

Final Regional Plan for Mumbai Metropolitan Region

April, 2021



Final Regional Plan for Mumbai Metropolitan Region

(Regional Plan Report)

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List of Abbreviations

AAQMS	:	Ambient Air Quality Monitoring Station
AKBSNA	:	Ambarnath Kulgaon-Badlapur Surrounding Notified Area
AQI	:	Air Quality Index
BEST	:	Brihan Mumbai Electric Supply and Transport Company
BDD	:	Bombay Development Department
BIT	:	Bombay Improvement Trust
BKC	:	Bandra Kurla Complex
BMW	:	Bio Medical Waste
BNCMC	:	Bhiwandi Nizampur City Municipal Corporation
BOD	:	Biochemical Oxygen Demand
BSNA	:	Bhiwandi Surrounding Notified Area
BSUP	:	Basic Services for the Urban Poor
BUA	:	Built Up Area
C&D	:	Construction and Demolition
CAGR	:	Compound Annual Growth Rate
CBD	:	Central Business District
CETP	:	Common Effluent Treatment Plant
CGWB	:	Central Ground Water Board
CIDCO	:	City & Industrial and Development Corporation Limited
CPCB	:	Central Pollution Control Board
CPHEEO	:	Central Public Health and Environmental Engineering Organisation
CRZ	:	Coastal Regulation Zone
CST	:	Chhatrapati Shivaji Terminus
CT	:	Census Town
CTS	:	Comprehensive Transportation Study
CWC	:	Central Water Commission
DCR	:	Development Control Regulations
DES	:	Directorate of Economics & Statistics
DO	:	Dissolved Oxygen
DP	:	Development Plan
DPR	:	Detailed Project Report
EBL	:	Exclusive Bus Lane
ELU	:	Existing Land Use
EW	:	East West
EWS	:	Economically Weaker Section
FDI	:	Foreign Direct Investment
FOB	:	Foot Over Bridge
FSI	:	Floor Space Index
G	:	Green
GDP	:	Gross Domestic Product
GEC	:	Ground Water Estimation Committee
GES	:	Gaothan Expansion Scheme
GIS	:	Geographic Information System
GOM	:	Government of Maharashtra
GSDA	:	Ground Water Survey and Development Agency
HH	:	Household/Households
HIG	:	High Income Group
HW	:	Hazardous Waste

List of Abbreviations

IDP	:	Interim Development Plan
IMPs	:	Integrated Mobility Plans
INR	:	Indian Rupees
IPT	:	Intermediate Public Transport
IR	:	Indian Railways
IT/ITES	:	Information Technology/Information Technology Enabled Services
JICA	:	Japan International Cooperation Agency
JNNURM	:	Jawaharlal Nehru National Urban Renewal Mission
JNPT	:	Jawaharlal Nehru Port Trust
JVLR	`):	Jogeshwari-Vikhroli Link Road
KDMC	:	Kalyan Dombivali Municipal Corporation
LDC	:	Local Development Centers
LIG	:	Low Income Group
LPCD	:	Litres Per Capita per Day
MADA	:	Modified Area Development Approach
MBMC	:	Mira Bhayandar Municipal Corporation
MCGM	:	Municipal Corporation of Greater Mumbai
MCI	:	Municipal Council
MHA	:	Mumbai Hydrometric Area
MHADA	:	Maharashtra Housing and Area Development Authority
MHUPA	:	Ministry of Housing and Urban Poverty Alleviation
MIDC	:	Maharashtra Industrial Development Corporation
MJP	:	Maharashtra Jeevan Pradhikaran
MLD	:	Million Litres per Day
MMC	:	Multi Modal corridor
MMR	:	Mumbai Metropolitan Region
MMRDA	:	Mumbai Metropolitan Region Development Authority
MMPC	:	Mumbai Metropolitan Planning Committee
MPCB	:	Maharashtra Pollution Control Board
MbPT	:	Mumbai Port Trust
MR&TP Act, 1966	:	Maharashtra Regional & Town Planning Act, 1966
MRVC	:	Mumbai Rail Vikas Corporation Limited
MSL	:	Mean Sea Level
MSRDC	:	Maharashtra State Road Development Corporation
MSW	:	Municipal Solid Waste
MTHL	:	Mumbai Trans Harbour Link
MTPA	:	Metric Tonnes Per Day
MTSU	:	Mumbai Transformation Support Unit
MUIP	:	Mumbai Urban Infrastructure Project
MUTP	:	Mumbai Urban Transport Project
NA	:	Not Available
NAINA	:	Navi Mumbai Airport Influence Notified Area
NC	:	Not Calculated
NDDP	:	Net District Domestic Product
NE	:	North East
NH	:	National Highway
NIC	:	National Industrial Code
NMT	:	Non-Motorised Transport
NNMC	:	Navi Mumbai Municipal Corporation

1.0 Introduction

- 1.1 Regional Planning - Need
- 1.2 Regional Planning in the Global Context
- 1.3 Regional Planning in India
- 1.4 Legal Mandate: Mumbai Metropolitan Regional Plan 2016-36
- 1.5 MMR: Area, Boundaries and Administrative Set-up
- 1.6 Review of previous Regional Plans for MMR

CHAPTER-1

INTRODUCTION

1.1. Regional Planning - Need

With increasing urbanization and India poised to increase its urban population from 38 Crores in 2011 to about 85 Crores by 2050 (assuming India's population in 2050 to be 170 Crores with 50% living in urban areas), it is clear that metropolitan regions have a pivotal role to play in the future. Peri-urban areas outside metropolitan jurisdictions are witnessing rapid unplanned transformation being the preferred destination for global capital, while also being subject to the least governance. The last decade has seen emergence of the city-region as a significant entity and a greater dispersal of job centres in the suburbs of Greater Mumbai. Given the fact that Greater Mumbai is the economic engine of the nation, it is important that the Regional Plan 2016-36 strategies to leverage this advantage while addressing issues of growing urbanization, uneven distribution of jobs, increasing commutes, lack of affordable housing and basic infrastructure in the region, environmental degradation and inadequate governance. The existing situation of Mumbai Metropolitan Region is analysed sectorally and cross-sectorally so as to arrive at issues that need to be addressed in the Regional Plan 2016-36.

1.2. Regional Planning in the Global Context

A review of regional spatial planning practices across the world reveals that there are a variety of ways in which National, Regional, Metropolitan and Local Plans are actualised. The nature of institutional structures that support these initiatives varies across countries. The planning and administration of Metropolitan Regions appears to be either through provision of planning and services through Central Government or a State Planning Authority or through voluntary cooperation across local governments.

In several capitalist countries, the practice of spatial planning is more locally rooted with economic and environmental considerations driving regional strategic planning. The regional planning organizations are based on voluntary collaborations and the plans drawn up are more in the nature of studies or guiding documents and are non-statutory.

The tradition of regional planning is strongest in Europe, illustrated by the case of Germany where the federal government and the regions are both responsible for the task of regional spatial planning and prepare Federal State Development Plans (Landesentwicklungsplan, LEP) and Regional Plans (Regionalpläne) respectively under the Spatial Planning Act (Raumordnungsgesetz, ROG). The broad objectives of the spatial plans are "the development of a balanced structure between urbanization and nature, avoiding the urbanization of the landscape, maintaining an effective transport network, developing the rural areas, encouraging leisure activities in the natural areas and responding to the housing need". Spatial planning in France is the task of the Regions, which are created by the free association of Municipalities while in Switzerland it is the task of the Cantons, through Direction Plans (Richtpläne). The identification of the federal state level with the regional level through the political and territorial coherence of the cantons allows the Direction Plans to be both politically effective and sufficiently detailed.

In Britain and in the USA, Regional Planning has had a chequered history. In Britain, with its long tradition of governmental evolution, voluntary regional bodies of local governments have been formed in the last two decades to provide the necessary regional contexts for municipal and local planning. However, recently in Britain, in 2010, the Government has announced its intention to abolish Regional Spatial Strategies and return Spatial Planning powers local authorities. In the USA, Regional Planning moved from being widely prevalent in the 1930s to falling in disfavour with the federal government in

the 1980s. Currently, there are regional councils or some form of regional planning organisations representing the local government operating in almost all states of the USA. They are either voluntary associations of local governments or are mandated or authorized by state legislation. They exist for purposes of undertaking Regional Plans while addressing issues that cut across jurisdictional boundaries; sometimes they have direct regulatory authority and also administer land-use controls and sometimes, directly implement the regional plan, (eg. the operation of regional transit systems); they often coordinate efforts involving federal funding. Responses to metropolitan growth usually take the form of Special Districts to meet demands for regional scale services like sewerage or an airport etc. Like in the USA, voluntary regional organizations of councils have also been in place in Australia, though their powers, are confined to research, advocacy, negotiation, indicative regional strategies, and occasionally, resource sharing. Recently, there is a move away from voluntarism to centralized local planning.

In the South Asian context, national and local plans are tied spatially. In Japan, planning is at three levels - National, Regional and Local. The National Development Plans set the strategies and investments for the regions in the country. The Regional Plans then determine industrial location, infrastructural and other projects and policies which in turn are further detailed out by Local Plans. In China, spatial planning is at two levels: National Spatial Plans (Land use Plans), and Urban and Rural Plans. National Spatial Plans (Land use Plans) determine the overall land use and secures productive lands and ecosystem areas from development. Regional plans are drawn up and Metropolitan Plans too are undertaken among the various scales that the urban and rural plans work at.

Regardless of the variety of institutional arrangements and the types of regional planning interventions (strategic, economic, sectoral – transport or sanitation etc.) that have been drawn up world over, it is observed that there is a clear need for spatial planning at the regional scale and spatial planning of metropolitan regions worldwide, has always been undertaken viz. London Plan 2011 for the Greater London Area, the National Capital Region Basic Plan for Tokyo and 7 prefectures, the Barcelona Metropolitan Area plan, the plan for Grande Paris etc. In some countries, there are strategic plans and economic plans which are drawn up for the region which are then actualized through specific projects.

1.3. Regional Planning in India

The 2014 revision of the World Urbanization Prospects by UN DESA's Population Division notes that the maximum urban growth will take place in India, China and Nigeria. These three countries are expected to account for 37 per cent of the projected growth of the world's urban population between 2014 and 2050. By 2050, India is projected to add another 404 million urban dwellers, China 292 million and Nigeria 212 million.

During the last decade, the urban population in India increased from 285 million to 377 million. From just one settlement with a population of over one million in 1901, there were five in 1951, thirty five in 2001 and fifty-three in 2011. The new urban growth is primarily through densification of existing settlements and through peri-urban expansion. Thus, in reality, urbanization in India implies metropolitanisation. The metro cities are getting densified disproportionately relative to other urban areas attracting population from both, rural and small/medium towns. Increasingly, there is a need for greater spatial planning and greater infrastructure provision in our urban areas.

The current tradition of modern spatial planning in India draws heavily from British town and country planning norms and practices. American planners have also influenced planning practice in India by virtue of the fact that they have helped draw up several of the early city plans in India. The Ford Foundation helped draw up the Delhi Master Plan 1962 and the Block Development Plan for Kolkata soon after.

There has been recognition of the need for regional planning from the early sixties and all Indian major cities undertook the creation of a Regional Planning Boards starting with Delhi, Kolkata, Chennai and Mumbai in that order. The Maharashtra Regional and Town Planning Act which was introduced in 1966 was the first legal instrument in the country that instituted a three tier planning system including

regional planning. The Bombay Regional Plan 1970 was the first Regional Plan intervention that was undertaken in India. Since then several regional plans have been created starting with the megacities of Delhi, Kolkata and Chennai.

Many more regional plans have been prepared for the Dandakarnaya region, Damodar Valley region, South East Resource region, Singrauli region, Western Ghats region, and Chandigarh interstate region but have not really been implemented on account of the absence of enabling legislation.

In Maharashtra, there are 15 sanctioned Regional Plans, 6 Regional Plans in process (Kolhapur, Satara, Nanded, Latur, Thane, Jalna) , 4 in approval stage (Solapur, Dahanu, Mahabaleshwar) and 11 yet to be prepared (Dhule, Nandurbar, Buldhana, Yavatmal, Bhandara, Gondia, Beed Wardha, Osmanabad, Parbhani & Hingoli). There are plans to prepare the remaining plans in the next five years. The Town Planning Department has prepared a phase-wise programme for preparation of these 11 regional plans within next 5 years. Once these regional plans are prepared, Maharashtra would be the first large state to have spatial statutory plans for the entire State- for urban as well as rural areas.

A comparison of MMR with other Metropolitan areas in India reveals that there is a wide variance between both the area and share of population across the core cities and the metropolitan region they are part of. Of the four major metro cities in India, the core cities seem to have nearly half or more of their population in the metropolitan area. In the other metros which are smaller, the majority of the population is in the core city with the exception of Pune where the metropolitan area is unusually large.

Table 1 : Population Share of Core City Metropolitan Areas in India (2011)

Region	Core City	Core City Area (sqkm)	Population	Metropolitan Area (sqkm)	Metropolitan Area Population (UA)	Share of Core City to Metropolitan Area	Population Share Core city to Metro. Area
MMR	Mumbai	438	1,24,42,373	4,254	2,28,04,355	10.3	54.56
NCR	Delhi+New Delhi	1483	1,10,07,835	34,144	1,63,14,838	4.3	67.47
CMA	Chennai	426	46,81,087	1,189	86,96,010	35.8	53.83
KMA	Kolkata	185	44,96,694	1,887	1,43,84,585	9.8	31.26
BMA	Bangalore	741	84,25,970	1,220	84,99,399	60.7	99.13
HMA	Hyderabad	650	68,09,970	7,100	77,49,334	9.2	87.87
AMA	Ahmadabad	464	55,70,585	7,700	63,52,254	6.0	87.69
SMR	Surat	327	44,62,002	4,255	45,85,367	7.7	97.30
PMR	Pune	224	31,15,431	9,220	50,49,968	2.4	61.69

Source: Census of India

1.4. Legal Mandate: Mumbai Metropolitan Regional Plan 2016-36

The Mumbai Metropolitan Planning Committee (MMPC) was formed under the provisions of the Maharashtra Metropolitan Planning Committee (Constitution and Functions) (Continuance of Provisions) Act 1999 and has been entrusted with the task of preparing the Regional Plan for the Mumbai Metropolitan Area with help from MMRDA. Currently, the Regional Plan, 1996 is in operation which was prepared by the Mumbai Metropolitan Region Development Authority (MMRDA) and sanctioned in 1999. The MMRDA was established under the MMRDA Act, 1974 and undertook the revision of the First regional plan prepared by the Regional Planning Board and sanctioned in 1973, under the provisions of the MR& TP Act, 1966.

1.5. MMR: Area, Boundaries and Administrative Set up

a) Area and Boundaries

The geographical area of Mumbai Metropolitan Region (MMR) is currently 4312 sq km (based on the GIS database) as against the Census area which is 4419 sq.km. The Census area considers Greater

Mumbai district's area as 603 sq.km. For the purpose of Regional Planning, it is considered as 437.71 sq.km. as per the Draft Development Plan of Greater Mumbai. With this modification, the Census area of MMR reduced to 4253 sq.km. The original boundary of MMR has undergone a few revisions since it was first defined in 1967 vide Government notification UDPH&HD no. RPB 1067/M dated 8th June 1967. The area was subsequently increased from 3965 sq. km. in 1967 to 4355 sq km with the inclusion of two part tehsils of Alibag and Pen of Raigad district in the South and also the deletion of 9.04 sq km from Vasai tehsil so that the boundary was co-terminus with the Tansa river.

