



# URBAN AND REGIONAL DEVELOPMENT PLANS FORMULATION AND IMPLEMENTATION (URDPFI) GUIDELINES

Volume I

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**Town and Country Planning Organisation**



**URBAN AND REGIONAL DEVELOPMENT PLANS  
FORMULATION AND IMPLEMENTATION  
(URDPFI) GUIDELINES**

**Volume I**





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MINISTER OF URBAN DEVELOPMENT  
INDIA



## FOREWARD

The Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines, 2014 have been formulated keeping in view the emerging scenario in planned development of cities and towns. The first Guidelines were prepared in 1996 and a lot of changes have taken place in terms of application of latest technology along with spatial growth of cities and towns, and urban dynamism together has contributed to their planning and development. Since the provision of infrastructure facilities has implications beyond the municipal limits of cities and towns, it becomes imperative to formulate City Regional Plan so as to ensure balanced development of all settlements within the region. Hence, the Guidelines have included methodological framework for plan formulation at the Regional level.

With the advances of Remote Sensing and Geographical Information Systems (GIS), the Plan making process can become expeditious and with integration of both spatial and attribute data, detailed assessment can be made in terms of spatial growth of cities and towns, extent of unauthorized and haphazard development and laying of physical infrastructure facilities in anticipation with the projected growth of population. Presently, about 2100 Master Plan have been notified out of total number of 7933 cities and towns. It is expected that with the use of URDPFI Guidelines, 2014, all the cities and towns of the country will have the benefit of Statutory Master Plans.

The Plan making process has to be further strengthened by ensuring that the cities and towns are able to generate enough resources to sustain themselves. This will be possible only if planned development along with transparency in governance is ensured. The vision for planned development for any city or a town should strive for inclusive development with efforts for provision of both physical and social infrastructure facilities for all sections of the population and level of inadequacy to be reduced to the minimum possible extent. In the era of globalization, the urban areas should emerge as *Smart Cities* which now is the main focus of the Ministry of Urban Development.

The URDPFI Guidelines, 2014 will be of great help to State Town and Country Planning Departments, Urban Development Authorities, Urban Local Bodies, Schools of Planning and various Research Institutions. The State Governments have to proactively adopt these Guidelines and complete the preparation of Master Plans for all the cities and towns. Ministry of Urban Development will always be keen to assist the State Governments in terms of adoption of the Guidelines.

(VENKAI AH NAIDU)



## PREFACE

Planning for development is an envisioning process which requires a sound assessment of the ground realities and providing options for sustainable development within the bounds of the demographic, physical, socio-economic, jurisdictional and financial aspects. It is a continuous process and must incorporate a regular evaluation of implementation. However, plans have been criticised to be rigid and static having little regard to investment planning efforts and taking very long time in the process of formulation and approval.

During 1995, a *National Workshop on Master Plan Approach: Its Efficacy and Alternatives* was held, which examined the entire process of urban development planning and implementation and as a recommendation of this Workshop, the first national level planning guidelines 'Urban Development Plans Formulation and Implementation' (UDPFI) were framed in 1996 by Institute of Town Planners, India.

UDPFI Guidelines, 1996 provided a framework for plan preparation and implementation process. Since 1996, many developments have taken place in the field of urban planning, especially in view of emerging needs and requirements of urban settlements due to rapid population growth, globalization of economy and phenomenal advances in information and communication technologies. The towns and cities have become more dynamic in nature and are subject to unprecedented changes in terms of requirements of infrastructure and other basic services/amenities. Besides, new emerging aspects like regional development, inclusive planning, sustainable habitat, land use and transport integration at planning stage, Service Level Benchmarks, disaster management concepts, and governance reforms have given a new dimension to the planning process.

To address these emerging aspects, it was felt that the revision of the UDPFI Guidelines should be taken up. The '**Urban and Regional Development Plans Formulation and Implementation Guidelines** (URDPFI)' were conceptualized as the outcome of widespread consultations with the planning peers in the various Ministries, Experts, Professional and Academic Institutions and other stakeholders. The URDPFI Guidelines, 2014 have been framed to incorporate the provisions of the legal and policy guidelines of the line Ministries, best practices of the States and the planning systems in vogue. A participatory consultative approach has been followed in order to revise the guidelines to holistically understand and proactively involve the Government of India Ministries/Agencies and State Governments for guiding Urbanization.

In line with the approach, the following key actions were undertaken:

- **National Consultation** – Consultative Workshop held in New Delhi to deliberate on the URDPFI Guidelines (1<sup>st</sup> Draft) to holistically consult with National and State level stakeholders.

- **Regional Workshops** – Six Regional Workshops across country were held covering all the States. The planning aspects varying across States and approach to planning in future were discussed.
- **Technical Core Group (TCG)** – TCG was formed by MoUD and interactions were held periodically with the TCG members formally and informally for getting inputs.
- **Google Discussion Group** – This portal was set up by the TCPO which promoted interface with various planners and practitioners.
- **Monthly Review Meetings with Stakeholders**- Monthly review meetings were held by MoUD with stakeholders for discussing progress of work and receiving their respective comments.
- **Key Consultations**- Interaction with more than 50 Organisations, Agencies, Institutions both public and private have provided technical appraisal and recommendation in the guidelines.

The URDPFI Guidelines, 2014 comprise two Volumes: Volume-I contains planning process, contents of the plans suggested in the planning system, resource mobilization for plan implementation including land and finance as the primary resources for sustainable development, institutional reforms particularly at State level, and approaches and strategies for regional and urban planning. For addressing sustainability, various sections focus on land suitability and urban renewal norms and provide a framework for Crisis/Disaster Management Plans as part of Development Plan. To speed up the process of plan formulation, simplified planning techniques, and norms and standards for social and physical infrastructure planning are detailed along with simplified development promotion regulations. Various cities of all classes across the country from different regions have been covered as best practices for review. The overall recommendations for future actions have also been included.

The urban and regional planning system has been divided under two heads, a) Core Area Planning and b) Specific and Investment Planning. The Core Area Planning comprises of a set of 4 interdependent plans: (i) a long term **Perspective Plan** with a vision and policy orientation, (ii) a sustainability based long term **Regional Plan** (and District Plan) with optimization of regional resources for development, (iii) a comprehensive long term settlement plan as **Development Plan** for urban and peri urban areas (iv) A short term rolling **Local Area Plan** within the framework of Development Plan. The Specific and Investment Planning comprises a set of three plans, (i) A rolling **Special Purpose Plan** for special areas within the framework of Development Plan, (ii) **Annual Plans** to translate the physical and fiscal resource requirement of Development/ Local Area Plan, and (iii) **Project/Research** to focus on items of execution.

A separate volume (Volume-II A) on legal aspects covers the implications of 74<sup>th</sup> CAA, 1992; Land Acquisition, Resettlement & Rehabilitation Act, 2013; a review of the Model Town & Country Planning and Development Law, Model Municipal Law, legal requirements for industrial development, State level planning framework and other National level requirements for heritage and environment conservation with the relevant Acts/ Law/ Notifications/ Guidelines etc. Volume II B consists of Appendices.

A Core Team of TCPO and consultants, M/s Mott McDonald, have worked painstakingly along with the various stakeholders across the country for formulating these Guidelines. The process of preparation of the Guidelines, including the approach, methodology and glossary has been detailed in the Appendix A of Volume II B. The key content of each volume is detailed in the following table.

**Table: Structure of the URDPFI Guidelines**

Volumes	Chapters	Key Contents
<b>Volume I: Urban &amp; Regional Planning Guidelines</b>		
1	Introduction	Need for Revision of UDPFI Guidelines 1996, Recommended planning system for India, overall guiding Sustainable Urban and Regional planning aspects of the guidelines
2	Plan Formulation	Planning Process, Contents of various level of plans
3	Resource Mobilisation	Land assembly, fiscal resource mobilisation, good governance, institutional set-up and key institutional reforms
4	Regional Planning Approach	Aspects of regional planning and classification of region in the Indian context, regional planning approach and its plan implementation
5	Urban Planning Approach	Guidelines for study on location and settlement setting, distribution of land use, city typology, planning for townships.
6	Sustainability Guidelines	Sustainability and aspects of urban development including impact of climate change, environment policies and statutory obligation, planning for disaster management
7	Simplified Planning Techniques	Comprehensively covering data collection techniques, types of survey, analytical techniques, projection techniques, base map & development plan preparation
8	Infrastructure Planning	Introduces the hierarchy of urban development and norms & standards for physical infrastructure, social infrastructure, safety management, commercial activity. Details for transportation planning and provisions for barrier free built environment
9	Simplified Development Promotion Regulations	Lists the simplified urban land use classification and zoning regulations, simplified development promotion regulations for specific land use zones, special requirements
10	General Recommendation	Recommendations to several Ministries, State Governments and Organisations

Volumes	Chapters	Key Contents
<b>Volume II A: National Legal Provisions in Urban &amp; Regional Planning</b>		
1	Implication of 74th CAA	Provisions of 74th Constitution Amendment Act and roles of the State Town and Country Planning Department, status of the provisions of 74th CAA on Urban Local Bodies and development authorities
2	The Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation & Resettlement Act, 2013	Basis of the new Act and the key features of the new Act
3	Model Regional and Town Planning Town and Development Law	Key features of the Law and suggested changes in the law
4	Model Municipal Law	Key features of the Law and suggested changes in the law
5	State Level Planning – Existing Legal Framework	An overview of the key features of various state level legislation(s)
6	Legal Requirements for Industrial Development	Industrial policies and Acts relevant for planning, schemes for cluster development under Ministries
7	Other National Level – Legal Requirements	National level heritage conservation and environmental legal requirements, Cantonment related legal requirements.
<b>Volume II B: Appendices</b>		Description of making of the Guidelines, Compilation of important Documents, Definitions, Best practices, Acts, Laws, policies and notifications referred in Volume 1 & 2A.

The URDPFI Guidelines, 2014 are intended to be comprehensive for promoting balanced and orderly regional and urban planning and development. These Guidelines *inter-alia* provide the framework, necessary techniques, norms and standards, options for resource mobilization including land assembly approaches, and development promotion regulations. Since conditions vary from place to place and even within a settlement, these guidelines may not be uniformly applicable to all situations and places and would need to be modified and adopted depending on local conditions, felt needs and technological innovations so that the Planning process may serve as an efficient and dynamic instrument. The URDPFI Guidelines are expected to provide an integrated framework for urban and regional plan formulation and implementation.

The Guidelines are intended to be a reference for various aspects of planning by State Governments, Development Authorities, Private Sector and Planning Organizations. Private entities can use guidelines as one-stop reference for various Acts, Standards and developing different types of townships.

  
 SHANKAR AGGARWAL  
 Secretary (UD)

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Ministry of Urban Development acknowledges the work of M/s Mott MacDonald (Consultants) in preparing URDPFI Guidelines, 2014.

The exercise of formulation of the URDPFI Guidelines, 2014 was guided and steered by then Secretary, Ministry of Urban Development (MoUD), Dr. Sudhir Krishna, and Secretary, MoUD Shankar Aggarwal and supported by then Joint Secretary, Dr. Ashok Singhvi, Mr. Neeraj Mandloi, Joint Secretary, MoUD and Mr. Parmod Kumar, Director (LSG), MoUD. Mention also needs to be made about the tireless work by the officers of the LSG Division, MoUD, Mr. Sunil Kumar Pal, Under Secretary and Mr. C. Jeevan Rao, Research Assistant.

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# 1 Introduction

## 1.1. Urbanisation Trends

Globally, the more urbanised countries have higher levels of income and prosperity. Indian States also exhibit the same trend. At the same time, urbanisation is also perceived to be correlated with pollution, congestion and inferior quality of life. This would call for developing a paradigm of urban development that would bring in higher levels of prosperity, but without the concomitant negative effects. The URDPFI has attempted to develop such a framework.

**Population trends:** The Census 2011 and 2001 give useful indicators for the trends in urbanisation in India. The three urban agglomerations, viz. Greater Mumbai, Delhi and Kolkata, have crossed the 10 million mark in population, but with much reduced the rate of growth. The Million Plus population cities have shown a growth of over 48 per cent, but the number of such cities has gone up from 35 to 53 and five cities viz. Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune have attained more than 50 lakh population. The total population in Class I cities (1 lakh +) constitutes 70% of the total urban population, while the total population of million plus cities constitute 42.6% of the total urban population. What is more interesting is that the cities with lower orders of population have exhibited higher rates of growth of population.

**Table-1.1** gives the details:

Table 1.1: Trends in Urbanisation 2001-2011

Class	Definition (Population)	Census 2001			Census 2011			Decade Growth Rate 2001 - 2011	
		No. of Towns	Population	% of Urban Population	No. of Towns	Population	% of Urban Population	No. of Towns	Population
Class I	>1 lakh	394	196.3	68.7	468	264.9	70.2	18.8	34.9
Of which,-									
Below Mn+	1 to 10 lakh	359	88.0	30.8	415	104.2	27.6	15.6	18.4
Million Plus cities	>10 lakh	35	108.3	37.9	53	160.7	42.6	51.4	48.4
Of which,-									
Mega cities@	>1 crore	3	42.5	14.9	3	48.8	12.9	0.0	14.8
Class II	50k to <100k	496	27.8	9.7	605	41.3	11.0	22.0	48.7
Class III	20K to <50k	1388	35.2	12.2	1905	58.2	15.4	37.2	65.5
Class IV	10k to <20k	1561	19.5	6.8	2233	31.9	8.5	43.0	63.8
Class V	5k to <10k	1041	6.7	2.4	2187	15.9	4.2	110.1	138.7
Class VI	<5k	234	0.7	0.2	498	2.0	0.5	112.8	180.1
Total		5161	286.1	100.0	7933	377.1	109.8	53.7	31.8
Statutory Towns		3799	265.1	92.7	4041	318.5	84.5	6.4	20.2
Non-Statutory Census Towns & UAs		1362	21.0	7.3	3892	58.6	15.5	185.8	179.0
Total Urban Population		5161	286.1	100.0	7933	377.1	100	53.7	31.8

Source: Census of India.

The decadal population growth rate has, however, shown a decline from 21.5% during 1991-2001 to 17.6% during 2001-2011. The growth rate of urban population also seems to be heading for stabilization as the decadal variation remained around 31.5% during the last two decades.

**Non-statutory towns:** The trend of urbanisation is reflected remarkably in the size of towns that carry the growing urban population. As per Census-2011, there are 7933 towns including 4041 Statutory towns and 3892 Census towns. However, it is notable that the number of statutory towns has increased marginally, by 6.4 per cent only, whereas the number of non-statutory towns has gone up by 186 per cent. Obviously, new towns are developing very fast, but, being not notified as a town, these are kept out of the purview of planned spatial development and become prone to haphazard growth. This would call for a serious effort to introduce the principles of the URDPFI Guidelines to even non-statutory towns, preferably in a regional set up, wherein the spatial plans for such towns are prepared in conjunction with that of the main cities, to which these are generally the satellite towns.

## 1.2. Framework for a Renewed Planning System

The framework for effective Spatial Planning needs to incorporate certain major issues, which, subject to local variations, can be listed and categorised as follows:

- Current principles, practises and issues in preparation and implementation of plans at National, Regional and Local levels so as to harmonise the same drawing on the best practices.
- Analysis of the latest trend in the Urban Development scenario.
- Address relevant issues related to peri-urban areas and urban planning regions.
- Compilation and analysis of the relevant data available from Census and other sources.
- Urban development issues, especially in newly formed states and backward areas.
- Need for uniformity in planning system in the country.
- Streamlining of planning practices.
- Requirement of coordinated efforts between Departments/ Authorities.
- Legal, funding and decision making aspects in implementation of plans and projects.
- Promoting rapid urbanisation and responding to the impact of climate change.
- Economic aspects of plan implementation while preparing land use development plans.
- Promotion of sustainable development with focus on planning for People, Environment and Financial viability principles.

- Inclusive planning, people's participation and specific issues relating to the elderly, women, the differently abled and the weaker sections of the society.
- Attention to Transit Oriented Development (TOD).
- Planning for and integration of Peri-urban areas in the planning process.
- Influence of industrial areas, such as SEZs, on spatial and urban development.
- CRZ policy and Coastal management in case of coastal cities.
- Special issues of urban development in hill areas.
- Provisions for Affordable housing.
- Safe disposal, mainly by way of recycling and reuse, of solid and other wastes.
- Adoption of geo-spatial data and technology in the planning process.
- Defining measureable benchmarks and milestones for the plan.
- Arrangements for periodic monitoring and evaluation of the implementation of the Plan.
- Integration of sector specific plans among each other and in overall spatial planning.

The last mentioned issue has become particularly significant over the years, as different Ministries advocate preparation of plans for specific sectors, such as Slum Redevelopment Plan, City Development Plan, City Investment Plan, Comprehensive Mobility Plan, City Sanitation Plan, District Credit Plan, Coastal Zone Management Plan, Environmental Conservation Plan, Riverfront Development Plan, Water Resource Management Plan, Heritage Conservation Plan, Tourism Master Plan, etc. It would be of great help to all if the Master Plan of the City/ Region incorporates the relevant features of all such sector specific plan. Also, the sector specific plans need to align with the framework of the overall Master Plan.

### 1.3. Classification of Urban Settlements

The classification of urban settlements adopted by the Census of India 2011 is as follows:

1. All places with a Municipality, Corporation, Cantonment Board or notified town area committee, etc.
2. All other places which satisfies the following criteria:
  - a. A minimum population of 5,000;
  - b. At least 75 per cent of the male main working population engaged in non-agricultural pursuits; and
  - c. A density of population of at least 400 persons per sq. km.

The first category of urban units is known as **Statutory Towns**. These towns are notified under law by the concerned State/UT Government and have local bodies like

Municipal Corporations, Municipalities, Municipal Committees, etc., irrespective of their demographic characteristics as reckoned on 31<sup>st</sup> December 2009. The second category of Towns is known as **Census Town**. Population trends in respect of statutory towns and census towns are indicated in **Table- 1.1**.

The human settlement classification for planning purposes, its nomenclature and population range is redefined in the URDPFI guidelines based on:

- Census 2011 and reference to census towns.
- Master plan formulation in the states.
- Emerging agglomerations in India.

The classification of urban settlements adopted for URDPFI is indicated in **Table- 1.2**

Table 1.2: Classification of Urban Settlements

S.No.	Classification	Sub-category	Population Range	Governing Local Authority	Number of Cities as per Census of India, 2011
1	Small Town*	Small Town I	5,000 - 20,000	Nagar Panchayat	7467
		Small Town II	20,000- 50,000	Nagar Panchayat/ Municipal Council	
2	Medium Town	Medium Town I	50,000 to 1,00,000	Municipal Council	372
		Medium Town II	1 lakh to 5 lakh	Municipal Council	
3	Large City	--	5 lakh to 10 lakh	Municipal Corporation	43
4	Metropolitan City	Metropolitan City I	10 lakh to 50 lakh	Municipal Corporation/ Metropolitan Planning Committee	45
		Metropolitan City II	50 lakh to 1 Crore	- Same -	5
5	Megapolis	--	More than 1 Crore	- Same -	3

Note: Names of Local Authorities may vary as per States' traditions and laws.

Source: Modifications for the URDPFI Guidelines based on census classification and State experiences.

\* Any urban centres even having less than 5,000 population may be given a statutory status and be called as a Statutory Town and Census of India follows 6-fold classification as per the population size

Small towns can be referred as 'transitional towns' mentioned in the 74<sup>th</sup> CAA where a Nagar Panchayat (as a municipality) is to be formed for an area in transition from a rural area to an urban area.

Agglomeration of urban nodes along with its peri-urban and rural areas are currently observed in the Metropolitan cities II (like in Chennai, Bengaluru, Hyderabad, Ahmedabad) and in Megapolis. However, 'Conurbation' of settlements is on much larger scale, which may develop accounting for population more than 5 Crore and with adjoining several large cities and few metropolitan cities.

The URDPFI Guidelines focus on the statutory towns. However, the concepts stated in these Guidelines can be easily made applicable to all human settlements, whether notified as a Municipality, Cantonment, Special Economic Zone, Port trust area or even a village.

## 1.4. Recommended Planning System

Literature review on the planning systems in India and abroad indicates that each country/territory has evolved its own system suiting specific needs, traditions and legal arrangements. The recommended urban development planning systems in the guidelines have, therefore, taken into account such variations.

The recommended planning system is to consider various plans, both statutory and non-statutory, to be a part of the system. These various plans such as urban revitalisation plan, city development plan, comprehensive mobility plan, city sanitation plan, coastal zone management plan etc. have emerged due to the planning needs and/or funding schemes/ programmes. Similarly, regional plan, which is to cover a larger land area, is included in the system across the scale of planning.

The **Table- 1.3** below, which has been designed based on stakeholder consultations, suggests the planning system framework on the basis of -

- Hierarchy
- Spatial extent
- Scale of planning
- Details provided in the plan
- Function and their speciality

## Introduction

Table- 1.3: Planning System Framework

Planning system	Scope and purpose of the plan	Time frame*	Various plans; indicative list							
<b>Core area of planning</b>										
Perspective Plan	To develop vision and provide a policy framework for urban & regional development and further detailing	20-30 years	Long Term Perspective Vision document	Concept plan	Mission statement	--	--	--	--	--
Regional Plan	To identify the region and regional resources for development within which settlement (urban and rural) plan to be prepared and regulated by DPC.	20years	Regional Plan (Mobility 1)	Sub-regional plan	--	--	--	--	--	--
Development Plan	To prepare a comprehensive Development Plan for urban areas, Peri-urban areas under control of Development authority/ Metropolitan Planning Committee.	20-30 years (Review every 5 years)	District Development Plan (Mobility 1)	City/ Metropolitan Development Plan (Mobility 2)	Master Plan City Utility (30 years)	Revised Development Plan	--	--	--	--
Local Area Plan	To detail the sub-city landuse plan and integration with urban infrastructure, mobility and services.	5-20 year (Review every 5 yrs)	Town Planning Schemes	Zonal Plan / Sub-city plan	Ward Committee Plan	Coastal Zone Mgmt Plan	Urban Redevelopment Plan	--	--	--
<b>Specific and investment planning</b>						1.4.1.	1.4.2.	1.4.3.		
Special Purpose Plan	To identify the needs of the special areas which require special plan within the framework of the development plan.	5-20 year (within city utilities 30 year plan)	City Development Plan (as per JnNURM)	Comprehensive Mobility Plan (as per JnNURM)	City Sanitation Plan (as per JnNURM)	Disaster Management Plan (as per NDMA)	Slum Redevelopment Plan (as per RAY)	Tourism Master Plan	Environmental Conservation Plan	Heritage Conservation Plan
Annual plan	To translate Development Plan in the context of annual physical & fiscal resource requirement. To monitor plan implementation with performance milestones.	1 year	Investment plan	Audit and monitoring plan	--	--	--	--	--	--
Project/ Research	To focus on project related investments, costing and returns & for the studies required prior to or post plan formulation. This should be a continuous process to support planning and implementation at all stages and promotes innovation in practice.	5-20 year	Pre-feasibility & feasibility study	Detailed Project Report	Schemes & Sub-projects	Surveys & Studies	Project such as: Riverfront development projects	--	--	--

Note: Consultative meetings and the regional workshops during URDFI formulation have pointed out the need to review the plan period of 20 years and extend the same to 30 years. However general consensus was in the favour of 20 years. Intermittent review in 5 year gap would be required.

## 1.5. Scope and purpose of various plans

The need and roles for the specific plan category, namely, Perspective Plan, Regional Plan, Development Plan, Master Plan, Local Area Plan, Special Purpose Plan and Annual Plan, thereby resolving gaps in the planning system is detailed in the following section.

### 1.5.1. Perspective Plan

Developing a vision for region is essential for policy framework. The vision stipulates direction of growth and identification of resource potential and innovations to be adopted for the thrust areas of development. It integrates broad level plan with the regional or development plan. A realistic vision helps policy formulation and preparation of Perspective plan.

Perspective plan defines the vision and focuses on the spatio-economic development policies, strategies and programmes towards the intended development of the State. The Perspective Plan of a State could include - State Urbanisation Policy and State Land Utilisation Policy. The plan is based on state resource mapping and analysis and assessment of potential resources. It addresses the long term policies regarding development of infrastructure and resource mobilisation. The scope of this plan covers the social, economic, environmental and spatial development goals, policies and priorities relating to the activities that have spatial and financial implications.

The purpose of a perspective plan is to provide an overall framework for preparation of detailed plans. Therefore it serves as a guide for urban local authorities and regional development authorities in preparation of the regional and development plans.

### 1.5.2. Regional Plan

For planned and sustainable development of the human settlements, the regional planning approach needs to be promoted. The planning regions could be classified under three heads:

- (a) **Administrative Regions**, which can be District Regions or Metropolitan Regions as per the recommendations of the 73<sup>rd</sup> & 74<sup>th</sup> Constitutional Amendment Act,
- (b) **Investment Regions**, which can be new investment manufacturing zones, industrial and freight corridors, special investment regions etc. They could be identified under National Acts/ policies,
- (c) **Special regions**, which are sensitive in terms of environment/ socio economic or political aspects.

States undertake Urban and Regional Planning under a variety of statutes such as the Town and Country Planning Act, Municipal Laws, Urban/Metropolitan Planning/ Development Act, Improvement Trust Act, Industrial Development Act, Cantonment Board Act, Major Ports Act etc. Often these laws are mutually exclusive. For instance,

a Master Plan for a city would exclude the lands covered under the Industrial Development Act, even though the lands would be adjacent and the movement of the people and of the economic activities may be seamless. This leads to sub-optimal planning for land use as well as for infrastructure. It is, therefore, suggested that the principles for spatial planning recommended by these guidelines are extended to all areas, whether administered by the regular administrative system of the State Government or by special laws such as for the ports, cantonments, railways, industrial zones etc. Furthermore, the concepts of regional planning enunciated in these guidelines should be extended to all contiguous areas that are socially, economically or functionally inter-dependent. For instance, a civilian town and the adjoining port/ cantonment/railway area should be covered by an umbrella regional plan, even though the actual authority for administration of the individual piece of land would continue to vest with the respective organisation, such as the Port Trust, Cantonment Board, Railway Administration, etc. At times, even certain infrastructure could be planned and developed in a regional set up. For instance, the road network/ mobility plan, or the drainage plan could more efficiently be executed in a regional set up, rather than limiting to the jurisdiction of the statutory authorities administering their respective lands.

This would also call for notification of regional planning authorities, for regions that have contours defined by seamless connectivity of people and economic activities. Typically, a town in the vicinity of a industrial zone (SEZ etc.) should become the node for notification of a Regional Planning Authority (RPA), wherein the region would be defined to include the town, the nearby SEZ and the adjoining villages. Similarly, a Port Area and it adjoining city and villages should put together be notified as a Region, with a RPA duly notified to prepare a regional plan and coordinate/ oversee the implementation of the regional plan. Such RPA may be chaired by a senior officer, such as the District Collector or could even have a full-time officer. Senior representatives of the various authorities administering the constituent areas (ports, villages, cantonment, SEZ etc.) should be represented on the executive body of the RPA.

Similar RPAs may be notified for tourist areas, religious places and the influence zones of the transit corridors such as national/ state highways, expressways, and waterways. Areas including and surrounding the airports may also be similarly notified for planned regional development. It would also be desirable to regularly monitor the contours of such RPAs and expand the same, as per need. The State Town & Country Planning Acts may be suitably modified to enable formation of such authorities. Till such time such statutory arrangements are put in place, the State Government could issue executive orders constituting such authorities and Ministry of Urban Development could extend necessary support for the purpose, as required.

Regional plan is to be a comprehensive plan at an appropriate scale (district/inter-district, investment region or special area) for the integration of urban nodes with

the semi-urban and rural areas. The plan is based on understanding of the characteristics of the region such as flow of people, goods, knowledge and money.

Some states have comprehensive town and country planning legislation, which provides for urban planning and development in a regional perspective beyond the city limits and coordinated with the overall framework of economic development, priorities and resource availabilities. Regions, identified in the States, are to be planned holistically or as sub-regions for the holistic approach of planning.

The detailed planning of the urban nodes will be addressed by the development plans at the next stage of planning, while the requirements of the region will be addressed by the regional plan to bring out policies for development and bringing in harmony between the different types of human settlements. Regional plan focuses on balanced development and plan for hierarchy of settlements, both urban and rural (in terms of its geographical area coverage), hierarchy of connectivity network, road, rail, sea and airports and intermodal transport hubs, focuses on land utilisation, resource mobilisation, environmental protection and disaster risk management.

### 1.5.3. Development Plan

Development plan is a statutory plan prepared (under relevant Act) within the framework of an approved perspective plan. The objective of a development plan is to provide further necessary details and intended actions in the form of strategies and physical proposals for various policies given in the perspective plan and regional plan depending upon the economic and social needs and aspiration of the people, available resources and priorities.

Proposals of a development plan should be definite, supported by an implementation strategy and evaluation criteria. It makes known publicly the intention of the local authority regarding physical, social and economic development, the facilities and the services that are proposed to be provided in the near future. The approved development plan allows the local authority to implement development of the land area specified under the plan with the help of local area plans and projects.

The time frame of the existing Development Plans is for a period of 20 years by most of the Urban Development Authorities/ULBs. For greenfield cities, a longer planning period can be considered, aligned with the infrastructure life of 30 years.

These plans should be in phases of 5 years, to make it convenient for periodic reviews and revision. This 5-year cycle could also be usefully coincided with the State Five Year plans and State Finance Commissions' recommendations, though such an alignment need not be made mandatory. The targets set for each phase can be assessed as the mid-term review against the achievements at the end of each

phase. For Greenfield area, phasing could include a 'Zero' period for approvals, institutional set-up, initial land polling and revisiting any strategy.

### 1.5.3.1. Master Plan to be referred as Development Plan

The term "Development Plan" is used differently in States. Some States use it for an integrated multi-sector plan, such as the District Development Plan. In some other States, it is a statutory land use plan, approved and adopted by the local authority and its proposals are precise and definite, notifying the property owners the manner in which their properties will be affected. The examples of the later type are the Delhi Master Plan, Chennai Master Plan, Guwahati Master Plan, Ahmedabad Development Plan, Hyderabad Metropolitan Development Plan and Bhopal Development Plan. Here, both the plans, Development plans and Master plans have the same functions and impose similar controls, with variation in the use of nomenclatures by States. Many states prefer and there is a growing consensus to replace the terminology of 'Master Plan' with 'Development Plan'.

In areas under the Schedule 6 of the Constitution, land is not directly State subject such as in the North-Eastern (NE) States, where land title is based on community ownership. The approach to land aspects of the Development Plan may be different in such cases. Therefore, a **Structure Plan** approach to land management may be appropriate in order to allocate land for different land uses in urban infrastructure etc.

In such cases or otherwise, **Structure Plan** is to serve as a planning tool which directs the growth and zones of planning, but is not as precise as the development plan (such as the Structure Plan for Bangalore Metropolitan Region). Structure Plans may be considered as an overarching Development plan for Metropolitan Regions, allowing broad framework and flexibility.

### 1.5.4. Local Area Plan

The thrust of micro-planning should shift to local area plans, which could encourage decentralisation and improve implementation of Development Plans. In view of the 73<sup>rd</sup> and 74<sup>th</sup> CAA, planning decision and implementation of plans should be disaggregated in order to bring the process closer to the local people. This would enhance the significance of Local Area Plans.

Local area plans are to be prepared to guide the development or re-development of land, conservation of buildings and physical features, providing improvements in the physical layout, making infrastructure and amenities available and managing the area to enhance health and safety of the residents to support economic development as well as to enhance the quality of living, environment, and for area specific regulatory parameters<sup>iii</sup> (see endnote) for the area covered.

Local area plans need to specify the implementation details to comply with the Government Policies, such as housing, hi-tech townships, rainwater harvesting, energy, disaster management, industrial and service sector investment, barrier-free environment for the elderly and the physically disabled, e-Governance, tourism and other policies and facilitate formulation of specific projects.

The plan should delineate reservation of land for roads and other public purposes, for construction, reclamation etc. The plan should provide a framework for recovery of the associated costs for public projects, by mechanisms like levy of betterment charges, charges on additional development rights, and appropriate user charges.

### 1.5.5. Special Purpose Plan

Special Purpose Plan can be prepared for specific development sectors depending on its economic and environmental importance. Depending on the urgency of the need and priority of the sector requiring special treatment and covering special aerial extent, Special Purpose Plans for specific subjects can be prepared. However, these plans are to be within the framework of the Regional Plan, Development Plan or Local Area Plan in the jurisdiction of the local authority.

These plans may also emerge to serve the purpose of urban planning needs under different Central and State Government grants, funding schemes<sup>iii</sup> (see endnote) / programmes with an aim to:

- Encourage reforms and fast track planned development of cities, peri-urban areas, out-growths, urban corridors, and others,
- Scale-up delivery of civic amenities and provision of utilities with emphasis on universal access to the urban poor,
- Special focus on urban renewal programme,
- Supplement to budget documents on ULBs,
- Sustainability, Environmental and heritage protection,
- Theme based development such as tourism, IT etc.

### 1.5.6. Annual Plan

An Annual Plan would contain the details of the new and ongoing projects that the local authority intends to implement during each financial year for necessary financial resource mobilisation and monitoring its performance.

The annual plan is to be prepared by the local authority in each financial year to identify the new projects, which the authority will undertake for implementation during the year, taking into account the physical and fiscal performance of the preceding year, the priorities, the policies and proposals contained in the approved Regional Plan, Development Plan or Local Area Plan.

The annual plan is intended to provide the resource requirement during the year and sources of funds including those mobilised by the local authority, grants, aids and project/scheme funds by the State and Central Governments.

It is thus an important document for the resource mobilisation as on the basis of this, the plan funds are to be allocated by the funding body. This plan, therefore, serves as an important link with the budgetary process. Annual plans also provide a mechanism to monitor progress of development plan and various projects.

### 1.5.7. Project / Research

Projects are derived targets of the sequences of plans, which focus on items of execution, investments, costing and returns. Conceived within the framework of the Perspective plan, Development plan or any of the plans in the planning system, projects are the working layouts with all supporting infrastructure and documents including cost, source of fund and recovery providing all necessary details for execution including finance, development, administrative and management.

These projects could be for any area, old or new, any activity or land use like residential, commercial, industrial, recreational, educational or health related, or infrastructure development, separately or in an integrated manner; for research and development in the field of planning, key surveys to determine statistics, by any agency such as government, semi-government, private or even individual; or any agency prepared by town planners, architects, engineers as the case may be, enjoying maximum freedom of expression in their design within the stipulations of development promotion rules and other regulations as applicable. Research, specifically for background studies preceding Perspective Plan, Regional Plan, Development Plan or even Local Area Plan formulation may be undertaken as required by the State Government and local authorities. Specifically, traffic surveys & related studies to collect current statistics are crucial for making decisions in plan formulation.

*(Details on the contents of the plans suggested above in the planning system are given subsequently in **Chapter 2- Plan Formulation.**)*

### 1.5.8. Inter-relationship among various plans

Taking into account the entire planning process and also incorporating the suggested planning system, **Figure- 1.1** shows the inter-relationship of the different plans, directly or indirectly related to the land development, at various levels ranging from national to a transitional urban area.

A Perspective Plan is formulation of development strategy generally at the State level or at the regional level. This is detailed further in Regional Plan or Sub Regional Plan as the case may be and in Development Plan. Perspective Plan should be a guiding document for planning. It could also specify the regional planning

authorities, urban/local area planning authorities, regulatory authorities in the State and those responsible for preparing plan at various levels. The State Urbanisation Plan shall give a stock of the urbanisation, planning status and especially of the land suitability.

Regional Plans are to be prepared at district and metropolitan region level, and where economic regions are formulated. This is the linkage for aggregation of plan proposals for consolidation and integration of physical and fiscal planning efforts at District, Metropolitan area, State and also at National level (in case of inter-state regions). As **Figure-1.1** depicts, integration and disaggregation of policies, resources in the planning system occurs at the level of Regional and Development Plan.

Figure 1.1: Relationship of the Planning System



Development Plan and Mobility Plan need to be integrated to ensure transportation oriented spatial planning. It needs to be emphasised here that urban plans should not be considered in isolation from its region as each urban centre is part of a regional system of the settlement which in turn play their respective roles in the process of development of the region as a whole. The Development Plan shall provide policies and development proposals, which are detailed in the local area plan to a greater scale. This interrelationship between planning system is the key to implementation; hence Development Plan and Local Area Plan should be prepared in close coordination.

However, areas that require special plan within the framework of the development plan or planning for specific purpose should be prepared only when the need arrives. The funding schemes, such as JnNURM, RAY, have significant role in the new planning system, where City Development Plan, Comprehensive Mobility Plan, City Sanitation Plan, Slum Redevelopment Plan, Disaster Management Plan are to be formulated. Among all, Comprehensive Mobility Plan should be prepared along with the Development Plan, while City Sanitation Plan, City Development Plan should be prepared in line with the Development plan.

Project reports and Annual plans are necessary requirements of the planning system. These are directly interrelated with each other and are vertical with the entire planning system. Implementation of all intended developments is linked to this stage and hence these can be prepared following any of the above mentioned stages.

### 1.6. Sustainable Urban and Regional Development

The urban and regional plans, in all its forms and dimensions, should focus on sustainability, from financial, social, governance/ managerial and environmental. **Financial sustainability** is to be achieved by working out the details of the capital and operational costs and the options to recover the same adequately. Each development project enhances the economic stature of the influence zone and, accordingly, the development activities in such influence zone should be subject to development charges, computed to recover the capex over the project lifecycle. Similarly, the user charges should pay for the operational expenses. In determining such charges, cross subsidies could be provided for.

**Social sustainability** relates to inclusion, i.e., the project should provide benefit to all residents in the influence zone equitably. It should also be based on identification of the gainers and losers from the project and to ensure that the gainers are subject to development and other charges that could be passed on in an appropriate form to the losers.

**Governance/ managerial sustainability** would require the project to meet all the statutory and regulatory requirements and also to have adequate capacities developed with the local authorities concerned for maintaining the project effectively and efficiently throughout the project lifecycle at reasonable costs.

**Environmental sustainability** would require, for instance, zero land-fill for solid waste management projects. In fact, each project should aim at improvement in the environment, rather than on 'minimising the damage'.

The sustainability issues have been highlighted in numerous policy documents including the **Twelfth Five Year Plan**, which recommends for strengthening urban governance structure/ Local Bodies, augmenting the soft infrastructure including system capacities, inclusive governance, environmental sustainability and enhanced attention to urban renewal as well as to regional approach to planning. These frameworks have been further detailed in the **National Mission for Sustainable Habitat**.

### 1.7. State Land Utilisation Policy

State Land Utilisation Policy would need to be defined at the Perspective Plan Level, which should be as per the guiding framework of National Land Utilisation Policy, 2013 (draft version is currently in place), brought out by the Department of Land

Resources, Ministry of Rural Development, for different states keeping in context the state-specific needs, potential, priorities and legal provisions.

The (draft) National Land Utilisation Policy, 2013 takes into consideration the predominant (existing or scientifically established) functions of land serving the needs of people, environment as well as different sectors of economy and development. Also, the Policy takes into consideration the existing laws and approaches that govern land uses. It suggests that the land in the country be divided into Land Utilisation Zones<sup>1</sup> (LUZs) based on the predominant use of those lands. Here, each state should formulate the strategy of land development in a spatial concept plan. The following six types of LUZs are indicated:

1. Predominantly Rural and Agricultural Areas;
2. Areas Under Transformation;
3. Predominantly Urban Areas;
4. Predominantly Industrial Areas;
5. Predominantly Ecological Areas, Landscape Conservation & Tourism Areas, Heritage Areas<sup>1</sup>;
6. Major Hazard Vulnerable Areas.

It may be desirable to further classify areas under the 'Predominantly Urban Areas' LUZ, where urban development is to be promoted, to be restricted/controlled or to be prohibited, as per the situation.

The perspective of the State, the state resource mapping and LUZs would set the foundation of the long-term policies regarding development of infrastructure and resource mobilisation for the land use plan.

### 1.7.1. Landuse Transport Integration

In the past decades, urban sprawl has resulted into loss of high quality agricultural land and open space, fragmentation of ecosystems, spatially segregated uses inducing high dependency on private vehicle use and unfavourable conditions for public transport. National Urban Transport Policy (NUTP), 2006 has highlighted the need for integrating land use and transport planning. Land transport integration benefits in making investment decisions in transport infrastructure and services, which in turn are linked to economic, social and environmental outcomes. It also helps in determining the optimal use of land in the influence zones of the transit corridors. Land transport integration would involve two mutually supportive processes:

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<sup>1</sup> LUZ to be considered for eco-tourism, sea and river front natural vegetation areas and protected forests.

- Organizing **the physical form and land use pattern of a city** such that the travel demands, trip lengths and travel times are minimized, while accessibility, comfort and efficiency are maximized.
- Organizing all systems of transportation from pedestrian pathways to mass transit systems such that they **integrate well with each other** and enable the harmonious establishment of land use around them, in the process generating a city form that is sustainable<sup>2</sup>.

Conventional development plans for Indian cities have a statutory requirement to plan land uses and channelize growth, whereas transportation plans are not statutory and work with the mandate of arriving at regional and local level projects for improving mobility. Thus, URDPFI Guideline suggests the shift from such an approach to explicitly regarding interactions between various land uses/ activity subsystems and transportation. Therefore, Comprehensive Mobility Plans (CMPs), first mooted under the JnNURM, are to be integrated with all development plans bridging the transportation projects and statutory land use planning.<sup>3</sup>

Transport networks are among the most permanent element of cities, which change very slowly over decades or centuries. While, buildings are the second most permanent element of cities, with lifetime of hundreds of years, but can be adapted to changes through refurbishment but the integration of the two shapes the urban form of a settlement.

### 1.7.2. Transit Oriented Development (TOD)

The integration of land use with transport systems is called “Transit Oriented Development”, which is essentially “any development, macro or micro that is focused around a transit node, and facilitates complete ease of access to the transit facility thereby inducing people to prefer to walk and use public transportation over personal modes of transport”<sup>4</sup>. This entails planning for compact cities and reducing urban sprawl and dependency on the large scale developments in the periphery which induce shift from non-motorized to motorized modes of travel. Approach to TOD highly depends on establishing mixed landuse zone as part of strategic densification. The policy includes:

- **Network & Connectivity:** Disperse high traffic volumes over multiple parallel streets rather than concentrating traffic on few major arterial roads. Create a fine network of streets through urban design that provides choice of routes for all modes, reducing distances between places as well as journey times.
- **Last mile connectivity:** Provide fast, convenient interchange options and spatial provision for various modes of Intermediate Public Transport (IPT) at

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<sup>2</sup>A framework for this purpose is provided in the Toolkit for Land Use Transport Integration and Density of Urban Growth brought out by the Ministry of Urban Development under the Sustainable Urban Transport Project (2013).

<sup>3</sup> Ibid.

<sup>4</sup>Draft UTTIPEC Guidelines, 2012

Multimodal Transit Station for seamless travel. Provide multiple mode choices for last-mile connectivity at various prices and comfort levels. Also, if possible, eliminate the need of IPT by design and engineering<sup>5</sup>.

- **Pedestrian access:** Provide the shortest direct route to pedestrians and non-motorised modes to station as well as between building blocks.
- **High Density, Mixed-Income Development:** Compact neighborhoods for shorter commutes and equity for all sections of society. Mix of compatible use to promote 24 hour activity.
- **Streetscape Design:** Urban places should be designed for enjoyment, relaxation and equity. Pedestrian and bicycle friendly designated space for all activities. Keeping in view the *prevention of heat island effects* from wide and open streets, by proper street and landscaping.
- **Promote Place Making to Create a Sense of Place:** Focus on promoting liveability, quality and uniqueness of each space
- **Direct Business to TOD Locations:** Create transit services to regional job centers, focus job creation investments in transit serviced locations.
- **Public facilities at nodes of public transport:** Plan for public facilities such as schools, universities, sport facilities, stadiums, theatres and concert halls around nodes of public transport.
- **Function/Activities at nodes of public transport:** Promote multi-functional developments around nodes that are otherwise deserted in the evening or at night. Plan a mix of different types of users and inhabitants to create a lively and safe place.

Application of TOD is in context of scales in planning i.e. Regional context, Sub-regional context, city context and area context. It shall require a robust methodology for intervention<sup>6</sup> and would need to be planned at (a) Regional or Sub-regional level and (b) City or Local Area planning level.

The context of TOD varies in respect to City Core areas, Peripheral areas and Greenfield areas which are equally important and mutually dependent on densification, redevelopment (in context of City Core areas), mode of public transport and intermediate public transport and therefore uses of land in the influence zone. However, in the setting of brownfield cities where transformation of landuse and built form has experienced continuous change, the Development Oriented Transport (DOT) may be used. DOT incorporates redevelopment or readjustment of transit network mediums as per transformation taking place or has taken place in development. Detailed approach of identifying TOD influence zone

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<sup>5</sup>In case of China and Japan

<sup>6</sup>Working paper on Transit Oriented Development, Embarq, India

and its planning is covered in **Chapter 8** and Zone wise TOD matrix is provided in **Table- 5.3**

Besides, integrated urban development, TOD can benefit as an alternative revenue generation source from:

- Financing of Urban Transport projects by Unlocking Land Values as Higher FSI in influence zone of Transit corridors within the framework of the overall planning guidelines to be prepared by respective states.
- Transit Corridors (Metro/ Mono Rail, BRTS, Ring Road) attracting economic activities and leading to induced urban development with less efforts.
- Land-use based financing sources along Transport Corridors. For example, periodic revision of property guidance value, higher property tax along transit corridors, impact fees, development charges, conversion charges and betterment charges.

If properly planned and implemented, TOD invariably promotes value added activities including commercial and services.

### 1.7.3. Flexibility in Plans

Statutory landuse plans have implications on the land use and development control mechanism. Despite statutory backing, due to the controlled conventional (rigid) approach, Development plans are not implemented fully and meaningfully. Plan proposal estimates have not kept pace with the growing requirement of cities or the aspirations of the city dwellers.

Development planning approach is to be for a flexible plan formulation for facilitation and promotion of development in plan making and implementation, where changes in landuse are to be permitted only when necessary by specifically appointed empowered body- 'Urban and Regional Planning & Development Authorities' (suggested in the institutional reforms **Section 3.6.1**). These changes may be guided by large developments, social interest and need for all. Further, fixation of FAR/FSI, density should be based on more rational grounds and any changes therein must be carefully planned. Preparation of City Investment Plan should facilitate easier implementation of Development plan.

For minor changes in the landuse, the planning system is to be improved to allow flexibility in the Development Plans/Master Plans. Such as allowing mixed use of land in the zoning regulation must consider the RoW of the abutting road for industrial and other (residential and commercial) aspects of mix. Vertical mix of use of land is an alternative approach for promoting flexibility and is suggested in **Section 5.3.2. & 9.2.**

#### 1.7.4. Land to generate fund for Infrastructure Development

The URDPFI Guidelines suggest the ways to augment financial resources for implementation of the development/ spatial plan through various innovative sources of revenue generation. Formulation of spatial plan should be such that the plan is able to create economic growth and which could fund the implementation of the plan. Among the land development mechanism, town planning schemes followed in the states of Maharashtra and Gujarat is a successful case to demonstrate financial sustainability (cost recovery) of the plan.

Many schemes and projects are conceptualised without proper techno-feasibility studies or financial viability assessments and therefore projects and research have been integrated in the planning system now. Consequently, in the Plan, there is not much appreciation of the implications of its standards for capital cost, cost recovery and maintenance by the municipalities and the state agencies. The Urban Local Bodies (ULBs) mainly in the small and medium size towns, without exception, suffer from a very weak resource base. Their per capita income is much less than the level of expenditure, which makes it heavily dependent on external funding instead of its self-generated revenues.

To address such issues, fiscal resource generation from land, tax on vacant land, regulation of unauthorised informal development and underutilisation of permitted FAR could be source of financial resource generation (refer **section 3.3**), which can be for dedicated urban development through an infrastructure fund. Here, implementing agencies need to treat land as an asset for infrastructure development through capital gain, stamp duty, auction and other mechanisms in consensus of the State Finance Commission.

#### 1.7.5. Sustainable Waste Management

International agencies working on zero waste have claimed that recycling rates of 75% and plus have been achieved by municipalities large and small throughout the world. The 'Zero waste'/'Zero Land-fill' concept is gaining ground as being practicably achievable in Indian cities too. Indian cities have the advantage of significant recycling and reuse in the solid waste management system. Those can be improved and coordinated with the view to moving towards 'Zero waste scenarios'.

Zero land-fill can be achieved by adopting systematic approach of segregation at source by planning, by collection facilitation and most importantly by public awareness. The green waste can be converted into fuel cakes, kitchen waste into manure, construction & demolition waste into bricks, plastic waste into oil, paper, glass and steel back into the same and all residuary inert materials can also be converted into bricks. Achieving zero land-fill is more conveniently possible, if (a) the collection is made from house to house and some segregation is done at household level and (b) the recycling is done at decentralized, say, ward or even lower levels.

Besides solid waste, the effective management of waste water would result in availability of treated water for reuse, capture of methane gas for power generation and improvement in the quality of the environment. This could also be done in a zero land-fill concept. More details on Sustainable Waste Management, including the norms for waste water and its reuse, are given in **Chapter 8**.

### 1.7.6. Inclusive planning

Development plan / Local area plans in India have not effectively earmarked adequate land and spaces for the urban poor / informal sector for residents or other activities at affordable rate. In new townships and new developments of IT / BPO Townships, Satellite Townships, SEZ, etc., where the space standards are normally affluent, informal sector is significantly gaining recognition. Planning norms for urban street vendors, the marginalised and the informal sector to be adopted and developed from this guideline. It is of utmost importance to protect the interest of urban poor by reserving space, extending legal title (ownership) and above all the Master Plans/Development Plans to take this component into account. Hence, Development Plan should allocate space with serious assessment of the requirements of urban poor after ascertaining the ground realities with regard to location of vendors, informal activities, slums and need for in-situ redevelopment /upgradation. Norms for informal sector and street vendors are given in **Chapter 8** and approach to affordable housing is suggested in **Chapter 5**.

The places of employment for most of the citizens are often located far away from their place of residence, which discourages them from accessing the most suitable employment. While this handicap would be applicable for all sections of the society, it is more significant for the women and other weaker sections, including the elderly and the differently able. The effective solution for this situation lies in the 'shelter-transport-livelihood link', which ought to be made a cornerstone for planning. Accessibility requires quality, attractiveness and safety of public spaces for pedestrians, cyclists and people using public transport.

Barrier Free Environment (refer **section 8.8**) is one way to enable people with disabilities to move about safely and freely and to use the facilities within the built environment<sup>7</sup>. In addition, to integrate the disabled and elderly persons fully into the society, the social infrastructure norms suggest co-development of old age home and orphanage facilities with appropriate infrastructure to be included in all the plans especially in the Local Area Plans.

### 1.7.7. Disaster Risk Management

Over the past couple of years, the Government of India has brought about a paradigm shift in the approach to disaster management. The new policy emanates from the realisation that investments in mitigation are much more cost effective

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<sup>7</sup>'Guidelines and space standards for Barrier Free Built Environment for Disabled and Elderly Person', CPWD, Ministry of Urban Development (2013). Also recommended by UN Habitat.

than expenditure on relief and rehabilitation. This approach has been translated in the URDPFI Guidelines in **Chapter 6** for disaster planning, covering institutional mechanisms, preparedness, response and capacity building both at State and District level, especially focusing on inclusive planning.

States, metropolitan areas, regions and cities need to collect data, information and undertake mapping for all infrastructure, services and amenities to understand requirements and identify gaps. At the local planning area level, spatial maps need to be created to evaluate neighbourhood, streets and public spaces based on their safety; comfort and convenience (refer **section 2.2.4**).

## 1.7.8. Speeding the process of planning & implementation

### 1.7.8.1. Simplifying the planning process

As per the 'Strategy paper on master plan formulation, inclusive planning, prioritization for housing and pedestrian movement', TCPO, there is a widely held view that the urban development planning process in the past has been unduly time consuming and largely confined to the detailing of land use aspects and projecting micro level needs on long term basis when there were dynamic changes in very short terms. In light to the concern, the State Governments would need to modify the respective Town & Country Planning Acts for the following:

- i. Simplification of preparation of plan: making provisions in the Development Plans for detailing only the focused key sectors and preparation of the draft for approval in a limited time to one year, as suggested by TCPO. (refer **Chapter 2** on Plan Formulation).
- ii. Simplification in the implementation of plan: the plans to be easily understandable & acceptable, minimizing conflicting recommendations within a plan, provision for translation of plans and related documents into vernacular languages.
- iii. Simplification in data gathering: user-friendly GIS and remote sensing data to be sourced for simplifying the process for plan formulation by developing a spatial data base useful for planning, decision making and implementation decision (refer **Chapter 7** for Simplified Planning Techniques)
- iv. Simplification of approval/schemes: improving the approval process by developing citizen's charter, approval mechanism for the change in landuse permissions and by developing regulatory body at State and/or local area planning level to bridge the gap between approval and implementation. Provision of Interim development order<sup>8</sup> in between the period of plan formulation to implementation can be considered.

<sup>8</sup>Kerala Town & Country Planning Ordinance, 2013

- v. Better public participation: The State planning provisions to be modified to emphasize on involvement of public at early stages, formulation of Grievance & Redress system to address the public grievances and bringing transparency in accounting system. It is suggested to involve Residential Welfare Associations in Local area plans (LAPs) and ULBs to use modern tools for awareness through websites/ on project sites.

Foremost, during the plan formulation, roles and responsibilities for the implementation of the plan are to be well defined in order to achieve the milestones as per the action plan and to bring in transparency in the implementation system. Further, during plan evaluation and monitoring, citizen's charter should to be involved, for transparency and accountability.

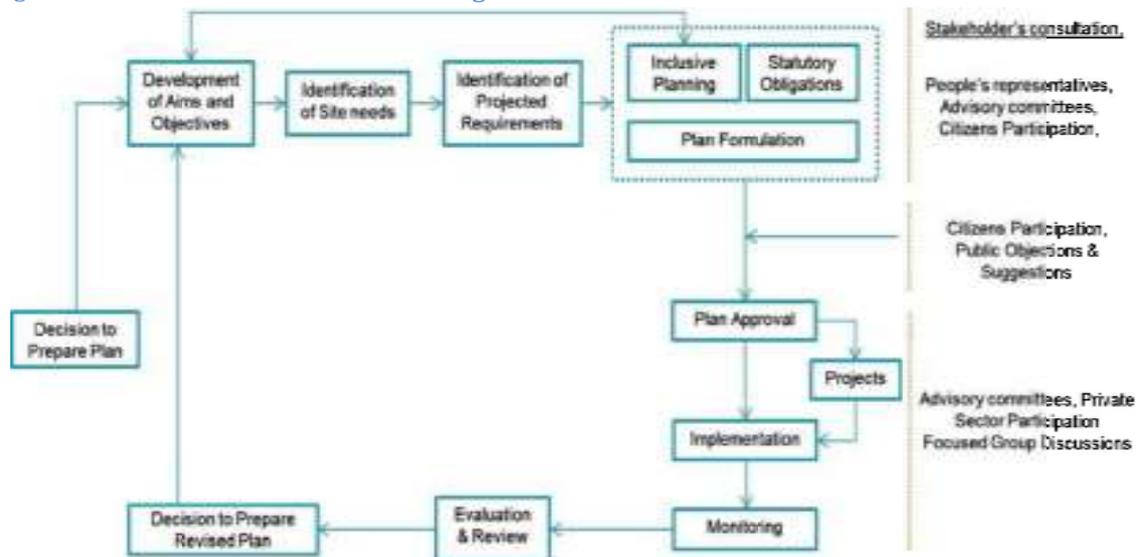
In case of inadequacy in the manpower capacity with the Government bodies for planning, outsourcing to non-governmental and private organisation could be considered as an option, but as suggested by TCPO - Local Bodies and Development Authorities of the States need to take necessary steps in the direction and take a lead to ensure that all the cities and towns of the State have statutory Master Plans by the end of the XII Five year plan. For this purpose, boost to the training of the new planners and provision of adequate planning schools is imperative, since the planning task, complex and interdisciplinary as it is, must be done only by qualified planners.

## 2 Plan Formulation

### 2.1. Planning Process

Spatial development planning is a continuous, time-oriented, cyclic process and should be seen and practised as a process where planning, implementation, monitoring, review and plan updating go on as a dynamic process. In this process, the decision to prepare a plan is outside the cycle of planning process. The following diagram portrays the general process of planning.

Figure 2.1: General Process of Planning



Following are the stages of planning process:

- Development of Aims and Objectives
- Identification of site needs
- Identification of projected needs
- Plan formulation
- Inclusive planning
- Statutory obligations
- Decentralisation of plan approval process
- People's participation
- Plan modification
- Review and revision of plans.

#### 2.1.1. Aims and Objectives

The aim of the plan is a broad and general statement indicating the decisions of the policy makers, aspirations of the people and needs of the community. For example, 'To provide job opportunities for all' is a statement of aims.

Objectives are specific statements indicating the ways and means of achieving the set aims taking into account the potentials. For example, for the aim related to job opportunities, the objectives could be:

- Provision of jobs through development of industries / commerce or trade;

- Provision of incentives and inducements (specific) to industries;
- Provisions of informal sector economic activity sites as part of commercial areas, and such others.

The aims and objectives formulation exercise comprises the following steps:

1. Identification of values cherished by and needs of various stakeholders including citizens, administrators, professionals, politicians, and other group of people.
2. Identification of aims incorporating the values.
3. Identification of criteria that further defines each aim to form basis for formulation of objectives.
4. Formulation of objectives, which could be further defined as design objectives and implementation objectives.

### 2.1.2. Identification of Site Needs

For comprehensive spatial planning and integration of the sectoral development, site specific needs are to be identified in the beginning of the planning process. The report of the Working Group on Urban Strategic Planning (12<sup>th</sup> Five year plan), states that due to '*Lack of Comprehensive Planning Approach, haphazard growth and proliferation of slums around industrial locations, peri-urban areas and randomly located new developments such as SEZs and township has taken place*'.

Diverse ground conditions and interrelationships in settlements require different strategies for spatial planning. The growth potential and special functions performed by the urban centres such as marketing, industrial, tourism, pilgrim centres etc. need to be explicitly recognized.

At this stage of the planning process, the site needs should be identified based on the typology of urban development- such as port city, old city, industrial townships, peri-urban areas, corridor development, regional development and accordingly the vision needs to be prepared. **Table 2.1** throws light on some site-specific features for studying urban and regional settlements while planning. The list is comprehensive but not exhaustive.

Table 2.1: Site Specific Needs of Few City Types

Indicators	Port City	Industrial City	Peri-Urban Area	Old City
Common Indicators	Regional Settings & connectivity, Historical background, Location Analysis, Demography, Socio-economic Analysis, Environmental profile, Land Profile, Key Developmental Indicators, Infrastructure, Proposed Developments, Existing regulations, Administrative profile.			
Site Specific Indicators	Cargo and logistics, Railways, Coastal features / details of the port, Analysis of primary economic activities, e.g. fishing.	Logistics and Transportation, Infrastructure, analysis of Environmental parameters (pollution), Common Treatment Facilities, Hazardous and non-hazardous waste disposal system.	Real estate, Housing, Land-use conversion, Natural features, Analysis of socio-economic profile / Primary economic activity e.g. agriculture.	Density, Land use, Built-up, Socio-Economic profile, Infrastructure status, Household industries, Parking and Heritage.

The stage of identification of site needs should be taken as baseline study phase. As this stage has implications on the following stages, a broad-based study should be done for identification and incorporation of as much as elements that are specific to the settlement and are likely to have impact on the future development of the settlements to prepare sound proposals.

### 2.1.3. Identification of Projected Needs

After identification of site needs, the next stage in the process of planning is identification of projected requirements of various activities, supporting infrastructure and land as the basic input for plan formulation. It is this stage of planning which would require most of the time. Thus, there is need to minimise the time taken at this stage. In this context, it is emphasised that primary surveys and studies should be rationally chosen so that it saves time and minimises delays in the process. The choice of technique of surveys, analysis, synthesis and projections should also be such that it is effective and time saving (refer **Chapter 7** for choosing the planning techniques).

#### 2.1.3.1. Gaps and Projections

Expansion or development of settlement necessarily requires corresponding provision of infrastructure to support residents and economic activities. Thus, infrastructure gap analysis should be carried out mandatorily while preparing the plan. Infrastructure gap can be assessed on the basis of remaining life of existing infrastructure and coverage of infrastructure against benchmarks. Special focus must be paid to the transport infrastructure at this stage. Detailed study/ research of different modes of transportation and their corridors should be carried out to find about travel demand and pattern of the planning area. Using public consultations and carrying capacity techniques (further elaborated in **Chapter 7**), current or future requirements in infrastructure can be identified. The background study of standards and guidelines for disaster mitigation should be completed to find out the gaps that may exist in city infrastructure, landscape and administration.

Aims and objectives of the study should also be considered at this level for setting up priorities of development. To incorporate the element of sustainability in human settlement planning and development, environmental and infrastructural carrying capacity study of the planning area alongwith detailed assessment of space requirements must be carried out at this stage. The capacity to hold the population is an indicator for infrastructure projection.

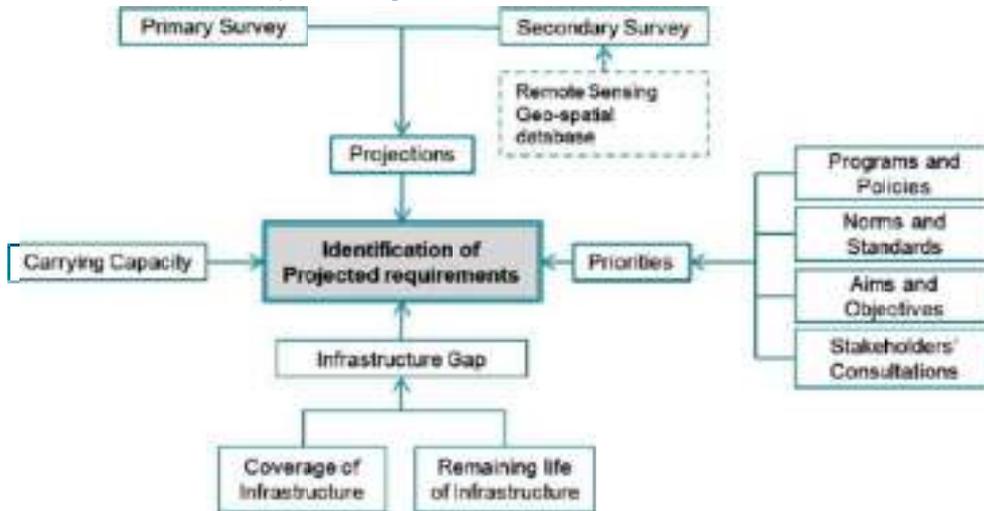
Population projections can be carried out based on past trends, employment and induced growth (of the future proposed economic activity of the land). The corresponding needs of the human settlements on infrastructure are to be projected (refer **Chapter 8**). Priorities for planned development are identified through norms

and standards for buildings, provision of services and infrastructure provided by national agencies, national and state level programmes and policies.

**2.1.3.2. Consultation**

Public participation is the key to planning exercise and hence different group of stakeholders should be consulted to know the needs and finalise the priorities for projections. Different demographic, social, economic categories of stakeholders can be prepared for wide-ranging public participation such as representatives from agencies and institutions involved in planning and development of the area, elected representatives, associations, experts in the sectors and the resident public.

Figure 2.2: Identification of Projected Requirements



**2.1.4. Plan Formulation**

Based on planning techniques, planning theories/principles, norms and standards - multiple alternatives of urban planning concepts must be prepared. This level of plan formulation also requires vision development. At all scales of planning, land and transport integration is suggested at this stage of planning, wherein a Comprehensive Mobility Plan (CMP) is to be formulated. All transportation surveys and studies should be undertaken independently by the transport department or jointly under JnNURM or other schemes before this stage.

The opportunities for Transit Oriented Development and multi modal mobility need to be taken into account. Use of non-motorized traffic options and public transport are to be optimised. The role of Intelligent Traffic System (ITS) and Electronic Road Pricing (ERP) has to be introduced. To a large extent these issues will define future development potential and the quality of life in cities.

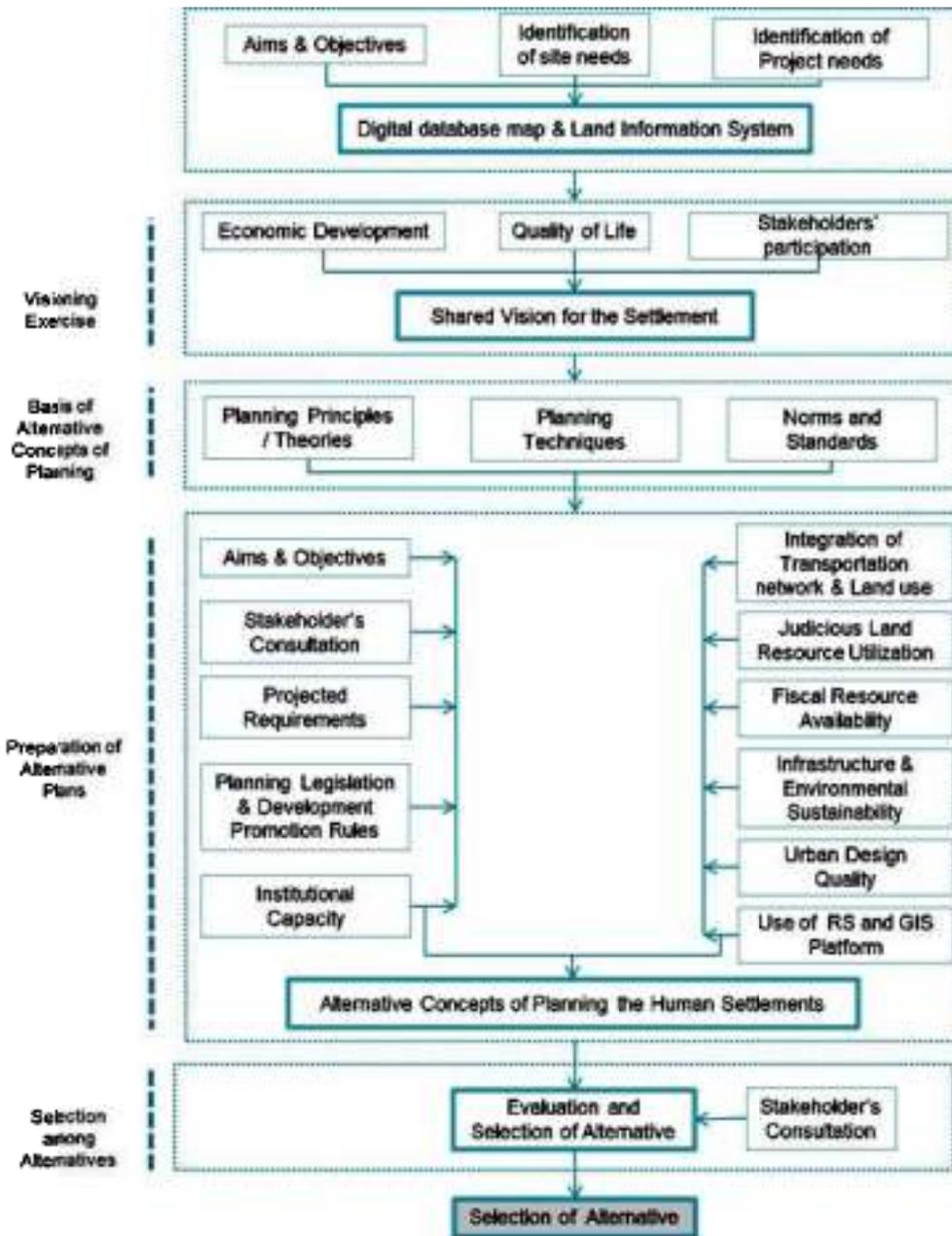
#### 2.1.4.1. Visioning Exercise

The focus of the plan preparation exercise should be on ensuring adequate stakeholder participation to arrive at a shared vision for the settlements, with regard to economic development and quality of life. The vision thus arrived should form the guiding principle for the Regional or Development plan. These would include inter alia:

- Economic Development Objectives (Increase in GDP, Income, Employment and such others)
- Transportation Objectives
- Utility Services (levels and coverage) Objectives
- Social Infrastructure Objectives
- Safety and security of the citizens
- Growth Pattern/Design Objectives
- Investment Program/ Sustainability Objectives
- Others, if any.

Planning and Development Authority should clearly mention in a plan as to how the plans are likely to benefit the dwellers in economic terms and in this context, the calculation of economic benefits is given in **Chapter 7**.

Figure 2.3: Plan Formulation Process



### 2.1.4.2. Preparation of Alternative Concept Plans

The outcomes of the first three stages would yield a digital updated Base-map and Land Information System, a complete report on status of the region/city establishing existing situation with regards all elements of development, identification of areas of concern, a shared vision and development goals and objectives. This should form the input for formulation of the plan. The planning horizon for the planning period should be identified based on the recommended planning system and the components should include:

- Estimation of land requirement for different uses (refer **Chapter 5 & 9** for detailing).
- Land suitability analysis: Environmental sensitive areas, social, economic and others (refer **Chapter 7** for further context).
- Delineation of developable area based on environmental land suitability and growth trend.
- Preparation of a general activity structure.
- Preparation of a conceptual land use plan as per the required scale (refer **Table 7.7**).

As projections are estimations of an envisioned pattern, deviation from the projection are always possible and hence projected figures should not be always treated as absolute. Here it is required by planners to build alternative scenarios and situations which may highlight the extremities as pessimistic or optimistic.

The following key remarks to be focused while formulating the plan:

- a. Land is limited and a very important natural resource and must be utilized vigilantly. Care should be taken regarding inter-relation of various activities and land uses with each other. Land use to be planned most solicitously. New concepts like Compact cities, mixed land use etc. can also be explored, if not for the entire jurisdiction, then for the upcoming zones at least.
- b. Deteriorating traffic conditions due to faster increasing travel demand in cities have impact not only on environment but also on economy by wastage of man-hours. Thus, to reduce the trip generation, land use and transport integration should be made at the initial stage by incorporating TOD and mixed land use concepts.
- c. As a part of the plan implementation, a study regarding quality and quantity manpower should be done and suggestions be made concerning human resources requirement for effective implementation of all the aspects of the plan.
- d. Vertical mobility of the vulnerable sections of the population must be integral to the planning goals. Inclusion of the women and population involved or dependent on the informal sector must be consulted while preparing plans.
- e. To prepare and implement all the aspects of the plan for the whole plan period requires steady flow of finance, otherwise the optimum outcome of the plans cannot be realized. Thus, it is imperative to plan and map out all the financial sources in the beginning of planning process so that plan proposals and milestones targeted can get maximum results. It should include financial aspects not only for plan implementation but also for plan preparation. At this stage, revenue generation capacity of plan itself should also be defined with measurable milestone against which plan could be monitored and reviewed from time to time.
- f. Other parameters, based on which plan is prepared and projected for plan period should be provided with distinct measurable milestone against which plan

must be intermittently reviewed at interval of 5 years and finally evaluated at the completion stage. This will work as input for next planning process from the previous plan period.

- g. Remote Sensing and GIS technologies should be used to speed up the plan formulation process. Large amount of spatial and attribute data can be processed through these platforms and alternate concepts of planning settlements can be prepared in shorter time span. The data available with the NRSC, SRSAC, Bhuvan Geoportal and NUIS can be utilised for the plan preparation (refer **Chapter 7** for methodology).
- h. Other elements like planning legislation, development promotion rules and urban design features should also be incorporated to prepare alternatives, which will be further detailed as the proposed plan.
- i. Green areas and related non-economic activities to be preferably proposed on Government land to avoid loss of economic benefit of the private land-owners. In case such activities are proposed on privately owned land, the local authority preparing the plan should provide a fair compensation as per law, to the land owner.

### 2.1.4.3. Selection among Alternatives

The next level of plan formulation requires evaluation of all the alternatives to reach one selected alternative that would be elaborated to prepare plan for the settlement. At this stage, focused group discussions or selected representative's discussion can be arranged as appropriate. Usually evaluation of alternatives result into another newly developed concept, which derives the best from all the options.

### 2.1.5. Inclusive Planning (further to the section 1.10.8)

Inclusive development as perceived by Central Government in 12<sup>th</sup> and 13<sup>th</sup> five year plans focuses on broad based improvement in the living standards of all residents of the country. 11<sup>th</sup> five year plan's approach was "Faster and more inclusive growth" while 12<sup>th</sup> five year plan called for "Faster, more inclusive and sustainable growth".

Inclusive planning means infusion of varying aspects, which lead to growth of whole society into development process, such as integrated trunk infrastructure, sustainable development, poverty elevation, decentralised decision making with special emphasis on women, elderly and disabled friendly infrastructure and financial planning. These facets of development were not traditionally recognised distinctly. Thus, for overall development of residents of human settlements in India, inclusivity in planning must be fundamental feature.

Inclusive development in planning should have focus on the following parameters; other such features to promote inclusivity in development process can be identified based on the needs and requirements of settlements and time<sup>9</sup>:

- Inclusive governance: entire system must function in a manner, which is seen to be fair and inclusive.
- Inclusive Sustainable development: Development is a qualitative indicator rather than quantitative. Development of human settlements should not be uni-directional causing environmental degradation in the process. To direct growth on sustainable manner Environmental Impact Assessment should be essential part of development plans and projects.
- Inclusive access to healthcare and education.
- For inclusive employment and regionally balanced growth, MSME should be promoted through Plans.
- Developing capacities of Infrastructure: Infrastructure plays an important role in growth and development of cities. It also promotes inclusivity in the society by means of easy access to services.
- Agriculture has been identified as very important for promoting inclusivity. Various Laws, Policies and Guidelines make provisions that agriculturally fertile/ multi-cropped land be acquired as last resort. Same provision should be followed while planning for human settlements too.
- For holistic development of entire population, issues concerning the people employed in informal sector, besides women, elderly and the disabled must be included in the entire process of plan preparation.
- The Plan should aim at creation of wealth and employment, in an inclusive and sustainable manner.
- Water management including flood prevention, groundwater management, rainwater harvesting, waste water treatment, recycling and reuse to be encouraged.
- Public spaces are crucial for pedestrian movement and accessible public facilities have significant impact on the quality of life.

### 2.1.6. Statutory Obligations

Numerous laws and policies made by the Central and the State Legislature and Governments impact spatial plans. Missing out on one or more of these could create serious impediment for implementation of the Plan at a later stage. Therefore, at the stage of plan formulation, a study would need to be conducted to list out all legislations and their impact on the plan formulation and implementation, to ensure affirmation with all the relevant laws.

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<sup>9</sup>Source: Eleventh Five Year Plan 2007-12 Volume-I; Twelfth Five Year Plan, 2012-17 Volume-I

### 2.1.7. Decentralisation of Plan Approval Process

Following the spirit of the 74<sup>th</sup> CAA and also recognising the fact that the current process of approval of urban development plans is time consuming resulting into delays, it is recommended that the plan approval process be decentralised as follows:

Table 2.2: Decentralised Plan Approval Process

Plan	Approving authority
Perspective plan	State Government
Regional Plan	State Government / Regional Development Authority
Development Plan	Municipal Corporation/ Development Authority/ MPC
Annual Plan	Municipal Council/ Municipal Corporation/ Development Authority
Zonal Development Plan	Municipal Corporation/ Development Authority/ MPC
Urban Revitalisation Plan	Municipal Corporation/ Development Authority/ MPC
City Development Plan (terminology to be changed to City Investment Plan)	As above
Comprehensive Mobility Plan	As above
City Sanitation Plan	As above
Projects/ Research	Municipal Corporation/ Development Authority/ MPC

Once the authority approves the Draft Plan, it can be put in public domain as per the State Town & Country Planning Act for inviting objections and suggestions from the public and various stakeholders.

### 2.1.8. People's Participation

The approach of planning should be shifted from top-down to bottom-up approach to make planning process more inclusive, comprehensive, and sustainable. Greater public acceptability is desirable, to ensure that plans are relevant. People can participate in the development process in the following realms:

- Pre-plan participation in decision making in vision development, for identification of development priorities.
- Post-plan participation before finalisation and implementation of development programmes and priorities.
- Participation during implementation and evaluation of development programmes and project.
- Participation and sharing the benefits of development, managing the assets etc.

e-Platform and crowd sourcing are coming up as new modes of obtaining feedback speedily.

Taking into account the interest, attitude and behaviour of the people, role of urban development professionals and obligations of local authority, a system of participatory plan approach has been suggested as under:

Table 2.3: Participatory Planning Approach

Planning Process Steps	Citizen's & Citizen Representative(s)	Urban development professional(s)	Official (s)
Determining goals and objectives	√	0	√
Data collection		√	√
Design of criteria and standards		√	
Developing alternative plans	0	√	0
Choosing an alternative	√	√0	√
Detailed design of selected plan		√	
Modification of plan	√	0	√
Plan Approval	0		√
Implementation	0	√	√
Monitoring	√/0		√
Maintenance	√/0		√
Feedback	√	√	√

√= Major role, 0= Facilitating or supportive role

Source: *Community Planning Assistance Program, Arizona Department of Commerce and UDPFI Guidelines, 1996.*

The suggested indirect participation of the people is ensured through elected representatives in the Municipal Council / Corporation and Ward committees. The direct participation can be through individuals, citizens, neighbourhood, business, consumer and other such groups.

There are several mechanisms and avenues for people's participation available today, few of these have been presented below. Such mechanisms and avenues can be used to bring wider and more interactive participation of public in planning and developmental process<sup>10</sup>:

- **Community Design Charrettes**<sup>iv</sup> (see endnote): It is a multiple-day interactive meetings, workshops and site walks/visits that fosters diverse and community-sourced ideas;
- **Advisory Committees:** Committees made up of representatives guide planning efforts over an extended period of time while regularly meeting during the planning process;
- **Low-Cost Demonstrations and Transformations:** Use of blocks and day to day objects to create a low cost model of proposals for visual understanding. Relatively inexpensive temporary transformations are made to test the project and experience changes.
- **Focus Groups:** Allow small groups of stakeholders to provide their knowledge of a project area and discuss their concerns and issues with local authority staff, planning consultants etc.
- **Other:** Citizens report card, participatory mapping and participatory budgeting etc.

<sup>10</sup> Modification of - Participation Tools for Better Community Planning by Local Government Commission & The California Endowment

## 2.1.9. Plan Modification

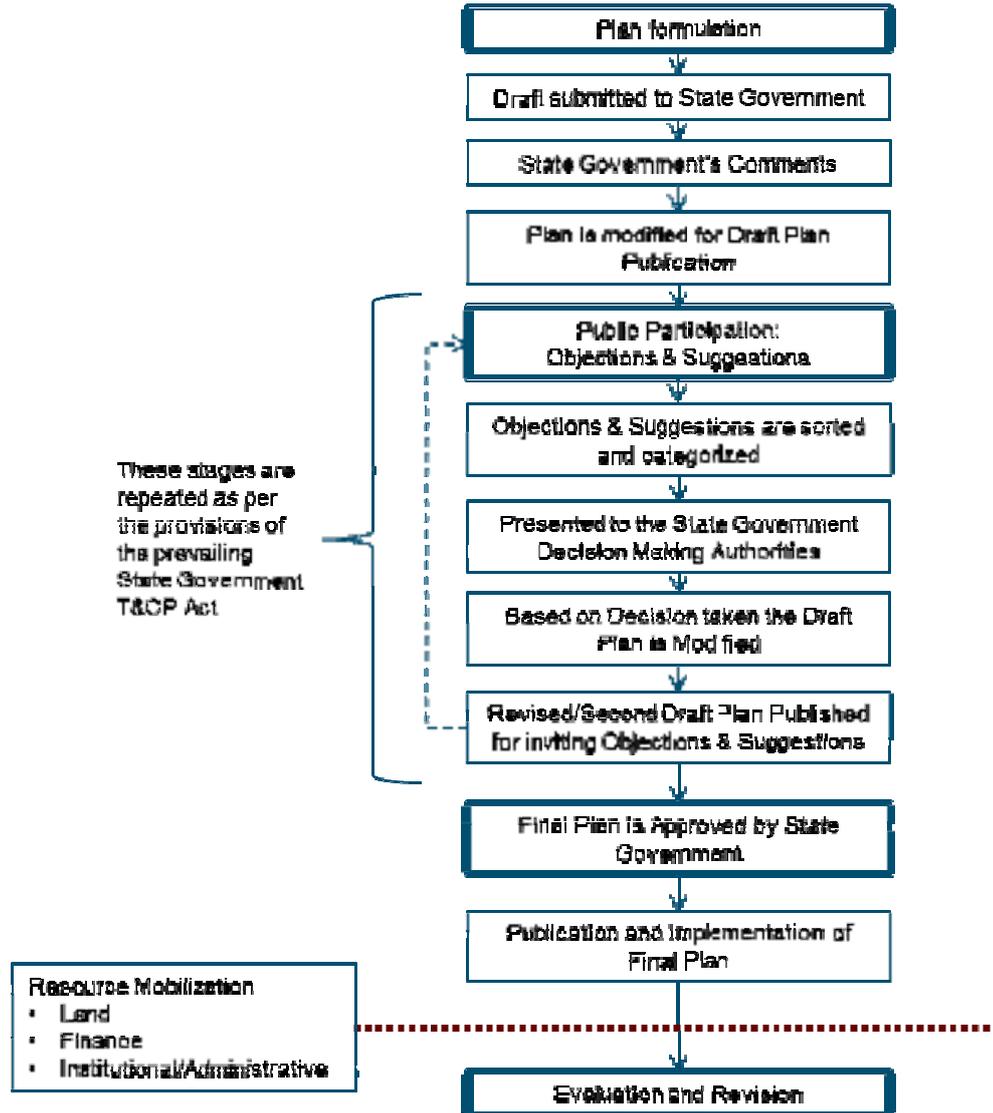
Once the plan is formulated, a draft is to be submitted to the State Government for comments. After incorporating comments in the plan, Draft Plan is published to invite Objections and Suggestions (O&S) from the public. The process of inviting O&S leading to final notification should be based on the provisions of the State Town & Country Planning Act.

### 2.1.9.1. In between the period of Plan formulation to finalisation

Currently there is no legal provision by many of the States to control or record landuse change in the period between preparation of Existing landuse map and Gazette Notification of the approved Proposed landuse plan. The conversion of the land use is done according to the provisions of Town and Country Planning Act and Urban Development Act of States. The process and time frame varies from State to State.

The State of Kerala has provision to monitor landuse change between the mentioned periods of planning. According to the Kerala T&CP Ordinance, 2013, Interim Development Order may be published by the local authority with the objective to control the interim development of land included in any planning area notified. The expression 'Interim Development' means development during the period between the date of notification of intention to prepare a plan and the date of coming into operation of the plan. Such orders must be approved by DPC or MPC. Further, the plan preparation time should be adequate to support Interim Development order.

Figure 2.4 Plan Modification Process



### 2.1.10. Review and Monitoring of Plans

A Regulatory body (Urban/ Regional Planning & Development Regulatory Authority) at State level should be established to regulate and monitor the functioning of Urban and Regional Development Authorities/ Agencies. This regulatory body should assess and monitor planning, observe and evaluate impacts of planning, quicken the process of approval of plans in the States.

Plan evaluation after every five years must be built in as permanent process and be mandatorily done at the completion of the planning period. The parameters for evaluation of plan must be predefined in the early stages so as to have a set of parameters as benchmarks towards the end of plan period. The basic parameters are provided in **Table 2.4**, besides these, other specific predefined plan related evaluation parameters could be added.

Table 2.4: Parameters for the Evaluation of Plans

S.No.	Evaluation Parameters	Quantitative benchmarks against the Plan to be evaluated
1	<b>Comparison with the projected population</b>	<ul style="list-style-type: none"> <li>• Comparison of population projected and the present population</li> <li>• Carrying capacity of the developed area <i>vis a vis</i> per person land availability</li> </ul>
2	<b>Comparison of existing land use with the planned land use</b>	<ul style="list-style-type: none"> <li>• Percentage deviation from the planned landuse of the major and minor changes</li> </ul>
3	<b>Upward trend of economy</b>	<ul style="list-style-type: none"> <li>• Contribution of sectors of economy in GDP of the city</li> <li>• Performance of individual sectors especially MSME</li> <li>• Performance of city GDP in comparison to State/National GDP</li> <li>• Workforce participation ratio</li> <li>• Workers classification</li> <li>• Income generation and participation</li> <li>• Female employment ratio</li> <li>• Vertical movement of the population from Below Poverty Line or lower income groups of the population</li> </ul>
4	<b>Funds invested</b>	<ul style="list-style-type: none"> <li>• Percentage share of expenditure <i>vis-a-vis</i> the phase and/or project life budget</li> <li>• Number of proposed projects completed</li> </ul>
5	<b>Achievements of targets in Infrastructure development</b>	<ul style="list-style-type: none"> <li>• Comparison against benchmarks provided by National Agencies</li> <li>• Change in the ratio of infrastructure coverage</li> </ul>
6	<b>Direction of growth vs Planned growth</b>	<ul style="list-style-type: none"> <li>• Number of planned TP Schemes or Zones developed</li> <li>• Number of Non-Agricultural conversions</li> </ul>

The basic objective of the review/ evaluation would be to assess the progress and identify area of success, failure and conflicts to guide/correct the future course of action. This is an important step in the dynamic planning process, which hitherto has not been effectively utilised. This activity should be made mandatory under the respective T&CP Acts.

The following sections provide more details of various stages of this process.

### 2.1.11. Plan Monitoring Parameters

The plan monitoring parameters should be standardised by Urban/ Regional Planning Development Regulatory Authority for third party evaluation and monitoring report to be submitted annually. The key aspects of monitoring (apart from **Table 2.4**) are suggested as:

- **Institutional set-up of the authority in place** (parameter may include adequate staff and required qualifications, health & safety norms followed)
- **Change in jurisdiction of the planned area** (parameter may include extent of the area)
- **Change in density** (parameters may include population density, built-up density)
- **Infrastructure development** (parameter may include actual infrastructure works *vis a vis* the proposed targets or benchmarks)
- **Decongestion** (parameter may include reduced travel time)

- **Investments** (parameter may include proposed investments under various heads and actuals)
- **Public Participation** (parameters may include formulation of citizens' charter and its functioning)
- **Indicators of success and indicators of failures**

Monitoring of performance is detailed in Annual Plan given in **section 2.2.6**.

### 2.1.12. Evaluation & Revision of Plans

The Perspective Plan, Regional Plan, Development Plan, Local Area Plan, Special Purpose Plan including the Comprehensive Mobility Plan and City Sanitation Plan are prepared usually for duration of 20 years, though some States have attempted even for 30 years. However, in the context of fast evolving social, economic and technological developments, it would be desirable to review these plans regularly, at the interval of 5 years or so. Such reviews should also incorporate the changes in legal framework and government policies, as are notified from time to time. However, care should be taken that the process of revision does not take too long and is completed within 6 to 10 months.

As regards **Annual Plans**, there would normally be no need to undertake any review per se. However, a review of previous year's annual plan should be included in the exercise of annual plan preparation. Performance of the projects/schemes implemented by the local authority, as contained in the annual plan of the previous year should be reviewed in terms of achievements of the physical and fiscal targets. This would ensure a continuous monitoring and review of actions taken by local authority. Results of the review should provide input for perpetration of next annual plan. The monitoring of the plans/projects should be regular so that time taken in review and formulation of annual plan is minimised.

The **Projects / Research** should be reviewed even during the project/research period, to ensure that the data sources, research methodology and analysis are realistic and do not suffer from infirmities.

## 2.2. Contents of Plans

The approved plan should consist of a report, supplemented by the existing and proposed landuse plans. The Report should include list of tables, list of illustrations and annexures which should be appropriately referenced. More importantly, the aims and objectives, scope of work, limitations and methodological framework should be highlighted.

The contents of various plans could be as follows:

### 2.2.1. Perspective Plan

The Perspective Plan should be driven by the vision and mission of the exercise being undertaken. Whereas the vision may refer to the end state, the mission should clearly focus on the steps to be undertaken to achieve the end state. At the same time, the Perspective Plan must take into cognizance the relevant policies and statutes of the Central and State Governments and projects/ schemes being implemented at National, State, District, Region and Town levels. Based on the foregoing analysis, clear strategies should be worked out for urban and regional planning and development including for the peri-urban areas, environmental protection, heritage conservation and the linkages between these aspects.

Surveys and analysis form the core issue both in terms of spatial and attribute data sets. Based on this analysis, alternative strategies for development may be worked out and the most appropriate strategy for development indicated for detailing out further. Accordingly, the contents of a perspective plan shall broadly encompass the following:

- Existing Scenario in overall terms.
- Projected requirements for the horizon year based on the total quantum of land available and that can actually be used for development.
- Specific planning studies related to setting, linkages both socio-economic and physical, and likely challenges. In addition climatological studies, identification of areas prone to hazards, environmentally sensitive zones.
- Population projection for the horizon year based on past trends and other statistical methods to arrive at assigned population for the horizon year.
- Economy and employment levels, both existing and projected.
- Shelter-including shortfalls in various categories of housing stock and the total requirement
- Transportation-analysis of the existing network, projected requirement based on detailed OD surveys.
- Institutional uses both existing and required for the horizon year in terms of education, health, socio-cultural, religious, and distributive services like police, fire, telecom etc.
- Infrastructure in terms of water, underground sewerage, drainage, and solid waste management. Vision should include an overview of new technologies and the way to develop and implement.
- Use of alternative sources of energy through new technology.
- Resource base- monetary resources required to implement plan proposals *vis-a-vis* financial health of the local body/implementing agencies.
- Manpower resources both existing and proposed as per requirement.

Given the extent of the planning area and the assigned population to be accommodated, physical proposals may be drawn up driven by transportation and activity nodes.

It is important to ensure that projects/schemes are identified at this level itself including their costing and modalities for implementation.

### 2.2.2. Contents of Regional Plan

**Regional Plan** is to be prepared for the area identified as formal or functional region, which could be state/ inter-state/ district/ inter-district, investment region or special area. If region so identified is inter-state, all such states will need to prepare **sub-regional plans** for their respective areas. For a regional plan for a normal region, the following key contents to be included:

1. Introduction of the Region
2. Analysis of regional resources
3. Projected requirements
4. Major proposals and projects
5. Implementation Plan

For Regional Planning for an Investment Region or Special Region, 'delineation of the region' to be included in the above given contents (refer **Chapter 4** for details).

#### Introduction of the Region

- About the Region
- Constituted areas: Region, Sub-region, Functional areas, Growth centres etc.
- Ratio of Urban and rural development
- Region Morphology

#### Analysis of Regional Resources & Project Requirements

1. **Physical setting**
  - Administrative profile
  - Connectivity and Economic linkages
2. **Geography of the Region**
  - Topography
  - Geology & Geomorphology
  - Hydrology (Surface and Ground water)
  - Climate
  - Minerals & Resource mapping
  - Study of State Land Utilisation Policy
3. **Demography** (Region and Sub-region wise)
  - Population and its distribution,
  - Population density
  - Age-sex composition and literacy rate (trend analysis)
  - Growth of population (natural and migratory)
  - Population projection based on scenarios (refer **Chapter 7**)
4. **Settlement pattern**
  - Urban and Rural settlement
  - Peri-urban areas and analysis of existing key developments
  - Hierarchy of settlements (refer **Chapter 4**)
  - Density of settlements

### 5. Transportation

- Mode of transportation - by road, rail, air, water as the case may be
- Network of roads, railways, waterways and their interrelationship with major activity nodes
  - Traffic volume
  - Pattern of movement
- Transport Corridors & Terminals

### 6. Physical and Socio Economic linkages

#### Social Infrastructure

- Education
- Health care (multi-speciality hospitals, health centres)
- Recreational
- Religious
- Gap assessment and requirement for the projected population

#### Physical Infrastructure

- Water
- Energy
- Drainage, sanitation and refuse and solid waste disposal
- Communication
- Police protection, fire protection
- Disaster Management cell
- Cremation and graveyards
- Gap assessment and requirement for the projected population

#### Heritage & Tourism

- Flow of Tourist (season wise and origin wise)
- Mapping of Natural heritage and Man-made heritage
- Tourism infrastructure analysis and gap assessment

#### Economic activity and Fiscal policy

- Major Economic sectors
- Distribution of workforce in formal and informal sector
- Workforce participation ratio
- Occupational structure
- Economic nodes

#### Shelter

- Housing scenario
- Housing stock & supply
- Housing need assessment including typologies

Low cost housing

Night shelters

Slum settlements

### 7. Environment

- Agro-climatic zone
- Eco-sensitive zones- Protected or restricted areas such as National parks and Wildlife sanctuaries and eco-sensitive buffers around it
- Rivers, water bodies and wetland
- Groundwater
- Coastal/ Hill zone, if any
- Green & Forest cover
- Urban Heat Island
- Biodiversity
- Environmentally Sensitive areas- Hazard prone zones such as earthquake, floods/ flash floods, high winds, cyclone, fire, land slide, tsunami, vulnerability and risk assessment of the region.

- Pollution levels of water, soil, land, air
- Other threat to Natural environment

## Major Proposals and Projects

### 1. Regional policy & Development strategy:

- Policy for zones of development
- Growth poles & Satellite townships: strategy of development of settlement system
- Recommendations on Urban centre jurisdiction changes, if any
- Development corridors and TOD zones
- Economic activity and fiscal policy
- Major economic thrust sectors & its identified markets (focus on encouraging economic activities for formal and informal for women empowerment)

### 2. Regional landuse and Development Controls:

- Landuse proposal: built-up area, agriculture, protected areas, waste lands, water bodies etc. conforming with State Land Utilisation Policy and State Perspective Plan
- Proposed hierarchy of settlements: Priority towns and Counter magnet areas
- Major economic hubs and industrial estates/ parks for cluster development
- Development Control Regulations for various regional uses

### 3. Regional infrastructure:

- Mobility: Transportation proposal at Regional level (including locations for integrated freight complexes, multi modal hubs among others)
- Major proposed institutional areas and policy on its location in peri-urban areas
- Proposals for other infrastructures for water supply, sanitation, decentralised treatment and for health, education at regional level (proposal to ensure that facilities and infrastructure are easily accessible to female population and differently abled / physically challenged / disabled).
- Earmark spaces and norms for services like communication (postal and telephone), protection (police, fire) and others at regional level
- Preferred locations for power generating activities
- Preferred locations and norms for regional landfill site. Strategy to minimize waste generation by encouraging Zero-Waste disposal.

### 4. Disaster Risk Mitigation measures: as per NDMA guidelines (refer *Chapter 6*)

### 5. Tourism: locations for promotion (even if seasonal) and proposed circuits including strategies to promote *green mobility* (walking, cycling, public transport) for tourism.

### 6. New and Modified Policies:

- Alignment with State Policies for Environmental, Land Utilisation Policy etc.
- Plan for Slum free City
- Rationalization of Floor Area Ratio (FAR) for villages/ transitional towns
- Policy on Tribal Settlements
- Proposals for MSME clusters or recommendations for separate studies
- Policy and action plan for decentralisation/ dispersal of hazardous and polluting industries and allocation of suitable land for industries clusters
- Policy and priorities for informal residential areas/ slums and unauthorised colonies.
- Other Issues that need New Policies, Incentives and disincentives.

## Implementation Plan

- Implementation strategies for the region for land and resource mobilisation
- Co-ordination of local bodies and authorities and integrated management structure for the region
- Estimation of the Fiscal requirement phase-wise and source of fund. Specifying projects to be taken up under PPP

- Capacity building for manpower and preparation of its work plan as per State policy
- Priorities of the developmental projects and further detailing of plans
- Framework of monitoring and its mechanism

### 2.2.3. Contents of Development Plan

This part recommends the contents of Development Plan document, which would include the written document as well as the map showing the spatial plan and other supporting charts and diagrams. Major heads and sub-heads to serve as a guide for formulation of development plan of an urban centre are given below.

Contents of Development Plan should be formulated in accordance with statutory provisions of the relevant Act. With the view of saving time and also developing a participatory system of planning, necessary information from secondary sources should be utilised, as far as practicable and primary surveys should be conducted only when it is unavoidable. Conceived within the framework of the perspective plan and adjusted as per the Regional District Plan, a Developmental Plan is to be prepared for a period of 20-30 years. While preparing Development Plan, special attention must be paid on safety, security and participation of women, the elderly, and other segments of society requiring special needs.

The Development plan should contain the following major heads:

1. Existing Conditions and Development Issues
2. Assessment of Deficiencies and Projected Requirements
3. Vision and Mission
4. Development Proposals
5. Implementation Plan

The details of each of the major sub-heads of Developmental Plan are given in the following sections:

#### 2.2.3.1. Analysis of Existing Scenario and Development Issues

##### 1. Background:

- Location, regional setting and connectivity
- Brief history of development of the town
- City influence and its characteristics including settlement pattern, rural-urban relationship and fringe area developments
- Physical setting – Topography, Climate, Soil (profile and condition), Geology & Geomorphology, Litho-logy, Neo-Tectonics, Micro-Seismic zones and Hydrology, Sub-surface aquifer systems

##### 2. Demographic Profile:

- Existing population and distribution
- Population growth and its composition of

Natural growth

Migration pattern/

Jurisdictional changes

- Floating population
- Age-sex composition and literacy rate (trend analysis)
- Workforce participation
- Population density (net and gross)
- Household characteristics - Household sizes

### 3. Land Profile:

- Jurisdiction changes and efforts of planned development
- Existing landuse map with revenue level details (map scale as per **Table 7.7**)
- Developable and non-developable area
- Peri-urban areas and urban villages, if any
- Existing zoning and development within zoned area (including inner city area)
- Built floor space, floor space permitted
- Particulars including - Vending zones, Heritage (sites, buildings and areas)
- Land development and management (Central & State Government land)

### 4. Economic Profile:

- Primary:

Agriculture, horticulture & forestry

Sericulture and/or Fishing

Mining & quarrying

- Secondary:

Manufacturing – large, medium and clusters of MSME

Household industries

Construction

- Tertiary:

Trade (whole sale / retail trade)

Tourism, Hotels and Restaurants

Transport, Storage and Communication

Financial services such as Banking, Insurance etc.

Real estate and Business services

Public Administration

Others services

Informal sector as informal trade, commerce.

- Work-force & Occupational pattern (Employment data to be analysed gender wise & age wise)
- Employment generation / Major work areas

### 5. Infrastructure Profile:

#### Transportation:

- Mode of transportation - by road, rail, air, water as the case may be.
- Network of roads, railways, waterways and their interrelationship with major activity nodes
- Transport Corridors & Terminals.
- Trans-intra city transportation facility
- Pedestrian and bicycle
- Network of city-level non-motorized routes and zones
- Goods movement system
- Transportation land use integration
- Parking
- Signage and way findings

#### Facilities like:

- Education: schools, technical institutes, universities,
- Health care: Dispensary, health centres, hospitals
- Recreational spaces, Parks and Open spaces

- Religious spaces
- Socio-cultural facilities

### **Physical Infrastructure: (benchmarks)**

- Water supply: network, existing demand and supply scenario, water transmission, reservoirs and distribution, rainwater harvesting
- Energy: existing demand and supply scenario, transmission and distribution network, renewable energy
- Drainage, Sanitation and Solid waste disposal: existing demand and supply scenario, generation and collection system, transportation, treatment, re-cycling and re-use of waste
- Transport and Communication
- Police protection, Fire protection
- Cremation and graveyards
- Disaster management centre

### **6. Environmental Profile**

- Eco-sensitive zone - Protected or restricted areas such as National parks and Wildlife sanctuaries and eco-sensitive buffers around it
- River, Water bodies and wetlands
- Coastal/ Hill zone, if any
- Green & Forest cover
- Pollution levels - air, water, noise, soil pollution
- Disaster Management
  - Hazard prone zones such as earthquake, floods/flash floods, high winds, cyclone, fire, land slide, tsunami
  - Disaster mapping - vulnerability and risk assessment of the region
- All environmentally sensitive areas

### **7. Shelter (both formal and informal)**

- Housing scenario
- Housing stock & supply
- Mapping of slums, squatter settlements/JJ clusters, other informal settlements
- Housing supply mechanism,
- Housing need assessment including typologies
  - Low cost housing
  - Affordable Housing
  - Rental Housing
  - Night shelters
  - Public housing
  - Slum settlements
  - Squatter settlement

### **8. Administrative profile:**

- Legal framework
- Institutional framework & manpower
- Fiscal: Sources of revenue, streams of expenditure – existing and required
- Major policy issues
- Key issues in governance
- Grievance Redress
- City level reforms

### **9. Maps & Plans:**

- Existing landuse / utilisation plan
- Historical city growth map
- Infrastructure maps
- Environmentally sensitive zones map

- Disaster maps

#### 10. Gap analysis:

- Based on the existing conditions and the projected requirements of the planning area, a gap analysis is suggested to be done and issues be identified.

### 2.2.3.2. Projected Requirements

Assessment of projected requirements should be for a period of twenty to thirty years and it should further be classified under periods of 5 year in line with State five-year plans. Such classification would help in preparation of annual plans and budget.

#### 1. Population

- Projected population: should be guided by environmental and infrastructure (especially drinking water) sustainability and holding capacity of the city. Dispersal of economic activity may also guide population projection
- Floating population, age sex composition, literacy

#### 2. Economic base and employment

- Hierarchy of commercial areas, dispersal of commercial activity and related activities
- Dispersal of industries, environmental restriction on industrial development
- Urban poverty and its alleviation.
- Work force, employment in different sectors of economy: formal and informal sectors
- Proposed hierarchy of trade and commerce area

#### 3. Shelter

- Informal sector housing, slum up-gradation and resettlement strategy
- Housing need and requirement

#### 4. Transportation

- Green mobility strategy with multimodal integration strategy
- Mass transportation system and its integration with activity nodes/facility centres and land use pattern
- Proposed network of city-level non-motorized routes and zones
- Travel demand forecast, Road length, Hierarchy of roads, Transport terminals
- Projection of parking requirements
- Need for Airport, seaport (as the case may be)

#### 5. Social Infrastructure

- Education: pre-schools, schools, technical institutes, universities
- Health care: Dispensary, health centres, hospitals
- Recreational: Parks and open spaces, theme based parks
- Religious
- Socio-cultural: museum, cultural centres
- Cremation/ Burial grounds

#### 6. Physical Infrastructure

- Water: projected water demand, water treatment plant
- Sewerage: estimation of generation and treatment capacity
- Power demand and supply gap with options for transition to renewable energy and Smart Grid electricity
- Drainage: estimation in case of change in jurisdiction, developable area or major change in land use share
- Gap assessment & projection of other utilities

#### 7. Land use requirement for

- Residential areas
- Commercial areas
- Manufacturing area

- Public and semi-public
  - Parks, Playgrounds and Open Spaces
  - Transport and Communication
  - Special areas
  - Agriculture
  - Water-bodies
8. **Assessment of Disaster management infrastructure** to meet the requirement of prescribed in the District Disaster Management Plan

### 2.2.3.3. Development of Vision

The plan, at this stage is to formulate Vision based on existing conditions and development issues and stakeholder consultation. Goals and objectives related to dispersal of activities, environmental and infrastructure sustainability, mass transportation and informal activities, Information and Communication Technology, women and poorer sections to be incorporated if not already included.

It should consist of the guiding planning principles for the plan formulation. Like whether the city development strategy is for Compact city/ Green city/ Dense cities. Also, if it is a Tourist city, Heritage city, Educational hub, Industrial city etc.

### 2.2.3.4. Development Proposals

The proposal sub heads are enlisted as:

#### 1. Land use Plan:

- Hierarchy: Concept of hierarchy of planning units and spatial development of various activity nodes, facility centres and network of roads
- Proposed land use plan (scale of the plan as per **Table 7.7**)
- Zoning regulations for proposed land use categories (refer **Chapter 9** for details for the land use classification) including:

Residential areas

Commercial areas

Manufacturing area

Public and semi-public

Parks, Playgrounds and Open Spaces

Transport and Communication

Special areas

Old built-up (core) area

Heritage and conservation areas

Scenic value areas

Disaster prone areas / Eco-sensitive area

Primary activities

Water-bodies

#### 2. Comprehensive Mobility Plan:

- Mass transportation system and land uses interfaces.
- TOD development with priority for NMV around nodes
- Integration of proposed Comprehensive Mobility Plan

**3. Infrastructure Plan/ Utility Plan:**

- Layout of plan of trunk infrastructure of each infrastructure and utility at the scale of the proposed land use plan

**4. Special Area Planning:**

- Plan for Renewal and redevelopment areas or recommendation for the further detailing of Urban Redevelopment Plan for the earmarked area
- Provisions for Heritage and conservation areas
- Regulations for the Hazard zone and protected areas
- Proposals for development of women and vulnerable population

**5. Development Promotion Rules / regulations**

To regulate and develop land use as mooted under the Development Plan, development promotion rules / regulations should be mentioned in this section.

**6. Annexures:**

- Detailed scaled maps of prevailing situation
- Detailed scaled maps of existing Land use
- Detailed scaled maps of proposed Land use
- Detailed scaled maps of proposed infrastructure plans and social services
- Detailed scaled maps of proposed Special purpose plans

**2.2.3.5. Implementation Plan**

Following inputs from preceding stages and prevailing Statutes, a seamless plan implementation schedule must be prepared for Development Plan. It should contain roles and responsibilities of all stakeholders, resource mobilisation framework and phase-wise implementation schedule for planned project activities. The key aspects to be covered in the Implementation framework should be in line with aims, objectives and prioritised projects and schemes. Implementation framework may include the following:

- Priorities of projects and research
- Phasing of developmental activities
- Proposal for land resource mobilisation
- Investment Strategy and Promotion
- Institutional set-up

**1. Priorities: Classify various projects identified as a part of development proposals by priority as under**

- Essentials (top priority)
- Necessary (2<sup>nd</sup> priority)
- Acceptable and desirable (3<sup>rd</sup> priority)
- Deferrable (4<sup>th</sup> priority)

Projects and research should be identified by phases and implementing agencies (including private and corporate sectors) to be given as per the institutional set-up.

**2. Phasing:** Development Plan should advisably be in phases of 5 years to coincide with the State Five Year Plans. The targets set for each phase can be assessed as the mid-term review against the achievements at the end of each phase. For Greenfield area phasing could include a 'Zero' period for approvals, institutional set-up, initial land pooling and revisiting any strategy.**3. Proposal for land resource mobilisation:** Implementation mechanism detailing approaches for land pooling and development in lines with the suggested mechanism in the State Perspective Plan**4. Investment Strategy:** Proposals for fiscal resource mobilisation including:

- Internal revenue
  - Grants & Aids
  - Institutional finance
  - Market borrowing
  - Private sector finance
5. **Institutional Set-up** to clearly provide Stakeholders' role and responsibility and organisation chart.

### 2.2.4. Contents of Local Area Plan

Once the Development plan is prepared, its proposals can be further implemented by preparing Local Area Plan. This plan can be either Zonal Development Plan or Local Area Scheme and these can have the following contents:

#### 2.2.4.1. Contents of Zonal Development Plan

##### 1. Introduction

- A brief introduction to the city comprising its regional setting, functional character growth trends.
- Development plan / Master Plan context
- Interdependence of Zones on other parts of the city

##### 2. Site Background & Analysis

- Land use distribution and analysis
- Population and density
- Built-up area, character, extent and delineation
- Transportation: Circulation network, traffic flow (people and goods) and terminal facilities
- Physical and social infrastructure
- Land ownership
- Slope analysis
- Micro-zoning hazard mapping
- Green cover: parks/open spaces, forest, orchards, green belts, etc.
- Site potentials and constraints
- Security mapping: specifying relatively safe and unsafe areas, streets etc.
- Types of housing subsystems: low cost housing, affordable housing

##### 3. Conceptual Framework

- Planning parameter
- Planning concept & hierarchy till community level
- Projected requirements
- Urban design framework

##### 4. Proposals and development strategy

- Land use plan (scale of plan as per **Table 7.7**)
- Proposed circulation system
- Proposals for physical infrastructure
- Proposals for community facilities
- Strategy for new development, redevelopment and improvement
- Proposal for integrating and developing urban villages
- Proposals for informal sector
- Strategy for rehabilitation/regularization of unauthorized colonies
- Strategy for maintenance of services
- Provision for facilitating physically challenged and disabled in urban development

- Proposals regarding vending zones: Transit-oriented markets and market streets can be pedestrianized or only NMVs and buses be permitted in vending zones.
- 5. Conservation and Improvement of Environment**
- Conservation and Improvement of land profile
  - Proposals for conservation and improvement of rivers streams, water-sheds.
  - Conservation and Improvement of green cover and landscape
  - Conservation of heritage areas/zones
  - Energy-efficient and environmentally sustainable development
  - Provision for rainwater harvesting & common infrastructure at LAP level
  - Integration of proposals regarding air water and noise pollution control
  - Security mapping: Focusing on provision of appropriate street furniture including lighting, spacing of police booths. Consideration is recommended for providing security for women
- 6. Compliance of Government Policies**
- State Land Utilisation Policy
  - State Perspective Plan and/or State Urbanisation Policy
  - State Urban Housing or Affordable Policy
  - Township and Integrated Township Policy
  - Rainwater Harvesting Policy
  - Energy Policy
  - Disaster Management Policy
  - Industrial and Service Sector Investment Policy
  - Barrier-free Environment for Physically Disabled
  - Information Technology Policy
  - Tourism Policy
  - Other Policies
- 7. Zoning Regulations**
- Definitions of various use zone premises
  - Use restrictions (uses permitted, conditionally permitted and uses prohibited)
  - Proposal for mixed land uses
  - Strategy for non-conforming land uses
  - Strategy for hazard zone and regulations
  - Proposals for meeting women's needs: mixed use development with focus on street activities/ TOD/ space for street vendors/encourage areas to be active at various times of day and night
- 8. Development Regulations**
- Building regulations and building bye-laws
  - Urban Design of major hubs, if required
  - Architectural Control, if necessary
  - Specific development controls for heritage areas and other special areas traditional areas as defined by the local authorities if any may be provided
- 9. Resource Mobilization and Implementation**
- Institutional set-up for Implementation
  - Physical Infrastructure development cost including annual and 5 year phasing
  - Resource Mobilization for implementation through public private and other sectors
- 10. Implementation framework**
- Phasing and prioritization of development
  - Development Management
- 11. Annexures:**
- Detailed scaled maps of prevailing situation
  - Detailed scaled maps of existing Land use
  - Detailed scaled maps of proposed Land use
  - Detailed scaled maps of proposed location of infrastructure and social services

- Detailed scaled maps of vending zones in the planned local area

Any other proposal necessary for the development of the zone or ward or area.

### 2.2.4.2. Specific Contents of Urban Redevelopment/Renewal Plan

Urban redevelopment or renewal plans have following distinct contents, apart from the local area plans' contents as provided in the preceding section:

1. **Development gaps & projected requirements**
2. **City Revitalisation Strategy**
3. **Development proposals:** Typology of the urban development- transportation, infrastructure, congestion areas revitalisation, heritage resources, utilisation of Government properties
4. **Restructuring of Institutional set-up**, if required
5. **Annexure**
6. **Local Area Plan (Ward Plans)** shall be aggregated at the Zonal Development Plan Level coterminous with the Administrative Divisions/Boundaries and Zonal Development Plans shall be aggregated at the Development plan level.

### 2.2.5. Contents of Specific Purpose Plan (e.g. City Development Plans formulated for accessing funds under JNNURM)

A specific purpose plans should draw upon and align with the objectives of the programmes etc. under which it is to be drawn. The CDP under JnNURM offers an example. The objectives of JnNURM was developing physical infrastructure for achieving MDGs and realising full potential of cities and making them engine of growth of the economy. Mission had objectives focusing on integrated development of infrastructure, ensuring adequate funds, promoting urban reforms, provision of basic services to the poor etc. Preparing CDP is a key strategy to achieving objectives of the Mission. Developmental Plan provides comprehensive proposals for socio-economic and spatial development of urban centre but increasing population and spatial extent of the cities has raised the need for urban planning. As a result various special purpose plans have come up to fill the gap and to cater the specialised planning needs of different aspects of city.<sup>11</sup>

#### 2.2.5.1. Contents of City Development Plan (may be renamed as City Investment Plan)

CDP is the perspective and vision document, which gives existing condition of the city, sets out direction of change through vision, provides thrust areas and strategies, and investment framework to follow for successful implementation of plan.<sup>12</sup> It is suggested that the terminology of 'City Development Plan' be renamed as 'City Investment Plan' to avoid confusion as in many states statutory plans are named as Development Plan.

##### 1. Introduction

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<sup>11</sup>JnNURM: Formulation of CDP, JnNURM: Overview.

<sup>12</sup>bid.

- Background
  - Concepts and principles of City Development Plan
- 2. City Profile**
    - Location
    - Geography
    - Profile of city
  - 3. City vision and development of goals and strategies**
    - Approach and Vision and mission statement
    - Development of goals and strategies
  - 4. Demographic Profile**
    - Demographic trends
    - Spatial spread and Population density
    - Composition of population growth
      - Natural
      - Migration pattern
      - Jurisdictional changes
    - Literacy rate and Gender ratio
    - Social composition and Income distribution
    - Population projection
  - 5. Land Management and Urban Growth**
    - Existing city assessment
    - Morphological development of city
    - Existing land use
    - Unauthorized & unorganized colonies
    - Urban villages
    - Industrial development
    - Ecologically sensitive areas
    - Land development and management
    - Efforts of planned development
  - 6. Inner city**
    - Inner city area
    - Problems of inner city
  - 7. Economic Profile**
    - Economic profile
      - Primary sector
      - Secondary sector
      - Tertiary sector
      - Formal and informal sector
    - Workforce participation
    - Occupational distribution and structure
    - GDP and per capita income
    - Directions of growth
  - 8. Financial Profile**
    - Review of the existing fiscal and financial status
    - Status of current assets and liabilities
    - Overview of finances of local authority and departments
    - Inter government transfer in the finances in local authority
    - Sources of revenue and expenditure stream
  - 9. Infrastructure**
    - Physical infrastructure

- City water supply system
- Sewerage system
- Storm water drainage
- Road network and transport system
- Solid waste management
- Electricity
- Social Infrastructure
  - Education
  - Health facilities
  - Other amenities
  - Recreational spaces

### 10. Environment Profile

- Water quality
- Air quality
- Noise pollution
- Land pollution

### 11. Disaster Management

- Existing situation
- Disaster prevention and management plan
- Investment estimates
- Training and other programs
- Information management system
- Implementation plan

### 12. Urban Poor and Slum

- Poverty profile
- Socio-economic profile of poor
- Poverty alleviation programmes
- Slums / JJ clusters
- Squatter settlements/JJ clusters
- Slum development policies & strategies
- Issues of slums/JJ clusters

### 13. Conservation and Heritage Management

- Inventory of heritage resources
- Legal framework

### 14. Governance and Institutional Arrangement

- Legal framework
- Institutional framework
- Key issues in governance
- Grievance Redress
- City level reforms

### 15. Community Consultation

- City stakeholders profile

Women

People employed in informal sector

Youths

Senior Citizens

RWAs

NGOs etcetera

- Sector wise viewpoint of communities
- Stakeholders workshop

### 16. SWOT Analysis

**17. Investment Framework**

- Sector wise investment options
- Summary of costs

**18. City Investment Plan**

A CIP provides an estimate of the level of investment that will be needed to implement the CDP. It is an estimate and provides an order of investment, arrived at by using financial norms or standards for service provision and up-gradation or directly estimating the cost of implementing a reform agenda. A linked aspect is to consider options and strategies for financing the vision as contained in the CDP.

These may cover:

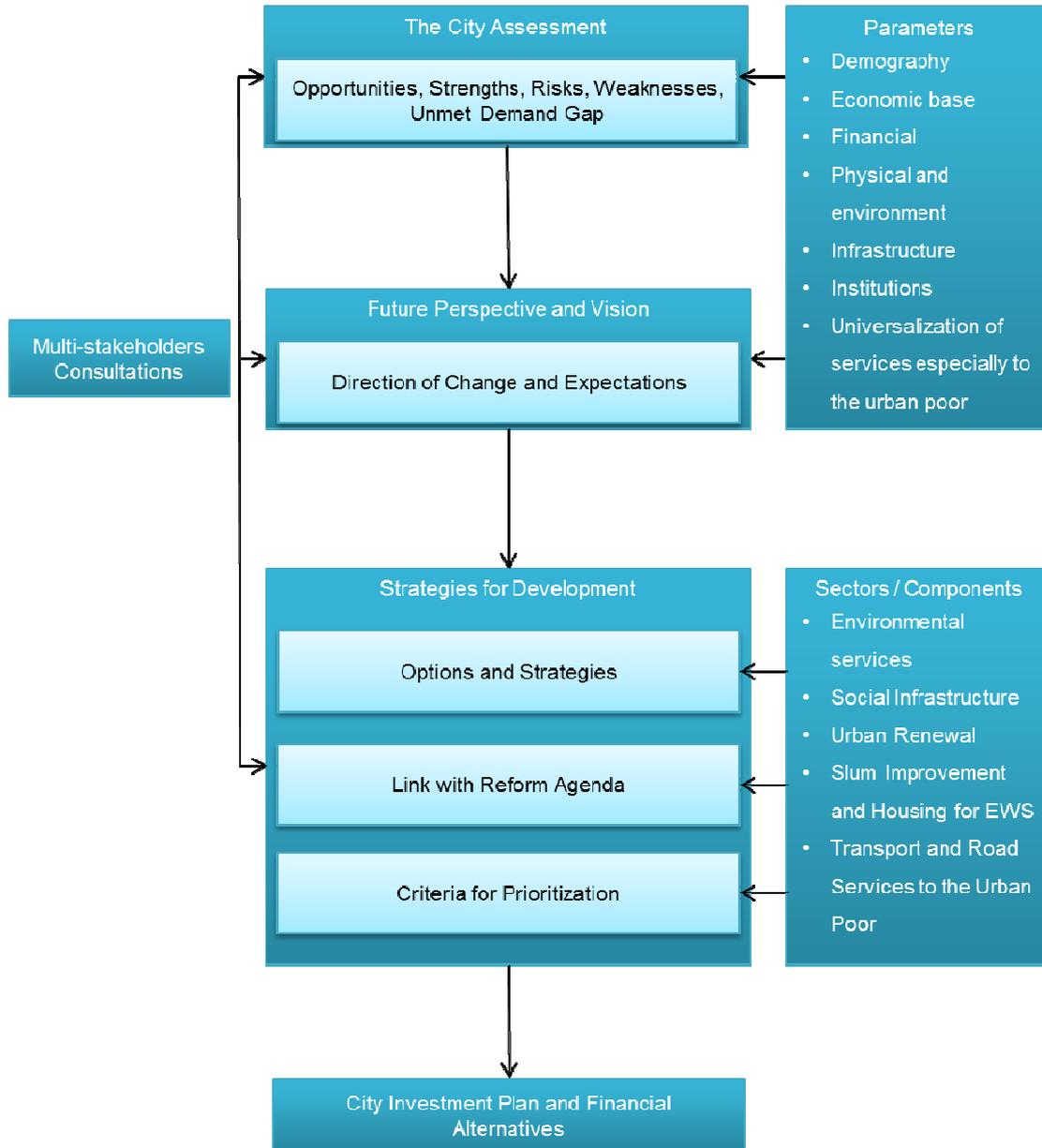
- Water supply
- Sewerage system
- Road network & Transportation system
- Storm water drainage system
- Solid waste management
- Heritage conservation and management
- Urban environment
- Urban governance
- Other development projects
- Urban slums and poor
- Summary of project investment plan

Financing options of the local body could be sourced from its own resources, Central/ State Government grants and loans, market borrowings, capital market, FDI, PPP etc.

**19. Institutional Reforms**

- Review of issues in governance
- Measures for good governance
- Institutional reforms
- Municipal accounting
- e-Governance
- Poverty reduction
- Other reforms

Figure 2.5: Process of Preparing City Development Plan



Source: JnNURM CDP Toolkit

### 2.2.5.2. Contents of Comprehensive Mobility Plan<sup>13</sup>

Increasing population of urban centres has resulted in traffic problems. CMP is the key document providing rationale for the transportation proposals under JnNURM. It draws its rationale and base from CDP, Master Plan and Comprehensive Traffic and Transport Studies (CTTS). It provides the long-term vision of mobility patterns and focuses on integration of land use and transport and improvement of the mobility and accessibility of people and facilities. CMP reviews the future landuse patterns in the

<sup>13</sup>Guidelines and Toolkit for Urban Transport Development.

Master Plan from the mobility optimization point of view and selects a preferred pattern of landuse-transport integration if necessary.<sup>14</sup>

### 1. Existing situation

- Introduction
  - Objective of the CMP
  - Scope of the CMP
- City Profile
  - General background
  - Socio-economic profile
  - Legal framework and standards
  - Institutional and financial situation
  - Environmental and social conditions
- Review of Land Use System
  - Existing reports and documents
  - Landuse patterns and development trends
  - Landuse development policies and strategies
  - Identification of issues
- Existing Transport Systems
  - Existing studies, reports and proposals
  - Existing Road Network and existing transportation infrastructure
  - Public transport systems
  - Urban goods movement
  - Traffic safety and enforcement
  - Other relevant issues
- Analysis of Existing Traffic Pattern /Transport Situation
  - Traffic surveys including Traffic Volume, Origin Destination, Traffic Movement, etc. (refer **Chapter 8** for details)
  - Analysis of travel characteristics
  - Analysis of vehicular traffic and bottlenecks
  - Analysis of social consideration
  - Development of base-year transport demand model
  - Identification of Issues
  - Comparative analysis of urban transport environment

### 2. Development of urban landuse and transport strategy

- Development of Visions and Goals
  - Vision statement
  - Urban transport development strategies
  - Goals setting
- Development of Alternative Urban Growth Scenarios
  - Urban growth scenarios in the master plan
  - Development of urban growth scenarios& evaluation
- Future Transport Network Scenarios
  - Road network scenarios
  - Public transport development split scenarios
- Development of Urban Land Use and Transport Strategy
  - Evaluation of urban growth and transport network scenarios

<sup>14</sup>Comprehensive Mobility Plans: Preparation Toolkit; Guidelines and Toolkits for Urban Transport development in Medium Sized Cities in India.

### 3. Plans and projects

- Public Transport Improvement Plan
  - Bus service improvement plan
  - MRT development plans, if required
  - Trunk and feeder public transport network
  - ITS application
- Road Network Development Plan
  - Hierarchical road network
  - Arterial road construction/improvement
  - Secondary road construction/improvement
  - Intersections and flyovers
  - Railway crossing and underpass
- NMV Facility Improvement Plan
  - Strategy for NMT facility improvement
  - Pedestrian facility improvement
  - NMV facility improvement (bicycles, rickshaws)
- Intermodal Facilities
  - Bus terminals
  - Bus-Rail interchange
  - Park and ride facilities
  - Freight terminals
- Regulatory and Institutional Measures
  - Unified Metropolitan Transport Authority and Traffic and Transportation cell for small and medium size towns
  - Traffic impact assessment mechanism
  - Regulatory changes required for the introduction of TDM measures
  - Traffic safety regulations
  - Parking regulations
- Fiscal Measures
  - Fare policy for public transportation and parking
  - Subsidy policy for public transport operators
  - Taxation on private vehicles and public transport vehicles
  - Potential for road congestion charging
- Mobility Improvement Measures and National Urban Transportation Policy Objectives
  - Introduction
  - Summary of NUTP objectives and the proposed measures
- Social and environmental considerations

### 4. Implementation programs

Implementation program should provide detailed process of implementing the proposal along with time frame, financing options and implementing agencies for each project.

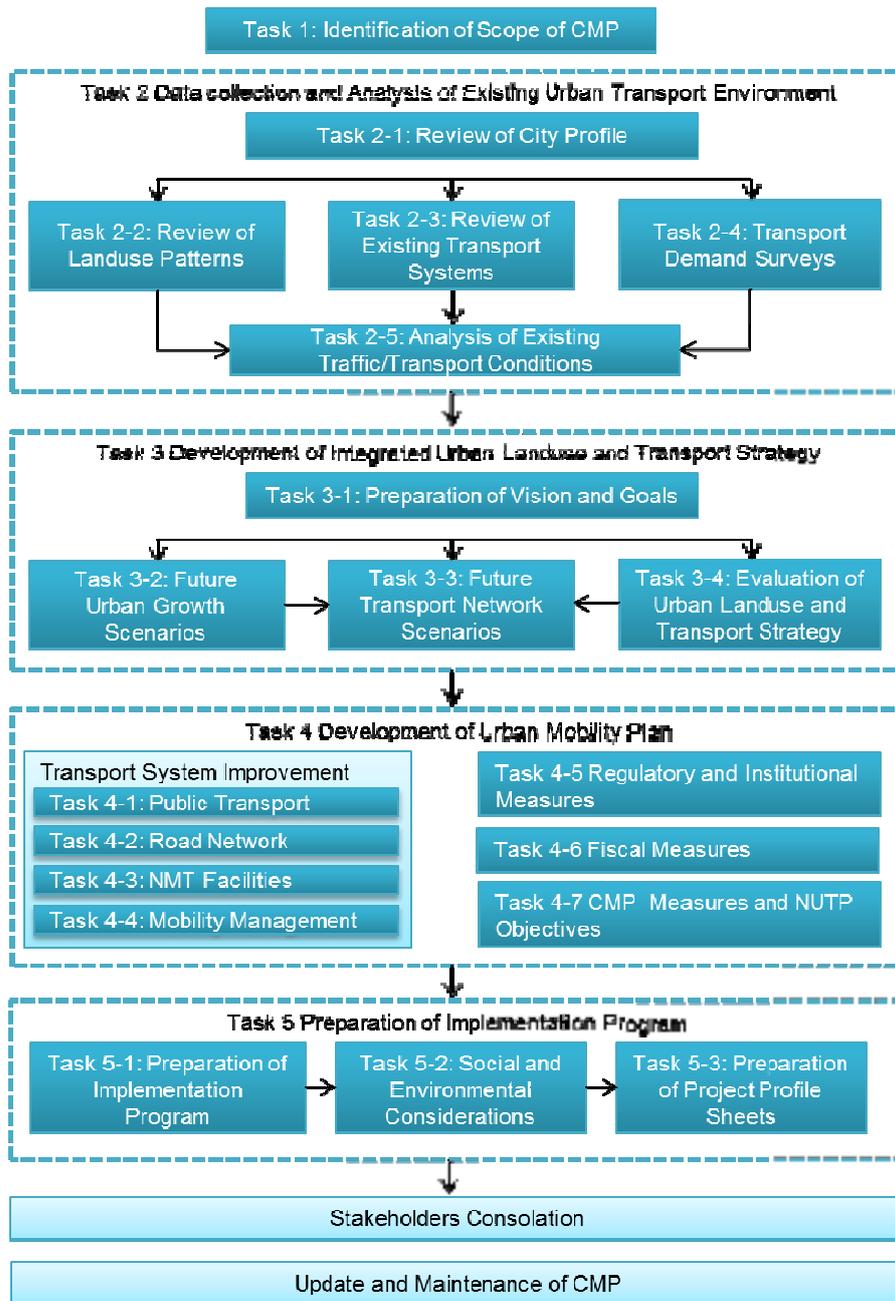
- Implementation Programs
  - List of mobility improvement projects and measures – list to be prepared by reviewing all the existing and on-going projects along with very brief summary of each.
  - Selection of priority projects/measures – while considering timeframe of measures, a selection process should be developed to screen prime candidates based on their importance and constraints to implementation.
  - Implementation agencies/organizations – for each project implementing agency / organisation should be identified and considering existing implementation capacity, new agencies could be proposed.

- Financing options – financing options could be from Local Government, Central Government, private sector financing (or PPP) and international development partners (donor agencies). In addition, the financial share of the local body should also be clarified.
- Implementation programs – followed by above examinations the implementation program should be summarized. An implementation program can be prepared based on time frame of each project, which will indicate a realistic schedule for implementing all recommended projects and measures.

**5. Annexures**

- Survey data
- Details of traffic demand modelling
- Proposal Plans
- Project profile sheets

Figure 2.6: City Mobilisation Planning Process



Source: Guidelines and Toolkit for Urban Transport Development

### 2.2.5.3. Contents of City Sanitation Plan<sup>15</sup>

Unprecedented growth of urban population in India has resulted in several infrastructural issues. Sanitation infrastructure is important to keep cities healthy and liveable. The National Urban Sanitation Policy (NUSP) was prepared with the vision of making all Indian cities totally sanitized, healthy and liveable for all citizens especially the urban poor. The CSP is a vision document on sanitation with 20 to 25 years horizon with short term town level action plans for 3-5 years to achieve sanitation goals. CSP provides for the preparation of City Sanitation Task Force, stakeholder mapping, situation analysis, current deficiency assessment, prioritising of areas, institutional capacity and financial mapping.<sup>16</sup> The key contents of CSP are listed as under:

#### **1. Introduction**

- Background
- Objectives of City-Wide Sanitation Plan
- City Sanitation Planning: Process, detailed steps and limitations
- Activity Update on CSP
- Verification of MoUD checklist

#### **2. Profile of the City**

- Introduction
- Location and regional linkages
- Climate
- Topography
- Brief History
- Regional Importance
- Economy
- Demography
  - Population projections
  - Population density
  - Sex-Ratio
  - Literacy
  - Ward wise population distribution and growth potential
- Housing Scenario-Ownership Status
- Slums and squatter settlements
- Existing Landuse
- Municipal Governance

#### **3. Environmental Sanitation – An Assessment**

- Sanitation Situation Analysis
  - Introduction
  - Household sanitation
  - Slum sanitation
  - Open defecation areas
  - Community toilets
  - Public toilets

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<sup>15</sup>Manual on Preparing CSP

<sup>16</sup>National Urban Sanitation Policy.

- School sanitation
- Wastewater treatment infrastructure
- Septage management
- Service level benchmarking indicators
- Wastewater projections
- Storm Water Drainage System
  - Introduction
  - Existing drainage network
  - Coverage
  - Outfalls
  - Existing drainage conditions
  - Local flooding areas/ low lying areas
  - Storm water drainage – peak run-off calculations
  - Standardized service level indicators
- Solid Waste Management
  - Primary collection and coverage
  - Street sweeping
  - Waste generation & segregation - quantity and characteristics
  - Secondary collection
  - Transportation
  - Treatment & disposal
  - Institutional setup & Health of sanitary workers
  - Operation & Maintenance (O&M)
  - Service level benchmarking indicators
  - Future demand and gap
- Water Supply
  - Source of water
  - Existing transmission, distribution and storage capacities
  - Service coverage
  - Standardized service level indicators
  - Future demand and gap

#### 4. Institutional Capacity and Finance:

- Existing institutional framework:
  - Details of existing State laws related to slums applicable to the city
  - Institutions engaged in slum improvement i.e. Slum Clearance Board, ULBs, District Urban Development Agency (DUDA), State Urban Development Agency (SUDA), Housing Boards, Development Authorities, District Collectorate, NGO, CDS / Neighbourhood society's, assessment of organizational capacities.
  - Community participation arrangements (Identification of city level Lead NGOs) and the existing community mobilization and development structure
- Financial Capacity Assessment of Local Body

#### 5. Sanitation Situation with respect to National Ranking Parameter

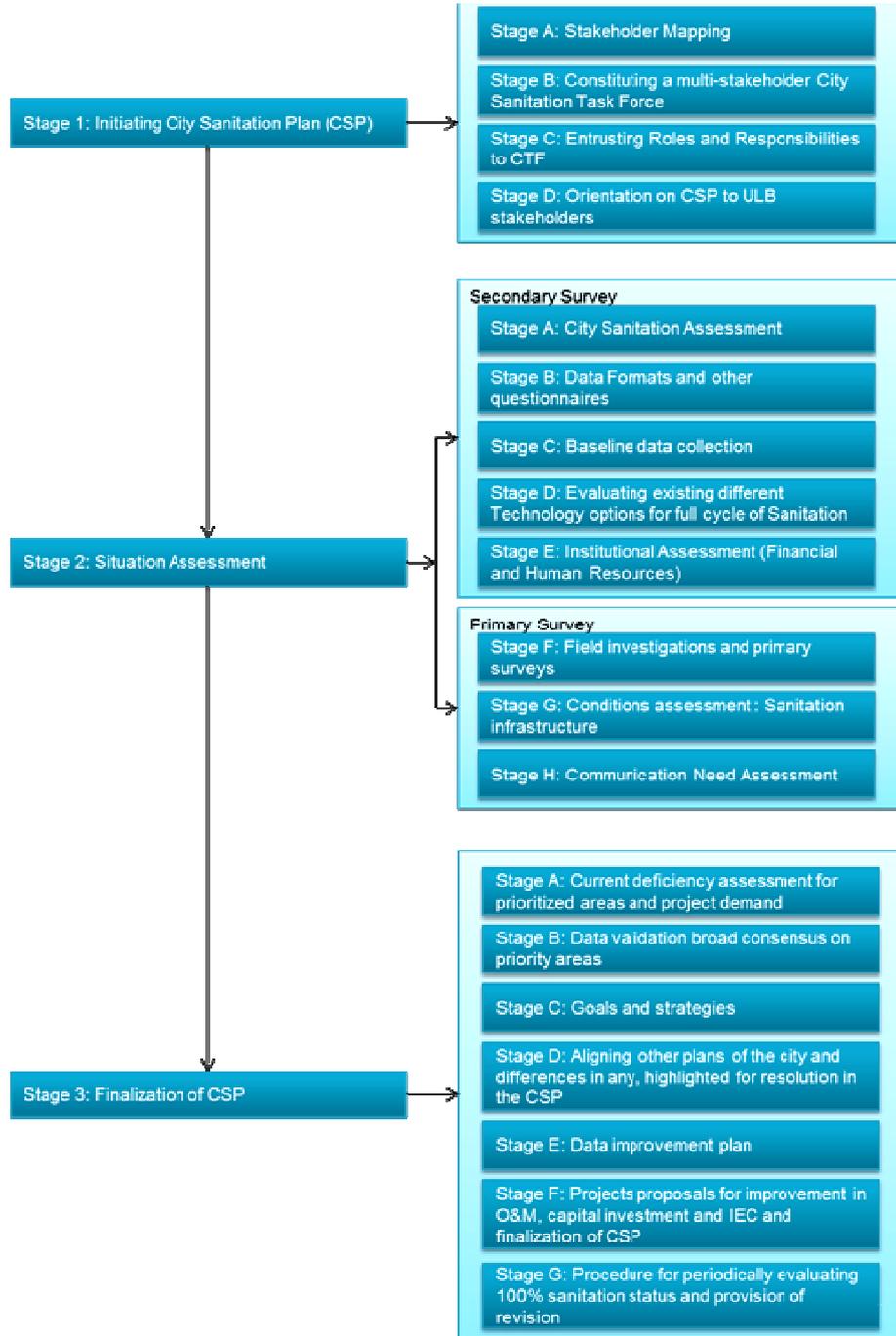
- Sanitation situation with respect to national sanitation ranking parameters: To promote sanitation in Indian cities, National Rating and Award Scheme for Sanitation for Indian cities, was implemented under National Urban Sanitation Policy by MoUD. Cities are rated based on set of objective indicators of outputs, processes and outcomes.

#### 6. City-Wide Sanitation

- Introduction

- Vision and City- Wide Sanitation Planning
  - Vision statement
  - Principles of CSP
  - Assumptions, norms and units costs
  - Various occurrences of issues versus consequences
- Sub-sector Strategies
  - Open defecation free status by ensuring access to all (including poor and slum dwellers as well as visiting population)
  - Excreta disposal and waste water management
  - Improvement of integrated solid waste management
  - Improvement of storm water management
- Enabling and Sustaining strategies
  - Awareness raising, hygiene promotion and community participation
  - Institutional arrangement and responsibility
- Monitoring and Evaluation
  - Monitoring and review
  - Launching reward scheme
  - Incentives and dis-incentives

Figure 2.7: City Sanitation Planning Process



Source: CSP Manual – NUSP.

#### 2.2.5.4. Contents of Slum Redevelopment Plan<sup>17</sup>

In pursuance of Government of India’s vision for “Slum Free India”, Rajiv Awas Yojana was launched in 2011 under which Slum Redevelopment Plan is prepared. RAY envisages two-step implementation strategy i.e. preparation of Slum free City Plan of Action (SFCPoA) and preparation of projects for selected slum. RAY provides financial

<sup>17</sup> Rajiv Awas Yojana Guidelines.

support to States/UTs/Urban Local Bodies (ULBs)/Central Government Agencies for providing housing and improvement of basic civic infrastructure and social amenities in each selected slums.

- Preparation for SFCPoA (Slum Free City Plan of Action)
  - Conducting Stakeholder Workshops and meetings to prepare the ground for beginning the processes and surveys required under SFCPoA.
  - Preparation of a City profile
  - Review of existing policies and programmes related to slum improvement and housing.

### 1. Curative strategy

- Assessment of present status of slums
  - Preparation of a municipal information base for all slums
  - Categorization of slums based on tenability analysis
  - Prioritization of tenable slums through priority matrix
  - Prioritization of untenable and semi-tenable slums
- Formulation of Slum Intervention Strategies
  - Detailed Analysis of all Prioritised Slums
  - Formulation of slum intervention strategies for all prioritised slums

### 2. Preventive strategy

- Estimating Urban Poor Housing Shortage & Identifying Supply and Demand constraints.
  - Estimating present and future housing shortage for the urban poor
  - Identification of supply and demand constraints in housing
- Identifying Supply and Demand Side Reforms and Framing Future Supply Strategy
  - Identifying policy reforms (Not applicable for smaller cities less than 3 lakh population included under RAY implementation phase)
  - Framing future supply strategy
  - Discussing and sharing findings with stakeholders guidelines for preparation for Slum Free City Plan of Action

Figure 2.8: Slum Free City Plan of Action Process



Source: RAY Guidelines SFCPoA.

### 3. Investment plan

- Framing Investment Requirements & Financing Plan
  - Estimation of Investment Requirements
  - Financial Planning for Implementation of Slum Improvement and Prevention Strategy
- Formulating a Credit Plan
  - Review of existing housing finance options for the urban poor
  - Review of the credit profile of urban poor

### 4. Finalisation of SFCPoA

- Framing Institutional Arrangements
  - Preparation of indicative implementation mode and definition of roles and responsibilities of institutions for implementation
- Finalization of Slum Free City Plan of Action

### 2.2.5.5. Disaster Management Plan (DMP)

The Disaster Management Plan is to be prepared on the lines of proposals made by National Disaster Management Authority. **Chapter 6** on 'Sustainability Guidelines' provides detailed contents for DMP at State and District level.

Other specific purpose plans - Tourism Master Plan and Heritage Conservation Plan to be prepared as required by the State Government and/or Local Authority for specific purposes, but within the framework of the Development Plan or Regional Plan (for the respective scale of preparation at city level or at district level).

### 2.2.6. Contents of Annual Plan

This section provides the contents of Annual plan prepared in the framework of an approved development plan by the local authority. It is an important document for the local authority as its aggregation at the district planning committee or metropolitan planning committee level will generate the district or metropolitan area annual plan which when further aggregated at State level will form its consolidated annual plan. The State annual plan would indicate the State and Central funds for different sectors, which finally will result in the allocation of funds to the local authorities. The annual plan of the local authority will also help in formulation of its annual budget and monitoring the performance annually.

As annual plan and budget are interlinked it is important that preceding annual plan be evaluated before the next financial year, so that the following plan will have inputs from previous plan and investments for new plan can be incorporated in budget. The contents of annual plan of a local authority, as given in the following sections, are applicable to all sizes of urban centres.

#### 2.2.6.1. Review or Evaluation of Preceding Annual Plan

##### **Review of last year's performance**

The review of the performance of the preceding year should include both physical and fiscal achievements. It should cover all the components of the development plan as contained in the last year's annual plan and highlight for each component:

- The physical target set, such as expressway, trunk infrastructure lines
- The status at the end of the annual plan and the level of physical performance by percentage of targets achieved
- The fiscal allocations made vis-a-vis proposed
- The money spent and level of fiscal performance by percentage of money spent

The review should also present an analysis of performance component wise, highlighting:

- Areas where the local authority had a very high degree of performance.

- Areas where the local authority had a very low degree of performance and reasons for such performance as well as the ways and means to correct the course of action.
- A further analysis of the performance by source of funds should also be presented. It should include physical and fiscal performance of the projects implemented through funds from:
  - Central assistance
  - Central and state assistance
  - State assistance
  - National funding agencies
  - International assistance or funding agencies
  - Local authority resources
  - PPP
  - Private sector funds
- Finally, specify the areas/ actions that require attention with particular reference to:
  - Finance
  - Capacity and skill up-gradation
  - Administrative and legal issues
  - Changes in policies, programmes or priorities

**Mechanisms of review of Annual Plans Performance:**

- Preparation of a pert chart in each annual plan, which shall be reviewed in the next year to rate the performance.
- The physical and fiscal performance to be assessed on the target achieved on quarterly or at least half yearly basis. This will ensure distribution of development and activities throughout the year and not at the end of the annual period.
- Key performance indicators (KPI) to be proposed in the Annual plan for its evaluation in the following year. This will ensure the quality and will be application specific.
- It is suggested to consider disasters, hazards and Act of God, if any, while reviewing the annual plan performance

### 2.2.6.2. The Annual Plan

**Brief Introduction:**

A brief introduction of the urban centre as indicated in its Development Plan. The objective in writing this introduction is to make the annual plan self-contained and its section should be as brief as possible.

**Aims and Objectives:**

Taking the review of the previous year's annual plan and the proposals of the development plan into account, annual plan id prepared. This plan should provide:

- Aims and objectives of development during the year
- Priorities

**Fiscal requirements and physical targets:**

Such a plan should provide implementation of each component of the plan:

- The funds required; and
- The physical targets to be achieved during the year

**Fiscal resource mobilisation plan:**

The resource mobilisation plan should present the manner of mobilisation of resource required for implementation of the annual plan, specifying the funds proposed to be mobilised through:

- Local authority resources
- PPP
- Institutional financing
- Market borrowing
- Private sector funds
- State assistance
- Central-state assistance
- Central assistance

### **Land assembly:**

Estimate the total land required by the development components and present the manner of assembly of land by the local authority including assembly.

### **Capacity building and skill up-gradation**

This section should incorporate-

- Appointment of staff, both technical and administrative
- Training of staff
- Strengthening of the urban planning department
- Consultancy practice

### **Other Proposals:**

Depending upon the specific needs and local area requirements provide other proposals also.

## 2.2.7. Contents of Projects /Schemes

The following is the recommended list of contents of plans of projects for execution on site. Depending upon the local requirements of the approving or funding agency, these may be modified. These contents are applicable to all plans of projects for all size of settlements.

### **Location**

- Location and other physical characteristics of the site if it is already available
- Identification of possible sites, if not already available, and :
  - Evaluation of alternative location;
  - Selection of preferred location; and
  - Physical characteristics of the preferred site.

### **Site Planning**

- Aims and objectives and schedule of area requirements as per provision of the development plan.
- Alternative concepts of layout, their evaluation and selection of a preferred concept.
- Layout based upon the preferred concept.
- Planning and design of infrastructure (water supply, sewage, drainage, electricity, road network and other infrastructures).

### **Detailed drawings**

In case of further contracting of projects - detailed drawings shall be provided for estimating cost, working drawing for design and procurements purposes.

### **Environment Impact Assessment**

As per the Guidelines issues by MoEF, Environment Impact Assessment of the project may be undertaken as an independent exercise.

### **Spatial Impact Assessment**

In case of large project, a spatial assessment of the project may be undertaken, if necessary.

Assessment should include:

- Impact of the project on additional demand for housing with specific reference to EWS & LIG sections of the society who would squat near the project site if no proper care is taken in this context
- Impact on the direction of the growth of the settlement
- Impact on the commercial and other ancillary industrial activities
- Impact on resettlement of the population due to compulsory land acquisition
- Impact on city level infrastructure specially- roads, bridges, transportation system, water supply, sewerage treatment plant, electricity generation and supply
- Impact on city level facilities

### **Financing Plan**

- Cost recovery strategy
- Financing terms
- Financing plan
  - Sources of finance
  - Proportion, form and nature of funds
  - Proportion, forms and nature of financing by various participating agencies and local authority
  - Interest rates and terms for borrowed funds
  - Cash flow and repayment schedule

### **Project Administration and Organisation**

- Project administration agency
- Major administrative requirements
  - Advertisement
  - Processing of application
  - Collection of dues
  - System of allotment of plots/units
  - Supervision
  - Monitoring
  - General management
- Requirement of manpower
- Executing agency

### **Legal Support / Constraints (if any)**

- Land assembly laws.
- Land tenure laws.
- Development promotion laws/regulations

These sections may not form part of the documents needed at the time of approval of private sector project by the local authority.

**All plans to be formulated in accordance with statutory provisions of the relevant Act.**



## 3 Resource Mobilization for Plan Implementation

### 3.1. Introduction

Land, finance and manpower are the three main resources for planning and development of urban and regional centres. As a basic principle, allocation of these resources among various competing land uses must be such that it helps in achieving an optimal level of economic efficiency with inclusion and equity<sup>18</sup>.

In case of spatial development and various development programmes, the government has been normally considered as the sole source for finance and ownership. However, in the recent years the role of private sector in the development process has been duly recognized. As a general policy on resource mobilization, it would be desirable to have a proper mix of public and private sectors participation, both playing a symbiotic role in such a way that the public infrastructure programmes are implemented with the strength of public authority and efficiency of the private entrepreneur. This should be the framework for PPP. The role of people is also being recognized, leading to development of the PPPP model.

This chapter focuses on the fiscal resource mobilization, land resource mobilization, good governance and manpower resources mobilization strategies for development. The local authorities, chief town planners, city commissioners could select the most appropriate model and combination depending upon the contextual possibilities.

### 3.2. Land

**Land** is the medium on which the entire superstructure of human settlement is created and under which a lot of infrastructure find their place. Planning for the use of land leads to socio-economic and physical development of urban and rural areas. However, it is a scarce commodity as its supply is limited and it cannot be mass created.

#### 3.2.1. Land as a Resource

The (Draft) National Land Utilization Policy, 2013 states that land is required for development of essential infrastructure and for urbanization, while at the same time there is also a need to protect land under environmentally sensitive zones and land which provides ecosystem services. Farmers' livelihood options and food security issues make it imperative to protect land for agriculture. Further, the need to preserve natural, cultural and historical areas requires land protection. It is, therefore, most essential to ensure that utilization of the available land is judicious and in the best interest of the community through the instrument of Development Plans.

<sup>18</sup>Technology and capacity to handle the various resources can also be defined as a resource.

### 3.2.2. Land Economics

Land value depends on demand and supply of land. The value increases as the demand exceeds the supply, which is the general case, owing to limited supply of land against its growing demand in the wake of urban growth and development. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCTLARR Act, 2013), defines “land” so as to include the benefits that arise out of land, and things attached to the earth or permanently fastened to anything attached to the earth<sup>19</sup>. The Act also requires that the market value of land be calculated as the minimum land value specified under the Indian Stamp Act, 1899 for the registration of sale deeds in the area, where the land is located, or the average of the sale price for similar type of land located in the immediate areas adjoining the land being acquired. It is to be ascertained from fifty per cent of the sale deeds registered during the preceding three years, where higher price has been paid. This approach is suggested for determining the market value of land for acquisition.

The Land Acquisition Act of 1894 was made mainly to facilitate the government to procure privately held land for the purpose of developing public infrastructure and also for companies. After 120 years, this Act was replaced by the RFCTLARR Act, 2013. The Act has provided for fair compensation to those whose land is acquired permanently or temporarily, while bringing in enhanced transparency to the process of acquisition of land.

### 3.2.3. Land Assembly

Land assembly and development mechanism are undertaken for achieving optimum social use of urban land and to ensure adequate availability of land to public authority and individuals. Public Private Participation is achieved in land development through various techniques. Mainly, land assembly techniques prevent concentration of land in few hands and promote its efficient social and economic allocation. Some of the land assembly techniques also promote flexibility in land utilization in response to changes resulting from growing city. The various mechanisms to assemble and/or develop land are enlisted below:

- **Land Acquisition:** bulk land acquisition by State and by private initiatives.
- **Land Pooling:** land pooling approach and redistribution scheme, popularly known as Town Planning schemes.
- **Land Reservations:** the concept of Accommodation Reservation which allows the land owner to develop the sites reserved for an amenity.
- **Transferable Development Rights:** a technique of land development which separates the development potential of a land parcel for use elsewhere.

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<sup>19</sup> Appendix B of Volume II B provides definition for land and associated terms.

- **Guided Land Development:** this model uses the provision of infrastructure as an instrument to guide urban development in partnership with land-owners without pooling any land.

### 3.2.3.1. Land Acquisition

“Land Acquisition” popularly means the acquisition of land for defined public purpose by a government agency from individual land-owners, as authorized by the law, after paying a government-fixed compensation to cover losses incurred by land-owners from surrendering their land. The land acquisition process can be undertaken by the State or through private initiatives. As of now, most of the land acquisition is to be processed as per the RFCTLARR, 2013. Some models of land acquisition are as follows:

**Bulk land acquisition method as a State Initiative:** In this method, Master Plan is prepared for the entire area encompassing different land uses and involving various activities. Land is developed in accordance to the planning norms for various uses/activities. Bulk land is acquired from farmers by the development agency and compensation is paid to farmers/owners based on the provision of prevailing act.

**Bulk land acquisition method with Private Initiative:** To defray the cost of land acquisition some state governments and ULBs have developed models in which private sector acquire land by directly paying compensation to the affected families. A variety of models are in existence per which land is acquired for planned development with private partnership.

**Haryana Guided Land Development Model:** In this model, the private developer can acquire land directly from farmers at market price and at the same time, it permits a land owner to assume the role of a colonizer. This model provides fixed time period of 5 years to utilize that land acquired (initially 2 years, then extension of 3 years, if required) and the developer is expected to complete the projects within this period. Major highlights of this model are that the difficulties and delays inland acquisition are avoided and pressure on government to pay compensation is reduced, overall enhancing investments.

**Ghaziabad Joint Venture Model:** As per approach followed by Ghaziabad Development Authority (GDA), a joint venture (JV) is formed between the GDA and the builders/developers/co-operative societies through open bid (based on technical and financial capabilities). Twenty per cent of the plots developed are to be reserved for EWS/LIG and the costing and allotting of social facility by developer has to be done as per the government regulations. The balance of the land is to be sold by the developer at profit. For the entire process, the development authority acts only as a facilitator. Project duration is specified in the JV agreement and penalty is imposed if developer requires time extension, thus making sure that land is utilized within the stipulated time period.

**Hyderabad Differential Compensation Models:** In Hyderabad, the land acquisition technique has been modified into two different models, in which while acquiring land for public and private projects, different level of compensations are arrived at, these are-

**Model I:** When land is acquired for projects mainly for public purpose such as roads, power generation and distribution, irrigation, schools, welfare housing, environmental projects etc., appropriate compensation is paid to land-owners by consulting them.

**Model II:** When land is acquired for projects such as SEZ, Industrial Estates, Satellite townships and others where value addition enhances the land prices substantially, mainly for third party use, compensation is normally worked out on profit sharing basis, which is in two parts, namely-

- Basic Value (Government Rate) of Land
- % Equity Sharing in SPV / % of Net Developed Area / Built Space

**CIDCO Model** of Land Development in Navi Mumbai follows the technique of land banking for land assembly. The compensation to land owners is done by the way of monetary and land compensation. But in Vasai Virar sub-region, CIDCO undertook the land assembly by obtaining power of attorney from land-owners or outright purchase of freehold lands located close to each other by private developers or builder. The promoter is solely responsible for providing and maintaining infrastructure for consolidated land parcel.

### 3.2.3.2. Land Pooling

In Town Planning or Plot Reconstitution Scheme, the land is pooled and its development is financed with the involvement of land-owners without compulsorily acquiring land. This land assembly technique helps to provide plots for basic services in a planned layout from the original haphazard arrangement. Costs incurred by the developmental authority for development and for infrastructure are recovered from the sale of few of the final land plots reserved by the authority and betterment charges levied on land-owners. The reconstituted plots are allotted to the land-owners in proportion to their original land holdings.

The scheme was first introduced in the Maharashtra Regional and Town Planning Act, 1966 and later in Gujarat Town Planning & Urban Development Act, 1976 and is now widely appreciated model of land assembly. Another deviation of the land pooling mechanism has been recently introduced by the Delhi Development Authority (DDA), wherein DDA facilitated developers and land-owners to pool land for development.

The town planning scheme is referred as 'land acquisition without tears' and has the following key advantages:

- Infrastructure is provided in coordinated way.
- Partial cost is recovered through betterment charges.
- Land for public and community purposes including green & open spaces is acquired without direct expenses.
- Community benefits through unified planning.
- Land-owner shares the project cost and benefits by increased property prices.

However, the Land Pooling Scheme suffers from certain difficulties, such as:

- Delay in process of preparation, approval, arbitration and implementation, mainly due to litigations.
- There are issues related to cost recovery.

- There is also inadequate public participation in such schemes. To overcome the drawbacks of TP scheme, some suggestions are enlisted below:
- Division of scheme into planning and financial part, which has been done in the Gujarat model.
- Appointment of an arbitrator and a project planner by local authority to modify the plan after initial preparation, who would undertake active consultation with original stakeholders pre and post plan preparation.
- The contribution, which is based upon the estimated value of land assuming full development as per the scheme, should be replaced by estimated cost of the scheme.
- Provision of Transferable Development Rights in lieu of compensation to original plot holders can be considered.
- Land pooling schemes to be prepared only for the areas included in current development plan.

**Land development for Schedule-6 areas:** Some North-east states have areas covered under the Schedule 6 of the Constitution. In such areas, land development and planning are not directly under the control of the State government but vests with the Autonomous District Councils and mainly under community ownership. Therefore, communities can be involved in development process of the settlements as it may be viable and easier approach.

### 3.2.3.3. Land Reservations

The concept of Accommodation Reservation allows the land-owners to develop the sites reserved for an amenity in the development plan using full permissible Floor Space Index (FSI)/Floor Area Ratio (FAR) on the plot, subject to agreeing to entrust and hand over the built-up area of such amenity to the local authority free of all encumbrances and accept full FAR/FSI as compensation in lieu thereof. The area utilized for the amenity would not form part of FAR/FSI calculation. Reservations such as retail markets, dispensaries, etc. can be implemented in this way wherein local authority is not required to acquire the land by incurring expenditure on payment of compensation. In case of reservations like shopping centres etc., the owner can be allowed to develop these on agreeing to give at least upto 25% of the shops to the local authority for the purpose of rehabilitation of the displaced persons on payment of cost of construction.

In case of road widening/ new construction, the local authority can grant additional FSI on 100% of the area required for the purpose, provided the owner surrenders the land for widening or construction of new roads to the local authority free of all encumbrances and accept the additional FAR/FSI as the compensation in lieu thereof. This mechanism has considerably relieved local authorities from incurring huge expenses for the purpose of acquisition of such lands. The model can be explored for other non-economic activities such as open spaces, public utilities among others.

The concept of accommodation reservation has been incorporated in the Development Control Rules of the Mumbai Municipal Corporation.

### 3.2.3.4. Transferable Development Rights (TDR)

TDR is a technique of land development, which separates the development potential of a particular parcel of land from it and allows its use elsewhere within the defined zones of the city. It allows the owner to sell the development rights of a particular parcel of land to another. This entitlement is over and above the usual FSI available for receiving plot in accordance with the prevailing laws and regulations, which entitles a land-owner to construct additional built-up area on his existing building or vacant land.

TDR is taken away from the zone and it is tradable which makes it different from Accommodation Reservation. This is also generally used for redevelopment of inner city zones and for reconstruction/ re-development and has been tried out in numerous cities/ States including Bengaluru, Chennai, Mumbai and Rajasthan. However it has its prospects and consequences as experienced from the implementation in various cities. For instance, unbridled pooling of TDRs could damage the urban form, TOD strategies, quality of public spaces, etc. Hence it should be used carefully within a predefined spatial framework. States like Karnataka and Rajasthan have made provisions to mitigate such effects.

### 3.2.3.5. Guided Land Development

Guided Land Development model uses the provision of infrastructure as instrument to guide urban development. This is done in partnership with land-owners who pay for the cost of providing services to their land and in return donate land for public infrastructure and a payment as betterment levy. This model, also proposed by the United Nations Economic & Social Commission for Asia & Pacific (UNESCAP), has been for guiding the conversion of privately owned land in the urban periphery. It uses a combination of traditional government role of providing infrastructure and the enforcement of land subdivision regulations. The key advantage of the approach is that it is less costly than outright land acquisition and more equitable than land banking.

The principle behind guided land sub-division is that the government agency proactively selects the direction where it feels urban development should take place and provides infrastructure in those areas. This acts as an incentive to encourage developer to invest in the planned area selected by the government agency. The cost effectiveness of guided land development approach results from the fact that land development is planned, designed and implemented with the land-owners of the designated area, who donate land for roads and right of way for infrastructure and public spaces, as well as pay a betterment levy to meet the costs of the project. To finance the scheme, a loan is initially taken to build the infrastructure, which is paid

from betterment levies provided by land-owners either on annual installments or in lumpsum upon sale of land. The infrastructure is provided by the government agency upto the site. Individual land-owners are supposed to subdivide their land for various developments and lay the on-site services.

But guided land is often fraught with difficulties on the ground. First, as the model depends on the consent of the land-owners it cannot be applied in areas with fragmented land-ownership, lack of owners' will and consensus. Second, collection of betterment levies may not be feasible by small landholders and lead to default of payment.

### 3.2.4. Inclusive Land Development

Most cities in developing countries suffer from land market distortions caused by poor land development and management policies including poor planning, slow provision of infrastructure and services, poor land information systems, cumbersome and slow land transaction procedures, as well as under regulation of private land development, leading to unplanned or ribbon/corridor development of land in the urban periphery. The urban poor suffer most from a dysfunctional city. Distortions in the land markets allow land speculation, which often prices the poor out of the formal land markets and into the informal land markets, which are exemplified by slums, squatter settlements and illegal sub-divisions, mainly in the periphery of cities. This leads to longer commuting time and costs, poor living conditions, in adequate infrastructure and services, adversely affecting the health and financial condition especially of the poor, thereby entrenching the cycle of poverty.

Land and housing have special significance for the poor. Often for poor, a house is not just a shelter, but is also a place for income generation. Urban settlements of the poor in the region are characterized by home based workshops from which the poor earn their incomes. Though slum, squatter and illegal settlements are often used interchangeably but they are different from each other and denote different characteristics of the settlement.

- Slums are legal but substandard settlements, with a lack of adequate services and overcrowding.
- Squatter are settlements where land has been occupied illegally. They are often found on marginal or environmentally hazardous lands, such as close to railway tracks, along rivers and canals etc. They are also found on government land or land whose ownership is unclear.
- While squatter settlements are spontaneous and unorganized, illegal settlements are planned and organized. These usually occur in cities where the government owns large tracts of vacant land, with low opportunity cost.

#### 3.2.4.1. Inclusion of Poor into the Formal Land / Housing Market

Experience has shown that bringing the poor into the formal land and housing markets needs a two pronged strategy: increasing the choices available on the supply side and increasing affordability on the demand side.

