link Road	0.50
77	MTB Road	0.50
78	Kurubarahalli Main Road in Ward 16	1.00
	Total	141.73
<b>Road Improvements (Outside ORR)</b>		
<b>Radial Roads</b>		
1	From Peenya II Stage to Andrahalli (via Peenya II Stag, Industrial Area, Andrahalli)	4.00
2	Tumkur Road – NH\$	8.80
3	New BEL Road	3.40
4	Jalahalli Main Road to Attur via Yelahanka	28.00
5	Yeshwanthpur to Yalahanka	20.00
6	Doddaballapur Road	6.00
7	Devanahalli – Hebbal Bellary Road	25.00
8	NH-7 Kogilu Junction to Nagavara Main Road	8.00
9	Dasarahalli Main Road	16.00
10	HBR Ring Road to Nagavara Main Road leading to Jakkur	20.00
11	HBR Ring Road to Hennur Main Road	16.00
12	Old Madras Road	5.25
13	ITPL Road from Ring Road to Hope farm	8.50
14	Varthur Road to Marathalli to Varthur Kodi	5.00
15	Varthur to Outer Ring Road via Belegere and Panathur	6.50
16	Kaigondanahalli to Sarjapur	10.00
17	Bannerghatta Road – ORR to National Park	8.60
18	Bannerghatta Road – National Park to PRR	2.40
19	Begur Road from Hosur Road to Begur	7.00
20	Kanakapura Road	10.40
21	Ring Road to Kanakapura Road (via Ittumadu)	7.00
22	Rajarajeshwarinagar Arch to PRR	10.00
<b>Connector Roads</b>		
23	From Magadi Road to NH 4 (via Sunkadakatte, Hegganahlli Main Road, Peenya II Stage, NTT circle, KIADB Main Road)	6.00
24	Peenya II Stage to Ring Road (via peenya II sTage Bus stop, Rajgopal nagar Main Road, Peenya Industrial Area)	3.00
25	NH 7 to Nagavara Main Road through Jakkur	16.00
26	NH & to Nagavara Main Road	12.00
27	Hennur Main Road to Hoskote Ring Road	10.00
28	Horamavu- Agara to HBR Ring Road	4.00
29	Horamavu Road from Outer Ring Road to Kalkere	4.20
30	T C Palya Main Road from ORR to Anandapura	5.50
31	Devasandra Main Road from NH 4 to Basavanapura Road	1.70
32	Kundalahalli Road from Devasandra Main Road to Kundanahalli gate via Hoodi	7.00

No.	Stretch	Length (in km)
33	ITPL Road to Varthur Road via Pattanadur Agrahara & Nellurahalli	4.00
34	Sarjapur Road to Ring Road (near Devarabisanahalli)	7.00
35	Nagarthapura to Matha Amruthamayee College	5.00
36	Hosur Road to Nagarthapura (Hosur Road)	4.00
37	Begur to Hosur Road (via Begur tank Bund, Chikkabegur and Manipal County)	7.00
38	Bannerghatta Road to Begur (via Dodda Kammanahalli, Yelenahalli)	8.00
39	Kottur Dinne to Bannerghatta Road	5.00
40	Harinagar to Kottanur Dinne	4.00
41	Corporation Bank to Ring Road via Javaraiana Doddi	4.00
<b>Parallel Ring Road</b>		
42	From Magadi Road to NH 4(via Herohalli, Karivobanahalli, Andrahalli, Tigalarapalya, Nelagadaranahalli, Nagasandra)	8.00
43	Hesaraghatta Main Road to SM Road (via Mallasandra, Shettyhalli, Abbigere, Kammagondanahalli Main Road, Gangammagudi Circle)	6.00
44	Vidyanyapura Main Road to Henuur Main Road	35.00
45	Nagavara Main Road to Kalkere Junction	8.00
46	Sarjapura Road to Kalkere via Chikkaballapur, Gurjurpalya, Varthur, Hope farm, Kadugodi, Sadaramangala, Kodigehalli, Basavanapura, TC Palya	31.00
47	Matha Amruthamayee to Sarjapura Road (Kaigondanahalli)	5.00
48	Kanakapur Road- Amruthnagar to Harinagar	4.50
49	Kengeri to Konanakunte via Uttarahalli (end of Kanakapura Road)	13.50
50	Kengeri 80' Ring Road to Ullalu Main Road via Matha Mata	10.50
51	Begur Road to Hosur Road and Kudlu	6.00
52	B G Road to Begur Road (via BTM Layout, Kodichikkanahalli)	5.00
53	Chunchaghatta Road to B G Road	6.00
54	Ganana Bharathi Circle to Magadi Road	11.00
	Total	502.75
	Grand Total	644.48

## GRADE SEPARATORS

No.	Location/ Road
<b>GRADE SEPARATORS -ROADS</b>	
1	Hudson Circle – NR Road Under Pass
2	Cuavery Theatre Junction - Bellary Road Grade Separator
3	Minerva Circle – J C Road Fly Over
4	Nagavara Junction Along ORR Flyover
5	Hennur Banasvadi along ORR underpass
6	Sarjapur Road & ORR junction along ORR flyover near Ibbalur
7	On ORR junction along ORR near Agara flyover
8	Flyover along Hosur Road near Check Post
9	Hosur Road – inner Ring Road along Hosur Road Flyover
10	Additional slip road at CSB intersection
11	Hosur Road Grade Separator at Aytinelle
12	Along 16 Main BTM Layout underpass
13	Puttenahalli along ORR underpass
14	Kanakapura Road & ORR junction along ORR Flyover
15	Kadirenahalli Road & ORR junction along ORR Flyover
16	Flyover on RV Road near RV Teacher College
17	Tagore Circle underpass on Gandhi Bazaar Main Road
18	Tumkur Road & ORR junction along ORR Grade Separator
19	Flyover along NH 4 at Jalahalli Cross
20	Underpass along pipeline Road near Ayyappa temple
21	Grade Separator along Guttahalli Main Road near Guttahalli Circle