The 'Mumbai Metropolitan Area' was declared following the constitution of the Mumbai Metropolitan Planning Committee (under the Maharashtra Metropolitan Planning Committee (constitution & Function) Ordinance 1999) for the purpose of preparation of the Draft Development Plan. Accordingly the Mumbai Metropolitan Region was constituted vide Government Notification No. MPC-2010/CR129/2011/UD-30 dated 23rd April 2012 which includes the following areas:

It comprises the whole of the area of

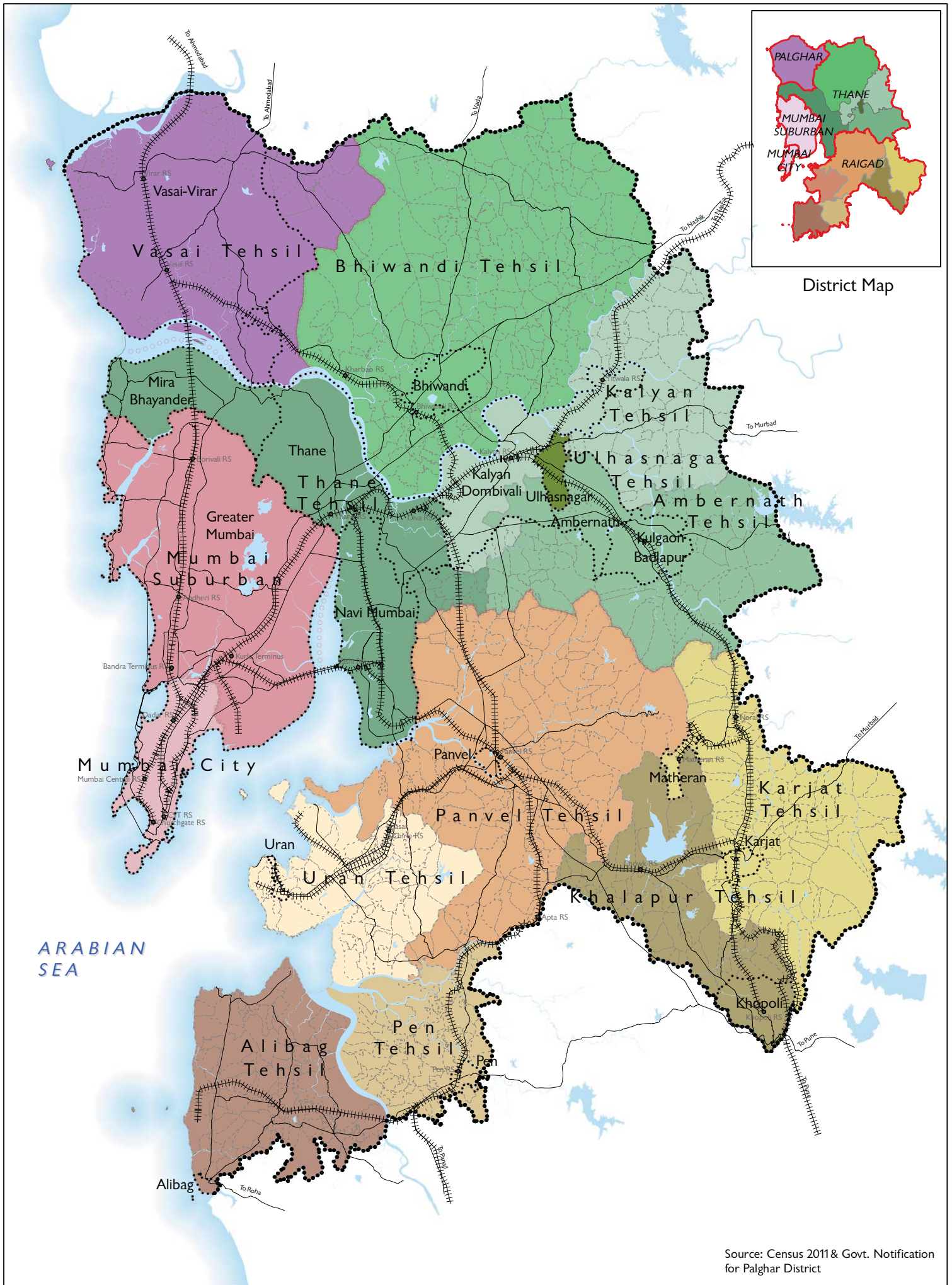
Mumbai City District, the Mumbai Suburban District and parts of Thane and Raigad districts within the following boundaries, namely, the Arabian Sea on the west, the Vaitarna Creek and Tansa River on the north, the eastern limits of the Bhiwandi, Kalyan and Ambernath tehsils and along the Ulhas river from villages Shelu to Kalamboli Tarf Varde and villages Takave Bhiwandi, Sawale, Hedwali, Mandvane, Bhivpuri Camp, Humgaon Saidaongar, Dhale, Salpe, Kharwandi, Khondane Chochi and eastern limits of Khopoli Municipal Council. Further, the MMR boundary follows the southern limits of Khopoli municipal council along the Patalganga river up to villages Dapivli, Vaveghar, Gulsunde, Lediwadi and Apta of Panvel Tehsil and then the eastern boundary of the following villages in Pen Tehsil: Dushmi, Kauli, Simadevi, Jite, Balawali, Ambivali, Davansar, Ramraj Dhavate, eastern boundary of Pen Municipal Council, Pen rural, Maleghar Khandale and then the southern boundary of the following villages in Pen Tehsil: Wave (Navegaon) and Beneghat and further the southern boundary of the following villages of Alibag Tehsil: Shahbaj, Dhudvadkhar, Dahankani, Bhakarwad, Mondvira, Ambepur, Pezari, Ambeghar, Sagargad, Gan Tarf Shirgaon, Gan Tarf Parhur, Talawade, Talavali Tarf Khandle, Veshvi, Chendre and Alibag.

Since the constitution of the MMR for the purpose of drafting the Regional Plan in 2012, a new district, Palghar has been carved out from the existing Thane district. A part of MMR falls within this new district. Thus, the Mumbai Metropolitan Region extends over an area of 4311.75 sqkm and includes two full districts of Mumbai City, Mumbai Suburban and three part districts of Thane, Raigad and the newly created Palghar. However, most of the data presented here assumes MMR as of the constituted 4 districts, (Mumbai City, Mumbai Suburban, part Thane and part Raigad) since much of the data collection and analysis were done prior to the formation of Palghar District (refer Map no.1).

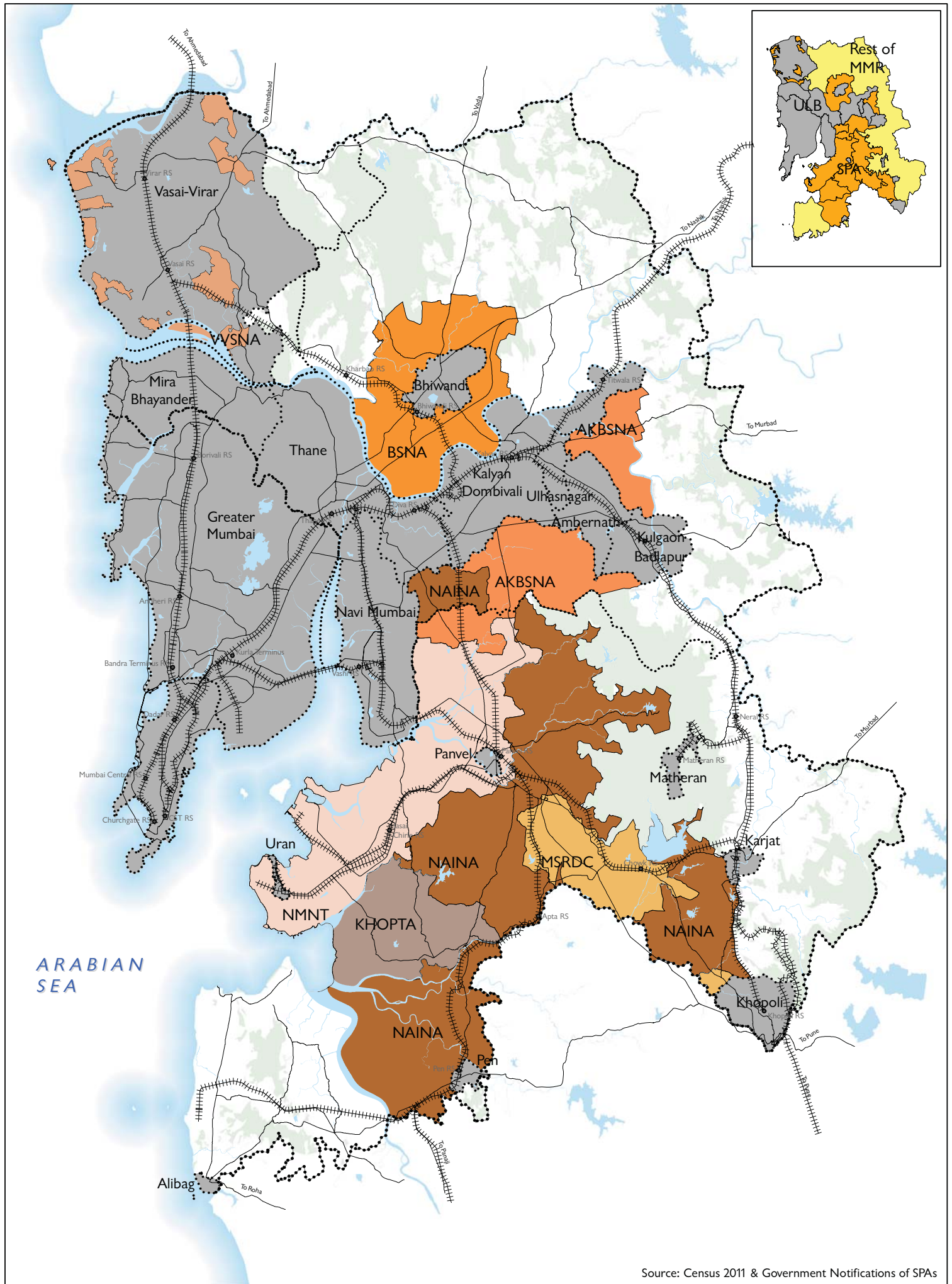
b) Administrative Set-up

The number of Municipal Corporations has been increasing over time, with Municipal Councils and villages often getting subsumed to form new Municipal Corporations across different census periods. Accordingly, the number of Corporations, Councils, Census Towns and Villages has changed from census to census. Starting with 1 Municipal Corporation (Greater Mumbai), 13 Municipal Councils, 24 Census Towns and 1166 villages in 1981, the number grew to three corporations (i.e. Greater Mumbai, Thane and Kalyan), 12 Councils, 12 census towns and 1013 Villages in 1991. By census 2001, there were 6 Corporations in MMR (including three new corporations of Mira Bhayander, Ulhasnagar and Navi Mumbai corporations), 14 Municipal councils, 17 Census Towns and 1023 Villages. By census 2011 two more corporations of Bhiwandi and Vasai Virar were added. MMR today has a total of 8 municipal corporations, 9 municipal councils, 35 census towns and 994 villages in MMR (refer Map no. 2).

Even the constituent areas and boundaries have varied from census to census. In census 1991 the Kalyan Corporation included current Ambernath, Kulgaon Badlapur and 29 Villages (21 from Kalyan Tehsil, 8 from Ambernath Tehsil). In Census 2001, Ambernath, Kulgaon Badlapur, Navghar-Manikpur and Karjat became councils. In census 2011, Vasai, Virar, Navghar-Manikpur and Nalasopara Councils



Source: Census 2011 & Govt. Notification for Palghar District



Source: Census 2011 & Government Notifications of SPAs

along with some villages formed Vasai Virar City Municipal Corporation. In census 2011, many villages became Census Towns to form total 35 Census Towns in MMR.

Table 2: Details of Urban Centres in MMR

Sl. No	Name of Urban Centre	Area in Sqkm	Population (2011)	Type of Local Authority
1	Greater Mumbai	476.24	1,24,42,373	Municipal Corporation 'A+' Class
2	Thane	141.61	18,41,488	Municipal Corporation 'B' Class
3	Kalyan-Dombivali	116.09	12,47,327	Municipal Corporation 'C' Class
4	Vasai-Virar	294.50	12,22,390	Municipal Corporation 'C' Class
5	Navi-Mumbai	108.98	11,20,547	Municipal Corporation 'C' Class
6	Mira-Bhayander	94.62	8,09,378	Municipal Corporation 'D' Class
7	Bhiwandi-Nizampur	27.37	7,09,665	Municipal Corporation 'D' Class
8	Ulhasnagar	13.20	5,06,098	Municipal Corporation 'D' Class
9	Ambarnath	36.63	2,53,475	Municipal Council 'A' Class
10	Panvel	3.76	1,80,020	Municipal Council 'A' Class
11	Kulgaon-Badlapur	35.85	1,74,226	Municipal Council 'B' Class
12	Khopoli	30.06	71,141	Municipal Council 'B' Class
13	Pen	5.54	37,852	Municipal Council 'C' Class
14	Uran	2.43	30,439	Municipal Council 'C' Class
15	Karjat	7.35	29,663	Municipal Council 'C' Class
16	Alibag	2.54	20,743	Municipal Council 'C' Class
17	Matheran	7.49	4,393	Municipal Council 'C' Class
18	Navi Mumbai, Panvel, Raigad	51.54	1,95,373	Census Town / CIDCO
19	Kharghar	11.13	80,612	Census Town/CIDCO
20	Taloje Panchanand	5.40	14,318	Census Town/CIDCO
21	Mharal Bk	0.98	29,462	Census Town
22	Khoni	1.76	26,016	Census Town
23	Kon	5.45	24,295	Census Town
24	Neral	10.93	18,429	Census Town
25	Chanje	8.43	16,714	Census Town
26	Kalher	5.34	15,573	Census Town
27	Shelar	3.31	14,899	Census Town
28	Karivali	2.92	12,907	Census Town
29	Katai	3.63	12,898	Census Town
30	Wangani	3.56	12,628	Census Town
31	Chendhare	1.73	11,039	Census Town
32	Rahanal	3.58	10,928	Census Town
33	Mohpada Alias Wasambe	2.60	9,694	Census Town
34	Palidevad	0.40	9,194	Census Town
35	Rees	3.61	8,632	Census Town
36	Jasai	5.41	8,234	Census Town
37	Chandrapada	4.72	7,750	Census Town
38	Kegaon	3.16	7,485	Census Town
39	Vadghar	3.14	7,341	Census Town
40	Kambe	5.59	6,642	Census Town

Sl. No	Name of Urban Centre	Area in Sqkm	Population (2011)	Type of Local Authority
41	Padagha	3.18	6,633	Census Town
42	Kalundre	2.10	6,626	Census Town
43	Navghar	5.06	6,603	Census Town
44	Purne	2.87	6,588	Census Town
45	Ambivali T. Wankhal	1.81	6,497	Census Town
46	Borivali Tarf Rahur	1.78	5,780	Census Town
47	Mahapoli	2.48	5,666	Census Town
48	Kambe	7.37	5,436	Census Town
49	Dadar	9.21	5,389	Census Town
50	Kharbav	8.67	5,250	Census Town
51	Ambepur	2.10	5,035	Census Town
52	Owle	4.23	4,275	Census Town
Total		1,603.44	2,13,32,059	

Source : Census of India, Respective Development Plans

Under the Maharashtra Town & Country Planning Act, 1966 (MR&TP Act), a Municipal Corporation or Council is the Planning Authority for the area under its jurisdiction. Within MMR, several Special Planning Authorities (SPA) were created under section 40 of the MR&TP Act, 1966. The details of the SPA areas outside Greater Mumbai and other municipal limits are as under (refer Map no. 2):

Table 3 : Special Planning Authorities (SPA) in MMR

Sr. No.	Notified Area	Area (sqkm)	Name of Special Planning Authority
1	Navi Mumbai new Town	236.09	CIDCO
2	Navi Mumbai Airport Influence Notified Area (NAINA)	474	CIDCO
3	Bhiwandi Surrounding Notified Area (BSNA)	144.89	MMRDA
4	Ambernath-Kulgaon-Badlapur Surrounding Notified Area (AKBSNA)	189.00	MMRDA
5	Khopta	93.93	CIDCO
6	Vasai Virar Notified Area*	69.00	VVCMC
7	41 villages along Mumbai-Pune Expressway	186.72	MSRDC
Total		1,392.91	

Source: Respective Government Resolutions

1.6. Review of previous Regional Plans for MMR

a) Regional Plan 1970-1991

The First Regional Plan for MMR 1970-91 was sanctioned in 1973. This Plan was largely a land use plan structured within the national economic framework prevailing at that time. Public land assembly was to be undertaken and infrastructure services were expected to be provided by the public sector by deploying public finances. The Regional Plan-1970 sought to address the uncontrolled growth of Mumbai and its suburbs.