1. Increasing supply of land for the poor includes following:
  - **Sites and Services:** It provides the target group with a plot and basic infrastructure, such as water, roads and sanitation facilities.
  - **Illegal settlements** regularization/upgrading: Settlement upgrading provides existing settlement dwellers land tenure, as well as, basic infrastructure.
  - **Land sharing:** Land-owner and the land occupants reach an agreement whereby the land-owner develops the economically most attractive part of the plot and the dwellers build houses on the other part with full or limited land ownership.
  - **Sites without services- incremental development:** The approach includes mechanisms whereby groups of households are encouraged to organize themselves, accumulate funds and provide infrastructure gradually.
  - Private developers to provide a percentage of FAR (DDA norms provides 15%) for EWS housing to be handed over to LB/ Authority at predetermined price.
  - **Reservation for service population** including domestic help, cleaners, drivers, other small scale and informal services should be made (DDA norm in 50%).
2. The strategy of increasing effective demand for land for the poor has following schemes which can be used to provide better shelter to the urban poor:
  - **Community organization:** Organized communities of the poor can afford housing and they also negotiate with governments and other stakeholders more effectively.
  - **Increasing savings and providing access to finance:** Community-based savings-and-credit schemes preserve organized communities and increase access to finance.
  - **Improving income opportunities** by providing access to the Central and State level schemes for employment (like Swarna Jayanti Shahari Rozgar Yojana, Urban Wage /Self-Employment Programme, Women Self-help Programme) and vocational trainings (like Skill Training for Employment Promotion).

(Source: UNESCAP- Urban Land Policy for the Uninitiated, DDA Norms and other sources.)

### 3.3. Fiscal Resource Mobilisation

Local bodies play an important role in providing social, civic, physical and economic infrastructure services to the public. Municipal finances are critical in initiating many urban and local governance projects, as financial resources' strategic management plays a vital role in ensuring long-term sustainability of local services and infrastructure. With the introduction of 73<sup>rd</sup> & 74<sup>th</sup>CAA, local government's role and responsibilities have been increasing continuously. To realize these responsibilities local governments require steady flow and efficient management of financial resources. However, as the traditional system of funding on basis of plan and budgetary allocations will be reduced, the local authorities will have to devise innovative methods of resource mobilization through fiscal instruments and accessing the market. The subsidies will need to be rationalized and urban development plans and projects need to be designed as commercially viable. A general lifecycle of a project is depicted in **Figure 3.1**.

Figure 3.1: Project Life Cycle



Also the estimation of project cost is to be accurately calculated including contingencies. The important head for project cost calculation are:

1. Capital Investment (**Capex**), including-
  - Land cost
  - Common infrastructure cost, like roads, water supply etc.
  - Project specific infrastructure cost like toll plaza, bridge- s
  - Building and civil cost
  - Interest during construction
2. Working capital margin (also incidental expenses)
3. Operations and Maintenance cost(s) (O&M), including-
  - Salary & Wages
  - Recurring raw material cost
  - Repair & Maintenance
  - Administration & Overheads
  - Marketing expenses
  - Project specific operating expenses

Requirement of finance in the project life cycle is for implementation and then later for operation and management. The first activity is raising funds in bulk to initiate a project. Once construction is over, the later stage of operation and maintenance requires steady flow from revenue sources. However, only well planned and implemented infrastructure projects generate revenue income for local authorities in form of fees and charges. **Figure 3.1** depicts general life cycle of a project. Various innovative and traditional approaches for financing developmental activities are available these days and an attempt to prepare a comprehensive list has been made, as presented in **Figures 3.2 & 3.3** below.

Figure 3.2: Funding Sources

### Traditional Sources

- Grants and subsidies
- Municipal Bonds & Debentures
- Funding by Bilateral & Multilateral Agencies

### Innovative Sources

- Foreign Direct Investment
- Public Private Partnership
- Pooled Finance Public Fund
- Loans from Financial Institutions

Figure 3.3: Revenue sources

### Traditional Sources

- Taxes
- Fees and Charges
- Surcharges
- Income from interest
- Other income sources

### Innovative Sources

- Land Auction
- Betterment Levy
- Betterment charges

### 3.3.1. Traditional and Innovative approaches for Fiscal Resource Mobilisation

Diverse options of the source finance are available for developmental projects. These traditional and innovative sources of financing projects at State and ULB level through funding and revenue sources are detailed below:

- a. **Taxes:** State Government authorises local governments by law, to collect taxes. Taxes are major source of revenue of Urban Local Bodies. Property tax, profession tax and advertisement tax are major sources of revenue in local governments.
- b. **Charges and fees:** Local bodies levy charges and fees for the services provided to citizens. These charges, for water supply, solid waste management, parking and other such services to cover the cost of undertaking the provision of services.
- c. **Grants and Subsidies:** Grants and subsidies are generally given by Central Government to State/ Local Government or State to Local Government for development and provision of services to citizens.
- d. **Public Private Partnership:** PPP is an agreement between public and private entity for providing services or infrastructure to citizens. It helps municipal authorities to shed some of its functions and evolve alternative institutional arrangement for the performance of such functions.
- e. **Loans from financial institutions:** Public and private organisations come together to pool funds from public and investing it in financial assets. Such loans are for long term.
- f. **Funding by Bilateral and Multilateral Agencies:** These are developmental agencies which provide soft loans for infrastructural projects. Almost all such loans are backed by sovereign guarantee and take long process to access.
- g. **Foreign Direct Investment:** FDI is direct investment from company or entity into a foreign country.
- h. **Pooled Finance Development Fund (PFDF) Scheme of Government of India:** PFDF is meant to provide credit enhancement grants to enable ULBs to access market borrowings to facilitate development of municipal infrastructure.
- i. **Municipal Bonds and Debentures:** Municipal bonds and debentures are issued by ULBs and Infrastructure Funds, to general public or specific institutional investors to raise finance for developing physical infrastructure.

### 3.3.1.1. Taxes (Property taxes, Vacant developed land tax)

The municipal entities derive their tax powers from the laws enacted by the State legislatures. The sources of revenue – both tax and non-tax are delegated to them under these laws as obligatory and discretionary taxes. However, the municipal bodies are at the liberty to levy a tax and may or may not levy all the entitled taxes.

In order to match the functional domain of municipal bodies with tax power, it is imperative to devolve additional tax powers to municipalities and to provide for transfer of new functions to them as proposed in 73<sup>rd</sup> & 74<sup>th</sup> CAA, along with the requisite funds which currently are under the purview of State Government Departments.

In addition to taxes, state governments also provide authority to local bodies to levy 'surcharge' on some taxes to generate additional fund to meet its requirements. Following is the list of taxes and surcharges that local bodies can levy to generate revenue.

#### Taxes:

- **Property tax on lands and buildings:** reforming the property tax entails bringing in amendment of inherent Rent Control Laws either for delinking its present depressing effect on rental value or for permitting legally the periodical revision of standard rent. The Model Rent Control Act of MoUD provides for refurbishing of standard rent and its periodical revision. This, if adopted by all the states, will go a long way in restoring the base of this tax with some relationship with the market value.
- **Stamp Duty:** This tax is levied on those instruments or documents of transactions when selling and buying property. The proceeds in regard with this duty go directly to State in which the individuals are levied. It can also be shared with Local Bodies.
- **Tax on Land/Property values increment:** It is common phenomenon that land values keep on increasing over the years not because of any individual effort but due to implementation of development schemes. Land values increment may also be due to economic phenomenon of rise in general prices. The basic objective of land value increment taxes is to capture some of this increase for the benefit of the community.
- **Water tax:** The Municipality can levy a water tax on any land or residential building or non-residential building as a percentage of property tax as specified by regulations.
- **Fire tax:** The Municipality can levy a fire tax on any building as a percentage of property tax as may be specified by regulations.
- **Tax on congregations:** It is a tax levied per head or per vehicle for providing municipal services to persons or vehicles visiting the municipal area for the purpose of tourism or in connection with any congregation of whatever nature, including pilgrimage, fair, festival, circus or yatra, within a municipal area for persons or vehicles assembling within the municipal area for the purpose.
- Tax on pilgrims and tourists.
- **Tax on deficit in parking spaces in any non-residential building:** This tax is on the deficits in the provision for parking spaces required for different types of vehicles in any non-residential building.

- **Advertisement Tax:** Such tax can be levied for the exhibition or display of any advertisement (other than in newspaper) to public view in any manner.
- **Vehicle tax:** It is a tax on purchasing vehicles and using roads.
- **Profession Tax:** Profession tax is levied by municipal authority on individual, company, business owners or merchants' It is levied on the income earned by way of trade, profession, employment or business.
- **Domestic Servants Tax:** This tax is payable by employer on domestic servants.
- **Vacant land tax:** In some urban places, the land is kept vacant without any use by the owner for a period of time. A tax is payable on vacant land to incentivize its development or sale to those who have the interest and access to resources to develop it. It is recommended to levy this tax as per applicable FAR rather than availed FAR.
- **Octroi:** This tax is levied on the entry of goods into a local area for consumption, use, or sale. Many States have replaced octroi by entry tax levied and collected by the State Government, but shared with the Local Bodies.
- **Other taxes:** The municipalities can also levy any other tax, which the state legislature has the power to levy, subject to the prior approval of the state government.

### Surcharges:

Some States provide for levy of surcharge on State taxes, to be passed on to the local bodies, though some economists find such surcharges to be distortionary. Examples are-

- **Surcharge on stamp duty:** The Municipality can levy a surcharge on the transfer of lands and buildings situated within the municipal area as a percentage of stamp duty levied on such transfer.
- **Surcharge on entertainment tax:** It is a surcharge on any tax levied by the state government on any entertainment or amusement within the municipal area.
- **Surcharge on electricity consumption:** It is a surcharge on consumption of electricity within the municipal area.
- **Surcharge on petroleum products:** State governments levy sales tax on petroleum products and additional surcharge to cover the financial demands of local bodies.

### Tolls:

Toll is a form of tax, typically implemented to help recover the cost of road construction and maintenance.

- **Roads & Bridges:** A Municipal authority can establish a toll-bar on any public street or bridge in the municipal area and levy a toll at such toll-bar on vehicles, over and above the vehicle tax, for specified reason.
- **Ferries:** Where a ferry plies between two points on a water-course and either one or both the points are situated within a municipal area, State Government can declare such ferry to be a municipal ferry and levy toll or tax.
- **Heavy trucks:** It is a toll on heavy goods or passenger motor vehicles, plying on a public street. This is to control heavy passenger motor vehicles movement in the restricted hours of the day and in the restricted areas.
- **Toll collection on navigation channels:** The State Government can levy tolls for use of any navigable channel, which passes through the limits of a municipal area in lieu of the maintenance of navigation channel.

Table 3.1: List of various Taxes, Surcharges, Charges, Fees and Tolls as may be levied for Urban & Infrastructure Development

Heads	Sources of Revenue				
Taxes	Property tax on lands and buildings	Water	Vehicles and other conveyance	Electricity Cess	Conservancy
	Property: (Lighting, water, drainage, general purpose, sanitary)	Drainage	Motor vehicles	Education cess	Congregation
	Profession	Sanitary	Non-Motorized vehicles	Special education tax	Sale of cattle in the market
	Stamp duty on transfer of properties	Fire	Terminal	Pilgrims and Tourist	Carriage and animal
	Stamp duty on transfer of immovable properties	Electricity	Local body tax on entry of goods	Artisans	Scavenging
	Deficit parking space in any non-residential building	Special water tax	Trade	Timber	Animals
	Land according to circumstances & property	Latrine	Markets	Boats	Dogs
	Building application	Garbage Treatment	Advertisement	Menial domestic servants	Dogs Latrine
	Vacant land development tax	Special and general sanitation	Theatre	Octroi*	
Surcharges	Transfer of lands and buildings	Tax/charge/fee on Buildings	Electricity consumption	Entertainment	Petroleum products*
Charges	Development charges	Water-supply	Drainage	Solid Waste Management	Sewerage
	Betterment Levy		Other specific Services rendered	Stacking of material or rubbish	
Fees	Sanction of building plans	Building betterment	Compounding	Hotel / Restaurant	Carts
	Issue of completion certificates	Betterment / Development Fee	Warrant fee	Swimming pool	Carriages
	Licensing: Professionals, activities	Building construction	Nature and cost of Internet services	Food adulteration	Registration of Dogs and Cattles
	Issue of Birth and Death certificates	Advertisement Fee	Street	Compounding	Cattle pounds
	Birth and Death registration	Boats (rental)	Pilgrim	Dangerous and Offensive trade license	Animals
	Mutation	Fire Brigade	Drainage	Market	Slaughter house
	Registration	Public Health	Lighting	Composting	Scavenging
	Trade License	Water Connection		Fee for sale of Goods	Stock Registration
Tolls	Roads	Bridges	Ferries	Heavy trucks	Navigable channel

Source: Compilation of State wise applicable taxes and fees as in 2004. \* Taxes and surcharges which may be abolished.

### Case Study: Canada, British Columbia

In British Columbia province of Canada, a study was undertaken to identify as to how to make better use of taxation powers to increase funding of Local Government needs. Various new sources of revenue by way of sharing or negotiating a greater share of existing taxes, developing new taxation tools were identified. Some of the innovative sources as identified are discussed below in three major categories:

Figure 3.4: Sources for Fund Generation

#### Taxes

- **Carbon Tax** : Carbon tax was suggested to be introduced in the province on virtually all fossil fuels including gasoline, diesel, natural gas, coal and propane.
- **Sin Taxes**: To discourage behaviours that are considered unhealthy or socially undesirable were suggested to be taxed. These taxes also referred to as "sin taxes", were to be put on alcohol and cigarettes. They were also intended to recoup some of the social costs for additional care services or addictions treatment.

#### Sales of Services (These were highlighted as significant opportunities for local government to expand their sales of services and take advantage of their existing expertise and infrastructure)

- Like sale of -
- Community Energy Cooperatives (in Denmark, Germany and the Netherlands),
- Land Fill Biogas for capturing and burning bio gas emissions,
- Sale of other services which also produce energy through by-product like Municipal Solid Waste and Anaerobic Digestion,
- Commercial Garbage Collection

#### Other Revenues

- Transportation related land development influencing land value captured as revenue source.

(Source: <http://www.thinkcity.ca/node/289>)

### 3.3.1.2. Charges and Fees (Development Charges, Levies, Impact Fees, non-tax sources, valorisation charges, service charges)

Charges are a fee charged by a consumer's local body to recover the costs of specific community/physical services. For example, municipal charges of water supply may go to cover costs of laying water supply infrastructure and water treatment plant in a city. Betterment charges are usually imposed on the beneficiaries of the improvement projects to recover the project cost. Development charge is used for recovering the cost of providing new services and infrastructure in an area.

The Municipality can levy user charges for following services provided in the urban areas:

- Provision of water-supply, drainage and sewerage
- Solid Waste Management
- Parking of different types of vehicles in different areas and for different periods
- Stacking of materials or rubbish on public streets for construction, alteration, repair or demolition work of any type
- Other specific services rendered

Transit Corridors attracts economic activities and concerted development where provision of additional infrastructure or its augmentation requires additional financial support. Therefore, such areas call for self-financed urban infrastructure projects. Alternative possibilities to raise revenues in these areas can be by tapping land-based financing sources along dense transport corridors, these options can be:

- Higher Conversion charges especially for commercial and economically lucrative activities.
- Higher Development charges or Betterment levy on land uses which put more pressure on infrastructure Impact fees or higher charges on the purchase of extra FSI/FAR along the corridor upto a maximum prescribed by the authority.
- Overall additional changes and fees such as higher property tax, special water tax (mentioned in the **Table 3.1**).
- Non-tax source for the use of particular services, such as Service charges for parking in the TOD influence zone, fire safety facilities in the zone among others.

Apart from the TOD focused charges, the Municipality can levy fees and fines for the following services and activities to generate revenue:

- Sanction of building plans and issue of Completion certificates,
- Issue of municipal licenses for various non-residential use of lands and buildings,
- Licensing of various categories of professionals, activities such as sinking of tube-wells, sale of meat, fish or poultry or premises used for private markets, slaughterhouses, hospitals, animals, carts or carriages and other activities.
- Sites used for advertisements in roads, parking lots, commercial locations and public building,
- Issue of birth and death certificates.
- Impact Fees: It is a fee imposed on builder, developer or industrialist to compensate the impact and burden new project is going to have on social and physical infrastructure (existing and need for new) and environment.

### 3.3.1.3. Grant-in-aid and Subsidies

Central Finance Commission (CFC) evolves a comprehensive framework for the distribution of the grants-in-aid between states, including those for the local bodies. Further, the 13<sup>th</sup> Finance Commission has introduced other grants namely, general basic grant, general performance grant and special area basic grant. Similar provisions are made by the State Finance Commissions. In addition, Planning Commission recommends Development (or Plan) Grants to States, including for the local bodies.

A capital grant is usually utilized for capital expenditure like purchase of land, building, equipment, facilities, etc. The benefits of such expenditure are of an enduring nature and spread over an extended period of time, such as road development grant.

The revenue grant is generally utilized for meeting recurring expenditure, the benefits of which usually expire within the accounting year in which it is incurred. Revenue Grants are usually in the nature of a subsidy. Subsidies are provided directly or indirectly for the provision of services such as water supply, disposal of sewage,

transporting and disposal of wastes, municipal transport, street lighting, hospitals and schools.

### 3.3.1.4. Public Private Partnership (PPP)

One of the ways to enhance fiscal capabilities of the municipal authorities is to shed some of their functions and evolve alternative institutional arrangement for the performance of such functions. Public Private Partnership is such arrangement between a government / statutory entity / government owned entity on one side and a private sector entity on the other. This partnership is for the provision of public assets or public services, through investments being made and management being undertaken by the private sector entity, for a specified period of time. There is well defined allocation of risk between the private sector and the public entity. The PPP arrangement ensures that private entity receives performance linked payments that conform to specified and pre-determined performance standards, measurable by the public entity or its representative.

PPP models are generally classified in the categories enlisted below and detailed in section 3.3.3:

- Management Contracts
- Turnkey Projects
- Lease
- Concession
- Private Ownership

### 3.3.1.5. Loans from Financial Institution(s)

A financial institution is either in public and private sector which brings funds from the public and puts them in financial assets rather than physical property. Such institutions are made up of different organizations such as banks, trust companies, insurance companies and investment dealers. Specialized financial institutions e.g. IDFC, NHB, HUDCO and IL&FS are some agencies which provide loans and a variety of instruments for infrastructure financing. Other financial institutions e.g. ICICI, LIC of India, etc. also provide funds for infrastructure projects. These institutions have access to funds which are for longer duration e.g. loans from development agencies, bonds from open market, foreign institutional investors, etc. and are thus able to lend for relatively longer durations than banks.

Credit Rating of the ULB plays an important role here. The better the credit rating for repayment of principal and interest, lower is the rate of interest. Certain financial institutions provide credit enhancement mechanisms to enhance the inherent credit quality to obtain a better credit rating resulting in lower interest rates. This facility is now also being extended by MoUD through its Pooled Finance Development Fund (PFDF) scheme. Institutions may also provide guarantees for funds accessed from other sources. *(Source: Municipal Finance Improvement Programme-JnNURM)*

Banking institutions also provide finance to local authorities. Bank loan is a relatively new avenue and an easier option for finance for Local Bodies, as the banks have prescribed norms and well laid down procedures. The time period of these loans are short to medium term and generally do not cater to the long tenure needs of infrastructure projects. Bank loans are available to finance the short term needs of institutions e.g. working capital loan, bridge loans, loans against property etc.

### 3.3.1.6. Funding by Bi-lateral & Multi-lateral agencies

Bilateral organizations are government agencies or non-profit organizations of a country that provide aid to other countries. Bilateral organizations receive funding from their national governments, and use the funding to aid developing countries. Few bilateral agencies are as follows:

- US Agency for International Development (USAID)
- Department for International Development (DFID; UK)
- Japan Bank for International Cooperation (JBIC)
- Japan International Cooperation Agency (JICA)
- Australian Aid Agency (Aus Aid)

Multilateral organizations are international organizations whose membership comprises member governments, who collectively govern the organization and are the primary source of funds, while the loans/grants-in-aid are provided for projects in various countries. Some examples of multilateral funding agencies are:

- Various United Nation (UN) bodies
- World Bank
- Organisation for Economic Cooperation and Development (OECD)
- Asian Development Bank (ADB)

Bi-lateral and Multi-lateral bodies are also known as Development Agencies. These provide soft loans and grants for infrastructure projects. Accessing funds from these agencies is relatively a long process and it requires preparation of various project documents - in-depth planning, and studies to assess compliance of the project with respect to environment, rehabilitation / resettlement and social safeguard policies, and pilot testing of new initiatives. As almost all loan projects of bi-lateral and multi-lateral agencies are backed by a sovereign guarantee, the Department of Economic Affairs, Ministry of Finance, Government of India plays an important role during the entire process. In line with the development financing objectives of these institutions, projects funded by these institutions are typically in sectors that are not commercially attractive. Local bodies can receive external development assistance from bilateral and multilateral sources on behalf of the State Governments for State sector projects/programmes.

*(Source: Municipal Finance Improvement Programme-JnNURM)*

### 3.3.1.7. Foreign Direct Investment

Funds from Foreign Direct Investment (FDI) have emerged as a major source of funds in infrastructural projects in India – for instance Japan’s (Japan Bank of International Cooperation) FDI support in developing the Delhi Mumbai Industrial Corridor (DMIC).

Under FDI Policy 2013, almost all the sectors have been opened for 100 per cent FDI except agriculture, mining and petroleum and natural gas, manufacturing, service sector and financial services. The sectors in which hundred per cent FDI is permissible are construction (townships, housing and built up infrastructure), Industrial Parks and Airports with few conditions. Hence FDI support for financial resource mobilization is easily available, which could be permitted through financial collaborations, joint ventures/technical collaborations, capital market, preferential allotments etc.

### 3.3.1.8. Pooled Finance Development Fund scheme by GoI

Small and medium sized cities find it difficult to raise resources from the market for infrastructure projects due to lack of project structuring capabilities and creditworthiness. The Government of India has launched the Pooled Finance Development Scheme (PFDS) to enable these local bodies to bridge this gap through accessing market funds for their infrastructure projects. The scheme is meant to provide credit enhancement grants to enable local authorities to access market borrowings through Pooled Finance Municipal Bonds (PFMB) for investment in urban infrastructure projects.

PFDS facilitates ULBs in municipal infrastructure by helping them access capital and financial market for investment in essential projects. It facilitates local bodies in developing bankable urban infrastructure projects. With appropriate credit enhancement measures it helps ULBs in reducing the cost of borrowing from market, on the other hand strengthening the municipal bond market.

The PFDS creates an incentive structure to support urban reforms, which would also be driven by covenants of financial market lenders to ULBs. These urban reforms are in synergy with urban reform agenda of other central schemes as JnNURM and UIDSSMT. In order to apply for the grant assistance a State Pooled Finance Entity (SPFE) is required to be established in every state. The SPFE could be a trust provided that the entity is just a pass through vehicle. The Central Government will be responsible for the funding of these State pooled finance entities through the PFDF. The cost of each project of the Municipality/ULBs will be estimated. Seventy-five per cent of these costs will be reimbursed by the Central Government and twenty-five per cent by the State Governments.

Other funds at the national level, set-up by Financial Institutions and Banks have also started providing the much required funds. State level Infrastructure funds (from supply side) and Pooled Finance Funds (from demand side) have also started providing funds for infrastructure projects. The examples of such funds are Tamil Nadu Urban Development Fund and Gujarat Infrastructure Development Fund etc.

### 3.3.1.9. Municipal bonds/debentures

Urban Local Bodies and Infrastructure funds, issue municipal bonds and debentures to general public or specific institutions at fixed rate of interest and are redeemable after a specific period. Municipal bonds can either be taxable or tax-free. These bonds and debentures can be listed on the stock exchange which makes the securities highly liquid and makes secondary market available for the bonds and debentures holders. National Stock Exchange and Bombay Stock Exchange provide a facility for listing of bonds and debentures in their Exchanges. In India, the Municipal bond market is still in its budding stage. Only large ULBs having buoyant revenue base e.g. Ahmedabad, Bangalore were successful in the past in raising funds through Municipal Bonds<sup>20</sup>.

Some national success cases of Local Bodies in raising bonds for infrastructure projects are given below:

**Municipal Bonds by Ahmedabad Municipal Corporation (AMC) for water supply and sewerage program, 1998:** To finance the water supply and sewerage program, AMC floated municipal bonds in January 1998. These were rated AA(SO) specifying having high degree of safety regarding timely servicing of financial obligations or carrying very low credit risk. These bonds were floated for seventy-five per cent private and twenty-five per cent public issues. This was a significant accomplishment at the given time, as it was the first municipal bond issue in India without a state government guarantee and it represented the first step towards fully market-based system of local government finance.

**Tamil Nadu Urban Development Fund (TNUDF), 2003:** Tamil Nadu Urban Development Fund issued bonds for commercially viable water and sewerage infrastructure projects by pooling fourteen municipalities in 2003. A special purpose vehicle, the Water and Sanitation Pooled Fund (WSPF), was set-up to issue the municipal bonds. The Indo-USAID Programme on Financial Institutions Reform and Expansion (FIRE-D) supported the efforts of WSPF to structure the bond issue whose proceeds financed small water and sanitation projects in the fourteen small ULBs. USAID provided a backup guarantee of fifty per cent of the bond's principal through the Development Credit Authority (DCA) mechanism.

**Greater Bangalore Water & Sewerage Project (8 ULBs), 2005:** Government of Karnataka created debt fund called the Karnataka Water and Sanitation Pooled Fund (KWSPF) and successfully floated tax-free municipal bonds during June, 2005. It was done for the Greater Bangalore Water Supply and Sewerage Project (GBWASP). Government of Karnataka was assisted by USAID under its DCA program and provided a guarantee of up to fifty per cent of the principal amount of market borrowing. The GBWASP was planned to provide water supply to 1.5 million people residing in about 300,000 households.

<sup>20</sup> (Source: Indo-US Financial Institutions Reform and Expansion Project - Debt Market Component FIRE(D); Creative Financing of Urban Infrastructure in India through Market-based Financing and Public-Private Partnership Options, Chetan and Hitesh Vaidya)

### 3.3.1.10. Possible Sources of Funding For Projects

Possible sources of funding various types of projects, but not limited to, are tabulated below:

**Table 3.2: Alternate Sources of Funding for Projects**

S. No.	Project type	Indicative sources to fund
1	Large Infrastructure Projects (at State/ District level)	Funding by Bi-lateral & Multi-lateral agencies Foreign Direct Investment Public Private Partnership (PPP)
2	City Urban Infrastructure	Central Grant-in-aid & Schemes Public Private Partnership (PPP) Loans from Financial Institution(s) (if short to medium term) Municipal bonds/debentures
3	Social Infrastructure, Capacity Building and PMC Projects	Funding by Bi-lateral & Multi-lateral agencies Municipal bonds/debentures Central Grant-in-aid & Schemes Public Private Partnership (PPP) / Corporate Social Responsibility
4	Real Estate Projects	Foreign Direct Investment Municipal bonds/debentures Public Private Partnership (PPP) Loans from Financial Institution(s)

### 3.3.2. Alternative Financial Avenues by Private Sector Participation

Public-Private Partnership (PPP) is a long term contractual agreement between a public agency (central, state or local) and a private sector entity for providing a public asset or service in which the private party bears significant risk and management responsibility.

The private sector includes consultancy firms, developers, builders and promoters, cooperative societies, Non-Governmental Organisations (NGOs) and Community Based Organisations (CBOs), cooperative bodies, industrialists and businessmen.

PPP means an arrangement between a government or statutory entity or government owned entity on one side and a private sector entity on the other, for the provision of public assets and/ or related services for public benefit, through investments being made by and/or management undertaken by the private sector entity for a specified time period, where there is a substantial risk sharing with the private sector and the private sector receives performance linked payments that conform (or are benchmarked) to specified, pre-determined and measurable performance standards<sup>21</sup>.

<sup>21</sup>(Department of Economic Affairs - DEA, Ministry of Finance, Government of India, 2010)

### 3.3.2.1. Conditions/Situations for PPP Selection

A project may be considered to be implemented as a PPP project when there are efficiency gains from improved project delivery, operation and management, and access to advanced technology can offset the incidental costs, improvement in human resource etc. In fact, many countries have established value for money as the main criterion in judging the merits of a PPP option for a project. Decision for PPP to be an alternative development mechanism can be selected for a project, if it satisfies the following conditions or is set in the given situations:

- Enhance the supply of much-needed services
- Does not require any immediate cash spending
- Provide relief from the burden of the costs of design and construction
- Transfer of many project risks to the private sector
- Promise better project design, choice of technology, construction, operation and service delivery
- PPP projects are viable essentially when robust business models can be developed

### 3.3.2.2. Systems of Participation

PPP models vary from short-term simple management contracts to long-term and very complex BOT form. Depending upon type of project and requirements of public entity any single or combinations could be selected. In such models amount of investment, risks, obligations and durations vary. These models vary mainly by:

- Ownership of capital assets
- Responsibility for investment
- Assumption of risks
- Duration of contract

The PPP models can be classified into following broad categories in order of generally (but not always) increased involvement and assumption of risks by the private sector. These are enlisted below and are diagrammatically presented in the figure 3.5.

- Management Contracts
- Turnkey Projects
- Lease
- Concession
- Private Ownership

1. **Management Contracts:** It is a contractual agreement between government and private sector for the management of public enterprise partially or completely by private party.

Control of public enterprise remains with the government. While private sector skills are brought into service design and delivery, operational control, labour management and equipment procurement.

**Supply or Service Contracts:** In these types of contracts supply of material, equipment or services is provided to public enterprise by private counterpart. The main purpose of such contracts is to ensure the supply of the relevant service at the desired level of quantity and quality. Example of these contracts is catering services for passengers on public railway systems.

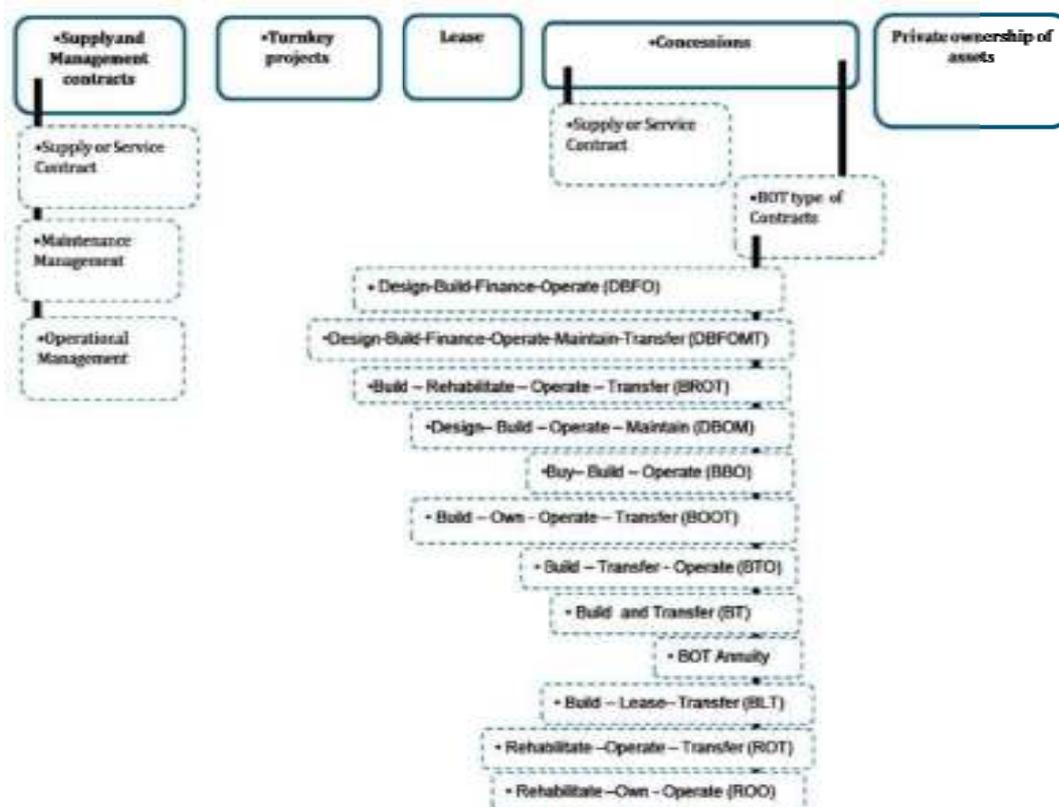
**Maintenance Management:** Private partner is contracted by public partner to operate, maintain, and manage a facility or system providing a service. Such as in provision of wastewater treatment services, transport projects etc.

**Operational Management:** Public partner (Centre, State, or Local Government agency or authority) contracts with a private partner to provide and/or maintain a specific service.

Such contracts are useful in major transport facilities (port or airport) when local manpower is limited, in the transport sector for providing management services like ticketing, reservation or of urban transport. In the simplest type of such contract, the private operator is paid a fixed fee for performing managerial tasks. More complex contracts may offer greater incentives for efficiency improvement by defining performance targets and the fee is based in part on their fulfilment.

2. **Turnkey projects:** It is a traditional public sector procurement model for infrastructure facilities. The private contractor designs and builds a facility for a fixed fee, rate or total cost, which is one of the key criteria in selecting the winning bid. The contractor assumes risks involved in the design and construction phases. The scale of investment by the private sector is generally low and for a short-term. This type of private sector participation is also known as Design-Build.
3. **Lease:** In this category of arrangement, an operator (the leaseholder) is responsible for operating and maintaining the infrastructure facility and services, generally without making any large investment. The operator retains revenue collected from customers/users of the facility and makes a specified lease fee payment to the contracting authority. Fixed facilities and land are leased out for a longer period than for mobile assets.

Figure 3.5: PPP Models



Source: PPP, MoUD and A Guidebook on PPP Infrastructure, ESCAP, UN

4. **Concessions:** In this alternative, Government defines and grants specific rights to a private company to build and operate a facility for a fixed period of time. The Government may retain

the ultimate ownership of the facility and/or right to supply the services. Typical concession periods range between 5 to 50 years. Concessions may be awarded to a concessionaire, under two types of contractual arrangements:

- **Franchise:** Under a franchise arrangement the concessionaire provides services that are fully specified by the franchising authority. Commercial risks are carried by private sector and may be required to make investments. This form of private sector participation is historically popular in providing urban bus or rail services.
- **Build-Operate-Transfer (BOT):** Build-Operate-Transfer or its other variants type of arrangement, the concessionaire undertakes investments and operates the facility for a fixed period of time after which the ownership reverts back to the public sector. In BOT type of model the government carries the risk. The various types of BOT combinations are given below:
  - **Design-Build-Finance-Operate (DBFO):** In DBFO approach, the responsibilities for designing, building, financing, operating and maintaining are bundled together and transferred to private sector partners. Varying degree of financial responsibilities is transferred to the private sector. Direct user fees are the most common revenue source.
  - **Design-Build-Finance-Operate-Maintenance-Transfer (DBFOMT):** DBFOMT model is the same as a DBFO except that the private sector owns the asset until the end of the contract when the ownership is transferred to the public sector.
  - **Build-Rehabilitate-Operate-Transfer (BROT):** A private developer builds an add-on to an existing facility or completes a partially built facility and rehabilitates existing assets, then operates and maintains the facility at its own risk for the contract period.
  - **Design-Build-Operate-Maintain (DBOM):** DBOM model is an integrated partnership that combines the design and construction responsibilities of design-build procurements with operations and maintenance.
  - **Buy-Build-Operate (BBO):** BBO is a form of asset sale that includes a rehabilitation or expansion of an existing facility. The government sells the asset to the private sector entity, which then makes the improvements necessary to operate the facility in a profitable manner.
  - **Build-Own-Operate-and-Transfer (BOOT):** BOOT is based on the granting of a concession by the Union/ Government/local authority to the concessionaire, who is responsible for the construction, financing, operation and maintenance of a facility over the period of the concession before finally transferring the fully operational facility.
  - **Build-Transfer-and-Operate (BTO):** BTO is a contractual arrangement whereby the public sector contracts out the building of an infrastructure facility to a private entity such that the concessionaire builds the facility on a turn-key basis, assuming cost overrun, delay and specified performance risks.
  - **Build-and-Transfer (BT):** BT is a contractual arrangement whereby the concessionaire undertakes the financing and construction of a given infrastructure or development facility and after its completion turns it over to the Government Agency or Local Government unit concerned.
  - **BOT- Annuity:** BOT Annuity is the contractual arrangement quite similar to BOT but return on investment is not through the levy and collection of user fee directly from the users. Instead the owner/ Government pay to the Concessionaire an amount annually or bi-annually (Annuity) which he bids for.

- **Build-Lease-and-Transfer:** BLT is a contractual arrangement whereby a concessionaire is authorized to finance and construct an infrastructure or development facility and upon its completion turns it over to the government agency or local government unit concerned on a lease arrangement for a fixed period after which ownership of the facility is automatically transferred to the government agency or local government unit concerned.
  - **Rehabilitate-Operate-and-Transfer (ROT):** ROT is a contractual arrangement whereby an existing facility is turned over to the private sector to refurbish, operate and maintain for a concession period, at the expiry of which the legal title to the facility is turned over to the government.
  - **Rehabilitate -Own-and-Operate (ROO):** ROO is a contractual arrangement whereby an existing facility is turned over to the private sector to refurbish and operate with no time limitation imposed on ownership.
5. **Private ownership of assets:** In this form of participation, the private sector remains responsible for design, construction and operation of an infrastructure facility and in some cases the public sector may relinquish the right of ownership of assets to the private sector. The main variants under this form are described below –
- **Build-Own-Operate:** In BOO type, the private sector builds, owns and operates a facility, and sells the product/service to its users or beneficiaries
  - **Private Finance Initiative:** In PFI model, the private sector similar to the BOO model builds, owns and operates a facility. However, the public sector purchases the services from the private sector through a long-term agreement.
  - **Divestiture by license or sale:** A private entity buys an equity stake in a state-owned enterprise. However, the private stake may or may not imply private management of the enterprise.
  - **Joint Venture:** Joint ventures are alternatives to full privatization in which the infrastructure is co-owned and operated by the public sector and private operators. Under a joint venture, the public and private sector partners can either form a new company or assume joint ownership of an existing company through a sale of shares to one or several private investors.

Table 3.3: Possible roles of Private and Public sectors in the urban development process

Model	Main Features	Ownership of Capital Assets (Public/Private/Shared)	Investment By		Assumption of Risk (Public/Private / Shared)	General Duration of Contract (Years)
			Public Sector	Private Sector		
Supply and Management Contracts	Government retains the ultimate control of the Public enterprise	Public	Investment	Investment	Public	1-5
Turnkey projects	Private contractor designs and builds a facility for a fixed fee, rate or total cost	Public	Investment	-	Private /Public	3-5
Lease	Operator is responsible for operating and maintaining the infrastructure facility	Public	Investment	-	Private /Public	5-20

Model	Main Features	Ownership of Capital Assets (Public/Private/Shared)	Investment By		Assumption of Risk (Public/Private / Shared)	General Duration of Contract (Years)
			Public Sector	Private Sector		
	and services					
Concessions	Specific rights are granted by Government to a private company to build and operate a facility for a fixed period of time	Public /Private	Investment	Investment	Private /Public	15-30
Private ownership of assets	The private sector builds, owns and operates a facility and then public sector purchases the services from the private sector through a long -term agreement	Public /Private	-	Investment	Private /Public	10-20 / Indefinite

Source: PPP, MoUD and A Guidebook on PPP Infrastructure, ESCAP, UN

While the spectrum of models discussed above are possible as individual options, combinations are also possible such as, a lease or (partial) privatization contract for existing facilities which incorporates provisions for expansion through Build-Operate-Transfer. In fact, many PPP projects of recent times are of combination type. Some of case studies of Public Private Partnership Projects in India are enlisted in Appendix C of Volume II B.

### 3.3.2.3. Toolkits for Decision Making for PPPs

Toolkits for decision making for PPP projects are available and could be used by the partners to identify, assess, develop, procure and monitor the PPP projects. Such toolkits are structured to cover the full life cycle of PPP projects. The toolkits are built on specific approaches for project procurement; approval etc. currently in place in India to ensure that it forms a relevant resource for practitioners in India.

Various toolkits to assist decision making for PPP are provided by Ministry of Finance<sup>22</sup>. Some of these are as follows:

1. **PPP Family Indicator** – It gives a starting indication of which PPP mode ‘family’ the particular project might be suited to.
2. **PPP Mode Validation Tool** – It uses a risk allocation analysis to help decide further whether the selected PPP mode is best for the project.
3. **The PPP Suitability Filter** –It tests how well suited the project is to being a PPP and checks for barriers that might make it difficult to do the project as a PPP
4. **Financial Viability Indicator Model** - It allows an analysis of the key questions of financial viability of the project and to test these using ‘what-if?’ scenarios.

<sup>22</sup>([www.pppinindia.com](http://www.pppinindia.com)).

5. **Value-for-money Indicator Tool** - It provides an indication of the expected range of value-for-money for the public sector from the PPP.
6. **Readiness Filters** – This toolkit checks that all the important steps have been followed and that the important preparations have been made, so that the project is ready to move on to the next step in development as a PPP.

### 3.3.2.4. Municipal Accounts

Reliable municipal accounting system has come to front as cities are approaching different sources for funding infrastructural projects. To access bank or bond market sound financial management is required. Currently due to lack of good financial and expenditure management, ULBs are wasting scarce resources.

With a view to provide better financial management, improved governance, accountability, and transparency of management, Ministry of Urban Development aims at implementing municipal accounting reforms as a part of the mandatory reform agenda under the Jawaharlal Nehru National Urban Renewal Mission. Hence, JnNURM reform conditions call for “improved municipal accounting, with the objective of having a modern accounting system based on double entry and accrual principles, leading to better financial management, transparency and self-reliance”, as a mandatory reform for local bodies.

The Ministry of Urban Affairs & Employment (erstwhile Ministry) has introduced National Municipal Accounting Manual with the objective of providing support to the state governments in implementing financial management reforms in the ULBs<sup>23</sup>. Existing trend of Municipal expenditure pattern is studied.

### 3.3.3. Existing Trend of Expenditure Pattern

Before an attempt is made to evaluate expenditure pattern of ULBs of India, it's imperative to understand expenditure heads. The details of expenditure categories are given in **Table 3.4**.

Table 3.4: Categorisation of Municipal Expenditure

Expenditure Category	Expenditure Items
Establishment expenditure	Staff salaries, Allowances, wages, Pensions & Retirement benefits etc.
Administrative expenditure	Rents, rates & Taxes, Office maintenance, Communications, Books & periodicals, Printing & stationary, Travel expenditure, Law charges etc.
Operations & Maintenance	Power & fuel, Bulk purchases, Stores, Hire charges, Repairs & expenditure Maintenance and Interest payments made on loans
Capital expenditure	Buildings, Water supply & Sewerage, Energy/lighting, Solid waste management , Roads, Bridges, Culverts, Causeways, Health & sanitation, Parks and recreation spaces, etc.,
Other expenditure	Principal repayments of loans, Furniture & fittings, Tools & plant, Equipment
	Miscellaneous expenses not accounted for in the above

Source: *Budgets of Municipal Corporations*.

As accepted and emphasized by reports of various institutions and committees<sup>24</sup>, cities are important for national economic growth, while physical infrastructure is

<sup>23</sup>(Source: National Municipal Accounting Training Manual- MoUD, JnNURM Primers-Municipal Accounting, ULB level Reforms [[http://jnnurm.nic.in/wp-content/uploads/2011/01/Mandatory\\_Primer\\_2-Mun-Acc.pdf](http://jnnurm.nic.in/wp-content/uploads/2011/01/Mandatory_Primer_2-Mun-Acc.pdf)])

<sup>24</sup>Rakesh Mohan Committee; The High Powered Expert Committee (HPEC) for Estimating the Investment Requirements for Urban Infrastructure Services of MoUD; & Urban Infrastructure in India by FICCI.

driving force for urban economies. Thus, for faster and consistent growth of cities, extensive infrastructure development is being promoted by centre as evident through various Policies, Programmes and Acts. This should reflect in the expenditure pattern of the cities. The development of infrastructure will be reflected in Capital Expenditure, as expenditure on infrastructure development falls under the latter.

In ULBs of India, as given in the table below, majority of expenditure goes into Establishment and Administration expenditure head. In fact, expenditure in O& M of existing infrastructure is higher than for new infrastructure. In absence of adequate infrastructure present in Indian cities, these figures indicate that enough money is not being spent on Infrastructure development as required. A positive outcome of the policies like JnNURM which has been emphasizing infrastructure development in cities and providing finance for same, is that growth rate of capital expenditure is to increase.

Table 3.5: Composition and Trends of Municipal Expenditure (Rs. in Lakh)

S.No	Composition and Trends of Municipal Expenditure	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	Average Growth (% of total expenditure)
1	Establishment and administration expenditure	279,216	330,414	329,592	411,432	402,550	10.19 (36.25%)
2	Operation and maintenance expenditure	107,383	128,165	142,174	164,406	154,400	9.96 (14.43%)
3	Other revenue expenditure	51,830	56,120	55,954	58,190	56,265	2.17 (5.88%)
4	Revenue Expenditure (1+2+3)	438,429	514,699	527,720	634,028	613,215	9.2 (56.66%)
5	<b>Capital Expenditure</b>	<b>96,933</b>	<b>105,942</b>	<b>119,463</b>	<b>124,817</b>	<b>150,424</b>	<b>11.76 (12.37%)</b>
6	Other Expenditure (not classified)	209,744	266,611	210,685	399,205	470,925	28.4 (31.07%)
7	Total Expenditure (4+5+6)	745,106	887,252	857,868	1,158,050	1,234,564	14.34

Source: Municipal Finance in India: An Assessment by Department of Economic Analysis and Policy, Reserve Bank of India, Mumbai. December 27, 2007.

It is recommended that the urban settlements need to increase spending on capital expenditure head in total Municipal Expenditure which leads to the development of economy and living condition.

### 3.3.4. Effective Finance Management

#### 3.3.4.1. Uniformity of accounting system

Under the JnNURM, MoUD decided to provide financial resources to states and ULBs that agree to undertake following modern accounting reforms:

- Budgeting, accounting, internal controls and auditing.
- Re-engineering business processes to align with accrual-based accounting system.
- Integrate financial management systems with financial accounting system.
- Staff and building financial management capacity.

To encourage decentralization and improving transparency in the functioning of municipalities of the country, the Government of India has made initiatives for improvements in the accounting and budgeting systems, improved record keeping and maintenance among others. With this objective the Ministry of Urban Development, initiated to develop a **National Municipal Accounts Manual**. The Manual comprehensively details the accounting policies, procedures, guidelines designed to ensure correct, complete and timely recording of municipal transactions and produce accurate and relevant financial reports. The manual is to be adopted and followed by the various State Governments while drafting their state specific municipal accounts manuals.

### 3.3.4.2. Efficient tax/charges administration and recovery management

Tax administration and recovery mechanisms need to be revised in India to improve tax collection and increase the revenue resources available with local bodies to meet its requirements. Enforcement of tax collection needs to be strengthened. For collection of fees for provision of services, proper techniques should be enforced. Periodic assessment and valuation of properties for tax revision should take place and for expanding the tax base, property tax rolls should be updated via identification of new properties, computerising billing & collection.

### 3.3.4.3. Fiscal transfer management for ULBs/RDAs

Lack of structured fiscal transfer mechanisms from State to ULBs is one of the major reasons of availability of lesser fiscal resources with local authorities. State Governments and ULBs need to explore the performance-based grants as suggested by the 13th Central Finance Commission (CFC). State Finance Commissions (SFC) generally do not have access to good database at the ULB level and there are no agencies at the state level, which collect and maintain comprehensive databases. State Governments should address this issue of creation and maintenance of database of ULBs rather than depending on databases based on sample surveys.

Timely constitution of SFC and timely submission of SFC Reports is very important. The system of providing grant-in-aid to ULBs is complex and the SFCs should try to introduce the concept of devolution packages after taking into consideration all types of revenue grants and these should be linked with State's own resources.

SFCs should also consider the idea of performance based or incentive grants based on outcomes such as improved service delivery, improved tax collections and improved

financial management etc. SFCs could review and link the grants to performance as suggested by the 13<sup>th</sup> CFC and reforms under JNNURM. Importantly, the State Governments should give a serious consideration to the recommendations of the SFC Reports and timely issuance of Action Taken Reports (ATR). All State Governments should build a system for predictability and transparency of state transfers to ULBs. The State Governments should follow the system of electronic transfers to ULBs rather than the conventional transfers.

*(Source: Tracking Central Finance Commissions and State Finance Commissions Grants to Selected States and Urban Local Bodies in India, NIUA.)*

### 3.3.5. City Infrastructure Fund

The infrastructure plays a vital role in the growth and development of cities in the current context. Keeping in mind the demands and requirements of urban development, Government of India has also been emphasizing and providing finance for development of infrastructure. Following the same line of thought, a City Infrastructure Fund should be established at urban centres by an Executive order. It should be other than the Budget fund and dedicated only for the Urban and Regional Infrastructure development.

The following can be possible sources of funding (whole or part of it):

1. Stamp Duty on transaction of real-estate property,
2. Capital gain tax on real-estate property,
3. Land use conversion fee,
4. Entry tax on vehicles in special areas (inner city, CBD etc.) of cities,
5. Part of the TDS on real-estate transactions valued over 50 Lakh (now mooted by the Finance Ministry),
6. Vacant tax on Municipal FAR rather than vacant land,
7. Toll tax,
8. Part of funds raised through auction of strategic plots,
9. Cess on purchase of luxury vehicles say costing above 10 lakh,
10. Betterment levy on special zones (transport corridors etc.).
11. Cess on electricity bill is imposed to cover the cost street lighting,
12. Urban Infrastructure Bonds,
13. Use idle funds (Provident Fund, various Trusts etcetera) to subscribe to the Bonds.
14. Leverage Urban Infrastructure Bonds with long term loans from multilateral development banks.
15. Land-based financing sources along Transport Corridors tapped through Betterment charges, Development charges, Impact fees, Pricing of Floor Space Index (FSI) above a certain limit.

State of Odisha has developed **Odisha Urban Infrastructure Development Fund (OUIDF)** to strengthen revenue buoyancy at ULB level.

Institutional framework of OUIDF consists of:

- Urban Loan Fund.
- Grant Fund.
- Project Development Fund.

OUIDF has been developed as a Trust under the Housing and Urban Development Department (HUDD) with assistance from KfW (Germany's Development Bank).

The OUIDF seeks to (a) catalyse development of well-structured pool of bankable projects, (b) build capacity in appraisals and resource mobilization and (c) spur institutional reforms as a pre-requisite for external financing.

Focus sectors and projects for funding under the OUIDF include the following:

- Water supply and water supply improvement schemes,
- Underground sewerage schemes,
- SWM,
- Climate adaption measures,
- Slum development, rehabilitation, provision of basic amenities to informal settlements,
- Bio-medical waste management,
- Development and renovation of bus/train terminals,
- Electric crematories,
- Energy efficient street lighting,
- Reclamation / preservation of water bodies/tanks.

To raise financial support under the fund project needs to clear set of criteria like, positive climate / environment impact, financial soundness of ULB, projects which are expected to achieve economic viability after three years of grant support amongst others.

Source: Odisha Infrastructure Development Fund

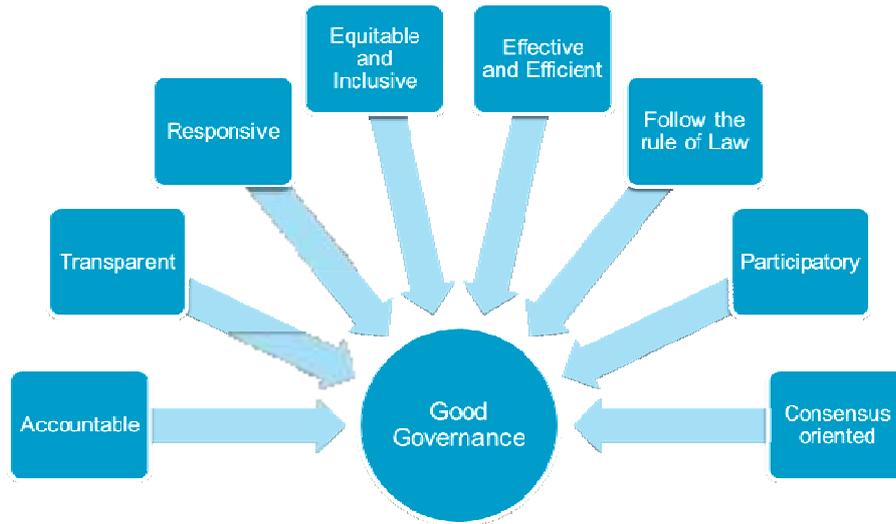
Similarly, State of Rajasthan has developed innovative sources of finance to develop infrastructure in State. The expenditure of the fund is broadly divided into two-

- 50% on Transport
- 50% on Urban infrastructure and buildings

### 3.4. Governance

The new economic policy of Government of India has changed the role of government from provider to facilitator. With entry of private sector in service provision and improving economic profile of Indian economy, urban public (basically but not only) has started demanding better service provision standards and accountability in the process of governance. Herein comes the role and concept of 'Good governance'. It is an evolving concept, concerning best practices of decision making for conducting public affairs and management of public resources. Good governance is responsive and responsible governance. It is described as accountable, transparent, responsive, equitable & inclusive, effective & efficient, follows rule of law, participatory and consensus oriented. Following are the characteristics of good governance:

Figure 3.6: Characteristics of Good Governance



Source: UN ESCAP, Good Governance guide: Municipal Association of Victoria

### 3.4.1. Characteristics of Good Governance

#### 3.4.1.1. Public accountability

Accountability is a key requirement of Good Governance and has become key policy priority of the government. In general, an organization or an institution is accountable to those who will be affected by its decisions or actions. Not only governmental institutions but also the private sector and civil society organizations must be accountable to the public and to their institutional stakeholders. Accountability cannot be enforced without transparency and the rule of law.

*(Source: Centre for Good Governance)*

#### 3.4.1.2. Transparency

Transparency is the basis of Good Governance. This requires management of government institutions so that government officials and agencies are accountable to citizens. Transparency is also essential for accountability, people's participation and efficiency. The working of the public authority should be such that all rules, regulations, decisions should be in the public domain. Transparency is essential for pursuing collective vision of development, determining the locus of accountability, keeps stakeholders' aware of achievements and process.

Emergence of United Nations Convention against Corruption, activism and awareness of civil society for transparency, strong media leading to increased voice of citizens and participation in governance have further emphasized the need for transparency in governance. This means addressing corruption and ensuring accountability in formulation of policies, implementing programmes and delivering services in a convenient, accessible and responsive manner is becoming a non-negotiable priority for governance.

*(Source: Good Governance & Transparency- Their Impact on Development by Saladin Al-Jurf & Transparency and Good Governance at the Municipal Level: Transparency International Canada.)*

### 3.4.1.3. Citizens charter and Grievance Redress

One of the functions of government is to provide public services to the citizens and to do the same, government i.e. State and Local authorities, Municipalities, Government departments have to operate efficiently and effectively for reaching its optimum performance. For the delivery of public services to the citizens at acceptable performance requires government entities to act in the public interest at all times. It requires transparency, citizen participation in decision making and public accountability. Citizens' feedback plays an important role in service delivery and its improvement.

Citizens' charter and grievance redress brings accountability in the process of service delivery. A Citizens' charter represents the commitment of the organisation towards standard, quality and time frame of service delivery, grievance redress mechanism, transparency and accountability. The concept of Citizen's charter enshrines the trust between the service provider and its users. A grievance can be defined as any sort of dissatisfaction, which needs to be redressed in order to result in service delivery.

Government of India has introduced, 'The Right of Citizens for time bound delivery of Goods and Services and Redress of their Grievances Bill, 2011'. It confers right on every individual citizen to time bound delivery of goods and provision for services and redress of grievances<sup>25</sup>. The citizen report card is a simple but powerful tool to provide public agencies with systematic feedback from users of public services. By collecting feedback on the quality and adequacy of public services from actual users, CRC provides a rigorous basis and a proactive agenda for communities, civil society organization or local governments to engage in a dialogue with service providers to improve the delivery of public services.

*(Source: Improving Local Governance and Service Delivery: Citizen Report Card Learning Tool Kit-ADB & ADBI)*

### 3.4.1.4. Inclusive development

The Government of India has put focus on inclusive development in the last two Five-Year Development plan's vision statement. As the title implies, inclusive development means development of all the citizens of an area. If all groups of people contribute in creating opportunities, share the benefits of development and participate in decision-making, the development can be inclusive. This requires all groups, but particularly the most vulnerable have opportunities to improve or maintain their well-being. Here focus should be given to women, poorer & disadvantaged section of society and people employed in informal sector in order to impart social and economic inclusivity.

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<sup>25</sup>(<http://gocharters.nic.in/welcome.html>& Study on Reforms and Restructuring Final Report of Meghalaya State Power Sector)

#### 3.4.1.5. Follow the 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. Here, need for a regulatory body is felt for planning and development with a legal backing to take decision in such aspects.

#### 3.4.1.6. People's participation

Good governance is linked to the welfare of citizens. Good governance through people's participation ensures development, which is equitable and sustainable. People's participation is not a single stage activity but as suggested in the planning process, it should be taken up at multiple stages. It should take place pre-plan and post-plan preparation at various stages from decision making to implementation and then feedback, for ensuring answerability and transparency in the public governance<sup>26</sup>.

#### 3.4.1.7. Consensus oriented

There are several actors and as many viewpoints in a society. Good governance requires mediation of the different interests in society to reach a broad consensus in society 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 and brought in the planning system right from the State Perspective Plan to be conceived for implementation in Development Plan and Special Purpose Plans. *(Source: UN ESCAP)*

### 3.4.2. E-Governance Reforms

E-Governance is the application of ICT in delivery of services to public by government. It brings efficiency, effectiveness, transparency and accountability of informational & transactional exchanges with in government, government agencies of National, State, Municipal & Local levels and citizen. It empowers citizens through access & use of information. In India through National e-Governance Plan (NeGP) both the Union and the State Governments are making efforts to bring in the latest ICT technologies for administration and increase the reach of services to citizens.

Vision of NeGP is to make all Government services accessible to the common man in his locality, through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realise the basic needs of the common man. Under state mission mode projects of NeGP, NRLMP, Road

<sup>26</sup><http://peoplesgoals.org/>

Transport, Agriculture, Municipalities, Commercial Taxes, E-Panchayat services, State Governments are responsible for its implementation.

**International best practices:**

**Singapore:** E-Governance in Singapore started with computerisation of civil service in 1981. Three relationships on which Singapore's e-Government framework is centred on are – Government to Citizens (G2C), Government to Businesses (G2B) and Government to Employees (G2E). The objectives of e-Governance are integrated on acronym CARE indicating: Courtesy, Accessibility, Responsiveness and Effectiveness. Five thrust areas of e-Governance in Singapore are: (i) reinventing government, (ii) delivering integrated electronic services, (iii) being proactive and responsive, (iv) using IT and Telecommunication to build new capabilities and capacities (v) innovating with IT and Telecommunication.”

**Vancouver:** The City of Vancouver has defined Digital Strategy as ‘a broad range of technology that enables new methods of engagement and service delivery supported by a robust and accessible digital infrastructure and open government ecosystem’. The Vision is to enhance multi-directional digital connections amongst citizens, employees, business and government. The pillars of digital strategy of Vancouver city are: engagement and access, digital infrastructure and assets, digital economy and organizational digital maturity.

**National best practices:** E-Governance functions and online services are detailed in Table 3.6.

Table 3.6: Selective e-Government functions and Online Services in India

State	Online Services
Gujarat	Public grievance redress, e-Gram - Vishvagram (connecting villages) e-Dhara (computerisation of land records through), Hospital Management Information System, e-City (delivery of municipal services)
Delhi	Conversion of lease hold to free hold, Booking of community hall, parks, open spaces, Samsyanidansewa, Legal management system, OPD medical claim reimbursement Review of Master Plan for Delhi 2021
Ghaziabad	Vehicle pooling facility (registration for owner), System of feedback for public departments, Online property information system Online complaint system
Tiruchirappalli (under IT Department, Govt. of India)	Dues Payment: property tax, water charges, non-tax, professional tax Birth and Death certificate, Building Plan approval, Trade license

Source: AMDA: Websites of Gujarat and Tamil Nadu Government, DDA and GDA.

### 3.5. Institutional Set-Up

Planning function is a continuous process and the Planning Department's work continues from plan preparation to plan processing, enforcement, implementation, plan detailing, review and then plan formulation and so on. The plan formulation, implementation, monitoring and review exercises must be statutorily prescribed in the State Acts and completed within the specified time-frame as schedule. In the context of these requirements institutional set-up has a vital role.

#### 3.5.1. Town and Country Planning Departments: State Levels

Most of the States in India have Department of Town and Country Planning (T&CP), under the provisions of State Town and Country Planning Acts. But, not all the Departments of T&CP are headed by qualified planners. Instead of Chief Town Planner, the Departments are headed by Chief Engineers or Administrators and in few cases by Senior Town Planners. Thus, despite of qualified manpower T&CP departments at many states are headed by non-planners which lead to problems, like delayed decision making, lack of appropriate visions and policy in planning, delay in master plan preparation. A review of the various States and detailed study by TCPO has provided (**Table 3.7, 3.8, 3.9 & 3.10**) general manpower requirements at State Departments of T&CP.

Table 3.7: Required manpower of State Town Planning Department

Professionals	Sub - Professional	Administrative
Chief Town Planner	Assistant Town Planner	Head Clerk, Accountants, UDC, LDC, Typists, Stenographers, Peons, Drivers, Cleaners, Gardeners and others
Deputy Chief Town Planner	Village Planner	
Assistant Director of Town Planning	Executive Engineer	
Town Planner	Assistant Engineer	
Deputy Town Planner	Statistical Assistant	
	Research Associates	
	Assistant Consulting Surveyor	
	Assistant Sociologist	
	Urban Designer	
	Planner(s)	
	Architectural/ GIS Draftsman	
	Assistant Architectural/ GIS Draftsman/ CAD/CAM expert	
	Photographer cum Draftsman	
	Quantity Surveyor	
	Supervisor	
	Sub Overseers	

Source: TCPO

### 3.5.2. District Planning Committee

State Governments have been empowered by 74<sup>th</sup> Constitutional Amendment Act to constitute District Planning Committee. These committees are to be responsible for the preparation of District Development Plan. However, even after 2 decades of amendment, most of the states have not constituted these committees.

In a study done by TCPO in consultation with State Town & Country Planning Departments and academic institutions, tentative strength of planners required at different planning levels was deliberated. It was agreed that proportion of town planners would vary according to the population and size of the administrative units. The manpower requirement of DPCs, as assessed, is presented in **Table 3.8**.

**Table 3.8: Number of Town Planners required at District Level**

Designation	Number
Chief District Planning Officer	1
Senior District Planning Officer	1
Associate District Planning Officer	3
Assistant District Planning Officer	5
Total	10

Source: TCPO

### 3.5.3. Urban Local Bodies (Municipality, Development Authority, MPC)

In view of growing number of cities and towns the number of town planners at Metropolitan Planning Committees was assessed to be around 1,200. It was established that number of town planners may vary city to city depending upon number of zones/wards in the city. It was normated that for every 5 lakh population, 1 town planner is required at metropolitan planning area.

**Table 3.9: Number of Town Planners in Metropolitan Planning Area**

Designation	Number
Chief Town Planner	1
Additional Chief Town Planner	1
Senior Town Planner	3
Associate Planner	6
Assistant Planner	12
Total	23

Source: TCPO

The Census of India, 2011 has for the first time classified a large number of towns as census towns (3,894). These rural settlements have attained urban characteristics and need support of town planners. It was assessed that about 79,000 planners will be required in small and medium cities alone.

Table 3.10: Number of Town Planners required for non-million plus cities (small &amp; medium cities)

Designation	Number
Chief Town Planner	1
Senior Town Planner	1
Associate Planner	2
Assistant Planner	6
Total	10

Source: TCPO

Thus, the analysis done by TCPO indicates that 85,000 to 90,000 planners would be required in the country at various levels of planning framework, which roughly works out to 1 planner per 14,000 population.

### 3.5.4. Team Requirement for Plan Formulation

Though the number of cities and the necessity of planning in these cities have increased but the qualified manpower for the preparation of various plans has been not yet met, as well as no statutory framework has been formed to meet the manpower requirement normatively. The TCPO study has concluded 'this has led to regional variations in planning manpower and hinders regional or national integration of ideas and rationales of planning standards followed in States'. In addition the use of modern techniques of planning including advancements in IT systems, Remote Sensing (RS), Geological Information System (GIS) and Global Positioning System (GPS) technologies, use of CAD, CAM is also falling behind due to lack of trained manpower of such disciplines in planning. Thus current situation calls for predefined acknowledgement of minimum team requirements for plan formulation, boosting training of the new planners and provision of adequate planning schools, capacity building. It is also desirable to revisit the curricula of the under- and post-graduate study courses in town planning to bring in the newer concept and technologies, including RS&GIS etc., into every aspect of town planning.

#### 3.5.4.1. Team Requirement

Core Planners' team for holistic planning of cities and regions should necessarily consist of:

- Urban planner and/or regional planner,
- Environmental planner,
- Transport planners and
- Infrastructure planner.

Apart from team of planners certain experts' are also required (as per requirement of the study) such as,-

- Urban designer,
- Legal expert,
- Economist,
- Geographers & Demographer,
- Sociologist/Anthropologist,

- Expert in housing and good governance,
- Heritage conversation expert,
- Tourism expert,
- Urban policy expert,
- Development planner,
- Water & Sanitation expert and others,
- Architectural draftsman / GIS expert or associate.

### 3.5.4.2. Qualified Planner

A qualified planner should preferably be a member of ITPI. A list of institutions recognized by ITPI is given in **Appendix D of Volume IIB**. However, to bring uniformity in the planning profession, Draft Town & Country Planners Registration Bill, 2012 has been prepared by the TCPO. The Bill also provides for establishment of a Council of Town & Country Planning. The purpose of such council is to regulate the quality of educational institutions and qualified professionals in Town and Country Planning. The Bill has defined "Town and Country Planning" as the profession responsible for planned development of urban and rural areas and the process concerned with control of the use of land so as to guide and ensure planned and orderly development.

Town and Country Planner is proposed to be a person holding a professional undergraduate or postgraduate qualification in Town and Country Planning or in accordance with the nomenclature as specified in the Schedule of the Bill, acquired from a recognized School, Institution, Department of study / University and registered with the Council. The Council will prescribe the standards of Town and Country Planning education. The Council could help ensure that only certified planners carry out the task of urban and regional planning.

### 3.5.4.3. Policy Options of Manpower Mobilisation

As indicated above, the requirement of planners to perform the function of planning and development at district, metropolitan and local area levels is over 85,000. Currently there are 3700 planners registered with Institute of Town Planners, India (ITPI), working in different organizations. It is therefore suggested that:

- Every state should have a **Planning School**. As of now, N-E States, Bihar, Haryana, Himachal Pradesh, J&K, Orissa and Uttar Pradesh do not have any recognized institute offering courses in Town Planning. This gap needs to be filled in soon.
- Capacity building for enhancing institutional capacities for plan preparation, effectively function as institutions of local governance and for improved service delivery. As per the 'Toolkit for **Comprehensive Capacity Building Programme**', JnNURM, 2013, the efforts should focus on creating an enabling environment at ULB level to improve governance and service delivery functions. Further, capacity building to include training programmes, such as:
  - i. Training /awareness programmes to ULB staff and elected representatives, with special emphasis on the women elected representatives.

- ii. Skill development trainings to ULB/parastatal functionaries to plan and implement development projects.
- iii. Technical and sectoral training programmes for ULB/ parastatal staff in water supply, solid waste management, roads & bridges, urban transport, sewerage, environment, and other sectors related to urban development / management.
- It is also desirable to strengthen the arrangements for training and capacity enhancement of town planners and urban designers in non-government sectors, for which ITPI or similar bodies could act as facilitators.

#### 3.5.4.4. Outsourcing Professional Services

In case of inadequacy in the manpower capacity with the Government bodies for planning, outsourcing to non-governmental and private consultancy/ organisation could be considered as an option. The conditions of engagement of professional services and scale of professional fees and charges are provided by ITPI<sup>27</sup>. It provides professional fees for preparation of different types of plans based on projected planned population and also as per man-months, which can be referred for estimating the cost of respective plan preparation.

### 3.6. Institutional Reforms

#### 3.6.1. Regulatory Body at State Level

A Regulatory body 'Urban- Regional Planning and Development Regulatory Authority' at State level should be established through statutory support. The role of this body should be to regulate and monitor the functioning of development bodies and also to regulate Urban and Regional Development Authorities/ Bodies / Agencies<sup>28</sup>. This regulatory body should have following objectives to fulfil its role and functions in an envisioned manner:

- Assess and Monitor the overall Urban / Regional Planning in the State.
- Observer and Evaluate impacts of planning on other elements of development system, especially Environment and Social & Balanced Regional Development.
- Quicken the process of approval of Plans coupled with transparency.
- Promote and direct FDI in Real Estate Sector.
- Prepare Standard monitoring plan and evaluation parameters
- To serve as a Centralised Single Window for clearance and
- Authority to exam the plan modification request and permit (mid-term) landuse changes in the plan which may be guided by large developments, social interest and need for all.

<sup>27</sup>Document: 'Conditions of engagement of professional services and scale of professional fees and charges', ITPI, effective from December, 2011 available at: <http://itpi.org.in/pdfs/DiscussionDraft.pdf>.

<sup>28</sup>Such arrangements have been introduced in Kerala, where Town & Country Planning Commission under the Kerala Town & Country Planning Ordinance, 2013 is an apex body to advise the Government and guide and assist the MPCs and DPCs on matters relating to spatial planning and development.

### 3.6.2. Grievance Redressal System

A decentralized grievance redress system should be established in every state upto the level of local development authority, to provide redress for complaints.

A Citizen's Charter could be formed in the framework of the "Action Plan for Effective and Responsive Government, 1997" and the Citizen's Charter and the Grievance Redress Bill, 2011 under consideration in Parliament.

Central Government is providing base for public grievance under Citizen's Charter, for which guidelines are also available in the Compilation of Guidelines for Redress of Public Grievance, 2010 of the D/o AR&PG, which has a dedicated website for citizen's charter: <http://goicharters.nic.in/welcome.html> .

To ensure obligation of transparent modification of schemes, including the updated progress Local Area Planning level, the method of public participation should be utilised.

## 4 Regional Planning Approach

### 4.1. Need of Region as Planning Unit

Region is a contiguous geographical area, which has a fair degree of uniformity, in administration, economic linkages or natural environment. It is relatively a large area, with hierarchy of settlements and varying landscape.

Urbanisation has accelerated in the past few decades while planning in India has been largely limited to urban settlements and the space between cities and their surroundings has been growing in an unplanned haphazard manner. Centrifugal forces attract huge volume of migrant population to urban centres, which has rendered short the planning efforts of local bodies. The resultant biases in demography have also had negative implications in the development at the source of migration. Thus, urban centres & its surrounding settlements have two-way interrelationship in terms of cause and effect of many elements. Accordingly, planning as an exercise should not be exclusively limited to urban settlements but a region can be identified to have holistic development of growth promoting centres and surrounding subsequent hierarchy of settlements. This should facilitate optimal planning and development of infrastructure in cities along with the adjoining rural areas and strengthen the economic links in the region.

The paradigm of regional development has evolved through the years after Independence. Most important ones are district planning, metropolitan planning, watershed management and special area development. The Planning Commission has also developed methods for regionalisation and policy guidance for preparation of development plans for regions. A number of such case studies have been taken up by the State Governments for development of special regions. Considering the importance of regional planning at the district level and with the view to integrating the urban and regional development, the DPC and MPC were created through the 73<sup>rd</sup> and 74<sup>th</sup> CAA.

### 4.2. Aspects of Regional Planning

The preliminary aspects of regional planning may constitute the following, which highlight the advantages of the approach:

1. **Sustainability** - Sustainability leads to balance in Regional Development which implies efficient use of available resources and opportunities for development in all parts of the region. Sustainability of regional planning depends upon:
  - i. Management of major environmental inputs namely water (both surface and ground), minerals, maintenance of green cover, protection of sensitive environmental areas and linking areas with special opportunities for development like religious, archaeological etc.
  - ii. Balanced and equitable spatial and economic development of the region
  - iii. Effective Use of local resources including cultural resources such as art & crafts.
  - iv. Optimisation of regional multimodal mobility and TOD.

Sustainability based regional development can provide solutions for elevation of urban poverty, minimisation of urban sprawl and managing migration, which are majorly outcomes of lack of regional planning.

2. **Environment** – Some of the major environmental concerns that can be addressed by regional planning approach are the following:
  - i. Control of pollution specially water pollution, use and maintenance of the water courses.
  - ii. Maintenance of green cover, forests and eco fragile areas.
  - iii. Control and regulation of activities which have impact on environment.

While planning, the environmentally sensitive areas should be identified which are non-conducive for development. Such areas should be either protected or developed while following relevant standards.

3. **Disaster Management** – The impact of natural disasters is exaggerated by unscientific plus unplanned development. Regional development should promote efficient response and preparedness to disasters such as floods, landslides, land subsistence, fire and earthquake. The Disaster Management Act, 2005 makes it mandatory to prepare Disaster Management Plan at State and District level. Integration of hazard (micro) zoning in planning activities is more facilitative and responding at regional level which can be integrated with the provisions of NDMA. Zoning hazards and its holistic approach can be achieved largely at the regional level scale or better at city level. Thus, regional planning is the solution to integrated response.
4. **Promoting Balanced Development** – Imbalanced development of the country due to missing regional planning approach to bring development in urban-rural settlements simultaneously has led to lopsided development in favour of urban settlements. As a result centripetal and centrifugal forces of human movement have come to work with intensity in the urban parts of the country. Lack of integrated spatial planning specially in the influence area of metropolitan cities has led to 'rural push'. Migration across administrative boundaries to the cities without adequate functional infrastructure to support the population puts pressure on the administrative departments. On the other hand the areas from where out-migration takes place suffer with imbalance growth. Thus, an integrated planning approach is required to provide administrative solution for provision of sustainable infrastructure in the region and vision development of the peri-urban areas & counter magnets.
5. **Inclusivity** – Regional planning can bring inclusivity in broader area by preparing plan after considering issues, strengths and prospects of a large spatial unit. Regional disparities especially peri-urban areas surrounding large cities and metropolitans present contrasting conditions both physically and social-economically. Regional planning can efficiently tackle the problem arising out of the transition of rural area into peri-urban and urban areas. Inclusive development principles can bridge the gap present in terms of regional disparity in India.

### 4.3. Planning Regions in India

The increasing need of urbanisation further aggravated by the rural push factors is directly affecting the quality of life and environment. Such areas shall not be merely left to the factors of natural growth and can be identified for Regional Planning. A region is a flexible concept and can be referred to as a continuous and localised area intermediate between National and Urban levels.

The District Planning Committees is to be the single decision making committee, which can address to the issues of planning in the District. In many States, DPC's are

not constituted, however, in some of them, the Town and Country Planning Acts provides a legal framework for constitution of Regional Development Authorities. For example, the Bombay Metropolitan Region Development Authority Act, 1974 makes it mandatory to constitute the Metropolitan Regional Development Authority for the planning and development of Mumbai metropolitan city.

Whenever functional areas cut across different State boundaries there may be problems of co-ordination in administration. Ideally in such cases, a unified RDA (for this specified region) may be instituted with representation from each of the State.

In the present scenario, Indian metropolitan cities have planned development, which partially satisfies the aim of the 73<sup>rd</sup> & 74<sup>th</sup> CAA, however, incomplete adherence of the Act has resulted into lack of holistic planning. Thus, it is required that state governments amend respective State Town and Country Planning Acts and provide a structure of regional planning with appropriate administrative structure to carry out its preparation and implementation.

Such regions are holistic from administrative point of view and there are little chances of conflict when there is a single administrative unit. The present planning system for only urban settlements has developed islands of growth centres, creating vast disparity. Planning for district as a region is the approach in which country as whole can be covered in planning exercise leaving no intermediate space. Thus, for convenience of administration of regions and entire coverage of country under planned development the structure of regional planning should be followed.

The 12<sup>th</sup> Five Year Plan has emphasised on regional development particularly DPC composition to control and regulate unplanned development beyond the urban areas i.e. urban sprawl/scatter. The State T&CP Acts provide statutory setup for urban and regional planning and development. In many States, Special Area Planning Acts, similar to Regional Planning, are also in place.

Transport linkages play an integral role in the growth of urban nodes. As movement of goods, services and alignment of infrastructure follow the transport network while the human settlement and economic activities generally follow the transport lines. Lately, Government of India has recognised the potential of transport corridors as instrument of imparting economic push to large region and thus has been implementing programmes, which are spread across a large region like, Delhi Mumbai Industrial Corridor (DMIC) Programme. The objective of DMIC project is to expand India's manufacturing and service base and develop DMIC as a "Global Manufacturing and Trading Hub". The project will provide a major impetus to planned urbanization in India with manufacturing as the key driver.<sup>29</sup>

The National Highway Development Programme (NHDP) was launched in 2000 to upgrade and strengthen National Highways and one of the advantages identified under the NHDP is all round development of areas. Other transport oriented regional

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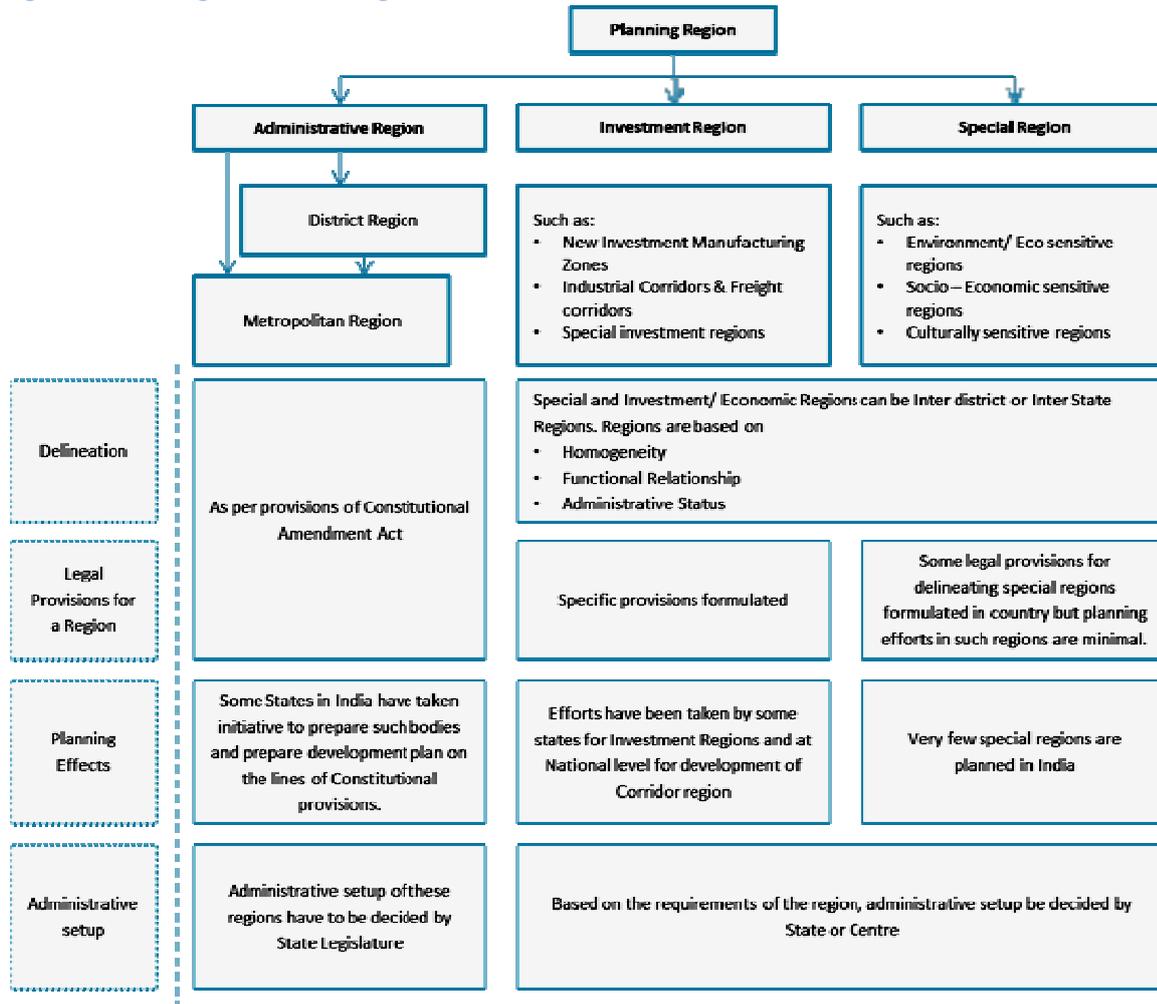
<sup>29</sup><http://www.dmicdc.com>

corridors conceptualised are the Eastern and Western Freight Corridors. Keeping these developments in mind, Transit Oriented Development (TOD) approach to plan and develop regions can be adopted.

There are other types of regions as well, which have homogeneity and linkages in terms of investment, tourism and natural environment. In India, owing to its vast stretch and heterogeneity, multiple/different typologies of regions could be adopted for planned development. The regional planning approach is suggested in these guidelines for planned and sustainable development of the human settlements.

The planning regions in India have been categorised as:

Figure 4.1: Categorisation of Regions in Indian Context



Source: *Compilation from 73<sup>rd</sup> & 74<sup>th</sup> CAA, State Administrative set-ups and regional planning cases in India*

### 4.3.1. District as a Planning Region

India has 640 districts and according to Census of India, 2011, 67% districts are urbanised upto 50% out of which approximately 7% have crossed the line of 40% urbanisation. New Delhi, Central Delhi, Kolkata, Mumbai, Mumbai Suburban, Hyderabad, Chennai, Yanam and Mahe (in Puducherry) are 9 districts which are

100% urbanized. However, there are many other districts which have rural-urban character and have a fast rate of urbanisation. Therefore, the urban trend of these districts should be planned. Efforts to direct urbanisation of such districts will synchronize the growth of cities with goals of national development.

District as a unit is a holistic concept which administratively provides a strong foundation for planning. The hierarchy of settlements and natural resources available in relatively larger region are other additional reasons which make district a unit of planning more logical premise.

#### 4.3.1.1. Need for Administrative Structure

Administrative structure to guide planning at district level is important. The 74<sup>th</sup> Constitutional Amendment Act provides that the State Legislature should provide for the composition of District Planning Committee (DPC) given that there shall be elected representatives of *Panchayats* and municipalities in committee in proportionate ratio. For this, State Governments are required to amend existing or enact new laws to introduce DPC in planning administration structure.

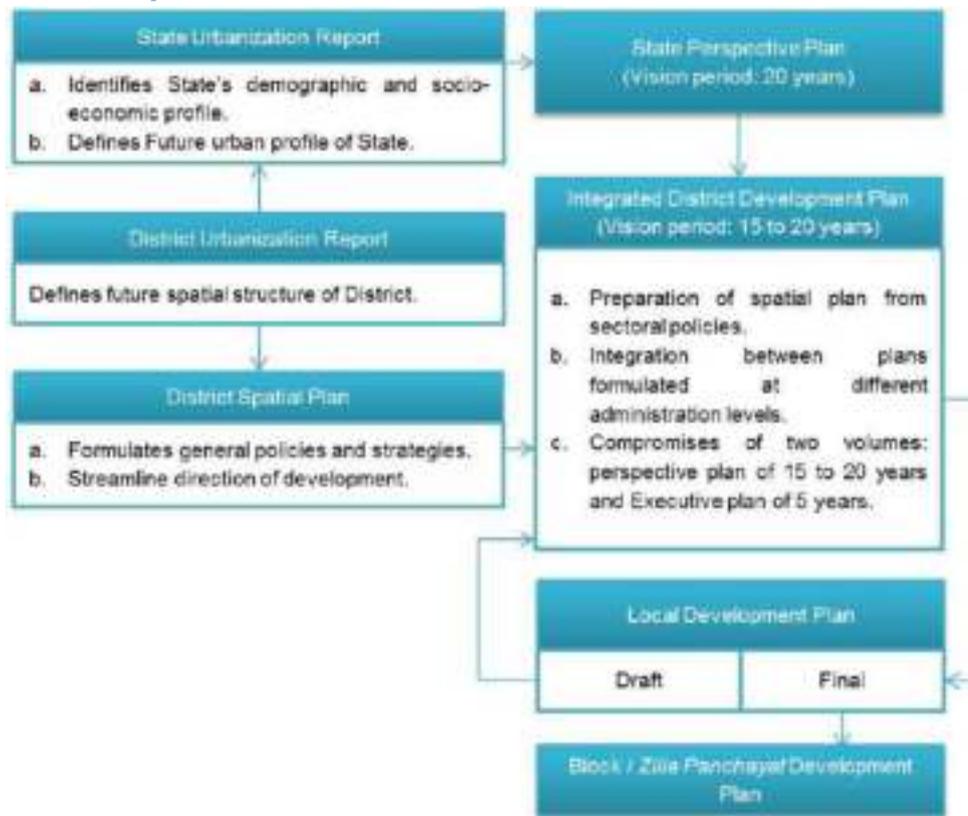
#### 4.3.1.2. Process of planning at District level

In India, planning process for administrative areas equal to or bigger than district has been attempted.

**Kerala:** The State of Kerala has provision for DPC and MPC. Its methodology of District plan preparation provides for a decentralised planning process by initiating preparation of an Integrated District Development Plan (IDDP) along with Local Development Plans (LDP) for every local government in the district in an integrated manner. The Integrated District Development Plan (IDDP) aims for an integrated draft development plan with due regard to common interests of *Panchayats* and municipalities (as shown in Figure 4.2) to plan for spatial and sharing of resources: both natural and man-made. The IDDP includes planning of special areas such as tribal areas, coastal areas, economically backward areas, areas for establishment of new towns etc. Also, there are provisions of Joint area planning in case the area comprises more than one Municipal Corporation, Municipal Council, Town *Panchayat* or village *Panchayat*, either in full or in part.

Draft IDDP should be prepared for the district incorporating suggestions of LSGs. The Draft IDDP prepared shall be an input for the identification of development issues and setting up of development goals and objectives of each LSG and thus becomes the frame within which the Draft LDPs are prepared. Based on suggestions and proposals of the Draft LDPs, the Draft IDDP is modified and finalised. Once the draft IDDP is approved by the DPC and sanctioned by the State Government, the Draft LDPs shall be modified and finalised.

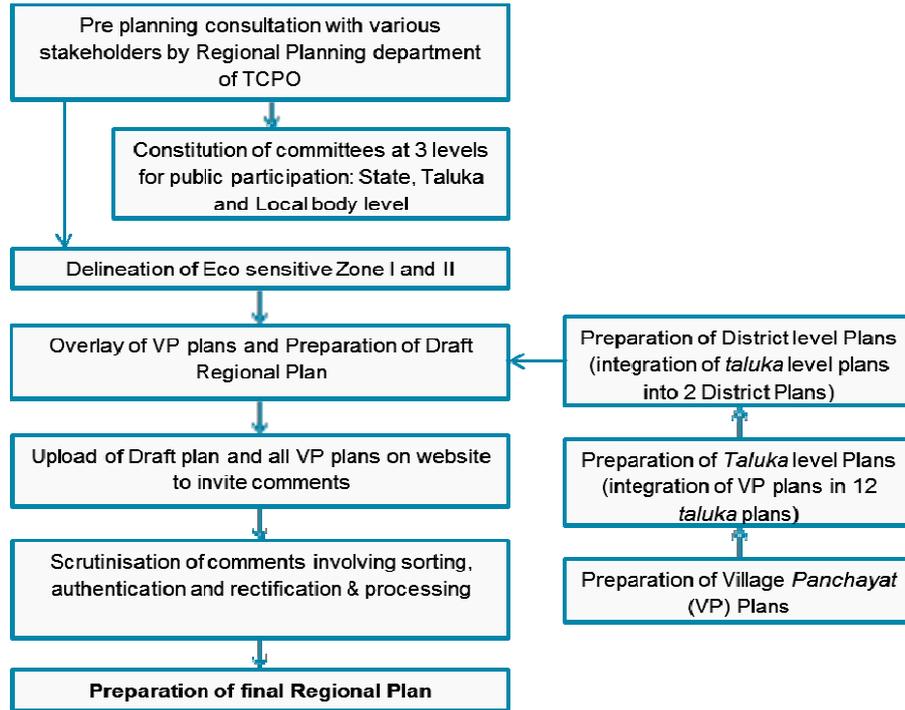
Figure 4.2: Plan Preparation Process of Kerala



Source: *The Kerala Town and Country Planning Ordinance 2013*

**Goa:** The State of Goa has prepared Goa Regional Plan, 2021. The basic approach for preparation of Goa Regional Plan has been protection of environmentally sensitive area of the State by introducing “Eco Sensitive Zones” and planning details at village *Panchayats* level. The Regional Plan gives a micro level planning of the State of Goa with the village *Panchayats* as the planning units. Multiple level consultative process has been undertaken in preparation of the plan. A decentralised approach was adopted in which a vision document was prepared for the State and was shared with the local bodies/villages. Plans prepared at grass root level were compiled at higher levels to prepare Draft State Regional Plan. Another round of public participation ensured inclusiveness. The approach has been presented in the following diagram.

Figure 4.3: Plan Preparation Process in the State of Goa



Source: Goa Regional Plan, 2021

The States of Kerala and Goa have attempted successfully the preparation of District or Regional Plans by adopting 74<sup>th</sup> CAA. While Kerala has prepared District Plans, Goa has prepared State level Regional Plan (but based on the two district plans) due to its size. Both the states have adopted decentralised approach as prescribed in the Constitution of India and have focused on public participation. The approach and methodology of these two States is influenced by the size and settlement structure and hierarchy present in the States.

A Planning process at district level for the larger States of India would require much more complex procedure to integrate bottom-up and top down approach. Hence considering the above mentioned case studies and keeping in view the constraints of large size States, a District Regional Planning simplified approach is given in Fig 4.4.

Plan preparation process for regional plan must start with preparation of State level Perspective Plan along with pre-plan interactive consultations of government departments, elected representatives, stakeholders, NGOs and Self-help groups. Outcome of such consultations is a Perspective Plan which will be vision document for the entire State either by the State Planning Board, State Town Planning Commission, and State Town & Country Planning Department or by State Urbanisation Committee, such as efforts taken by Kerala and Rajasthan recently.

Perspective Plan must include the LUZs from the State Land Utilisation Policy. In case the State Land Utilisation Policy is not prepared, Perspective Plan should delineate State into developable, prohibited and restricted zones. For this classification, variety of parameters could be used based on development approach of the state. Some of the

parameters have been shared below but this is only suggestive list, which must be made exhaustive while preparing plan at state level:

- Eco sensitive zones of the state,
- Boundaries of all the urban and rural settlements of the state,
- Mapping of transport and communication networks,
- Mapping of natural features,
- Industrial, mining and related area,
- Disaster Zonation
- All maps/plans must be prepared on GIS platform and geo-referenced.

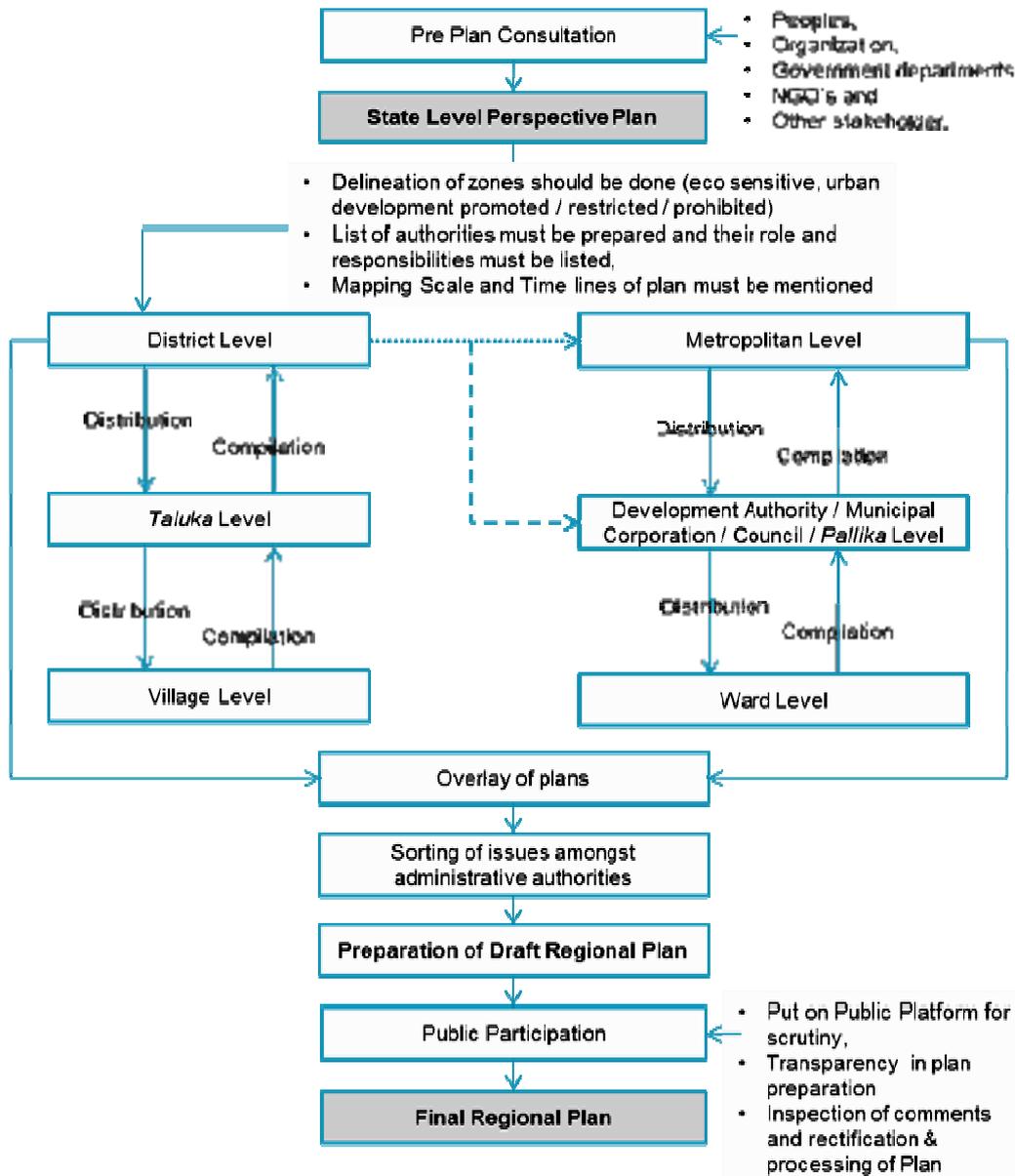
The State Perspective plan should be distributed to the Districts as a reference for preparation of further plans at district level. At the stage of Perspective Plan preparation, the mapping scale, time lines and roles and responsibilities for the preparation of district plan preparation should be decided which will bring clarity and uniformity in mapping and plan preparation process. District administration should proceed with distributing the plans and maps at *taluka* level and from *taluka* level to village *Panchayats*. The Draft Development plan should then be prepared at each village *Panchayat* level with public participation. Here, capacity building and technical knowhow would need to be percolated from the top administrative set-ups and supporting institutional arrangements. The training to the selected people or people's representatives must be provided along with trained officials through the plan preparation process. Similar process must be followed in settlements of urban hierarchy. Once the plan process at grass root level is over, these plans should be compiled first at *taluka* level or at its urban counter parts by Development Authority/ Municipal Corporation to formulate the draft District Regional Plan.

The Draft District Regional Plan then must be put on public forum for objections and suggestions to impart transparency in the plan process. To meet the purpose of the district plan, interchangeable options and conflict of interest would need to be answered in the regional plan. Once the process of public participation is over and with the approval of State legislature, the final Regional Plan should be uploaded on relevant websites for future reference and use.

Table 4.1: Institutional responsibilities

Administrative Unit	Institutional Body
District	DPC/ Zila Parishad
Taluka	Block Development Level/ Town & Country Planning Department
Village Level	Panchayat/ Gram Sabha
Metropolitan & Megapolis	MPC/ Development Authority / Municipal Corporation
Large & Medium Towns	Development Authority / Municipality / Urban Local Body
Small Towns	Nagar Palika/ Municipal Council / State T&CP Department
Ward	Ward Committee

Figure 4.4: Proposed District Planning Process



Source: Compilation from 73<sup>rd</sup> and 74<sup>th</sup> CAA, State Administrative Setup and Regional Planning examples of Kerala and Goa

### 4.3.2. Various settlements in Region

In delineation of the planning regions there can be certain levels of settlement, existing or planned which give special structure to a region. The growth nodes around which the flows are active and intense shall be the nodal centre. The nodal centre could act as the highest echelon in the hierarchy of the settlements. This may have a uni-polar (metropolitan city), bipolar (such as twin cities) or multi-polar structure. The other settlements within the region shall be directly or indirectly functionally linked to this centre. They can be:

1. **Counter Magnets:** The counter magnets are potential and growing sub nodal centres located out of the direct functionally linked areas of the growth node/ nodal centres in the region, e.g. Hissar, Gwalior, Patiala and Kota etc in context of NCR. The main objective of development of

the counter magnets is to prevent undesirable concentration of growth impulses in the nodal centres and to disperse the same to counter magnets for more balanced development of the region. The counter magnet areas may play two distinctive roles:

- i. As interceptors of migratory flows into the nodal centre
  - ii. As regional growth centres, this would be able to achieve a balanced pattern of urbanisation in the region over a period of time.
2. **Satellite Towns:** A Satellite Town is one, which is located near or within reasonable distance, well connected by transportation route of the growth node or a metropolitan city, e.g. Gurgaon and Noida (Delhi), Navi Mumbai (Mumbai) and Salt Lake City (Kolkata) etc. The Satellite towns are dependent on the growth node largely for employment. If developed well, satellite towns offer great scope for providing economic growth and employment for the benefit of the main city, subject to efficient transport connectivity.
  3. **Priority Towns:** Priority towns are the potential towns for investment and development; identified on the basis of their inter-aerial relationship with the regional nodal centre. For integrated development of the identified region, identification of the priority towns and planning for their development should be done.
  4. **Growth Centres/Points:** Settlements with growth potential and special advantage of location within the region can be classified as growth centres/ growth points/ service village in order of hierarchy from high to low while planning for settlement structure within the region.
  5. **Peri Urban Areas:** Peri-urban areas are zones of transition from rural to urban land uses located between the outer limits of urban and regional centers and the rural environment. The boundaries of peri-urban areas are porous and transitory as urban development extends into rural, agricultural and industrial land. Peri-urban areas might include valuable protected areas, forested hills, preserved woodlands, prime agricultural lands and important wetlands, which may require conservation. Irrespective of how the boundaries move, there will always be peri-urban zones. These areas if planned properly can provide essential life support services for urban residents. In preparation of development plans for metropolitan cities, the area may be taken as 5-8 kms around existing cities, say those with more than 3 lakh population to cover the urban spill.<sup>30</sup>
  6. **Urban Agglomeration:** Census, 2011 defines an urban agglomeration (UA) as a continuous urban spread constituting a town and its adjoining outgrowths, or two or more physically contiguous towns together with or without outgrowths of such towns. An UA must consist of at least a statutory town and its total population (i.e. all the constituents put together) should not be less than 20,000. In varying local conditions, there were similar other combinations which have been treated as urban agglomerations satisfying the basic condition of contiguity. Examples: Greater Mumbai UA, Delhi UA, etc.
  7. **Out Growth:** Census 2011, defines 'Out Growths' (OG) as a viable unit such as a village or a hamlet or an enumeration block made up of such village or hamlet and clearly identifiable in terms of its boundaries and location. Some of the examples are railway colony, university campus, port area, military camps, etc., which have come up near a statutory town outside its statutory limits but within the revenue limits of a village or villages contiguous to the town. While determining the outgrowth of a town, it has been ensured that it possesses the urban features in terms of infrastructure and amenities such as pucca roads, electricity, taps, drainage system for disposal of waste water etc. educational institutions, post offices, medical facilities, banks etc. and physically contiguous with the core town of the UA. Examples: Central Railway Colony (OG), Triveni Nagar (N.E.C.S.W.) (OG), etc.'
  8. **Spatial Priority Urban Regions (SPURs):** National Commission on Urbanisation, 1988 with a visionary approach to future urbanisation in India, identified 329 urban centres all over the country as Generators of Economic Momentum (GEMs) where development activities should

<sup>30</sup>Working group on urban strategic planning, p 33.

converge, based on which the upcoming Metropolitan regions could be forecasted. The Commission also identified 49 Spatial Priority Urban Regions (SPURs). SPURs were based on observed trends of growth and Commission's assessment of growth potential, integration with national transport network, optimising investments and opportunities already in a particular region. Such an attempt of regional planning pan India was the first of its kind and evolved from the idea of expanding planned urban regions.

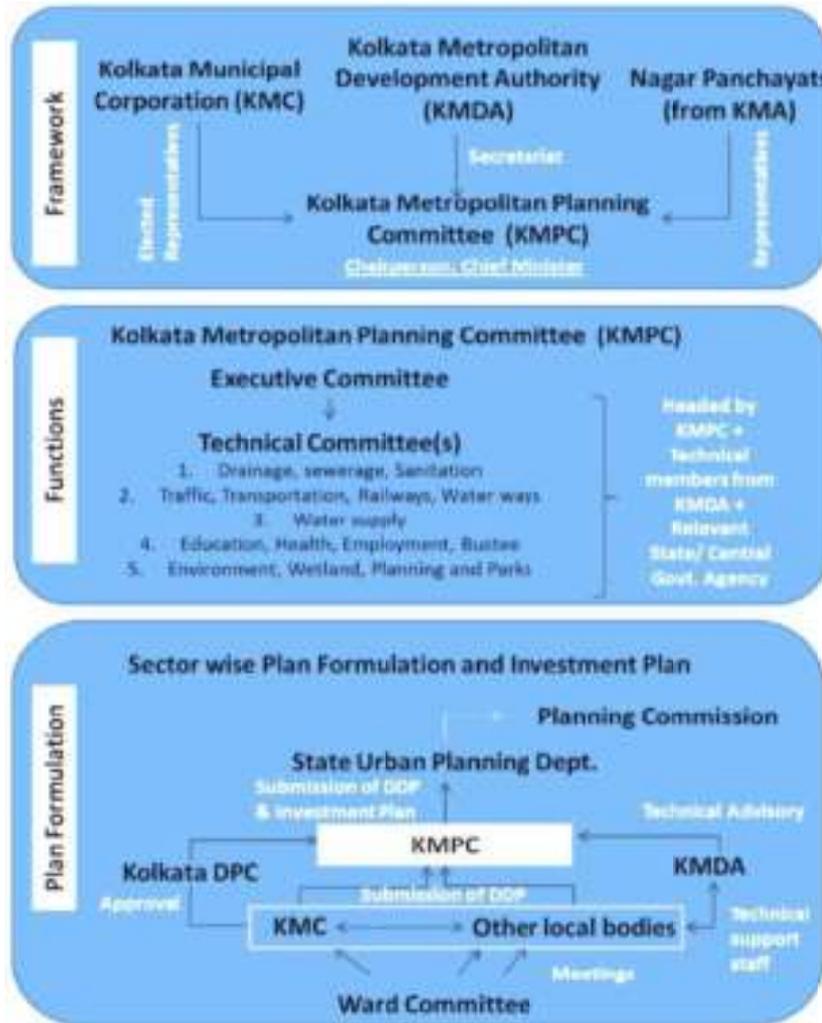
#### 4.4. Metropolitan Planning Region

Metropolitan area is a large urban settlement, which has population from 10 lakh and above. The aerial extent of such settlements is huge and often spread across multiple districts. India has 53 metropolitan cities per Census, 2011. Many of these cities have already been covered by metropolitan planning or development authorities, such as Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad and Guwahati. Formulation of Metropolitan Authorities was conceived with the idea of initiating the integrated planning and development of the major cities and their surrounding areas. Constitution requires the States to constitute Metropolitan Planning Committees through State legislature. Various States- West Bengal, Maharashtra, Andhra Pradesh have issued procedures for formulation of Metropolitan Planning Committee (MPC) and metropolitan areas like Kolkata, Mumbai, Nagpur, Pune have MPCs. However, only Kolkata MPC has prepared a Metropolitan Development Plan (MDP). This has been referred as a lesson to guide the MPC formulation and integration in the existing scenario.

##### 4.4.1. Metropolitan Administrative set-ups

As major cities increase in size, Municipal Bodies often turn out to be inadequate to meet the requirements. Thus, the need for Metropolitan Regional Development Authority (MRDA) Acts was felt, to regulate a designated jurisdiction covering urban and peri-urban areas. The authorities formed under these acts perform functions in close coordination with the State agencies, apart from the already core Municipal Corporations. MRDAs perform the function of integrated spatial planning and inducing coordination among the numerous authorities and institutions operating in/for the region, thus facilitating the planned growth in a smooth urban-rural continuum framework. Examples are Bengaluru, Chennai, Kolkata, Mumbai etc.

Figure 4.5: Framework for Kolkata Metropolitan Planning Committee



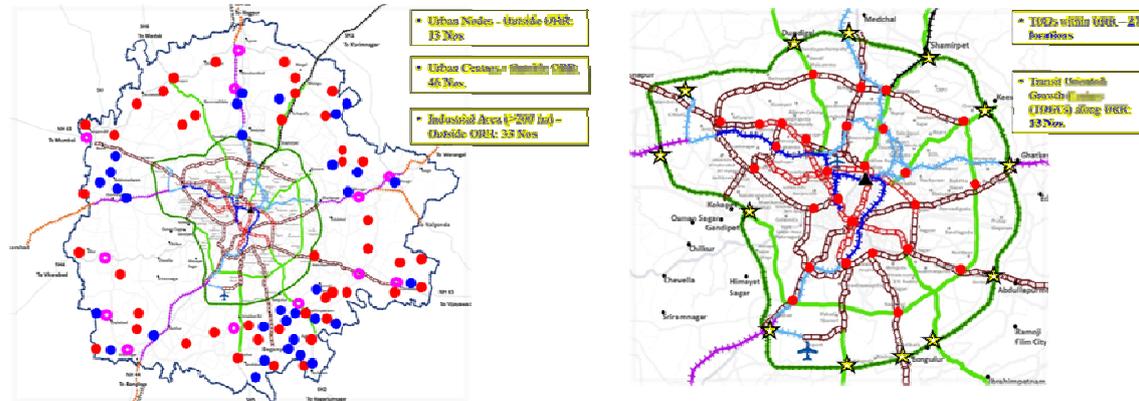
Source: Kolkata Metropolitan Planning Committee

### 4.4.2. Transit Oriented (Urban) Development (TOD)

In India, the concept of TOD to plan and develop cities / regions has been used in various cities, few of which are National Capital Region, Hyderabad Metropolitan Area and Ahmedabad Urban Development Authority (AUDA). In NCR, transport options of metro rail, ring railway and ring road has been used to guide urban development. Hyderabad Metropolitan Development Authority has prepared TOD development plan for city using metro corridors, MMTS, potential BRTS/LRT and outer ring road. AUDA has developed BRTS corridor, ring road to guide development along transport corridors. Hyderabad Metropolitan Development Authority (HMDA) has developed a Transit Oriented Development plan to develop metropolitan area (the case study is as follows).

**Case Study: HMDA: Transit Oriented Development (TOD)**

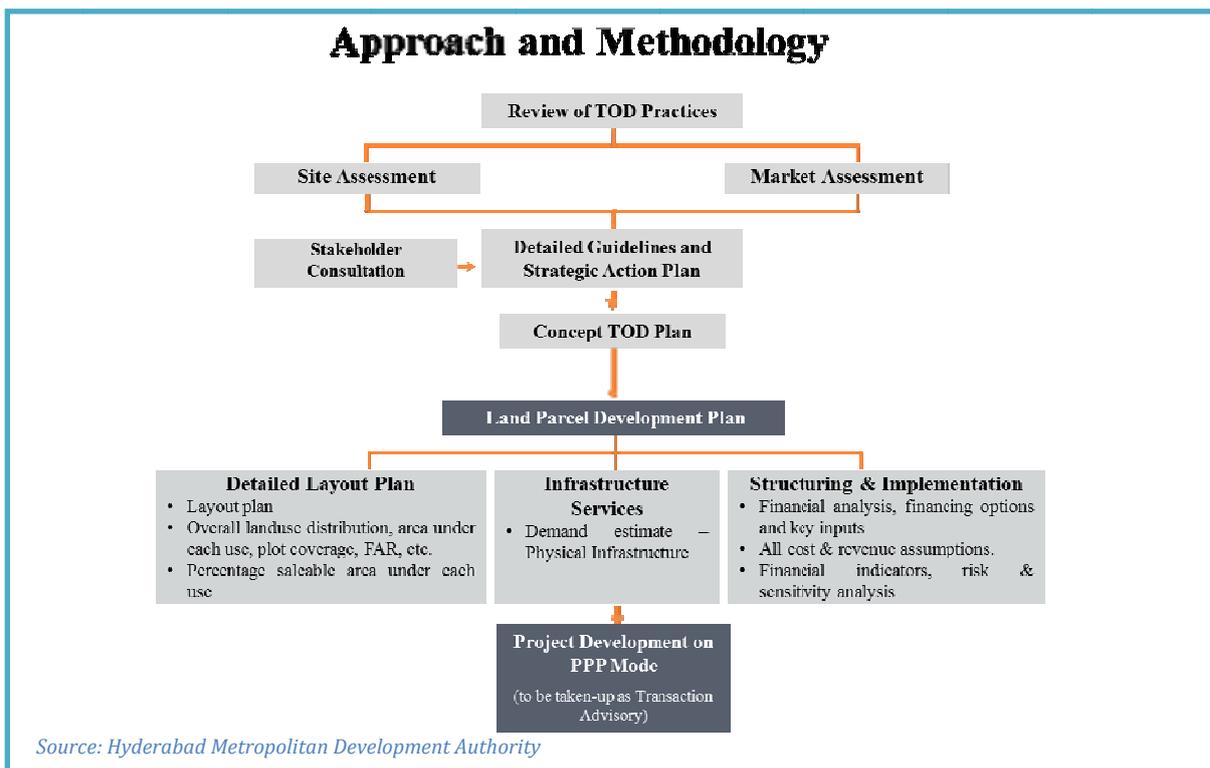
Approach and Methodology: HMDA conceived TOD plan to be compatible with Master Plan. Integrated transit network was proposed with focus to integrate employment generating nodes with transit network. Influence zone along transit network were identified and detailed development control rules FAR and land use in such areas are decided.



TOD zones, special features of such zones and the facilitating authorities have been recognised in the Hyderabad metropolitan region. Features of TOD Zones are:

- Mixed land use zoning,
- Incentivized higher density development,
- Expedited building permits,
- Decreasing parking requirement
- Affordable housing,
- Integration of employment and transit,
- Alternatives to personalised vehicle ownership.

The method followed for planning and development under TOD approach is given below:



### 4.4.3. Planning for peri-urban area

Peri-urban is the zone which is within the planning area limits but outside the urbanisation limit of the municipal corporation / authority or metropolitan planning committee or authority. Integration of the plans of such settlements can be done through two approaches.

- The plans can be prepared by the developmental body in consultation with the village authority and implemented jointly by the village authority and/or developmental body,
- Village bodies may prepare the plan and such plans will be compiled and made part of overall developmental plan of the region by developmental body.

Since, peri-urban area is not well defined in all the states, identification and planning of peri-urban area (outside municipal limits) is important in the context of urban and rural development. Also the States till now have not clearly defined what should constitute peri-urban areas and therefore a change in the Acts in this context is surely called for. However peri-urban area has been included in planning areas of Master / Development plans which invariably go beyond the municipal boundary. In some state like in Andhra Pradesh, *Mandal* committees are empowered to prepare land conversion and development of peri-urban areas. Nonetheless this aspect of urban and rural development needs special legal and policy efforts.<sup>31</sup>

To holistically approach the legal and planning issues for peri-urban areas, it is suggested by the Ministry of Urban Development to the States to avoid multiplicity of the authorities and simultaneously allow coordination. In a regional authority, the urban agglomeration should be recognised as the urban centre, while the small towns and service villages should be within the overarching boundary of the Metropolitan regions to co-exist. Where planning, the power to plan land use should be decentralised to local authorities, apart from some regional resource management such as management of water and preservation of eco-sensitive areas.

As the regional and metropolitan area planning intends to bring such area in planning framework it is only logical that development norms of urban area are adopted for peri-urban area too because of its heavy bias towards urban character. In addition, provision for institutional requirements for example specialised hospitals and education and research centres in the peri-urban areas are to be allowed as per the Regional Plan.

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<sup>31</sup> Note: Uttar Pradesh Government has followed for long years delineation of planning area by the authority on the basis of 8 kms from the municipal boundary. This norm is not backed / supported by any rationality. Adding to it, the planning area so designated under the Town and Country Planning Act under the section 143, conversion of land use from rural/agriculture to non-agriculture was permitted by the competent authority (District Collector). The conversion of land use as per the Act, section 143 could be done for development 'abadi'. This has created confusion for planning urban extension. In 2013, the UP government modified the Act and excluded 'abadi' from the section 143. This implies that any type of land use proposed such land use conversion, land lords must adhere to the development control rules, regulations and bye laws specified under the Master Plan.

Low income habitat planning norms of National Building Code, 2005 are suggested to be followed in peri-urban areas. The states may develop further specific guidelines for such settlements based on their growth trend and economic base. Low income habitat planning norms are as following:

1. Plot size: Minimum 80 sq.m.
2. Density: Maximum 60 plots per ha
3. Minimum frontage: 6m
4. Ground Coverage: 33% (subject to a maximum of 50%)
5. FAR: Maximum 200
6. Open spaces: 1.21 ha open space for a village with 200 houses.
7. If required, facilities like branches of co-operative bank, a fertilizer depot, a veterinary hospital, market place and a branch of the co-operative consumer store besides facilities for educational and health care should be available within a maximum distance of 5 km from any settlement.
8. Proposed Road Hierarchy:

Table 4.2: Road Hierarchy for peri-urban areas in line with low income habitat planning norms

Road Type	Road Description	Road width	Function/ Remarks
R1	Road which connects village to nearby areas	9 m	Widest road
R2	Road which take major traffic to village	6m	Amin village roads with drain on both sides to facilitate drainage system of the village
R3	Internal Village road	4.5 m	Other village roads
R 4	Internal Village road	3 m	Village lanes

Source: NBC

9. Community facilities:
  - A community hall/ baraat ghar
  - Rural development centre shall include Panchayat ghar, a Mahila Kendra that may also serve as a vocational training centre
  - School, health centre, post office, police post, shopping, work sheds for the artisans, telephone facilities, should be established.
  - The concept of 'aided self-help' shall be ensured for active participation of the prospective users and association in the construction and development of dwelling units and other community buildings.
10. When specifically planning for an Industrial area; service villages, hamlets and rural settlements to be provided with a buffer of 100-300 meters for the expansion of the settlements, for health & safeguard point of view (after calculating the induced growth rate).

#### 4.4.4. Village Planning

Planning at grass root level includes village *Panchayat* in rural settings of both District Planning and Metropolitan Planning region. Plans prepared at grass root level must be compiled at higher administrative units either through *talukas* or villages falling in urban areas and finally compiled draft plan is prepared at appropriate level. Use of cadastral maps at village area planning level is important and the revenue department which is custodian of cadastral maps has to play the critical role in providing, reliable and authentic land data base.

States are advised to provide technical support to village *Panchayat* for providing support in planning process. Lower literacy levels in rural areas can be hindrance to

the planning process or can result in faulty planning or social-economic bias. The State governments can provide conditional planning powers to village *Panchayats*. State can provide planning function to village *Panchayats* when the performance at grass root level is good in following parameters:

- Literacy,
- Women's participation in decision making, women empowerment,
- Handling of development funds as in past records,
- Transparency in funds handling,
- Inclusion of vulnerable groups and youths in decision making.

### Case study: Goa Institutional set-up Study

In the State of Goa to facilitate the process of Regional planning three tier structure was prepared. At highest level is State Level Committee, at lowest level is Village *Panchayat* and *Taluka* Level Task Force at intermediate level. The State of Goa has prepared Draft Regional Plan for Goa, 2021 through this three tier structure.

**State Level Committee (SLC):** This committee had 10 members and presided by CM and Minister (TCP). SLC supervised the process of Public participation, co-ordinated with *Taluka* level technical team (TLTT), explained the Revised Regional Plan for Goa, 2021 and its features to TLTT. It also prepared a questionnaire and a list of parameters on which comments/suggestions were sought from village *Panchayats*.

**Taluka Level Technical Committee (TLTC):** This committee comprising of 7 members was headed by Town Planner/Dy. Town Planner to headed Committee of concerned *taluka*. TLTC took the Revised Regional Plan for Goa-2021 to the respective village *Panchayats* and municipalities, under its jurisdiction. It arranged for the venue of meeting at respective village *Panchayats* and municipalities to explain the plan. Committee also assisted the village *Panchayats* and municipalities by visiting the Village *Panchayats*/municipalities in phased manner and supervised the public participation process. The suggestions from all village *Panchayats* and municipalities were collected and classified in categories and submitted to State Level Committee.

**Local body level team/committee:** These bodies had to mark all the existing (up to 6 meters) and proposed roads in the village, identified resources/services, water bodies, heritage sites, missing water bodies, nalhas, heritage sites, settlements, industrial areas, public utilities and services etc on the map with the help of TLTC.

*Source: Goa Regional Plan, 2021*

## 4.5. Investment Planning Regions

Investment Regions/ Zones are generally areas which show potential for development due to economic forces. These areas face problem of uncontrolled land confiscation and holding by the private entities. Due to lack of policies or plan to control development in such places haphazard development of commercial, industrial activities and human settlement takes place along transportation nodes and routes. Urbanisation in the eco-sensitive areas takes place and natural resources are misused in the process of unplanned growth. Thus, the planning efforts of the investment regions must be undertaken at the earliest to realise the scope of economic development with the global vision.

Government of India has started the process of developing investment zones across the country. DMIC, Chennai- Bangalore Economic Corridor and Bangalore-Mumbai Economic Corridor are examples of such efforts. While these investment zones are inter-State and backed by Central government, States have also started envisaging such investment regions and have brought legislations to support the same. The State of Gujarat has enacted Special Investment Region (SIR) Act, 2009. The Act is an initiative to develop investment zones and encourage industrial activities in the State. Under this Act, minimum area requirement for an SIR is 100 sq. km. Forty percent of the area of such zones shall be for industrial activities. This is an example of intra-State investment region, which can be inter-district or intra-district.

### 4.5.1. Approach of Plan Preparation

Unlike the district and metropolitan region planning which has administrative boundaries, planning of investment region involves a strategic decision making process beginning from delineation of the region boundary; identifying the region which has the potential to attract investment and can lead to an economic development.

Among the several techniques to delineate a region, few have been elaborated in the subsequent section. These techniques use parameters based on which area is demarcated. In case of development of nodes, the delineation should be based on the potential of development/ investment that the node can attract, while the corridor development shall depend upon its hinterland. The delineation of investment region should follow the steps given below:

- Identification of infrastructure gaps and planning for providing last mile connectivity either at regional or sub regional level as the case may be.
- Identification of main thrust sectors for investment.
- Identification of growth drivers and potential growth centres
- Market assessment – primary, secondary and tertiary
- Pre-feasibility of the proposals

Based on the evaluation of resources, thrust areas should be identified for the region's economic development and overcome the bottlenecks. For such regions to be investment friendly, market analysis techniques to arrive at the viability of the region in terms of generating investment and feasibility of thrust areas in terms of technicality. For Indian investment regions to compete in the International market and attract foreign investment, the state of art infrastructure facilities must be developed rapidly.

With this vision, the economic profile of the region should be envisaged and realistic investment goals could be targeted. At the given stage of investment region planning, a broad spatial plan, along with indicative land use shall be proposed for conceptualising the region as a whole. Here, planners must pay attention to major roads, trunk infrastructure, tapping points for power, water and carefully modifying local drainage pattern.

The approach of the plan preparation should be followed by encapsulating the vision for the Investment region, which should become the part and parcel or the basis for preparation of the Perspective plan for the region.

### 4.5.1.1. Aspects of Investment Region Planning

The planning process should include the following key elements essential to promote growth and balanced development of the region, namely:-

- The policy in relation to land-use and the allocation of land for different uses.
- Identification of the potential nodes and counter magnets (if required for decongestion) for future and proposals for development.
- Integrated transport policy, administration policy, law and order machinery.
- Plan for regional infrastructure linkages, a dedicated and sustainable connectivity across the corridor and hinterland.
- Policy for economic development.
- Fund flow for development.
- Indication of the areas which require immediate development as "priority areas".
- Roles and responsibilities of various stakeholders.
- Housing and shelter development.
- Protection of environmentally and ecologically sensitive areas and conservation of heritage.
- Sustainable development of resources including agriculture and rural development.
- The perspective plan should define the influence zone of the corridor or define the rationality of selection in case of a node.
- Monitoring systems and social audit mechanisms to ensure effective implementation of the plan.

### 4.5.2. Criteria for Delineation of Region

Regions can be classified based on many criteria but while delineating region for planning purpose the forward and backward linkages of the parameters must be kept in mind and relevant parameters be selected for the delineation process. Some

criteria for delineating the Planning Regions are presented below but list can be expanded based on requirements on planning approach and region's specifications:

**Table 4.3: Criteria for Delineation of Region**

S. No.	Parameters	Indicators
1	Environment and land suitability	<ul style="list-style-type: none"> <li>▪ Soil cover &amp; fertility,</li> <li>▪ Topography, Geology, Geomorphology, Lithology &amp; Drainage</li> <li>▪ Surface water body &amp; Ground water table,</li> <li>▪ Green &amp; forest cover,</li> <li>▪ Buffer areas,</li> <li>▪ Agriculture cover and intensity of production</li> <li>▪ Hazardous zone</li> <li>▪ Other environmentally sensitive areas</li> </ul>
2	Demographic, Quality of Life	<ul style="list-style-type: none"> <li>▪ Population growth rate: percentage increase in population,</li> <li>▪ Urbanism: percentage of urban population to total population</li> <li>▪ Migration: number of persons migrating to nodal point,</li> <li>▪ Density: population per Ha,</li> <li>▪ Aspect of literacy,</li> <li>▪ Other socio economic aspects,</li> </ul>
3	Flows	<ul style="list-style-type: none"> <li>▪ Goods: Volume of goods traffic:                             <ul style="list-style-type: none"> <li>– Supply of raw materials,</li> <li>– Sale of finished goods,</li> <li>– Supply of perishable goods like vegetables, milk, egg, meat, etc.</li> </ul> </li> <li>▪ People: Passenger traffic:                             <ul style="list-style-type: none"> <li>– Floating population</li> <li>– Labour supply</li> <li>– Cultural affinity: shopping, major recreational,</li> </ul> </li> <li>▪ Finance: banking facilities</li> <li>▪ Infrastructure links: Supply and management of services such as water supply, waste water and solid waste treatment with focus on recycling and re-use.</li> <li>▪ Drainage channels, irrigation channels, power house etc.</li> <li>▪ Information: location of institutes, movement of students and scholars, Telephone calls etc.</li> </ul>
4	Economic and investments	<ul style="list-style-type: none"> <li>▪ Economic:                             <ul style="list-style-type: none"> <li>– Local economic activity,</li> <li>– Wholesale trade,</li> <li>– Major existing developments,</li> </ul> </li> <li>▪ Large investment proposals for developments</li> <li>▪ Workers: Percentage of non-agricultural workers to total workers,</li> <li>▪ Land ownership and land uses</li> </ul>
5	Others	<ul style="list-style-type: none"> <li>▪ Contiguity of areas,</li> <li>▪ Integrated development,</li> <li>▪ Adjustment of boundaries with other planning areas,</li> <li>▪ Manageable size of the region from planning point of view.</li> </ul>

*Source: Various Sources including Reading Material on Planning Techniques by JH Ansari and Mahavir.*

It is recommended that the planning region should have a nodal point, either developed or developable to satisfy the organisational needs of the region. The homogeneous region identified should be adjusted to the nearest administrative boundary, such as village boundary, taluka or district.

### 4.5.2.1. Techniques for delineation

The criteria mentioned above are to be analysed by the following suggested techniques for area delineation:

1. **Weighted Index Number Method:** This method helps to determine a homogeneous region within certain variations/ deviation limits. For example, delineation of a region based on literacy rate may be limited within the area having specific mean literacy rate with not more than one a standard deviation. The approach used in this method is:
  - i. Identification of the criteria such as literacy rate, unemployment rate, watershed, contours etc.
  - ii. Determination of weights to the respective criteria
  - iii. Determination of homogeneity limits such as standard deviation.
2. **Flow Analysis:** The flow analysis identifies the direction and intensity of flows and builds up functional relationship between the dominant centre and the surrounding satellite towns. The flows show decreasing intensity as it becomes more distant from the main centre, hence identifying the sphere of influence of the main centre. The flows can be plotted on linear graphs from which following information can be obtained:
  - i. Most intense (Primary) and less intense (Secondary) flows into and out of each centre
  - ii. Hierarchy of nodes providing the form and extent of functional relationships within an area.The flow analysis involves grouping together of local units which displays a considerable degree of inter dependence.
3. **Gravitational Analysis:** This technique identifies the potential flows between centres rather than the actual flows. This model suggests that the interaction between the two centres is directly proportional to the 'mass' of the centres and inversely proportional to the 'distance' between the centres. The variables used to measure 'mass' and 'distance' depend upon the problem and data availability. The 'mass' can be represented by variables such as population, employment, income, expenditure etc. and 'distance' can be represented by distance in physical terms i.e. km, time, price etc. Mathematically this can be represented as:

$$T_{ij} = [ p_i p_j / d_{ij}^2 ]$$

Where  $T_{ij}$  is the gravitational force between towns  $i$  and  $j$  and  $P_i$  and  $P_j$  are the masses of the two centres and  $d_{ij}$  is the distance between them.

By calculating the potential for the centres in a study area, contour lines of equal potential can be plotted on a map, illustrating the relative attractiveness and sphere of influence of various centres.

## 4.6. Special Area Planning Regions

Special area development planning implies prudent use of all the available resources to ensure optimum and sustained development of the region, towards improving quality of life of the people and to meet growing demands of increasing population. It is also imperative to maintain the fragile balance between development and conservation practices through identification of the problem areas and preparation of location specific development plans.

The special areas requiring conservation- development approach could be:

### 4.6.1. Eco-sensitive areas

Eco-sensitive area is a designation provided to area which has very diverse yet fragile ecosystem. Western Ghats is one of the ecologically sensitive areas in the country. The Government of India had taken a step to conserve and develop this region sustainably.

For this GoI constituted **Western Ghats Ecology Expert Panel** which submitted its report in year 2011. Western Ghats is a region which is defined by its geological characteristics, biological landscape, richness in flora-fauna species, spatial heterogeneity, high conservation value and ecological sensitivity. Human activities had deteriorating ecological impacts on the region due to which the committee was constituted to give recommendations for its conservation. The committee has given recommendations for protection of Western Ghats, few of which have been shared below:

- River basin-level planning and decentralised management of water resources
- Sustainable strategy of livestock development for the Western Ghats
- Convert tea estates to organic production with the integration of animal husbandry
- Promote systems of providing incentives to local people for conservation efforts
- Strengthening the Rural Development department on issues related to non-timber forest produce
- Promote industries and services that involve dematerialization e.g. e-commerce, tele-conferencing
- Promote education hubs and special incentives should be given to agro-based fruit and food processing industries
- The Zoning Atlas for siting of Industries should be used as a tool for decision-making at various levels for industry, regulatory authorities and the general public
- Exclusion of mining from ecologically sensitive areas/zones etc

The basic unit of development of eco-sensitive areas can be a watershed, which is a manageable hydrological unit and covers the entire area starting from the highest point of the area to the outlet of the stream. The efficient development planning requires an overlay of various thematic layers of the spatial and non-spatial data. The watershed management approach is a suitable planning platform for conservation and sustainable development of all the resources specially land and water.

The development approach shall consist of the following steps:

- a. Identification and acquisition of the spatial and non-spatial data
- b. Identification of the 'formal region' on the basis of homogeneity of demographic and economic characteristics and sharing of natural resources
- c. Creation of the thematic layers, overlay and interpretation for developing an integrated approach for conservation and development

### 4.6.2. Socio economic sensitive areas

These are areas which lack amenities due to an imbalance in the economic development of the region/ nearby region and standard of living of the residing population. Such areas also encounter high rate of social stresses.

There are culturally sensitive areas like tribal areas which lack even the basic social amenities of health and education as mostly they are not covered in the jurisdictional areas of the administrative offices. Schedule 6 of Constitution of India gives the provision for the tribal areas in the north-east states of India. This schedule gives provisions for the administration of tribal areas in the States of Assam, Meghalaya, Tripura and Mizoram. In such cases, planning and land development is not directly under the control of the State, but rests with the Autonomous District Councils, formed in the districts as per the constitution.

However, the Regional Council of an autonomous region or District Council for an autonomous district of these states have the power to make laws with respect to 'the allotment, occupation or use, or the setting apart, of land, other than any land which is a reserved forest for the purposes of agriculture or grazing or for residential or other non-agricultural purposes or for any other purpose likely to promote the interests of the inhabitants of any village or town.

### 4.7. Land use classification for Regional Planning

- 1. Urbanisable Zone:** In Regional Plan, the areas under existing development and those earmarked for future development shall be termed as 'U Zone'. This zone is envisaged at three levels U-1, U-2 & U-3.
  - 'U-1' zone shall primarily cover the existing areas where more intensive urban development and economic activity are expected in future.
  - 'U-2' zone shall cover the new town areas/ satellite towns/counter magnet/growth centres where urban development and economic activity is expected or proposed.
  - 'U-3' zone shall be zone outside the existing or proposed urban zones, which have potential for urban development such as lands around major roads and corridors, railway stations etc. No formal development plan may be prepared for U-3 zone but the development shall be regulated on the basis of road widths and development promotion regulations.  
In U Zone all residential, commercial, light and service industry, public and semi-public buildings, transport zones and recreational area may be permitted depending upon the compatibility of the uses.
- 2. Industrial Zone:** The areas earmarked for industrial use – service and light industry, extensive and heavy industry, special industrial zone or development of SIR, IT zones etc. shall be termed as 'I Zone'.
- 3. Transport and Communication Zone:** The areas earmarked for transport and communication use shall be termed as 'T Zone'. This zone can be sub divided into Roads/ BRTS: T-1, Railway/ MRTS: T-2, Airport: T-3, Seaports/ Dockyard/ Dry ports: T-4, Bus depots/ truck terminals and freight complexes: T-5 and Transmission and Communication T-6.
- 4. Primary Activity Zone:** The areas earmarked for primary activity use shall be termed as 'PA Zone'. This zone can be sub divided into Agriculture: PA-1, Forest: PA-2, Poultry and dairy farming: PA-3, and Brick kiln and extractive areas: PA-4.
- 5. Open Area Zone:** The areas earmarked for leaving open shall be termed as 'O Zone'. This zone can be subdivided into Recreation Area: O-1, Green Buffer Zone: O-2. Green buffer zone shall be provided, so as to restrict the peri-urban areas from unauthorised development. For peri urban

areas special regulations and development control regulations shall be determined in the development plans.

- 6. Protective and Eco Sensitive Zone:** The areas earmarked as Protective and Eco-sensitive Areas shall be termed as 'E Zone'. This zone may comprise of Water bodies: E-1, Special recreation zone/ protective areas such as sanctuaries/ reserve forests: E-2, Forest Zone: E-3, Coastal Zone: E-4 and Undevelopable use zone: E-5. Undevelopable use zone shall be identified as Earthquake/ landslide prone, cliffs and environmentally hazardous area, areas adjacent to fault lines, areas with slope higher than 45°, areas adjacent to major drainage lines and other areas identified by State Disaster Management Authority and all environmentally sensitive areas.
- 7. Special Area Zone:** In addition to the above listed zones, zones may also be specified keeping in view the special characteristic of such areas/pockets. Such areas shall be termed as 'S Zone'. This zone may comprise of old built-up areas with architectural or historical importance : S-1, areas of scenic value: S-2 which need to be preserved without spoiling the character by putting up various kinds of structures, the area restricted for development by Government: S-3, or it may be area under other uses/ spot zones: S-4. Therefore, it is necessary that use/activity permissibility in special areas should be carefully thought of in the development plan when it is being formulated.

Table 4.4: Simplified Regional Land use Classification

Level I			Level II		
N	A-N	Use Zone	N	A-N	Use Zone
1.	U	Urbanisable Zone	11	U-1	Existing Zone
			12	U-2	New Area Zone
			13	U-3	Potential for Urban Development Zones
2.	I	Industrial Zone			
3.	T	Transportation & Communication Zone	31	T-1	Roads/ BRTS
			32	T-2	Railways/ MRTS
			33	T-3	Airport
			34	T-4	Seaports, Dockyards and Dry ports
			35	T-5	Bus Depots/ Truck Terminals and freight Complexes
			36	T-6	Transmission and Communication
4.	PA	Primary Activity Zone	41	PA-1	Agriculture
			42	PA-2	Poultry and Dairy Farming
			43	PA-3	Rural Settlements
			44	PA-4	Brick Kiln and Extractive Areas
5.	O	Open Area Zone	51	O-1	Recreation Area
			52	O-2	Green buffer zone
6.	E	Protective and Eco sensitive Zone	61	E-1	Water Bodies
			62	E-2	Special recreation Zone / Protective Areas such as sanctuaries/ reserve forests
			63	E-3	Forest Zone
			64	E-4	Coastal Zone
			65	E-5	Undevelopable Use Zone
7.	S	Special Area Zone	71	S-1	Heritage and Conservation Areas
			72	S-2	Scenic Value Areas& Tourism Zone
			73	S-3	Government Restricted Area (such as Defence)
			74	S-4	Other Uses/ Spot Zone*

Source: Various Regional Plans (NCRPB, MMRDA, HMDA). N= Numeric Code ; A-N= Alpha Numeric Code

**Note:** \*The process of changing/relaxing/modifying land use of part or "Spot" of a "zone" in a particular land use is termed as "**Spot Zoning**". Spot Zoning can be done for comparatively smaller area in a particular land use zone in such a way that it does not affect the overall Plan.

### 4.8. Composition of the Planning Committees

Traditionally, the planning bodies in India have remained nominated, starting with the Chairperson and including the members. At times, in the name of democratisation, a serving or former Legislator is made the Chairperson. Also, the technical expertise available with the Planning Bodies needs to be augmented, in view of the flooding of the environment with technological tools and techniques that can make spatial planning far more realistic, speedy and transparent. Accordingly, in the changing socio-economic environment, it would be desirable to consider introducing greater

democracy as well as subject matter expertise in the composition of the Planning Authorities at all levels.

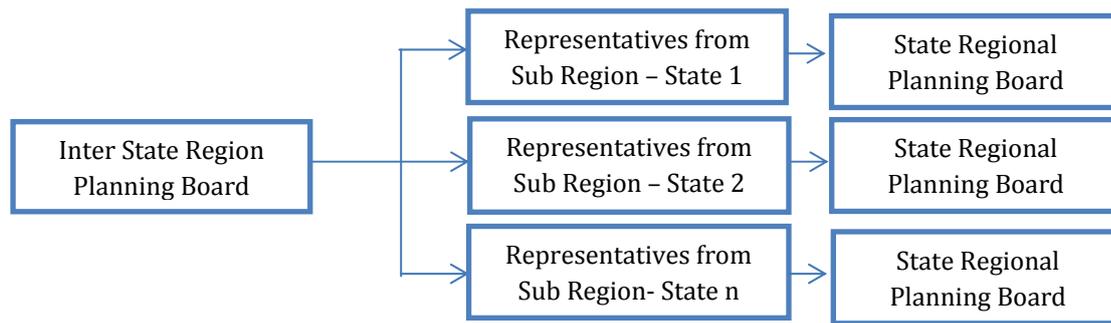
There is also this perception that Planning bodies are increasingly doubling up as Development Authorities and, in the process, they suffer from conflict of interest and besides, the development functions get overwhelming attention to the detriment of the planning functions. The Municipalities and *Panchayats* falling in the jurisdiction of the Development Authorities (DAs) have been complaining of all the financial and regulatory 'cream' being skimmed off by the DAs, leaving only the rubbish removal task and unpleasant authority (like property tax collection) with the Municipalities and Panchayats.

To address such concerns, some broad suggestions are given below.

**District/Metropolitan Planning Committees and Regional Planning Boards:** The DPCs and MPCs may be constituted as per the broad framework indicated in the 74<sup>th</sup> CAA. However, it is suggested that the DPC/MPC should not be unwieldy in size and the total number of members, including the Chairperson and the nominated members, *should not exceed 30*. *Subject matter experts* (3 to 4), from the fields of spatial planning, agriculture, climate issues, and finance should be nominated as members. The members should be authorised to elect among themselves a Chairman, Vice Chairmen and Chairmen of Subject Committees. Wherever the District/Region include cantonment areas, the Head of the Cantonment Board may also be made a member. The State level Heads of relevant Central and State Government organisations may be invited from time to time, as per felt need.

For interstate regions, such as the NCR, Parliament would have to make a law, in consultation with the States concerned, for constitution of the Regional Planning Board (RPB). Concomitantly, the State Laws, including the T&CP Acts, would need to be amended suitably, to mandate the alignment of the Local Area Plans with the Regional Plans. The onus of such alignment should remain with the State Government concerned by way of self-certification and there should be no need for mandating formal approval of the Local Area Plans by the RPB. The Chief Ministers of the participating States should, by rotation, be made the Chairperson of the RPB. This would be in line with the federal principles. In the alternative, a Minister of the Union may be the Chairman of the Inter State RPB. For the area of region falling in the respective States, there should be State Regional Planning Board, to carry out the regional plan in finer details in the sub-regions.

Figure 4.6: Planning Board for Inter State Regions



**Regional Development Authorities and Improvement Trusts:** The broad principles for composition and functioning indicated above for the DPCs and MPCs may be suitably adopted for the Regional Development Authorities and Improvement Trusts as well. The Development Authorities should preferably not be combining the planning, regulatory and development functions all in one. All the resources generated by way of fees etc. in approval of layouts should be sharable with the local bodies (*Panchayats* and Municipalities) besides using it partly for development of regional infrastructure.

## 5 Urban Planning Approach

### 5.1. Introduction

The location, site and situation significantly contribute to growth and function of a settlement. Location and surroundings could have positive and negative impact on settlement development. However, careful planning should be able to use well the advantages that the location of a town provides. Particularly location in the context of waterfront of sea, river and large lakes provides special resources, which can be effectively used for development of the town. Similarly, the town located on the hills provide other special opportunities for development. Any appraisal of the value and importance of a particular site must involve a knowledge of its historical past, evolution and landmarks of change.

The growth of clusters of urban settlements is more frequently found around large metropolises and results in what are sometimes called “city regions”. Often these are made up of small towns and villages, which have been enormously expanded as a result of national policy on dispersal of economic activities away from the metropolises. The small and medium towns in these city regions are related to one another by the functions, which they perform. Site condition in the hilly and mountainous regions may occupy site in Ridges, Valleys, River terraces, Confluences, Rolling Meadows and in cases linear settlement growth along the major transportation routes or at the entrance to specific hill region.

### 5.2. Guidelines for Study on Location, Site and situation of Settlement

#### 5.2.1. Location

Location attributes to be considered in a planning exercise:

- a) Location in terms of latitude and longitude, population size and area and connectivity with other settlements etc.
- b) Nodal significance in the national or regional transport and communication network, power network and industrial development etc.
- c) Location in terms of agricultural produce collection and distribution centre, agro-industries linked to local markets, irrigation network, agricultural extension services etc.
- d) Significance of the location in ecological terms, related to important ecological networks
- e) Status that the settlement in hierarchy in the State or the Region
- f) Role and status of the city/ town in the national delivery systems of social services;
- g) Relative significance of locations of city/ town in proximity to a Metropolitan/Megapolis:
  - i. Nodal significance
  - ii. Presence of high productive economic activities
  - iii. Presence of large scale market

### 5.2.2. Site

Site attributes to be studied for planning exercise:

- a) Conditions of site: low-lying, swamp, or dry land, ridge, on a riverbank or canal side. Within the town-flat, slopping (in which direction), undulating-gentle slope, moderate slope, steep slope.
- b) Value and importance of the site and its historical past, that is, when the nucleus was established.
- c) Analyse the factors responsible for determining the site:
  - i. In alluvial plains
  - ii. In hilly and mountainous regions
  - iii. In arid regions
  - iv. In the areas of territorial ruler ship
  - v. In the areas around some localised physical resources, mining settlements, manufacturing towns, resort towns
  - vi. Around large metropolis
- d) Climate and its influence on daily life, construction, range of crops and how the city activities have modified the natural climate, particularly in the built-up area.
- e) Analysis of climate type, variations in temperature, wind velocity and wind directions in different parts of the city; study of the climate with reference to summer, rainy and winter seasons.
- f) Limiting and the favourable factors of site in the spread and growth of the city/town.

### 5.2.3. Situation

The following to be considered for situation analysis:

- a) The endowment of the situation (wider setting) for the subsequent growth in size of the city/town and for the enhancement of its functions
- b) The important and interrelated aspects of situation, namely,
  - i. Physical configuration
  - ii. Route patterns
  - iii. The extent of the territory to which the urban functions are related
- c) Suggest measures to retard or even overcome the weakening of the original value of the site and situation.

### 5.2.4. Hinterland

The endowment of the hinterland is another factor on which growth of an urban centre rests. An urban centre, for example, can establish a mutually interacting relationship with its hinterland if the hinterland has a variety and extent of natural resources in terms of both agriculture and economic potentials. A city's growth may be consistent and stable mainly because its economic base is closely linked with that of its hinterland. It is also conceivable that the city can be an instrument not merely for effectively utilising the existing potential of its hinterland but also of increasing the hinterland's potential itself. The development of the regional economy helps the growth of small towns, which in the process become the main service centres for their hinterlands.

Therefore, considerable attention should be given to the delimitation, functionality, social and economic link to a particular urban settlement. The area linked socially and

economically to an urban settlement has been given various names, such as “Hinterland”, “Upland”, “Urban Field”, “Sphere of Influence”, “Zones of Influence”, “Tributary Area”, or “Catchment Area”. The immediate hinterland of a large city, which is directly under the influence of the agglomeration, is the ‘peri-urban area’.

Location, Site, Situation and Hinterland may be studied using Geospatial techniques on the aspects like Hydro-Geological analysis, Temperature Change analysis, Network analysis, Proximity analysis, Land Suitability analysis, Urban Growth analysis, etc.

#### 5.2.4.1. Peri-urban area

The area influenced by a town is not a two-dimensional feature, not a sphere, nor does it necessarily form a continuous zone. Flow of goods, services and information into and out of a town/city, most modern urban settlements and their immediate hinterlands are economically interdependent, rather than one being a tributary to the other. An analysis of the rural area served by a city/town gives some indication of the relation between city and the urban-rural mix (the peri-urban area), which is of practical application in examining the provision of goods and services in an urban centre. However, as mentioned in the Regional planning chapter, ***Peri-urban is the zone which is within the planning area limits but outside the limit of the municipal corporation / authority or metropolitan planning committee or authority.***

As smaller towns fall within the areas served by larger metropolitan regions, the delimitation of urban zones of influence also sheds light on the manner in which a city at a particular level in the urban hierarchy provides specialist services for the surrounding population and settlements (such as service towns, satellite towns or service villages). Finally, very large cities extend a particularly intensive influence over the areas around them; so much so that these can be well defined peri-urban areas. Delimitation of peri-urban areas is directly influenced by accessibility as of highways and/or prime economic investments. With rapid urbanisation conditions, the peri-urban zone is dynamic. Hence peri-urban limits undergo alterations subject to high stress for urban growth and therefore always in fast transition.

In examining zone of influence, one commonly adopted method is to establish on a map the areas served by employment, shopping, entertainment, education, health services and so on. This method of analysis is applicable to cities and towns at all level in urban hierarchy. At a higher level in urban hierarchy the criteria used reflect the distinctive functions of larger settlements and employ information like:

- The area served by the city’s services and amenities like water supply, electricity, gas supply and telephone, health services, educational, cultural, recreational elements, security services such as police and fire brigades, postal services, mainly the local delivery areas and postal zones; banking and insurance facilities, the circulation of its daily newspapers.

- Flow of wholesale products, trip generation, intensity and speed of movement should be taken into consideration.
- Other reflective elements, which may be considered, are land use ratio of non-agricultural to agricultural population, density trends in population growth, settlement pattern, growth of built-up areas and pattern of communication.

In respect to a typical industrial town, its peri-urban area may be much more restricted than that of the other types of town. An intrusive industrial town may well not have the full range of urban services appropriate of its size. These missing functions will be supplied from other centres, thus making its zone of influence less clearly defined.

Temporal data provided by Satellite imageries may be used for the delineation of Urban Zones of influence. All maps for urban areas like utility maps, infrastructure maps, growth maps, vegetation maps, transport maps, etc. may be prepared using high resolution satellite data. It will be clear that the analysis of urban zones of influence is most appropriate for those cities whose dominant role is that of serving as a central place, although most settlements of any reasonable size will have this among their various functions.

### 5.2.4.2. Leapfrog Development and Urban Sprawl

Leapfrog development refers to the occurrence of urban settlement in places separated from denser areas by open space and land under agricultural production. This development has “jumped” land unavailable for such development because it is held by the state, by other private owners, or because it is under the control of traditional authorities. This type of development may take the form of upmarket residential and business park development, or it may take the form of low-cost housing projects or informal settlements which may be implemented, or which may occur as a consequence of rapid urbanization<sup>32</sup>.

Urban sprawl refers to urban growth; along transportation routes in linear form with one or a few property depth as width on both sides of the road, taking advantage of accessibility, flow of goods and services. These urban developments have higher infrastructure systems cost such as water supply, power supply, which often have to be long extended from the nearest serving areas. Land Assembly/Land Management Techniques using geospatial techniques may be used for effective utilization of land and thus check the urban sprawl.

Municipal Planning & Management should apply careful control over change of agricultural land for non-agricultural uses. These conversions are commonly seen in peri-urban areas and are neither covered under Municipal laws not under any planning regulations as the location is outside the limits of municipality or even a planning authority.

Often, sporadic and scattered conversions create problems for future planned urban development, where many of these are done for speculation purposes to gain high

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<sup>32</sup>Sustainable Urbanization: Guidelines to Manage Urban Growth, Volume 2: Tools and Guidelines, McIntosh Xaba & Associates.

capital returns from land lots. Though the laws require the land revenue authorities to take the advice of State Town Planning Department about viability before permitting conversions, but due to absence of any approved land use plan and weak structure of Town Planning Department, this step is rarely taken or even if taken it is hardly effective from planning perspective. Such haphazard urban sprawl needs to be curbed and regulations should be in place to discourage unplanned growth, which can be achieved through the Regional Planning Approach (see **Chapter 4**).

### 5.2.5. Accessibility

Accessibility is the dominant factor influencing the location, growth and functions of urban centres. It is to combine at least three elements: the location of a place within a region (in general, centrally located places are more accessible); the form of the transport system; and accessibility within the area of the activities: access to employment opportunities, access to population, access to educational or health facilities, etc. Green mobility and TOD demand a focus on better accessibility by non-motorised mobility and public transport.

Urban settlements tend to grow on transport routes only at specific places, particularly at junctions and break-of-bulk points, where one form of the transport is changed for another. Hence settlements whose locations are guided by transport routes are found not only at the end of these routes, but also along them. The number of routes, which come together at a particular point, is important, but the degree to which passengers and goods are interchanged is more important.

The guidelines for the study of accessibility are as under –

Establish the role of:

- i. Long-distance regional/inter-regional transportation in determining the locations of the city/town;
- ii. Both the long distance as well as local and intra-urban transportation in the growth of size of the city/town;
- iii. Inter-urban and intra-urban transportation in affecting urban structure.
- iv. Non-Motorised Transport and Transit Oriented Development in defining intra-urban transportation and urban structure.
- v. Inter-regional easy access by different modes;
- vi. Good mobility within city/town due to construction of tunnel results in the development of new areas with commercial, industrial and residential activities, which leads to population increase in the entire urban area.

### 5.2.6. Socio-Economic Profile

City is not alone a characteristic of its physical or locational forms; its population and its characteristics determine the social processes that set the City culture. Socio-economic class-wise distribution of the population is a key indicator of the social parameters in a settlement. In case of existing settlement, the pattern of population on the basis of socio-economic levels can be studied for planning to understand the services and facilities. On the contrary, it is useful for the greenfield sites, where

zoning can be proposed based on the income of the settling population class, higher, middle or low. Spatial plan is usually influenced by living and work places of different of population classes.

This principle of Urban Strategic Planning<sup>33</sup> should in consonance with the income distribution structure of the city region with the urban poor located near public transport nodes/links and specially providing space for the urban poor in master/development plans for living, selling and working - at city, zone and local levels.

Overall, the social indicators allow the planner to understand the city, link it with the city spatial form and its behaviour pattern. In short, unlike the traditional approach to zoning, social parameters can be used for creating zones and its functions. This can directly point at the urban facilities such as bus services, dedicated transportation corridors, facilities of social infrastructure and physical infrastructure.

### 5.3. Distribution of Land Use

#### 5.3.1. Developed Area Average Densities

For the purpose of these guidelines, the densities mentioned in this section are the Gross Population Densities defined as person per unit area (in hectares) for developed area only. The calculation includes population of the settlement on the developed land of the settlement.

Fixation of density norms should be based on carrying capacity analysis focusing on parameters - space per person, access to facilities, available piped water per capita, mobility and safety factors. The task should be settlement specific. However, for overall planning approach density ranges are suggested in **Table 5.1**.

Table 5.1: Developed Area Average Densities

Settlement Type	Persons per Hectare(pph) in	
	Plain Areas	Hill Areas
Small Towns	75-125	45-75
Medium Town	100-150	60-90
Large Cities	125-175	60-90
Metropolitan Cities	125-175	100-150
Megapolis	More than 200	--

Source: Revised based on UDPMI Guidelines.

These are suggestive population densities as per the settlement size. However, while planning for compact and TOD development, these densities should be modified to suit the requirement and should be based on carrying capacity analysis. Developed area densities suggested above is useful to calculate total developed area requirement

<sup>33</sup>Report of the Working Group on Urban Strategic Planning, 12<sup>th</sup> Five-year Plan'

at city level, when the target population for the city is given. When used along with the suggested norms for different land use, area can also be calculated.

### 5.3.2. Proposed Land use Structure of Urban Centres

The proposed land use structure for urban centres is indicated in **Table 5.2:**

Table 5.2: Land use Structure for Developable Area in Urban Centres

S.No.	Land use Category*	Percentage of Developed Area			
		Small	Medium	Large Cities	Metropolitan Cities & Megapolis
1	Residential	45-50	43-48	36-39	36-38
2	Commercial	2-3	4-6	5-6	5-6
3	Industrial	8-10	7-9	7-8	7-8
4	Pub. & Semi Public	6-8	6-8	10-12	10-12
5	Recreational	12-14	12-14	14-16	14-16
6	Transport & Communication	10-12	10-12	12-14	12-14
7	Agriculture, Water bodies and Special areas	Balance	Balance	Balance	Balance
<b>8</b>	<b>Total Developed Area</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Revised based on UDPI Guidelines, 1996

Note:

1. It would be desirable to fix the recommended Landuse share for essential uses (Residential, Transportation and Recreational) while the proportion for other uses may be flexible. Actual land use percentage in a given city case should be calculated based on local conditions and needs.
2. Zoning regulations given in Table 9.1 – ‘Simplified land use classification’ to be followed in consistency with the land use structure given in the table above.
3. \*Land occupied under Special Areas (refer Table 9.1 for uses) to be included in the land use categories 1-6 given in the table above, unless large special areas to be considered as a separate entity for planning, such as cantonment areas.
4. \*However, to propose the mixed land use of a city –percentage share of residential, commercial and industrial land use to be adjusted proportionally as planned by the local authority. Mixed land use should be either non-industrial oriented or industrial mix oriented (refer Table 9.1 for uses).
5. The adjustment in the residential, commercial and industrial land use (dominant use) to be based on the land area proposed for mixed land use zone and reduction of respective proposed mixed land use(s). Appropriate reduction in residential, commercial or industrial uses and adjustments in other uses to be made so that the total land use becomes 100%. The mixed use of land to be envisaged at vision development stage of the plan formulation.
6. Detailed study is to be undertaken on the co-relation of and effects of FAR/Densities in our towns (both small towns and metropolitan cities) and guidelines to be adopted for the optimal use of land.

*Specific attention needed on areas in section 5.4 - Urban planning approach.*

## 5.4. Urban Planning Approach

Though urban development increasingly accounts for a large share in the National economy, huge gap between the need of infrastructure services and available resource still remains unbridged as a major concern. It adversely effects provision of employment, mobility and lifestyle of large sections of city's population. Challenges like environmental sustainability, changing but stressed lifestyle put pressure on mobility and health. In order to reduce pressure on land and response to climate change impact, alternative approaches of city planning and building is the need of the hour.

Such solutions lay in keeping the city compact by mixing uses of land to an optimum level, decreasing trip generation and high population density making mass rapid transit systems technically and economically viable. Aspect to be encouraged by urban planners are walk to work best designed pedestrian safety, protection of natural features and environmentally sensitive areas, along with finding new source of financial resources for city development.

To moderate and eventually curb the environmental impacts of urbanisation, sustainable ways of planning are required. Urban centres by its conventional form play a significant role in mounting urban heat island. Green city modules such as street orientation in lines with sun direction, prevailing wind direction and use of heat repelling material not only help reduce the impact, but also slow down the gas emissions from artificial cooling systems. Further green spaces within the urban set-up ensure cooling effect and better public interaction spaces, apart from psychological supports in reducing human stress levels.

Both compact city and green city approach should help to release land for open space and recreational use purposes, reducing pollution levels, decentralising waste handling, encouraging public transportation and simplifying land use segregation.

To technically meet the demand of the urban centres in making it cost effective and in optimum utilisation of available resources to any of the urban planning approaches, Information Communication Technology (ICT) has emerged as a solution. Smart city concept facilities better living experience for human kind, declining dependency on contingencies by using ICT enable development of smart communities, providing a communication web that connects buildings, energy and mobility devices such as Electric Vehicles (EV) by using bi-directional information exchange. 3D City Models may be used to facilitate orientation of views in terms of scale and spatial position and planning other urban utilities. Digital modelling can also be used to create decision support tools that help to reduce the environmental impact of planning decisions, for flood risk prevention and for cost benefit analysis.

The following sections cover the key benefits of compact city, green city and smart city approaches and its aspects in planning.

### 5.4.1. Green City

Green cities are those where economic growth and development is fostering, that reduce negative environmental externalities, the impact on natural resources and the pressure on ecosystem services. These cities have significant synergies between environmental and economic objectives. A clean or effective production and consumption of facilities related to movement of people and goods, waste management and recycling, pollution prevention, treatment, energy, abatement, design, construction, maintenance, resource extraction, agriculture, natural resource management and other environmental services, are the prime component of a green city.

#### 5.4.1.1. Key Benefits of Green city

- **Effective Land Use:** Green cities promote effective land use and get rid of urban sprawl by encouraging compact mixed-use developments. Higher urban densities are promoted without affecting the quality of life.
- **Habitat Prevention and Restoration:** These cities aim to prevent damage to the natural landscape, productivity of agricultural land, biodiversity and natural habitat. Such green spaces improve the quality of air and canopy covers reduces noise level.
- **Efficient Transportation Management:** Green city increases opportunities for non-motorised movement, bicycling, pedestrian friendly network, reduction in the number of automobile trips, promoting public transportation and use of vehicles with alternative fuels.
- **Effective Use of Resources:** Limits the usage of resources by incorporating efficient systems, like:
  - Water Efficiency:** Green city includes “R3” (reduce-recycle-reuse) strategies and can save potable water to an extent of 30-40% including water harvesting.
  - Energy Efficiency:** On-site power generation using various renewable energy technologies and other clean fuels can significantly reduce the load on grid power supply. There can be energy saving to the tune of 20-30%.
  - Waste Management:** Waste management in Green Cities are well planned which takes into account waste reduction initiatives by planning and implementation of efficient and effective systems for collection, transportation, treatment, recycling and reuse or disposal of municipal solid waste. Also, Waste-to-energy is a key component of green city.
- **Other Benefits:** Reduced maintenance costs, resource consumption, waste generation along with higher marketability and speedy environmental clearance approvals.

#### 5.4.1.2. Green city Planning Components

##### Site Selection and Planning

Green city development in India is a new effort. West Bengal Government and Maharashtra Government have recently taken initiatives. Green city initiatives should on publically owned land with minimum site disturbance should be preferred during site selection in case of a Greenfield township. Priority should be given to the already developed land in order to achieve green redevelopment.

### Land Use & Transportation Planning guidelines for green cities

1. Urban sprawl is controlled by practicing higher density development
2. Green cities should majorly use public transportation to reduce fossil fuel consumption & vehicular emissions. The proximities of basic transportation mode should be in walk-able distance.
  - a. Eco- friendly transportation services should be preferred which runs on CNG, bio-fuels, solar battery etc. Thus, Non-Motorised Transport (NMT) and Intelligent Transport System (ITS)<sup>34</sup> should be encouraged.
  - b. Requirements:
    - i. **Rail Station Proximity:** Locate a city project within 1/2-mile (800-meter) walking distance as far as possible (measured from a station building entrance) of an existing or planned commuter rail, light rail or subway station.
    - ii. **Bus Stop Proximity:** Locate a city project within 1/4-mile (400-meter) walking distance as far as possible (measured from a main building entrance) of 1 or more stops for 2 or more public, campus, or private bus lines usable by building occupants.
    - iii. **Public Transportation Proximity:** Locate the project within ¼-mile (400-meter) walking distance as far as possible from the bus stop. Rideshare options should be promoted which include passenger ferry terminals, vans and IPT, such as rickshaws, that are authorized by the local transit authority and that meet the definition of public transportation.
3. About 25-35 % of total area should be earmarked as recreational and open spaces within the Green City in addition to environmental sensitive areas, which must be protected.
4. Locate basic amenities within walk-able distances to reduce dependency on automobiles
  - a. Basic amenities like ATM, Parking, Convenience shopping, religious facilities, crèche etc. should be within 600-800 meters.
  - b. Amenities such as School, Medical Clinic, Community hall with sports facilities, Restaurant etc. within 1.6 - 2 km.
5. Provide a non-industrial mixed land use by including at least 3-4 developments like Offices, Hospitals, Retail, Recreational areas, etc.
6. Economic sustainability and resilience are important aspects of green cities. Provide good connectivity and accessibility by *green mobility*. Provision of TOD to create economic opportunities and facilities around multimodal nodes of infrastructure.
7. The need of differently abled / physically challenged / disabled people should also be adequately addressed.

### Infrastructure Resource Management

Green cities are required to be developed as a self-sustained entity i.e. the place where the resources can be utilized in a recycled and reusable approach, so that the dependency over the civic bodies can be minimized.

**Addressing water supply:** It should be mandatory for a green city to practice the rainwater harvesting to enhance groundwater table through recharging and reduce municipal water demand. As a whole, water supply should comply with the R3 (*Reduce-Recycle-Reuse*)<sup>35</sup> concept in order to address the water related issues. Grey water reuse shall be built in the infrastructure set-up (refer Chapter 8 for details).

**Efficient energy:** Green cities shall majorly emphasize on non-conventional sources of energy, at least 10% of city's peak electricity load<sup>36</sup>. Solar energy, Waste-to-energy, Landfill Gas Energy and Wind energy are some of the alternative sources that can be integrated with the green city development to reduce the load on grid power. Further attempts should be made to guide and channel prevailing wind

<sup>34</sup>Green Module, A study of West Bengal.

<sup>35</sup>Ibid.

<sup>36</sup>Pasadena Green City Report.

through sensitive design of roads, related plantation and maintenance of building lines. This should reduce heat island formation and also make mobility including cycling and walking easier.

**Waste reduction:** The aim should be to achieve “Zero Waste” to landfills. “User-friendly” recycling and composting programs should be implemented with the goal to reduce at least 20% per capita solid waste disposal to landfill. Use of eco-friendly materials (e.g. heat repellent material) are recommended including use of hollow AAC Blocks for better insulations.