No.	Location/ Road
22	Raded Separator at Yeshwantpur Circle near Bus sTation
23	Brige at Gali Anjaneya junction
24	Grade Separator at Malleshwaram Circle
25	Underpass at Prof. C N Rao Circle
26	Underpass along Chord Road at Magadi Road & Chord Road junction
27	Underpass along ORR at ORR and Bansawadi Ramamurthy nagar Road junction
28	Grade Separator at ORR & Magadi Road junction
<b>RAIL OVER BRIDGE/ RUBS – RAIL</b>	
29	ROB along MES road near Jalahalli
30	Underpass along Link Road Connecting D Rajagopal Road & Kodigehalli Road
31	Ashoka Theatre – Pottery Road
32	Nagavara – Arabic College Road
33	Kasturinagar – Chikka- Banaswadi Road
34	Baiyyappanahallu Road
35	Kadugondanahalliu Railway Line alinf Nagavara Main Road
36	Hudi Main Road n ear Whitefield Railway Station
37	Construction of ORR connecting Mysore Road to Magadi Road including underpass across Bangalore Mysore Railway Line
38	Along Settihalli Main Road
39	Along S M Road near Gurudwara
40	Along Koigehalli Main Road near Kodigehalli Raliway Station
41	Along Hesaraghatta Main Road
42	Near Tanisandra Railway station
43	Along Kundalahalli Road at Kundalahalli gate
44	Along Varthur Road near Lakshmi Layout
45	Along Panathur Main Road near Bellandur Railway Station
46	Along Sarjapur Road
	Elevated Roads
47	Elevated Road from Sirsi Circle to ORR on Mysore Road (6.0 km)
48	Elevated Road on Hosur Road (10.5 km)

## SKY WALKS/ SUB-WAYS

No.	Location/ Road
1	Cauvery Bhavan to Education Department Building and to Law College to Mysore Bank crossing KG Road on State Bank junction
2	Opposite NTI connecting Guttahalli Road and Palace (Opposite Bus Stop) on Sankey Road
3	Arya Bhavan Sweets and Kanthi Sweets to Himalaya Theatre, crossing KG Road
4	Lalabagh Main gate (Jabaraiah Circle)
5	Bannerghatta Road near Jayadeva Hospital
6	BMTC Main Bus stand to Amr Lodge Building in Majestic Area
7	KSRTC Kempegowda Bus Station to BMTC Main Bus Station
8	At Kengeri Bus Stand, Mysore Road
9	At Byatarayanapura on Bellary Road (near junction of BBMP office complex)
10	BMTC Main Bus Station to Railway Station Premises
11	Shanthala Silk House to KSRTC Main Bus Station and to Good shed Road
12	RNS Motors, Tumkur Road
13	Jalahalli Circle, Tumkur Road
14	Near Webb junction
15	Near Kamakhya, Kathriguppe Ring Road
16	Gandhi Bazaar Main Road
17	On Vittal Mallya Road near Mallya Hospital
18	Sheshadri Road near Maharani College
19	On JC Road near Ravindra Kala Kshetra
20	On Hosur Main Road near Madivala Check Post

No.	Location/ Road
21	On Raja Ram Mohan Roy Road, near Pallavi Theatre
22	On Richmond Road near D'Souza Circle
23	On Race Course Road near Chalukya Hotel
24	On Commissariat Street near Garuda Mall
25	On Residency Road near Mayo Hall
26	On Kamraj Road near Commercial Street
27	Near Indiranagar 100 feet Road & water tank junction on Airport Road
28	On Hosur Road (Near Forum)
29	On Tumkur Road, near SMS Railway Station
30	On Airport Road, Marathalli at Village Pond
31	On Airport Road, Marathalli at junction of Underpass ORR
32	K R Puram Bus Stand
33	Charathi Vidya Bhavan, Devraj Urs Road
34	On Hosur Road "T" junction with Tavarekere Main Road (Opposite Sai Sadan & Prestige Acropolis) (High Rise Apartments Condominium)
35	Mission Road at the foot of Flyover
36	Vidhana Veedhi near MS Building
37	Tumkur Road near Yeshwanthpur Circle
38	At South End Circle
39	Malleswaram 5th Cross
40	Double Road opposite Shanthinagar bus station
41	City Market additional arm to be added to existing underpass
42	30 no. Sky wals/ sub-ways along the eastern crescent of the ORR

## PROPOSED PARKING SITES

No.	Location	Type
1	MG Road	AMP
2	Near Kamraj Road	AMP
3	Gandhinagar	AMP
4	Jayanagar Shopping Complex	CMP
5	Koramanagala near Raheja Towers	CMP
6	Rajajinagar BDA Complex	CMP
7	Banashankari BDA Complex	CMP
8	Gandhi Bazaar	CMP
9	Malleswaram	AMP
10	Fire Station, Residency Road	AMP
11	Dhobi Ghat, Cunningham Road	AMP
12	SP Office, Miller Road, Cunningham Road crossing	AMP
13	Near Sagar & States	AMP
14	Kanteerava Stadium	AMP
15	City Market	AMP
16	Bakshi Gardens	AMP
17	KSRTC Bus Depots	AMP

## ANNEXURE 6: MAP SHOWING LOCATION OF BMTC BUS DEPOTS