Accordingly, the Regional Plan proposed:

1. Decentralised growth through the establishment of new growth centres within Greater Mumbai as well as in other parts of MMR like Navi Mumbai.
2. Dispersal of industries with a goal to reduce migration to MMR. This was accompanied by restriction on expansion of industries and offices in Mumbai

3. Bulk land acquisition recommended to control speculation and to raise resources for infrastructure provision.
4. Growth was to be limited to well-defined areas based on population density and distribution with the rest of MMR declared as conservation area.

However, growth occurred along transport corridors and was not confined to predetermined limits. Though bulk acquisition succeeded in Navi Mumbai, the non-viability of land acquisition as a strategy also became evident. Investments towards encouraging polycentric growth also did not materialize.

b) Regional Plan 1996-2011

The Second Regional Plan for MMR 196-2011 was sanctioned in 1999. During the preparation of Regional Plan-1996, on account of economic liberalization of 1991 and the 74th Constitutional amendment of 1992, the policy context of metropolitan planning changed substantially. The revised Regional Plan, therefore, emphasized “management of growth” as distinct from “planned and controlled growth”. The strategic goal of such regional development management was “to promote and sustain growth with social justice in a resource efficient manner and in consonance with the goals of national development planning”. The objectives, derived from the goals, are as given below:

The Regional Plan 1996-2011 accordingly proposed:

1. The establishment of the Bandra-Kurla complex (BKC) as a finance and business centre with due recognition of the fact that after liberalization of the Indian economy, Greater Mumbai would have opportunities for significant growth of financial sector;
2. Removal of the blanket ban on setting up new industries and offices in Island City and permitted office use in commercial and industrial zones; and
3. Transit connectivity among various parts of the region, recognizing the multi-nucleated structure of MMR.

It is observed that Bandra Kurla Complex is now a well-established Central Business District and the flight of industry from the region has accelerated during the last Regional Plan period. Growth has once again not occurred in the areas envisaged in the Regional Plan- 1996. The Urbanisable Zone proposed as U2 in the Regional Plan 1996 remained largely undeveloped while the peripheral areas of existing towns boomed. The growth within the Island City of Greater Mumbai has declined for the first time and it is the far flung suburbs of Mumbai that are registering growth.

2.0 Status of the Mumbai Metropolitan Region

- 2.1 Regional Features
- 2.2 Population Growth and Demographic Characteristics
- 2.3 Regional Economy and Employment
- 2.4 Spatial Growth Trends and Land Use
- 2.5 Transportation
- 2.6 Housing
- 2.7 Physical Infrastructure
- 2.8 Rural Status of MMR
- 2.9 Status of Environment

CHAPTER-2

STATUS OF THE MUMBAI METROPOLITAN REGION

2.1. Regional Features

2.1.1. Geography

The Mumbai Metropolitan Region lies to the west of the Sahyadri hill range and is part of the North Konkan region. It broadly lies between the rivers Tansa in the north and Patalganga in the south. The south-western boundary extends beyond the Patalganga River and includes the town of Alibag and Pen, thus including parts of the Tehsils of Alibag and Pen. On the west, the MMR is bounded by the Arabian Sea; on the south-east, it extends to the foothills of the Sahyadris and in the north east, its extent is contiguous with the administrative boundaries of Bhiwandi, Kalyan and Ambarnath Tehsils. The geography of the region is a significant determinant of urbanization in MMR. The MMR is largely a low land, though not plain. A series of north-south trending hill ridges bring significant local elevational variation; though the average elevation of most areas is below 100 metres above sea level (refer Map no. 3).

The significant geographical features of the region include hills, rivers, lowlands and a long coastline, which in turn determine the nature of land uses prevalent in the region. The MMR is typical of the Deccan Basaltic terrain with flat topped mountains bordering a low lying coastal region traversed by five rivers. The above features are described briefly as under:

- a. **Hills:** These include the Matheran Ridge, the Panvel Mumbra Ridge, the Bhiwandi Gotara Ridge, the Bhatsai Hills, the Tungar Hills complex, the Kanheri Ridge, the Trombay Hills, the Uttan Hills, the Karnala Hill Ridge, the Kankeshwar and the Bhal-Man hills;
- b. **Rivers:** MMR is a water resource rich region fed by five rivers and a network of creeks and tributaries. The major rivers that flow within the MMR are the 135 km long Ulhas river and its tributaries, the Bhatsai and Kalu, all of which flow towards the western coast. Other rivers include the Tansa and Vaitarna which flow in the North and the Patalganga, Panvel, Balganga, Bhogeshwari, Amba and Bhogwati rivers in the South. All these rivers ultimately drain into the Arabian Sea through a number of creeks. The Vaitarna and Tansa rivers drain out through the Vaitarna creek; the Ulhas River drains out through the Vasai and Thane creeks; the Patalganga, Balganga and Bhogeshwari, and Amba rivers drain through the Dharamtar creek while the Panvel River drains out through the Panvel creek.
- c. **Lowlands:** These include the Patalganga valley, the upper Ulhas valley, the eastern lowlands that lie between the Bhatsai in north and Ulhas in south, the lower Ulhas valley or the Kalyan basin, the Vasai lowlands, the Bhiwandi lowlands, the Salsette lowlands, the Thane creek lowlands, the Uran lowlands or the Patalganga estuary and the Mumbai islands.
- d. **Coastline:** The MMR has a long coastline of nearly 270 km which is punctuated by several creeks, of which the Thane, Panvel, Versova, Manori and Vasai creeks are the larger ones. Several large bays and sandy beaches are also present along the coast between the creeks and jutting headlands. The northern coastal belt between Vasai and Arnala is marked by beautiful beaches and horticultural plantations while the southern coastal belt between Rewas and Alibag is scenic with beaches, palm groves and paddy fields. The Gorai and Juhu beaches in Salsette and the Dadar and Chowpatty beaches in Mumbai Island are the main beaches in the region. Backbay and Mahim bay are significant bays in Greater Mumbai. The coast is also marked by the presence of several off-shore islands, of which Karanja Island, Butcher Island and Elephanta (Gharapuri) Island are the

major ones. Greater Mumbai's Salsette and Mumbai Island were also formed as a result of silting and reclamation of seven smaller original islands over the last few centuries.

The lowlands between the hills have historically been used for paddy cultivation, except for the coastal areas which were marshy with salt pans while the hills have forest cover.

2.1.2. Geology and Soils

- a. **Soils:** Basaltic lava flows of the upper Cretaceous to the lower Eocene age underlie most of MMR, which largely falls in the Deccan lava country. Shallow alluvium formations of recent age occur as narrow stretches along the major rivers in the region. Soils in MMR are largely derived from Deccan Trap or basalt, which is volcanic in origin. They are of two types- medium to deep black and reddish in colour. The basaltic flows are horizontally bedded forming step-like terraces and are more or less uniform. The soil in Mumbai is slightly different from the rest of MMR and the types of rocks found here include various types of basalts, rhyolites, trachytes, volcanic breccias, ash beds, diorites and inter-trappean beds. The Thane area is largely made up of basalt volcanic breccias and tachylytic basalts, intruded by numerous basaltic and doleritic dykes. The southern parts of MMR, viz. Panvel, Uran, Pen Khopoli, is dominated by both compact and amygdaloidal basalt, which are intruded by a number of dykes and some areas have the presence of soil overburden of 5 to 8 m depth.
- b. **Minerals:** There are no minerals of economic importance in the region with the exception of bauxite deposits in Tungar hill ranges. The basalt found in the region is a good construction material that can be used for a variety of purposes including masonry, roadworks or concrete aggregate. Fine grained trachytes, brownish pink or greenish in colour, found only around Mumbai (Malad, Uttan, Dongri) are used extensively for building material. Quarrying activity on an extensive scale is witnessed currently in the region, especially in Thane district.
- c. **Geological Features:** The following important geological features are observed in the region:
 - i) The hot springs in northern MMR at Vajreshwari, Akloli and Ganeshpuri. The waters are largely saline containing sodium, calcium, chloride and sulphates, and the temperature ranges between 42- 55 degrees Celsius,
 - ii) The hexagonal basaltic columns at Gilbert Hill in Andheri, Greater Mumbai, of about 27 metres height,
 - iii) The pillow lavas at Sewri,
 - iv) The frog beds (intra-trappean beds of scientific value) at Worli hills, Greater Mumbai, which give clues regarding the age of the Deccan traps
 - v) The raised beaches of Manori, which indicate vertical movement of continents or the recession of oceanic waters.
- d. **Seismic Activity:** MMR lies in a seismically active zone classified Zone III, which means that an earthquake of up to magnitude 6.5 on the Richter-scale may be expected. The Deccan area was largely believed to be an earthquake free zone until the major Koyna earthquake of 1967 occurred. Since then, the region has experienced several quakes at regular intervals.

2.1.3. Climate

The climate of MMR can be described as warm and humid. MMR receives ample rainfall from the south-western monsoons during the wet monsoon season between June and September every year. The annual rainfall ranges between 180 cm – 248 cm. The monsoons are followed by three short cooler winter months between December and February. The rest of the months are hot.

- a. **Temperature:** Typically, January is the coldest month of the year with May being the warmest, in accordance with the course of the sun. During the monsoons, the temperature is nearly uniform at around 27 degrees Celsius. In October, the temperature rises before beginning to fall gradually reaching its minimum in January.

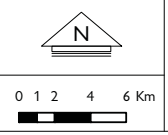


Mumbai Metropolitan Region Development Authority

Geographical Features

Draft Mumbai Metropolitan Regional Plan 2016-36

- MMR Boundary
- ULB Boundary
- District Boundary
- Village Boundary
- ≡≡≡ Rail
- Road
- Waterbody



Map No.
03

- b. **Wind:** The normal seasonal prevailing wind direction during the dry season is west-north-west except during the monsoons when it is south-west. During December, the wind direction fluctuates between west-north-west and east-north-east. There is considerable diurnal and seasonal variation though there is little fluctuation in the velocity in the dry season. The winds are light and variable at 8 kmph during the dry season and reach a peak of around 13 kmph during the monsoon. Southern parts of MMR have higher wind velocities at around 10 kmph during the dry season peaking to about 25 kmph during the wet season. Squalls are common during the monsoon and accompanied by gusty winds.
- c. **Monsoons:** The south-western monsoons generally arrive in the Mumbai area during the second week of June and continue till late September. The average rainfall in the region is over 2000 mm, with the coastal areas receiving much less rain than the interior plains typically, though they receive the first onslaught of the rains. Due to local topographical conditions, Matheran which is situated at 760 m above MSL receives the highest rainfall in the region.
- d. **Climate Variation:** Though typically the climate of Mumbai and its surrounds are termed as equable with no large seasonal fluctuations of temperature, (due to the proximity to the sea and the relatively large amount of humidity in the atmosphere), over the years, however, with increasing urbanization, there are variations in the climate. Studies in the long term trends of rainfall reveal a significant increase in monsoon rains for Mumbai between 1901-2000, significant reduction in wind speeds (59 per cent) along with significant changes in frequencies of occurrence of warmer days (maximum temperatures above certain threshold) and colder days (minimum temperatures below certain threshold).¹

2.2 Population Growth and Demographic Characteristics

2.2.1 Urbanisation

Maharashtra is currently the third urbanized state in the country (after Tamil Nadu and Kerala) with its urban population constituting 45.23 per cent of the total population of the State in 2011. It has the largest number of people living in urban areas in the country at 5.08 crores. Nearly 45 per cent of this urban population lives in MMR. The urban population growth accounted for 62 per cent of the total population growth in the State in the last decade.

The share of the urban population in India has been steadily increasing over the decades and is now 31.16 per cent of the total population. Similarly, the share of Maharashtra's urban population to the total population indicates a steady increase in urbanization from 31.16 per cent in 1971 to its current 45.23 per cent in 2011. Interestingly, while the proportion of Maharashtra's urban population relative to India's urban population has been steady over the decades (between 13-14 per cent), the proportion of MMR's urban population with respect to Maharashtra's urban population revealed that MMR's share has declined from 46.02 per cent in 1971 to 41.97 per cent in 2011 indicating the growth of other urban centres in Maharashtra. Similarly, the proportion of Greater Mumbai's population relative to MMR's population declined from 76.89 per cent in 1971 to 54.56 per cent in 2011, which is indicative of the growth of other municipal corporations within MMR.

¹ Rao, G. P., Jaiswal, A. K., & Kumar, M. S. (2004). Effects of urbanization on meteorological parameters. *Mausam*, 55(3), 429-440.

Table 4: Population Growth and Distribution in Greater Mumbai, MMR, Maharashtra and India

Year	Greater Mumbai	MMR Other Corporations	Urban MMR	MMR	Urban Maharashtra	Maharashtra	Urban India	India
1971	5.97	1.04	7.27	7.76	15.71	50.41	109.10	529.00
1981	8.24	1.81	10.43	11.08	21.99	62.72	159.72	658.00
1991	9.93	3.24	13.73	14.55	30.50	78.92	212.87	844.00
2001	11.98	5.29	18.21	19.37	41.00	96.88	285.36	1027.01
2011	12.44	7.46	21.33	22.80	50.82	112.37	377.11	1210.57
Population Growth (Annual Comp. Growth Rates per cent)								
1971								
1981	3.28	5.68	3.68	3.62	3.42	2.21	3.89	2.21
1991	1.87	6.00	2.79	2.77	3.33	2.32	2.91	2.52
2001	1.90	5.02	2.86	2.90	3.00	2.07	2.97	1.98
2011	0.38	3.48	1.59	1.65	2.17	1.49	2.83	1.66
Population Share								
Year	Urban India /India	Maharashtra /India	Urban Maharashtra /Urban India	Urban Maharashtra /Maharashtra	MMR Urban/Urban Maharashtra	Greater Mumbai/MMR	Other Corp. MMR /MMR	
1971	20.62	9.53	14.40	31.16	46.02	76.89	13.44	
1981	24.27	9.53	13.77	35.06	47.25	74.36	16.41	
1991	25.22	9.35	14.33	38.65	45.44	68.24	23.42	
2001	27.79	9.43	14.37	42.32	44.49	61.84	28.27	
2011	31.16	9.29	13.48	45.23	41.97	54.56	32.69	

Source: Census of India.

Note: Population (in Millions), Percentage Shares (in %)

2.2.2 Population Growth, Densities and Distribution

a. Population Growth:

Of the 22.8 million population of the Region, 20.7 million reside in the 8 Municipal Corporations and 9 Municipal Councils within MMR (accounting for 87.26 per cent of the total population) as per the 2011 Census. Additionally there are 35 villages in rural MMR which exhibit urban characteristics that qualify them as Census towns². The population of MMR is thus largely urban³ accounting for nearly 94 per cent of the total MMR population (refer Map no. 4).