**Case study: Vancouver, the Greenest City**

**Vancouver** is the world's most liveable city as per the Economist magazine. It's proved to be not only the most liveable, but also Canada's model for using renewable energy sources.

- 93% of Vancouver’s electricity is generated from renewable sources.
- The City has implemented the greenest building code in North America.
- The City has shifted investment to walking, cycling and transit infrastructure instead of building new roads.
- Vancouver has the smallest per capita carbon footprint of any city in North America.
- By 2020, reduce waste heading to landfills or incinerator by 40% and over 50% of commuter by walking, biking or public transport.



Source: Greenest City Action Plan, City of Vancouver

**Microclimate change<sup>37</sup>**

Green cities can be planned in accordance with the microclimate. Conditions of wind, sun, radiation and humidity experienced at a particular location around the built mass contribute to microclimate and understanding of these can create energy efficient landscapes for buildings and comfortable dwelling units.

Proper practices that affect microclimate can reduce pressure on artificial temperature reducing power consumption and ultimately GHG emissions, which is explained below:

1. **Street Orientation:** Street geometry and orientation influences the amount of solar radiation received by street surfaces, as well as the potential for cooling of the whole urban system. The streets can be oriented (as mentioned earlier) parallel to prevailing wind direction for free airflow in warm climates. Preferably, the street orientation in Indian context should be E-W, as the buildings will be oriented N-S, thus there will be easier seasonal solar control as the walls are protected in the summer and exposed in the winter.

<sup>37</sup>MNRE, Solar Energy, Chapter 2

- 2. Water bodies:** Since water has a relatively high latent heat of vaporisation, it absorbs a large amount of heat from the surrounding air for evaporation, which cools the air. The wind pattern at a site is also influenced by the presence of water body. Therefore, water bodies such as lakes, ponds or fountains should be provided.
- 3. Open spaces & Vegetation:** Open spaces such as courtyards can be designed, that can act as heat sinks. Grass cover and shading which gives cooling effect. Plants adsorb radiations and cool the environment. Planting a deciduous plant (e.g. Mulberry, Champa) on East and West side provides shade from intense and glazing morning and evening sun in summers, cut off hot breeze, and also allow solar radiations in winter as they shed the leaves in that period.
- 4. Semi-pervious ground cover:** Semi-pervious paving which allow percolation of water into the underground water table.
- 5. Green Buildings:** A green building is one, which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building. As an added benefit, green design measures reduce operating costs, enhance building marketability, increase worker productivity and reduce potential health impacts resulting from indoor air quality problems.
- 6. Solar Passive Design<sup>38</sup>:** Passive solar design refers to the use of the sun's energy for heating and cooling of living spaces. In this approach, the building itself or some element of it takes advantage of natural energy characteristics in materials and air created by exposure to the sun. The key features lies with solar passive design are: Orientation of building, Sunshades, Window design, double glazed windows, Building insulation, Roof treatment, Evaporative cooling, Landscaping, Surface to volume ratio, Passive heating, Earth air tunnel, Solar chimney, and Wind tower.
- 7. Green Roof:** Green roofs are roofs that have a layer of living plants on top of the standard structure and waterproofing elements. It helps in reducing Urban Heat Island Effect and also delays storm-water runoff. It also reduced energy consumption. Thus, adaption of this technology throughout the city will increase the green area; hence areas with construction can also be converted to green area.

For development of green buildings, the norms as suggested by MoE&F and various bodies such as LEED, IGBC or GRIHA may be applicable depending upon the requirements.

An effective design of green city for its various components can even reduce crime. Green cities promote features that maximize visibility of people, open spaces in and around the campuses and building entrances looking over the streets and parking areas, pedestrian-friendly sidewalks, which allows natural surveillance.

### 5.4.1.3. Redevelopment of brownfield sites

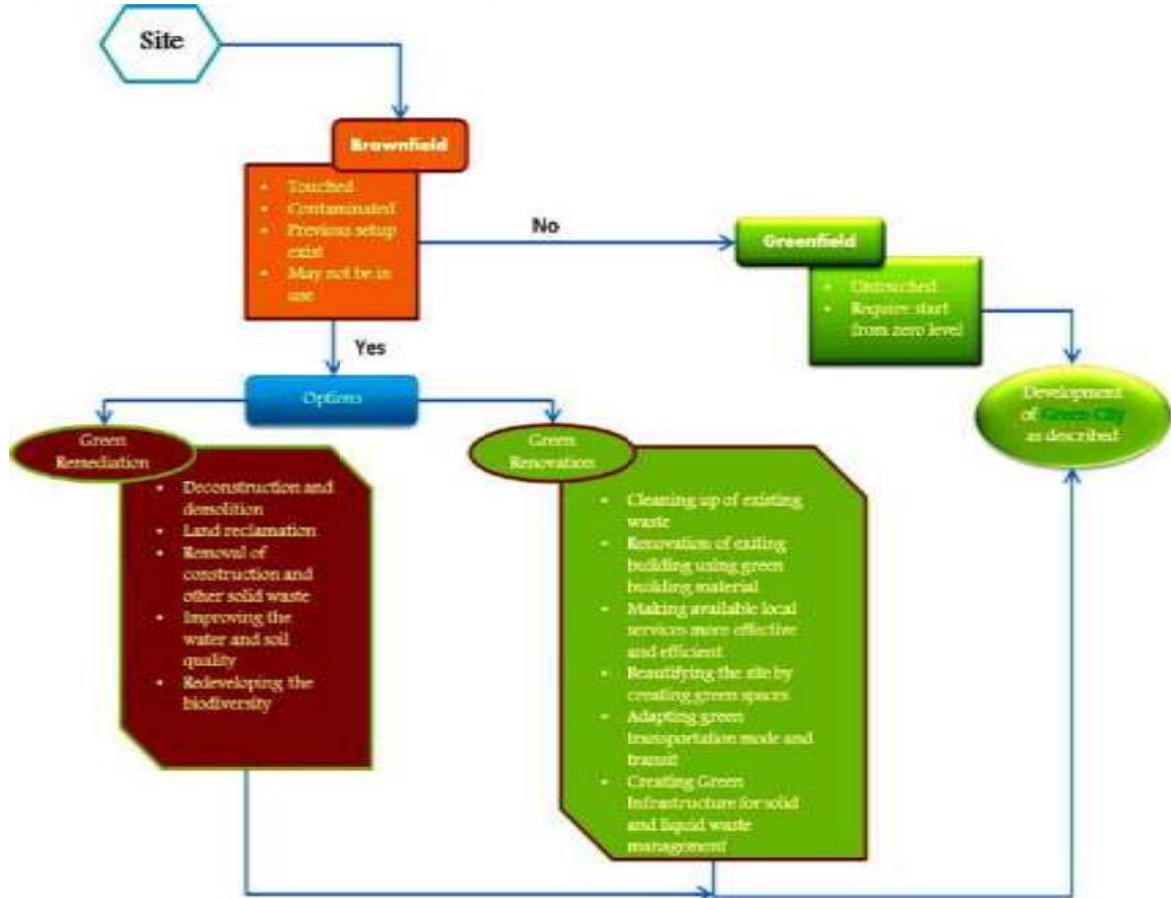
Priority shall be given to redevelopment of contaminated and dense sites, which are environmentally degraded or demographically saturated. Focus should be on green redevelopment of such site, which can improve the overall condition of existing sites. Thus, it is advisable to prefer redevelopment on brownfield sites than fresh development on a greenfield site until absolutely essential. In such a case, brownfield

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<sup>38</sup>TERI with support of MNRE

redevelopment makes efficient use of existing infrastructure. The process for the decision and actions is given in the figure below:

Figure 5.1: Way towards Green Redevelopment

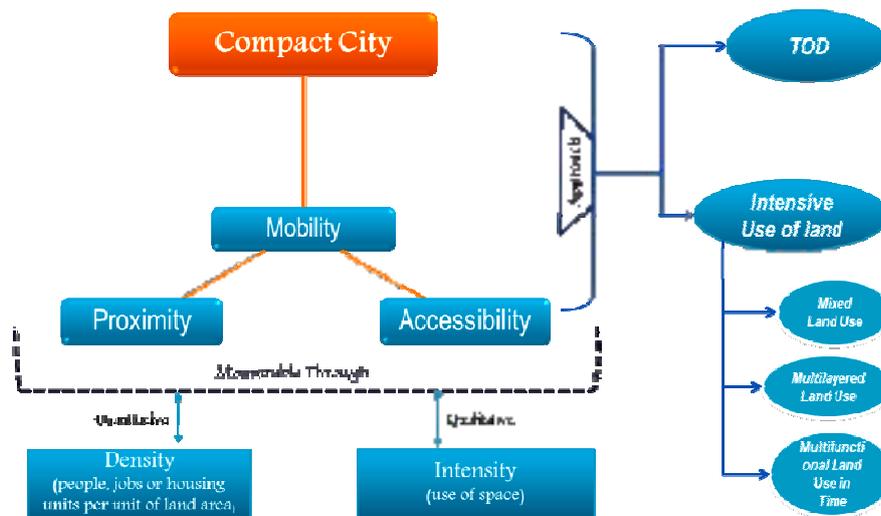


### 5.4.2. Compact city

Urban sprawl is a resultant of an ever-expanding city jurisdiction due to absence of compact development practices. This has resulted in undesirable extension of urban infrastructure, encroachment of valuable agricultural land, raising cost of development and also increasing carbon, water and energy footprints.

Concept of Compact City revolves around high-density development without compromising the quality of life of the people. Cities based on compact approach may or may not incorporate all dimensions of a green city approach, stated under **section 5.4.1**. This approach largely solves the problem of externalities such as friction on space (congestion), travel time delays and losses in economic productivity, air and water pollution, solid waste collection and disposal. The optimum density reduces the capital and operating costs of providing public infrastructure and services and improves overall accessibility.

Figure 5.2: Compact City's Concept and Approach



Source: Various sources including Fact Sheet, UNESCAP, MILUNET, Practitioner's Guide, 2006 etc.

As shown in the figure above, the efficient densification and effective intensification needs to be balanced in order to maintain the liveability of people.

### 5.4.2.1. Key Benefits of Compact city

The benefits of the compact city approach are:

- Efficient use of land and urban containment
- Increase in the number of ridership for economically viable MRTS
- Environment protection by lowering the climatic change emissions
- Protection of ecological diversity, countryside and land for agriculture
- Efficient delivery of utility services in more densely populated areas. Due to the economies of scale in supplying energy, water and treating waste, it is less costly to deliver urban utility service in compact cities than in suburban areas<sup>39</sup>
- Increased social interaction leading to safety against crime
- Less travelling distances that saves time, money and fuel consumption per capita
- Improved public health by better water and air quality, and by walking and jogging

**The approach of compact city development is given below:**

### 5.4.2.2. Transit Oriented Development

Transit Oriented Development is a compact & integrated transportation development, which should be incorporated in Compact Cities. It is defined as, “any development, macro or micro that is focused around a transit node, and facilitates and complete ease of access to the transit facility, thereby inducing people to prefer to walk and use public transportation over personal modes of transport.<sup>40</sup>”

TOD provides opportunities by access to high-quality public transportation by enhancing connectivity and contributing to attractive and walkable distances through

<sup>39</sup>Fact Sheet, UNESCAP.

<sup>40</sup> Draft UTTIPEC Guidelines, 2012.

densification. TOD Ideal land use mix and mixed land use development (with Density) and the Transit mode function at various city destinations are indicatively explained in the Table 5.3. High density, mixed-use and interconnected street networks reduce per capita vehicular trips. This can be achieved through a balanced mix of job, housing and markets along MRTS corridors.

Table 5.3: Transit Oriented Development Matrix

TOD	Ideal Land use mix and mixed land use development (with Density)	Transit mode function
Core Area	<ul style="list-style-type: none"> <li>▪ Residential: High Intensity</li> <li>▪ Commercial/ Office: Medium Intensity</li> <li>▪ Mixed Use</li> <li>▪ Supporting retails &amp; services</li> </ul>	<ul style="list-style-type: none"> <li>▪ Bicycle Lanes</li> <li>▪ Pedestrian Networks</li> <li>▪ Intermediate transportation supported by non-motorised vehicles</li> <li>▪ Limited Parking Lots</li> </ul>
Commercial Zones	<ul style="list-style-type: none"> <li>▪ Employment (commercial, office, industrial, institutional): High Intensity</li> <li>▪ Supporting retail &amp; services: Medium Density</li> <li>▪ Residential: Minimal</li> </ul>	<ul style="list-style-type: none"> <li>▪ Parking Lots, if required</li> <li>▪ Pedestrian Networks</li> <li>▪ Bicycle Lanes</li> <li>▪ BRT and Bus Stops</li> <li>▪ Intermediate transportation supported by motorised vehicles</li> </ul>
Neighbourhood	<ul style="list-style-type: none"> <li>▪ Residential: Medium Intensity</li> <li>▪ Employment (commercial, office, industrial, institutional): Medium Intensity</li> <li>▪ Supporting retails &amp; services</li> </ul>	<ul style="list-style-type: none"> <li>▪ Pedestrian Networks</li> <li>▪ Bicycle Lanes</li> <li>▪ Considerable Multi-level Parking Areas</li> <li>▪ Intermediate transportation support by non-motorised vehicles</li> </ul>
Peri-urban Area	<ul style="list-style-type: none"> <li>▪ Commercial: High Intensity along TOD</li> <li>▪ Residential: Medium Intensity in inner region</li> <li>▪ Mixed Use including compatible institutional use</li> </ul>	<ul style="list-style-type: none"> <li>▪ Transition to higher density and greater mix of uses close to the transit source</li> <li>▪ BRT and Bus Stops</li> <li>▪ Green Interconnected Pedestrian Network</li> <li>▪ Considerable Multi-level Parking Areas</li> </ul>

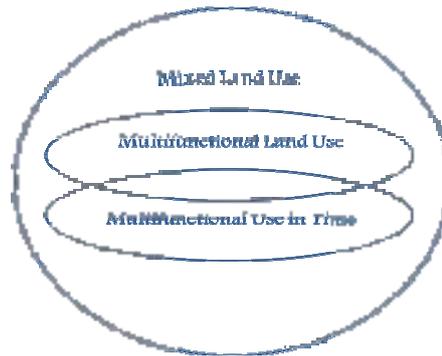
Source: *Transit Oriented Development Policy Guideline, Calgary, 2004.*

As a whole, TOD encourages use of non-motorized transportation, directs compact high-density developments, intensifies under-utilized urban areas through redevelopment, leads to lower infrastructure costs and increases public safety, mobility options and health benefits.

### 5.4.2.3. Intensive Use of land

The intensive land use offers cities the possibility of (re)development of urban areas for a number of functions that, in combination, can offer residents, workers and visitors high quality services. This concept can be sub-divided into three types with combinations as shown in **Figure 5.3**.

Figure 5.3: Types of Intense Land Use



Source: MILUNET, Practitioner's Guide, 2006

**Mixed Land Use:** Mixed-use development is the practice of allowing more than one type of use in a building or set of buildings which can be a combination of residential, commercial, industrial, office, institutional or other land uses. It is presumed that mixed land uses yields socio-economic benefits and therefore has a positive effect on housing and commercial values.

Good mixed-use can be defined as a finely grained mix of primary land uses, namely a variety of housing and workplaces with housing predominant, closely integrated with all other support services, within convenient walking distance of the majority of the homes. (Murrain 1993:86). It is also referred as cellular development. Mixed use is to be carefully allowed along with the compatible use only. The mixed use of land and the dominant use thereof should be referred from Chapter 9 on Simplified Development Promotion Regulations.

The approaches for promoting mixed-use development can be by increasing intensity of land use, increasing diversity of land use or integrating segregated uses. The key parameters for integration of different uses can be:

- The functional and physical integration of different uses such as Residential, Commercial – Retail & service and Public Semi Public.
- Integration of three or more significant revenue producing uses – Industrial, Commercial – Wholesale, Retail & service and Public Semi Public – offices

In an urban space, mixed use development can be planned at selected locations with ideal mix, such as a) City or town centres comprising the commercial and civic core of town and cities, b) Inner city areas and c) Peri-urban locations and greenfield sites in urban fringes as also indicated in **Table 5.3. Mixed layer development/ Multifunctional land use:**

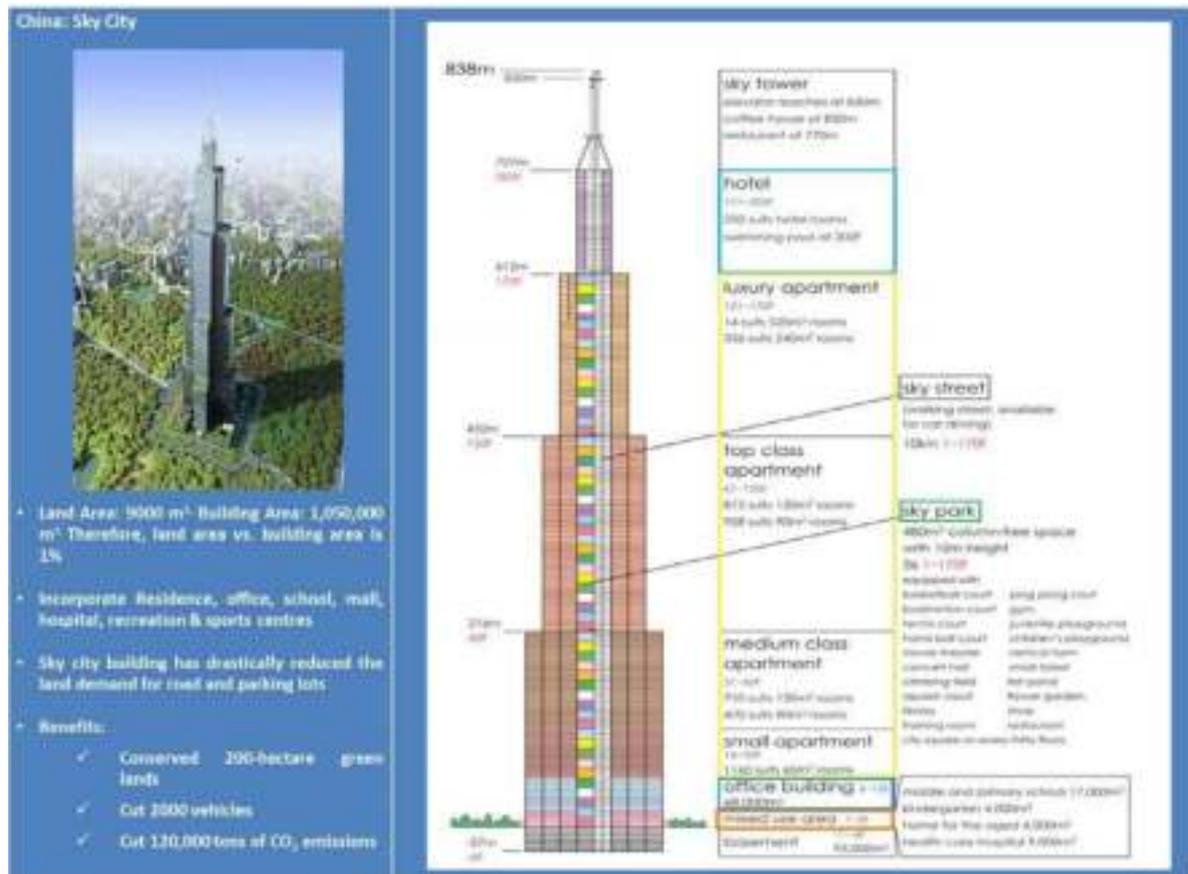
Mixed layer development is based on the principal of high intensity with vertical integration. It is under the category of multifunctional land use and also termed as “Layering Development”.

Vertical integration has many benefits to offer to cities as a whole. Benefits include energy-saving potential, reduction in unnecessary journeys, improves overall accessibility and social inclusion possibilities offered by combining housing, shopping, work, transport, recreation, culture and social functions within one area. This

combination also helps to utilize the full potential of an urban site, leaving sufficient open spaces for a greener surrounding. A mixed-use high-rise development diversifies the use of space within a single building structure, which in turn saves horizontal travelling, and hence additional land requirement.

Mixed layer development provides (re)development opportunities that ease the way towards Compact Cities. This concept should be preferred for abandoned sites within the city instead of building on greenfield sites on the edge of town. Therefore, brownfield sites can be redeveloped to offer a higher building density by layering different functions on top of each other. The land use structure and densities given earlier in this chapter is not applicable for mixed layer development. Such planned areas are proposed to have high average density up to 800-1000 pph, with large open spaces and inter-block margins. Typically, this form of vertical integration land use development has commercial/retail on the street level with offices and recreational commercial on the top levels, while the intermediate levels are for residential, well developed open spaces, institutional. Case study of Sky City, China, is a world-class example, which is explained below.

Figure 5.4: Case Study of China Sky City



Source: Sky City, China.

High-rise development may limit the access of light to the lower storeys and therefore demands slender buildings or appropriate setbacks from the boundary wall. The

recommendations of the Expert Advisory Committee (EAC) for high-rise buildings are:

- The height of the building should be linked with the width of the road on which the proposed building is to be located;
- Also the distance of Fire Station from the building so that in case of emergency, the Fire Tender may reach in the shortest possible time.

The EAC also recommended that the provisions and the guidelines, as applicable, of the State Departments and National/State Disaster Management Authority should be strictly followed<sup>41</sup>.

### Multi-functional use in time:

A public space or a building can have different functions at different time periods. For example use of spaces even buildings can be used in shifts in a day allowing different types of uses in different shifts.

School playground, which can be utilized by the students during school hours and later in evening wherever possible, can be used for sports training and practice purposes or public stadium which can be seasonally used as fair grounds. Such areas can be considered especially in small size towns where infrastructure and funds are limited.

### 5.4.3. Smart City

A smart city uses information, communication and technology to enhance its liveability, workability and sustainability. A smart city is build-up by key basic functions: Information collection, communicating, and crunching (analysing). The two basic steps towards Smart city are:

1. **DATA**- Created by the already implemented information technology. Some of the Indian cities have created a cornucopia of data in past few decades, which can form the basis for the development of a Smart city.
2. **DIGITAL DNA (BUILT ENVIRONMENT DATA)**-Data collected by building departments, engineering departments, land department, planning department, tax department and department of postal services. India is still finding its footprints in this regard.

In view of rapid urbanisation and high congregation of population in large cities, it is imperative to make use of advances in technology, capability to make cities safer and protect cities from cyber-crime and also augment the quality of governance with higher levels of transparency and accountability. Such cities, which take advantage of advanced technology, are called as Smart Cities.

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<sup>41</sup>MoEF Office Memorandum, Guidelines for High Rise Buildings, 2012.

### 5.4.3.1. Important Insights

The following figure provides the important insights of Smart City application globally.

Figure 5.5: Important insights of SMART city application globally

NEED	DRIVERS	ELEMENTS
<ul style="list-style-type: none"> <li>• Growing urbanization</li> <li>• Growing stress</li> <li>• Inadequate infrastructure</li> <li>• Growing economic competition</li> <li>• Growing expectation</li> <li>• Growing environmental challenges</li> <li>• Rapidly improving technology capabilities</li> <li>• Protection from Cyber Crime</li> <li>• Revolutionize people's relationship with Govt.</li> </ul>	<ul style="list-style-type: none"> <li>• Legal provisions and Insurance</li> <li>• Planning and design</li> <li>• Construction Commission and handover</li> <li>• Facility operations-</li> <li>• Space planning, Asset Management, Maintenance, Environment Health and Safety security</li> </ul>	<ul style="list-style-type: none"> <li>• Energy</li> <li>• Water</li> <li>• Waste</li> <li>• Infrastructure</li> <li>• Public Safety</li> <li>• Education</li> <li>• Health Care</li> <li>• Green Buildings</li> <li>• Transportation</li> <li>• Citizen Services</li> </ul>
BENEFITS	BARRIERS	INITIATIVES TAKEN
<ul style="list-style-type: none"> <li>• Enhanced Livability-Better living conditions</li> <li>• Enhanced Workability-Better working conditions( broadband connectivity, clean, reliable, inexpensive energy, efficient transportation</li> <li>• Enhanced Sustainability</li> </ul>	<ul style="list-style-type: none"> <li>• Siloed, piecemeal implementations</li> <li>• Lack of Financing</li> <li>• Lack of ICT know-how</li> <li>• Lack of Integrated Services</li> <li>• Lack of citizen Engagement</li> <li>• Lack of a Smart City Vision</li> </ul>	<ul style="list-style-type: none"> <li>• Installation of smart meters and sensors</li> <li>• Smart thermostats and Building management system</li> <li>• Healthcare consultation via computer</li> <li>• Installation of intelligent transportation management software, roadway sensors, smart parking apps.</li> <li>• Setting up of Smart Grids</li> </ul>

Source: Various sources including Smart Cities Readiness Guide, RICS-Smart Cities.

### 5.4.3.2. Universal Targets to achieve Smart city development

There are mandatory targets that must be accomplished in order to propel on the smart city path, these are termed as “Universal” as each of them applies to every city responsibility. **The Check Sheet (Implementation Progress)** reflects the strong and the weak points in the existing city infrastructure. Status of this matrix reflects the preparedness of the city to be a Smart city and helps in prioritizing the points on the basis of the status (progress) in order to drive on the path of development towards being a Smart city.

Figure 5.6: The Universal Targets

Enabler	Universal Targets	Implementation Progress			
		None	Partial	Over 50%	Complete
	<b>How Smart Cities Deploy and Use ICT</b>				
Instrumentation and control	Implement optimal instrumentation				
Connectivity	Connect devices with multi-service communications				
Interoperability	Adhere to open standards				
	Use open integration architecture and loosely coupled interfaces				
	Prioritize use of legacy investments				
Security & Privacy	Publish Privacy Rules				
	Create a security framework				
	Implement cyber security				
Data Management	Create a citywide data management transparency and sharing policy				
Computing Resource	Consider a cloud computing framework				
	Use an open innovation platform				
	Have access to a central GIS				
	Have access to comprehensive device management				
Analytics	Achieve full situational awareness				
	Achieve operational optimization				
	Achieve asset optimization				
	Pursue predictive analytics				

Source: Smart Cities Readiness Guide.

**The essential elements of focus in a Smart city include:**

### 5.4.3.3. Smart grid concept

A **smart grid** is a modernized electrical grid that uses analogue or digital information and communications technology to gather and act on information, such as information about the behaviours of suppliers and consumers, in an automated fashion to improve the efficiency, reliability, economics, and sustainability of the production and distribution of electricity. Metering and Smart power generations are the two basic steps taken in the direction of handling power in cities.

- a. **Smart meter-** Smart meters help utilities to better detect and manage outages. Smart meters coupled with advanced metering infrastructure (AMI) helps to pinpoint problems in the grid, allowing determination of faults and failures in no time<sup>42</sup>.
- b. **Smart power generator-** Smart power generation is a concept of matching electricity production with demand using multiple generators, alternatively to buffer the peak and high demand for load balancing. These generators are designed on smart technologies to operate efficiently at chosen load<sup>43</sup>.

### 5.4.3.4. Smart Transportation Concept

The smart transportation refers to the integration of information and communication technologies with transport infrastructure to improve economic performance, safety,

<sup>42</sup>A U.S. Department of Energy study showed that real-time pricing information provided by the smart meter helped consumers reduce their electricity costs 10% on average and their peak consumption by 15%.

<sup>43</sup>Source: GE: Smart grid technology guide.

mobility and time saving of the citizens. The above can be accomplished by incorporating the following technologies in the existing structure:

- a. **Digital view terminals**-These terminals provide users with an intelligent navigation system that optimizes the best routes, alternative destinations, efficient movement by a well-informed guidance from the terminal. For example, the entire city's bus lines, their stops, and drop-off and pick-up times are displayed on the terminals along with satellite street views of locations, such as of restaurants and other tourist attractions. Coordinates for banks, schools, hospitals, and real estate are also featured for the citizens to determine best-suited route between destinations.
- b. **Intelligent roads**- It includes setting up of sensor technologies in the pavements and over the bridges, which can be combined with the data collected from moving vehicles to provide operators, maintenance authorities and road users with rapid warning of emerging problems.
- c. **Traffic Prediction Tool**-It predicts traffic flows over pre-set durations (10, 15, 30, 45 and 60 minutes) by stimulations. With these predictions, traffic controllers can anticipate and better manage the flow of traffic to prevent congestion and save time.

Other smart applications in the intelligent Transportation system may consist of:

- Optimised dynamic signalling
- Automatic parking system,
- Advanced Driver Assistance Systems (ADAS),
- Satellite application for emergency handling, traffic alerts, road safety and incident prevention
- Automated transport systems.

#### Case Study: Malta, World's first Smart Island

Malta is a group of small islands 50 miles to the south of Sicily. Smart meters are installed in the island for both electric and water customers. These smart meters records the data automatically and sends the data back to the office for billing. Smart meters also act as the analysis instrument that locate problems and determine when and whether to expand the grid. The new smart water grid has increased theft detection, and has also introduced **new pricing options for customers that reward conservation**.

Figure 5.7: Malta: World's first Smart Island



Source: Smart Cities Council-Readiness Guide

The goal of Smart City Malta is to put everything a high-tech company needs to succeed in one place, including state-of-the-art ICT infrastructure along with a host of IT, media and production services.

### 5.4.3.5. Application of Built Environment Data

The built environment data of the city is captured by the different departments to develop a blue print of the city and its attributes for virtual representation of the physical city. This data forms the DNA for the smart city. It includes:

- Demographic distribution
- Land uses
- Transportation and other infrastructure framework
- Forests and parks
- General urban plan
- **Space and organization plan:** This data when linked with the Information communication and technology develops the digital DNA, which forms the basis for the Smart city. The software and service layers for the built environment data can contain the following layers<sup>44</sup>:
- **Data layer:** that presents all the information, which is required, produced and collected in the smart city.
- **Service layer:** This incorporates all the particular e-services being offered by the smart city.
- **Infrastructure layer:** that contains network, information systems and other facilities, which contribute to e-Service deployment.
- **User layer:** that concerns all e-service end-users and the stakeholders of a smart city for dialoguing and in decision-making. The participation includes:

The local *stakeholders* –who supervise the smart city, and design

Those who offer e-services- and

The *end-users* –who “consume” the smart city’s services

### 5.4.3.6. Urban planning and smart city interrelations

On the attributes discussed in the preceding section, various e-service portfolios can be offered in a modern smart city, some of which have been mentioned below:

Table 5.4: e-Services of a Smart city

e-Services	
<b>e-Government</b>	Public complaints, showing administrative procedure, bringing transparency in governance.
<b>e-democracy</b>	Performing dialogue, consultation, polling and voting of issues of city.
<b>e-Business</b>	Supports business installation.
<b>e-health and Tele-care</b>	Distant support and services to elderly, civilians with diseases, disabled
<b>e-learning</b>	Distant learning opportunities, training material to the students.
<b>e-Security</b>	Supports public safety via amber-alert notifications, school monitoring and natural hazard management
<b>Environmental services</b>	Information about recycling, guide households and enterprises in waste/energy/water management
<b>Intelligent Transportation</b>	Offers tools for traffic monitoring, measurement and optimization.
<b>Communication services</b>	Broadband connectivity, digital TV

Source: Compiled from *Urban Planning & Smart Cities: Interrelations and Reciprocities*, Leonidas G. Anthopoulos.

<sup>44</sup>Source: *Urban Planning and Smart Cities: Interrelations and Reciprocities*, Leonidas G. Anthopoulos.

## 5.5. City Typology

Urbanisation over centuries and evolving city morphology has given shape to the present day cities in India. Most post-independence cities have emerged from planned directions and yet have experienced population explosion. Cities also have benefited from planning based on Government schemes and programmes. However, the functions of the urban centres have taken natural course to its maturity, without or with intended interventions. These are the consequences of response of human settlement and interaction of societies. Focus on planning even application of land use standards and development controls could vary depending upon the typology of the cities.

**Situation of the city:** Situation of the city is the prime factor to be considered while planning. City situation is established on its growth in size, physical configuration or route pattern and largely with its function. Cities, besides multi-functional, can be also defined on the basis of the prime economic activity and/or evolution of the city. Such cities with typical location, situation and functions need focused approach while planning, to address the associated issues. Some of such kinds are:

- Hill cities,
- Inner cities/ walled cities,
- Industrial cities,
- Religious cities,
- Tourism cities,
- Heritage cities,
- Port cities,
- Medi-cities (townships),
- Sports cities (townships)

**Site and situation specific solutions:** These cities, owing to its nature of development and population, and either permanent, new settlers or floating population, have specific functions and therefore have associated issues. Some of the generic ones are:

- Lack of alternative economic activities,
- Stagnation of city growth,
- Strict segregation of classes by profession and income,
- High crime rate,
- Lack of public spaces,
- Lack of recreational activities,
- Lack of educational facilities for low income class/ poor,
- Significant ratio of bachelor population,
- Lack of gender specific health facilities and other facilities,
- Investment oriented land/property ownership,
- Others: pressure on public utilities, lack of social guidance in case of exposure to cultural variation etc.

Such as, in case of industrial cities or township, specific drawbacks are observed like lack of recreational activities, lack of alternative economic opportunities, and social activities. These townships are limited to work - home relationship and lack

recreational activities and therefore, there is a need to focus on providing dedicated public spaces for population to interact in such cities/towns.

Similarly, other city typologies also have specific issues to be addressed for which approach can be defined while preparing plans. Mix of economic activities such as service industries and social activities should be promoted to encourage the avenues for wholesome development.

Increased rate of crime as observed in some industrial and port town is primarily due to segregation of population income classes, lack of recreational activities, lack of educational facilities for low income class, and to some extent due to high proportion male workers living without families and also large number of bachelor population.

Therefore to promote sustainability of cities, its situation in terms of its function and its social behaviour shall be addressed. Such cases need emphasis on complimentary requirements of the city, besides its prime economic activity and physical infrastructure for holistic development of the city. Some of the complementary activities are suggested below-

- Promotion of service industries,
- Educational facilities with emphasis on technical institutes
- TOD mix of institutional and administrative land use,
- Social infrastructure, targeting needs of specific strata of population
- Recreational facilities, also theme based facilities
- Heritage and religious activities to be promoted for mixing of economic base and population
- Earmarked spaces for the urban poor / informal sector residents or their activities<sup>45</sup>.

### 5.5.1. Hill city

The National Building Code defines hilly areas as “Any area above 600 m in height from mean sea level, or any area with average slope of 30°, considering the sensitive and fragile eco-system of hills and mountains.” However, the State Governments may identify and notify areas to be covered under ‘Hilly Area’, which need to be dealt with special consideration, when developmental activities are taking up.

Hilly areas have fragile ecosystems, which need to be conserved. Therefore planning and development strategies for hilly areas shall have to be designed with added sensitivity and sound land use planning and settlement planning.

#### 5.5.1.1. Associated Issues

Hilly areas have a sensitive ecosystem consisting of mountains, rivers and valleys, several lineaments and some of them even experience extreme weather conditions. These varied natural features also make hilly areas a suitable place for tourist destination, thus creating a pull for commercial development and urbanisation. Also, many rivers originate from the Northern Himalayan range, thus the areas attract

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<sup>45</sup> Also Suggested in ‘Strategy paper on master plan formulation, inclusive planning, prioritization for housing and pedestrian movement, 2010’

development of hydro power plants, which directly or indirectly have shown great impact on the river hydrology and bio-diversity.

The common issues associated with planning in Hilly areas are:

- Hilly areas in Himalayas and Northeast experience heavy rainfall, which makes the shallow soil, cover highly susceptible to erosion (such as in Darjeeling)<sup>46</sup>. These conditions necessitate conserving the precious soil cover during monsoons and harvesting irrigation water for dry months. In other areas heavy rainfall causes deep weathering of sedimentary rock and rapid and active erosion of weathered materials from steep slopes.
- There are issues with respect to mobility and connectivity due to steep slopes and difficult terrain.
- Also geographically younger hill areas with high seismic activities make settlements vulnerable to disaster risks. In such areas regulating construction activity is of prime importance in planning. Adherence to seismic code specific to seismic design of buildings is to be made mandatory for plan approval in hill areas.
- In hilly areas, remarkable variations in culture and practices (including in many places tribal culture and rich craft skill) exists between the settlements even within short distances as compared to those in plain areas<sup>47</sup>
- As terrain plays a crucial role in the hilly areas, settlements are to be on definite habitable lands only and thus, its carrying capacity needs to be determined for adequate planning.
- The planning status of hilly areas, in the present state, is uncontrolled creating haphazard growth due to need for urbanisation, industrialisation (such as quarrying and hydro power generation) and intrusion of commercial activities (such as tourism industry) on the limited land cover, typically along hill routes. These trends has led to encroachment on forest land and precious green cover, construction on unsuitable lands and development at higher level of ridges, thereby disturbing the natural ecosystem and making the areas more vulnerable to disasters.

The impacts on infrastructure are - traffic chaos, inefficient service infrastructure and congestion in prime locations, inadequate social infrastructure.

The impacts on the environment are loss of hill and forests, degradation of stream system, landslide and erosion, increase in natural hazard as earthquake, landslide and manmade hazards such as air pollution and roadway noise.

### 5.5.1.2. Strategies for Development

Hilly areas have various factors, which necessitate a thrust on adoption of an integrated planning approach for conservation, preservation and planned development.

#### Strategy 1: Land Conservation and Optimisation:

- 1) **Environment Inventory/ Impact Assessment:** For planning of the new settlements or working out the strategies for the growth of the existing settlements, it is necessary to conduct detailed environmental inventory/ impact assessment. The inventory would involve geological investigations, slope analysis, soil, flora and fauna analysis, climatic inventories, vulnerability to natural disasters (such as earthquakes, landslides, floods etc.), etc. In addition to this the aesthetic factors, cultural, architectural and historical heritage, scenic/ landscape value shall also be taken into consideration.

<sup>46</sup>Planning Commission Report of Task Group on Problems in Hilly habitations.

<sup>47</sup>Report of the Evaluation Study on Hill area Development programme in Assam and West Bengal", Planning Commission, June 2010.

- 2) **Identification of Developable Area:** Identification of developed area is calculated by deducting the natural ecological area from the entire township jurisdiction. Jurisdiction may be large to control the surrounding areas. The classification of land uses should be given only for developed area, while the rest of the ecological area shall be for conservation or restoration.

*Hill Town Developable Area = Hill town jurisdiction area – Natural Ecological Area.*

- 3) **Land use optimisation:** Keeping in view the scarcity of good buildable land and also the high cost of the construction, it is necessary to optimize the use of land by calculation of carrying capacity and land suitability analysis. Green building approach should be adopted such as use of cost effective and appropriate building materials and technologies.

### Strategy 2: Sustainable development based on Watershed Management:

A watershed, also called a drainage basin or catchment area, is defined as an area in which all water flowing into it goes to a common outlet. People and livestock are the integral part of watershed and their activities affect the productive status of watersheds and vice versa. From the hydrological point of view, the different phases of hydrological cycle in a watershed are dependent on the various natural features and human activities. In hilly areas or where intensive agriculture development is planned, the size of watershed relatively preferred is small.<sup>48</sup> Watershed managements, i.e. river basin management also is important in the context of regional planning both in terms of as a source of water and sources of disaster risk like flood etc.

During the Tenth Five Year Plan of Government of India, emphasis was on watershed development and ecological restoration/preservation for the hill areas of Assam and West Bengal. In the sixth Five Year Plan, the Planning Commission had suggested achieving a balance between beneficiary-oriented and infrastructural development programmes, keeping in view the vital importance of ecological restoration and conservation. This can be achieved through<sup>49</sup>:

- Better water and land-use and control of soil erosion through watershed management,
- Afforestation, silvi-pasture development and replacement of annual crops with perennial shrubs and trees and plantation crops in steep slopes and development of other high value-low volume crops linked with processing and marketing.
- Rural and small industries and electronic and precision instruments industries can also be promoted taking advantage of favourable weather conditions.

To understand watershed system data from latest and authentic sources to be collected (details provided in **Chapter 7**), simulation models may be used to analyse (drainage pattern modification) scenarios before Development Plan Preparation and building regulations.

<sup>48</sup><http://oar.icrisat.org/3914/1/1. Watershed Management Concept.pdf>

<sup>49</sup><http://planningcommission.nic.in/plans/planrel/fiveyr/6th/6planch25.html>

### 5.5.1.3. Proposed Land use Structure of Hill Towns

The proposed land use structure for hill towns are:

Table 5.5: Land use structure for hill towns

Land use Category	Percentage of Developed Area		
	Small	Medium	Large & Metropolitan Cities
Residential	50-55	48-52	45-48
Commercial	2-3	2-3	4-5
Industrial	3-4	4-5	4-6
Pub. & Semi Public	8-10	8-10	12-14
Recreational	15-18	15-18	16-18
Transport & Communication	5-6	5-6	6-8
Ecological	Balance	Balance	Balance

Source: UDPM Guidelines, 1996.

The ecological area (non-developable area) given in the table above for Hill towns is applicable for the hill town jurisdiction developable area only. Hill town developable area shall be considered as area hill town jurisdiction minus natural ecological area. Where, non-developable area is defined as- Earthquake/landslide prone, cliffs and environmentally hazardous area, areas adjacent to fault lines, areas with slope higher than 45°, flood plain and areas adjacent to major drainage lines for general guidance and all environmentally sensitive areas. Land suitability analysis should be an important tool in first principal approach for deciding on land use proportions.

### 5.5.1.4. Aspects of planning<sup>50</sup>

The important aspects to be considered in planning for the hilly areas are suggested as below:

1. The hillside with less than 30° slope are in general stable. Therefore, building sites (temporary or permanent) should in general be located on hillside with not more than 30°- 45° slope. In areas where most of the land is above 30° degree slope, spatial regulations should control construction activity on slopes above 30° degree with maximum of 45° provided that appropriate technology is used.
2. The maximum height of the building to be fixed, such as in States of Meghalaya maximum building height permitted is 15 meters on hills.
3. Flat land is normally not available in hilly regions. The houses are required to be constructed on partially sloping land made available by cut and fill. It shall be necessary to protect the house by building retaining walls/breast walls to avoid landslides occurring at time of earthquakes or heavy rains.
4. Cut slopes with height less than 5 m or two to three storey heights of residential buildings are in general stable. For higher cut slopes special investigation should be carried out and details of protection works should be worked out and implemented.
5. Site development in hilly regions consumes about 30 to 40 per cent of total cost of building complex, therefore the following investigations shall be done to obtain the following geotechnical parameters:

<sup>50</sup>NBC, 2005 & IS 14243, 1995 b.

- a. Type of Soil Rock: Weathered or intact, dip of bedding planes, drainage conditions, shear planes, material between the joints, tension cracks, type of plantation, verticality of trunks of the trees etc. Cliff sides and spur faces need to be protected with appropriate technology including where netting with tables and/or blowing of RCC along the walls.
  - b. Thickness of overburden, nature of soil strata, details of soil matrix etc.
  - c. Estimation of shear-parameters of the in situ soil mass, which will govern the failure.
  - d. Drainage pattern of the area and permeability tests in the area to see the Drainage conditions.
  - e. Specific slip zones in the area, if any.
6. Roads and paths: Street orientation shall preferably be East-West to allow for maximum South sun to enter the buildings. The street shall be wide enough to ensure that the buildings on one side do not shade those on the other side. Hill Road Manual (IRC: SP: 48-1998) should be referred to for detailed guidelines for planning roads in Hilly Areas.
  7. Provisions for Landslide Hazard Mitigation, Seismic Micro-zonation and mitigation of Liquefaction hazard should be integrated.

### Specific aspects for New Hill Towns:

1. The new hill towns will have to follow the basic principles of hill architecture including use of local building materials, slanting roofs, seismic bands in structures etc. so that they merge in cultural landscape of their regions.
2. Travelling time from nearest town to the new township should be at least one hour or 20 Km.
3. The new town should be self-sufficient in infrastructure and its area should ideally not be less than 40 hectares.
4. Provision of facilities for additional (and /or floating) population should be made.

### Specific aspects for Buildings in Hilly area:

1. A minimum clearance of 1.5 m should be provided between toe of boundary wall and building wall.
2. On the uphill side of the building on a sloping site, the natural flow of the water shall be diverted away from the foundations.
3. The slope of ground all around building should be not less than 1: 50 built in such a way that rain water does not find way to ingress in ground excessively and moves away quickly to surface drains or away on adjoining hill surface towards natural streams.
4. A minimum of 0.75 m wide apron should be provided all around the building to prevent entry of water into foundation.
5. Stepped terrace development and stepped storeyed building construction may be adopted for offices, schools and other building complexes<sup>51</sup> because of following advantages:
  - a. It results in least hill cutting, disturbance to hill stability and also in least deforestation.
  - b. Cost of site development works, slope protection and other protection works is reduced considerably.
  - c. Least load comes on valley side, so danger of foundation failures is avoided.
6. Buildings to be provided with good drainage facilities to prevent excessive saturation of sub surface formations. Construction should not obstruct existing surface drainage courses.
7. Buildings shall be located on the south slope of a hill or mountain for better exposure to solar radiation. At the same time, locating the building on the leeward side may minimize exposure to cold winds.
8. Appropriate solar passive methods, such as orientation, double-glazing, trombe walls and solar collectors, to be adopted to achieve climatic comfort with little use of conventional energy.

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<sup>51</sup>(Refer conditions of development from IS 14243 Part 2: 1995 for details )

## 5.5.2. Planning for Inner city

Walled cities, old city, often central zones, which are also generally the core area of the settlements, are referred as inner cities. These city parts have been the melting pot for cultures with a history. Some of the old cities have been historically an important trading centre, owing to its regional prominence, strategic location and trade links. However, owing to its prosperity, some of the cities were under the threat of plunder and loot, which reshaped the city form over the centuries (as also walled cities). These cities are marked by key features, such as, narrow roads (gullies), dense built-up, often mixed use of land, small plot sizes occupying 100% ground for built-up, social homogeneity, limited public spaces, which are usually congested developments, in comparison to the modern day cities.

### 5.5.2.1. Associated Issues

Common issues associated with the inner cities:

- Out migration of local residents and release of residential spaces for commercial use,
- Dilapidated buildings (as building owners only repair their buildings, while little or no reconstruction is takes place) and vacant properties,
- Narrow roads- not planned for vehicular movement,
- Unorganized on-street parking at various locations,
- No prominent public transport system present in the city,
- Presence of cottage or household industries and polluting industries
- Prominence of on-street encroachments for informal markets & hawkers,
- Due to shift from residential to commercial land use, emergence of warehouses, go-downs, workshops or other non-compatible activities,
- Old water supply distribution network and in non-metric sizes, difficult to maintain
- Repeated excavation of roads damaging the underground utilities and disturbed road levels
- Overall lack of social infrastructure facilities compared to the density of the inner cities
- Outcrop of Slum like conditions in the open areas surrounding historical properties or on old recreational open spaces

### 5.5.2.2. Alternative strategies for Redevelopment and Regeneration

Redevelopment and regeneration are the prime planning aspects of inner cities. The space norms and development control rules that are generally applicable to other city areas are normally not applicable to inner cities. The two alternatives for the redevelopment of an inner city/ old city are based on the strategy of revival or in-situ development. These are:

**Alternative 1- Modification in Built-up:** In this approach, the residential built up is adjusted with the plot size and height from urban renewal point of view. The building density is redefined, usually by increasing the permissible FAR/FSI as permissible by the available infrastructure. It allows the market forces to reconstruct and redevelop the core city areas. The urban local authority may provide supporting infrastructure through betterment levy or charges. This tool of redevelopment is in practise in major cities like, Hyderabad and in some parts of the old Delhi (Shahajahanabad). Abutting road width, plot sizes, accessibility and land use regulates the increased building height. This entails amalgamation of plots.

This alternative can be applied for the entire inner city or it could be limited to an identified area such as along the transport corridors as in the case of Old Delhi (Shahajahanabad) wherein a 500 meter influence zone of metro rail is permitted with a suitable enhanced FAR.<sup>52</sup>

An added advantage of this alternative is amalgamation of residential units. To improve the morphology of the core city, increase in unit size of the residential plots is also often necessary, especially where very small units are present. Higher FSI, for medium size plots, even marginally will lead to amalgamation of small and very small plots by market forces. This will improve the urban design and density of residential areas. However amalgamation of plots is to be carried out in lines with regulations, which is to be defined based on the study of the area by the local authority. The redevelopment project of east Kidwai Nagar, New Delhi is among the first initiatives as a vision project of Ministry of Urban Development.

**Alternative 2- In-situ Development:** In order to conserve the characteristics of the inner city, this alternative is adopted to maintain and revive the old city by different mechanisms. Unlike the alternative 1, in-situ development maintains the height and the building foot print, by carefully using Transferable Development Rights (TDR). This alternative is used where the redevelopment strategy is to maintain and encourage the heritage of the city and its housing morphology, as in the case of Ahmedabad, where Tradable Development Rights are provided for the notified Structures, Buildings and Precincts in the form of Tradable Right Certificate by competent authority. However the authority controls other activities such as:

- The Permissible Uses for the Heritage Areas and other buildings on the basis of its plot size and floor.
- Amalgamation and/or Sub-division not be permitted in the Zone,
- The owners of these heritage structures and buildings are required to conserve the following original aspects of their Buildings:

All Façades

Building Footprint

Character of Open Spaces such as courtyards, khadki, streets, etc.

The in-situ development also does not encourage road widening until necessary, as it aims to preserve the building façade. Therefore parking spaces are created through community initiatives and by consultative process. In case if it is not feasible to provide the required parking within the existing building as per Regulations, the Competent Authority may recover fees for deficit parking to develop on-street parking/parking lots/parking structures as a part of Parking Management Plan.

The concept of Accommodation Reservation may be introduced for social infrastructure whereby for the provision of essential public facilities to be handed over to the local body / government, the owner of property is given full permissible FAR on the component of public facility. Vacant properties should be preferred for this purpose.

The two alternatives of redevelopment to be chosen carefully and a combination of the two may be used for suitable sub-zones in an inner city. However the redevelopment strategy is to cover the key aspect i.e. positive growth for the city to be a liveable area and also as a work space. Therefore in most of the Indian inner cities, mixed land use is to be recognised as permissible and thereafter organised, as the city is planned on the concept of work & live with inherited benefit of reduced travel trips. The land use structure given in Table 5.2 could be modified and adjusted for mixed land use as planned by the local authority. To achieve this, regeneration is to be a part of the redevelopment, including socio-economic development, maintaining and encouraging commercial lifeline of the inner city for its revival.

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<sup>52</sup>Source: ITPI article by A.K. Jain, Commissioner (Planning), Delhi Development Authority.

### 5.5.2.3. Aspects of Revival

While planning, planners face the problems associated with road levels, lying of new pipelines, parking in residential areas, decongestion, fire safety issues, requirement of road widening and lose of heritage façade, provision of land for social infrastructure and sometimes re-planning underground infrastructure. Core city revival is based on conservation, promotion and solution. These can be:

1. Out-Shifting of polluting, noxious and hazardous trades / industries and de-limitation of non-residential non-compatible activity with priority,
2. To decongest the inner city, proposal can be to develop counter centres in the form of Integrated Freight Complexes at the peripheral location or new industrial area,
3. Iconic developments along the historically valuable areas and if space allows - encourage city level recreational areas to create a pull factor towards the old city,
4. A new set of development controls for Mixed Use, enhanced FAR and TDR applicability. Mixed use to be maintained with regulations on the road width, plot sizes and density,
5. Conservation and restoration of historical buildings. Provisions for FAR and Tax incentives for those who have to maintain the architectural controls,
6. Revival of cities by alternative public transport system technically modified for the road network and as per the trip generation,
7. For parking, multi-level parking is one of the solutions for identified residential pedestrian,
8. In case of new development or redevelopment, stilt parking to be mandatory,
9. Adding street furniture can enhance street design. This is to facilitate public space for community interaction and promote pedestrian movement,
10. In congested and bottle neck areas, solutions such as one ways and multi-level parking to be adopted,
11. Alternative solutions of use of smaller fire hydrants for very narrow roads for the fire safety,
12. To meet the social infrastructure requirement, reducing space norms up to 50-60% in case of space non-availability in the core city. In order to compensate for the shortfall in various types and levels of facilities in the existing built-up area, such facilities may be provided in contiguous / proximity to sectors of new development.
13. Multi-functional uses should be proposed to encourage optimum utilisation of existing built-up infrastructure.
14. ULBs to initiate developing database of the buildings, with attributes such as its age, height, heritage value, revenue collection and other points as desirable.

### 5.5.3. Industrial city

Cities with major thrust in manufacturing and production are industrial cities. Such a focus on manufacturing was initially in the beginning five year plans after independence, when the focus was on heavy iron and steel manufacturing. Industrialisation again boosted after liberalisation in 1991 and encouraged developing clusters for export in 2005 by the SEZ Act, 2005, which provides for the establishment, development and management of the Special Economic Zones for the promotion of exports. There were also schemes proposed for promotion of cluster/park development by respective Ministries, while Small Scale Industry (SSI) was defined under Micro, Small & Medium Enterprises (MSMED) Act, 2006.

Lately, Government of India has also announced the National Manufacturing Policy in year 2011 with the objective to enhance the share of manufacturing in GDP and

increasing employment. Under the National Manufacturing Policy, the New Investment and Manufacturing Zones (NIMZ) guidelines was cleared by the Cabinet in 2011.

### 5.5.3.1. Associated issues

The following are the key concerns for industrial area planning:

- Industrial cities are marked by high intensity of noise levels and air pollution levels, which makes unsuitable for residential. Also, improper discharges of liquid and solid industrial waste/effluents are concerns for health. These hazard prone activities have a direct impact on residential areas,
- Movement of heavy traffic for transportation of raw material and finished goods, large share of the traffic load on the roads (highways) & rail,
- Lack of supporting infrastructure such as logistics, warehousing,
- Industries face power problems with respect to unscheduled cuts, which affects the productivity, especially in the continuous process plants. In order to make up for production loss, industries have to operate DG sets which eventually increase the overall production cost and air pollution,
- Lack of emergency facilities for fire safety and accidents, including medical infrastructure and health care,
- Absence of integration with research and development and ICT infrastructure in Indian industrial cities,
- Unplanned infrastructure provisions for various utilities, both underground and on surface,
- Limited space for industrial plots, allowing no expansion in future.

Other issues associated with industrial township are:

- Issues of compatibility between processing and non-processing areas,
- Lack of alternative economic activities leading to stagnation of city growth,
- Some of the industrial towns also show high rate of crime. This is primarily due to segregation of classes, lack of recreational activities, lack of educational facilities for labour class, and to some extent due to a portion of the population is bachelor,
- Ignorance on the public transportation in the industrial areas for labour and managerial labour,
- Lack of housing for construction labour, who continue to live within and adjacent to the industrial cities for years and lack of housing requirements for low income labour and informal employment.

### 5.5.3.2. Planning strategies

**Site location** of the industrial city is the prime aspect of its planning. The siting criteria shall satisfy the environmental requirements mentioned by Ministry of Environment and Forest, which is with sufficient buffers, distance from a large size town and agricultural land (refer Chapter 6 for specifics).

**Land suitability analysis** to be done for identifying zones for placing hazardous industrial (uses including air polluting units and wind directions), other manufacturing industrial, compatible uses along surface water bodies, hamlets and settlements and placing of non-processing areas. For locating industrial zone, preference to areas with easy connectivity, provision for logistics and areas with existing industries to be given, also wind directions to be considered.

**Zoning for processing and non-processing areas** is recommended in the ratio of 40:60 (especially in SEZ). The land use regulations have to keep in view the requirements of both these areas according to the activities envisaged. Due to the health concerns and safeguards, provision of green buffers of minimum of 500 meters between compatible and non-compatible shall be well defined while zoning (as given in **Chapter 6**).

**Processing area:** may be comprise of the following activities:

- Industries / manufacturing;
- Ancillary & MSMEs;
- Retail Trade and commerce;
- Go-downs and warehousing;
- Utility corridor;
- Port and port related activities;
- Airport and related uses, rail, road and inland waterway and spaces for parking etc.;
- Public utilities and any other essential services;
- Incidental and other activities for safety and security; and essential residential for the same;
- Governmental use / activities to manage the proper functioning of such processing areas.
- Information Technology and Enabled Services;

Within the processing areas, space for informal commercial, service industries and parking as per industrial requirement to be paid attention. For development of various types of parks – like IT parks, Plastic parks, Bio-technology parks, Food parks, Agro park, etc. the policy and norms issued by respective departments and guidelines available to be considered for planning. In absence of such handholding provisions, case studies of the specific industrial sector to be referred.

**Cluster development:** A cluster approach may be taken to optimise use or resources and minimise cost of production. For example, all work related to computers, IT, Communication can be housed in a cluster at the outskirts of processing area to minimise heavy transportation within the city. Small clusters related to IT and communication can also be accommodated within the non-processing area at uniform distance for easy reach of availability of all services in time.

**Non-processing areas:** Areas other than processing area are to be planned for various uses and activities, mainly as an industrial township including residential, commercial, recreational and activities related to social infrastructure like education, health care, and socio-cultural facilities.

**Social infrastructure:** The overall quantum of social infrastructure to be provided in the industrial township may be divided into two levels of facilities, including - Industrial city level Facilities and Local Level Facilities.

**Land use:** An industrial township should provide for a judicious mix of land uses / activities in such a way that it is not dependant on the neighbouring or other city. The norms and standards for distribution of land use may be as under<sup>53</sup>.

### 5.5.3.3. Proposed Land use Structure of Industrial towns

Table 5.6: Land use structure for Industrial towns<sup>54</sup>

Sl. No.	Land use Category	Percentage of Developable Area
1	Residential	20-25
2	Commercial	3-4
3	Industrial	30-35
4	Public and Semi-Public	6 -8
5	Recreational	12-15
6	Transport and Communication (including logistics)	10-12
7	Water bodies & Special areas	Balance
<b>Total</b>		<b>100</b>

Note: The above landuse distribution is indicative, and may vary as per the size of SEZ, industrial town, cluster development.

<sup>53</sup>Draft SEZ Guidelines study by TCPO presented to the Parliament Standing Committee.

<sup>54</sup> Ibid.

#### 5.5.3.4. Aspects of planning

The industrial town should primarily be a modern state-of-the-art township having **world-class infrastructure**<sup>55</sup>, high quality living, working and entertainment provisions, which are particularly suited to the flexible uses and space demands of modern technology and knowledge based activities.

##### **Infrastructure:**

- a. All industries to be responsible for treating the effluent generated as per the CPCB regulations, for small and medium size industries infrastructure of Common Effluent Treatment Plants (CETP) to be planned. Special care to be taken in cases where the effluent after treatment is discharged into a water body.
- b. Solid waste disposal to be as per CPCB/SPCB regulation, specifically for hazardous waste disposal,
- c. To meet the power supply pressure, alternative source of energy to be explored in the site and situation to meet the domestic and commercial demand within the region.
- d. Logistics and Parking requirement of industrial area as per the industrial area demand. The transportation infrastructure, including RoW and speed design to be as per the norms given in the transportation section of this guideline.
- e. To ensure safety from high-tension power line, reduce disruption and for increasing life, infrastructure lines are to be well designed within the Row for infrastructure corridors, by allocating Right of Use as per regulations of each facility.

##### **Non-processing areas:**

- a. To bring harmony in the society, integration of residential sectors (informal/low income group/managerial staff/ pockets of high income group) shall be planned to reduce friction and encourage interaction socially and economically. The locations of low income group to be in proximity to the industrial and commercial areas to facilitate easy movement and reduce pressure on public transportation.
- b. Public transportation shall primarily target integration of residential areas with industrial zone.
- c. In case of greenfield industrial sites, for the expansion of existing hamlets and small settlement, a buffer to be governed by respective authority (to be marked on the development plan after calculating the induced growth rate). Such buffers shall be established for recreational, livestock support and social infrastructure for the developments of the hamlets. Similarly buffers along rivers in the industrial areas shall be well protected from any water pollution by allowing river front developments with recreational activities but without permanent developments.

##### **Space norms:**

After liberalisation in 1991, several changes have taken place in the manufacturing and service industries. Among which the key shift is from labour intensive to capital intensive. Hence the space for industrial allocation is shrinking, while in service sector the work space norms are altering with the FDI in IT/BPO sector. Workers space norms are to be proposed based on the latest technologies used, scale of development and investment planned. The work force ratio is as given below<sup>56</sup>:

- 1) Work force participation can be considered more than 75% of the total population in industrial towns, in case the Work Force Participation Rate (WFPR) is not available.
- 2) The Industrial workers density can be: 100 pph to 125 pph

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<sup>55</sup> "World class infrastructure" would consist of 24X7 hour water supply, uninterrupted power supply, efficient and pollution-free transport and modern solid waste management, sewerage treatment and communication systems.

<sup>56</sup>Source: Based on UDPMI Guidelines, 1996

The ratio of employment to land allocation should be case to case specifically for the sector of investment. With the advancing technology, the investment intensive developments will be altering the employment and space ratio.

**Safeguards:**

- a. Disaster management Plan for the industrial towns to be prepared at initial stages of planning and integrated with the Development Plan. In case of hazardous industrial, an evaluation plan shall be designed within the transportation network, to ensure evaluation by high speed designed roads.
- b. Health care facilities and emergency services to be decentralised and located in the processing and non-processing areas both.
- c. Specifically fire stations to be located on the corner plot giving direct access to sub-arterial roads.
- d. Local water holes and rainwater harvesting tanks to be linked with pressured hoses as a back-up to fire extinguisher.

### 5.5.4. Heritage/ Religious/ Tourism city

Heritage areas and cities with historical and tangible / intangible cultural values; preserved, conserved and evolved by social interactions and changing economic factors have given shape to tourism in these cities. The World Heritage Organisation, Ministry of Culture, Ministry of Tourism have laid focus on the conservation, restoration and promotion of cultural heritage. Among these historical cities, pilgrim destinations and centres of religious values have emerged with broad base economic activity of tourism. Close observation of these cities reveals that these cities were not designed for large population influx. Many of the religious towns with pilgrim destination in India are located on the fronts of water bodies or in the fragile ecosystems, (such as in the Himalayan ranges) where the balance between human activities and the nature is sensitive issue. It is crucial to include the eco-sensitive area mapping, evaluation of carrying capacity (refer **Chapter 7** for details) and provision of eco-tourism in planning for such towns.

Planned tourism is a major contributor to cities' economy. Tourism sector provides a high multiplier in employment generation. Tourist cities' economy may almost be totally based on tourism.

As evolved from the Tourism 2020 Vision, UNWTO 2002, 'cities or places of high population density where trips are taken by travellers for leisure and recreation can be referred as tourism cities'. Besides, the heritage and religious cities, as mentioned before, tourism cities/regions have developed from natural tourism, sports tourism, adventure tourism, rural tourism, and wellness tourism, among others. The National Tourism Policy, 2002, Ministry of Tourism rests on the principle of:

- Institutional framework may be based on participation between Government and the private sector. Government to provide legislative framework to regulate tourism trade and private sector to tourism related activities,
- The deep rooted relationship of tourism and culture to be realised, and promotion of cultural tourism should be encouraged focusing culture related (craft, art, performing art, living style as) saleable products for tourist.
- Greater emphasis on Eco-tourism, focusing on natural landscapes and other environmental features and also virgin traditional rural environment etc.

- Special thrust may be imparted to rural tourism and tourism in small settlements, where sizable assets of our cultural and natural wealth exist.

Linking heritage, build and nature with tourism is important. Heritage sites both global (world heritage sites) and natural are to be identified and protected. Such areas should be integrated with rest of the development based on rules and regulations specified by World Heritage Centre, Archaeological Survey of India and State Governments. Protection of sites of historical value other than officially designated at local area level may be identified and integrated in the Regional/ Development / LAPs.

### 5.5.4.1. Associated issue

Some of the issues associated with heritage cities, religious cities and cities of tourism potential are:

- Influx of the floating population or tourists,
- Assessment of areas of influence of tourism/ pilgrimage,
- Pressure on fragile/sensitive tourism zones and on eco-tourism sites in the tourist circuits,
- Seasonal variation of the local economic base,
- Unclear infrastructure estimations & planning estimations for the tourism towns due to fluctuation in the population to be served,
- Transport planning issues associated with terrain, slopes and undulated systems,
- Priority for non-motorised transport and public transport.
- Conservation and improvement of land profile, areas of scenic value and utilization of site features for strengthening the ambience,
- Issues in solid waste management especially in religious/pilgrim towns,
- Street vending activities in the popular religious and tourist sites and measures for their rehabilitation,
- Lack of documentation of heritage buildings and areas and application of general architectural control in historical areas,
- Supporting investment in heritage assets and generating returns by ULBs or by private sector,
- Lack of social guidance in case of exposure to cultural variation, specifically in international tourism destination, et al.

### 5.5.4.2. Planning Strategy

A tourism city planning strategy is to be broadly based on the understanding -

- For 'Nature' in its many forms, its mountains, streams, sylvan surroundings;
- Its 'Culture' as manifest in the art, architecture, temples and pilgrim towns;
- Its 'History' as seen in the archaeology of the tangible and intangible outputs of an earlier era.

On 10<sup>th</sup> November 2011, UNESCO's General Conference adopted the new recommendation on the Historic Urban Landscape by acclamation, as an additional tool to integrate policies and practices of conservation of the built environment into the wider goals of urban development in respect of the inherited values and traditions of different cultural contexts. The UNESCO General Conference recommended its Member States to take the appropriate steps to facilitate its implementation and further recommended that Member States and relevant local authorities identify

within their specific contexts the critical steps to implement the Historic Urban Landscape approach, which may include the following:

- To undertake comprehensive surveys and mapping of the city's natural, cultural and human resources;
- To reach consensus using participatory planning and stakeholder consultations on what values to protect for transmission to future generations and to determine the attributes that carry these values;
- To assess vulnerability of these attributes to socio-economic stresses and impacts of climate change;
- To integrate urban heritage values and their vulnerability status into a wider framework of city development, which shall provide indications of areas of heritage sensitivity that require careful attention to planning, design and implementation of development projects;
- To prioritize actions for conservation and development;
- To establish the appropriate partnerships and local management frameworks for each of the identified projects for conservation and development, as well as to develop mechanisms for the coordination of the various activities between different actors, both public and private.

Through adopted strategies, such as of UNESCO's new Recommendation on the Historic Urban Landscape, the local conservation approach is to be defined by the local authority in lines with the broader prevailing policies in India. However application of conservation, preservation and promotion is not to be equally treated. With detailed mapping, documentation and analysis, zones of treatment and extend of tourism may be identified for sustainable development. Figure 5.8 explains the integrated approach to tourism city/region planning.

**High Value zone:** The core zone of heritage, religious or of tourism value is the high value zone. This may consist of Natural Heritage or Built Heritage or both. Ethnic value of the zone is of the highest level and is meant for preservation. The carrying capacity of this value zone is the key to the tourism potential of the city.

Figure 5.8: Integrated approach to Tourism City/Region Planning



**Native's Zone:** This can be called as the residential zone of the locals or the settlement. This zone usually overlaps with the high value zone, as mentioned earlier, due to social interactions and economic relationships. The economic benefits of tourism are measurable in the native zone and improvement in the quality of life of the local population can be achieved through planned development. This zone is for conservation of the culture, valuable architecture, and for promotion of local economy. This zone is suggested for innovative strategies to provide the city with a

consistent image and therefore provide significant revenue and added value to its residents.

**New infrastructure zone:** The city periphery or outer zone is the new development zone. This outer zone is for the new development to come-up to meet the tourism requirements for the promotion of tourism and for city growth. By understanding market trends through market analysis, demand and needs of the tourist is to be assessed for the Tourism Product Development<sup>57</sup> such as experiential-shopping, festivals, emotional-cultural and historic resources, hospitality, physical-infrastructure, natural resources, restaurants, accommodation. In doing so, tourist attraction spots and areas should be first made easily accessible. Depending on the quality of such tourist area, certain experience based tourist trails can be planned with adequate support of logistics. These new developments should be integrated with the inner two zones.

The investment in this zone can draw from the various tourism infrastructure development schemes by the State. Promotion of tourism as an economic activity, alternative economic base including thrust in institutional & commercial developments is to be adopted in this zone & if allowable in Native's Zone too.

In case of tourism regions/circuits, the new infrastructure zone may be wide spread and can be considered as the rest of the area of the region/circuit outside high value zone and native's zone. A tourism circuit will have various nucleus of high value zone bedded by the thread of connectivity.

**Networks:** The integration of the zones is to be strong with networks. Networks to connect zones for accessibility between the two outer zones i.e. new infrastructure zone and native's zone shall have strong linkages, while from eco-sensitive approach; the High Value zone shall have limited access (if possible pedestrian). For the protection of the (built and natural) heritage from the adverse impacts of tourism, adoption of greener tourism in this zone is the key. For improving external connectivity up to the tourist city/ nodes in the tourist circuit, alternative modes of transportation should be promoted.

Simple practical steps to reduce adverse impact on the environment and promote the benefits of tourism are through zoning. Local consultative approach to be taken for tourism based livelihood development, physical infrastructure, transport and tourists, heritage and tourism conservation, environment and tourism, any other. However, a generalised land use structure is proposed below.

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<sup>57</sup>Tourism Product Development is a key factor in the overall experience demanded by tourists visiting cities or other types of destinations. Understanding market trends through market analysis will help create a strategy that will match tourists' needs and demands.

### 5.5.4.3. Proposed Land use Structure of Heritage/ Religious/ Tourism city

Table 5.7: Land use structure for Heritage/ Religious/ Tourism City

Sl. No.	Land use Category	Percentage of Developable Area
1	Residential	35-40
2	Commercial	5-7
3	Industrial	4-5
4	Public and Semi-Public	10-12
5	Transport and Communication	12-14
6	Recreational & water bodies	10-12
7	Special areas (including heritage and religious areas)	7-10
<b>Total</b>		<b>100</b>

Source: Modified based on the Proposed Land use Structure for Urban Centers and analysis of various case studies (including Agra, Puri, Rameshwar, Hampi, Bodhgaya etc.)

Note: The above land use distribution is indicative, which may vary as per the size of city and the economic base.

### 5.5.4.4. Aspects of preservation, conservation & promotion

1. In line, with the objectives of the Ministry of Culture, (RFD 2013-14), planning for heritage cities to include- 'safeguard of various forms of Intangible Cultural Heritage and promote research through financial support to artistes, scholars and cultural organizations and Manage national monuments (Tangible Heritage) of India through Archaeological Survey of India, State Governments, Universities, Local Bodies'.
2. Special attention to be paid while planning for religious settlements along the river fronts and water bodies, where emphasis is to be laid on conservation of water bodies, reduction of pollution (due to incompatible activities), improper solid waste management and no alteration of the watershed system of the area.
3. For the application of the conservation, preservation and promotion in various zones of treatment and flow of tourist, the various planning aspects can be adopted:
  - a. Development plan should include historic & religious zones as special zones where all Development should be permitted by the competent authority.
  - b. Development controls to be based on ground realities with a separate section on urban design approach (such as façade controls) for improving aesthetics of the town at large,
  - c. Standardisation of Urban Design in the preservation and conservation zone including: Typical elevation of the houses, Building height, Elevation colour theme, Building material (Maintain and encouraging local building material use), Typical styles for column, bracket, balcony, motifs. While the usable area inside should be free from regulation.
  - d. Visibility of historical monuments and façade of the core zone to be maintained and implementation of the Ancient Monuments and Archaeological Sites & Remains Act, 2010 (AMASR).
  - e. Signages to be specified and preferably aesthetically fitted, (as given in Shimla Master Plan)
4. Formation of a Heritage Conservation Committee within the Municipality/Development Authority for the heritage cities is suggested as an implementation agency for Heritage related policies and plans. The cell to essentially consist of Planners, Conservation architects, Archaeologist, Structure (retrofitting) engineer, urban designer, Property evaluator, representative from ASI, members from revenue department, town planning department and local representatives (councillor). Its roles & responsibility may include:
  - a. Strict implementation of Central & State Government policies
  - b. Carry out Heritage related studies & surveys, categorising heritage properties and mapping

- c. Formulate special heritage guidelines
  - d. Formulate & implement Heritage related Development Control regulations and make revisions for the 'regulated zone' as per the AMASR Act, 2010
  - e. Any heritage related notification and fines
  - f. Equipment and infrastructure for maintenance of the heritage buildings to be acquired and maintained
  - g. Conducting workshops, awareness programs and cultural activities
  - h. Support heritage property owners in repair and maintenance and suggestions for retrofitting of old structures
5. The tourism plan may also include:
- a. Promotion of Heritage walkway and River front walkway,
  - b. Landscaping & Up-gradation of available open spaces
  - c. Revival of urban water bodies
  - d. Seasonal tourism events such as Fair and Festivals to be organised as per the approved 'Guidelines for Financial Assistance to State Government / Union Territory Administrations for Organizing Fair and Festivals and Tourism related Events'.
  - e. Alternative modes of transportation to be encouraged in the tourism plan. Key nodes on transportation networks to have Tourist Information Centre/kiosk.
  - f. Marketing strategies of the tourism destinations to be well-defined including generating revenue to the local population, apart from employment generation estimations. On average, Employment generation by tourism industry as direct and indirect is suggested for hotel industry (per room) by the Tourism Policy is:
    - i. Direct employment: 2 persons
    - ii. Indirect employment: 3 persons

### 5.5.5. Port city

A coastal city whose seafront is dominated by port and which has come into existence primarily due to port activities is referred to as a Port City. Such cities represent exceptional developmental potential due to their maritime identity. Coastal features remarkably notable within the high-low tide line mark are mudflats, salt pans, estuaries, creeks, mangroves, coral reefs, geomorphological features with patches under sand and beaches; scrubs, plantations, forests and sometimes horticulture. On the other hand, easy access to large water body of the port leads to development of coastal infrastructure, fishing activities, salt manufacturing, presence of industries and even power plants, which provide an advantage to the City development by means of bearing the benefits of its location. Besides the coastal advantages, these sites are connected to the hinterland by rail and roads.

#### 5.5.5.1. Associated issue

The challenge in the management of such a city lies in the balanced development of port activities, environmental protection and urbanisation. Key issues associated with port city planning are:

- Challenge to sustain the port city's activities while transforming into major economic centres. Some of the ports have intensified port activities, which have resulted in increasing pressure on land for urbanisation.
- Development of compatible land uses, activity areas and integration of port, industries, logistics facilities and the residential zones, with the provision of adequate green buffer and connectivity.

- Decentralised development through provision of self-contained zones within the Port City region.
- Preservation of ecologically fragile areas, water bodies and their basins, CRZ and forests.
- Identification and planning for the Coastal Regulations Zone and land under the High Tide lines per the CRZ regulations and major use of the available waterfront.
- Attempts along the port land to reclaim land impacting the marine ecology.
- Lack of alternative economic activities leading to stagnation of city growth.
- Some of the port towns also show high rate of crime. This is primarily due to segregation of classes; lack of recreational activities, lack of educational facilities for labour class, and to some extent due to a considerable percentage of the population is bachelor.

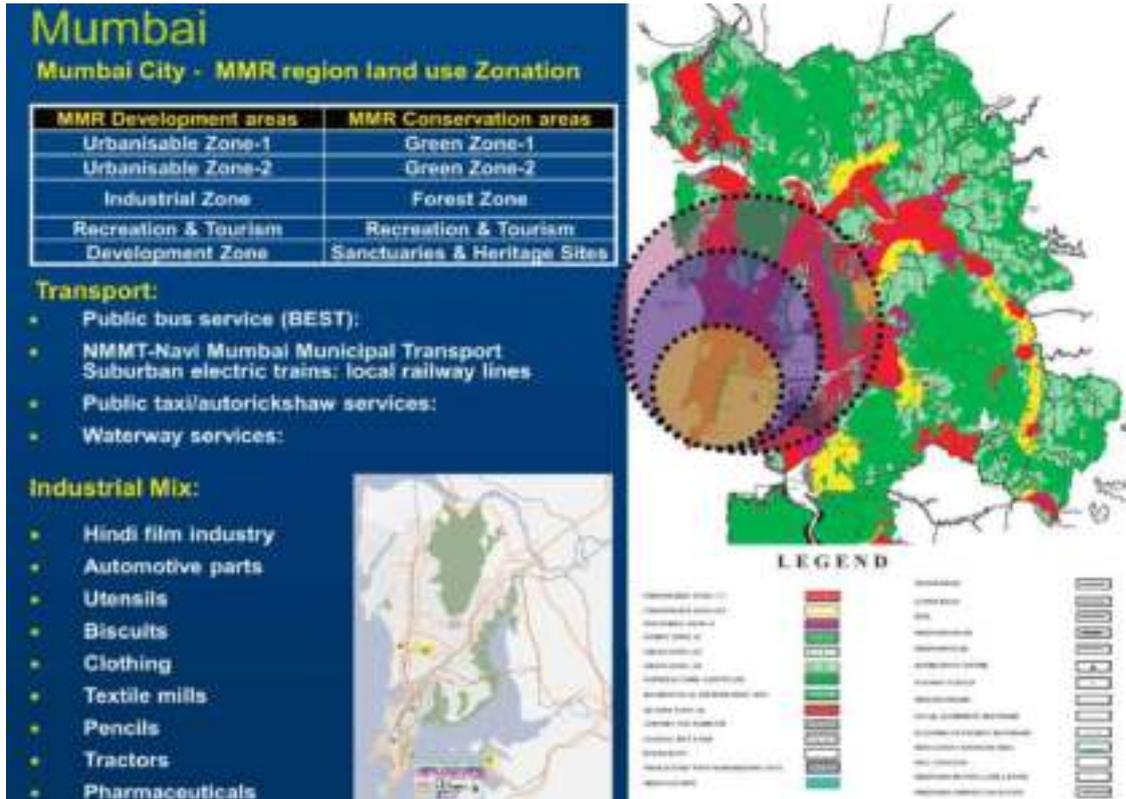
#### 5.5.5.2. Planning strategy

A port and a city usually have two distinct entities, the port operational area and the civil city. These two entities may be differently administered and managed, however, under the Indian Port Act (IPA), 1908; the Port Trust is the nodal agency for the port operational area and, at times the civil city too. In some cases port city may have the administration under the municipal law, hence planning for port city must take into account the conditions of IPA 1908. Planning for the port for which the jurisdictional area is well defined is to be done by the Port Trust. While planning for the civil city may be done by the Port Trust or by the Town and Country Planning Department/ relevant body of the State.

A growth model in general is observed for port city, which evolves from harbour to a heavy manufacturing base, eventually leading to a commercial growth centre. The pressure on land impacts its demographic profile and land values. Also, industrial development requires supporting residential development. Often ancillary and service industries, warehousing facilities, logistic sector, truck and heavy vehicle parking areas begin cropping up around the industrial development. This is the stage where the unplanned proliferation of developmental activities start and a strong need for planning intervention is felt. Slowly the surrounding land's real estate value rises and commercial development intensifies. As a result worker population increases and forward linkages are established as services like institutional development, development of financial institutions, corporate offices, BPO amongst others. As the quality of infrastructure and service improves, eventually the tourism sector also grows.

International and Indian port cities, viz, Mumbai, Vishakhapatnam, Shanghai and Singapore reflect presence of industrial manufacturing base and other key components such as city size and population density. Land use pattern of Los Angeles and Vishakhapatnam, amongst others have inspired the planning for the non-industrial components of institutional support system and commercial economic base.

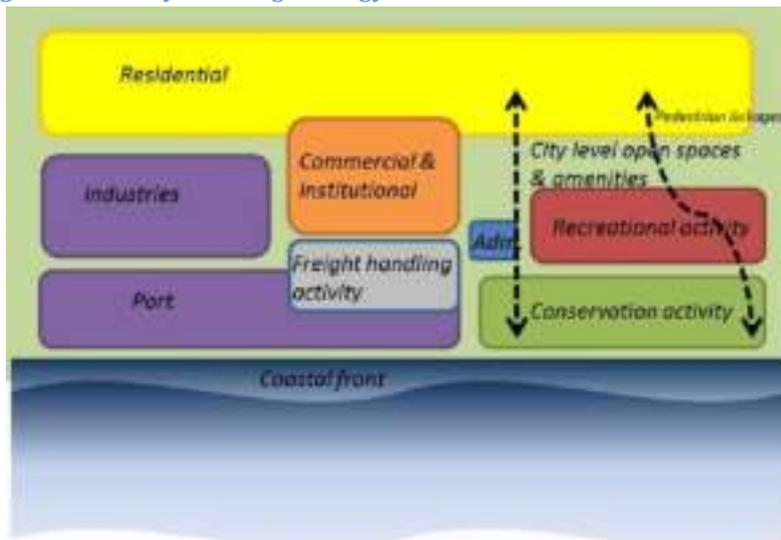
Figure 5.9: Mumbai Port City Analysis



Source: MMRDA.

The strategy to accommodate all the self-contained zones within the Port City region is largely dependent on the geographical and topographical patterns of each port city. However there are some fundamental similarities in the arrangements in their land use pattern, which have been depicted in the following diagram.

Figure 5.10: Suggested Port city Planning Strategy



Source: Various Port city case studies referred.

**Port & Industries:** Ports bring in a variety of trade and their ancillary activities to the immediate hinterland. Freight handling and industrial activities have inseparable linkages with the port.

The industrial and residential zones generally form two distinct parts of the port cities with industries and manufacturing units clustering together in the area immediately surrounding ports. Within the industrial region, the heavy and the light industries tend to be separated as well with the light industries being set up away from the port but well connected with transport lines. In many situations SEZs come up right around the port to attract industry and form the main urban centre of these port cities. However, shipbuilding and saltpans are economic activities, which come up along the waterfront.

**Residential & Support:** Port Trust can allow the development of residential building for the employees of the Board, within or outside the limits of port as the board may consider necessary<sup>58</sup>. Migratory population increases the demand for housing in the port vicinity, which creates a large portion of the land use share to be residential and commercial activities.

Residences are generally planned in the port hinterland with strong connectivity. Along with residences, planned educational/institutional and commercial areas come up with a view to cater the urban population. Here it is important to note that the commercial and institutional developments are as a complimentary requirement of the thrust economic sectors and thus need to be integrated with the port & industries.

To avoid stagnation of port city growth, alternative avenues and economic opportunities shall be adopted as key strategy taking advantage of the agglomeration economy and access to basic logistics, like transport, power and water. Institutional infrastructure base provides skilled and semi-skilled labour as per the demand and as a consequence, share of institutional requirement in port cities is slightly on the higher side. With higher end services being provided, an institutional framework is established that provides a highly educated and motivated workforce.

**Transportation:** There would be two aspects for the development of transport infrastructure in port cities. Firstly, the aspect of infrastructure development is the establishment of interstate rail lines and airports that are created to accommodate the easy movement of cargo as the capability of port increase with the setting up of more industries.

Second is development of a public transport network, which in most cases consists of rail lines as well as mass rapid transit service. This comes up to cater the movement of the residential population to the commercial and industrial zones and forms the backbone of the expansion and growth of the city. Also, the areas around these Transport Corridors gain in land values and various kinds of mixed use developments develop around it including commercial, institutional, theme developments, investment areas, and hospitality and tourism activities amongst others.

A seamless transport infrastructure network should be developed throughout port trust and local authority area. Works for roads, railways, bridges, and tunnels can be

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<sup>58</sup>Major Port Trust Act, 1963.

executed within or without the limits of the port by the sanction of the Board of Trustees.<sup>59</sup>

**Environment and Sustainability:** Marine ecosystems of the coast are very rich in species diversity and abundance. It is seen in many of the port cities across the world that once industry and residence has been established, port cities set up environmental reserves and forest regions and fish culture areas begin focussing on sustainable development even attracting tourism. Economic activities requiring water front and conservation of this front under coastal regulation zones have a combating demand for the sensitive land. However, port trusts have power to carry out the activities like reclaiming, excavating, enclosing, and raising any part of the foreshore of the port or port approaches to carry the port activities properly.<sup>60</sup>

This zone can be regulated through provision of buffers and protected areas surrounded with compatible land uses of recreational, institutional and sparse residential areas. Recreational zone can be developed with beaches, creek development, parks, street shopping etc. to accommodate urban leisure activities by carefully integrating the sea edge with the city by well-developed pedestrian paths.

**Quality of life:** As more workers begin to settle, an urban, cosmopolitan environment is generated which attracts the commercial and service sectors to these port as well as recreational areas. The development of these service sectors attracts a different population of workers, service providers, henceforth emphasising on the need of educational facilities with technical institutes.

For interaction of the various classes of the society, the living and recreational areas are to be integrated and hence the open spaces and amenities to be decentralised and inclusively planned for public integration. Here, social infrastructure can target needs of specific strata of population to ensure improved quality of life and eventually social security.

Maritime boards of the country in respective States are making effort to plan these cities as multi-functional and sustainable. The idea is to provide for infrastructure to attract & accommodate urban population and to regulate development in and around these ports.

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<sup>59</sup>Ibid.

<sup>60</sup>Ibid.

### 5.5.5.3. Proposed Land use Structure of Port city

**Table 5.8** summarises the land use structure for a typical port city

Table 5.8: Land use structure for Port City

Sl. No.	Land use Category	Percentage of Developable Area
1	Residential	20-24
2	Commercial	3-4
3	Industrial (including Port)	20-25
4	Public and Semi-Public	6-8
5	Recreational (including waterfront activities)	15-20
6	Transport and Communication (including logistics)	15-18
7	Primary activities & Water bodies	Balance
<b>Total</b>		<b>100</b>

Source: Modified based on the Proposed Land use Structure for Urban Centers and analysis of various case studies, including Singapore, Shanghai, Los Angeles, Vishakhapatnam, Chennai, Mumbai, Surat, Rotterdam etc.

Note: The above land use distribution is indicative and including green, open spaces, water front activities area, but excluding CRZ areas and non-developable areas.

### 5.5.5.4. Aspects of Planning

1. Planning of the port and its surrounding area to be based on the harbour structure, port infrastructure, cargo capacity, facilities including jetties & wharfs, Godown facilities and on the understanding of its backward & forward linkages of the commodities of import and export. The following port supporting infrastructure could be considered in a port city as per requirement:
  - i. Encourage logistics infrastructure development by private or by the ULBs to generate revenue. Logistics as a backward linkage benefits from port & other industries and generates direct and indirect employment.
  - ii. Separate rail lines and cargo/freight handling junctions to be situated along the port and its industries.
  - iii. Aerodrome, if existing, can be extended to commercial operations as well.
  - iv. During planning, provision for pipelines infrastructure in and around port city to be given attention
  - v. Innovative and feasible alternatives of water supply infrastructure, using techniques such as desalination, reverse osmosis to be considered.
  - vi. Appropriate disposal system for industrial effluents, sewerage and solid waste.
  - vii. Area identification for Cyclone Shelters in view of cyclone proneness and Hazard Line demarcation.
2. Sectors with focus on local raw material available from the natural resource base have due advantage to bring benefit to the local economy. The areas marked as high cropping intensity should be left as green/agriculture. Also, Ship building industry to be allowed/considered along the coastal front.
3. Institutional development is complementary and key support to port city industrial development for sectors such as port & logistics. Skilled labour is

required and crucial in light engineering for technical inputs. Similarly semi-skilled manpower is prime logistics requirement. Development centres for skilled and semi-skill labour shall be developed as a part of institutional facility. Office spaces and Information Technology is a support system required for high end and value addition in the entire industrial zone. Besides this, Marine mining & biotechnology may benefit from research & development. R& D can be diverted to add value to agriculture, pharmaceuticals etc. also.

4. The National Environmental Policy, 2006 suggests actions to conserve coastal resources - explicitly consider sea-level rise and vulnerability of coastal areas to climate change and geological events, in coastal management plans, as well as infrastructure planning and construction norms.

Adopt a comprehensive approach to Integrated Coastal Management by addressing linkages between coastal areas, wetlands, and river systems, in relevant policies, regulation, and programs.

Environment risks and mitigation plan to be taken into consideration while planning the port city development.

Sustainability of the port is reflected from its planning as per local weather conditions and for Ecologically Sensitive Areas & Protected areas such as CRZ, Marine National park and sanctuaries, specifically taking into consideration the climate change.

Port city design is generally in grid formation. This is due to alignment with the wind flow directions in the coastal areas as sea breezes and helps to reduce pressure of cyclonic winds, apart from the influence of mangroves on the cyclone.

5. In case of older cities where ports were set up many years ago, the aim is to attain sustainable growth of the city by decongesting city centres while at the same time allowing greater growth in the commercial and industrial sectors by connecting these cities to smaller towns, suburbs and decentralized hubs of activity.

Apart from coastal ports, India also has Dry ports- Inland Container Depots (ICD) and Container freight Stations (CFS) are alternatively called Dry Ports. ICD and CFS provide warehousing space, temporary storage and handling equipment for import and export load, as well as empty containers. Rail network should be provided for strong connectivity between the port cities and dry ports.

### 5.5.6. Integrated Township

Integrated Township can be defined as clusters of planned housing and commercial businesses with associated infrastructure such as roads, schools, hospitals, convenience shopping, water treatment plants and drainage & sewage facilities. Integrated townships majorly emphasise on creating self-contained settlements with work-live-play concept by integrating selected economic activities in manufacturing/service/business categories.

Integrated townships have more open areas with suitable economic size capable of supporting businesses and homes, with adequate physical and social infrastructure. Yet, these should be compact enough to enable high quality living environments where it is possible to walk-to-work / school or take public transport for other activities. Such townships are expected to offer the same or more comforts and facilities as available in main city. Over that, it provides relief from congestion and traffic bottlenecks.

Strategically, integrated townships should be designed to have zero impact in terms of waste management and be adequately self-sufficient in terms of facilities for education, health and other aspects of social welfare. Therefore, for sustainable infrastructure and continued operation and maintenance, new service sectors such as facilities management and integrated waste management shall be promoted in Integrated Townships.

States like Maharashtra and Rajasthan have policy (township policy) under which new townships are being developed by private developers within the city limits on Urbanisable land under the Development plan/ Master plan of the city. The minimum area of such townships is 100 acres in Maharashtra and 10 hectares in Rajasthan.

**Government of India has permitted Foreign Direct Investment up to 100% for development of integrated townships** including housing, commercial premises, hotels, resorts, city and regional level urban infrastructure facilities such as roads and bridges, mass rapid transit systems and manufacture of building materials. Development of land and providing allied infrastructure will form an integrated part of township's development.<sup>61</sup> Many States in India, following initiatives by Maharashtra and Rajasthan, have made attempt to prepare policies or schemes for the development of integrated townships. The brief based on study of relevant policy/schemes of three States' is being presented below.

#### 5.5.6.1. State Integrated Township Policies

To provide a framework for the development of townships and to regulate the functions of the participants in such developments, the Government should formulate an Integrated Township policy / scheme, as has been done by the Governments of Gujarat<sup>62</sup>, Himachal Pradesh<sup>63</sup>, Rajasthan<sup>64</sup> and Uttar Pradesh<sup>65</sup>. Such policies institutionalise the role of the state government, developers and other state level agencies in the process of developing Integrated Townships.

##### **Rajasthan:**

<sup>61</sup>Guidelines for FDI in Development of Integrated Township, DIPP Press Note, 2002.

<sup>62</sup>Gujarat Integrated Township Policy, 2008 (GUDC).

<sup>63</sup>Himachal Pradesh Integrated Township Scheme (Draft).

<sup>64</sup>Rajasthan Township Policy, 2010.

<sup>65</sup>Integrated Township Policy, Housing & Urban Planning Department, Government of Uttar Pradesh.

The salient features of the Guidelines for developing Integrated Township provided by State of Rajasthan<sup>66</sup> has been listed below:

- Minimum area for integrated township shall be 10 hectares,
- The local authority shall acquire land and may allot for township projects to developers,
- Local authorities would develop sector parks on the lines of sector roads as per zonal plans,
- Road connectivity shall be ensured by the developer and no road shall be less than 40 ft.,
- FAR for the entire gross area of scheme shall be 1.2,<sup>67</sup>
- Industrial Township shall have Facilities/Services/Open/Road area as 35%, further breakup of which is facilities area -10%, open area- 5%, area under roads – 20%
- Street Lights: The distance between poles should not be more than 30 meters,
- It is mandatory for the developer to establish and operate STP in the township along with recycling of treated waste water,
- Horticulture & Plantation: Trees of heights more than five feet should be planted with minimum of 30 trees per acre of the gross area,
- In township schemes local authority will construct “community water harvesting structures” and all water outlets and drainages will be connected to this structure. This shall be strictly enforced by the Local Authority,
- The design of the township shall aim at water and energy conservation.

Rajasthan Township Policy, 2010 has provided following categories of schemes for developing different type of townships:

Table 5.9: Rajasthan Township Policy: Types of Townships

Types of Townships	Area requirement
Township Scheme	More than 20 hectares.
Mini-Township Scheme	More than 10 hectares and up-to 20 hectares
Special Townships (like Educational Township, Industrial Township, I.T. Township)	Special Townships (like Educational Township, Industrial Township, I.T. Township)
Mixed land use on land of closed /sick units in small towns	Minimum area of 10 hectares in RIICO68 industrial areas in small towns.
Affordable housing projects on land of sick or unviable units in industrial areas of RIICO or elsewhere.	

Source: Rajasthan Township Policy, 2010.

### Himachal Pradesh:

The salient features of Himachal Pradesh Integrated Township Scheme<sup>69</sup> are:

- More than 40 hectare of land in hilly terrain and above in 50 hectare in plains mandatory for developing Integrated Townships,
- Special Townships (like Educational Township, Industrial Township, I.T. Township etc.), with more than 40 hectares of land,
- The Township shall not include land under the forest, water bodies, land falling within 100m from (having the level the HFL) the HFL (High Flood Level) of the major lakes, dams land falling within 200m from the official boundary of historical monuments and places of archaeological importance, archaeological monuments, heritage precincts, other restricted areas.
- The Township scheme shall have a minimum of 15 meter approach road from any National Highway, State Highway, Major District Road, Other District Road or any other road area network/sector roads/master plan roads.

<sup>66</sup>Notification, 2007, Government of Rajasthan.

<sup>67</sup> However, the individual plots can be allowed maximum FAR as per Building Regulation but not exceeding 2.4.

<sup>68</sup>Rajasthan State Industrial Development and Investment Corporation.

<sup>69</sup>Himachal Pradesh Integrated Township Scheme.

- For global township, FAR for the entire gross area of scheme shall be 1.75.<sup>70</sup>

Policies at national level also provided guidelines for the Integrated Townships, as National Urban Housing and Habitat Policy states that, Integrated Townships should generally be located on comparatively degraded land excluding prime agricultural areas growing more than one crop with the help of assured irrigation. Also, these should be located at a reasonable distance from medium or large towns.<sup>71</sup>Hence, mass rapid transport corridors shall be developed between existing medium and large towns and new green-field towns so that the relationship between industry and commerce is developed to an optimum level.

### **Gujarat:**

Government of Gujarat has proposed to provide primarily five types of support activities through the Gujarat Integrated Township Policy, 2008 (GUDC) for facilitating to develop Integrated Townships in the State, which are as follows:

- Provision of trunk infrastructure and procurement of land,
- Establishment of a Green Channel for statutory clearances related to land, development permissions, environmental clearances,
- Special benefits (tourism, education, health projects) under the policy,
- Rating of developers and projects to be mandated by the government.

Gujarat Integrated Township Policy has provided detailed town planning norms on land use classification. Broad percentages of land area under each use sub category in the proposed township are defined in the policy document. The land use categories prescribed in table below may be the predominant use of the land, thus, the document also specifies land uses which are permitted and those which are not permitted in the land use zone. The colour coding differentiates the mandatory from the recommended norms.

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<sup>70</sup> However, the individual plots can be allowed maximum FAR as per Building Regulation but not exceeding 2.4.

<sup>71</sup> National Urban Housing and Habitat Policy, 2007.

Table 5.10: Space Allocation/Land Use Mix: Permitted under Gujarat Integrated Township Policy, 2008

NO	Use Category Name	Description	Measurable Parameter	Value	What does the value include?	Minimum Land Area by Use Sub-Category						Functional Open Spaces		
						Residential	Residential for EWS	Commercial	Commercial for EWS	Institutional	Institutional (Social infrastructure)		Industrial	Road
1	Technology Parks	Such as Parks of IT ITES, Biotechnology, Apparel, Gems & Jewellery and other R & D Institutions with Ancillary Housing	Proportion of total Built Up Area used for Economic Activity	70% or more	Residential, Commercial, Institutional and Industrial area as specified	30% of the developed land area	10% of land under residential development to be allocated	-	5% of land under commercial development to be allocated	-	1% of developed land area	-	10% of the developed land area	10% of the developed land area
2	Education Based Townships	Such complexes of schools/colleges/ Universities/research centres with Hostels and Ancillary Housing	-	60% or more	Residential and Institutional	15% of the developed land area	10% of land under residential development to be allocated	5% of the developed land area	5% of land under commercial development to be allocated	-	1% of developed land area	-	10% of the developed land area	10% of the developed land area
3	Medical/Health care Townships	Such as complexes of hospitals/ health resorts/ medical colleges/ medical research facilities with Hostels and Ancillary Housing	Proportion of total Built Up Area used for health Care facilities	60% or more	Residential and Institutional	15% of the developed land area	10% of land under residential development to be allocated	5% of the developed land area	5% of land under commercial development to be allocated	-	1% of developed land area	-	10% of the developed land area	10% of the developed land area
4	Tourism Related Infrastructure		Proportion of total Built Up Area used for Economic Activity	70% or more	Commercial, Institutional, Residential	20% of the developed land area	10% of land under residential development to be allocated	-	5% of land under commercial development to be allocated	-	1% of developed land area	-	10% of the developed land area	10% of the developed land area
5	Logistics Parks	Includes all large scale logistics (freight handling) and trading activities (wholesale or retail) with ancillary activities such as office complexes,	Proportion of total Built Up Area used for commercial activity	70% or more	Commercial, Industrial, Residential	20% of the developed land area	10% of land under residential development to be allocated	-	5% of land under commercial development to be allocated	5% of the developed land area	1% of the developed land area	-	10% of the developed land area	10% of the developed land area

NO	Use Category Name	Description	Measurable Parameter	Value	What does the value include?	Minimum Land Area by Use Sub-Category								
						Residential	Residential for EWS	Commercial	Commercial for EWS	Institutional	Institutional (Social Infrastructure)	Road	Functional Open Spaces	
6	Residential	entertainment complexes and Ancillary Housing Where Housing is developed as serviced plots or constructed Dwelling Units and is contiguous to an accessible economic activity	Proportion of total Built Up Area used for Dwelling Units	80% or more	Residential	-	10% of land under residential development to be allocated	10% of the developed land area	5% of land under commercial development to be allocated	5% of the developed land area	5% of the developed land area	-	10% of the developed land area	10% of the developed land area
7	Mixed Use Townships	Are also eligible				-	10% of land under residential development to be allocated	10% of the developed land area	5% of land under commercial development to be allocated	-	1% of the developed land area	-	10% of the developed land area	10% of the developed land area

Source: Gujarat Integrated Township Policy, 2008.

### 5.5.7. Planning for Affordable Housing

Provision for affordable housing is a critical provision in the context of sustainable development. Affordable housing implies that the cost of the housing should be affordable to the disposal income of low income group, EWS and the poor. The cost of housing has two major components- land and construction of houses. Invariably in large cities land cost undesirably is boosted making housing cost unaffordable for the majority. Therefore, the critical policy in planning has to relate to adequate supply of land, commensurate to the needs of the majority, not for demand of the minority. This requires strong policy interventions to control rise of land price, speculation and more importantly to increase supply of land for buildings in the market. Some State initiatives have made efforts in policy and planning and prevention in order to affordable housing and this involves enacting regulations of reservation in housing supply for EWS and the poor.

#### Case Study: Affordable Housing Norms, Rajasthan

Sustainable human development cannot be achieved without adequate & affordable housing to the vulnerable population residing in the ever-growing urban settlements currently. Affordable shelter for the masses or creation of productive and responsive housing is a complex amalgam of a host of factors, which need to be tackled at all levels and in a synchronized manner. Department of Urban Development, Housing and Local Self Government, Government of Rajasthan has developed Affordable Housing Policy, 2009 after studying and dovetailing various housing schemes of Government of India. With the help of the policy framework and the in-built incentives it is aimed to motivate various agencies, including private developers to take up construction of affordable housing for EWS/LIG categories in various urban centres of Rajasthan. Under the said Policy, five models for developing Affordable Housing have been advanced.

#### Model No-1: Mandatory Provisions

Table 5.11: Proportion of Plots/Houses/Flats in Townships/Group Housing Schemes

S.No.	EWS/LIG	MIG-A category
Rajasthan Housing Board	50%	20%
All Urban Local Bodies	25%	20%
Private developers	15%	-

Source: Affordable Housing Policy, 2009, Rajasthan Government

#### Model No-2: Private developers on land owned by them

- Developers to take up construction of EWS/LIG flats on minimum 40% of the total land.
- The built up EWS/LIG flats to be handed over to Avs Vikas Limited at pre-determined prices.
- Several incentives are offered like double of the normal FAR, TDR facility, waiver of EDC, Building plan approval fee, conversion charges, 10% of the total land allowed for commercial use, fast track approval

#### Model No-3: Private developers on acquired land

- The land would be made available to the developer on payment of compensation (Land Acquisition cost + 10% Administration charges). All other parameters as per Model No. 2.

**Model No-4: Private developers on Government land**

- Earmarked Government land to be offered free of cost to the developer selected through an open bidding process. The developer offering the maximum number of EWS/LIG flats free of cost to the ULB would be awarded the project. At least 50% houses should be of EWS category.
- The developer shall be free to use the remaining land as per his choice for residential purpose with 10% for commercial use. All other parameters as per Model No. 2.

**Model No-5: Slum Housing**

- The model is based on various schemes approved by Government of India and also on the lines of "Mumbai Model" of slum redevelopment with private sector participation.

The Policy document also provides for the tentative land use breakup, ground coverage, time period for finishing project, additional FAR and Use of TDR as a result of additional FAR.

**Integrated Townships developing in the periphery of cities lead to formation of enclaves once city grows and once peripheral area is accommodated in city planning area. These enclaves can be assimilated with the city character and structure by realising needs of the main city, promoting required activities in the townships and developing policies to accommodate needs of development.**

### 5.5.8. Medi-City

The concept of modern medical cities or special health care facilities as been in place for some time, but has gained renewed interest, particularly in rapidly developing economies. The concept of a medi-city or health city defines a cluster of hospitals, a holistic healthcare centre; a large hospital sprawled across acres of land. Medi-city can be a new township or a zone of a city, where medical facilities are provided releasing pressure from the main city or to promote medical tourism attracting new sources of economic growth.

Medi-cities have been designed to be comprehensive in scope and incorporate advanced technologies and medical practices. The scale and scope of medical cities usually demands an advanced level of care, both in technology and approaches to create an attractive destination for care to ensure the high level of patient volumes required to support such a large setup.

#### 5.5.8.1. Pre-requisites

In certain circumstances, Medi-cities evolve in metropolitan cities. There are many pre-requisites for the development of Medi-cities, as:

- **Volume and demand:** Medi-cities will always require a significant amount of patient volume from the local population in addition to the human resources and community infrastructure that a city setting provides.
- **Special infrastructure:** Medical care and associated infrastructure is to be provided in a planned manner. Medi-cities require highly specialised provisions for medical waste handling especially hazardous bio-waste, accessibility, special care systems, area reservations and infrastructure.

- **Accessibility:** Well-connected site is required for Medi-city development to provide ease in accessibility. Parking provisions in a medi-city is need based demand, focusing on institutional set-ups. Accessibility into and around the medi-city should be highly focused on the accessibility of differently abled / physically challenged / disabled.
- **Attractiveness:** Medical cities need to offer several attractive attributes to attract foreign or 'non-local' patients to overcome the competition, having special care, area reservation, and infrastructure facilities. Hotels, beautiful landscaping and country club, in order to attract and promote medical tourism, should complement the medi-city.
- **Multiple functions:** Medi-cities developing in isolation do not reach the maturity stage. Medical cities should also incorporate substantial non-medical services to support the staff, patients and visitors. Clear approach and effective forecasting may not be easy in such a case.
- **Poor management of health care waste** potentially exposes health care workers, waste handlers, patients and the community at large to infection, toxic effects and injuries, and risks polluting the environment. It is essential that all medical waste materials generated from medical city are segregated at the point of generation, appropriately treated and disposed of safely. Bio-Medical Waste (Management and Handling) Rules, 2011 of MoEF or latest such guidelines, must be followed in Medi-cities (to be monitored by CPCB/SPCB as per their regulations).

### 5.5.8.2. Planning strategy

Medi cities have the ability to support services that are highly specialized, services that often struggle to see sufficient volume to support a business case. Medi-cities need to have a strong higher and medical educational system and complete and stable infrastructure to become an ideal location for specialisation. Due to the interplay of economies of scale, the Medi-city creates an interesting and opportunistic intersection with medical tourism as mentioned earlier. For those organizations providing medical tourism services, this integration extends beyond the immediate community into the global healthcare delivery system.

### 5.5.8.3. Aspects of Planning

Since the most critical issue in Medi-city is handling of hazardous medical waste, essential facilities for the maintenance of Medi-city has been prescribed by WHO, these are:

- Effective waste reduction and waste segregation, ensuring that only appropriate wastes are incinerated;
- Siting incinerators away from populated areas or areas where food is grown, thus minimizing exposures and thereby risks;
- A properly engineered design, ensuring that combustion conditions are appropriate, e.g., sufficient residence time and temperatures to minimize products of incomplete combustion;
- Construction following detailed dimensional plans, thus avoiding flaws that can lead to incomplete destruction of waste, higher emissions, and premature failure of the incinerator.

Apart from the waste handling of the Medi-city, the key aspects of planning are:

1. **Access:** One of the primary success factors for proper healthcare design is convenient and easy access to and from the facility. This includes simple way-finding, safe and weather-protected vehicular drop-offs, and convenient access to parking. Such access is often at odds with urban planning trends, which attempt to minimize the impact of vehicular transportation in favour of more pedestrian-oriented buildings.

2. **Transportation facilities** like bus routes, metro rail, bicycling, and heliports are substantial non-medical services to support the staff, patients and visitors.
3. **Parking Demands:** Access to public transportation and housing within walking distance creates opportunities for staff and certain patients and visitors to avoid vehicular commuting altogether. This reduces the polluting impact of automobiles and can minimize the size of required parking facilities. It should be noted, however, that even with these reductions, hospitals would still generally create a much higher parking demand per square foot than a typical urban office building.<sup>72</sup>
4. **Natural Environment:** Environment Studies have concluded that a natural environment is essential to create a genuine state-of-the-art healing environment and reducing stress. Key sustainable design elements such as roof-gardens, courtyard spaces can minimize the building's heat-island effect, reduce demand on storm water systems, improve surrounding air quality, and reduce noise pollution.
5. **Institutional:** Integration of Medi-city with research and development centres for bio-medical research, medical colleges, training centres are necessary. Also, financial support units should be created such as banks, ATM facilities, information centres, money transfers and exchange and insurance company outlets.
6. **Commercial Space:** A mixed use community is desirable in this area because of its proximity to the emerging Medical City. Therefore, Planned Development shall be encouraged, including a mixture of residential use types, hotel, retail/commercial, office and airport support, commerce, conservation and recreational uses.

Medical city should encompass the concept of self-sustainable cities/townships, in a way as an eco-city is designed with consideration of environmental impact. They should have clean disposal of waste, waste-to-energy, renewable energy, sustainable transportation and drainage system, zero-energy building, green roof, etc.

### 5.5.9. Sports city

Sports City defines a large developed area with all kind of sports infrastructure facility to support organising and hosting different sports activities in a city. Basically it is a concept of "City within City" which provides a regular series of sports venues, sports academies, providing a platform for youth development, recreational sports facilities, residential and commercial developments, together with all the related amenities. The purpose-built city is supported by service facilities like schools, medical facilities for sportsmen and residents, hotels, community centres and entertainment venue. And eventually all the events of sports city translate their activity into economic generation for an economically sustainable sport city.

#### 5.5.9.1. Associated issue

As sports city emerges as a newly developed city on the fringe or near to the existing or old city so the associated issues are different from the parent city. Following are some of the issues associated with sports city:

- Large vacant land is required for developing sports city for development of sports infrastructure and supporting services. This required land is only available near to the parent city, if planned in advance.

<sup>72</sup> Case Studies in Design Excellence for Mid-Sized Urban / Inner Suburban Medical Centers, by AIA Potomac Valley

- Huge and regular investment for infrastructure development is a big challenge to sustain sports cities. Major sports events are not held on a high frequency so maintenance and sustainability during lean time is a challenge
- World class modern infrastructure and equipment only can act as a pull factor of sports persons to come, participate and stay for long. Apart from development of sports complexes other development including residential, commercial and logistic facilities (store houses) are to be integrated.
- As sports cities lies on outskirts of the city, lack of connectivity leads to isolation of the sport city.
- Further, if the sports city lacks alternative economic activities, apart from sport event, it leads to stagnation of city growth.

Apart from sports city, it has been widely accepted that availability of facilities for sports and games and recreation is an essential part of healthy social life. Now it has been considered as an important parameter in determining the quality of human development. Sports play a vital role in overall development of youth. As per the latest All India Educational Survey conducted by the National Council for Educational Research and Training (NCERT) more than 50 per cent of one million plus schools in the country lack playground facility. This problem is more acute in the urban areas where playing fields are facing serious threat from competing demands on open spaces due to the low priority attached to it.

### 5.5.9.2. Planning strategy

The various factors associated with Sports city planning are strategic location, sports infrastructure, supporting institutional infrastructure and most importantly, skilled man power in the sector.

In India, cities and townships like Greater Noida Sports City, Mohali Sports Complex has emerged as a sports city. Now, New Raipur, almost 20 km from Raipur city is developing as a new sports city by the Naya Raipur Development Authority in eastern part of India.

Initial development of the sports city are to focus on infrastructure development, specific to sports, recreation and connectivity to national level urban centres and also international. Success of the city lies in the institutional backing to provide for highly specialised skill development, research and development and application of evolving technologies in the field. To overcome the challenge of huge investments, sports tourism, is among the alternative sources to sustain sports cities. The management of such cities/townships shall strategies these with hospitality, commercials, recreational and entertainment venues and proportion of its land use up to 15-20% to be dedicated for such uses<sup>73</sup>.

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<sup>73</sup>Evolved from Gujarat Integrated Township Policy, 2008.

### Case Study: Naya Raipur Sports City

**Total area:** Proposed development is on 130 acres, with its prime use divided into recreational and residential zone as mentioned in the Master Plan of Naya Raipur, 2031.

**Land use & Infrastructure:** The project is conceived as an integrated development featuring residential and commercial real estate components of the Greenfield capital city, complemented by various sports facilities of international standards. Core activities of the two areas is proposed to be well segregated, however, the supporting infrastructure and amenities to facilitate all the prerequisites for luxury lifestyle and a well-equipped base for sports requirements are integrated.

**Inclusive planning:** As per the stipulations of NRDA, 10% of the total housing units need to be developed as LIG and 15% of the total number of housing units need to be developed as EWS housing.

**Residential Zone:** The core concept of this component is to be an integrated neighbourhood development with easy access to social amenities and facilities like healthcare, education, shopping, leisure and entertainment, sports.

**Sports Zone:** It is the prime focus area for development of sports city for providing sports complex for organising games, training centre, practice venue and competition based environment of sports at both national and international level. The sports zone would offer a wide range of indoor and outdoor sports facilities, mainly comprising an aquatic centre and indoor stadium to be development components. Sports centre, accommodation facilities for players along with other support infrastructure such as food courts, restaurants, and open spaces form optional sports components.

Other facilities would be parking space, public utilities and amenities, hospital and primary health centre and shopping centre for local residents.

### 5.5.9.3. Aspects of Planning

The major planning aspects of the sports city are development of sports complexes, training centres, medical facilities, good connectivity, residential and commercial zones. The following supporting infrastructure should be considered for sport city:

- Good connectivity with the existing cities by road and rail facilities.
- Provisions for all basic infrastructures like water supply, storm water drainage and sewerage, and if location allows, integrate with the parent city, in order to draw benefits from the common infrastructure.
- Share of open spaces and recreational land use to be significantly high and hence provision of water harvesting system for available large open spaces in the sports city to be mandatory.
- Alternative uses of the open space to generate revenue during lean period.
- To regulate the development activity of sports city an integrated institutional development is required with local bodies and the sports authority.
- To promote Sports Tourism, Sports City to boast major entertainment venues, community centres, hotels and all the related amenities expected

It should be noted that the projections and allocation of infrastructure provisions and space standards of a Sports city are different. Such as the per capita water supply requirement should be planned for higher amount compared to the other cities. Since it is a “City within City”, the building regulations in the development plan for these areas to be individually prepared. The large land requirement in these cities must be compensated by sustainable development and green infrastructure.

Government of India (GoI) has taken into consideration, the importance of sports in day to day life and have made policies for development of sports at the level of Gram Panchayat, Urban Local Body and schools. Initiatives taken by the GoI are as follows:

- The National Sports Policy, 2001 of Government of India, ensures the provision of land and development of sports for the educational institutions, Schools and Colleges in **both rural and urban areas**, where existing play fields and stadium, both in rural and urban areas, will be maintained for sports purposes. The introduction of suitable legislation may be considered for providing open areas to promote sports activities. Steps would be taken to evolve low cost functional and environment-friendly designs in this regard, so that maximum benefits could be derived through relatively low levels of investment.
- The revised Twenty Point Programme, 2006 of Ministry of Youth Affairs & Sports provide for substantially enhanced public investments as a fundamental requirement for the time-bound establishment of basic but extensive sports infrastructure along with trained supervisors and organized sports management arrangements. This will include trained supervisors, **in all rural Panchayats and urban neighbourhoods throughout the country, leading to the establishment of a National Sports Infrastructure Grid extending from the community level in Panchayats and Municipalities to Block, District, State, Metropolitan and National levels, backed by sports medicine and sports sciences.**
- Apart from Sports city, the Comprehensive Sports Policy, 2007 of Ministry of Youth Affairs and Sports urges State Governments and Local Governments to engage physical instructors in schools and make available at least **1 acre of land for a primary school and 2.5 acres of land for an upper primary school for use as playgrounds.** In addition, it is also introducing and thus, implementing major programme in urban areas, to financially support the *Nagarpalikas* and other Urban Local Institutions to provide basic safe places to play in poorer areas in convergence with the Jawaharlal Nehru National Urban Renewal Mission. The *Nagarpalikas* will need to provide the minimum prescribed extent of land on a realistic basis. For this, financial assistance from GoI should be used as seed money to raise other contributions from the public and private entities for the creation of the basic sports infrastructure.

### 5.5.10. Development by the Private Sector

Multiple urban planning approaches that are available today pave way for the development of planned settlements in greenfield and brownfield sites. The information provided in this chapter about different cities and townships, state policies and development approaches can be realised on the ground of State backing. Easy adoption of these opportunities by developers for developing planned and better cities is possible once State Governments legislate and bring out township policies.

## 5.6. Special Area Planning (cantonment area, restricted area etc.)

### 5.6.1. Cantonment Area

Cantonment area is a place or places along with boundaries in which any part of the Armed Forces is quartered in a region amidst civil population. The overall municipal administration of the notified cantonments is the function of the Cantonment Boards which are local bodies comprising democratically elected representatives of the residents of the Cantonment as well as official members on a 50:50 basis.

As per “*The Cantonments Act, 2006*”, the Central Government may, by notification in the Official Gazette, declare any place or places along with boundaries in which any part of the Forces is quartered or which, being in the vicinity of any such place or places, is or are required for the service of such forces to be a cantonment for the purposes of this Act and of all other enactments for the time being in force, and may, by a like notification, declare that any cantonment shall cease to be a cantonment. Also, section 10(2)<sup>74</sup> states that, “Every Board shall be deemed to be a municipality under clause of article 243P of the Constitution for the purposes of-

- a. Receiving grants and allocations; or
- b. Implementing the Central Government schemes of social welfare, public health, hygiene, safety, water supply, sanitation, urban renewal and education.

Thus, the Cantonment Board provides municipal services, community facilities and civic utilities including Water Supply, Sanitation, Street-lighting, roads, medical, educational, and recreational facilities. The Board also strives, as per the National Policy, for the environmental up-gradation by planting trees, bushes, decorative plants, etc. The cantonment board also act as a municipality for taxation purposes<sup>75</sup>.

The structure of Cantonment Boards is being maintained keeping in view the fact that the Cantonment areas were and are primarily meant to accommodate the military population and their installations. The Cantonment is an area, which comprise of both military and civil population. Thus, it needs to be covered under the guidelines of area development plan, so that the civic services can be integrated for the benefit of the ultimate user.

#### 5.6.1.1. Categorises of Cantonments

As per the Cantonments Act, 2006, the cantonments are categorised into four types based on the population residing within the cantonment limit. The categories are mentioned in table below.

<sup>74</sup>The Cantonments Act, 2006.

<sup>75</sup>Section 108<sup>75</sup>, states that, “A Board shall be deemed to be a municipal committee for the purposes of taxation as per the Municipal Taxation Act, 1881 (11 of 1881).”

Table 5.12: Cantonment Categories

Sr. No.	Cantonment Categories	Population Limit
i	Category I	More than 50, 000
ii	Category II	10,001 - 50,000
iii	Category III	2,501 – 10,000
iv	Category IV	Up to 2,500

### 5.6.1.2. Land Use in Cantonment

Land in cantonments is classified under the following major categories for the purpose of development:

- **Class A:** Reserved for specific military purpose and is managed by military authorities.
- **Class B:** Reserved for military administration for central government departments, railways; state government and agricultural land; used by private persons on lease; Vacant land, managed by the defence estate officer.
- **Class C:** Occupied or used for municipal purposes such as markets, roads, ranges, gardens, etc. it is managed by the cantonment board.

#### Case Study of Cantonment areas

##### 1. Delhi Cantonment Area

Delhi Cantonment Area is spread over an area of 42.97sq.km and municipal administration is provided by the Delhi Cantonment Board (DCB), which works under the administrative control of the Central Government (Ministry of Defence).

**Role in Infrastructure:** The Board (DCB) is responsible for solid waste management, drainage and sewerage, street cleaning of the Delhi Cantonment area. While bulk water is supplied by Delhi Jal Board, which is 100%, metered, water is being metered in the distribution side at the pump houses for bulk consumers but not at individual houses. The Delhi Jal Board receives in bulk all sewerage from Delhi Cantonment Board for treatment and disposal.

**Land features:**DCB regulates development in the Cantonment Area, located between the airport and the NDMC area, within which features such as the Cantonment low density bungalow layout with extensive gardens, heritage buildings associated with the Armed Forces, and components such as Gopinath Bazaar and St. Martins Garrison church are considered to be of significance. Some locations in the Cantonment Area have been proposed as a Conservation Area by INTACH in the 2000 List. However, total number of Jhuggies has been increased from 1570 in 1990 to 1700 in 1994 in Delhi Cantonment Board area.

(Source: CDP Delhi, Dept. of Urban Development, Govt. of Delhi

[http://jinnurm.nic.in/wp-content/uploads/2010/12/CDP\\_Delhi.pdf](http://jinnurm.nic.in/wp-content/uploads/2010/12/CDP_Delhi.pdf))

##### 2. Pune Cantonment Board (PCB)

The Pune Cantonment Board (PCB) is considering levying the Local Body Tax (LBT) in future, only after the Pune Municipal Corporation abolishes octroi. They have also studied the implementation of LBT in Aurangabad and have found there is a hike in their revenue and they believe LBT is far more feasible than octroi. Specific rule under Cantonments Act states that if the State abolishes a particular tax, the Cantonment Board situated in that State cannot levy that particular tax, limiting PCB to impose it.

### 5.6.1.3. Associated issues

Some major and minor issues associated with Cantonment areas and their developments are:

- Cantonments were always considered as high-security areas. The Cantonment Land Administration Rules permitted lease option for civilian population, who initially settled within the limit of Cantonment for the purpose of residential and commercial activity. These settlements are support systems such as for commercial activities, manpower support as formal or informal and to fulfil some of the institutional requirements. Within the cantonment areas, military based development and civilian based development takes place. But the management of this development faces the similar issues as those by the ULBs and development authorities. They are:

Lack of sufficient funding due to dependency on the Central and State government policies and permitted or abolished finance revenues;

Lack of consolidated and appropriate planning norms to guide the development of the civilian areas;

- The administration of Cantonments is a Union Subject, placed in List I of VII Schedule of the Constitution. The municipal administration of Cantonments is regulated under the provisions of the Cantonments Act, 2006. Cantonments cannot access development funds because the Ministry of Defence and the army are in the non-plan sector. This isolation is the fundamental reason for

**Lack of integration with the city as a whole**, due to paucity of funds and non-implementation of Central and State Sponsored Schemes is the Cantonments.

However, as per the Cantonments Act, 2006 the Board may join with any other local authority and appoint a joint committee for any purpose in which they are jointly interested.

In most cases, cantonments draw services from the city municipality especially water and power, this creates a dependence on city municipality which needs to be planned carefully and with higher standards than that set for the city.

Therefore, from the planning perspective, the integration of planning between cantonment areas and the urban settlements around it, is weak or absent.

- Another important planning issue is urban sprawl/ out growths. Cantonment areas which were originally located at a distance from the city are now within its limits or on its fringe which creates planning problems related to security and planned urban development of the city. The rapid urbanisation along urban settlements has engulfed the buffer zone between the two, leading to<sup>76</sup> :

Haphazard development in the surrounding areas of cantonment due to lack of Master Plan / Development Plan, and lack of land use specifications, resulting into unplanned formal and informal commercial establishments.

High waste generation in the surroundings of the Cantonment areas due to uncontrolled and undeveloped open spaces. Such a case is of Ahmedabad Cantonment area (due to untreated disposal methods and lack of proper waste management system).

Illegal occupancy on defence land due to uncertain General Land Records (GLR). Cases of occupants questioning the preparation of GLR particularly in the case of Secunderabad Cantonment have arrived.

### 5.6.1.4. Planning Strategies

The Cantonment Board has to execute a variety of duties and functions with the limited availability of funds. The board is responsible to make provisions for physical as well as social infrastructure. Construction, conservation and

<sup>76</sup>The Times of India

maintenance of public service infrastructure, historical monuments, public places, etc. are also under the purview of the board.

In the given circumstances, where the duties and functions of the cantonment board and the municipality are similar, the integrated planning efforts shall address the associated issues of the cantonment area planning

**Strategy 1:** To control the overall area, in absence of land use specifications, which results into shopping and commercial establishments in Cantonment residential areas calls for the need for preparation of Development Plans/ Master Plan. Here, efforts shall be made by the Cantonment Board or by Joint Committee for formulation of a detailed Development plan. The norms and standards given in this Guideline may be adopted with modifications for planning (specifically) the civilian areas of the cantonment. Some specific planning aspects to include:

- a. Public utilities such as water supply, sewage systems and treatment plants, telecommunication, transportation networks and modes, power etc. can be integrated for ULB's and Cantonment Board for an effective output by the powers vested in the Joint Committee.
- b. Social infrastructure such as stadium and sports complex, working women hostel can be built within the Cantonment area for civilians. Recreational facilities shall be integrated with the cantonment areas.
- c. Commercial space development with proper guidelines will result in increment of the land value, which will be beneficial for Cantonment Board.
- d. Integration of the external infrastructure with the city level infrastructure facilities.
- e. More importantly, cantonment boards should make provision to include all sprawls or outgrowths within their jurisdiction areas for control (building) and land use managements<sup>77</sup>.

**Strategy 2<sup>78</sup>:** Another approach for planning exercise is by JNNURM scheme, where Comprehensive Development Plan and Comprehensive Mobility Plan shall be prepared by the Local authorities in consultation with Cantonment Board and approved by Ministry of Defence for raising the funds under the scheme. As per norms, a city development plan projecting future development of roads, water, sewerage and storm water drains and an indent of existing land use and a future land use plan is mandatory to obtain grants under all Central scheme such as Jawaharlal Nehru National Urban Renewal Mission (JnNURM), Rajiv Awas Yojana (RAY) and other Central government schemes.

This approach of planning the cantonment is to ensure:

- Integration in terms of connectivity as well as mass rapid transportation system,
- Suitably chosen locations of city level infrastructure for cantonment and civilians
- Well planned economic/commercial base in the cantonment area,
- Giving city a direction to its future growth towards or away from cantonment as strategized.
- Another advantage is that the natural systems management such as rivers and flood control measures can be clubbed for both the Cantonment areas and City area, which will minimise the losses, as, witnessed for Ambala Cantonment.
- City zonal plans on areas adjacent to cantonment board area should be finalised by the Competent City Authority (Municipalities/ Development Authority) in consultation with Cantonment Board Administration.
- Control on the surrounding or immediate zonal plans to cater to the requirements of the cantonment area.

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<sup>77</sup>In case of requirement buffer zones are created for specific defence land pockets under Works of Defence Act, 1903.

<sup>78</sup>Ministry of Urban Development (MoUD) had introduced JnNURM in selected 76 cities of the country to provide funds on Central/ State/ Local Body sharing basis to develop basic infrastructure of the cities keeping in view the modern day requirements of urban governance. Among these cities, there are 28 Cantonments which are co-located within these Mission cities in the first phase of JnNURM. However, the issue of sharing funds with cantonment boards is still under consideration of Government of India.

### Case Study for CDP preparation in Cantonment area

The Khadki Cantonment Board (KCB), Pune is preparing City Development Plan (CDP) to strengthen urban infrastructure and integrate it with that of the Pune Municipal Corporation with focus on traffic management for better connectivity, improvement in water supply, better garbage disposal system, developing sewerage system in bungalow areas and implementing projects in slum areas. The concept arises to get more funds from the state and Union governments under the JnNURM as cantonment board is looking for more funds. The first step for getting the funds is to prepare a CDP, which has to be approved by the state government and sent to the Union government for final approval

(Source: *The Times of India*.)

#### Revenue generation for Implementation of the plan:

The Cantonment Board generates revenue through meagre octroi, taxes and other fees, as explained in above sections. There are alternatives to increase this revenue. Cantonment area should incorporate shopping plaza/complex, which will encourage the shopkeepers to pay more rent to the board. The board can also organise weekly markets, which will also encourage higher shop rents<sup>79</sup>. Proper planning strategy as recommended above shall ease the establishment of paid parking, theatres, cinemas, community hall, stadiums, gymnasium etc. that will also generate revenue. As per “The Cantonment Act, 2006”, these establishments are the responsibilities of Cantonment Board.

#### 5.6.1.5. Recommendations

As per the Study of the National Commission to Review the Working of the Constitution, recommendation on “Empowering and Strengthening Local Self-Government in Cantonments” suggest the following reforms:

1. As Cantonments come within the legislative competence of the GoI under Article 246 read with entry-3 of List I of the Seventh Schedule, the solution appears to bring the Cantonments under the administrative control of the Ministry which has something to do with the local self-government and can access plan finance and developmental grants and loans. It may be worthwhile considering that the Ministry of Urban Development and Poverty Alleviation as the most suitable Ministry for Cantonments. The Cantonments could be brought under the Ministry of Urban Development and Poverty Alleviation (now MoUD) for planning and budget purposes and the mechanism may be worked out as in the case of border roads and coastal guards which are not under the administrative control of Ministry of Defence but still function in the interest of Defence forces with the Ministry of Defence and army having their say.
2. The Cantonments may also be brought under the Part IX-A of the Constitution so that they can take the advantage of the benefits of district planning, metropolitan planning, the finance commission, assignment of taxes, duties, tolls and grants and aids from the State Government, prepare plans for economic development and social justice, etc.
3. Structural constraints prevent the Cantonment Boards to access plan finance and development funds available for municipal necessities merely because the Cantonments come under the Ministry of Defence, a non-plan area.

<sup>79</sup>The Deolali Cantonment Board (DCB), *The Times of India*.



## 6 Sustainability Guidelines

One of the early definitions of sustainable development was provided by Brundtland Commission (1987) as: ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’<sup>80</sup>. The Commission’s report also states that “in essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional changes are all in harmony and enhance both current and future potential to meet human needs and aspirations. Applied to the context of planning and development, the most fundamental element of sustainability is the utilization of natural resources in a city region most efficiently, most equitably across sections of society and in such a manner that the resources are conserved and renewed for future generations to meet their needs and aspirations. Integrating sustainability principles in planning process and development in today’s scenario has been explained in this chapter.

### 6.1. Sustainable Development

#### 6.1.1. Sustainable Planning

Sustainable habitat development means achieving a balance between the economic and social development of human habitat together with the protection of environment, equity in employment, shelter, basic services, social infrastructure and transportation. Some of these parameters, which can be considered in Planning and Development, are:

1. **Regional Planning:** Regional development to control mushrooming unplanned and un-organized growth outside Master Plans/Development Plans along with integration of land use and transport resulting in sustainable development.
2. **Compact city/ High Density Development:** The National Mission on Sustainable Habitat<sup>81</sup> (NMSH) recommends Low Rise and Higher Density Development to improve overall energy efficiency of the area; such forms are less expensive and reduce pressure on travel demand. Therefore for planning for high-density development and for increase in FAR in existing built up area, rationality for the increase in FAR should be worked out apart from carrying capacity analysis for the area.
3. **Re-development / re-densification:** Approaches shall be developed for Re-development / re-densification of existing urban habitat. Mixed land use, integrated and shared social space and multiple transport options can be considered and implemented to reduce trip generation and create efficient transport system.
4. **Open Spaces:** Emphasis should be given on vegetation/Green Belt in urban areas to reduce “heat island” effects.

<sup>80</sup> World Commission on Environment and Development’s (The Brundtland Commission) Report Our Common Future (Oxford: Oxford University Press, 1987).

<sup>81</sup> National Mission on Sustainable Habitat, MoUD.

Apart from the key parameters, the National Mission on Sustainable Habitat has identified the components, which have major role to play in bringing environmental sustainability. These basic norms are detailed out below:

### 6.1.2. Energy Efficiency

The Generic Energy Efficiency Guidelines are given below. These guidelines are applicable for various categories of the building irrespective of their climate location.

- **Non-Conventional /Renewal Energy:** As per NMSH<sup>82</sup>, for residential buildings 15% of the total external lighting load should be met through renewable energy and for commercial / institutional / industrial / mixed use buildings, 5% of the total lighting load should be met through renewable energy sources (solar, wind, biomass, fuel-cells and so on). Also, there should be development of city level Energy Efficiency (EE) and Renewal Energy (RE) policy actions for e.g. Nagpur and Bhubaneswar have developed and adopted city level EE and RE.
- **Energy Efficient Design:** Efficient development control regulations and building byelaws from the point of view of energy efficient design should be considered. The Government of India has developed the Energy Conservation Building Code (ECBC), which provides minimum energy performance standards for energy efficient buildings, which can to be referred while designing private and public buildings. The ECBC is currently a voluntary programme, with a number of States adopting it as a mandatory requirement.
- **Building Performance Certification and Rating System:** After the introduction of ECBC, MoEF suggested ECBC compliance while undertaking EIA for all building and construction projects falling under their purview. Apart from EIA, in 2008, the Ministry of New and Renewable Energy, the Government of India have launched Green Rating for Integrated Habitat Assessment (GRIHA). GRIHA rating standards have been incorporated the provisions of the NBC 2005, ECBC, and other Indian Standard codes.

Similar to the Leadership in Energy & Environmental Design (LEED) rating system (practiced globally), the LEED-India promotes a whole-building approach to sustainability by addressing performance in the following five areas: (1) sustainable site development, (2) water savings, (3) energy efficiency, (4) materials selection and (5) indoor environmental quality. It also meets the specifications of ECBC 2007, NBC 2005, MoEF Guidelines, and CPCB norms.

### 6.1.3. Urban Transport

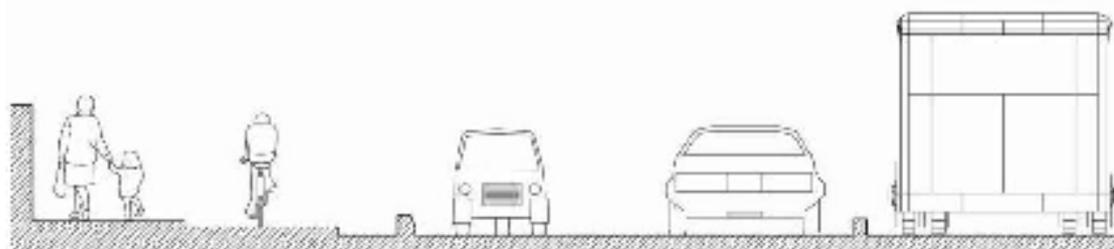
- **Transit Orient Development (TOD):** Provision for TOD in cities should be considered, as it encourages high density and mixed-use development, overall reducing the travel demand and in turn reducing the carbon footprints. The details on TOD are elaborated in Physical Infrastructure section.
- **Strengthening of Public Transport System:** It can be done through a Combination of Promotional, Regulatory and Fiscal Measures adopting green transport models. Report of the Sub-Committee on Urban Transport (NMSH) can be referred for strengthening Public Transport.

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<sup>82</sup> Report of the sub-committee for development of NMSH parameters for energy efficiency in Residential and Commercial Buildings.

- Reducing Fuel Consumption per passenger:** Significant GHG mitigation can be achieved through modal shift by providing all arterial roads more than 25 m Right of Way to have minimum of 2.5 m pedestrian path (with trees) and proper street furniture and 2.5m bicycle path preferably in each direction as a mandatory measure. Where it is not possible to provide a dedicated cycle path because of right of way being narrow, traffic calming measures to reduce the speed of traffic to 30 kmph need to be adopted.

Figure 6.1: Schematic cross-section of Arterial Roads



Source: Code of Practice Part-1, MoUD

- Road Passenger with Urban Transport systems:** Long-distance passenger travel needs to be closely integrated into the urban environment, facilitating fast traveller-friendly mass-transport access to well-located terminals and airports. Carefully planned highway system improvements are required to reduce travel times for goods and passengers while improving road safety, congestion, fuel consumption and emissions.
- Non-Motorised Transport (NMT) and Intelligent Transport System (ITS):** NMT and ITS should be encouraged. Provision of NMT is described in Physical Infrastructure section of this guideline, which aims to reduce carbon footprint. Moreover, ITS should be implemented for demand management and efficient implementation/enforcement of Public Transport. Provision of Mixed-use along the streets to ensure public safety and attractiveness for pedestrians and cyclists and hence accommodate large numbers of pedestrians and street vendors.
- Non-Conventional source of Energy:** Changing to fuels that have a lower carbon footprint in sufficient quantities would have a major impact on GHG emissions from urban transport. Also alternative fuel base in cities to be promoted to reduce dependency. To achieve a good quality of public space, trees need to be planted to prevent *Heat island* effects.
- Accessibility:** Accessibility of public transport to be improved in order to reduce travel distance.

Table 6.1: Accessibility of Public Transport at Neighbourhood Level

S. No.	Transport infrastructure	Distance from Neighbourhood
1	Rail Station including metros, monorail, light rail	800 meters or 5 minutes walking distance
2	Bus stops	400 meters
3	Intermediate Public Transport	400 meters

Source: LEED for India, 2011, IGBC 2011.

#### 6.1.4. Urban Infrastructure

- Zero Waste and Waste Recycling:** The urban waste should be recognised with a significant proportion of organic constituents, which has emerged as a resource for energy generation in an environmentally sustainable manner. Energy in the form of biogas, heat or power should be seen as a bonus, which improves the viability of such projects.

Bio-methanation, refuse derived fuel and incineration are the most common technologies,

Pyrolysis and gasification are also emerging as preferred options,

In case of existing landfills, bioremediation of waste is recommended with a view to reclaim the land and convert organic waste into useful products, which will result in reduction or elimination of GHG emission.

- **GHG mitigation measures for wastewater:** GHG mitigation measures includes - collection, conveyance and treatment of wastewater, reuse and recycling of treated effluent and gas recovery from sludge as well as use of treated wastewater for artificial recharge of aquifers to improve the ground water potential.
- **Decentralised Wastewater Management** - Decentralized wastewater management systems for community, housing complexes, and commercial buildings to be introduced for efficient wastewater management. Institutional capacity of all (ULBs) should be strengthened for effective implementation and O&M of sewerage system.
- **Low Water use and Ecological Sanitation** - It should be ensured that systems for the management of human excreta incorporate conservation principles. Low-water use toilets (3-5 litre) and ecological sanitation approaches (including ecological toilets), where nutrients are safely recycled into agricultural manure can be promoted.
- **Recovery of Energy** - The major benefits of recovery of energy from urban wastes is to bring about reduction in the quantity of waste by 60 per cent to 90 per cent; reduction in demand for land as well as cost for transportation of wastes to faraway landfill sites; and net reduction in environmental pollution besides generation of substantial quantity of energy.
- **Reducing need for pumping** - It would reduce the demand for energy, reduction of Non-Revenue Water (NRW), energy audit of all the water utilities, rationalization of water tariff to reduce wasteful use of water, minimization of leakages, metering of all water taps and water audit, etc.

## 6.2. Climate Change Mitigation and Adaptation

Climate change and its recent trends have a direct impact on all types of the development. Numerous agencies including National and International agencies are carrying out studies and are supporting cities to develop, adopt and implement sustainable and climate safe practices as per the National Action Plan on Climate Change, Government of India.

The International Panel on Climate Change (IPCC) Working Group-II's most recent report (2013) paints a grim picture for India. Focus of the report is on food and water supply and the urgent need for our cities to be resilient. Considering this, the Regional Plans and Development Plans must incorporate the possible impact of climate change on development. The focus should be on water security, use of heat reflecting materials in construction and minimising concrete surfaces. Aspects such as urban agriculture, vertical farming, water harvesting and preservation of all environmentally fragile ecosystems including water, landscapes etcetera should be incorporated. Specific actions should be included to address, among the other mentioned components. It may be desirable to develop appropriate policies and bring about effective legal and administrative control systems to deal with the problem.

City-Level Action Plans, for e.g. Kanpur and Meerut have already initiated the effort, which is supported by WWF. Green building is also one of the approaches for effectively reducing impact of climate change. It is combination of all the best practise principle. A brief on Green Building is given in subsection below.

### 6.2.1. Green Building

Green building concept recognises sustainable development by effective performance in the following key areas:

1. **Sustainable site development:** the sustainable site development shall include the following:
  - a. Efficient land use
  - b. Habitat preservation and restoration
  - c. Efficient transportation management
  - d. Efficient use of locally available materials and resources
2. **Water Efficiency:** It shall encourage use of water in a self-sustainable manner through reducing, recycling and reusing strategies. The methods of rainwater harvesting can be integrated to reduce load of water requirement on the urban water supply system.
3. **Energy Efficiency:** It shall reduce energy consumption of infrastructural equipment through energy efficient street lighting, motor pumps etc. On site power generation using various renewable energy technologies and other clean fuels can also be integrated in the planning system.
4. **Waste Management:** It shall encourage effective waste management strategies by facilitating the segregating of waste at source and promoting re-use of products and materials.
5. **Indoor Environment Quality:** For development of green buildings, the norms as suggested by Ministry of Environment and Forest and various bodies such as LEED, GRIHA or IGBC may be applicable depending upon the requirements.

### 6.2.2. Climate Proofing Guwahati, Assam: City Resilience Strategy and Mainstreaming Plan

Housing and urban planning, urban infrastructure and services, informal settlements and slums, poverty and livelihood, ecosystems and land-use and emergency response capacity are the key sectors which are considered to understand the present and future vulnerability of the city in context of climate change impacts.

Table 6.2 Disaster Management strategies for different sectors

Parameters	Strategy
Housing	<ul style="list-style-type: none"> <li>Guidelines for construction of buildings on slopes</li> <li>Structural stability of buildings in hills and for the entire GMA</li> <li>Soil erosion and sedimentation control for construction in non-hill areas</li> </ul>
Ecologically sensitive urban planning	<ul style="list-style-type: none"> <li>Demarcate eco-sensitive areas in the city as low/ no built up areas</li> <li>Bring in principles of climate resilient urban development based on environmental parameters like conservation of natural ecosystems, natural drainage patterns</li> </ul>
Urban infrastructure and services	<ul style="list-style-type: none"> <li>Augment the piped water supply network in the city</li> <li>Augment the water treatment capacity of the city</li> <li>Water Conservation and Rainwater harvesting</li> <li>Development of a sewerage system</li> <li>Monitoring water quality at disposal points</li> <li>Integrated natural drainage plan for the city</li> <li>Prepare and implement a storm water drainage plan</li> </ul>
Disaster Resilience	<ul style="list-style-type: none"> <li>Preventive health measures</li> <li>Public health management and surveillance system</li> <li>Emergency medical response</li> </ul>

Source: Climate Proofing Guwahati, Assam City resilience strategy and Mainstreaming Plan, Synthesis Report, TERI, 2013

Based on sectorial analysis, recommendations have been provided for each sector, which was focused on ecologically sensitive urban planning, management and conservation of natural resources and efficient and eco-friendly urban infrastructure and services.

Figure 6.2: Components of Guwahati Climate Resilience Strategy



Source: Climate Proofing Guwahati, Assam City resilience strategy and Mainstreaming Plan, Synthesis Report, TERI, 2013.

### 6.3. City Bio Diversity Index

City Biodiversity Index (CBI) is a dynamic process, being prepared for depicting the urban biodiversity status. This helps in evaluation, planning, improving and reviewing the city conditions in biodiversity perspective. The UNEP and UN Habitat

states that cities occupy 2 % of the Earth's surface, their inhabitants use 75 per cent of the planet's natural resources.

Recognising the importance of biodiversity and healthy ecosystems for their survival, cities should undertake initiatives to utilize and conserve their surroundings efficiently. These actions can reach far beyond the boundaries of the city, affecting biodiversity on a global scale. At the City level, High-resolution satellite images may be used for identifying Bio-diversity areas.

As adopted by Greater Hyderabad City for formulating Greater Hyderabad Biodiversity Index, the city biodiversity index system has 92 score system with 23 indicators. These indicators are given in Appendix E of Volume II B.

International convention (Convention on Biological Diversity) and national policies/plans (National Biodiversity Action Plan (NBAP), 2008) and documents have identified Invasive Alien Species as threat to biodiversity<sup>83</sup>. The 12<sup>th</sup> Five Year Plan (2012-2017) has emphasised the need for a national invasive species monitoring system to track the introduction and spread of invasive species and advised that such a system should be linked to the State Forest Departments, and field staff should be trained to collect information on invasive species. Invasive species identification should not be limited to invasion in forests— it should also include invasion in aquatic and marine ecosystems, grasslands, wetlands and so on<sup>84</sup>. It is suggested that while implementing a plan or project and developing green areas or green buffers, local species be used and the State Forest Departments to be made stakeholders in such projects.

## 6.4. Environment Policies and Statutory Obligation

Key environmental policies and obligations to be observed while planning are enlisted and detailed in this section, for reference. However, the latest and updated versions shall be referred from respective sources during planning and compliance.

### 6.4.1. National Environmental Policy (NEP), 2006

The NEP, 2006 encompasses an integrated approach to reduce the impact on environment degradation on human life by taking proactive measures at various fronts. These include regulatory reforms, process related reforms, substantive reforms, enhancing and conserving environmental resources, prevention of land degradation, desert ecosystem, and also various other factors that influences the environment. The policy primarily focuses on ensuring that people who are dependent on natural resources for securing their livelihoods from the act of degradation should realize that a greater purpose will be served from the

<sup>83</sup>India's Fifth National Report to the Convention on Biological Diversity, 2014

<sup>84</sup>Twelfth Five Year Plan (2012-17), Volume I

conservation of resources which includes land, desert ecosystem, water, wildlife, forests, wetlands etc.

The National Environment Policy (NEP, 2004) is a response to our National Commitment to a clean environment, mandated in the Constitution in Articles 48 A and 51 A (g), strengthened by judicial interpretation of Article 21. The NEP, 2004 has been motivated by the above considerations and is intended to mainstream environmental concerns in all development activities.

### 6.4.1.1. Reforms suggested through the policy

The statements of policy objectives are to be realized by concrete actions in different areas relating to key environmental challenges. Therefore the key reforms suggested through this policy, which impact planning directly or indirectly are:

- Environmental and Forest clearance
- Economic principles for environmental decision making by costing the resources
- Coastal areas: development activities in the coastal areas are regulated by means of the coastal regulation zone notification.
- **Environmentally sensitive zones:** *environmental sensitive zones may be defined as areas with identified environmental resource with 'incomparable values' which require special attention for their conservation.*
- Monitoring & enforcement of environmental compliance.
- Use of economic principles in environmental decision making so that costs are associated with the degradation and depletion of natural resources.
- Enhancing and conserving environmental resources through production and consumption practices with focus on regulatory and institutional reforms. Land degradation, forests and wildlife, biodiversity, freshwater resources; ground water and wetlands are the thrust resources of concern.
- Pollution abatement: ecosystems have some natural capacities to assimilate pollution; however these vary considerably with the nature of the pollutant and the ecosystem.
- Climate change issues

### 6.4.1.2. Strategic actions suggested

There is requirement of evolving a flexible policy framework with a built-in system for monitoring and review, and where necessary, revise the same for further use.

Table 6.3 Strategic Actions suggested

Actions	Strategy
Environmental standards	Environmental Standards refer both to the acceptable levels of specified environmental quality parameters at different categories of locations (“ambient standards”), as well as permissible levels of discharges of specified waste streams by different classes of activities (“emission standards”).
Environmental Management Systems, Eco-labelling and Certification	Environmental Management Systems (EMS), such as ISO 14000, by requiring the adoption of standardized environmental management practices, documenting their actual use, and third party verification of the fact may significantly ease the public burden of monitoring and enforcement of prescribed emissions standards.
Clean Technologies and Innovation	Clean technologies, as distinct from “end-of-pipe” abatement technologies minimize the generation of waste streams in the production processes themselves, rather than treating the waste after generation. In general, clean technologies are less intensive in use of raw materials and energy, than conventional technologies, which rely on pollution abatement after generation. For this reason, they may also offer significant cost advantages to the producer.
Environmental Awareness, Education, and Information	Enhancing environmental awareness is essential to harmonize patterns of individual behaviour with the requirements of environmental conservation. This would minimize the demands placed on the monitoring and enforcement regimes; in fact, large-scale non-compliance would simply overwhelm any feasible regulatory machinery.
Partnership and stakeholder involvement	Conservation of the environment requires the participation of multiple Stakeholders, who may bring to bear their respective resources, competencies, and perspectives, so that the outcomes of partnerships are superior to those of each acting alone. Implementing and policy making agencies of the Government, at Central, State, Municipal, and Panchayat levels; the legislatures and judiciary; the public and private corporate sectors; financial institutions; industry associations; academic and research institutions; independent professionals and experts.

Source: The National Environment Policy (NEP, 2004).

### 6.4.2. EIA Notification, 2006

To ensure that the economic growth and development in our country is in conformity with regulations for environmental conservation, the Ministry of Environment & Forests (MoEF) has notified the Environmental Impact Assessment (EIA) Notification, 2006. The EIA Notification 2006 has notified 39 developmental sectors, which require prior EC.

MoEF has prepared EIA guidelines on each sector as identified by EIA notification 2006, which elaborates the procedure and mandatory requirements of EIA with respect to the sector. For e.g. Manual on norms and standards for environment clearance of large construction projects has been issued by MoEF to assist developers to measure and quantify environmental impacts of proposed construction, and derive mitigation options to minimise impacts. The manual also enables evaluation of construction projects by the expert appraisal committee. The proponent may use mitigation options, other than the ones described in the manual, to mitigate environmental impacts of respective projects.

### 6.4.3. Environment Protection Act, 1986

The Environment Protection Act, 1986 (EPA) has notified various rules under EPA for protecting the environment which are chronologically mentioned below:

- The Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organism Genetically Engineered Organism or Cells Rules, 1989
- The Hazardous Wastes (Management and Handling) Rules, 1989
- The Manufacture, Storage and Import of Hazardous Chemicals Rule, 1989
- Scheme of Labelling of Environment Friendly Products (ECO-MARK)
- Restricting certain activities in special Specified area of Aravalli Range
- The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- The Bio -Medical Waste (Management and Handling) Rules, 1998, as amended to date
- The Recycled Plastics Manufacture and Usage Rules, 1999
- The Municipal Solid Wastes (Management and Handling) Rules, 2000
- The Noise Pollution (Regulation and Control) Rules, 2000
- The Ozone Depleting Substances (Regulation) Rules, 2000
- The Batteries (Management and Handling) Rules, 2001

Along with the above rules as identified in EPA 1986, The Air (Prevention and Control of Pollution) Act, 1981 and the Noise-Pollution (Regulation and Control) Rules, 2000 should also be referred to formulate norms and standards while preparing development plan for a city. The various statutory obligations for different clearances are mentioned in table below:

Table 6.4 Statutory Obligations of Environment Clearances

Type of Clearances	Statutory obligations
Environment Clearances	As per EIA notification, 2006
Forest Clearances	As per Forest Conservation Act, 1980
GEAC Clearances	Rules for Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms/Genetically Engineered Organisms or Cells 1989, under EPA 1986

Source: MoEF and other sources.

### 6.4.4. Forest Conservation Act, 1980

Due to rising rate of deforestation and the resulting environmental degradation, the Central Government enacted the Forest (conservation) Act in 1980. The Act prohibits the deletion of a reserved forest or the diversion of forestland for any non-forest purpose, and prevents the cutting of trees in a forest without prior approval of Central government. The salient features of the Act are given below:

- This Act has five Sections, which deal with conservation of forests.
- The Act was enacted with the twin objectives under Section 2 of restricting the use of forestland for non-forest purposes, and preventing the de-reservation of forests that have been reserved under the Indian Forest Act, 1927. However, in 1988 the Act was further amended to include two new provisions under Section 2, where it sought to restrict leasing of forest land to private individuals, authority, corporations not owned by the Government, and to prevent clear felling of naturally grown trees.
- The Act empowers Central Government to constitute a committee to advise the Government with a grant of approval under Section 2, as also on any other matter connected with the conservation of forest and referred to it by the Central Government.
- The Act provides for punishment of offenders from the Government Departments, including Head of the Departments and Authorities.

## 6.4.5. Strategic plan for new and renewable energy sector for the period 2011-17, Ministry of New and Renewable Energy

India's substantial and sustained economic growth is placing enormous demand on its energy resources. The demand and supply imbalance in energy sources is pervasive requiring serious efforts by GoI to augment energy supplies. India imports about 80% of its oil. There is a threat of its increasing further, creating serious problems for India's future energy security.

The Vision of Ministry of New and Renewable Energy (MNRE) is to upscale and mainstream the use of new and renewable energy sources in furtherance of the national aim of energy security and energy independence, with attendant positive impact on local, national and global environment.

### 6.4.5.1. Objectives

The key objectives are:

- To promote deployment of grid-interactive renewable power generation projects
- To promote renewable energy initiatives for:
  - Meeting energy/ lighting needs in rural areas
  - Supplementing energy needs in urban areas
  - Supplementing energy needs in industry and commercial establishments, and
- To promote research, design and development activities at premier national institutions and industries on different aspects of new and renewable energy technologies and help development of new products
- To encourage development of a Robust Manufacturing Industry in Renewable Energy Sector

Table 6.5 Thrust areas of solar thermal sector

Cost reduction in:	
Incubating technologies	Industrial process heat systems
Development of silicon and other materials	Technology improvement for various low temperature applications
Efficient solar cells	Solar cooling
Thin film materials	Concentrating PV technology

Source: Strategic Plan for new and renewable energy sector for the period 2011-17

## 6.5. Environmental Guidelines

### 6.5.1. Environmental Guidelines for Industries

#### 6.5.1.1. Areas to be avoided<sup>85</sup>

In siting industries, care should be taken to minimise the adverse impact of the industries on the immediate neighbourhood as well as distant places. Some of the natural life sustaining systems and some specific land uses are sensitive to industrial impacts because of the nature and extent of fragility. With a view of protection such an industrial site shall maintain the following distances from the areas listed:

<sup>85</sup><http://moef.gov.in/citizen/specinfo/enguin.html>

Table 6.6 Distance of Different Areas from Industrial Site

S. No.	Areas	Distance
1	Ecologically and/or otherwise sensitive areas	At least 25 km, depending on the geo-climatic conditions the requisite distance have to be increased by the appropriate agency.
2	Coastal areas	At least 1/2 km from High Tide Line.
3	Flood Plain of the Riverine Systems	At least 1/2 km from flood plain or modified flood plain affected by dam in the upstream or by flood control systems.
4	Transport/Communication System	At least 1/2 km from highway and railway.
5	Major settlements (3,00,000 population)	Distance from settlements is difficult to maintain because of urban sprawl. At the time of siting of the industry if any major settlement's notified limit is within 50 km, the spatial direction of growth of the settlement for at least a decade must be assessed and the industry shall be sited at least 25 km from the projected growth boundary of the settlement.

Source: Environmental Guidelines for Industries, MoEF.

### 6.5.1.2. Siting criteria<sup>86</sup>

Economic and social factors are recognized and assessed while siting an industry. Environmental factors must be taken into consideration in industrial siting. Proximity of water sources, highway, major settlements, markets for products and raw material resources is desired for economy of production, but all the above listed systems must be away for environmental protection. In such a selected site, the following factors must be recognized:

- No forestland shall be converted into non-forest activity for the sustenance of the industry (as per the Forest Conservation Act, 1980).
- No prime agricultural land shall be converted into industrial site.
- Within the acquired site the industry must locate itself at the lowest location to remain obscured from general sight.
- Land acquired shall be sufficiently large to provide space for appropriate treatment of wastewater still left for treatment after maximum possible reuse and recycle. Reclaimed (treated) wastewater shall be used to raise green belt and to create water body for aesthetics, recreation and if possible, for aquaculture. The green belt shall be 1/2 km wide around the battery limit of the industry. For industry having odour problem it shall be a kilometre wide.
- The green belt between two adjoining large-scale industries shall be one kilometre.
- Enough space should be provided for storage of solid wastes so that these could be available for possible reuse.
- Layout and form of the industry that may come up in the area must confirm with the landscape of the area without affecting the scenic features of that place.
- Associated township of the industry must be created at a space having physiographic barrier between the industry and the township.
- Each industry is required to maintain three ambient air quality-measuring stations within 120-degree angle between stations.

### 6.5.2. Guidelines for Rain Water Harvesting

Rainwater harvesting is the technique of collection and storage of rainwater at surface or in sub-surface aquifers, before it is lost as surface run-off. The augmented

<sup>86</sup> Ibid.

resource can be harvested in the time of need. Artificial recharge to ground water is a process by which the ground water reservoir is augmented at rate exceeding that under natural conditions of replenishment.

The functioning of ground water recharge units, various methods and techniques have already been elaborated in Infrastructure Planning section. Ministry of Water Resources, Central Ground Water Board (CGWB) has issued the 'Manual on Artificial Recharge of Ground Water<sup>87</sup>', which can be referred for development of such projects.

### 6.5.3. Guidelines for Buffer Zones

Buffer zones are areas created around the conservation area, often peripheral to it, inside or outside to enhance its protection. Within Buffer zones, certain legal and/or customary restrictions are placed upon resource use and/or is managed to reduce the negative impacts of restrictions on the neighbouring communities. Based on various activities, important buffer zones have been identified in **Table 6.7**.

**Table 6.7:** List of Buffers for various activities

S.No.	Activities	Recommended Buffer
1	<b>Eco-sensitive zones</b> <sup>88</sup>	<ul style="list-style-type: none"> <li>▪ As per National Wildlife Action Plan (NWAP) 2002-2016, "All identified areas around Protected Areas and wildlife corridors are to be declared as ecologically fragile under the Environment (Protection) Act, 1986."</li> <li>▪ As general principle the width of the eco-sensitive zone could go up to 10kms around a Protected area as provided in the Wildlife Conservation Strategy, 2002. In case where sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkage, are even beyond 10 kms width; these should be included in the Eco-sensitive zones.</li> <li>▪ Further, even in context of a particular Protected Area, the distribution of an area of Eco-sensitive Zone and the extent of regulation may not be uniform all around and it could be of variable width and extent.</li> </ul>
2	<b>Railway land</b>	RoW includes no development zone in itself.
3	<b>Aviation related infrastructure</b>	<ul style="list-style-type: none"> <li>• As per Airport Authority of India (AAI), the buffer zone is applicable within 20 km radius of Airport on the height of the buildings, for which NOC is required from AAI for any construction activity.</li> <li>• Aviation imposes height restrictions only. Other DCR norms such as ground coverage, setbacks etc. of the local municipality are applicable.</li> <li>• The airport should be 20 km away from green area such as wildlife sanctuaries/ zoos/ bird sanctuaries and should not have restricted activities such as butcheries, sewage and no garbage storage around airports.</li> </ul>
4	<b>Communication and Transmission facilities such as satellite towers</b> <sup>89</sup>	Installation of telecom towers should not be allowed on and around (100 Meters) the buildings where educational, religious and health care institutions are functioning.
5	<b>Industrial area / SEZ</b> <sup>90</sup>	<ul style="list-style-type: none"> <li>• No SEZs may be planned in the sensitive areas such as the forests, mangroves, coral reefs, archeologically important sites, sensitive ecosystems, etc. A buffer zone of 1000 m shall be maintained from such sensitive areas and a greenbelt with tree density of 1000 trees/ acre shall be developed in the said buffer zone.</li> <li>• Major settlements (of 3,00,000 population) to maintain a buffer of 50-25 kms from the settlement's notified limit and projected growth boundary</li> </ul>

<sup>87</sup>Available at [www.cgwb.gov.in](http://www.cgwb.gov.in)

<sup>88</sup> Guidelines for declaration of Eco-Sensitive Zones around national parks and wild life sanctuaries, MoEF, 2011

<sup>89</sup>Draft Special Regulation For Installation Of Telecom Towers In Urban Areas, Government of Orissa, 2013

<sup>90</sup>SEZ guidelines, Industries Commissionerate, Government of Gujarat

S.No.	Activities	Recommended Buffer respectively.
6	<b>Mining and quarrying</b> <sup>91</sup>	Buffer zone in case of Mining Lease (ML) area up to 25 ha is to be considered as 5 km all around the periphery of the core zone and for ML area above 25 ha - an area 10 km all around the periphery of the core zone.
7	<b>Petrochemical and Gas industries</b> <sup>92</sup>	<ul style="list-style-type: none"> <li>No Gas pipeline should be located within 15.0 meters of any private dwelling or any industrial building or place of public assembly in which persons work, congregate or assemble, unless it is provided with at least 300 mm of cover over and minimum cover as specified Petroleum And Natural Gas Regulatory Board Notification, 2009.</li> <li>No Gas or Oil well shall be drilled at any point, within a minimum distance, to be prescribed by the Central Government, of any railway, pipeline or other right of way, surveyed road, dwellings, industrial plant, air-craft runway, buildings used for military or public purposes, or within three kilometres of any mine, whether active or abandoned, unless the special permission of the Central Government is obtained in advance.</li> <li>About 90m x 90m buffer to be maintained along the active oil wells, petroleum storage tanks, encompassing all the safety norms for precautions against fire<sup>93</sup>.</li> </ul>
8	<b>Heritage related areas</b> <sup>94,95</sup>	<p>Every area, beginning from the limit of the protected area/monument, extending to a distance of 100 meters in all directions shall be the 'protected areas' and extending up to a distance of 200 meters in all directions shall be 'regulated area'. The protected zone is a no construction zone.</p> <p>The building regulations in the regulated zone to be prepared by the Heritage Conservation Committee in consultation with ASI.</p>
9	<b>Natural hazard zones such River flood plains and water bodies including wetlands</b> <sup>96</sup>	<ul style="list-style-type: none"> <li>The basic concept of flood plain zoning is to regulate land use in the flood plains to restrict the damage caused by floods. Flood plain can be identified based on last 50 or 100 year flooded area of water bodies or river. There can be different considerations for regulations. For example, the area likely to be affected by floods up to a 10-year frequency should be kept reserved only for gardens, parks, playgrounds, etc. Residential or public buildings, or any commercial buildings, industries, and public utilities should be prohibited in this zone.</li> <li>In area liable to flooding in a 25-year frequency flood, residential buildings could be permitted with certain stipulation of construction on stilts (columns), minimum plinth levels, prohibition for construction of basements and minimum levels of approach roads, etc. In urban areas there should be double storeyed buildings. Ground floors could be utilised for schools and other non-residential purposes.</li> </ul>
10	<b>Coastal Regulation Zone</b>	Coastal land up to 500 m from the High Tide Line (HTL) landward side and a stage of 100 m along banks of creeks, estuaries, backwater and rivers subject to tidal fluctuations is called the Coastal Regulation Zone, which is regulated for developmental activities.
11	<b>Manmade hazard zones such as radioactive, chemical and gas treatment / processing / distribution lines</b> <sup>97</sup>	<p><b>Chemical Industry</b></p> <ul style="list-style-type: none"> <li>The development of buffer zones all around the industry in an effective manner and establish Off-Site responding agencies at an appropriate distance from the new installations.</li> </ul> <p><b>Nuclear Plants</b><sup>98</sup></p> <ul style="list-style-type: none"> <li>500 Ha is needed to be in the control of power station as an exclusion zone. This is maintained as a vacant space and developed as a green belt area.</li> <li>Sterilised Zone: the plant as sterilized zone maintains Area of 5 km radius. No restriction is imposed by the plant on organic development activities of</li> </ul>

<sup>91</sup>Proforma For Environmental Appraisal Of Mining Projects, MOEF

<sup>92</sup>The Petroleum and Natural Gas Rules, 1959

<sup>93</sup>Oil Mines Regulations, 1984

<sup>94</sup> Model Building Byelaws, TCPO

<sup>95</sup>Ancient Monuments and Archaeological Sites and Remains Act, 2010 (AMASR)

<sup>96</sup> National Disaster Management Guidelines Management of Floods, NDMA

<sup>97</sup> National Disaster Management Guidelines Chemical Disasters (Industrial), NDMA

<sup>98</sup>[http://www.npcil.nic.in/pdf/news\\_12oct2011\\_01.pdf](http://www.npcil.nic.in/pdf/news_12oct2011_01.pdf) (National Power Corporation of India Limited)

S.No.	Activities	Recommended Buffer
		<p>population in the annulus between 1.5 and 5 kms. Administrative actions ensure that there is no influx of large population in this area</p> <ul style="list-style-type: none"> <li>• Population Restriction: <ul style="list-style-type: none"> <li>– Population density within 10 km radius: Less than two-third of state average;</li> <li>– Population within sterilised zone (5Km radius) Less than 20,000;</li> <li>– Population centres with more than 10,000 persons more than 10 km away;</li> <li>– Population centres with more than 100,000 person) more than 30 km away;</li> </ul> </li> </ul>
12	<b>High density/ high activity zones</b>	Areas around high density, mixed land use or residential areas along dense commuter's zones/ arterial and sub-arterial roads to be buffered with trees and plantations, flexible building material for attenuation/reflection.

Sources: As given

## 6.6. Environmental Guidelines for Planning Eco-fragile zones <sup>99</sup>

### 6.6.1. Coastal Area

As per the CRZ notification, 2011, coastal land up to 500 m from the High Tide Line (HTL) landward side and a stage of 100 m along banks of creeks, estuaries, backwater and rivers subject to tidal fluctuations is called the Coastal Regulation Zone (CRZ). For regulation of developmental activities, the coastal stretches within 500 m of HTL on the landward side are classified into four categories and restrictions have been imposed on construction activities in these zones. The following activities are prohibited within the CRZ: -

1. Setting up of new industries and expansion of existing industries, except those directly related to waterfront or directly needing foreshore facilities.
2. Manufacture or handling or disposal of hazardous substances.
3. Setting up and expansion of fish processing units including warehousing (excluding hatchery and natural fish drying in permitted areas).
4. Setting up and expansion of units/mechanism for disposal of waste and effluents into the watercourse.
5. Discharging of city untreated waters and effluents from industries, cities or towns and other human settlements.
6. Dumping of city or town waste for the purposes of land filling or otherwise, the existing practice, if any, shall be phased out within a reasonable time not exceeding 3 years from the date of notification.

### 6.6.2. Eco-Sensitive zones

Due to rapid urbanisation and its impact on protected zone, there is a need to conserve protected areas. The MoEF has developed guidelines for declaration of eco-sensitive zones around protected areas, national parks and wildlife sanctuaries. These guidelines provide the framework to states/UTs to develop specific buffer zones around National Parks, Wildlife Sanctuaries, Sanctuaries, important migratory

<sup>99</sup> Eco fragile zone s are Fragile Ecosystems such as Coastal eco-system, Desert eco-system, Mountain eco-system, Aquatic eco-system, Rain forest eco-system.

corridors, etc. with a view of minimizing and preferably eliminating any negative impact on protected areas and sanctuaries. The recommended procedure to be adopted by states is mentioned below:

- Prepare an inventory of the different land use patterns and the different types of activities, types and number of industries operating around each of the Protected Area (National Parks/Sanctuaries) as well as important Corridors be made with the help of range officers.
- A small committee comprising the concerned Wildlife Warden, Warden, an Ecologist and an official of the Revenue Department of the concerned area, could be formed whose function is to provide recommendation on requirement and extent of eco sensitive zone. Further, the committee can also suggest the methods of management of zone and thematic activities, which can be included in the Development Plan/ Master Plan of the region.

### 6.6.3. Water bodies in Urban Areas

Water Bodies play multi-functional role in urban area. It can be the source of water for supply, landscaping, irrigation, fishing and eco-tourism, which add values to social benefits. They can also be used to prevent heat island effects and to improve the micro-climate in cities. For conserving the same, it is necessary to analyse the hydrological system with reference to catchment basins for the water bodies. MoEF has prepared 'Advisory Report for Conservation and Restoration of Water Bodies in Urban Areas' which recommends State and ULBs to take initiatives in order to conserve water bodies. While formulating Development Plan at city levels, steps suggested by MoUD & MoEF in the above mentioned report could be adopted to conserve and restore the water bodies in cities. One of the finest examples of restoration of lakes in the fast growing urban environment is the Kankaria Lake in Ahmedabad.

### Case Study: Kankaria Lake, Ahmedabad

Restoration of lake in a fast growing urban environment - Kankaria Lake in Ahmedabad

Key Highlights:

1. Source of water: Surface and recharge of groundwater, for drinking and irrigation
2. Supports livelihoods
3. Food and nutrition
4. Act as flood control measures
5. Recreation Spot
6. Lake as a 'natural infrastructure' for climate change adaptation

### Transformations of Ghats: Kankaria Lake, Ahmadabad



Before

After



After

Source: MoUD presentation.

MoEF has also suggested to integrate identified projects on water bodies with Programmes such as National Lake Conservation Programme and National Wetland Conservation Programme, JnNURM/ UIDSSMT, Ministry of Water Resources programme for Repair, Renovation & Restoration (RRR) of Water Bodies with Domestic/External Assistance which are undertaken by Government of India (GoI).

For conserving rivers, MoEF has taken up the initiative and formed National River Conservation Directorate (NRCD). Initiatives have been taken through various River Action Plans such as - Ganga Action Plan and Yamuna Action Plan

### 6.6.4. Desert areas<sup>100</sup>

India is a party to the UN Convention to Combat Desertification (UNCCD) and MoEF is the National Coordinating Agency for the implementation of the UNCCD in the country<sup>101</sup>, under the 'National Action Programme to Combat Desertification' with objectives:

- Community based approach to development,
- Activities to improve the quality of life of the local communities,
- Awareness raising,
- Drought management preparedness and mitigation,
- R&D initiatives and interventions which are locally suited,
- Strengthening self-governance leading to empowerment of local communities.

Desert ecosystem sensitive planning is crucial at Regional planning stage including mapping of land degradation, drought monitoring and indicating components for the State and District Disaster Management Plan for drought preparedness and warning system groups.

At Development Plan and local area planning level the key actions suggested in NEP, 2006 as given below to be considered:

- Intensive water and moisture conservation through practices based on traditional and science-based knowledge, and relying on traditional infrastructure.
- Enhancing and expanding green cover based on local species.
- Reviewing the agronomic practices in these areas, and promoting agricultural practices and varieties, which are well adapted to the desert eco-system.

### 6.6.5. Wetlands<sup>102</sup>

Wetlands, natural and manmade, freshwater or brackish, provide numerous ecological services. They provide habitat to aquatic flora and fauna, as well as numerous species of birds, including migratory species. Several wetlands have sufficiently unique ecological character as to merit international recognition as Ramsar Sites<sup>103</sup>.

Wetlands also provide freshwater for agriculture, animal husbandry, and domestic use, drainage services, and provide livelihoods to fisher folk. Larger wetlands may also comprise an important resource for sustainable tourism and recreation.

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<sup>100</sup>National Environmental Policy 2006, MOEF.

<sup>101</sup>Source: [http://moef.nic.in/sites/default/files/Document1\\_0.pdf](http://moef.nic.in/sites/default/files/Document1_0.pdf).

<sup>102</sup>National Environmental Policy 2006, MOEF.

<sup>103</sup>The Ramsar Convention defines wetlands as, 'areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres', thereby giving a wide scope to the term.

Wetlands are under threat from drainage and conversion for agriculture and human settlements, besides pollution. This happens because public authorities or individuals having jurisdiction over wetlands derive little revenues from them, while the alternative use may result into financial gains to them.

A holistic view of wetlands is necessary, which looks at each identified wetland in terms of its causal linkages with other natural entities, human needs, and its own attributes.

Key actions suggested in NEP 2006 at state or local level are as follows:

- Integrate wetland conservation, including conservation of village ponds and tanks, into sectoral development plans for poverty alleviation and livelihood improvement, and link efforts for conservation and sustainable use of wetlands with the ongoing rural infrastructure development and employment generation programmes.
- Formulate conservation and prudent use strategies for each significant catalogued wetland, with participation of local communities, and other relevant stakeholders.
- Formulate and implement eco-tourism strategies for identified wetlands through multi stakeholder partnerships involving public agencies, local communities, and investors.
- Take explicit account of impacts on wetlands of significant development projects during the environmental appraisal of such projects; in particular, the reduction in economic value of wetland environmental services should be explicitly factored into cost-benefit analyses.
- Consider particular unique wetlands as entities with “Incomparable Values”, in developing strategies for their protection.
- Promote traditional techniques and practices for conserving village ponds.

### 6.6.6. Hilly areas (further to section 5.5.1)

Hilly areas have one of the most fragile ecosystems, which need to be conserved. Therefore planning and development strategies for hilly areas shall be designed with added sensitivity and stress on integrated development. The development approach shall comprise judicious land use planning and settlement planning. In hill areas, the space standards are affected by the following and therefore these factors should be considered while setting norms in such areas:

- Exposure to sunlight, degree of slopes and accessibility in the form of distance travelled.
- Minimum needs of the people and the conservation principle.
- Flexibility in norms and standards to accommodate conditions guided by difficult hill terrain and its geology.
- Work place and residence relationship.
- Energy needs.
- Alternative mode of transportation communication network.
- Communication network.
- Mobile and emergency facilities.

On the same line, TCPD of Government of Himachal Pradesh has formulated the Norms and Standards for their state, which can be adopted by other states for hilly areas. Some of the infrastructure norms and standards are detailed in Infrastructure planning chapter. For vision development of Himalayan cities, ‘National Mission for

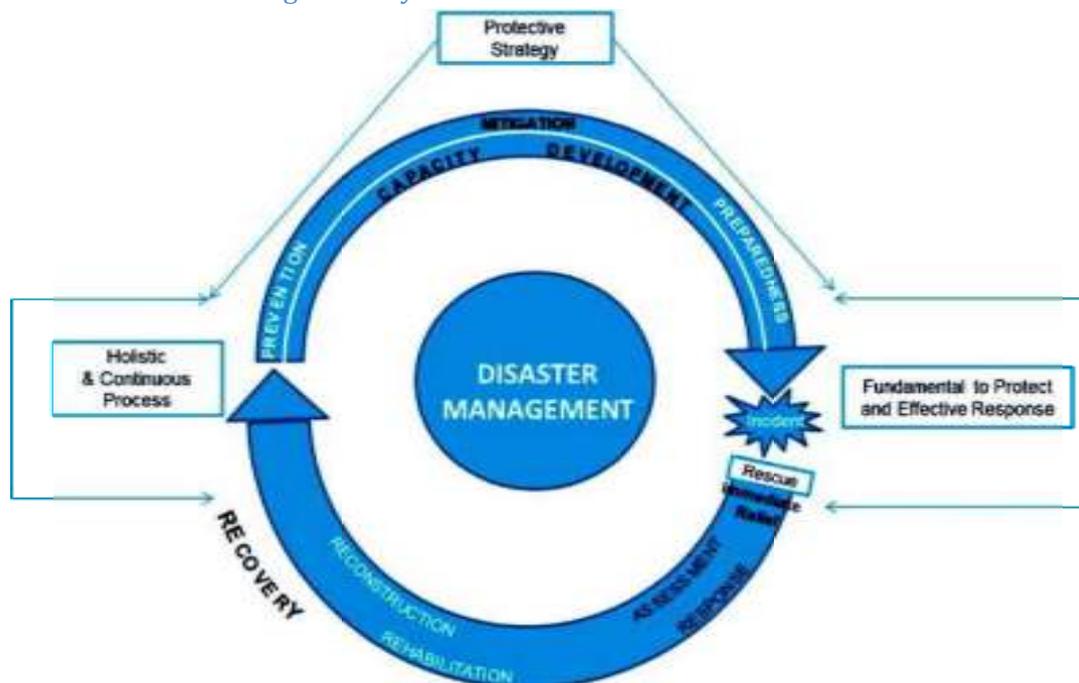
Sustaining Himalayan Ecosystem' should be referred from the National Action Plan on Climate Change, Government of India.

## 6.7. Disaster Management

Disaster means a catastrophe, mishap, calamity or grave occurrence affecting any area from natural and manmade causes, or by accident or negligence, which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of environment and is of such a nature and magnitude as to be beyond coping capacity of the community of the affected areas. As it is clear from the definition disaster may impact human habitat in a severe manner. Hence it is evident to manage these disasters at appropriate level so that impact can be minimised.

As per Section 2 (e) of Disaster Management Act, 2005, disaster management means a continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient for - (i) prevention of danger or threat of any disaster; (ii) mitigation or reduction of risk of any disaster or its severity or consequences; (iii) capacity-building; (iv) preparedness to deal with any disaster; (v) prompt response to any threatening disaster situation or disaster; (vi) assessing the severity or magnitude of effects of any disaster; (vii) evacuation, rescue and relief; (viii) rehabilitation and reconstruction" as shown in **Figure 6.3**.

Figure 6.3: Disaster Management Cycle



Source: National Disaster Management Hand Book for Training and Capacity Building of Civil Defence and Sister Organisations.

### 6.7.1. Institutional set-up

The institutionalized approach for disaster management initiated when 4<sup>th</sup> Finance Commission (FC) proposed the concept of “Margin Money”. Subsequently, 9<sup>th</sup> FC suggested ‘Calamity Relief Fund’ (CRF) now termed as State Disaster Relief Force (SDRF). Further, 11<sup>th</sup> FC recommended establishment of ‘National Calamity Contingency Fund’ (NCCF) now termed as ‘National Disaster Relief Force’ (NDRF). The institutional and policy mechanisms for disaster to carry out response, relief and rehabilitation have been well established since independence. NDMA has prepared various Guidelines for the Management of different types of disasters including, natural and manmade, to assist the GoI Ministries and Departments, State Governments and other agencies to prepare Disaster Management (DM) Plans. The Central Relief Commissioner (CRC) in the Ministry of Home Affairs is the nodal officer to coordinate the relief operations for natural disasters. The CRC in the Ministry of Home Affairs is the Chairman of the Crisis Management Group (CMG) whose primary function is to review the contingency plans formulated by various Ministries / Departments / Organizations in their respective sectors; provide measures and coordinate among central and state ministries.

**Post Disaster Management:** The National Crisis Management Committee (NCMC) set up by Ministry of Home Affairs, Government of India that gives direction to the CMG. NCMC can give directions to any Ministry/Department/Organization for specific action needed for meeting the crisis situation. These mechanisms are based on post-disaster relief and rehabilitation and have proved to be robust and effective mechanisms in addressing its requirements.

However, in order to further institutionalize the new approach, the Government of India have decided to enunciate a National Policy on Disaster Management (2009), whose broad objectives are to minimize the loss of lives and social, private and community assets because of natural or manmade disasters and contribute to sustainable development and better standards of living for all, more specifically for the poor and vulnerable sections by ensuring that the development gains are not lost through natural calamities/disasters.

**Disaster Prevention, Preparedness & Mitigation:** Apart from above, the Disaster Management Act, 2005 (DM Act, 53 of 2005) lays down institutional and coordination mechanisms for effective disaster management (DM) at the national, state, and district levels. As mandated by this Act, the Government of India (GoI) created a multi-tiered institutional system consisting of:

- National Disaster Management Authority (NDMA), headed by the Prime Minister,
- State Disaster Management Authorities (SDMAs) by the Chief Ministers and
- District Disaster Management Authorities (DDMAs) by the District Collectors and co-chaired by elected representatives of the local authorities of the respective districts.

Others organisations: The Act further provides for constitution of National Executive Committee (NEC), National Institute of Disaster Management (NIDM) and National Disaster Response Force (NDRF).

## 6.7.2. National Disaster Management Guidelines

The salient features of the NDMA guidelines with respect to the formulation of DM plans have been briefed, along with integration of the recommended planning system for the urban and regional planning in **Table 6.8 and Table 6.9**. The detailed NDMA guidelines for following disasters can be referred separately while formulating the Plans<sup>104</sup>.

Table 6.8: Salient Features of NDMA Guidelines for Management of Natural Hazards

Sr. No.	Types of Natural Hazards	Salient Features on Prevention, Preparedness and Mitigation of respective Disasters
1	Flood Management	<p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>Set up River Basin Organisations to deal with the management of water resources at river basin level.</li> <li>Preparation of Flood Management Plan by joint effort of States and concerned department of Central. This plan should be integrated with plans at city region or district level.</li> </ul> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Identification and marking of flood prone areas on maps, preparation of close contour and flood vulnerability maps, formulating plans for expansion and modernisation of flood can also be included in Development Plans.</li> <li>Implementation of the schemes for expansion and modernisation of the flood forecasting and warning network, execution of flood protection and drainage improvement scheme and identification of reservoirs.</li> <li>Implementation of activities, which include construction of dams and catchment area treatment (CAT) works in India as well as neighbouring countries for flood mitigation.</li> </ul>
2	Earthquake Management	<p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>Facilitate selective strengthening and seismic retrofitting of existing priority and lifeline structures in earthquake-prone areas</li> <li>Prioritise the enforcement of earthquake resistant design features and strengthen the existing structures.</li> <li>Improve the compliance regime through appropriate regulation and enforcement.</li> </ul> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Incorporation of earthquake resistant design features for the construction of new structures. The same should be reflected in building byelaws in development planning.</li> <li>Sensitive earthquake seismic zones should be identified at city</li> </ul>

<sup>104</sup>For details NDMA guidelines are available at [www.ndma.gov.in](http://www.ndma.gov.in) website.

3	Drought Management	<p>or region or district level. Priority to be given in Earthquake Seismic Zones 3, 4 and 5.</p>
		<p><b>Prevention and Preparedness</b></p>
		<ul style="list-style-type: none"> <li>■ Preparation of Drought Management Plan at district and State level in integration with Disaster management Plan and development plans. Plan to be prepared in advance based on the long season forecast issued by India Meteorological Department (IMD) in April and also the previous season rainfall.</li> </ul>
		<p><b>Mitigation</b></p>
		<ul style="list-style-type: none"> <li>■ Measures for integration of soil, water and forest management and form part of soil conservation, watershed development and forestry programmes.</li> <li>■ Drought proofing measures are taken before the crop is planted and drought management measures are taken during the crop-growing period.</li> </ul>
4	Cyclones Management	<p><b>Prevention and Preparedness</b></p>
		<ul style="list-style-type: none"> <li>■ Coastal bio-shields spread, preservation and restoration/regeneration plans to be prepared by the Coastal Area Development, and Irrigation and Command Area Development Authorities</li> </ul>
		<ul style="list-style-type: none"> <li>■ Developing Integrated Coastal Zone Management (ICZM) frameworks for addressing the sustainability and optimal utilisation of coastal resources, which shall also serve as cyclone impact minimisation plans.</li> </ul>
		<ul style="list-style-type: none"> <li>■ Evolving eco-system restoration plans for degraded ecological zones.</li> </ul>
		<p><b>Mitigation</b></p>
		<ul style="list-style-type: none"> <li>■ Mapping and delineation (coastal wetlands, patches of mangroves and shelterbelts), identification of potential zones for expanding bio-shield spread based on remote sensing tools, which can be integrated with DM Plan and Development Plan formulation.</li> </ul>
		<ul style="list-style-type: none"> <li>■ Regulating infrastructure and development activities in coastal zones. Ensuring cyclone resistant design standards are incorporated in the rural/ urban housing schemes in coastal areas.</li> </ul>
		<ul style="list-style-type: none"> <li>■ Implementing coastal flood zoning, flood inundation management and regulatory plans.</li> </ul>
		<ul style="list-style-type: none"> <li>■ Groundwater development (recharge) and augmentation of freshwater requirement in coastal urban centres.</li> </ul>
		<ul style="list-style-type: none"> <li>■ Development of Aquaculture Parks in the identified potential zones.</li> </ul>
5	Tsunami Management	<p><b>Prevention and Preparedness</b></p>
		<ul style="list-style-type: none"> <li>■ Preparation of State and District Disaster Management Plans (also at city and village level), with specific reference to the management of tsunami.</li> </ul>
		<ul style="list-style-type: none"> <li>■ Integration of coastal and tsunami risk into community planning.</li> </ul>
		<p><b>Mitigation</b></p>

6	Landslides/ Avalanches Management	Snow	<ul style="list-style-type: none"> <li>■ Revision of town planning byelaws and adoption of model byelaws, wide dissemination of earthquake and tsunami-safe building codes, the National Building Code 2005, and other safety codes.</li> <li>■ Development of tsunami safety standards and guidelines for existing critical lifeline structures in coastal areas.</li> <li>■ Emphasis on Early Warning System.</li> <li>■ Mapping contour levels up to which Tsunami impacted on the last incident of disaster.</li> </ul> <p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>■ Integrating landslide concerns in the development of disaster management plans at all levels (especially for hilly areas and the Master plans of these areas to integrate the DMP provisions).</li> <li>■ Landslide hazard zonation mapping in macro and meso scales.</li> <li>■ Setting up of institutional mechanisms for generating awareness and preparedness about landslide hazard among various stakeholders.</li> <li>■ Strengthening Post disaster management by respective DMAs and it should be considered as an integral component of mitigation effort.</li> </ul> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>■ Taking up pilot projects to carry out detailed studies and monitoring of selected landslides to assess their stability status and estimate risk and the output of these studies can be utilised in planning process at all levels.</li> <li>■ Development of model landuse / town planning byelaws and revision of existing ones.</li> <li>■ Strengthening of building / heritage structures and safety of critical facilities against landslides and snow avalanches in hazard prone areas.</li> <li>■ Enforcing and monitoring the compliance of land use and town planning byelaws, and other safety regulations in hilly areas.</li> </ul>
7	Urban Management	Flooding	<p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>■ Contour Mapping will be prepared at 0.2 - 0.5 m contour interval.</li> <li>■ Inventory of the existing storm water drainage system will be prepared on a GIS platform.</li> <li>■ Catchment will be the basis for planning and designing the storm water drainage systems in all ULBs.</li> <li>■ Storm water drainage systems for coastal cities have to be designed taking into account the tidal variations.</li> <li>■ Risk assessment will be carried out with a multi-hazard concept leading to fool proof land use planning.</li> <li>■ Involvement of the Residents' Welfare Associations &amp; Community Based Organisations in monitoring this and in all Urban Flood Disaster Management actions.</li> </ul> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>■ Future Storm water drainage systems will be designed with a</li> </ul>

	<p>Runoff Coefficient of up to 0.95 in using Rational Method taking into account the approved Land-use Plan.</p> <ul style="list-style-type: none"> <li>■ Rainwater Harvesting as an integral component of the building.</li> <li>■ Encroachments on Drains and in Floodplains will be removed by providing alternative accommodation to the poor people.</li> <li>■ Low-lying areas should be reserved for parks and other low-impact human activities.</li> <li>■ Storm water drainage concerns will be made a part of all Environmental Impact Assessment norms.</li> </ul>
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Table 6.9: Salient Features of NDMA guidelines for Man-made Hazards

S. No.	Types of Man-made Hazards	Salient Features on Prevention, Preparedness and Mitigation of respective Disasters
1	Chemical Terrorism Disasters(CTD) Management	<p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>■ Preparedness for an emergency response at the incident site requires protection, detection, and decontamination. The Chief Medical Officer will be the main coordinator for the management of CTD. Preparedness for emergency medical response includes prompt establishment of medical posts as part of the ICS.</li> <li>■ The nodal ministry for CTD and for chemical accidents will organise necessary activities to develop a common information platform for a sufficiently robust networking system, as part of the DM plans. Nodal and line ministries at the central level and departments of health, SDMAs and DDMAAs at the state or district level will identify the various requirements of critical infrastructure to be developed with PPP models to mitigate the impact of CTD.</li> </ul> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>■ Counter-terrorism strategies, risk and vulnerability assessment, chemo-surveillance, and environmental monitoring are required for the mitigation of CTD by authorities recommended by NDMA.</li> <li>■ A buffer zone to be defined to such industries, which are vulnerable for CTD. Development in such zones should be restricted, which should be covered in development planning.</li> </ul>
2	Chemical (industrial) Disaster Management	<p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>■ Strengthening of the present regulatory framework to meet the defined national policies and aspirations; augmentation of technical support functions, a supportive and technology neutral regulation framework.</li> <li>■ Specific roles and responsibilities of MAH units, transporters, drivers, authorities and aspects related to emergency communication systems and training of various stakeholders.</li> <li>■ Preparation of Crisis Management Plan by the hospitals, concept of mobile hospital and mobile teams, planning for and regular testing of emergency plan, establishing post-disaster documentation procedures, epidemiological surveys and minimum criteria for relief and rehabilitation.</li> </ul> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>■ Legislation on land-use policy (buffer zone around chemical industry), Standardisation of national codes and practises, Preparation of On-Site</li> </ul>

S. No.	Types of Man-made Hazards	Salient Features on Prevention, Preparedness and Mitigation of respective Disasters
		<p>and Off-Site, Preparation of a highway DM plan for the transportation of hazardous chemical, Establishing a risk management framework criterion for chemical assessment.</p> <ul style="list-style-type: none"> <li>▪ Hazard identification, risk assessment, incorporation of GIS technology, risk mapping, and development and improvement of database.</li> </ul>
3	Nuclear & Radiological Disaster Management	<p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>▪ The plans for DM of nuclear/radiological emergencies / disasters from all levels of administration must be mainstreamed, allocation of funds from the Planning Commission as well as the concerned ministry.</li> <li>▪ Off-site emergency preparedness and response plans to be prepared by the collectors/ magistrates of the districts.</li> <li>▪ The SDMAs are required to identify and enlist officers with total responsibility of issues related to nuclear/radiological disaster management, the collector/magistrate of the district affected by nuclear emergency from nuclear power plant/facility will be in-charge of the off-site emergency programme and for radiological emergencies in the metropolitans/large cities, wherein more than one district is involved. The state authorities will nominate an incident commander; NDRF personnel must always be made available on emergency basis by NDMA at the affected site.</li> </ul> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>▪ Engineering safety features and accident management procedures that should be in place in a nuclear plant as accident mitigation measures for minimising the impact of a nuclear emergency by keeping the radioactivity release in the environment to levels as low as possible.</li> <li>▪ Controlling the power, cooling the fuel and confining the radioactive material should be used as three basic safety functions in Nuclear Plant.</li> <li>▪ The inbuilt safety measures, including biological shields, safety systems and interlocks, safety audits, operations strictly following safety procedures, etc., mitigate the consequences of accidents should be adopted.</li> </ul>
4	Fire Services Management	<p><b>Prevention and Preparedness</b></p> <ul style="list-style-type: none"> <li>▪ Preparation of Fire Hazard Response Mitigation Plan (FHRMP)</li> <li>▪ The plan should incorporate activities for mass awareness and inspection of fire-fighting facilities and equipment especially in schools, busy shopping malls, high-rise buildings and residential clusters.</li> <li>▪ Integration of FHRMP with 13th Finance Commission report and state five year plans for mobilisation of funds.</li> </ul>

Source: [NDMA guidelines for each of the Man-made Hazards.](#)

Moreover, in addition to above points, there is a need to identify infrastructural needs for preparing mitigation plans, Implementing a financial strategy for the allocation of funds for different national and state/district level mitigation projects.

**Capacity Building:** In addition to above-mentioned salient features, the capacity development for managing the disaster is an important criterion, which should be considered as a part of preparedness. There should be availability of skilled and

adequately trained manpower like rescue and relief teams, Civil Defence, Home Guards, and other emergency service providers having basic knowledge of relevant disasters. In Disaster Management Plan, the role of NGOs, other voluntary organisations, and the community is required to be defined. Capacity development should be undertaken at the district, state, and national levels by the Ministries and departments concerned as a part of their respective DM plans.

**Response Mechanisms:** A mechanism for coordinated approach and efforts is required for effective response after the incident. Role of communities, NGO and National Disaster Response Force (NDRF)<sup>105</sup> should be considered while formulating incident response strategy.

**Response & Relief:** To provide Psycho Social Support after the incident as a part of relief is an important aspect. NDMA has also issued detailed guidelines which describes the following features:

- Implementation of Psycho-Social Support and Mental Health Services (PSSMHS) in National Mental Health Programme (NMHP) and in District Mental Health Programme (DMHP);
- Integration of the PSSMHS in DMHP and General Health Programme as a part of hospital and District health plan;
- Formation of a National Sub-Committee on PSSMHS;
- Training of National Disaster Response Force (NDRF), Quick Reaction Teams (QRTs)
- Disaster Management Teams (DMTs) in all basic psycho-social support skills;
- Integration of PSSMHS and NMHP with Disaster Management (DM) Plan and Health/Hospital DM Plans.

In terms of medical preparedness<sup>106</sup>, the prevention measure and the preparedness measure is separately highlighted by NDMA.

- Preventive measure: Integrated Disease Surveillance Programme (IDSP)
- Preparedness for the management of mass casualties: Emergency Medical Response (EMR) at the incident site and their quick and safe evacuation by ambulance, are two important steps.

### 6.7.3. State Disaster Management Plan

The Section 23 of Disaster Management (DM) Act 2005 states that there shall be a DM plan for every state. The NDMA has also issued guidelines on preparation of State Disaster Management Plan (SDMP), which outlines the broad coverage of the plan as well as the requirements of consultation in its preparation. It also provides provision for annual review and updating of the State DM Plan, and enjoins upon the state governments to make provisions for financing the activities to be carried out under the state plans. The SDMP shall be prepared in consultation with the State Perspective Plans and/or State Urbanisation Policies.

The Act provides for the departments of the State Governments to draw up their own plans in accordance with the state DM plan. The SDMP should be prepared by the State Executive Committee (SEC) in conformity with the guidelines to be issued

<sup>105</sup>A separate guideline has been issued by NDMA on Incident Response System and National Disaster Management Information and Communication System, which is available at [www.ndma.gov.in](http://www.ndma.gov.in).

<sup>106</sup>The NDMA guideline on Medical Preparedness available at [www.ndma.gov.in](http://www.ndma.gov.in) can be referred.

on related matters by the SDMA having regard to the NDMA guidelines. The SDMP prepared by SEC should be approved by the SDMA. The approach to the preparation of the SDMP should be holistic and address all the hazards the state is vulnerable to.

The SDMP may also adopt the generic categorisation of disasters with respect to specific plans at the state level by various departments to handle different disasters. These categories could be L0, L1, L2, and L3.

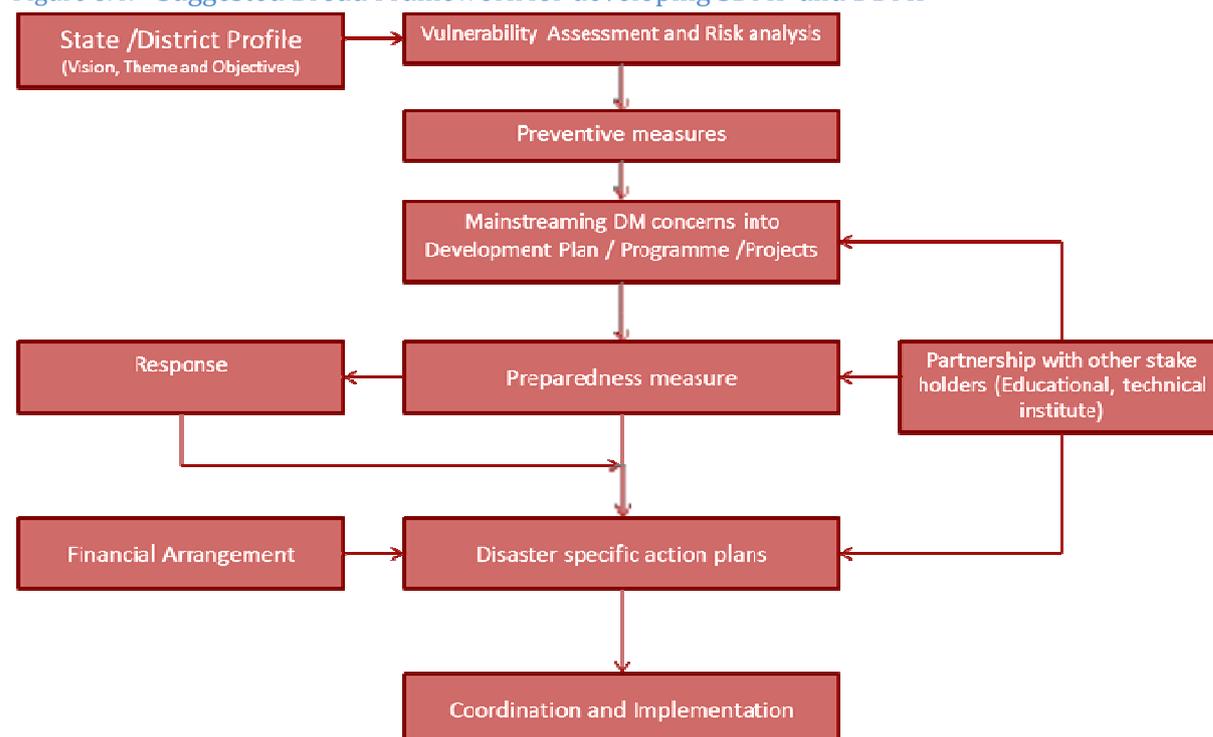
- L0 denotes normal times, which are expected to be utilised for close monitoring, documentation, prevention, mitigation and preparatory activities. This is the planning stage where plans at all levels from community to the State should be put in place. Training on search and rescue, rehearsals, evaluation and inventory updating for response activities should be carried out during this time.
- L1 specifies disasters that can be managed at the district level, however, the state and centre will remain in readiness to provide assistance if needed.
- L2 specifies disaster situations that may require assistance and active participation of the state, and the mobilisation of resources at the state level.
- L3 disaster situations arise from large-scale disasters where districts and the state may not have the capacity to respond adequately and require assistance from the central government for reinstating the state and district machinery.

The following features should be considered while preparing the SDMP

- Hazard Risk and Vulnerability Atlas (HRVA) assessment of different parts of the state to different kinds of disasters.
- The vulnerability of different parts of the state to different kinds of disasters.
- The SDMP should be developed in line with DDMPs.
- The measures to be adopted for prevention and mitigation of disasters.
- The manner in which mitigation measures shall be integrated with development plans and projects.
- The capacity building and preparedness measures to be taken.
- The roles and responsibilities of each department of the government of the state in relation to the measures specified above.
- The roles and responsibilities of different Departments of the government of the state in responding to any threatening disaster situation or disaster.
- The state plan will be reviewed and updated annually.

The suggested framework for developing SDMP & DDMP is shown in the **Figure 6.4**.

Figure 6.4: Suggested Broad Framework for developing SDMP and DDMP



Source: National Disaster Management Guidelines, Preparation of State Disaster Management Plans.

#### 6.7.4. District Disaster Management Plan (DDMP)<sup>107</sup>

Section 31 of the DM Act, 2005 makes mandatory to formulate District Disaster Management Plan (DDMP) by District Authority in consultation with local authorities. DDMP shall include Hazard Risk and Vulnerability Analysis (HRVA), prevention, mitigation, preparedness measures, response plan and procedures. An indicative list with possible plan objectives is given below:

- To identify the areas vulnerable to major types of the hazards in the district.
- To adopt proactive measures at district level by all the Government departments to prevent/ know disaster and mitigate its effects.
- To define and assign the different tasks and responsibilities to stakeholders during the pre-disaster and post-disaster phases.
- To adopt disaster resilient construction mechanism in the district by way of using Information, Education and Communication for making the community aware of the need of disaster resilient future development.
- To enhance disaster resilience of the people in the district by way of capacity building.
- Reduce the loss of public and private property, especially critical facilities and infrastructure, through proper disaster management planning
- Manage future development to mitigate the effect of natural hazards in the district.
- To set up the early warning system so as to prepare the community to deal with the disaster and responsive communication system based upon fail-proof proven technology.
- To develop the standardized mechanism to respond to disaster situation to manage the disaster efficiently.

<sup>107</sup> Source: Explanatory Notes for Preparation of District Disaster Management Plan (DDMP), NDMA

- To set up an Emergency Operations Centre at the District level to function effectively in search, rescue, response.
- To prepare the response plan based upon the guidelines issued in the State Disaster Management Plan so as to provide prompt relief, rescue and search support in the disaster affected areas.
- To make the use of media in disaster management.
- Rehabilitation plan of the affected people and reconstruction measures to be taken by different govt. departments at district level and local authority.
- Integration of DM initiatives into development plan and projects.
- To coordinate with Centre & State agencies concerned for effective and efficient DM.

The District Disaster Management Plan (DDMP) is the guide for achieving the objective mitigation, preparedness, response and recovery. It should be noted that Development Plan for the District/City should also integrate with DDMPs and city planning or town planning should be in compliance with the DDMPs and SDMP of the concerned District.

## 7. Simplified Planning Techniques

Town planners use variety of techniques at different stages of the planning process. These techniques may relate to surveys for collection of data, assessment of existing conditions in a settlement, as well as analysis and projections of future requirements in respect of various activities.

Substantial proportions of these techniques are highly elaborate and demand intensive data inputs. Considerable time is lost in collecting the required data causing delays occur in the plan preparation process. Further, with rapid urbanisation, planners need simplified techniques for analysis and plan preparation. The chapter describes some of the useful and simplified techniques for data collection, survey, analysis, projections and mapping. Most of these exercises can be take up as a separate research/ survey before plan preparation to provide processed data inputs.

### 7.1. Identifying Data Needs and Data Collection List

The basic presumption of simplified information gathering methodologies is that there is always a certain amount of uncertainty attached to any set of data, and that the available data may or may not be complete as compared to what is required for ensuring perfectness in decision making. This presumption implies that decision-making most often involves an element of imperfect data and good decision maker makes good use of extrapolation of the collected data though the application of simplified survey techniques.

The methods of rapid information collection institutionalise existing good practices and even common sense. They rely mostly on direct observation, seek several views of any one “fact” (cross checking) and make use of checklists and semi-structured dialogues instead of lengthy and often costly questionnaire-based surveys. Due to difficulties of measuring much of socio-economic information directly, rapid survey techniques make liberal use of proxy indicators to trace ranking, trends and shifts. These rapid methods must not be considered as substitutes to specialist investigations and should be used for quick access to information for rapid decision-making.

#### 7.1.1. Data Checklist

The data collection checklist is a precise and exhaustive listing of topics/issues and sub-topics/issues related to the information need. The process begins with the preparation of an initial checklist. The next stage is to define the method of acquiring information about each sub-topic in the list. The checklist is flexible and allows the surveyor to adapt and improvise in the field. The steps involved in the preparation of the checklist are as follow:

- List major topics with its priority.
- List of major information needs and how each will be used for analysis.
- Break down each topic into sub-topics.
- Indicate the likely information sources such as  
 Document from Government departments, organisations, private agencies, publications etc.  
 Observation in the study area and inspection  
 Dialogue, interviews  
 Self-completion surveys etc.

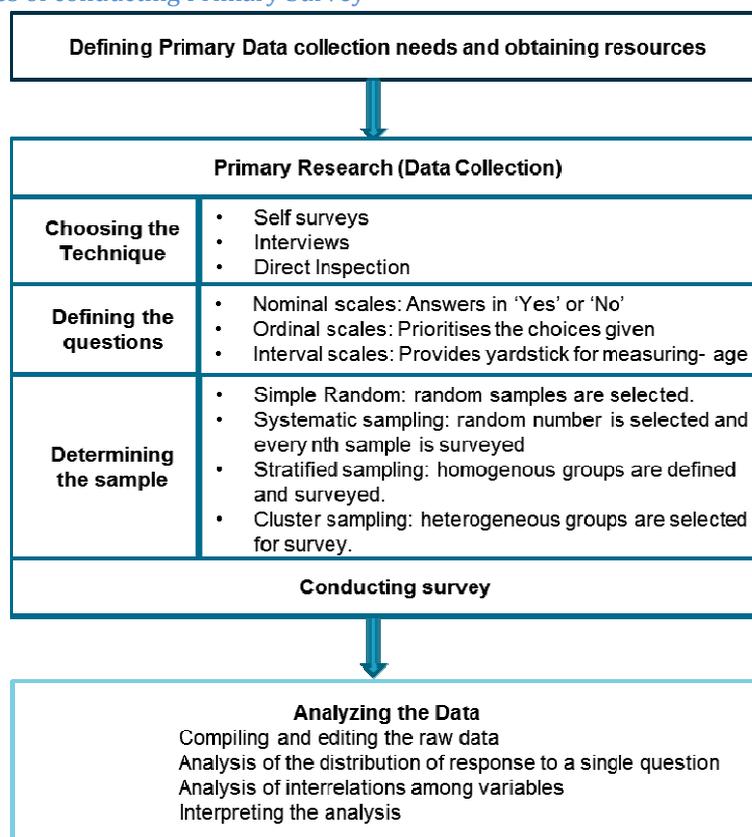
## 7.2. Data Collection Techniques

Information or data can be divided into two types, i.e. Primary data and Secondary data. Primary data is collected first hand by investigator, thus through Primary survey. Secondary data is second hand data, initially collected by some other investigator for other purpose but later on used by an investigator for his/her own purpose.

### 7.2.1. Primary Data Collection techniques

Primary data are those, which are collected for the first time and are always given in the form of raw material and original in character. Before beginning the primary data collection process, the technique of data collection, the questionnaire thereof and the survey sample selection technique is to be finalised. To process, analysis and interpret primary data, suitable statistical methods are needed.

Figure 7.1: Stages of conducting Primary Survey



Source: Reading Material on Planning Techniques by JH Ansari and Shri Mahavir.

This section discusses four types of primary surveys, which are listed in the order of passive to active respondents. Following are the broad categories of primary surveys:

- **Visual survey / Reconnaissance survey:** This survey does not require direct contact with population of the study area. It is quick overview of the area.
- **Inspection:** It involves direct inspection of area by surveyor for extracting information.
- **Personal Interview / Dialogue:** This survey is more personal and could be either face-to-face or telephonic. In such type of surveys some initial topics are investigated to gain insight in the area of interest.
- **Self-survey:** In this type of survey indirect contact is made with the respondent by sending questionnaire through mail or handed out but the response is not collected on the spot.

#### 7.2.1.1. Visual surveys / Reconnaissance survey

Visual surveys are direct inspection surveys, which are performed by survey teams moving in a vehicle or walking. This type of survey can be used in the initial stages of the investigation, often after preparing initial checklist. It performs variety of functions, such as:

- Familiarise with study area.
- Give initial impressions of the physical and social state of an area.
- Identify selected areas for further investigation.
- Generate ideas for development of checklist.

#### 7.2.1.2. Inspection

**Direct Inspection:** The direct inspection of conditions or activities is employed in many kinds of surveys where human communication is not required to elicit the information (*Source: Reading Material on Planning Techniques by JH Ansari and Shri Mahavir*). It can be used for observing traffic counts, recreation area use surveys, housing quality studies and proxy observations where required.

**Indirect Inspection:** The findings of the initial survey can be substantiated with the help of Key Indicator Survey, which are specific to the objectives of the analysis. Often, instead of getting direct information on the variable, surveyors rely on observing approximations known as proxies. A proxy is used to inform about a variable without direct investigation, instead investigating its key indicators. Such as: instead of enquiring about the income range, the surveyor can observe the housing condition, number of vehicles and other consumer goods. Table 7.1 lists proxy indicators to be generated through checklist, relating to the sub-topics, which are identified as important.

Table 7.1: Possible Proxy Indicators

Topic	Possible Proxy	Add your own proxies
Economic growth	Housing construction & condition Dwelling extensions Electricity consumption Sale of new vehicles	
Prosperity	Number of Petrol pumps Sale of Furnishings types Types of commercial stores	
Service levels	Number of standpipes Private water carriers Electricity supply Use of public urinals On-street garbage	
Wealth distribution	Differing new houses construction Private car ownership Imported goods consumption	
Women's participation	Hand portage of water Ratio of girls in higher education	
Municipal efficiency	Frequency of garbage removal Condition of road Street lights	

Source: UDPFI Guidelines, 1996

Such methods are to be adopted if the documentary statistics is aggregative or out-dated or both. Good proxies are those which can be easily investigated, however, proxies can often be misleading and must be used with care. Therefore generating proxies require knowledge about the relationship between the proxy and the variable it is trying to assess and its relationship in the study area.

### 7.2.1.3. Personal Interview/Dialogue

A number of types of surveys are undertaken face to face or by telephonic conversation. In case of quantitative survey, the structured dialogue is one-way where precise questioning takes place. Semi-structured dialogue is a flexible two-way process where only some initial topics are investigated. These topics can be revised as the practitioner gains insight in the area as information flows-in from the respondents. The semi-structured dialogue is thus an informal process but it needs to be managed expertly, particularly in the aspects listed below:

- Behavioural factors of the surveyors and respondents
- Questions not to be ambiguous or long
- Managing the conversation & careful probing to seek answers
- Judging responses without biases
- Cross-checking with other respondents
- Recording the interview (audio/video)
- Avoiding errors

#### 7.2.1.4. Focussed Group Discussion (FGD)

Focussed group discussion is a qualitative data collection and research technique. Questions about opinions, perceptions, beliefs, attitude of people towards planning aims, services are probed in these discussions. FGD can be used for learning about stakeholders, their interrelationship and to know about a range of issues on the topic. This method costs fairly low compared to surveys, as one can get results relatively quickly and increase the sample size. FGDs can either be used to explore meaning of survey findings that cannot be explained statically as well as before designing questionnaires.

Homogenous group of people are selected for FGD so that they are comfortable and have free flow of discussion. Main objective and key questions of the meeting should be pre-decided. Group of 10 to 12 people and questions should be selected for a single FGD<sup>108</sup>. More than one, mostly three to four FGDs to be done before legitimate results can be reached on an issue. FGD in rural settings can make use of interactive diagrammatic data collection techniques such as mapping, Venn diagram etc.

#### 7.2.1.5. Participatory Rapid Appraisal

PRA is an intensive, systematic but semi-structured learning experience carried out in a community by a multi-disciplinary team, which includes community members<sup>109</sup> using various tools given below. Participatory appraisal methods and tools can be used across all age groups and cultures and do not rely on literacy skills. Methods of PRA are highly visual and comprise a myriad of activities to elicit and triangulate the same information<sup>110</sup>. Tools used in participatory interviews or group meetings include brainstorming, mapping, ranking and diagramming and can be broadly put in four categories<sup>111</sup>:

- Group dynamics, e.g. learning contracts, role reversals, feedback sessions
- Sampling, e.g. transect walks, wealth ranking, social mapping
- Interviewing, e.g. focus group discussions, semi-structured interviews, triangulation
- Visualization e.g. Venn diagrams, matrix scoring, timelines

Participation usually takes place in familiar surroundings in the street, public places or through community-based activities<sup>112</sup>.

#### 7.2.1.6. Self-Survey

These are often in the questionnaires sent to respondents through mail or survey forms handed out or inserted in the newspapers and the filled questionnaires are

<sup>108</sup>Source: Overseas Development Institute, UK; Wikipedia.

<sup>109</sup><http://www.slideshare.net/ronelcana/participatory-rapid-appraisal>.

<sup>110</sup>[http://shortwork.org.uk/?page\\_id=210](http://shortwork.org.uk/?page_id=210).

<sup>111</sup> Source: Wikipedia.

<sup>112</sup>[http://shortwork.org.uk/?page\\_id=210](http://shortwork.org.uk/?page_id=210)

mailed back to the surveyor. It has various limitations, like; responses can be low and unsatisfactory.

Primary data collection techniques can be costly and very time consuming thus methods of rapid information collection, which rely mostly on direct observation, is an alternative. This method seeks several views of any one “fact” (cross checking), makes use of checklists and semi-structured dialogue. However, rapid methods must not be considered as substitutes to specialist investigations and should be used for quick access to information for rapid decision making only.

### 7.2.2. Secondary Data Collection techniques

Secondary data are those, which have already been collected by someone other than the investigator himself. These are usually compiled and processed information but may be relatively less accurate than the primary data. However, the problems associated with the primary data collection such as time consumption, skilled manpower requirement do not arise here. Secondary data can be collected from a number of sources, which can be broadly classified, into two categories.

#### 7.2.2.1. Published Sources

Mostly secondary data is collected from published sources, which makes it reliable. Some important sources of published sources and statistical data are as follow:

- Published reports of Central and State Governments and local bodies.
- Statistical abstracts, census reports and other reports published by different Ministries of the Government.
- Official publications of the foreign Governments.
- Reports and Publications of trade associations, chambers of commerce, financial institutions etc.
- Journals, Magazines and periodicals.
- Periodic Publications of Government organizations like Central Statistical Organization (CSO), National Sample Survey Organization (NSSO).
- Reports submitted by Economists, Research Scholars, Bureaus,
- Published works of research institutions and Universities

#### 7.2.2.2. Unpublished Sources

Statistical and non-statistical data can also be collected from various unpublished sources. Some of the important unpublished sources from which secondary data can be collected are:

- The research works carried out by scholars, research associates and professionals.
- The records maintained by private firms and business enterprises, which may not have been published due to business discretion.
- Records and statistics maintained by various departments and offices of the Central and State Governments, Corporations, Undertakings among others.

For assisting planning and development efforts of local bodies, **Central Statistical Organisation (CSO) of Ministry of Statistics and Programme Implementation (MoSPI)** has published a document ‘Basic Statistics for Local Level Development’ for

Rural-village schedule, Urban- ward schedule and Metropolitan city/ city/ town schedule. At village level, the *gram Panchayat* will consolidate, maintain and own village level data. It is suggested that District Statistical Office (DSO) will coordinate with respective local body and different departments for getting the information compiled at respective schedule.

### 7.3. Types of Surveys

While planning regional or urban area, diverse studies are done which use various sets of information to analyse existing situation and make future projections. Thus, keeping in mind the range of data required in planning, following survey types have been undertaken.

#### 7.3.1. Socio-Economic Survey

Demographic survey is concerned with collection of socio-economic data regarding characteristics of human populations, such as size, growth, density, distribution, and vital statistics. This survey forms base for not only understanding current socio-demographic characteristics of specific area but also projections of future population and related infrastructure. However this survey is to be done in rare cases only as Census of India provides detailed information of demography.

#### 7.3.2. Land use/utilisation Surveys

Land use survey is commonly undertaken with the purpose to identify developed and undeveloped areas for analysis of physical distribution and condition of existing development for future projections. In case of ground verification of the land use map prepared by remote access or by various secondary sources, land use of a defined land parcel can be observed by undertaking a well-planned exercise.

The developed and undeveloped area can then be further classified into major categories depending upon the use to which major portions of land are put to. The categories are to be in line with Urban or Regional Plan (s) (as given in Table 4.4 and Table 9.1). In case of multiple use of a land parcel, the dominating land use should be marked, if mixed land use is not considered in the plan.

#### 7.3.3. Density Surveys

Density surveys are done to understand the relationship between built-up area and population density. It is taken up for assessment of infrastructure requirements, to reduce congestion, appropriate availability of land for specific activities and services required by residents for good quality of life.

### 7.3.3.1. Residential Density<sup>113</sup>

Residential density surveys are undertaken with the objective to understand the accommodation density, built-up area density (built-up area per land area) and the residing population density. Based on the analysis from this survey, the decisions on the control and promotional measures can be taken.

There are two separate aspects of this objective, first is less congestion within dwelling unit and second is low- high density in a neighbourhood or the study area. Another reason for such surveys is to control number of people residing in an area so as to provide appropriate/sustainable or decentralised services and utilities for the area.

Residential density is normally expressed in terms of:

- Houses per unit land (dwelling units/hectare),
- Habitable rooms per unit land (rooms/hectare) (Accommodation density) and
- Persons per unit land (persons/hectare) (Population Density).

For comparison at later stages and analysis of the residential areas, the study area can be further divided into zones/sub-divisions of similar housing types/conditions and tentative observation of density or based on similar pattern for survey within the study area.

As accommodation density and population density are calculated for same unit of area, these can be compared to reach at number of persons (occupancy rate) per habitable room. Thus it is used to determine whether particular area is under-utilized or over-utilised. This information can be used in future planning to decide which areas are to be decongested and in which areas density can be increased. The following formulas are used for the calculation:

$$\text{Accommodation density} = \frac{\text{Number of habitable rooms in the study area/sub-division}}{\text{Net area of the study area/sub-division}}$$

$$\text{Population density} = \frac{\text{Total population of the study area}}{\text{Total area of the study area}}$$

$$\text{Occupancy rates} = \frac{\text{Population density}}{\text{Accommodation density}}$$

### 7.3.3.2. Non-Residential Density

Density in non-residential areas is carried out for assessment and provision of appropriate quantity and quality of services to the users of study area. Measurement of density in non-residential area in terms of room or occupant per acre does not

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<sup>113</sup> Source: Reading Material on Planning Techniques by Sh.JH Ansari and Sh. Mahavir; and Keeble Lewis, Principles and Practices of Town & Country Planning, 1968.

provide useful information, thus a method based upon the floor space index (FSI) is used to calculate non-residential density.

This survey seeks to obtain twofold information about study area; first, a statement of the total area devoted to different classes of land use within the non-residential area, distinguishing only between quite distinct kinds of use, e.g. shop, office, place of assembly. Second, the intensity of use of each street blocks in the non-residential area in terms of its overall FSI. The FSI survey gives some idea whether the amount of land requires be increasing or reducing for different land uses.

Table 7.2: Field sheet for non-residential survey

Sub-division No.	Floor area in square meters				Total floor area	Total Size	F.S.I.
	Shop	Residence	Office	Industry			
1							
2							
3							
4							
5							

Source: Reading Material on Planning Techniques by JH Ansari and Shri Mahavir.

### 7.3.4. Infrastructure Surveys

Infrastructure survey includes the survey of existing infrastructure within and surrounding the study area in terms of its population. The result of infrastructure survey is compared to benchmarks and parameters provided by National/Government authorities. Such survey includes physical as well social infrastructure. This survey is commonly integrated with the land use survey to cohesively understand the use of land and to save on time and manpower.

- Physical infrastructure indicators: transportation, water supply, wastewater, sewerage, and solid waste management infrastructure.
- Social infrastructure indicators: educational, civic and utilities, health care, recreation infrastructure etcetera.

Key parameters to be assessed in the survey are capacity, utilisation, gap assessment, issues associated as well as technology. The following table indicates the various infrastructure indicators that can be used and the benchmark providing agencies for the same.

Table 7.3: Infrastructure indicators and benchmark providing agencies

Indicators	Benchmarks providing Authority
Transportation	Urban Road – Code of Practice
Water supply	CPHEEO, Service level benchmarking-Ministry of Urban Development (MoUD)
Waste water management	CPHEEO, Service level benchmarking-MoUD
Solid waste management	CPHEEO, Service level benchmarking-MoUD
Storm water Drainage	CPHEEO, Service level benchmarking-MoUD
Sewerage	CPHEEO, Service level benchmarking-MoUD
Industrial Effluent	As per CPCB / SPCB norms

Sources: As given.

Transportation infrastructure survey is undertaken to comprehend the transport network and the movement of commuters in the city. It comprises survey of traffic volume, commuter load of different forms of commutation, parking survey and others. **Table 7.4** covers this in detail.

### 7.3.5. Transportation Surveys

Types of surveys, their objectives and methods, sampling size and expected output are given in the table below:

Table 7.4: Comprehensive Table of Transportation Surveys (Transport Survey forms Refer Appendix F of Volume II B)

S. No.	Survey Name	Objectives	Survey Methods	Sampling Size	Expected Output
1.	Inventory of road network system  Review of existing transport infrastructure and facilities, including: <ul style="list-style-type: none"> <li>▪ Flyovers/ underpasses,</li> <li>▪ Major intersections,</li> <li>▪ Parking facilities,</li> <li>▪ Traffic control facilities</li> <li>▪ Pedestrian facilities</li> <li>▪ NMV facilities,</li> <li>▪ Level Railway Crossings</li> <li>▪ Public Transport and Para transit Facilities</li> </ul>	<ul style="list-style-type: none"> <li>▪ To appreciate the physical characteristics of the identified road network in terms of right-of-way, carriage way, number of access points, surface type, abutting land use, etc.</li> <li>▪ To identify physical constraints and bottleneck points along the identified road network.</li> <li>▪ To assess the capacity potential of the identified road network</li> <li>▪ To appreciate traffic management measures presently adopted along the identified road network</li> <li>▪ To understand the existing transport situation in order to develop a rational land use and transport plan and mobility improvement measures in a CMP</li> </ul>	Manual	<ul style="list-style-type: none"> <li>▪ Two sections for a road section with similar land uses</li> <li>▪ Two samples for a road section with similar land use</li> <li>▪ Samples to be collected where ever section has variation</li> </ul>	Physical characteristics and physical constraints of road network and transport infrastructure
2.	Speed and delay studies	<ul style="list-style-type: none"> <li>▪ To elicit the journey and running speed along the road network</li> <li>▪ To identify the bottleneck point</li> <li>▪ To obtain the travel time matrix for all the O-D pairs</li> <li>▪ To quantify delays and identify factors causing delay</li> </ul>	<ul style="list-style-type: none"> <li>▪ Moving Observer method</li> <li>▪ Floating Car Method</li> <li>▪ Registration Number Method</li> <li>▪ Elevated observer Method</li> </ul>	The average of around six runs <sup>114</sup>	Journey and running speed, travel time, delay causing factors
3.	Classified traffic volume counts	<ul style="list-style-type: none"> <li>▪ To appreciate traffic characteristics in terms of size composition and variation – directional and temporal.</li> <li>▪ To appreciate the spatial distribution of traffic</li> <li>▪ To establish the level of service on the road network system</li> </ul>	<ul style="list-style-type: none"> <li>▪ Manual Method</li> <li>▪ Using automatic devices like Sensors</li> <li>▪ Video Photography</li> </ul>	As even day count will then give the Average Daily Traffic (ADT) <sup>115</sup>	<ul style="list-style-type: none"> <li>▪ Traffic Characteristic of the study area</li> <li>▪ Traffic volume</li> <li>▪ Spatial distribution of traffic</li> <li>▪ Circulation of traffic</li> </ul>

<sup>114</sup> IRC:SP:19-2001.

<sup>115</sup> *Ibid.*

S. No.	Survey Name	Objectives	Survey Methods	Sampling Size	Expected Output												
4.	<p>Road Side Origin and destination surveys at</p> <ul style="list-style-type: none"> <li>■ Cordon and</li> <li>■ Screen lines</li> </ul>	<ul style="list-style-type: none"> <li>■ To appreciate the traffic characteristics</li> <li>■ To appreciate the desired patterns of passenger and goods traffic</li> <li>■ To assess the intensity of through and destined traffic</li> <li>■ To use in model validation</li> </ul>	<ul style="list-style-type: none"> <li>■ Road Side Interview Method</li> <li>■ Registration Number Plate survey</li> <li>■ Tags on vehicles</li> </ul>	<p>The survey should normally be conducted for three consecutive days, on sample basis, if possible during a representative week in the year and must encompass the weekly market day and one working day<sup>116</sup></p>	<ul style="list-style-type: none"> <li>■ Travel pattern</li> <li>■ O-D matrix to calibrate a transport demand model</li> </ul>												
	<p>The diagram shows a network of roads and bridges. A blue line represents a 'Cordon Line Survey' encircling a central area. Two red lines represent 'Screen Line Survey (Railway)' and 'Screen Line Survey (River)', crossing the network at specific points. Yellow squares mark various survey points along the roads and bridges.</p>																
5.	Mobility survey (Household Survey)	<ul style="list-style-type: none"> <li>■ To elicit socio-economic characteristics of the household</li> <li>■ To elicit travel characteristics of the household (total trips, purpose of trips, mode used, trip length, trip origin and destination etc.)</li> <li>■ To appreciate desired pattern of traffic</li> <li>■ To elicit opinion (of the residents of the study area) regarding general transport problems of the city and the probable areas of improvement.</li> </ul>	<ul style="list-style-type: none"> <li>■ Household interviews</li> </ul>	<table border="1"> <thead> <tr> <th>Population</th> <th>Sampling rate</th> </tr> </thead> <tbody> <tr> <td>&lt;50,000</td> <td>1 in 5</td> </tr> <tr> <td>50,000-1,50,000</td> <td>1 in 8</td> </tr> <tr> <td>1,50,000 – 3,00,000</td> <td>1 in 15</td> </tr> <tr> <td>3,00,000-5,00,000</td> <td>1 in 20</td> </tr> <tr> <td>&gt;10,00,000</td> <td>1 in 25</td> </tr> </tbody> </table>	Population	Sampling rate	<50,000	1 in 5	50,000-1,50,000	1 in 8	1,50,000 – 3,00,000	1 in 15	3,00,000-5,00,000	1 in 20	>10,00,000	1 in 25	<p>Socio-economic profile of the study area, number of trips, purpose of trips, mode used, trip length, trip origin and destination, vehicle ownership</p>
Population	Sampling rate																
<50,000	1 in 5																
50,000-1,50,000	1 in 8																
1,50,000 – 3,00,000	1 in 15																
3,00,000-5,00,000	1 in 20																
>10,00,000	1 in 25																
6.	Parking Demand Characteristics	<ul style="list-style-type: none"> <li>■ To assess the parking characteristics in terms of parking duration and accumulation by mode</li> <li>■ To assess future levels of demand</li> </ul>	<ul style="list-style-type: none"> <li>■ Parking Space Inventory</li> <li>■ Parking usage Survey by patrol</li> </ul>	<p>Each typology to be covered / representative sample to be collected</p>	<p>Parking duration, load, volume, index, turn-over</p>												

<sup>116</sup> *ibid.*

S. No.	Survey Name	Objectives	Survey Methods	Sampling Size	Expected Output
		<ul style="list-style-type: none"> <li>To develop a parking policy</li> </ul>	<ul style="list-style-type: none"> <li>Cordon count</li> <li>Questionnaire type parking survey</li> </ul>		
7.	Parking Supply	<ul style="list-style-type: none"> <li>To assess the Parking Supply</li> </ul>	<ul style="list-style-type: none"> <li>Parking Space Inventory</li> </ul>	Each typology to be covered / representative sample to be collected	Determine availability of existing parking
8.	Activity place study	<ul style="list-style-type: none"> <li>To appreciate the activity pattern in terms of type and intensity</li> <li>To appreciate the employment levels by type of activity</li> <li>To develop relationship between floor space and employment</li> <li>To appreciate the trip and other characteristics of employees</li> <li>To develop trip production and attraction rates by type and intensity of activities.</li> </ul>	<ul style="list-style-type: none"> <li>Primary survey</li> </ul>	100 % of land use survey and Sample size of trip rate to be decided based on the size of study area.	Identify trip generation rates
9.	Public transport system study	<ul style="list-style-type: none"> <li>To appreciate system and operational characteristics</li> <li>To appreciate the performance and economic characteristics</li> </ul>	<ul style="list-style-type: none"> <li>Inventory</li> <li>User surveys</li> <li>Operator Surveys</li> </ul>	Sample size to be decided based on the size and characteristic of study area	System and operational characteristics
10.	Para transit study	<ul style="list-style-type: none"> <li>To appreciate role and function of Para transit</li> <li>To appreciate the system characteristics of Para transit</li> <li>To appreciate characteristics Para transit users</li> </ul>	<ul style="list-style-type: none"> <li>Inventory</li> <li>User surveys</li> <li>Operator Surveys</li> </ul>	Sample size to be decided based on the size and characteristic of study area	System and operational characteristics
11.	Terminal studies	<ul style="list-style-type: none"> <li>To appreciate physical characteristics of the terminal regarding size, space usage etc.</li> <li>To appreciate the operational characteristics in terms of flow of vehicles/good/people to and from the terminal</li> <li>To appreciate the user characteristics (in case of passenger terminal) regarding their origin, destination, mode used, trip length etc.</li> <li>To appreciate the parking characteristics in the terminal</li> <li>To appreciate the problems, constraints and potentials for expansion of the terminal activity</li> </ul>	<ul style="list-style-type: none"> <li>Inventory</li> <li>User surveys</li> <li>Operator Surveys</li> </ul>	Sample size to be decided based on the size and characteristics of study area and availability of users	Physical characteristics of the terminal, operational characteristics in terms of flow of vehicles/good/people, parking characteristics in the terminal

## Simplified Planning Techniques

S. No.	Survey Name	Objectives	Survey Methods	Sampling Size	Expected Output
12.	Safety studies (accident studies, including collision & traffic incidences)	<ul style="list-style-type: none"> <li>To appreciate the trends of accidents in the study area</li> <li>To appreciate the temporal and spatial variation of accidents</li> <li>To identify the accident prone areas</li> <li>To identify planning and management measures for improvement of traffic safety</li> </ul>	<ul style="list-style-type: none"> <li>Secondary data collection from police stations</li> </ul>	Accident record for last 2 years	Identification of accident prone areas
13.	Pedestrian Survey <ul style="list-style-type: none"> <li>Volume Counts               <ul style="list-style-type: none"> <li>Along</li> <li>Across</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>To appreciate pedestrian characteristics in terms of size composition and variation – directional and temporal.</li> <li>To appreciate the spatial distribution</li> <li>To establish the level of service on the road network system</li> <li>Safety: Continuity of street lighting for carriageway and pavements</li> <li>Comfort: Continuity of shade, provision of access ramps</li> <li>Convenience: Presence of pedestrian path-finding signage, street furniture such as garbage bins, seating, drinking water</li> </ul>	<ul style="list-style-type: none"> <li>Manual Counts</li> <li>Video</li> <li>Attitude</li> </ul>	As even day count will then give the Average Daily Traffic (ADT) <sup>117</sup>	Level of service of the pedestrian system and need for additional pedestrian facilities
14.	Intersection Survey <ol style="list-style-type: none"> <li>Intersection Turning Movement Survey</li> <li>Queue length Survey</li> </ol>	<ul style="list-style-type: none"> <li>Measures turning movements at key intersections during the morning and evening peak hours.</li> <li>A queue length survey at major bottlenecks can show the severity of traffic congestion quantitatively.</li> </ul>	<ul style="list-style-type: none"> <li>Manual counts</li> </ul>	<ul style="list-style-type: none"> <li>Directional movement of traffic in the peak hour</li> <li>Counts for 2 hours each in the morning and evening peak periods unless there exist extended peak hours.</li> </ul>	Performance characteristics of an Intersection

Source: As given

### Notes:

1) In 'Inventory of Road Network System' inclusion of 'City, ward and neighbourhood level NMT routes' & 'NMT priority zones, public bicycle sharing schemes, NMV parking facilities' may be considered.

2) Special emphasis must be paid to understand the differences in travel between men and women (especially in 'Mobility survey' 'Public Transport System Study', 'Para transit Study' and 'Terminal Study'; assess their met and unmet requirements for incorporating the results to improve transport system towards providing gender sensitive transport system.

<sup>117</sup> Ibid.

## 7.4. Analytical Techniques

Analysis breaks down complex phenomena into simple elements by organising, correlating, classifying, displaying and resolving. Based on the understanding of existing conditions, analysis and trends of change, the planners propose short-term and long-term scenarios of future and design schedules of inter connected interventions to steer development towards a desired future state.

These analysis techniques shall be carefully chosen keeping in view the objective of the study and the extent of data collected. The techniques with following characterised shall be preferred:

- Consideration of multiple parameters
- Handling mass data base
- Analysis output in visual form

**Simplified Reporting:** A report can be a summarized or detailed description of studied phenomenon. It helps in performing the tasks of putting information in an ordered format, identifying patterns, classifying, observing trends, correlating and inferring with a view to arrive at insights, conclusions, policy guidelines or design directions related to issues under investigation.

The report should introduce the contents at the very beginning, stating the objectives, scope and limitation of the study, describing the methodology used in collecting information and conducting analyses for arriving at alternatives, evaluating alternatives and deriving conclusions and recommendations.

**Trend Analysis:** This is a simple technique to study changes in a system over a period of time. Availability of time series data at least for three points of time is a basic requirement for its application. The analysis can be displayed in the form of tables, graphs, maps or diagrams. This technique is popularly used in study and analysis of change in urban economy, demographic pattern and physical form. Analytical tools for Trend Analysis may be used to predict the result of specific measures in the context of Traffic and Transportation strategies as decision support tools.

**Data Compilation & Analysis Techniques:** With advancement, data analysis can be executed more exhaustively and extensively through various software platforms. Complex analysis involving multiple variables and scenario building for various cases require advanced analytical software. These are carefully chosen to meet the requirement of the data compilation and analysis.

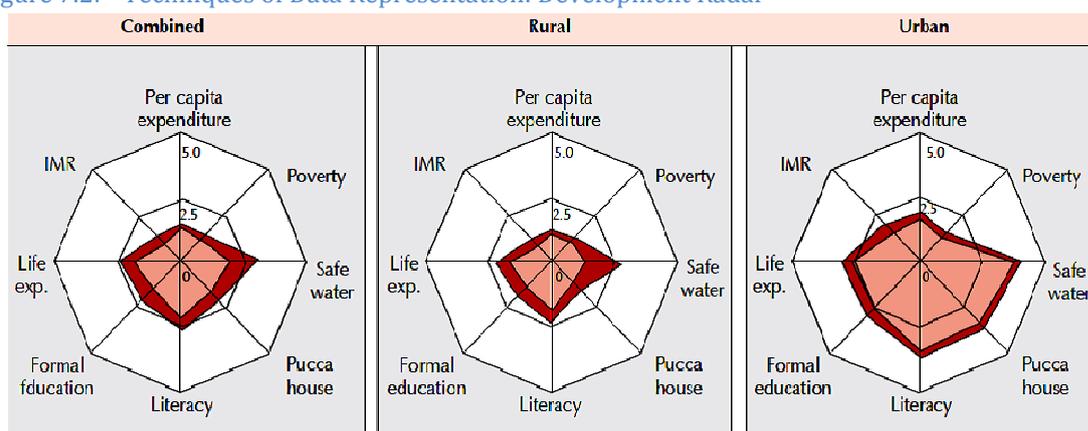
Software like Statistical Package for the Social Sciences (SPSS), Statistical Analysis System (SAS), STATA, Microsoft Excel files and others assist in data analysis for multiple variables, the output of which could be presented visually with graphs, trend charts and diagrams. Various other software, which aid in decision making like Pan Plus, which supports in preparation of participatory plans by enabling recording of

preferences and priorities of people and slotting them into schemes and programmes that form part of the budget envelope of planning unit is useful as an analysis technique.

**Innovative data analysis techniques**

Development radars are pictorial depictions of performance of planning unit with coordinates plotted around at 360 degrees, with each axis depicting one parameter of development. Development radars can also be a report card, because it can be re-drawn over a time sequence and the difference in attainment measured. These can be used in respect of various sectors such as health, education, poverty alleviation, drinking water, and housing.

Figure 7.2: Techniques of Data Representation: Development Radar



Source: Integrated District Planning, Planning Commission

Figure 7.3: Tabular presentation of Smiley face

Item	Unit	National norm	District position	Smiley face
Drinking water	lpcd	50	30	☹️
Literacy	percent	85	85	😊
IMR	per 1000	50	20	😊

Source: Integrated District Planning, Planning Commission.

Data representation can add value to stock taking and visioning exercises through interfacing numerical data with spatial information and making it more communicative – one of such method is smiley face which describes the deviation from norm/average through smileys, greater the gap, sadder the face.

**Map Analysis Techniques:** Map related software contains maps from official sources such as NRSC; NIC having locations of infrastructure and services and boundaries of urban/rural centres plotted on them through GIS overlays. They also contain an interface between numerical data and display of data on map. Some initiatives of such software applications are by Gram +++ (which converts numerical data into visual

outputs) and Ridhisoft's Whizmap (GIS platform for local planning)<sup>118</sup>. These and other platforms of GIS can be used for the preparation of different plans. The method of planning through GIS platform has been elaborated later in this chapter in the section: GIS application in plan formulation.

The above mentioned data collection, analytical and mapping techniques are comprehensive in nature and can be appropriately adopted during the course of the project. Land availability for development is declining with accompanying competition amid various activities. With this scenario land suitability analysis plays important role wherein land for particular use is selected after considering range of factors. Land selected thereupon is most suitable and tend to reduce wastage of this limited resource.

With the expanding city areas, threshold analysis for limiting its boundaries is evaluated on the basis of viability. These techniques have significant impact on decision-making.

### 7.4.1. Carrying Capacity

Carrying capacity of an area can be defined as the maximum number of population that can be supported by the environment of that area through optimum utilization of the available resources. The pattern and extent of resource usage serves to be the primary factor that affects the carrying capacity. This indeed depends highly on the:

- Socio-economic status of the people
- Use of technology

If technology is used in a positive manner then the carrying capacity is measured to increase manifold.

Planners usually define carrying capacity as the ability of the natural or artificial system that can absorb the population growth or physical development without considerable degradation or damage (*Schneider et al., 1978*).

*(Source: Schneider, D.M., D.R. Godschalk, and N. Axler. 1978. The Carrying Capacity Concept as a Planning Tool. Chicago, IL: American Planning Association, Planning Advisory Service Report 338).*

The techniques can be translated into policies, strategies and action plans at the local level towards augmentation and sustenance of urban environment resources in terms of their supportive and assimilative capacities on one hand and size, nature and distribution of urban-economic activities and their concomitant demands on environment, on another.

*(Source: Carrying Capacity based Regional Planning by National Institute of Urban Affairs, New Delhi; IHS, Rotterdam)*

The evaluation of urban carrying capacity is a complex process as it is determined from basic needs such as food requirements, various kinds of resources consumed

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<sup>118</sup>Source: Integrated District Planning Manual by Planning Commission

and the many kinds of wastes generated, different kinds of land use conversions leading to ecological imbalance and the great variability in technology, institutions and lifestyles created. There are 6 types of carrying capacities that can be evaluated -

- Infrastructure capacity level,
- Institutional capacity level,
- Perceptual carrying capacity,
- Environmental capacity level,
- Sustainable capacity level and
- Bio-centric capacity level.

Among these six types, the profound ones are infrastructure capacity level, environmental capacity level, and sustainable capacity level, which are more relevant to urban planning.

Table 7.5: Levels of evaluating carrying capacity for the urban areas

Level of Evaluation	Infrastructure Capacity Level	Environmental Capacity Level	Sustainable Capacity Level
<b>Definition</b>	<i>"The degree of human activity that facilities and services within an area can support without causing serious degradation or damage to the maintenance of quality of life."</i>	<i>"The degree of human activity that environment and ecosystems within an area can support without causing serious degradation or damage to quality of life."</i>	<i>"Sustainable carrying capacity is the number of a species that can be supported in a particular area indefinitely, given that area's endowment of water, food, and other necessities."</i>
<b>Concept</b>	At this capacity level, the major factor of evaluation is the <b>infrastructure development</b> .	This level basically reflects the <b>present state of the environment</b> with respect to productivity.	The <b>basic resource flow through the urban area to its ultimate sink</b> is evaluated. These are long term-based factors.
<b>Indicator</b>	Here the <b>intensity and pattern of resource usage</b> is estimated for the development of infrastructure like, water supply system, sewage system, transportation system, waste disposal system, etc.	The <b>state of productivity of the environment</b> , e.g. agricultural productivity by evaluating the past data or the availability of clean air & water, low pollution.	Indicators of particular resource: <b>how long it will be available</b> . If a resource is getting scarce then efficient steps could be taken to sustain it for long term.

Source: Urban Carrying Capacity: Concept and calculation; IIT Guwahati; 2011-12, Determining Sustainable Development Density using the Urban Carrying Capacity Assessment System Kyushik Oh, Yeunwoojeong, Dongkun Lee, Wangkey Lee; UCL, Working Paper Series, 2004 & The sustainable carrying capacity of New Zealand; The royal society of New Zealand.

### 7.4.2. Applying Carrying Capacity for Urban and Regional planning:

Carrying capacity based approach to planning is a concept as well as tool towards sustainable development of cities and region. It is still in nascent stages in India. Planning based on carrying capacity deals with the management of human activities, supportive resources and assimilative capacities of the environment (**Figure 7.4**) and general process of carrying capacity based planning is depicted (**Figure 7.5**).

Carrying Capacity analysis tool is useful to rationalise fixation of FAR including increase in given FAR. Two major determining factors should be considered:

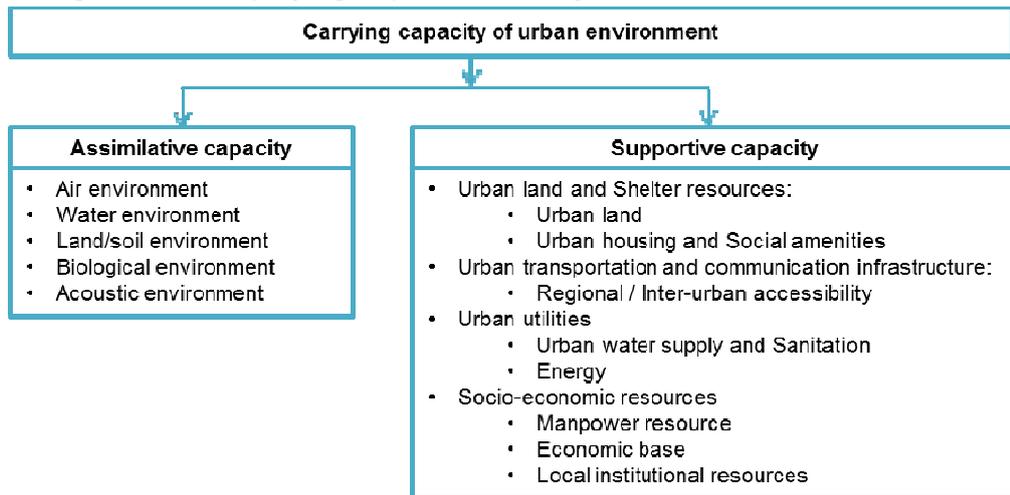
1.  $V/C$  ( $V$ = volume,  $C$ = capacity)

V/C: optimum level is 0.8; it can be relaxed up-to 0.9. Above 0.9 is dysfunctional and 1.0 is not desirable.

**2. LPCD of piped water supply**

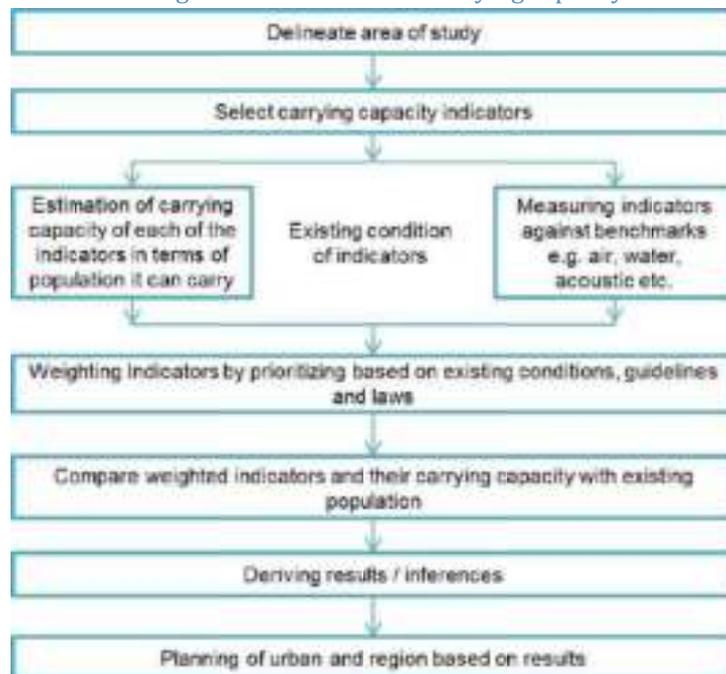
Litres per capita per day (LPCD): the planned LPCD should be as per the minimum of norm is 135 LPCD set. However, the density is to be capped by the Development/ Master Plan as per the threshold.

Figure 7.4: Components of Carrying Capacity of Urban & Regional Areas<sup>119</sup>



Source: Project paper on Carrying Capacity based Regional Planning by NIUA.

Figure 7.5: Planning of Urban and Regional areas based on carrying capacity



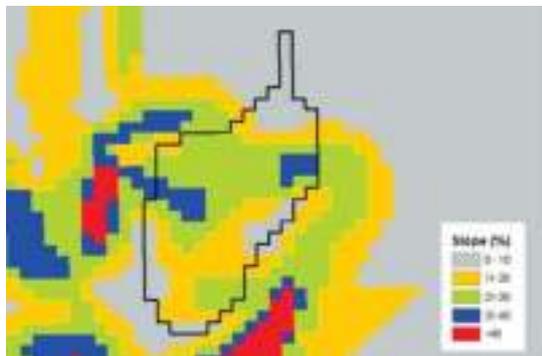
Source: Modified based on Project paper on Carrying Capacity based Regional Planning by NIUA.

<sup>119</sup>Supportive capacity means the capacity of the environment to support the lives of the people and other living organism. Assimilative capacity is the capacity of the environment to absorb/re-cycle matter, energy and/or other components, which come into the environment either by themselves or through human intervention, for sustenance of environmental quality.

### Case Study1: Urban Carrying Capacity, Guwahati

A new method of calculating carrying capacity was developed by IIT, Guwahati called Sustainable Accommodation through Feedback Evaluation (SAFE). This method was developed for hilly urban area to ensure hazard free sustainable urban development. The Steps is as follow:

- Step 1: Delineation of the urban watershed.
- Step 2: Demarcation of the developable & non-developable area.
- Step 3: Determination of area required for different infrastructure and facilities.
- Step 4: Calculation of the available residential area.
- Step 5: Socio economic survey of the urban region and calculation of the floor area requirement of the people.
- Step 6: Determination of the Floor Area Ratio.
- Step 7: Calculation of population carrying capacity.
- Step 8: Check adequacy of other indicators not analysed earlier.

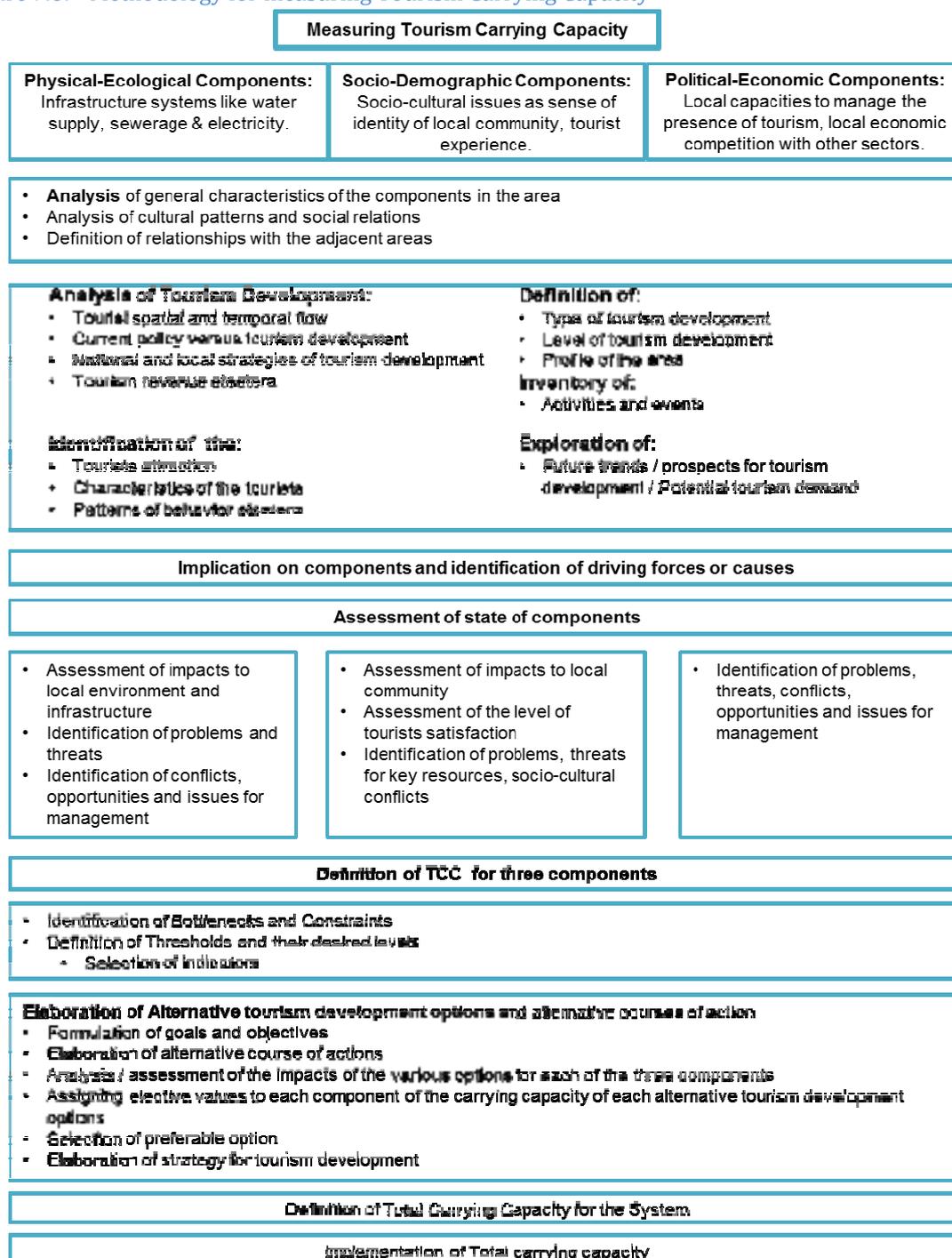


### Case Study 2: Tourism Carrying Capacity in European Tourism Destinations

The study was undertaken to elaborate comprehensive methodological framework to understand the concept of Tourism Carrying Capacity (TCC) and applying this methodology for sustainable tourism activities in the European tourist destinations.

The basic elements of the concept of carrying capacity from tourism point of view, i.e. the need for a limit/ a threshold in the tourist activities, were charted. For measuring TCC different components and subsequent indicator swere weighted based on the (a) characteristics of the locality, (b) the type of tourism and environment interface and (c) the type of tourism. Sample of different type of tourism destinations were studied for calculating TCC. Such as coastal areas, islands, protected areas, mountain resorts etcetera. The methodology of measuring TCC has been shown in **Figure 7.6**.

Figure 7.6: Methodology for measuring Tourism Carrying Capacity



Source: Defining, Meaning & Evaluating Carrying Capacity in European Tourism Destinations by University of Aegean, Greece.

### 7.4.3. Threshold Analysis

The threshold theory is based on the observation that any urban centre encounters limitations to their expansion due to physiographic features, existing land use and technology of infrastructure. An important inference from this observation is that physical growth of town is not smoothly continuous but proceeds in stages marked by successive limitations which have been called development threshold. These

thresholds are not insurmountable and can be overcome but only at additional (often very high) development investments known as threshold costs.

This technique is used to determine influence zones, urban extents and regions, attempts to rationalize and control the process of urban growth and provides a quantitative tool to help decision-making. Thresholds based on physical limitations are comparatively easy to determine using mapping techniques. Thresholds can be tangible or intangible.

Tangible thresholds are those, which can be measured, quantified and represented. These are physical, technological and structural limitations such as land available for development, current technology of water treatment or electricity production. Physical limitations or threshold are restrictions imposed by physiography and topography and get physically identified in the form of natural features such as rivers to be crossed, hilly areas and steep slopes etc. Technological thresholds are limitations imposed on physical growth of city, by constraints in expansion of infrastructure system. Some of these thresholds can be identified spatially and some numerically for instance, watershed line is generally the limit of extension of sewerage system, whereas, the capacity of a sewage treatment plant can be expressed in terms of number of inhabitants that can be served (numerically) identified threshold. Intangible thresholds can only be understood and indirectly measured such as, socio economic limitations.

### 7.4.3.1. The Process of Threshold Analysis

#### Part One: Analysis

- **Stage I:** Delineation of area to be surveyed by drawing the boundaries of area as closely as possible to a homogenous pattern of settlement.
- **Stage II:** Analysis of factors affecting town/urban development such as physiographic suitability of land and possible extension of public utilities.
- **Stage III:** Tracing the threshold lines, delimiting areas suitable for urban development and new development areas from fundamental land development.
- **Stage IV:** Synthesis – The information can now be correlated to form a synthesis of all factors considered on basis of which, the lines of urban development thresholds can be defined. Physical thresholds are shown spatially on base map and quantitative thresholds such as population figures, investment, power or water supply requirement can be expressed.
- **Stage V:** Land is subdivided for main functions of city within the successive physical threshold areas. This is done generally for two main functions, suitable area for industry and suitable area for other urban uses, priority being given based on vision of development.
- **Stage VI:** The calculation of capacity of residential areas within the first and successive threshold lines in relation to quantitative threshold figures in order to define the approximate number of inhabitants, which may be accommodated.
- **Stage VII:** The calculation of averages of industrial areas within the first and successive threshold lines to define their potential for industrial location after considering the quantitative threshold figures.

**Part Two: Outline of Economic Assessment**

- Stage VIII: Calculating the approximate capital investment costs necessary to overcome each threshold within the examined area.
- Stage IX: Calculating the following efficiency indices for each successive threshold area:
  - Cost of each new inhabitant
  - Cost per acre of land suitable for development

In regional planning indirect use of quantified results can be used in decision making among alternative locations for some significant investment within the region, while preparing a comprehensive regional policy for the distribution of the expected influx of population.

**7.4.3.2. Land Suitability Analysis**

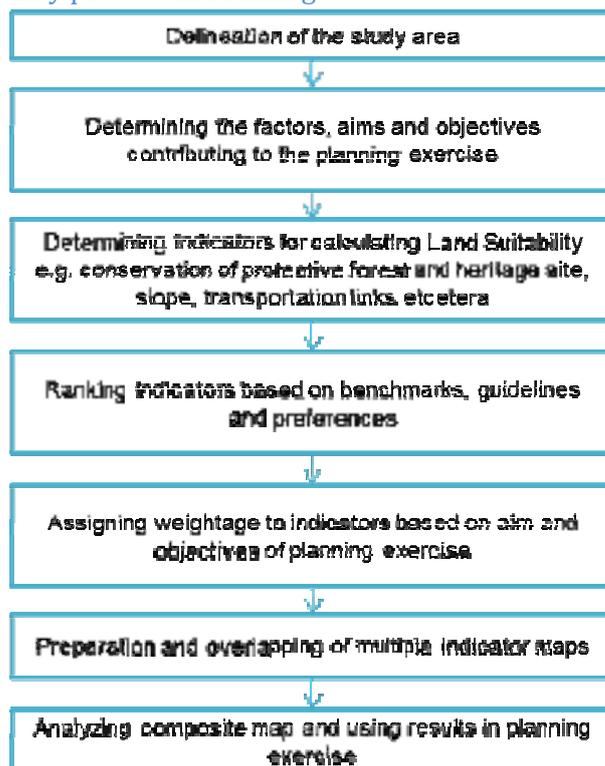
Land suitability refers to the ability of a particular type of land to support a specific use. The process of land suitability classification involves; evaluation and grouping of particular land areas based on their suitability for a defined use<sup>120</sup>. Land use suitability analysis aims at identifying the most appropriate spatial pattern for future land uses according to specific requirements, preferences, or predictors of some activity<sup>121</sup>.

Applications of suitability analysis can be found in many fields, such as site selection for cropland, agriculture suitability, graze suitability, forestry suitability (natural resource management field), flooding control, sustainable development (environment field), suitability for urban expansion, site selection for specific land use etcetera. Land suitability can be used in planning process to finalise most appropriate land for particular land use or activity by following the process presented in **Figure 7.7**.

<sup>120</sup>Land suitability analysis for agriculture crops: a fuzzy multi-criteria decision making approach; 2003; Prakash T N.

<sup>121</sup>Hopkins, L., 1977. Methods for generating land suitability maps: a comparative evaluation. *Journal for American Institute of Planners* 34 (1), 19–29.) (Collins, M.G., Steiner, F.R., Rushman, M.J., 2001. Land-use suitability analysis in the United States: historical development and promising technological achievements. *Environmental Management* 28 (5), 611–621.

Figure 7.7: Land suitability process in Planning



Source: Various source on land suitability analysis.

Factors taken into consideration to bring out most suitable land will vary according to the desired land use for which this technique is undertaken. A few examples of factors are given in the Figure 7.8. However, list of the factors can be broadly gauged according to the scope of project and availability of data.

Figure 7.8: Factors taken into consideration to assess the most suitable land use



Source: Land suitability Analysis, Rohtak, Land suitability Analysis for urban planning environmental assessment in an ecologically sensitive coastal area of eastern china based upon multi-criteria mechanism; Xiang S, Dong Z X, Fan L Y, Li Z, Yan Z; 2008.

### 7.4.3.3. Method

Suitability analysis is the process to assign weightage and overlay the factors to identify the land parcels on the pre-defined scales. There are various advanced mapping and statistical techniques that can be used for calculating land suitability. **Grey tone method**, also known as **map overlay method**, makes use of gradual colours to represent the suitability levels in the same scale, and overlay all the factor maps in a certain order. GIS techniques are used to transfer the suitability level into

numerical value, and assign weightage to each factor according to their relative importance. Three simplified steps for suitability analysis model include:

- **Selecting Suitability Factor:** Each factor is represented by a thematic map in GIS,
- **Single Factor Analysis:** According to single factor evaluation standard, score is given to the map unit of each factor and then the single factor suitability is generated,
- **Multiple Factors Overlay:** Weights are accorded to suitability factors according to their relative importance. The weights are determined by statistic integration and hierarchic analysis in this research from which the composite score is calculated.

Computer methods were developed to solve the inherent shortcomings of the traditional land suitability methods.

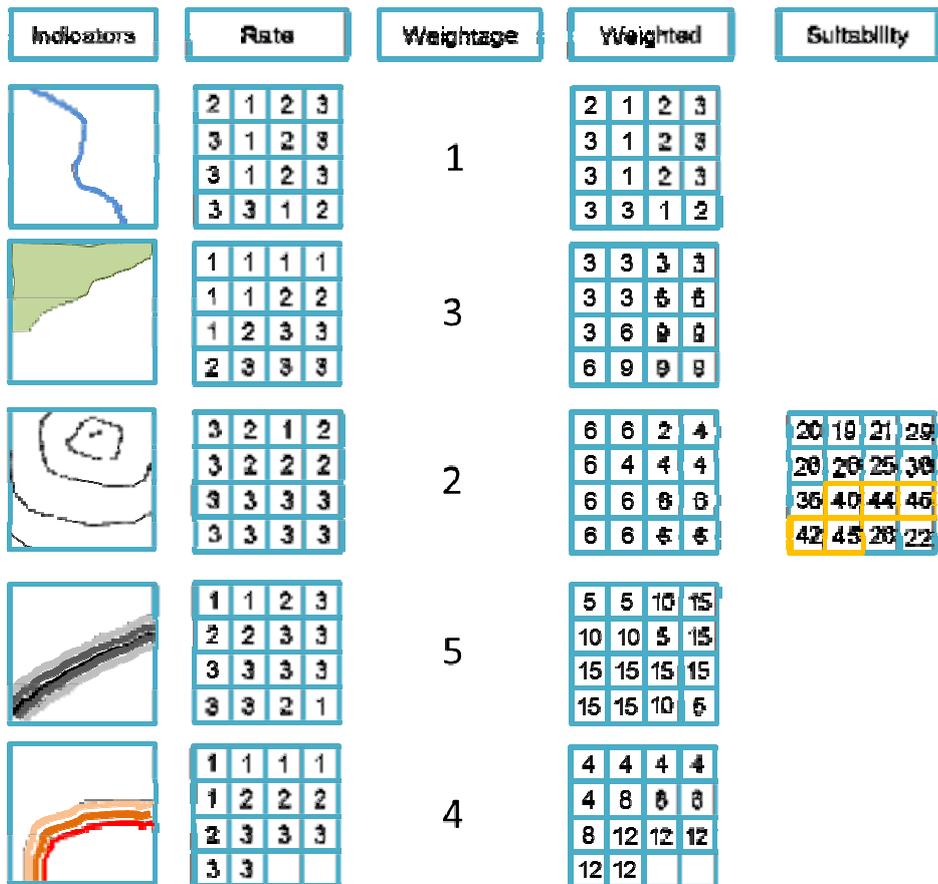
In case, specific data is not available or indicative study is to be undertaken or in case of cross checking, **sieve mapping** can be used. In this method, a series of 'sieves' (factors) are overlaid to exclude the areas, which are not suitable for the specific land use, thereof, the left over area is considered as- suitable for some specific uses<sup>122</sup>. Weighted overlay method of land suitability is presented in **Figure7.9**.

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<sup>122</sup>Mnalun Y, Suitability Analysis of Urban Green Space System Based on GIS, 2003.

Figure 7.9: Weighted Overlay of Land Suitability

Parameters / Indicators	Preferences 1 > 2 > 3	Weight
Rivers	River body > Buffer 500m > 1000m	1
Forest	Forest Area > Buffer 500m > 1000m	3
Slope	Slope 15% above > 10-15% > 5-10%	2
National Highway	Proximity 3km > 2km > 1km	5
City Boundary	City Boundary 3km > 2km > 1km	4



Source: [http://www.urban.uiuc.edu/courses/up503/Lectures/3\\_UP503SuitabilityAnalysis11.pdf](http://www.urban.uiuc.edu/courses/up503/Lectures/3_UP503SuitabilityAnalysis11.pdf).

### Case Study: Hyderabad Metropolitan Development Region

For calculating land suitability of Hyderabad region two broad categories of indicators were made:

- Environment suitability (ten features)
- Land potential analysis (twelve features)

Total twenty-two features were studied and land was divided into 5 classes after conducting land suitability / potential analysis. Based on land suitability study alternative concepts for future development of city were proposed.

Features studied for Environment suitability:

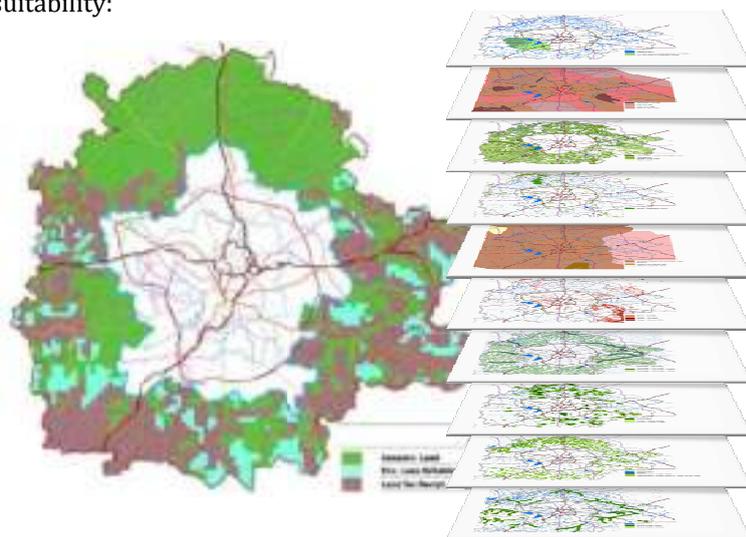
- River, Water bodies
- Forest
- Drainage
- Slope, Soil
- Vegetation
- Agriculture
- Govt. Order (GO)
- Ground water

Features studied for Land potential analysis

- Airport and railway stations
- Workplace and industrial locations
- Urban area
- Urban village 1,2 &3
- National Highway
- State Highway
- Ring road
- District road
- Proposed road
- Hyderabad City boundary

Five classes decided upon, through land suitability study:

- Conservation area (as environmentally sensitive areas)
- Least suitable area
- Moderate suitable area
- Highly suitable area
- Most suitable area



## 7.5. Projection Techniques

In the process of plan formulation, projection techniques are used for anticipating future, which is a necessary step. Here, two types of projection techniques, Simple (1, 2 and 3) and Analytical (4, 5 and 6) are available to planners for making projections, have been discussed.

The distinction between simple projections and analytical projections is that simple projections operate on limited data directly and usually extrapolate a series of

observations in a direct manner. Analytical projections depend on more detailed information in which the projected value is often the dependent variable derived from projections of independent variables. Generally speaking, analytical methods are to be preferred over simple ones since it allows accounting for or assuming differing patterns of change in the components of a situation; this usually leads to more accurate results than is the case with simple projections.

### 7.5.1. Population Projection

Planners are concerned with population projections which form the basic framework for setting targets expected to be achieved within a specified time-frame, be it for land use, services or facilities. Most of the important decisions about land uses and services are derived from population estimates: the demand for water, power and waste disposal facilities; housing, open spaces and schools; the supply of labour; spending power available for the retail trade, the numbers of private cars to be expected, possible recreational demands -all can be estimated from the projected population.

The section describes six methods of population projections viz.

1. **Mathematical and Direct Methods:** These are simple or direct methods of estimations based on the past population records. Arithmetic progression is involved when, past data suggests that, population is changing by a constant rate. The figures are plotted on plain paper (conventionally with  $y$  = population and  $x$  = time), which results in a straight line. This straight line is extrapolated for projecting the future population.

However, mostly population changes according to geometric progression, in such a case semi-logarithmic paper is to be used to yield a straight line for extrapolation. If the past data does not follow a definite progression, then a 'best fit' equation can be derived by method of least square and this may be extended to provide projection.

Graphical methods are most useful for short-term projections, particularly when demographic changes show stable trends. Hence, these methods should be used for projecting up to 10 years in stable situations and 5 years where population change is more volatile.

2. **Employment Method:** This method assumes that there is a very strong inter-relationship between population and employment and indicators such as worker's population can be correlated with total population to yield extrapolated information.

This method's reliability is low and should not be used for long range population forecasting.

3. **Ratio Methods:** These methods rests on the assumption that changes in any geographical area is a function of those experienced in wider area. Thus population of a city is held to be a function of the region and region itself is a result of the function of that nation.

In ratio methods the population of the second largest area (e.g. the region) is plotted against that of the parent area (the nation). A curve is obtained by fitting it on the two points. Thereafter it is extrapolated, by least square/ graphical/other method, to estimate the projected value for the parent area for the target year.

4. The requirements of such projections are time-series of populations for the areas to be used in the analysis and a forecast or sets of forecast for the larger area. These methods are weaker for longer periods and smaller areas, but are useful for quick and cheap forecasting for middle range (10-15 years) for areas not less than a whole metropolitan area or a city region.

**Migration and Natural increase Method:** As the name implies, this method enables natural and migratory changes to be handled separately. By examining past data on net migration rates and by attempting to relate these to economic conditions, particularly to the demand for employment in the study area, it is possible to adopt varying assumptions about the pattern of future migration. Next, a set of programmes of future natural change would be developed either by subjective projection of past maximum and minimum migration rates or by using migration data from projections produced nationally or regionally. The essence of the method is to begin with the starting date population, add the estimated migratory population figure to produce the next figure (A). Natural change in population is then added to the projected figure (A), thus completing one cycle of the projection giving a figure (B). The process is then repeated until the end of the projection period giving a figure (C). Cycle of projection could be any convenient period e.g. 5 years, 10 years or more.

This projection method uses total population, but age & sex structure is not considered. Thus changes in death and birth rates, which might result from changing age/sex structure cannot be seen and acted upon. Neither future estimates of school-age population and numbers of women of working age can be made. Still migration and natural increase method does reveal the possible sequence and the main elements of change.

- 5. The Cohort-Survival Methods:** The Cohort-Survival projection is a method for forecasting what the future population will be, based upon the survival of the existing population and the births that will occur<sup>123</sup>. This method can be applied for any period of time but typically it involves five-year steps.

Cohort-component models are so-called because they divide the population into cohorts and model on the demographic components of change such as fertility, mortality and migration – affecting each of the cohorts. Cohort indicates the generational group e.g. 0- 9, 10-19 and so forth<sup>124</sup>.

The cohort component method is used when population projections by age and sex are needed for 5 years, 10 years or longer periods of time. This projection tool allows planners to examine the future needs of different segments of the population including the needs of children, women in their reproductive years, persons in the labour force and the elderly. It also allows planners to project the total size of the population. The results can be used in all aspects of local and regional development plans<sup>125</sup>.

- 6. Matrix Methods:** These methods follow the logic of the cohort-survival technique. The initial age and sex distribution is similarly represented as a column sector but the incidence of births and deaths is handled by means of a 'survivor-ship matrix' which operates on the original population to age the population through successive time periods, simultaneously performing the calculations of births and deaths.

### 7.5.2. Economic Projection

The likely demands of land development rest on various types of economic activities, its scale, its possible location within a city or a city region and broad relationships between these activities. The key concerns are addressed by economic projections, which are ultimately relevant for calculating demand for housing, hospitals, schools and other social facilities. Seven methods of economic projections are described, viz.

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<sup>123</sup><http://www.sjsu.edu/faculty/watkins/cohort.htm>.

<sup>124</sup> Tom Wilson, *A Review of Sub-Regional Population Projection Methods*, 2011.

<sup>125</sup> <https://training.measureevaluation.org/non-certificate-courses/pap/lesson-8>.

- **Simple Extrapolation:** Measures of economic activity such as employment, volume or value of production, value added by manufacturer etc. may be arranged in time series and extrapolated in a variety of ways.

These methods have advantage of simplicity, relying on readily available data and do not require high level of skills. But since these do not attempt to examine the factors of the phenomenon (e.g. employment) to reveal the possible reasons of its occurrence or influences upon it, these are likely to be unreliable and are only referred as a general guide. Also, simple extrapolation method is suitable for small planning areas only.

- **Productivity Method:** The variables of 'production' or 'output' on one hand and 'employment' on the other are linked by the variable 'productivity'. This is simply measured as 'output per worker'. This simple form is suitable for planners for whom employment is the most useful measure. The projection is accomplished by obtaining estimate of future production or output and productivity from some reliable source. Hence,

$$\text{Output} / \frac{\text{Output}}{\text{Workers}} = \text{Workers}$$

Or, in other words, output divided by productivity yields an estimate of workers.

This method has advantages over the simple manipulations of employment data since it enables user to examine the projected employment with the trends of production, separately and therefore more clearly.

- **Projections by Sectors of Economy:** It is more valuable to have estimates of the future levels of output or employment in the various sectors of the economy separately. For example, to estimate the possible amount of secondary activity, the land requirement for different kinds of manufacturing is estimated (such as the floor-space needed by wholesaling and retailing and office-type employment).

In the simplest case, the forecaster simply extrapolates the past trend in each sector of the economy e.g. through productivity method. The estimates from different sector forecasts then have to be summed. Such figure arrived should be cross-checked with a forecast of total employment derived from some other source or calculation.

- **Economic Base Method:** This method is based on the postulate that growth in an area's economy comes from the expansion of economic base which is defined as all those 'basic' activities which are produced for export beyond boundaries of local area and which increases its wealth and ability to pay for imports. The remaining activities, which do not produce for 'export' but which exist to satisfy local needs are referred to as the 'service' or 'non-basic' activities.

The projection of basic activities (produce for export only) of the economy is made by using ratio method of comparing local to national trends (for each sector of economy separately). Once the projection of basic activities of each sector of economy has been made in the basic/non-basic ratios, the forecasts of basic employment are projected in comparison to total employment estimate.

The problems associated with the method are, definition of the 'local area' and identification of the basic sector of the economy itself. The shortcomings of the economic base method are: reliance on employment as the measure ignores the possible effects of changes in productivity; and the basic/non-basic ratio is a suspect measure at any given point of time.

**Ratio Method:** The method makes use of a similar rational as described in the population projection studies i.e. local levels of economic activity (either in total or sector wise) bear proportional relationships to levels of economic activity in successively larger geographical areas. The ratio method also implies that these relationships may be studied as they change over time and are extrapolated so that, estimates for the local area may be derived based on the given set of forecasts for the larger geographical unit (e.g. the nation).

**Input-Output Methods:** This method is based on the assumption that if the total output of particular industry is distributed among all other sectors of economy (including consumers and export) in a known proportion, it should be possible to calculate a 'table of co-efficiency' which would show effects of a given increase of output of one industry on the purchase of all others. This kind of definable relationship spelled out in input-output grid can be helpful for economic projections for a particular region/city.

The results are valid for short-term projections only, as it cannot be assumed that relationships between sectors will be stable through time. But to use this method, first, the relationship between different sectors of economy for a given date has to be obtained by some reliable source.

- **Social or Regional Accounts Method:** These methods employ the same logic as input-output method but by using money (rather than production or employment) as the measure. It can be fully comprehensive in its analysis of the inter-relations within an economic system by inclusion of capital formation, investment and trade as well as industrial production. In this way the matrix is a record of the income-and-expenditure relationships between all sectors of the economy. This matrix may be used to obtain projections of the expected income of each sector for the future. To do so, it is necessary that the coefficients expressing the inter-sector relationships (each cell in the matrix) is set. Then, the level of employment and income per worker of different sectors of economy is estimated<sup>126</sup>.

### 7.5.2.1. Estimation of City level GDP

National product is a measure in monetary terms of the volume of all goods and services produced by an economy during a given period of time, accounted without duplication. It is measured by three approaches, namely the production, income, and expenditure. In India Gross Domestic Product (GDP) is calculated through production and expenditure approach<sup>127</sup>.

**Production approach (of GDP calculation)** = the sum of value added of all economic activities within the country's territory (sum of output minus intermediate consumption) + indirect taxes - subsidies on products<sup>128</sup>.

**Expenditure approach (GDP at market price)** = Household final consumption expenditure + Non-profit Institutions' final consumption expenditure + Government final consumption expenditure + Gross fixed capital formation + Acquisition less disposals of valuables + Changes in inventories + Exports – Imports.

GDP - Depreciation = **Net Domestic Product (NDP) of the country.**

The state accounts statistics are an extension of the system of national accounts at the regional level.

The most important aggregate of the state & district accounts is the **State Domestic Product (SDP) and District Domestic Product (District DP)** respectively, compiled by State Directorates of Economics and Statistics. For estimating the Domestic Product, the economy is divided into various economic activities like agriculture, forestry, fishing, mining, manufacturing, construction, electricity, transport, communication, trade etc.

**The Central Statistical Organisation (CSO) estimates Rural and Urban share of the GDP at National level for few years<sup>129</sup>. From the National Urban GDP, the following method could be considered for estimating urban share of District GDP<sup>130</sup>:**

<sup>126</sup>Urban & Regional Planning-A systems Approach by J.BrianMcLoughlin.

<sup>127</sup> Quarterly Estimates of Gross Domestic Product for the Third Quarter (October-December) of 2013-14.

<sup>128</sup>National Accounts Statistics: Manual on Estimation of State and District Income, 2008.

- Fundamental equation estimated at all India level for urban GDP calculated by CSO.
- Simplify the fundamental equation by making urban share of GDP a function of urbanization rate and non-agriculture share of GDP to estimate State's Share of Urban GDP.
- Apply the estimated coefficients on district level urbanization rate and non-agriculture GDP to estimate District share of Urban GDP.

Once the urban share of District GDP is derived, City GDP could be calculated by following steps:



The approach and methodology for estimating the Rural and Urban income sector wise, is discussed in the National Accounts Statistics Sources and Methods, 2007.

For calculating city level GDP, CSO may develop a city level inventory. The following table provides sector wise tentative items, the monetary value of which can be considered in the inventory, to calculate city GDP.

Table 7.6: Items for consideration in the inventory for City GDP calculation

S. No.	Sector	Items
1	Manufacturing	Index of Industrial Production (Manufacturing) Manufacturing registered (unorganised sector) Production and income
2	Financing, Insurance, Real estate and business services	Banking Insurance Real estate Ownership of dwellings Legal services Accounting Computer related services Renting of machinery Research and development
3	Electricity, Gas and Water supply	Electricity: Index of Industrial Production (Electricity) Gas Water Supply: public and private
4	Railways	Goods (Net tonne Kms.) and Passenger (Net passenger Kms.) The two indicators are combined using the weights of respective earnings
5	Transport by other means	Public: road, water transport, air transport, Private: road transport, water transport, air transport Service incidental to transport Warehousing Storage Cold storage
6	Communication	Public services and infrastructure cost Private-courier services, cable operators, other communication

<sup>129</sup>[http://planningcommission.nic.in/hackathon/Urban\\_Development.pdf](http://planningcommission.nic.in/hackathon/Urban_Development.pdf).

<sup>130</sup>McKinsey & Company's note to MoUD, 17<sup>th</sup> April 2014.

S. No.	Sector	Items
7	Construction	<i>Pucca</i> construction: House hold sector, Public sector, Private corporate sector <i>Kutch</i> a construction
8	Trade, Hotels and Restaurants	Trade: public sector dealing in wholesale and retail trade; private organised trade, private unorganised trade, Hotel and restaurants: public, private
9	Public administration	Public administration Quasi-government bodies
10	Mining and Quarrying	Coal and crude petroleum Other major minerals Other minor minerals
11	Agriculture	Major and Minor crops Commercial crops Miscellaneous crops By-products
12	Livestock	Milk & milk products Egg, Meat Other products (wool)
13	Forestry	Fuel wood Industrial wood Minor forest products, if any
14	Fishing	Inland and marine fish, prawns Subsistence fish
15	Other services	Public: education, medical, coaching centres etc. Private: coaching centres, medical and health, sewage and refuse disposal, recreational activities, washing and cleaning, hair dressing, funeral related services, tailoring services etc.

Sources: National Accounts Statistics Sources and Methods, 2007. Respective source of data collection of the above mentioned items could be referred from National Accounts Statistics: Manual on Estimation of State and District income, 2008.

### 7.5.3. Assessment of Requirement of Housing

Based on the projection of population and economic activities, town planners' major pre-occupation is to determine the demand for housing and other facilities in a town. While dealing with housing, it is necessary to clearly distinguish between housing need and its demand. 'Need' refers to inadequacy of existing provisions when compared with socially acceptable norms, while 'demand' is an economic concept wherein standard and amount of housing demand is related to household's income and ability to pay. Both housing need and demand are affected by factors such as housing shortage and rate of obsolescence, whereas demand would be additionally affected by affordability and future housing needs.

**Present housing need:** By subtracting the number of unsuitable dwellings from the existing housing stock the present housing need can be estimated.

**Future housing need:** Further, the future housing need can be estimated from the projected number of additional households in the city. A simple way of doing this is to estimate the future population of the city and divide it by the expected household size. The household size is to be referred from National average family size.

Demand estimation requires careful analysis of the affordability criterion. For this initial capital cost of the housing units, total annual household income and annual

economic rent<sup>131</sup> have to be looked into simultaneously. The annual economic rent can be further analysed based on the information on amortisation rates, interest rates, and cost of maintenance, repair and management.

## 7.6. Mapping

A map can be defined as representation of earth's pattern as a whole or part of it on a plane surface with conventional signs, drawn to a scale and projection so that each and every point on it corresponds to the actual terrestrial position.

No matter how large or small a community is; a planner has to deal with spatial information required for planning such as land parcels, zoning, land use, transportation networks, housing stock among others. As well, to monitor multiple urban and regional indicators, forecast community needs, and plan accordingly to improve quality of life of the community; mapping activities are valuable in understanding and communicating planning issues.

### 7.6.1. Scale of Map

The scale of map used depends upon the size of the planning area and the coverage and extent of the information to be shown. The scale of maps for different types of planning exercises at various levels may be selected out of the range indicated in the following table.

Table 7.7: Scale of Maps for Planning

Sr. No.	Type of map/Planning Exercise	Size of Planning Area
1	Perspective Plan	1:2,50,000 - 1:1,00,000 (for larger regions) 1:1,00,000 - 1:50,000 (for smaller regions)
2	Regional Plan	1:50,000- 1:25,000 (District Development Plan) 1:25,000 - 1:10,000 (Metropolitan Region Plan)
3	Development Plan	1:10,000 – 1:8,000 (as per State Provision)
4	Local Area Plan/ Special Purpose Plan	1:5,000-1:1,000 (as per the requirement of the project)

Source: Based on scale of Sol Toposheet, Bhuvan data availability and UDPI Guidelines, 1996, NUIS 2006, Scale of various Plans as per State provisions.

### 7.6.2. Map Information Checklist

Maps contain lots of spatial data for the planning of urban and regional areas. Depending upon the requirement of study and availability of data, features can be selected and presented through map.

This data is collected from various sources and in diverse fields to make a comprehensive and working plan. A map information checklist with sources of information is given below to save time and expedite planning process. This data is broadly divided into 17 categories and these categories are further divided into detailed data list.

<sup>131</sup> Considering the fast rising land prices in almost all towns and cities, it is necessary to promote rental housing. This requires augmenting access to reasonable housing by the low income and fresher in the employment. Requiring higher residential density over and above the owned housing stock.

Table 7.8: Map Data Checklist

S.No.	Features	Sub-categories	Sources		
1	Physical	Physiography	Undulating plain with mounds	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (Resolution 30m Height accuracy 8m), Aerial Photographs	
			Plains	Flood plain, Alluvial plain, Coastal plain, Lacustrine plain,	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (1:50,000), Aerial Photographs
			Valleys	'U' shape, 'V' shape, Hill valley, River valley, Plateau valley	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (joint project of NRSC/ISRO and GSI), Aerial Photographs
		Water bodies/ Drainage	River, Canal, Lakes/ Ponds, Reservoirs, Tanks, Cooling ponds / cooling reservoir, Abandoned quarries with water, Hot springs	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (1:50,000; for 2005, 2012), Aerial Photographs	
		Ground water	Aquifers, Depth of water table, Fluctuation of water table	SoI Toposheets, Bhuvan Ground water prospects maps (1:50,000), Centre Ground Water Commission	
		Lithology	Un-consolidated sediments, Residual Capping, Volcanic Flows and Inter-trapeans, Semi-Consolidated Sediments, Consolidated sediments, Intrusive Rocks, Crystalline / Metamorphic rocks, Fault and shear zones,	Geological Survey of India, Bhuvan Under Rajiv Gandhi Drinking Water Mission (RGDW) Joint project of NRSC/ISRO and Ministry of Rural development (1:50,000),	

S.No.	Features	Sub-categories	Sources		
		Geological Structure	Lineament, Fracture / Fault line valley, Folds, Geomorphology, Fault lines, Fractures, Folds	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (1:50,000), Geological Survey of India	
		Soil	Types of Soils	Red Soil, Black Soil, Mixed Red and Black Soil, Laterite and Lateritic Soils, Alluvial Soil (river/deltaic/costal), Peaty and Marshy Soils, Desert Soils, Saline and Alkaline Soil, Forest and Hill Soil	Satellite Image Photo mosaic from NRSC & Bhuvan, District census handbook
		Soil depth	Very deep (>150 cms), Deep (100-150 cms), Deep to moderately deep (50-100 cms), Shallow (25-50 cms), Very shallow (<25 cms)	Satellite Image Photo mosaic from NRSC & Bhuvan, Photo mosaic from NRSC & Bhuvan,	
2	Planning and Administrative	Administrative Boundaries	State Boundary*, District Boundary*, Taluka / Tehsil Boundary*, Mandal / block Boundaries*, Village Boundary*, UDA Boundary, Municipal Boundary, Cantonment Boundary, Zone Boundary, Block Boundary, Locality Boundary, Municipal / Census wards,	SoI Toposheets, Census Atlas Maps, Maps / Drawings from ULB, Revenue records, Municipal maps, State Remote Sensing Application Centre (SRSAC), Satellite Image Photo mosaic from NRSC & Bhuvan* (1:50,000),	

S.No.	Features	Sub-categories	Sources
			Survey no. Boundary, City survey no. Boundary
3	Locational and regional settings	Location of town in regional setting, Urban/rural settlements	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (Cities and Towns locations), Census Atlas maps, National Atlas and Thematic Mapping Organisation (NATMO), State Remote Sensing Application Centre (SRSAC)
4	History of development	Settlement morphology	Municipal maps Maps and Drawings from ULBs Departmental maps
5	Climate	Temperature, Rainfall, Humidity, Wind direction	Bhuvan (Point information Can be registered and data can be downloaded, SAC/ISRO web site provides these parameters by AWF station
6	Land use assessment	Existing land use / cover, Proposed land use / cover	SoI Toposheets Maps and Drawings from ULBs Satellite Image Photo mosaic from NRSC & Bhuvan(1:50,000; 2005-06, 2011-12), Aerial Photographs State Remote Sensing Application Centre (SRSAC), NUIS maps
		Residential, Industrial, Mixed land use, Recreational, Public and semi-public, Communications, Public utilities and facility, Commercial, Transportation, Reclaimed land Vacant land, Vegetated area	
		Agricultural land	Cropland, Fallow land, Plantation, Double cropped area, Irrigated land: Canal irrigated,
			SoI Toposheets Departmental maps Revenue records Satellite Imageries Aerial Photographs, Satellite Image Photo mosaic from NRSC & Bhuvan (1:50,000; 2005-06, 2011-12),

S.No.	Features	Sub-categories	Sources
			Well irrigated, Tank irrigated
		Waste land	Salt affected Gullied / ravenous Land with / without scrub, Barren / rocky / unculturable land, Culturable waste land, Sandy area
		Grazing land	Permanent pastures, Other grazing land, Miscellaneous tree crops and groves
7	Environmentally and ecologically sensitive area	Air, water and noise pollution, Location of pollution generating industries, Map depicting the location of slums, squatters and other blighted area	SoI Toposheets Satellite Image Photo mosaic from NRSC & Bhuvan (1:50,000; 2005-06, 2011-12), Revenue maps Aerial Photographs
			Departmental Maps Maps and Drawings from ULBs Aerial Photographs CPCB (Zoning Atlas of Industries)
8	Conservation of environment	Hazards zone	National Disaster Management Authority (NDMA), Geological Survey of India
		Polluting activities	Central Pollution Control Board (CPCB), State Pollution Control Board (SPCB), Major project EIA reports
		Environmentally sensitive / Conservation area	Forest boundary
			Notified / Reserved / Protected Forest Boundary, National Park Boundary, Sanctuary Boundary
		World heritage sites	Cultural and Natural heritage
		RAMSAR sites	UNESCO
		Other Wetlands	Salt pans, Marshy / swampy
			SoI Toposheets Satellite Image Photo mosaic from NRSC & Bhuvan,

S.No.	Features	Sub-categories	Sources
			Mudflats, Waterlogged
9	Heritage site, building and areas	ASI sites, Location of heritage site, building and areas	SoI Toposheets, Archaeological Survey of India
10	Tourism	Tourism development Map	Ministry of Tourism, State Tourism Departments
11	Hazard prone	Earthquake prone, Flood Prone, Cyclone Prone, Deforestation Prone, Desertification Prone	Building Material and Technology Promotion Council, CWC (Flood Atlas of India), Bhuvan(1:50,000; only Bihar and Assam)
12	Demography	Distribution of existing and proposed population, Migration trends, Population growth, Population Density, Sex ratio, Child sex ratio, Gender gap in Literacy, Workforce  Main workers, Marginal workers, Non-workers, Cultivation, Agricultural labourers, Household industry workers, Other workers  Slum population	Census Atlas maps, National Atlas and Thematic Mapping Organisation (NATMO)
13	Economic and social development	City ward/ district map, Location of informal sector's area Type of street vendors Stationary, Mobile, Nature of street vendors Perishable, Non-perishable goods.	Departmental Maps, Maps and Drawings from ULBs, Census Maps Ground survey

S.No.	Features	Sub-categories	Sources
14	Housing and shelter	Built-up area Distribution of residential land use, Base map containing building / property boundaries, Building material map, Building age map, Land value map	Revenue department of the local authority Departmental Maps, Maps and Drawings from ULBs
15	Transportation	Road network, Existing and Proposed road network map  National highway, State highway, District roads, Village roads, City roads, Ward and neighbourhood level non-motorized routes Existing, Proposed non-motorized transport priority zones, Bus Transport Chowkies or Resting areas, Existing street lighting, Ring road, Bye-pass, Expressway, Bus terminus, Truck terminal  Railway network, Existing and Proposed rail network map  Broad gauge, Narrow gauge, Railway stations, Railway terminals,  Airports Location of airports and airdromes, Air funnel maps  International airports, Domestic airports, Customs airports	SoI Toposheets, NHAI, Departmental Maps, Maps and Drawings from ULBs, Detailed Project Reports, Road and Building Department, Public Work Department, Satellite Image Photo mosaic from NRSC & Bhuvan (110,000; existing road network), Ground survey  SoI Toposheets, Minister of Railways  SoI Toposheets, Airport Authority of India, Satellite Image Photo mosaic from NRSC & Bhuvan,

S.No.	Features	Sub-categories	Sources	
		Water ways, Sea Ports, Land use maps of jetties and ports	Major ports, Minor ports	SoI Toposheets, Departmental Maps
16	Infrastructure	Water supply network,  Drainage Network,  Sewerage and solid waste management,	Water treatment plants, Water pumping stations,  Public toilets for men and women. Sewerage treatment plants, Sewerage pumping stations, Outlets in water bodies / low lying areas, Community garbage bins, Waste treatment site, Waste dumping site,	SoI Toposheets, Departmental Maps, Maps and Drawings from ULBs, City Guide Maps, Aerial Photographs, Detailed Project Reports, Public Work Department Ground survey.
		Power supply line network,	Electricity line, Electricity sub stations, Power stations,	
		Telecommunication network,	Mobile Towers,	
		Health centres,	Including day-care centres, health posts, de-addiction centres,	
		Educational institutes, Fire station, Post office, Police stations, Banks / ATMs, Community centres,	Including street schools and <i>balwadis</i> ,   Police field offices.	

S.No.	Features	Sub-categories	Sources
		Socio-cultural and religious centres All social infrastructures within informal settlements.	
17	Review, Revise	Updated base map, Existing land use map, Proposed plan of various sectors	Maps and Drawings from ULBs

Source: As given.

### 7.6.3. Procedure of Collecting Data

Procedure to retrieve data by permissions, which is not available in the public forum are given below:

#### 7.6.3.1. Topo sheets

Unrestricted topographical/ city guide maps published by Survey of India are available for sale. The standard topographical maps on scale 1:25000, 1:50000 and 1:250,000 and city guide maps published for selected towns/cities are useful for urban development plan purpose.

All the topographical maps along the external boundary/coastline of India, as indicated in the Topo Index map of Survey of India are categorised as restricted maps. The restricted category maps can be procured by State and Central Governments / Private Individuals / Organisations/commercial firms by filling a separate form. Private individuals and organizations / commercial firms can also obtain restricted maps with prior approval from Ministry of Defence through the State Government to whom they should apply.

#### 7.6.3.2. Aerial photography

Information regarding area of interest for aerial photography, its scale and cost rates can be obtained from Surveyor General's Office, Dehradun or the Directorate of Survey (Air), New Delhi. Survey of India (SoI) has a dedicated web portal for presenting the meta-data information available with SoI from various aerial photography tasks commenced. Web Aerial Photography Transaction Registry (APTR) provides transparent indenting process based on instructions issued by Ministry of Defence.

Indenter can obtain the existing photography by marking the area of interest on 1:250,000 scale topographical map, indicating purpose, identifying the type (B&W, colour, colour infrared), scale and the photographic product required (contact prints, enlargements, mosaic, etc.). If the existing photography does not cater to the requirements of indenter, process for fresh aerial photography can be initiated. The National Government agencies, which provide fresh aerial photography, are:

- Indian Air Force (through Survey of India)
- National Remote Sensing Centre, Hyderabad
- Air Survey Company, Calcutta.

For indenting fresh aerial photography the indenter may approach any of the flying agencies with specific information. The indenter may mark the limit of the area to be photographed on 1:250,000 scale top sheet if photography is required on scale smaller than 1:20,000 and 1:50,000 scale top sheet if photography is required on

scale 1:20,000 and larger and apply with the specific requirements mentioned for the procurement of the existing aerial photography.

### 7.6.3.3. Satellite Images

National Remote Sensing Centre (NRSC) is the important segment of Indian Space Research Organization (ISRO) with the mandate of providing Earth Observation (EO) data from space and aerial platforms to users, develop technologies for the management of natural resources, support disaster monitoring and management and capacity building for utilization of EO data. It is vested with the authority to acquire and disseminate all satellite remote sensing data in India, both from Indian and foreign satellites.

Table 7.9: IRS Satellite Data Products relevant for Urban Applications

S.No	Satellite / Sensor	Spatial Resolution	Spectral Resolution	Scale of Base & Thematic mapping (Possible)	Remarks
1	Cartosat-2	1m	PAN	1:5,000	Merging PAN+ LISS-IV Images can generate 1m multi-spectral images.
2	Cartosat-1	2.5m Stereo	PAN	1:10,000	2.5m multi-spectral image can generated by merging PAN+ LISS-IV Images
3		LISS-IV (5.8m)	Multi-spectral	1:25,000	
4	Resourcesat-1/2	LISS-III (23.5m)	Multi-spectral	1:50,000	
5		Awifs (56m)	Multi-spectral	1:25,000	
6	RISAT	Capable of imaging 50m to 3 m in different modes	Microwave sensor		Capable of imaging in cloud conditions, hence Useful in especially during monsoon
7	Near Future Satellite Cartosat-3	Proposed sensors 25 cm PAN 1M Multi-spectral		1:2,000 or better	24cm multi-spectral image can be generated by merging PAN+ LISS-IV Images.

Source: National Remote Sensing Centre<sup>132</sup>

In addition to the IRS satellite data products, very High Resolution foreign satellite data may procure through NRSC, as per the Remote Sensing Data Policy 2011.

1. All data of resolutions up to 1 m shall be distributed on a non-discriminatory basis and on “as requested basis”
2. With a view to protect national security interests, all data of better than 1 m resolution shall be screened and cleared by the appropriate agency prior to distribution.

Apart from the responsibilities stated above, NRSC proactively disseminates the information derived from its various national level projects through its Bhuvan Geoportal. The free satellite data download facility is also available for registered users to facilitate research, formulate projects and plan development activities.

<sup>132</sup>Details on data products, price and necessary data order forms are available [www.nrsc.gov.in](http://www.nrsc.gov.in). Apart from the responsibilities stated above, NRSC proactively disseminates the information derived from its various national level projects through its Bhuvan Geoportal. The free satellite data download facility is also available for registered users to facilitate research, formulate projects and plan development activities.

#### 7.6.3.4. Geological Survey of India

To assess the meta-database of Geo-environmental studies for various cities in India, with interpretation of geomorphology, hydrology, geological structures and tectonic data from Geological Survey of India, Urban Local Bodies and its representatives can approach Ministry of Mines and GSI with their specific requirements.

### 7.7. Base Map & Development Plan Preparation

#### 7.7.1. Base map features

Before taking up any urban development plan exercise the first task, both from planning point of view and as statutory requirement, is to prepare or obtain reliable, accurate and up-to-date base map for the respective town or city for which the plan is being prepared. The amount of information to be represented on the map varies from map to map because information depiction depends on:

- Purpose of map
- Scale
- Projection
- Method of map-making
- Draughting skill

Uniformity of base map with regard to presentation of features, scale, size and notations, facilitates the readability of these maps and comparison of one map with another. Mapping software of Remote Sensing and Geographical Information System are capable of generating maps with uniformity as well as processing data from different platform. The standard layout of map is given in **Appendix G of Volume IIB**.

#### 7.7.2. Plan formulation through Remote Sensing & Geographic Information System

Geographical Information System (GIS) in planning is increasingly being applied for plan formulation, analysis as well as for proposal. As a powerful tool, GIS helps the planners to view different scenarios and their outcome so that an optimal strategy can be chosen for planning and development. Besides this ***Plan formulation using Remote Sensing and in GIS platform have the following advantages:***

- Benefits of Analytical techniques in GIS platform
- Ground points and geo-referenced data base for proposals preparation
- Dynamic features can be incorporated from RS data
- Regular Database updating and Plan Revision without hassle
- Provide decision making support
- Promote collaboration among public agencies.
- Automated tasks -reduce human errors
- Long Term Investment
- In addition, for *Bhuvan* - Enhance public participation
- In addition, for *Bhuvan*- Increase access to government & efficient approval procedures

Once the spatial and attribute data are generated in GIS frame, their applications are wide and varied. These include resource inventory and management, planning and monitoring, land records for taxation and ownership controls, facilities and services management, environment impact assessment. GIS is being used for planning of various cities in India lately. Development Plan is a level of plan for which GIS could be used very successfully. Preparation of Development Plan using RS & GIS can be classified under following parts for easier understanding and implementation.

- Base map preparation process
- Preparation of existing land use map
- Analysis of the study area
- Proposed land use plan
- Revision of the plan

### 7.7.2.1. Base Map preparation process

Preparation of Master Plan starts with base map preparation before which relevant data of all the necessary information, which is to be presented via base, map is collected. For base map preparation, National Urban Information System (NUIS) Scheme has prepared maps on 1:10,000 scale and made available on NRSC/ISRO Geoportal *Bhuvan* ([www.bhuvan.nrsc.gov.in](http://www.bhuvan.nrsc.gov.in)) for Urban Local Bodies for 152 towns.

*Bhuvan* NUIS GIS database comprises **Base layers**: Road, Rail, Canal, Transportation nodes, Drainage, Surface water Bodies and **Thematic layers**: Urban Land use / Cover, Geomorphology\*, Lithology, Geological structures\*, Physiography\* and **Administrative Layers**: State, District, Village, City/Town boundaries and Ward Boundaries (\*outside core area also). Attribute data has spatial layers as, administrative boundaries, forest boundary, settlement and village locations / names and city / town boundaries and non-spatial data. Other sources of licenced/authentic versions of interpreted satellite imageries can also be used for preparation of base map.

Alternatively, for detailed base map preparation high spatial resolution panchromatic image and medium resolution multi-spectral image can be merged to provide a high-resolution multispectral image at appropriate large-scale urban information. For preparing thematic maps, under NUIS, Cartosat-1 (panchromatic) with 2.5m spatial resolution and Resourcesat-1 (LISS-IV/ multispectral data) 5.8m spatial resolution satellite imageries were fused, to produce colour images at 2.5m spatial resolution for analysis, mapping and product generation.

At this stage, scale of the map should be decided. The Thematic GIS databases available on *Bhuvan* range from 1:10,000, to 1:250,000. The important Satellite data and thematic GIS data resources available for utilization for various planning and development are listed below.

Table 7.10: Bhuvan Satellite data and thematic GIS data resources available

S.No	Description	Scale of data	Coverage
<b>Satellite Data Resources</b>			
1	High Resolution satellite image	2.5m spatial resolution Natural Colour Composite (NCC)	Entire India
2	Very High Resolution satellite Image	1 m spatial resolution Natural Colour Composite (NCC)	Major Cities/Towns
<b>Base and Thematic GIS data services</b>			
1	NUIS Scheme Base and Urban Thematic GIS database	1:10,000	152 Towns
2	SIS-DP Base and Land Use/Cover GIS data	1:10,000	Entire India- State wise
3	Land use / Cover GIS data	1:50,000	Entire Indian 2005 -2006 2011-2012
4	Geomorphology GIS data	1:50,000	Entire India (Collaboration with GSI)
5	Geological structures GIS data	1:50,000	Entire India (Collaboration with GSI)
6	Wasteland GIS data	1:50,000	Entire India
7	Ground Water Prospects GIS data	1:50,000	Entire India
8	Land use / Cover Raster data	1:250,000	Entire India 9 Cycles of data from 2004 to 2013

Source: National Remote Sensing Centre. This list of satellite data and Thematic GIS data availability gets updated, regularly as per the ISRO/DOS policies.

Once the base and thematic layers from the Satellite Imagery are prepared, other city/town specific information such as, cadastral maps, revenue records, and plans of government agencies and attribute information from Industrial Development Corporations, Public Work Department, Railways, National Highway Authority could be integrated for preparation comprehensive GIS database as required for Development Plan/ Master Plan preparation.

The process to overlay Satellite images over cadastral maps for preparing base map is explained in the **Manual: Space based Information System for Decentralised Planning, ISRO**<sup>133</sup>. The satellite imageries, Resourcesat LISS-4 and Cartosat PAN, can be overlaid on cadastral maps to prepare base map. These satellite images depict field bunds, cart tracks, small *nullahs*, settlements, tanks and other cultural features like roads, railway network and canals. These features facilitate identification of Ground Control Points (GCP) for tie down satellite image and cadastral map.

For overlaying cadastral map with satellite image it is required that cadastral map be generated in vector mode. In this process the main tasks are acquisition of cadastral maps, scanning and digitisation of cadastral maps and generation of vector data. Once the cadastral maps in vector mode are available, the geo-referencing of these maps

<sup>133</sup> Appendix G of Volume II B and Manual also available at: <http://www.bhuvan-panchayatnrsc.gov.in/assets/Manual-Part2.pdf>

can be done. The geo-referencing of digital cadastral maps and overlaying with satellite image consists of the following steps:

- Acquisition of GCP's
- Transformation model development and assessment
- Geo-referencing of cadastral maps
- Validation of Geo-referenced map, in Isolation
- Validation of Geo-referenced map, with neighbourhood
- Mosaic generation at revenue inspector (RI), *taluka* and district level

These steps are detailed in Appendix H of Volume II B.

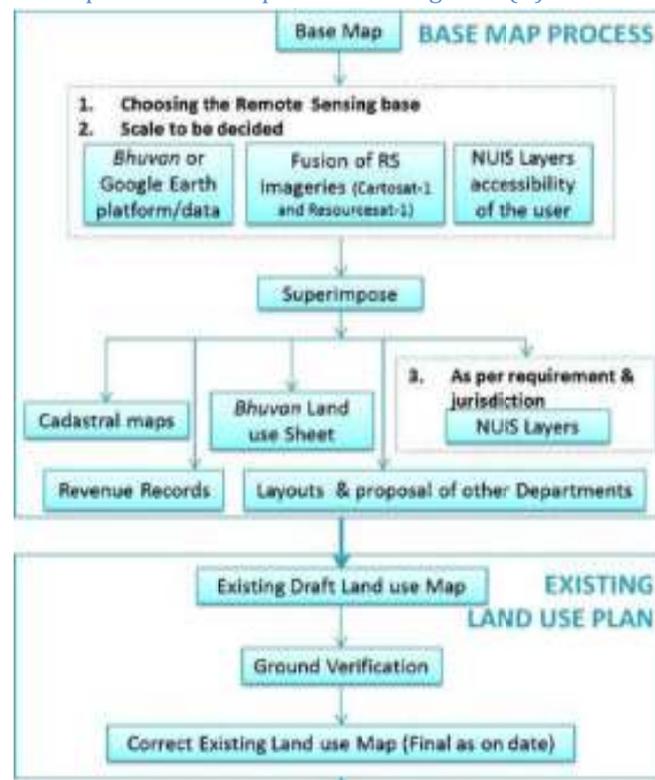
Further, the process of preparation of Existing land use plan can be initiated as the logical step of data preparation.

### 7.7.2.2. Preparation of Existing Land Use Map

The draft of the existing land use map, incorporating the land use features from the satellite interpretation and revenue records are taken up for ground verification. The amount of information or area verified under this stage varies from settlement to settlement. In rural areas 15-20% of ground verification should be appropriate, given the predominance of agriculture, wasteland or forestland cover. While, in urban areas ground verification could be 20-50% or even up to 100%, if settlement is very dense.

Once ground verification is over and incorporated in the existing draft land use map, final land use map is produced. In the final existing land use map, the date on which map was approved should be mentioned.

Figure 7.10: Process of Development Plan Preparation through GIS (A)



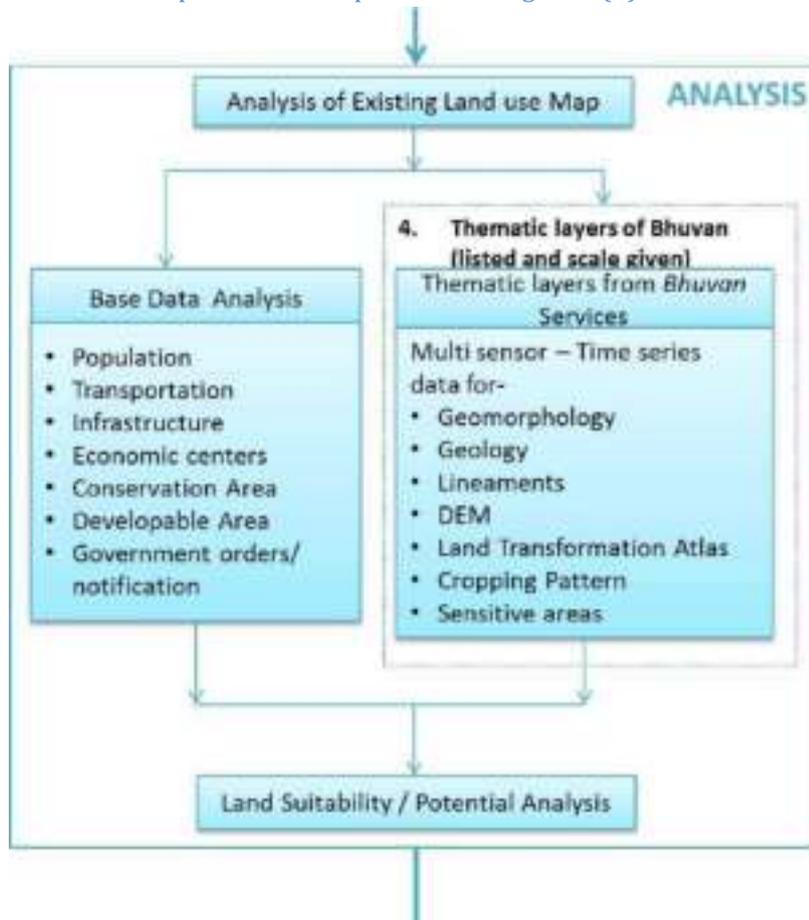
Source: Consultations with NRSC, NUIS, HMDA and various sources.

### 7.7.2.3. Analysis of Existing Land Use Map

Base data, such as population, transportation, infrastructure, area under conservation/preservation, ecologically sensitive area, developable area etc., can be taken. Thematic layers from Bhuvan series providing data of geomorphology, geology, lineaments, DEM, land transformation Atlas etc., can be selected. After giving weightage to the chosen indicators, these layers can be superimposed to generate maps showing land suitability or its potential for development or conservation. Here the parameters for selection are to be carefully chosen to suit the planning requirements of the region. Through the weightage given for analysis, the resulted map can be categorised into suitability layers, such as:

- Land most suitable for development
- Land suitable for development
- Land moderately suitable for development
- Land non-suitable for development

Figure 7.11: Process of Development Plan Preparation through GIS (B)



Source: Consultations with NRSC, NUIS, HMDA and various sources.

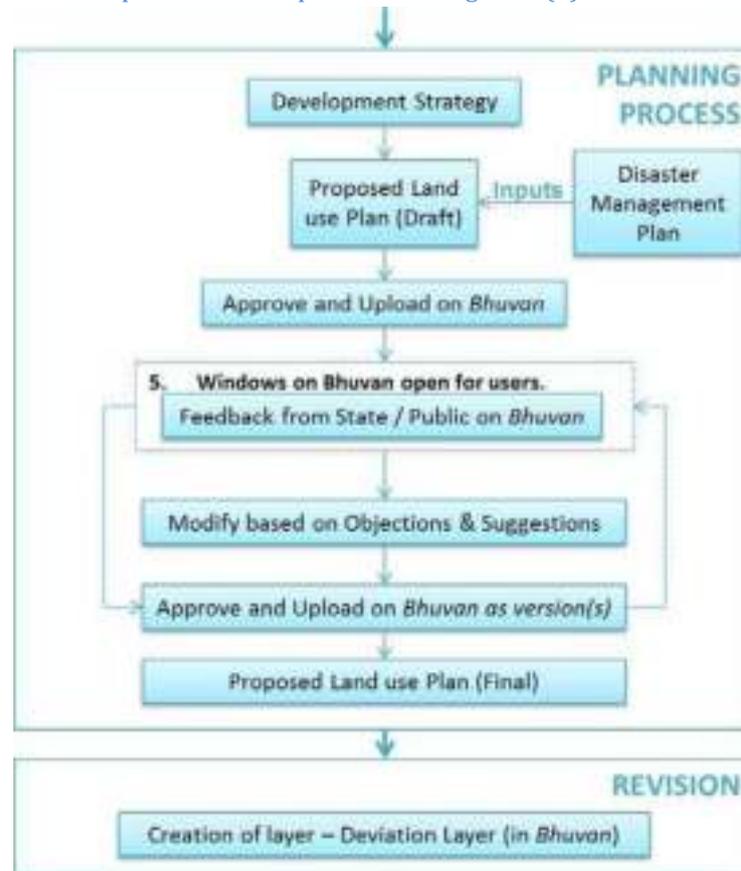
### 7.7.2.4. Proposed Land use Plan

Development strategy can be prepared from the analysis of the situation after superimposing it on the existing land use map. Development strategy could be

focussed on urban nodes, key infrastructure, transport links or industrial development. The development strategy and land suitability analysis is to suggest the land use zoning and the proposed plan. However, these zones and specifications of the existing land use map are overlaid and refined for bringing out details on the proposed plan. Analysis on GIS also allows planners to integrate inputs from Disaster Management Plan into the Proposed Draft Land Use Plan.

Through efforts of the State and Local Government, Master Plan formulation using web based GIS software application on *Bhuvan* can be utilised for public participation on Geospatial platform. The approved proposed land use plan could be uploaded on *Bhuvan* Geoportal. Feedback can be given on such plans on *Bhuvan* Geoportal by the public or by State officials. Based on the objections and suggestions received in earlier stage, the proposed land use plan can be modified and uploaded on *Bhuvan* Geoportal again as a new version. The process of objections & suggestions and approvals and uploading of the Plan can be repeated for a number of times as per the State's statutory provisions until the Final Plan version is not approved.

Figure 7.12: Process of Development Plan Preparation through GIS (C)



Source: Consultations with NRSC, NUIS, HMDA and various sources.

#### 7.7.2.5. Use of GIS in Plan Revision

For monitoring and revision of the Development Plan, deviation from the proposed land use can be determined in GIS. The ULB and the State governments having utilised

the *Bhuvan* portal can create new data layers for the non-conforming land uses to assess the deviation between the previous approved Proposed Land use plan and the existing situation. And since the mapping has been done on GIS, temporal variation from the latest remote sensing imagery can also be earmarked. This deviation can be addressed in the revision of the plan.

### 7.7.3. *Bhuvan* GeoPortal for Planning

*Bhuvan* is a geoportal of Indian Space Research Organisation (ISRO), which is for Indian Earth Observation data products and services. *Bhuvan* provides interpreted satellite imageries, thematic data and other services to all, apart from base for urban and regional planning for the authorised Government agencies. Some of its salient features are:

- Provide access to all *Bhuvan* GIS databases as well as any other relevant data from other websites like Survey of India (SOI), Forest Survey of India, National Highways Authority of India, Indian Railways etc., Can used through the WMS service for effective utilization of available data. This helps in avoiding the duplication and redundancy.
- Respective ULB can upload the town specific spatial data like cadastral maps and attribute data to *Bhuvan* and comprehensive database required can be organised and used for formulation of Master Plan.
- Open source freely available WebGIS software package for example QGIS
- Use *Bhuvan* WMS service for data creation.

#### 7.7.3.1. *Bhuvan* GeoPortal User Access

*Bhuvan* provides access to ULBs<sup>134</sup>, development authorities for government administration for urban and regional planning, to work on the available information, create new database as layers; prepare, approve and upload plan. At ULB, the three tier system of *Bhuvan* data mangement provides login to draughtman, Town Planning Officer and Commissioner level officers.

Each level has different powers to access *Bhuvan* database, which is described below (and can be customized as per ULBs procedures/methods being followed):

- Draughtsman can work on Town database and have rights to read and control write in the portal database. Draughtsman have access control for all database for ready, edit, process and write to temporary folder. At this level personnel can create new spatial files or edit the existing files and upload data for approval.
- Town planning officer (TPO) can work on Town database and have rights to read and write. TPO have full control on the database. The maps, analysis on existing data, uploaded data and reports by draughtsmen are posted in temporary folder and requires TPO approval to move these files to the database.
- Commissioner level officer can work on Town database and have rights to self-controlled read and write access.
- State level authorities (Director's office of State town & Country Planning Department) have rights for accessing respective sate all towns.

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<sup>134</sup> ULBs can access *Bhuvan* through MoUD and State Town & Country Planning Department for authorisation and facilitation of *Bhuvan* username and password.

- National level authorities (Ministry of Urban Development, TCPO, Delhi) have the rights of all accessing state wise all towns status of India.

### 7.7.3.2. Portal User Interface

After Planning activity is over, such data can be uploaded on *Bhuvan* portal for public viewing. *Bhuvan* portal has user interface in three levels such as:

- Viewing: Citizens and government departments can view the spatial plan that is uploaded on *Bhuvan* portal
- Data creation: *Bhuvan* accessed town level Urban Planning authorities can create and upload data on the Portal.
- Feedback on the uploaded Plans: Citizens, Government departments and *Bhuvan* accessed Town level Urban Planning authorities can give feedback on uploaded data/plans.

### 7.7.3.3. *Bhuvan* Mobile applications

*Bhuvan* provides varieties of solutions on Mobile and Smart-phone platform in addition to field data collection and upload, which can be used for urban and regional planning exercise. '*BhuvanApp*' can be downloaded on compatible mobile software. Both attribute data and pictorial data can be collection from the field through the app, and uploaded on *Bhuvan* to develop a centralized database and thereafter can be viewed by all for decision-making.

Other applications are also available as a part of *Bhuvan* mobile app, such as emergency services/responses at the event of hazard. Such applications can be used for Smart city concepts and can be modified or customized for the need to the ULBs/DA. For the State of Uttarakhand, a post disaster initiative was taken using *Bhuvan*. *Bhuvan* has developed customized applications called, Mapping the Neighbourhood in Uttarakhand (MANU), for collecting information from the field on mobile by assigned team and updating it on the *Bhuvan* for enabling reconstructs and rehabilitation exercise that could be used by local Govt. effectively.



## 8 Infrastructure Planning

Millennium Development Goals (MDG), directly or indirectly, are linked to status physical infrastructure. MDGs were adopted by UN in 2000 keeping in mind to raise the quality of life of vulnerable population of the world. India is falling behind the goals and time frame to achieve goal will get over in 2015. In this scenario it is prudent that local bodies focus on improving physical infrastructure. Many policies and schemes of Central government are also providing for improvement of physical infrastructure in India.

The planning of infrastructure shall be based on the hierarchy of urban development. This chapter of URDPFI guidelines suggest the infrastructure planning norms for an Urban/ Regional space; the norms are suggested under five categories, namely:

1. Transportation Planning
2. Physical Infrastructure
3. Social Infrastructure
4. Commercial Infrastructure
5. Miscellaneous Infrastructure

### 8.1. Hierarchy of Urban Development

A planned city for an environment of convenience should have a hierarchical structure; with each unit planned for basic self-sufficiency. The smallest planning unit is conceived as Housing Area for 5000 population with convenience shopping, open area, Anganwadi and milk booth as minimum infrastructure provision. The higher level of additional facilities is to be provided at Neighbourhood, Community, District, Zonal, Sub-city and Regional levels. The hierarchy of development on the basis of population is given in **Table 8.1**.

Table 8.1: Hierarchy of Infrastructure Development

Sr.No.	Planning Unit	Population
1	Housing Cluster/ Neighbourhood	5000
2	Neighbourhood	5000-15,000
3	Community	Up to 100,000
4	District*	5 Lakh
5	Zonal	10 lakh
6	Sub city centre	25 Lakh – 50 Lakh
7	City	50 Lakh +

Source: UDPI Guidelines, 1996; MPD, 2021, Jaipur Master Plan. \* Ward at 3-lakh population.

## 8.2. Transportation Planning

Besides the National Urban Transport Policy (2006), the National Transport Development Policy Committee (NTDPC)<sup>135</sup> was constituted by the Government of India in 2010 to formulate a long-term transport policy having an aim to set up the conditions for a coherent transport strategy for India in the long term for the horizon year 2032, with a vision to arrive well-developed and competent institutional system for planning, management and execution of transport projects. Indian cities are expanding and therefore urban transport has gained regional importance. The public transport needs to improve by an integrated road and rail base transport, expansion of BRTS/MRTS, etc through formulation of Master/Development/Mobility Plan which may help to integrate transport and urban development. Similarly, bus priority ways, connectivity of MRTS with CBD and residential areas, improvement of intermediate public transport and priority in planning for NMT, etc should be developed along with other facilities such as parking, street furniture, etc.

The report recommends that State Governments should also enact “Comprehensive Urban Transport Law” to define the roles and responsibilities of the city authorities and State level entities related to public transport, landuse and transport integration, multi-modal integration, transport infrastructure for pedestrians, bicycle, cycle rickshaws, etc. Further, priority in planning for various modes should focus on improving mobility through NMT, Public Transport, Para-Transit and Personal vehicles in order. There is a need to set up Metropolitan Urban Transport Authorities as holistic and integrated decision making and coordinating bodies. The dedicated non-lapsable and non-fungible urban transport funds should be set-up at the National, State and City levels.

Each Municipality and Development Authority could have a Transportation and Traffic cell/division to comprehensively prepare CMP in lines with the Development Plan, implement the transportation plan and coordinate with Traffic Police. The role of such a cell/division is also to include application of smart technologies to improve transportation in the city. It is necessary for Transportation and Traffic cell/division to employ transport planners and urban planners for technical inputs.

### 8.2.1. Classification of Urban road

1. **Urban Expressway:** Expressways are divided highways for through traffic with full or partial control of access and generally with grade separations at major crossroads.<sup>136</sup>
2. **Arterial road**<sup>137</sup>: They are the primary roads for ensuring mobility function. They carry the largest volumes of traffic and longest trips in a city. These

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<sup>135</sup> NTDPC India Transport Report- *Moving Indian to 2032*, Jan 2014.

<sup>136</sup> Highway Design Manual, Department of Transportation, New York State (USA).

roads are characterized by mobility and cater to through traffic with restricted access from carriageway to the side. In such cases, special provisions should be introduced to reduce conflict with the through traffic.

3. **Sub Arterial Road:** This category of road follows all the functions of an Arterial Urban road and is characterized by mobility, and caters to through traffic with restricted access from carriageway to the side. It carries same traffic volumes as the arterial roads. Due to its overlapping nature, Sub arterial roads can act as arterials. This is context specific and is based on the function and the land use development it passes through.
4. **Distributor/Collector Roads:** As the name suggests, these are connector roads, which distribute the traffic from access streets to arterial and sub arterial roads. They are characterized by mobility and access equally. It carries moderate traffic volumes compared to the arterial roads. Due to its overlapping nature, distributor roads can act as sub arterial and as access streets, depending upon the function and the land use of the surroundings.
5. **Local Street**<sup>138</sup>: These are intended for neighbourhood (or local) use on which through traffic is to be discouraged. These roads should be made pedestrian and bicycle friendly by using modern traffic calming designs to keep the speeds within limits as per design.
6. **Access Street:** These are used for access functions to adjoining properties and areas. A majority of trips in urban areas usually originate or terminate on these streets.

## 8.2.2. Design Consideration of Urban Roads

### 8.2.2.1. Design Speed and Space Standard

The design speed and carriageway width for different types of road, as recommended recently by MoUD may be seen in **Table 8.2 & 8.3:**

Table 8.2: Design consideration of urban roads

S.No.	Road Types	Design Speed (kmph)	Space Standards (m)
1	Urban Expressway <sup>139</sup>	80	50-60
2	Arterial Road	50	50-80
3	Sub Arterial Road	50	30-50
4	Distributor/Collector Roads	30	12-30
5	Local Street <sup>140</sup>	10-20	12-20
6	Access Street	15	6-15

Source: Urban Road, Code of Practice Part-1, MoUD.

<sup>137</sup>Urban Road Code of Practice, MoUD.

<sup>138</sup>Urban Street Design Guidelines, UTTIPEC.

<sup>139</sup>The Urban expressway design standards have not been developed in India, However for urban context, it is assumed as Main Arterial road and IRC: 86-1983 recommends design speed of such road is 80 KPH and Space standard of 50-60m width.

<sup>140</sup> Urban Street Design Guidelines, UTTIPEC.

### 8.2.2.2. Carriageway Width

Table 8.3: Carriageway Width for each type of road

S.No.	Types of Roads	Characteristics	Width of each car lane (m)	Width of each Bus lane (m)
1	Urban Expressway <sup>141</sup>	Minimum 6 lanes divided (using a median)	3.0 to 3.5m width each	3.5m -(segregated )
2	Arterial Road	Minimum 6 lanes divided (using a median)	3.0 to 3.5m width each	3.5m -(segregated )
3	Sub Arterial Road	Minimum 4 lanes divided (using a median)	3.0 to 3.5m width each	3.5m (segregated ) or Painted lane
4	Distributor/Collector Roads	Maximum 4 lanes of 3.0m width each (excluding marking) or 2 lanes of 3.0 to 3.3m width each (excluding marking) with or without an intermittent median	2 lanes of 3.0 to 3.5m width each	Mixed traffic
5	Local Street <sup>142</sup>	1 to 2 lanes, (undivided);traffic calming is required	2.75 to 3.0m width each	Not required
6	Access Street	1 to 2 lanes, (undivided); of 2.75 to 3.0m width each,	2.75 to 3.0m width each	Not required

Source: Code of Practice Part-1, MoUD, (refer Appendix I of Volume II B for the Cross Sections).

Notes:

1. Footpath, NMT provisions and Right of Use (RoU) of the various infrastructure shall also be assigned in the RoW at the stage of finalisation of road network and hierarchy.
2. RoW shall also include a well-planned utility corridor.
3. Road levels to be defined at the Local Area Plan level to ensure integrated road levels with drainage system and slope.
4. No roads to have two different road levels without a proper median or a separator.

### 8.2.3. Footpath

Footpath should be normally designed for a pedestrian Level of Service (LOS) B, thereby providing wide pedestrian facilities for pleasant and comfortable walking. Under resource constraint LOS C can be adopted for deciding the width of footpath mentioned in Table 8.4. The width of footpaths depends upon the expected pedestrian traffic and may be fixed with the help of the following norms subject to not being less than 1.8m

<sup>141</sup> The Urban expressway design standards have not been developed in India, However for urban context, it is assumed as Main Arterial road, and hence the lane of width is assumed to be the same as arterial road which is referred from Code of Practice Part-1, MoUD.

<sup>142</sup> Urban Street Design Guidelines, UTTIPEC.

Table 8.4: Capacity of Footpath &amp; Design

Width of sidewalk (m)	Design Flow in Number of Persons per hour			
	In Both Directions		All in one direction	
	LOS B	LOS C	LOS B	LOS C
1.8	1350	1890	2025	2835
2	1800	2520	2700	3780
2.5	2250	3150	3375	4725
3	2700	3780	4050	5670
3.5	3150	4410	4725	6615
4	3600	5040	5400	7560

Source: IRC 103-2012.