Table 5: Population and CAGR of various areas of MMR

Sl. No.	Unit	Census				CAGR				
		1971	1981	1991	2001	2011	71-81	81-91	91-01	01-11
A Municipal Corporations										
1	Greater Mumbai	59,70,575	82,43,405	99,25,891	1,19,78,450	1,24,42,373	3.28	1.87	1.90	0.38
2	Thane	2,54,045	4,74,438	8,03,389	12,62,551	18,41,488	6.45	5.41	4.62	3.85
3	Ulhasnagar	1,72,947	2,81,728	3,69,077	4,73,731	5,06,098	5.00	2.74	2.53	0.66
4	Kalyan-Dombivali	2,46,038	4,40,310	8,36,602	10,76,316	12,47,327	5.99	6.63	2.55	1.49
5	Mira-Bhayander	31,860	67,195	1,75,605	5,20,388	8,09,378	7.75	10.08	11.48	4.52
6	Bhiwandi-Nizampur	1,05,793	2,10,712	3,79,070	5,98,741	7,09,665	7.13	6.05	4.68	1.71
7	Navi Mumbai	40,063	89,907	3,07,724	6,67,611	11,20,547	8.42	13.09	8.05	5.32
8	Vasai - Virar City	1,91,916	2,47,444	3,71,910	6,95,482	12,22,390	2.57	4.16	6.46	5.80
	Sub-Total (A)	70,13,237	1,00,55,139	1,31,69,268	1,72,73,270	1,98,99,266	3.67	2.73	2.75	1.43
B Municipal Councils										
1	Ambernath	58,303	99,655	1,25,801	2,03,804	2,53,475	5.51	2.36	4.94	2.21
2	Kulgaon-Badlapur	19,201	32,801	52,154	97,948	1,74,226	5.50	4.75	6.51	5.93
	Thane Dist. Councils	77,504	1,32,456	1,77,955	3,01,752	4,27,701	5.51	3.00	5.42	3.55
1	Alibag	11,913	14,051	16,289	19,496	20,743	1.66	1.49	1.81	0.62
2	Karjat	14,423	16,136	20,204	25,531	29,663	1.13	2.27	2.37	1.51
3	Khopoli	18,152	24,545	45,039	58,664	71,141	3.06	6.26	2.68	1.95

² A minimum population of 5000, at least 75 per cent of the male main working population engaged in non-agricultural pursuits and a population density of at least 400 persons per sq km

³ Including Municipal Corporations, Municipal Councils and Census Towns

Sl. No	Unit	Census				CAGR				
		1971	1981	1991	2001	2011	71-81	81-91	91-01	01-11
4	Matheran	3,397	3,000	4,708	5,139	4,393	-1.24	4.61	0.88	-1.56
5	Panvel	26,602	37,073	58,986	1,04,058	1,80,020	3.37	4.75	5.84	5.63
6	Pen	11,754	14,772	21,588	30,201	37,852	2.31	3.87	3.41	2.28
7	Uran	12,616	15,168	17,775	23,251	30,439	1.86	1.60	2.72	2.73
	Raigad Dist. Councils	98,857	1,24,745	1,84,589	2,66,340	3,74,251	2.35	4.00	3.73	3.46
	Sub-Total (B)	1,76,361	2,57,201	3,62,544	5,68,092	8,01,952	3.85	3.49	4.59	3.51
C	Census Towns									
	Thane District	23,707	42,169	68,080	1,54,488	2,09,351	5.93	4.91	8.54	3.09
	Raigad District	54,334	77,467	1,29,997	2,14,168	4,21,490	3.61	5.31	5.12	7.00
	Sub-Total (C)	78,041	1,19,636	1,98,077	3,68,656	6,30,841	4.36	5.17	6.41	5.52
	Urban MMR (A+B+C)	72,67,639	1,04,31,976	1,37,29,889	1,82,10,018	2,13,32,059	3.68	2.79	2.86	1.59
D	Rural(MMR)									
	Thane Dist Rural									
1	Thane	6,137	7,111	10,723	36,391	15,623	1.48	4.19	13.00	-8.11
2	Ambernath	30,047	36,631	61,524	84,899	1,25,011	2.00	5.32	3.27	3.95
3	Vasai	8,883	17,782	49,022	78,227	93,145	7.19	10.67	4.78	1.76
4	Kalyan	30,754	37,053	45,811	1,47,708	2,83,192	1.88	2.14	12.42	6.73
5	Bhiwandi	1,11,924	1,39,522	1,79,664	2,29,431	2,77,646	2.23	2.56	2.48	1.93
	Total of Thane District Rural	1,87,745	2,38,099	3,46,744	5,76,656	7,94,617	2.40	3.83	5.22	3.26
	Raigad Dist Rural									
1	Alibaug	69,153	83,337	89,824	1,05,590	1,12,162	1.88	0.75	1.63	0.61
2	Karjat	50,041	58,736	69,673	80,888	94,449	1.62	1.72	1.50	1.56
3	Khalapur	26,121	33,136	42,091	53,166	57,364	2.41	2.42	2.36	0.76
4	Panvel	93,525	1,21,827	1,50,736	1,92,070	2,45,769	2.68	2.15	2.45	2.50
5	Pen	41,250	53,770	60,869	69,849	77,107	2.69	1.25	1.39	0.99
6	Uran	29,197	54,450	62,862	77,232	90,828	6.43	1.45	2.08	1.63
	Total of Raigad District Rural	3,09,287	4,05,256	4,76,055	5,78,795	6,77,679	2.74	1.62	1.97	1.59
E	Rural(MMR)	4,97,032	6,43,355	8,22,799	11,55,451	14,72,296	2.61	2.49	3.45	2.45
F	Total(MMR)	77,64,671	1,10,75,331	1,45,52,688	1,93,65,469	2,28,04,355	3.62	2.77	2.90	1.65

Note: Calculated on the basis of current boundaries (2011) of the Corporations, Councils, Census Towns and Villages

The population of MMR has been increasing continuously since 1971-2011. However, since 1991, there is clearly a slowing down in the growth of MMR (Refer Table 5). The population distribution in the region has been very uneven as a major share of MMR's population has always been located within Greater Mumbai. Over the last several decades, Greater Mumbai has been showing a continuously decreasing share of population relative to the Region. Its share of the population within MMR has steadily declined from 77 per cent in 1971 to around 55 per cent in 2011 (refer Figure 1). Even within Greater Mumbai, the population share of the Island City since 1971-81 has been decreasing (along with a decline in population growth) and that of the suburbs has been increasing. The suburbs currently house a little over 75 per cent of the population of Greater Mumbai (Census 2011). Refer Table 6.

Table 6: Population Distribution within Greater Mumbai

Year	Population (in lakhs)			Population Distribution (in %)			Population Growth (Annual Comp. Growth Rates)		
	Island	Suburbs	Greater Mumbai	Island	Suburbs	Greater Mumbai	Island	Suburbs	Greater Mumbai
1901	7.76	1.52	9.28	83.62	16.38	100.00			
1911	9.79	1.69	11.48	85.28	14.72	100.00	2.35	1.07	2.15
1921	11.76	2.05	13.81	85.16	14.84	100.00	1.85	1.95	1.87
1931	11.61	2.36	13.97	83.11	16.89	100.00	-0.13	1.42	0.12
1941	14.90	3.11	18.01	82.73	17.27	100.00	2.53	2.80	2.57
1951	23.29	6.65	29.94	77.79	22.21	100.00	4.57	7.90	5.21
1961	27.72	13.80	41.52	66.76	33.24	100.00	1.76	7.57	3.32
1971	30.70	29.00	59.70	51.42	48.58	100.00	1.03	7.71	3.70
1981	32.85	49.58	82.43	39.85	60.15	100.00	0.68	5.51	3.28
1991	31.75	67.51	99.26	31.99	68.01	100.00	-0.34	3.14	1.88
2001	33.38	86.40	119.78	27.87	72.13	100.00	0.50	2.50	1.90
2011	30.85	93.57	124.42	24.80	75.20	100.00	-0.79	0.80	0.38

Source: MMR RP 1996-2011, Census of India

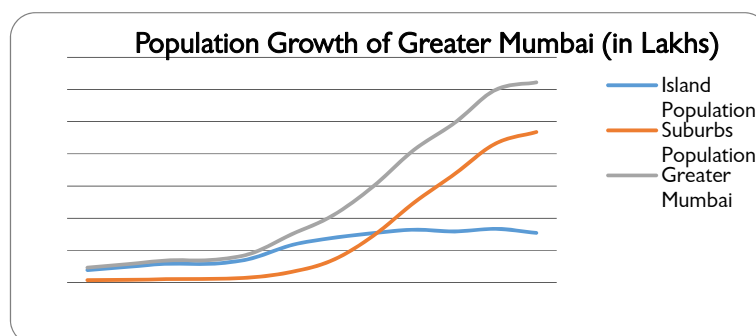


Figure 1: Graph showing Island City's Declining Share of MCGMs population

In the 1980s, the suburbs of Greater Mumbai along with cities of Kalyan, Thane and Navi Mumbai witnessed a growth spurt along with an escalated shift of population outside the Island City of Greater Mumbai. In the 1990s, Mumbai's extended suburbs along the Western rail corridor, Vasai and Mira-Bhayander saw increased growth along with Navi Mumbai which grew rapidly after suburban rail connectivity with Greater Mumbai was established. In the last decade of 2001-2011, areas showing high growth included areas distant from Mumbai like Kurla-Badlapur and Panvel, Vasai-Virar and Navi Mumbai, which continued to record high growth rates and Mira Bhayander and Thane which got further consolidated. Consolidation of inner city areas of several cities in MMR is continuing. The population distribution and dynamics within MMR during 1971-2011 indicates predominant increase in the share of other Corporations of Thane district over MCGM

b. Densities:

Population within the MMR is mostly concentrated in the dense Municipal Corporation areas. The average gross population density within MMR has increased substantially from 3,421 persons/sq km in 1991 to 5,361 persons/sq km in 2011⁴.

Table 7: Gross Density and Percentage share of Population in MMR

Unit	Area (sq km)	% Share of Population					Gross Density				
		1971	1981	1991	2001	2011	1971	1981	1991	2001	2011
Municipal Corp.	1,168.91	90	91	90	89	87	6,000	8,602	11,266	14,777	17,024
Gr. Mumbai	437.71	77	74	68	62	55	13,640	18,833	22,677	27,366	28,426
Thane	128.23	03	04	06	07	08	1,981	3,700	6,265	9,846	14,361
Ulhasnagar	13.00	02	03	03	02	02	13,304	21,671	28,391	36,441	38,931
Kalyan-Dombivali	56.14	03	04	06	06	05	4,383	7,843	14,902	19,172	22,218
Mira-Bhayander	79.40	00	01	01	03	04	401	846	2,212	6,554	10,194
Bhiwandi-Nizampur	26.41	01	02	03	03	03	4,006	7,978	14,353	22,671	26,871
Navi Mumbai	108.63	01	01	02	03	05	369	828	2,833	6,146	10,315
Vasai Virar	319.39	02	02	03	04	05	601	775	1,164	2,178	3,827
Mun. Councils	145.05	02	02	02	03	04	1,216	1,773	2,499	3,917	5,529
Ambarnath	38.00	01	01	01	01	01	1,534	2,623	3,311	5,363	6,670
Kulgaon-Badlapur	36.05	00	00	00	01	01	533	910	1,447	2,717	4,833
Alibag	1.81	00	00	00	00	00	6,582	7,763	8,999	10,771	11,460
Karjat	7.50	00	00	00	00	00	1,923	2,151	2,694	3,404	3,955
Khopoli	30.17	00	00	00	00	00	602	814	1,493	1,944	2,358
Matheran	7.24	00	00	00	00	00	469	414	650	710	607
Panvel	12.17	00	00	00	01	01	2,186	3,046	4,847	8,550	14,792
Pen	9.82	00	00	00	00	00	1,197	1,504	2,198	3,075	3,855
Uran	2.29	00	00	00	00	00	5,509	6,624	7,762	10,153	13,292
Census Towns	197.26	01	01	01	02	03	4,809	6,903	9,085	12,050	14,116
Thane District	73.19	00	00	00	01	01	324	576	930	2,111	2,860
Raigad District	124.07	01	01	01	01	02	438	624	1,048	1,726	3,397
Urban MMR	1,511.20	94	94	94	94	94	4,809	6,903	9,085	12,050	14,116

⁴ The actual net densities in the urban areas within MMR are significantly higher. The core city of Greater Mumbai, for example, has some wards with the highest densities in the country. The gross population density in Greater Mumbai is around 26,350 persons/sq km which translates into a net density of around 36,932 persons/sq km.

Unit	Area (sq km)	% Share of Population					Gross Density				
		1971	1981	1991	2001	2011	1971	1981	1991	2001	2011
Rural (MMR)	2,742.30	06	06	06	06	06	181	235	300	421	537
Thane Dist. Rural	1,270.20	02	02	02	03	03	148	187	273	454	626
Raigad Dist. Rural	1,472.10	04	04	03	03	03	210	275	323	393	460
Total (MMR)	4,253.60	100	100	100	100	100	1,825	2,604	3,421	4,553	5,361

Source: Census of India

The average gross density of urban MMR has always been nearly 3 times the average gross density of MMR and is 14,116 persons/sq km as per census 2011. Within the Municipal Corporations, the gross density is highest in Ulhasnagar at 38,931 ppsqkm. The other cities with high gross densities include Bhiwandi (26,871 ppsqkm) and Kalyan Dombivli (22,218 ppsqkm). The net density figures reveal that Ulhasnagar, Greater Mumbai and Bhiwandi have net densities in excess of 35,000 ppsq km. Cities like Greater Mumbai, Ulhasnagar and Bhiwandi are almost saturated (refer Map no. 5).

c. Growth of Municipal Corporations & Councils:

Municipal Corporations account for 87.26% of the total population, of which Greater Mumbai accounts for the major share at 54.56 % while the remaining seven Corporations account for 32.7%. Four of these seven Municipal Corporations namely, Thane, Kalyan-Dombivali, Vasai-Virar and Navi Mumbai are million plus cities and of the other three namely, Mira Bhayander and Bhiwandi-Nizampur are soon expected to become million plus cities.

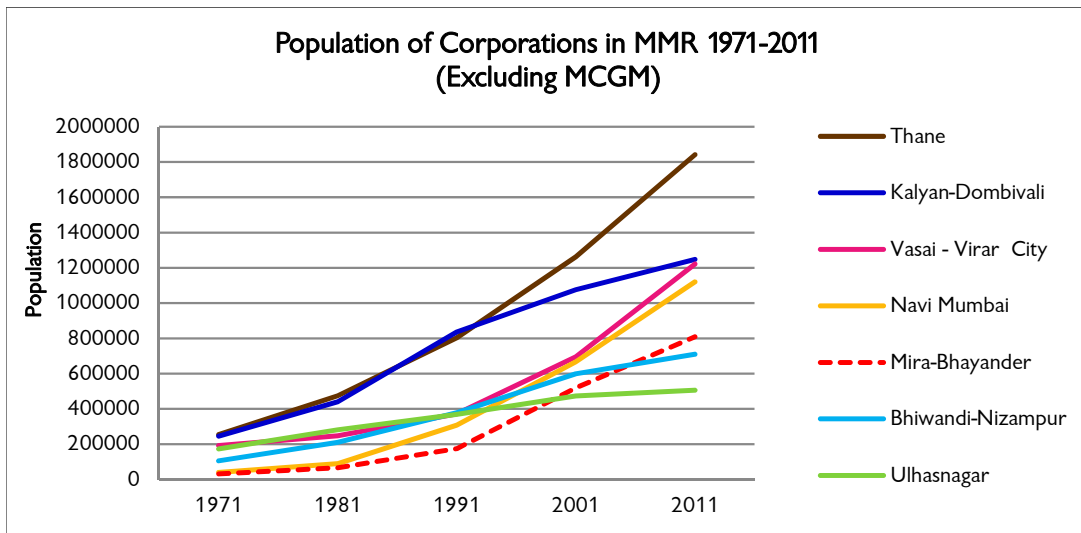


Figure 2: Population Growth of Municipal Corporations in MMR excluding Greater Mumbai (1971-2011)

In MMR, cities with high densities either, seem to show signs of stabilized growth as in the case of Greater Mumbai and Ulhasnagar, or their growth rates have substantially reduced, as in Kalyan Dombivli and Bhiwandi Nizampur. Greater Mumbai, overall, is showing signs of stabilized growth while the Island City recorded negative growth, with the population actually reducing by 2.53 lakhs during 2001-11. Post 1991, Kalyan Dombivli growth has slowed down. In case of the Bhiwandi Nizampur and Ulhasnagar the population is increasing slowly while the CAGR is continuously decreasing since 1971.

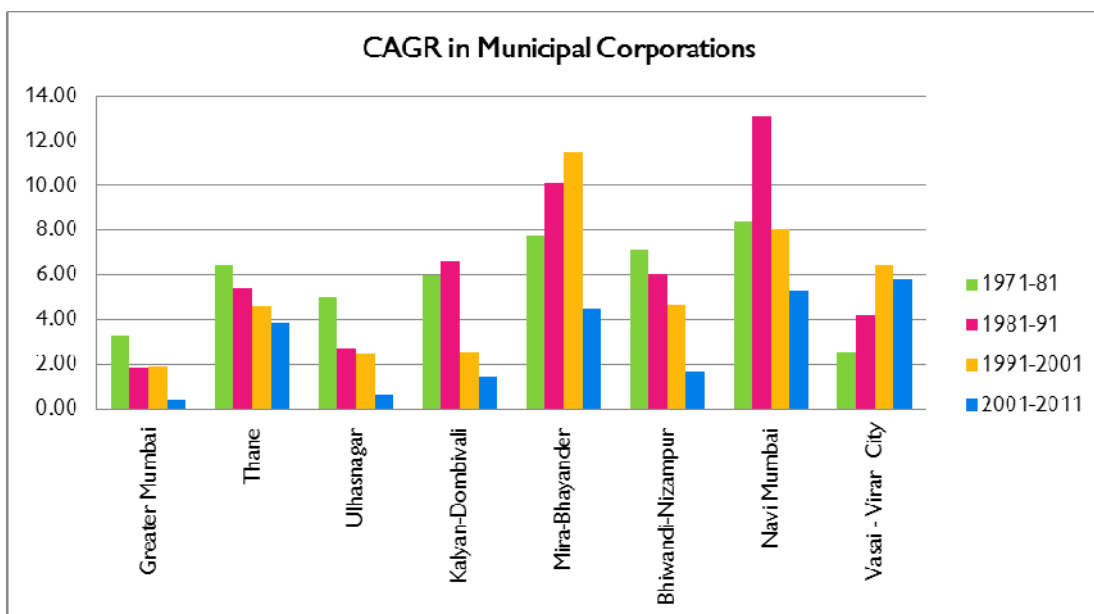


Figure 3: CAGR of Population in Municipal Corporation areas in MMR

Corporations such as Thane, Mira Bhayander, Vasai Virar and Navi Mumbai are growing rapidly. Affordable housing options combined with rail connectivity to Mumbai are the main reasons behind shift of population from Mumbai to these areas. Ambernath, Kulgaoon Badlapur, Panvel, and Uran Municipal Councils are also growing rapidly.

d. Population Growth of areas under Special Planning Authority (SPA):

There are several notified areas which are under Special Planning Authorities in rural MMR, constituted at various times. The areas under SPAs inside the existing Municipal Areas are not considered in this exercise as these areas are covered in Municipal areas. There are seven Special Planning Authority areas in the MMR Region viz. Navi Mumbai New Town, Navi Mumbai Airport Influence Notified Area (NAINA), Kalyan 27 Villages, Bhiwandi Surrounding Notified Area (BSNA), Ambernath-Kulgaoon-Badlapur Surrounding Notified Area (AKBSNA), Vasai Virar Sub-region Notified Area (VVSNA), Khopta. The population of these notified areas is 15,51,533 as per Census 2011. This is much lower than the population projected by the respective Planning Authorities for these areas.

Table 8: SPA areas within MMR by Area and Population

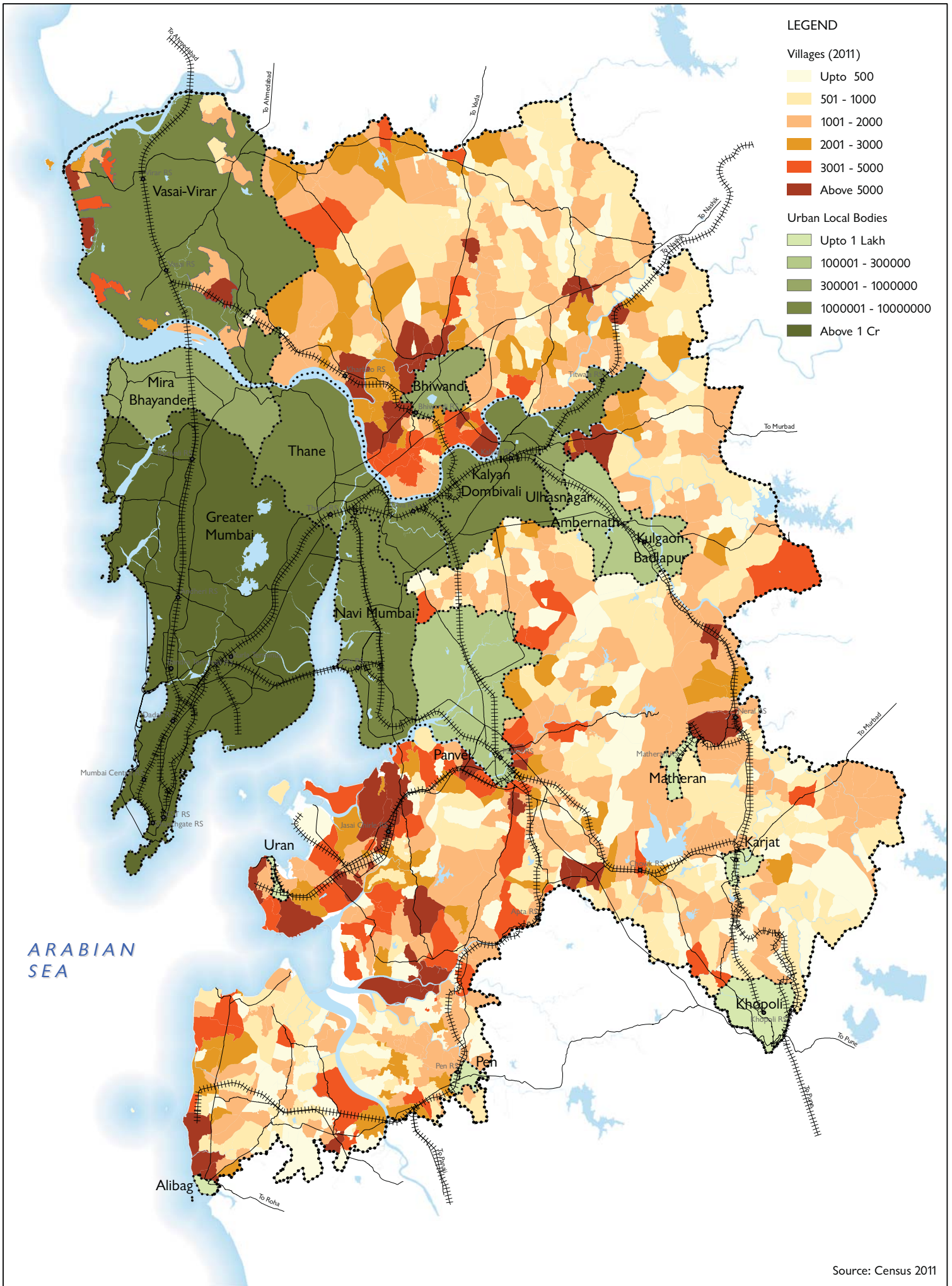
Unit	Authority	Area * Sq. km.	Census Population			Population Projected by Authority(Lakhs)
			1991	2001	2011	
CIDCO New Town	CIDCO	236.09	1,54,837	2,36,592	4,49,485	11 (2001)
NAINA ***	CIDCO	725.8	2,31,610	3,14,854	3,49,351	22.5 (2034)
Kalyan 27 Villages	MMRDA	48.43		1,17,196	2,71,435	12.5 (2028)
BSNA	MMRDA	156.2	1,18,342	1,84,493	2,44,163	12 (2028)
AKBSNA	MMRDA	138.06	41,906	81,293	1,05,731	6.12 (2016)
VVSNA	CIDCO	64.23	35,009	62,857	77,138	**
Khopta	CIDCO	98.12	41,740	47,672	54,230	-
Total		1466.93	6,23,444	10,44,957	15,51,533	-

*Area as per Census 2011, ** as most of the area of SPA included in VVCMC details of remaining are not separately available.

***Entire Area and Population of Villages partly included in NAINA are considered for this exercise

e. Population Growth of Rural MMR

The urban areas in MMR recorded a declining growth rate, whereas the rural areas grew at an increased CAGR during 1991-2001 (refer Table 5). However, in the last decade, 2001-2011, the CAGR of rural areas registered a decline which could perhaps be due to the formation of new Corporations like VVCMC and the emergence of new census towns like Kharghar.



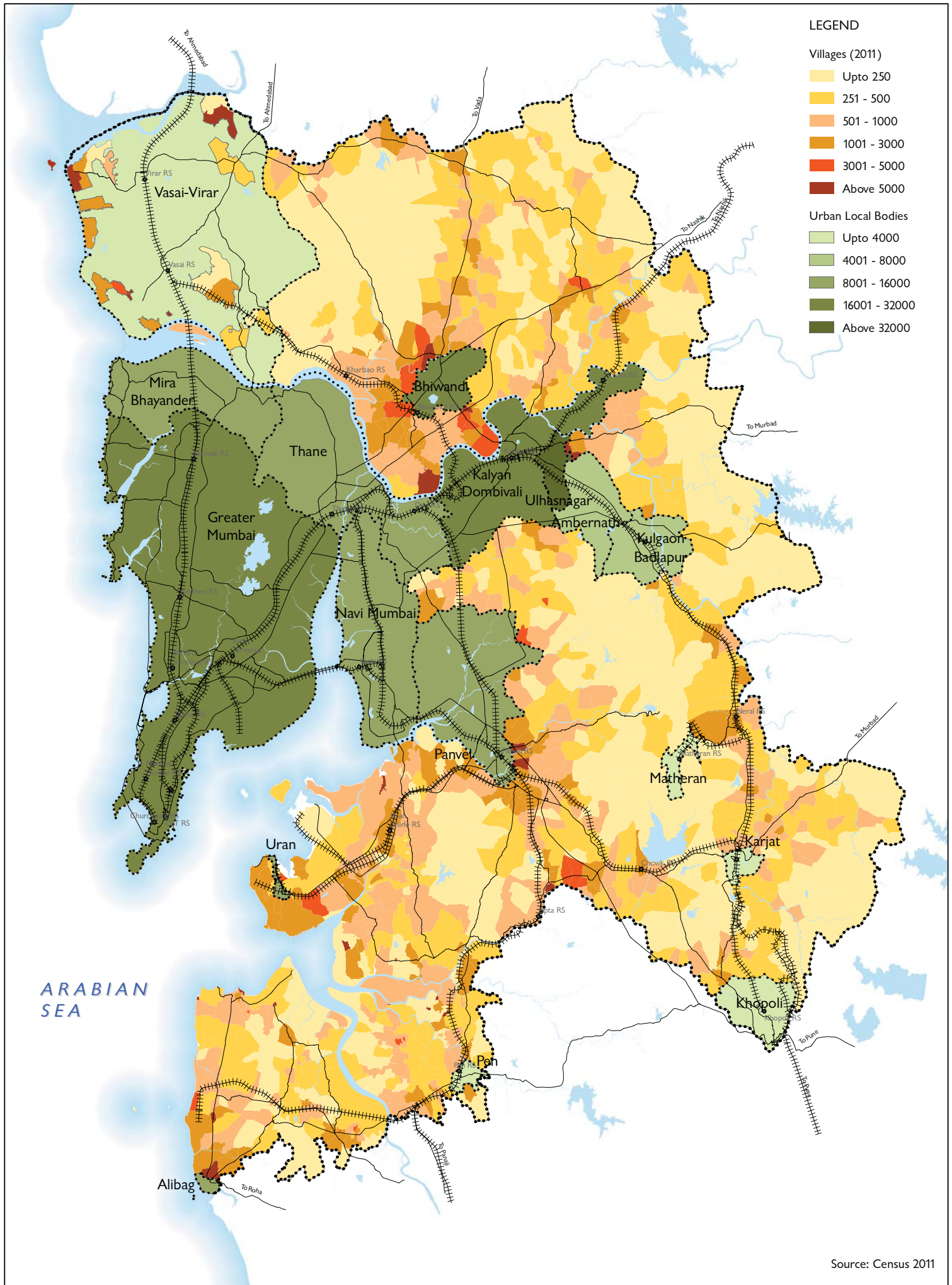
LEGEND

- Villages (2011)**
- Upto 500
 - 501 - 1000
 - 1001 - 2000
 - 2001 - 3000
 - 3001 - 5000
 - Above 5000
- Urban Local Bodies**
- Upto 1 Lakh
 - 100001 - 300000
 - 300001 - 1000000
 - 1000001 - 10000000
 - Above 1 Cr

Source: Census 2011

Population Distribution - 2011

Modified Draft Mumbai Metropolitan Regional Plan 2016-36



LEGEND

Villages (2011)

- Upto 250
- 251 - 500
- 501 - 1000
- 1001 - 3000
- 3001 - 5000
- Above 5000

Urban Local Bodies

- Upto 4000
- 4001 - 8000
- 8001 - 16000
- 16001 - 32000
- Above 32000

Source: Census 2011

2.2.3 Demographic Characteristics

- a. **Household Size:** The average household size in urban MMR is 4.39 which is less than both that of India (5.3) and that of Maharashtra (5.0) as per Census 2011 and is decreasing over time. Decreasing household size translates directly into increasing space demand for housing.

Table 9: Household Size and Sex Ratio

Unit	HH Size			Sex Ratio		
	1991	2001	2011	1991	2001	2011
Urban MMR	4.84	4.67	4.39	818	816	859
Municipal Corporations						
Greater Mumbai (MCGM)	4.84	4.76	4.48	818	809	853
Thane (TMC)	4.32	4.45	4.23	856	870	888
Ulhasnagar (UMC)	4.99	4.78	4.53	905	881	881
Kalyan-Dombivali (KDMC)	4.42	4.33	4.12	876	884	920
Mira-Bhayander (MBMC)	4.58	4.44	4.33	857	817	886
Bhiwandi-Nizampur (BNCMC)	5.41	5.42	5.07	649	629	709
Navi Mumbai (NMMC)	4.30	4.30	4.10	821	779	837
Vasai - Virar City(VVCMC)	4.56	4.27	4.20	901	883	886
Municipal Councils						
Ambernath	NA	4.60	4.34	-	899	912
Kulgaon-Badlapur	NA	4.30	4.16	-	889	928
Alibag	4.78	4.49	4.16	935	923	948
Karjat	5.08	4.56	4.35	907	933	945
Khopoli	4.85	4.64	4.37	870	875	907
Matheran	5.12	5.10	4.50	745	725	954
Panvel	4.70	4.35	4.18	908	893	946
Pen	4.67	4.40	4.17	927	906	966
Uran	4.92	4.48	4.21	899	898	958
Census Towns						
Thane District	4.76	4.73	4.50	834	635	734
Raigad District	4.57	4.52	4.15	847	811	867
Rural MMR	5.11	4.81	4.44	940	922	911
Thane	5.26	-	4.73	942	-	898
Ambernath	5.25	5.08	4.50	932	930	900
Vasai	4.90	4.62	4.52	940	892	976
Kalyan	5.56	5.04	4.25	940	921	860
Bhiwandi	5.30	5.06	4.61	905	909	889
Thane District Rural	5.16	4.88	4.45	925	906	890
Alibag	4.72	4.41	4.18	1015	973	980
Karjat	5.35	5.14	4.85	941	957	965
Khalapur	4.95	4.81	4.65	898	918	946
Panvel	5.26	4.95	4.48	939	920	894
Pen	5.13	4.61	4.32	981	949	959
Uran	4.92	4.55	4.24	954	934	952
Raigad District Rural	5.07	4.74	4.43	955	939	937
Overall for MMR	4.79	4.68	4.39	832	822	862

Source: Census of India

- b. **Sex Ratio:** The overall sex ratio of MMR is 862 which is lower than that of India (933) and that of Maharashtra (922) as per Census 2011. The average sex ratio of Urban MMR (859) is increasing as against that of Rural MMR (911) which is decreasing over the decades. From Table 9, it is observed that the overall sex ratio in rural areas is above 900 except the rural areas of Panvel, Bhiwandi, Kalyan, and Thane. The highest sex ratio for 2011 within Corporations is in KDMC (920) and lowest is in BNCMC (709) where there is a high presence of migrant males.
- c. **Literacy Rate:** The literacy rate of MMR stands at 79.49 per cent which is higher than that of India (64.8 per cent) and Maharashtra (77 per cent). MMR follows typical trends, with literacy rates - higher than female literacy rates and literacy rates of urban areas are higher than rural areas. Further, the gap between literacy and female literacy rates, and between literacy rates in urban

and rural areas, is reducing within MMR. Literacy rate, female literacy rate (both above 70 in urban MMR) and effective literacy rate (above 85 in urban MMR) within MMR are all increasing except in the case of VVCMC and Vasai Tehsil, (perhaps due to the incorporation of several rural areas into the Corporation). BNCCM is an exception where the literacy rates are the lowest in MMR and lower than even the rural areas of MMR between 1991 and 2011. This could be due to the presence of a large migrant uneducated workforce that works in the textile industry.