The land use adjacent to road significantly influences generation of pedestrian traffic. Recommended width of footpath along various landuses are given in Table 8.5

Table 8.5: Required width of footpath as per adjacent land use

S.No.	Description	Width
1	Minimum free walkway width and residential/mixed use areas	1.8
2	Commercial/Mixed Use Areas	2.5
3	Shopping Frontages	3.5 to 4.5
4	Bus Stops	3
5	High Intensity Commercial Areas	4

Source: IRC 103-2012.

## 8.2.4. Cycle Tracks

Cycle infrastructure width requirements are based on vehicle dimensions, volume and clearance requirements of moving vehicles (cycle rickshaw, freight rickshaw). These requirements vary for straight riding cyclists and those manoeuvring a bend at a cruising speed.

Exclusive lanes for slow moving vehicles-bicycles and rickshaws and pedestrians along with spaces for street vendors are also essential. Hawkers and roadside vendors provide services to bus commuters and pedestrians therefore designed spaces would discourage them from occupying the carriageway. This improves the capacity of the lanes designed for motorized vehicles and increases safety of bicyclists and pedestrians.

**Table 8.6: Cycle / NMT track**

Sl No.	Arterial Roads	Sub Arterial Roads	Distributary Roads	Access Roads
Non-Motorised Vehicle	Segregated Cycle Track	Segregated Cycle Track	Cycle Lane	Mixed \traffic
Location	Between Carriageway or street parking and footpath on either edge of the carriageway	Between Carriageway or street parking and footpath on either edge of the carriageway	On the edge of the carriageway, adjacent to the footpath or parking.	Not Applicable
Gradient	1:12 – 1:20	1:12 – 1:20	1:12 – 1:20	1:12 – 1:20
Lane width	2.2 to 5.0m	2.2 to 5.0m	1.5 to 2.5m	Mixed with motorized vehicular traffic
Minimum Width	2.5 for a two lane cycle track and 1.9m for a common cycle track and footpath	2.0 for a two lane cycle track and 1.7m for a common cycle track and footpath	1.5m	1m (painted)

Source: Code of Practice Part-1, MoUD, 2012.

### 8.2.5. For Hilly Areas

Width of roads in hilly areas is given below which can be adopted as per requirement and adjoining land uses.

**Table 8.7: Carriageway width in Hilly areas**

S.No.	Description	Width(metre)
1.	Single lane without kerbs	05.00
2.	2-lane without kerbs	08.80
3.	2-lane with kerbs	10.00
4.	3-lane with /without kerbs	13.00 / 11.80

Source: TCPO, Government of Himachal Pradesh.

### 8.2.6. Passenger Car Units (PCU)

The PCU standards as per the vehicle type for planning the area requirement are given in **Table 8.8** below:

**Table 8.8: PCU standards**

S.No.	Vehicle Type	Equivalency factor
1	Passenger car, tempo, auto, jeep, vans, or agricultural tractor	1.0
2	Truck, bus, agricultural tractor-trailer	3.0
3	Motor-cycle, scooter and cycle	0.5
4	Cycle-rickshaw	1.5
5	Horse drawn vehicle	4.0
6	Bullock cart	5.0
7	Hand-cart	6.0

Source: JnNURM - Rapid Training Programme, Preparation of DPRs, UDPFI guidelines and in IRC 106-1990.

## 8.2.7. Design Service Volume

The Design Service Volume standards as given in IRC Code 106-1990, which recommends LOS C while designing road capacity, are given in **Table 8.9** below:

Table 8.9: Design Service Volume Standards

S.No.	Type of Carriageway	Total Design Service Volume for different road category		
		Arterial	Sub-Arterial	Collector
1.	2-Lane (one way)	2400	1900	1400
2.	2-lane (two way)	1500	1200	900
3.	3-lane (one way)	3600	2900	2200
4.	4-lane undivided (two way)	3000	2400	1800
5.	4-lane divided (two way)	3600	2900	--
6.	6-lane undivided (two way)	4800	3800	--
7.	6-lane divided (two way)	5400	4300	--
8.	8-lane divided (two way)	7200	--	--

Source: IRC Code 106-1990.

## 8.2.8. Parking

### 8.2.8.1. Equivalent Car Space (ECS) for different vehicles

The recommended ECS required for different type of vehicles are given in Table 8.10

Table 8.10: Recommended ECS for various types of vehicles

S.No.	Vehicle Type	ECS
1	Car/taxi	1.00
2	Two Wheeler	0.25
3	Auto Rickshaw	0.50
4	Bicycle	0.10
5	Trucks/Buses*	2.5
6	Emergency Vehicles*	2.5
7	Rickshaw*	0.8

\*Source: Volume V-D1: DPR for Multi-level Parking Facility at Ghaziabad Main Report, NCRPB and ADB, 2010.

### 8.2.8.2. Recommended ECS based on land use type

The recommended ECS required for different type of land use, as recommended by the NBC, are given in **Table 8.11**.

**Table 8.11: Parking Standards**

S.No.	Land use	Parking Standards	Remark
1	<b>Residential</b>		
	Residential Plot-Plotted Housing	2 Equivalent Car Space (ECS) in plots of size 250-300 sqm and 1ECS for every 100 sqm. built up area, in plots exceeding 300 sqm.	--
	Residential Plot - Group Housing	2.0 ECS/100 sqm built up area	--
	Cluster Court Housing	2.0 ECS/100 sqm built up area	--
	Guest House / Lodging & Boarding House / Dharamshala	2 ECS per 100 sqm. of built up area	--
2	<b>Commercial Centres</b>		
	Convenience Shopping Centre/Local Shopping Centre / Local Level Commercial areas	2 ECS / 100 sqm of floor area	--
	Service Market	2 ECS / 100 sqm of floor area	--
	Community Centre / Non- hierarchical Commercial Centre	3 ECS / 100 sqm of floor area	--
	District Centre/ Sub-Central Business District/Sub-City Level Commercial areas	3 ECS / 100 sqm of floor area	--
	Commercial Plot: Retail & Commerce Metropolitan City Centre	3 ECS / 100 sqm of floor area	--
	Hotel	3 ECS / 100 sqm of floor area	For Population between 2- 10 lakh – 1 car parking space for every 4 guest room. For Population between 10-50 lakh – 1 car parking space for every 3 guest room. For Population more than 50 lakh – 1 car parking space for every 2 guest room <sup>143</sup> .
	Service Apartments	3 ECS / 100 sqm of floor area	--
	Any other commercial centre including commercial component along with Railway/MRTS and ISBT	3 ECS / 100 sqm of floor area	--
	Integrated Freight Complex/ Wholesale Market	3 ECS / 100 sqm of floor area	In case of plots up to 300 sqm. common parking is to be provided

<sup>143</sup> National Building Code, 2005.

S.No.	Land use	Parking Standards	Remark
3	<b>Socio-Cultural Facilities</b>		
	Community Hall	Parking standard @ 3.0 ECS / 100 sqm	--
	Recreational Club	Parking standard @ 2 ECS / 100 sqm of floor area	--
	Socio-cultural activities such as auditorium, music, dance & drama, centre / meditation, spiritual centre etc.	Parking standard @ 2 ECS / 100 sqm of floor area	--
	Science Centre	Parking standard @ 2 ECS	--
	International Convention centre	Parking standard @2 ECS	--
	Old Age Home / Care Centre for Physically / Mentally challenged / Working women / men hostel /Adult Education Centre / Orphanage / Children's Centre / Night Shelter	Parking standard @ 1.8 ECS of floor area.	--
	Sport facility for international sports event	2 ECS / 100 sqm of floor area.	--
4	<b>Public-Semi Public</b>		
	Integrated Office Complex	1.8 ECS / 100 sq m of floor area	The norms for Local Government offices / Public Sector Undertakings under Government Land use shall be as per Integrated office complex
	District Court	1.8 ECS / 100 sqm of floor area	--
	Head Post Office with Administrative office & with / without delivery office	1.33 ECS per 100 sqm. of floor area	--
	Amusement Park	3 ECS / 100 sqm. of floor area	--
	ISBT/Metro	2 ECS per 100 sqm. of floor area	--
	Hospitals	2 ECS per 100 sqm. of floor area	--
	Veterinary Hospital	1.33 ECS per 100 sqm. of floor area	--
	Veterinary Dispensary	1.33 ECS per 100 sqm. of floor area	--
	Nursing and Paramedic institute	2 ECS per 100 sqm. of floor area	--
	Medical College	As per norms of Medical Council of India / Regulatory Body	--
5	<b>Industry</b>		
	Industrial Plot up to 50 sqm area	2 ECS / 100 sqm of floor area	--
	Industrial Plot 51sqm -400 sqm area	2 ECS / 100 sqm of floor area	--
	Industrial Plot 401 sqm and above	2 ECS / 100 sqm of floor area	--
	Flatted group Industry (Min Plot size 400 sqm)	2 ECS / 100 sqm of floor area	--

S.No.	Land use	Parking Standards	Remark
6	Mixed Land use	Parking @ 2.0 ECS per 100 sqm built up area shall be provided within the premises.	Where this is not available, cost of development of parking, shall be payable by the plot allottee / owner to the local body concerned or Multi-level parking to be provided as an option. This condition shall apply even if residential premises are used only for professional activity.

Source: Master Plan of Delhi (MPD) 2021.

Parking standards are prescribed in above table, however, where it is not prescribed; it could be followed as given in **Table 8.12**.

Table 8.12: Permissible ECS for different land uses

S.No.	Use Premises	Permissible Equivalent Car Spaces (ECS) Per 100 sqm. of floor area
1	Residential	2.0
2	Commercial	3.0
3	Manufacturing	2.0
4	Government	1.8
5	Public and Semi-Public Facilities	2.0

Source: MPD 2021.

### 8.2.8.3. Space Standards for Parking

For the provision of car parking space, the space standards shall be given as per the **Table 8.13**.

Table 8.13: Space standards for Parking

S.No.	Type of Parking	Area in sqm per ECS
1	Open	23
2	Ground Floor covered	28
3	Basement	32
4	Multi-Level with Ramps	30
5	Automated Multilevel with lifts	16

Source: MPD 2021.

### 8.2.8.4. Parking for Hilly Areas<sup>144</sup>

Apart from the above given parking norms, one car parking space / garage for each dwelling unit should be provided in residential buildings. For institutional buildings, one floor exclusively for parking of vehicles should be compulsory.

<sup>144</sup> TCPD, Government of Himachal Pradesh.

## 8.2.9. Bus Terminals

### 8.2.9.1. Functions

The functions of bus terminal primarily includes processing of vehicles, passengers etc. with provision of necessary facilities for their smooth flow. The terminal serves as a point and unit where necessary information to user is made available for processing. To create seamless multimodal connectivity, the bus terminal should be integrated with other modes of transport (train, metro, bicycle, pedestrian, private car)

A bus terminal also functions as the centre of a neighbourhood with high density mixed use activities in its vicinity. To provide a safe and attractive place at all times, the presence of residential housing, shopping complexes, offices and other commercial activities are to be encouraged around the terminal.

A passenger bus terminal broadly needs to perform the functions to meet requirements of the following:

- a. Passengers and Vehicles
- b. Passengers only
- c. Vehicles only
- d. Crew
- e. Management

The functions related to both passengers and vehicles include:

- Concentration
- Loading
- Dispersal
- Unloading

Passenger only oriented functions of the terminal include provision of:

- Passenger platforms to board and alight (with ramps for disabled & elderly)
- Ticketing facilities
- Waiting lounges
- Rest houses/ rooms
- Baggage Storage Facilities
- Commercial: Basic Shopping and retail facilities
- Utilities, Services and Amenities (including public toilets, ATM, drinking water etc.)
- Information System
- Shelter from weather
- Communication and postal facilities
- Eating places

### 8.2.9.2. Components

The components related to vehicles (bus) only include provision of:

- Bays for loading and unloading
- Idle bus parking spaces
- Facilities related to maintenance

- Information system for movement with terminal

The terminal components to meet the needs of crew are:

- Rest rooms
- Information system
- Communication facilities
- Eating places

The terminal facilities for the management in terms of:

- Demand management on account of concentration
- Incurring minimum expenditure
- Development of centralised information
- Ensuring better control

### 8.2.9.3. Design Criteria

The design criteria of terminal studies determining the size of terminal and factors to be taken into consideration in planning the facilities and activities is primarily governed by the following factors:

- Traffic Demand
- Traffic Characteristics
- Function of Terminal
- Type and Sophistication of Facilities

The other factors to be considered in terminal design by appreciating activity and facility inter-relationship are:

- Segregation of terminal and non-terminal traffic
- Segregation of vehicular and pedestrians traffic and movement
- Segregation of traffic by type, function and direction
- Coordination of different activities in terms of functional and spatial inter-relationship
- Provision of good user and vehicular information
- Provision of necessary and identified facilities to meet requirement of all user groups achieving minimum passenger and vehicular processing time
- Achieving overall functional and spatial efficiency
- Achieving smooth flow of all types of traffic to and from terminal.

### 8.2.9.4. Planning Norms and Space Standards

#### Norms

- |  |                               |
|--|-------------------------------|
| a. Capacity of an intra-city bus terminal    | : 1.5 lakh passengers/day     |
| b. One bus bay for 5000 passengers per day   | : Loading                     |
| c. One bus bay for 10,000 passengers per day | : Unloading                   |
| d. Peak hour load                            | : 10% of daily passenger load |
| e. Occupancy/bus:                            | : 50 ideal                    |
| f. Time taken for loading                    | : 6 min; 12 min               |
| g. Time taken for unloading                  | : 3 min; 6 min                |

#### Space standards for Parking Facilities

The parking standards for bus bays, as mooted by UDPFI Guidelines 1996, continue to remain valid and are given in **Table 8.14** below:

Table 8.14: Bus Bays – Parking Standards

Type of parking	Area/vehicle
Idle Parking	145 sqm
Angular	76 sqm
Parallel	104 sqm

Source: UDPMI Guidelines, 1996.

## 8.2.10. Truck Terminal

A truck terminal is highly specialised facility, designed for a specific function and operating plan in terms of service standards it must meet, the area it serves and the volumes to be handled. It provides interface between intercity and local transportation facilities and which handle the distribution and collection of goods within the city.

The major objectives of a truck terminal are:

- a. To reorganise office and go-down space of transport companies
- b. To provide for expansion of companies
- c. To reduce parking, loading/unloading instances in CBD (Central Business District)
- d. To locate the facilities for vehicle repairs, servicing, rest places, shops etc.
- e. To cater to intercity movements destined to operator's godown and provide for idle parking for trucks waiting for return load.
- f. To function as a rest and halting place for through traffic.

### 8.2.10.1. Facilities in Transport Nagar

The main facilities for which area allocation needs to be made in Transport Nagar are:

- i. Transport Agencies
- ii. Circulation
- iii. Parking
- iv. Open Space
- v. Petrol Pump
- vi. Service Centre
- vii. Toilets
- viii. Police Station
- ix. Restaurant
- x. Shops
- xi. Godowns
- xii. Weigh Bridge
- xiii. Stalls/Dhabas
- xiv. Administrative Office
- xv. Fire Station, Post Office, Dispensary
- xvi. Bank, Bus Station, Electric Sub station
- xvii. Cold Storage
- xviii. Spare Parts Shops
- xix. Body Building Shops
- xx. Cinema

### 8.2.10.2. Locational Factors

The following factors are generally considered while locating a truck terminal/ Transport Nagar:

- a. They should be located on main corridor of goods movement.
- b. Multimodal connectivity with train corridors and waterways
- c. They are generally located on fringe of developed lands
- d. They should have proper linkage with other freight generating activities as well as developed areas.
- e. Consideration for intra city goods movement pattern in terms of desire of movement, modes used and distances over which movement is made should also be kept in view.

### 8.2.10.3. Broad Land Use Break Up

The broad land use breakup in a truck terminal (Transport Nagar) is as follows:

Table 8.15: Broad Land Use break-up

S.No.	Use	Percentage Area
1	Transport operators - Office, Godown, Loading/Unloading	30.0
2	Service Industry - Petrol Pump, Service Area, Weigh Bridge, etc.	6.0
3	Public/Semi Public - Police Post, Post office, Telephone, First Aid etc.	3.0
4	Commercial	3.0
5	Parking - Idle, Transit, Other Vehicles	18.0

Source: UDPI Guidelines, 1996.

## 8.2.11. Integrated Freight Complex<sup>145</sup>

### 8.2.11.1. Functions

The basic functions of an integrated freight complex are:

- a. To provide facilities for regional and intra – urban freight movement.
- b. To provide facilities for freight in transit as well as interchange of mode.
- c. To provide warehousing and storage facilities and link-link these sites with specialised markets.
- d. To provide servicing, loading and boarding, idle parking, restaurants and other related functions in the complex.

### 8.2.11.2. Objectives

The functional objectives of wholesale complex-cum-truck terminal should be:

- a. To provide adequate facilities for wholesale trade activities, these include:
  - i. Auction areas
  - ii. Wholesale shops and subsidiary storage capacity
  - iii. Parking facilities
  - iv. Wholesales godowns, cold storage, etc. together with handling facilities and equipment, etc.

<sup>145</sup>These norms may be modified to be used for Dry Ports, Container Freight Station (CFS), Logistics Hub.

- b. To provide adequate parking space and facilities for trucks expected to utilise the terminal. These facilities include:
  - i. Service/repair facilities
  - ii. Rest/recreation for drivers
  - iii. Weighing of trucks etc.
- c. To provide adequate facilities for office/storage activities of trucks operating at terminal. These include :
  - i. Godown space
  - ii. Office space
  - iii. Loading/unloading facilities
  - iv. Weighing of goods vehicle etc.

Apart from the above mentioned objectives, the complex must provide for a number of associated/ancillary facilities and services, some of which are:

- d. Provision for goods movement within the complex in terms of truck movement and loading unloading / stacking of goods.
- e. Building and amenities for administration and security measures necessary for complex.
  - i. Facilities like banking, postal truckers, etc. required for business transactions
  - ii. Amenities for wholesales, truckers and their employees
  - iii. Areas for shops, eating houses and other service establishment
  - iv. Provision of lighting, water supply and garbage, sewerage disposal.

### 8.2.11.3. Space Norms

The Space norms in terms of quantum handled (kilograms) per square meter area for selected commodities as per Central Warehousing Corporation (CWC) is given below:

Table 8.16: Space Norms

Commodity	Wt./Area (Kg./s q.m.)
Food grains	1054
Fruits and Vegetables	721
Hardware and Building Material	1054
Iron and Steel	904
Timber	968
Machinery	968
Auto Parts	968
Textile	968
Chemicals and fertilisers	968

Source: Central Warehousing Corporation.

### 8.2.11.4. Broad Land Use Break-up

The broad land use break-up of an integrated freight complex recommended in UDPFI Guidelines 1996 continue to be relevant and are as follows:

**Table 8.17: Broad Land Use Break Up**

Use Type	Percentage of Area
1. Wholesale Market	35.0
2. Warehousing	8.0
3. Booking Agencies	2.0
4. Commercial & Public/Semi-Public	5.0
5. Utilities and Services	3.0
6. Service Industry	4.0
7. Parking	12.0
8. Circulation	25.0
9. Others	6.0
Total	100.0

Source: UDPFI Guidelines, 1996.

### 8.2.11.5. Area Requirements

As a general guideline, the area required for a truck terminal (Transport Nagar) should be reserved at the rate of one hectare per 300 tonnes of daily goods inflow into the complex. In case of integrated freight complex, the area necessary would be one hectare per 400 tonnes of daily goods inflow into the complex.

### 8.2.12. Travel Demand Modelling Process<sup>146</sup>

A travel model is a simplified representation of travel behaviour through the use of mathematical equations and data analysis. Models are based on the theory that an individual's travel choices are a function of his or her socioeconomic characteristics (household size, income, and vehicle ownership), geographic location (distance to work, shops, etc.) and modal choices (road, rail, bus, NMT) available to them. Modelling is an attempt to replicate this behaviour using statistical analysis. The process is complex and requires large amount of data.

The accuracy of a travel model depends on many factors: land use and demographic data, quality of travel survey data, technical expertise of the developer, and assumptions used. Therefore, a model should be evaluated as a whole and never as a function of the forecasts produced. A model should always be calibrated well so that it can replicate current year conditions within reason before using it to produce forecasts. Model calibration and validation should be done at every step of the process to ensure quality of forecasts.

<sup>146</sup> Development of Training Material under Sustainable Urban Transport Project, Reference Guide Volume 2 Demand Assessment, MoUD.

Models are a simplified simulation of travel behaviour producing rational travel choices based on the controlled variables within a model. In the real world, variables are constantly changing and individuals don't always make the most rational decisions. Therefore model forecasts should only be used as one element in transport planning.

The most commonly used method of forecasting is 4 step Aggregate Model; this model includes trip generation, distribution, modal split, and assignment.

An individual decides whether to make a trip, where and when to go, which mode to select, and which route to take based on his needs, income, occupation, vehicle ownership, etc. and the choices available to them. The choices could be different modes of transportation (car, 2 wheeler, public transport, bicycle etc.), different times of day travel (peak, off-peak) or competing destinations (shopping mall, downtown). As mentioned above, this method involves 4 major components, which are detailed in **Appendix J of Volume II B**.

### 8.2.12.1. Recommended Modal Split by Public Transport Modes

The recommended share of public transport modes based on city size, which is mentioned in **Table 8.18**.

Table 8.18: Recommended derived Modal Split

City Size	Recommended Modal Spilt
Below 1 Million	30%
Around 1 Million	35%
1.5 Million	40% plus
3.0 Million	50% plus
6.0 Million	70% plus
9.0 Million	75% plus (85% with a mass transit system)

Source: UDPMI Guidelines, 1996.

### 8.2.13. MRT options for the City

Every city is different and requires its own study of the potentially realistic options. The guidelines shown in Table 8.19 and Table 8.20 are to assist decision makers in narrowing down the applicable options. As can be seen in the table, population density is an important criterion. City shape/form (linear or circular) also influences the concentration of demand; therefore, this factor may be incorporated when selecting appropriate MRT options.

Table 8.19: MRT options for the City

S.No.	MRTS Options	City Requirements
1	<b>Bus Rapid Transit (BRT)</b>	<ul style="list-style-type: none"> <li>• When more than about 100 buses per hour per direction (bphpd) use the busway<sup>147</sup></li> <li>• Cities with a medium- to high-density urban area</li> <li>• BRT should be one of the first considerations in MRT system development in any city.</li> <li>• BRT system can be developed as trunk systems as well as feeders to an existing (or planned) MRT system</li> <li>• Suitable for cities where an MRT system needs to be developed quickly and incrementally as conditions and funding allow</li> <li>• A well-developed traffic planning/management capability should be available (this may be brought in initially)</li> <li>• Existing bus and paratransit operations can be regulated/restructured</li> <li>• Road space is available for BRT development (2-4 lanes from existing roads)</li> <li>• Bus Only Lane (BOL) can be recommended in the following two cases:               <ul style="list-style-type: none"> <li>• One lane busway (4 meters for a single lane) is available and the passenger demand is below 6,000 bphpd; and</li> <li>• Multiple lane busways (7 meters for two lanes, or 10.5 meters for three lanes) are available and the passenger demand exceeds 6,000, but is below 12,500 bphpd</li> </ul> </li> </ul>
2	<b>Light Rail Transport (LRT) including monorail, tramways</b>	<ul style="list-style-type: none"> <li>• Cities with a medium- to high-density urban area</li> <li>• Cities where environmental issues are critical and there is a need to attract car users to use public transport systems; however, if the core requirements are operational effectiveness,</li> <li>• LRT system should be developed that is more flexible and costs less</li> <li>• Appropriate for cities with an existing tram operation, which may be cost-effectively enhanced.</li> <li>• A well-developed traffic planning/management capability should be available</li> <li>• Existing bus and para-transit operations can be regulated/restructured</li> <li>• Road space is available for LRT development (2-3 lanes from existing road) or existing tram track can be converted to an LRT route</li> </ul>
3	<b>Metro Rail</b>	<ul style="list-style-type: none"> <li>• Existing public transport flows on the main corridor of the order of 10,000-15,000 passengers per hour per direction with more than 15km trip length</li> <li>• City incomes that are not low (typically at least US\$1,800 per person)</li> <li>• Prospects for sustained economic growth and an expanding centre ( in case of metropolitan regions)</li> <li>• Existence of a low-cost metro alignment</li> <li>• Fares policy – a fares policy on metro and bus systems to encourage ridership yet limit the need for financial support</li> <li>• A well-developed traffic planning/management capability should be available</li> <li>• Existing bus and para-transit operations can be regulated/restructured</li> <li>• Strong and largely autonomous management of metropolitan region, with clear objectives</li> </ul>

Source: Guidelines and Toolkits for Urban Transport Development Module 1 Comprehensive Mobility Plan.

Personal rapid transit system is also emerging as an alternative mode of transportation in many Nations. This system is capital intensive and has long payback period, besides, the system is feasible where passenger flow in the main corridor is higher than the demand for the metro rail and the paying capacity is higher.

<sup>147</sup> Guidelines and Toolkits for Urban Transport Development in Medium Sized Cities in India Module 2: Bus Rapid Transit (BRT): Toolkit for Feasibility Studies, MoUD.

Table 8.20: Technical Parameters of Public Transport Options

	Metro Rail	LRT	Tramways	HCBRT	BRT	Bus Priority Lanes	City Bus
Line Capacity (PAX/hr/dir.)	40,000-75,000	15,000-45,000	5,000-15,000	20,000-35,000	7,500-15,000	5,000-7,500	Below 1,000
Cost per km (Infrastructure, vehicles, OCC, Maintenance)	Very high	High	Medium/high	Medium/high	Medium	Low	Very Low, only bus stops and maintenance stop required
Alignment	Double-track railway	Double-track railway, elevated, at grade or in tunnels	Double-track tramway, at-grade	4 Bus Lanes (2 per direction)	2 to 3 Bus Lanes	2 Bus Lanes	Use public roads
Segregation	100% segregated in tunnels, elevated or at-grade	High degree of segregation preferred, but sections with shared right of way possible	Uses public roads, but may have reserved right of way on sections with higher demand	All Bus Lanes must be segregated to achieve high capacity	Bus Lanes must be in general segregated, exceptions possible, reduce capacity and speed	Bus Priority Lanes must be exclusively for buses	None
Road space required	None	None in case of elevated and tunnel alignment, 2 lanes at-grade, additional space required for stations and terminals	2 Lanes, additional space may be required for stations and terminals, tracks can be shared with public roads or pedestrian roads	4 Lanes; more linear space for Interchanges and Terminals	2 Lanes, possibly 3 or 4 at Stations and Interchanges, space for major Interchanges and Terminals	2 to 3 Lanes (3 to 4 Lanes at Bus Stops)	Shared with cars and pedestrian
Vehicles	High capacity EMU	Medium to high capacity EMU's (upgraded trams as an option)	Trams, articulated and/or with wagons as an option	Special articulated bus with at-floor boarding and wide doors	Articulated buses; pre-paid boarding required	Standard City Bus, articulated as option	Standard City Bus
Passengers per Vehicle/Train	1,200-2,500	250-1,500	Depends on length	180-240	150-180	75-100	75
Traction	Electric	Electric	Electric	Diesel	Diesel (Electric as an option)	Diesel	Diesel
Feeder System	Necessary	Necessary	Not necessary	Necessary	Desired	Not necessary	Not necessary
Flexibility of route changes	Very low	Low	Low	Very low	Medium	Medium	Very high
Ticketing System	Closed	Closed	Open	Closed	Closed or open	Open	Open

Source: Guidelines and Toolkits for Urban Transport Development Module 1 Comprehensive Mobility Plan.



### 8.2.14. Urban Buses and characteristics

MoUD<sup>148</sup> has established different types of buses for urban services. The following table defines the characteristics and floor height of different urban buses.

Table 8.21: Types of urban buses and their characteristics

S.No.	Bus Types	Bus Characteristics	Low floor definition
1	Standard size urban bus (AC/Non-AC)	Maximum floor height: 400/650/900 mm	Low floor area shall not be less than 50% of the total saloon area (excluding front wheel boxes and driver's cab) and shall not be ramped in the longitudinal plane.
2	Mini and Midi urban buses (AC/Non-AC)	Maximum floor height 900 mm with inclusion of variants of having floor height of 400 mm and 650mm	Low floor area shall not be less than 50% of the total saloon area (excluding front wheel boxes and driver's cab) and shall not be ramped in the longitudinal plane.
3	Standard BRTS bus (AC/Non-AC)	Maximum floor height:400/650/900 mm	Floor height of 400, 650 or 900 mm shall be uniform inside the vehicle.
4	Mini BRT Bus	Floor height of 400, 650 or 900 mm shall be uniform inside the vehicle	Low floor area shall not be less than 50% of the total saloon area (excluding front wheel boxes and driver's cab) and shall not be ramped in the longitudinal plane.
5	Midi BRT Bus	Floor height of 400, 650 and 900 mm shall be uniform inside the vehicle	Low floor area shall not be less than 50% of the total saloon area (excluding front wheel boxes and driver's cab) and shall not be ramped in the longitudinal plane.
6	Standard Bus of Premium Segment (Air conditioned)	Maximum floor height:900 mm	Low floor area shall not be less than 50% of the total saloon area (excluding front wheel boxes and driver's cab) and shall not be ramped in the longitudinal plane.
7	Midi Bus of Premium Segment (Air conditioned)	Maximum floor height:900 mm	Low floor area shall not be less than 50% of the total saloon area (excluding front wheel boxes and driver's cab) and shall not be ramped in the longitudinal plane.
8	Articulated BRTS Bus (AC /Non -AC)	Maximum floor height: 900 mm	Floor height shall be uniform inside the vehicle
9	Bi-articulated BRTS Bus (AC/Non -AC)	Maximum floor height:900 mm	Floor height shall be uniform inside the vehicle

### 8.2.15. TOD Norms

Transit Oriented Development is a development, macro or micro that is focused around a transit node, and facilitates complete ease of access to the transit facility thereby inducing people to prefer to walk and use public transportation over personal modes of transport<sup>149</sup>.

<sup>148</sup> Recommendatory Urban Bus Specifications, MoUD 2013.

<sup>149</sup>As per Draft UTTIPEC Guidelines of DDA.

Figure 8.1: Proposed Karkardooma TOD Project



Source: <http://uttipec.nic.in/writereaddata/linkimages/6080492270.pdf>

Region and Transit-Oriented Development arises from investment in infrastructure that guides the urban growth of the city and is suggested as one of the approaches in the regional & urban planning approach Chapter 4 and 5 respectively of the guidelines. Typically, TOD involves implementing or strengthening a mass transit system with development focused on major transport nodes (which can be planned at regional level or city level). This strategy supports the objective of achieving a desirable modal split of 50-70% as advised<sup>150</sup>.

Mass transit can be strengthened by:

- Enhancing the public transport network by careful and robust selection of an optimum mass transit system, including bus service improvements, bus rapid transit (BRT), and/or rail-based solutions; and
- Developing an integrated public transport system that combines modes and services through interchanges and feeder services, rationalises existing services, and improves passenger dispersal at terminals

Cities with strong Central Business Districts (CBDs) are generally good candidates for transit-oriented development. Trips can take place along radial axes between the CBD and suburban communities, with concentrated mixed use development around the suburban nodes. TOD can be facilitated by identifying major corridors and investing in them as primary mass transit corridors. This can be undertaken with reference to analysis of travel demand and desire line patterns from the modelling exercise.

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<sup>150</sup>“Traffic and Transportation Policies and Strategies in Urban Areas in India”, 1998, MoUD, GoI.

### 8.2.15.1. Demarcation of the TOD Influence Zone<sup>151</sup>

TOD is a new concept introduced in India. Currently UTTIPEC (a subdivision of Delhi Development Authority DDA) has developed draft policy norms and guidelines for TOD. Some of the key aspects related to demarcate TOD zone is given below:

1. A maximum up to 2000 m. wide belt on both sides of centre line of the MRTS Corridor is designated as TOD Influence Zone, which should also be identified in Development Plan of a city.
2. The entire influence zone shall be considered as “white zone”. Application of Development Control Norms in the White Zone shall be compliant with TOD norms as stated in TOD guidelines (approved by competent Authority). Final boundaries of Influence Zones shall be demarcated as per the Influence Zone Plans.
3. The overall Influence Zone further consists of three sub zones – Zone 1: Intense TOD Zone, Zone 2: Standard TOD Zone, and Zone 3: TOD Transition Zone.
4. Development Control Norms as per UTTIPEC TOD norms apply to all three TOD zones.
5. Development Control Norms of High Density Mixed Income Development shall not be applicable to the TOD Transition Zone.
6. All properties public or private shall be able to avail the norms and benefits of TOD while complying to an approved Influence Zone Plan, However exception can be identified where:

Height restriction has already made.

Flight funnel zones shall follow the height restrictions as per regulations of Airport Authority of India.

Environmentally sensitive zones for protection (Environment Protection Zones)

Seismic Zones such as fault lines.

Table 8.22: TOD Influence Zones

Zone 1: Intense TOD Zone	Zone 2: Standard TOD Zone	Zone 3: TOD Transition Zone
300m influence zone of all MRTS Stations	800m* (10-min walking)influence zone of all MRTS Stations.	2000m** (10-minute cycling distance) influence zone of all MRTS Stations.
800m* (10-min walking)influence zone of Regional Interchange Station (i.e. Rail-MRTS, or two MRTS lines.)		300m influence zone of BRT corridors. Zones within Intense (zone 1) or Standard TOD Zones which are not permitted for redevelopment but need enhancements in public realm and network connectivity.

Source: Draft Transit Orient Development – Policy, Norms, Guidelines, UTTIPEC

### 8.2.15.2. Development Types within Influence Zones<sup>152</sup>

Broadly the types of planned and unplanned development which may fall within the Zone 1: Intense TOD influence zones and Zone 2: Standard TOD may be categorized into three broad categories:

**Redevelopment/ Infill** – Sites within the Intense/ Standard TOD Zones are those within Existing Urban Area and suitable for development/ redevelopment.

7. Infill Sites are empty sites within Existing Urban Area, which may have opened up for development.
8. Redevelopment sites could be any of the following:
  - i. Low density areas
  - ii. Shopping/ Commercial centres
  - iii. Industrial areas/ clusters

<sup>151</sup> Draft Transit Orient Development – Policy, Norms, Guidelines, UTTIPEC.

<sup>152</sup> Ibid.

- iv. Resettlement Colonies
- v. Unauthorized colonies
- vi. Urban Villages
- vii. JJ clusters

**Greenfield** – Sites within the Intense/ Standard TOD Zones which are in the Urban Extension Area where provision of road networks, services and social facilities has not yet taken place.

**Retrofit** – In addition to TOD Transition Zones, sites within Intense/ Standard Zones which have existing gross density higher than 250 du/ha may not be suitable for redevelopment, but may need retrofitting to meet TOD Zone requirements. The following criteria may be used as benchmarks for selecting such dense sites for need for retrofitting:

1. Lack of street network and connectivity
2. Lack of fire access to buildings.
3. Lack of adequate physical and social infrastructure facilities.

Hence, depending upon the requirement of the area, to which TOD is applied, the influence zone plan is to be prepared.

### 8.2.15.3. Influence Zone Plan

A Detailed Influence Zone Plan is a document that provides a framework and vision for future TOD development for MRTS. Any public or private development within the Influence Zone Plan Areas must adhere to the overall strategies, framework and benchmarks provided by the Plan. The Plan shall be prepared or be approved by the competent Planning Authority for each influence zone area in a phased manner, customized to site characteristics and context. The plan shall include the following components:

**1. Urban Design Framework** – This would include:

Street Network Plan indicating street hierarchy and character

Landscape and Open Space Structure indicating type of open spaces and distribution of play areas. To include planting strategy for all street trees.

Net FAR and residential densities for each block within the Influence Zone

Vertical mix of uses for each TOD parcel indicating location of civic amenities within mixed –use blocks (refer Chapter 9 for mixed zone use). To include location of ‘unbundled’ parking sites for shared use.

Three-dimensional site briefs for each block within the Influence Zone indicating recommended massing and organisation of uses.

Location and numbers of short and long term parking spaces

**2. Transport Impact Assessment & Mitigation Strategies** – This would include strategies for:

Achieving the desired modal shift, in particular mode shift for short trips

Street network improvement through assessment of existing capacity and augmentation of network as required through new linkages, alternate routes, junction designs etc. for all modes with priority for intermediate public transport, pedestrians, cyclists / NMT.

Integrated strategy for Public transport, Pedestrian and Cycle access

Determining the optimum mix of uses to mitigate negative impact on surrounding land uses and transport networks

Parking Strategy as a Demand Management Tool

Mitigation strategies for traffic noise and vibration

The Draft TOD Guidelines and Norms of UTTIPEC are under finalization. In the context of MPD-2021 provisions which spell out that a 500 m wide belt from the centreline of MRTS corridors/major transport axis shall be designated as the “*influence zone*”. The Guidelines and Norms have been included under the Chapter on **Transportation**, which is under revision as part of MPD-2021 review exercise.

It is important to appreciate that TOD is a value-addition over and above mixed-use streets and the Land-Pooling policy in the sense that provides for multiple uses within the same building along with higher FAR provisions so as to promote intensive development along MRTS corridors/major transport axis which will induce people to use Public Transport and do away with personalized vehicular modes. However, TOD has to be designed case-to-case basis and cannot be a default function.

Figure 8.2: Proposed Karkardooma TOD Project



Source: <http://uttipec.nic.in/writereaddata/linkimages/6080492270.pdf>

**3. Decentralized Infrastructure and Sustainability Plan** – This would include:

Water and Waste Water management strategy including recycling and re-use of waste water. To include strategy for both potable and non-potable water.

Rain water strategy, to be integrated with the Landscape and Public Open Space Strategy

Solid Waste Management Strategy

Energy Strategy maximising use of renewable sources

Integrated Infrastructure and Services Systems Plan indicating space requirements for all infrastructure

**4. Economic Viability and Implementation Model** – This would include:

Determining a financially profitable mix of uses based on the current demand and supply, coupled with the projected land values for the TOD zone. To include cost delivering of Social and Physical infrastructure

Determining a financial model and delivery mechanism for affordable housing, public infrastructure and public transport facilities through mechanisms of cross subsidy, FAR benefits or any other possible benefit that the TOD authority can give.

Strategy for revenue collection from the TOD zone based on the benefits enjoyed by a piece of land lying within the TOD zone. To determine total profit generated from the TOD Zone in a phased manner for individual owners, consortiums and TOD administration.

Determining appropriate mechanisms for land-pooling by individual plot holders to avail the benefits of TOD based on the specific characteristics of the site.

Determining the structure of the administrative body of the TOD zone and the cost of operation of the body.

Strategy for implementing the TOD policy in the TOD zone through the principle of award and penalty.

**Note:** After preparation of Influence Zone Plans for Urban Extension areas, the TOD Zones shall accommodate substantially greater proportion of the population of planned areas of Zonal Plans, which may therefore require subsequent modification.

### 8.2.15.4. Redevelopment Criteria and Minimum Project Size Criteria<sup>153</sup>

#### Policy:

- Redevelopment within developed areas of the city would be permitted only when an overall Influence Zone Plan has been prepared for the Station. This is to ensure that local street networks, physical and social infrastructure and shared parking facilities have been planned for the area, before densification commences.
- For achieving higher FAR it would be desirable to incentivize amalgamation of plots as well as make appropriate amendments in the bye laws, as per TOD norms. However, though amalgamation is desirable but it may not be a pre-requisite. Densification should be allowed in all plot sizes subject to the project complying with the approved Influence Zone Plan, so that incremental development and densification can start taking place.
- It is highly inappropriate to allow land banking in TOD zones. Penalties such as vacant land tax, etc. on underutilized land and/or underutilized FAR could be levied, in order to ensure time bound densification along with MRTS corridor. Such penalties should apply to all developers as well as Govt. bodies, to even inefficient use of valuable land.

#### Norms:

1. If Influence Zone layout plan for the station area does not exist, no individual developments with TOD norms shall be permitted.
2. If Influence Zone Plan for the station area exists:
  - i. Any projects size of equal or more than 50 Ha may be taken up for development/ infill or redevelopment, if in adherence to the influence zone plan prepared by the Planning Authority.
  - ii. Individual buildings shall be given sanction by the concerned authority within the framework of the overall influence zone plan.
  - iii. For projects accommodating more than 5000 residential population, the residents/ cooperative societies/private developers should get the detailed layout and services plan prepared in consultation with the concerned authority for final approval.

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<sup>153</sup>Draft Transit Orient Development – Policy, Norms & Guidelines, UTTIPEC.

### 8.2.15.5. TOD Development Control Norms<sup>154</sup>

The TOD mainly has 6 components for which the DCR is to be developed by development authorities. These components are as following:

1. Pedestrian & Cycle/ Cycle-Rickshaw Friendly Environment
2. Connectivity: Create dense networks of streets and paths for all modes.
3. Multi-modal Interchange: Mass transportation modes servicing the area should be well integrated to afford rapid and comfortable modal transfers.
4. Modal Shift Measures: Shift to Sustainable Modes by using Design, Technology, Road Use Regulation, Mixed-Use, Parking Policy and Fiscal Measures
5. Placemaking and Safety: Urban places should be designed for enjoyment, relaxation and equity.
6. High Density, Mixed-Income Development: Compact Neighbourhoods for Shorter Commutes and equity for all sections of society.

Policy details and development norms for each of the above components are provided in Draft Transit Orient Development – Policy, Norms, Guidelines issued by UTTIPEC<sup>155</sup>, which is the only guideline available in India at present and can be referred for TOD projects. In addition, ITDP mentions principal and objectives of TOD in its version 2.0 of ‘TOD Standards’ and provides project eligibility criteria and its scoring. However, any latest and more comprehensive document and case studies can also be referred for this exercise.

### 8.2.16. Non-Motorised Vehicles (NMV)

As per Guidelines and Toolkits for Urban Transport Development in Medium Sized Cities in India prepared by MoUD and ADB, Non-Motorised Transport (NMT) measures proposed by an Indian city should conform to existing policy at National, State and City level. National Urban Transport Policy has also encouraged using NMVs by offering Central financial assistance for this purpose. As per MoUD guidelines, NMVs can be promoted through the following initiatives:

- Providing better facilities to accommodate existing NMV use and encourage more NMVs through visible infrastructure;
- Developing a strategic NMV plan including a network of routes available to NMVs throughout the city;
- Segregating NMVs/MVs to improve safety and smooth passage of NMVs;
- Promoting freight NMVs for the transport and delivery of small goods to markets and shopping areas;
- Identifying sub-projects which make positive, pro-active provision for NMVs as part of a balanced approach to traffic planning;
- Giving NMVs priority over MVs on selected routes and in selected areas;
- Strengthening Road User Education (RUE) programmes for NMV users to improve behaviour and road safety;
- Rationalising and improving NMV registration, licensing for use as a Public Transport or freight vehicle, regulation and enforcement
- Encourage NMV by improving women’s access.

<sup>154</sup> Ibid.

<sup>155</sup>The document is available at [www.uttipecc.org](http://www.uttipecc.org).

Various initiatives and programmes taken-up by Ministry of Road Transport and Highways in this direction.

It has also been suggested by MoUD that NMV measures can be implemented either as mandatory or advisory. Mandatory measures are 'formal' and require to be backed up by appropriate traffic regulations. For example, part of the highway may be designated for NMVs only. Advisory measures are usually designed to encourage NMV use, or where mandatory measures are difficult to implement due to the requirement of traffic regulations or the practicalities of accommodating motorized vehicles within limited road space. For example, part of the highway may be allocated for NMVs, but MVs would be allowed to encroach for side accesses or when traffic volume is high. Even advisory measures can incur costs such improved road surfacing or removal of physical obstructions to ensure that NMV passage is smooth and comfortable.

MoUD has also recommended that segregation of NMVs and Motor Vehicles (MVs) is well suited for Indian scenario. Segregated NMV measures can take the form of dedicated lanes within the highway (with physical dividers or simple line demarcation) either with-flow or contra-flow, and streets that prohibit motor vehicles. Mixed flow measures allow all types of traffic to mix within the highway and are typically a do-nothing or minimum case, though some treatments can be implemented to improve the comfort level of NMVs or provide priority, e.g. at intersections. It also offers safe and efficient network for NMVs.

### 8.2.17. Road Safety

Road safety is to include design strategies for elements that make up the urban environment at various scales must be clearly articulated, and must be integrated with relevant development regulations (Development Plan, Local Area Plans, Urban Design Guidelines, etc.)<sup>156</sup>. A checklist of road safety indicators is provided in Appendix K of Volume II B for ready reference. The principle of road safety to be included at Regional planning level (Mobility 1), Development Plan Preparation level with CMP (Mobility 2) and local area plan level to create safe infrastructure.

### 8.2.18. Special Requirements for Barrier Free Built Environment for Differently abled and Elderly Persons<sup>157</sup>

Barrier free environment is one, which enables people with disabilities to move about safely and freely and to use the facilities within the built environment. The goal of barrier free design is to provide an environment that supports independent functioning of individuals so that they can get to and participate without assistance

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<sup>156</sup> Working Paper on 'Urban Development and Road Safety', Embarq, India.

<sup>157</sup> Guidelines, NBC, pg 47-48.

in everyday activities such as procurement of goods and services, community living, employment and leisure.

- Public walks should be minimum 1.2 m wide with a maximum gradient of 1 in 20
- Parking spaces for individuals with physical disabilities when placed between two conventional diagonal or head on parking spaces should be 3.6 m to 3.8 m wide and the length of the aisle should 7.3m, 6.3m and 6.5 m for head on, 90° and 60° parking respectively.
- Buildings- Ramps with gradients: A ramp should have a maximum slope of 1 in 20 or maximum of 1 in 12 for short distance up to 9 m. Other details of ramp shall be referred from NBC 2005.
- Use of Tactile paving and ensuring continuous pavement

For designing elements within the building premises, the norms as given in the Guidelines for Barrier Free Built Environment shall be applicable.

### 8.2.19. Inland Water Transportation

Water based transport is effective as operating costs of fuel are lower and environmental pollution is lower than for corresponding volumes of movement by road, rail or air. A major advantage is that the main infrastructure, i.e. the waterway is often naturally available<sup>158</sup>.

In India, a number of central and state agencies play crucial role in the regulation, operation and sustenance of Inland Water Transport (IWT). Their smooth functioning is required for IWT to be viable. Some of the actors in this sector are given below.

- Inland Waterways Authority of India (IWAI)
- Central Inland Water Transport Corporation (CIWTC)
- State governments
- Port authorities
- Transport development agencies
- Customers

As per constitutional provisions, only those waterways, which are declared as National Waterways, come under the purview of Central Government while rest of waterways remain in the purview of respective State Government. Since formation of IWAI, waterways namely:

1. Ganga
2. Brahmaputra
3. West Coast Canal with Udyogmandal and Champakara Canals
4. Kakinada-Puducherry Canals system along with Godavari and Krishna rivers
5. East Coast Canal with Brahmani River and Mahanadi delta
6. Barak river

The National Transport Policy Committee (1980) recommended the following principles for declaration of a National Waterway.

- It should possess capability of navigation by mechanically propelled vessels of a reasonable size.

<sup>158</sup> Rangaraj N and Raghuram G, Viability of Inland Water Transport in India, <http://www.ieor.iitb.ac.in/files/faculty/narayan/transport/iwt-tec-rep-oct-05.pdf>.

- It should have about 45 m wide channel and minimum 1.5m depth.
- It should be a continuous stretch of 50 km. The only exception to be made to waterway length is for urban conglomerations and intra-port traffic.
- It should pass through and serve the interest of more than one State (or).
- It should connect a vast and prosperous hinterland and Major Ports (or).
- It should pass through a strategic region where development of navigation is considered necessary to provide logistic support for national security (or).
- It should connect places not served by any other modes of transport.

As per IWAI, the waterways shall be classified in the following categories for safe plying of self-propelled vessels up to 2000 Tonnes dead weight tonnage and tug barge formation in push-type units of carrying capacity up to 8000 tonnes.

Table 8.23: Waterways Classification

S.No.	Class	River	Canal
1	Class-I	Minimum 1.2 metre depth, 30 metre bottom width, 300 metre bend radius, 4 metre vertical clearance and 30 metre horizontal clearance between piers	Minimum of 1.5 metre depth, 20 metre bottom width, 300 metre bend radius, 4 metre vertical clearance and 20 metre horizontal clearance between piers
2	Class-II	Minimum 1.4 metre depth, 40 metre bottom width, 500 metre bend radius, 5 metre vertical clearance and 40 metre horizontal clearance between piers	Minimum of 1.8 metre depth, 30 metre bottom width, 500 metre bend radius, 5 metre vertical clearance and 30 metre horizontal clearance between piers
3	Class-III	Minimum 1.7 metre depth, 50 metre bottom width, 700 metre bend radius, 7 metre vertical clearance and 30 metre horizontal clearance between piers	Minimum of 2.2 metre depth, 40 metre bottom width, 700 metre bend radius, 7 metre vertical clearance and 40 metre horizontal clearance between piers
4	Class-IV	Minimum 2.0 metre depth, 50 metre bottom width, 800 metre bend radius, 10 metre vertical clearance and 50 metre horizontal clearance between piers	Minimum of 2.5 metre depth, 50 metre bottom width, 800 metre bend radius, 10 metre vertical clearance and 50 metre horizontal clearance between piers
5	Class-V	Minimum 2.0 metre depth, 50 metre bottom width, 800 metre bend radius, 10 metre vertical clearance and 80 metre horizontal clearance between piers in case of rivers only.	NA
6	Class-VI	Minimum 2.75 metre depth, 80 metre bottom width, 900 metre bend radius, 10 metre vertical clearance and 80 metre horizontal clearance between piers	Minimum of 3.5 metre depth, 60 metre bottom width, 900 metre bend radius, 10 metre vertical clearance and 60 metre horizontal clearance between piers
7	Class-VII	Minimum 2.75 metre and above depth, 100 metre and above bottom width, 900 metre bend radius, 10 metre vertical clearance and 100 metre horizontal clearance between piers in case of rivers only	NA

Source: The Inland Waterways Authority of India Act, 1985.

There are only few states, which have undertaken the initiatives to develop waterways as transport medium. Such states are Assam, Goa, Kerala, Maharashtra (Mumbai), West Bengal, and some other coastal areas (where it has natural advantage and no developmental intervention is needed).

### 8.2.20. Airport Planning

Airport planning is a systematic process used to establish guidelines for the efficient development of airports that is consistent with local, state and national goals. A key objective of airport planning is to assure the effective use of airport resources in order to satisfy aviation demand in a financially feasible manner. An airport has different elements, which required space; however it may vary (depending on the passenger traffic which is the essential parameter to determine the size of airport). Such overall required space should be integrated with development plan in order to minimise the effect at later stages of planning. Airport consist of different elements, such elements are:

1. Runway
2. Taxiway
3. Terminal Building
4. Ancillary buildings which include Cargo Terminal, Fire fighting Station, Fuel farm
5. Aprons
6. Hanger
7. Air Traffic Control Tower etc.
8. Road infrastructure which includes Airside road and land side road, and
9. Other Infrastructural facilities such STPs, WTPs.

#### 8.2.20.1. Airport Land Requirement

The following table assembled by International Air Transport Association (IATA)<sup>159</sup> provides the approximate land requirement based on passenger movement, number of runways, cargo movement etc. in order for airport planners and airport authorities (could be used for development planning as well) to understand the scale of the site required for airport infrastructure development. These cover the above mentioned elements and should be used for rough estimation purposes only. However these figures may vary depending upon the local topography, type of aircraft for which airfield is to be designed etc.

Table 8.24: Approximate Land Requirement for Airport infrastructure

Airport (Asia & Pacific)	No. of Runways	Total Annual Mvts.	Total Annual Passengers (mppa)	Total Annual Cargo.	Land Area (ha)
Sydney (SYD)	3	307,058	25.7	573,880	887
Hong Kong (HKG)	2	193,895	32.7	2,240,585	1,255
Singapore Changi Airport (SIN)	2	184,533	28.6	1,680,000	1,300
Narita International Airport (NRT)	2	133,396	27.3	1,932,694	1,084
Kansai International Airport (KIX)	1	122,916	19.4	999,692	510

Source: Airport Development Reference Manual, 9<sup>th</sup> edition, IATA.

<sup>159</sup>Airport Development Reference Manual, IATA.

### 8.2.20.2. Unit area norms for Airport Terminal<sup>160</sup>

Overall space/area norm should be such as to provide a reasonable level of service for all components required in a Terminal Building. Commercial or Retail area providing amenities like food & beverages, book shops, counters for car rental, vending machines, public rest rooms etc., normally require 8-12 per cent of the overall area, and should be planned and provided accordingly. This shall be considered as the built-up area by the planners while providing indoor infrastructure facilities and trunk infrastructure capacity.

In bigger airports, i.e., with annual passenger traffic exceeding 10 million, commercial area could be up to 20 per cent of overall area.

Table 8.25: Norms for Airport Terminals

Sl. No.	Nature of Terminal	Area Norm – Sqm/ peak hour passenger (php)
1	Domestic Terminals	
	Traffic up to 100 php	12
	Traffic between 100-150 php	15
	Traffic between 150-1000 php	18
	Traffic above 1000 php	20
2	Integrated terminal for handling both domestic and international	25
3	International Terminals	27.5

## 8.3. Physical Infrastructure

### 8.3.1. Water Supply

The objective of a public protected water supply system is to supply safe and clean water in adequate quantity, conveniently and as economically as possible. Rising demand of water due to rapid urbanisation is putting enormous stress. While planning the water supply system for an area, it is evident to consider water conservation aspects, which may be possible through optimal use of available water resources, prevention and control of wastage of water and effective demand management.

<sup>160</sup> Norms & Standards for Capacity of Airport Terminals, Planning Commission, Government of India.

### 8.3.1.1. Water Supply Standards

The water supply standards as indicated by the CPHEEO are detailed in Table 8.26.

Table 8.26: Water Supply Standards

S.No.	Classification of town/cities	Recommended maximum water supply levels (lpcd)
1	Towns provided with piped water supply but without sewerage system	70
2	Cities provided with piped water supply where sewerage system is existing / contemplated	135
3	Metropolitan and Mega cities provided with piped water supply where sewerage system is existing/contemplated	150

Source: CPHEEO Manual, 1999.

Notes:

- i. In urban areas, where water is provided through public stand posts, 40 lpcd should be considered
- ii. Unaccounted-for Water (UFW) is the difference between the quantity of water supplied to a city's network and the metered quantity of water used by the customers. UFW has two components: (a) physical losses due to leakage from pipes, and (b) administrative losses due to illegal connections and under registration of water meters. The above figures exclude UFW, which should be limited to 15% for new proposed systems.
- iii. Water requirement for the town/city will be 135 to 150 lpcd. However, water requirement for institutional buildings should be as specified in Table 8.27.
- iv. The water needs of the town will be partially met by making provision of Rain Harvesting Structures in all the buildings.
- v. Figures include requirements of water for commercial, institutional and minor industries. However the bulk supply to each establishment should be assessed separately with proper justification.
- vi. Piped water supplies should be designed on continuous 24 hours basis to distribute water to consumers at adequate pressure at all points (using grid supply system of a Smart city).
- vii. For towns where one storeyed building is common and for supply to the ground level storage tanks in multi-storeyed buildings, the minimum residual pressure at ferrule point should be 7m for direct supply. Where two storeyed buildings are common, it may be 12m and where three storeyed buildings are prevalent 17m or as stipulated by local byelaws.
- viii. The consumption of water when supply is metred is less compared to that when the water charges on flat rate basis. Hence in order to achieve optimal utilisation of water, metering is recommended.
- ix. CPHEEO manual specifies design period for various components, broadly 30 years for civil works and 15 years for electro-mechanical works. In fixing a design period, the useful life of structures and equipment employed, taking into account obsolescence as well as wear and tear, design constraints, rate of population growth etc. should be incorporated and integrated with overall planning of the city.
- x. PPP should be encouraged and could be introduced in phases, either on Build, Operate and Own (BOO) or Build, Operate, Own and Transfer (BOOT) basis. Primarily, it is possible in two ways i.e. privatization of the existing water supply systems and secondly, privatization of systems in newly developed townships, housing colonies, business and commercial complexes, etc.

### 8.3.1.2. Fire fighting

The CPHEEO Manual recommends fire-fighting water demand as a function of population, i.e. water demand for fire-fighting purpose =  $100\sqrt{P}$ , where P stands for forecasted population may be adopted for communities larger than 50,000. It is desirable that one-third of fire-fighting requirements from part of the service storage. The balance requirement may be distributed in several static tanks at strategic points. These static tanks may be filled from nearby ponds, streams or canals by water tankers wherever feasible. The pressure required for fire-fighting would have to be boosted by fire engines.

### 8.3.1.3. Institutional Buildings

Table 8.27: Water requirements for Institutional Buildings – CPHEEO, 1999

S. No.	Institutions	Litres per head per day
1	Hospital (including laundry) a. no of beds exceeding 100 b. no. of beds not exceeding 100	a. 450 (per bed) b. 340 (per bed)
2	Hotels	180 (per bed)
3	Hostels	135
4	Nurses homes and medical quarters	135
5	Boarding schools/colleges	135
6	Restaurants	70 (per seat)
7	Airport and seaports	70
8	Junction stations and intermediate station where mail or express stoppage (both railway and bus stations) is provided	70
9	Terminal stations	45
10	Intermediate stations (excluding mail and express stops)	45 (could be reduced to 25 where bathing facilities are not provided)
11	Day Schools/colleges	45
12	Offices	45
13	Factories	45 (could be reduced to 30 where no bathing rooms are required to be provided)
14	Cinema, concert halls and theatres	15

Source: CPHEEO Manual, 1999.

### 8.3.1.4. Industrial Units

Table 8.28: Water requirement for Industrial Units

Industry	Unit of Production	Water Requirement in Kilolitres per unit
Automobile	Vehicle	40
Distillery	Kilolitre (proof alcohol)	122-170
Fertilisers	Tonne	80-200
Leather	100 kg (tanned)	4
Paper	Tonne	200-400
Special Quality paper	Tonne	400-1000
Straw board	Tonne	75-100

Industry	Unit of Production	Water Requirement in Kilitres per unit
Petroleum refinery	Tonne (crude)	1-2
Steel	Tonne	200-250
Sugar	Tonne	1-2
Textile	100 kg (goods)	8-14

Source: CPHEEO Manual, 1999.

### 8.3.1.5. Station water requirements

Water requirement for the Station for various uses (per day):

- 15 litres per passengers (Metcalf Eddy)
- 455 litres per employee (ref: CPHEEO Manuals)
- Apron washing – 10 litres per sq meters as per Indian Railways Work Manual (IRWM)
- Cleaning/ mopping of platform and floor – 5 litres per sqm.
- Meters and greeters – 5 litres per visitor
- Catering – 45 litres per passengers
- Gardening/ Horticulture – 22500 litres per hectares (IRWM)
- Cleaning of trains on platform – 500 litres per coach (IRWM)
- Cleaning of trains in washing lanes – 3600 litres per coach (IRWM)
- Watering of trains – 1800 litres/ coach (IRWM)
- Fire-fighting (CPHEEO Norms)
- Commercial -45000 litres per hectares per day (IRWM)
- UFW – 15% of total demand for new system (CPHEEO)
- 75% of total capacity shall be filled at the station for long haul trains (passing trains)

Water requirement for metro station could be calculated based on the type of station (underground or elevated). In absence of any specific norms to calculate water demand for metro station, the water estimations can be calculated from the above mentioned information for stations. Parameters such as staff requirement, HVAC requirement if station is underground, toilet requirement and passenger requirement to be considered based on the facilities provided at metro stations.

### 8.3.1.6. District Meter Area Planning (Bulk metering)

The term ‘district metering’ is used to describe the method whereby flow meters are installed on all major supply lines and strategic points within the distribution system. The meters should be used to monitor the overall performance of the system establishing average daily flows into various districts. District meter areas ideally consist of 2000 to 5000 properties.

Size of the district meter should be such that it is capable of recording night flow without loss of accuracy and also must be capable of supplying peak flow without introducing serious head loss.

The District Meters should be read at weekly intervals at the same time of day as previous readings of the meter.

### 8.3.1.7. Billing and Collection

Revenue management system is an important aspect of any Water supply System as it governs the financial aspect. Besides fixing a tariff structure, billing and collection of revenue play an important part.

The water charges to be fixed taking into account the ability of the system to meet the expenditure on the following heads.

- Operating Cost (excluding establishment cost),
- Establishment Cost,
- Depreciation,
- Debt Services & Doubtful Charges,
- Asset replacement fund.

Tariff structure should be fixed and revised periodically. Automatic increase of tariff periodically on index basis can also be adopted. Where the same authority also provides sewerage system, charges for this can also supply through Public stand post, may be charged and also be included as a percentage of the water charges.

There are various methods by which Water Billing can be done. The user is advised to refer 'Manual on Operation and Maintenance of Water Supply Systems' of CPHEEO while fixing the tariff, billing process and collection system.

### 8.3.1.8. Leakage Control

The overall objective of leakage control is to diagnose how water loss is caused and to formulate and implement action to reduce it, to technically and economically acceptable minimal.

The water losses can be termed into two categories i.e. Physical losses and Non-Physical Losses. The Physical Losses is mainly due to leakage of water in the network and comprises of physical losses from pipes, joints & fittings, reservoirs & overflows of reservoirs & sumps. The Non-Physical Losses is due to theft of water through illegal, already disconnected connections, under-billing either deliberately or through defective meters, water wasted by consumer through open or leaky taps, errors in estimating flat rate consumption, public stand posts and hydrants.

The major activities which should be taken up for efficient monitoring and leakage control are:

- **Preliminary data collection and planning** – The water distribution drawings are to be studied and updated. The number of service connections is to be obtained and in the drawings of the roads the exact locations of service connections marked. The district and sub-district boundaries are suitably fixed taking into consideration the number of service connections, length of mains, and pressure points in the main. The exact locations of valves, hydrants with their sizes should be noted on the drawings.
- **Pipe location and survey** – Electronic pipe locators can be used during survey. These instruments work on the principle of Electromagnetic signal propagation. It consists of a battery

operated transmitter and a cordless receiver unit to pick up the signals of pre-set frequency. There are various models to choose from.

- **Assessment of pressure and flows** – Data loggers are used to record the pressure and flows. It is an instrument which stores the raw data electronically so as to be able to transfer it to the computer with a data cable link. Two types of portable data loggers are used either with a single channel or dual channel. In the absence of electronic equipment, the pressures can be ascertained by tapping and providing a pressure gauge. Flows can be assessed by using meters on a bypass line.
- **Locating the leaks** – Walking and sounding are the two general methods or their combination can be used to detect possible location of leakages. Leakage can be detected by walking over the main looking for tell-tale signs of presence of water. Whereas sounding is the cheapest and an effective method of detecting leaks in a medium - sized water supply system. The equipment used for detecting leakages is described in in ‘Manual on Operation and Maintenance of Water Supply Systems’ of CPHEEO.
- **Assessment of leakage** – To conduct tests for assessment of leak the following equipment are needed :
  - Road measurer
  - Pipe locator
  - Valve locator
  - Listening sticks or sounding rods
  - Electronic sounding rods

Each method mentioned above is described in ‘Manual on Operation and Maintenance of Water Supply Systems’ of CPHEEO and can be referred during formulation of the strategy.

### 8.3.1.9. Water Quality Standards

The water quality standards as prescribed by the Indian Standard Organisation are tabulated below:

Table 8.29: Organoleptic and Physical Parameters of Drinking Water

S. No.	Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Method of Test, ref. to part of IS 3025	Remarks
1	Colour, Hazen units, Max	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
2	Odour	Agreeable	Agreeable	Part 5	Test cold and when heated Test at several dilutions
3	pH Value	6.5-8.5	No relaxation	Part II	-
4	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
5	Turbidity, NTU, Max	1	5	Part 10	-
6	Total dissolved solids, mg/l, Max	500	2000	Part 16	-

Source: IS 10500: 2012.

Note: It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col.4, above which the sources will have to be rejected.

Table 8.30: General parameters concerning substances undesirable in excessive amounts in drinking water

S No.	Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Method of test, Ref. No.	Remarks
1	Aluminium (as Al), mg/l, Max	0.03	0.2	IS 3025 (Part 55)	-
2	Ammonia (as total ammonia-N), mg/l, Max.	0.5	No relaxation	IS 3025 (Part 34)	-
3	Anionic, detergents (as MBAS) mg/l, Max.	0.2	1.0	Annex K of IS 13428	-
4	Barium (as Ba), mg/l, Max.	0.7	No relaxation	Annex F of IS 13428 or IS 15302	-
5	Boron (as B), mg/l, Max	0.5	1.0	IS 3025 (Part 57)	-
6	Calcium (as Ca), mg/l, Max.	75	200	IS 3025 (Part 40)	-
7	Chloramines (as Cl <sub>2</sub> ), mg/l, Max.	4.0	No relaxation	IS 3025 (Part 26) or APHA 4500-Cl.G	-
8	Chloride as (Cl)/mg/l, Max.	250	1000	IS 3025 (Part 32)	-
9	Copper (As Cu), mg/l, Max	0.05	1.5	IS 3025 (Part 42)	-
10	Fluoride (as F) mg/l, Max	1.0	1.5	IS 3025 (Part 60)	-
11	Free residual chlorine, mg/l, Min	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l.
12	Iron (as Fe), mg/l, Max	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l)
13	Magnesium (as Mg.), mg/l, Max	30	100	IS 3025 (Part 46)	-
14	Manganese (as Ms), mg/l, Max	0.1	0.3	IS 3025 (Part 59)	Total concentration of Manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
15	Mineral Oil, Mg/l, Max	0.5	No relaxation	Clause 6 of IS 3025 (Part 39) Infrared partition method	-
16	Nitrate (as NO <sub>2</sub> ), mg/l, Max	45	No relaxation	IS 3025 (Part 34)	-

S No.	Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Method of test, Ref. No.	Remarks
17	Phenolic compounds (as C6H3OH)	0.001	0.002	IS 3025 (Part 43)	-
18	Selenium (as Se), mg/l, Max	0.01	No relaxation	IS 3025 (Part 56) or IS 15303	-
19	Silver (as Ag), mg/l, Max.	0.1	No relaxation	Annex J of IS 13428	-
20	Sulphate (as SO <sub>4</sub> ), mg/l, Max	200	400	IS 3025 (Part 24)	May be extended to 400 provided that Magnesium dos not exceed 30
21	Sulphide (as H <sub>2</sub> S), mg/l, Max	0.05	No relaxation	IS 3025 (Part 29)	-
22	Total alkalinity as Calcium, Carbonate, mg/l, Max.	200	600	IS 3025 (Part 21)	-
23	Total hardness (as CaCO <sub>3</sub> ), mg/l, Max	200	600	IS 3025 (Part 21)	-
24	Zinc (as Zn), mg/lr, Max	5	15	IS 3025 (Part 49)	-

Source: IS 10500: 2012.

Table 8.31: Permissible limits of Toxic Substances

S No.	Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Method of test, Ref. No.	Remarks
1	Calcium (as Ca) mg/l, Max	0.003	No relaxation	IS 3025 (Part 41)	-
2	Cyanide (as CN), mg/l, Max.	0.05	No relaxation	IS 3025 (Part 27)	-
3	Lead (as Pb), mg/l, Max	0.01	No relaxation	IS 3025 (Part 47)	-
4	Mercury (as Hg), mg/l, Max.	0.001	No relaxation	IS 3025 (Part 47) Mercury analyser	-
5	Molybdenum (as Mo), mg/l, Max	0.02	No relaxation	IS 3025 (Part 2)	-
6	Nickel (as Ni), mg/l, Max	0.07	No relaxation	IS 3025 (Part 54)	-
7	Pesticides, mg/l, Max.	As given above	No relaxation	As given above	-
8	Polychlorinated biphenyls, mg/l, Max	0.0005	No relaxation	ASTM 5175	-
9	Polynuclear aromatic hydro-carbons (as PAH), mg/l, Max	0.0001	No relaxation	APHA 6440	-
10	Total arsenic (as As), mg/l, Max.	0.01	0.05	IS 3025 (Part 37)	-
11	Tribalomethane:				
(a)	Bromoform, mg/l Max	0.1	No relaxation	ASTM D 3973.85 or APHA 6232	-

S No.	Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Method of test, Ref. No.	Remarks
(b)	Dibromochloromethane, mg/l Max				
(c)	Bromodichloron ethane, mg/l, Max	0.06	No relaxation	ASTM D 3973-85 or APHA 6232	-
(d)	Chloroform, mg/l, Max.	0.2	No relaxation	ASTM D 3973-85 or APHA 6232	-

Source: IS 10500: 2012.

**Table 8.32: Permissible Limits of Radioactive Substances**

S. No.	Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Method of test, Ref. No.	Remarks
1	Alpha emitters Bq/l, Max	0.1	No relaxation	Part 2	-
2	Beta emitters Bq/l, Max	1.0	No relaxation	Part 1	-

Source: IS 10500: 2012.

**Table 8.33: Pesticide Residues Limits of Drinking Water**

S. No.	Pesticide	Limit ug/l	USEPA	AOAC/ISO
1	Alachlor	20	525.2.507	-
2	Atrazine	2	525.1.8141 A	-
3	Aldrin / Dieldrin	0.03	508	-
4	Alpha HCH	0.01	508	-
5	Beta HCH	0.04	508	-
6	Butachlor	125	525.1.8141 A	-
7	Chlorpyrifos	30	525.2.8141 A	-
8	Delta HCH	0.04	508	-
9	24-Dichlorophenoxyacetic acid	30	515.1	-
10	DDT (o,p and pp – Isomers of DDT, DDE and DDD)	1	508	AOAC 990.06
11	Endosulfan (alpha, beta and sulphate)	0.4	508	AOAC 990.06
12	Ethion	3	1657 A	-
13	Gamma – HCH (Lindane)	2	508	AOAC 900.06
14	Isoproturon	2	508	-
15	Malathion	190	532	-
16	Methyl parathion	0.3	8141 A	-
17	Monocrotophos	1	8141 A	-
18	Phorate	2		-

Source: IS 10500: 2012.

Table 8.34: Bacteriological Quality of Drinking Water

S. No.	Organisms	Requirements
1	All water intended for drinking:	
(a)	E. Coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml. sample
2	Treated water entering the distribution system	
(a)	E-Coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml. sample
(b)	Total coliform bacteria	Shall not be detectable in any 100 ml. sample
3	Treated water in the distribution system	
(a)	E-Coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml. sample
(b)	Total Coliform bacteria	Shall not be detectable in any 100 ml. sample

Source: IS 10500: 2012.

### 8.3.1.10. Land requirement for Water Supply System

Identification of land for water infrastructure is an essential parameter. It is necessary to earmark land for Water Treatment Plant (WTP) in Development Plans. Also land for overhead reservoirs, pumping stations should be marked at the zonal level or local area plan level. However land requirement may vary based on the capacity of WTPs and up-gradation of technology. Below is the table, which recommends land requirement based on different capacity.

Table 8.35: Recommended land Requirement based on capacities

S.No.	Identified Capacities	Land Requirement (Hectares)
1	5 MLD	0.10
2	10 MLD	0.19
3	50 MLD	0.93
4	100 MLD	1.87
5	200 MLD	3.73
6	500 MLD	9.34

Source: CPHEEO.

Note: Additional 0.63 ha of land can also be considered for staff quarters

### 8.3.1.11. Design Period for Water Supply Components

Table 8.36: Design Period for Water Supply Components

S.No.	Components	Design period (in years)
1	Storage by Dams	50
2	Infiltration works	30
3	Pumping	
i	Pump house (civil works)	30
ii	Electric motors and pumps	15
4	Water treatment units	15
5	Pipe connection to several treatment units and other small appurtenances	30
6	Raw water and clear water conveying mains	30
7	Clear water reservoirs at the head works, balancing tanks and service reservoirs (overhead or ground level)	15
8	Distribution system	30

Source: Manuals on Water Supply and Treatment, 1999, CPHEEO.

National Water Policy, 2012 by Ministry of Water Resources was formulated to govern the water resource's planning and development along with its optimum utilisation. The Policy provides following recommendations regarding urban settlements:

- Urban water supply and sewage treatment must be integrated along with its billing,
- Least water intensive sanitation and sewerage systems with decentralized sewage treatment plants should be incentivized.
- Water reuse must be encouraged in urban settlements,
- Urban domestic water systems need to collect and publish water accounts and water audit reports indicating leakages and pilferages, which should be reduced.
- In urban and industrial areas, rain water harvesting and desalination where techno-economically feasible, should be encouraged to increase availability of utilizable water.

State Governments shall draft State Water Policy for decentralised or micro level water management to yield better results.

### 8.3.2. Sewerage & Sanitation

#### 8.3.2.1. National Urban Sanitation Policy

The aim of the National Urban Sanitation Policy (NUSP), 2008 is to transform Urban India into community-driven, totally sanitized, healthy, and liveable cities and towns.

Basic features laid down in NUSP given below should be adhered for planning of the cities

- Cities must be open defecation free
- Must eliminate the practice of manual scavenging and provide adequate personnel protection equipment that addresses the safety of sanitation workers
- Municipal sewage and storm water drainage must be safely managed
- Recycle and reuse of treated sewage for non-potable applications should be implemented wherever possible
- Solid waste collected and disposed-off fully and safely
- Services to the poor and systems for sustaining results
- Improved public health outcomes and environmental standards.

The objective of public waste water collection and disposal system is to ensure that sewage or excreta and sullage discharged from community is properly discharged, collected, transported, treated to the required level of degree and finally disposed-off without causing any health or environmental problems<sup>161</sup>.

As per CPHEEO manual, 80% of water supply may be expected to reach the sewers however it recommends designing the system by considering minimum wastewater flow of 100 litres per capita per day.

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<sup>161</sup>Further details area also available in National Mission on sustainable Habitat, Adaptation & Mitigation Measures in the felid of Water supply & Sanitation, CPHEEO, MoUD

Table 8.37: Recommended Design Period for Sewerage Systems Components

S.No	Component	Recommended Design Period (Years)	Clarification
1	Collection system i.e. Sewer Network	30	The system should be designed for the prospective population of 30 years, as its replacement is not possible during its use.
2	Pumping Stations (Civil Works)	30	Duplicating machinery within pumping station would be easier/cost of civil works will be economical for full design period.
3	Pumping Machinery	15	Life of pumping machinery generally 15 years
4	Sewerage Treatment Plant	30	The construction may be in a phased manner as initially the flows may not reach the designed levels and it will be uneconomical to build the full capacity plant initially.
5	Effluent Disposal and Utilisation	30	Provision of design capacities in the initial stages itself is economical.

Source: Manual on Sewerage and Sewage Treatment, CPHEEO.

### 8.3.2.2. Decentralised Wastewater Management System (DWMS)

DWWM has emerged over the period of time, which reduces the load of centralised wastewater treatment unit. As per MoUD<sup>162</sup>, Decentralized wastewater management may be defined as “the collection, treatment, and disposal/reuse of wastewater from individual homes, clusters of homes, isolated communities, industries, or institutional facilities, as well as from portions of existing communities at or near the point of waste generation”. In case of decentralized systems, both solid and liquid fractions of the wastewater are utilized near the point of its origin, except in some cases when a portion of liquid and residual solids may be transported to a centralized point for further treatment and reuse.

MoUD (Guidelines for Decentralised Waste Water Management, MoUD 2012) in association with Indian Institution of Technology (IIT)Madras has developed guidelines on DWWM, which recommends 15 years of design period for DWWM, if possible. Another way to design a DWWM is to estimate the present day capacity and plan the system for an additional 20% capacity. Further, the detailed guidelines as mentioned in Draft Manual on Sewerage and Sewage Treatment of CPHEEO (December 2013) can be referred while developing DWWM units in a city which elaborates siting criteria, components and other design consideration including wastewater characteristics and waste water treatment.

### 8.3.2.3. Centralized vis-a-vis Decentralized Sewage Treatment Systems

While the conventional sewerage may be a comprehensive system for sewage collection and transport, it also remains as a highly resource-intensive technology. Consequently, high capital cost, and significant O&M cost of this system inhibits its

<sup>162</sup>Guidelines for Decentralized Wastewater Management.

widespread adoption in all sizes of urban areas. The implementation of Centralized Wastewater Management System (CWMS) should not be considered as the only option available for collection, transportation and treatment of sewage. There are certain factors, which govern the selection of options between CWMS and DWMS.

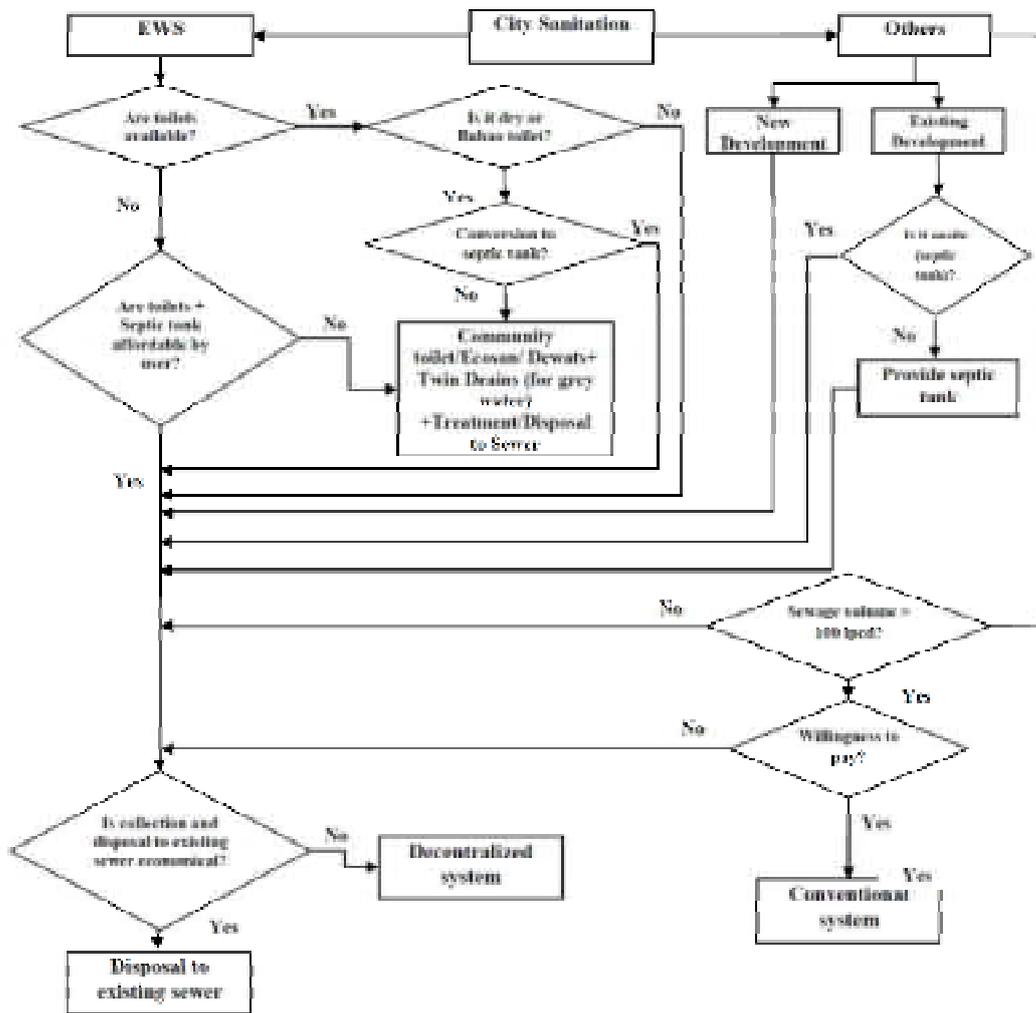
Recognizing the many applications and benefits of sewage reuse, some important points may be kept in view such as;

- (i) Review of the impact of the population growth rate
- (ii) Review of potential water reuse applications and water quality requirements
- (iii) Review of appropriate technologies for sewage treatment and reuse
- (iv) Considering the type of management structure that will be required in the future and
- (v) Identification of issues that must be solved to bring about water reuse for sustainable development on a broad scale.

***It has been emphasized that if sewage from the urban and semi urban areas were reused for a variety of non-potable uses, the demand on the potable water supply would be reduced.***

The choice of appropriate technology also depends on several factors such as composition of sewage, availability of land, funds and expertise. Different operation and maintenance options have to be considered with respect to sustainable plant operation, the use of local resources, knowledge and manpower. A flow diagram showing the decision making steps is given in figure 8.3.

Figure 8.3: Decision Tree: Selecting the wastewater management system (Onsite, Decentralized or Conventional)



Source: Guidelines for Decentralized Wastewater Management, MoUD.

### 8.3.2.4. Effluent Standards

As per MoEF, the general effluent standards for discharging the waste water are given in table below:

Table 8.38: General Effluent Standards for Discharge

S No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for Irrigation	Marine Coastal areas
1	Colour and Odour	All efforts should be made to remove colour and unpleasant odour as far as practicable			
2	Suspended Solids mg/g, Max.	100	600	200	For process waste water 100
					For cooling water effluent 10 per cent above total suspended matter of influent.

S No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for Irrigation	Marine Coastal areas
3	Particulate size of suspended solids	Shall pass 850 micron IS Sieve	-	-	(a) Floatable solids, max. 3 mm  (b) Settle-ablesolids, max. 850 microns
4	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	Shall not exceed 50C above the receiving water temperature	-	-	Shall not exceed 50C above the receiving water temperature.
6	Oil and grease mg/l, Max.	10	20	10	20
7	Total residual chlorine mg/m, Max	1.0	-	-	1.0
8	Ammonical nitrogen (as N), mg/l, Max.	50	50	-	50
9	Total Kjeldahl Nitrogen (as NH <sub>3</sub> ), mg/l, Max	100	-	-	100
10	Free Ammonia (as NH <sub>3</sub> ), mg/l, Max.	5.0	-	-	5.0
11	Biochemical Oxygen demand (3 days at 270C), mg/l, Max.	30	350	100	100
12	Chemical Oxygen Demand, mg/l, Max.	250	-	-	250
13	Arsenic (as As), mg/l, Max.	0.2	0.2	0.2	0.2
14	Mercury (as Hg), mg/l, Max.	0.01	0.01	-	0.01
15	Lead (as Pb), mg/l, Max	0.1	1.0	-	2.0
16	Cadmium (as Cd), mg/l, Max	2.0	10	-	2.0
17	Hexavalent Chromium (as Cr+6), mg/l, Max.	0.1	2.0	-	1.0
18	Total Chromium (as Cr.), mg/l, Max.	2.0	2.0	-	2.0
19	Copper (as Cu), mg/l, Max.	3.0	3.0	-	3.0
20	Zinc (as Zn.), mg/l, Max	5.0	15	-	15
21	Selenium (as Se) mg/l, Max	0.05	0.05	-	0.05

S No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for Irrigation	Marine Coastal areas
22	Nickel (as Ni), mg/l, Max	3.0	3.0	-	5.0
23	Cyanide (as CN), mg/l, Max	0/2	2.0	0.2	0.2
24	Fluoride (as F), mg/l, Max	2.0	15	-	15
25	Dissolved Phosphates (as P), mg/l, Max	5.0	-	-	-
26	Sulphide (as S), mg/l, Max	2.0	-	-	5.0
27	Phenolic compounds (as CSHS OH, mg/l, Max	1.0	5.0	-	5.0
28	Radioactive materials:				
a	Alpha emitter micro curie/ml	10-7	10-7	10-8	10-7
b	Beta emitter micro curie/ml	10-6	10-6	10-7	10-6
29	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
30	Manganese (as Mn)	2 mg/l	2 mg/l	-	2 mg/l
31	Iron (as Fe)	3 mg/l	3 mg/l	-	3 mg/l
32	Vanadium (as V)	0.2 mg/l	0.2 mg/l	-	0.2 mg/l
33	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l

Source: Environment Protection Act, 1986.

### 8.3.2.5. Recommended norms for Sewage and its uses

The recommended treated sewage quality is proposed to be achieved for the stated reuse as given in the table below:

Table 8.39: Recommended upper limits of treated Sewage quality for specified activities at point of use

S.No.	Parameter	Toilet flushing	Fire Protection	Vehicle Exterior washing	Non-contact impoundments	Landscaping, Horticulture & Agriculture			
						Crops which are eaten			
						Horticulture, Golf Course	Non edible crops	Raw	Cooked
1	Turbidity (NTU)	<2	<2	<2	<2	<2	AA	<2	AA
2	SS	Nil	Nil	Nil	Nil	Nil	Nil	Nil	30
3	TDS	2100							
4	pH	6.5 to 8.3							
5	Temperature °C	Ambient							
6	Oil & Grease	10	Nil	Nil	Nil	10	10	Nil	Nil
7	Minimum Residual Chlorine	1	1	1	0.5	1	Nil	Nil	Nil
8	Total Kjeldahl Nitrogen as N	10	10	10	10	10	10	10	10
9	BOD	10	10	10	10	10	20	10	20
10	COD	AA	AA	AA	AA	AA	AA	AA	30
11	Dissolved Phosphorous as P	1	1	1	1	2	5	2	5
12	Nitrate Nitrogen as N	10	10	10	5	10	10	10	10
13	Faecal Coliform in 100 ml	Nil	Nil	Nil	Nil	Nil	230	Nil	230
14	Helminthic Eggs/litre	AA	AA	AA	AA	AA	<1	<1	<1
15	Colour	Colourless	Colourless	Colourless	Colourless	Colourless	AA	Colourless	Colourless
16	Odour	Aseptic which means not septic and no foul odour							

Source: Draft Manual on Sewerage and Sewage Treatment Systems, CPHEEO 2013.

In order to achieve desired water quality, excess chlorination, granular activated carbon adsorption / Ozonation and/ or various kind of filtration including membrane are recommended. For recreational impoundments for non-human contact, residual chlorine is not required so as to protect aquatic species of flora and fauna.

As per the Manual of Sewerage and Sewage Treatment, the following provisions are to be followed for usage of treated sewage, sludge and biogas utilization:

- a. Reuse of treated sewage should be taken up after discussions between ULB, water boards, PHEDs / Jal Nigams and the public, as the case may be. Various possible reuse methods such as farm forestry, greenbelt development and lawns in road medians.
- b. Utilization of sludge in public areas is not possible due to issues of public acceptance and hence it is best to focus on farm forestry.
- c. Utilization of alternative energy, like in plant energy to be harnessed from bio-methanation and to evaluate the ambient temperature suitability or hearing of sludge vs economics.
- d. Reuse of treated sewage to a minimum extent of 20% by volume shall be mandatorily explored and the proposed use for achieving this 20% target shall mandatorily form part of the CSP.
- e. Utilization of sludge as a construction material (as porous pavement, bricks etc.)

### 8.3.2.6. Recycling of Waste Water

Various sewage treatment technologies, given below, are adopted in sewerage system to treat wastewater up to secondary level, as per the effluent standards in India as well as in other parts of the world. These technologies are:

1. Activated Sludge Process (ASP)
2. Waste Stabilisation Pond Systems (WSPS)
3. Upflow Anaerobic Sludge Blanket Process (UASB)
4. Duckweed Pond System (DPS)
5. Facultative Aerated Lagoon (FAL)
6. Trickling Filter (TF)
7. Biological Filtration and Oxygenated reactor (BIOFOR) Technology
8. High rate Activated Sludge Biofor-F Technology
9. Fluidized Aerated Bed (FAB)
10. Submerged Aeration Fixed Film (SAFF) Technology
11. Cyclic Activated Sludge Process (CASP)

The salient features and comparison of these technologies in terms of their applicability, land requirement, capital cost and operation and maintenance (O&M) cost are given in table below.

Table 8.40: Fact Sheet for Various Treatment Process

S.No.	Recycling Technique	Applicability	Land Requirement (Per MLD in Hectares)	Capital Cost (per MLD in INR)	O&M Cost (Million/Year/MLD)
1	Activated Sludge Process (ASP)	<ul style="list-style-type: none"> <li>■ The most widely used option for treatment of domestic wastewater for medium to large towns where land is scarce.</li> </ul>	0.15-0.25	2 – 4	0.3 – 0.5
2	Waste Stabilisation Pond Systems (WSPS)	<ul style="list-style-type: none"> <li>■ In warm conditions</li> <li>■ Easy land availability</li> <li>■ Where power supply is expensive, low or unreliable.</li> <li>■ Where social preference for aquaculture</li> </ul>	0.8-2.3	1.5 – 4.5	0.06 – 0.1
3	Upflow Anaerobic Sludge Blanket Process (UASB)	<ul style="list-style-type: none"> <li>■ The suitability of this technology may be doubtful as a standalone secondary treatment option</li> </ul>	0.2-0.3	2.5 – 3.6	0.08 – 0.17
4	Duckweed Pond System (DPS)	<ul style="list-style-type: none"> <li>■ Low strength domestic wastewater after sedimentation with influent BOD &lt; 80 mg/L</li> </ul>	2-6	1.5 – 4.5	0.18

S.No.	Recycling Technique	Applicability	Land Requirement (Per MLD in Hectares)	Capital Cost (per MLD in INR)	O&M Cost (Million/Year/MLD)
		<ul style="list-style-type: none"> <li>In combination with existing WSP</li> <li>Easy land availability</li> <li>As a polishing pond for an existing activated sludge plant or other technology based STPs.</li> </ul>			
5	Facultative Aerate Lagoon (FAL)	<ul style="list-style-type: none"> <li>Standalone system</li> <li>As a pre-treatment unit for WSP</li> <li>As an upgradation option for overloaded WSPs.</li> </ul>	0.27-0.4	2.2 – 2.9	0.15 – 0.2
6	Trickling Filter (TF)	<ul style="list-style-type: none"> <li>Standalone system if operated at slow rates</li> <li>As a high rate roughing filter for high BOD waste water</li> <li>In combination with ASP</li> </ul>	0.25-0.65	Not available, but slightly lower than ASP	
7	Biological Filtration and Oxygenated reactor (BIOFOR) Technology	-	0.04	6.5 – 8.1	0.86
8	High rate Activated Sludge Biofor -F Technology	-	0.08	5.2	0.18
9	Fluidized Aerated Bed (FAB)	<ul style="list-style-type: none"> <li>Small to medium flows in congested locations</li> <li>Sensitive locations</li> <li>Decentralised approach</li> <li>Reliving existing overloaded STPs.</li> </ul>	0.06	3 – 5	0.6 – 0.75
10	Submerged Aeration Fixed Film (SAFF) Technology	<ul style="list-style-type: none"> <li>Small to medium flows in congested locations</li> <li>Sensitive locations</li> <li>Decentralised approach</li> <li>Reliving existing overloaded trickling filters</li> </ul>	0.05	7	1.14
11	Cyclic Activated Sludge Process (CASP)	<ul style="list-style-type: none"> <li>Small to medium flows in congested locations</li> <li>Sensitive locations</li> <li>Decentralised approach</li> <li>Reliving existing overloaded trickling filters</li> </ul>	0.1-0.15	Not Available	Expected to be higher than ASP

Source: Compendium of Sewage Treatment Technologies, National River Conservation Directorate, MOEF, 2009.

Land availability plays an important role in providing such facilities. Land requirement may vary based on the technology adopted for sewage treatment. However, it is evident to mark the required land on development plan. It is recommended to decide the most suitable technology in advance based on the various parameters as given in Appendix L of Volume II B.

### 8.3.2.7. Septage Management – Planning and Implementation<sup>163</sup>

For effective septage management plan, robust data on septage arrangements, their quantity and locations of its generation etc. are required. The ULBs would need to make arrangements to collect baseline data, like type of latrine disposal, effluent disposal arrangement, size, age, when it was last cleaned, access to the on-site

<sup>163</sup> Advisory Note – Septage Management in Urban India, 2013, MoUD.

system, arrangement for disposal of effluent, if any of existing installations, to plan for workable de-sludging schedules. It is advisable to divide the city into different sanitary zones (if not already done) and carry out the baseline survey in one or a few of these zones, pilot de-sludging area wise schedules to learn operational issues and devise solutions, before up-scaling to the entire ULB can be taken up. The selection of zone could be based on availability of septage disposal sites – existing STPs could be potential septage disposal/application sites or trenches provided in solid waste landfill sites or suitable urban forestry sites where the septage trenches would serve to fertilize the plants. In order to be economical and financially competitive, it is suggested that households in demarcated septage management zone should be within 20 to 30 km travel distance from the identified treatment and disposal sites.

Further a two-step process is to be followed for selection of the treatment system:

1. To determine the appropriate treatment option on the basis of size of town, land availability, proximity/availability of sewage treatment plants and proximity to residential areas; and
2. To conduct a techno-economic feasibility to choose the most appropriate technology on the basis of capital, operations and maintenance costs.

The steps in planning and implementing septage management are given below:

3. Collect data on the households and other properties with on-site arrangements in the city.
4. List out the municipal, private and other septic tank/pit cleaning services active in the city
5. Identify catchment-wise land for septage treatment facility such as use existing STP where available; or acquire land if not available for construction of septage treatment facility
6. Formulate draft regulations for septage management
7. Choose technology for septage treatment: prepare design of Septage Treatment and Disposal Facility (STDF) along with operations and maintenance costs
8. Conduct techno-economic feasibility of the STDF
9. Implement construction of septage management and disposal facility
10. Purchase vehicles and vacuum trucks etc.
11. Launch awareness campaign
12. Initiate training and capacity building
13. Provide cleaning services incrementally in areas completing surveys of tanks and pits.

Further, the guidelines for selection of Septage management disposal system are summarized in **Table 8.41**.

Table 8.41: Guidelines for the selection of Septage disposal system

Town / Category	Conditions	Recommended Technologies	Capital Cost	O&M Cost	Management
Unsewered Class-III, IV and V towns and rural communities	Remote land area available with suitable site and soil condition	Sludge drying beds and waste stabilization pond	Low	Low. User fees to recover O&M costs	Municipality or private (if implemented by private sector through a management contract)
	Land available but close to settlements	Lime stabilization, sludge drying beds and waste stabilization pond	Low to medium	Low to medium. User fees to recover O&M costs	Municipality or private (if implemented by private sector through a management contract)

Town / Category	Conditions	Recommended Technologies	Capital Cost	O&M Cost	Management
	Inadequate land area with unsuitable site and soil condition, but available STP capacity within 20-30 km distance	Disposal at STP	Low to medium	Low to medium. User fees to recover O&M costs	Municipality
Partially sewered medium size (Class-II Towns)	Land area available with suitable site and soil condition but close to settlements	Lime, stabilization, sludge drying beds and waste stabilization pond	Low to medium	Low to medium. User fees to recover O&M costs	Municipality or private (if implemented by private sector through a management contract)
	Inadequate land area, but available STP capacity	Disposal at STP	Medium	Medium. User fees to recover O&M costs	Municipality or private (if implemented by private sector through contract)
	Inadequate land area; no available STP capacity	Disposal at independent mechanical treatment facility	High	High. User fees to recover O&M costs	Municipality or private (if implemented by private sector through a management contract)
Class-I and metro cities	Available STP capacity	Disposal at STP	Medium	Medium. User fees to recover O&M costs	Municipality or private (if implemented by private sector through a management contract).
	No available STP capacity	Disposal at independent mechanical treatment facility	High	High. User fees to recover O&M costs	Municipality or private (if implemented by private sector through a management contract).

Source: Advisory Note – Septage Management in Urban India, MoUD 2013.

### 8.3.2.8. Recommended Norms for Public Toilets in Public Area

The general standard/guidelines for public toilets in public area and modified norms for public toilets in public places and roads recommended in the draft CPHEEO manual are given below.

Table 8.42: Norms for Public Toilets in Public Area

TYPE	Norms for Toilets
Public Toilet	On roads and for open areas: @ every 1 Km, including in parks, plaza, open air theatre, swimming area, car parks, and fuel stations. Toilets shall be disabled-friendly and in 50-50 ratio (M/F). Provision may be made as for Public Rooms.
Signage	Signboards on main streets shall give directions and mention the distance to reach the nearest public convenience of visitors. Helpline number shall be pasted on all toilets for complaints/queries.
Modes	Pay and use or free. In pay and use toilets entry is allowed on payment to the attendant or by inserting coin and user gets 15-20 minutes.
Maintenance/Cleaning	The toilet should have both men and women attendants. Alternatively automatic cleaning cycle covering flush, toilet bowl, seat, hand wash basin, disinfecting of floor and complete drying after each use can be adopted, which takes 40 seconds. Public toilets shall be open 24 hours.

Source: Draft Manual on Sewerage and Sewage Treatment Systems, CPHEEO 2013.

### 8.3.3. Drainage

As per CPHEEO manual on Sewerage and Sewage Treatment System, sanitary sewers are not expected to receive storm water. Strict inspection, vigilance, proper design and construction of sewers and manholes should eliminate this flow or bring it down to a very insignificant quantity. Therefore, it is evident to plan a separate system to carry storm water.

#### 8.3.3.1. Estimation of Storm water runoff

During rainfall periods there can be a considerable amount of storm water that does not infiltrate into the ground surface and most of this becomes the excess overland flow or direct surface runoff. There are many contributing factors for analysing the quantity and temporal variations of this flow; these include geology of the land, topography, geography, rainfall intensity and pattern and the land use type.

Estimation of such runoff reaching the storm sewers, is dependent on the intensity and duration of precipitation, characteristics of the tributary area and the time required for such flow to reach the sewer. There are various methods available to calculate the runoff, the two of the below mentioned methods can be adopted to calculate runoff:

1. Rational Method
2. Kirpich Equation Method

#### Rational Method

It is based on the assumption that the entire precipitation over the drainage district does not reach the sewer. The characteristics of the drainage district, such as, imperviousness, topography including depressions and water pockets, shape of the drainage basin and duration of the precipitation determine the fraction of the total precipitation which will reach the sewer. This fraction known as the **coefficient of run-off** needs to be determined for each drainage district.

The National Disaster Management Authority (NDMA) guidelines on urban flood management has prescribed that “all future storm water drainage systems for peak flow for any city should be designed after taking into consideration a runoff Coefficient of up to 0.95<sup>164</sup> using the rational method. The runoff reaching the sewer is given by the expression,

$$Q = 10 C i A$$

- Where Q is the runoff in m<sup>3</sup>/hr;
- C is the coefficient of runoff
- i is the intensity of in mm/hr and
- A is the area drainage district in hectares.

<sup>164</sup>Source: National Disaster Management Guidelines- Urban Flood management, 2010.

It may be reiterated that Q represents only the maximum discharge caused by a particular storm.

The portion of rainfall, which finds its way to the sewer is dependent on the imperviousness and the shape of the drainage area apart from the duration of storm. The percentage of imperviousness of the drainage area can be obtained from the records of a particular district. In the absence of such data, the table below may serve as a guide.

**Table 8.43: Runoff coefficients for stated surfaces**

S. No.	Type of Area	Percentage of Imperviousness
1	Commercial and Industrial Area	70-90
2	Residential Area	
	- High Density	61-75
	- Low Density	35-60
3	Parks and undeveloped areas	10-20

Source: NDMA.

When several different surface types or land use which comprise the drainage area, a composite or weighted average value of the imperviousness runoff coefficient can be computed, such as:

$$I = 1/A \times (A_1 \times I_1 + A_2 \times I_2 + A_3 \times I_3 + \dots + A_n \times I_n)$$

Where, the subscripts refer to respective sub-drainage area types, and 'A' is the total drainage area.

**Kirpich Equation Method<sup>165</sup>**

The time of concentration is defined as the time it takes for a drop of water in the remotest point in a drainage basin to travel to the outlet. As calculation methods go, the Kirpich formula is one of the most widely used methods.

$$T_c = 0.01947 \times L^{0.77} \times S^{-0.385}$$

Where:

- $T_c$  = Time of concentration (hours)
- L = Maximum length of water travel (m)
- S = surface slope, given by H/L (m/m)
- H = difference in elevation between the remotest point in the drainage basin and the outlet (m)

The Kirpich equation is normally used for natural basins with well-defined channels. If there are many undefined channels that are grassed or vegetated throughout, the Kirpich formula will likely underestimate the time of concentration, and so a factor of 1.3 – 1.5 should be added. If most of the drainage basins are non-natural (in urban system) with concrete or other smooth channels, the result should be decreased about 40 – 60%.

**8.3.4. Rain Water Harvesting**

Rain water harvesting and conservation is the activity of direct collection of rain water. The conservation of rain water so collected can be stored for direct use or can be recharged into the ground water. The main goal is to minimise flow of rain water

<sup>165</sup>K Subramanyapg 247,45.

through drains / *nallahs* to the rivers. It is a known fact that the ground water level is depleting and has gone down in the last decades. Thus the rain water harvesting and conservation aims at optimum utilisation of the natural resource i.e. rain water<sup>166</sup>. *Many states such as Tamil Nadu<sup>167</sup>, Kerala<sup>168</sup>, and Delhi<sup>169</sup> etc. have made mandatory the adoption of rainwater harvesting in new constructions. It is suggested to all the other States to mandate rainwater harvesting in all their new construction works. Also, continuous monitoring of the performance of the rainwater harvesting structures is also recommended.*

#### 8.3.4.1. Basic requirement of artificial recharge<sup>170</sup>

- A. Availability of non-committed runoff in space and time;**
- B. Identification of suitable hydrogeological environment and sites for augmenting subsurface reservoir through cost effective artificial recharge techniques.**

If the above mentioned criteria are satisfied, the following criteria need to be evaluated for planning the artificial recharge scheme:

- C. Identification of Area**
  - Areas where ground water levels are declining on regular basis.
  - Areas where substantial amount of aquifer has already been desaturated.
  - Areas where availability of ground water is inadequate in lean months.
  - Areas where salinity ingress is taking place.
  - Urban Area where decline in water level is observed.
- D. Hydrometeorological studies**
  - Rainfall pattern in the area.
  - Evaporation losses from the area.
  - Climatological features that effect the planning of artificial recharge.
- E. Hydrological studies**
  - In-situ precipitation on the watershed.
  - Surface (canal) supplies from large reservoirs located within basin.
  - Surface supplies through trans-basin water transfer.
  - Treated municipal and industrial wastewaters.
  - Hydrological investigations are to be carried out in the Watershed/Sub-basin/basin for determining the source water availability.
- F. Soil infiltration studies**
  - Control the rate of infiltration.
  - Prerequisite study in cases of artificial recharge through water spreading methods.
  - Infiltration rates can be estimated by soils infiltration tests using Cylinder or flood infiltro-meters instruments.
- G. Hydrogeological studies**
  - Firstly, to synthesize all the available data on hydrogeology from different agencies.
  - Study of satellite imagery for identification of geomorphic units.
  - Regional Hydrogeological maps indicating hydrogeological units, both at shallow and deeper levels.
  - Water table contours to determine the form of the water table and the hydraulic connection of ground water with rivers, canals etc.

<sup>166</sup> Manual on Rain Water harvesting and Conservation, CPWD.

<sup>167</sup>Tamil Nadu Municipal Laws Ordinance, 2003.

<sup>168</sup>The Kerala Municipality Building Rules, 1999.

<sup>169</sup>Central Ground Water Board.

<sup>170</sup> Guide on Artificial Recharge to Ground Water, CGWB.

- Depths to the water table (DTW) for the periods of the maximum, minimum and mean annual position of water table.
- Ground water potential of different hydrogeological units and the level of ground water development.

### H. Aquifer Geometry

- Data on the sub-surface hydrogeological units, their thickness and depth of occurrence
- Disposition and hydraulic properties of unconfined, semi-confined and confined aquifers in the area

### I. Chemical Quality of Source Water

- Quality of raw waters available for recharge is determine
- Treatment before being used for recharge
- Relation to the changes in the soil structure and the biological phenomena which take place when infiltration begins
- Changes expected to the environmental conditions.

## 8.3.4.2. Artificial Recharge Techniques<sup>171</sup>

A variety of methods have been developed to recharge ground water. Most of the artificial recharge techniques are briefly described below:

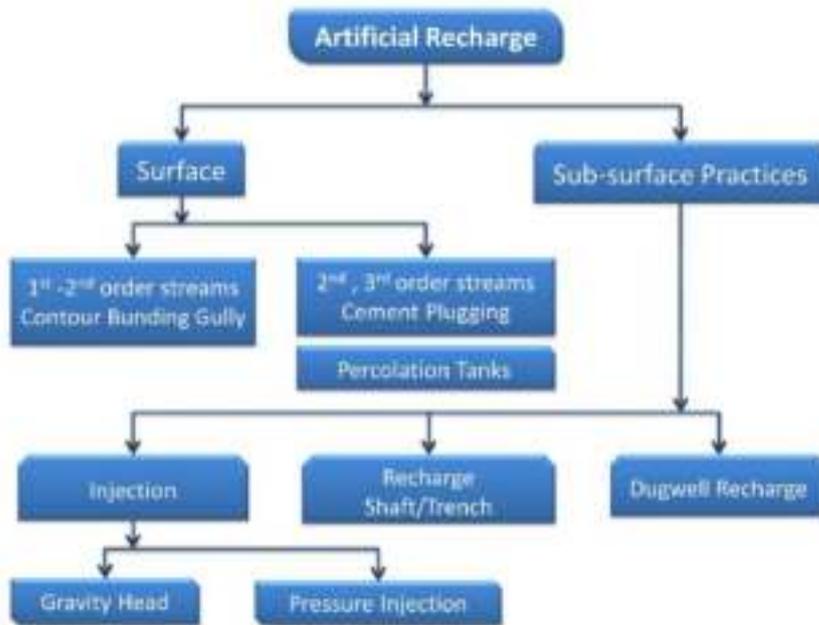
1. Direct surface techniques, by -
  - Flooding
  - Basins or percolation tanks
  - Stream augmentation
  - Ditch and furrow system
  - Over irrigation
2. Direct sub surface techniques, by -
  - Injection wells or recharge wells
  - Recharge pits and shafts
  - Dug well recharge
  - Bore hole flooding
  - Natural openings, cavity fillings.
3. Combination surface – sub-surface techniques, by -
  - Basin or percolation tanks with pit shaft or wells.
4. Indirect Techniques, by -
  - Induced recharge from surface water source.
  - Aquifer modification

Although no two projects are identical, most use variation or combination of direct method, direct sub-surface, or indirect techniques. A schematic diagram of the artificial recharge methods used is given as flowchart below.

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<sup>171</sup> Select Case Studies Rain Water Harvesting and Artificial Recharge, Central Ground Water Board

Figure 8.4: Flowchart showing the various Artificial Recharge Practices



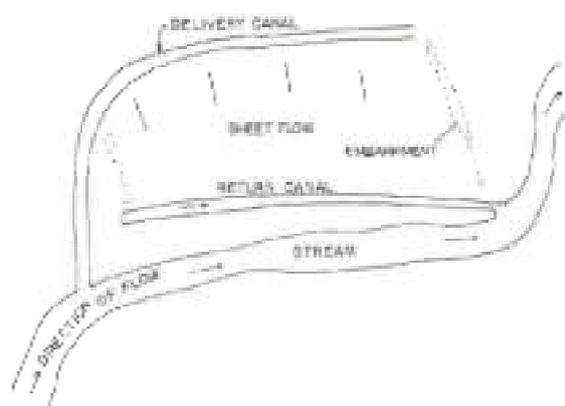
Source: Manual on Artificial Recharge of Groundwater, Ministry of Water Resources, CGWB.

The brief on artificial recharge methods has been given below. These methods and detailed methodology has been explained in ‘Manual on Artificial Recharge of Groundwater’<sup>172</sup>, prepared by Ministry of Water Resources, Central Ground Water Board (CGWB).

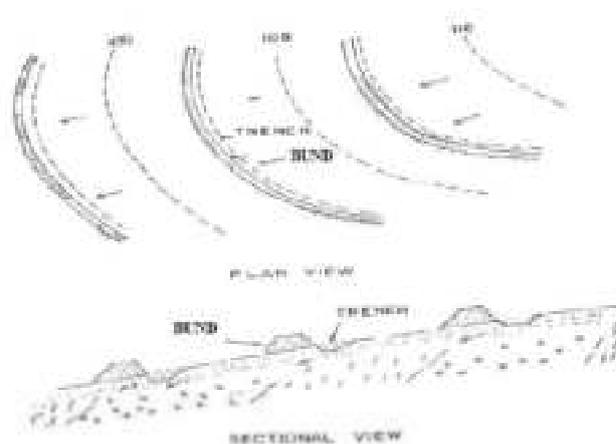
1. Ditch and Furrow Method
2. Lateral Ditch Pattern
3. Dendritic Pattern
4. Contour Pattern
5. Spreading Basin or Percolation Tanks
6. Gully Plug / Check Dam / Nala Bund / Gabbion Structures
7. Dug Well Recharge
8. Recharge Shafts / Pits / Trenches
9. Artificial Recharge through Injection Well
10. Induced Recharge from Surface Water Sources
11. Subsurface Dykes / Underground Bandharas

<sup>172</sup>[www.cgwb.gov.in](http://www.cgwb.gov.in)

Figure 8.5: Ditch and Furrow Method

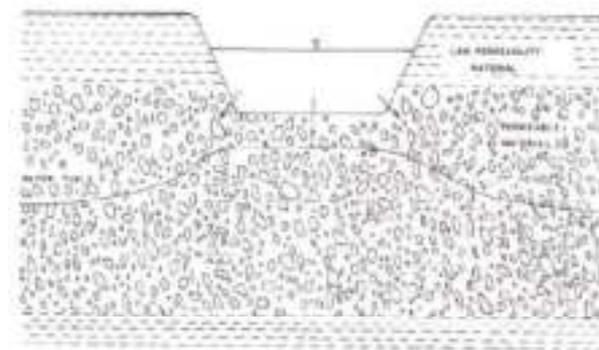


Source: Manual on Artificial Recharge of Ground Water  
Figure 8.7: Contour Pattern

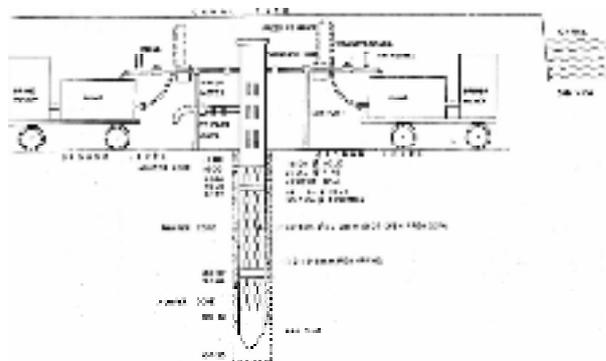


Source: Manual on Artificial Recharge of Ground Water

Figure 8.6: Recharge Pit:



Source: Manual on Artificial Recharge of Ground Water  
Figure 8.8: Injection well:



Source: Manual on Artificial Recharge of Ground Water

### 8.3.5. Electricity

Based on the estimated requirements of power supply as per the National Electricity Policy published in 2005, the recommended consumption is 1000 units per Capita per year or 2.74 kWh per capita per day demand which included domestic, commercial, industrial and other requirements.

The actual estimation of power can be made based on the industrial development (type and extent), commercial development, domestic and other requirements. The provision of one electric substation of 11KV for a population of 15,000 can be considered as general standard for electricity distribution.

Ministry of New and Renewable Energy has come out with strategic plan for new and renewable energy sector for the period 2011-17. Ministry has identified local bodies as one of the main users who can be encouraged to utilise energy from biomass and urban waste etc. A National Rating System - GRIHA has been developed, to promote green buildings, which is suitable for all types of buildings in different climatic zones of the country. A green building designed through solar passive concepts and including active renewable energy systems can save substantial

conventional energy apart from generating energy for meeting various requirements in different seasons.

### 8.3.6. Solid Waste Management

Municipal Solid Waste (MSW) is the trash or garbage that is discarded day to day in a human settlement. According to MSW Rules 2000 MSW includes commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes. Waste generation encompasses activities in which materials are identified as no longer being of value (being in the present form) and are either thrown away or gathered together for disposal. The following table indicates the waste generation per capita per day for estimation and forecast of waste generation for future for planning purposes:

Table 8.44: Waste Generation Per Capita per Day

S.No.	Land use type	Estimated waste generation
1	Residential refuse	0.3 to 0.6 kg/cap/day
2	Commercial refuse	0.1 to 0.2 kg/cap/day
3	Street sweepings	0.05 to 0.2 kg/cap/day
4	Institutional refuse	0.05 to 0.2 kg/cap/day

Source: Manual on Solid Waste Management, CPHEEO – 2000

#### 8.3.6.1. Systematic process

Municipal Solid Waste Management (MSWM) refers to a systematic process that comprises of waste segregation and storage at source, primary collection, secondary storage, transportation, secondary segregation, resource recovery, processing, treatment, and final disposal of solid waste. For effective MSWM following steps should be followed, hence appropriate considerations should be made at planning stage. To meet zero waste / landfill site, the complete SWM systematic process could be followed to reduce waste disposal at landfill site or no disposal at all. Some of the best practices of solid waste management are given in Appendix M of Volume II B for reference. GIS/GPS/ICT techniques for Solid Waste Management need to be used for Landfill site selection, site assessment of illegal dump-sites, routing efficiency for solid waste collection and monitoring waste collection performance.

#### 8.3.6.2. Storage of waste

Storage of waste at source is the first essential step of Solid Waste Management. Every household, shop and establishment generates solid waste on day-to-day basis. The waste should normally be stored at the source of waste generation till collected for its disposal.

Biodegradable waste and non-bio-degradable waste should be collected in separate bins from the source.

- Green coloured bins – Waste bins for biodegradable waste

- White coloured bins – storage of recyclable wastes
- Black coloured bins – storage of other wastes

### 8.3.6.3. Primary collection of waste

Primary collection of waste is the second essential step of Solid Waste Management activity. Primary collection system is necessary to ensure that waste stored at source is collected regularly and it is not disposed of on the streets, drains, water bodies, etc.

Local bodies should arrange for the primary collection of waste stored at various sources of waste generation by any of the following methods or combination of more than one method:

- Doorstep collection of waste through non-motorised and motorised vehicles with active community participation.
- Collection through community bins
- Doorstep or lane-wise collection of waste from authorised/unauthorised slums or collection from the community bins to be provided in the slums by local bodies

### 8.3.6.4. Waste Storage Depots

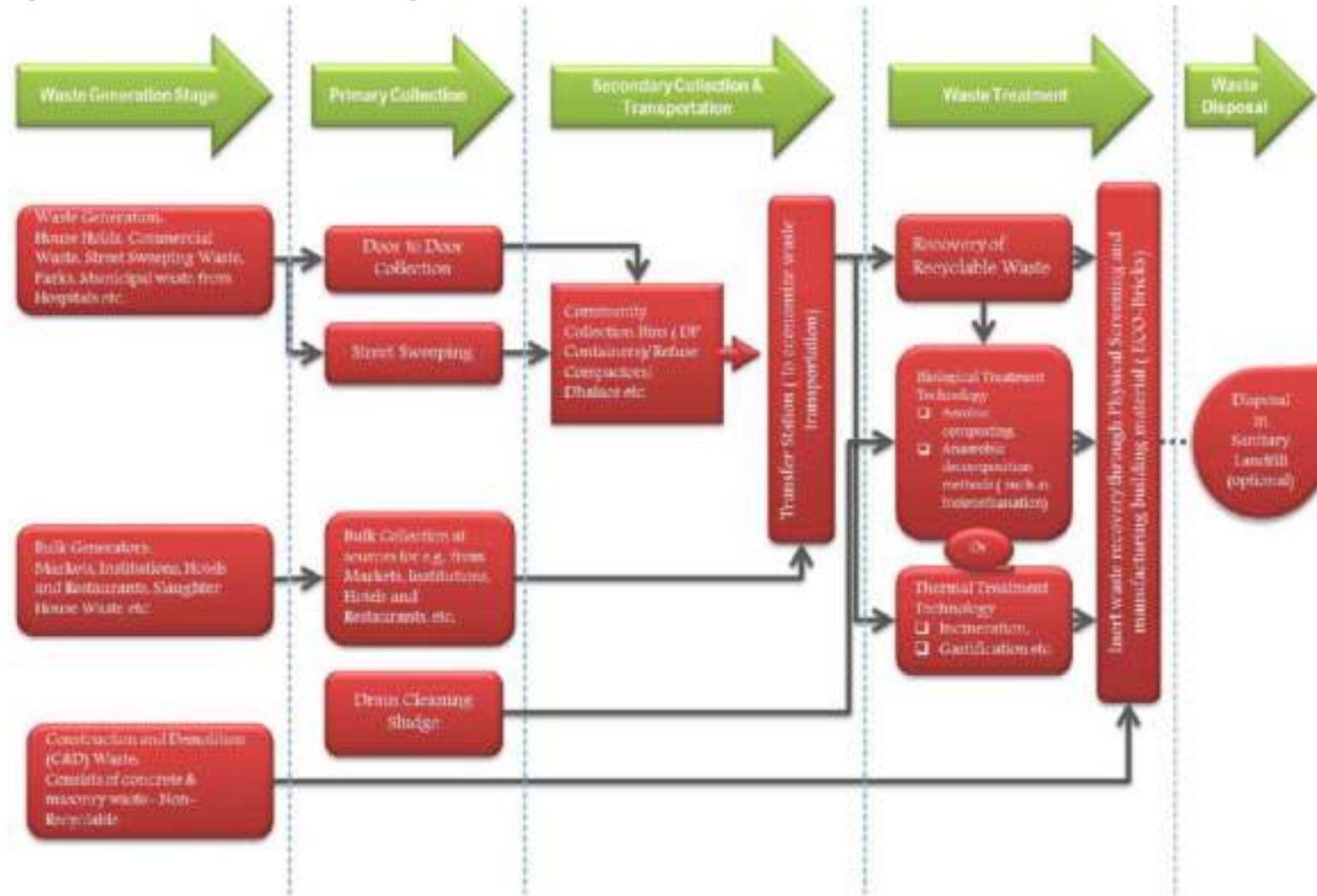
This is the third essential step for an appropriate Solid Waste Management System. All the waste collected through Primary Collection System, from the households, shops and establishments has to be taken to the processing or disposal site either directly necessitating a large fleet of vehicles and manpower or through cost effective systems which are designed to ensure that all the waste collected from the sources of waste generation is temporarily stored at a common place called "Waste Storage Depots" and then transported in bulk to the processing or disposal sites. Such temporary arrangement for storage of waste is popularly known as dust bin, dhalavs, etc. This facility has to be so designed that the system synchronizes with the system of primary collection as well as transportation of waste. Locations for bins/depots of appropriate size should be identified at planning stage.

### 8.3.6.5. Transportation of the waste

Transportation of the waste stored at waste storage depots at regular intervals is essential to ensure that no garbage bins/containers overflow and waste does not litter on the streets. Hygienic conditions can be maintained in cities/towns only if regular clearance of waste from temporary waste storage depots (bins) is ensured. Transportation system has to be so designed that it is efficient, yet cost effective. The system should synchronize with the system of waste storage depot and should be easily maintainable.

The schematic diagram of SWM process is shown in Figure 8.9. The detailed description of above mentioned stages are given in Manual on Municipal Solid Waste Management, CPHEEO.

Figure 8.9: Schematic Solid Waste Management Process



Source: Modified from the Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission, MoUD.

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### 8.3.6.6. Solid Waste Treatment<sup>173</sup> Technologies

There are various technologies available for treatment and processing of waste in an environmentally sound manner. However, a technology suitable for one may not be appropriate for others. The comparison of these technologies is shown in table below:

Table 8.45: Comparison of Different Solid Waste Treatment Technologies

Element	Composting	Refuse derived fuel	Biomethanation	Gasification / Pyrolysis	Incineration
Technically and economically feasible size of operation per day fresh waste	50 TPD and above	100 TPD and above	1 TPD at small scale and above 50 TPD at larger scales of pure organic waste	500 TPD and above. Due to high moisture in our waste, suitable only for segregated dry waste.	500 TPD and above due to high moisture in our waste. Suitable only for segregated waste. However, sizes as small as 10-50 TPD of waste are available for commercial sale but not advisable due to high running costs.
Adopted Capacity for study	500 TPD	500 TPD	500 TPD	500 TPD Plant	500 TPD
Land required for adopted capacities	6 Ha	3 Ha	4 Ha	10 Ha	4 Ha
Waste Characteristics	Moisture Content >50%	Moisture Content <45%	Moisture Content >50%	Moisture content <45%	Moisture Content <45%
	Organic Matter >40%	Volatile Matter >40%	Organic Matter >40%	Net Calorific Value >1200 Kcal/Kg	Net Calorific Value >1200 Kcal/kg
	C/N Ratio between 25-30		C/N Ratio between 25-30		
Waste Suitability	Suitable for MSW Characteristics of India	Not suitable for MSW characteristics in India but workable with use of Auxiliary Fuel	Suitable for MSW characteristics of organic waste in India	Not suitable for MSW characteristic in India but workable with use of Auxiliary Fuel	Not suitable, due to high moisture in our waste.
Typical investment for assumed capacities (excluding cost of land)	INR 17-20 Cr. For a 500 TPD Plant	INR 17-20 Cr. For a 500 TPD Plant	Approximately INR 75-80 Cr for a 500 TPD Plant	INR 80-90 Cr. For 500 TPD Plant	NA
Recurring cost	INR 300 per ton of input waste	INR 290 per ton of input waste	INR 100 per ton input waste	NA	-
Recoverable	250 Kgs of compost per ton of waste	200 Kgs pellets per ton of waste	80 cum of bio gas / ton of waste plus 200 Kgs of manure / ton	NA	-

<sup>173</sup>Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission, MoUD.

Element	Composting	Refuse derived fuel	Biomethanation	Gasification / Pyrolysis	Incineration
Volume reduction	45-55%	55-65%	55-65%	>80%	>80%
Environmental issue	Impurities in compost due to mixed waste, traces of heavy metals, leachate runoff	Problems in burning exhaust	Problems if mixed feed stock	Ash handling and Air Pollution	Ash handling and Air Pollution (emission of particular matter, chlorinated compounds dioxins / furans)
Technology Reliability	Running successfully in India	Running successfully in integrated facilities	Small scale organic treatment plant operational but mixed waste large scale plants failed in India	Insufficient operational experience for MSW	Only Plant in India failed due to mismatch in waste quality. MSW 2000 has recommended for incineration of waste only after doing a waste suitability analysis and providing adequate flue gas management methods.
Limitation	Large Land Requirement, Non acceptance of compost as soil enrichener in some areas of the Country Process depends highly on factors such as waste quality & climatic conditions	Fluff / Pellets can be used a fuel in large industries, e.g. In cement kilns with necessary permissions from the PCBs and required pollution control measures.	The technology requires pre-segregated homogenous biodegradable waste as mixed waste retards efficiency of the process. Hence applicability is limited to highly organic and homogenous waste streams like market wastes.	Requires waste with high calorific value. Expensive flue gas remediation methods to attain achievable outputs.	Expensive technology, waste criteria must have low moisture content and high calorific value, which is not found in Indian Waste. Costly flue gas remediation methods to attain achievable outputs.

Source: Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission, MoUD.

### 8.3.6.7. Disposal of Waste<sup>174</sup>

Waste after treatment must be disposed in a manner that does not create any instance of environmental pollution and public nuisance. The MSW Rule 2000 defines waste disposal as an activity, which involves “final disposal of municipal solid wastes in terms of the specified measures to prevent contamination of ground-water, surface water and ambient air quality”.

The landfill design shall be aimed to minimize the following:

- The ingress of water into the landfill,
- The production of leachate, its subsequent outflow and uncontrolled dispersions into surrounding aquatic environment,
- The accumulation, migration and uncontrolled release of landfill gas into the atmosphere.

<sup>174</sup>Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission, MoUD.

The detailed description of disposal of waste can be referred from Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission, MoUD.

#### 8.3.6.8. Landfill Gas Extraction (LFG)<sup>175,176</sup>

The waste deposited in a landfill gets subjected, over a period of time, to anaerobic conditions<sup>177</sup>. This leads to landfill gas production containing about 45-55% methane. This methane can be recovered through a network of pipes and utilised as a source of energy. Landfill gas extraction systems adds to efforts to reduce Climate Change initiatives as it helps reduce Green House Gas emissions through avoidance of landfill gas (mainly comprising of methane) into the atmosphere.

Waste composition is the most important factor in assessing the LFG generation potential and total yield at a site. Inorganic and inert wastes will produce little or no LFG; more organic wastes will produce greater amounts of LFG on a per unit mass basis. Similarly moisture content in waste also impacts the LFG generation from waste. For e.g. highly organic wastes such as food wastes are able to produce LFG, but comprises of large water, which inherently does not produce LFG but will aid the rate of LFG evolution.

While planning for LFG, pH and Nutrient content of the waste should also be considered. The generation of methane in landfills is greatest when neutral pH conditions exist. Numerous toxic materials, such as heavy metals, can retard bacterial growth in portions of a site and consequently slow gas generation. Another parameter that influences the LFG generation rate is the particle size and density, which may affect the transport of nutrients and moisture throughout the landfill.

#### 8.3.6.9. Regional Solid Waste Management<sup>178</sup>

A 'Regional MSW Project' means a project to either:

1. Develop and/or construct and/or operate, maintain and/or manage any type of new Regional MSW Facility; or
2. Convert and/or redevelop an existing MSW facility or system from being a facility used by a single Authority into a Regional MSW Facility. A Regional MSW Project can cover, within its scope, any existing MSW management facilities or systems within the jurisdiction of an Authority.

Thus, Regional MSW Facilities or Regional MSW Projects would help the Authorities to share technical expertise, costs of development and management of infrastructure.

For the implementation of the Regional MSW Projects, state governments may incorporate a public limited company or state-level utility (which may be called the

<sup>175</sup>Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission, MoUD

<sup>176</sup> Landfill Gas Management Facilities Design Guidelines, Ministry of Environment, British Columbia

<sup>177</sup>Organic Compounds are transformed into methane (CH<sub>4</sub>), CO<sub>2</sub>, and Water in an atmosphere devoid of oxygen.

<sup>178</sup> Guidance Note on Municipal Solid Waste Management on a Regional Basis, MoUD

State MSW Management Company Limited/Utility—the ‘Company/Utility’) for the purposes of identifying and enabling the development of Regional MSW Projects within the state. The Company/Utility may create a body of expertise in the development, implementation and financing of Regional MSW Projects for the benefit of the state. The utility may be backed by appropriate legislation.

The Company/Utility would have to be supported by the state government through issuance of adequate administrative instructions/ directions/policies. The state government may facilitate the process where Authorities are unable to provide for adequate services in a consultative manner.

In order to ensure a balanced framework for the implementation of a Regional MSW Project through such a Company/Utility, a framework should be established whereby a Project Coordination Committee for each project is constituted which comprises representatives of each participating Authority and the Company/ Utility; and important project decisions during the project development, implementation and operational stages are taken through this committee.

In the event that the Regional MSW Project is implemented through the PPP route, the Board of the Project Company (SPV) so constituted with a private sector participant, will have nominees of the participating Authorities, state government as well as the Company/Utility. The Project Coordination Committee, overseeing project implementation, would also have a nominee of the selected private sector participant.

### 8.3.6.10. Special provisions for hilly areas<sup>179</sup>

Cities and towns located on hills shall have location-specific methods evolved for final disposal of solid wastes by the municipal authority with the approval of the concerned State Board or the Committee.

- The municipal authority shall set up processing facilities for utilization of biodegradable organic wastes.
- The inert and non-biodegradable waste shall be used for building roads or filling-up of appropriate areas on hills.
- Because of constraints in finding adequate land in hilly areas, wastes not suitable for road laying or filling up shall be disposed of in specially designed landfills.

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<sup>179</sup>Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission, MoUD

**Case study Solid Waste Management in Bruhat Bangalore Mahanagar Palike (BBMP)<sup>180</sup>**

The Bruhat Bangalore Mahanagar Palike has area of 800 sq. km, which accommodates the population of 78 Lakh. Estimated MSW generation projection for 2009, from all the BBMP zones is 3000 tpd. BBMP aims to adopt zero waste management or reducing the quantity of inerts that goes to landfills by less than 10% by recycling wherever possible.

**Waste Collection System**

About 70% of the MSW (Municipal Solid Waste) activity starting from primary collection to disposal has been outsourced & 30% is managed by BBMP. A combination of alternatives is adopted, such as:

- There are about 4300 Pourakarmikas (Sweepers) of BBMP & 10000 Pourakarmikas (Sweepers) from contractor who performs Door-to-Door collection & sweeping activities.
- In some of the new zones the Door-to-Door collection activity is entrusted to Self Help Groups (SHG's), which are basically below poverty women's groups.
- In some of the residential areas the Residential Welfare Associations (RWA's) are involved in Door-to-Door collection & decentralization of composting the waste.

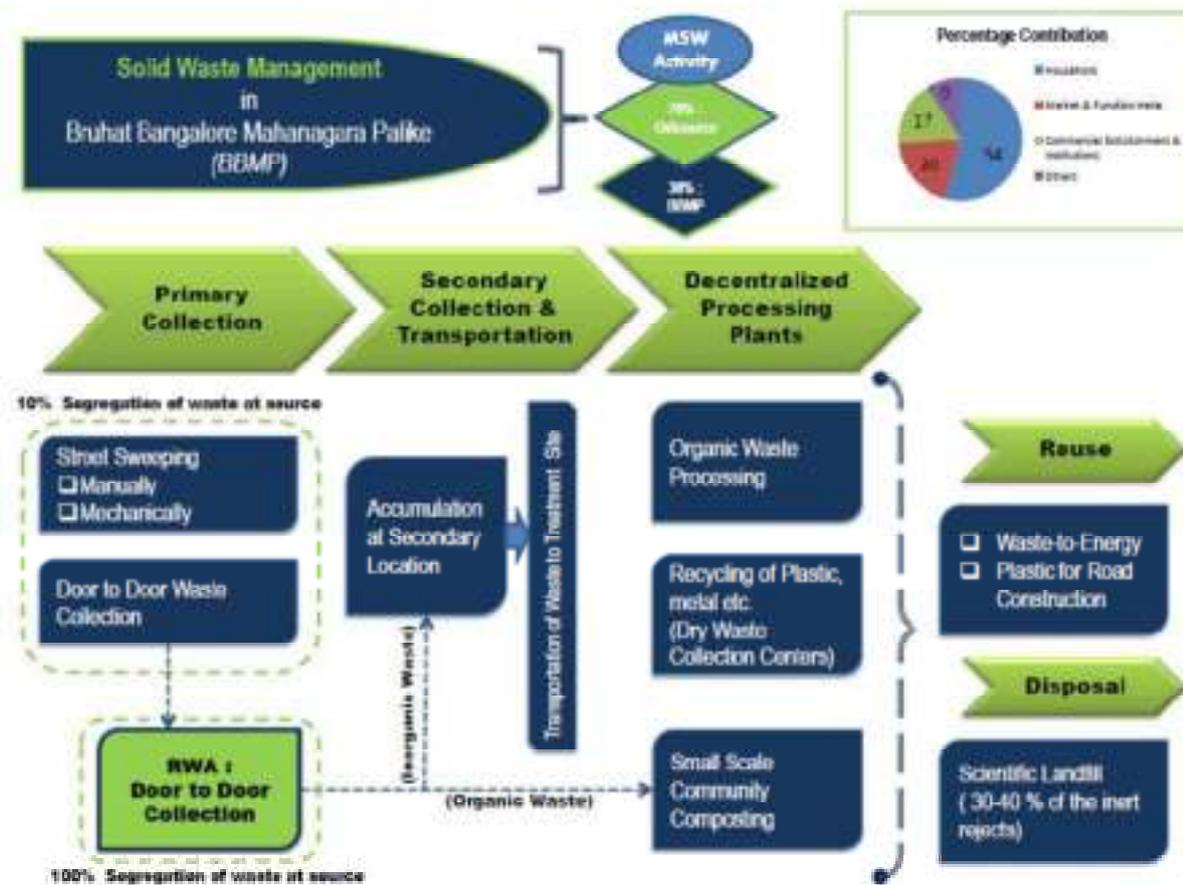
**Decentralized Processing Plants**

- Some of the areas where RWA's are performing Door to Door collection, the waste is segregated at source & the organic waste is composted in the community in a small scale.
- BBMP has setup a 15 ton capacity decentralized plant to process organic waste as well as recycle the plastic, metal etc.
- BBMP has established a decentralised one-ton capacity aerobic composting unit at Malleshwaram market (West Zone) using organic waste convertor.
- Dry waste collection centres has been set up for recycling the dry materials like plastic, paper, glass, metals etc.

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<sup>180</sup> [www.bbmp.gov.in](http://www.bbmp.gov.in)

Figure 8.10: BBMP model of SWM



Source: [www.bbmp.gov.in](http://www.bbmp.gov.in).

### Processing & Disposal sites

In order to comply with MSW rules, BBMP has setup processing & disposal facilities on PPP model. Following are the processing & disposing facilities:

Table 8.46: Disposal and Processing Site

S.no.	Name of the project	Capacity of the plant	Technology adopted
1	M/s Ramky	600 MTPD	Aerobic Composting & scientific land fill
2	M/s S.G.R.R.L	1000 MTPD	Waste to energy (Presently composting & land filling the inert & combustible. material are stored for RDF)
3	M/s Terrafirma	1000 MTPD	Integrated system where composting, vermi composting, biometanization is followed
4	M/s Organic Waste India pvt ltd (yet to start)	1000 MTPD	Integrated system (yet to commission)

Source: BBMP.

### Construction Waste<sup>181</sup>

As per Central Pollution Control Board (CPCB), India's construction industry generates around 14 million tonnes of waste every year. A recycling unit makes imminent sense as it could solve two problems: dispose tons of debris dumped illegally every day and will make a sound replacement to river sand, which causes ecological degradation.

The Karnataka State Pollution Control Board (KSPCB) has directed the Bruhat Bengaluru Mahanagara Palike (BBMP) to set up a unit at a site in Mallasandra (on Hessarghatta road), which is already designated as a municipality dump yard for construction waste. A unit is developed to crush and process 50 lorry-loads of debris every day. Some of the salient features of this effort are shown in picture below:

Figure 8.11: Processing of Construction Waste at Mallasandra, Bangalore



Source: The Hindu, Bangalore edition, Date: 19-Jan-2014

#### Approach adopted & actions taken:

- The combination of technologies for processing of MSW attempted for sustenance & viability.
- Generally around 30 to 40 per cent of inert rejects, which includes recyclables, are going to the scientific landfill.
- Attempt is being made to utilize all the recyclables.
- Small quantity of Waste Plastic are segregated and used in the construction of pavement roads. About 8% of Poly blend is mixed in the asphalt
- There is an exposure of converting the plastics into diesel by following de-polymerisation technology, which is yet to be implemented in large scale.
- To bring in accountability for the distance travelled by the vehicles GPS/GPRS Based Tracking system is implemented.
- CCTV cameras have been installed at all the processing sites at the entry and exit points to view the vehicles reached.
- Also a ticketing system using Hand Held Device, which collect the data and send it to the central server for monitoring and analysis is in place,
- The entire truck numbers and operation schedule is automatically downloaded to the Hand Held device through GPRS.

<sup>181</sup><http://www.thehindu.com/news/cities/bangalore/debris-is-preciousdont-just-dump-it/article5590977.ece>

#### 8.3.6.11. Construction & Demolition (C&D) Waste

As per the (draft) Construction and Demolition Waste Rules, large waste generators of 500 MT are to process (recycle and reuse) construction and demolition waste at the site- minimum 20% of process waste at the site for reconstruction purposes meeting structural requirements. Recent initiatives of MoUD at the Redevelopment of East Kidwai Nagar (Delhi) Government Residential Complex have shown that it is possible to provide for 100 per cent recycling and reuse of C&D Waste at the construction/demolition site itself in a decentralised mode. Such models obviate the need for transporting the C&D waste to a centralised unit and also for transporting the reuse material such as bricks, to the construction sites. This would be cost-effective, besides environment friendly and would also avoid movement of the waste related transport vehicles through the city.

#### 8.3.6.12. Municipal Solid Waste (Household)

While regional and centralised waste processing has been tried out over the years, the availability of landfill sites is becoming a growing problem, as residents do not like a land fill site in their vicinity. Many cities had set up landfill sites and plants on the outskirts, but such outskirts have gradually become part of the city, owing to natural outgrowth, and the residents have started agitating for removal of the landfill. A viable solution has been tried out in the *New Moti Bagh Government Residential Complex* in Delhi, wherein a small plant of 3 to 5 tonne capacity set up in less than a quarter of hectare recycles the household and green waste into fuel cake and manure. Small plants make sorting easy and avoid the need for any collection point. Carefully planned, the recycling process can do away with the need for land fill altogether. The financial viability of any waste recycling system would depend on (a) reuse of the recycled material and (b) levy of some user fee on those who generate the waste.

#### 8.3.6.13. Nuclear or Radioactive Waste

Nuclear or radioactive waste means any waste material containing radio-nuclides in quantities or concentrations. The disposal of such waste include the release of radioactive material to the environment in a manner leading to loss of control over the future disposition of the radio-nuclides contained therein and includes emplacement of waste materials in a repository beings or animals or in research activities in these fields or in the production or testing of biological waste. Such waste must be managed through "Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987".

#### 8.3.6.14. E-Waste

E-waste or electronic waste means waste Electrical and Electronic Equipment (EEE), whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded. “The E-waste (Management and Handling) Rules 2011” should be followed for disposal of E Waste.

#### 8.3.6.15. Bio Medical Waste

Hospital waste/Bio-medical waste is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities in these fields or in the production or testing of biological waste. Hospital/Bio-medical waste must be handled and disposed-off as per guidelines laid in “Bio-Medical Waste (Management and Handling) Rules, 1998”.

### 8.3.7. Domestic Gas Supply Pipelines

#### 8.3.7.1. Criteria for Technically Feasible Domestic PNG Connection<sup>182</sup>

A technically feasible area/locality/ society / building shall have provision to lay Medium-Density Polyethylene (MDPE) pipelines and its lanes shall have free accessibility for fire tender in case of any emergency. The under-developed slum areas, water-logging areas, places with soak pits, narrow lanes that do not have room for excavation and/or the narrow and/ or crowded lanes which prevent accessing the area in case of emergency and structurally unstable buildings shall be considered technically not feasible.

A technically feasible domestic PNG connection shall have provision for connecting the customer’s premises with the service MDPE pipeline with the riser for the customers building. The connectivity service pipeline to customers building from the mainline should be possible without posing any hindrance or safety hazard.

#### 8.3.7.2. Provisions

The provision of the domestic and trans-country pipelines shall be as per the PNGRB Technical & Quality Standards and specifications, which ensures overall safety, quality, and convenience. The last updated PNGRB rules and regulations shall be followed for:

- Design, Layout, Construction, & Maintenance of City Gas Distribution Infrastructure
- Pressure Standards & Maintenance
- Material of Construction
- Selection of Location for City Gate Stations (CGS)

The municipalities and development authorities to make provisions for:

<sup>182</sup>Indraprastha Gas Limited (IGL)

- Right of Usage (RoU) to be pre-defined in the Right of Way (RoW) of the city roads, as per the norms of PNGRB to be compatible with the other utilities,
- The safety norms prescribed by PNGRB to be included in the Development Control Regulations by the development authorities,
- Land for City gas stations to be provisioned in the urban extensions, avoiding congested areas. Land requirement for the CGS of an area of minimum 2000 sq. mtrs.

### 8.3.8. Telecom Services

**Utility corridor:** The telecom services including broadband are to be integrated with the utility corridor and Right of Way (RoW) permission should be made available to telecom services, similar to tower installation with buffers and distances prescribed by the State Governments (refer table number 6.7).

**Building regulations:** modifications in the building regulation of the dense cities may be allowed for accessing telecom and broadband services to the end users.

**Large facility installation:** municipalities and local authorities to provide large facility installation of telecom and broadband services in the peri-urban areas.

### 8.3.9. Service Level Benchmarking for Infrastructure

In recent development, MoUD has initiated an exercise to define Service Level Benchmarking (SLBs). Measuring service levels of civic agencies implies measuring outcomes, and indirectly reflects on institutional capacity, financial performance and other parameters. The Handbook of Service level benchmarking prepared by MoUD can be referred while providing basic infrastructure facility such as water supply, sewerage, drainage and solid waste management for efficient functioning.

Considering the importance of SLBs to measure the performance of above mentioned infrastructure facilities it is suggested that SLB should be considered as benchmark for measuring, reporting and monitoring the performance and comparing inter and intra city level infrastructure. The MoUD (Advisory note on Improving Urban Water Supply and Sanitation Services, MoUD, 2012) has suggested SLBs for different utility services in an urban area, which are mentioned in table below:

Table 8.47: Service Level Benchmarks

Sr. No.	Indicators	Benchmark Levels
<b>Water Supply</b>		
1	Coverage of WS connections (Population)	100%
2	Per capita availability of WS at consumer end	135 Lpcd
3	Extent of metering of WS connections	100%
4	Extent of Non-Revenue Water	20%
5	Continuity of Water Supply	24x7
6	Efficiency of redress of Customer Complaints	80%
7	Quality of Water Supplied	100%
8	Cost recovery of in Water Supply Service	100%
9	Efficiency in collection of Water Supply Charge	90%
<b>Sewerage</b>		
1	Coverage of Wastewater network service	100%
2	Collection efficiency of Wastewater network	100%
3	Adequacy of Wastewater treatment capacity	100%
4	Quality of Wastewater treatment	100%
5	Extent of reuse & recycling of treated Wastewater	20%
6	Extent of cost recovery in Wastewater management	100%
7	Efficiency of redress of Customer Complaints	80%
8	Efficiency in collection of sewerage charges	90%
9	Coverage of toilets	100%
<b>Storm Water Drainage</b>		
1	Coverage of storm Water Drainage network	100%
2	Incidence of water logging / flooding	0
<b>Solid Waste Management</b>		
1	Household level Coverage of Solid Waste Management service	100%
2	Efficiency of Collection of Municipal Solid Waste	100%
3	Extent of segregation of Municipal Solid Waste	100%
4	Extent of Municipal Solid Waste recovered / recycled	80%
5	Extent of scientific disposal of Municipal Solid Waste	100%
6	Extent of cost recovery in Solid Waste management service	100%
7	Efficiency of redress of Customer Complaints	80%
8	Efficiency in collection of user charges	90%

Source: Advisory note on Improving Urban Water Supply and Sanitation Services, MoUD, 2012.

## 8.4. Social Infrastructure

The quality of life in any urban centre depends upon the availability of and accessibility to quality social infrastructure. These include the following infrastructure:

- a) Education facilities
- b) Healthcare facilities
- c) Socio Cultural facilities
- d) Recreational facilities
- e) Sports Facilities
- f) Distribution Services
- g) Police Safety

### 8.4.1. Provision of Infrastructure

**Hierarchy:** The provision of social amenities in any urban area shall consider the regional bearings; as small towns cater to the requirements (especially of higher level facilities) of surrounding villages, medium size towns cater to small towns and villages and so on. However, in case of large and metro cities, certain apex level facilities significantly cater to regional requirements in addition to the city demand. In order to efficiently plan for cities & regions, alternatives, which could be considered, may be to provide:

- a) Amenities for 25% additional population overall as a cushion, or
- b) Exclude such apex level facilities from the total estimated needs provision.

In distribution of infrastructure, population plays the guiding role and therefore, indication of population served by a facility or service is given. In some cases depending upon the regional requirements, a higher order facility becomes necessary in a lower order settlement. A comprehensive list of facilities at each hierarchy is given in **Appendix N of Volume II B**.

Location of social infrastructure should be decided by local authority taking into account walkable distances. Maintenance of such micro-level facilities should be, as far as possible, handed over to RWA / housing co-operative societies with the provisions of direct involvement of women.

**Proximity:** The local community participation shall be encouraged, especially women, in management of the local level facility units to promote efficient utilization and upkeep of the facilities. These local level facilities shall be provided at a preferable 300 m to 800 m walkable distance (located within 5-15 minutes) to promote pedestrianisation and reduction in vehicular use.

It is observed that a number of lower level social amenities particularly in regard to education and health infrastructure operate in private residential premises due to their proximity to the area of demand. The potential of such practices shall be assessed to find out the actual needs, which shall be reliable input for arriving at realistic norms as well as for providing adequate number of sites for such facilities.

**Multiple uses:** The possibilities for multiple uses of social amenities may be considered depending upon the compatibility of the activities and acceptance of the society, such as the school auditoriums can be utilised for public seminars in off working hours. The multiple uses can be for private and public owned land/properties. The possibility of multiple activities in public facilities may also be considered such as in case of bus terminal, the above floors can be provided for use of staff residential, post office, courier services, ticket booking offices, retail markets etc.

**Utilisation threshold:** It is observed that the built up facilities for social amenities are often underutilised and lie vacant. A consideration of 80% utilization of existing facilities can be made mandatory before approving plan of new facility for similar use in a particular area.

In case of vacated properties, for efficient utilisation of the built up spaces; change in use permission can be considered.

**Self-sufficiency:** In planning of social infrastructure the provisions given in ‘National Mission on Sustainable Habitat’ shall be considered such as utilisation of renewable sources of energy like solar roof top panels, rain water harvesting etc. The facilities can be designed for self-sufficiency and can also generate revenue by selling of surplus resources.

The planning norms for social infrastructure as suggested below are based on the provisions given in National Building Code 2005 and the current guidelines from respective departments. It is suggested that the latest guidelines shall be referred at the time of urban and regional plan preparation. The plot area requirement given herein is suggestive and may vary depending upon the size, geography and land availability of an urban centre.

## 8.4.2. Education Facilities

### 8.4.2.1. Pre-primary to Secondary Education

Table 8.48: Norms for Pre Primary to Secondary Education

Sr. No.	Category	Student Strength	Population Served per unit	Area Requirement	Other Controls
1.	Pre Primary, Nursery School	--	2500	0.08 ha	To be located near a park
2.	Primary School (class I to V)	500	5000 (NBC, 2005)	Area per School = 0.40 Ha a) School building area = 0.20 Ha b) Playfield Area = 0.20 Ha	Playfield area with a minimum of 18 m x 36 m to be ensured for effective play
3.	Senior Secondary School (VI to XII)	1000	7500	Area per School = 1.80 Ha (NBC, 2005) a) School building area = 0.60 Ha b) Playfield Area = 1.00 Ha c) Parking Area = 0.20 Ha	Playfield area with a minimum of 68 m x 126 m to be ensured for effective play

Sr. No.	Category	Student Strength	Population Served per unit	Area Requirement	Other Controls
4.	Integrated School without hostel facility (Class I-XII)	1500	90,000 – 1 lakh	Area per School = 3.50 Ha a) School building area = 0.70 Ha b) Playfield Area = 2.50 Ha c) Parking Area = 0.30 Ha	To be located near a sport facility
5.	Integrated School with hostel facility (Class I-XII)	1500 (NBC, 2005)	90,000 – 1 lakh	Area per School = 3.90 Ha a) School building area = 0.70 Ha b) Playfield Area = 2.50 Ha c) Residential Hostel Area = 0.40 Ha d) Parking Area = 0.30 Ha	To be located near a sport facility
6.	School for Physically Challenged	400	45,000	Area per School = 0.70 Ha a) School Building Area = 0.20 Ha b) Playfield Area = 0.30 Ha c) Parking Area = 0.20 Ha (NBC, 2005)	To be located near a park or sport facilities
7.	School for Mentally Challenged		10 lakh (MPD, pg 137)	0.20 Ha	To be located near a park and non-noise polluting zone

**Other Controls:** The schools should preferably face service roads and roads with less traffic intensity.

Source: NBC, 2005 Part 3 and MPD 2021.

### 8.4.2.2. Higher Education

Table 8.49: Norms for Higher Education Facilities

Sr. No.	Category	Student Strength	Population Served per unit	Area Requirement
<b>General</b>				
1.	College	1000 - 1500	1.25 lakh	Area per college = 5.00 Ha a) College Building Area = 1.80 Ha b) Playfield Area = 2.50 Ha c) Residential including Hostel Area = 0.30 Ha d) Parking Area = 0.30 Ha
2.	University Campus	--	--	10.00 to 60.00 Ha area a) Residential (if included) = 25% of total land area b) Sports and Cultural Activities = 15% of total land area c) Parks and landscape including green belt= 15% of total land area. (MPD)
<b>Technical Education</b>				
3.	Technical Education Centre (A) – To include 1 Industrial Training Institute (ITI) and 1 Polytechnic	ITI = 400 Polytechnic = 500	10 lakh	Area per Technical Education Centre = 4.00 Ha a) Area for ITI = 1.60 Ha b) Area for Polytechnic = 2.40 Ha
4.	Technical Education Centre (B) – To include 1 ITI, 1	--	10 lakh	Area per Technical Education Centre = 4.00 Ha a) Area for ITI = 1.40 Ha b) Area for Technical Centre = 2.10 Ha

Sr. No.	Category	Student Strength	Population Served per unit	Area Requirement
	Technical Centre and 1 Coaching Centre			c) Area for Coaching Centre = 0.30 Ha
<b>Professional Education</b>				
5.	Engineering College	1500	10 lakh	Area per College = 6.00 Ha
6.	Medical College	--	10 Lakh	Area per College = 15.00 Ha Area of site including space for general hospital
7.	Other Professional Colleges	250 to 1500	10 Lakh	a) Area of site for student strength up to 250 students = 2.00 Ha b) Additional area of site for every additional 100 students or part thereof up to total strength of 1000 students = 0.50 Ha c) Area of site for strength of college from 1000 to 1500 students = 6.00 Ha
8.	Nursing and Paramedical Institute (MPD, pg 135)	--	10 lakh	Institute Plot area = 2000 sqm (subject to Nursing Council of India/ Ministry of Health Norms)
9.	Veterinary Institute (MPD, pg 135)	--	-	As per Veterinary Council of India/ Ministry Norms (subject to availability of land)

Source: NBC, 2005 MPD 2021.

Threshold population of each of education facilities should not only to depend on the number of population, but also on the characteristics of the population. Considering that there is a wide variation in the levels of literacy and increasing rate of entry into the school, the variations based on the areas are to be respected. Further to the table above, it is recommended that the threshold population shall be determined based on the characters of the population, along with the number of population in order to determine social infrastructure provision at varying regions.

### 8.4.3. Healthcare Facilities

The size of a hospital depends upon the hospital bed requirement, which in turn is a function of the size of the population it serves. As per the Indian Public Health Standards (IPHS), 2012, the calculation of number of beds is based on-

- annual rate of admission as 1 per 50 population
- average length of stay in a hospital as 5 days

For example: In India the population size of a district varies from 50,000 to 15,00,000. For the purpose of convenience the average size of the district is taken as one million population. Based on the assumptions the number of beds required for 10,00,000 population is :

- No. of bed days per year :  $(10,00,000 \times 1/50) \times 5 = 1,00,000$
- No. of beds required with 100% occupancy :  $1,00,000 / 365 = 275$
- No. of beds required with 80% occupancy :  $(1,00,000 / 365) \times 80\% = 220$

The classification of health care facilities is given in Table 8.50.

**Table 8.50: Health Care Facilities**

Sr. No.	Category	No. of beds	Population served per unit	Area requirement
1.	Dispensary	--	15000	0.08 to 0.12 Ha
2.	Nursing home, child welfare and maternity centre	25 to 30 beds	45000 to 1 lakh	0.20 to 0.30 Ha
3.	Polyclinic	Some observation beds	1 lakh	0.20 to 0.30 Ha
4.	Intermediate Hospital (Category B)	80 beds Initially maybe for 50 beds including 20 maternity beds	1 lakh	Total Area = 1.00 Ha a) Area for Hospital = 0.60 Ha b) Area for residential Accommodation = 0.40 Ha
5.	Intermediate Hospital (Category A)	200 beds Initially the provision maybe for 100 beds	1 lakh	Total Area = 3.70 Ha a) Area for hospital = 2.70 Ha b) Area for residential Accommodation = 1.00 Ha
6.	Multi-Speciality Hospital (NBC)	200 beds Initially the provision may be for 100 beds	1 Lakh	Total Area = 9.00 Ha a) Area for hospital = 6.00 Ha b) Area for residential accommodation = 3.00 Ha
7.	Speciality Hospital (NBC)	200 beds Initially the provision may be for 100 beds	1 Lakh	Total Area = 3.70 Ha a) Area for hospital = 2.70 Ha b) Area for residential accommodation = 1.00 Ha
8.	General Hospital (NBC)	500 Initially the provision maybe for 300 beds	2.5 lakh	Total Area = 6.00 Ha a) Area for hospital = 4.00 Ha b) Area for residential Accommodation = 2.00 Ha
9.	Family Welfare Centre (MPD, pg 134)	As per requirement	50,000	Total area = 500 sqm 800 sqm
10.	Diagnostic centre (MPD, pg 134)	--	50,000	Total area = 500 sqm to 800 sqm
11.	Veterinary Hospital for pets and animals (MPD, pg 134)	--	5 lakh	Total area = 2000 sqm
12.	Dispensary for pet animals and birds (MPD, pg 134)	--	1 lakh	Total area = 300 sqm
13.	Rehabilitation centres			As per requirement

Source: UDPMF Guidelines, 1996, NBC, 2005 Part 3 and MPD, 2021.

The Department of Health and Family welfare suggests incorporation of **Trauma Centres** in the highways cutting across urban local authority jurisdiction. The trauma care centres should be suitably positioned along the highways with doctors trained in emergency medicine and trauma care, with adequate emergency management technicians, supported by efficient and efficient ambulance system.

### 8.4.4. Socio-cultural

The provision of socio cultural facilities shall correspond to the changing urban demography and work lifestyle.

Table 8.51: Norms for Socio – Cultural Facilities

Sr. No.	Category	Population Served per unit	Land Area Requirement
1.	Anganwadi - Housing area/ cluster	5000	200-300 sqm
2.	Community Room	5000	750 sqm (NBC)
3.	Community hall, mangalkaryayala, barat ghar/ library	15000	2000 sqm
4.	Music, dance and drama centre	1 lakh	1000 sqm
5.	Meditation and spiritual Centre	1 lakh	5000 sqm
6.	Recreational Club	1 lakh	10,000 sqm
7.	Old age home	5 lakh	Max. 1000 sqm, subject to availability of land
8.	Religious Facilities (MPD, pg 149)		
8a.	At neighbourhood / housing cluster level	5000	400 sqm
8b.	At sub city level in urban extension	10 lakh	4.00 Ha
9.	Other Facilities (MPD)		
9a.	Orphanage/ Children’s Centre (One each)	10 lakh	Max. 1000 sqm, subject to availability of land
9b.	Care centre for physically /mentally challenged	10 lakh	Max.1000 sqm, subject to availability of land
9c.	Working women – men hostel	10 lakh	Max. 1000 sqm, subject to availability of land
9d.	Adult education centre	10 lakh	Max.1000 sqm, subject to availability of land
9e.	Night Shelter	10 lakh	Max. 1000 sqm, subject to availability of land
10.	Socio – Cultural centre/ Exhibition cum fair ground	10 lakh	15 Ha (NBC)
11.	Science Centre (MPD, pg 148)	10 Lakh	As per requirement
12.	International Convention Centre (MPD, pg 148)	City level	As per requirement

Source: UDPMI Guidelines, 1996 and MPD 2021.

**Notes:**

1. For lower income group population, the maintenance and management of formal community buildings is a challenging task. Thus to ensure optimum utilisation and maintenance and management of formal community buildings, the use of such facilities shall be planned and designated for multipurpose activities. Activities such as adult education, training programmes for economic generation activities, child and family welfare programmes etc. can be organised in such spaces.

2. Orphanage and Old age homes can be co-developed with appropriate green spaces to promote social relations between the two dependent age groups. The facility could include the following apart from living space:
  - a) Common recreational facilities such as sports facilities, walking tracks, reading rooms etc.
  - b) Opportunity for part time work for old people. This shall promote their active involvement with other social groups.
  - c) Adequate barriers in living spaces between the two groups to address social security of orphanages.
3. It has generally been observed that the religious buildings come up on encroached sites and especially those meant for open spaces. Effort should be made by the development agencies with the assistance of NGO's in the area to ensure that the places of worship come up as planned with the participation and preferences of the community itself. As a general basis, separate religious sites (2 for 15,000 populations) may be provided so that places of worship do not get established on encroached sites.

### 8.4.5. Open Spaces

The open spaces can include the following three categories, namely:

- a) Recreational space
- b) Organised green
- c) Other common open spaces (such as vacant lands/ open spaces including flood plains, forest cover etc. in plain areas.

Considering open spaces, including all the above-mentioned categories, provision be 10-12 sqm per person may be desirable. However, in hilly areas the protected zones and ecological conservation areas shall be considered to be over and above this open space requirement. In the built up area (excluding recreational space, vacant land, flood plain, forest) the NBC suggests 3 sqm/ person as minimum norm.

The hierarchy for organised green such as parks, play fields and other open spaces like specified park, amusement park, maidan, a multipurpose open space, botanical garden and zoological parks, traffic parks etc. are as under:

Table 8.52: Hierarchy of Organised Green

S. No.	Planning Unit	Number of Organised green spaces
1	Housing Cluster	3 - 4 local parks and playgrounds
2	Neighbourhood	3 - 4 local parks and playgrounds
3	Community	2-3 community level park and open space
4	District/ Zone	1 district level park and sports centre, maidan
5	Sub city centre	1 city level park, sports complex, botanical / zoological garden, maidan

Source: UDPMI Guidelines, 1996.

### 8.4.5.1. Organised Green for Plain Areas

Table 8.53: Norms for Organised Green for Plain Areas

S. No.	Category	Population served per unit	Area Requirement (Ha)
1.	Housing Area Park	5000	0.50
2.	Neighbourhood park	15000	1.00
3.	Community park	1 lakh	5.00
4.	District park	5 lakh	25.00
5.	Sub city park	10 lakh	100.00

Source: MPD, 2021.

### 8.4.5.2. Other Controls (NBC):

- 1) Open spaces/ maidans should be spatially distributed and multiple function in time to be promoted
- 2) In any layout or sub-division of land measuring 0.3 Ha or more in residential and commercial zones, the community open space shall be reserved for recreational purposes which shall as far as possible be provided in one place.
  - a) The minimum recreational space provided shall be 450 sqm.
  - b) The minimum average dimension of the recreational space shall not be less than 7.5 m and the length shall not exceed 2.5 times the average width.
- 3) Each recreational area and the structure on it shall have an independent means of access.
- 4) Any building line to be at least 3 m away from the boundary of recreational open space.
- 5) Zoological garden to be as per Central Zoo Authority provisions

#### Notes:

Green areas and other associated non-economic activities to be preferably proposed on Government reserved land. In case the open/green spaces which do not generate income are proposed on privately owned land, the local authority preparing the plan shall part with a fair compensation as per 'The Right to Fair Compensation and Transparency in LARR Act, 2013' to the land owner.

### 8.4.5.3. Organised Green for Hilly Areas

Table 8.54: Norms for Organised Green for Hilly Areas

S. No.	Category	Population served per unit	Area Requirement (Ha)
1.	Housing Area Park	5000	0.50 to 1.00
2.	Neighbourhood park	10000	1.20 to 2.00
3.	City Parks/ playgrounds/ maidan/ exhibition grounds/ cultural gathering grounds	For entire town at one or more sites, depending upon design and space availability	--
4.	Botanical Garden	1 for every town	10.00 to 20.00
5.	Recreational complex including zoo	1 for every settlement with tourist potential	10.00 to 12.00

Source: NBC, 2005.

### 8.4.5.4. Norms for Multipurpose Grounds

Table 8.55: Norms for Multipurpose grounds

S.No	Category	Population served per unit	Area Requirement (Ha)
1	Sub city level multipurpose ground	10 lakh	8
2	District level multipurpose ground	5 lakh	4
3	Community level Multipurpose ground	1 lakh	2

Source: MPD, 2021.

#### Variation by size of settlement

##### A. Small Towns

- 1) In light of the standards recommended by various bodies, it is suggested to provide 1.0 to 1.2 ha per 1000 persons for town level open spaces (excluding the open spaces in residential pockets), which can be distributed for different residential pockets uniformly for a population of 8000 to 10,000. (Calculation based on the 10-12 mts / person for the entire planned areas).
- 2) As already mentioned, the open spaces are to be developed with other socio cultural and commercial facilities so that they can serve multiple purposes.