- d. **Age-Sex Distribution:** Census 2011 data was available only at the District level for different age groups differentiated by gender. This was analysed through age-sex pyramids across the decades for MMR Districts between 1991 and 2011. This data reveals that there is a significant increase in the share of the working population aged 25-59 as also the population over 60 years. There is also a decline in the share of children below 14 over the years and in population aged 15-24.
- e. **Workforce Participation Ratio (WPR):** The WPR for urban and rural MMR is 39.75 per cent and 41.04 per cent respectively, which are both less than that of Maharashtra which is 42 per cent and greater than that for India which is 39.1 per cent (Census 2011). The WPR for Urban MMR has been increasing between 1991 and 2011 (with the exception of BNCCM which has recorded a slight decrease). The female WPR has also increased for Urban MMR during this period. The work participation ratio for rural MMR has always been slightly higher than urban MMR and the female rural work participation ratio has always been significantly higher than the urban female WPR. However, the WPR and female WPR for rural MMR has decreased over the last decade during 2001-2011.
- f. **Migration:** The latest Census figures for migration are yet to be released. Historically, Mumbai has grown largely because of migration, with 80 per cent of the population born outside Mumbai at the beginning of the 20th century. The trend and pattern of migration has undergone significant changes since then. There has been a declining share of migrants in the total population of Mumbai Urban Agglomeration (Mumbai UA). There is also a considerable change in the source regions of migrants to Mumbai. Migration from areas within Maharashtra continues to account for the majority of migrants into MMR. This share has however declined from 41.6 per cent in 1961 to 37.4 per cent in 2001. There has also been a doubling in the share of migrants from Uttar Pradesh during the period 1961 to 2001 (12 per cent to 24 per cent share), and from Bihar (0.5 per cent to 3.5 per cent), while the share of migrants from Gujarat and Goa has continuously declined over the same period, from 16.9 per cent to 9.6 per cent and from 3 per cent to 0.6 per cent respectively.

The virtual lack of any growth during 2001-2011 in the Island City of Greater Mumbai can be ascribed to the decline in migration as well as the decline in fertility to below replacement levels. There has been an outmigration to Mumbai Suburbs, and to the peripheral areas of Mumbai UA i.e. Thane, Kalyan, Navi Mumbai, Mira Bhayander, Ambarnath, Badlapur. Recent latest research on migration⁵ indicates that during the past decade, there has been an increase in short-term migration, return migration and in two-way daily commute across rural-urban areas in India, which may also be the case in MMR.

Table 10 : Age-Sex Distribution of Population

Age Group	(%) 2011			(%) 2001			(%) 1991		
	M	F	T	M	F	T	M	F	T
0-14	12.88	11.79	24.67	15.45	14.38	29.83	17.22	16.07	33.29
15-24	10.35	8.81	19.16	11.03	8.94	19.98	10.21	9.24	19.45
25-34	10.00	8.77	18.77	9.87	8.48	18.35	9.36	8.48	17.84
35-59	15.25	13.57	28.82	13.70	11.63	25.33	12.95	10.58	23.54
60+	4.19	4.38	8.57	3.17	3.47	6.64	2.91	2.96	5.87

Source: Census of India

⁵ Chandrasekhar S et al, Urbanisation and Spatial Patterns in Internal Migration in India, May 2014, WP 2014-016, <http://www.igidr.ac.in/pdf/publication/WP-2014-016.pdf>,

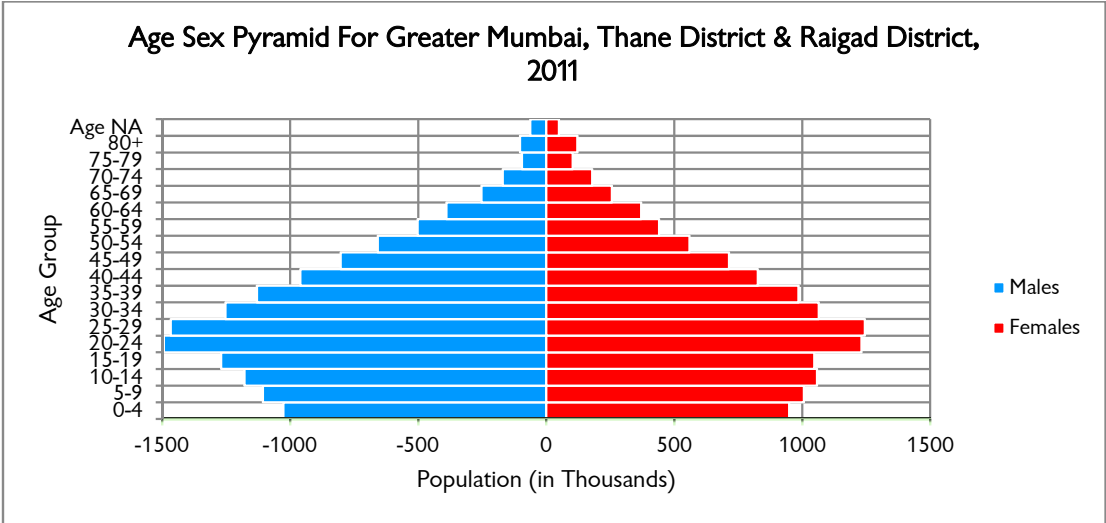
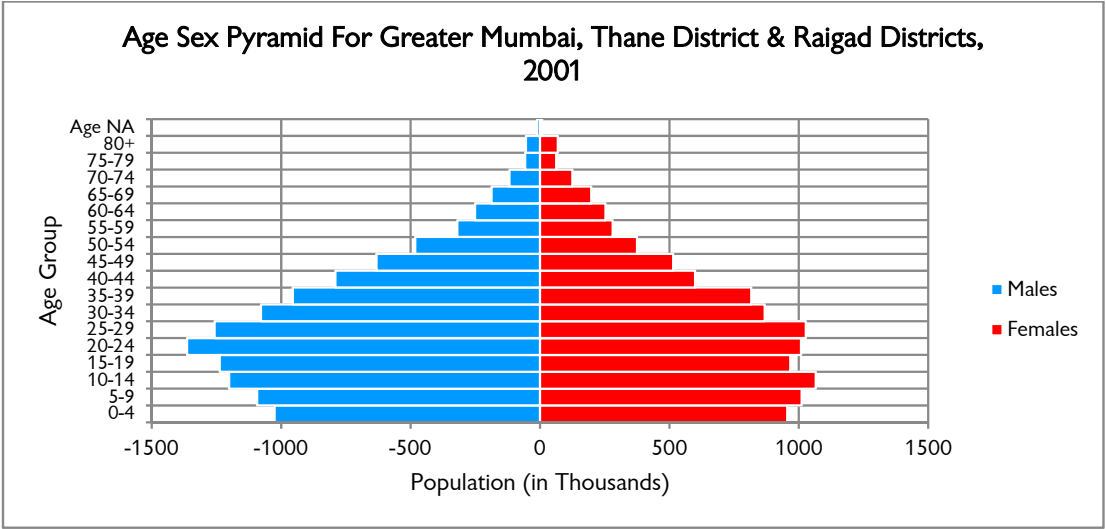
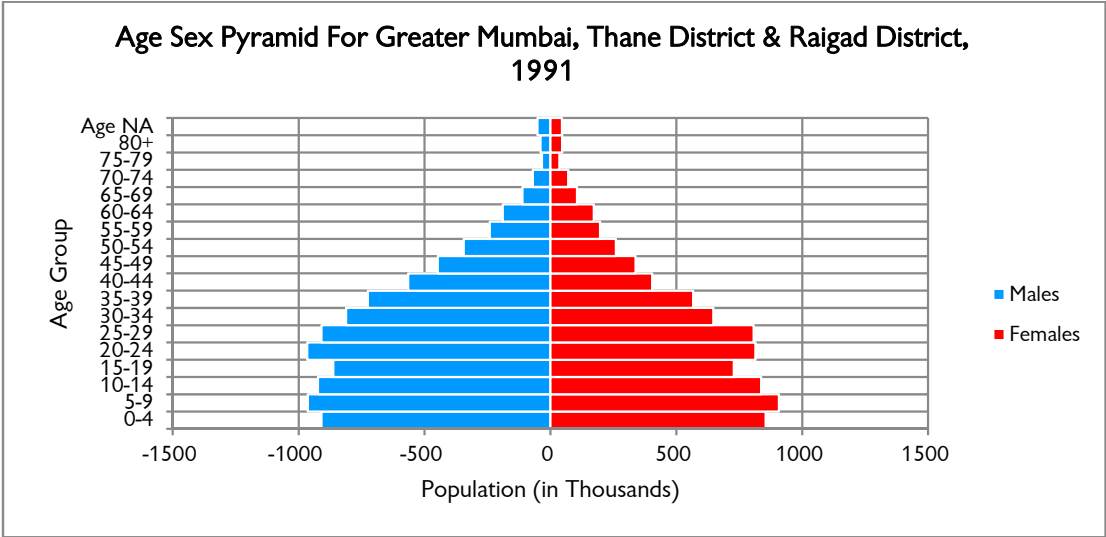


Figure 4: Age-Sex Pyramid of MMR Districts (1991, 2001 and 2011)

2.3 Regional Economy and Employment

Greater Mumbai, the Financial Capital of India, has always been a significant driver of the economic growth of both the State of Maharashtra as well as the Country. The MMR districts contributed 40.26 per cent of the State Domestic Product. Sectorally, MMR districts have always had a major share in the tertiary and secondary sectors, contributing 45 per cent of the tertiary sector Net District Domestic Product (NDDP) and 40 per cent of the state's secondary sector NDDP in 2012-13⁶.

2.3.1 Regional Income

District level analysis of Mumbai, Thane and Raigad which constitute the Region has been carried out in order to understand MMR's contribution to the economy. Domestic product data at constant prices for three periods at three separate base prices has been used for the analysis. Data for 1993-94 to 1998-99 is available at 1993-94 prices, data for 1999-2000 to 2003-04 is available at 1999-2000 prices and the data for the next 8 periods 2004-05 to 2012-14⁷ is available at 2004-05 prices.

Table 11: CAGR of NDDP within MMR and Maharashtra

Period	1993-94 to 1998-99		1999-2000 to 2003-04		2004-05 to 2012-14	
	MMR	Maharashtra	MMR	Maharashtra	MMR	Maharashtra
Primary	5.99	3.46	4.68	3.36	2.6	5.76
Secondary	6.27	6.09	1.25	0.84	11.17	11.57
Tertiary	7.67	6.23	5.91	5.07	11.58	10.91
Total NDDP	7.03	5.62	4.37	3.68	11.29	10.56

Source: The Directorate of Economics and Statistics, GoM

The above analysis shows that the annual average growth in the domestic product for all the 3 districts was only about 7.03 per cent during 1994-99 and reduced to 4.37 per cent during 2000-04 while it significantly increased during 2005-2013 to 11.29 per cent. MMR's tertiary sector grew at higher growth rates than the overall growth during all three periods between 1994 and 2013 while the secondary sector in MMR grew at a rate lower than the overall growth in all three periods. The primary sector in general grew at a rate lower than the overall growth during 1994-1999 and during 2005-2013 and grew at a slightly higher rate than the overall during 2000-2004.

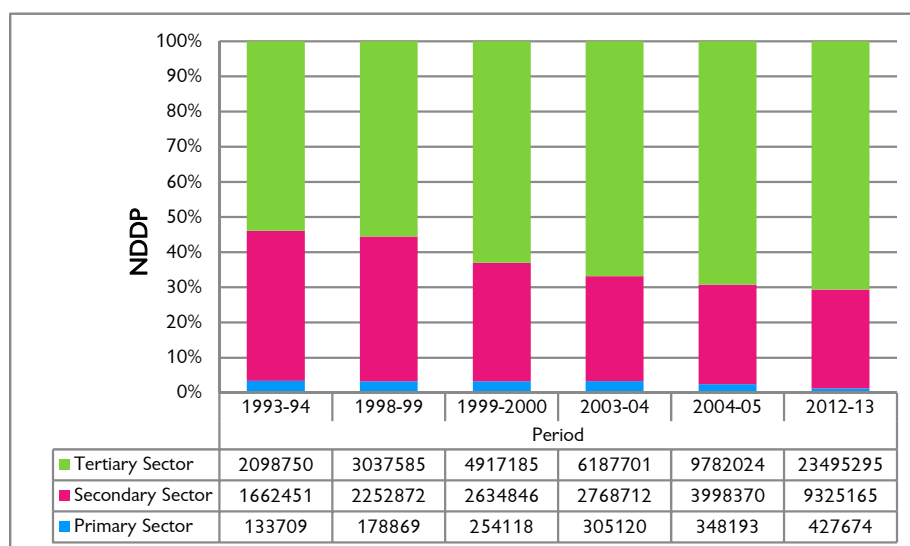


Figure 5: Trends in Sector-wise Share of NDDP in MMR (1993-1994 to 2012-2013)

⁶ a decline from 52% share in secondary sector in 1993-94.

⁷ Economic Census - 2014 data where available has been used.

MMR contributed a significant 40.26 per cent to the State Domestic Product in 2012-13. In terms of the share of MMR's contribution sectorally to the State economy, it is observed that the contribution of the secondary and the tertiary sectors has always been significant as against that of the primary sector. MMR's secondary sector in 2012-13 contributed 40 per cent to the overall state secondary sector NDDP though it declined from a 52 per cent share in 1993-94. The region's tertiary sector's contribution to Maharashtra's tertiary sector has been 45 per cent in 2012-13 which has slightly increased since 1993-94. MMR's primary sector has been contributing to the State primary sector NDDP at an almost constant 6 per cent over the years.

The NDDP of MMR districts is primarily generated by the tertiary sector which contributed 70.67 per cent, and the secondary sector at 28.05 per cent with a minor contribution from the primary sector at 1.29 per cent.

As regards district level contribution towards the overall combined MMR districts NDDP, Mumbai leads in its share towards the tertiary sector at 63 per cent followed by Thane at 32 per cent. In the contribution towards the secondary sector, both Mumbai and Thane districts are significant contributing 45 per cent and 42 per cent to the overall NDDP of MMR districts. As regards the primary sector, Thane leads with a 46 per cent share followed by Raigad and Mumbai at 27 per cent each.

The Tertiary Sector recorded higher growth rates (7.67 per cent, 5.91 per cent and 11.58 per cent in 1993-1999, 2000-2004, 2005-13 respectively) than the overall growth in MMR. Its share to the total increased gradually from 53.88 per cent in 1993-94 to 70.67 per cent in 2012-13. Significantly, Mumbai's share to the Tertiary Sector in MMR has decreased from 73.73 per cent in 1993-94 to 63.31 per cent in 2012-13, while that of Thane has correspondingly increased from 22.59 per cent to 32.14 per cent during the corresponding period. Within tertiary sector, communication is growing at the fastest rate (26.14) in MMR, followed by Banking and Institute (14.11) and Real Estate activities (10.18) which show higher growth rates than other activities of Tertiary Sector. Banking & Institute and Real Estate activities have increased at a threefold growth rate in Mumbai and Thane.

The Secondary Sector shows slightly lower growth rate (6.27 per cent, 1.25 per cent and 11.17 per cent in 1993-1999, 2000-2004 and 2005-14 respectively) than the overall growth (7.03 per cent, 11.29 per cent in 1993-1999 and 2005-14 respectively) in MMR and a significantly lower growth rate of 1.25 per cent as against 4.37 per cent overall growth rate in MMR in 2000-2004.

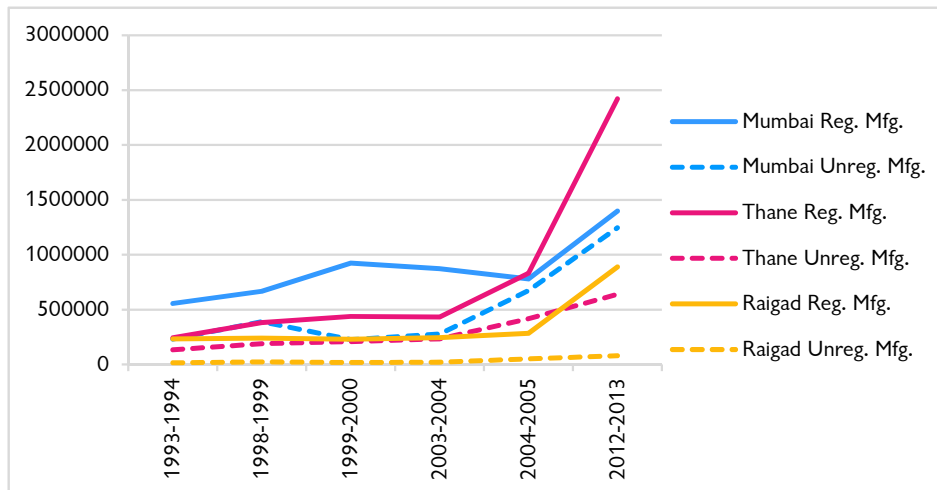


Figure 6: Registered and Unregistered Manufacturing in MMR Districts

Registered Manufacturing has grown at a higher rate than the overall rate during 2005-2013 even though in the previous two periods it grew at a rate lower than the overall growth (except Thane during 1994-99). The Un-registered Manufacturing performed better, posting significantly higher growth rates than Registered Manufacturing (again with an exception of Thane during 1994-99).

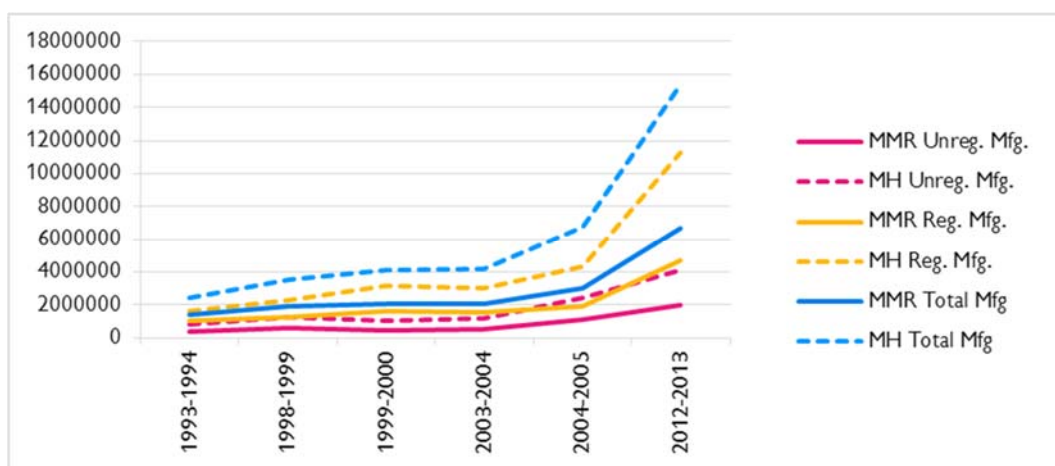


Figure 7: Registered and Unregistered Manufacturing in MMR with respect to Maharashtra

The overall picture shows that Thane district has outperformed Greater Mumbai except for Un-registered Manufacturing and that the rate of growth has slowed down from the period 1994-99 to 2000-09, more significantly so in the Manufacturing sector as a whole. Construction activity is growing at the fastest growth rate (20.6 per cent) among all secondary sector activities in Mumbai, Thane and Raigad.

2.3.2 Employment

The total number of workers in MMR based on place of residence is 90,83,920 with a workforce participation rate of 39.83 per cent for MMR, according to the Census 2011. Of these, the majority of the workers are engaged in other services (93.45 per cent) while household workers are 3.11 per cent and cultivators and agricultural workers accounting for 3.44 per cent.⁸ Among the districts, Raigad has the highest share of resident workers in the primary sector with nearly 20 per cent of its workforce engaged in agriculture. However, it must be noted that this is a dramatic reduction from 31.21 per cent engaged in agriculture in 2001. This indicates that Raigad is undergoing increasing urbanization with the share of employment in other services by resident workers increasing to 77 per cent as against 65 per cent in 2001.

Table 12: Resident Workers and Workforce Participation in 2001 and 2011

Districts	Census 2001			Census 2011		
	Population	Total Resident Workers	% Work force Participation	Population	Total Resident Workers	% Work force Participation
Mumbai District	1,19,78,450	44,64,248	37.27	1,24,42,373	50,19,417	40.34
Thane District	63,27,716	23,17,920	36.63	88,88,562	34,88,110	39.24
Raigad District	10,59,303	4,11,733	38.87	14,73,420	5,76,393	39.12
MMR	1,93,65,469	71,93,901	37.15	2,28,04,355	90,83,920	39.83

Source: Census of India

⁸ Data regarding employment is largely based on the primary Census and the Economic Census. This is supplemented with data on factory employment and shops and establishments data from the various ULBs.

Table 13: Category-wise Percentage Share of Resident Workers

Districts	Mumbai		Thane		Raigad		MMR	
	2001	2011	2001	2011	2001	2011	2001	2011
Cultivators	0.1	0.44	3.43	2.05	16.43	10.54	2.11	1.70
Agricultural Labourers	0.08	0.53	2.52	2.24	15.78	9.33	1.77	1.74
Household	3.05	3.27	2.31	2.84	3.00	3.26	2.81	3.11
Other Services	96.76	95.76	91.74	92.87	64.78	76.87	93.32	93.45

Source: Census of India

The district level data of the 2014 Economic Census indicates an overall increase in employment in MMR Districts which now stands at 45.54 lakhs and Mumbai's total employment is 27.34 lakhs. As per trends, the number of employees at the work place within MMR is estimated at around 40.08 lakhs as against 33.35 lakhs in 2005. Mumbai accounted for the major share of both establishments (64 per cent) and employment (67 per cent) in the MMR (and 62 per cent of the MMR Districts employment) in 2005.

Employment in urban area has largest share in MMR's total employment. The share of employment in urban areas has been 97.23 per cent, 96.90 per cent and 95.20 per cent during the census periods 1990, 1998 and 2005 respectively. The urban share of employment has thus been decreasing gradually over the years with a corresponding increase in the rural employment from 2.77 per cent in 1990 to 4.8 per cent in 2005.

Table 14: District-wise share of Urban and Rural Formal Employment

District	U/R	1990		1998		2005	
		Employment	% Share	Employment	% Share	Employment	% Share
Mumbai	U	24,25,881	100.00	26,25,867	100.00	22,48,373	100
	R	0	0.00	0	0	0	0.00
	T	24,25,881	100.00	26,25,867	100.00	24,25,881	100.00
Thane	U	6,59,884	92.74	7,61,341	92.29	8,49,609	89.62
	R	51,674	7.26	63,627	7.71	98,443	10.38
	T	7,11,558	100.00	8,24,968	100.00	9,48,052	100.00
Raigad	U	48,293	56.16	65,692	58.45	77,043	55.55
	R	37,694	43.84	46,701	41.55	61,638	44.45
	T	85,987	100.00	1,12,393	100.00	1,38,681	100.00
MMR	U	31,34,058	97.23	34,52,900	96.9	31,74,925	95.2
	R	89,368	2.77	1,10,328	3.1	1,60,081	4.8
	T	32,23,426	100.00	35,63,228	100.00	33,35,006	100.00

Source : Economic Census 1990, 1998 and 2005

In order to spatially understand deficiencies in employment in rural MMR, mapping exercises in GIS were undertaken to identify such villages where the ratio of the total people employed to the total population was below the general average or where the ratio of those employed in formal jobs to the total population was below the general average (refer Map no. 6). Villages that recorded paucity of employment seem to be largely located furthest away from the urbanised areas of MMR, largely to the N-E of MMR in Bhiwandi and to the S-E near Karjat and which have hilly terrain and far away from major infrastructure.

2.3.3 Establishments

As per the Economic Census 1990, 1998 and 2005, the total number of establishments and employment in Mumbai, Thane, Raigad districts and in MMR and their growth rates are detailed in Table 15.

Table 15: District-wise Establishments and Employment in MMR

Districts	1990	1998	2005	2014	90-98	98-05	05-14
	Establishments				CAGR		
Mumbai	4,23,418	4,86,499	5,73,094	7,34,323	1.75	2.37	3.15
Thane	1,40,335	1,87,148	2,76,145	NA	3.66	5.71	-
Raigad	21,715	27,014	43,379	NA	2.77	7	-
MMR	5,85,468	7,00,661	8,92,618	NA	2.27	3.52	-
MMR Districts	NC	NC	NC	12,73,495			
Employment							
Mumbai	24,25,881	26,25,867 (71%)	22,48,273 (62%)	27,34,166 (62%)	1	-2.19	2.48
Thane	7,11,558	8,24,968	9,48,052	NA	1.87	2.01	-
Raigad	85,987	1,12,393	1,38,681	NA	3.4	3.05	-
MMR	32,23,426	35,63,228 (96.49%)	33,35,006 (92.05%)	40,08,200* (92%)	1.26	-0.94	2.32
MMR Districts	NC	36,92,721	36,22,842	43,54,347		-0.27	2.33

Source : (Economic Census 1998)(Economic Census 2005)(Regional Plan 1996-2011),

* Assumption based on trend, Figures in brackets are share of MMR Districts,

**figures will be higher since 2013 figures do not include Public Administration, Defence and Compulsory Social Security Service Activities

NA- Not Available, NC- Not calculated

The establishments in MMR have continuously grown with a positive growth rate during 1990 to 2013. However, employment in MMR declined and saw a negative growth rate during the period 1998-2005 as compared to 1990-1998. The employment in MMR has grown with a positive growth rate of 2.33 between 2005 and 2014.

The growth rate of establishments has been increasing continuously while employment increased after recording negative growth rate during the period 1998–2005 in Mumbai. In Thane, both the number of establishments and employment increased during the periods 1990 to 1998 and 1998 to 2005. In Raigad, the growth rate of establishments was 2.77 per cent during the period 1990–1998 and 7.00 per cent during the period 1998–2005. Similarly in employment, it is observed that the growth rate was 3.40 per cent during the period 1990–1998 and 3.05 per cent during the period 1998–2005. It shows that, the establishments have increased with higher growth rate and the total employment has also increased, though at a marginally lower growth rate during the period 1998–2005 as compare to 1990–1998. However, the number of establishments is fewer and employment figures are lower in Raigad, in comparison with Mumbai and Thane.

Growth Rates of Number of Establishments for Major Industry Groups in MMR

The higher rate of growth in the number of establishment is at the MMR level is mainly on account of tremendous growth observed in

- Basic Metals (CAGR 56.78 per cent) as witnessed in Greater Mumbai (even higher at 57.75 per cent), Thane and Raigad;
- in Wearing Apparels, Dressing and Dying of Fur (CAGR 33.09 per cent) as witnessed more in Thane-46.33 per cent and Raigad-108 per cent,
- in Tanning & Dressing of Leather, manufacturing of Luggage, Handbags, Saddlery, Harness and Footwear (CAGR 15.10 per cent) as seen in all the 3 districts,
- in Electrical Machinery and Apparatus n.e.c. (CAGR 13.65 per cent) more on account of Greater Mumbai and Raigad districts at 24 per cent each; and
- Furniture and related n.e.c. (CAGR 11.69 per cent) due higher growth in all 3 districts but more in Raigad at 18.53 per cent.

The notable exceptions of higher than average MMR growth for Greater Mumbai are Textiles (CAGR 16.12 per cent), Machinery and Equipment (CAGR 13.32 per cent) and other non-metallic Mineral Products (CAGR 10.01 per cent). While there is no exception in Thane, the exception for Raigad is Publishing, Printing and Reproduction of Recorded Media (CAGR 9.26 per cent).

At the MMR level, the only group recording net reduction in the number of establishments is Other Transport Equipment (CAGR - 23.04 per cent), which is witnessed in all 3 districts. In Greater Mumbai the group Fabricated Metal Products except Machinery and Equipment also recorded marginal reduction (CAGR -0.82 per cent). In Thane, Machinery and Equipment n.e.c. (CAGR -7.54 per cent) and other non-Metallic Mineral Products (CAGR -2.96 per cent) witnesses negative growth. Raigad witnesses reduction in number of establishments is many groups, namely, Chemicals and Chemical Products (CAGR - 19.19 per cent), Machinery and Equipment n.e.c. (CAGR - 13.13 per cent), Rubber and Plastic Products (CAGR - 3.90 per cent) and Fabricated Metal Products except Machinery and Equipment (CAGR - 3.37 per cent).

2.3.4 Employment Growth Trends by Sectors

a) Primary Sector:

In MMR, the share of primary sector employment was 0.89 per cent in 1998 and 1.03 per cent in 2005. The share of agriculture, hunting and forestry related activities declined during the period 1998 to 2005. The share of fishing related activities remained the same, while there was marginal increase in the share of mining and quarrying related activities. Employment in the primary sector is prominent in Thane District where employment in agriculture, hunting and forestry has gone down from 1998 to 2005; employment in fishing has remained the same while mining & quarrying have recorded an increase in the persons employed. Employment in mining and quarrying was the highest in Mumbai in 2005. Raigad District shows just a minute change in different sub-sectors of Primary Sector across the various time periods. Agriculture has declined over time while mining and quarrying have increased in terms of employment.