##### B. Medium Towns

- 1) The open spaces shall be provided at the rate of 1.4 to 1.6 ha per 1000 persons. The lower income areas shall be provided with more open spaces and the area under facilities like community halls etc. can be merged with the open spaces to suit their social requirements.

##### C. Large City, Metropolitan and Megapolis

- 1) The suggested standards for open spaces in large and metropolitan cities are 1.2 to 1.4 ha per 1000 persons, depending upon the land availability.
- 2) The older parts of the large cities have normally been found highly deficient with respect to the availability of open spaces, thus additional provisions in the new development may also take care of the existing deficiencies. For large and metro cities, provisions shall also be made for city level special parks such as botanical and zoological parks, picnic huts, children parks, amusement parks, etc.

### 8.4.6. Sports Facilities

Table 8.56: Norms for Sports Facilities

Sr. No.	Category	Population Served per unit	Land Area Requirement
1.	Residential unit play area	5,000	5000 sqm
2.	Neighbourhood Play area	15,000	1.50 ha
3.	District Sports Centre	1 lakh	8.00 ha
4.	Divisional Sports Centre	10 lakh	20.00 ha

Source: NBC, 2005, part 3.

## 8.4.7. Distribution services

Table 8.57: Norms for Distribution Services

Sr. No.	Category	Populati on served per unit	Land Area Requirement		Other Controls
			Type of Facility	Area requirement	
1.	<b>Petrol/ Diesel filling and Service Centre</b>				
	Permitted in:		i. Only filing station	30 m x 17 m	<ul style="list-style-type: none"> <li>• Shall not be located on road having Right of Way less than 30m.</li> <li>• Special cases in old city areas may be considered based on the approval by statutory authorities.</li> <li>• Shall be approved by the explosive/ fire department.</li> </ul>
	a) Central District		ii. Filling cum service station	36 m x 30 m	
	b) Sub central District		iii. Filling cum service station cum workshop	45 m x 36m	
	c) District Centres		iv. Filling station only for two and three wheelers	18m x 15m	
	d) Community Centres (Only Filling Station)				
	e) Residential & Industrial Use Zone in Urban Areas				
	f) Along National and State Highways				
	g) Villages identified as growth centres				
	h) Freight Complex				
	i) Proposed major roads				
	j) Police/ security force services (for captive use only) (MPD, pg 125)				
2.	<b>Compressed Natural Gas (CNG)/ filling centre</b>				
	Permitted in:		CNG mother station	1080 sqm	<ul style="list-style-type: none"> <li>• Shall not be located on road having Right of Way less than 30m.</li> <li>• Shall be approved by the explosive/ fire department.</li> </ul>
	a) All use zones (except in Regional Parks and Developed District Parks)		(Including building component – control room/ office/ dispensing room/ store, pantry and W.C.)	(36m x 30m)	
	b) Along National and State Highways				
	c) Villages identified as growth centres				
	d) Freight Complex				
	e) Proposed major roads				
3.	<b>LPG Godown/ Gas godown</b>	40,000 to 50,000	Capacity = 500 cylinders or 8000 kg of LPG Area (inclusive of guard room)	520 sqm (26m x 20m)	The major concern for its storage and distribution is the location, which shall be away from the residential areas and shall have open spaces all around as per the Explosive Rules.
4.	<b>Milk Distribution</b>	5000	Area inclusive of service area	150 sqm	--

Source: NBC, 2005.

**Notes:**

- 1) Super Kerosene Oil/ Light Diesel Oil for industrial activity shall be given separately.
- 2) Large petrol/diesel storage centres to be located outside city jurisdiction.

## 8.4.8. Police, Civil Defence and Home Guards

Table 8.58: Norms for Police Facilities

Sr. No.	Category	Population Served per unit	Land Area Requirement
1.	Police Post	40,000 – 50,000 (Area not served by Police Station)	0.16 Ha (Area inclusive of residential accommodation)
2.	Police Station	90,000	1.50 Ha (Area inclusive of essential residential accommodation) 0.05 Ha additional to be provided for civil defence and home guards.
3.	Traffic and Police Control Room (MPD, pg 143)	--	As per requirement
4.	District office and battalion	10 lakh	Total area = 4.80 Ha a) Area for district office = 0.80 Ha b) Area for battalion = 4.00 Ha
5.	Police line	20 lakh	4.00 to 6.00 Ha
6.	District Jail	10 lakh	10.00 Ha
7.	Civil defence and home guards	10 lakh	2.00 Ha
8.	Police Training Institute/ College (MPD, pg 143)	City level (to be located in fringe areas)	5 Ha
9.	Police Firing Range (MPD, pg 143)	City level (to be located in fringe areas)	Up to 10 Ha
10.	Police camp including Central Police Organisation/ Security Forces (Including Central Security Forces) (MPD, pg 143)		Up to 10 Ha
11.	Police Booth (at major road intersections)	--	10-12 sqm (to be provided by transport planners)

Source: NBC 2005 and MPD 2021.

## 8.4.9. Safety Management

Table 8.59: Norms for Safety Facilities

Sr. No.	Category	Distribution or Population Served per unit	Area Requirement
1.	Sub fire station/ Fire Post	Within 3-4 km radius	0.6 Ha (with essential residential accommodation)
2.	Fire Station	2 lakh population or 5-7 km radius	1 Ha with residential accommodation
3.	Disaster Management Centre	One in each administrative zone	1 Ha along with suitable open area 2 Ha if soft parking, temporary shelter, parade ground etc. included
4.	Fire Training Institute/ College	City level (one site in Urban extension)	3 Ha

Source: MPD 2021.

**Guidelines for locating fire stations and other fire fighting facilities (As per MPD)**

- Fire stations should be located so that the fire tenders are able to reach any disaster site within 3-5 minutes
- Fire stations should be located on corner plots as far as possible and on main roads with minimum two entries.
- In the new layouts, concept of underground pipelines for fire hydrants on the periphery exclusively for fire fighting services should be considered.
- Necessary provisions for laying underground/ over ground fire fighting measures, water lines, hydrants etc. may be kept wherever provision of fire station is not possible.
- The concerned agencies shall take approval from Fire Department for fire fighting measures while laying the services for an area.

**8.4.10. Special Requirements for Gender Sensitive Planning<sup>183</sup>**

Women's travel is characterized by trip chaining i.e. combining multiple destinations within one trip. Given women's higher domestic and caretaking responsibilities, they tend to seek employment opportunities closer to home with more flexible hours than their male counterparts. This translates into a higher sensitivity to distance.<sup>184</sup>

- At the regional and city levels, decentralized economic opportunities should be considered to reduce travel distances.
- At the neighbourhood or planning sector levels, single land use zones should be discouraged, as they tend to be "dead" or inactive as with business districts in the night or residential areas. Mixed land uses (such as mixed residential and mixed commercial uses) should be encouraged which will generate street activity throughout the day and also reduce walking distances.
- Women are disproportionately affected by poor quality pedestrian infrastructure and increased walking distances. Walkable blocks should be promoted by limiting block sizes, providing direct, shortest non-motorized transport routes or pedestrian public right of ways.
- The height of compound walls can restrict street visibility. Therefore porous or semi-porous compound walls are recommended to allow street visibility.

Figure 8.12: Compound walls Restricting Street Visibility



High compound walls limit street visibility. Semi-porous and porous compound walls attract people.

Source: Working Paper on 'Incorporating a Gender Perspective in Urban Planning and Regulations', Embarq, India.

<sup>183</sup> Working Paper on 'Incorporating a Gender Perspective in Urban Planning and Regulations', Embarq, India.

<sup>184</sup> Camstra, 1996.

### 8.4.10.1. Housing

- Any project, which involves relocation of households, economic links or networks, should be preserved by considering relocation within the same ward or local area.
- The design of housing schemes for poor women should consider their lower incomes, work in the informal sector<sup>185</sup> and that the house and the open space adjoining it is also used for economic activity.<sup>186</sup>

### 8.4.10.2. Amenities

- Where land is not reserved for amenities like police stations, public toilets, reading areas, community bins, they are constructed on pavements or informally provided thereby obstructing pedestrian movement.
- Due to women's higher domestic and care-taking facilities, amenities like day care centres, pre-primary and primary schools, primary health facilities, local markets are recommended to be provided within 5-15 minutes walking distance (300-800m).
- Similarly adequate space and access should be provided for women in these public amenities, considering their needs. For example, it is recommended that public toilets should be provided within 15 minutes walking distance with special emphasis on areas with high volumes of people i.e. railway stations, markets, bus terminals, public buildings, public open spaces etc. Public toilets should ensure sufficient seats for women, space for childcare and include toilet seats for dependents.

### 8.4.10.3. Street Design

- There needs to be an effort to increase cycling modal shares of women by improving women and girls' access to cycles, especially load carrying cycles.
- Crowded streets, station entrances or exits are perceived as unsafe for women. Therefore a level of service approach should be used to plan pedestrian infrastructure. As per IRC Guidelines 103-2012: Guidelines for Pedestrian Facilities, a level of service B or C is recommended. All footpaths should include and specify a dead zone, an uninterrupted walking zone and a multi-utility zone for street furniture etc.
- Streets, including carriageway and pavements should be consistently and continuously lit.
- The role of street vendors in creating street eyes is acknowledged<sup>187</sup> and therefore must be planned for in neighbourhood layout or local area plans and in street design.

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<sup>185</sup> Khosla, Renu. Addressing Gender Concerns in India's Urban Renewal Mission. UNDP.

<sup>186</sup> SPARC and KRVI. 2010. Re-Dharavi. <http://www.sdinnet.org/media/upload/documents/ReDharavi.pdf> (Accessed on 25th February 2014).

<sup>187</sup> Cross, John and Morales, Alfonso (Ed). 2007. Street Entrepreneurs: People, Place and Politics in Local and Global Perspective, Routledge.

#### 8.4.10.4. Public Transport

Such provision include - Prioritizing safe access to transit, rethinking transit fare structures to minimize cost for multi-stop journeys and in off-peak hours, introducing flexible services – such as halting buses in-between stops to drop women closer to their destination in the night, women only buses/trains/coaches or reserved seats for women in buses, ensuring sufficient toilet seats for women at stations and terminals, ensuring bus shelters and train stations have safety and comfort features (lighting, benches, emergency call options) etc.

### 8.5. Commercial Activities

#### 8.5.1. Hierarchy of Commercial Centres

Hierarchy of commercial centres is a function of the hierarchy of planning units in an urban centre. Normally an urban centre shall have some or all of the following, depending upon its size:

Table 8.60: Hierarchy of Commercial Centres (NBC)

Sr. No.	Planning Unit	Class of Settlement			Population served	Hierarchy of Commercial Centre
		S	M	L		
1	Housing Cluster	✓	✓	✓	5000	Convenience Shopping
2	Neighbourhood	✓	✓	✓	15000	Local shopping centre
3	Community	✓	✓	✓	100000	Community Centre
4	District	-	✓	✓	500000	District Centre
5	Sub city	-	-	✓	25 lakh - 50 lakh	Sub city Centre
6	City	-	-	✓	50 lakh +	City Centre

S: Small Town  
M: Medium Town  
L: Large City, Metropolitan City and Megapolis

#### 8.5.2. Norms for Commercial Centres

The norms for planning of commercial centres are as given in table below:

Table 8.61: Norms for Commercial Centres

Sr. No.	Category	Population Served per unit	Land Area Requirement
1.	Convenience Shopping	5,000	1,500 sqm
2.	Local shopping including service centre	15,000	4,600 sqm
3.	Community Centre with service centre	1,00,000	5 Ha
4.	District Centre	1 at District level / 5,00,000 population	40 Ha
5.	Sub-city Centre (UDPFI)	25 lakh to 50 lakh	As per requirement
6.	City Centre (UDPFI)	50 lakh +	As per requirement
7.	Local Wholesale Market/ <i>Mandi</i>	10 lakh	10.00 Ha
8.	Weekly Markets	1 to 2 locations for every 1 lakh	Area per location = 0.40 Ha

Sr. No.	Category	Population Served per unit	Land Area Requirement
	1) Parking and other open spaces within the commercial centres could be so designed that weekly markets can operate in these areas during non-working hours. 2) The area of informal sector should have suitable public conveniences and solid waste disposal arrangements.	population with 300 to 400 units per location	
10.	Organised Informal eating spaces	1 lakh	2000 sqm

Source: NBC, 2005.

Note:

- Small and medium towns to give emphasis on the weekly markets from promoting local economic activities,
- Mandis* and wholesale markets to be given emphasis in regional planning. Integration of the rural and small and medium towns to be developed through the provision of *Mandis*.

The area of commercial centres and the number of shops is given below:

Table 8.62: Area of Commercial Centres

Sr. No.	Category	Area per 1000 persons (sqm)	Number of shops
1.	Convenience Shopping	220	1 for 110 persons
2.	Local shopping including service centre	300	1 for 200 persons
3.	Community Centre with service centre	500	1 for 200 persons
4.	District Centre	880	1 for 300 persons

Source: UDPMI Guidelines, 1996 updated.

### 8.5.3. Distribution of Activities

The following activities allowed in the hierarchy of Commercial Centres.

Table 8.63: Distribution on Activities

Hierarchy of Commercial Centres						
Sr. No.	Activities	City an Sub city centre	District centre	Community centre	Neighbourhood Centre	Cluster Centre
1.	Shopping (retail services, repair)	✓	✓	✓	✓	✓
2.	Limited wholesale & <i>Mandi</i>	✓	✓	-	-	-
3.	Informal shopping	✓	✓	✓	✓	✓
4.	Commercial Offices	✓	✓	✓	✓	-
5.	Cinema	✓	✓	✓	-	-
6.	Hotel	✓	✓	✓	-	-
7.	Guest House	✓	✓	✓	-	-
8.	Bank/ ATM	✓	✓	✓	✓	✓
9.	Nursing Home	✓	✓	✓	-	-
10.	Service Industries	✓	✓	✓	✓	✓
11.	Auditorium	✓	✓	✓	-	-
12.	Museum	✓	✓	-	-	-

Sr. No.	Activities	Hierarchy of Commercial Centres				
		City an Sub city centre	District centre	Community centre	Neighbourhood Centre	Cluster Centre
13.	Library	✓	✓	✓	-	-
14.	Reading room	✓	✓	✓	✓	-
15.	Science Centres, Art/ Craft/ Music/ Dance School	✓	✓	-	-	-
16.	Weekly markets (on close days)	✓	✓	✓	✓	-
17.	Local Government Offices	✓	✓	✓	-	-
18.	Bus Terminal	✓	✓	-	-	-
19.	Fire Station	✓	✓	-	-	-
20.	Police post/ station	✓	✓	-	-	-
21.	Telephone Exchange	✓	✓	-	-	-
22.	Electric sub station	✓	✓	✓	✓	✓
23.	Post office	✓	✓	✓	-	-
24.	Petrol pump	✓	✓	✓	-	-
25.	Conveniencs shopping centre	✓	✓	✓	✓	✓
26.	Essential Residential	✓	✓	-	-	-

Source: UDPMI Guidelines, 1996 updated.

### 8.5.4. Urban Street Vendors

Street vendors<sup>188</sup> form a very important segment of the unorganised sector in the country and it is estimated that in several cities street vendors account for about 2% of the population. The planning of the urban street vending zones shall be so done so as to provide for and promote a supportive environment for the vast mass of urban street vendors to carry out their vocation while at the same time ensuring that their vending activities do not lead to overcrowding and unsanitary conditions in public spaces and streets.

The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 has come into force since March 2014. The Act provides for Town Vending Committee (TVC), which shall conduct a survey of all existing street vendors every five years. According to the Act every local authority shall prepare a plan to promote the vocation of street vendors in consultation with the planning authority and on the

<sup>188</sup>The National Policy on Urban Street Vendors, 2009 defines Street Vendors as ‘a person who offers goods or services for sale to the public in a street without having a permanent built up structure’. The three basic categories of street vendors are a) Stationary, b) Peripatetic and c) Mobile.

Street Vending Act, 2014: “Street Vendor” means a person engaged in vending of articles, goods, wares, food items or merchandise of everyday use or offering services to the general public, in a street, lane, side walk, footpath, pavement, public park or any other public place or private area, from a temporary built up structure or by moving from place to place and includes hawker, peddler, squatter and all other synonyms terms which may be local or region specific; and the words “ street vending” with their grammatical variations and cognate expressions, shall be construed accordingly.

recommendations of the Town Vending Committee once in every five years. Local authority can also make byelaws, under the Act, to provide vending zones, regulation of civic services in the vending zones and other matters.

#### 8.5.4.1. Planning norms for Urban Street Vendors

Master/ Zonal/ Local/ Layout development plans to be 'inclusive' and address the requirements of space for street vending through reservation of space. With the growth of cities/ towns in response to urbanisation, the statutory plans of every new area should have adequate provision for Vending<sup>189</sup>/ Hawking zones and 'Vendor Markets'.

The provision for number of informal units for urban street vendors for different types of land use categories is given below. It is observed that the informal eating places mushroom at a faster rate. It is suggested to make provision for 1 informal eating-place per 1 lakh population with a space allocation of 2000 sqm (NBC, 2005 part 3)

Table 8.64: Norms for Informal Units for Urban Street Vendors

Sr. No.	Category	No. of Informal Units
1.	Retail Trade	3 to 4 units per 10 formal shops as specified in the norms
1a	Central Business District	
1b	Sub central Business District	
1c	District Centre	
1d	Community Centre	
1e	Convenience Shopping Centre	
2.	Government and Commercial Offices	5 to 6 units per 1000 employees
3.	Wholesale Trade and Freight Complexes	3-4 units per 10 formal shops
4.	Hospital	3-4 units per 100 beds
5.	Bus Terminal	1 unit per 2 bus bays
6.	Schools	
6a.	Primary	3-4 units
6b	Secondary/ Senior Secondary/ Integrated	5-6 units
7.	Parks	
7a.	Regional/ District Parks	8-10 units at each major entry
7b.	Neighbourhood Parks	2-3 units
8.	Residential	1 unit/ 1000 population
9.	Industrial	5-6 units per 1000 employees
10.	Railway terminal	To be based on surveys at the time of preparation of the project

Source: UDPMI Guidelines, 1996.

<sup>189</sup>"Vending zone" means an area or a place or a location designated as such by the local authority, on the recommendations of the town vending committee, for the specific use by street vending and includes footpaths, side walk, pavement, embankment, portions of a street, waiting area for public or any such place considered suitable for vending activities and providing services to the general public.

**Quantitative Space Norms:** Every land use has a carrying capacity ceiling and the same is true of vendors operating in a clearly demarcated area. Overuse can cause congestion and reduction of public hygiene. Every city/ town shall evolve its own quantitative norms after conducting proper surveys and evaluating actual needs. The principle of 'Natural markets' should be followed in designating areas as Vending Zones and their maximum holding capacity should be determined based on this principle.

#### 8.5.4.2. Demarcation of Vending Zones

City/ Town Development Plan shall demarcate the zones as 'Restriction free vending zones', 'Restricted Vending Zones' and 'No-vending zones'. Guidelines for locating zones:

- a) Spatial planning should take into account the natural prosperity of street vendors by providing locations in response to the patterns of demand for their goods/ services. For this, competent institutions recommend photographic digitised surveys of street vendors and their locations.
- b) A policy for regulating entry of street vendors into the identified street vending zones on time-sharing basis shall be formulated by Municipal Authorities.
- c) The 'vendor markets' may be established at suitable locations keeping in view demand for the wares/ services of street vendors. Time restrictions on vending should be in accordance with the need for ensuring non-congestion of public spaces/ maintaining public hygiene without being ad hoc, arbitrary or discriminatory. Attempts should be made to provide ample parking areas for mobile vendors for security of their vehicles and wares at night on payment of suitable fees.
- d) Mobile vending should be permitted in all areas even outside the 'Vendors Markets', unless designated as 'No- vending zone' in the zonal, local area or layout plans. 'Restricted Vending zones' may be notified in terms of both location and time. Locations designated as 'No vending zones' shall be fully justified.

#### 8.5.4.3. Provision of Civic facilities

The following basic civic facilities shall be provided in Vending Zones/ Vendor's markets:

- a) Solid waste disposal
- b) Public toilets to maintain cleanliness
- c) Aesthetic design of mobile stalls/ push carts
- d) Electricity
- e) Drinking water
- f) Protective covers to protect wares of street vendors as well as themselves from heat, rain, dust etc.
- g) Storage facilities including cold storage for specific goods like fish, meat and poultry, and
- h) Parking areas

The vendor markets should to the extent possible, also provide for crèches, toilets and restrooms for female and male members.

For other aspects of the street vending norms such as organisation and participative processes, promotional measures, action plan for stakeholders, monitoring and

review etc., the provisions of the policy shall be referred to as updated from time to time.

### 8.5.4.4. Small Towns

- 1) For the general retail shopping requirements, the concept of street/ road side commercial activity shall be accepted as a policy with certain specific controls such as:
  - a) No commercial activity along the NH/ SH or any major district road
  - b) The minimum width of the street to be 12 m, where vehicular movement is permitted to a limited extent (i.e. only up to 2 wheelers or rickshaw) and the streets with a minimum width of 4.5 m without vehicular movement may be permitted for road/ street side commercial activity.
- 2) It has been generally observed that the service and retail shops emerge along the major roads and the activities are extended up to the roads in most cases, thereby affecting the smooth flow of traffic and increasing probability accidents. Thus us, it is suggested that the service centres shall be provided as a planned component and the sites near the petrol pumps shall be considered. The exact requirement of the area for service centre will be guided by the following factors:
  - a) Vehicular population
  - b) Villages falling in the influence zone of the towns or, in other words, the service requirements of the villages in the surrounding areas.
- 3) The function based commercial requirements such as *mandi* (vegetables/ grains/ fruits), cattle markets or any other such specialised markets are to be planned as per the case specific requirements based on the study of the area.
- 4) The quantum of commercial activities to be proposed shall be restricted based on locational attributes and the local need based emergence in its natural growth be permitted.
- 5) For the newly planned schemes in small towns also, the policy of mixed land use can be adopted suiting the behaviour pattern of the society.
- 6) As already dealt in the previous section, the area requirements for commercial activities in small sized towns works out to be about 0.2 to 0.25 Ha/ 1000 persons on an average, based on the proposed land use which is governed by the functional character of the town.

### 8.5.4.5. Medium Town

- 1) The growth of towns from small to medium sized town through transition phases (50,000 to 100,000) changes the requirements for commercial activities gradually and for a town exceeding a population of 1 lakh, the extensions start developing in pockets of well-defined economic strata of the people and thus it is suggested that the areas predominantly planned for upper middle groups shall be provided with the planned commercial centres (with adequate inbuilt provision for informal commercial activities with the commercial centres) at the rate of 4-5 formal shops and 2-3 informal shops per 1000 persons.
- 2) The requirements for the wholesale trade will be governed by the following factors:
  - a) Location of the town with respect to large/ metro cities
  - b) Small towns and villages falling in the direct influence zone of the town for which it has to act as a distribution centre.
- 3) As already dealt in the previous section on land use, the area requirements for commercial activities in medium sized towns works out to be about 0.24 to 0.32 Ha/ 1000 persons on an average, based on the proposed land use which is governed by the functional character of the town and the regional imperatives mentioned above.

#### 8.5.4.6. Large City, Metropolitan City and Megapolis

The average land requirements for commercial activities work out to be 0.4 Ha per 1000 persons in a range of 0.2 to 0.6 Ha/ 1000 persons depending on the location of these large cities with respect to metropolitan. Similar requirements have also been observed in case of metropolitan which are located in the influence zone of Megapolis; the average land requirement for commercial activities under this category works out to be about 0.3 Ha/ 1000 persons.

#### 8.5.4.7. Variations for Hill Towns

- 1) The requirements of commercial activities in hilly areas are mainly limited to retail activities that are mainly catered by small shops in the residence in non-tourist centres. The provision of commercial facilities in tourist centres is to be reviewed for two major aspects. First, the boarding and lodging requirements of the tourists and second the informal activities near tourist spots.
- 2) The requirements for hotels and restaurants can be worked out on the basis of data on tourist and their growth trends. The informal activities at the tourist spots are mainly informal eating-places and other general shops selling local specialities.

### 8.6. Miscellaneous Facilities

#### 8.6.1. Cremation/Burial Ground

Table 8.65: Norms for Cremation/ Burial Ground

Sr. No.	Category	Population served per unit	Min. Land Area Requirement
1.	Electric Crematorium	1 for large size towns	2.00 Ha
2.	Cremation Ground	5 lakh	2.50 Ha
3.	Burial Ground	5 lakh	4.00 Ha

Source: NBC, 2005.

#### Other Controls:

- 1) The site not to be in proximity to residential areas and preferably in urban extension.

#### 8.6.2. Dhobi Ghat

Table 8.66: Norms for Dhobi Ghat

Sr. No.	Category	Population served per unit	Min. Land Area Requirement
1.	Dhobi Ghat with appropriate arrangements for water and drainage facilities.  It may be ensured that the water bodies are not polluted as a result of such activities.	1 Lakh	5000 sqm

Source: NBC, 2005.

### 8.6.3. Mandis and whole-sale agricultural produce markets

According to the recommendations by National Farmers Commission (2004)<sup>190</sup>, availability of regulated Markets should be within 5 km radius (area served approx. 80 sq km) The agricultural produce can be categorised under two heads (a) Perishable produce consisting of fruits, vegetables and flowers and (b) Non-perishable produce consisting of grains and pulses. The planning for the *mandis* shall depend upon the following parameters:

- Number of food items
- Perishability of food items
- Volume to be handled
- Type of storage/ cool chain facilities.
- The *mandis* shall be preferably adjacent to arterial roads.

The government initiatives for promoting regulated markets are:

3. **Direct marketing** by promoting farmers' markets in various forms, such as *Apni Mandis* in Punjab, *Rythu Bazaars* in Andhra Pradesh, *UzhavarSanthai* in Tamil Nadu, and *Shetkari Bazaar* in Maharashtra, promoted by state agencies.
4. **e-trading**: Various states have adopted the Model APMC Act, which provides for e-trading. (Pg 16)
5. **Terminal market complex**: proposed to be implemented through Public Private Partnership (PPP) mode by establishing the Hub (Main Market) and Spokes (Collection Centres) in the States who have amended their APMC Act.

### 8.6.4. Provisions for Livestock Management/ Animal Management Centre

In order to ensure primary economic activities and food security, in urban areas and region, sustainable development of agricultural sector and associated activities is interdependent. Livestock management and addressing the urban problem of street animals calls for a dedicated space for its management.

The National Livestock Policy, 2013 provides a policy framework for improving productivity of the livestock sector in a sustainable manner, taking into account the provisions of the National Policy of Farmers, 2007 and the recommendations of the stakeholders, including the States.

The policy recommends the following with respect to urban and regional planning:

1. Inclusive planning of livestock management services such as veterinary institutions, vaccine and diagnostic production units, semen stations and artificial insemination breeding farms, feed and fodder production units etc. at regional and community level for generation and delivery of these services in rural and urban areas.
2. Integrated land use planning with livestock as a component should be encouraged through *Panchayati Raj* Institutions to ensure production potential of pastures and grazing community lands

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<sup>190</sup>Working group on Agriculture Marketing Infrastructure, Planning Commission, 12<sup>th</sup> Five Year Plan, pg 8.

Along with the livestock management, adequate provisions for street animals shall also be planned for by provision of animal management centres in urban and regional areas. The other facilities to be provided here are:

- Veterinary facilities & hospitals as mentioned before
- Gaushala with primary milk packaging facilities
- Bio-degradable solid waste disposal and decomposition facilities
- Bio-gas plants
- Open green spaces and nurseries
- Essential residential spaces

### 8.6.5. Norms for Telephone, Postal and Banking facilities

Table 8.67: Norms for Communication facilities

Sr. No	Category	Population served per unit	Area Requirement
<b>1.</b>	<b>Telephone &amp; communications</b>		
1 a	Telephone exchange of 40,000 lines	4 Lakh	4 Ha
1b	Radio/ TV Station	5 -8 lakh	1,700 sqm
1c	Remote subscriber unit (MPD, pg 142)	1 for 3 km radius	300 sqm
<b>2.</b>	<b>Postal</b>		
2a.	Post office counter without delivery (Floor area to be provided in local shopping centre)	15,000	85 sqm
2b.	Head post office with delivery office	2.5 Lakh	750 sqm
2c.	Head post office and administrative office	5 Lakh	2500 sqm
<b>3.</b>	<b>Banking</b>		
3a.	Bank with extension counters with ATM facility	15000	
i)	Floor area for counters		75 sqm
ii)	Floor area for ATM		6 sqm
3b.	Bank with locker, ATM and other banking facilities	1 lakh	2500 sqm

Source: NBC, 2005 & Study on Zoning Regulations, TCPO, 2004.

### 8.7. Provisions for Hilly Areas

The provision of Social infrastructure; Police, Civil defence and home guards; Safety; Commercial Activity and other Miscellaneous Activities for hilly areas shall be general as given above. However, the following minimum norms shall also be ensured:

Table 8.68: Norms for Hilly Areas

Sr. No.	Category	Population served per unit	Distance between two facilities (km)	Area Range (Ha)
<b>1.</b>	<b>Education Facilities</b>			
1a	Primary School	4000	1 to 2	0.20 to 0.30
1b	Secondary School (10+2)	15,000	5 to 7	0.30 to 0.50
1c	Industrial Training Centre	--	8 to 12	0.30 to 0.60

Sr. No.	Category	Population served per unit	Distance between two facilities (km)	Area Range (Ha)
1d	College	30,000	8 to 12	2.00 to 3.00
1e	Professional College	30,000	8 to 12	1.00 to 1.50
1f	University	50,000	8 to 12	2.00 to 3.00
<b>2.</b>	<b>Healthcare Facilities</b>			
2a	Dispensary	2500	2 to 4	0.015 to 0.020
2b	Health sub centre	3000	2 to 4	0.025 to 0.067
2c	Family Welfare Centre	5,000	5 to 10	0.025 to 0.050
2d	Maternity Home	15,000	5 to 10	0.025 to 0.050
2e	Nursing Home	15,000	5 to 10	0.050 to 0.075
2f	Primary Health Centre (25 to 50 beds)	20,000	16 to 20	0.105 to 0.210
2g	Hospital (200 to 250 beds)	80,000	16 to 20	0.840 to 2.100
2h	Veterinary Centre	1000	16 to 20	0.050 to 0.100
<b>3.</b>	<b>Other Facilities</b>			
3a	Local Convenience Shopping	10,000	2 to 4	0.50 to 0.10
3b	Milk Booth	10,000	2 to 4	0.04
3c	Banquet Hall	10,000	5 to 10	0.10
3d	Religious Buildings	10,000	5 to 10	0.10
3e	Cremation Ground	10,000	5 to 10	0.20
3f	Informal Bazaar	15,000	5 to 10	0.10 to 0.20
3g	Community Welfare Centre	16,000	5 to 7	0.10 to 0.15
<b>4.</b>	<b>Services</b>			
4a	Rural post office	1000	1 to 2	--
4b	Rural post office	2000	2 to 4	0.025 to 0.050
4c	Post Office	10,000	5 to 7	0.10 to 0.15
4d	General Post Office	50,000	10 to 15	0.20 to 0.40
4e	Telephone exchange	50,000	10 to 15	0.20 to 0.40
4f	Bank (tribal areas)	10000	16 to 20	0.100 to 0.150
4g	Police Chowki	5000	2 to 4	0.10
4h	Police Station	15000	5 to 10	0.50
4i	Fire Station	50,000	--	0.30 to 0.80
4j	Disaster Management Centre	20,000	5 to 10	1.00
4k	Electric substation (66 kv)	--	--	1.00
4l	Electric substation (11 kv)	--	--	0.05
4m	LPG godown	As per requirement	--	0.15

Source: NBC 2005, TCPO Draft Indian Standard for Development Planning in Hilly Areas.

## 8.8. Access Provisions for the “Differently abled”

The minimum access provisions shall be provided as per ‘Guidelines and Space Standards for barrier free built environment for disabled and elderly persons’, 1998. The following provisions shall be provided in various types of buildings:

Table 8.69: Minimum Access provisions for Barrier Free Built Environment

Sr. No.	Type of Building	Minimum Provisions
1.	Single detached, single dwelling units	A minimum of 2% of the total number of units to be constructed with barrier free features (adoptable units)
2.	Staff housing, multiple dwelling and high rise residential units and tenements	Minimum of 1 unit for every 25 units to be designed for barrier free built environment Plus 1 additional unit for every 100 units thereafter. Entrances and exits to be designed for barrier free accessibility.
3.	Tenement houses, row houses, apartments and town houses	A minimum of 1 unit for up to 150 units Plus minimum of 1 additional unit for every 100 units thereafter Entrances and exits to be designed for barrier free accessibility
4.	Post offices, banks and financial service institutions	a) A minimum of 1 lowered service counter on the premises. b) A minimum of 1 lowered ATM/ cash dispersal point on the premises.
5.	Shop houses and single storey shops	Barrier free access to/within shopping area.
6.	Places of worship	Entrances and exits and main area of the worship to be accessible.
7.	Food centres	a) A minimum of 1 table without stools or seats attached to the floor for every 10 tables. b) A minimum of 2 tables without stools or seats attached to the floor for the whole premises. c) Accessible entrance.
8.	Community centres, village halls, auditoria, concert halls, assembly halls, cinemas, theatres and other places of public assembly	a) Accessible entrances, exits, aisles and main community or public gathering areas. b) Accessible toilet facilities should be nearby c) Seating for persons with disabilities to be accessible from main entrances and lobbies. d) Various seating/ viewing choice to be provided for persons in wheelchairs throughout the main seating area. e) A minimum of 2 wheelchair spaces for seating capacity up to 100 seats. f) A minimum of 4 wheelchair spaces for seating capacity from over 100 to 400 seats.

Source: Guidelines and Space Standards for barrier free built environment for disabled and elderly persons, Central Public Works Department, Ministry of Urban Affairs & Employment, India, 1998.



## 9 Simplified Development Promotion Regulations

The purpose of the Simplified Development Promotion Regulations is to guide the formation of zonal and building regulations by State Departments and by Local Urban Bodies. These regulations, besides prescribing the various provisions, also allow freedom to adopt appropriate practices in lines with the approach to the human settlement, both urban and regional. These can be:

- Development plans for its zonal planning and building design,
- Fire safety provisions,
- Environmental and geographical variation,
- Protection and improvement of local environment,
- Socio-economic considerations,
- Towards the creation of sustainable human settlements.

As per the National Building Codes, 2005, “Technological and socio-economic developments in recent times have led to remarkable increase in demand for more and more sophistication in buildings resulting in ever increasing complexities. These perforce demand high levels of inputs from professionals of different disciplines such as architecture, civil engineering, structural engineering, functional and life safety services including special aspects relating to utilities, landscaping, etc in conceptualization, spatial planning, design and construction of buildings of various material and technology streams, with due regard to various services including operation, maintenance, repairs and rehabilitation aspects throughout the service life of the building.

Apart from the given general regulations, energy efficiency in the building bye-laws to be adopted as per Energy Conservation Building Code (ECBC) was launched by Ministry of Power in May 2007. It sets minimum performance standards for buildings to promote energy efficiency. The National Building Code – 2005 focuses on energy efficiency in the following:

- Use of Pozzolona in concrete production
- Daylight integration (indoor lighting levels to be met via day lighting)
- Artificial lighting requirements for indoor spaces
- Ventilation standards (natural and mechanical) for optimal human health and well-being.
- Electrical standards (minimum power factor, allowances for diversity etc)
- Select HVAC design norms.

India being a large country with variations from region to region, these regulations may be followed for the regulating development in the settlement which under no jurisdiction or in case of absence of any statutory plan to meet the requirements of different regions of the country.

## 9.1. Simplified Urban Land use Classification

Table 9.1: Simplified Urban Land use Classification

Level I			Level II		
N	A-N	Use Category	N	A-N	Use Zone
1.	R	Residential	11	R-1	Primary Residential Zone
			12	R-2	Unplanned/ Informal Residential Zone
2.	C	Commercial	21	C-1	Retail Shopping Zone
			22	C-2	General Business and Commercial District/ Centres
			23	C-3	Wholesale, Godowns, Warehousing/ Regulated Markets
			24	C-4	Service Sector
			25	C-5	Regulated/ Informal/ Weekly Markets (TCPO Study on Zoning Regulations)
3.	I	Industry	31	I-1	Service and Light Industry
			32	I-2	Extensive and Heavy Industry
			33	I-3	Special Industrial Zone - Hazardous, Noxious and Chemical
4.	PS	Public and Semi-Public	41	PS-1	Govt./ Semi Govt./ Public Offices
			42	PS-2	Govt. Land (use undetermined)
			43	PS-3	Police Headquarter/ Station, Police Line
			44	PS-4	Educational and Research
			45	PS-5	Medical and Health
			46	PS-6	Social Cultural and Religious (inc. Cremation and Burial Grounds)
			47	PS-7	Utilities and Services
5.	M	Mixed Use	51	M-1	Mixed Industrial use Zone
			52	M-2	Mixed Residential Zone
			53	M-3	Mixed Commercial Zone
6.	P	Recreational	61	P-1	Playgrounds/ Stadium/ Sports Complex
			62	P-2	Parks & Gardens – Public open spaces
			63	P-3	Multi-open space (Maidan)
7.	T	Transportation and Communication	71	T-1	Roads/ BRTS
			72	T-2	Railways/ MRTS/
			73	T-3	Airport
			74	T-4	Seaports and Dockyards

Level I			Level II		
N	A-N	Use Category	N	A-N	Use Zone
			75	T-5	Bus Depots/ Truck Terminals and freight Complexes
			76	T-6	Transmission and Communication
8.	A	Primary Activity	81	PA-1	Agriculture
			82	PA-2	Forest& Horticulture
			83	PA-3	Poultry and Dairy Farming
			84	PA-4	Rural Settlements
			85	PA-5	Brick Kiln and Extractive Areas
			86	PA-6	Others (fishing, pottery etc.)
9.	E	Protective and Undevelopable Use Zone	91	E-1	Water Bodies
			92	E-2	Special Recreation Zone / Protective Areas such as sanctuaries/ reserve forests and Eco-sensitive zone
			93	E-3	Undevelopable Use Zone
10.	S	Special Area	101	S-1	Old Built-up (Core) Area
			102	S-2	Heritage and Conservation Areas
			103	S-3	Scenic Value Areas
			104	S-4	Government Restricted Area (such as Defence)
			105	S-5	Other Uses/ Spot Zone*

N: Numeric Code

A-N: Alpha Numeric Code

Source: UDPFI Guidelines, 1996 & various sources including Study on Zoning Regulation, TCPO, 2004.

**Notes:**

1. Overall, there could be 43 use zones at the Development Plan level within 10 land use categories at the Perspective Plan level as given in the above table.
2. Areas of informal activities may be identified in the above land use categories at Level II for 1 to 7 Level I Use Zones only.
3. Mixed use zone shall be identified at the Development Plan level, having dominant use and mixed use.
4. Use permissions for different activities, as specified in the next section on Simplified Use Zone Regulations can be provided at the project/action plan level or with the approval of the Statutory Authority as the case may be.
5. \*The process of changing/relaxing/modifying land use of part or “Spot” of a “zone” in a particular land use is termed as “Spot Zoning”. Spot Zoning can be done for comparatively smaller area in a particular land use zone in such a way that it does not affect the overall Development Plan.
6. Use zone regulations for the use permissibility (from the suggestive list) could be decided by the town planner depending upon the requirement/ feasibility.
7. Appropriate code in terms of both numerical and alphabetic (letter) are provided to facilitate the reference and to have a simplified procedure to follow.

## 9.2. Simplified Urban Land use Zoning Regulations

Buildings and premises listed below are 'Permitted' normally on specific sites/locations forming part of the Regional Plan, Development plan, LAPs, Annual plan and Projects. However, this is a suggested list which could be further enhanced or reduced, as the case may be, depending on the size of the city/town, characteristics and other relevant factors. The list also contains the buildings/premises which could be allowed on an application to the Competent Authority if such sites do not form part of the Regional Plan, Development plan, LAPs, Annual plan and Projects. Such use/activity is termed as 'Restricted'. The uses/activities which are otherwise not allowed in a particular use zone are termed as 'Prohibited'. The activities shall be proposed in the land use based on its compatibility with surrounding land uses and width of the approach road as the case may be.

### **1) RESIDENTIAL (R)**

The Residential Use Zone can be subdivided into

1. Primary Residential Zone: R1
2. Unplanned/ Informal residential Zone: R2

The activities Permitted, Restricted and Prohibited in Residential land use zone shall be as given below:

Residence – plotted, (detached, semi-detached and row housing) group housing houses, residential flat, residential-cum-work, hostels, boarding and lodging (accommodation for transit employees of Govt./ Local Bodies) houses, barat ghar/ marriage hall, community hall, old age home, police post, guest houses, crèches, day care centre, convenience shopping centres, local (retail shopping), medical clinic, dispensaries, nursing home and health centres (20 bed), dispensary for pets and animals, professional offices, educational buildings: (nursery, primary, high school, college), school for mentally/ physically challenged, research institutes, community centres, religious premises, library, gymnasium, park/tot-lots, plant nursery, technical training centre, yoga centres/health clinics, exhibition and art gallery, clubs, banks/ ATM, police stations, taxi stand/three wheeler stands, bus stops, electrical distribution depot, water pumping station, post offices, hostels of non-commercial nature, kindergartens, public utilities and buildings except service and storage yards.

### **Restricted Uses/Activities**

Dharamshala, foreign missions, night shelters, petrol pumps, motor vehicle repairing workshop/garages, household industry, bakeries and confectionaries, storage of LPG gas cylinders, burial-grounds, restaurants and hotels, printing press, go-downs/warehousing, bus depots without workshop, cinema hall, auditoriums, markets for retail goods, weekly markets (if not obstructing traffic circulation and open during non-working hours), informal markets, multipurpose or junior technical shops, transient visitors camp, municipal, state and central government offices.

### Uses/Activities Prohibited

Heavy, large and extensive industries : noxious, obnoxious and hazardous industries, warehousing, storage go-downs of perishables, hazardous, inflammable goods, workshops for buses etc., slaughter-housing wholesale *mandis*, hospitals treating contagious diseases, sewage treatment plant/disposal work, water treatment plant, solid waste dumping yards, outdoor games stadium, indoor games stadium, shooting range, zoological garden, botanical garden, bird sanctuary, picnic hut, international conference centre, courts, sports training centre, reformatory, district battalion office, forensic science laboratory.

### 2) COMMERCIAL USE (C)

The Commercial zone can be subdivided into

1. Retail Shopping Zone: C1
2. General Business and Commercial District/ Centres: C2
3. Wholesale, Go-downs, Warehousing/ Regulated markets: C3
4. Service Sector: C4 and
5. Regulated/ Informal/ Weekly markets: C5

The activities Permitted, Restricted and Prohibited in Commercial land use zone shall be as given below:

### Permitted Use/Activity

Shops, convenience/neighbourhood shopping centre, local shopping centres, professional offices, work places/offices, banks, stock exchange/financial institution, bakeries and confectionaries, cinema hall/theatre, malls, banquet halls, guest houses, restaurants, hotels, weekly market, petrol pumps, go-downs and warehousing, general business, wholesale, residential plot-group housing, hostel/boarding housing, hostel, banks/ ATM, restaurants, auditoriums, colleges, nursing homes/medical clinics, pet clinics, religious places, offices/work places, commercial centres, research/training institute, commercial service centres/garages/workshop, *baratghar*/night shelter, weekly/formal markets, library, parks/open space, museum, police stations/post, taxi stand/three wheeler stands, parking site, post offices, government/ institutional offices, telephone exchange/centres, warehousing and covered storage, research institutions.

### Restricted Uses/Activities

Non-pollution, non-obnoxious light industries, warehousing/storage go-downs of perishable, inflammable goods, coal, wood, timber yards, bus and truck depots, gas installation and gas works, poly-techniques and higher technical institutes, junk yards, water treatment plant, railway yards/stations, sports/stadium and public utility installation, hotel and transient visitor's homes, religious buildings, hospitals and nursing homes.

### **Uses/Activities Prohibited**

Dwellings except those of service apartment, essential operational, watch and ward personnel, heavy, extensive, noxious, obnoxious, hazardous and extractive industrial units, hospitals/research laboratories treating contagious diseases, poultry farms/dairy farms, slaughter-houses, sewage treatment/disposal sites, agricultural uses, storage of perishable and inflammable commodities, quarrying of gravel, sand, clay and stone, zoological garden, botanical garden, bird sanctuary, picnic hut, international conference centre, courts, sports training centre, reformatory, district battalion office, forensic science laboratory and all other activities which may cause nuisance and are noxious and obnoxious in nature.

### **3) INDUSTRIAL USE ZONE**

The Industrial Use Zone can be subdivided into

1. Service and Light Industry: I 1
2. Extensive and Heavy Industry: I 2
3. Special Industrial Zone – Hazardous, Noxious and Chemical: I 3

The activities Permitted, Restricted and Prohibited in Industrial land use zone shall be as given below:

#### **Permitted Use/Activity**

Residential building for essential staff and for watch and ward personnel, all kind of industries, public utilities, parking, loading, unloading spaces, warehousing, storage and depot of non-perishable and non-inflammable commodities and incidental use, cold storage and ice factory, gas go-downs, cinema, bus terminal, bus depot and workshop, wholesale business establishments, petrol filling stations with garage and service stations, parks and playgrounds, medical centres, restaurants.

#### **Restricted Uses/Activities**

Noxious, obnoxious and hazardous industries except storage of perishable and inflammable goods, junkyards, sports/stadium/playgrounds, sewage disposal works, electric power plants, service stations, cemeteries, government/semi-government/private business offices, bank and financial institutions, helipads, hospitals/medical centres, religious buildings, taxi stands, gas installations and gas works, animal racing or riding stables, workshops/garages, dairy and farming, quarrying of gravel, sand, clay or stone.

#### **Prohibited Uses/Activities**

Residential dwellings other than those essential operational, service and watch and ward staff, schools and colleges, hotels, motels and caravan parks, recreational sports or centres, other non-industrial related activities, religious buildings, irrigated and sewage farms, major oil depot and LPG refilling plants, commercial office, educational institutions, social buildings.

#### 4) PUBLIC AND SEMI-PUBLIC USE ZONE (PS)

The Public and Semi Public use zone can be sub divided into

1. Govt./ Semi Govt. / Public Offices: PS 1
2. Govt. land use: PS 2
3. Police Headquarter/ Station. Police line: PS 3
4. Educational and Research: PS 4
5. Medical and Health: PS 5
6. Socio Cultural and Religious (incl. Cremation and Burial Grounds: PS 6 and
7. Utilities and Services: PS 7

The activities Permitted, Restricted and Prohibited in Public and Semi Public use zone shall be as given below:

##### Permitted Uses/Activities

Government offices, central, state, local and semi government, public undertaking offices, defence court, universities and specialised educational institute, polytechnic, colleges, schools, nursery and kindergarten (not to be located near hospital or health care facility), research and development centres, social and welfare centres, libraries, social and cultural institutes, religious buildings/centres, conference halls, community halls, *barat ghar*, *dharamshala*, guest house, museum/art galleries, exhibition centres, auditoriums, open air theatre, recreational club, playground, banks, police station/police posts, police lines, police headquarters, jails, fire stations/fire posts, post and telegraph, public utilities and buildings, solid waste dumping grounds/sites, post offices, local state and central government offices and use for defence purposes, bus and railway passenger terminals, public utility and buildings, local municipal facilities, uses incidental to government offices and for their use, monuments, radio transmitter and wireless stations, telecommunication centre, telephone exchange, hospitals, health centres, nursing homes, dispensaries and clinic.

##### Restricted Activities/Uses

Residential flat and residential plot for group housing for staff employees, hostels, water supply installations, sewage disposal works, service stations, railway stations/yards, bus/truck terminals, burial grounds, cremation grounds and cemeteries/graveyards, warehouse/storage godowns, helipads, commercial uses/centres, other uses/ activities.

##### 5) Prohibited Uses/Activities

Heavy, extensive and other obnoxious, hazardous industries, slaughter-houses, junk yards, wholesale *mandis*, dairy and poultry farms, farm-houses, workshop for servicing and repairs, processing and sale of farm product and uses not specifically permitted herein.

#### 6) MIXED USE ZONE (M)

The Mixed-use Zone can be subdivided into

1. Mixed Industrial use: M1
2. Mixed Residential use: M2
3. Mixed Commercial use: M3

The activities permissible, restricted and prohibited shall as given below.

### Permitted Uses/Activities

In M1 Zone activities falling within non-polluting industry/ service industry (dominant landuse) categories can coexist with maximum up to 20-30% of commercial, institutional, recreational and residential land use.

In M2 Zone all activities falling within permitted residential land use (dominant landuse) shall be minimum 60% and to coexist with commercial, institutional, recreational.

In M3 Zone all activities falling within permitted commercial, institutional land use (dominant landuse) shall be minimum 60% and to coexist with residential, recreational and non-polluting and household industry.

### Restricted Uses/Activities

Activities related to commercial, institutional and residential landuse in M1 Zone and non-polluting industrial landuse in M2 Zone can be increased to between 20-50% depending on the contextual and locational feasibility of the area.

### Prohibited Uses/Activities

All other activities especially industrial which are polluting in nature and which will have an adverse impact on the overall activities of this zone

Note: Mixed landuse to be well defined by the Development control body by prescribing the limits on the use of activity based on the abutting road width, compatible uses, plots size, ground coverage, FAR/FSI, density, any other urban design guideline.

## 7) RECREATIONAL USE ZONE (P)

The Recreational Use Zone can be subdivided into

1. Playgrounds/ Stadium/ Sports Complex: P1
2. Parks and Gardens – Public open spaces: P2 and
3. Multi-open space (Maidan): P3

The activities Permitted, Restricted and Prohibited in Recreational Use Zone shall be as given below:

### Permitted Uses/Activities

Regional parks, district parks, playgrounds, children traffic parks, botanical/zoological garden, bird sanctuary, clubs, stadiums (indoor), outdoor stadiums with/ without health centre for players and staff, picnic huts, holiday

resorts, shooting range, sports training centres, specialized parks/*maidans* for multiuse, swimming pool, special recreation and special educational areas, , library, public utilities.

### **Restricted Uses/Activities**

Building and structures ancillary to use permitted in open spaces and parks such as stand for vehicles on hire, taxis and scooters, bus and railway passenger terminals, facilities such as police post, fire post, post and telegraph office, commercial use of transit nature like cinema, circus and other shows, public assembly halls, restaurants and caravan parks, sports stadium, open air cinemas.

### **Prohibited Uses/Activities**

Any building or structure which is not required for open air recreation, dwelling unit except for watch and ward personnel and uses not specifically permitted therein.

## **8) TRANSPORT AND COMMUNICATION USE ZONE (T)**

The transport and communication use zone can be sub divided into

1. Roads/ BRTS: T 1
2. Railway/ MRTS: T 2
3. Airport: T 3
4. Seaports/ Dockyard: T4
5. Bus depots/ truck terminals and freight complexes: T5
6. Transmission and Communication T 6

The activities Permitted, Restricted and Prohibited in Transport and Communication use zone shall be as given below:

### **Permitted Uses/Activities**

Road transport terminals (bus terminals and depots), goods terminals, parking areas, circulations, airports-building and infrastructure, truck terminal, motor garage, workshop, repair and repair shop and facilities such as night shelter, boarding house, banks, restaurants, booking offices, transmission centre, wireless station, radio and television station, observatory and weather office.

### **Restricted Uses/Activities**

Any other use/activity incidental to transport and communication, residential dwelling units for essential staff and watch and ward personnel.

### **Prohibited Uses/Activities**

Use/activity not specifically permitted herein. In vicinity of airports: butcheries, tanneries and solid waste disposal sites shall be prohibited within 10 km from the Aerodrome Reference Point (ARP)

## **9) PRIMARY ACTIVITY USE ZONE**

Primary Activity can be sub divided into

1. Agriculture: PA 1
2. Forest: PA 2
3. Poultry and dairy farming: PA 3
4. Rural settlements: PA 4
5. Brick kiln and extractive areas: PA 5
6. Others (fishing, pottery etc.): PA 6

The activities Permitted, Restricted and Prohibited in Primary Activity zone shall be as given below:

### **Permitted Uses/Activities**

Dwelling for the people engaged in the farm (rural settlement), farm-houses and accessory buildings, agriculture, horticulture and forestry, poultry, piggeries and dairy farm, cottage industries, storage, processing and sale of farm produce, petrol and other fuel filling stations, fishing, public utility and facility buildings.

### **Restricted Uses/Activities**

Farm houses, extensive industry, brick kilns, sewage disposal works, electric power plant, quarrying of gravel, sand, clay or stone, service industries accessory to obnoxious and hazardous industries, school and library, temple, churches, mosques and other religious buildings, milk chilling stations and pasteurisation plants.

### **Prohibited Uses/Activities**

Residential use except those ancillary uses permitted in agricultural use zone, heavy extensive, noxious, obnoxious and hazardous industries, any activity which is creating nuisance and is obnoxious in nature.

## **10) PROTECTED AND UNDEVELOPABLE USE ZONE**

The protective and undevelopable use zone shall be sub divided into

1. Water bodies: E1
2. Special Recreation Zone / Protective Areas such as sanctuaries/ reserve forests and Eco-sensitive zone: E2
3. Undevelopable use zone: E3

Undevelopable use zone shall be identified as all earthquake/landslide prone, cliffs and environmentally hazardous area, areas adjacent to fault lines, areas with slope higher than 45 degree (NBC), flood plain and areas adjacent to major drainage lines<sup>191</sup> for general guidance, other areas identified by State Disaster Management Authority and all the environmentally sensitive areas.

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<sup>191</sup>Aizawl Master Plan

**Eco-Sensitive Zones:** Guidelines for declaration of Eco-sensitive zones around National Parks and Wildlife Sanctuaries, has provided the extent of eco-sensitive zones as following:

- Many of the existing protected areas have already undergone tremendous development in close vicinity to their boundaries. Some of the protected areas actually lying in the urban setup (Eg. Guindy National Park, Tamil Naidu, Sanjay Gandhi National Park, Maharashtra, etc.). Therefore, defining the extent of the eco-sensitive zones around protected areas will have to be kept flexible and protected area specific. The width of the eco-sensitive zone and type of regulations will differ from protected area to protected area. However, as a general principle the width of the eco-sensitive zone could go up-to 10 Kms around a protected area as provided in the Wildlife Conservation Strategy-2002.
- In case where sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkages, are even beyond 10 Kms width, these should be included in the eco-sensitive zone.
- Further, even in context of a particular protected area, the distribution of an area of eco-sensitive zone and the extent of regulation may not be uniform all around and it could be of variable width and extent.

## **11) SPECIAL AREAS (S)**

In addition to the various uses/activities, permitted, restricted on application to the Competent Authority and prohibited, listed under various use zones, zone may also be specified keeping in view the special characteristic of such areas/pockets. This may comprise of old built-up areas having mixed land use: S1, areas of historical or archaeological importance having historical monuments and architecturally important buildings: S2, areas of scenic value: S3, which need to be preserved without spoiling the character by putting up various kinds of structures, the area restricted for development by Government: S4, or it may be area under other uses/ spot zones: S5. Therefore, it is necessary that use/activity permissibility in special areas should be carefully thought of in the development plan while formulated, keeping in view the predominant and compatible activities of a specific use, of which such a special area is a part of.

## 9.3. Plot Requirement Regulations in Land use zones

### 9.3.1. Means of Access<sup>192</sup>

Every building/plot shall abut on a public/private means of access like streets /roads.

#### A. Residential Buildings

Plots which do not abut on street /road shall be provided with minimum width corresponding to the length of the means of access as given in table below:

Table 9.2: Width and Length of Means of Access for Residential Plots

Sr. No.	Width of Means of Access (m)	Length of Means of Access (m)	Other Controls
1.	6.0	75	➤ Development on plot shall not be permitted without a minimum 6m width of access road. ➤ If development is only on one side of the means of access, the prescribed widths may be reduced by 1m in each case.
2.	7.5	150	
3.	9.0	250	
4.	12.0	400	
5.	18.0	1000	
6.	24.0	Above 1000	

Source: NBC, 2005.

#### B. Other Buildings

For plot development of uses other than residential, the following minimum width corresponding to the length of the means of access shall be followed:

Table 9.3: Width and Length of Means of Access for plots other than residential

Sr. No.	Width of Means of Access (m)	Length of Means of Access (m)	Other Controls
1.	12.0	200	➤ The width of the means of access shall not be less than the internal access ways in layouts and subdivision.
2.	15.0	400	
3.	18.0	600	
4.	24.0	above 600	

Source: NBC, 2005.

#### Other Controls:

- 1) Pathway: Approach to a building from Public Street/ road/ means of access shall be through a paved pathway of minimum width 1.5 m, provided its length is not more than 30 m.
- 2) No premises other than highway amenities like petrol pumps, motels etc. shall have direct access from highways and other roads minimum width of 52 m.
- 3) For high rise buildings and buildings other than residential, the following additional provisions shall be ensured:
  - a) The width of the abutting main street shall not be less than 12 m and one end of this street shall join another street not less than 12 m in width.
  - b) The approach to the building and open spaces on all sides upto 6 m width and the layout shall be done in consultation with Chief Fire Officer of the city.
  - c) The main entrance to the plot shall be of minimum 6 m width to allow easy access to fire engine.

<sup>192</sup> NBC 2005 Part 3, Pg 13.

### 9.3.2. Area and Height Limitations<sup>193</sup>

The limitation of area and height of buildings shall be specified in terms of Floor Area Ratio (FAR). The FAR shall take into account the following aspects:

- 1) Population Density
- 2) Occupancy Class
- 3) Types of construction
- 4) Width of street fronting the building and the traffic load
- 5) Locality where the building is proposed and the density
- 6) Parking facilities
- 7) Local firefighting facilities
- 8) Water supply and drainage facilities
- 9) Earth prone zone
- 10) Land use zone
- 11) Carrying capacity (estimated population on above based inputs)

#### 9.3.2.1. Model for Flexible FAR<sup>194</sup>

Normally maximum permissible FAR's are specified for various use premises in the Master Plan. No construction beyond permissible FAR is allowed except additional 5% which may be compounded i.e. permitted with penalties generally to accommodate construction deficiency. Since the allotment is based on FAR's and it is generally revised upwards over a period of time as part of extensive modification to the Master Plan, the concept of "additional FAR charges" is provided for (for the difference between the FAR at the time of allotment and the permissible FAR) with a view to recover part of the cost for augmentation of essential services.

With a view to provide flexibility and also to utilize the scarce urban land optimally additional FAR, as provided in the Master Plan may also be examined on a site based upon its Additional FAR Factor which is a product of 'creativity' and 'context'. **Creativity can be defined by design parameters such as urban form, parking provision, pedestrian safety, concern for the poor through induced informal activities, and provisions for evacuation during an emergency due to disaster (for example, Delhi falls in the Zone 5).** It also includes the impact of the design on essential services and environment. As a principle, the additional FAR should not result in a negative impact on the essential services and environment.

Locational attributes, of the site being assigned additional FAR, refer to its location with respect to land use as given in the approved Master/Zonal/Layout Plan (as the case may be), accessibility, level of congestion on the approach road, and nearness to a heritage building (if any).

<sup>193</sup> NBC 2005 part 3 Pg 26.

<sup>194</sup> Source: An Innovative Approach to Structured Spatial Transformation: Case- Delhi, Dr. S.P. Bansal, Journal Spatio-economic Development Record (SDR) Volume-19, No. 1, Jan-Feb., 2012.

Taking into account the creativity and context the Additional FAR Factor of a site can be expressed as:

$$\begin{aligned} \text{Additional FAR Factor} &= \text{Creativity x context} \\ &= \text{design parameters x locational attributes} \\ &= \left( \frac{a+b+c+d+e}{x+y} \right) \text{ m.n.o.p. .... (1)} \end{aligned}$$

Where:

- a = Parking provision value
- b = Disaster emergency provision value
- c = Urban Form value
- d = Pedestrian Safety value
- e = Induced informal activities value
- x = Impact on essential services value
- y = Impact on environment value
- m = Land Use value
- n = Accessibility (Right of way of the approach road) value
- o = Congestion (Mobility index in terms of travel speed) value
- p = Heritage Value

### **Assignment of Values**

For finding the Additional FAR Factor, the various values are assigned in the Equation (1) on the following basis:

**a = Parking provision:** Based on design efficiency of parking provisions made. If parking provisions are made over and above the norms then it could be **0.2**; if as per norms **0.1** & if less than norms it would be **0**.

**b = Disaster emergency provision value:** For disaster emergency evacuation arrangements made in the design. The value may be given as **0.2** if all the considerations for safety & disaster management in terms of fire, seismic, cyclone etc. incorporated. If partially incorporated than value could be **0.1** & if not incorporated it would be **0**.

**c = Urban Form value:** Based on height and urban form. The value depending upon the location & expenditure on work of art @ at least 2% of the project cost and fulfillment of all the social corporate responsibility it could be **0.2**, if partially fulfilled it could be **0.1** & if not addressed it may be **0**.

**d = Pedestrian Safety value:** Depending on the pedestrian safety considerations made in the design. If the design has made all the provisions for conflict free pedestrian movement as well as barrier free movement for physically challenged the value could be **0.2**; if partial provisions are made **0.1** and if no provisions made it could be **0**.

**e = Induced informal activities value:** Depending on the induced informal activity and design considerations made. If spaces for various informal sector activities e.g. taxi stand, petty trades, servicing etc. are provided the value could be **0.2**; if partial provisions are made it could be **0.1** & if no provisions are made it would be **0**.

**x = Impact on essential services value:** (e.g. water, waste water, power, waste management etc.): If the design offers positive impacts the value could be between **0.4** to **0.5**; if there are no impacts (i.e. business as usual) the value be **0.5** and if the impacts are negative the value would be **between 0.5 to 0.6**.

**y = Impact on environment value:** (In terms of carbon credits and green building design concepts): If the impacts are positive the value could be **between 0.4 to 0.5**; if there are no impacts (i.e. business as usual) the value be **0.5**; and if there are negative impacts it would be between **0.5 to 0.6**.

**m = Land Use value:** For 'river bed', 'regional park/ridge' & 'LBZ area' the value may be **0**, for other conforming land uses it could be **1**; and in case of 'redevelopment', 'facility corridor' and 'TOD area' with conforming land use the value could be **1.5**.

**n = Accessibility (Right of way of the approach road) value:** For roads less than 18 mts. the value could be considered at **0**, for roads between 18 to 30 mtr. it is to be **0.5**; and for roads above 30 mtr. the value could be as **1**.

**o = Congestion (Mobility index in terms of travel speed on the approach road) value:** If it is less than 10 km/h. it may be taken as **0**, if the speed is between 10 to 15 km/h it may be **0.5** and if it is 25 km/h or more it may be considered as **1**.

**p = Heritage Value:** If the distance between the location and the protected monument is less than 100 mtr. the value is **0**, if the distance between plot and protected monument is between 100-300 mtr. it is **0.5** and if it more than 300 mtr. the value is **1**.

#### Example

As per MPD-2021 for '**hospital - B (201-500 bed)**' Master Plan provides coverage of 30% + additional 5% for multi level parking (not to be included in FAR), FAR 200 and height of 37 mtr., parking standard @ 2 ECS/ sqmt. of floor area. In view of repeated request of hospital industry for grant of higher FAR to cope up with the rising cost of providing specialized health care and to make the construction and operation of hospitals viable; location specific request for additional FAR could be examined using the above formula. If the hospital plot is located in River Bed, Regional Park or LBZ area or it faces road less than 18 mtr. in any other area, where the travel speed is less than 10 km/h and the plot is at a distance less than 100 mtr. from notified protected monument; the request for additional FAR can be rejected as the value of **m, n, o** and **p** would be zero and the net additional FAR factor would be zero too. However, in other circumstances based on the location where the value of is not zero and the design parameters are worked out in such a way that the maximum permissible value of **m, n, o** and **p** are scored i.e. **a, b, c, d** and **e** each has a value of **0.2** and the value of **x** and **y** are **0.4** each, the additional FAR factor could be maximum i.e. and the value of **x & y** are **0.4** each could be **1.25 (1÷0.8)** at any location or **1.87 (1.25×1.5)** at location forming part of 'redevelopment', 'TOD' & facility corridor', thereby with the permissible FAR could be raised to **250** or **374**, instead of **200** as assigned in the Master Plan. This, however, would be subject to seeking all mandatory clearances from the concerned statutory bodies, NOC from local service providing agencies and depositing an additional FAR charge as per rules.

Source: Dr. S.P. Bansal

#### 9.3.2.2. Model for Purchaseable FAR<sup>195</sup>

Provision of purchasable FAR in Group Housing, Commercial, Institutional, Industrial, Sport and amusement complex, recreational greens and Low Density Sports plot may be considered, where:

- (i) The Plots exist on '24mtrs. and above' wide road.
- (ii) The construction has not started, or
- (iii) The allottee wants to construct a new additional building within the limits of permissible ground coverage, or
- (iv) The allottee wants to construct new building on the vacant plot, or

<sup>195</sup> Source: The Greater NOIDA Industrial Area Development Regulations, 2010

- (v) The allottee has already constructed building within purchasable F.A.R limits, or
- (vi) Purchaseable F.A.R may be allowed on minimum 18.0mtrs. road width and above road width for institutional and industrial use.

Explanation: The Purchasable FAR shall be allowed up to the maximum limit of the applicable FAR in the Building Regulations.

**Purchasable FAR shall be allowed with the following provision/ conditions:-**

- (i) No construction shall be allowed beyond the limit of maximum permissible ground Coverage.
- (ii) Parking facilities shall be provided within the plot as per the provisions of the building bylaws.
- (iii) No objection certificate from the Airport Authority of India/ Competent Authority shall be obtained for the height of the building.
- (iv) Structure design duly checked and verified by the I.I.T/ N.I.T./ Government Engineering College shall be submitted along with the proposal in case where additional floors are being proposed.
- (v) No objection certificate from Fire Safety and Environmental Clearance shall be obtained from the Competent Authorities.
- (vi) Purchasable FAR shall be applicable only on the basis of assessment of planned and available physical infrastructure.
- (vii) Use of purchaseable FAR shall be governed by the terms and conditions of lease deed.
- (viii) In case where purchasable FAR is allowed, the Authority shall permit increase in the height of building as per requirement.
- (ix) Additional Proportionate residential units shall be allowed on the purchaseable FAR for Group Housing.

Note:-

- (i) Purchasable FAR is an enabling provision. It shall not be allowed to any Allottee as a matter of right.
- (ii) With the consideration of Traffic density, conditions of approach road, availability of physical infrastructure, distance from the protected area and heritage sites or in the light of planning the Authority may identify the zones/ areas where purchasable FAR shall not be allowed.
- (iii) In case of mixed land use permitted in any pocket/plot:
  - (a) Permissible FAR for various uses shall be as applicable for respective use including the purchasable FAR
  - (b) The total FAR in the pocket/plot shall be subject to the overall permissible FAR for the pocket/plot.
  - (c) Purchasable FAR shall be calculated on the basis of the FAR of the individual uses within that pocket/plot.

**Calculation Method for the rate of charges of Purchasable FAR:-**

Rate assessment for purchasable FAR shall be calculated in proportion to the land requirement for additional built up area. The Fraction of land value shall be charged from the allottee on the basis of following formula:-

$$C = Le \times Rc \times P$$

C=Charge

Le=Proportionate Land required against purchasable FAR , i.e.  $F_p \times 100 / FAR$

$F_p$  = Allowed Additional covered area (sq.mt.) as per purchasable FAR.

FAR=Permissible Floor Area Ratio as per Building Regulations.

Rc= Prevailing sector rate or allotment rate of related plot (on the basis of auction/sealed bid) whichever is higher.

P=Value of purchasable Factor is as follows:-

Group Housing =0.40

Commercial =0.60

Institutional /Institutional green\* =0.30

Industrial =0.30

Green/sport/recreational Areas =0.20

Note:-

*\*(i) The purchasable FAR in institutional green plot shall only be permissible for the institutional use in the plot.*

(ii) The purchaseable FAR shall be allowed to a maximum permissible FAR allowed for the particular use above the constructed building. If the allottee has done the construction before sanctioning, the compounding charges of un-sanctioned area shall be payable at the rate of Rs. 200/-per sqmts. These compounding charges shall be over and above the fee charged for purchaseable FAR. In case of the construction is beyond the limit of purchasable F.A.R the allottee will have to first remove the extra construction beyond permitted F.A.R., then allottee may be allowed the extra purchasable F.A.R.

(iii) The Authority may also allow additional ground coverage with purchaseable F.A.R upto the maximum limit of 40% in commercial plots of more than 5000 sq. mtr. area on the basis of additional charges.

Additional Charges for Purchasable Ground Coverage shall be calculated as follows:

$$C = L \times 0.30 \times R$$

C= Cost of additional purchasable ground coverage

L= Land required under ground cover for additional ground coverage

R= Rate of land per sq.mt.( current reserve price or auction/ bid/allotment rate whichever is higher)

0.30 is a constant factor for purchasable ground coverage.

However, additional coverage will not considered in the setback area

### 9.3.2.3. Model for Floating FAR:

The state of Andhra Pradesh has adopted floating FAR concept. The method is to allow development by restricting/ regulating height of the building width of abutting road and plot sizes. This method is based on the carrying capacity analysis of the infrastructure planned. In keeping with the norm in the provision of infrastructure adjusted to the percentage, plot owners are permitted to use the additional FAR on payment basis.

**Basis for increasing FAR:** Carrying Capacity analysis tool is useful to rationalise fixation of FAR including increase in given FAR. Two major determining factors should be considered:

**4. V/C (V= volume, C= capacity)**

V/C: optimum level is 0.8; it can be relaxed up-to 0.9. Above 0.9 is dysfunctional and 1.0 is not desirable.

**5. LPCD of piped water supply**

Litres per capita per day (LPCD): the planned LPCD should be as per the minimum of norm is 135 LPCD set. However, the density to be capped by the Development/ Master Plan as per the threshold.

### 9.3.3. Minimum Setbacks

The setbacks in a building layout are provided subject to requirements of building height, the ventilation and fire safety requirements. Setbacks can be provided in two ways, i.e;

- 1) Based on plot sizes
- 2) Based on abutting road widths.

These two methods as described below may be adopted for providing setbacks. However, the provisions shall also confirm to the local building bye-laws.

#### 9.3.3.1. Setbacks based on Plot Sizes

The following table may be referred for deciding the minimum setbacks for different size plots in various use zones. The size of plots should be decided after taking into account the provisions of National Housing Policy and Urban Land (Ceiling and regulation) Act. The setbacks, if necessary, may be changed depending upon the local situations and specified in the Development Plans and Building byelaws. Details indicated in UDPF I Guidelines 1996 continue to be valid and are presented in the table below.

Table 9.4: Minimum Setbacks

Sr. No.	Plot Size (in sqm)	Front (m)	Rear (m)		Side (m)	
			Plains	Hill Towns	Plains	Hill Towns
1.	Upto 60	0	0	2	0	1.5
2.	Above 60 and upto 150	3	0	2	0	1.5
3.	Above 150 & upto 300	3	3	3	0	1.5
4.	Above 300 & upto 500	3	3	3	3	3
5.	Above 500 & upto 1000	6	3	3	3	3
6.	Above 1000 & upto 2000	9	3	3	3	3
7.	Above 2000 & upto 4000	9	6	6	6	6
8.	Above 4000 & upto 10000	9	6	6	6	6
9.	Above 10000	15	9	9	9	9

Source: UDPF I Guidelines 1996.

#### Notes:

- 1) In case the permitted coverage is not achieved with setbacks, the setbacks of the preceding category may be followed.
- 2) In case a layout is sanctioned with more than the minimum prescribed setbacks, the same shall be followed in the sanction of the building plans.
- 3) The building plan sanctioning authority may relax setbacks in special circumstances.
- 4) In case of Compact city planning, the margins to be altered upto at least 50%.

### 9.3.3.2. Setbacks with respect to Abutting Road Width<sup>196</sup>

The norms for setback, as per National Building Code, are indicated in the following tables:

#### A. Front Setback

Table 9.5: Front Setbacks with respect to Abutting Road Width

Sr. No.	Front Setback (m)	Width of street fronting the plot (m)	Remarks
1.	1.5	Upto 7.5	For buildings upto a maximum height of 7 m
2.	3.0	7.5 to 18	
3.	4.5	18 to 30	
4.	6.0	Above 30	

Source: NBC 2005.

**Note:** For streets less than 7.5 m in width, the distance of the building (building line) shall be at least 5m from the centre line of the street.

#### B. Rear and Side setback for building height upto 10 m

Rear setback: the rear setback shall be minimum 1.8 m

Side setback: the side setback shall be as follows:

- For detached buildings: Minimum 3m on both sides,
- For semi-detached buildings: Minimum 3 m on one side,
- For row type buildings: No side setback is required.

#### C. Rear and Side setback for building heights above 10 m

Table 9.6: Rear and side setback with respect to abutting road width

Sr. No.	Height of Buildings (m)	Side and rear setbacks (m)	Other Controls
1.	10	3	<ul style="list-style-type: none"> <li>➤ For buildings above 24 m in height, the minimum front setback shall be 6 m.</li> <li>➤ Where rooms do not derive light and ventilation from the exterior open space, the width of such space shall be reduced by 1 m subject to a minimum of 3 m and maximum of 8m.</li> <li>➤ Alternative setbacks for tower like structures               <ul style="list-style-type: none"> <li>○ Upto height of 24 m with one setback: Minimum 6m</li> <li>○ Between 24 m and 37.5 m with one setback: Minimum 9 m</li> <li>○ Above 37.5 m with two setbacks: Minimum 12 m</li> </ul> </li> </ul>
2.	15	5	
3.	18	6	
4.	21	7	
5.	24	8	
6.	27	9	
7.	30	10	
8.	35	11	
9.	40	12	
10.	45	13	
11.	50	14	
12.	55 and above	16	

Source: NBC, 2005.

**Note:** The building plan sanctioning authority may relax setbacks in special circumstances and increase in case of compact city and TOD development.

<sup>196</sup>NBC 2005 part 3 Pg 23.

### 9.3.4. Activities permissible in open area<sup>197</sup>

The open areas provided in the buildings can be used for the following permissible activities:

- a. Garden, rockery, water well and well structures, plant nursery, water pool, swimming pool (if uncovered), platform around a tree, landscaping, tank, fountain, bench, *chabutra* with open top and unenclosed on sides by walls and the like.
- b. Drainage culvert, conduit, catch pit, gully pit, chamber, gutter and the like.
- c. Compound wall, gate, un-storeyed porch and potico, canopy, slide, swing, uncovered staircase, ramps areas covered by *chhajja* and the like.
- d. Watchmen's booth, suction tank and pump-house, garbage shaft, sanitary block, parking lock up garages, electric cabin or substations and such other utility structures meant for the services of the building under consideration.

### 9.3.5. Distance from Electric Lines<sup>198</sup>

Following clearances shall be maintained between the building and overhead electric supply line in accordance with the current Indian Electricity Rules as amended from time to time:

Table 9.7: Distances from Electric Lines

Sr. No.	Description	Vertical Distance (m)	Horizontal Distance (m)
1.	Low and medium voltage lines and service lines	2.5	1.2
2.	High voltage lines upto and including 11 kV	3.7	1.2
3.	High voltage lines above 11 kV and upto and including 33 kV	3.7	2.0
4.	Extra high voltage line beyond 33 kV	3.7 (plus 0.3 m for every additional 33 kV or part thereof)	2.0 (plus 0.3 m for every additional 33 kV or part thereof)

Source: NBC, 2005.

<sup>197</sup> NBC 2005.

<sup>198</sup> NBC 2005, Part 3 Pg 22.

## 9.4. Simplified Development Promotion Regulations for Specific land Use Zones

### 9.4.1. Residential Use Zone

#### 9.4.1.1. Indicative Dwelling unit Sizes

The minimum dwelling units size could vary from State to State and region to regions, owing to various factors, including the terrain and soil type etc. However, a thumb rule could be noted from the following table.

Table 9.8: Indicative Minimum Dwelling Unit Sizes

Number of rooms	Dwelling unit size (sqm)
1 BHK	60-80
2 BHK	80-120
3 BHK	120-160
4 BHK	160-200
5 BHK	200-260

Source: Naya Raipur Master Plan.

The residential areas are developed either as (a) plotted development or (b) group housing/ flatted development. The density pattern i.e. (high density, high medium density, low medium density or low density) are followed for working out the pattern of development with respect to the size of plot to number of dwelling units on each plot, setbacks, FAR and the number of storeys/ height of the building.

#### 9.4.1.2. Plotted Development

The layout plans for residential scheme are formulated keeping in view the following:

- 1) That there would be sufficient light and air in the buildings when constructed
- 2) That there would be protection against noise, dust and local hazards
- 3) That there would be sufficient open space for various family needs
- 4) That the circulation and access is easy and is safe from accident point of view
- 5) That, as far as possible, the plots are of regular shape and size and
- 6) These are logically arranged in a systematic manner so as to give a regular pattern of development in the form of row houses, detached and semidetached houses and if necessary the regular bungalow type sites.

The size of the plot would depend upon the number of dwelling units to be permitted on each plot and the type of the housing needed for a particular city based on general affordability of the people. The following table is suggested for different size of plots applicable, ground coverage, FAR, height and number of dwelling units for a residential area:

Table 9.9: Plotted Housing

S. No.	Plot Area (Sqm)	Maximum Ground Coverage (%)	FAR	Maximum Height (m)
1.	30	75	150 (350, MPD)	8 (15, NBC)
2.	Above 30 upto 50	75	150	8 (15, NBC)
3.	Above 50 upto 100	65	180	12
4.	Above 100 to 250	65	180	12
5.	Above 250 to 500	55	165	15
6.	Above 500 to 1000	45	120	15
7.	Above 1000 to 1500	40	100	15
8.	Above 1500 to 3000	33 1/3	100 (120, MPD)	15

Source: UDPMI Guidelines, 1996.

**Note:**

- 1) In the already approved/developed plots the pattern of development should confirm to the existing regulations.
- 2) Basement, if constructed, may be used for incidental use such as parking, servicing and household storage. It is not to be used as a dwelling unit.
- 3) The area of the basement should not be more than the ground coverage.
- 4) Parking as per the prescribed norms should be provided with the plot or provision should be made in the layout plan without affecting the circulation pattern.
- 5) 50% of the open area of the plot should be used for proper landscaping and for plantation.

**A. Low Income Housing<sup>199</sup>**

For low income housing, the minimum plot size should not be less than 30 sqm.

The guidelines as given below shall be adopted for low income group housing:

- 1) It is recommended to provide cluster housing instead of single room dwelling.
- 2) The minimum plot size with ground coverage not exceeding 75%, shall be minimum 40 sqm in small and medium towns and minimum 30 sqm in metropolitan cities.
- 3) Plot sizes below 30 sqm and not less than 15 sqm may be permitted in case of cluster planning. In such a case the ground coverage and FAR can be 100 and 200 respectively.
- 4) Size of room: Every dwelling unit should have at least two habitable rooms, first room of minimum 9 sqm and width of 2.5 m. Other room shall be min 6.5 sqm with minimum width of 2.1 m provided the total area of both the rooms shall not be less than 15.5 sqm.
- 5) In case of single room tenements, the single multipurpose room shall be minimum 12.5 sqm carpet area.
- 6) The recommended density of dwelling units for low income housing may be as given below:

Table 9.10: Density norms for low income housing

S. No.	Type of Development	Range of Densities	Population Density (PPH)*
1.	Plotted Development	65-120 plots per Ha	--
2.	Mixed Development		--
2a)	Small Towns	75-100 DUs per Ha	335 - 450
2b)	Cities	100-125 DUs per Ha	450 - 560
2c)	Metropolitan Cities	125-150 DUs per Ha	560 - 675

Source: NBC: Special Requirement for Low Income Housing in Urban Areas.

\* calculated @ 4.5 persons per dwelling

<sup>199</sup>Annexure C, NBC 2005, pg 43.

The above dwelling unit and population density as suggested can be modified in view of development of Greenfield cities which should be based on compactness. The range of density may be applicable with slight modification to suit the local condition in brownfield cities, especially in case of redevelopment.

### 9.4.1.3. Group Housing

The number of dwelling units is calculated on the basis of the density pattern given in the development plan, taking into consideration a population of 4.5 persons per dwelling unit, as in the table below:

Table 9.11: Group Housing

S. No.	Minimum plot size (sq.m)	Maximum Ground Coverage (%)	FAR	No. of DUs	Maximum Height (m)
<b>Plains</b>					
1.	3000	25 to 35	50-175/ (Higher FAR may be given depending on the pattern of development. DUAC study, 2013 suggest FAR 400 in order to meet the requirements)	To be calculated on the basis of the net plot area of a particular neighbourhood. This may vary between 25 DUs to 175 DUs per Ha (if the FAR is raised beyond 175 the number of DUs will vary accordingly).	15 for plot sizes upto 4000 sqm 26 m for plot sizes above 4000 sqm
<b>Hill Towns</b>					
1.	5000	25 to 35	50 (Higher FAR may be given depending on the pattern of development and should not exceed 175)	To be calculated on the basis of the net plot area of a particular neighbourhood. This may vary between 25 DUs to 175 DUs per Ha.	15 (for all plot sizes)

Source: UDPFI Guidelines, 1996.

**Note:**

- 1) Basement, if constructed, is to be used for parking, servicing and for essential household storage and for providing facilities without counting in FAR.
- 2) The quantum of basement may vary between 33% to 50% of the plot area.

FAR and Ground Coverage for Group Housing based on density in DU's / Ha:

Table 9.12: FAR and Ground Coverage for Group Housing

Sr. No.	Net Residential Density Average (in DU's / Ha)	Maximum Ground Coverage (%)	FAR
1.	25	25	0.50
2.	50	30	0.75
3.	75	33	0.90
4.	100	35	1.00
5.	125	35	1.25
6.	150	35	1.50
7.	175	35	1.75

Source: NBC, 2005.

**Other Controls<sup>200</sup>:**

- a) The size of the habitable room should be minimum of 9.5 sqm, where there is only one room with a minimum width of 2.4m. Where there are two rooms, one of these shall be minimum of 9.5 sqm and other 7.5 sqm, with a minimum width of 2.1 m.

<sup>200</sup>NBC 2005 Part 3 page 30.

## 9.4.2. Commercial

Table 9.13: Norms for Commercial Centres

Sr. No.	Hierarchy of Commercial Centre	Maximum Ground Coverage (%)		Maximum FAR		Maximum Height (m)		Other Controls
		Plains	Hills	Plains	Hills	Plains	Hills	
1.	Cluster Centre Convenience Shopping	40	40	60	60	15	6	
2.	Neighbourhood Centre	30	35	100	100	15	9	
3.	Community Centre	25	30	100	100	26	15	
4.	District Centre	25	25	125	125	37	15	Some of the buildings in Plains could be permitted upto 50 m height with the approval of the Government for achieving an urban form.
5.	Sub city centre	--	--	--	--	--	--	Controls to be as per requirement
6.	City Centre	25 (MPD, pg 59)	--	150 (MPD, pg 59)	--	--	--	Other controls to be as per requirement
7.	Hotel	40 (MPD, pg 59)	--	225	--	--	--	Other controls to be as per requirement
8.	Service Apartment	30	--	150	--	--	--	Other controls to be as per requirement
9.	Any other commercial centre	25%	--	100	--	--	--	Other controls to be as per requirement

Source: UDPMF Guidelines 1996, MPD.

## 9.4.3. Public and Semi-public

The norms for public and semi public uses as indicated in the UDPMF Guidelines 1996 have been compared with those proposed for MPD-2021 by the DDA and are suggested in the **Tables 9.14, 9.15& 9.16** below.

Table 9.14: Norms for Public and Semi Public uses

Sr. No.	Uses	Maximum Ground Coverage (%)		Maximum FAR		Maximum Height (m)		Other Controls
		Plains	Hills	Plains	Hills	Plains	Hills	
1.	<b>General (in cases where specific regulations are not given)</b>	30 (MPD)	25	120 (MPD, pg 150)	100	26	15	<ul style="list-style-type: none"> <li>➤ 15% of the total floor shall be allowed for residential purpose.</li> <li>➤ Basement upto envelope line and to the maximum extent of 50% of the plot area shall be allowed and if used for parking and services should not be counted in FAR.</li> </ul>
2.	<b>Government Offices</b>	30 (MPD)	25	200 (MPD, pg 87)	100	37	15	<ul style="list-style-type: none"> <li>➤ The integrated office complex shall include Central Government</li> </ul>

Sr. No.	Uses	Maximum Ground Coverage (%)		Maximum FAR		Maximum Height (m)		Other Controls
		Plains	Hills	Plains	Hills	Plains	Hills	
								office, local government office, public undertaking offices and courts. ➤ Basement upto envelope line and to the maximum extent of plot area shall be allowed and if used for parking and services should not be counted in FAR.
3.	<b>Nursery School</b>	33 1/3	33 1/3	100 (MPD, pg 137)	66 2/3	8	6	➤ Basement below the ground floor and to the maximum extent of ground coverage, and if constructed shall be counted in FAR.
4.	<b>Primary School</b>	33	33	120 (MPD)	100	15	15	➤ School for handicapped shall have same norms as the Primary School.
5.	<b>Higher Secondary School</b>	35 (MPD)	30	150 (MPD)	100	15	15	
6.	<b>College</b>	35 (MPD)	25	150 (MPD, pg 139)	75	15	15	The total area of the plot shall be divided in: a) School/ college building area b) Play field area c) Parking area d) Residential and hostel area
7.	<b>Education and Research Centres (Large campus i.e above 8 Ha)</b> Large campuses of universities, medical and engineering colleges and other education and research institutes shall be covered under these regulations. The campus will be divided into three parts and the regulations shall apply, as given below:							
7a)	Academic, including administration 45% of the total land area	30 (30, MPD)	20	120 (MPD, pg 139)	80	37 (MPD)	15	Basement below the ground floor and to the maximum extent of ground coverage shall be allowed and if used for parking and services should not be counted in FAR.
7b)	Residential 25% of the total land area							This will be developed at a density of 400 pph gross. The land shall be reserved for residential facilities @ 9.2 sq.m per person. Sub division regulations as given for group housing shall apply.
7c)	Sports and Cultural activities	10	10	15	15	--	--	

Sr. No.	Uses	Maximum Ground Coverage (%)		Maximum FAR		Maximum Height (m)		Other Controls
		Plains	Hills	Plains	Hills	Plains	Hills	
	15% of the total land area							
7d)	Parks and Landscapes 15% of the total land area	--	--	--	--	--	--	Suitable landscape plan to be prepared for this area.
8.	<b>Religious Premises</b>	33 1/3	33 1/3	66 2/3	66 2/3	11 (excluding minarets, shikhars and domes)	11 (excluding minarets, shikhars and domes)	Basement below the ground floor and to the maximum extent of ground coverage, if constructed, shall be counted in FAR.

Source: UDPI Guidelines, 1996 and MPD, 2021.

**Table 9.15: Socio Cultural Use Zone**

Sr. No.	Category	Ground Coverage (%)	FAR	Maximum Height (m)
1.	Multipurpose Community hall, Banquet hall	30	120	26
2.	Recreational Club	25	100	26
3.	Socio cultural facilities such as auditorium, music, dance and drama centre/ meditation centre etc.	35	120	26
4.	Exhibition cum fair ground	20	20	--
5.	Science centre	30	120	26
6.	International Convention centre	30	120	--
7.	Old age home/ care centre for physically / mentally challenged/ working women/ men hostel/ adult education centre/ orphanage/ children's centre/ night shelter	30	120	26
8.	Aanganwari	30	60	15
9.	Sports Facilities	20	40	--

Source: MPD, 2021.

Norms for socio cultural use zone & security and safety facilities use zone is given for application in plains and hilly areas both.

**Table 9.16: Security and Safety Facilities Use Zone**

Sr. No.	Category	Ground Coverage (%)	FAR	Maximum Height (m)
<b>Security Facilities</b>				
1.	Police Post	35	150	15
2.	Police Station	30	150	26
3.	District office and Battalion	30	120	26
4.	Police Lines			
	- Administration	20		
	- Residential	30		
	- Sports and Facilities	10		
	- Open Spaces	40		
5.	District Jail	30	120	26
6.	Police Training Institute/ College	30	120	26
7.	Police Firing Range	12.5	25	9
8.	Police camp including Central Police	12.5	25	9

Sr. No.	Category	Ground Coverage (%)	FAR	Maximum Height (m)
Organisation/ Security Forces				
<b>Fire Facilities</b>				
1.	Fire Post/ Fire Station/ Disaster Management Centre/ Fire Training Institute	30	120	26

Source: MPD, 2021

## 9.4.4. Industrial use Zone

Table 9.17: Industrial Use Zone

Sr. No.	Plot Size (sq m)	Maximum Ground Coverage (%)		Maximum FAR		Maximum Height (m)		Other Controls
		Plains	Hills	Plains	Hills	Plains	Hills	
1.	<b>Flattened Group Industry</b>							
	Minimum 2000	30	30	120	100	15	15	Basement upto the building envelope line to the maximum extent of 50% of plot area shall be allowed and if used for parking and services should not be counted in FAR.
2.	<b>Light and Service Industry</b>							
2a)	Less than 400	60	60	125	100	12	9	➤ Maximum floors allowed shall be basement, ground floor and first floor. Basement should be below ground floor and to the maximum extent of ground coverage shall be counted in FAR. In case the basement is not constructed, the permissible FAR can be achieved on the second floor. ➤ In case of roof truss, height of buildings should be adjusted/ relaxed.
2b)	Above 400 upto 4000	50	50	125	100	12	12	
2c)	Above 4000 upto 12000	45	45	125	100	12	12	
2d)	Above 12000	40	40	100	75	12	9	
3.	<b>Extensive Industry</b>							
3a)	400 to 4000	50	50	100	75	9	9	➤ Single storey building with basement is allowed. Basement shall be below the ground floor and the maximum extent of ground coverage and shall be counted in FAR. ➤ In case of roof truss, height of buildings should be adjusted/ relaxed.
3b)	Above 4000 upto 12000	45	45	90	60	9	9	
3c)	Above 12000 upto 28000	40	40	80	50	9	9	
3d)	Above 28000	30	30	60	45	9	9	

Source: UDPFI Guidelines, 1996

### Note:

- 1) A new planned industrial area to have minimum 100- 300 sqm size of plot and its width shall not be less than 15 m.
- 2) For industrial plots upto 1000 sq.m, 5% of the total area shall be reserved as amenity open space which shall also serve as general parking space. When such amenity open space exceeds 1500 sq.m, the excess area could be utilised for construction of buildings for banks, canteen, welfare centre and such other common purposes.
- 3) For industrial plots more than 1000 sq m, 10% of the total area shall be reserved as amenity open space to a maximum of 25 sq m.

### 9.4.5. Transportation & Communication Use Zone

For transportation use zone the following norms may be applicable:

Table 9.18: Norms for Transportation Zone

Sr. No.	Category	Area under operation (%)	Area under building (%)	FAR	Floor area that can be utilised for passenger accommodation (%)
1.	Rail Terminal	70	30	100	15
2.	Bus Terminal	50	50	100	25
3.	ISBT	25	Max 50 (as per requirement)	100	as per requirement
4.	Metro Yards	80	20	100	15

Source: MPD, 2021.

#### Other Controls:

- 1) The space on first and second floor shall be essentially used for public services like post office, police-post and other essential services.
- 1) Bus queue shelters are not to be included in the coverage and FAR.
- 2) In order to integrate the supporting commercial uses around the transportation zone, FAR can be more for promoting mixed use.

#### 9.4.5.1. Aerodromes

The following restrictions in vicinity of aerodromes shall be applicable<sup>201</sup>:

- 2) The buildings or structures which rise to 30 m or more in height and are to be located within 20 km of the aerodrome reference point shall require No Objection Certificate from the Directorate General of Civil Aviation.
- 3) In case of buildings to be located in the vicinity of defence aerodromes, the maximum height of such buildings shall be decided by the Defence Authority.
- 4) No new chimneys or smoke producing factories shall be constructed within a radius of 8 km from the Aerodrome Reference Point (ARP).
- 5) Overhead high voltage/ medium voltage lines or telephone & other communication lines shall not be permitted in the approach/ take off climb areas (funnel zone) within 3000 m of the inner edge of these areas.
- 6) A 3 m margin shall be allowed in new constructions for wireless/ TV antennas, cooling towers and munties.
- 7) For height Restrictions with respect to Approach Funnels and Transitional areas NBC 2005 or the latest revised version shall be followed.

<sup>201</sup>NBC, 2005, part 3, pg 27.

## 9.4.6. Primary Activity

Table 9.19: Norms for Farm Houses

Sr. No.	Size of Farm	Maximum FAR	Maximum Height	Other Controls
1.	Above 1.0 Ha and upto 2.0 Ha	100 (including mezzanine floor)	Single storeyed maximum height 6m	➤ Setback in dwelling house should be 15 m away from any boundary line of the property.
2.	2.0 Ha and above	150 (including mezzanine floor)	Single storeyed maximum height 6m	➤ Where the property abuts an urban road, the dwelling house building should be setback from the centre line of that road by 60m. Where the property abuts a village road, the building setback from the centre line of that road should be by 30 m. ➤ No dwelling unit should be built within 400 m of the right of way of any National Highway.

Source: UDPI Guidelines, 1996

Table 9.20: Norms for Primary Activity

Type	FAR	Ground Coverage	Max. Building Ht.
Agro based uses	5	5%	15 m
Poultry Farm	25	25%	10 m
Religious, Educational, Hospital, Slaughter house, cold storage, transport related activities and truck terminal, Govt/ semi govt / FCI go-downs and warehouses	45	15%	15 m

Source: Ahmedabad Development Plan (part III, page 103).

## 9.5. Special Requirement

### 9.5.1. Building Norms for Natural Habitat

The land uses identified as Natural Habitat covering water bodies, forest & vegetation, green open spaces, coastal zone, wetlands etc., shall be protected and adequate buffer shall be provided from the planned establishments. For planning around these areas, the building norms and regulations as stipulated by the respective statutory bodies such as MoEF and State Environment and Forest Department shall be applicable.

### 9.5.2. Historical or Archaeological areas

The special areas shall be identified as old built-up areas, areas of historical or archaeological importance, areas of scenic value, area restricted for development by Government or area under other uses/ spot zone during preparation of Development plan. For protection of these areas the norms as stipulated by the respective statutory bodies such as Archaeological Survey of India and respective departments shall be applicable.

As per the Model Building Bye-laws, buildings within heritage precincts or in the vicinity of heritage sites shall maintain the skyline in the precinct and follow the architectural style (without any high-rise or multi-storeyed development) as may be existing in the surrounding area, so as not to diminish or destroy the value and beauty

of or the view from the said heritage sites. The distance is prescribed as 200 meters Regulation zone by AMASR Act, 2010. The development within the precinct or in the vicinity of heritage sites shall be in accordance with the guidelines framed by the Commissioner, Municipal Corporation / Vice- Chairman, Development Authority on the advice of the Heritage Conservation Committee or separate regulations / guidelines, if any, prescribed for respective zones by Municipal Corporation / Development Authority.

### 9.5.3. Industrial Regions

For planning of Industrial Regions the guidelines development by State Authorities such as Special Investment Region (SIR) guidelines within Delhi Mumbai Industrial Corridor (DMIC) or by National Authorities such as guidelines for National Investment & Manufacturing Zones (NIMZ's), Special Economic Zone (SEZ) should be referred to. Refer Chapter 6 for environmental aspects and annexures of Volume II for various Acts and Policies.

### 9.5.4. Introduce Use of Form Based Codes

In view of current urban form of Indian city, an approach may be adopted to the form the image of city through Form-Based Code in addition to the development promotion regulation. This can act as a technique for regulating development to achieve a specific urban form, and it creates a predictable public realm by the regulation of the physical form primarily. The different parameters used to zone the city into different transects are land use intensity, density, building disposition, building configuration, building function, standards, mixed use and neighbourhood.

## 10 General Recommendations

### 10.1. Adoption of URDPFI Guidelines, 2014

Spatial planning for development is an envisioning process which requires a sound assessment of the ground issues and provides options for sustainable development within the bound constraints of the demographic, physical, socio-economic, jurisdictional and financial aspects. The focus is on spatial dimension as all development efforts have direct impact on the use of land and different development projects need to be coordinated and integrated within a desirable spatial frame. The process of planning must always be continuous to address the evolving issues of the human settlements. The formulation of the URDPFI guidelines as a revision of the UDPFI guidelines, 1996 addresses the present challenges of urban and regional development, plan preparation process and implementation and attempts to standardise and also simplify the guidelines required for planning in the country. Considering the rapid pace of urbanisation, it is suggested that the Ministry of Urban Development should revisit the guidelines in a periodic time frame.

The norms and standards prescribed by URDPFI Guidelines are in a form of a suggested model, which may be adopted by the respective State Governments in accordance to the local conditions. State Town and Country Planning Departments have been preparing Development plans with reference to UDPFI Guidelines of 1996. The recommendations provided in the 2014 guidelines are specific and aim at facilitating and quacking the processes of plan preparation and implementation of plans. Specifically, some of the key points that require immediate attention of the State Town & Country Planning Departments, planners and practitioners have been detailed. Along with suggestions for further actions to be taken up by the Ministries, Organisations and Agencies at the National level, those for the governments, organisations and agencies at State level and Development Authorities are also provided.

These Guidelines are generic in nature and the title starts with the word 'Urban', these are applicable for all settlements, urban or rural. Some States such as Orissa and Rajasthan have moved ahead to prepare formal spatial plans for rural areas having population of 10,000 or more. The URDPFI Guidelines endorse such policies. More significantly, these Guidelines highlight the concept of regional planning, by recommending treating the rural areas that are contiguous to the urban areas as a continuum. This continuum is termed as 'RURBAN' in Gujarat and is profusely used for notifying 'Development Authorities' in many States.

### 10.2. Key Recommendations in the Guidelines

Based on the extensive consultations & deliberations with various stakeholders and experts, it can be summed up and recommended that following parameters are a

prerequisite for the developments to be taken up in India. The guidelines, focuses on the following:

- Integrated regional and urban development with focus on spatial planning
- Regional spatial development frame to provide the backdrop within which settlement planning (urban, rural, peri-urban) and local area planning should be taken up,
- Adapting a paradigm shift towards planning and development for compact, green, smart cities and safer cities,
- Ensuring that the task of urban and regional planning must be only carried out or must ONLY be the responsibility of certified planner.

India is not only one of the oldest civilizations but also the largest democracy and is extremely diverse geographically, culturally, socially, economically, administratively & historically. Hence, no single approach can work uniformly. The approaches to development need to be tailored contextually, which needs to be done by the individual State Governments and City Municipalities.

Also during the implementation process as seen while comparing cases like Delhi, Ahmedabad, Hyderabad and Mumbai, there are various limitations seen in terms of diversity in the mix of activities, population concentration, nature of existing developments and dynamic changes in the peri-urban areas. Urban design approach based projects need to be taken up at micro area level so that the cross cutting development themes can be tailored/modified to suit as per contextual realities while implementing plans in various regions/cities/areas.

Therefore contextual approach becomes important consideration specially at local area planning level. However, a uniform frame of spatial planning considerations must guide all development within an integrated frame of regional and urban perspective. At local area level, it is essential that approach to planning and design has to be mainly guided by urban design approach. For this purpose, urban planners and urban designers should work together as unified team.

Table 10.1: Key Aspects of the Guidelines

Sector	Key Aspects
Transportation planning	<ul style="list-style-type: none"> <li>• The streets, roads, mass rapid transit systems, other public transportation systems provide the back bone structure for urban and regional development. Transportation including mobility should therefore be given a prime importance.</li> <li>• Transportation planning not only to be efficient, but also needs to be designed and integrated into other systems in such a way that it facilitates mobility for all genders, age groups and citizens with disabilities (differently abled citizens).</li> </ul>
Sustainable Land development	<ul style="list-style-type: none"> <li>• Selecting the right density of development taking into consideration the environment, provision and cost of infrastructure and mobility.</li> <li>• High &amp; medium density zones as appropriate to contextual situation in planning to include mixed use development/ Compact city development.</li> </ul>
Sustainable Resource Management	<ul style="list-style-type: none"> <li>• Realizing the pressure on the natural resources, all infrastructure planning should be done with a strong emphasis on sustainability like green cities approach.</li> <li>• Also, it is important that based on the suitability of the land and availability of resources, States should prepare Perspective (Strategic) Plan in order to guide development at regional and city level.</li> </ul>
Efficient Urban Development Management	<ul style="list-style-type: none"> <li>• Application of GIS, Bhuvan in planning process</li> <li>• 73<sup>rd</sup>&amp;74<sup>th</sup> Amendment to be adopted in the given planning system and</li> </ul>

Sector	Key Aspects
	<ul style="list-style-type: none"> <li>formulation of DPC &amp; MPC.</li> <li>• Transparency and integration in various planning &amp; non-planning department in terms of the processes related to planning and development works.</li> <li>• Smart cities application</li> </ul>
Participatory Planning approach	<ul style="list-style-type: none"> <li>• Direct involvement of the citizens as appropriate in planning processes and mechanisms.</li> <li>• Pre and post planning people’s participation and consultation to be promoted, which has been successfully practised in Goa and Rajasthan.</li> <li>• Citizens’ charter to bring transparency and accountability.</li> </ul>
Regional Planning Approach	<ul style="list-style-type: none"> <li>• Planning regions can be identified as Administrative Regions such as District and Metropolitan Regions, Investment Regions and Special Regions.</li> <li>• Preparation of a State Perspective Plan with planning for Districts and Metropolitans as Regions</li> <li>• The planning for investment regions should be under a National level policy, like DMIC, NMIZ policy.</li> </ul>

Source: URDPFI Guidelines, 2014

### 10.3. Key aspects of Guidelines for local area/ site specific development

- Local area/ site specific development planning should be based on urban design approach focusing on mobility, accessibility and connectivity, street furniture including street plantation, pedestrian & cycle paths, signage and parking, provision of site level facilities, etc.
- Special attention is required on authenticity of property boundaries and land tenure on the basis of the revenue records
- Special development incentives such as increased FAR should be adopted in the designated TOD influence zone (approx. 500 meters) along the major transportation corridors.
- Special attention to be given to conservation of archaeological, architectural and historic buildings and sites as per the prevailing rules.

### 10.4. Suggestions for future Development in Planning

MoUD as the nodal ministry has taken the initiative to prepare the Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines, now it is recommended that the following specific tasks be reviewed by the relevant Central and State Government Ministries/ Departments/ Organisations/ Agencies/ Authorities and if found suitable and necessary, adapt in their own policy, legal and administrative procedures. In doing so, States are urged to review respective policies and Acts which are relevant to operationalize the URDPFI Guidelines and bring changes wherever necessary and appropriate. The URDPFI Guidelines are to be circulated to all the State Town and Country Planning Departments, Urban Development Authorities, Urban Local Bodies, relevant Ministries and other agencies which are involved in preparation of Master Plans/ Development

Plans/Metropolitan Plans /District Development Plans for their appropriate adoption.

Land development and Urban Development are State subject, therefore URDPFI Guidelines need to be integrated with the State level legal and policy measures. In the process of preparing the Master Plans/ Development Plans /District Development Plans, it would be desirable that all the State Town and Country Planning Acts, Urban Development Authority Acts, Municipal Acts, Industrial Development Corporation Acts may be aligned with the URDPFI Guidelines.

### 10.4.1. Recommendations for the National Organisation(s)

1. The current policy for primary categorisation of Land under the **Draft National Land Utilisation Policy (2013)**, should be followed by State during the preparation of State Perspective Plans.
2. The prevailing Model law(s) needs to be reviewed and revised to simplify & suggest State Departments to come to a unified legal and operational framework.
  - i. The **Model Regional and Town Planning and Development Law** was prepared in 1985, almost 30 years ago, since then many legislative and ideological changes have taken place in the developmental approach of Government of India. Also to incorporate the provisions of 73<sup>rd</sup>&74<sup>th</sup> CAA, the Model Regional and Town Planning and Development Law, 1985 requires appropriate revision and restructuring. Accordingly, an independent exercise for changes in the Model law in light to the suggestions made in the URDPFI Guidelines, 2014, Volume – II could be undertaken.
  - ii. The **Model Municipal Law (MML), 2003** was introduced more than a decade back; it is pertinent that the provisions of MML need to be updated to bring it in harmony with the recent developments in the Municipal Law. The MoUD study undertaken by NIUA (2013) to review the MML, suggested various points for revision of the provisions given in MML, based on their status of implementation. There are various provisions in the current scenario that are vital for MML to bring it in line with the new developments in municipal governance. Provisions like reservations of seats for Women/SC/ST/BC in Municipality, Local Bodies/Municipal Ombudsman, functions and duties of *Area Sabha* Representative, disclosure of various documents relating to municipal affairs, accrual based double entry system of accounts, defining functions and responsibilities of DPCs and MPCs are suggested to be detailed out under the MML. Such changes and more are suggested to be considered for the revision of the Model Municipal Law.

3. **Draft Town and Country Planners Registration Bill, 2012** is being prepared by Town and Country Planning Organisation identifies the need for establishment of Council of Town and Country Planning. Such Council is suggested to be body corporate, having continuous succession and a common seal. The purpose of such Council is to control and regulate the quality of education institutions of Town and Country Planning and qualified professionals from such institutes, in the country. It is suggested, that the bill to be reviewed, be given a legal status and adopted at the earliest. It could be explored that the certified planners by the council are empowered to take decision on financial expenditure as appropriate for the administrative position. Also, the Council could ensure that the task of urban and regional planning must be only carried out by certified planners.
4. It is suggested that the nomenclature of JnNURM's 'Comprehensive Development Plan' be changed to as '**City Investment Plan**' to avoid confusion between the recommended statutory Development Plan (the nomenclature) as per the State provision and 'Comprehensive Development Plan' as per JnNURM and also the fact that City Development Plan is essentially a resource mobilisation plan on specific schemes and projects .
5. For integration of planning systems, both statutory and non-statutory plans, JnNURM to accept City Investment Plan (named as City Development Plan under JnNURM) and Comprehensive Sanitation Plan as sub-plans of Development plan/ Master plan or Statutory Plans as per the State Government provision and provide funding of such plans after official approval of the Development Plan.
6. While adopting the URDPFI Guidelines, it is necessary to develop **Planning Information System (PIS)** on the lines of Management Information System (MIS). This will be essential as numbers of agencies are involved in collection of different attribute and spatial data, which often leads to duplicity of work and ambiguity in terms of analysis and interpretation. Hence, it becomes necessary to streamline the data collection, analysis and interpretation for preparing the Master Plans/ Development Plans/Metropolitan Plans /District Development Plans. This will enable hastening the process of preparation of Plans. It has been observed that the process of Plan Preparation often gets delayed due to lack of availability of relevant and comparable both in content and time scale spatial/attribute data.
7. National Remote Sensing Centre (NRSC) to take necessary actions for easy access and wider popularity of *Bhuvan* and making it faster and more user friendly. Ministry of Urban Development to extend the necessary support for it. For **compatibility of geo-spatial database other Ministries' geospatial data** could be incorporated with the *Bhuvan* database, like Ministry of Drinking Water & Sanitation, Ministry of Road Transport & Highways MoRTH, NIC. Already

database from Geological Survey of India has been integrated at appropriate scale with *Bhuvan*.

8. Lack of cadastral maps limits the use of *Bhuvan* land use base for preparation of development plan/ Mater plan, and therefore, integration of the cadastral records at appropriate scale with **National Land Record Modernisation Programme** is suggested which could provide ready to use geo-spatial and revenue database pan India.
9. For preparation of local area plan, authentic and reliable data at 1:2000 or 1:1000 scale is required specially on plot boundaries and area of plots. In reality there exists lot of discrepancies between the plot boundaries and area as recorded in the revenue records and what actually is the ground reality. This problem is a serious one and greatly hampers implementation of local area schemes. MoUD in assistance with NRSC and in collaboration with representatives revenue departments of the States should evolve mechanisms to improve the situation. The crucial aspect in helping implementation of the local area plans will be access to digitised and authentic data on plot boundaries and plot areas, and also on land tenure by planners.
10. The centrally sponsored National Urban Information System (NUIS) Scheme approved by GoI with two major components (i) Urban Spatial Information System (USIS) to meet the spatial data requirements of urban planning & management (ii) National Urban Data Bank & Indicators (NUDB&I) to develop town level urban database to support development of indices through a network of Local Urban Observatories (LUO) under the National Urban Observatory (NUO) programme. These schemes and programmes are suggested to be expedited for completion.
11. With the experience of the practitioners in the North eastern hilly states, it is suggested to review at the Service Level Benchmarks (SLBs), which should be flexible on such certain items, for example: extent non-revenue water source may be additional 5%. MoUD to review and assess the **SLBs in hilly and North-Eastern areas** to redefine the SLBs. Apart from this, SLB's to include extent of **Municipal Construction waste reuse/ recycled** benchmark<sup>202</sup>.
12. **E-governance, techniques and methods:** Under the E-Governance, it has to be seen that how the entire planning process gets expedited in a short period of time, wherein use of digital technology should be maximized by way of preparing spatial database and integration of attribute data periodically. It is recommended that the plans should be updated /revised through mid- term review, so as to ascertain the efficacy of implementation, preferably every five years, which may be co-terminus with the five year plans. Under E-governance, various processes related to planning like change of land uses, building plan

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<sup>202</sup> For cities about 20% as per the (draft) Construction and Demolition Waste Rules

sanctions, issuance of completion certificate and other clearances required for any project needs to be streamlined, so that all the urban infrastructure projects gets completed within the stipulated time.

13. For this purpose, URDPFI suggests that '**citizen's charter**' should be enacted at the state level to bring transparency and accountability.
14. **Promotion of the network, viz, "City Net":** "City Net" could be recommended for encouraging the networking between various cities with a view to ensure balanced development in a region. This will require exchanging /sharing of information and data among the cities. This will ensure effective integration of trunk infrastructure in a region connecting all urban settlements. The benefit of "City Net" network will ensure efficient delivery of the services and will also be helpful in achieving the balanced development and redistribution of population, thereby reducing urban primacy. City Net will also facilitate formulation of Inter – State Regional Plans
15. Independent research is suggested to be initiated by the Ministry of Urban Development for the following:
  - i. **Mixed landuse and compact city norms** observing the international scenario and national resource availability, to identify norms for sustainable density norms (range) for different scales of cities.
  - ii. In case of inadequacy in the manpower capacity with the Government bodies for planning, outsourcing to non-governmental and private organisation could be considered as an option. A standard **Terms of Reference (ToR) for such consultancy services** is suggested to be prepared and made available to the State Governments.

***It is recommended that all the human settlement planning, infrastructure and administrative related departments could use the URDPFI Guidelines, 2014 and not merely only the State Town and Country Planning Departments.***

#### 10.4.2. Recommendations to State Governments/ State Town and Country Planning Departments/ Local Bodies/ Development Authorities

1. State Governments could review and where necessary amend the **respective State Town and Country Planning Acts and related laws of the State Government** to minimise inconsistencies and contradictions, if any. The State T&CP Acts could direct the public participation at pre-planning and post draft plan formulation stage and the time period for approval of development plans. The amendments are suggested to be referred from the Model Town and Country Planning Law and Model Municipal Law by the Central Government revision.

Table 10.2: Relevant State Level Acts to be considered for revision

S.No.	Name of State	T & CP Act	Urban Development Authority Act	Industrial Development Act
1	Andhra Pradesh	Andhra Pradesh Town and Country Planning Act, 1920	Andhra Pradesh Urban Areas (Development) Act, 1975	-
2	Arunachal Pradesh	Arunachal Pradesh Urban and Country Planning Act, 2007	The Arunachal Pradesh Urban and Country Planning Act, 2007	-
3	Assam	Assam Town and Country Planning Act, 1959	Guwahati Metropolitan Development Authority Act, 1985	-
4	Bihar	Bihar Urban and Regional Planning and Development Act, 2011	-	The Bihar Industrial Area Development Authority, Act -1974
5	Chhattisgarh	Chhattisgarh Town and Country Planning Act, 1973	-	-
6	Goa	Goa Town and Country Planning Act, 1974	-	The Goa Industrial Development Act 2013
7	Gujarat	Gujarat Town Planning & Urban Development Act, 1976	Gujarat Town Planning and Urban Development Act, 1976	The Gujarat Special Investment Region. Act-2009
8	Haryana	Haryana Development & Regulation of Urban Areas Act, 1975.	Haryana Urban Development Authority Act, 1977	-
9	Himachal Pradesh	Himachal Pradesh Town and Country Planning Act, 1970	Himachal Pradesh Housing & Urban Development Authority Act, 2004	-
10	Jammu & Kashmir	Jammu & Kashmir Development Act, 1970	J&K Development Act 1970	-
11	Jharkhand	Jharkhand Town Planning and Improvement Trust Act, 1954 (adopted from Bihar)	Jharkhand Regional Development Authority Act, 2001	Jharkhand Industries (Facilitation) Act - 2012
12	Karnataka	Karnataka Town and Country Planning Act, 1961	Karnataka Urban Development Authorities Act, 1987	The Karnataka Industrial Areas Development Act, 1966
13	Kerala	Kerala Town Planning Act, 1939	-	Kerala Industrial Township Development Area Act, 1999
14	Madhya Pradesh	Madhya Pradesh Nagar Thatha Gram NiveshNiyam, 1975	Madhya Pradesh Municipalities Act, 1961	The Madhya Pradesh Investment Region Development And Management Act, 2013,
15	Maharashtra	Maharashtra Regional and Town Planning Act, 1966	Mumbai Metropolitan Region Development Authority Act, 1974 Maharashtra Regional and Town Planning Act, 1966	The Maharashtra Industrial Development Act, 1961
16	Manipur	Manipur Town and Country Planning Act, 1975	Manipur Municipalities Act, 1994	-
17	Meghalaya	Meghalaya Town and Country Planning Act, 1973	Meghalaya Urban Development Authority, Shillong Building Bye-Laws 2001	-
18	Mizoram	Mizoram Urban & Regional Development Act, 1990	Mizoram Urban and Regional Development Act, 1990	-

S.No.	Name of State	T & CP Act	Urban Development Authority Act	Industrial Development Act
19	Nagaland	Nagaland Town and Country Planning Act, 1980	Nagaland Town and Country Planning Act 1966	-
20	Orissa	Orissa town Planning and Improvement Trust Act, 1956	The Odisha Development Authorities Act, 1982	-The Orissa Industrial Infrastructure Development Corporation Act, 1980
21	Punjab	Punjab Regional Town Planning and Development Act, 1995	Punjab Regional & Town Planning & Development Act, 1995	-
22	Rajasthan	Rajasthan Urban Improvement Act, 1959	Jaipur/ Ajmer/ Jodhpur Development Authority Act	Rajasthan Industrial Area Development Authority Act, 1995
23	Sikkim	The Sikkim Urban and Regional Planning and Development Act, 1998	-	-
24	Tamil Nadu	Tamil Nadu Town and Country Planning Act, 1971	-	Tamil Nadu Industrial Township Area Development Authority Act, 1997
25	Tripura	Tripura Town and Country Planning Act, 1975	Tripura Municipal Act 1994,	-
26	Uttar Pradesh	Uttar Pradesh Urban Planning and Development Act, 1973	Uttar Pradesh Nagar Planning & Development Act 1973	U.P. Industrial Area Development Act ,1976
27	Uttarakhand	Uttarakhand Urban Planning and Development Act, 1973	Uttarakhand (U.P. Urban Planning and Development Act,1973) Adoption & Modification order, 2006	-
28	West Bengal	West Bengal Town and Country (Planning and Development ) Act, 1979	Town & Country (Planning & Development) Act, 1979	Durgapur Industrial Board (Development & Control of Building Operation) Act 1958
29	A & N Islands.	Andaman & Nicobar Town and Country Planning Regulations, 1994	-	-
30	Chandigarh	The Capital of Punjab (Development and Regulation ) Act, 1952	-	-
31	Delhi	Delhi Development Act, 1957	Delhi Development Act, 1957	-
32	Dadra & Nagar Haveli	Dadra & Nagar Haveli Town and Country Planning Act, 1974	Dadra & Nagar Haveli,	-
33	Daman & Diu	Daman & Diu Town and Country Planning Act, 1974	-	-
34	Lakshadweep	Yet to be enacted	-	-
35	Pondicherry	Puducherry Town and Country Planning Act, 1969	The Puducherry Town & Country Planning Act, 1969	-

Source: TCPO

Note: Review of listed various acts should be useful in the context of different suggestions made by URDPFI under 10.4.1 and 10.4.2. State Governments are urged to do the useful.

2. In view of '**The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013**' (effective from 1<sup>st</sup> January 2014), the State Governments could review and if found necessary modify their land policies and legal system in order to facilitate – simplification of planning process and effective implementation of development plan.
3. All the States have full-fledged Departments of Town and Country Planning. However, based on the deliberations in the 'Brainstorming Sessions on Planning and Development, 2025: Professional and Academic Challenges' conducted by TCPO, it was learnt that several States are functioning without a qualified Director/Chief Town Planner as the post is being held either by an Administrator or charge is given to Senior Town Planner. Hence, the cities/towns of such States continue to suffer from lack of attention to the development aspects apart from infrastructure deficiencies and ad-hoc decisions which lead to mismatch between the actual availability and requirement of the infrastructure facilities. It is suggested that all State Governments appoint a **qualified Town Planner as the head** of State Town and Country Department.
4. **Regulatory Authority at the State level:** The major institutional reforms suggested by the URDPFI Guidelines, 2014, at the state level are the constitution of Urban and Regional Planning & Development Authority (or Town Planning Board or Town Planning Council as existing in some states). This apex body should be chaired by the Chief Executive of the state, Chief Minister of an Urban and Regional Development Regulatory Authority at State level and creation of City Level Infrastructure Fund. The regulatory authority at the state level may function as an appellate authority to address the related grievances redress. The regulatory body could review the smooth functioning of the agencies to overcome the multiplicity, duplication or gaps. The authority will guide the preparation of Perspective plan for the State which should provide the frame for all regional and urban development plans in the State. The regulatory authority should be responsible for guiding land utilisation based on suitability and proposed structure of transportation networks. It should guide the state for development focusing on protection of environmentally sensitive areas, natural land forms, natural vegetation and water bodies etcetera.
5. **City Infrastructure Fund** could raise funds from direct and indirect taxes which have direct relevance to urban and state subjects, this consolidated fund at State and ULBs level to be exclusively used for urban infrastructure. Apportionment of the tax for the proposed fund between the State government and ULBs to be based on the State policies.
6. State Finance Commission could bring **uniformity in accounting and budgeting at municipal level**. TCPO, IIPA, NIUA to recommend a uniformed accounting system based on the JnNURM reform(s). The Model Municipal Law could be revised keeping in view of the same.

7. State level policy could be adopted for institutional requirements to **meet the demand of manpower** in planning:

Every State could have a Planning School.

Standardization of nomenclature for planning courses.

Schools of Planning could have continuous interface with the profession/industry.

8. Under the attempts to improve implementation of plans, State Governments could develop **Good Governance systems**, including:

- i. Citizen's charters could be formulated by the State government taking into account the local condition that determine level and discharge of the services. This may include items like issue of licence, approval of building plans, issue of completion certificate etc. This could consider Right to Information (RTI) system also.
- ii. Direct responsibility of the project progress by the responsible field officers to chief of the division/ departments.
- iii. The details of the start and progress of the local projects including financial and time allocation could be displayed publically, at strategic locations within the development sites and updated regularly.
- iv. Maintenance of regular updated land and property records preferably with the changes of land use in land transactions. This database integrated with GIS maps should be on a digital platform easily accessible to the public. This approach will also initiate Smart city concept.
- v. The practice of monitoring land prices in cities as followed by some cities including Delhi Development Authority. Monitoring and dissemination of land/ property prices should be done by Development /State Authorities for benefit of real estate market.

9. Respective State Town and Country Planning Department to approach NRSC/Bhuvan for the authorised access to the spatial data and attribute data for the preparation of Development Plan/Master Plan. Each State/ UT to identify one town/city (medium/ metropolitan size) **Development/Master Plan pilot project on Bhuvan platform.**

10. Creation of real time demographic and other database at State level which can be accessible to public on Government website. This should be integrated on a National level platform. Use of advanced techniques for digital database and hyper database uploaded on the website which is user-friendly.

11. Every State should formulate the **State Level Planning Guidelines** within the Framework of URDPFI Guidelines (making key amendments in the provisions as per the State's vision or contextual requirements) and National and State level policies.

12. In order to promote **affordable housing** for low income & EWS, State Governments to set norms and initiate its adoption.

In order to promote the visionary approach of urban and regional development, facilitation of effective implementation of the plan it is necessary to have availability of number of qualified planners at the state level and municipal level. The State Governments are urged to notify Statutory Towns & Cities and prepare Statutory Plans. State Governments may seek support from MoUD for the plan preparation or existing plan revision, for capacity building, standardization of technical assistance with the adoption of URDPFI Guidelines, 2014.

Before concluding, it may be desirable to note that for promoting planned urbanization, the rural areas contiguous to a town/ city need not necessarily be amalgamated with the parent city. It may often be more helpful to notify such rural areas as a new city, like a 'Nagar Panchayat' and allow it to grow into a bigger city at its own pace.

*"The Growth Story of India shall be written on the canvass of planed urban development and the script writers shall be the town and country planners!"*

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## Endnotes

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<sup>i</sup>“Area specific regulatory parameters” shall include height of buildings, quantum of built-up area, regular lines of streets and building lines, setbacks, floor area ratios, façade controls, parking spaces, loading and unloading spaces, sizes and locations of projections and advertisement signs, and circulation pattern.

<sup>ii</sup>In 2005 the Ministry of Urban Development and M/o Housing & Urban Poverty Alleviation launched JNNURM with the aim to encouraging reforms and fast track planned development of cities. It focused on efficiency in urban infrastructure and service delivery mechanisms, community participation, and improvement in urban governance.

<sup>iii</sup>Ibid.

<sup>iv</sup>A charrette is an intensive planning session where citizens, designers and others collaborate on a vision for development, giving immediate feedback to the designers. This process allows everyone who participates to be a mutual author of the plan. It is located near the project site, team of design experts and consultants sets up a full working office. Formal and informal meetings are held throughout the event and updates to the plan are presented periodically. Through brainstorming and design activity, many goals are accomplished during the charrette.

- (i) Everyone who has a stake in the project develops a vested interest in the ultimate vision.
- (ii) The design team works together to produce a set of finished documents that address all aspects of design.
- (iii) Since the input of all the players is gathered at one event, it is possible to avoid the prolonged discussions that typically delay conventional planning projects.
- (iv) The finished result is produced more efficiently and cost-effectively because the process is collaborative.

Charrettes are organized to encourage the participation of all. That includes everyone who is interested in the making of a development: the developer, business interests, officials, residents, and activists. Ultimately, the purpose of the charrette is to give all the participants enough information to make good decisions during the planning process.



# URBAN AND REGIONAL DEVELOPMENT PLANS FORMULATION AND IMPLEMENTATION (URDPFI) GUIDELINES

Volume II A and II B  
*Appendices to URDPFI Guidelines, 2014*

*January, 2015*



**Government of India**  
**Ministry of Urban Development**  
<http://moud.gov.in>



**Town and Country Planning Organisation**



**URBAN AND REGIONAL DEVELOPMENT PLANS  
FORMULATION AND IMPLEMENTATION  
(URDPFI) GUIDELINES**

**Volume II A**

***Appendices to URDPFI Guidelines, 2014***



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# 1 Implications of 73<sup>rd</sup> & 74<sup>th</sup> Constitution Amendment Act, 1993

## 1.1. Provisions of 74<sup>th</sup> Constitution Amendment Act

The 73<sup>rd</sup> Constitutional Amendment Act (73<sup>rd</sup> CAA) came in effect from 24<sup>th</sup> April, 1993 and 74<sup>th</sup> Constitution Amendment Act (74<sup>th</sup> CAA), in effect from 1<sup>st</sup> June 1993, ushered a new era in the history of urban local government in the country. The Constitution of India has detailed provisions for ensuring protection of democracy in Parliament and State Legislatures; however, it did not make local self-government in urban areas a clear cut constitutional obligation. Even though there was provision for organisation of village *Panchayats* in the Directive Principles of State Policy, there was no reference to municipalities except implicitly in Entry – 5 of the State List, which places the subject of local self-government as a responsibility of the State. The 74<sup>th</sup> CAA (referred to as part IXA of Constitution) made provisions for decentralisation, thereby, ensuring democracy in the establishment and operation of local self-government. It bestows power to the people to plan for themselves and participate in the decision making process. The main provisions introduced by the Act are as under:

### 1) Constitution of Panchayats and Municipalities:

Article 243 B of 73<sup>rd</sup> CAA, provides for the constitution of *Panchayats* at three levels in a state:

- a) Village,
- b) Intermediate (may not be constituted in a State having a population not exceeding twenty lakhs) and
- c) District.

Article 243 Q of 74<sup>th</sup> CAA, provides for constitution of Municipalities in every State as given under:

- a) Nagar Panchayat for transitional area, that is to say, an area in transition from rural to urban in character.
  - b) Municipal Council for a smaller urban area, and
  - c) Municipal Corporation for a larger urban area.
- 2) **Constitution of Ward Committees:** Article 243 S provides for constitution of ward committees, consisting of one or more wards, within the territorial area of a Municipality having a population of 3, 00,000 or more.
- 3) **Duration of Municipalities:** Article 243 E of 73<sup>rd</sup> CAA and 243 U of 74<sup>th</sup> CAA, provides a fixed term of 5 years of a *panchayat* and municipality respectively, from the date appointed. Elections to constitute a *panchayat* or municipality are required to be completed before the expiration of the duration of the municipality.

- 4) **Powers, authority and responsibilities of Panchayats and Municipalities:** Article 243G of 73<sup>rd</sup> and 243W of 74<sup>th</sup> CAA provides powers, authority and responsibilities of Municipalities subject that legislature of the State by law endow:
- a) The Panchayats and Municipality with such powers and authority those are necessary to enable them to function as institutions of self-government. The law prepared by the state government may contain provisions for the devolution of powers and responsibilities upon Municipalities, with or without conditions with respect to-
    - i. the preparation of plans for economic development and social justice;
    - ii. the performance of functions and implementation of schemes as may be entrusted to them including those in relation to the matters listed in the Eleventh and Twelfth Schedule;
  - b) The Committees with such powers and authority as may be necessary to enable them to carry out the responsibilities conferred upon Municipalities them including those in relation to the matters listed in the Twelfth Schedule.

**Table 1.1: Items listed in Eleventh and Twelfth Schedule**

S.No.	29 Items of the 11 <sup>th</sup> Schedule	S.No.	18 Items of the 12 <sup>th</sup> Schedule
1	Agriculture, including agricultural extension	1	Urban planning including town planning
2	Land improvement, implementation of land reforms, land consolidation and soil conservation	2	Regulation of land-use and construction of buildings
3	Minor irrigation, water management and watershed development	3	Planning for economic and social development
4	Animal husbandry, dairying and poultry	4	Roads and bridges
5	Fisheries.	5	Water supply for domestic, industrial and commercial purposes
6	Social forestry and farm forestry	6	Public health, sanitation conservancy and solid waste management
7	Minor forest produce	7	Fire services
8	Small scale industries, including food processing industries	8	Urban forestry, protection of the environment and promotion of ecological aspects
9	<i>Khadi</i> , village and cottage industries	9	Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded
10	Rural housing	10	Slum improvement and up-gradation
11	Drinking water	11	Urban poverty alleviation
12	Fuel and fodder	12	Provision of urban amenities and facilities such as parks, gardens, playgrounds
13	Roads, culverts, bridges, ferries, waterways and other means of	13	Promotion of cultural, educational and aesthetic aspects

S.No.	29 Items of the 11 <sup>th</sup> Schedule	S.No.	18 Items of the 12 <sup>th</sup> Schedule
	communication		
14	Rural electrification, including distribution of electricity	14	Burials and burial grounds; cremations, cremation grounds and electric crematoriums
15	Non-conventional energy sources	15	Cattle pounds; prevention of cruelty to animals
16	Poverty alleviation programme	16	Vital statistics including registration of births and deaths
17	Education, including primary and secondary schools	17	Public amenities including street lighting, parking lots, bus stops and public conveniences
18	Technical training and vocational education	18	Regulation of slaughter houses and tanneries
19	Adult and non-formal education		
20	Libraries.		
21	Cultural activities		
22	Markets and fairs		
23	Health and sanitation, including hospitals, primary health centres and dispensaries		
24	Family welfare		
25	Women and child development		
26	Social welfare, including welfare of the handicapped and mentally retarded		
27	Welfare of the weaker sections, and in particular, of the Scheduled Castes and the Scheduled Tribes		
28	Public distribution system		
29	Maintenance of community assets		

Source: 73<sup>rd</sup> & 74<sup>th</sup> Constitutional Amendment Act

- 5) Finances of *Panchayats* and Municipalities: As per Article 243 H of 73<sup>rd</sup> & 243 X of 74<sup>th</sup> CAA it has been left to the legislature of the State to specify the imposition of taxes.

Table 1.2: Finances of *Panchayats* & Municipalities

Revenue Sources	Responsibility of
Taxes, Duties, fees etcetera	Levied and collected by <i>Panchayats</i> & Municipalities
Taxes, Duties, fees etcetera	Levied and collected by State Government
Grant-in-aid	Given to municipalities from the State Government
Funds	For crediting and withdrawal of money by <i>Panchayats</i> & Municipality

Source: 73<sup>rd</sup> & 74<sup>th</sup> Constitutional Amendment Act

- 6) **State Finance Commission:** Article 243 I of 73<sup>rd</sup> CAA give provision of State Finance Commission (SFC). Article 243 Y of 74<sup>th</sup> CAA extends duty/power of SFC

to review the financial positions of municipalities apart from *Panchayati Raj* Institutions and make recommendations to the Governor.

- 7) **Committee for District Planning:** Article 243 ZD provides for constitution of District Planning Committee at district level in every state, to consolidate the plans prepared by the *Panchayats* and the Municipalities in the district and to prepare a draft development plan for the district as a whole.
  - a) A close study of this article provides a reasonable inference that each municipality is expected to prepare a plan for its area and undertake the task of urban planning including town planning, regulation of land uses, construction of buildings and phasing of the programme for economic and social development as envisaged in the Twelfth Schedule.
  - b) The DPC would provide interaction with the municipal bodies and *panchayati Raj* institutions, in addition to planning and conflict resolutions.
- 8) **Committee for Metropolitan Planning:** Article 243 ZE provides for constitution of a Metropolitan Planning Committee (MPC) for planning a metropolitan area having a population of 10 lakh or more, comprising one or more districts and consisting of one or more municipalities or *panchayats*.
- 9) **Scheduled Areas:** In terms of Article 243 M of 73<sup>rd</sup>&243ZC of 74<sup>th</sup> CAA, these provisions shall not apply to Scheduled areas and Tribal areas as referred to in Article 244 of the Constitution (i.e Scheduled areas and scheduled tribes in the States of Assam, Meghalaya, Tripura and Mizoram.) However, Parliament may by law, extend the provisions of Part IXA to these areas subject to such exceptions and modifications as may be specified in that law.

In order to provide time to State Governments to allow changes to be made in the then existing State Municipal laws which were inconsistent with the provisions of the 74<sup>th</sup> CAA, a transition period of one year was provided, up till 31<sup>st</sup> May 1994.

## 1.2. New Roles and Functions of State Town and Country Planning Department

The new role of Town and Country Planning Departments that emerges out of the provisions of the 73<sup>rd</sup>&74<sup>th</sup> CAA shall, among others, include<sup>1</sup>:

- a) Advice and technical assistance to the State Government on matters pertaining to spatial planning and development as well as implementation of state programmes;
- b) Initiation of action pertaining to provision of legal support in relevant Acts for socio-economic, spatial planning and development processes; and on the suggested Regional and Urban Development Planning system;

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<sup>1</sup>UDPFI Guidelines, 1996 & MM

- c) Assistance to the State Urban and Regional Planning Board in formulation of the State Perspective Plan and strategy of spatio-economic development of the State, having regard to proposals contained in district and metropolitan area development plans;
- d) Division of the State into various planning regions taking into account the physical, socio cultural, economic and climatic considerations and formulation of plans of their spatio-economic development to serve as a guide for resolving inter-district developmental issues and provide basis for inter-district co-operation and co-ordination with a view to prepare district development plans more harmonious;
- e) Scrutiny of the district and metropolitan area development plans for approval of State Government, taking into account the State perspective plan, spatio-economic development strategy and proposals of relevant planning region covering the district of the metropolitan area;
- f) Ensuring that respective settlement Development Plans prepared by local authorities are within the framework of the approved perspective plan of the State/settlement;
- g) Technical assistance to local authorities if so requested at the cost of the concerned body;
- h) Preparation of the development plan in case of default by the local authority, district planning committee or the metropolitan planning committee, if so directed by the State Government, at the cost of the concerned planning body;
- i) Provision of necessary research input directly or through the help of consultants in formulation of policies, strategies, norms, standards, laws, regulations and rules pertaining to urban and regional planning and development matters;
- j) Provision of manpower training facilities;
- k) Establishment of an Urban and Regional Information System and dissemination of information.

### 1.3. Status of the Provisions of 74<sup>th</sup> Constitution Amendment Act on Urban Local Bodies

The 74<sup>th</sup> CAA envisages that the District and Metropolitan Planning Committees consolidate plans prepared by the *Panchayats* and the Municipalities in the district/metropolitan region. It shall prepare a draft development plan for the district/metropolitan region as a whole and send the “draft” District and Metropolitan Plans to the State Government. The implication is that these plans are to be integrated with the State Plans. As per the Constitutional mandate, the District and Metropolitan Development Plans have to ensure coordinated spatial planning, sharing of natural

and other resources, integrated provision of infrastructure and environmental conservation. The approach has been maintained for regional planning in Chapter 4 of Volume 1.

The constitution of DPC and MPC in 74th CAA is an approach for the States to address regional planning issues. However, these provisions have not been adopted at all-India level. The study carried out by National Institute of Urban Affairs (NIUA) 'Impact of the Constitution (74th) Amendment Act on the Urban Local Bodies: A Review, April 2007' and MOUD 'Strategic Plan of Ministry of Urban Development for 2011-2016' reveals that only few States have undertaken constitution of MPC, DPC and Ward Committees (WCs), whereas there are large number of states who are yet to integrate these provision in their legislative framework. The table below shows the state wise compliance of 74<sup>th</sup> CAA provisions as on October 2004.

Table 1.3: State wise Compliance with 74<sup>th</sup> CAA as on October 2004

Sr. No.	State/ UT	Constitu- tion of ULB's	Reservation of Seats	Regular Conduct of Elections	Constitution of			
					WC's	DPC's	MPC's	SFC's
1.	Andhra Pradesh	✓	✓	✓	✓			✓
2.	Arunachal Pradesh #					✓		✓
3.	Assam	✓	✓	✓		✓		✓
4.	Bihar	✓	✓	✓		✓		✓
5.	Chhattisgarh	✓	✓		✓	✓		✓
6.	Delhi	✓	✓	✓	✓			✓
7.	Goa	✓	✓	✓				✓
8.	Gujarat	✓	✓	✓				✓
9.	Haryana	✓	✓	✓		✓		✓
10.	Himachal Pradesh	✓	✓	✓				✓
11.	Jharkhand	✓	✓					✓
12.	Karnataka	✓	✓	✓	✓	✓		✓
13.	Kerala	✓	✓	✓	✓	✓		✓
14.	Madhya Pradesh	✓	✓	✓	✓	✓		✓
15.	Maharashtra	✓	✓	✓	✓			✓
16.	Manipur	✓	✓	✓				✓
17.	Meghalaya *							
18.	Mizoram *#							
19.	Nagaland *							
20.	Orissa	✓	✓	✓		✓		✓
21.	Punjab	✓	✓	✓				✓
22.	Rajasthan	✓	✓	✓		✓		✓
23.	Sikkim #							✓
24.	Tamil Nadu	✓	✓	✓	✓	✓		✓
25.	Tripura	✓	✓	✓				✓
26.	Uttaranchal	✓	✓	✓				✓
27.	Uttar Pradesh	✓	✓	✓				✓
28.	West Bengal	✓	✓	✓	✓	✓	✓	✓

Source: NIUA - update table # There are no municipalities in State

\* The provisions of 74th CAA are not applied to certain schedule areas and tribes of India

It can be observed that only 10 states have provision for constituting DPCs and only 1 state has provision for constituting MPC. However, other States like Maharashtra and Andhra Pradesh now have provision for constituting MPCs.

According to Indian Institutes of Public Administration (IIPA) report - 'Urban Sector Feedback for Metropolitan Planning Committees, IIPA', the status of the Metropolitan Planning Committees constituted so far or those which are in the process of being constituted as in 2011 are given in table below:

Table 1.4: Status of MPC's in various States

S.No.	Name of State	Metropolitan City	Status of MPC
1.	West Bengal	Kolkata	Constituted
2.	Maharashtra	Mumbai	Constituted
3.	Maharashtra	Nagpur	Constituted
4.	Maharashtra	Pune	Constituted
5.	Andhra Pradesh	Hyderabad	At initial stage of constitution.
6.	Karnataka	Bengaluru	At initial stage of constitution.
7.	Madhya Pradesh	Bhopal	Necessary legislation is yet to be passed
8.	Uttar Pradesh	Kanpur	State Government is considering to issue a notification under Section 57 A of UP Municipal Corporations Act, 1959 for constitution of MPC
9.	Gujarat	Ahmedabad	To be constituted
10.	Rajasthan	Jaipur	To be constituted
11.	Haryana	Faridabad	Constituted

Source: IIPA

As per the IIPA Report, the States are reluctant to expedite follow up with regard to implementation of the constitutional provisions and most of them are lagging behind in the preparation of Metropolitan Development Plan. Some of the reasons for not operationalizing the provisions of the Constitutional Amendment Act may be:

- The preparation of Metropolitan Development Plan is a professionally led spatial exercise and is not mere consolidation of the sectoral plans. The MPCs **lack adequate / requisite professional capacities** to prepare it.
- **Lack of technical expertise** in the Metropolitan Planning Committee or lack of directions/guidance for constituting the same.
- Prior to preparing a Metropolitan Development Plan (MDP), it is imperative to delineate the **metropolitan region based on certain criteria**. Barring a few mega cities like Kolkata, Mumbai, Chennai, Hyderabad and Bengaluru, none of the other metropolitan cities have delineated their respective metropolitan regions.
- For preparing Metropolitan Development Plan, a **multi-disciplinary team** comprising of Town & Country Planners as an urban planner and/or regional planner, environmental planner, transport planners and infrastructure planner as the core team and a team of experts as per requirement of the study is essentially a multi-disciplinary exercise.
- **Lack of will** among the State Governments to take action for delineating the metropolitan area as well as preparing the plan for the same.

- **Lack of incentives/initiatives** for taking appropriate action for preparation of Metropolitan Development Plan which may not be the priority for some of the State Governments.

As per NIUA study, in Karnataka, Kerala and Tamil Nadu, DPCs have been constituted and technically they are functioning. However, it is learnt that in Karnataka they have not been functioning as expected. In case of Madhya Pradesh, it is learnt that DPC has no executive powers. In Chhattisgarh, the DPC's are not functioning at all and no meetings of DPC's are being held. In fact, Kerala is the only state in the south where DPC's are active and functional.

It is apparent that many states are yet to integrate 74<sup>th</sup> CAA in terms of constituting DPC and MPC as a part of decentralized planning process in order to address the issues at all levels. Report of the Working Group on Urban Strategic Planning prepared by MoUD, has also emphasized a major thrust to Regional and Urban Planning and preparation of District, Metropolitan and City Spatial and Development Plans through strategic guidelines and financial support.

## 1.4. Recommendations

For promotion of stronger public private partnership, it is essential to implement 73<sup>rd</sup> and 74<sup>th</sup> CAA. Quality of development largely depends upon how direct and free participation is incorporated for development projects in local areas, this requirement is almost essential. Further, Guidelines recommend review and revision of Regional Plans and Development Plans every 5 years. This review is critical mechanism for guiding development meaningfully and can only be done through direct involvement of local communities (their representatives), concerned local authorities and experts. Therefore URDPFI Guidelines recommends that States should implement the 73<sup>rd</sup> and 74<sup>th</sup> CAA at the earliest. All legal and administrative hurdles in implementation should be addressed and actions should be taken. Some States have already shown examples in this regard. For implementation of the provisions of 73<sup>rd</sup> and 74<sup>th</sup> CAA, the recommendations on the existing setup of Development Authorities are as under:

- a) The existing State Regional and Town Planning Board, constituted under State Town Planning Act may continue.
- b) The current planning role and function of Metropolitan Regional Planning and Development Authorities and Boards constituted for planning and development of metropolitan regions may be in conflict with the role and functions of Metropolitan Planning Committee (MPC) when constituted as mandatory requirement of the provisions of the 74<sup>th</sup> CAA. Considering this and also that an established institution need not be demolished, it is suggested that these bodies be reorganised to serve as MPC itself or alternatively serve as technical arm of MPC. The Kolkata MPC model is given in Section 4.5.1 of volume 1.

- c) The Area Planning and Development Authorities constituted to prepare and enforce development plans of urban centres under the State Town and Country Planning Act or other Acts may have a conflict of role and functions with the Urban Local Authorities constituted under modified State Municipalities Act.
- d) It is suggested that, taking into consideration the spirit of 74<sup>th</sup> CAA, these bodies should be merged or work as technical wings of the MPC and DPC wherever the case may be. Administrative amalgamation process should be effectively decided by the state governments.
- e) The existing single function boards/ undertakings like Housing Board, Electricity Board, Refuse Collection and Disposal Board, Transport Corporation/ Undertaking, which were constituted under various Acts for the purpose of discharging the specifically assigned function, may continue, if so required by the council of the local authority.
- f) Training programmes for awareness building about development process and related issues among the elected representatives is important. Such programmes should be conducted by the state governments with the help of T&CP Department and outside experts.
- g) Extra attention shall be paid on the development and administration of peri-urban areas through local self-governments so that ground developments of outer fringes of large settlements are consistent with proposals of planning activities.

The Constitution (73<sup>rd</sup>& 74<sup>th</sup>Amendment) Act, 1992 is appended with its web URL in Appendix 'O' of Volume II B.

## 2 The Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation & Resettlement Act, 2013

### 2.1. Basis of the new Act

The Land Acquisition Act of 1894 was created with the purpose of facilitating acquisition of privately held land by the government for public purposes. “Land Acquisition” plainly means the acquisition of land for some public purpose by a government agency from individual landowners, as authorised by the law, after paying a government-fixed compensation to cover losses incurred by landowners from surrendering their land to the concerned government agency.

Over a period of time numerous issues were highlighted in the 1894 Act, such as; cumbersome and costly procedure delaying the land acquisition, determination of public purpose contestable at law, property valuation techniques were flawed resulting in a heavy strain on public finances and restrictions on the scale of development and redevelopment project. It was also argued that land was acquired for number of projects with no public purpose attached, as in the case of SEZs, at well below the market value of the properties. Additionally, relocation and rehabilitation of land owners displaced by the actions of the Act, was not covered comprehensively and adequately.

It is for these and other reasons that government proposed to replace the said Act with a New Act - ‘The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013’ (effective from 1<sup>st</sup> January 2014).

This Law was proposed due to the following basic reasons:

- Public concern on land acquisition issues and absence of National law to provide for the Rehabilitation and Resettlement (R&R) and compensation for loss of livelihoods.
- Multiple amendments were made to the original Act, but principal law continued to be the same i.e. the Land Acquisition Act, 1894 which was an outdated Law.
- Need for balance was felt for addressing concerns of farmers and those whose livelihoods were dependent on the land being acquired as well as facilitating land acquisition for industrialization, infrastructure and urbanization.

### 2.2. Key Features

Salient features of ‘The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013’, are as following:

- As the title of the said Act suggests, it favours fair compensation rather than fast acquisition of land. Minimum compensation for land acquisition is detailed out in the Act and Indian states are even empowered to provide benefits and safeguards that go over and above the provisions of this law to the affected family.
- 'Affected families' have been defined as 'land owners' and 'livelihood losers'.
- Safeguard for 'food security' has been included by stating that multi-crop irrigated land will be acquired only as last resort under exceptional circumstances. Still, if such areas are acquired, equivalent area of culturable wasteland is to be developed for agricultural purposes or an amount equivalent to the value of the land acquired shall be deposited with the appropriate government for investment in agriculture for enhancing food-security.
- Minimum rehabilitation and resettlement (R&R) entitlements package has been introduced. Affected families will have choice of availing options given in the Act.
- Special provisions, in addition to the R& R package, have been given for SCs/STs.
- Role of *Panchayati Raj* Institutions especially *GramSabh*as has been enhanced in the Act. Consent of *GramSabha* is mandatory for acquisition in Scheduled Area.
- Special Provisions have been provided to the farmers like, farm land will be acquired only when no unutilised land is available, enhances compensation, prior consent of land losers, increased share in sale of acquired land and exemption from income tax and from stamp duty, damage to crops will be included in compensation price, 20% of the developed land (if land was acquired for urbanization purpose) will be offered to the farmers.
- Under the new Act, land can be returned to original owners if the State so decides, with the condition that land is not used within 5 years in accordance with the purpose for which it was acquired.
- Role of the District Collector has been reduced in the new Act as compared to the old one, where collector had complete authority to decide what activity constituted 'public purpose'. Under the new law, these roles of the collector are not prescribed. Under the old Act, collector could decide what quantum of compensation could be paid to those displaced while the new law has a formula for deciding the quantum of compensation.
- In the new Act, benefits for tenants and share croppers have been introduced. The law covers all tenants and share-croppers, artisans; who will not just bear the rehabilitation and resettlement benefits but will also have a share in the compensation.
- In the Resettlement area, 25 infrastructural amenities have to be provided to minimise the impact of relocation. Few of such amenities are roads, proper drainage and sanitation, safe drinking water, grazing land, fair price shops, post offices, storage facility, transport facility, burial or cremation ground etcetera.
- The provision of the New Law has been made compliant with other laws such as; The *Panchayats Act*, 1996, The Schedule Tribes and Other Traditional Forest Dwellers Act, 2006 and land transfer regulations in Schedule 'V' area. This act has

gone one step further by providing 'consent' of *GramSabh*as rather than just 'consultation' as in the above mentioned Acts.

- Diverse safe guards have been provided against indiscriminate acquisition of land. Such as, social impact assessment has been made mandatory except for irrigation projects and it has to be completed within 6 months. Use of acquired land cannot be changed from the purpose specified in the land use plan submitted at time of land acquisition.
- Transparency provisions have been provided in Act, few of which are, *GramSabha* has to be consulted in Social Impact Assessment (SIA) process, SIA document to be made available for public scrutiny, all documents mandatory to be made available in the public domain and on the website etcetera.
- Timelines have been specified in Act to make the process of land acquisition time bound. Like compensation has to be given within a period of three months from the date of the award. Monetary R&R entitlements are to be provided within a period of six months from the date of the award.
- Provisions of the New Law do not apply to the activities covered under other 13 Government of India Laws which permits land acquisition for specific purposes (like, legislations relating to National Defence, National Highway, and Railway). Though the provisions of the New Law relating to compensation, rehabilitation and resettlement will apply by a notification of the Centre Government.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 is a legislation that regulates land acquisition and provides laid down rules for granting compensation, rehabilitation and resettlement to the affected persons. The Act has provisions to provide fair compensation to those whose land is acquired permanently or temporarily, brings transparency to the process of acquisition of land to set up factories or buildings, infrastructural projects and assures rehabilitation of those affected. The Act establishes regulations for land acquisition as a part of India's massive industrialization driven by public-private partnership.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 is appended with web URL in Appendix O of Volume II B.

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## 3 Model Regional and Town Planning and Development Law, 1985

### 3.1. Key features

Town and Country Planning Organisation (TCPO) formulated the Model Town and Country Planning Law in the year 1960. This model Act was revised by TCPO in year 1985 as “Model Regional and Town Planning and Development Law” to enact a comprehensive urban and regional planning legislation in all the States and UT’s. It is in the form of guidelines which ensures better overseeing and coordination of planning with implementation, so that a single agency can undertake both these functions. In the model, the planning and development authority to be constituted has been equipped with full planning and development powers to discharge the task of planning and implementation.

The Model Regional and Town Planning and Development Law, 1985 provides for the following:

- 1) Constitution of State Regional and Town Planning Board by the State Government for the purpose of advising on the delineation of the region for the planned development,
- 2) Directing the preparation of metropolitan, regional and area plans by the metropolitan, regional and area planning and development authorities,
- 3) Setting up of metropolitan, regional and area planning and development authorities for different urban and rural areas within the State to undertake preparation of development plans and to enforce and implement them,
- 4) Co-ordinating the planning and implementation of physical development programmes,
- 5) The Model Law provides 3 steps for the administration of this law, the steps are following:
  - a) Preparation of existing land use map,
  - b) Preparation of an outline development plan and comprehensive development plan and their enforcement, and
  - c) Preparation of detailed schemes of development or redevelopment as envisaged in the plans and their implementation.

The Model Regional and Town Planning and Development Law was prepared in 1985, almost 30 years ago, since then many legislative and ideological changes have taken place in the developmental approach of GoI. Also to incorporate the provisions of 74<sup>th</sup> CAA, the Model Regional and Town Planning and Development Law requires a complete revision and restructuring. Accordingly, the suggested changes in the Model law are described in the following sections:

### 3.2. Suggested modifications in the law

- **Replacing old Land Acquisition Act with the LARR Act (2013):** Land Acquisition Act of 1894 is suggested to be replaced by The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.
- **Mandatory Implementation of 73<sup>rd</sup> and 74<sup>th</sup> CAAs:** It should be mandatory by all Urban Local Bodies (ULBs), to follow 74th CAA, for making ULBs a strong and effective body through devolution of power and functions. On the same line, Kerala Town and Country Planning Department implemented – Kerala Town and Country Planning Ordinance 2013, which came into effect following the 73rd and 74th amendments to the Constitution. The ordinance constitutes the District Planning Committee (DPC) at district level and Metropolitan Planning Committee (MPC) at Metropolitan level.  
In MPC/DPC, full time dedicated urban and regional professionals for better assessment, preparation and execution or implementation of plan at both levels are required. In the DPC, an average of 1 Planner for 1 million population is suggested by the TCPO, while in MPC 1 Town Planner is required for population of 5 lakh.
- **Inter-state Planning** – provisions, organization structure, roles and responsibilities

The main objective for setting up Inter-State Planning concept is to promote economic growth and balanced development of the Region (two or more than two states) for providing suitable infrastructural development through inter rail and road based transportation networks, minimizing the adverse environmental impact, developing selected urban settlements with urban infrastructure facilities. In India a number of Inter-State planning organizations have been established to achieve the above said objectives.

In 1985, Enactment of the National Capital Region Planning Board Act by the Union Parliament, with the concurrence of the participating States of Haryana, Rajasthan and Uttar Pradesh, NCR Planning Board was constituted.

Under section 8 of the NCRPB Act, the powers of the Board shall include the powers to:

- Call for reports and information from the participating States and the Union territory with regard to preparation, enforcement and implementation of Functional Plans and Sub-regional Plans ;
- Ensure that the preparation, enforcement and implementation of Functional Plan or Sub-Regional Plan, as the case may be, is in conformity with the Regional Plan;
- Indicate the stages for the implementation of the Regional Plan;

- Review the implementation of the Regional Plan, Functional Plan, Sub-Regional Plan and Project Plan;
- Select and approve comprehensive projects, call for priority development and provide such assistance for the implementation of those projects as the Board may deem fit;
- Select, in consultation with the State Government concerned, any urban areas, outside the National Capital Region having regard to its location, population and potential for growth, which may be developed in order to achieve the objectives of the Regional Plan; and
- Entrust to the Committee such other functions as it may consider necessary to carry out the provisions of this Act.

Similar interstate development regions may be necessary to be planned in other parts of India especially involving fast changing urban regions which fall in more than one State. The Law is suggested to be modified to include provisions for not only DPC and MPC but also for interstate authorities as stated above.

- **Joint Area Committee:** Kerala Town and Country Planning Ordinance, 2013 provides constitution of Joint Area Committee for an area of more than one Municipal Corporation, Municipal Council, Town Panchayat or Village Panchayat either in full or in part. For the purpose of planning of the area in which they are jointly interested or for which they are responsible.
- **Innovative Systems of Land Assembly:** There are various techniques to develop small or fragmented land parcels into usable land through transfer of ownership. Some of these techniques are suggested to be included in the Law.
  - **Town Planning Scheme:** Town Planning Scheme has emerged as a successful model of land development; it is suggested to include the provision in the Law. The Maharashtra Regional and Town Planning (MRTP) Act, 1966, The Gujarat Town Planning and Urban Development Act (GTPUDA), 1976 and now Kerala Town and Country Planning Ordinance, 2013, have included provisions for Town Planning Scheme.
  - **Land Pooling and Development Schemes<sup>2</sup>:** Land Pooling scheme aims to prevent, selling of land without the owner's consent. Under Delhi Land Pooling Policy, land owners can surrender their land holding into the central pool and be stake holder to the development proposed in their land. Once the land is pooled, the landowner would get back certain amount of land of their total land surrendered land as developable land.
  - **Transferable Development Rights (TDR),** TDR is a technique of land development which separates the development potential of a particular

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<sup>2</sup>Source: Master Plan of Delhi, 2021.

parcel of land from and allows its use elsewhere within the defined zones of the city. TDR is taken away from the zone and it is tradable. The Law shall define its use as a technique for redevelopment and reconstruction of inner city zones.

- **Accommodation Reservation:** The concept of Accommodation Reservation allows the land owners to develop the sites reserved for an amenity in the development plan using full permissible FSI/FAR on the plot subject by agreeing to entrust and hand over the built up area of such amenity to the local authority free of all encumbrances and accept the full FSI/FAR as compensation in lieu thereof. This mechanism has considerably relieved the local authorities from incurring huge expenses for the purpose of acquisition of such lands and can be considered in the Law with certain conditions.
- **Encouraging Private and Joint Sector Participation:** The current policies of economic liberalization in the country and the emphasis on private sector participation in planning and development process should be provided with the appropriate legal support. It is suggested that private sector participation in certain sectors shall be allowed and encouraged by the law in light of the FDI policy. Local Self Government has to consult non-governmental institutions, organizations and professional bodies in the preparation of Perspective Plan for the District and Metropolitan Area.
- **Time Line:** Regional Plans and Development Plans should be for 20 years with the provisions for review / revision every 5 years to be co-terminus with the State Five Year plan. Different plans suggested:
  - Regional Plan (Inter-state/ Inter-district/ district)
  - Development Plan (planning area including the Municipal area)

Currently different time line is followed for review of regional and city or metropolitan development plans by different states which should be standardised as far as possible.

Tamil Nadu, Mizoram and Gujarat have provision of revising Developmental Plan once in 5 years of plan preparation. Karnataka provides for revision only after ten years and Maharashtra in twenty years. Himachal Pradesh provides for revision but gives no minimum time frame. Bihar has no provision of plans revision.

- **State Regulatory Body** - The Urban-Regional Planning & Development Regulatory Authority (Town Planning Board/ Town Planning Committee (Kerala)) suggested by the URDPFI Guidelines, 2014 to be established by State Governments through statutory support. The role of this State Body would be to regulate and monitor the functioning of Development bodies. The regulatory

authority at the state level may function as an appellant authority to address the grievances redressal. It shall also list of authorities and roles and responsibilities to avoid multiplicity. Regulatory body should review the smooth functioning of the agencies to overcome the multiplicity, duplication or gaps. The establishment of this authority would require amendment of State Town and Country Planning Acts.

This State level apex regulatory body for appropriate functioning should be chaired, preferably, by the Chief Minister of the state with other members decided by the State government. The role of State authority to be referred from Volume I (section 3.6).

- **Disaster Risk Management:** Disaster risk management with specific reference to climate change impact and appropriate response for it should be incorporated as an important component of plan formulation with focus on better energy use, water management, green balance and reduction of vulnerability to disaster.
- **City Infrastructure Fund:** A City Infrastructure Fund should be established at urban centers by the Executive order of State Government. It should be other than the Budget fund and dedicated only for the Urban and Regional Infrastructure development. The possible sources of funding for the infrastructure fund must be defined and streamlined in consultation with State Finance Commission by the State Government.
- **Planning for Green Cities:** In view of the need for accelerated urban development and to guide cities to eco-friendly, Green city development approach should be given priority especially in green field development. Planning for such cities should be encouraged and provisions for the same to be included in the Act.

The changes in the Model Law should be considered based on the above mentioned points, provision from various State Town and Country Planning Acts and detailed study by Town and Country Planning Organisation. The Model Regional and Town Planning and Development Law, 1985 is appended with its web URL in Appendix O of Volume II B.

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## 4 Model Municipal Law, 2003

### 4.1. Key features

The Model Municipal Law, 2003 prepared by Ministry of Urban Development and Poverty Alleviation (the erstwhile undivided Ministry) is an initiative to implement the provisions of the 74<sup>th</sup> CAA for empowerment of urban local bodies and provide legislative framework for implementation of the Urban Reform Agenda. The Law is expected to enhance the capacities of ULBs to leverage public funds for development of urban sector and provide an environment so that urban local bodies can play their role more effectively and ensure better service delivery.

The salient features of the Model Municipal Law are:

- 1) Constitution of the Municipal Area based on population, classification of the three levels of Municipalities and its constitution.
- 2) All the executive actions of the Empowered Standing Committee shall be taken in the name of Municipality.
- 3) Indirect election of Mayor or Chairperson for a five year term.
- 4) Constitution of Wards and Ward Committees.
- 5) State Level Municipal Establishment Audit Commission to review the staff status.
- 6) Classification of Municipal functions into:
  - a) Core municipal functions- including water supply, drainage and sewerage, solid waste management, roads, etcetera;
  - b) Functions assigned by Government<sup>3</sup>; and
  - c) Other functions.
- 7) State government can dissolve an elected body if it shows default in performance or abuse of powers, after giving due notice and review by a committee.
- 8) Provision to implement recommendations of the State Finance Commission.
- 9) “Municipal fund” with separate accounts for various services.
- 10) Preparation of budget estimation of Municipality.
- 11) Preparation of State Municipal Accounting Manual and appointment of the Municipal Accounts Committee.
- 12) State Government can appoint a professional chartered accountant as auditor. ULBs to prepare balance sheet of the assets and liabilities annually.
- 13) Municipalities to prepare an inventory of properties each year.

<sup>3</sup>The “functions assigned by Central/ State Government” may be undertaken subject to the underwriting of the costs by the concerned levels of government.

- 14) State Government to frame a Comprehensive Debt Limitation Policy laying down the general principles of borrowings of loans with regard to Municipalities' financial capacity.
- 15) Power of municipalities to raise loans.
- 16) Internal revenues of Municipality and power to levy taxes, user charges, fees and fines, development charge, advertisement, other taxes and tolls.
- 17) Enable participation of private sector and NGOs in construction, financing and delivery of services including billing and collection.
  
- 18) Enable setting up of State Municipal Regulatory Commission that will determine user charges and standard of services suggest avenues of private sector participation and ensure fair deal to citizens.
- 19) Agenda for urban environment management. Municipalities to prepare annual environmental and subsidy reports
- 20) Provides for the representation of Municipalities in District and Metropolitan Planning Committees.
- 21) Provision for improvement in existing area such as removal of congested buildings
- 22) Constitution of Municipal Streets Technical Committee and other aspects related to streets
- 23) Unique Premises Numbering System
- 24) Provisions for buildings
- 25) Municipal Licenses
- 26) Maintenance of Statistics
- 27) Management of Disasters

## 4.2. Suggested changes in the Law

The Model Municipal Law (MML) was introduced more than a decade back; it is pertinent that the provisions of MML need to be updated to bring it in harmony with the recent developments in the Municipal Law. MoUD study undertaken by NUIA to review the MML, suggested various points for revision of the provisions given in MML, based on their status of implementation.

There are various provisions in the current scenario that are vital for MML to bring it in line with the new developments in municipal governance. Provisions like reservations of seats for Women/SC/ST/BC in Municipality, Local Bodies/Municipal Ombudsman, functions and duties of *Area Sabha* Representative, disclosure of various documents relating to municipal affairs, accrual based double entry system of accounts, defining functions and

responsibilities of DPCs and MPCs are suggested to be detailed out under the MML.

The above mentioned NUIA study has also highlighted lack of critical provisions in MML, such as, municipal ombudsman, accrual based double entry system; public disclosure of budget, financial and accounts of municipality; public private partnership (PPP) in the delivery of basic services of the municipality, and in performance of infrastructure projects.

#### 4.2.1. Clause(s) for inclusion in the present MML

- Definitions of “area *sabha*” and “area *sabha* representatives” shall be defined in the MML.
- MML to be the Model Law for States to follow. It should clearly have a clause defining “Annual Rateable Value” / “Capital Value” / “Unit Area Value” / “Annual Letting Value.”
- Definition of “Local Bodies or Municipal Ombudsman”/ under jurisdiction of *LokAyukta* should be defined. According to 13th Central Finance Commission, the state government must put in place a system of independent local body Ombudsman. However, it is left to the States to decide which system to follow.
- **Provision on reservation:** Article 243 T of the Constitution of India provides for reservation of women, SC, ST, and BC. Since MML supplement the aims of 74th CAA, it should be incorporated in MML.
- **Provisions relating to Local Bodies/Municipal Ombudsman:** The Second Administrative Reforms Commission and the 13th Finance Commission have recommended that a separate Ombudsman for local bodies be constituted to look into the complaints of corruption and mal-administration against the functionaries of local bodies.  
This may also include Staff’s review on the Non- Ethic practises and provision for the protection of whistle blowers. In case, the municipality opts to create a position of local bodies’ ombudsman, it is necessary to add provisions relating to appointment, functions, powers, term of office, conditions of service, procedure of disposal of complaint filed to his office etcetera.
- **Formulation of citizen’s charter** – provision for Citizen’s Charter formulation under “Action Plan for Effective and Responsive Government” (1997) to be suggested in the MML. Citizen's Charter and Grievance Redressal Bill, 2011 is also under consideration in Parliament, which will support the amendment in MML. The role of the charter to be well defined including Grievance Redressal other than those handled by Local Bodies/Municipal Ombudsman and focus on development of e-governance mechanisms for Public accountability, Duties of the staff, Transparency and People’s participation.

- **Accrual Based Double Entry Accounting System:** Currently double entry accounting system is followed by most of the Municipalities in the country. However, as per the mandate of the JnNURM, accrual based accounting system should be followed as it estimates the future generation of revenue and expenditure of the Municipality. MML does not mention this provision. Since it is one of the important reforms undertaken through JnNURM scheme, it is important that a corresponding provision is incorporated in the MML.
- **Action taken report:** The Municipal Authorities must send an action taken report to the State Government on the defects detected by the government auditor. It is imperative that this provision should be included in MML for other states to follow.
- **Establishment of Escrow Account for any particular project:** An escrow account for particular projects helps the municipality to maintain their accounts clear in terms of borrowing and in terms of future borrowings needs of the municipality. It will increase transparency for the lenders/stakeholders. Considering few states have already established an escrow account, such provision may be added to MML as an option for the municipalities that wish to opt for it.
- **Property Tax assessment:** MML should have a provision regarding manner of assessment of property tax. Municipal Acts must specify whether an assessee would file a Self-assessment or a bill would be presented to him by the municipality.
- **Functions and Responsibilities of DPC & MPC:** MML only speaks of constitution of these committees, which does not suffice the purpose. Therefore, it is suggested to define the provisions relating to composition, role and responsibilities of MPC/DPC as well as their jurisdictions as envisaged under the constitutional provisions including specifying the organization which will function as the technical and administrative secretariat of the MPC/DPC.
- **Fire hazard and disaster risk response:** One of the conditions of the 13th Central Finance Commission was that all the municipal corporations must put in place a fire hazard response and mitigation plan for million plus cities. Therefore, MML should contain a provision with respect to fire hazard response plan, if not for all the Disaster managements. URDPFI recommends fire hazard disaster risk response to be incorporated focusing on reduction of vulnerability.
- **State Regulatory Body** - The Urban and Regional Development Regulatory Authority suggested by to be established by State Governments through statutory support should play a crucial role to regulate and monitor the functioning of Development bodies. Grievances redressal system, roles and responsibilities of authorities to be integrated with the State Regulatory Body. Therefore, functions of State Regulatory Body to be incorporated in the Model Municipal Law.

## 4.2.2. Additional Provisions

### 4.2.2.1. State Property Tax Board / Act

The 13th Central Finance Commission recommended for a State Property Tax Board to put in place an independent and transparent procedure for assessing property tax.

MML provides for a provision mentioning the State Property Tax Board, however, it does not clearly state the provisions relating to its establishment, composition, functions, powers, accounts, budget, etc. It could be a useful provision since property taxation is an important source of revenue and this would help improve the valuation of the property in a systematic and transparent way.

### 4.2.2.2. State Finance Commission

The 13th Central Finance Commission suggests that the States Governments must prescribe through an Act qualification of persons eligible for appointment of the State Finance Commission (SFC). Therefore, MML is suggested to prescribe a provision for establishment of permanent SFC cell.

### 4.2.2.3. Notification with Respect to Service Levels

The 13<sup>th</sup> Central Finance Commission suggests that State Government must notify or cause all municipalities to notify at the end of the fiscal year - the service standards for four service sectors (Water Supply, Storm Water Drainage, Sewerage and SWM). For a step towards the compliance of such reforms, MML must contain this provision.

### 4.2.2.4. Human Resources Policy Reform

Services provided by local bodies for SWM, Sewage, Water Channels and Electricity plays a crucial role in maintaining environmental standards of city and as well quality of life of residents. Municipal law looks at only the performance of this function. However, the most neglected part of this function is the health hazards of the employees, who are directly related to perform this function. For mitigating health hazards to the employees of the Municipality dealing in the works relating to sewerage, garbage collection, etc. - Municipality should provide proper gear to its employees like uniforms, gloves, gum boots, masks, first-aid kit etc. Even though human contact cannot be avoided in the performance of these tasks, the only minimal requirement of proper equipment and gear should be

provided to employees. Inclusion of this provision is important to realize the vision of smart, sustainable and responsible cities.

#### 4.2.2.5. Exemptions as incentive

It is essential to provide for the extent of Exemption in the property taxation on defined conditions. Property tax exemption can be provided for following or implementing certain desirable projects like, Green development, Rain water harvesting, solar power installation in building and Green building etc. as an incentive. As per the NUIA study, Municipal Acts of Bihar has no provision mentioning the exemptions from property taxation, but many other states have already provided for exemptions. It is suggested that MML provide for any such provision.

#### 4.2.2.6. Rain Water Harvesting Mandatory

It is one of the optional reforms under JnNURM. Looking at the urban growth, rainwater harvesting should be a mandatory provision in all the Acts to recharge groundwater and augment overall water availability. Such provisions in the Municipal Act may ensure its application in the Local Area Plans and Special Purpose Plan. It is suggested to include this in the MML and places where it can be made mandatory within the building bye laws depending upon enforcement capabilities and local conditions.

The Model Municipal Law, 2003 is appended with URL in Appendix O of Volume II B.

## 5 State Level Legal Framework – Comparative Analysis Overview

Urban and regional planning legislation controls the planning and development activity in a State. Some states have comprehensive Town and Country Planning legislation which provides for urban planning and development from a regional perspective beyond the city limits and coordinated with the overall framework of economic development, priorities and resource availability. Some of these states are Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Nagaland, Orissa, Punjab, Rajasthan, Tripura and Uttar Pradesh.

Town and Country Planning Organisation (TCPO) with the direction from MoUD conducted brainstorming session throughout the country during 2008 to 2010. Further, during the formulation of URDPFI Guidelines, various workshops were conducted in both the studies to share knowledge on urban development practices and development policies / strategies of respective States and recommendations / advice were provided to all the States. TCPO has analysed the status of T&C planning Acts of the States. An overview of the States in terms of implementation of T&C Planning Acts in their jurisdiction is given in **Table no. 5.1**. This table has been updated as per the latest information available as on 31st July 2013 from TCPO with respect to the cities who have prepared Statutory Master Plans.

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Table 5.1: Comparison of Town and Country Planning Acts & implementation across Nation

Sr.No	Name of State	Whether Town and Country Planning Dept. Exists	Whether T & CP Act enacted	No of Towns as per Census 2011	No. of Census Towns	No. of Statutory Towns (ULBs)	Statutory Towns (%)	No. of Master Plan Approved	No. of Master Plans Under Preparation	Towns having Master Plan (%)
1	Andhra Pradesh	Directorate of Town & Country Planning	Andhra Pradesh Town and Country Planning Act, 1920	353	228	125	35	89	60	25
2	Arunachal Pradesh	Department of Town & Country Planning	Arunachal Pradesh Urban and Country Planning Act, 2007	27	1	26	96	1	3	4
3	Assam	Directorate of Town & Country Planning	Assam Town and Country Planning Act, 1959	214	126	88	41	36	42	17
4	Bihar	Department of Town & Country Planning	Bihar Urban and Regional Planning and Development Act, 2011	199	60	139	70	9	20	1
5	Chhattisgarh	Department of Town & Country Planning	Chhattisgarh Town and Country Planning Act, 1973	182	14	168	92	28	64	15
6	Goa	Department of Town & Country Planning	Goa Town and Country Planning Act, 1974	70	56	14	20	13		19
7	Gujarat	Department of Town & Country Planning	Gujarat Town Planning & Urban Development Act, 1976	348	153	195	56	125	14	33

Table 5.1: Comparison of Town and Country Planning Acts & implementation across Nation

Sr.No	Name of State	Whether Town and Country Planning Dept. Exists	Whether T & CP Act enacted	No of Towns as per Census 2011	No. of Census Towns	No. of Statutory Towns (ULBs)	Statutory Towns (%)	No. of Master Plan Approved	No. of Master Plans Under Preparation	Towns having Master Plan (%)
8	Haryana	Department of Town & Country Planning	Haryana Development & Regulation of Urban Areas Act, 1975.	154	74	80	52	66		20
9	Himachal Pradesh	Department of Town & Country Planning	Himachal Pradesh Town and Country Planning Act, 1970	59	3	56	95	19	0	31
10	Jammu & Kashmir	Department of Town & Country Planning	Jammu & Kashmir Development Act, 1970	122	36	86	70	2		2
11	Jharkhand	Department of Town & Country Planning	Jharkhand Town Planning and Improvement Trust Act, 1954 (adopted from Bihar)	228	188	40	18	5		2
12	Karnataka	Department of Town & Country Planning	Karnataka Town and Country Planning Act, 1961	347	127	220	63	159	7	46
13	Kerala	Department of Town & Country Planning	Kerala Town Planning Act, 1939	520	461	59	11	49	15	9
14	Madhya Pradesh	Department of Town & Country Planning	Madhya Pradesh Nagar Thatha Gram NiveshNiyam, 1975	476	112	364	76	93	63	18
15	Maharashtra	Directorate of Town Planning &	Maharashtra Regional and Town	534	278	256	48	275		51

Table 5.1: Comparison of Town and Country Planning Acts & implementation across Nation

Sr.No	Name of State	Whether Town and Country Planning Dept. Exists	Whether T & CP Act enacted	No of Towns as per Census 2011	No. of Census Towns	No. of Statutory Towns (ULBs)	Statutory Towns (%)	No. of Master Plan Approved	No. of Master Plans Under Preparation	Towns having Master Plan (%)
		Valuation	Planning Act, 1966							
16	Manipur	Department of Town and Country Planning	Manipur Town and Country Planning Act, 1975	51	23	28	55	19	0	37
17	Meghalaya	Directorate of Urban Affairs	Meghalaya Town and Country Planning Act, 1973	22	12	10	45	15	4	68
18	Mizoram	Department of Town and Country Planning	Mizoram Urban & Regional Development Act, 1990	23	0	23	100	15		65
19	Nagaland	Department of Town and Country Planning	Nagaland Town and Country Planning Act, 1980	26	7	19	73	10	1	38
20	Orissa	Department of Town and Country Planning	Orissa town Planning and Improvement Trust Act, 1956	223	116	107	48	72	22	32
21	Punjab	Department of Town and Country Planning	Punjab Regional Town Planning and Development Act, 1995	217	74	143	66	32	27	6
22	Rajasthan	Department of Town and Country Planning	Rajasthan Urban Improvement Act, 1959	297	112	185	62	183	46	62
23	Sikkim	No independent Town and Country Planning	The Sikkim Urban and Regional Planning and	9	1	8	89	4	17	44

Table 5.1: Comparison of Town and Country Planning Acts & implementation across Nation

Sr.No	Name of State	Whether Town and Country Planning Dept. Exists	Whether T & CP Act enacted	No of Towns as per Census 2011	No. of Census Towns	No. of Statutory Towns (ULBs)	Statutory Towns (%)	No. of Master Plan Approved	No. of Master Plans Under Preparation	Towns having Master Plan (%)
		Department, however Town Planning cell exists under Urban Development and Housing	Development Act, 1998							
24	Tamil Nadu	Department of Town and Country Planning	Tamil Nadu Town and Country Planning Act, 1971	1097	376	721	66	123	50	11
25	Tripura	Department of Town and Country Planning	Tripura Town and Country Planning Act, 1975	42	26	16	38	13		2
26	Uttar Pradesh	Department of Town and Country Planning	Uttar Pradesh Urban Planning and Development Act, 1973	915	267	648	71	207	25	23
27	Uttarakhand	Department of Town and Country Planning	Uttarakhand Urban Planning and Development Act, 1973	115	41	74	64	42	0	37
28	West Bengal	Town and Country Planning Cell functioning under Urban Development Department	West Bengal Town and Country (Planning and Development ) Act, 1979	909	780	129	14	126	85	5
29	A & N Islands.	No independent Town and Country	Andaman & Nicobar Town and	5	4	1	20	1	Not reported	20

Table 5.1: Comparison of Town and Country Planning Acts & implementation across Nation

Sr.No	Name of State	Whether Town and Country Planning Dept. Exists	Whether T & CP Act enacted	No of Towns as per Census 2011	No. of Census Towns	No. of Statutory Towns (ULBs)	Statutory Towns (%)	No. of Master Plan Approved	No. of Master Plans Under Preparation	Towns having Master Plan (%)
		Planning Department exists as on date. A small Town and Country Planning unit is working under the Comm-cum-Secy(PWD/UD) & Chief Engr as part of APWD.	Country Planning Regulations, 1994							
30	Chandigarh	Department of Urban Planning	The Capital of Punjab (Development and Regulation ) Act, 1952	6	5	1	17		2	0
31	Delhi	Town Planning Department, MCD	Delhi Development Act, 1957	113	110	3	3	1	0	1
32	Dadra & Nagar Haveli	Department of Town and Country Planning	Dadra & Nagar Haveli Town and Country Planning Act, 1974	6	5	1	17	6	0	100
33	Daman & Diu	Department of Town and Country Planning	Daman & Diu Town and Country Planning Act, 1974	8	6	2	25	1	0	13

Table 5.1: Comparison of Town and Country Planning Acts & implementation across Nation

Sr.No	Name of State	Whether Town and Country Planning Dept. Exists	Whether T & CP Act enacted	No of Towns as per Census 2011	No. of Census Towns	No. of Statutory Towns (ULBs)	Statutory Towns (%)	No. of Master Plan Approved	No. of Master Plans Under Preparation	Towns having Master Plan (%)
34	Lakshadweep	No Town and Country Planning Department, However the works are handed by PWD	Yet to be enacted	6	6	0	0			0
35	Puducherry	Department of Town and Country Planning	Puducherry Town and Country Planning Act, 1969	10	4	6	60	4	0	40
Grand Total				7933	3892	4041	51	1843	567	23

Source: TCPO, MoUD 2011

As reflected in table above, barring UT of Lakshadweep, all States and UTs of India have Town and Country Planning Acts and Departments. It has been noticed that all the new States including Chhattisgarh, Jharkhand and Uttarakhand have their own Town and Country Planning Acts. However, these Acts are same as enacted by their original State from where they were bifurcated.

There are few States which have enacted or are in process to enact new laws with respect to Urban Development and Town Planning. Bihar has enacted Bihar Urban Planning and Development Act, 2012.

Based on the understanding from existing UDPFI guidelines, it is essential to identify gaps and best practices which are adopted by States with respect to Urban and Regional Development. Comparison of some of the States as case studies has been undertaken for the review T&CP Acts of country. The States have been chosen in such a manner so that it covers almost all the region, i.e. North, West, South and East, of the country. Moreover, for review purpose, various parameters such as Regional Development, Land Acquisition Mechanism, affirmation with 74th CAA, institutional setups are considered. These States are:

- **North:** Himachal Pradesh
- **South:** Tamil Nadu and Karnataka
- **East:** Bihar and Mizoram
- **West:** Maharashtra and Gujarat

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
1	<b>State Planning Committee/Board/Authority</b>	Provision of State Planning board	Provision of State Planning Board	Directorate of Town and Country Planning, headed by the Director, appointed by State	Mizoram Urban Planning and Development Board/committee	Bihar Urban Planning and Development Board The Government may also constitute Urban Arts and Heritage Commission	No provision for State Level Planning Committee or Board or Authority.	No provision for State Level Planning Committee or Board or Authority.
2	<b>Functions Of State Planning Board</b>	<ul style="list-style-type: none"> <li>▪ To guide, direct and assist the planning authorities</li> <li>▪ Advise the State Government on planning matters</li> <li>▪ Direct the preparation of Development Plans by Planning Authorities</li> <li>▪ Prepare and furnish reports relating to the working T&amp;C Act</li> </ul>	Not Applicable	Not Illustrated	<ul style="list-style-type: none"> <li>▪ To prepare and enforce Integrated Interim Development Plan, District or Regional Development Plan, Rural or Sectoral Plan, Urban Development Plan and Action</li> <li>▪ To prepare Development Scheme</li> <li>▪ To prepare Regional and</li> </ul>	<ul style="list-style-type: none"> <li>▪ To guide, direct and assist the Planning Authority</li> <li>▪ Advise on the delineation of the Planning Area(s) and direct the preparation of Development Plan</li> <li>▪ Undertake, assist and advise on the coordination of planning and implementation of physical development programmes</li> <li>▪ Direct the</li> </ul>	Not Applicable	Not Applicable

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
					Rural Centre Development Plan and integrating Urban and Rural Development schemes and Development Plans prepared by the Municipalities or Village Councils or any Local authority and assist the State Government to co-ordinate development activities at all levels within the Planning Area or Region	<ul style="list-style-type: none"> <li>preparations of one or more Regional Development Plan, Regional Transportation Plans, Town Development Plans</li> <li>Direct the preparations of one or more regional natural resources and environmental Conservation Plans</li> </ul>		
3	<b>Metropolitan Development /Planning Authority/Committee</b>	Establishment of Chennai Metropolitan Development Authority Functions and Powers : <ul style="list-style-type: none"> <li>To prepare a Master Plan or a detailed</li> </ul>	Separate Provision in Bangalore Metropolitan Region Development Authority Act, 1985	No provision to constitute	No provision to constitute MPC	The act doesn't have provision for constituting the Metropolitan Planning Authority or Committee, however it defines the function of MPC to prepare Development Plan for Metropolitan Area	No provision, however a separate act makes mandatory to constitute Mumbai Metropolitan Regional Development Authority under	No provision to constitute

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
		<p>Development Plan or a new Town Development Plan</p> <ul style="list-style-type: none"> <li>To prepare a new Town Development Plan for the area concerned to secure the laying out and development of the new town in accordance with the new Town Development Plan</li> </ul>					<p>Bombay Metropolitan Region Development Authority Act, 1974</p>	
4	<b>Planning Area</b>	<ul style="list-style-type: none"> <li>Regional Planning area - based on Population and type of development</li> <li>Local Planning Area - based on Population and type of development and provision in Regional Plan</li> <li>New Town Area - based on Population and</li> </ul>	<p>State has got power to declare any area in the State to be a Local Planning Area.</p>	<p>State to declare Planning area</p>	<p>State government in consultation with Board or Committee may declare the limit of Town or Urban area in the State</p>	<p>State on advice of Board may declare or withdraw the regions or areas, including a Metropolitan Area or area for development of new towns in the State to be a Planning Area</p>	<p>Criteria for delineation of planning area is not described</p>	<p>Development area and Urban Development area to be declared by State Government</p>

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
		type of development and provision as new town in Regional Plan						
5	<b>Planning Authorities</b>	<p>Planning Authorities to be constituted at different level as:</p> <ul style="list-style-type: none"> <li>■ The Regional Planning Authority</li> <li>■ The Local Planning Authority</li> <li>■ The New Town Development Authority</li> </ul>	<p>The State Government in consultation with the Board may constitute Planning Authority after declaration of planning area</p>	<ul style="list-style-type: none"> <li>■ Town and Country Planning Authority to constitute by the State</li> <li>■ Special Area Development Authority to be established for special areas as identified by State or in Regional Plan</li> </ul>	<ul style="list-style-type: none"> <li>■ District Planning and Development Committee</li> <li>■ City or Town Planning and Development Committee</li> </ul>	<p>State to constitute the Planning Authority and it shall be known by such name as the Government may determine</p>	<ul style="list-style-type: none"> <li>■ Regional Planning Board</li> <li>■ Special Planning Authority</li> <li>■ New Town Development Authority</li> </ul>	<ul style="list-style-type: none"> <li>■ Area Development Authority</li> <li>■ Urban Development Authority</li> </ul>
6	<b>Function and powers of Planning Authority</b>	<p>The Regional Planning Authority to:</p> <ul style="list-style-type: none"> <li>■ carry out a survey and prepare reports on the surveys</li> <li>■ prepare an existing land use map</li> </ul>	<p>Planning Authority (as mentioned in section above) Preparation of a map showing present land use</p> <p>The planning authority to:</p> <ul style="list-style-type: none"> <li>■ Prepare</li> </ul>	<p>Special Area Development Authority</p> <ul style="list-style-type: none"> <li>■ To prepare Development Plan for the special area;</li> <li>■ to implement the Development Plan</li> </ul>	<p>Function and powers of Planning Authority or board are described (same as in row 2)</p>	<ul style="list-style-type: none"> <li>■ Planning Authority shall carry out such functions and exercise such powers as may be prescribed by the Rules</li> <li>■ Planning Authority may carry out or cause to be carried out surveys of its Planning Area and to</li> </ul>	<p>Regional Planning Board to:</p> <ul style="list-style-type: none"> <li>■ carry out a survey of the region, and prepare reports on the surveys so carried out</li> <li>■ prepare an</li> </ul>	<p>Area Development Authority to undertake:</p> <ul style="list-style-type: none"> <li>■ Preparation of Development Plans</li> <li>■ preparation of Town Planning</li> </ul>

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
	Local Planning Authority to:	<ul style="list-style-type: none"> <li>carry out a survey of the Local Planning Area</li> <li>prepare reports on the surveys</li> <li>prepare a Master Plan and a Detailed Development Plan</li> </ul>	<p>Outline Development Plan prior to the preparation of Master Plan</p> <ul style="list-style-type: none"> <li>Carry out the survey as soon as the planning area declares Preparation of Master Plan.</li> <li>Prepare Town Planning Scheme</li> </ul>	<ul style="list-style-type: none"> <li>to provide for the municipal management of the special</li> <li>to otherwise perform all such functions with regard to the special area as specified by State Government from time to time.</li> </ul>		<p>prepare report or reports of such surveys</p> <ul style="list-style-type: none"> <li>Every planning authority will prepare a present Land Use Map and a Land Use Register</li> <li>Planning Authority to prepare a Development Plan after declaration of Planning Area</li> </ul>	<p>existing-land-use map for the purpose of preparing a Regional Plan;</p> <ul style="list-style-type: none"> <li>prepare a Regional plan</li> </ul> <p>Special Planning Authority to:</p> <ul style="list-style-type: none"> <li>carry out a survey and prepare an existing land-use map of the area, and prepare and publish the draft proposals for the lands</li> </ul>	<p>Schemes to carry out surveys in order to prepare Development Plans</p> <ul style="list-style-type: none"> <li>control the development activities</li> </ul> <p>Urban Development Authority to undertake:</p> <ul style="list-style-type: none"> <li>Preparation of Development Plans</li> <li>preparation of Town Planning Schemes</li> <li>carry out surveys in order to prepare Development Plans</li> <li>control the development activities</li> <li>guide, direct</li> </ul>
	New Town Development Authority to:	<ul style="list-style-type: none"> <li>prepare a new Town Development Plan</li> <li>carry out building and other operations</li> </ul>	<p>Implementation of plan , Once the Master Plan is approved by the State,</p>					

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
								and assist the local authorities
7	<b>Preparation of Plans</b>	<ul style="list-style-type: none"> <li>■ Regional</li> <li>■ Master Plan</li> <li>■ New Town Development Plan</li> <li>■ Detailed Development plan</li> </ul>	Master Plan	<ul style="list-style-type: none"> <li>■ Regional Plan</li> <li>■ Development Plan and Sectoral Plan</li> </ul>	<ul style="list-style-type: none"> <li>■ District or Regional Development Plan,</li> <li>■ Urban Development Plan,</li> <li>■ Rural or Sectoral Plan,</li> <li>■ Action Plan</li> </ul>	<ul style="list-style-type: none"> <li>■ Development Plan</li> <li>■ Metropolitan area Development plan</li> </ul>	<ul style="list-style-type: none"> <li>■ Regional Plans</li> <li>■ Development Plan</li> <li>■ Preparation of Development Plan for additional area</li> </ul>	Development Plan
8	<b>Scope/Objectives/Contents of Plans</b>	Objectives of each type of plan is defined	Contents of Master Plan are elaborated	Contents of Development Plan and Sectoral Plan are elaborated	Contents of each type of plan as mentioned in act are elaborated	Scope and Contents of Development Plan are illustrated	Contents of Regional Plan and Development Plan are elaborated	Contents for Draft Development Plan are elaborated
9	<b>Affirmation with 74th Amendment Act</b>	DPC and MPC are not incorporated	DPC and MPC are not incorporated	DPC and MPC are not incorporated,	State to constitute District Planning and Development Committee and City or Town Planning and Development Committee. Chairman of the committee to be appointed by State whereas other members to be	No provision for constituting DPC and MPC. However it elaborates some functions of MPC	No provision for DPC and MPC.	No provision for MPC and DPC

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
					selected at district level and city level in compliance with the Act.			
10	<b>Provision for Regional Planning</b>	Provision of Regional Planning to be done by Regional Planning Authority	No provision for Regional Planning	Provision for preparation of Regional Plan	Provision for preparation of District or Regional Plan	The Act doesn't have specific provision for Regional Development Plans, however it defines basic scope of Development Plans which also include Regional Plans	The Act has provision for Regional Planning Board and elaborates its function with respect to regional development	No provision for Regional Planning. Though the Act provides for Development Area however it does not elaborate on the spatial extent and criteria for declaration of such area.
11	<b>Town Planning/Development Scheme</b>	Detailed Town Planning Schemes prepared under the Tamil Nadu Town Planning Act, 1920,	Planning Authority, for the purpose of implementing the proposals, may make one or more town planning schemes for the area within its jurisdiction	The Town and Country Development Authority may, at any time, declare its intention to prepare a town Development Scheme and provisions are define to incorporate in Town Planning	For the purpose of implementing the proposals contained in the Development Plan, prepare one or more Development Scheme for five years or for one year.  Development Scheme to be	The planning authority may invite area Development Schemes from developers. An Area Development Scheme may be made in respect of any land which is:- (a) in the process of development, (b) likely to be used for any development including building	A Planning Authority may for the purpose of implementing the proposals in the final Development Plan, prepare one or more Town Planning Schemes for the area within its jurisdiction. Contents of draft	Appropriate authority may make one or more Town Planning Scheme for the respective development area. Town Planning Scheme may be made in respect of any

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
				scheme. State has power to give directions to frame/modify or revoke the scheme	developed in respect of: (a) in the course of development, (b) likely to be used for building purposes or (c) already built up.	purposes, or (c) already built upon.	scheme is elaborated	land in the course of development, likely to be used for building purposes and already built upon. Content of draft scheme are defined in the act.
12	<b>Periodic Revision of Plans</b>	Provision of reviewing the Regional Plan once in 10 years and the Master Plan may be reviewed once in in 5 years.	At least once in every ten years from the date on which the Master Plan has come into force	Provision for review the Plans at any time; however minimum timeframe has not provided.	District or Regional Development Plan shall be reviewed at least once in every 10 years whereas, Interim Development Plan, Urban Development Plan and Rural or Sector Plan shall be reviewed at least once in every 5 years	No provision	<ul style="list-style-type: none"> <li>■ The State Government can revise at any time after a Regional plan has come into operation, but not earlier than ten years</li> <li>■ The revision shall be at least once in twenty years from the date on which a Development Plan has come into operation,</li> </ul>	<ul style="list-style-type: none"> <li>■ At least once in ten years.</li> <li>■ Area Development Authority shall revise Development Plan</li> </ul>

Table 5.2: Comparison of Town and Country Planning Acts of seven States

S.No.	Criteria	Tamil Nadu	Karnataka	Himachal Pradesh	Mizoram	Bihar	Maharashtra	Gujarat
13	<b>Land Assembly/Mechanism/Acquisition</b>	<ul style="list-style-type: none"> <li>Power to acquire land under the Land Acquisition Act</li> <li>Acquisition of land by agreement, however if the value of such land exceeds fifty thousand rupees, appropriate Planning Authority shall not enter into such agreement without previous approval of the Government</li> </ul>	<ul style="list-style-type: none"> <li>Power to acquire land under the Land Acquisition Act or</li> <li>Acquisition of land by agreement,</li> </ul>	<ul style="list-style-type: none"> <li>Power to acquire land under the Land Acquisition Act or</li> <li>Acquisition of land by agreement,</li> </ul>	<p>Land can be acquired by following ways:</p> <ul style="list-style-type: none"> <li>compulsorily ;</li> <li>by agreement ; or</li> <li>by taking an application to the collector for acquiring such land under the Land Acquisition Act, 1894</li> </ul>	<p>Acquisition of Land by Way of</p> <ul style="list-style-type: none"> <li>Transferable Development Right</li> <li>Accommodation Reservation</li> <li>Purchase of Land by way of Negotiated Settlement</li> <li>Power to Acquire land under the Land Acquisition Act, 1894 or any other Land Acquisition Act</li> </ul>	<p>Acquisition of Land by Way of</p> <ul style="list-style-type: none"> <li>Transferable Development Right</li> <li>Accommodation Reservation</li> <li>Purchase of Land by way of Negotiated Settlement</li> <li>Power to Acquire land under the Land Acquisition Act, 1894 or any other Land Acquisition Act</li> </ul>	<ul style="list-style-type: none"> <li>Acquisition of Land either by agreement or Under Land Acquisition Act 1894 by Area Development Authority</li> </ul>

Source: Respective Acts

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Various criteria are identified for making the comparisons of T&CP Act of the States. It has been observed in the table above that there is no provision of constituting State level Planning Board or Committee in the States of Gujarat and Maharashtra. But in Bihar, the recently enacted Urban Planning and Development Act in 2012 gives provision to constitute Urban Planning and Development Board at State level. This Act also recommends constituting the Urban Arts and Heritage Commission in order to (a) preserve and conserve archaeological and historical sites, (b) restore and conserve urban design in planning area. Karnataka and Himachal Pradesh have provision of constituting the State Level Planning Boards; however functions of these boards are not specified in their respective T&CP Acts.

The State may notify Planning Area in consultation with Planning Boards. However, in many States such as Karnataka, Himachal Pradesh, Maharashtra and Gujarat, the State Government without any consultation with the Planning Boards can notify Planning or Development Area for the region. Tamil Nadu is the only State which elaborates the criteria for delineating the Planning Boundary whereas other States have not considered any such criteria in their respective Acts.

The role of Planning Board is significant for constituting the Planning Authorities for Notified Planning Area. It has been observed that every State has its own hierarchy for constituting Planning authorities / Committees for the planning area. States of Tamil Nadu and Maharashtra have a provision to constitute the Regional Planning Authority, whereas in Gujarat, Area Development Authority and Urban Development Authority are to be constituted for development of settlements. Though, the extent of Development Area is not defined in the Gujarat TP&UD Act which may create confusion in deciding the region's boundary. The constitution of District Planning Committee (DPC) is almost left by every State except Mizoram. The Mizoram Urban and Regional Development Act, makes mandatory to constitute DPC and City or Town Planning Committee in accordance with 74<sup>th</sup> CAA, however function and power of DPC are not specified. Mizoram Urban and Regional Development Act, have provision for constituting Local Authorities such as Village Councils and Municipalities to participate in planning process.

On the same line, Tamil Nadu, Karnataka and Maharashtra have also made a provision with respect to constitution of Metropolitan Development Authority. However this provision is limited to Chennai, Bangalore and Mumbai. All other Metropolitan cities in these States such as Pune, Nagpur and Mangalore etcetera have been ignored. It has been noticed that States such as Maharashtra and Himachal Pradesh have special provision to constitute Special Area Development/Planning Authority in order to develop Notified Area.

In order to prepare Plans at different levels, most of the States have provision for Development Plan or Master Plan which is to be developed for Notified Planning Area,

whereas Tamil Nadu and Maharashtra have specific provision to formulate Regional Plans in identified region.

Town Planning or Development scheme is an important tool to develop land; every State has made provision to develop Planning/Development Scheme. Land acquisition is an important aspect for implementation of plans. States empowers Planning Authorities through T&CP Acts to acquire land, however mechanism for land acquisition vary amongst States. In every State, land acquisition is mentioned to be either as per Land Acquisition Act, 1894 or through agreement with the owner. Maharashtra and Bihar have additional mechanism i.e. Town Planning Schemes and Transfer of Development Right to acquire land for development purposes.

## 5.1. Maharashtra

In Maharashtra, Town Planning is a statutory function of all the Municipal Authorities even before the Constitution (74th) Amendment Act. In view of this, no separate provision was considered necessary by the State Government to amend the 1966 Act. This Act, amended up to 5th August 1992 was considered a comprehensive Act. The Act provided that the Development Plan prepared by Planning Authority shall indicate the manner of land use, allocation of land for various purposes, and prescribe the time period for steps in the plan preparation process with extended time if required.

The Maharashtra Regional and Town Planning (MRTP) Act has given emphasis on Regional Planning. It enables State Government to constitute Regional Planning Boards to prepare Regional Plans. *The Act, however, does not have any provision to constitute MPC or DPC, thus it is not entirely compliant with 74<sup>th</sup> CAA.* It is, Bombay Metropolitan Region Development Authority Act which makes it mandatory to constitute MPC and elaborated the procedure to be followed by MPC in order to prepare Development Plans for Metropolitan Area.

The Special Planning Authority to be constituted by the States for certain Notified Areas. The Special Planning Authorities will have all the powers of a Planning Authority to acquire land for special purpose in Notified Areas. In Maharashtra, there is a special provision to constitute New Town Development Authority for the purpose of acquiring, developing and disposing of land in the area of a new town.

For implementation of the plan, compulsory acquisition of land is regarded as a pre-requisite under the Land Acquisition Act, 1984. In view of the exorbitant market rates of land to be paid for compensation, opposition to compulsory land acquisition by land owners, etcetera has compelled the authorities to explore collaborative approaches within the existing legal framework. As a result, the alternatives to compulsory land acquisition in the form of Transferable Development Rights (TDR) and Accommodation Reservation have been explored in Maharashtra.

However, in both these cases i.e. Accommodation Reservation and TDR, the Local Authority reserves its right to compulsorily acquire the land if the land owner does not come forward. Further, the Town Planning Scheme (TPS) as an alternative model for urban land development has been provided in the MRTTP Act as one of the tools for implementing the proposals contained in the Development Plan and had been used most extensively in the State of Maharashtra.

The draft scheme is prepared by the Planning Authority and finalisation of development scheme is done by the Arbitrator/ Assistant Director of Town Planning and then it is submitted to the government for approval. However the procedure of TPS formulation and approval consumes lot of time and requires to be simplified.

## 5.2. Himachal Pradesh

In the State of Himachal Pradesh, The Himachal Pradesh Town and Country Planning Act, 1977 is in force. It is a comprehensive planning and development act and provides for the preparation of Regional Plans; Urban Area Plans, Zonal Plans, and prescribes controls on use and development of land. The legislation also provides for levy of development charges.

Under the Act, the Planning Areas are constituted and the Director of Town Planning is entrusted with the task of preparation of Development Plan which will be followed by Sectoral Plans in consultation with the Local Authorities concerned. The Interim Development Plan is submitted to the State Government who notifies approved Interim Development Plan in the official gazette and the Local Authorities are required to follow the plan. The Act also contains provision for the constitution of Town and Country Development Authorities for preparation of Town Development Schemes.

The act has provision for the preparation of Regional Plan and Development Plan, which will be prepared by the Director, Town and Country Planning of the state. The content of Regional Plan and Development Plan have been provided in the Act and a brief methodology to formulate the plans is given. The final approval of the plan is to be provided by the State.

The Town and Country Development Authority may, at any time, declare its intention to prepare a Town Development Scheme. State has power to give directions to frame/modify or revoke the schemes.

*The Act has provision to review the plans at any time after a Regional/Development Plan has come into operation. The State can undertake the review and evaluation of the plan, however the minimum time frame has not been provided by which the Plan is to be revised or reviewed.*

Provisions to declare any area as Special Area which is to be notified by State are given in the Act. The Plan for such areas will be controlled and regulated by Special Development Authority (SDA). SDA will prepare the Development Plans for such areas and implement it. Other than special areas, Town and Country Planning Authorities in the State will prepare and implement the plan.

### 5.3. Tamil Nadu

The Tamil Nadu Town and Country Planning Act, 1971 is currently in force in the State. The legislation was brought in after repealing the Town Planning Act, 1920. It is a comprehensive piece of legislation and contains provisions for the preparation of Regional, Metropolitan, Master Plan, New Town and Detailed Development Plans. Besides, the Act envisages the constitution of Regional, Local and New Town Planning Authorities and a Town and Country Planning Board at the apex empowered with implementation powers.

The Town and Country Planning Act, 1971 has been amended so as to have separate provision for the constitution of Madras Metropolitan Development Authority and preparation and implementation of Master Plan for the Madras Metropolitan Planning Area.

The scheme of the Act is that the planning process starts with decentralisation of Regional Planning Area and Local Planning Area under section 10 of the Act which is notified in the gazette, defining the limits of the area. After this, the Town and Country Planning Authority are constituted in consultation with the Director of Town Planning for performing the function of preparing a Regional/Master Plan and detailed Development Plan. Once the Plan is prepared and submitted to the government, State government can give its consent to the Planning Authority to the publication of a notice of the preparation of plan with or without modification.

In case of Tamil Nadu, the Town Planning Scheme (TPS) of Maharashtra or Gujarat has been re-designated as Detailed Development Plans under the Act. These can be prepared on any land located in the Planning Area.

*The Tamil Nadu Town and Country Planning Act, 1971, has laid down the procedure for plan preparation and approval but, unfortunately, there is no time frame within which the planning process should be completed.*

### 5.4. Gujarat

Gujarat has a fairly good and robust legislative framework for urban planning as compared to other States in India. The Gujarat Town Planning and Urban Development Act (GTPUDA) was enacted in 1976 by the State Government. The Act stems from early 20th century planning law devised by the British to improve and

manage Indian cities. It also has been amended from time to time to keep pace with the changing requirements.

The Act mandates the delineation of a “Development Area” around a city or a town for planning purposes. It encompasses a much larger area around the city or town that is likely to see development. This ensures and allows for better planning and for guiding development in the area. A village is the basic spatial unit and every development area is an agglomeration of numerous villages, or may also include portions of villages.

The GTPUDA also mandates the creation of a Special Planning Authority—the Urban/Area Development Authority (UDA/ADA)—which is charged with the task of undertaking planning within the delineated Development Area.

Urban planning in Gujarat is a two-step process and is prescribed in the Act and its Rules. The first step is to prepare a “Development Plan” for the entire city or development area. The second step is to prepare “Town Planning Schemes” (TPSs) for smaller portions of the development area for which the Development Plan is prepared.

*The Act does not have provision for Regional Planning. Though it says development area however it has not elaborated extent and criteria for declaration of such area. The preparation of Area Plan is done by Area development Authority. Whereas Development Plan for urban areas is done by Urban Development Authority. The Development Plan is revised every 10 years and is updated in the interim whenever a need arises to respond to the changing context.*

The planning process also includes limited public participation. After a Draft Development Plan is prepared by the Development Authority it is published and kept open for public inspection for a period of two months and objections and suggestions are invited. Each objection and suggestion is responded to and, if required, the DP is modified. It is published again to invite further objections and suggestions. These are again taken into account and the plan is modified. It is then sent to the State Government of Gujarat for approval and oversight. The State Government may suggest modifications, keeping the overall public good in view if required, before approving the Development Plan.

Appropriate authority can make one or more TPS for the respective development area. TPS may be made in respect of any land which is in the course of development, likely to be used for building purposes and already built upon. The Public Planning Authorities/Development Agencies acquire large areas of land under the Land Acquisition Act of 1894 or by agreement. Then a Master Plan of the area is prepared, laying out the roads, plots for social amenities, and plots for sale. Roads and infrastructure are then built, using government funds or loans. Serviced plots are then

sold for urban uses at market rates, which are most often much higher than the rate at which land is acquired.

## 5.5. Karnataka

The Karnataka Town and Country Planning (KTCP) Act provides for the regulation of planned growth of land use and development, for the making and execution of Town Planning Schemes, in the State of Karnataka, which came into force in 1965. *The Act mandates constitution of State Planning Board, which consult and direct the Local Planning Authorities after notifying the Planning Area. The detailed functions of State Planning Board have not been elaborated.*

*In Karnataka, the KTCP Act does not have any provision to constitute Metropolitan Planning Authority, however a separate Act i.e. Bangalore Metropolitan Regional Authority Act, 1985 has been established for Bangalore Metropolitan Area.*

Emphasis has been given on preparation of Master Plan, the contents for the same have been elaborated, *however the concept of Regional Planning has completely ignored in KTCP Act.* After notifying the Planning Area by State in consultation with Board, the Planning Authority is to prepare Outline Development Plan, prior to the preparation of Master Plan. As soon as the Master Plan is approved by the State, the Planning Authority prepares the TPS for the implementation of Plan. The Planning Authority may prepare one or more TPS for the area within its jurisdiction. A TPS may be made in accordance with the provisions of KTCP Act in respect of any land which is in course of development, or likely to be used for building purposes, or already built upon.

There is a provision for revision of Master Plan at least once in every ten years from the date on which the Master Plan came into force.

The KTCP act has laid down the procedure to acquire land for Master Plan and Schemes for public purposes. The Planning Authority may acquire any land designated in a Master Plan for a specified purpose or for public purpose by agreement or under the Land Acquisition Act, 1894.

## 5.6. Bihar

Bihar Urban Planning and Development (BUPD) Act, 2012 was enacted to make provision for promotion of planned growth and development of urban areas and such rural areas having potential of urbanization and regulation thereof including land use. The act empowers the State of Bihar to constitute Bihar Urban Planning and Development Board to perform certain functions which mainly includes to guide, (a) direct and assist the Planning Authority; (b) to advise on the delineation of the Planning Area(s) and direct the preparation of Development Plan; (c) undertake,

assist and advise on the coordination of planning and implementation of physical development programmes; (d) direct the preparations of one or more Regional Development Plan, Regional Transportation Plans, Town Development Plans and (e) direct the preparations of one or more Regional Natural Resources and Environmental Conservation Plans.

The Board is empowered to constitute one or more committees under BUPD Act, to assist Board in exercising its powers, discharging its duties or performing its functions. This Act also empowers the State to constitute Urban Arts and Heritage Commission in order to preserve and conserve archaeological and historical sites, restore and conserve urban design in Planning Area.

*The Act has given provision to prepare Development Plan for Metropolitan area by Metropolitan Planning Committee (MPC), and the criteria for constitution of MPC will be in accordance with Article 243ZE of the Constitution of India; however such criteria have not been discussed in detail. The power and function of Planning Authorities as well as MPC has been elaborated.*

The contents and scope of Development Plan and Metropolitan Development Plan have been elaborated in the Act. *Regional Planning aspects have been addressed however specific content to Regional Plans have not been discussed in the Act.*

After the receipt of the Development Plan, together with the report of the Committee, the Government may either approve the Development Plan, with or without modifications, or may return the Development Plan to the Planning Authority to modify the plan or to prepare a fresh plan in accordance with such directions as the Government may issue in this behalf. Immediately after the Development Plan has been approved by the Government, the Planning Authority shall publish a public notice in the Official Gazette and in a local newspaper, of the approval of the Development. The Development Plan shall come into operation from the date of publication.

The Planning Authority may invite Area Development Schemes from developers. An Area Development Scheme may be made in respect of any land which is in the process of development, or likely to be used for any development including building purposes, or already built upon.

Any land required, reserved or designated in any Development Plan and Area development Scheme can be for a public purpose by Way of TDR or Accommodation Reservation or purchase of land by way of negotiated settlement or under the Land Acquisition Act, 1894. The act has also given the provision to create and maintain a land bank, in which all lands acquired, allotted, purchased and obtained, will be monitored and maintained and position reviewed periodically by respective Planning Authorities.

## 5.7. Mizoram

The Mizoram Urban and Regional Development Act, 1990 was enacted to make provision for the regulation of planned growth and development of urban and rural areas and regions in relation to economic growth and protection and preservation and development of natural setting and urban environment and archaeological monuments and historical places in Mizoram.

The Act empowers the State to constitute Urban Planning and Development Board for the State and for the district or town or a city to advise State Government in regard to the Spatial and Economic Planning and development and also for determining principles and policies under the Act with a view to achieve balance and co-ordinated development of the cities, towns and regions as a whole; and to assist the Board in matters of Development Plan preparation and its implementation.

The act has also elaborated the procedure to constitute District Planning and Development Committee in compliant with 74<sup>th</sup> CAA.

The functions of Planning Board or Committee are to prepare and enforce following plans, prepared by the Municipalities or Village Councils or any Local authority and assist the State Government to co-ordinate development activities at all levels within the Planning area or region.

- Integrated Interim Development Plan,
- District or Regional Development Plan,
- Rural or Sectoral Plan,
- Urban Development Plan and Action,
- Preparation of Development Scheme,
- Preparation of Regional and Rural Centre Development Plan and
- Integrating Urban and Rural Development schemes and Development Plans

The hierarchy of Development Plans with elaborated content has been established by the Act. The comments and suggestions are invited from any person within 30 days from the publication of notice for publishing the Development Plan, as soon as may be, but not later than 6 months after the submission of the Development Plan the State Government in consultation with the Board or Committee may either Approve the Development Plan in full or Approve with such modifications or return it for further improvement. Once the State has approved the Development Plan, the official notice is published to invite objection and suggestion. After considering objections and suggestions and after giving hearing to the persons desirous of being heard the State Government may confirm the modification in the Development Plan.

For the purpose of implementing the proposals contained in the Development Plan, The Government in consultation with the Board or Committee is empowered to entrust any Government Agency or Local authority or Board to prepare one or more

Development Scheme for efficient implementation of Development Plans. Development scheme can be developed in respect of land which is in the course of development, likely to be used for building purposes, or already built up.

Land can be acquired either by compulsorily; or by agreement; or by taking an application to the District Collector for acquiring such land under the Land Acquisition Act, 1894 for Development Schemes.

There is a provision of review and evaluation of Development Plan at any time by the State after Development plan has come into operation and make such modification, however District or Regional Development Plan shall be reviewed at least once in every 10 years whereas, Interim Development Plan, Urban Development Plan and Rural or Sector Plan shall be reviewed at least once in every 5 years.

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## 6 Legal Requirements for Industrial Development

### 6.1. Industries (Development and Regulation) Act, 1951

The Industries (Development and Regulation) Act, 1951 provides for development and regulation of certain industries. The Act has been amended time to time. The last amendment in the said Act was - The Industries (Development and Regulation) Amendment Act, 1984. It provides for Establishment of the Central Advisory Council and Development Councils; regulation of the industries through the processes of registration, licensing and investigation into industries liquidation or reconstruction of companies and miscellaneous provisions. The Act gives a list of industries which requires compulsory licensing.

### 6.2. Industrial Policy, 1991

The first Industrial policy of the Government of India was announced in year 1948. The 1991 Industrial policy aims to maintain sustainable growth in productivity, enhance gainful employment, achieve optimal utilisation of human resources, attain international competitiveness and transform India into a major partner in the global arena. The policy is focussed on the following:

- Industry de-regulation
- Market responsive industrial development
- Provision of a policy regime for facilitation and growth of Indian industry.

The major provisions of the policy are as given below:

#### 1) Liberalization of Industrial Licensing Policy

##### a) Industries requiring compulsory licensing

As per the Industries (Development and Regulation) Act, 1951, industries required compulsory licensing. As of year 2014, only five types of industry sectors require compulsory licensing on account of environmental, safety and strategic considerations, these are:

- Distillation and brewing of alcoholic drinks
- Cigars and cigarettes of tobacco and manufactured tobacco substitutes
- Electronic aerospace and defence equipment
- Industrial explosives including detonating fuses, safety fuses, gun powder, nitrocellulose and matches.
- Specified hazardous chemicals i.e (i) Hydrocyanic acid and its derivatives, (ii) Phosgene and its derivatives, (iii) Isocyanates & di-isocyanates of hydrocarbon.

b) Industries under public sector

Since, 1991 only two industry sectors have been reserved for public sector. They are:

- Atomic Energy – Production, separation or enrichment of special fissionable materials and substances and operation of the facilities, specified in the Department of Industrial Policy and Promotion.
- Railway transport

**2) Industrial Entrepreneurs’ Memorandum (IEM)**

The industries which are exempted from compulsory licensing require filing an Industrial Entrepreneurs’ Memorandum (IEM) with the Secretariat for Industrial Assistance (SIA). No industrial approval is required for the exempted industries.

### 6.3. Policy for Foreign Direct Investment (FDI)

URDPFI Guidelines provide the sections of the Consolidated FDI Policy, 2013 which have relevance to the preparation of Regional or Urban Development Plans and its implementation.

Promotion of Foreign Direct Investment (FDI) forms an integral part of Industrial Policy. It helps in accelerating economic growth by means of infusion of capital, technology and modern management practices. The FDI policy is announced through issue of Consolidated FDI Policy Circulars. The latest Circular is effective from April 2013. As per the circular the sectors which have been liberalised are mentioned in **Error! Reference source not found..**

**Table 6.1: Liberalised Sector for Foreign Direct Investment (Related to Urban and Regional Planning)**

Sr. No.	Sector	Maximum FDI % allowed
1.	Agriculture and Animal Husbandry, covering the following sectors: a) Floriculture, Horticulture, Apiculture and Cultivation of Vegetables & Mushrooms under controlled conditions; b) Development and production of Seeds and planting material; c) Animal Husbandry (including breeding of dogs), Pisciculture, Aquaculture, under controlled conditions; and d) services related to agro and allied sectors	100%
2.	Tea sector including teaplantation	100% subject to 26% divestment in 5 years
3.	Mining, subject to the Mines and Minerals (Development & Regulation) Act, 1957 a) Coal and lignite mining b) Coal processing plants	100%

Sr. No.	Sector	Maximum FDI % allowed
	c) Mining and mineral separation of titanium bearing minerals and ores, its value addition and integrated activities	
4.	Petroleum and Natural Gas a) Exploration activities and infrastructure for marketing b) Petroleum refining by PSU's	100% 49%
5.	Airports : Greenfield and existing projects	100%
6.	Construction Development: Townships, Housing, Built up infrastructure	100% (subject to conditions) Minimum area to be developed under each project would be as under: (i) In case of development of serviced housing plots, a minimum land area of 10 hectares (ii) In case of construction-development projects, a minimum built-up area of 50,000 sq.mts (iii) In case of a combination project, any one of the above two conditions would suffice
7.	Industrial park; New and Existing	100%
8.	Power Exchange : Power Exchanges registered under the Central Electricity Regulatory Commission (Power Market) Regulations, 2010	49%
9.	Manufacturing for production in Micro and Small Enterprises	Conditions apply
10.	Defence Industry	26%

Source: Consolidated FDI Policy, 2013

Foreign Investment Implementation Authority (FIIA) has been established to strengthen the foreign investment. As per the Consolidated FDI Policy (effective from April, 5<sup>th</sup> 2013) salient features relevant to FDI in industrial parks (cited in section 6.2.12, page no. 59) and manufacturing (from section 6.2.5, page no. 45 of the Consolidated FDI policy, 2013) have been mentioned below:

- **Industrial Parks:** FDI allowed in industrial parks is 100%, provided the following conditions are satisfied:
  - The Industrial park shall comprise minimum of 10 units and none shall occupy more than 50% of the allocable area.
  - Minimum percentage of area to be allocated for industrial activity shall not be less than 66% of the total allocable area.

- Manufacturing: FDI in MSE (Micro, Small and Medium Enterprises) is subject to sectoral regulations. Any organization other than MSE but manufactures items reserved for MSE sector and has foreign investment in capital of more than 24% would have to come through Government Route. Additionally, such organization shall require industrial license for manufacturing. It has to achieve minimum 50% export of the MSE products within a period of three years.

### 6.4. Manufacturing Policy for Cluster Developments

The Government of India has announced the National Manufacturing Policy in year 2011 with the objective to enhance the share of manufacturing in GDP upto 25% within a decade and creating 100 million jobs. The National Manufacturing Policy outlines creation of clusters. The clusters play a critical role in technological propagation by facilitating technological learning and manufacturing through the presence of an entire ecosystem in the same geographical location. The XII Five Year Plan of Planning Commission also suggests a cluster approach for promotion of manufacturing industries.

URDPFI Guidelines provides the following Acts / Policies / Guidelines in relevance to the preparation of Regional, Industrial or Urban Development Plans and its implementation:

- National Manufacturing Policy, 2011
- National Investment and Manufacturing Zones (NIMZs) Guidelines
- Special Economic Zone (SEZ) Act, 2005
- Various schemes for cluster development under Ministries
- Provisions for Micro Small and Medium Enterprises (MSME)

National Manufacturing Policy, 2011 and NIMZ Guidelines, SEZ Act, 2005 and Micro, Small & Medium Enterprises Development (MSMED) Act, 2006 are appendices listed with their respective web URL at Appendix 'O' of Volume II B.

#### 6.4.1. National Manufacturing Policy, 2011

The policy is based on the principle of industrial growth in partnership with the States. The Central Government will create the enabling policy frame work, provide incentives for infrastructure development on a Public Private Partnership (PPP) basis through appropriate financing instruments, and State Governments will be encouraged to adopt the instrumentalities provided in the policy.

Under the policy (section 1.11), the industry verticals which will be given special attention are: employment intensive industries, capital goods, industries with strategic significance like aerospace; shipping; IT hardware and electronics; telecommunication equipment; defence equipment; and solar energy, industries

where India enjoy a competitive advantage, Small and Medium Industries and Public sector Enterprises. The policy presents specific action points in the areas identified as constraints that require immediate policy attention

For rationalisation and simplification of business regulations (section 2, page no. 8), several provisions of different acts may be rationalised or implemented in cooperation with public or private institutions under the control of statutory authorities. The provisions are:

- a) Central and State Government may provide exemptions subject to fulfilment of conditions.
- b) Mechanisms to be developed for cooperation of public or private institutions with government inspection services.
- c) In respect of environment laws, it is proposed to delegate the powers as allowed by the relevant statutes to an official of the State Pollution Control Board posted in the NIMZ.
- d) State Pollution Control Boards to evolve mechanisms for third party inspection (by notified private agencies) for compliance monitoring
- e) State Environment Impact Assessment Authorities to expedite prior environment clearances for 'B' category projects under the provisions of EIA notification 2006
- f) Defining the timelines in respect of all clearances – the clearance to be 'deemed' to have been given on expiry of timeline.
- g) Development of Combined Application Form and a Common Registrar for granting various consents and authorisations under various statutes.

The Planning Commission has identified concomitant policy interventions (page no. 1 of Policy document) which impact the manufacturing sector (but which have not been addressed in the National Manufacturing Policy), these are : digitization of land and resource maps and creation of land banks by states; water zoning; offset policy; fiscal and exchange rate measures; strategic acquisitions; development of world class manufacturing management capabilities; trade policy especially boosting India's exports; and reforming the role of public sector enterprises.

#### **6.4.2. National Investment and Manufacturing Zones (NIMZs) Guidelines**

The NIMZs are important instrumentality of the National Manufacturing Policy. The NIMZs are envisaged as integrated industrial townships with land use on the basis of zoning, clean and energy efficient technology, necessary social infrastructure, skill

development facilities etc. to provide a productive environment for persons transitioning from the primary to the secondary and tertiary sectors.

The key features of the NIMZ Guidelines are:

- 1. The approval process is in two stages:** In principal approval and final approval for the NIMZ. After the in-principal approval, as soon as a substantial part of the land area is in possession of State Government, application for obtaining final approval shall be made which will be granted at the level of Ministry of Commerce and Industry. After obtaining the approval, each NIMZ will be notified by the DIPP in the official gazette.
  - a. For planning the NIMZ, maps shall be prepared and submitted along with the application for final approval. The maps shall consist of following:
    - Administrative and physical map: indicating the districts, villages, townships, water bodies, high lands, low lands and forests etc. which are located within its boundaries.
    - Existing land use map: At least 30% of the total land area proposed for the NIMZ will be utilized for location of manufacturing units.
    - External and existing internal linkages map of proposed NIMZ.
  - b. Preparation of Techno-economic feasibility report cum development plan and presentation by the State for final approval. It shall include the following:
    - Overview of the region and adjoining areas
    - External linkages
    - Existing internal infrastructure in NIMZ area
    - Land including status and time frame of land acquisition
    - Assessment of industrial and commercial potential
    - Preliminary environment impact assessment
    - External and technical infrastructure requirement
    - Financial implications
    - Proposed management structure
    - Zone development plan
    - Regulatory environment
- 2. Formation of an agreement of implementation between State Government and DIPP:**
  - a. Constitution of Special Purpose Vehicle to discharge the functions: There shall be a provision for suitable representation of a nominee of the Government of India (DIPP), and of the allottees and subsequently of the industrial units on the Board of the SPV.
  - b. Preparation of Master Plan and designing by SPV
  - c. Preparation of a strategy of development of zone and action plan for self-regulation within 3 months from constitution of SPV.

3. **Land Allotment:** Land shall be allotted on leasehold basis by SPV. The SPV will ensure that land is utilised as per the permissible purpose within the specified period of time as indicated in the land allotment letter otherwise, it shall revert back to the SPV.
4. **Land for NIMZs:** NIMZs would be large developed land, with the requisite ecosystem for promoting world class manufacturing activity. They would be different from SEZs in terms of size, level of infrastructure planning, and governance structures related to regulatory procedures and exit policies. Following are the land requirements for NIMZ:
  - a. Size of land for NIMZ – An NIMZ would have an area of at least **5000 hectares** in size.
  - b. Availability of land- The State Government will be responsible for selection of land suitable for development of the NIMZ including land acquisition, if necessary. The land may constitute:
    - i. Government owned land;
    - ii. Private lands falling within the proposed NIMZ, to be acquired by the State Government;
    - iii. Land under existing industrial areas/estates/sick and defunct units including PSUs.

Following guiding principles will be applied by the State Government for the purpose of acquiring land for NIMZ sites:

- i. Preferably in waste lands; infertile and dry lands not suitable for cultivation;
  - ii. Use of agricultural land to the minimum;
  - iii. All acquisition proceedings to specify a viable resettlement and rehabilitation plan;
  - iv. Reasonable access to basic resources like water;
  - v. It should not be within any ecologically sensitive area or closer than the minimum distance specified for such an area.
5. **Rationalisation and simplification of regulatory processes:**
    - High priority shall be given to Environment Clearance under EIA Notification, 2006
    - The entire process of clearances by State authorities will be made web-enabled.
    - Timelines will be defined in respect of all clearances and there is provision of deemed approval of clearances.
  6. **Role of Central Government:** the Central Government shall perform the following tasks:
    - a. Bearing the cost of Master Planning



- f. maintenance of sovereignty and integrity of India, the security of the State and friendly relations with foreign States.
3. Section 6 of SEZ Act states that areas falling within the SEZ may be demarcated as:
  - a. the processing area for setting up Units for activities such as manufacture of goods, or rendering services;
  - b. the area exclusively for trading or warehousing purposes; or
  - c. the non-processing areas for activities other than those specified under clause (a) and (b)
4. Any goods or services exported, imported or procured from the domestic tariff area by a unit in the SEZ or the developer is exempted from the payment of taxes, duties or cess.
5. According to section 17 (page 20) of the Act, the application for setting up and operation of an Offshore banking unit in a SEZ may be made to the Reserve Bank.
6. The SEZ can be deemed to be a port, inland container depot, land station and land customs station as per notification of Central Government under section 7 of the Customs Act, 1962.
7. The Modifications to the Income Tax Act, 1961; Insurance Act, 1938; banking Regulation Act, 1949; the Indian Stamp Act, 1899 applicable to the SEZ are given in the Act.
8. For computation of total income of an assessee, a deduction of the following is allowed:
  - a. Hundred % of profits and gains derived from exports for a period of first five years
  - b. Fifty % of profits and gains derived from exports for further five assessment years and thereafter
  - c. An amount upto fifty % of the profits shall be credited to a Reserve Account for the next five consecutive assessment years for the purpose of acquiring plant and machinery or for creation of any asset.

#### 6.4.3.1. Minimum land area requirements for setting up of SEZ

- **Area of the SEZ:**As per the amendment (12<sup>th</sup> August, 2013) of SEZ rules (2006), to address the problem of aggregating large tracts of uncultivable land for setting up SEZs, while conforming to vacancy and contiguity norms, the minimum land area requirements for setting up of SEZ in various categories has been reduced by half. This is also aimed at permitting optimum utilization of land by the existing SEZs.
- **Multi-product SEZ:** can be established with minimum land area of 500 hectares instead of 1,000 hectares. Similarly, a sector specific SEZ can be set-up with a minimum land area requirements of 50 hectares instead of 100 hectares.
- **Agro Sector:** In order to encourage agro-based industries in SEZs, a new sector 'agro-based food processing' sector has been introduced. A sector specific SEZ would require a minimum land area of 10 hectares.

- **IT /ITES Sector:** No minimum land area requirement for IT/ITES SEZs is prescribed, but these will have to conform to a minimum built up area requirement.
  - The minimum built up area requirement of 1,00,000 square meters will now be insisted upon for seven major cities viz: Mumbai, Delhi (NCR), Chennai, Hyderabad, Bangalore, Pune and Kolkata,
  - For the other set of Category B cities 50,000 square meters norm will be applicable and
  - For the remaining cities / locations 25,000 square meters of minimum built up area will be insisted upon.

#### 6.4.4. Schemes for cluster development under Ministries

The schemes proposed for promotion of cluster/ park development by respective Ministries till the fiscal year of 2013 are as mentioned below; however any other latest scheme and the policy shall be referred while planning.

Table 6.2: Schemes proposed for promotion of Cluster/ Park Development

Sr. No.	Ministry	Department	Scheme / Policies	Implementation/Approval Year
1.	Ministry of Chemicals and Fertilisers	Department of Chemicals and Petrochemicals	Policy Resolution for Promotion of Petroleum, Chemicals and Petrochemical Investment Regions	2007
2.	Ministry of Communications and Information Technology (MoCIT)	Department of Electronics and Information technology	Software Technology Parks	1991
3.	MoCIT	Department of Electronics and Information Technology	Electronics Hardware Technology Park/ Export Oriented Unit Scheme	--
4.	Ministry of Food Processing Industries		Mega Food Parks Scheme	--
5.	Ministry of Commerce and Industry	Department of Industrial policy and promotion	Mega Leather Cluster Scheme	2012
6.	Ministry of Micro, Small and Medium Enterprises		Micro and Small Enterprises Cluster Development Programme	2007 (Renamed)
7.	Ministry of Textiles		Modified Comprehensive Power loom Cluster Development Scheme	2013
8.	Ministry of Textiles		Comprehensive Handloom Cluster Development Scheme	2008

Sr. No.	Ministry	Department	Scheme / Policies	Implementation/Approval Year
9.	Ministry of Textiles		Comprehensive handicraft Cluster Development Scheme	2008
10	Ministry of Textiles		Scheme for Integrated Textile parks	2005

Source: Ministry websites

### 6.4.5. Provisions for Micro Small and Medium Enterprises (MSME)

MSME sector's contribution to Indian economy is considerable with 4 percent share of GDP and largest employment provider after agriculture. Micro, Small & Medium Enterprises (MSMED) Act, 2006 defines Micro Enterprises, Small Enterprises, and Medium Enterprises for the Manufacturing Sector and service sector. About 21 items are reserved for manufacturing under Small Scale Industries. The MSME as defined by the Act are:

Table 6.3: Micro, Small and Medium Enterprises Classification

For the Manufacturing Sector	
Enterprises	Investment in plant & machinery
Micro Enterprises	Does not exceed Rs. 25 lakh
Small Enterprises	More than Rs. 25 lakh but does not exceed Rs. 5 crore
Medium Enterprises	More than Rs. 5 crore but does not exceed Rs. 10 crore
For the Service Sector	
Enterprises	Investment in plant & machinery
Micro Enterprises	Does not exceed Rs. 10 lakh
Small Enterprises	More than Rs. 10 lakh but does not exceed Rs. 2 crore
Medium Enterprises	More than Rs. 2 crore but does not exceed Rs. 5 crore

Source: Micro, Small and Medium Enterprises Development (MSMED) Act, 2006.

The details of the Micro, Small & Medium Enterprises (MSMED) Act, 2006 are appendices in Appendix 'O' of Volume II B.

#### 6.4.5.1. Inter-Ministerial Committee for Accelerating Manufacturing in Micro, Small & Medium Enterprises Sector, 2013

Ministry of Micro, Small and Medium Enterprises (MoMSME) had constituted 'Inter-Ministerial Committee for Accelerating Manufacturing in Micro, Small & Medium Enterprises Sector' in year 2013 to suggest short and medium term measures for accelerating manufacturing in the MSME sector. Following are few of the recommendations made by the committee:

- **Land:** State governments may urgently streamline and simplify internal processes and allot over 30,000 vacant plots lying vacant in established industrial estates across the country.
- **Mid-sized Industrial Estates:** State governments should urgently identify mid-sized land parcels close to urban areas, which may be developed with public funding, for allotment to MSMEs.
- **Harmonising Urban Plans with Economic Activity:** Ministries of Urban Development, Urban Poverty Alleviation and MSME, backed by sufficient resources may incentivize State governments and local bodies to designate adequate areas for manufacturing and industrial activity in the urban centres or emerging urban areas.

### 6.4.5.2. Prime Minister's Task Force on Micro, Small and Medium Enterprises, 2010

The said task force was constituted to consider various issues raised by the Association of MSMEs. After stakeholders' consultation to overcome the issues raised by MSME sector following recommendations were made by the Task Force:

- For new industrial parks/areas being developed under various programmes of different Ministries, where there is no specific provision for locating Micro and Small Enterprises (MSEs), it may be made mandatory to earmark at least 40-45% (preferably 60%) of available land for MSEs. It was advised that all Ministries/Departments shall take action regarding it within 3 months.
- Local bodies may be encouraged to set aside substantial part of the collections derived from industrial estates, to upgrade infrastructure such as roads, drainage, sewage, power distribution, water supply distribution, etc. for the existing industrial estates. Alternatively, industrial estates could be notified as separate local bodies as envisaged in the Constitution and entrusted with municipal functions that shall include levy of taxes, responsibility to maintain the infrastructure within the Industrial Estate, etc.
- Flatted Factory Complexes may be set up, particularly in and around large cities for MSEs on PPP mode. On similar lines, dormitories for industrial workers in industrial estates may be set up.
- Encourage setting up/earmarking of at least one industrial estate in each block for MSEs. Wherever possible, private sector participation may be encouraged.

### 6.4.5.3. Micro & Small Enterprises - Cluster Development Programme (MSE-CDP)

The Ministry of Micro, Small and Medium Enterprises (MSME), Government of India (GoI) has adopted the 'Cluster Development Approach' as a key strategy for enhancing the productivity and competitiveness as well as capacity building of Micro and Small Enterprises (MSEs) and their collectives in the country.

The essential characteristics of enterprises in a cluster are:

- a. Similarity or complementarity in the methods of production, quality control and testing, energy consumption, pollution control, etc.
- b. Similar level of technology and marketing strategies/practices
- c. Channels for communication among the members of the cluster
- d. Common challenges and opportunities.

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## 7 Other National Level – Legal Requirements

### 7.1. National Heritage Conservation

The sections of the Ancient Monuments and Archaeological Sites and Remains Act, 2010, which have relevance to the preparation of Regional, or Urban Development Plans and their implementation have been provided in the URDPFI Guidelines for reference.

#### 7.1.1. The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010

The Ancient Monuments and Archaeological Sites and Remains Act, 1958 was amended in 2010. This Act provides prohibited and restricted areas around protected monuments as a buffer in which construction activities are prohibited and restricted. According to the Act prohibited and restricted areas are defined as follow:

As per the section 20 A of the Act, **Prohibited Areas:** Every area, beginning at the limit of the protected area or the protected monument, as the case may be, and extending to a distance of one hundred meters in all directions shall be the prohibited area. Government of India can specify an area even more than hundred meters. Construction activities in such areas are prohibited.

Section 20 B defines **Regulated Area:** Every area, beginning at the limit of the prohibited area in respect of ever ancient monument and archaeological site and remains, declared as of national importance, extending to a distance of two hundred meters in all directions shall be the regulated area in respect of such protected area or protected monument. Government of India can specify an area even more than two hundred meters. Construction activities in such areas are regulated.

The said Act in section 20 F provides for the constitution of National Monuments Authority, by Central Government through notification in the Official Gazette. Some of the functions granted to the Authority are:

- To make recommendations to the Central Government for grading and classifying protected monuments and protected areas,
- To consider the impact of large-scale developmental projects, including public projects and projects essential to the public which may be proposed in the regulated area.

The details of The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 are appended in Appendix O of Volume II B.

## 7.2. National Environmental Legal Requirements

The key National level environmental legal requirements, which have relevance to planning and implementation, are briefly explained in this section. These are:

- Environment Impact Assessment Notification 2006,
- Environment Protection Act, 1986,
- Forest Conservation Act, 1980,
- Coastal Regulation Zone, 2011
- Eco-Sensitive Zone

### 7.2.1. Environment Impact Assessment Notification 2006

Considering recent developments, and to ensure that the economic growth and development in our country is in conformity with regulations for environmental conservation, the Ministry of Environment & Forests has notified the Environmental Impact Assessment Notification, 2006. The environmental clearance (EC) process under implementation prior to 2006 highlighted the need to introduce specific processes /categories/ activities and also the need for new sectors such as coal washery to be brought in the ambit of the EC process due to their extent of impact on environment. The EIA Notification 2006 has notified 39 developmental sectors which require prior EC.

The MoEF has prepared EIA guidelines on each sector as identified by EIA notification 2006, which elaborates the procedure and mandatory requirements of EIA with respect to the sector. For example Manual on norms and standards for environment clearance of large construction projects has been prepared by MoEF to assist developers and project proponents' measure and quantify environmental impacts of proposed construction, and derive mitigation options to minimise impacts.

EIA is an exercise to be carried out before any project or major activity is undertaken to ensure that it will not in any way harm the environment on a short term or long term basis. Any developmental endeavour requires not only the analysis of the need of such a project, the monetary costs and benefits involved but most important, it requires a consideration and detailed assessment of the effect of a proposed development on the environment. EIA should provide information to decision makers at early stage of the project planning cycle. It should be initiated as early as possible before the commencement of projects. If the projects secure approval, EIA should include a provision to cover the audit of the project. Following is the general list of projects that require Environmental clearance from the central government:

- Nuclear Power and related projects such as heavy water plants, nuclear fuel complex, rare earths.

- River Valley projects including hydel power, major irrigation & their combination including flood control.
- Ports, Harbours, Airports (except minor ports and harbours).
- Petroleum Refineries including crude and product pipelines.
- Chemical Fertilizers.
- Pesticides.
- Petrochemical complexes.
- Bulk drugs and pharmaceuticals.
- Exploration for oil and gas and their production, transportation and storage.
- Synthetic Rubber.
- Asbestos and Asbestos products.
- Hydrocyanic acid and its derivatives.
- (a) Primary metallurgical industries, (b) Electric arc furnaces (Mini Steel Plants).
- Chlor alkali industry.
- Integrated paint complex including manufacture of resins and basic raw materials required in the manufacture of paints.
- Viscose staple fibre and filament yarn.
- Storage batteries integrated with manufacture of oxides of lead and lead antimony alloys.
- All tourism projects between 200m—500 metres of High Water Line and at locations with an elevation of more than 1000 metres with investment of more than Rs.5 crore.
- Thermal Power Plants.
- Mining projects with leases more than 5 hectares.
- Highway Projects.
- Tarred Roads in the Himalayas and or Forest areas.
- Distilleries.
- Raw Skins and Hides.
- Pulp, paper and newsprint.
- Dyes.
- Cement.
- Foundries (individual)
- Electroplating
- Meta amino phenol

### 7.2.2. Environment Protection Act, 1986

The Environment Protection Act, 1986 (EPA) has notified various rules under EPA for protecting the environment which are mentioned below:

- The Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organism Genetically Engineered Organism or Cells Rules, 1989
- The Hazardous Wastes (Management and Handling) Rules, 1989
- The Manufacture, Storage and Import of Hazardous Chemicals Rule, 1989

- Scheme of Labeling of Environment Friendly Products (ECO-MARK)
- Restricting certain activities in special Specified area of Aravalli Range
- The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- The Bio -Medical Waste (Management and Handling) Rules, 1998,
- The Recycled Plastics Manufacture and Usage Rules,1999
- The Municipal Solid Wastes (Management and Handling) Rules, 2000
- The Noise Pollution (Regulation and Control) Rules, 2000
- The Ozone Depleting Substances (Regulation) Rules, 2000
- The Batteries (Management and Handling) Rules, 2001

Along with the above rules as identified in EPA 1986, The Air (Prevention and Control of Pollution) Act, 1981 and the Noise-Pollution (Regulation and Control) 2000 shall also be referred to formulate norms and standards while preparing development plan for a city. The various statutory obligations for different clearances are mentioned in table below:

**Table 7.1: Statutory Obligations of Environment Clearances**

Type of Clearances	Statutory obligations
Environment Clearances	As per EIA notification, 2006
Forest Clearances	As per Forest Conservation Act, 1980
GEAC Clearances	Rules for Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms/Genetically Engineered Organisms or Cells 1989, under EPA 1986
GEAC Clearances	Rules for Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms/Genetically Engineered Organisms or Cells 1989, under EPA 1986

The Act may be referred from the web URL provided in Appendix O, Volume II B.

### 7.2.3. Forest Conservation Act, 1980

With the rising rate of deforestation and the resulting environmental degradation, the Central Government enacted the forest (conservation) Act in 1980. The Act prohibits the deletion of a reserved forest or the diversion of forestland for any non-forest purpose, and prevents the cutting of trees in a forest without the prior approval of the Central government. The salient features of the act are given below:

- This Act has five Sections which deal with conservation of forests.
- The Act was enacted with the twin objectives under Section 2 of restricting the use of forest land for non-forest purposes, and preventing the de-reservation of forests that have been reserved under the Indian Forest Act, 1927. However, in 1988 the Act was further amended to include two new provisions under Section 2, where it sought to restrict leasing of forest land to private individuals, authority, corporations not owned by the Government, and to prevent clear felling of naturally grown trees.

- The Act empowers the Central Government to constitute a committee to advise the Government with a grant of approval under Section 2, as also on any other matter connected with the conservation of forest and referred to it by the Central Government.
- The Act provides for the punishment of imprisonment, extendable to fifteen days for the contravention of the provisions of the Act.
- The Act provides for punishment of offenders from the Government Departments, including Head of the Departments and authorities.

The Act can be referred from the web URL provided in Appendix O, Volume II B.

#### 7.2.4. Coastal Regulation Zone, 2011

Central Government declared the following areas as CRZ and imposed restrictions on the setting up and expansion of industries, operations or processes and the like in the CRZ through the Coastal Regulation Zone Notification, 2011:

- The land area from High Tide Line (HTL means the line on the land up to which the highest water line reaches during the spring tide) to 500 meters on the landward side along the sea front.
- CRZ shall apply to the land area between HTL to 100 meters or width of the creek whichever is less on the landward side along the tidal influenced water bodies that are connected to the sea and the distance upto which development along such tidal influenced water bodies is to be regulated shall be governed by the distance up to which the tidal effects are experienced which shall be determined based on salinity concentration of 5 Parts Per Thousand (ppt) measured during the driest period of the year and distance upto which tidal effects are experienced shall be clearly identified and demarcated accordingly in the Coastal Zone Management Plans (CZMPs).
- The land area falling between the hazard line and 500 meters from HTL on the landward side, in case of seafront and between the hazard line and 100 meters line in case of tidal influenced water body the word 'hazard line' denotes the line demarcated by Ministry of Environment and Forests (MoEF) through the Survey of India (SoI) taking into account tides, waves, sea level rise and shoreline changes.
- Land area between HTL and Low Tide Line (LTL) is termed as the intertidal zone.
- The water and the bed area between the LTL to the territorial water limit (12 Nm) in case of sea. The water and the bed area between LTL at the bank to the LTL on the opposite side of the bank, of tidal influenced water bodies.

The following activities have been declared prohibited under the CRZ notifications:

- i. Setting up of new industries and expansion of existing industries with some exception,
- ii. Manufacture or handling oil storage or disposal of hazardous substance, with some exception,

- iii. Setting up and expansion of fish processing units including warehousing except hatchery and natural fish drying in permitted areas
- iv. Land reclamation, bunding or disturbing the natural course of seawater with some exception,
- v. Setting up and expansion of units or mechanism for disposal of wastes and effluents with some exception,
- vi. Discharge of untreated waste and effluents from industries, cities or towns and other human settlements. The concerned authorities shall implement schemes for phasing out existing discharge of this nature, if any, within a time period not exceeding two years from the date of issue of this notification.
- vii. Dumping of city or town wastes including construction debris, industrial solid waste, fly schemes for phasing out any existing practice, if any, shall be phased out within a period of one year from date of commencement of this notification.
- viii. Port and harbour projects in high eroding stretches of the coast, except those projects classified as strategic and defence related in terms of EIA notification, 2006 identified by MoEF based on scientific studies and in consultation with the State Government or the Union territory Administration.
- ix. Reclamation for commercial purposes such as shopping and housing complexes, hotels and entertainment activities.
- x. Mining of sand, rocks and other sub-strata materials.
- xi. Drawl of groundwater and construction related thereto, within 200mts of HTL; with some exception.

(Source: Coastal Regulation Zone Notification; 6<sup>th</sup>January, 2011)

### 7.2.5. Eco-Sensitive Zones

Wild Life Protection Act, 1972 gave provision for the creation of National Parks, Sanctuaries and Closed Area. Further, for the purpose of buffers around these protected areas as shock absorber, Eco-sensitive Zones were declared. Eco-sensitive Zones would also act as transition zone from areas of high protection to areas involving lesser protection. The activities in the eco-sensitive zones are regulatory in nature rather than prohibitive nature.

By the time this guideline was declared, many of the protected areas had undergone tremendous development in close vicinity to their boundaries. Therefore, defining the extent of Eco-sensitive zone around protected areas was kept flexible and protected area specific.

The width of Eco-sensitive Zone and type of regulations differ from one protected area to another. However, as a general principle the width of the Eco-sensitive Zone could go up to 10 kms around a Protected Area as provided in the Wildlife Conservation Strategy, 2002. In case where sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkage, are even beyond 10Kms

width; these should be included in the Eco-sensitive Zone. Further, in context of a particular protected area, the distribution of an area of Eco-sensitive Zone and the extent of regulation may not be uniform all around and it could be of variable width and extent.

**Table 7.2: Activities Prohibited, Regulated or Permitted in Eco-sensitive Zone**

S.No.	Activity	Prohibited	Regulated	Permitted	Remarks
1	Commercial Mining	Y			Regulation will not prohibit the digging of earth for construction or repair of houses and for manufacture of country tiles or bricks for housing for personal consumption
2	Felling of tress		Y		With permission from appropriate authority
3	Setting of saw mills	Y			
4	Setting of industries causing pollution (Water, Air, Soil, Noise, etc.	Y			
5	Establishment of hotels and resorts		Y		As per approved master plan, which takes care of habitats allowing no restriction on movement of wild animals
6	Commercial Use of fire wood	Y			For hotels and other business related establishment
7	Drastic change of agriculture systems		Y		
8	Commercial use of natural water resources including ground water harvesting		Y		As per approved master plan, which takes care of habitats allowing no restriction on movement of wild animals
9	Establishment of major hydroelectric projects	Y			Promote underground cabling
10	Erection of electrical cables		Y		
11	Ongoing agriculture and horticulture practices by local communities			Y	However, excessive expansion of some of these activities should be regulated as per the master plan
12	Rain water harvesting			Y	Should be actively promoted
13	Fencing of premises of hotels and lodges		Y		
14	Organic farming			Y	Should be actively promoted
15	Use of polythene bags by shopkeepers		Y		
16	Use of renewable energy sources			Y	Should be actively promoted
17	Widening of roads		Y		This should be done with proper EIA and mitigation measures
18	Movement of vehicular		Y		For commercial purpose

## Other National Level- Legal Requirements

S.No.	Activity	Prohibited	Regulated	Permitted	Remarks
	traffic at night				
19	Introduction of exotic species		Y		
20	Use or production of any hazardous substances	Y			
21	Undertaking activities related to tourism like over flying the national park area by any aircraft, hot air balloons	Y			
22	Protection of hill slopes and river banks		Y		As per the master plan
23	Discharge of effluents and solid waste in natural water bodies or terrestrial area	Y			
24	Air and vehicular pollution		Y		
25	Sign boards and hoardings		Y		As per the master plan
26	Adoption of green technology for all activities			Y	Should be actively promoted

Source: Guidelines for the Declaration of Eco-sensitive Zones around National Parks and Wildlife Sanctuaries; dated 9th February, 2011

### 7.3. Cantonment Act, 2006

Following provisions of The Cantonment Act, 2006 have been identified by URDPFI guidelines that have relevance to the preparation of Regional or Urban Development Plans and their implementation. The detailed Act can be referred from Appendix O of Volume II B.

1. The Central Government can declare any place or places along with boundaries in which the Forces is quartered or which is required for the service of such forces, to be a cantonment and can also declare that any such area shall cease to be a cantonment, by notification in the Official Gazette.
2. The Central Government can define the limits of any cantonment for the aforesaid purposes, by a like notification.
3. The Central Government can, by notification in the Official Gazette, direct that in any place declared a cantonment under this Act, the provisions of any enactment relating to local self-government other than this Act shall have effect only to such extent, as may be specified in the notification.

For the alteration of limits of cantonments, The Contentment Act, 2006, prescribes:

4. The Central Government can declare to include or to exclude the cantonment any local area, by notification in the Official Gazette.

5. Any inhabitant of a cantonment or local area in respect of which notification has been published under subsection (1) may, within eight weeks from the date of notification, submit in writing to the Central Government through the General Officer Commanding-in-Chief, the Command, an objection to the notification, and the Central Government shall take such objection into consideration.
6. The Central Government considers the objections which have been submitted, after the expiry of eight weeks from the date of the notification, by notification in the Official Gazette, include or exclude the local area in respect of which the notification was published or any part thereof, in the cantonment.







**URBAN AND REGIONAL DEVELOPMENT PLANS  
FORMULATION AND IMPLEMENTATION  
(URDPFI) GUIDELINES**

**Volume II B**

***Appendices to URDPFI Guidelines, 2014***



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# 1 Appendix A – Making of the Guidelines

## 1.1. Background and Objective

The first National level planning guidelines ‘The Urban Development Plans Formulations and Implementation Guidelines’ (UDPFI) were framed in 1996. Since then, many changes have taken place in the field of urban development especially in view of emerging needs and requirements of urban settlements due to rapid population growth and other reasons like globalization and liberalization. The towns and cities have been more dynamic in nature and are subject to unprecedented changes in terms of requirements of infrastructure and other basic services/amenities. Besides, new emerging aspects like inclusive planning, sustainable habitat, land use and transport integration at planning stage, preparation of Comprehensive Mobility Plans (CMP) for urban transport, Service Level Benchmarks, disaster management, environmentally sustainable transport and urban reforms have given a new dimension to the planning process. Therefore, it necessitated to revisit the UDPFI Guidelines, 1996.

The Ministry of Urban Development (MoUD), through the standard tendering procedures, awarded the task to revise the guidelines to Mott MacDonald (referred to as Consultant) in August 2013. The time frame was 9 months. The objective was to revise ‘The Urban Development Plans Formulation & Implementation (UDPFI) Guidelines, 1996’ and formulate-

**“The Urban and Regional Development Plans Formulation & Implementation (URDPFI) Guidelines, 2014”**

## 1.2. Terms of Reference (ToR)

Ministry of Urban Development proposed to formulate the URDPFI Guidelines, 2014 to accommodate the future needs of the ever growing population coupled with urbanization with the following Terms of Reference (ToR):

- Review the UDPFI Guidelines, 1996, revise and prepare the URDPFI guidelines;
- Undertake stakeholder consultation with all relevant stakeholders;
- Consult key Ministries and the Planning Commission, NCRPB, MMRDA and other relevant State and Central Ministries, Bodies or Authorities;
- Study relevant Central and State Laws , rules and regulations;
- Address to the data available with *BHUVAN*, ISRO, NESAC, NUIS Census 2001 and 2011, Survey of India and GIS database of NIC;
- Integration of different types of plans;
- Identify the gaps where new set of norms and standards for plan formulation are required;
- Suggest a clear-cut framework for plan formulation in view of the emerging scenario of the country’s urbanization and overall vision;
- Suggest the new set of norms and standards, zoning regulations including integrated development of peri-urban areas which are easily comprehensible and user-friendly;
- Suggest framework and standards, for transit oriented development, affordable housing projects and slum redevelopment and incorporate principles of inclusive development;
- Suggest set of norms and standards for land use and transport integration at planning stage itself, integration of CMP with the master plan of the planning area;
- Suggest planning, regulatory and enforcement mechanisms for effectively dealing with challenges of urbanization;
- Suggest set of norms and standards for earthquake prone areas, environmentally fragile zones such as CRZ areas and hazard prone areas etc.;

- Suggest mechanism for improving economic opportunities of cities;
- Include framework for Crisis/Disaster Management Plans as part of Development Plan;
- Suggest mechanism and avenues for participatory planning; and
- Suggest various resource mobilization options and institutional supporting systems for urban development.
- Assess the Legal Implications and framework for plan preparation, monitoring and impact assessment of the Master Plans.
- Evolve participatory plan approach including planning at ULBs, planning for peri-urban areas and provide for integration between different levels of plan.

### 1.3. Scope of Work (SOW)

While formulating the URDPFI Guidelines, 2014 the following issues was to be focussed upon as was indicated by the MoUD:

1. The service level benchmarks developed by the MoUD.
2. A broad based consultation process by developing a discussion portal and disseminating the Guidelines in regional language.
3. Integration between different levels of plans including integration of City Development Plan and Comprehensive Mobility Plan (CMP) with statutory Master Plan.
4. Integrated land use transport planning with priority to public transport and non-motorised transport.
5. A separate volume on legal aspects.
6. Need for assessing the impact of the plan on growth, employment etc. in a quantifiable manner to make it more acceptable to various stakeholders.
7. A separate chapter should be included on redevelopment of inner city areas as well the city as a whole, with densification along mass transit corridors.
8. A separate Chapter on Urban Transport Impact Assessment for different land use scenarios in terms of overall travel demand, average trip length Maximum time of travel by public transport (for 80% of the trips) in peak time.
9. Guidelines for regional planning including for interstate region that would require cross cutting interventions from zonal administration.
10. Norms and standards for earthquake prone areas, environmentally fragile zones such as CRZ areas and hazard prone areas etc.
11. Framework to make Crisis/Disaster Management Plans a part of Development Plan.
12. Use of GIS technologies for plan formulation including integration with *Bhuvan* and Google Map etc.
13. Dovetailing the guidelines with various statutory provisions as also the recommendations of 2nd Administrative Reforms Commission and the Working Group on Urban Planning.
14. Measures to tackle the problems arising out of the transition of rural areas into peri urban and urban areas.
15. Include guidelines for special purpose cities, industrial towns, smart cities, port cities, sport cities, heritage cities, medicities, IT corridors, corridor (main and subsidiary), SEZ, Hi tech cities, greenfield towns, hill towns etc.
16. Focus on land suitability and urban renewal norms.
17. One National Workshop and three Regional Workshops to be organized with at least one workshop in the eastern region with State T&CP Department, Urban Development Department, Transport Department, Traffic Police, Development Authorities, UMTAs and Local Bodies.
18. Links with the National Building Code and parameter under National Mission for Sustainable Habitat.
19. Include plans for water, sanitation and drainage.

20. Principles for determination of the costs (capital & recurring) to implement the different aspects of the plan along with specific measures to meet such costs.
21. Uniform/ standardisation of colour code
22. Framework for implementation of the plan, including governance of the same.
23. Ultimately, the URDPFI guidelines should culminate in a responsive planning system.

## 1.4. Deliverables

The project was delivered in six stages as tabulated below:

Table 1.1: Deliverables of the project

Stages	Description	Deliverables
Stage I- Inception	Finalization of road map for completion of the project	Inception Report
Stage II- Review	Review of UDPFII Guidelines, 1996 and Gap Identification	Report on reviews of existing UDPFII guidelines, 1996
Stage III- Consultation	Regional Workshops	Recommendations of regional workshops at major cities
Stage IV- Draft	Framing of new guidelines, including the legal document	Revised UDPFII Guidelines – Draft Stage
Stage V- National workshop	National Workshop to deliberate on the first Draft Report	Report of recommendations in the Workshop
Stage VI- Final	Incorporation of the final recommendations	Final Report- UDPFII Guidelines, 2013

Source: Terms of reference of the project

## 1.5. Approach and Methodology for the Revision Study

### 1.5.1. Approach

With the vision to encompass and provide for the holistic urban and regional development for the entire land cover of India, the approach followed in the formulation of URDPFI Guidelines, 2014 comprised of a participatory consultation of the various stakeholders through the following pathways, viz:

- 1) Formulation of Technical Core Group (TCG):** TCG was formed by MoUD for this revision. The consultant held periodic interactions with the TCG members formally and informally for getting inputs. The role of TCG members included:
  - Co-ordination with the consultant on technical aspects
  - Technical inputs & area specific recommendations
  - Review the consultant's work at various stages
  - Guide & support - data collection, stakeholder consultation and workshops
- 2) Google Discussion Group:** An online group was facilitated by TCPO which allowed interface of various planners and practitioners for the following:
  - Technical inputs & area specific recommendations
  - Sharing of information
  - Technical feedback & interaction
- 3) Monthly Review Meetings with MoUD:** Monthly review meetings were held by MoUD for the consultant to appraise the progress of the project and highlight the key issues for inclusion in the guidelines.

4) **Key Consultations:** The foremost criteria adopted in provisions of the URDPFI guidelines, 2014 were to make them in concomitance with the provisions of the Policies/ Guidelines/ Acts/ Bills of various other Ministries and Departments.

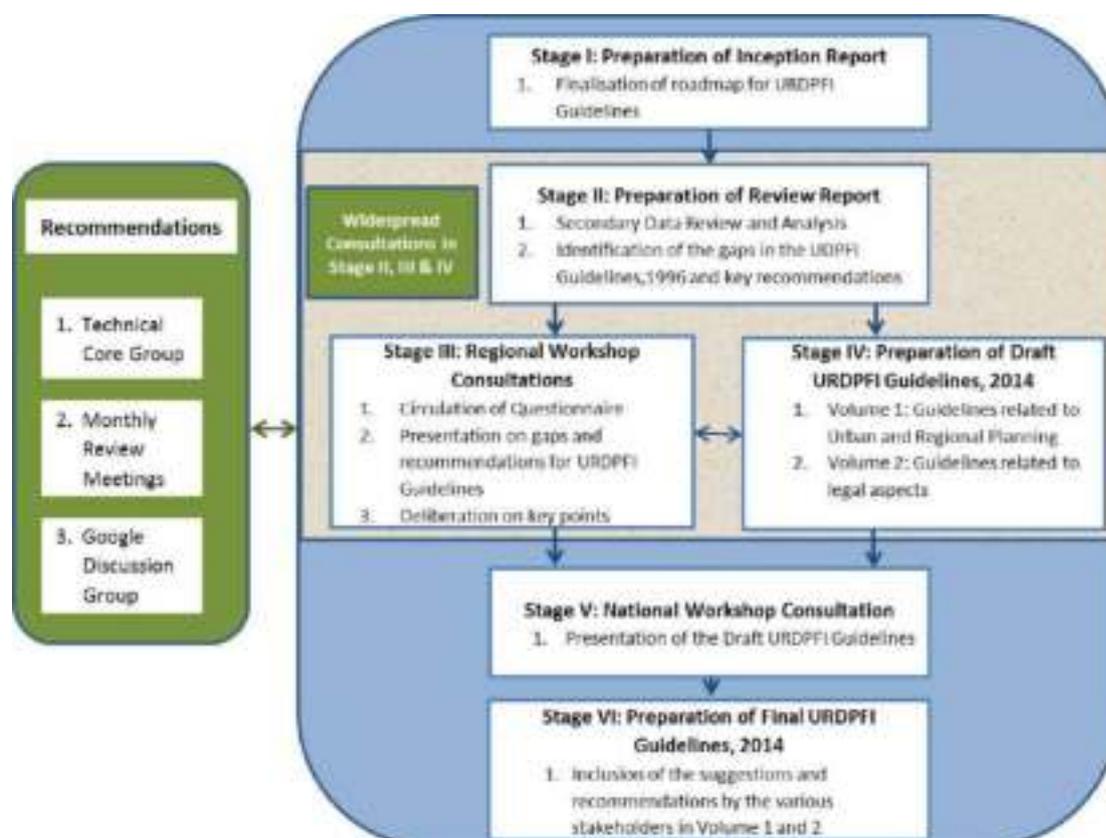
5) **Regional workshops and National Consultative meeting:** A total of five Regional workshops were conducted to invite comments from all the 35 States and Union Territories of India. Regional workshops were organised wherein the planning aspects varying across States were discussed and approach to planning in future was directed. Regional workshops were held at Panchkula, Mysore, Goa, Guwahati and Bhubaneswar. The National Consultative meeting was organised in New Delhi on the 4<sup>th</sup> of April 2014 to deliberate on the aspects of the guidelines to holistically consult with National and State level stakeholders.

All the key suggestions, comments and provisions obtained from the legal documents, authentic reference and the consultations held have been comprehensively incorporated in the URDPFI Guidelines, 2014 amongst other inclusions upon appraisal at various stages.

## 1.5.2. Methodology

The methodology adopted for formulation of the guidelines is described in the figure below:

Figure 1.1: Methodology of preparation of URDPFI Guidelines, 2014



Source: MM

### 1.5.2.1. Stage I - Inception

The Inception stage comprised of brainstorming sessions for finalisation of road map of URDPFI Guidelines and a kick off meeting with the MoUD. The major aspects covered in the inception study/report were:

- Finalisation of methodology and work plan.
- Framework and locations for regional workshop,
- List of stakeholders to be consulted including Ministries & Departments, ULBs, Experts and Institutes and issue of authorisation letter,
- Suggestions on data to be referred.
- Selection of the State Town & Country Planning Acts, cities for case studies
- Formation of the Technical Core Group as suggested by the consultant.
- Discussion on the overall National consultation framework and stakeholders & set up of “Google Discussion Group”.

### 1.5.2.2. Stage II - Review & Analysis

The second stage undertook secondary data review & analysis of the UDPI guidelines, 1996. During this stage the stakeholder consultations were initiated which followed through the Stages III and IV.

**Secondary Data Review:** The secondary data of various Ministries, Departments, Institutions and Professional Bodies uploaded on websites such as of Planning Commission; Ministry of Urban Development; Ministry of Drinking Water Supply and Sanitation; Ministry of Environment and Forests; Department of Land Resources, Ministry of Rural Development, etc. and various City Master/ Development Plans were identified for review and analysis. Some of the important references included - Report of the Working Group on Urban Strategic Planning, Twelfth Five Year Plan, Public Private Partnership Toolkit of ADB and MoUD, JNNURM CDP Toolkit, The Land Acquisition, Rehabilitation and Resettlement Act, 2013, Handbook on Service Level Benchmarking, National Urban Sanitation Policy, NDMA Guidelines for Disaster Management, State Town and Country Planning Acts of Tamil Nadu, Karnataka, Himachal Pradesh, Mizoram, Bihar, Maharashtra and Gujarat, The Kerala Town and Country Planning Ordinance, 2013 etc.

Based on the secondary data review, analysis and consultations; the gaps in the UDPI guidelines, 1996 were identified. As an output of analysis, the recommendations for formulation of URDPFI guidelines were listed. The gaps and updations were finalised in close consultation with the TCG and MoUD.

**Stakeholder consultations:** After secondary data review, consultations were through telephonic conversation/ email/ face to face meetings. This undertook in depth interview and assisted in crystallisation of the vision of the URDPFI guidelines. The major consultations corresponding to the information obtained were:

Table 1.2: Major Stakeholder Consultations and Key Inputs (in addition to MoUD)

Sr. No.	Particulars	Consultations
1.	Planning Process	a) Planning Commission b) Registrar General of India c) Survey of India (SoI) d) Town and Country Planning Organisation, Delhi (TCPO) e) Ahmedabad Urban Development Authority (AUDA) f) Delhi Development Authority (DDA) g) Association of Municipalities and Development Authorities (AMDA) h) Jawaharlal Nehru National Urban Renewal Mission (JNNURM)

Sr. No.	Particulars	Consultations
		i) School of Planning & Architecture, Delhi (SPA, Delhi)
2.	Urban Planning Approach	a) Ministry of Shipping b) Ministry of Tourism Indian Green Building Council (IGBC) c) Directorate General of Defence Estates d) Delhi Urban Arts Commission (DUAC) e) Institute of Town Planners (ITP) f) EMBARQ, India g) Hyderabad Metropolitan Development Authority (HMDA)
3.	Regional Planning	a) Delhi Mumbai Industrial Corridor Development Corporation (DMICDC) b) Mumbai Metropolitan Region Development Authority (MMRDA) c) National Capital Regional Planning Board (NCRPB) d) Urban Development & Urban Housing Department, Government of Gujarat e) Town and Country Planning Department, Goa f) Town and Country Planning Department, Kerala g) School of Planning & Architecture, Delhi (SPA, Delhi)
4.	Sustainability & Disaster Management	a) Ministry of Environment and Forests (MoEF) b) Central Pollution Control Board (CPCB) c) National Disaster Management Authority (NDMA) d) National Institute of Disaster Management (NIDM) e) Indian Green Building Council (IGBC)
5.	Planning Techniques	a) Geological Survey of India (GIS) b) National Remote Sensing Centre (NRSC) c) National Urban Information System (NUIS) d) Survey of India (SoI) e) Hyderabad Metropolitan Development Authority (HMDA) for GIS mapping
6.	Transport Planning	a) Ministry of Road Transport and Highways (MoRTH) b) Central Road Research Institute (CRRI) c) Institute of Urban Transport (IUT) d) Airport Authority of India (AAI) e) Indian Institute of Technology, Delhi (IIT- Delhi) f) School of Planning & Architecture, Delhi (SPA, Delhi) g) Centre for Environment Planning and Technology (CEPT)
7.	Water, Drainage, Waste Management & Social Infrastructure Planning	a) Ministry of Water and Sanitation b) Central Ground Water Board c) Central Public Health & Environmental Engineering Organisation (CPHEEO) d) Bureau of Indian Standards (BIS)
8.	Development Promotion Regulation	a) Bureau of Indian Standards (BIS) b) Ministry of Social Justice and Empowerment c) Airport Authority of India (AAI)
9.	Resource Mobilisation	a) Ministry of Rural Development b) Town and Country Planning Organisation, Delhi (TCPO) c) Centre for Good Governance d) Delhi Development Authority (DDA)

An exhaustive contact list is given in Section 1.7, Table A.7.

### 1.5.2.3. Stage III – Regional Workshop Consultation

The preparation of the Draft URDPFI Guidelines and organisation of Regional Workshops at five locations were held. The agenda of the regional workshop consultations were:

- Learning from State specific best practices and planning innovations

- Identification of the sources to bridge data gaps
- Sharing of guidelines/ policies and other data

The agenda was attained by a three step procedure followed in the workshops:

- a) Circulation of questionnaire:** the questionnaire consisting section on information sharing and data sharing was circulated in advance to the identified stakeholders for receiving their comments
- b) Presentation:** presentation of the identification of gaps in UDPFI guidelines, 1996 and major recommendations for the URDPFI Guidelines, 2014
- c) Deliberations on key points**

During the workshops most of the States responded to the questionnaire circulated and provided database for reference. Alongwith this, some States gave presentations on chosen best practices such as Planning in Hilly Areas by Shimla, Himachal Pradesh; Regional planning process by Goa, Plan preparation process by Kerala, Village level planning in Rajasthan etc. The Regional Workshops provided a good platform for communication of URDPFI vision and dovetailing the expectations of the various stakeholders and also getting inputs on best practices.

States and UTs of Andhra Pradesh, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Puducherry, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand, Goa, Sikkim, Tripura, Odisha shared comments on UDPFI Guidelines, 1996 and suggestions for the URDPFI Guidelines, 2014 in writing. Ministries including Ministry of Defence, Directorate General of Defence Estates, Ministry of Shipping, Ministry of Railways, Ministry of Rural Development, Ministry of Road, Transport and Highways, Ministry of Water Resources extended great help in the formulation of the Guidelines.

Further suggestions were invited from the States & Institutes on "Google Discussion Group". Some academic institutions such as Indian Institute of Technology, Kharagpur; School of Planning and Architecture, Vijaywada, College of Engineering, Pune, Department of Architecture and Planning, College of Engineering, Trivandrum shared their comments.

**Recommendations from Regional Consultation:** At this stage an analysis of the suggestions was made and a concise recommendation report of all the workshops was prepared. The key points from the recommendation report were appropriately addressed in the URDPFI Guidelines upon consultation with MoUD and TCG.

#### 1.5.2.4. Stage IV – Drafting of URDPFI Guidelines

##### **Drafting of Volume I- Guidelines related to Urban and Regional Planning**

Based on the inputs from stage I to III and the gaps in the existing UDPFI guidelines, the Draft URDPFI guidelines were prepared containing the following points. In preparation of the guidelines, some of the sections of UDPFI Guidelines were retained which were applicable in the current planning scenario.

- Reclassification of the urban settlements
- Recommended planning system, Planning process including the inter relationships between various plans and their contents
- Resource mobilisation and options for land assembly, fiscal resource mobilisation and institutional set up.
- A separate chapter on Regional Planning including peri-urban area and land use classification
- Revised urban planning approach and planning based on city typologies such as hilly, inner city, industrial, heritage/ religious/ tourism, port, medical and sport cities. An introduction to the

planning aspects of compact city covering TOD and Mixed use, green city/ township and Smart city.

- Inclusion of mandatory aspects of sustainability- sustainable transportation viz a viz landuse planning, disaster management, environment statutory obligations etc.
- Techniques for plan preparation including GIS based planning through use of *Bhuvan* and allied portals.
- Guidelines for assessment of infrastructure demand for the newer kind of integrated developments
- Dovetailing with various statutory provisions including recommendations of 2nd Administrative Reforms Commission, Working Group on Planning, 73<sup>rd</sup> and 74<sup>th</sup> CAA.
- A chapter on recommendations and action plan based on rationality.

### **Drafting of Volume II- Guidelines related to National Level legal aspects**

A separate volume on Legal aspects was formulated, especially focussing on:

- Implications of 73<sup>rd</sup>&74<sup>th</sup> CAA
- The Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act, 2013
- Suggestions on the revision of Model Regional and Town Planning and Development Law, 1985 and Model Municipal Law, 2006
- Some of the State level Legal framework were compared to bring out advantages and disadvantages
- Legal requirements for industrial developments
- Other National level legal requirements for heritage and environment conservation

The draft URDPFI guidelines including its chapterisation structure was prepared in consultation with the various stakeholders. Further draft technical sections were shared with respective agencies for their inputs such as NRSC, NDMA, AAI, various departments of SPA, Delhi etc. who confirmed the provisions with reference to their statutory requirements/ key suggestions. The glossary of the reference is given in Appendix A.5.

*The draft URDPFI guideline was widely circulated on MoUD website, Google Discussion Group, web links and to all Ministries, inviting comments and suggestions for inclusion/ making modifications in the guidelines. Comments were received from more than 20 sources before and 22 sources after the National Workshop, which were sorted, examined and considered for inclusion.*

### **1.5.2.5. Stage V & Stage VI: National Consultative Meeting and formulation of Final URDPFI Guidelines, 2014**

National Consultative was held on 4<sup>th</sup> April, 2014 in Delhi to have holistic consultation on the Draft Guidelines. Stakeholders for the workshop were finalised in close consultation with MoUD.

Total of 174 participants attended the National Workshop, including the following:

- Ministries participated – Ministry of Water Resources, Ministry of *Panchayati Raj*, Ministry of Shipping, Ministry of Defence
- Participating States & Union Territories (about 16) -Andhra Pradesh (HMDA), Assam, Chandigarh, Chhattisgarh, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Maharashtra, NCT Delhi, Orissa, Puducherry, Rajasthan, Uttarakhand, Uttar Pradesh and West Bengal.
- Other agencies participated- AIA, CPCB, CPHEEO, CSO, CPWD, Delhi Metro, Department of Post and Telegraph, Geological Survey of India, IUT, INTACH, Indian Port Association,

International Boundary Directorate, National Disaster Management Authority, RGI, and Survey of India.

- Participating Planning Institutes- College of Engineering Trivandrum, IIT Roorkee, Mysore Institute of Development Studies, NIT Warangal and SPA Delhi.

Based on the comments and recommendation on the Draft Guidelines and outputs of consultative meeting including monthly review meetings with MoUD, the Draft Guidelines was updated as Final URDPFI Guidelines, 2014.

## 1.6. Organisation of the Research Study

### 1.6.1. Project Team

As constituted by the appointed Consultant according to the RFP approved by the Ministry of Urban Development.

### 1.6.2. Technical Core Group Team

As per MoUD, Office Memorandum, dated 2<sup>nd</sup> September, 2013.

***Joint Secretary (UD), MoUD, Chairperson***

***Chief Planner, TCPO, Member Convenor***

#### **Consultative Members**

India Urban Space Foundation

Town Planner, TCPO

Chief Regional Planner, NCRPB

Director, NIUA

Director General, Institute of Urban Transport, MoUD

Director, Centre for Research, Documentation & Training (CRDT),  
Institute of Town Planners India

Head, Department of Physical Planning,  
School of Planning & Architecture, New Delhi

Head, Department of Transport Planning,  
School of Planning & Architecture, New Delhi

## 1.7. Contact List

Table 1.3: Contact list for consultation and data collection

S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
1	Ahmedabad Urban Development Authority	Ms. NeelaMunshi, Chief Town Planner	Sardar Vallabhbhai Patel Sankul, Usmanpura, Ashram Road, Ahmedabad - 380 014 Phone - +91-79-27545051 - 54	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>• Sustainable Development Plan Strategy,</li> <li>• Use of TDR,</li> <li>• Urban Water Bodies Redevelopment</li> <li>• Local Area Plan</li> </ul>
2	Airport Authority of India	Ms. KalpanaSethi	Executive Director (Planning) “C” Block, Rajiv Gandhi Bhawan, Safdarjung Airport, New Delhi – 110003 Phone – 011-24654084 Email – <a href="mailto:edplg@aai.aero">edplg@aai.aero</a>	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>• Zone within which NOC is required from AAI for construction.</li> <li>• Height restrictions.</li> <li>• Minimum distance of airport from Green areas.</li> <li>• Suggestions from AAI.</li> <li>• Restrictions in the aerodrome buffer zone,</li> </ul>
		Mr.Pawan Kumar Nagpal	Executive Director (Engg.) – 1 B Block – III Floor, Corporate Head Quarters Phone 011-24693697 Email – <a href="mailto:edengg@aai.aero">edengg@aai.aero</a>	Face to face meeting, Mail	
3	Association of Municipalities and Development Authorities	--	7/6, Sirifort Institutional Area, August Kranti Marg, New Delhi-110 049, India Phone - 91-11-26494486, 26497973	Library research	<ul style="list-style-type: none"> <li>• Municipal Ward as the Basic Urban Planned Development Area,</li> <li>• Changing Urban Scenario for Good Governance</li> </ul>
4	Bureau of Indian Standards	Mr. Sanjay Pant, Scientist & Director (Civil Engineering)	Bureau of Indian Standards ManakBhavan 9 Bahadur Shah Zafar Marg New Delhi 110 002 (INDIA) Phone: 011-23230131 Extn 4402 Fax: 011-23235529 e-mail: <a href="mailto:sanjaypant@bis.org.in">sanjaypant@bis.org.in</a>	Face to face meeting, Mail, Telephonic	<ul style="list-style-type: none"> <li>• Special Requirements for Urban Planning in Hilly Areas</li> <li>• National Building Codes, 2005</li> <li>• City typology</li> </ul>
5	Central Ground Water Board, Ministry of Water Resources	Mr. S. K. Suneja	Central Ground Water Board, Bhujal Bhawan, NH-IV, Faridabad, 121001, Ph.: +91-129-2419075,	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>• Artificial recharge unit</li> <li>• Aquifer Mapping</li> <li>• Salient features of Provision of Rainwater Water Harvesting, Central Ground Water Board’ for artificial</li> </ul>
		Mr.Sushil, Chairman	Email: <a href="mailto:chmn-cgwb@nic.in">chmn-cgwb@nic.in</a>	Face to face meeting, Mail, Telephonic	

## Appendix A- Making of the Guidelines

S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
					recharge techniques.
6	Central Pollution Control Board	Mr.Sudhakar Mr. Anand Kumar Ms. Piyali	Parivesh Bhawan, CBD-cum-Office Complex East Arjun Nagar, Delhi - 110 032	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>State Zoning Atlas manual</li> <li>Manual on preparation of Zoning atlas at district level</li> </ul>
7	Central Public Health & Environmental Engineering Organisation	Mr. V.K Chaurasia, Joint Adviser (PHEE)  Dr. M. Dhindhyan (Joint Advisor) Deputy Adviser (PHE)	Room No. 660 A, NirmanBhavan, Maulana Azad Road, New Delhi – 110011. Phone: (o) 011-23061144, (R) 0120-2417613 Email: <a href="mailto:vijchaurasia@yahoo.co.in">vijchaurasia@yahoo.co.in</a>  Neerman Bhawan, Room Number- 658 'A', New Delhi. Phone: 011-23061571, Email: <a href="mailto:mdheen@gmail.com">mdheen@gmail.com</a>	Face to face meeting, Mail, Telephonic  Face to face meeting, Mail, Telephonic	<ul style="list-style-type: none"> <li>CPHEEO manual for-</li> <li>Sewerage and Sewage Treatment</li> <li>Rain Water Harvesting (RWH)</li> <li>Drainage</li> <li>Storm Water</li> <li>Toilets</li> <li>Allocation of land for water infrastructure, STP,</li> <li>Provisions for Septic Management, Regional landfill,</li> <li>Treated sewage and its reuse</li> <li>Decentralised waste water management</li> </ul>
8	Centre for Good Governance	Mr.KarunakarReddy.R., Knowledge Manager , CGG,	Dr. MCR HRD Institute of A.P. Campus), Road No. 25, Jubilee Hills, Hyderabad 500033 Andhra Pradesh	Telephonic	<ul style="list-style-type: none"> <li>Land-based Resource Mobilisation,</li> <li>Innovative Practices of Local Resource Mobilisation</li> </ul>
9	Central Road Research Institute	Dr.Errampalli Madhu, Principal Scientist, Transportation Planning Division	Central Road Research Institute (C.R.R.I.), Mathura Road New Delhi-110025, INDIA <a href="tel:+91-11-26312268">Tel:+91-11-26312268</a> (Off) +91-99580 80643 (Mobile) +91-11-26923114 (Res) Email: <a href="mailto:madhu.rrri@nic.in">madhu.rrri@nic.in</a> , <a href="mailto:errampalli.madhu@gmail.com">errampalli.madhu@gmail.com</a>	Face to face meeting, Mail, Telephonic	<ul style="list-style-type: none"> <li>Travel Demand Modelling</li> </ul>
10	Delhi Development Authority	Mr. J.B Ksirsagar, Chief Planner, TCPO & Commissioner Planning DDA	Town & Country Planning Organization Government of India Ministry of Urban Development E- Block, Vikas Bhawan, I.P. Estate, New Delhi-110002	Face to face meeting	<ul style="list-style-type: none"> <li>Land Pooling Techniques</li> <li>Land use planning study</li> </ul>
11	Delhi Mumbai	Mr Abhishek Chaudhary,	Room No. 341B, 03rd Floor, Hotel	Face to face	<ul style="list-style-type: none"> <li>Perspective Plan and Master Plan of DMIC</li> </ul>

S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
	Industrial Corridor Development Corporation	Vice President - Corporate Affairs & Company Secretary	Ashok, Diplomatic Enclave, 50B Chanakyapuri, New Delhi - 110021 Email: abhishekchaudhary@dmicdc.com Ph.: 9810027336	meeting, Mail	<ul style="list-style-type: none"> <li>A technical discussion with DMICDC on regional planning aspects</li> </ul>
12	Delhi Urban Art Commission	Mr. Raj Rewal, Chairman, DUAC	<a href="mailto:duac74@gmail.com">duac74@gmail.com</a>	Mail	<ul style="list-style-type: none"> <li>Guidelines/ points for inclusion/ revision of UDPFI guidelines</li> </ul>
13	Directorate for Spatial Planning and Water, Government of the Netherlands	Henk Snoeken, Acting Director for Spatial Development	Henk.Snoeken@minienm.nl	Mail	<ul style="list-style-type: none"> <li>Public participation &amp; Participation process</li> <li>Participation in official environmental impact assessments</li> <li>Dutch national urban planning policy document</li> </ul>
14	Embarq, India	Mr. Amit Bhatt, Strategy Head, Urban Transport	87, 2nd Floor, New Mangala Puri, MG Road, New Delhi 110030, <a href="mailto:abhatt@embarqindia.org">abhatt@embarqindia.org</a> +91 9868453595	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>Land &amp; transport integration, TOD</li> <li>Issues and challenges in planning</li> <li>Street Vendors as Pedestrian Infrastructure</li> </ul>
		Ms. Sonal Shah	<a href="mailto:sshah@embarqindia.org">sshah@embarqindia.org</a> <a href="mailto:sshah@embarqindia.org">sshah@embarqindia.org</a>	Mail	<ul style="list-style-type: none"> <li>Gender Consciousness in Urban Planning and Regulations</li> </ul>
15	Geological Survey of India	Mr Gurprit Singh Jaggi, Director, GSI	Geological Survey of India, A-II, Pushpa Bhawan, Madangir Road, New Delhi-110 062. Tel: 011- 29053777 (0) FAX : 011-29962671, 29051328	Face to face meeting	<ul style="list-style-type: none"> <li>Integration of GSI with Bhuvan maps,</li> <li>Geo-environmental profile in the Metadata base (procedure)</li> </ul>
16	Hyderabad Metropolitan Development Authority	Mr.Sarma, Consultant, Hyderabad Metropolitan Development Authority	HMDA, Hyderabad	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>Development plan preparation in GIS platform,</li> <li>Site analysis strategies</li> </ul>
17	Indian Green Building Council	Mr Praveen Kumar Soma, Senior Counsellor	CII-Sohrabji Godrej Green Business Centre, Survey No. 64, Kothaguda Post, Near HITEC City, R. R. Dist., Hyderabad -500 084, Ph.: +91 40 4418 5121, Email: <a href="mailto:praveen.soma@cii.in">praveen.soma@cii.in</a>	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>Work done in the field of the Green Buildings,</li> <li>Green Townships and Green SEZs by Indian Green Building Council.</li> <li>NBC, 2005 Codes for sustainable Development</li> </ul>
		Mr Ritabrata Sen, Engineer	<a href="mailto:ritabrata.sen@cii.in">ritabrata.sen@cii.in</a>		
		Mr V Nagesh Gupta,	<a href="mailto:nagesh.gupta@cii.in">nagesh.gupta@cii.in</a>		

## Appendix A- Making of the Guidelines

S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
		Counsellor			
18	Indian Institute of Technology (IIT) Delhi	Prof. Geetam Tiwari, Professor, Department of Civil Engineering	TRIPPS, Indian Institute of Technology, Room MS 815 (Main Building) HauzKhas, New Delhi Ph.: 011-26858703 Email: geetamt@gmail.com	Face to face meeting	<ul style="list-style-type: none"> <li>Travel Demand Modelling</li> <li>Freight complex</li> <li>Non Motorised Transport modal split</li> <li>Transit Oriented Development</li> <li>Sampling size of various transport surveys</li> <li>Design standards related to Urban Expressways</li> <li>Urban Road Design Standards</li> </ul>
19	Indian Institute of Technology (IIT) Kharagpur	Dr. B.K. Sengupta, professor, Department of Architecture and Regional Planning	B-185, IIT campus, 03222-255303, 282700, 277190	Mail, Face to face meeting during regional workshop at Bhubneshwar	<ul style="list-style-type: none"> <li>Comments on UDPFI Guidelines, 1996</li> </ul>
20	Institute of Town Planners, India	Dr. Meshram, President, ITPI	4-A, Ring Road, I.P.Estate, New Delhi – 110002	Face to face meeting	<ul style="list-style-type: none"> <li>City typologies,</li> <li>Hill cities consideration</li> </ul>
		Dr. Kulsheshta		Face to face meeting	<ul style="list-style-type: none"> <li>Regional Planning</li> <li>Plan process concept</li> <li>Plan formulation</li> <li>74th CAA provision</li> <li>Participatory approach</li> </ul>
21	Institute of Urban Transport	Mr. C. L. Kaul, Executive Secretary (IUT), Mr. M. L. Chotani, Consultant, IUT	Institute of Urban Transport (India) 1st Floor, Anand Vihar Metro Station Building, Entry adjacent to Gate No 1, Delhi - 110 092 (INDIA), Ph.: (+91) 11 66578700 – 709, Fax.: (+91) 11 66578733/44, Email: info@iutindia.org	Face to face meeting, Mail, Telephonic	<ul style="list-style-type: none"> <li>Revised toolkit for CMP</li> <li>Sampling Size</li> <li>Travel Demand Modelling</li> </ul>
22	Jawaharlal Nehru National Urban Renewal Mission	Mr. Anand Mohan, Director, JnNURM	Room No: 340 C, Ph.: 23062194, Email: anandmohan2006@hotmail.com	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>General information regarding Project</li> <li>Tool kits provided by JnNURM</li> <li>CDPs of various cities</li> </ul>

S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
23	Ministry of Defence, Directorate General of Defence Estates	Dr. D. K Malik, Additional Directorate General	Ph: 011-25674976 Email: <a href="mailto:dkmalik1958@gmail.com">dkmalik1958@gmail.com</a>	Face to face meeting, Mail, Telephonic	<ul style="list-style-type: none"> <li>Integration of GIS in planning</li> <li>Suggestions for inclusions in UDPFI Guidelines</li> </ul>
		Mr. Ajay Kumar Sharma, IDES, Deputy Director General	Ph: 011-25676979, 9990699002 Email: <a href="mailto:ajayced@gmail.com">ajayced@gmail.com</a>	Face to face meeting	<ul style="list-style-type: none"> <li>The Cantonment Act, 2006</li> </ul>
		Mr. N. V Satyanarayana, Dy. Director General (Cantts)	Ph: 011-25676979, 9968608234 Email: <a href="mailto:nvsatya2008@gmail.com">nvsatya2008@gmail.com</a>	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>Review of the Cantonment section in the Guidelines</li> </ul>
24	Ministry of Environment and Forest	Mr. Maninder Singh, Joint Secretary (EIA)	Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi - 110003, Email: <a href="mailto:jsicmoef@gmail.com">jsicmoef@gmail.com</a>	Mail, Telephone	<ul style="list-style-type: none"> <li>Technical aspects of environmental obligations and planning requirements by MoEF</li> </ul>
		Mr. Susheel Kumar, Additional Secretary	C-II/51, Shahjahan Road, Ph.: 24362285, 24363918 (F), 23073953 Email: <a href="mailto:asmefsusheel@gmail.com">asmefsusheel@gmail.com</a>	Mail	
25	Ministry of Road Transport and Highway	Mr. R.K. Pandey, Chief Engineer (Planning)	Room No. 249, Office of Minister for Road Transport & Highways, Ph.: 23739085	Face to face meeting, Telephonic	<ul style="list-style-type: none"> <li>Urban road design standards</li> </ul>
26	Ministry of Rural Development, Land Department	Mr. Charanjit Singh, Director, Land Reforms, Department of Land Resources	Nirman Bhawan, NBO Building, G- Wing, Maulana Azad Marg New Delhi-110011 T +91 11 23062456 Email: <a href="mailto:da-dolr@nic.in">da-dolr@nic.in</a>	Face to face meeting, Telephonic	<ul style="list-style-type: none"> <li>Draft National Land Policy,</li> <li>National Land Record Modernization Programme (NLRMP)</li> </ul>
27	Ministry of Social Justice & Empowerment	Dr. Vikram Sima Rao Director (DD-III & National Awards)	Ministry of Social Justice and Empowerment, Room. No. 740, 'A', Wing, Shastri Bhawan, Dr. Rajendra Prasad Road, New Delhi - 110001 (India) Ph: 011 23383464 Email: <a href="mailto:vickybotha@hotmail.com">vickybotha@hotmail.com</a>	Telephonic, Mail	<ul style="list-style-type: none"> <li>The Persons with Disabilities Act, 1995, Guidelines</li> <li>Space Standards for Barrier Free Built Environment for Disabled and Elderly Persons</li> </ul>

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S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
28	Ministry of Shipping	Dr.Vishwapati Trivedi, Secretary	Transport Bhawan, Room No. 401, SansadMarg, New Delhi, 110001 Phone: 011-23714938 Email: secyship@nic.in	Mail, Letter	<ul style="list-style-type: none"> <li>• Consultation with Ministry of Shipping</li> </ul>
29	Ministry of Tourism	Mr.S.K.Mohanta, DPA Grade "B"	Phone: 91-11-23013072 Email: mohanta@nic.in	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>• Eco-tourism guidelines for tourism cities</li> </ul>
30	Ministry of Water & Sanitation	Mr Pankaj Jain, Secretary	Room No. 247, A Wing, NirmanBhavan, New Delhi – 110001, Ph.: 23061207, Email: ppsdws@nic.in	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>• Technical aspects on Water supply standards, Water quality standards, Service level benchmarking, Sewerage System, Effluent quality standards etc.</li> </ul>
31	Mumbai Metropolitan Regional Development Authority (MMRDA)	Ms. Uma Adusumilli, Chief Planner.	E Block, MMRDA Building, Opposite Driven in Theatre, BandraKurla Complex, Bandra East, Mumbai, Maharashtra 400051 Ph: 022-26594060, 022- 26591237 Email: <a href="mailto:umaplanner@gmail.com">umaplanner@gmail.com</a>	Mail, Telephonic	<ul style="list-style-type: none"> <li>• Regional plan of MMR</li> </ul>
32	National Capital Region Planning Board	Mr. J.N. Barman, Director, Planning Wing	National Capital Region Planning Board, Core-IV B, First Floor, India Habitat Centre, Lodhi Road, New Delhi- 110003. Ph.: 24628179 Email: <a href="mailto:ncrpb-jd1@nic.in">ncrpb-jd1@nic.in</a>		<ul style="list-style-type: none"> <li>• Revised Regional plan, GIS based Plan</li> </ul>
33	National Disaster Management Authority	Dr. Anita Bhatnagar Jain, JS (Policy & Plan)	Email: 'anita.bhatnagar@nic.in	Mail, Telephonic	<ul style="list-style-type: none"> <li>• Sensitive Landuse Planning document,</li> <li>• National Plan for Disaster</li> </ul>
		Mr. Rajesh Kumar Singh (Director)	Room no. 326, NDMA Bhawan, A-1, Safdarjung enclave New Delhi- 110029, <a href="mailto:singhkrajesh@hotmail.com">singhkrajesh@hotmail.com</a>	Face to face meeting, mail	<ul style="list-style-type: none"> <li>• Disaster Management guidelines</li> <li>• District Disaster Management Plan</li> <li>• Sensitive land use planning document</li> </ul>
34	National Institute of Disaster Management	Dr. Anil K. Gupta, Associate Professor	5-B, IIPA Campus, I.P. Estate, M.G. Road, New Delhi – 110002 Ph.: 23724311 Email: <a href="mailto:anil.nidm@nic.in">anil.nidm@nic.in</a>	Face to Face Meeting	<ul style="list-style-type: none"> <li>• National Mission on Sustainable Habitat, National Building Code Of India 2005 (covering hazard components),</li> <li>• Disaster Management Guidelines, Chennai master plan (sensitive to urban flood)</li> </ul>
35	National Remote Sensing Centre	Dr.K.Venugopala Rao, Group Head Urban	ISRO, Department of Space, Balanagar, Hyderabad-	Face to face meeting, Mail	<ul style="list-style-type: none"> <li>• Bhuvan database and services</li> <li>• GIS application of Bhuvan in Master plan preparation (</li> </ul>

S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
		Studies & Geo Informatics Group, NRSC  Mr. Arul Raj, Bhuvan, NRSC,  Ms. Reedhi, Engg. SD, Geo Informatics Group	500037, A.P. Tel: +914023884556 Fax: +914023884259 <a href="mailto:Venu_koppaka@nrsc.gov.in">Venu_koppaka@nrsc.gov.in</a>		including pilot project of Nalgonda) <ul style="list-style-type: none"> <li>• Consultation with Hyderabad Metropolitan Development Authority (HMDA) for understanding the process of Hyderabad Metropolitan Development Plan formed in GIS platform</li> <li>• NUIS landuse layers for the core city area</li> </ul>
36	National Urban Information System	Dr.Debjani Ghosh, Mr.Sandeep Thakur, Mr.Jagan Shah	Indian habitat Centre, Core 4B, Lodhi Road, 110003 Tel: 91-11 24617517/43 <a href="mailto:dghosh@niua.org">dghosh@niua.org</a>	Mail	<ul style="list-style-type: none"> <li>• NUIS mapping,</li> <li>• Latest status and utilisation for planning</li> </ul>
		Mr.Mohd.Monis Khan, Town & Country Planner	Town & Country Planning Organization Government of India Ministry of Urban Development Email: <a href="mailto:khanmonis@yahoo.com">khanmonis@yahoo.com</a>	Face to face meeting	<ul style="list-style-type: none"> <li>• Status of NUIS on 18.02.13</li> </ul>
37	Planning Commission	Mr.RakeshRanjan, Advisor, HUD	Yojana Bhawan, New Delhi-110001	Face to face meeting	<ul style="list-style-type: none"> <li>• Considering the economic aspects while preparation of plans</li> <li>• Consider the factors of migration into urban areas</li> <li>• Emphasis of 'Mixed Land Use '</li> <li>• Optimum Use of Land</li> <li>• planning of urban areas more economically optimum</li> </ul>
38	Registrar General of India	Dr. D.K. Dey, Additional Director	Office of The Registrar General and Census Commissioner, 2/A, Man Singh Road, New Delhi -110011, Tel: +91-11-23070629, 23381623,23381917, 23384816, Email: <a href="mailto:rgoffice.rgi@nic.in">rgoffice.rgi@nic.in</a>	Face to face meeting	<ul style="list-style-type: none"> <li>• Census database,</li> <li>• PCA data for social-economic development,</li> <li>• Census Atlas,</li> <li>• National Commission on Population</li> </ul>
39	School of Planning and Architecture	Ms. SanjuktaBhaduri HoD Urban Planning	Email: <a href="mailto:sanjukta.bhaduri@gmail.com">sanjukta.bhaduri@gmail.com</a> , <a href="mailto:s.bhaduri@spa.ac.in">s.bhaduri@spa.ac.in</a>	Face to Face Meeting	<ul style="list-style-type: none"> <li>• Mixed uses of land, Alternative to Master Plan approach – Two slides</li> </ul>
40	School of Planning and Architecture	Mr.Sewaram, HoD, Transport Planning	Department of Transport Planning, School of Planning and Architecture, 4-Block-B, Indraprastha Estate, New Delhi	Face to Face Meeting	<ul style="list-style-type: none"> <li>• Transport Planning</li> </ul>

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S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
			110002		
41	School of Planning and Architecture	Mr.Mahaveer, HoD, Transport Planning	4-Block-B, Indraprastha Estate, New Delhi 110002	Face to Face Meeting	<ul style="list-style-type: none"> <li>Regional Planning</li> </ul>
42	Survey of India	Maj. Gen. RC Padhi, Additional Surveyor General, SOI	Indian Institute of Surveying and Mapping, SOI, Uppal, Hyderabad-500039, Tel: 040-27201181, 040-27202059	Telephone	<ul style="list-style-type: none"> <li>NUIS mapping,</li> <li>District Planning Series</li> </ul>
43	Town and Country Planning Organisation, Delhi	Mr. J.B. Kshirsagar Chief Planner, Town and Country Planning Organisation  Mr.R.Srinivas Town and Country Planner, Head, Metropolitan & Union Territories Division, Town and Country Planning Organisation  Mr.Sudeep Roy, Asstt Town and Country Planner Town and Country Planning Organization	Town & Country Planning Organization Government of India Ministry of Urban Development E- Block, Vikas Bhawan, I.P. Estate, New Delhi-110002 Ph-23370837(O),9810636758(M) 0120- 4297227(R)  Email: <a href="mailto:srinimetro@gmail.com">srinimetro@gmail.com</a>	Face to Face Meeting, Mail, Telephonic	<ul style="list-style-type: none"> <li>Zoning regulations,</li> <li>Institutional requirement,</li> <li>Master plan studies</li> <li>Various studies and interactions during the project</li> </ul>
44	Urban Development & Urban Housing Department, Government Of Gujarat	Mr.G.R.Aloria, Principal Secretary	Email: us-ud@gujarat.gov.in	Mail	<ul style="list-style-type: none"> <li>Metropolitan plan formulation</li> <li>Empowering the ULB</li> </ul>
<ul style="list-style-type: none"> <li>Consultation during Regional Workshops and comments shared</li> </ul>					
45	Town & Country Planning, Government of Karnataka	Mr Shantappa. B. Honnur, Director	Office of the Director of Town & Country Planning, M. S. Building, Gate No. 3, Bangalore – 500 001 Ph.: 984515 0829	Mail	<ul style="list-style-type: none"> <li>Views and information pertaining to Department of Town and Country Planning, Government of Karnataka</li> </ul>

S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
			Email: shanthonnur@gmail.com		
46	Town Planning & Valuation Department, Maharashtra	Mr K. S. Akode, Director	Town Planning & Valuation Department, Central Office, Pune-411 001	Mail	<ul style="list-style-type: none"> <li>Review, study and recommendations for applying Planning Standards for various urban area in the State of Maharashtra</li> </ul>
47	Town & Country Planning Organization, Puducherry	Mr S. Ragunathan Chief Town Planner - cum - Secretary, SLNA, JNNURM	Town and country Planning Department, Puducherry (SLNA for JNNURM) Puducherry	Mail	<ul style="list-style-type: none"> <li>Puducherry Bye-Law Amendment 2013, Puducherry City Development Plan, Puducherry Master Plan, Puducherry Master plan document, Puducherry TCP Act, 1969, Yanam Master Plan</li> </ul>
48	Town Planning Organisation, Government of Tripura	--	TCPO, 3rd floor of Khadya Bhawan, Pandit Nehru Complex, Gurkhabasti, Agartala, Tripura	Mail	<ul style="list-style-type: none"> <li>Comments on the UDPFI Guidelines, 1996</li> </ul>
49	Town Planning Department, Government of Uttarakhand	Mr S. K. Pant, Senior Planner	Town Planning Department, 53, Tomar Complex, Dehradun, Uttarakhand	Mail	<ul style="list-style-type: none"> <li>Comments on the UDPFI Guidelines, 1996</li> </ul>
50	Indian Institute of Technology (IIT) Kharagpur	Dr. Jaydip Barman, Professor and Head of Department	Department of Architecture and Regional Planning, Indian Institute of Technology, Kharagpur- 721 302	Mail	<ul style="list-style-type: none"> <li>Observation on review of UDPFI Guidelines, 1996</li> </ul>
51	Government of Sikkim	Ms Devika Sharma Chettri, Additional Chief Town Planner	Urban Development & Housing Department, GoS, Gangtok, Ph: 03592-202900	Mail	<ul style="list-style-type: none"> <li>Comments on the UDPFI Guidelines, 1996</li> </ul>
52	College of Engineering, Pune	Prof. Pratap Raval, Professor	College of Engineering, Pune, Maharashtra Ph.: 9422506124, Email: <a href="mailto:pushpak20@yahoo.co.uk">pushpak20@yahoo.co.uk</a>	Mail	<ul style="list-style-type: none"> <li>Views regarding revision of UDPFI and inclusion in new guidelines.</li> </ul>
53	Town Planning Department Rajasthan	Mr. Praveen Jain, Chief Town Planner, Government of Rajasthan	Town Planning Department, opp. Birla Temple, JLN Marg, Jaipur -04 Telephone no.: 0141-2563702, email: <a href="mailto:cto-ri@nic.in">cto-ri@nic.in</a>	Face to face meeting in the regional workshop	<ul style="list-style-type: none"> <li>Comments on the UDPFI Guidelines, 1996</li> <li>Suggestions on Infrastructure fund, planning norms, Small town level planning</li> </ul>
		Mr. Pradeep Kapoor, Town Planning Department, Government of Rajasthan	<a href="mailto:p.kapoor57@gmail.com">p.kapoor57@gmail.com</a>	Face to face meeting in the regional workshop and mail	<ul style="list-style-type: none"> <li>Planning provision in the State</li> <li>Affordable Housing Policy and Integrated Township Policy of Rajasthan</li> </ul>

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S.No.	Agency Name	Name & Designation	Address and Contact number	Mode of Contact	Key points consulted
54	Urban Development & Housing Department, Sikkim	Mr.Dinek Gurung, Sr.Architect-cum-Town Planner	Urban Development & Housing Department, Government of Sikkim, Gangtok-737101 Ph: 9933032718 <a href="mailto:gurungdinker@gmail.com">gurungdinker@gmail.com</a>	Face to face meeting in the regional workshop and mail	<ul style="list-style-type: none"> <li>• Comments on the UDPFI Guidelines, 1996</li> </ul>
55	Directorate of Town Planning, Odisha	Mr. Mishra	Chief Town Planner, Directorate of Town Planning, "Block IV, Unit 5", Bhubaneswar-751001 (Tel:0674-2392294, Fax:0674-2395574) E-mail: dtpodisha@gmail.com	Face to face meeting in the regional workshop	<ul style="list-style-type: none"> <li>• Comments on the UDPFI Guidelines, 1996</li> <li>• Orissa Development Authority Manual,</li> <li>• OTP &amp; IT Act, 1956</li> </ul>

## 1.8. Glossary

### 1.8.1. List of reference made in the guidelines (as sources, footnotes, references in the volumes)

Table 1.4: List of reference made in the guidelines (as sources, footnotes, references in the volumes)

S. No.	Particulars	Sources
1	73rd & 74 <sup>th</sup> Constitutional Amendment Act	<a href="http://indiacode.nic.in/coiweb/amend/amend73.htm">http://indiacode.nic.in/coiweb/amend/amend73.htm</a> <a href="http://indiacode.nic.in/coiweb/amend/amend74.htm">http://indiacode.nic.in/coiweb/amend/amend74.htm</a>
2	A Gendered Perspective of the Shelter-Transport-Livelihood Link: The Case of Poor Women in Delhi. Transport Reviews, Volume 26 (1), p 63-80	Wilson, Anand, Anvita and Tiwari, Geetam;1987
3	Advisory Note – Septage Management in Urban India, 2013	Ministry of Urban Development (MoUD)
4	Affordable Housing Policy, 2009	Government of Rajasthan
5	Ahmedabad CDP	Jawaharlal Nehru National Urban Renewal Mission (JnNURM)
6	Ahmedabad Draft Comprehensive Development Plan 2021 (Second Revised) Ahmedabad Urban Development Authority Part III: General Development Regulations - Draft	Ahmedabad Urban Development Authority (AUDA)
7	Airport Development Reference Manual, 9th edition	International Air Transport Association (IATA)
8	Aizawl Master Plan	Aizawl Development Authority
9	Alternative Modes of Assembly And Development of Land and Housing in the NCT of Delhi	Association of Municipalities and Development Authorities (AMDA)
10	Ancient Monuments and Archaeological Sites and Remains Act, (Amendment and Validation) 2011	Archaeological Survey of India (ASI)
11	Approach to the Twelfth Five Year Plan	Planning Commission
12	Arizona Department of Commerce	
13	Basic Statistics for Local Level Development (BSLLD)	Ministry of Statistics & Programme Implementation (MoS&PI)
14	BBMP Model of SWM	<a href="http://www.bbmp.gov.in">www.bbmp.gov.in</a>
15	Bihar Urban Planning and Development Act 2012	Patna Municipal Corporation
16	Bio-Medical Waste (Management and Handling) Rules, 1998	Ministry of Environment and Forest (MoEF)
17	Canada, British Columbia Table	<a href="http://www.thinkcity.ca/node/289">http://www.thinkcity.ca/node/289</a>
18	Case Study: Kankaria Lake, Ahmedabad	<a href="http://www.narendramodi.in/kankaria-lake-development-project-restores-iconic-lake-to-itsgrandeur/">http://www.narendramodi.in/kankaria-lake-development-project-restores-iconic-lake-to-itsgrandeur/</a>
19	Case Studies in Design Excellence for Mid-Sized Urban / Inner Suburban Medical Centers	AIA Potomac Valley
20	Census of India, 2001	Office of the Registrar General and Census Commissioner, India, Ministry of Home Affairs
21	Chemical Terrorism Disaster Guidelines-N	National Disaster Management Authority (NDMA)

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S. No.	Particulars	Sources
22	City Development Plan (CDP) Delhi	Department of Urban Development
23	Climate Proofing Guwahati, Assam City resilience strategy and Mainstreaming Plan, Synthesis Report, 2013	Tata Energy Research Institute (TERI)
24	Coastal Regulation Zone (CRZ) Notification, 2011	Ministry of Environment and Forest (MoEF)
25	Code of Practice (Part-I) Cross Section (Urban Road)	Ministry of Urban Development (MoUD)
26	Community Planning Assistance Program	American Planning Association
27	Compendium of Sewage Treatment Technologies, 2009	National River Conservation Directorate, Ministry of Environment and Forest (MoEF)
28	Comprehensive Mobility Plans: Preparation Toolkit	Ministry of Urban Development (MoUD)
29	Conditions of engagement of professional services and scale of professional fees and charges	Institute of Town Planners, India (ITPI)
30	Consolidated FDI Policy, 2011	Department Of Industrial Policy & Promotion (DIPP)
31	Creative Financing of Urban Infrastructure in India through Market-based Financing and Public-Private Partnership Options	Chetan and Hitesh Vaidya, Metropolitan Congress, Sydney, October 22-26, 2008.
32	Draft UTTIPEC Guidelines, 2012	<a href="http://www.uttipeec.nic.in/index1.asp?linkid=31&amp;langid=1">http://www.uttipeec.nic.in/index1.asp?linkid=31&amp;langid=1</a>
33	Defining, Meaning & Evaluating Carrying Capacity in European Tourism Destinations	University of Aegean, Greece
34	Delhi Land Pooling Policy	Town and Country Planning Organisation (TCPO)
35	Designing Green Modules for New Urban Spaces in West Bengal-Workshop	Department for International Development (DFID)
36	Determining Sustainable Development Density using the Urban Carrying Capacity Assessment System, 2004	University College London (UCL) (available at: <a href="https://www.bartlett.ucl.ac.uk/casa/pdf/paper78.pdf">https://www.bartlett.ucl.ac.uk/casa/pdf/paper78.pdf</a> )
37	Development of Toolkit under Sustainable Urban Transport Project, Land Use Transport Integration and Density of Urban Growth, 2013	Ministry of Urban Development, Government of India
38	Development of Training Material under Sustainable Urban Transport Project, Reference Guide Volume 2 Demand Assessment	Ministry of Urban Development (MoUD)
39	Disaster Management of India	Ministry of Home Affairs (MoHA)
40	Debt Market Component	Indo-US Financial Institutions Reform and Expansion Project FIRE(D)
41	Delhi-Mumbai Industrial Corridor	<a href="http://www.dmicdc.com/">http://www.dmicdc.com/</a>
42	Draft Development Plan (DDP) - Dholera Special Investment Regional Development Authority (DSIRDA)	Dholera Special Investment Regional Development Authority (DSIRDA)
43	Draft Guidelines for Development of Special Economic Zone (SEZ)s	Town and Country Planning Organisation (TCPO)
44	Draft Special Regulation for Installation of Telecom Towers in Urban Areas	Government of Odisha
45	Eleventh Five Year Plan 2007-12 Volume-I	Planning Commission
46	Energy Conservation Building Code (ECBC)	Ministry of Power (MoP)

S. No.	Particulars	Sources
47	Environment Protection Act, 1986	Ministry of Environment and Forest (MoEF)
48	Environmental Impact Assessment (EIA) notification, 2006	Ministry of Environment and Forest (MoEF)
49	Explosive Rule, 2008	Department Of Industrial Policy & Promotion (DIPP)
50	FDI Indian Road Congress (IRC) 2013	Department Of Industrial Policy & Promotion (DIPP)
51	Flood Management Guidelines	National Disaster Management Authority (NDMA)
52	Forest Conservation Act, 1980	Ministry of Environment and Forest (MoEF)
53	A Gendered Perspective of the Shelter-Transport-Livelihood Link: The Case of Poor Women in Delhi	Wilson, 1987; Anand, Anvita and Tiwari, Geetam. 2006. Transport Reviews, Vol 26 (1), p 63-80
54	Good Governance Guide	Municipal Association of Victoria (at: <a href="http://www.goodgovernanceguide.org.au/">http://www.goodgovernanceguide.org.au/</a> )
55	Good Governance & Transparency- Their Impact on Development	Saladin Al-Jurf ; (Article at <a href="http://heinonline.org/HOL/LandingPage?handle=hein.journals/tlcp9&amp;div=22&amp;id=&amp;page">http://heinonline.org/HOL/LandingPage?handle=hein.journals/tlcp9&amp;div=22&amp;id=&amp;page</a> )
56	Greater Bangalore Water and Sewerage Project (GBWASP), India	Indo-US Financial Institutions Reform and Expansion Project - Debt Market Component FIRE(D)
57	Greater Hyderabad Biodiversity Index, 2012	Greater Hyderabad Municipal Corporation (GHMC)
58	Greenest City Action Plan, City of Vancouver	<a href="http://www.greencitytimes.com/Sustainable-Cities/vancouver-greenest-city-2020.html">http://www.greencitytimes.com/Sustainable-Cities/vancouver-greenest-city-2020.html</a>
59	Guidance Note on Municipal Solid Waste Management on a Regional Basis	Ministry of Urban Development (MoUD)
60	Guidebook on PPP Infrastructure	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
61	Guide on Artificial Recharge to Ground Water	Central Ground Water Board
62	Guideline Note - Municipal Solid Waste Management on Regional Basis	Ministry of Urban Development (MoUD)
63	Guidelines and Space Standards for Barrier Free Built Environment for Disabled and Elderly Persons	Central Public Works Department (CPWD)
64	Guidelines and Toolkits for Urban Transport Development in Medium Sized Cities in India	Ministry of Urban Development (MoUD), Asian Development Bank (ADB)
65	Guidelines and Toolkits for Urban Transport Development in Medium Sized Cities in India - Guidelines for Non-Motorised Transport Measures: Policy and Options	Ministry of Urban Development (MoUD)
66	Guidelines and Toolkits for Urban Transport Development Module 1 Comprehensive Mobility Plan	PADECO Co., Ltd., Tokyo, JAPAN
67	Guidelines for Decentralised Wastewater management	Ministry of Urban Development (MoUD)
68	Guidelines for Declaration of Eco-Sensitive Zones Around National Parks & Wildlife Sanctuaries	Ministry of Environment & Forest (MoEF)

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S. No.	Particulars	Sources
69	Guidelines for FDI in Development of Integrated Township, 2002	Press Note, Department Of Industrial Policy & Promotion (DIPP)
70	Guidelines for Financial Assistance to State Government	Ministry of Tourism (MoT)
71	Guidelines for High Rise Buildings, 2012	MoEF Office Memorandum
72	Guidelines for Preparation of Slum Free City Plan of Action	Ministry of Housing & Urban Poverty Alleviation (MoHUPA)
73	Guidelines for establishment of National Investment and Manufacturing Zones (NIMZ)	Department Of Industrial Policy & Promotion (DIPP)
74	Gujarat Integrated Township Policy, 2008	Gujarat Urban Development Company Ltd. (GUDC)
75	Handbook of Service Level Benchmarking	Ministry of Urban Development (MoUD)
76	Highway Design Manual	Department of Transportation, New York State (USA)
77	Himachal Pradesh Integrated Township Scheme(Draft)	Government of Himachal Pradesh
78	Historic Urban Landscape (Recommendation), 2011	UNESCO's General Conference
79	Improving Urban Water Supply & Sanitation Services - Advisory Note	Ministry of Urban Development (MoUD)
80	Improving Local Governance and Service Delivery: Citizen Report Card Learning Tool Kit, 2007	Asian Development Bank (ADB) & Asian Development Bank Institute (ADBI)
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## Appendix A- Making of the Guidelines

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## Appendix A- Making of the Guidelines

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395	Integrated Township Policy	Housing & Urban Planning Department, GoUP

## 2 Appendix B – Basic Planning Definition

Table 2.1: Chapterwise Basic Planning Definitions

Sr. No.	Particular	Definitions	Source
<b>Chapter 3: Plan Formulation</b>			
1	Agriculture	Includes horticulture, farming, raising of crops, fruits, vegetables, flowers, grass, fodder, trees or any other kind of cultivation, dairy, animal husbandry, breeding and keeping of live-stock, including cattle, horses, donkeys, mules, pigs, fish, poultry and bees; and use of land which is ancillary to the farming of land or any other agriculture purposes, but shall not include the use of land attached to a building for the purposes of a garden to be used alongside such building.	Model Regional and Town Planning and Development Law
2	Amenities	Include roads and streets, open spaces, parks, recreational grounds, playgrounds, water and electric supply, street lighting, sewerage, drainage, public works and other utilities, services and conveniences.	Model Regional and Town Planning and Development Law
3	Development	The carrying out of building, engineering, mining or other operations in, on, over or under land or the making of any material change, in any building or land, or in the use of any building or land and includes sub-division of any land.	Model Regional and Town Planning and Development Law
4	Development Plan	A plan for the development or redevelopment or improvement of an area within the jurisdiction of a Planning Authority and includes a Regional Development Plan, a Metropolitan Development Plan, Area Development Plan, Town Development Plan, Zonal Development Plan, District Development Plan, or any other plan or scheme prepared under relevant Act by whatsoever name known.	Bihar Urban Planning and Development Act, 2012
5	Disposal	Discharge, deposition or dumping of any liquid or solid waste onto land or water so that it may enter the environment.	National Urban Sanitation Policy, City Sanitation Plan Manual
6	Domestic sewage	All forms of wastewater derived from residential properties, as well as black water and grey water from commercial and institutions buildings.	National Urban Sanitation Policy, City Sanitation Plan Manual
7	Floor Space Index	The quotient or the ratio of the Total Covered area of all floors to the total area of the plot, multiplied by 100.	Bihar Urban Planning and Development Act, 2012
8	Infrastructure	Any project, public amenity or public utility or service, which is required for smooth, productive and efficient functioning of the Planning Area such as trunk infrastructure, access from or to the nearest major road, bulk supply of drinking water (surface water and ground water with trunk line), power (electric substation and network), health, education facilities, transport (major roads such as national highways, state highways, major district roads, other district roads, , bridges, bypasses and underpasses), common effluent treatment plants (CETP), sewage treatment plant (STP), solid waste disposal system and receptacles, communication network, sectorial shopping markets, institutional buildings, malls and multiplexes, cinema halls, community halls, open air theatres, playgrounds, civic and cultural facilities, public parking areas etc.	Bihar Urban Planning and Development Act, 2012
9	Land Use	The major use for which a land is being used on any specified date.	Bihar Urban Planning and Development Act, 2012
10	Local Authority	A municipal corporation or committee or board or district board or other authority legally entitled to, or entrusted by the government with the control or management of a municipal or local fund or which is permitted by the government to exercise the powers of a local authority, and includes a town improvement trust; and a local authority is a "Local Authority Concerned" if any land within its local limits falls in the area of a plan prepared or to be prepared under relevant Act.	Model Regional and Town Planning and Development Law
11	Plan	The statement of proposals, policies and development briefs for securing, promoting and regulating development in a Planning Area, and includes a map or maps or sets of documents or all of them.	Bihar Urban Planning and Development Act, 2012

## Appendix B- Basic Planning Definition

Sr. No.	Particular	Definitions	Source
12	Planning Area	A territorial unit demarcated and declared by the Government for the purposes of planning under <i>relevant</i> Act and shall be known by such name as the Government may decide.	Bihar Urban Planning and Development Act, 2012
13	Public Place	Any place or building which is open to the use and enjoyment of the public whether it is actually used or enjoyed by the public or not and whether the entry is regulated by any charge or not.	Bihar Urban Planning and Development Act, 2012
14	Residence	Includes the use for human habitation of any land or building or part thereof, the use of gardens, grounds, garages, stables and out-houses, if any, appertaining to such land or building, and "Residential" shall be construed accordingly.	Model Regional and Town Planning and Development Law
15	Sanitation	Interventions (usually construction of facilities such as latrines) that improve the management of excreta and promote sanitary (healthy) conditions.	National Urban Sanitation Policy, City Sanitation Plan Manual
16	Scheme	A Development scheme and includes a plan or plans together with the descriptive matter, if any, relating to such a scheme.	Model Regional and Town Planning and Development Law
17	Septage	Mixture of wastewater and sludge removed from a septic tank during cleaning operations.	National Urban Sanitation Policy, City Sanitation Plan Manual
18	Septic tank	A form of on-plot sanitation for the anaerobic treatment of sewage/black water.	National Urban Sanitation Policy, City Sanitation Plan Manual
19	Sewage	A mixture of wastewater from all urban activates from residential, commercial properties. It may also contain a component of industrial wastewater.	National Urban Sanitation Policy, City Sanitation Plan Manual
20	Sewerage	A network of interconnected sewers in an area, district or town.	National Urban Sanitation Policy, City Sanitation Plan Manual
21	Utility	Services such as roads including approach roads, bridges, bypasses and underpasses, street lights, water supply system, sewerage system, storm water drainage system, electrical network, communication network, sewage treatment plants, percolation wells, solid waste disposal system, collection, treatment, discharge and disposal of industrial, institutional and township waste, gas pipeline, common effluent treatment plants (CETP), spaces for informal services, and any other as may be delineated by the Government.	Bihar Urban Planning and Development Act, 2012
22	Wastewater	Liquid waste from households or commercial or industrial operations, along with any surface water/storm water.	National Urban Sanitation Policy, City Sanitation Plan Manual
23	Wastewater treatment	A combination of physical, chemical and biological processes to remove suspended solids, dissolved pollutants, and pathogens and render the water harmless to the environment.	National Urban Sanitation Policy, City Sanitation Plan Manual
<b>Chapter 4: Resource Mobilisation</b>			
1	Accommodation Reservation	Allows the land owners to develop the sited reserved for an amenity in the development plan using full permissible FSI/FAR on the plot subject to agreeing to entrust and handover the built-up area of such amenity to the local authority free of all encumbrances and accept the full FAR/FSI as compensation in lieu therefore.	UDPFI Guidelines
2	Accrual Concept	Occurrence of claims and obligations in respect of incomes or expenditures, assets or liabilities based on happening of any event, passage of time, rendering of services, fulfilment (partially or fully) of contracts, diminution in values, etc., are recorded even though actual receipts or payments of money may not have taken place.	Administrative Staff College of India, (Regional Capacity Building Hub)
3	Bilateral Organizations	Government agencies or non-profit organizations based in a single country while the agencies provide aid in other countries.	--
4	Bio-medical waste	any waste generated during diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals.	Municipal Bill

Sr. No.	Particular	Definitions	Source
5	Budget grant	The total sum entered on the expenditure side of a budget estimate under a major head and adopted by the Municipality, and includes any sum by which such budget grant is increased or reduced by transfer from or to other heads in accordance with the provisions of this Act and the rules and the regulations made thereunder.	Municipal Bill
6	Building	a structure constructed for whatever purpose and of whatever materials, and includes the foundation, plinth, walls, floors, roofs, chimneys, fixed platforms, verandas, balconies, cornices or projections or part of a building or anything affixed thereto or any wall (other than a boundary wall of less than three metres in height) enclosing, or intended to enclose, any land, sign or outdoor display-structure but does not include a tent, shamiana or tarpaulin shelter.	Municipal Bill
7	Citizen's charter	The document declaring the functioning, obligations, duties and commitments of a public authority for providing goods and services effectively and efficiently with acceptable level of standards, time limits and designation of public servants for delivery and grievance redress.	Citizen's Bill
8	Dwelling House	A masonry building constructed, used, or adapted to be used, wholly or principally for human habitation.	Municipal Bill
9	e-Government	Use Information Communication Technology to organize and manage the government administrative processes, specifically the interactive procedures between government and public.	e-Government: Singapore Study
10	FDI	Investment by non-resident entity/ person resident outside India in the capital of an India economy.	FDI Circular
11	Grants-in-aid	Grants-in-aid are payments, transfers or devolution of funds, in cash or in kind, in the nature of donations or contributions by one government (grantor) to another government, body, institution or individual (grantee).	Indian Government Accounting Standard (IGAS), 2007
12	Industrial township	Such urban area or part thereof as the Governor may, having regard to the size of the area and the municipal services being provided or proposed to be provided by an industrial establishment in that area and such other factors as he may deem fit, by notification, specify to be an industrial township.	Municipal Bill
13	Land	"Land" includes benefits to arise out of land, and things attached to the earth or permanently fastened to anything attached to the earth.	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013
14	Land Acquisition	The acquisition of land for some public purpose by a government agency from individual landowners as, authorised by the law, after paying a government-fixed compensation to cover losses incurred by landowners from surrendering their land to the concerned government agency.	Wikipedia
15	Local Bodies	<i>Panchayati Raj</i> Institutions and Urban Local Bodies under the provisions of Article 243 and Article 12 of the Constitution.	Indian Government Accounting Standard (IGAS), 2007
16	Multilateral organisations	International organisations whose membership is made up of member governments, who collectively govern the organisation and are its primary source of funds and spend it on projects in various countries.	--
17	Service	All goods and services, including functions, obligations, responsibility or duty, to be provided or rendered by a public authority.	Citizen's Bill
18	Transferable Development Right (TDR)	A process of making available certain amount of additional built up area in lieu of the area relinquished or surrendered by the owner of the land whose land or a part thereof, is required for public purposes such as construction and widening of roads, development of parks, playgrounds, green area civic amenities, recreational uses, urban infrastructure, implementation of development control and Zoning Regulations and conservation of heritage sites or such other purposes as Government may notify so that he can use the extra	Bihar Urban Planning and Development Act, 2012

## Appendix B- Basic Planning Definition

Sr. No.	Particular	Definitions	Source
		built up area either himself or transfer it to another person for a consideration.	
<b>Chapter 7: Sustainability Guidelines</b>			
1	Accessibility	The ability to reach desired goods, services and activities.	Ministry of Urban Development, 2008
2	Buffer Zone	Buffer zones are areas created to enhance the protection of a conservation area, often peripheral to it, inside or outside. Within Buffer zones, certain legal and/or customary restrictions are placed upon resource use and/or is managed to reduce the negative impacts of restrictions on the neighbouring communities	<a href="http://www.biodiversity-a-z.org/areas/10/">http://www.biodiversity-a-z.org/areas/10/</a> A-Z of Areas of Biodiversity Importance
3	Climate Change	A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.	Global Warming Policy Foundation, IPCC
4	Coastal Area/ Zone	The coast is a unique environment where land, sea and atmosphere interact and interplay continuously influencing a strip of spatial zone defined as coastal area/ zone.  Coastal area/zones are the areas having the influence of both marine and terrestrial processes.	Coastal Zones of India, ISRO, 2012
5	Deforestation	The direct human-induced conversion of forested land to non-forested land.	<a href="http://www.cbd.int/doc/publications/cbd-ts-43-en.pdf">http://www.cbd.int/doc/publications/cbd-ts-43-en.pdf</a>  UNFCCC – Marrakech Accords
6	Disaster	A catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made cause, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or destruction of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area.	The Disaster Management Act, Ministry of Law and Justice, 2005
7	Disaster Management	A continuous and integrated process of planning, organising, coordination and implementing measures which are necessary or expedient for- prevention of damage or threat of any disaster; mitigation or reduction of risk of any disaster or its severity or consequences; capacity-building; preparedness to deal with any disaster; prompt response to any threatening disaster situation or disaster; assessing the severity or magnitude of effects of any disaster; evacuation, rescue and relief; rehabilitation and reconstruction	The Disaster Management Act, Ministry of Law and Justice, 2005
8	Ecological Sanitation	A form of dry sanitation that involves separation of faeces and urine in order to facilitate recycling of nutrients in local agricultural systems.	Manual City Sanitation Plan Preparation (CSP), National Urban Sanitation Policy
9	Mitigation	"Mitigation" means measures aimed at reducing the risk, impact or effects of a disaster or threatening disaster situation	The Disaster Management Act, Ministry of Law and Justice, 2005
10	Eco-Sensitive Zones	The extent of eco-sensitive zones as following: Many of the existing protected areas have already undergone tremendous development in close vicinity to their boundaries. Some of the protected areas actually lying in the urban setup (Eg. Guindy National Park, Tamil Naidu, Sanjay Gandhi National Park, Maharashtra, etc.). Therefore, defining the extent of the eco-sensitive zones around protected areas will have to be kept flexible and protected area specific. The width of the eco-sensitive zone and type of regulations will differ from protected area to protected area. However, as a general principle the width of the eco-sensitive zone could go up-to 10 Kms around a protected area as provided in the	Guidelines for declaration of Eco-Sensitive Zones Around National Parks and Wild Life Sanctuaries, MoEF, 2011

Sr. No.	Particular	Definitions	Source
		Wildlife Conservation Strategy-2002. In case where sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkages, are even beyond 10 Kms width, these should be included in the eco-sensitive zone. Further, even in context of a particular protected area, the distribution of an area of eco-sensitive zone and the extant of regulation may not be uniform all around and it could be of variable width and extent.	
11	Environmentally sensitive zone/ area	Environmental sensitive zones may be defined as areas with identified environmental resource with 'incomparable values' which require special attention for their conservation. All Earthquake/landslide prone, cliffs and environmentally hazardous area, areas adjacent to fault lines, areas with slope higher than 45 degree (NBC, 2005), flood plain, wetlands and areas adjacent to major drainage lines for general guidance, other areas identified by State Disaster Management Authority to be included in the environmentally sensitive areas.	National Environmental Policy, 2006 ; NBC, 2005, and Aizwal Master Plan
12	Preparedness	"Preparedness" means the state of readiness to deal with a threatening disaster situation or disaster and the effects thereof	The Disaster Management Act, Ministry of Law and Justice, 2005
13	Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.	Brundtland Commission, 1987
<b>Chapter 8: Simplified Planning Techniques</b>			
1	GIS (Geographical Information System)	A system which provides computerized mechanisms for integrating various geo information data sets and analysing them in order to generate information relevant to planning needs in a context.	Indian Space Research Organisation
2	Mapping	Representation of earth's pattern as a whole or part of it on a plane surface with conventional signs, drawn to a scale and projection so that each and every point on it corresponds to the actual terrestrial position.	UDDPFI Guidelines
3	Primary Data	Data collected for the first time and is always given in the form of raw material and original in character.	--
4	Remote Sensing	Science of acquiring information about the Earth's surface without actually being in contact with it.	National Remote Sensing Centre
5	Secondary Data	Second hand data initially collected by some other investigator for other purpose but used by an investigator for his/her own purpose later.	--
<b>Chapter 9: Infrastructure</b>			
1	Adult Education Centre	A premise having the facility of formal education and training to adults with flexible timings.	Master Plan for Delhi, 2021
2	Anganwari	Anganwari as space provision at residential housing/ neighbourhood level is a centre to provide service for children of 0-6yrs age, pregnant women, feeding mothers, etc. under the Integrated Child Development Scheme (ICDS).	Master Plan for Delhi, 2021
3	Artificial Recharge	Artificial recharge to ground water is a process by which the ground water reservoir is augmented at rate exceeding that under natural conditions of replenishment.	Rain water Harvesting Techniques, Ministry Of Water Resources Central Ground Water Board, 2003
4	Banquet hall	A premise to hold small public gatherings, community functions, marriages etc.	Master Plan for Delhi: 2021
5	Burial ground	A premise with facilities for burying of dead bodies.	Master Plan for Delhi: 2021
6	Bus Terminal	A premise used by public transport agency to park the buses for short duration to serve the population. It may include the related facilities for passengers.	Study on Zoning Regulation, TCPO, 2004

## Appendix B- Basic Planning Definition

Sr. No.	Particular	Definitions	Source
7	Central/State Government Office	A premise used for the offices of Central/State Government.	Study on Zoning Regulation, TCPO, 2004
8	Civil defence and home guards etc.	A premise having facilities for offices and other functions of civil organization for internal defence.	Master Plan for Delhi: 2021
9	Continuous Water Supply/ 24-7 Water Supply	24-7 supply is achieved when water is delivered continuously to every customer of the service 24 hours a day, every day of the year, through a transmission and distribution system that is continuously full and under positive pressure throughout all of its pipelines and networks.	Guidance Notes for Continuous Water System, MoUD, 2009
10	Convenience Shopping centre	A group of shops in residential area serving a population of about 5000 persons and if required for 2,000 persons in hill residential areas	Master Plan for Delhi: 2021 & Study on Zoning Regulation, TCPO, 2004
11	Crèche and Day care Centre	A premise having nursing facilities for young children during day time. The center may be managed by an individual or an institution on commercial or non-commercial basis.	Study on Zoning Regulation, TCPO, 2004
12	Cremation ground	A premise with facilities of performing last rites of dead bodies by burning.	Master Plan for Delhi: 2021
13	Crematorium	A premise with facilities for last rites of the deceased.	Master Plan for Delhi: 2021
14	Decentralised Wastewater Management	The collection, treatment, and disposal/reuse of wastewater from individual homes, clusters of homes, isolated communities, industries, or institutional facilities, as well as from portions of existing communities at or near the point of waste generation	Guidelines For Decentralized Wastewater Management, MoUD, 2012
15	Dharamshala and its equivalent	A premise providing temporary accommodation for short duration on no profit basis.	Master Plan for Delhi: 2021
16	Dhallao and Dustbin	A premise used for collection of garbage for its onward transportation	Study on Zoning Regulation, TCPO, 2004
17	District Centre	A group of shops in residential area serving a population of about 500000 persons.	Master Plan for Delhi: 2021
18	District Meter Area	The term district metering is used to describe the method whereby flow meters are installed on all major supply lines and strategic points within the distribution system.	O & M Manual, Kolkata Metropolitan Water & Sanitation Authority
19	Disaster management centre	A premise having facility of disaster emergency, backup, hospital facility, training centre for disaster preparedness, wireless communication etc.	Master Plan for Delhi: 2021
20	Dispensary	A premise having facilities for medical advice and provision of medicine, managed by public or charitable institutions.	Master Plan for Delhi: 2021
21	Dispensary for pet animal and birds	Premises having facilities for medical advice and provision of medicines to pet animals and birds, managed by public/ private or charitable institutions.	Master Plan for Delhi: 2021
22	District police office and battalion	A premise having facilities for the offices and paramilitary forces.	Master Plan for Delhi: 2021
23	Electric Sub-Station	A premise having electrical installation and transformer for distribution of power.	Study on Zoning Regulation, TCPO, 2004
24	Effluent	The wastewater that flows out of a treatment system (in this case septic tank) or supernatant liquid discharged from the septic tank.	Advisory Note: Septage Management In Urban India, MoUD, 2013
25	Exhibition-cum Fair Ground	A premise having facilities for the exhibition and display and other cultural activities for a group of participants.	Master Plan for Delhi: 2021
26	Farm house	A dwelling house on a farm.	Master Plan for Delhi:

## Appendix B- Basic Planning Definition

Sr. No.	Particular	Definitions	Source 2021
27	Fire post	Premises with lesser degree of facilities for firefighting. The post may be attached to specific premises with fire prone activities.	Master Plan for Delhi: 2021
28	Fire station	A premise having facility for firefighting for a catchment area assigned to it. It may include residence of essential staff.	Master Plan for Delhi: 2021
29	Fire training institute	A premise having facilities of training for emergency times in case of fire, building collapse etc.	Master Plan for Delhi: 2021
30	Gas Godown	A premise having the facility of wholesale storage of LPG, godown, etc.	Master Plan for Delhi: 2021
31	<i>GauShala</i> / Dairy farm	A premise with facilities for rearing and processing of dairy products. It may have temporary structure for sheds of animals and birds.	Study on Zoning Regulation, TCPO, 2004
32	General and head post office with administrative office	A premise with facility for postal and telecommunication to and from a number of post offices attached to it.	Master Plan for Delhi: 2021
33	Government Land	Land owned by the Central/State/Local Govt.	Study on Zoning Regulation, TCPO, 2004
34	Hospital	A premise providing medical facilities of general or specialised nature for treatment of indoor and outdoor patients. It may be managed by public, private or charitable institution.	Master Plan for Delhi: 2021
35	Hotel	A premise used for lodging of 15 persons or more.	Master Plan for Delhi: 2021
36	Informal Unit	Retail/service unit, stationary or mobile, work place without roof including small Khokhas on roadside	Study on Zoning Regulation, TCPO, 2004
37	International convention centre	A premise having all facilities for international /national conferences, meetings, symposium etc.	Master Plan for Delhi: 2021
38	Jail	A premise with facilities for detention, confinement and reform of criminals under the law.	Master Plan for Delhi: 2021
39	Library/ reading room	A premise having a large collection of books for reading and reference for general public or specific class.	Study on Zoning Regulation, TCPO, 2004
40	Local shopping centre	A group of shops in residential area serving population of 15,000 persons.	Master Plan for Delhi: 2021
41	LPG godown including booking office	A premise for the booking, storing and supply of LPG to local population.	Master Plan for Delhi: 2021
42	Multipurpose community hall, barat ghar	A premise having an enclosed space for various social and cultural activities.	Master Plan for Delhi: 2021
43	Municipal Solid Waste	According to MSW Rules 2000, MSW includes commercial and residential wastes generated in municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes.	Toolkit for Solid Waste Management, Ministry of Urban Development, 2012
44	Night Shelter	A premise having the facility for providing the night accommodation to individuals without any charges. It may be run by local government or voluntary agencies.	Master Plan for Delhi: 2021
45	Nursing Home/ Maternity home/ Polyclinic	A premise having medical facilities for indoor and outdoor patients having upto 50 beds. It may be managed by a doctor or a group of doctors. In case of polyclinic, it shall be managed by a group of doctors.	Master Plan for Delhi: 2021
46	Old Age Home/ Care Centre for	A premise having the facility of caring and training boarding and lodging of the elderly/ physically/ mentally challenged.	Master Plan for Delhi: 2021

## Appendix B- Basic Planning Definition

Sr. No.	Particular	Definitions	Source
	Physically/ Mentally Challenged		
47	Observatory & Weather Office	A premise with facilities for research and development of data relating to weather and forecasting thereof.	Master Plan for Delhi: 2021
48	Orphanage	A premise having the facility of boarding of children who are bereaved of parents. It may or may not have educational facilities.	Master Plan for Delhi: 2021
49	Park	A premise used for recreational/leisure activities. It may have on it related landscaping, parking facilities, public toilet, fencing etc. It will include lawns, open spaces, green etc.	Study on Zoning Regulation, TCPO, 2004
50	Play Ground	A premise used for outdoor games. It may have on it landscaping, parking facilities, public toilet, etc	Study on Zoning Regulation, TCPO, 2004
51	Police firing range	A premise having facilities for firing practice of the paramilitary forces.	Master Plan for Delhi: 2021
52	Police Line	An area having facilities for work and residential accommodation of paramilitary forces.	Master Plan for Delhi: 2021
53	Police post	A premise having facility for a local police post of a temporary nature or on smaller scale as compared to a police station.	Master Plan for Delhi: 2021
54	Police station	A premise having facilities for offices of local police post.	Master Plan for Delhi: 2021
55	Police training institute/ college	A premise having facilities for training of paramilitary forces.	Master Plan for Delhi: 2021
56	Primary health centre/family welfare centre/ Diagnostic Centre	A premise having facilities for treating indoor and outdoor patients having upto 10-15 beds. It may be managed by a public or charitable institution on non-commercial basis. It includes family welfare centre and maternity home.	Master Plan for Delhi: 2021
57	Primary School	A premise having educational and playing facilities for students upto V standard.	Study on Zoning Regulation, TCPO, 2004
58	Radio and TV Station	A premise with facilities for recording, broadcasting and transmission of news and other programmes through the respective medium. It may include some hostel accommodation for guest artists, transmission facilities like towers, etc.	Study on Zoning Regulation, TCPO, 2004
59	Rain Water Harvesting	Rain water harvesting is the technique of collection and storage of rain water at surface or in sub-surface aquifers, before it is lost as surface run-off.	Rain water Harvesting Techniques, Ministry Of Water Resources Central Ground Water Board, 2003
60	Recreational Club	A premise having the facility for recreation with indoor sports, swimming pool, outdoor sports, socializing and gathering space for small functions with restaurant.	Master Plan for Delhi: 2021
61	Regional MSW Facility/Mana gement	A 'Regional MSW Facility' means a waste management facility or system of any kind (whether in relation to collection, transportation, treatment or disposal of MSW or a combination of any or all of them), which collects, manages or receives or disposes (as the case may be) MSW from more than one Authority.	Municipal Solid Waste Management on a Regional Basis, Ministry of Urban Development
62	Retail Shop	A premise for sale of commodities directly to consumer with necessary storage	Study on Zoning Regulation, TCPO, 2004
63	Research and Development Center	A premise providing facilities for research and development in any specific field.	Study on Zoning Regulation, TCPO, 2004
64	Restaurant	A premise used for serving food items on commercial basis including cooking facilities. It may have covered or open space or both for sitting arrangement.	Master Plan for Delhi: 2021

## Appendix B- Basic Planning Definition

Sr. No.	Particular	Definitions	Source
65	Street	Any means of access, namely, highway, street lane, pathway, alley, stairway, passageway, carriageway, footway, square, place or bridge, whether a thoroughfare or not, over which the public have a right of passage or access or have passed and had access uninterruptedly for a specified period, whether existing or proposed in any scheme, and includes all bunds, channels, ditches, storm-water drains, culverts, sidewalks, traffic islands, roadside trees and hedges, retaining walls, fences, barriers and railings within the street lines.	National Building Code: 2005
66	Secondary School	A premise having educational and playing facilities for students from VI to X standard.	Study on Zoning Regulation, TCPO, 2004
67	Senior Secondary School	A premise having educational and playing facilities for students from X to XII standard.	Study on Zoning Regulation, TCPO, 2004
68	Septage	The settled solid matter in semi-solid condition usually a mixture of solids and water settled at the bottom of septic tank. It has an offensive odour, appearance and is high in organics and pathogenic microorganisms.	Advisory Note: Septage Management In Urban India, MoUD, 2013
69	Septic tank	An underground tank that treats wastewater by a combination of solids settling and anaerobic digestion.	Advisory Note: Septage Management In Urban India, MoUD, 2013
70	Sludge	The settled solid matter in semi-solid condition – it is usually a mixture of solids and water deposited on the bottom of septic tanks, ponds, etc.	Advisory Note: Septage Management In Urban India, MoUD, 2013
71	Technical Training Centre/ Institute, Nursing and Paramedic Institute	A premise with facilities for training in discipline of technical nature. It includes technical school and industrial training institute.	Master Plan for Delhi: 2021
72	Traffic and police control room	A premise of temporary structures having facilities for managing of traffic and law & order related issues.	Master Plan for Delhi: 2021
73	Transit Oriented Development	“Transit Oriented Development is essentially any development, macro or micro that is focused around a transit node, and facilitates complete ease of access to the transit facility, thereby inducing people to prefer to walk and use public transportation over personal modes of transport.	UTTIPEC, Delhi Development Authority, 2012
74	Unaccounted-for Water / Non-Revenue Water	Unaccounted-for Water (UFW) is the difference between the quantity of water supplied to a city's network and the metered quantity of water used by the customers.	Manual on Water Supply and Treatment, CPHEEO, 1999
75	University Campus	A premise having an educational institution designed for instruction, examination, or both, of students in many branches of advanced learning, conferring degrees in various faculties, and often embodying colleges and similar institutions.	Master Plan for Delhi: 2021
76	Veterinary hospital for pet animal and birds	A premise having medical facilities for indoor and outdoor treatment of pet animal and birds. It may be managed by a public or charitable institution or on community basis.	Master Plan for Delhi: 2021
77	Veterinary Institute	A premise having educational and playing facilities for students of undergraduate and post graduate in veterinary courses along with research facilities under a university.	Master Plan for Delhi: 2021
78	Weekly market	An area used once in a week by a group of informal shop establishments in the form of a market. These markets shift from one area to another on different days of the week.	Master Plan for Delhi: 2021
79	Wholesale Trade	A premise from where goods and commodities are sold and delivered to retailers. The premise includes storage, godown and loading & unloading facilities.	Study on Zoning Regulation, TCPO, 2004

## Appendix B- Basic Planning Definition

Sr. No.	Particular	Definitions	Source
<b>Chapter 10: Simplified Development Promotion Regulations</b>			
1	Clinic	A premise with facilities for treatment of outdoor patients by a doctor.	Master Plan for Delhi : 2021
2	Floor Area Ratio (FAR)	The quotient obtained by dividing the total covered area (plinth area) on all floors by the area of the plot, FAR = Total covered area of the floors/Plot area	National Building Code: 2005
3	Group Housing	Housing for more than one dwelling unit, where land is owned jointly (as in the case of cooperative societies or the public agencies, such as local authorities or housing boards, etc) and the construction is undertaken by one agency.	National Building Code: 2006
4	Habitable Room	A room occupied or designed for occupancy by one or more persons for study, living, sleeping, eating, and kitchen, if it is used as a living room, but not including bathrooms, water-closet compartments, laundries, serving and store pantries, corridors, cellars, attics, and spaces that are not used frequently or during extended periods.	National Building Code: 2007
5	Open Spaces	An area, forming an integral part of the plot, left open to the sky.	National Building Code: 2008
6	Parking Space	An area enclosed or unenclosed, covered or open, sufficient in size to park vehicles, together with a drive-way connecting the parking space with a street or alley and permitting ingress and egress of the vehicles.	National Building Code: 2009
7	Post office	A premise with facility for postal communication for public use	Master Plan for Delhi : 2021 & Study on Zoning Regulation, TCPO, 2004
8	Poultry farm	A premise with facility for rearing and processing of poultry products. It may have temporary structures for sheds of birds.	Master Plan for Delhi : 2021
9	Residential Flat	Residential accommodation for one family/ household as part of group housing.	Master Plan for Delhi : 2021
10	Residential plot- Housing	A premise for one or more than one dwelling unit and may have on it one main building block and one accessory block for garages and service personnel.	Master Plan for Delhi : 2021
11	Service Apartment	A premise fully furnished, serviced and self-contained with meal preparation used for short-term corporate and accommodation	Master Plan for Delhi : 2021
12	Mumty	A structure with a roof over a staircase and its landing built to enclose only the stairs for the purpose of providing protection from weather and not used for human habitation	National Building Code: 2005
13	Tower like structures	Structures shall be deemed to be tower like structures when the height of the tower like portion is at least twice the height of the broader base at ground level.	National Building Code: 2005

Source: As given

## 3 Appendix C – PPP Models in existing scenario

### 3.1. Introduction

Public Private Partnership (PPP) is infusion of private capital and management in provision of services that have traditionally been provided by the government. Adequate risk transfer from the government to the private sector is a key feature of PPPs along with the delivery of high-quality and cost-effective services to consumers and the government<sup>1</sup>.

### 3.2. Existing scenario

Reforms of 1990 brought/started economic liberalisation in India. The role of government underwent transformation from provider to facilitator as a result. Initially it was in the form of privatisation but after following international experiences PPP was introduced in India. The tendency of the private sector to undervalue social infrastructure, and the large sunk costs associated with providing much economic infrastructure, has been obstacle to privatization. Thus PPPs began to emerge significantly as a means of obtaining private sector capital and management expertise for infrastructure investment (both to carry on where privatization had left off and as an alternative where there had been obstacles to privatization).

It has emerged as one of the leading PPP markets in the world, due to several policy and institutional initiatives taken by the central as well as many state governments. Over the years an elaborate ecosystem for PPPs has developed, including institutions, developers, financiers, equity providers, policies and procedures<sup>2</sup>.

The growing role of PPP in India has led for the requirement of national policy. As a result Government of India in 2011 published a draft National PPP Policy which is under public consultation currently.

### 3.3. Public Private Partnership: Alternate Definitions

- **Government of India:**

'PPP means an arrangement between a government or statutory entity or government owned entity on one side and a private sector entity on the other, for the provision of public assets and/ or related services for public benefit, through investments being made by and/or management undertaken by the private sector entity for a specified time period, where there is a substantial risk sharing with the private sector and the private sector receives performance linked payments that conform (or are benchmarked) to specified, pre-determined and measurable performance standards.'

- **The International Monetary Fund (IMF):**

'Public-private partnerships (PPPs) refer to arrangements where the private sector supplies infrastructure assets and services that traditionally have been provided by the government.' (IMF 2004,)

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<sup>1</sup>Sources: Public Private Partnership, IMF, 2004

<sup>2</sup>Source: National PPP Policy 2011 - Draft for Consultation

### ■ **The World Bank:**

'PPP programs are projects that are for services traditionally provided by the public sector, combine investment and service provision, see significant risks being borne by the private sector, and also see a major role for the public sector in either purchasing services or bearing substantial risks under the project.' (World Bank 2006)

### ■ **The Asian Development Bank (ADB):**

'PPPs broadly refer to long-term, contractual partnerships between the public and private sector agencies, specifically targeted towards financing, designing, implementing, and operating infrastructure facilities and services that were traditionally provided by the public sector (ADB 2006)

### ■ **The European Union:**

'A PPP is the transfer to the private sector of investment projects that traditionally have been executed or financed by the public sector' (European Commission 2003).

## 3.4. Public Private Partnership (PPP) in India

PPP in India has evolved in the past decade and several projects of PPP have been completed in infrastructure sector apart from residential/commercial development and these can be considered for understanding the critical aspects of such project implementation in future.

Some of the case studies are as follow:

1. Alandur Underground Sewerage Project
2. Timarpur Okhla Integrated Municipal Solid Waste Management Project
3. Hyderabad Metro
4. Vadodara Halol Toll Road

These projects were considered owing to the key learning and observations derived from them, some to be emulated and others to be mitigated. Each of the case studies belongs to different sectors.

### **Alandur Underground Sewerage Project:**

The Alandur Sewerage Project (ASP) was initiated in the year 1996. The ASP was the first project in the municipal water sector to be taken through the Public Private Partnership route in India. The proposed sewerage system was to be designed for the estimated population of about 300,000 in 2027 and was planned to be completed within a five-year period from its inception date.

Alandur Municipality (AM), located adjacent to Chennai, forms a part of the Chennai Metropolitan Area. With a population of around 165,000 (Census of India, 2011), the municipality is a residential suburb of Chennai with predominantly residential and commercial activities. Approximately one-fourth of its population lives in slums. Prior to 1996, the town did not have an underground sewerage system and all sewage was managed with individual septic tanks. In 1996, AM announced an ambitious plan to construct an underground sewerage system and wastewater treatment facility with the participation of the private sector, contribution from the public, and payment to be provided by the city.

The Alandur Municipality worked in partnership with the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL), the state asset management company and with USAID’s Financial Institution Reform and Expansion (FIRE) Project.

The construction of the underground sewerage system in Alandur town was done on a BOQ (Bill of Quantities) basis, and the sewerage treatment plant (STP) on a BOT (Build, Operate and Transfer) basis. Besides the construction responsibility, the contractor was also required to undertake the operation and maintenance of the sewerage system for a period of five years from the date of completion of the construction, on a fixed fee basis. The collection of tariff and provision of new connections during the O&M phase was to be undertaken by the municipality directly. Key features of the project are given below:

Table 3.1: Alandur Sewerage Project Details

Alandur Underground Sewerage Project	
<b>PPP Project Structure &amp; Concession Period</b>	O&M Contract (5 Years) BOT Annuity (14 Years)
<b>State and year PPP contract signed</b>	Tamil Nadu 2005
<b>Project Cost</b>	INR 41.28 Crore
<b>Salient Features</b>	<ul style="list-style-type: none"> <li>• The construction of the underground sewerage system in Alandur town, involving the laying of pipes, construction of pumping station, etc., was done on a BOQ (Bill of Quantities) basis, and the Sewerage Treatment Plant (STP) on a BOT (Build, Operate and Transfer) basis.</li> <li>• Besides the construction responsibility, the contractor was also required to undertake the operation and maintenance of the sewerage system for a period of five years from the date of completion of the construction, on a fixed fee basis.</li> <li>• The collection of tariff and provision of new connections during the O&amp;M phase was to be undertaken by the municipality directly</li> </ul>
<b>Key Learning</b>	<ul style="list-style-type: none"> <li>• Beneficiary participatory approach</li> <li>• Stakeholder involvement and interdepartmental coordination</li> <li>• Political will and strong decision making, especially at the grass-root level</li> <li>• Acceptance of fiscal discipline</li> <li>• Implementing an effective fee system</li> <li>• Assurances on payment to the Private Sector Participant</li> <li>• Access to finance for the municipality</li> <li>• Technical and financial assistance from other institutions</li> <li>• Transparency in bidding and contracting procedures</li> </ul>

Source: [Public Private Partnership Projects in India, Compendium of Case Studies, Department of Economic Affairs, Ministry of Finance, Government of India](#)

Public Private Partnership Projects in India, Compendium of Case Studies, Department of Economic Affairs, Ministry of Finance, Government of India

### Timarpur Okhla Integrated Municipal Solid Waste Management Project

Delhi generates 7,000 metric tonnes (MT) of Municipal Solid Waste (MSW) daily, which is expected to increase to 18,000 MT by 2021. The present landfill sites that are being utilized for disposing the garbage are approaching their full capacity. Municipal Corporation of Delhi (MCD) has thus embarked on a project to reduce the amount of MSW being disposed in the landfill sites and utilizing the waste for productive purposes such as generation of power from waste. MCD has identified two locations, namely Timarpur and Okhla, for implementing this project. The project has been undertaken on Built, Own, Operate and Transfer (BOOT) basis.

The project is registered with the United Nations Framework Convention on Climate Change (UNFCCC) for the Clean Development Mechanism (CDM) to earn 2.6 million Certified Emission Reductions (CERs) over a ten-year period.

Table 3.2: Timarpur-Okhla Integrated MSWM Project details

Timarpur Okhla Integrated Municipal Solid Waste Management Project	
<b>PPP Project Structure &amp; Concession Period</b>	BOOT (25 Years)
<b>State and year PPP contract signed</b>	Delhi 2008
<b>Project Cost</b>	INR 200 Crore
<b>Salient Features</b>	<ul style="list-style-type: none"> <li>Infrastructure included plants for converting MSW to Refuse Derived Fuel (RDF), capable of processing 1300 TPD at Okhla and 650 TPD at Timarpur, a bio-methanation plant capable of handling of 100 TPD of green waste at Okhla, a water recovery plant capable of handling up to 6 MLD of treated sewage at the Okhla site for recycling into process water and cooling water and a Power plant with a generation capacity of 16 MW at Okhla</li> <li>The salient features included - Solid and liquid waste can be treated in the same complex. The treatment process is well integrated in terms of inputs and output. The complex generates compost and methane from the Bio-methanation process, fuel from the RDF plant and power from the RDF fluff and methane.</li> </ul>
<b>Key Learning</b>	<ul style="list-style-type: none"> <li>Project Preparedness</li> <li>Government Support</li> <li>Innovative Use of Technology</li> <li>Consumer Education</li> </ul>

Source: [Public Private Partnership Projects in India, Compendium of Case Studies, Department of Economic Affairs, Ministry of Finance, Government of India](#)

### Hyderabad Metro

Hyderabad is a growing city that covers 625 square kilometres of municipal corporation area and 6,852 square kilometres of metropolitan area. The burgeoning population has put Hyderabad's transportation system under immense pressure. To address this need, the Government of Andhra Pradesh (GoAP) has planned a Mass Rapid Transit system (MRTS) covering three high traffic density corridors of Hyderabad. The project is planned to be developed on a PPP basis through the Build Operate Transfer (BOT) mode.

Hyderabad Metro Rail Ltd, a fully owned Public Sector Undertaking of GoAP is currently implementing the Hyderabad Metro Rail Project. The project is to be developed under a concession agreement on BOT basis. Under the concession agreement, the operator has to design, finance, construct, operate, and maintain the 3 corridors and transfer the assets at the end of the concession period.

Table 3.3: Hyderabad Metro Details

Hyderabad Metro Project	
<b>PPP Project Structure &amp; Concession Period</b>	BOT (35 Years)
<b>State and year PPP contract signed</b>	Andhra Pradesh 2008
<b>Project Cost</b>	INR 200 Crore
<b>Salient Features</b>	<ul style="list-style-type: none"> <li>Under the concession agreement, the operator has to design, finance, construct, operate, and maintain the 3 corridors and transfer the assets at the end of the concession period.</li> <li>In addition, the operator would also have access to the commercial development of land available at the depots (212 acres) and 10% of the carpet area of the station sites identified in the concession agreement. This aggregates to a cumulative maximum of 12.5 million square feet in the case of depots and a cumulative maximum of 6 million square feet in the case of stations.</li> </ul>

### Hyderabad Metro Project

- The SPV would also be allowed to undertake real estate development over the parking and circulation areas at stations.

#### Key Learning

- Real Estate Development along with metro project
- Transfer of Traffic Risk
- Creation of Right of Way
- Issues of Promoter Backing

Source: [Public Private Partnership Projects in India, Compendium of Case Studies, Department of Economic Affairs, Ministry of Finance, Government of India](#)

### Vadodara Halol Toll Road

VHTR was an initiative commissioned as a part of the Vision 2010 – an infrastructure master plan developed by the Government of Gujarat (GoG). The project involved widening and strengthening of 32 kilometres (km) of the existing two-lane State Highway (SH 87) connecting Vadodara to the industrial town of Halol into a four-lane tolled expressway.

The Vadodara Halol Toll Road (VHTR) was one of the first State Highway widening projects developed on a Public Private Partnership basis in India and it has subsequently paved the way for a large number of projects to be undertaken on a similar format in Gujarat and the rest of India.

The VHTR project is developed under the Built, Own, Operate and Transfer (BOOT) basis.

Table 3.4: Vadodara Halol Toll Road Details

### Vadodara Halol Toll Road Project

<b>PPP Project Structure &amp; Concession Period</b>	BOOT (30 Years)
<b>State and year PPP contract signed</b>	Gujarat 1998
<b>Project Cost</b>	INR 161 Crore
<b>Salient Features</b>	<ul style="list-style-type: none"> <li>• Under the concession agreement, construction aspects included design and completion of the road, including the pavement, cross drainage system, bridges, toll facilities, medians, separators, road furniture, and horticultural aspects.</li> <li>• The O&amp;M aspects included the toll collection, operating the toll plaza, traffic regulation and maintenance of the facility. It also includes special maintenance activities such as eliminating potholes in the pavements, replacing drainage structures, road markings and signage, cleaning lanes, shoulders, right-of-way strips, structures, maintaining operational installations and drainage facilities.</li> </ul>
<b>Key Learning</b>	<ul style="list-style-type: none"> <li>• The criticality of pre development market assessment</li> <li>• Competitive bidding can ensure a better deal</li> <li>• Need to create a balanced risk return profile</li> <li>• Conflicts of Interest should be identified early and avoided</li> <li>• Innovative Financing Mechanisms</li> <li>• Environmentally and socially responsive development framework</li> </ul>

Source: [Public Private Partnership Projects in India, Compendium of Case Studies, Department of Economic Affairs, Ministry of Finance, Government of India](#)

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## 4 Appendix D – List of ITPI recognised Institutes

Table 4.1: List of Institutes offering various courses in Town Planning and recognised by ITPI

Sr. No.	State	Institute
1	Punjab	Guru Ramdas School of Planning, Amritsar
2	Haryana	Amity University*,Gurgaon
3	NCT Delhi	School of Planning and Architecture , New Delhi Institute of Town Planners, India
4	Uttarakhand	Indian Institute of Technology, Roorkee
5	Uttar Pradesh	GautamBudh University*, Greater NOIDA Amity University* , NOIDA
6	Madhya Pradesh	Maulana Azad National Institute of Technology (MANIT), Bhopal  School of Planning and Architecture, Bhopal
7	Uttar Pradesh	GautamBudh University*, Greater NOIDA Amity University* ,NOIDA
8	Madhya Pradesh	Maulana Azad National Institute of Technology (MANIT), Bhopal School of Planning and Architecture, Bhopal
9	Jharkhand	BIT*, Mesra, Ranchi
10	West Bengal	IIT, Kharagpur Bengal Engineering and Science University, Shibpur
11	Bihar	NIT, Patna
12	Gujarat	CEPT University, Ahmedabad Sardar Vallabhbhai Patel National Institute of Technology, Surat Bhai Kaka Centre for Human Settlements, Arvind Bhai Patel Institute of Environmental Design,VallabhVidhyanagar
13	Maharashtra	Government College of Engineering, Pune Vishvesharaiya National Institute of Technology, Nagpur
14	Rajasthan	Malviya National Institute of Technology *
15	Andhra Pradesh	JNTU, Hyderabad School of Planning & Architecture , Vijaywada
16	Karnataka	Institute of Development Studies, Mysore
17	Tamil Nadu	School of Architecture& Planning, Chennai
18	Kerala	College of Engineering, Thiruvananthapuram

Source: Planning and Development, 2025: Professional and Academic Challenges, TCPO

\*Applicants under recognition process by ITPI

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## 5 Appendix E – Biodiversity Index Indicator

Table 5.1: Biodiversity Index Indicators

S.No.	Indicators	Calculation	Score Range
1	Proportion of Natural Areas in the city	$(\text{Total Area of Natural Areas}) \div (\text{Total Area of the City}) \times 100$	0 point: <1% 1 point: 1%-6% 2 points: 7%-13% 3 points: 14%-20% 4 points: >20%
2	Connectivity measures or ecological networks to counter habitat fragmentation	$(1 / A \text{ total})(A12 + A22 + A32 + \dots + A_n2)$	1 point <0.787 2 points 0.787-0.883 3 points 0.884-0.979 4 points >0.979
3	Native bird species in built up areas (other than natural areas)	Number of bird species in built-up areas	1 point < 10 2 points 11-23 3 points 24-53 4 points >53
4	Change in number of native species <sup>3</sup>	Net change in number of native species	1 point: No loss of species 2 points: 1 species increase 3 points: 2 species increase 4 points: 3 species or more increase
5	Proportion of natural protected areas	$(\text{Area of protected or secured natural areas}) \div (\text{Total area of the city}) \times 100$	N.A.
6	Proportion of invasive alien species of vascular plants (as opposed to native species)	$(\text{Number of invasive alien species}) \div (\text{Number of native species}) \times 100$	0 point: >30% 1 point: 21%-30% 2 points: 11%-20% 3 points: 1%-10% 4 points <1%
7	Regulation of quantity of water	$(\text{Total permeable area}) \div (\text{Total terrestrial area of the city})$	1 point <0.307 2 points 0.307-0.4785 3 points 0.4786-0.65 4 points >0.65
8	Climate regulation: carbon storage and cooling effect of vegetation	$(\text{Tree canopy cover}) \div (\text{Total terrestrial area of the city}) \times 100$	1 point <0.07454 2 points 0.07454-0.160 3 points 0.160-0.339 4 points >0.339
9	Tree canopy cover on terrestrials area	Tree Count and Tree Cover Mapping	N.A.
10	Recreational and education services (areas of park with natural areas and protected or secured natural areas per 1000 persons)	$(\text{Parks Area with natural areas and protected or secured natural areas}) \div 1000 \text{ persons}$	0 point: <0.1 ha/ 1000 persons 1 point: 0.1-0.3 ha/ 1000 persons 2 points: 0.4-0.6 ha/ 1000 persons 3 points: 0.7-0.9 ha/ 1000 persons 4 points: >0.9 ha/ 1000 persons
11	Recreational and education services (Number of formal educational visit per child per park)	Number of visits per year	0 point: 0 formal educational visit/ year 1 point: 1 formal educational visit/ year 2 points: 2 formal educational visit/ year 3 points: 3 formal educational visit/ year 4 points: >3 formal educational visit/ year 4

<sup>3</sup>Indicators 4-8 (Vascular plants, Birds, Butterflies, Reptiles, Freshwater fish)

## Appendix E- Biodiversity Index Indicator

S.No.	Indicators	Calculation	Score Range
12	Budget allocation for biodiversity	(Amount spent on biodiversity related administration) ÷ (Total budget of city)	1 point <0.74 2 points 0.74-2.50 3 points 2.51-4.26 4 points >4.26
13	Number of biodiversity projects implemented in the city per year	Number of biodiversity projects implemented in the city per year	1 point <4 2 points 4-9 3 points 10-14 4 points >14
14	Rules, regulations and policy – existence of local biodiversity strategy and action plan	Existence of local biodiversity strategy and action plan (LBSAP), National Biodiversity Strategy and Action Plan (NBSAP)	0 point: No LBSAP 1 point: LBSAP not aligned with NBSAP 2 points: LBSAP incorporates elements of NBSAP, but does not include any CBD initiatives 3 points: LBSAP incorporates elements of NBSAP, and includes 1-3 CBD initiatives 4 points: LBSAP incorporates elements of NBSAP, and includes more than 4 CBD initiatives
15	Institutional capacity – Essential biodiversity - related function	Number of essential biodiversity related functions includes biodiversity centres, botanical gardens, herbaria, zoological gardens or museums, insectariums, etc.	1 point: 1 function 2 points: 2 function 3 points: 3 function 4 points: > 3 function
16	Institutional capacity – Inter Agency Cooperation	Number of city or local government agencies involved in inter-agency corporation pertaining to biodiversity matters	0 point: 1 or 2 agencies cooperate on biodiversity matters 1 point: 3 agencies cooperate on biodiversity matters 2 points: 4 agencies cooperate on biodiversity matters 3 points: 5 agencies cooperate on biodiversity matters 4 points: More than 5 agencies cooperate on biodiversity matters
17	Participation and partnership: public consultation process	Existence and state of formal or informal public consultation process pertaining to the biodiversity related matters	0 point: No routine or informal process 1 point: Formal or informal process being considered as part of the routine process 2 points: Formal or informal process being planned as part of the routine process 3 points: Formal or informal process in the process of being implemented as part of the routine process 4 points: Formal or informal process exists as part of the routine process
18	Participation and partnership: Institutional partnership	Number of institutional partnerships	0 point: No formal/ informal partnership 1 point: City in partnership with 1-6 other national or sub-national agencies/ private company/ NGO/ academic institutions/ international organizations 2 points: City in partnership with 7-12 other national or sub-national agencies/ private company/ NGO/ academic institutions/ international organizations

S.No.	Indicators	Calculation	Score Range
			<p>3 points: City in partnership with 13-19 other national or sub-national agencies/ private company/ NGO/ academic institutions/ international organizations</p> <p>4 points: City in partnership with 20 or more other national or sub-national agencies/ private company/ NGO/ academic institutions/ international organizations</p>
19	Is biodiversity or nature awareness included in the school curriculum?	Based on the query "Is biodiversity or nature awareness is included in the school curriculum?"	<p>0 point: Biodiversity or elements of it are not covered in the school curriculum</p> <p>1 point: Biodiversity or elements of it are being considered for inclusion in the school curriculum</p> <p>2 points: Biodiversity or elements of it are being planned for inclusion in the school curriculum</p> <p>3 points: Biodiversity or elements of it are in the process of being implemented in the school curriculum</p> <p>4 points: Biodiversity or elements of it are included in the school curriculum</p>
20	Education and awareness: public awareness events	Number of natural awareness and Biodiversity events in the city	<p>0 point: 0 outreach events/year</p> <p>1 point: 1-59 outreach events/year</p> <p>2 points: 60-149 outreach events/year</p> <p>3 points: 150-300 outreach events/year</p> <p>4 points: &gt; 300 outreach events/year</p>

Source: Greater Hyderabad City Biodiversity Index, Greater Hyderabad Municipal Corporation, 2012

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## 6 Appendix F – Transport Survey Format

### 6.1. Review of Existing Studies, Reports and Plans

Name of studies / reports / Plans	Major Problems / Issues addressed	Major Strategies	Major Proposed Projects / Plans

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>

## 6.2. Ongoing and Planned Projects

**Description:** Ongoing, planned and proposed projects in the existing reports or studies, or identified by relevant agencies, should be summarized and listed.

**Survey Methods:** Literature review and interview survey with relevant agencies

Project / Programme	Cost Estimation	Implementing Agency	Brief description of project	Project Status						
				Completed	Ongoing / under construction	D/D Stage (Fund Committed)	Waiting Fund	Planning (F/S) Stage	On Pipeline or some movement	No Progress

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>

## 6.3. Outline of Road Network

		Metropolitan Area	Municipal Area	City Core
Road Length	National Highway length (km)			
	State Highway length (km)			
	Other Arterial Road length (km)			
	Secondary Road length (km)			
Road Density by road type	Road Density of Arterial Road (km/km <sup>2</sup> )			
	Road Density of all roads (km/km <sup>2</sup> )			
Major Road Infrastructure	Number of Rotaries			
	Number of signalised Inter sections			
	Number of Flyovers			
	Number of Railway Overbridge			
	Number of Railways Underpass			
	Number of Railway Railway Level crossing			

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	Optional / ITEM (Italic Font)



## 6.5. Inventory of Flyovers and Underpasses

Name of Flyover / Underpass	Location / direction of flyover / underpass	Length (m)	Width (m)	No. of Lanes	Width of footpath (m)		Traffic Volume (PCU/Day)
					Left	Right	

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>





### 6.8. Inventory of Traffic Control Facilities

	Metropolitan Area	Municipal Area	City Core
Number of traffic signals			
Existence of area traffic control system			
Type of signal operation (automatic or manual by Police)			

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	Optional / ITEM (Italic Font)







### 6.12. Availability of Public Transport Types / Para-Transit Modes

	City Core	Urban Area	Sub-urban Area
	(Available or not available)		
Inter city bus			
Large Bus			
Mini Bus			
Taxi			
Auto Rickshaws			
Cycle Rickshaws			
Hand pull Rickshaws			

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>









## 6.16. Summary of Traffic Accidents

	5 years ago	4 years ago	3 years ago	2 years ago	1 year ago
Total number of accidents					
involving pedestrians					
involving cyclists					
Involving cars					
Involving buses					
Number of injured or dead					
Number of dead					
Number of injured					
Identification of hazardous locations					
Major accident causes					

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	Optional / ITEM (Italic Font)

### 6.17. Summary of Enforcement

	Municipality Area	Metropolitan Area
Number of Traffic Police		
Existing Traffic Regulations		
Costs and types of violations		
Fines for traffic violations		
Number of police trap activities		
Manner of enforcement		
Organizational structure of enforcement body		

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	Optional / ITEM (Italic Font)

## 6.18. Inventory of Agencies / Organizations Relating to Urban Transport

Name of agency/department	Function and responsibility of agency/department	Relationship to other agency	Organization chart	Number of staffs	Annual Budget	Profitability and financial sustainability (only for operators)
State Government						
Transport Department						
Public Works Department						
Regional Transport Authority						
State Transport Company						
Municipality						
Metropolitan Development Authority						
State Government						
Transport Department						
Bus Operators						
Associations of Rickshaws or Taxis						
Ferry Operators						
Other relevant agencies (if any)						

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	Optional / ITEM (Italic Font)

### 6.19. Assessment of Planning, Implementation and Coordination Capacity

	Assessment
<b>Planning and Implementation Capacity:</b>	
Staffing capacity for urban transport planning	
Data capture capability e.g. systems for periodic traffic data collection	
Financial resources to implement planned transportation projects	
Experience in Public-Private Partnerships (PPP)	
<b>Coordination Capability:</b>	
Control over small private developers in planning supporting infrastructure	
Systems or processes to integrate transport and urban planning agencies	
Systems or process to integrate land use plans with transport plans	
Role and impact of workers/transport operator’s unions	
Division of duties between State Government and Urban Local Bodies (ULB)	
Planning and Implementation Capacity:	

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>

## 6.20. Inventory Environmental Monitoring Data

	Standard	Location 1	Location 2	Location 3	Location 4	Location 5
Ambient for Air Quality Data						
NO <sub>x</sub>						
SO <sub>x</sub>						
Pb						
Noise						
Water Quality						

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>

### 6.21. Typical Urban Transport Issues

Issue	Severity
<b>Traffic Congestion</b>	
City-Wide Traffic Congestion	
Traffic Congestion on Major Roads at Peak Hours	
Narrow Streets Contributing to Congestion	
Waiting or Parked Vehicles Contributing to Congestion	
Slow Vehicles (Bicycle, Cycle Rickshaw, Auto Rickshaw, Two wheeler)	
Contributing to Congestion	
<b>Existing Bus System</b>	
Lack of (Public) Bus Operator	
Lack of Bus Routes (i.e. bus routes are far from residence/commercial area)	
Lack of Bus Vehicles	
Poor Maintenance of Publicly Operated Bus Vehicles (e.g. level of breakdowns and pollution generation)	
Poor Maintenance of Privately Operated Bus Vehicles	
Proliferation of Disorganized Private Bus Services (including mini buses)	
Low Profitability of Bus Operators	
Lack of Bus Driver Training	
<b>Parking</b>	
Major Streets are too Narrow for Parking	
Problems Caused by Parking of Private Vehicles	
Problems Caused by Parking/Waiting of Rickshaws and Auto-Rickshaws	
Lack of Parking Areas at Station/Bus Terminals	
Lack of Land for Off-Street Parking Lots	
Lack of Regulations for Parking Measures (including development control standards)	

<b>Issue</b>	<b>Severity</b>
Parking Policy and Guidelines	
<b>Safety</b>	
Vehicle-Vehicle Accidents	
Accidents Involving Pedestrians	
Accidents Involving Cyclists	
Accidents Involving Auto/Cycle Rickshaws	
Level of Driver Education Training/Licensing	
Lack of approach to make women's travel by Public Transport and NMT safer, affordable, comfortable and convenient.	
<b>Enforcement</b>	
Enforcement of Illegal Traffic Movements or Speeding	
Enforcement of Illegal Traffic Parking	
Enforcement of Unlicensed Private Vehicle Motorists	
Enforcement of Illegal Bus/Para-Transit Operators	
Lack of Enforcement Resources (traffic police and equipment)	
<b>Environmental</b>	
Air Pollution	
Traffic Noise	
<b>Planning and Implementation Capacity</b>	
Guidance for Making City Transport Policy/Plans	
City Master Plans Do Not Reflect Actual Situation on the Ground	
Lack of Sufficient Urban Transport Planners within the City Government	
City Officials Dealing with Transport Planning Lack Experience or Training in Transport Planning	
Lack of Data Collection Capability e.g. Periodical Traffic Surveys (inc. traffic volume survey)	

<b>Issue</b>	<b>Severity</b>
Lack of Financial Resources to Implement Planned Transportation Projects	
Lack of Knowledge of Public-Private Partnerships (PPP)	
Lack of understanding of the gendered aspects of travel	
Lack of gender specific transport data	
Lack of women Urban Transport Planners at mid and senior levels within city government.	
<b>Coordination Capability</b>	
Small Private Developers Do Not Make Strategic Provision for Transport Infrastructure	
Transport and Urban Planning Agencies Do Not Coordinate or Integrate Plans and Processes	
Land Use Plans are Not Coordinated with Transport Plans	
Workers/Transport Operator’s Unions Obstruct Improvements	
Division of Duties between State Government and Urban Local Bodies (ULB) is Not Clear	
<b>Transport/Traffic Regulations</b>	
Bus/Paratransit (Auto-Rickshaw, Cycle Rickshaw) Operators are Not Adequately Regulated	
Para Transit Vehicles are Not Adequately Regulated	

## 6.22. Population and Socio-economic Situation

	Metropolitan Area			Municipality Area			Ward 1	Ward 2	Ward 3	Ward 4
Population										
Number and size of household										
Population growth trend										
Population density										
	Male	Female	Total	Male	Female	Total				
Number of Workers by category										
Main Workers										
Cultivator										
Agriculture										
Labour										
Household Industry										
Others										
Marginal Workers										
Non Workers										
Average Personal Income										
Average Household Income										

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>

### 6.23. Vehicle Ownership Data

	Total in Metropolitan Area	Total in Municipality Area				Ward 1	Ward 2	Ward 3	Ward 4
Number of Registered Vehicles by Type									
Passenger Vehicle									
Small Passenger Vehicle									
Small Truck									
Heavy Truck									
Auto Rickshaws									
Cycle Rickshaws									
Buses									
Mini Bus									
Motorcycles (two wheeler)									
			Number of users						
			Male	Female	Total				
Number of households having Bicycle									
Number of households having Scooter, Motorcycle, Mope									
Number of households having Car, Jeep, Van									
Number of Licensed Drivers by License Type									

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	Optional / ITEM (Italic Font)

6.24. Traffic Count Surveys (Screen Line Survey and Cordon Survey)

Location:	Section(To/From):	Date / Month / Year:
Count Station No.:	Direction:	Day:
	Road Name & No.:	

	Passenger Vehicles								Good Vehicles			Grand Total	
	Heavy Fast	Light Fast				Slow			Heavy Fast	Light Fast			Total
		Bus	Mini Bus	Car	2-Wheel	3-Wheel	Cycle	Others		Total	Truck		
6-7 AM													
7-8 AM													
8-9 AM													
10-11 AM													
11-12 AM													
12-1 PM													
1-2 PM													
2-3 PM													
3-4 PM													
4-5 PM													
5-6 PM													

### 6.25. Traffic Count Survey (Intersection Turning Movement Survey)

Location:	Direction From:	Date / Month / Year:
Count Station No.:	Direction:	Right Turn/Straight/Left Turn:
Road Name & No.:		Day:

	Passenger Vehicles								Good Vehicles			Total	Grand Total
	Heavy Fast	Light Fast				Slow			Heavy Fast	Light Fast			
		Bus	Mini Bus	Car	2-Wheel	3-Wheel	Cycle	Others		Total	Truck		
6-7 AM													
7-8 AM													
8-9 AM													
10-11 AM													
11-12 AM													
12-1 PM													
1-2 PM													
2-3 PM													
3-4 PM													
4-5 PM													
5-6 PM													

Essential/ITEM A (Bold font)
Preferable (ITEM B)
<i>Optional / ITEM (Italic Font)</i>



### 6.27. Travel Speed and Time Survey

<b>Name of Road:</b>	From:	To:
<b>From</b>		
<b>Km:</b>	To Km:	No. of Trip:
		Date:
		Time:

Sl.No.	Distance		Control Points	First Stop Watch		Second Stop Watch		Cause of Delay
	Km	M		Journey Time		Delay Time		
				Min.	Sec.	Min.	Sec.	

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	<i>Optional / ITEM (Italic Font)</i>

## 6.28. Household O-D Survey

Household Summary										
Date: / Day:				Enumerator:					Sample No.:	
1. Address				2. Head of the Household:						
				3. Numbers of Family Members						
				4. Vehicles Owned:			Passenger Car	2-Wheeler	Bicycle	Aut o
						5 Years Ago				Other s
						Present				
5. Details of Household Members:										
Member No.	Sex (M/F)	Age	Occupation*	Monthly Income (Rs.)		Monthly Export on Transport (Rs.)		Availability of Driver License	Working / School Location	
				5 Years ago	Present	5 Years ago	Present			

\* Occupation, 1-Govt. Service, 2-Pvt. Service, 3-Business, 4-Student, 5-House-wife, 6-Retired Person, 7-Unemployed

	Essential/ITEM A (Bold font)
	Preferable (ITEM B)
	Optional / ITEM (Italic Font)

## 6.29. Household O-D Survey

### Trip Summary

#### 6. Details of each trip

Sl. No.	Member No. <sup>1</sup>	Traffic Mode <sup>2</sup>	No. in vehicle	Where did this trip begin <sup>3</sup>	Where did this trip end <sup>3</sup>	Trip purpose <sup>4</sup>	Travel Time	Travel cost

**Note:** <sup>1</sup>Referring to the numbers described in “5. Details of Household Members”

<sup>2</sup>1-Bus, 2-Mini Bus, 3-Car, 4-Two-wheeler (motorcycle). 5-Three-wheeler (Auto-rickshaw), 6-Bicycle, 7-Railway, 8-Walk

<sup>3</sup> Put zone number

<sup>4</sup> 1-Going to work, 2-Going to school, 3-Going home, 4-Shopping, 5-Leisure, and 6-Business

Essential/ITEM A (Bold font)
Preferable (ITEM B)
Optional / ITEM (Italic Font)





## 7 Appendix G – Standard Layout of Map

### 7.1. Introduction

The layout of map should facilitate convenient reading of the map and location of essential information as given below:

#### Margin

- A trimming margin of 10 mm all around for the purpose of trimming and edge binding.
- A second margin with thick firm line indicating the outer limits of the drawing. Such margin of filing edge could be 25 mm while on other three sides it could be 15 mm for all sizes of maps.

#### Title

The title of the map should be as short as possible and should include the general title as well as sub-title. Size of letters used for the sub-titles should be generally one to two sizes smaller than the size of letters used for the main title.

Normally, the title block should contain the following particulars:

- Name of the office
- Drawing number and the title of the drawing
- Signature of the dealing officer
- Date of preparation / revision / alteration

Title block should be located at the bottom right hand corner of the sheet in a simple manner.

Recommended size of title block is 150 mm X 100 mm for sizes A2 and larger and 150 mm X 75 mm for sizes A3 and A4.

#### North Point

Indication of north point is essential on the drawing and it could be located immediately above the title block. Wherever possible, north point should be shown along with the windrose. The north point on a map should, as far as possible, point upwards.

#### Scale

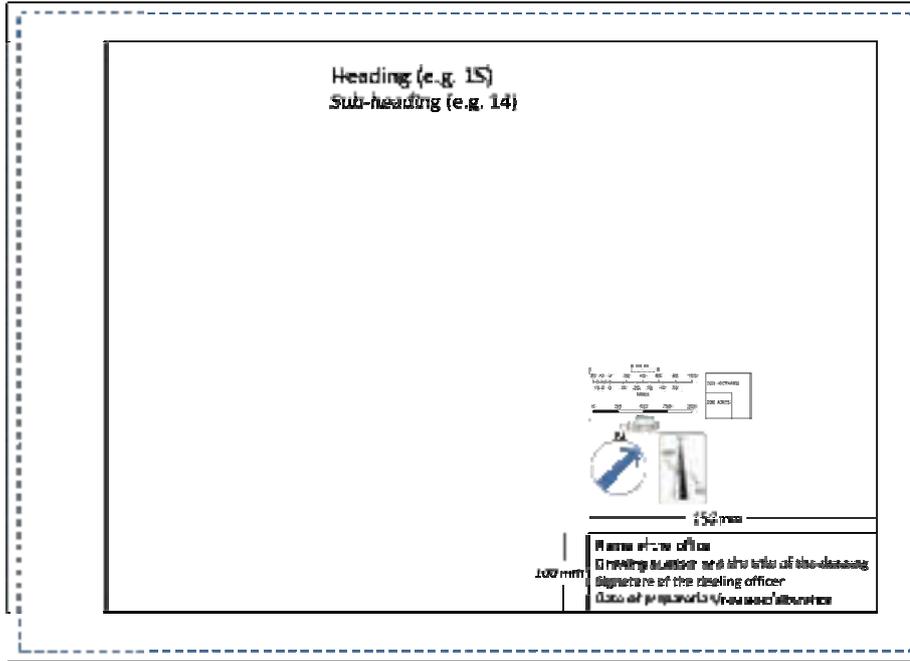
- Graphic scale: Graphic scale is one of the essential requirements of map and preferably it should be given in metric system for the convenience of reproduction. The graphic scale could be drawn above the title block.
- Spatial scale: In addition to graphic scale, the spatial scale should also be given on all plans. The spatial scale should consist of square with metric sides and the area covered by the square should be given inside the square. Such spatial scale could be located above the graphic scale in the drawing.
- Numeric scale: A numeric scale giving representation fraction (R.F.) e.g. 1:10,000 should be given below the graphic scale.

#### Numbering

A systematic numbering of maps / drawings would be convenient for reference. Respective department/ organization may allow its own numbering system based on standardised methods such as:

- Systematic numbering
- Consecutive numbering
- Sectional numbering

Figure 7.1: Representation of Standard layout of the map



Source: Compilation & representation of various source and UDPFI Guidelines

## 7.2. Map Enlargement and Reduction

Maps are generally available in different size and scales from different sources. All these maps could be brought in a required uniform scale by employing any of the following methods:

- Square method
- Similar triangle method
- Pantograph (mechanical method)
- Optical pantograph method
- Photographic method (optical)
- Digital method

The last three methods require sophisticated equipment, but they produce more accurate maps.

## 7.3. Map Notation

Planning exercise of settlements require preparation of maps to depict on ground conditions and variety of data relating to physical and socio-economic aspects which play crucial role in decision making and showing plans in spatial context. Broadly, these maps could be grouped under 2 categories.

- Survey and study maps
- Development plan maps/Proposal maps

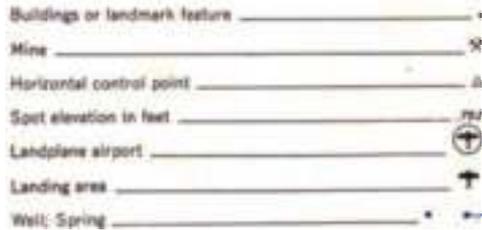
It is important that the manner of preparing survey and study maps must be closely related and in many cases identical to the preparation of proposal maps to facilitate the quick correlation of proposals with the existing conditions. Therefore, the notations and symbol used in both sets of maps should be similar as far as possible. Notations and symbols are language by themselves and need to be designed properly for easy understanding. For uniformity of presentation, it is also necessary to establish uniform practices in regard to the information to be included in these maps. Taking into consideration the standardisation of notations and information content of the maps, type of notations to be adopted can be grouped in three broad categories as following:

- Point
- Line
- Polygon

**Point**

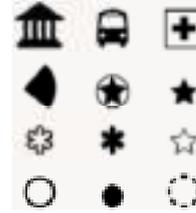
Point data on map shall be used for depicting prominent feature, like building or highest point. Details that could be shown as point feature, varies depending on the scale of map. Following are some examples of point features that could brought under standard frame work on State level.

Figure 7.2: Survey of India Toposheet



Source: Survey of India

Figure 7.3: International Study inputs

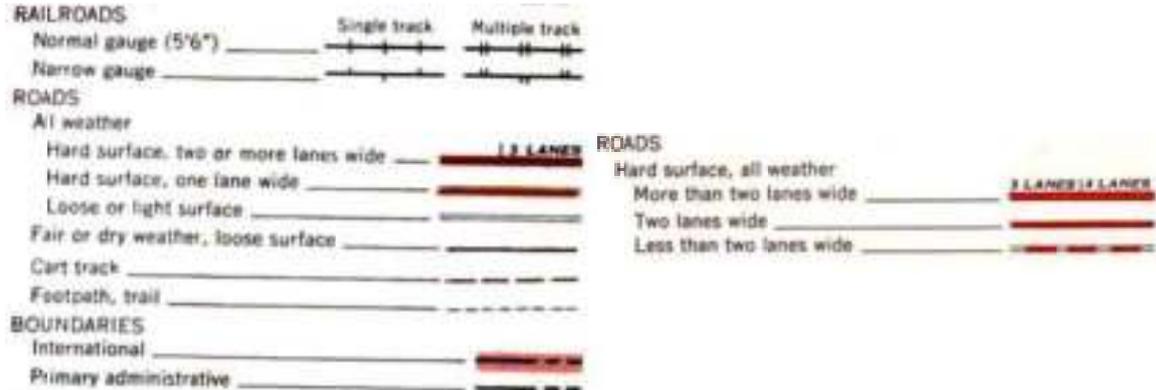


Source: Activity Centre Zone Mapping Style Guide, State Government Victoria

**Line**

Linear features could be boundaries, transportation network or water bodies' etc. Standardisation in linear features, specifically administrative boundaries shall be made at States' level. Boundary symbols as used by Survey of India organisation can be used by states as it will bring uniformity in boundary features at national level.

Figure 7.4: Survey of India Toposheet



Source: Survey of India

**Polygon**

A calibration in colour, notation and font used in maps should be made by state departments so that maps of a State depict information in uniform manner and are relatively easy for comparison and study by public. Mode of preparation of map on different platforms has impact on colour and notation. Thus, a standardised format of legend shall be made. RGB (Red Green Blue) colour specification can be provided for computer based platforms like GIS or CAD etc. Following are examples of such RGB colour specifications:

- Red : 255:51:0
- Purple : 102:0:204
- Yellow : 255:255:0
- Green : 0:153:0
- Orange : 255:153:0

Font's specifications can also be provided in terms of style, size and colour. Though these provisions will vary as per the scale and site of the sheet and be accordingly provided.

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## 8 Appendix H – Cadastral Map Overlay

### 8.1. Introduction

The process of preparing base map by overlaying satellite imagery over cadastral maps has been referred from chapter-6 of 'Space based information support for decentralized planning (SIS-DP) Manual: Preparation of Geo-spatial layers using (Cartosat – 1 Pan + LISS-IV Mx) Orthorectified Satellite Imagery' of ISRO. The manual (part -2) is available for public and can be downloaded from the link: <http://www.bhuvan-panchayat.nrsr.gov.in/assets/Manual-Part2.pdf>.

### 8.2. Process of base map formulation by overlaying Satellite images over cadastral maps

For overlaying cadastral map with satellite image it is required that cadastral map to be generated in vector mode. In this process the main tasks are acquisition of cadastral maps, scanning and digitization of cadastral maps and generation of vector data. Once the cadastral maps in vector mode are available, geo-referencing of these maps can be done. The geo-referencing of digital cadastral maps and overlaying with satellite image consists of the following steps:

- Acquisition of GCP's
- Transformation model development and assessment
- Geo-referencing of cadastral maps
- Validation of Geo-referenced map, in Isolation
- Validation of Geo-referenced map, with neighbourhood
- Mosaic generation at revenue inspector (RI), *taluka* and district level

#### 8.2.1. Acquisition of ground control points:

Sufficient numbers of GCP's shall be identified on the vector cadastral map and on satellite image. The characteristics of the GCP's are intersections of parcel boundaries, river/stream with parcel boundary, of roads with parcel boundaries, roads with rivers and corners of water tanks. The GCPs should spread uniformly in the entire map.

#### 8.2.2. Transformation model assessment:

Transformation model is applied for geo-referencing the cadastral map. The area of the village, number of sheets covered in a single village, condition of the cadastral map sheets, number and characteristics of GCPs collected and terrain conditions the affect polynomial model. The transformation model is accepted when the actual root mean square and residual errors arrived are less than the threshold values i.e. 6 m in either direction.

#### 8.2.3. Geo-referencing of cadastral maps:

Once the transformation model is accepted, the vector cadastral map is geo-referenced through affine transformation<sup>4</sup> in GIS environment. The outputs are further validated both visually and mathematically.

<sup>4</sup>Affine Transformation: A geometric transformation that scales, rotates, skews, and/or translates images or coordinates between any two Euclidean spaces. It is commonly used in GIS to transform maps between coordinate systems. In an affine transformation, parallel lines remain parallel, the midpoint of a line segment remains a midpoint, and all points on a

### 8.2.4. Validation of Geo-referenced map, in isolation:

Output product validation is an essential element in development of land information system. The geo-referenced vector file of each village is validated with reference to the merged product. The geo-referenced vector file is overlaid on the reference image and initial validation is carried out through visual checking. If the parcel boundaries coincide with the image features and deviations/displacements are not observed, the geo-referencing is successful. Feature matching is checked in the following order of priority; tanks, water bodies, tank bunds, ponds, road, rail, canal, stream, *nalla*, river, field bunds, forest boundary / vegetation boundary, *abadi* (village settlement).

### 8.2.5. Validation of Geo-referenced map, with neighbourhood reference:

This validation is carried out to ensure that the village boundary is matching with all adjoining village boundaries. The boundary should match perfectly. However, in accordance with the terrain conditions, the boundary (overlap/under lap) error tolerance in undulating terrains is kept around 15 m and in hilly areas, the tolerance is around 25 m (Srinivasa Rao et al., 2003b).

### 8.2.6. Mosaic generation at Revenue, taluka and district level:

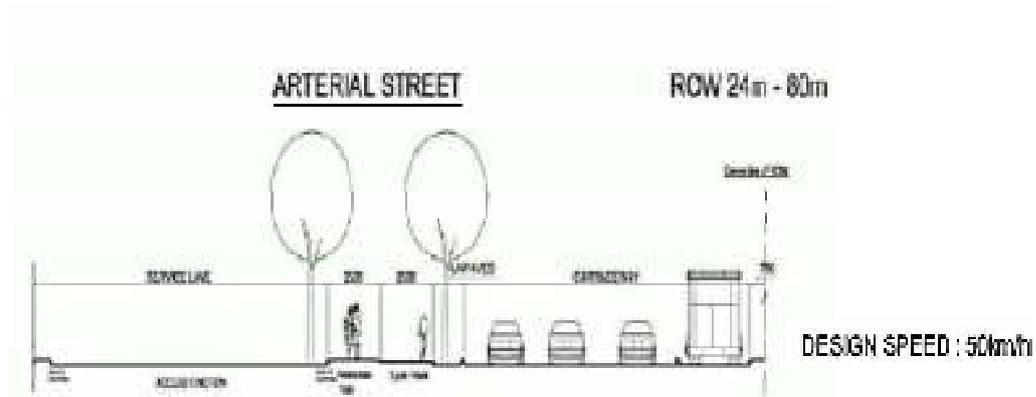
After geo-referencing the cadastral maps to the required accuracy standards, a number of maps are mosaiced at the next higher administrative level. While mosaicing, feature continuity as well as attribute accuracy is to be maintained. These are the final products of geo-referencing of cadastral maps and can be used as base map. These products are directly linked to LIS and GIS databases.

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straight line remain on a straight line.

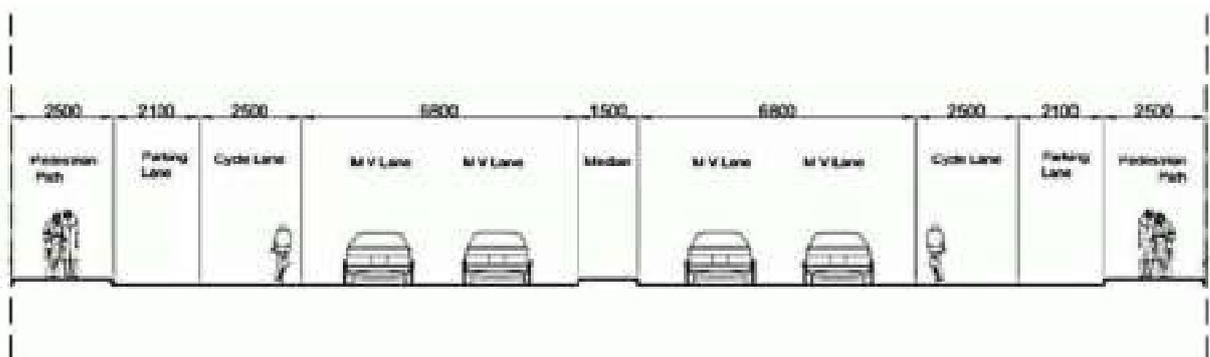
## 9 Appendix I – Road Cross Sections

Figure 9.1: Cross Section Distributary Road



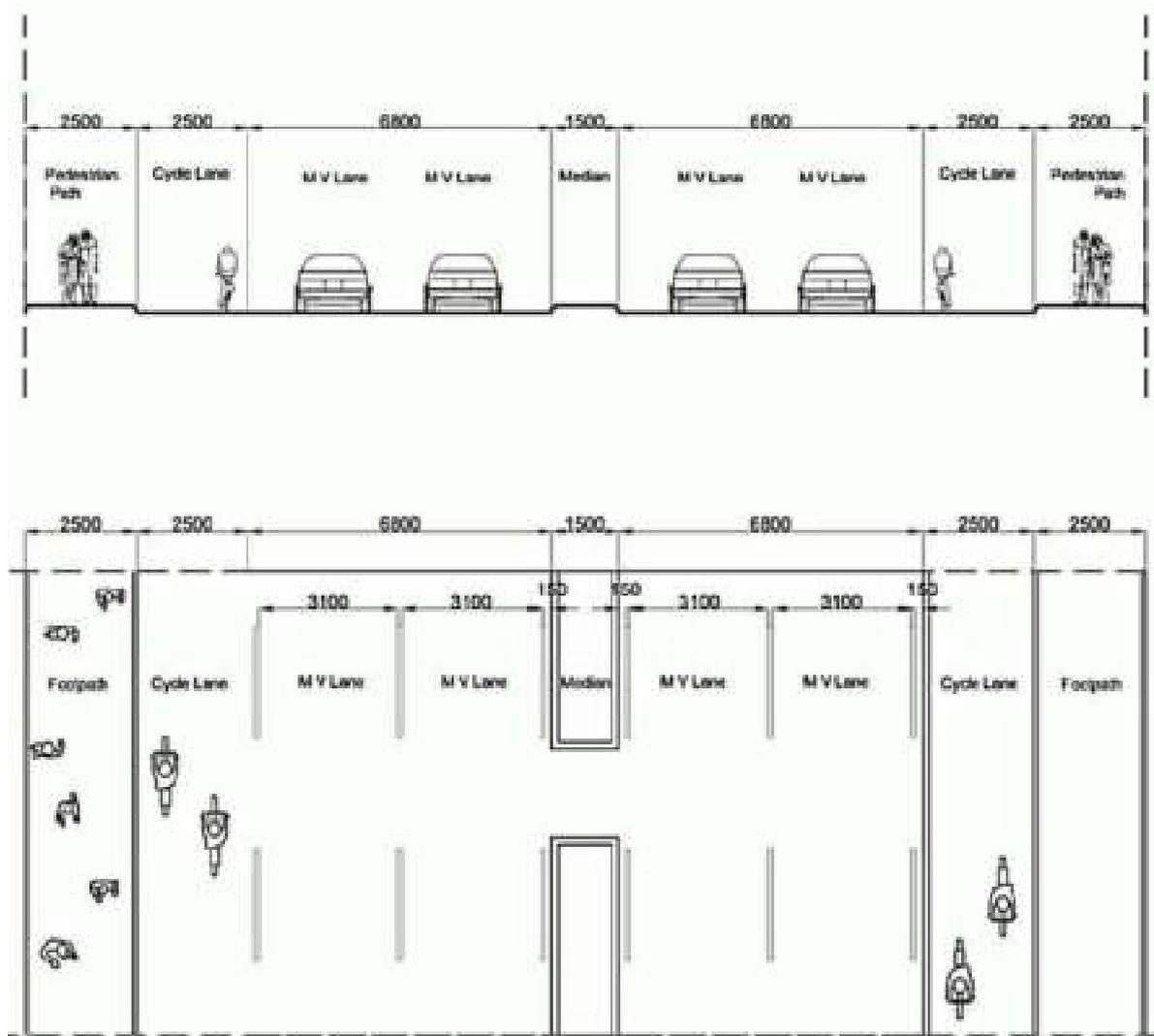
Source: Code of Practice Part-1, MoUD, 2012

Figure 9.2: Cross Section Distributary Road



Source: Code of Practice Part-1, MoUD, 2012

Figure 9.3: Cross section of Access road



Source: Code of Practice Part-1, MoUD, 2012

## 10 Appendix J – Travel Demand Modelling Process

### 10.1. Trip Generation

The first step in travel forecasting is trip generation. In this step, information from land use, population, and economic forecasts are used to estimate how many trips will be made to and from each zone.

#### Types of Most Commonly Used Trip Generation Models

- Regression models: equations such as:
  - Total trips = 1.1\*population,
  - Home-based work trips = 1.5\*total employment, etc;
- Cross-classification tables based on: household size, number of workers, income class, vehicle ownership, etc.;
- Special generator models: used for generators such as airports, colleges, amusement parks, green spaces, etc.;
- Separate rates for peak and off-peak trips.

#### Assumptions and limitations:

- Pedestrian and bicycle trips are usually excluded from trip generation models.
- Commercial vehicles need to be generated separately.
- Care should be taken before interchanging vehicle trip rates with person trip rates.

#### Validation and Reasonableness Checking for trip generation

- Compare trips per household to the regional average. There should be a valid explanation if numbers are too high or too low.
- Review trips per household by purpose.
- Ensure that trip productions and trip attractions balance well. Check trip rates and adjust if they do not balance
- Create GIS color-coded maps of productions and attractions to review for errors. Use special generators for facilities such as schools, hospitals, malls, and recreational facilities such as parks, playgrounds, etc.
- Make model external trips and visitor trips using external cordon and visitor surveys.
- Make sure Commercial Vehicle and Freight Travel is included in the model

### 10.2. Trip Distribution

The trip distribution model estimates number of trips travelled from one zone to another. Trip generation only finds the number of trips that begin or end at a particular zone. The process of trip distribution links the trip ends to form an origin-destination pattern. Trip distribution is used to represent the process of destination choice (i.e. "I need to go shopping, but where should I go to meet my shopping needs?").

The most commonly used procedure for trip distribution is called the gravity model. The gravity model takes the trips produced at one zone and distributes to other zones based on both the size of the other zones (as measured by their trip attractions) and the composite cost (travel time, distance or cost for all modes available) to other zones. A zone with many trip attractions (say, a large

shopping center) will receive a greater number of distributed trips than one with few attractions (a small shopping center). The mathematical formula for a gravity model is shown below:

$$T_{ij} = P_i \left( \frac{A_j F_{ij} K_{ij}}{\sum_{k=1}^{\text{zones}} A_k F_{ik} K_{ik}} \right)$$

Where,

$T_{ij}$ = the number of trips from zone i to zone j,

$P_i$  = the number of trip productions in zone

$A_j$ = the number of trip attractions in zone j,

$F_{ij}$ = the friction factor relating the spatial separation between zone i and zone j, and

$K_{ij}$ = an optional trip-distribution adjustment factor for interchanges between zone i and zone j.

Distance to possible destinations is the other factor used in the gravity model. The number of trips to a given destination decreases as the distance to the destination increases (it is inversely proportional). This is represented in a factor called friction factor. It is inversely proportional to the distance or travel time between two zones. Friction factors are used to calibrate trip lengths from the model to observed data. The most common formulation of friction factors is through a gamma function as shown below:

$$F_{ij} = a \times t_{ij}^b \times e^{c \times t_{ij}}$$

Where,

$F_{ij}$  = the friction factor between zones i and j,

a, b, and c = model coefficients; both b and c should, in most cases, be negative; a is a scaling factor and can be varied without changing the distribution,

$t_{ij}$ = the travel time between zones i and j, and

e = the base of the natural logarithms.

**Validation and Reasonableness Checking for trip distribution**

- Compare trip length frequency from model and survey data.
  - Do this for every purpose
  - Do this for distance and time
  - If different, adjust friction factors in the model
  - Maximum of 5-10% difference in observed and modelled.
- Compare trip patterns from the model to data from O-D Surveys.
  - Aggregate data into districts and compare trips
  - Look at north-south and east-west trips

**10.3. Modal Split**

Mode choice is one of the most critical parts of the demand modelling process. It is the step where trips between a given origin and destination are split into trips using available modes such as two-wheeler, car, private vehicle, public transport, etc. Calculations are conducted that compare the attractiveness of travel by different modes to determine their relative usage. All proposals to improve public transport or to change the ease of using private vehicles are passed through the mode split/private vehicle occupancy process as part of their assessment and evaluation. It is important to understand what factors are used and how the process is conducted in order to plan, design, and

implement new systems of transportation. The most common mathematical formulation of a mode choice model is a logit model and is as follows:

$$P_i = \frac{e^{u_i}}{\sum_{i=1}^k e^{u_i}}$$

Where,

$P_i$  = the probability of a traveller choosing mode  $i$ ,

$u_i$  = a linear function of the attributes of mode  $i$  that describe its attractiveness, also known as the utility of mode  $i$ , and

$\sum_{i=1}^k e^{u_i}$  = the summation of the linear functions of the attributes of all the alternatives,  $k$ , for which a choice is available

The utility function is calculated based on the following equation:

$$u_i = a_i + b_i + IVTT_i + c_i \times OVTT_i + d_i \times COST_i$$

Where,

$IVTT_i$  = the in-vehicle travel times for mode  $i$ ,

$OVTT_i$  = set of variables measuring the out-of-vehicle travel times for mode  $i$ —walk, wait, and transfer times—may all be kept separate or combined, depending on the calibrated structure of the model,

$COST_i$  = the cost of mode  $i$ ,

$a_i$  = mode-specific coefficient (constant) to account for mode bias not measurable with the level of service variables,

$b_i$  = coefficient for the  $IVTT$  variables of mode

$c_i$  = a set of coefficients for  $OVTT$  variables of mode  $i$ , and

$d_i$  = coefficient for  $COST$  variable of mode  $i$

### Key Points about Mode Split

- Mode split is done by a comparison of the "disutility" of travel between two points for the different modes that are available.
- "Disutility" is a term used to represent a combination of the travel time, cost, and convenience of a mode between an origin and a destination.
- Travel time is divided into two components: in-vehicle time to represent the time when a traveller is actually in a vehicle and moving, and out-of-vehicle time, which includes time spent travelling outside of the vehicle (time to walk to and from bus/rail stops, waiting time, transfer time).
- Out-of-vehicle time is used to represent "inconvenience" and the coefficient for out-of-vehicle time is typically several times larger than for in-vehicle time, reflecting the fact that travellers do not like to wait or walk long distances to their destinations. The size of the multiplier will be different depending upon the purpose of the trip.
- For public transport trips, the cost of the trip is usually measured as the average public transport fare for that trip, while for private vehicle trips, cost is found by adding the parking cost to the length of the trip and multiplying by cost per kilometer. Private vehicle cost is based on a "perceived" cost per kilometer (on the order of 5-10 cents/kilometer), which only includes fuel and oil costs and does not include ownership, insurance, maintenance, and other fixed costs (total costs of private vehicle travel are much higher).
- Disutility equations also contain a "modal constant", represents other characteristics or travel modes that are not explicitly captured by the variables in the model, but that may influence the choice of mode (such as a difference in comfort between public transport and private vehicles). A model will have  $n-1$  constants with 'n' being the number of modes.

- Once disutilities are estimated for the various choices between an origin and a destination, the trips are split among various modes based on the relative differences between disutilities. A large advantage will mean a high percentage for that mode.

All model coefficients are estimated using actual traveller data.

**Types of Mode Choice Models:**

- Factoring of vehicle trips** - In this model, fixed factors are used to factor total trips into trips by mode. This is based on fixed data from surveys. This is not recommended for long-term projects with high investment
- Binomial logit model** - In this model, only two modes are considered: private vehicle and public transport. This is a simpler model and should be used when short on time and data.
- Multinomial logit model** - This is the most common type of model used to compare a number of modes. Variations of the model include nested logit and hierarchical logit, which splits total trips first into public and private vehicles, and then into categories such as two- and four-wheelers, bus, rail, etc.

Table 10.1: Factors Affecting Mode Choice

Factor	Private Vehicle	Public Transport
In-Vehicle Time	Congested driving Time	Time riding public transport
Out-of-Vehicle Time	Walk to Vehicle from parking	Walk to stop, wait/transfer time, walk from stop to destination
Cost	Cost of fuel, parking, tolls	Fare

Source: Development of Training Material under Sustainable Urban Transport Project, Reference Guide Volume 2 Demand Assessment, MoUD

**Validation and Reasonableness Checking for modal split**

- Compare observed modal split to estimated modal split
  - Do this for every purpose
  - Maximum of 5-10% difference in observed and modelled.
- A typical range for value of in-vehicle time coefficient is between -0.015 and -0.02.
- A typical range for value of out-of-vehicle time coefficient is 2- 3 times the in-vehicle coefficient.
- Constant terms should not be too high or low.
- Perform sensitivity tests to make sure model is stable.
  - Increase/decrease travel times/fares of highway and PT
  - Change socioeconomic data

The first three steps of modelling generate total person trips in the region. Before assigning them to road network, person trips need to be converted into vehicle trips. The first step in this process is to split private vehicles trips into private vehicle driver and private vehicle passenger trips. Private vehicle occupancy analysis is often a highly simplified process that uses fixed private vehicle occupancy rates for a given trip purpose or for household size and private vehicle ownership categories.

Trips are then converted into an origin-destination format for conducting daily assignments. Traffic varies considerably throughout the day and during the week. The travel demand forecasts are made on a daily basis for a typical weekday and then converted into peak-hour conditions. Daily trips are multiplied by an "hour adjustment factor", for example, 10%, to convert them into peak-hour trips. The number assumed for this factor is very critical. A small variation, say, plus or minus one percent, will make a significant difference in the level of congestion that would be forecast on a network. Most models are unable to represent how travellers tend to cope with congestion by changing the time they make their trips, although advanced travel demand models and activity models represent time of travel explicitly.

## 10.4. Traffic Assignment

Once trips have been split into highway and public transport trips, the specific route that they use to travel from their origin to their destination must be found. These trips are then assigned to that route in the step called traffic assignment. Traffic assignment is conducted differently for highway trips and public transport trips.

The process first involves the calculation of the shortest path from each origin to all destinations (usually the minimum time path is used). Trips for each O-D pair are then assigned to the links in the minimum path, and the trips are added up for each link. The assigned trip volume is then compared to the capacity of the link to see whether it is congested. If a link is congested, the speed on the link needs to be reduced to result in a longer travel time on that link. When speeds and travel times are changed, the shortest path may change. Hence, the whole process must be repeated many times (iterated) until there is an equilibrium between travel demand and travel supply. Trips on congested links will be shifted to uncongested links until this equilibrium condition occurs. There are a variety of ways in which the calculations are done to reach network equilibrium. One way to get a feel for the accuracy of the models is to look at the resulting speeds on the network. These should be realistic after equilibrium.

Public transport trip assignment is done in a similar way, except that public transport headways are adjusted rather than travel times. Public transport headways (minutes between vehicles) affect the capacity of a public transport route. Low headways mean that there is more frequent service and a greater number of vehicles. Public transport supply and demand are also recalculated to reach equilibrium between supply and demand.

It is important to understand the concept of equilibrium. If a highway or public transport route is congested during peak hours, its excess trips will be shifted to alternative routes. If the alternative routes are also congested, the final results will show congestion over a wide part of the network. In the real world, this congestion will eventually dissipate overtime.

Another important step in assignment is the time of day analysis. Daily trip patterns need to be converted into peak-time period traffic. A key assumption needed is the portion of daily travel that occurs during the peak period. This is normally used as a constant, and conventional travel models have very limited capability to describe how travellers will shift their trips to less congested times of the day.

### Validation and Reasonableness checking for traffic assignment

The following summaries should be prepared:

- Compare traffic volumes with observed counts.
  - Volumes by road class
  - Volumes by area type
  - Volumes by screenlines
  - Volumes at external cordons
  - Observed vs. estimated speeds
- Compare PT ridership from the model with observed ridership.
- Ridership by route groups should be within +/- 15%

## 10.5. Model Forecasts

Forecasting is the process of using a fully calibrated and validated model to estimate future year traffic volumes and public transport ridership.

### Inputs for Forecasts

- Socioeconomic data, such as population, income class, and employment forecasts;
- List of approved highway and public transport projects and a list of projects to be evaluated.

Transportation forecasting processes should consider a broad range of alternatives. There can be alternative modes of transportation, alternative locations of different systems, alternative levels of capacity, or alternative policies. This would include the following:

- **A no-build alternative:** This is basically the status quo with continuing maintenance and operation of the current transportation system. It may include substantial efforts to improve the efficiency and utilization of existing transportation systems. These are considered as an alternative to building new systems. Developing a no-build alternative is a must for evaluating other alternatives. Every new investment alternative has to be compared to the no-build alternative to see if the improvement justifies the cost.
- **Travel demand management policies:** Transportation services require a broad range of policies to function. Travel demand management involves efforts to make the current system more efficient and to use techniques to reduce demand during critical periods. This is not unlike programs that utility companies have used to promote energy conservation among their customers. Some of the techniques that could be used include: use of priority techniques for high occupancy vehicles, parking regulation, efforts to shift when travel occurs, promotion of telecommuting, public transport service improvements, use of pricing techniques, etc.
- **Land use alternatives:** Different land use patterns and policies can be used to affect travel demand and to affect the use of natural resources. These could include concentrated urban development patterns, increased suburban growth, or some combination.
- **Modal alternatives:** Different modes of transportation such as highway, public transport, ride sharing, freight, etc. should be considered. Generally, transportation plans are concerned with picking the best combination of modes to deal with a particular problem. Single-mode plans such as a highway plan, public transport plan, etc. should not be done without first considering other modes. All options should be considered in order to develop a balanced transportation system.
- **Capacity changes:** The capacity of each mode (number of lanes, how often public transport vehicles operate) can be varied in different alternatives. Highway capacity depends on many factors besides the number of lanes, such as intersection characteristics, traffic signal systems, and the characteristics of access along the highway.
- **Alternative locations:** Proper location of public transport and highway facilities is an important part of their success. Facilities should be located to serve travel markets and to facilitate land development patterns that are good for the community.

# 11 Appendix K – Road Safety Checklist

## 11.1. Introduction

To encourage road safety, checklists have been provided in this section which can be utilised at various stages of project life cycle.

Table 11.1: Road Safety Checklists

Checklist No.	Checklist
1	Audit : Stage:1 During feasibility study
2	Audit: Stage:2 Completion of preliminary design
3	Audit: Stage:3 Completion of detailed design
4	Audit : Stage:4 During construction stage
5	Audit : Stage:5 Completion of construction/pre-opening
6	Audit: Stage:6 On existing roads or during Operation & Management
7	Planning
8	Alignment
9	Cross-section
10	Junctions
11	Road signs
12	Road markings
13	Lighting
14	Roadside hazards
15	Roadside facilities
16	Vulnerable road users
17	Development proposals
18	Maintenance work

Source: Manual on Road Safety Audit, IRC: SP: 88-2010, Page 67

## 11.2. CHECKLIST 1 –Audit: Stage 1 (During Feasibility Study)

1. What is the category of road for which the feasibility study has been carried out e.g., Expressway, National Highway, State Highway or Other Roads?
2. Is the road intended to carry high-speed traffic or serve local access needs only?
3. What kind of traffic is likely ranging from high speed mixed traffic or for more general use, including bicycles and significant pedestrian traffic?
4. Do the chosen type of road and the standards, alignment and cross-section offer optimum road safety to all groups of road user including disabled in combination with the expected traffic density and speeds?
5. Does the project follow existing roads or is it a 'green field project' and what are the effects of this?
6. Check whether appropriate design standards have been used having regard to the scope of the project, and its function in relation to the traffic mix.
7. Check the appropriateness of the designs for the design volume and traffic characteristics.
8. Has access control been proposed?
9. Will the proposed scheme be compatible with the standard of conjoining road sections?
10. Will there be sufficient opportunities for overtaking?

11. Are the number and distribution of intersections appropriate in relation to:
  - a. The desired function of the new road?
  - b. Impact on the surrounding, adjacent and/or off-loaded road network (does the project simply move present problems)?
  - c. Accessibility for public transport and emergency vehicles?
12. Are junction types shown the safest available at each location, in relation to the expected turning volumes?
13. Are the proposed horizontal and vertical alignments consistent with visibility requirements both along the road and junctions?
14. Has lighting been planned? If so, does the lighting offer maximum safety, both on links and at junctions?
15. Will the project have any effect on existing pedestrian and cycle routes?
16. Does the project include measures for vulnerable road-users and if so, do these measures offer maximum safety?
17. Do the available accident data for the existing/adjacent road network give reason to expect particular road safety problems in the proposed project?
18. Whether non-motorised traffic is expected to cause problems?
19. What is the likelihood of future widening?
20. Do the gradients, curves and general design approach fit in with the class of terrain and likely weather or environmental aspects?
21. Check any special events creating unusual or hazardous conditions and any other matter, which may have a bearing on safety.
22. Other checks pertinent to the project at discretion of auditor or client.

### **11.3. CHECKLIST 2 - Audit: Stage 2 (Completion of Preliminary Design)**

1. Have all recommendations from the previous stage been followed? If not, why not?
2. Is the desired speed compatible with the cross-section and other design elements and is the desired speed realistic?
3. Cross-section:
  - a. Has delineation of the carriageway with a kerb been proposed?
  - b. Is there adequate space for all groups of road users?
  - c. Is there appropriate separation between various groups of road users?
4. Horizontal and Vertical alignment and visibility:
  - a. Does the proposed alignment satisfy any demands on visibility at junctions and sight distances on free sections?
  - b. Will sight distances/visibility be blocked by traffic signs, guardrails, bridge parapets, buildings, rigid obstacles or plantations (now and in the future)
  - c. Can parts of the project constitute a risk, especially in combination (e.g. peaks in the vertical alignment plus sharp horizontal bends, crests of hills plus traffic signals)?
5. Are the lane widths, shoulders, medians and other cross-section features in accordance with standard design and adequate for the function of the road?
6. Check whether there are undesirable variations in cross-section design. Check cross-falls, which could affect safety, particularly where sections of existing highway have been utilized, or where there have been compromises to accommodate access to abutting properties.
7. Check the safety aspects of shoulder provision, including the provision of paved and earthen shoulders, the width and treatment on embankments and cross-fall of shoulders? Are the shoulders likely to be used by slow-moving vehicles or cyclists?
8. Check for the provision of climbing lanes in hilly sections where vertical gradients are steep for considerable length of the highway?

9. Junctions, interchanges and their design:
  - a. Will road users coming from all directions (including side roads) be able to see that they are approaching a conflict area? Are give-way lines, stop lines, turning lanes and ramps clearly visible?
  - b. Are existing conjoining and intersecting roads appropriately adjusted and matched to the new road (without sharp bends and gradients)?
  - c. Do the routes of road users through the junction seem clear for all directions and manoeuvres?
  - d. Is there sufficient space for all types of vehicles to undertake all manoeuvres?
  - e. Are the crossing facilities for pedestrians and non-motorised traffic adequate and safe?
  - f. Can parking cause problems?
  - g. Have roundabouts been considered?

*(In urban areas, ghost markings and left-turning lanes with islands are safest; they prevent overtaking and assist pedestrians and cyclists who are crossing the road.)*
10. Decide whether or not old, unrecovered section of road can give undesired optical directions.
11. Special points at roundabouts:
  - a. Are all entrance lanes curved and is speed adequately reduced?
  - b. Will the central island be visible?
  - c. Are the measures taken for the benefit of pedestrians from a safe stopping distance and cycle traffic adequate?
12. At the junction/transition to existing roads (especially from multi-lane to two-lane, dual to single carriageway):
  - a. Are there sudden changes of alignment?
  - b. Does the road standard change too rapidly, or can road users clearly see and recognize the transition in good time?
  - c. Would a roundabout be able to mitigate any sudden changes in standards and alignment?
13. Are existing junctions and intersections adjusted and matched to the new road appropriately (without sharp bends and gradients)?
14. Are there any constructions that will be difficult to drain and are the cross-fall and any gutter gradient adequate at the critical spots?
15. Are there places where there is a risk of flooding?
16. Will overtaking be prevented at critical places (not simply by restrictions, but also by making it quite apparent that overtaking is prohibited)?
17. If signs and road markings have been proposed:
  - a. Are the markings consistent and are they adequate?
  - b. Has the quantity of information been kept at a reasonable level?
18. If markings have not been proposed: will special markings be necessary?
19. Is there any risk that cannot be "marked out of existence"?
20. Will there be any large sign constructions? If so; will guardrails or breakaway safety devices protect them?
21. Has it been proposed that lighting be located on the outside or inside of bends?
22. Will it be possible to carry out maintenance work (on lighting, gantries, plantations, etc.) safely and without using the carriageway or cycle path?
23. Is the landscaping design or plantation likely to lead to a lowering of safety with mature or seasonal growth? Is frangible vegetation appropriate?
24. Are there arrangements for safe access by emergency vehicles? Check the design of medians and barriers, and the ability of emergency vehicles to stop without necessarily disrupting traffic?
25. Pedestrians
  - a. Have pedestrian needs been considered?
  - b. If footpaths are not specifically provided, is the road layout safe for use by pedestrians, particularly at blind corners and on bridges?

- c. Are pedestrian subways or footbridges sited to provide maximum use?
  - d. Is the avoidance of footbridges or subways possible by crossing the road at grade?
  - e. Has specific provision been made for pedestrian crossings, school crossings or pedestrian signals?
  - f. Are pedestrian refuges/kerb extensions needed?
  - g. Whether needs of disabled road users taken care of?
26. Have the needs of public transport users been considered? Are bus stops positioned for safety?
27. Is lighting envisaged in specified locations of the project? Are the difficulties of illuminating sections of the road caused by trees or over bridges, for example? Are there any aspects of the provision of the lighting poles, which would require consideration from the safety point of view in their being struck by vehicles?
28. Is adequate safe access to the work site available?
29. Are there any factors requiring specific road safety provision, including maintenance?
30. Are there any traffic management features, which would require special attention during construction or during the transition from construction to full operation?
31. Other checks made at discretion of auditor or client.

### 11.4. CHECKLIST 3 - Audit: Stage 3 (Completion of Detailed Design)

1. Have all recommendations from the previous stage been followed? If not, reasons thereof?
2. Visibility, sight distance
  - a. Are horizontal and vertical alignments consistent with the required visibility requirements?
  - b. Confirm whether the standard adopted for provision of visibility in the design is appropriate for the ruling design speed and for any unusual traffic mix.
  - c. Check whether sight lines are obstructed by:
    - i. Safety fences
    - ii. Boundary fences
    - iii. Street furniture
    - iv. Parking facilities
    - v. Signs
    - vi. Landscaping
    - vii. Bridge abutments
  - d. Check whether railway crossings, bridges and other hazards are conspicuous.
  - e. Will sight lines to be obstructed by temporary features such as parked vehicles in lay-byes or parked or queued traffic has been taken care of?
3. Check whether the design standards are appropriate for all the new requirements of the proposed project and check for consistency of general standards and guidelines such as lane widths, camber and cross-fall.
4. Cross-sections:
  - a. Are cross-falls appropriate?
  - b. Is there a suitable gutter gradient or is the carriageway laid at a suitable height above the shoulder?
5. Lighting columns, traffic signals, sign standards, etcetera:
  - a. Have requirements on safe distances to carriageway and cycle path been observed?
  - b. Have breakaway safety devices or such like been proposed?
6. Signs and markings:
  - a. Are markings consistent along the entire road section?
  - b. Is the information clear?
  - c. Are there enough signs?
  - d. Are there too many signs?
  - e. Will signs mask each other or traffic signals (be sure to include all plans for signs and markings in your assessment)?
  - f. Are the signs correctly positioned, without obstructing sight distances/visibility in anyway?
7. Are the proposed types of kerb stone/edge marking appropriate?
8. Lighting:
  - a. Is there any risk that the lighting can be optically misleading and will it have any detrimental effects on traffic signals and signs?
  - b. Are there any unlit areas that could conceal hazards?
  - c. Will an illuminated side road mislead road users on the planned, unlit road?
  - d. Are all pedestrian crossings illuminated (not merely the formally marked crossings, but also unmarked places where pedestrians could be expected to cross)?
  - e. Will powerful illumination of adjoining areas or strongly illuminated advertisements cause problems?
9. Junctions, interchanges and their design:

- a. Will road users coming from all directions (including side roads) be able to see that they are approaching a conflict area? Are give-way lines, stop lines, turning lanes and ramps clearly visible?
  - b. Are existing conjoining and intersecting roads appropriately adjusted and matched to the new road (without sharp bends and gradients)?
  - c. Do the routes of road users through the junction seem clear for all directions and manoeuvres?
  - d. Is there sufficient space for all types of vehicles to undertake all manoeuvres?
  - e. Are the crossing facilities for pedestrians and non-motorised traffic adequate and safe?
  - f. Can parking cause problems?
  - g. Have roundabouts been considered?
- (In urban areas, ghost markings and left-turning lanes with islands are safest; they prevent overtaking and assist pedestrians and cyclists who are crossing the road.)*
10. Decide whether or not old, unremoved section of road can give undesired optical directions.
  11. Special points at roundabouts:
    - a. Are all entrance lanes curved and is speed adequately reduced?
    - b. Will the central island be visible?
    - c. Are the measures taken for the benefit of pedestrians from safe stopping distance and cycle traffic adequate?
  12. At the junction/transition to existing roads (especially from multi-lane to two-lane, dual to single carriageway):
    - a. Are there sudden changes of alignment?
    - b. Does the road standard change too rapidly, or can road users clearly see and recognise the transition in good time?
    - c. Would a roundabout be able to mitigate any sudden changes in standards and alignment?
  13. Are existing junctions and intersections adjusted and matched to the new road appropriately (without sharp bends and gradients)?
  14. Guardrails, hedges and railings:
    - a. Are all vulnerable areas protected?
    - b. Are bridge pillars, steel posts and trees etc., protected by guardrails where necessary?
    - c. Are there places where hedges are necessary to prevent pedestrians from crossing?
    - d. Are the chosen hedges/guardrails "light" enough?
    - e. Does guardrails/road side furniture have any hazardous sharp protruding edges?
  15. Road surface:
    - a. Has a porous type of surface been chosen?
    - b. Will an exceptionally high-friction surface be necessary in especially exposed places?
    - c. Would a change of surface as a purely visual signal to road users be of benefit? Used in this way, could a change of surface be misunderstood by road users?
  16. At junction/transition to existing road network (especially from multi-lane to two-lane, end of central reserve)
    - a. Is there sufficient advance warning?
    - b. Are reflector posts correctly positioned?
    - c. Are ghost markings appropriate in connection with the merging of two lanes?
    - d. Is there continuity of edge markings?
  17. For two-lane sections prepared for expansion to four lanes with central reserve (e.g. expressways built as "semi-motorways"):
    - a. Will road users be clear everywhere that they are not on a one-way, two-lane carriageway?
    - b. Should night illumination of signs be of extra high standard?
    - c. Is overtaking prevented at all points where prevention is necessary?

- d. Should special measures be adopted at bridges built with a view to future expansion?
18. Examine adjoining areas for potential safety problems (airfield, signals for maritime traffic and railways, flying golf balls etc.).
  19. Additional temporary signs will be necessary for most new constructions. In this context consider:
    - a. Is the text, etc. comprehensible and correct?
    - b. Have all signs etc., been positioned safely?
    - c. When will they be removed?
- (Be sure also to use the separate checklists for specific facilities and measures.)*
20. Landscaping:
    - a. Is there advertising conflict between landscaping and visibility requirements? Has ultimate growth height been considered and potential obstructions to pedestrian visibility and potential for trees to become collision objects?
    - b. Will maintenance of soft landscaping be safe?
  21. Plantations:
    - a. Will plantations obscure visibility and has a maximum height been specified?
    - b. Are plantations likely to encroach on markings or lighting?
    - c. Will fully-grown trees constitute a hazard (have the requirements on distances to rigid obstacles be observed)?
    - d. Can maintenance be carried out safely?
  22. Lay byes:
    - a. Are there any lay-byes available in the section?
    - b. Is the bye properly located and it is not inconvenient to the drivers to stop the vehicles?
    - c. Is there any need to modify the lay-bye design (if yes, suggest the parameters that need modification)?
    - d. Are advance warning signs and markings properly guiding the driver about the lay-bye?
    - e. Is there any need of any additional signs and markings?
  23. Check provision for pedestrians to cross safely at intersections, signalised and pedestrian crossings, refuges, kerb extensions and at other locations.
  24. Are median barriers necessary and have they been properly detailed? Are there any design features such as end conditions which require special attention?
  25. Are there any poles located adjacent to moving traffic which could be sited elsewhere?
  26. Have frangible or breakaway poles been detailed?
  27. Is the unprotected median width adequate to accommodate lighting poles?
  28. Are there any obstructions, which are likely to create a safety hazard and can they be mitigated or relocated?
  29. Is a crash barrier provided wherever necessary and is it properly detailed?
  30. Check whether access to structures and road furniture is safe. Check that the road or utilities in the road reserve can be maintained safely. Both road users and maintenance personnel should be considered.
  31. Check that the requirements for the traffic management of the construction site and safety measures needed for workers and road users have been adequately spelled out from the safety point of view including the transition from the existing arrangements to the construction site and from the construction site to the final layout can be effected safely.
  32. Check for the arrangement for temporary and permanent traffic control devices, including possible signals, temporary diversion etc.
  33. Check that the design duly considers the needs of persons with disabilities.
  34. Other checks made at discretion of auditor or client.

### **11.5. CHECKLIST 4 - Audit: Stage 4 (During Construction Stage)**

1. Have all recommendations from the previous stage been followed? If not, why not?
2. Whether information regarding the construction zone approaching has been provided well in advance or not?
3. Whether standard procedure and contract conditions provided for proper management of the construction site and road users are properly and safely accommodated?
4. Whether the transitions from the existing road to the site of works safely and clearly laid out?
5. Whether the width of the lanes is satisfactory for the traffic passing through the works area?
6. Whether sight and stopping distances adequate at site of works and at intersections?
7. Whether bus stops appropriately located with adequate clearance from the traffic lane for safety and visibility.
8. Whether appropriate street lighting or other delineation provided at the road works to ensure that the site is safe at night? Check the night time visibility of traffic control devices.
9. Check for proper education and training programme for site operators and managers, which would assist in creating and maintaining safer environment for construction workers and road users.
10. For clear and sufficient information to the road user, advance warning signs installed or not?
11. Is there any provision of marked lanes for safe and clearly guiding road users?
12. Whether suitable measures provided through construction zones to control driver behaviour?
13. Check for the adequacy of traffic control devices (such as signs, markings, cones, drums, delineators, barricades, flashing lights etc.) required for each zone i.e., at advance warning zone, at approach transition zone and at work zone? Check for placement and visibility of these control devices.
14. Has permission been taken while changing the standard layouts from safety point of view?
15. Whether police and other emergency services been consulted?
16. Check for proper care and attention for pedestrian and non-motorised traffic at construction sites.
17. Check for adequate safety provisions for the elderly and persons with disabilities.
18. Whether construction workers provided with protective clothing etc. reflecting jackets, hard hats, gloves etc.?
19. Whether flagmen are available on duty at the appropriate places? Check for proper traffic management practice to avoid inhibiting traffic to pass clear of work site and necessary attention to roadside safety.
20. Whether the temporary diversion is provided at work zones in compliance with the contract and traffic management plan approved by the Engineer.
21. Whether the Traffic Management Plan at work site prepared and submitted by the Contractor to the Engineer for approval.
22. Is the Supervision Engineer ensuring the required quality of traffic management plan?
23. Whether arrangements of First Aid Box and other emergency care exist for persons getting injured.
24. Whether suitable speed reducing measures are provided at work zones.
25. Other checks made at discretion of auditor or client.

### 11.6. CHECKLIST 5 - Audit: Stage 5 (Completion of Construction/Pre-Opening)

1. Have all recommendations from the previous stages been followed? If not, why not? (*Involve the site engineer*)
2. Test the installations of traffic control devices as a road user: by car, by truck, by bus, by cycle and on foot - from disabled road user angle. Also in the dark/ night hours.
3. Examine the carriageway for defects, especially at junctions to existing roads.
4. Has the opening of the road facility been adequately publicized?
5. How will the transition phase proceed?
6. Check that provision for emergency vehicle access and stopping is safe?
7. Check that all delineators and pavement markings are correctly in place.
8. Check that all signs and other traffic control devices are correctly in place. Check that they are likely to remain visible at all times.
9. Check that the road markings as installed have sufficient contrast with the surfacing and are clear of debris.
10. Check that all lighting operating is effective from safety point of view.
11. Check that no roadside hazard has been installed or overlooked.
12. Check that the form and function of the road and its traffic management are easily recognised under likely operating conditions.
13. Check that all temporary arrangements, signing, etcetera have been removed and replaced by permanent arrangements.
14. Other checks made at discretion of auditor or client.

### 11.7. CHECKLIST 6 - Audit: Stage 6 (On Existing Roads or During Operation & Management)

1. Carryout inspection - do not forget to take the results of accidents analysis and relevant checklists with you.
2. Does the actual function of the road correspond to its intended function?
3. Are the prevailing speed levels within desirable limits?
4. Do the equipment and standard of the road correspond to its function, speed level and classification? (Use checklist 2 and 3, as well as any specific checklists, which are relevant.)
5. Do road users park in ways that could constitute hazards?
6. Do plantations obscure visibility or the view of signs?
7. Are the surface and carriageway markings in good condition?
8. Are there any signs that road users drive over islands or kerbs or that the routes taken by motorists through junctions and bends are less than ideal?
9. Are there signs of other conflict situations and minor accidents?
10. Are the specified distances to rigid obstacles maintained for all groups of road users?
11. Are medians and islands of adequate width for the likely users?
12. Are there signs of pedestrian traffic in places that seem hazardous to pedestrians?
13. Does there appear to be a need for more or better crossing facilities for pedestrians?
14. Does there appear to be a need for more or better facilities for cyclists?
15. Has due consideration been given to children, the elderly, persons with disabilities?
16. Are bus stops and bus bays safely located with adequate visibility and clearance to the traffic lane?
17. Any provisions for parking satisfactory in relation to traffic operations and safety?
18. Are all locations free of construction or maintenance equipment, and any signing or temporary traffic control devices that are no longer required?
19. Are overtaking opportunities available for heavy vehicles where volumes are high?
20. Are the road boundaries free of any activities that are likely to distract drivers?

21. Is the location of rest areas and truck parking areas along the route appropriate and adequate?
22. Is sufficient warning provided in advance of breaks in service roads and openings in medians for traffic using multilane highway?
23. Are there reasonable traffic calming measures in place for the road stretches passing through habitations and built up areas?
24. Other checks made at discretion of auditor or client.

### **11.8. CHECKLIST 7 - Planning**

1. Is there a development plan or development strategy for the area and, if so, does the project conform to this?
2. Is the proposed design appropriate in relation to the forecast traffic volumes, traffic characteristics and the adjoining land use?
3. Does the route fit in with the physical constraints imposed by the topography? Does the route serve major generators of traffic in a safe and adequate manner?
4. Is the frequency of junctions and their type appropriate for the function of the road and its design speed?
5. Does the project road fit in well with the existing road network? (Check for potential problems at the connections - will changes in traffic volumes cause problems)
6. Does the project road relieve routes or sites with bad accident records? Does it have any harmful effects on safety on the surrounding road network?

### **11.9. CHECKLIST 8 - Alignment**

1. Is the proposed design speed appropriate to the function of the road, the mix of traffic likely to use it, and the road environment? (Check whether different sections need different design speeds?).
2. If the speed is not up to the mark of design speed, whether proper cautionary sign have been provided?
3. Does the alignment (horizontal and vertical) give sufficient forward visibility for the selected design speed? (Check for inadequate stopping sight distances)
4. Check for consistency throughout the route; note any location where alignment standard changes abruptly and is not as would be expected by drivers.
5. Do the horizontal and vertical alignments fit together comfortably? (Check for bad combinations, such as a sharp bend immediately after a summit curve, and sag curve within a bend).
6. Does the alignment provide safe overtaking opportunities? Does it avoid creating situations where the forward visibility is marginal for overtaking (neither clearly adequate nor inadequate)?
7. Does the treatment at curves, proposed if any, make appropriate, adequate and safe provision for transition curves, super elevation and carriageway and formation widening?
8. Does the vertical alignment pose excessive demands on the power of heavy vehicles? Has it been designed so those maximum grades are interspersed with recovery grades? Are there passing places to enable faster vehicles to overtake slow-moving heavy vehicles?
9. Is the transition between project road and the existing road(s) i.e., access roads handled safely?

## 11.10. CHECKLIST 9 - Cross-Section

1. Are the widths of the carriageway, shoulders, medians (if any), service roads in accordance with standards and adequate for the function of the road and volume and the mix of traffic likely to use it?
2. Check whether bridges have footpaths and they have proper gradients/crash barriers.
3. Note any location where the cross-section standard changes abruptly along the route or is otherwise inconsistent with driver expectations.
4. Identify any locations where the capacity of the roadway is restricted and note locations of regular traffic congestion.
5. Have the shoulders and side slopes been designed to a safe standard and note any locations with inadequate shoulder width?
6. Have the side drains been designed to a safe standard? Are the batter slopes and drains safe for run-off vehicles to traverse?
7. Is the transition between the project road and the existing road(s) handled safely? (Check for major changes in standards).
8. Check whether the cross-section has adequate provision for the Vulnerable Road Users including persons with disabilities:
  - a. Pedestrians: Have paved footpath, adequate refuge width on median and proper ramps, up and down kerbs, where there is regular pedestrian traffic?
  - b. Bicyclists: Segregated areas (e.g. paved shoulders) where numbers are significant.

## 11.11. CHECKLIST 10 - Junctions

### General

1. Is the general layout of junction caters safely for all road users including disabled road users? (Check whether there are other junctions too close to it. Check whether approaching drivers will get a clear view of it. Check with respect to pedestrians, cyclists and two wheelers etc.)
2. The type of junction (T-type, staggered, signal controlled, roundabout) suitable for the function of the two or more roads, the traffic volume, the traffic movements (pedestrians and vehicular) and the site constraints? Is it safest alternative?
3. Is the layout of the junction adequate for all permitted vehicular movements and for all types of vehicles?
4. Will the general type of junction, its layout and the priority rules be recognised by approaching drivers well in time? Is the route through junction as simple and clear as possible? (Check for unusual or over-complicated layouts? Check that signages and marking are correct and clear?)
5. Does the layout encourage slow controlled speeds at and on the approach to stop/ give way lines and other critical decision points? (Check for Y and skew junctions, which can be a problem. Also roundabout with inadequate deflection?)
6. Are the sight lines at and on the approach to stop/give way lines and other critical decision points adequate and unobstructed? (Check for Y and skew junction, which can be problem. Check signs, lighting columns, pedestrian guardrails etc.?)
7. Is there adequate provision for channelising the different streams of traffic? (Check the provision for right turn lanes, deceleration lanes and acceleration lanes?)
8. Is adequate provision made for pedestrians and non-motorised vehicles?
9. Is the provision of night time lighting adequate, if not what the deficiencies are?
10. Are junction(s) at that stretch having proper markings, signs and studs to avoid accidents?

### Roundabouts

1. Is the geometry simple and easily understood? (Pay attention to roundabouts which are not circular, or which have awkward entry paths).
2. Are there too many entries for safe efficient operation? Are they sufficiently separated from each other to avoid confusion?
3. Does the design deflect entering traffic sufficiently to ensure entry speeds are safer? (Check entry path curvature, centre island size and positioning).
4. Is there visibility for entering traffic adequate? (Check if visibility is too good, if it encourages entry speeds which are too high)
5. Is the visibility for circulating traffic adequate?
6. Has the Central Island been designed to be forgiving to errant vehicles?
7. Has adequate provision been made for pedestrians to cross the arms of the junction?
8. Have the needs of cyclists and other non-motorised vehicles been considered?
9. Does the signing make the priorities clear? (Entering traffic must give way to circulating traffic).

### Signal-Controlled Junction

1. Does the signal sequence conform to the requirements of the regulations and standards?
2. Do the signals clearly indicate which movements are allowed at any one time? Are the timings of various phases of signal cycle adequate?
3. Are the signal heads positioned so that drivers can see them easily, and in time to react (stop or go)?
4. Are the signals for competing phases located in such a way that they are visible only to the traffic for which they are intended?
5. Are all right turning movements protected as far as possible?
6. Do the signing; marking and channelisation make it clear to drivers what path they should take through the junction?
7. Are pedestrian crossing places marked, and are pedestrians channelled to these crossings?
8. Are the pedestrian signals positioned so those pedestrians can see them?
9. Whether the pedestrian crossing signal controls are provided where appropriate? If so, there is a need for the crossing movements to be fully protected from conflicting traffic movements for example where there will be serious conflicts with turning traffic.

### Vegetation and Plantation

1. Is the top of vegetation in the traffic island as well as channelisers, dividers less than 600 mm above the road top level for a length of 15 m from the end of the dividers?
2. Is the vegetation/plantation at the corners of the junction retracted for enough back from the edge of the shoulders to afford clear view of approaching traffic to the driver?
3. Are there no branches of trees projecting over the road berms/pavement at a height less than 7 m?

## 11.12. CHECKLIST 11 - Road Signs

1. Is the provision for road signs (regulatory, warning and informatory signs and delineators) adequate and in accordance with standards? (Check with respect to size, shape and placement etc.)
2. Check for any unauthorized traffic signs and use of non-standard signs (colour and shape).
3. Location and spacing of signs:
  - a. Note locations where there are too many signs placed.
  - b. Note the signs placed too close to each other.
4. Note if all traffic signs are clearly visible and are prominently displayed for the intended road users.
5. Find any instances where the legibility of the information on traffic signs is inadequate, bearing in mind the speed of vehicles and the amount of information displayed.
6. Determine effectiveness of traffic signs by observing them at night and identify any lack of reflectivity.
7. Examine type of sign posts used and record situations where sign posts constitute a fixed roadside hazard or where the use of frangible sign posts should be considered.
8. Are there any situations where traffic signs themselves are obstructing essential 'Line of Sight' for drivers and pedestrians.
9. Regulatory and Warning signs:
  - a. Are appropriate regulatory signs provided where necessary?
  - b. Are warning signs provided only where they are warranted?
10. Informatory signs:
  - a. Has signing been done on a systematic route or regional strategy that it is logical and meets needs of unfamiliar driver?
  - b. Are all important junctions provided with advance direction sign, distance information sign and intersection sign etc.?
  - c. Are these signs correctly positioned to enable the required timely action to be taken by the intended drivers?
  - d. Find instances of poor legibility and poor arrangement of information on signs.
  - e. Overhead signs - size, message information adequate, languages as per IRC standards.

## 11.13. CHECKLIST 12 - Road Markings

1. General adequacy and visibility of road markings, during day/night time and in wet/ dry weather conditions
2. Has correct type of markings been used in various situations (e.g. lane line, edge line etc.)?
3. Are correct colours used for laying road markings?
4. Is there any deficiency in the delineation of merge and diverge areas, including situations where 'through' traffic may inadvertently lead into auxiliary and turn lanes?
5. Are zebra crossing markings provided at junctions and mid-blocks of the sections (depending upon the movement of pedestrian)?
6. Is positioning of stop lines appropriate?
7. Are the directional arrows marked on the pavement guiding the driver or creating confusion to the driver?
8. Are there locations where there is a lack of 'Hazard markings' at approach end of island, medians and culverts/ bridges etc.?
9. Have retro-reflective markers been installed? Where coloured markers are used, have they been installed correctly?
10. If chevron alignment markers are installed, have the correct types of markers been used?

### **11.14. CHECKLIST 13 - Lighting**

1. Is there any need of lighting on the project roads, or parts of it, to be lighted at night (particularly where there are pedestrians and parking along the road) important interchanges, bus bays, truck lay bays, toll plazas?
2. Are the proposed lighting scheme and illumination levels of an appropriate standard, consistent with the needs of the location, pedestrian and other factors?
3. Identify the locations where street lighting columns constitute a hazard to traffic (on the outside of sharp curves, on small islands, noses of medians) or which may conflict visually with traffic signals or signs?
4. Does the existing street lighting enhance as 'route guidance', rather than confuse the drivers' ability to 'see the direction of the route ahead'?
5. Are the appropriate types of poles used for all locations and correctly installed (e.g. slip-base at correct height, rigid poles protects if within clear zone)?
6. Has lighting for signs, particularly overhead signs, been provided where necessary?
7. Are there any lighting or telephone poles close to the edge of the berms so as to pose hazard to traffic?
8. Are there any lighting poles in the median unprotected by crash barriers?

### **11.15. CHECKLIST 14 - Roadside Hazards**

1. Is a clear zone provided in accordance with the guidelines? Is the appropriate treatment or projection provided for any objects within the clear zone?
2. Are bridge and culvert parapets and other obstructions close to moving traffic? If so, can they be relocated? If not, are they adequately provided with signs and, where necessary, protected by safety barrier?
3. Are bridge parapets designed to contain errant vehicles, where the speed and volume of traffic warrants them?
4. Are the ends of bridge parapets, bridge railing and pedestrian guardrail/crash barriers of a safe design?
5. Are there any poles or columns along the road and comment on whether some or any of them can be removed, relocated to less hazardous positions etc.
6. Is there a degree of hazard associated with large trees, boulders, etc. and whether these can be treated to improve roadside safety?
7. Do the trees and other vegetation obstruct driver and pedestrian sight lines, which are essential for safe traffic operation?
8. Are there any 'fixed roadside objects', which occur within the roadway? Comment on the need to treat them in terms of road safety?
9. Is there an existence of roadside stalls and other roadside business activities within the right of way of the road?
10. Are the provided crash barriers suitable for the purpose?
11. Is the length of crash barrier at each installation adequate? Are the crash barrier installed correctly?
12. Is the provided barrier/fencing in the clear zone free of separate horizontal rails?
13. Is there adequate delineation/visibility of barriers and fences during night time?
14. Are there any thorny bushes by the roadside, whose branches are likely to hurt the passengers occupying the window seat of a vehicle, especially a non-AC bus?
15. Is any thick growth of vegetation by the roadside enough far back from the edge of the pavement to enable a driver to take protective steps in time if any human or animal should run across the road from behind or within the vegetation?

16. Are there any sharp edged or pointed fixtures or tops of supporting verticals on the median crash barriers or on dividers which can hurt a motor cyclist in case of a collision or crash or loss of balance.?
17. Are there any village name boards or direction boards by the roadside with pointed ends to hurt a passenger in a bus on window seat?
18. Bridges/Canal crossings: Are the open spaces by the side of ends of Parapets covered by protective crash barriers or walls to prevent vehicles going into the river or canal?
19. Have the roadside trees close to edge of berms, which cannot be removed for want of permission of tree authority, been made visible at night and day by white washing/ pasting reflective tape on them?
20. Is the height of vegetation in the median at breaks in median at junctions or for U Turns or for pedestrian crossings reduced to less than 60 cm for a length of 20 m to afford complete visibility to drivers?
21. Is the height of vegetation in the median less than 60 cm on curves?
22. Is the median clear of any trees with trunks with girth greater than 30 cm? If not, are such locations enveloped by protective crash barriers?
23. Are fixing details of pipe railing such that the entire length of pipe is smooth and continuous without any projection on roadward side?
24. Are entrances to abandoned roads properly fenced off?

### 11.16. CHECKLIST 15 - Roadside Facilities

1. Do the cross-section, alignment and signages encourage drivers to adjust their speed on entering the town or village and maintain it at an appropriate level? (Check that it will be quite clear to drivers that the road environment is changing and that they slow down).
2. Is there adequate and safe provision for pedestrians and non-motorised traffic to walk alongside the road and to cross it? (Check for provision of footpaths, shoulders and safe crossing places and whether pedestrian movements are controlled and channelled by guardrail in busy places?)
3. Are the design and provision of roadside parking and access to properties adequate, controlled and safe?
4. Has the opportunity been taken to improve the traffic and parking situation in the town and villages through which the road passes? (Check for junction improvements, access control, provision of service lanes, parking areas and bus stops).
5. Are bus stop locations safe and proper and whether the provision for buses to stand clear of traffic lanes has been made? Also is there need for lighting at these locations for the security and safety of passengers?
6. Is there any need for overtaking opportunities along the route at regular intervals on divided roads, particularly where traffic flows are high or in hilly terrain?
7. Consider the need for rest areas and other roadside stopping places e.g., truck stops, scenic view points, wayside picnic areas etc, and note any current 'unofficial' places where vehicles stop and the degree of hazard that this involves.

### 11.17. CHECKLIST 16 - Vulnerable Road Users

1. Has there been a survey of non-motorised vehicle and pedestrian flows?
2. Will there be any major conflicts between motorised traffic and pedestrians and other disabled / handicapped road users?
3. Have pedestrians need for crossing the road and walking safely alongside it been adequately provided for? (Check particularly in towns and villages and at all junctions - check shoulder width - check whether it is desirable and feasible to provide a segregated footway - check whether steps are provided where pedestrians will have to climb high embankments).

4. Is the provision for pedestrians and non-motorised vehicles at bridges and narrow sections adequate in relation to pedestrian and vehicular traffic volumes and traffic speeds?
5. Have measures been taken to reduce the accident risk for children going to and from roadside schools (Pedestrian guardrail may be needed to prevent children from running out into the road)?
6. Have the need of cyclists and other non-motorised vehicles been provided for (Check shoulder width - check the need and feasibility of segregated cycle/cycle rickshaw lanes, especially in towns)?
7. Are bicycle safe grates provided at drainage pits where necessary?
8. Does the volume of motorcycle traffic justify the provision of separate lanes? (Check in towns).
9. Are bus stops appropriately located with adequate clearance from the traffic lane for safety and visibility?
10. Where necessary, is fencing installed to guide pedestrians and cyclists at crossings or overpasses?

### **11.18. CHECKLIST 17 - Development Proposals**

1. Horizontal Alignment:
  - a. Is visibility satisfactory at proposed access, including that for pedestrians?
  - b. Are curve radii and forward visibilities satisfactory?
  - c. Are verge widths satisfactory?
2. Vertical Alignment:
  - a. Are gradients satisfactory?
  - b. Are sight and stopping distances maintained?
3. Parking Provision:
  - a. Is off-site parking adequate to minimise on street parking and associated risks?
  - b. Are parking areas conveniently located, with adequate turning facilities?
4. Servicing Facilities:
  - a. Are off street loading/unloading areas provided?
  - b. Are there any turning facilities for large vehicles?
  - c. Is emergency vehicles access provided for?
5. Landscaping:
  - a. Does landscaping affect visibility at junctions, bends or access points?
  - b. Is tree planting proposed where vehicles are most likely to run off road?
6. Traffic Signs and Road Markings:
  - a. Have necessary traffic signs and road markings been provided as part of development?
7. Other Traffic Control Devices - Road Side furniture, delineators, crash barriers, guard rails, etc.
8. Others:
  - a. Will there be area-wide effect on other roads?
  - b. Will design keep speeds down where necessary?
  - c. Are number of access points to busy roads minimised by layout?
  - d. Are footpaths (sidewalks) necessary and provided adequately?
  - e. Are cycle tracks required?
  - f. Is street lighting required/ adequate?
  - g. Are bus bays and stops safely located?
  - h. Are dropped crossings provided at preferred pedestrian route or crossing points?
  - i. Is pedestrian guardrail provided where walkways join the highway?
  - j. Are truck lay byes required?
  - k. Are toll plazas congestion free?

### 11.19. CHECKLIST 18 - Maintenance Work

1. Is it publicised to the necessary extent about road works, including applicable speed limits and diversions?
2. Are temporary traffic signals or road markings adequate and does the message reach all road users?
3. Has a temporary speed limit been suggested and is it proper?
4. Will the unaffected road users misunderstand temporary traffic signals?
5. Is the standard of proposed signs adequate?
6. Will it be necessary to illuminate critical points?
7. Will the work site, enclosing material, etc. behave as a rigid obstacle?
8. Will there be safe access to the work place?
9. Has a safety zone been proposed and is it adequate?
10. Has due consideration been given to all groups of road users in the layout of staggering and diversions?

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## 12 Appendix L – Waste Water Recycling Techniques

### 12.1. Waste Stabilisation Pond Systems (WSPS)

#### Key features of the technology

- Simple to construct, operate and maintain
- Does not involve installation of expensive electro-mechanical equipment
- Operates on a combination of solar energy and natural forces and thereby has very low O&M costs.
- Extremely robust and can withstand hydraulic and organic shock loads
- Effluents from maturation pond are safe for reuse in agriculture and aquaculture.

#### Performance

- Can reliably produce high quality effluent with low BOD, SS, Fecal Coliform and high DO levels.
- BOD reduction of the order of 90% and more
- Suspended solids reduction is somewhat less due to possible overflow of algae
- Coliform reduction could be upto 6 log units
- Total nitrogen removal between 70-90%
- Total phosphorus removal between 30-45%

#### Specific requirements

- In case of unlined ponds, soil and geo-hydrological survey during planning stage to assess risk of groundwater contamination.
- Sulphate concentration in raw wastewater under 300 mg SO<sub>4</sub>/L to avoid odour nuisance.

#### Applicability

- Suitable under warm Indian climatic conditions
- For areas with easy availability of land
- In areas with social preference for aquaculture
- In areas with low, unreliable or expensive power supply.

### 12.2. Duckweed Pond System (DPS)

#### Key features of the technology

- Natural and simple wastewater system involving sheltered pond like culture clots
- A large pond subdivided into smaller cells through floating bamboo or other material to break the wave and wind action.
- Extremely rapidly growing floating duckweed vegetation serving as a dynamic sink for organic carbon, dissolved nutrients and minerals.
- Thick mat of duckweed out competing and inhibiting growth of other aquatic plants.
- Pond functioning as a facultative lagoon with deeper layers under anaerobic environment.
- Retention period in the system 7-21 days
- Continuous process requiring intensive management for optimum production.
- Yield of large quantities of proteinaceous matter as fish feed or as a supplement for animal feed.

#### Performance

- **Can meet Indian discharge standards for BOD and SS.** Removal of Ammonical nitrogen (N) and Dissolved Phosphates (P) is also substantial.
- For settled wastewater, BOD and SS below 30mg/L are attainable at 12 detentions.

- High nutrient and mineral removal due to uptake by duckweeds.

### Specific requirements

- Primary treatment including screening, grease trap, grit removal and sedimentation.
- Preferably the influent BOD, SS and ammonia to be under 80 ppm, 100 pm and 50 ppm respectively.
- A series of smaller cells of around 10m x 10m to 10m x 30m to break the continuum in the pond (cell size as a function of wind speed, pond size and wave action).
- Cell borders made with floating bamboo mats or PVC profiles to shelter from wind and wave action
- Impermeable lining of clay or artificial liners in case of pervious and fractured strata
- Outlet structure with variable weir height
- Nitrogen loading of around 9 km/ha/day
- Small size culture ponds for duckweed seeding and as fish nursery ponds.
- Duckweed drying and processing unit in case of large harvest and for sale as animal feed
- In case of downstream aquaculture ponds – introduce suitable species of fishes e.g. Grass Carp., Common Carp, Silver Carp, Rohu, Mingal, Cattle and freshwater prawns.

### Applicability

- Low strength domestic wastewater or after primary sedimentation with influent BOD – 80mg/l
- In combination with existing WSP
- **Rural and semi urban settlements** with easy land availability
- As a polishing pond for an existing activated sludge plant or other technology based STPs

## 12.3. Facultative Aerate Lagoon (FAL)

### Key features of the technology

- Simple flow scheme without primary or secondary settling and sludge recirculation
- Deep lagoon with anaerobic bottom layer and aerobic top layer.
- Simultaneous degradation of sludge in the bottom and dissolved organics in the top layer.
- Lower energy input corresponding to requirement for maintaining only desired DO levels in the top layer and not for creating completely mixed conditions.

### Performance

- As per the information in literature based on Indian experience the following performance is expected from a well-functioning aerobic lagoon:
  - BOD removal 70-90%
  - Suspended solids removal 70-80%
  - Coliform removal 60-99%

### Specific requirements

- Typical hydraulic detention time 3 days or more
- Depth between 2-5 m depending on local soil and groundwater conditions
- Effective outlet structure with baffles and stilling basin to prevent solids overflow.

### Applicability

- Standalone system for sewage treatment
- As a pre-treatment unit for WSP
- As an up-gradation option for overloaded WSPs.

## 12.4. Trickling Filter (TF)

### Key features of the technology

- A proven 100 year old technology
- Rugged system with simple and silent operation
- Lower process monitoring requirement as compared to ASP
- Consistent effluent quality.

### Performance

- Performance of a slow rate trickling filter is comparable to ASP

### Applicability

- Standalone treatment for sewage if operated at slow rates
- As a high rate roughing filter for high BOD wastewater.
- In combination with ASP for good and consistent performance

## 12.5. Activated Sludge Process (ASP)

### Key features

- Proven and tested for more than 7-8 decades all over world
- Several modifications possible to meet specific requirements.

### Performance

- Very good performance in terms of BOD and SS. Treated effluent can most often **satisfy the current Indian effluent discharge standards**. Performance is critically dependent on sludge settling characteristics and design of secondary clarifier. Sludge settling characteristics are typically influenced by bio-flocculation which in turn depends on growth rate of micro-organisms. Growth rate is generally controlled by controlling biological solids retention time / food to micro-organism ratio.

### Specific requirements

- Un-interrupted power supply for aeration and sludge recirculation
- Maintenance of biomass concentration in the aeration tank and proper settling in the secondary clarifier.

### Applicability

- The most widely used option for treatment of domestic wastewater for **medium to large towns** where land is scarce.

## 12.6. Biological Filtration and Oxygenated Reactor (BIOFOR) Technology

### Key features of the technology

- Enhanced primary treatment with addition of coagulants and flocculants.
- High rate primary tube settlers and integrated thickening offering space economy.
- Two stage high rate filtration through a biologically active media and with enhanced external aeration.
- Co-current up flow movement of wastewater and air enable higher retention and contact.
- Treatment scheme excluding secondary sedimentation but recycling of primary sludge.
- Deep reactors enabling low land requirements.

- A compact and robust system.

**Performance**

- Suspended solids and BOD removal of 90% and 70% respectively in the primary clarifier.
- High quality effluent with BOD 10mg/L and total system efficiency of 94-99.9%
- Low turbidity with suspended solids under 15 mg/L and total system efficiency of 98%
- Pathogen removal of 2 on the log scale.

**Specific requirements**

- Addition of alum as coagulant (~@60 ppm)
- Polyelectrolyte for high rate sedimentation (~@0.2-0.3ppm) in tube settlers.
- Special and patented granular filter media 'Bioloite' made of clay.
- Backwash of BIOFOR bed and recycle of the wastewater.
- Treatment (digestion) and disposal of sludge from clarifier (not provided at the STPs due to space limitations)

## 12.7. High rate Activated Sludge Biofor –F Technology

**Key features**

- In general, high level of mechanization and sophistication
- The flow scheme excludes primary sedimentation tank
- Superior aerated grit chamber and classifier
- Circular aeration tank with tapered air diffusion system
- Second stage aeration and rapid sand filtration through a biologically active filter media
- Dissolved air floatation for sludge thickening.
- Digester heating and temperature controller anaerobic sludge digestion.
- Mixing of digester contents through biogas.
- Dynamic cogeneration of electrical and thermal energy through gas engines.

## 12.8. Fluidized Aerated Bed (FAB)

**Key features of the technology**

- A compact and robust system involving extended aeration process with submerged aeration
- Biomass growth on fluidized bed of plastic media enabling retention of biomass and long solid retention time in the reactor leading to low food to 'micro-organism ratio' and higher organic removal.
- Two stage biological oxidation
- Flexibility in handling organic load by adjusting quantity of fluidized media
- Reactors upto 5 m deep enabling low land requirements
- Tube settlers again offer space economy
- Ability to withstand limited organic overload

**Specific requirements**

- Special grade plastic proprietary media custom made for offering high specific surface area
- Diffused aeration system
- Submerged stainless steel screens at the outlet of FAB reactors to prevent media overflow
- Tube settlers for compact clarifier.

**Options**

- Addition of coagulant and polyelectrolyte for compact plants
- Tertiary treatment of chlorination

- Sludge treatment through thickener and bag filter press or drying beds.

#### Performance

- High BOD removal with effluent concentration under 10mg/L
- High suspended solids removal with effluent concentration under 20mg/L
- Faecal coliforms removal of the order of 2-3 log scale at FAB-2 stage.

#### Applicability

- The FAB technology based system is particularly applicable for:
  - Small to medium flows in congested locations
  - Sensitive locations
  - Decentralized approach
  - Reliving existing overloaded STPs.

## 12.9. Submerged Aeration Fixed Film (SAFF) Technology

#### Key features of the technology

- Essentially a trickling filter with enhanced oxygen supply through submerged aeration
- Unconventional plastic media offering high void ratio and specific area compared to stone and aggregates.
- Large biomass and long solid retention time in the reactor leading to low 'food to micro-organism ratio' and higher organic removal.
- Two stage biological oxidation
- Treatment scheme excluding primary sedimentation and sludge digestion
- Reactors upto 6 m deep enabling low land requirements.
- Tube settlers again offer space economy.

#### Applicability

- The SAFF technology based system is particularly applicable for:
  - Small to medium flows in congested locations
  - Sensitive locations
  - Decentralised approach
  - Reliving existing overloaded trickling filters.

## 12.10. Cyclic Activated Sludge Process (CASP)

#### Key features of the technology

- Essentially activated sludge process operated in batches through auto control
- Aeration and settling in one tank leading to lower plant foot print
- Savings in air/oxygen supply and hence energy
- Two levels of treatment possible depending on the requirement
- Treatment scheme excluding primary sedimentation and sludge digestion

#### Specific requirements

- Complete reliance on auto control, uninterrupted power supply is a must
- Diffused aeration system
- Several moving parts

#### Performance

- High BOD removal of 98% with effluent concentration under 10mg/L
- High suspended solids removal with effluent concentration under 20mg/L

- Faecal coliforms removal of the order of 2-3 on log scale.

**Applicability**

- The Cyclic Activated Sludge Process (CASP) may be applicable for:
  - Small to medium flows in congested locations
  - Sensitive locations
  - Decentralized approach
  - Reliving existing overloaded trickling filters.

## 12.11. Upflow Anaerobic Sludge Blanket Process (UASB)

**Key features**

- No mechanical components or external energy requirements in the reactor, therefore process not vulnerable to power cuts
- No primary treatment, suspended solid in the wastewater serve as carrier material for microbial attachment.
- Recovery of gas with high calorific value
- Low sludge production
- Relatively simple routine operation and maintenance
- Biological activity can be restarted without any external seeding or special care after interrupted operations.

**Performance**

- An UASB reactor can bring down the BOD of the domestic wastewater to 70-100 mg/L and suspended solids (TSS) to 50-100 mg/L. However, sludge washout from the reactor is possible and effluent BOD and TSS is very high during such episodes. The effluent is strongly anoxic with high immediate oxygen demand (IOD). Should not directly discharged into water bodies or used for aquaculture or irrigation without re-aeration.

**Specific requirements**

- Use of anticorrosive materials / paints on exposed surfaces
- Frequent cleaning / de-sludging of distribution / division boxes and influent pipes
- Skilled supervision during start-up and for control of biomass levels within the reactor
- Post treatment of the UASB effluent is invariably required.
- Control of toxic materials and sulfates in the wastewater is required for efficient operation.

**Applicability**

- The suitability of this technology may be doubtful as a stand-alone secondary treatment option.

## 13 Appendix M – Solid Waste Management: Best Practises

### 13.1. Introduction

As mentioned in Introduction chapter number 1 of volume I, Zero waste is gaining ground as being practicably achievable in Indian cities, which have the advantage of significant recycling and reuse in the solid waste management system. Those can be improved and coordinated with the view to moving towards 'zero waste' scenarios. Further, in order to achieve the SLBs, waste management techniques can be improved in all types of settlements. Some of the solid waste best practises are covered in this section, these are:

- Vellore Municipality, 2000
- Pimpri-Chinchwad Municipal Corporation (PCMC)
- Amritsar Municipal Corporation

### 13.2. Case: Vellore Municipality, 2000<sup>5</sup>

A zero waste management (ZWM) project in Tamil Nadu's Vellore district is an example of a successful Solid Waste Management programme and its benefits. ZWM is a technique of handling solid wastes that attempts to recover, recycle and reuse maximum waste.

- **Waste segregation at source:** This practice leads to reduction of space requirement for waste segregation at later stage.
- **Minimizes pollution:** ground water, land and air pollution created at landfill sites is avoided by doing away with disposal of wastes at dumpsites and landfills.

In Vellore Municipality, citizens were informed about the concept of ZWM and taught how to segregate waste at the household or respective source. Red and green dust bins were provided to each household unit for initiating waste segregation. Teams with two street beautifiers each, were formed. Each team was assigned 300 households and provided a tricycle and a set of hand tools. The tricycle had two compartments, one green and the other red, to collect organic and inorganic waste respectively.

The street beautifiers collect domestic garbage in their allocated zones. The waste collected in the households in green and red dust bins are emptied in the colour-matching compartment of the tricycle and brought to the zero waste centre. Inorganic waste is separated into more than 25 items under categories like bottles, plastics, metals, cardboard, paper, PVC etc. They are then packed and sold to local waste collectors and recyclers every month. Mixed waste (10-15 percent), which cannot be recycled, is sent to landfills.

The organic waste is composted and treated in two stages: (a) cattle dung/bio-dung composting (b) vermi-composting.

- **Cattle dung composting:** the organic waste is laid in a composting yard in large compartments and spread in different layers. Each layer is treated with cattle dung microbial inoculums. When the height of a layer reaches 5 feet, it is covered with a polythene sheet. This first stage of composting takes 45 days. The polythene sheets trap the heat generated during anaerobic composting and increase the internal temperature to 70-75 degrees Celsius. This high temperature kills the pathogens. The moisture evaporates and condenses on the underside of the

<sup>5</sup>India Sanitation Portal: United Nations Children's Fund (UNICEF), P Amudha

polythene. The cyclic movement of water also cycles the bacteria aiding rapid decomposition and reducing the volume to about one third in 15 days. After 50 days, the compost can be harvested, sieved and packed in bags for sale.

- **Vermi-composting:** semi-decomposed organic waste is put into vermi-composting beds after 15 days. The vermi-compost can be collected after 45 days. The rich composted manure is sieved and packed for agricultural purposes and afforestation activities.

The Vellore solid waste management project is now managed by village *Panchayats* supported by Residential Welfare Associations and SHGs. Each household and shop pays for waste collection. The funds collected from monthly subscriptions and sale of inorganic waste and organic manure are used for paying the street beautifiers and supervisors. The pilots in Vellore district are successful because of informed communities and their participation. Equally crucial to the success is the full involvement of local bodies and their commitment.

Due to information technology in Municipal Solid Waste Management (SWM) sector has equipped this sector with better management of this crucial mandatory functions under the urban domain, as per 12th Schedule of 74th CAA. Better management of SWM includes GPS based vehicle tracking system, tracking clearance of secondary collection points, GIS based shortest route identification to landfill / dumping site etc.

### 13.3. Case: Pimpri-Chinchwad Municipal Corporation (PCMC)<sup>6</sup>

Pimpri-Chinchwad is one of the cities who has done pioneering task of monitoring its SWM services through the use of ICT.

The city of Pimpri-Chinchwad located northwest of Pune, has an area 171 sq. km. with an estimated population of over 12.5 lakhs. PCMC deployed GPS based vehicle tracking system due to low capital cost of deployment and ease of operation. A step by step implementation strategy was followed at PCMC:

- **Step 1:** Selection of technology partner
- **Step 2:** Installation of GPS system on waste collection vehicles
- **Step 3:** Geo Coding of bins across the city
- **Step 4:** Development of web based application and public information system
- **Step 5:** Stabilization of system and training to stake holders

#### **Brief on Solid Waste Management – “GPS & GIS enabled”**

Geo coding of the all the bins across the city were marked on the GIS mapping database and real time vehicle movement (GPS location of the vehicle on which a GPS device was installed) were monitored against them as per route. Overall city wide 75 different routes were identified and geo coded with GIS map. An intelligence algorithm/logic was developed in web based application to flag the bin as “Served”, when a waste collector vehicle stops near a bin within a specified distance for a sufficient period.

Table 13.1: Prior Conditions and Achievements of the Project

S. No.	Situation prior to proposed ICT based SWM system	Achievements
1	Monitoring of actual pick-up of the waste from the assigned bins/locality and the same was recorded purely on manual recording basis.	Monitor the actual movement and real time position of the vehicle.
2	Monitoring actual movement of the fleet and its productivity i.e. no. of bins picked by each vehicle on	Analyse the bin pick up status in real time.

<sup>6</sup>JnNURM: Best Practices in e-Governance, MoUD ([http://www.innurm.nic.in/wp-content/uploads/2011/01/BP\\_SWM.pdf](http://www.innurm.nic.in/wp-content/uploads/2011/01/BP_SWM.pdf))

S. No.	Situation prior to proposed ICT based SWM system	Achievements
	schedule basis.	
3	Difficulty in tracking the non-compliance to the schedules.	Improve service delivery mechanism and achieve better information management.
4	Processes for validating the productivity of the fleet and payments were done purely based on manual records of no. of trips made by each vehicle.	Reducing the unwanted trips/detours/stoppages and enhance the productivity/utilization of the fleet.
5	Difficulty in locating the bins in a manual process.	Generate MIS and exception report to take informed decision.
6	Difficulty in monitoring actual pick up of the waste from the assigned bins/locality and dumping in the dumping yards and recoding of data is a manual process.	Greater accountability on field level staff.
7	Difficulty in preparing status reports as it is a manual process and takes a lot of time.	Timely completion of job with greater efficiency.
8		Measuring service level with benchmarks, making it compulsory to each ULB to achieve the benchmarks.
9		Improve public image and also offered a tool for RTI.

Source: JnNURM: Best Practices in e-Governance, MoUD ([http://www.jnnurm.nic.in/wp-content/uploads/2011/01/BP\\_SWM.pdf](http://www.jnnurm.nic.in/wp-content/uploads/2011/01/BP_SWM.pdf))

### 13.4. Case: Amritsar Municipal Corporation<sup>7</sup>

Prior to the project, Amritsar city had no door-to-door collection of waste and heaps of garbage was seen in most of the localities. The sanitary conditions were very poor due to lack of unorganized system of collection and transportation. The Sanitation Zones of 4, 5, 6 and 7 were selected for collection and transportation of waste. The job was awarded to a private party in 2008 for operation and maintenance of the project facility.

The major activities under the project included:

- Provision of adequate machinery, equipment and staff for the project upgrading door to door services and SWM infrastructure.
- Vehicles have alarm system for house to house collection.
- Primary and secondary storage in bins.
- Prohibition of waste littering and arbitrary disposal of waste.
- Public awareness for better sanitation/ waste management.
- Provision of mobile covered bins and synchronized transportation mechanism, has removed *dhalaos* and *kudaghars*.
- Uniforms for the *safaisewaks*, drivers and supervisors etc.
- Transportation of waste through high capacity, covered vehicles.
- Provision of centralized complaint redressal system by the Contractor.
- Arrangement for processing facility with multiple product recovery (work is in progress through private participation)

#### Project Achievements:

- Improved door to door collection and efficient, hygienically safe transportation of waste to the landfill site.
- Improvement in the environmental conditions in the selected zones.
- Negligible littering in the streets due to awareness of the citizens, adequate bins, timely and effective collection of waste from the source and its regular transportation.

<sup>7</sup>JnNURM-Toolkit for Solid Waste Management

- Replacement of old *dhalaos/kudaghars* with colourful collection points, improving aesthetics of the area.
- Reduced manual handling of waste in collection and transportation.
- Greater awareness among citizens about cleanliness/ waste management.
- Reduction in expenditure on improving the waste collection/ transportation under SWM Rules.

## 14 Appendix N – Hierarchy of Social Infrastructure Development

Table 14.1: Hierarchy of Social Infrastructure Development

Planning Unit	Population	S.No.	Facilities	No.	Area per Unit (Ha)	Total area (Ha)
Housing Area	5000	1	Pre Primary	2	0.08	0.16
		2	Primary school(I to V)	1	0.40	0.40
		3	Aanganwari - Housing area/ cluster	1	200 to 300 sqm	200 to 300 sqm
		4	Community Room	1	750 sqm	750 sqm
		5	Religious Facility	1	400 sqm	400 sqm
		6	Housing Area Park	1	0.50	0.50
		7	Residential unit play area	1	5000 sqm	5000 sqm
		8	Milk Distribution	1	150 sqm	150 sqm
		9	Convenience Shopping	1	1500 sqm	1500 sqm
Neighbourhood	5000-15,000	1	Senior Secondary School(VI to XII)	1-2	1.80	3.60
		2	Dispensary	1	0.08 to 0.12	0.08 to 0.12
		3	Community hall, mangalkaryayala, barat ghar/ library	1	2000 sqm	2000 sqm
		4	Neighbourhood park	1	1.00	1.00
		5	Neighbourhood Play area	1	1.50	1.50
		6	Local shopping including service centre	1	4600 sqm	4600 sqm
		7	Post office counter without delivery	1	85 sqm	85 sqm
		8	Bank with extension counters with ATM facility	1		
		8a	Floor area for counters		75 sqm	75 sqm
		8b	Floor are for ATM		6 sqm	6 sqm
Community	1 Lakh	1	Integrated School Without Hostel facility(I to XII)	1	3.50	3.50
		2	Integrated School With Hostel facility(I to XII)	1	3.90	3.90
		3	School for physically challenged	2	0.70	1.40
		4	College	1	5.00	5.00
		5	Nursing home, child welfare and maternity centre	1	0.20 to 0.30	0.20 to 0.30
		6	Polyclinic	1	0.20 to 0.30	0.20 to 0.30
		7	Intermediate Hospital (Category B)	1	1.00	1.00
		8	Intermediate Hospital (Category A)	1	3.70	3.70
		9	Multi-Speciality Hospital (NBC)	1	9.00	9.00
		10	Speciality Hospital (NBC)	1	3.70	3.70
		11	Family Welfare Centre	2	500 to 800sqm	1000 to 1600sqm
		12	Diagnostic centre	2	500 to 800sqm	1000 to

## Appendix N – Hierarchy of Social Infrastructure Development

Planning Unit	Population	S.No.	Facilities	No.	Area per Unit (Ha)	Total area (Ha)
						1600sqm
		13	Dispensary for pet animals and birds	1	300 sqm	300 sqm
		14	Music, dance and drama centre	1	1000 sqm	1000 sqm
		15	Recreational Club	1	10,000 sqm	10,000 sqm
		16	Meditation and spiritual Centre	1	5000 sqm	5000 sqm
		17	Community park	1	5.00	5.00
		18	Community level Multipurpose ground	1	2.00	2.00
		19	District Sports Centre	1	8.00	8.00
		20	LPG Godown/ Gas godown (inclusive of guard room)	2	520sqm	1040sqm
		21	Police Post	2	0.16	0.32
		22	Police Station	1	1.50	1.50
		23	Fire Station	1	1.00	1.00
		24	Community Centre with service centre	1	5.00	5.00
		25	Weekly Markets	1 to 2	0.40 to 0.80	0.40 to 0.80
		26	Organised Informal eating spaces	1	2000 sqm	2000 sqm
		27	Dhobi Ghat	1	5000 sqm	5000 sqm
		28	Telegraph Booking Counter	1	200 sqm	200 sqm
		29	Bank with locker, ATM and other banking facilities	1	2500 sqm	2500 sqm
District	5 Lakh	1	General Hospital (NBC)	2	6.00	12.00
		2	Veterinary Hospital for pets and animals	1	2000 sqm	2000 sqm
		3	Old age home	1	Max.1000 sqm	Max.1000 sqm
		4	District park	1	25.00	25.00
		5	District level multipurpose ground	1	4.00	4.00
		6	District Centre	1	40.00	40.00
		7	Cremation Ground	1	2.50	2.50
		8	Burial Ground	1	4.00	4.00
		9	Telephone exchange of 40,000 lines	1	4.00	4.00
		10	Telegraph booking and delivery office	1	1700 sqm	1700 sqm
		11	Head post office with delivery office	2	750 sqm	1500 sqm
		12	Head post office and administrative office	1	2500 sqm	2500 sqm
Zonal	10 Lakh	1	School for mentally challenged	1	0.20	0.20
		2	Technical Education Centre (A) – To include 1 Industrial Training Institute (ITI) and 1 Polytechnic	1	4.00	4.00
		3	Technical Education Centre (B) – To include 1 ITI, 1 Technical Centre and 1 Coaching Centre	1	4.00	4.00
		4	Engineering College	1	6.00	6.00

## Appendix N – Hierarchy of Social Infrastructure Development

Planning Unit	Population	S.No.	Facilities	No.	Area per Unit (Ha)	Total area (Ha)
		5	Medical College	1	15.00	15.00
		6	Other Professional Colleges	1	2.00 to 6.00	2.00 to 6.00
		7	Nursing and Paramedical Institute	1	2000 sqm	2000 sqm
		8	Religious Facility	1	4.00	4.00
		9	Orphanage/ Children's Centre (One each)	1	Max.1000 sqm	Max.1000 sqm
		10	Care centre for physically mentally challenged	1	Max.1000 sqm	Max.1000 sqm
		11	Working women – men hostel	1	Max.1000 sqm	Max.1000 sqm
		12	Adult education centre	1	Max.1000 sqm	Max.1000 sqm
		13	Night Shelter	1	Max.1000 sqm	Max.1000 sqm
		14	Socio – Cultural centre/ Exhibition cum fair ground	1	15.00	15.00
		15	Science Centre	1	As per requirement	As per requirement
		16	Sub city park	1	100.00	100.00
		17	Sub city level multipurpose ground	1	8.00	8.00
		18	Divisional Sports Centre	1	20.00	20.00
		19	District office and battalion	1	4.80	4.80
		20	Police line	1	4.00 to 6.00	4.00 to 6.00
		21	District Jail	1	10.00	10.00
		22	Civil defence and home guards	1	2.00	2.00
		23	Local Wholesale Market / Mandi	1	10.00	10.00
Sub city centre	25 Lakh – 50 Lakh	1	Sub-city Centre	1	As per requirement	As per requirement
City	50 Lakh +	1	City Centre	1	As per requirement	As per requirement
		2	International Convention Centre	1	As per requirement	As per requirement
		3	Police Training Institute	1	5.00	5.00
		4	Police Firing Range	1	upto 10.00	upto 10.00
		5	Fire Training Institute/ College	1	3.00	3.00
Other Facilities		1	University Campus		10 to 60	10 to 60
		2	Veterinary Institute	As per Veterinary Council of India/ Ministry Norms		
		3	Petrol Diesel: Only filling station		30 m x 17 m	30 m x 17 m
		4	Petrol Diesel: Filling cum service station		36 m x 30 m	36 m x 30 m
		5	Petrol Diesel: Filling cum service station cum workshop		45 m x 36m	45 m x 36m

## Appendix N – Hierarchy of Social Infrastructure Development

Planning Unit	Population	S.No.	Facilities	No.	Area per Unit (Ha)	Total area (Ha)
		6	Petrol Diesel: Filling station only for two and three wheelers		18m x 15m	18m x 15m
		7	CNG mother station		1080 sqm	1080 sqm
		8	Traffic and Police Control Room		As per requirement	As per requirement
		9	Police camp including Central Police Organisation/ Security Forces		upto 10.00	upto 10.00
		10	Sub fire station/ Fire Post		0.60	0.60
		11	Disaster Management Centre	One in each administrative zone	1.00 to 2.00	1.00 to 2.00
		12	Electric Crematorium	1 for large size towns	2.00	2.00
		13	Remote subscriber unit	1 for 3 km radius	300 sqm	300 sqm
		14	Reading room	City or sub city/District/Community/neighbourhood Centre	-	-
		15	Rehabilitation Centre	As per requirement	-	-
		16	Police booth	At major intersections	10-12 sqm	

Source: Chapter 8, URDPFI Guidelines, 2014

## 15 Appendix O – All other Planning related Acts

Figure 15.1: Planning related Acts and reference URLs

S.No.	Relevant Act / Law	Document web-Location for reference
1	The Constitutions 73 <sup>rd</sup> and 74 <sup>th</sup> Amendment Act, 1992	<a href="http://indiacode.nic.in/coiweb/amend/amend73.htm">http://indiacode.nic.in/coiweb/amend/amend73.htm</a> <a href="http://indiacode.nic.in/coiweb/amend/amend74.htm">http://indiacode.nic.in/coiweb/amend/amend74.htm</a>
2	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013	<a href="http://indiacode.nic.in/acts-in-pdf/302013.pdf">http://indiacode.nic.in/acts-in-pdf/302013.pdf</a>
3	The Model Regional and Town Planning and Development Law, 1985	<a href="http://www.ndmindia.nic.in/.../VOLUME%20I%20Prop_Am_Legi_Regu_Add">www.ndmindia.nic.in/.../VOLUME%20I%20Prop_Am_Legi_Regu_Add</a>
4	Model Municipal Law, 2003	<a href="http://www.ielrc.org/content/e0331.pdf">www.ielrc.org/content/e0331.pdf</a>
5	National Manufacturing Policy, 2011	<a href="http://dipp.nic.in/english/policies/national_manufacturing_policy_25october2011.pdf">http://dipp.nic.in/english/policies/national_manufacturing_policy_25october2011.pdf</a>
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**ANNEXURE 1 of URDPFI Guidelines, 2014**

**Addendum to Urban and Regional Development Plan formulation and Implementation Guidelines, 2014**

**1. Introduction**

Cities should consider promoting urban forestry. Building water bodies and fountains in dense areas, and improving green transport and energy systems is important. Unnecessary concretization should be avoided and maximum permeability in construction should be encouraged.

Increase in construction of concrete buildings adversely impacts the urban environment mainly by the production of waste heat from refrigeration and air-conditioned systems. Industrial processes and motorized vehicular traffic have also been recognized as additional causes of the Urban Heat Island (UHI) effect. The urban heat island adversely affects the residents, with spill over effects for environmental aspects.

Cooling is particularly important in cities facing rising temperatures, worsened by the urban heat island effect—concrete and tarmac absorbing the sun's power, radiating it out as heat and keeping the city warm long after the sun has gone down. Waste heat from engines and other energy-consuming equipment in transportation, industry and space cooling make cities even hotter.

Often, slum and unauthorized colonies neighbourhoods are more affected as residents have less access to air conditioners and breezy green spaces, putting vulnerable people at greater risk of heat-related health complications.

The standard solution to cooling in cities is to add more air conditioning, but this brings its own set of problems. Energy-hungry cooling further drives global warming. In addition to increasing urbanization and wealth – climate change will also play a decisive role in the surge of the number of ACs in India, which are projected to reach 40% of households by 2038. The number of Cooling Degree Days in India is also projected to increase by 25% and 40% under moderate and high warming scenarios. If air conditioners were provided to all those who need them, not just those who can afford them, there will be 14 billion cooling appliances in use by 2050. There will be considerable increase in Green House Gases (GHG) emissions.

Cities need to take steps so that they can keep cool in a sustainable manner through a system of well-articulated green spaces, and by greening building facades and roofs and promoting passive building design; cities can modernize traditional construction and help reduce urban temperatures. The Indian city of Ahmedabad has taken many steps in this direction. The city implemented its Heat Action Plan after an extremely hot and deadly pre-monsoon season in 2010. The plan not only sets up an early-warning system for the vulnerable but it also included water supplies to the public, plants and trees and a “cool roof” initiative to reflect heat. Some

7,000 low-income households have had their roofs painted white, a simple measure that dramatically reduces inside temperatures by reflecting sunlight.

Cool roof is a simple and cost-effective solution for minimising heat gain in the buildings. Cool roofs save energy, increase thermal comfort and reduce cooling demand. Cool roofs reflect sunlight and absorb less heat. Depending on the setting, cool roofs can help keep indoor temperatures lower by 2 to 5°C (3.6 - 9°F) as compared to traditional roofs. Ahmedabad Municipal Corporation has made use of this technique for reducing heat gain in several lower income households. The AMC is also developing a citywide Cool Roof Program.

Three main strategies can help achieve these objectives:

**2. Strategy 1: Mandatory cool roofs for all municipal, commercial and government buildings.**

There is need for spearheading the Cool Roofs Program in the cities and towns. It is important for all government office buildings, new and existing, to adopt cool roofs. The key driver for this building sector is to showcase leadership in adoption of the cool roof technique with the benefits of thermal comfort, energy savings, and reduction of urban heat island affect. The commercial sector includes all offices, retail complexes/shops, malls, hotel, industrial buildings etc. The key driver for adoption of cool roofs for these types of buildings is the cooling load reduction and resulting energy savings. Thus, a pay-back period of cool roofing material installations is important for these types of buildings, which would have an impact on the overall energy bill of the building.

**3. Strategy 2: Voluntary cool roofing for residential buildings.**

The residential segment includes all multi-level apartment complexes as well as individual houses. The key driver for this segment of the population staying in these buildings in addition to the thermal comfort would be the cooling load reduction and resulting energy savings. Thus, a pay-back period of cool roofing material installations is important for these types of buildings.

**4. Strategy 3: Cool roofing for low income housing under HAPs and through CSR initiatives**

In low-income communities, cool roofs keep temperatures lower and increase thermal comfort. In the long run, cool roofs for vulnerable communities also introduce the concept of cool roofs for existing buildings and potentially new buildings in the future, thus locking in energy savings and reducing the demand for cooling conditions indoors. The driver for this segment of the population for cool roofs is increased thermal comfort and lower indoor temperatures. Also, since for a large proportion of these households, their homes are also their

place of work, increased thermal comfort due to cool roofs, would also lead to enhanced productivity.

The city-wide program with the above three main strategies also define the regulatory outreach and awareness, and financial mechanisms, along with the implementation plan for the program.

## **5. Cool Roofing Material**

The choice of an appropriate cool roof material in a particular context depends on a range of factors such as existing roof material, life and maintenance, availability, cost, time needed for installation and availability of skilled labour. In order to help cater to a range of contexts, cool roofs techniques can be broadly divided into four categories. Building owners can choose from these techniques as appropriate for implementing cool roofs.

- **Coated cool roofs:** these roofs involve the coating of a material or paint with high reflectivity on top of a conventional roof material to increase the roof surface's solar reflectance index. These are liquid applied coatings made of simple materials such as lime wash or an acrylic polymer or plastic technology and are usually white in colour.
- **Membrane cool roofs:** these roofs involve using pre-fabricated materials such as membranes or sheeting to cover an existing roof in order to increase the roof surface's Solar Reflection Index (SRI). These types of roofs can be polyvinyl chloride (PVC) or bitumen- based.
- **Tiled cool roofs:** these roofs involve the application of high albedo, china mosaic tiles or shingles on top of an existing roof or to a new roof.
- **Special cool roof materials such as Mod Roof:** these roofs, made of coconut husk and paper waste, have been installed in households around Gujarat and Delhi and can serve as an alternative to reinforced cement concrete roofs.
- **Green roofs:** green roofs make use of vegetation to help the roof absorb less solar energy by providing a thermal mass layer to reduce flow of heat into a building. Vegetation is especially useful in reflecting infrared radiation. Green roofs are also considered cool roofs, but due to higher costs and need for water, they are likely not a cost-effective solution for heat reduction in low-income communities in India.

The cost implications vary by the type of material used for cool roofing. However, most of these materials have been applied locally in India and are available through local vendors.

**Source:** Ahmedabad Heat Action Plan-2018

Green infrastructure includes parks, street trees, community gardens, green roofs and vertical gardens. In tropical and subtropical climate zones, green infrastructure is a cost-effective cooling strategy.

One of the best ways to tackle the problem of the urban heat island is simple – plant more trees. Evapotranspiration might sound made up, but it's a real process that helps cool our cities

down. Trees soak up radiation from the sun before it hits the ground, and the heat evaporates the water from the tree's leaves. That cools the surrounding area.

It is assumed that a 10% increase in tree canopy cover can lower afternoon ambient temperatures by as much as 1-1.5°C, as the chart below shows. Similarly, in parks with adequate irrigation ambient temperatures can be 1-1.5°C lower than nearby un-vegetated or built-up areas.

The authorities can increase street tree canopy cover by planting more shade trees on footpaths, lanes and street medians. Where there is little space for parks and street trees, green roofs and walls may be viable options.

## **6. Water-sensitive Urban Design**

The use of water as a way to cool cities has been known for thousands of years. Water-based landscapes such as rivers, lakes, wetlands and bios wales can reduce urban ambient temperatures by 1-2°C. This is a result of water heat retention and evaporative cooling.

In addition to natural water bodies, various other water-based technologies are now available for both decorative and climatic reasons. Examples include passive water systems, like ponds, pools and fountains, and active or hybrid systems, such as evaporative wind towers and sprinklers. Active and passive systems can decrease ambient temperatures by 3-8°C,

Water-based systems are usually combined with green infrastructure to enhance urban cooling, improve air quality, aid in flood management and provide attractive public spaces.

## **7. Cool materials**

Building materials are major contributors to the urban heat island effect. The use of cool materials on roofs, streets and pavements is an important cooling strategy. A cool surface material has low heat conductivity, low heat capacity, high solar reflectance and high permeability.

Evidence suggests that using cool materials for roofs and facades can reduce indoor temperature by 2-5°C, improve indoor comfort and cut energy use.

Cool materials commonly applied to buildings include white paints, elastomeric, acrylic or polyurethane coating, ethylene propylene diene terpolymer membrane, chlorinated polyethylene, polyvinyl chloride, thermoplastic polyolefin, and chlorosulfonated polyethylene.

Lighter aggregates and binders in asphalt and concrete, permeable pavers made from foam concrete, permeable asphalt and resin concrete are standard cool pavement materials.

## **8. Shading**

Shading can decrease radiant temperature and greatly improve outdoor thermal comfort. Providing shading on streets, building entries and public venues using greenery, artificial structures or a combination of both can block solar radiation and increase outdoor thermal

comfort. Examples of artificial structures include temporary shades, sunshades and shades using solar panels.

## **9. Combined cooling strategies**

Performance analysis of various projects in Australia suggests the cooling potential of the combined use of the different strategies discussed above is much higher than the sum of the contributions of each individual technology, as the charts below show. The average maximum temperature reduction with just one technology is close to 1.5°C. When two or more technologies are used together the reduction exceeds 2.5°C.

Climate-responsive building design and adaptive design techniques in existing buildings can minimize occupants' demand for cooling energy by reducing indoor and outdoor temperatures

Urban Local Bodies and Urban Development Authorities can prepare for and respond to heat events through emergency response plans. However, emergency responses alone cannot address other challenges of urban heat, including human vulnerability, energy disruptions and the economic costs of lower workplace productivity and infrastructure failures.

Long-term cooling strategies are needed to keep city residents; buildings and communities cool which will lead to savings in energy and resulting costs.

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