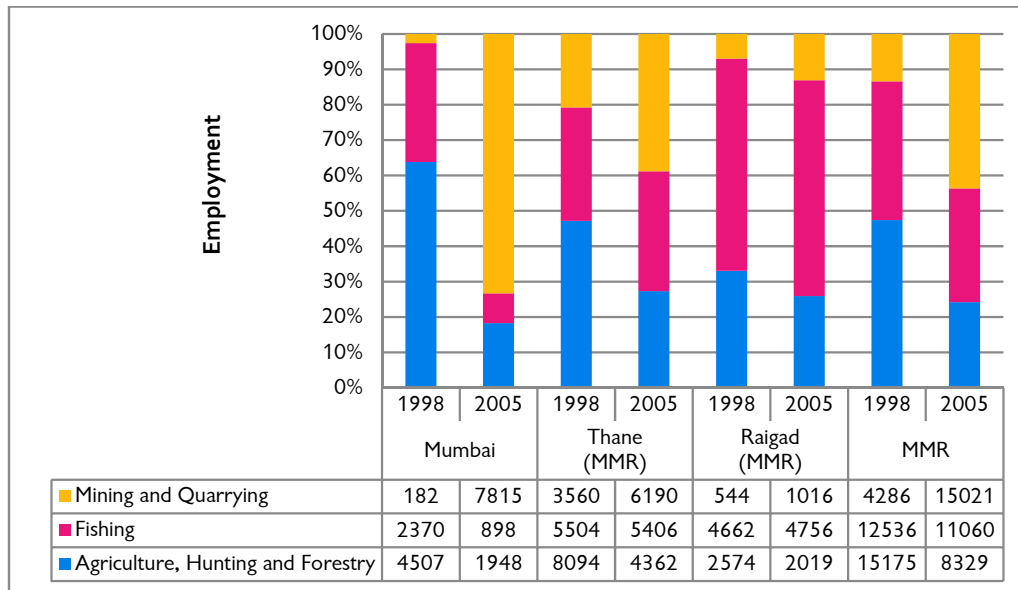


Figure 8: Primary Sector Employment in MMR Districts (1998-2005)

b) Secondary Sector:

At the MMR level, employment in Secondary sector shows negative growth rate (-0.07%). Employment in Manufacturing, Electricity, Gas and Water Supply as well as Construction has remained more or less same during the period 1998 to 2005. Although, growth rate is higher (4.5%) in Employment in Electricity, Gas and Water Supply; Construction has grown by 1.63 per cent. Manufacturing shows slightly negative growth rate (-0.18%) though it forms a major part of employment provider. Five major employment providing sub sectors are as follows:

- a. Manufacturing Of Textiles
- b. Manufacturing Of Wearing Apparels, Dressing and Dyeing of Fur

- c. Manufacturing Of Furniture, Manufacturing etc.
- d. Manufacturing Of Fabricated Metal Products, except Machinery and Equipments
- e. Manufacturing Of Chemicals and Chemical Products

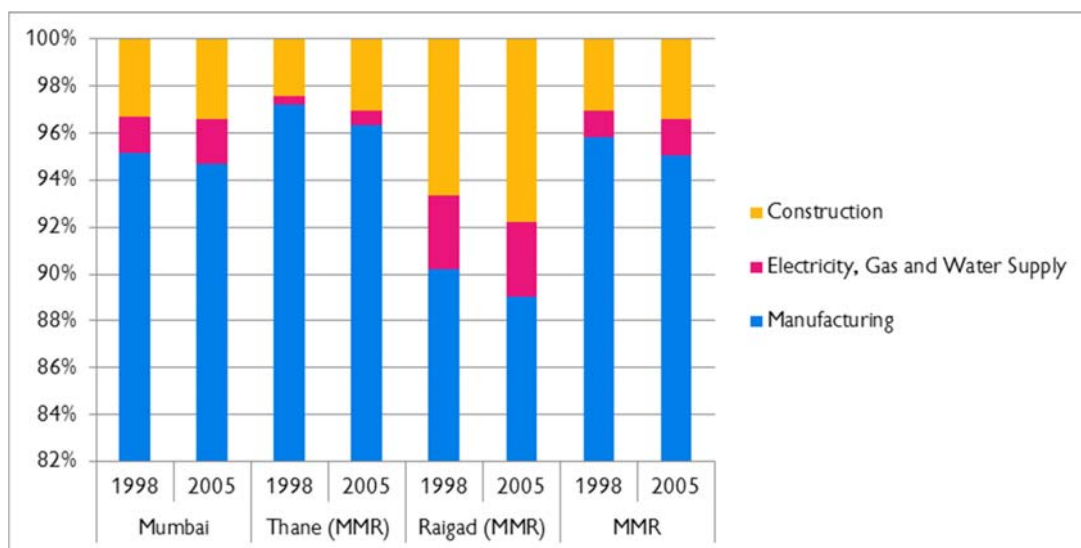


Figure 9: Secondary Sector Employment in MMR Districts (1998 and 2005)

Table 16: Growth rate of Employment in Secondary Sector in Districts of MMR

Sector	Mumbai	Thane	Raigad	MMR
	1998 - 2005	1998 - 2005	1998 - 2005	1998 - 2005
Manufacturing	2.11	-3.27	-2.55	-0.18
Elect., Gas and Water Supply	5.39	4.06	-2.12	4.5
Construction	2.69	0.14	-0.13	1.63
Secondary Sector	2.19	-3.14	-2.36	-0.07

Source: Economic Census 1998 and 2005

Further it is observed that employment in, Manufacturing of wearing apparels and Manufacturing of Furniture has considerably increased from 1.62 per cent to 3.94 per cent and 1.76 percent to 3.33 percent from 1998 to 2005 respectively.

c) Tertiary Sector

In MMR, the share of the tertiary sector employment decreased from 73.37 per cent in 1998 to 71.61 per cent in 2005. The employment in the tertiary sector shows negative growth rate (-1.26 per cent). It has been observed that at the MMR level, employment in the sub-sector of wholesale and retail trade, (including repair of motor vehicle, motorcycles, retail sale of automotive fuel) and sub-sectors real estate, renting and business activities was highest from 1998 to 2005. The growth rate was 2.05 percent and 2.52 percent in 1998 and 2005 respectively. All other sub sectors showed negative growth rate except education and other community, social and personal service activities which show a marginal growth rate.

It is remarkable that the sub-sector of Wholesale and Retail Trade, Repair of Motor Vehicle, Motorcycles, Retail Sale of Automotive Fuel was providing the highest employment in MMR. As per Economic Census 2005; 9,42,954 people were employed in this sub sector, which carries a share of 28.27 per cent of the total employment across all sub-sectors in MMR.

Employment in Retail Trade except of Motor Vehicles and Motorcycles, Repairs of personal and Household Goods, was providing the highest employment, among all the divisions of sub- sector wholesale and retail trade, repair of motor vehicle, motorcycles, retail sale of automotive fuel.

2.3.5 Employment Growth Trends for various Types of Industries

It may be seen that new industry groups are emerging faster during 1998-2005. The analysis of the manufacturing employment of different industrial groups at 2 digit NIC Code indicates that in 1990-91, rubber, plastic and chemical industries had the largest share (20.67 per cent) of the employment, followed by cotton textiles (12.51 per cent) and silk and synthetic fibre textiles (10.13 per cent). The NIC codes for industry groups have been changed in the Economic Censuses of 1998 and 2005. The analysis of employment shares and growth rates of various types of industries are presented in the following table:

Table 17: Growth Rates of Establishments of Major Industry Groups in MMR

No	Industry Group	NIC Div	MMR		
			1998	2005	CAGR (%)
1	Textiles	17	15,012	24,527	7.26
2	Fabricated Metal Products except Machinery & Equip.	28	17,359	17,600	0.20
3	Chemicals and Chemical Products	24	2,642	3,160	2.59
4	Furniture and related n.e.c.	36	12,601	27,321	11.69
5	Wearing Apparels, Dressing and Dyeing of Fur	18	6,100	45,108	33.09
6	Food Products and Beverages	15	13,746	16,472	2.62
7	Rubber and Plastic Products	25	5,240	5,938	1.80
8	Other Transport Equipment	35	3,377	540	-23.04
9	Publishing, Printing and Reproduction of Recorded Media	22	5,376	6,575	2.92
10	Machinery and Equipment n.e.c	29	2,686	3,158	2.34
11	Other Non-metallic Mineral Products	26	2,533	3,463	4.57
12	Electrical Machinery and Apparatus n.e.c	31	904	2,214	13.65
13	Tanning & Dressing of Leather, Manuf. of Luggage, Handbags, Saddlery, Harness & Footwear	19	2,891	7,736	15.10
14	Basic Metals	27	188	4,377	56.78
15	All Other groups		8,188	10,047	2.97
	Total		98,843	1,78,236	8.79

Source : Economic Census, 1998 & 2005

It may be seen that 14 major industry groups accounted for about 94 per cent of the employment in 1998 and their share more or less remained constant in 2005. Prominent industries in 1998 were Textiles with a share of 27.37 per cent in employment, followed by Fabricated Metal Products (except Machinery & Equipment) with a share of 14.20 per cent, then Chemicals and Chemical Products with

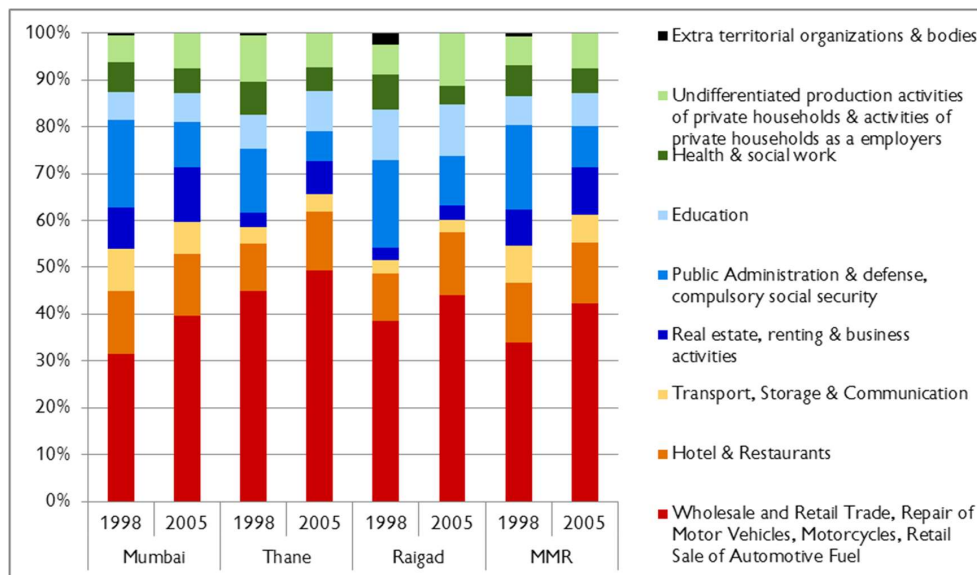


Figure 10: Tertiary Sector Employment in MMR Districts (1998 and 2005)

a share of 8.68 per cent. The shares of all these industry groups have reduced in 2005 to 17.51 per cent, 10.55 per cent and 5.13 per cent respectively. On the other hand, the shares in employment of Wearing Apparels, Dressing and Dyeing of Fur increased substantially from 6.58 per cent in 1998 to 16.88 per cent in 2005 (almost equal to the share of Textiles) and that of Furniture and related (Not Elsewhere Classified) increased from 7.14 per cent in 1998 to 13.42 per cent in 2005. While the shares of Tanning & Dressing of Leather, Manufacturing of Luggage, Handbags, Saddlery, Harness and Footwear, Basic Metals, Machinery and Equipment n.e.c. improved significantly mainly due to increase in Greater Mumbai, the shares of Rubber and Plastic Products (mainly due to reduction in Thane) and Other Transport Equipment (mainly due to reduction in Greater Mumbai and Thane) reduced significantly during 1998-2005. The composition of prominent industry groups is likely to have further changed after 2005.

Table 18: Employment in Major Industry Groups in MMR

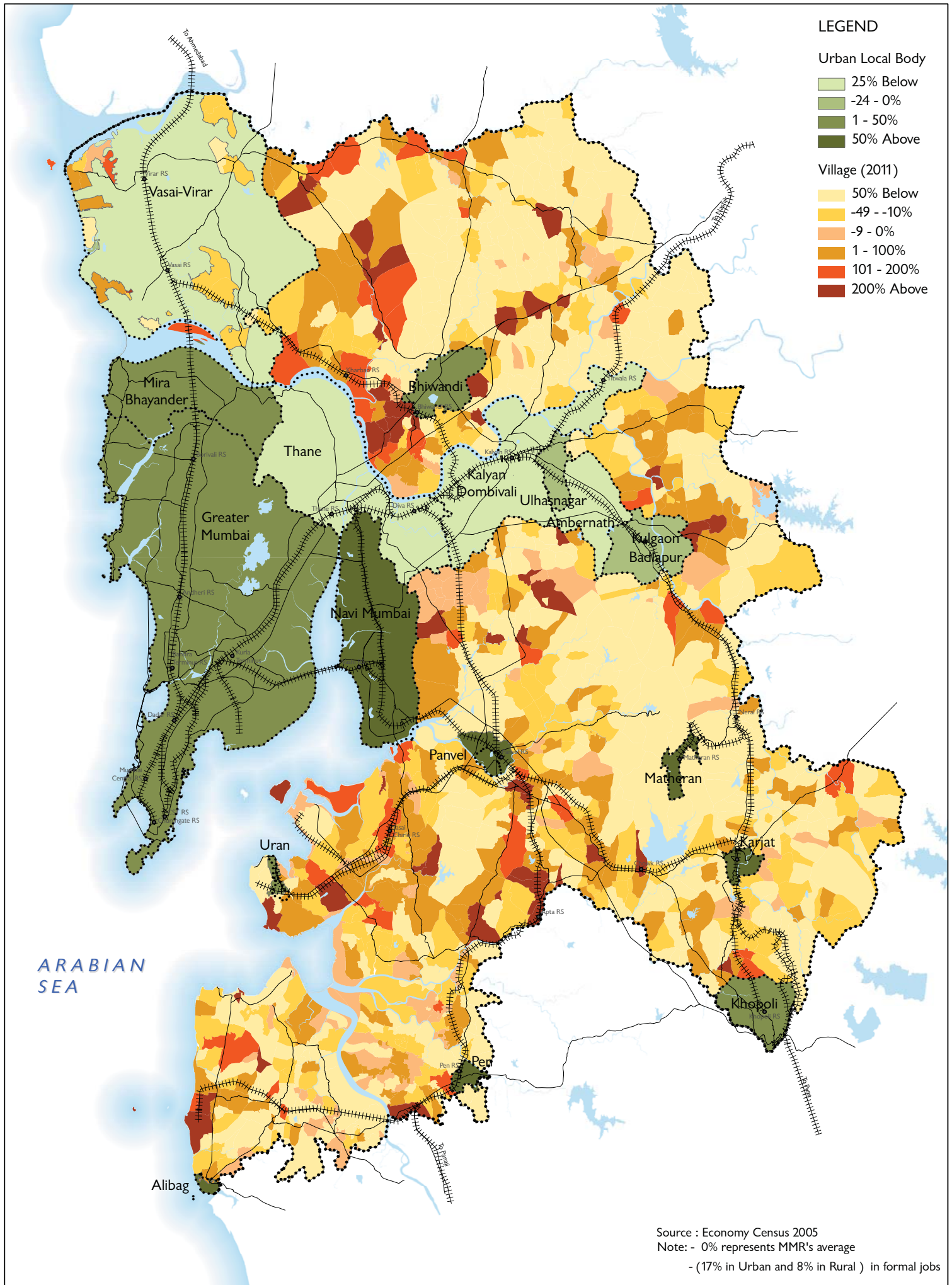
Sr. No.	Industry Group	NIC Division	1998		2005	
			Employment	Share	Employment	Share
1	Textiles	17	2,40,483	27.37	1,83,895	17.51
2	Fabricated Metal Products except Machinery & Equip.	28	1,24,777	14.20	1,10,781	10.55
3	Chemicals and Chemical Products	24	76,285	8.68	53,896	5.13
4	Furniture and NEC	36	62,721	7.14	1,40,964	13.42
5	Wearing Apparels, Dressing and Dyeing of Fur	18	57,824	6.58	1,77,270	16.88
6	Food Products and Beverages	15	57,326	6.52	73,430	6.99
7	Rubber and Plastic Products	25	47,914	5.45	41,447	3.95
8	Other Transport Equipment	35	45,965	5.23	8,116	0.77
9	Publishing, Printing and Reproduction of Recorded Media	22	31,980	3.64	43,629	4.15
10	Machinery and Equipment n.e.c.	29	25,716	2.93	41,257	3.93
11	Other Non-metallic Mineral Products	26	24,554	2.79	27,271	2.60
12	Electrical Machinery and Apparatus n.e.c.	31	12,754	1.45	19,178	1.83
13	Tanning & Dressing of Leather, Manuf. of Luggage, Handbags, Saddlery, Harness & Footwear	19	11,421	1.30	37,622	3.58
14	Basic Metals	27	7,645	0.87	32,463	3.09
15	All Other groups		51,269	5.84	58,997	5.62
	Total		8,78,634	100.00	10,50,216	100.00

Source : Economic Census, 1998 & 2005

The major reasons for reduction in the employment in Textile Industry in MMR is its reduction in Thane district from 1,55,950 in 1998 to 94,149 in 2005. The reduction in the employment in Fabricated Metal Products (except Machinery and Equipment) is on account of reduction in Greater Mumbai from 74,462 in 1998 to 53,802 in 2005 and that in Raigad from 5,341 in 1998 to 1,533 in 2005. Similarly, the employment in Chemicals and Chemical Products reduced in Thane district from 40,026 to 21,500 and in Raigad district from 13,931 to 6,309 during 1998 and 2005. The growth in the employment in Wearing Apparels, Dressing and Dyeing of Fur in MMR is on account of growth in all districts. The employment in this industry group in Greater Mumbai increased from 50,809 to 1,23,443, in Thane from 6,852 to 49,218 and in Raigad district from 163 to 4,609 during 1998 and 2005. Similarly, the employment in Furniture and related n.e.c. grew from 52,820 to 1,18,945 in Greater Mumbai, from 9,461 to 17,829 in Thane and from 440 to 4,190 in Raigad during 1998 and 2005.

Highest employment growth at MMR level during 1998-2005 is seen in the industries related to:

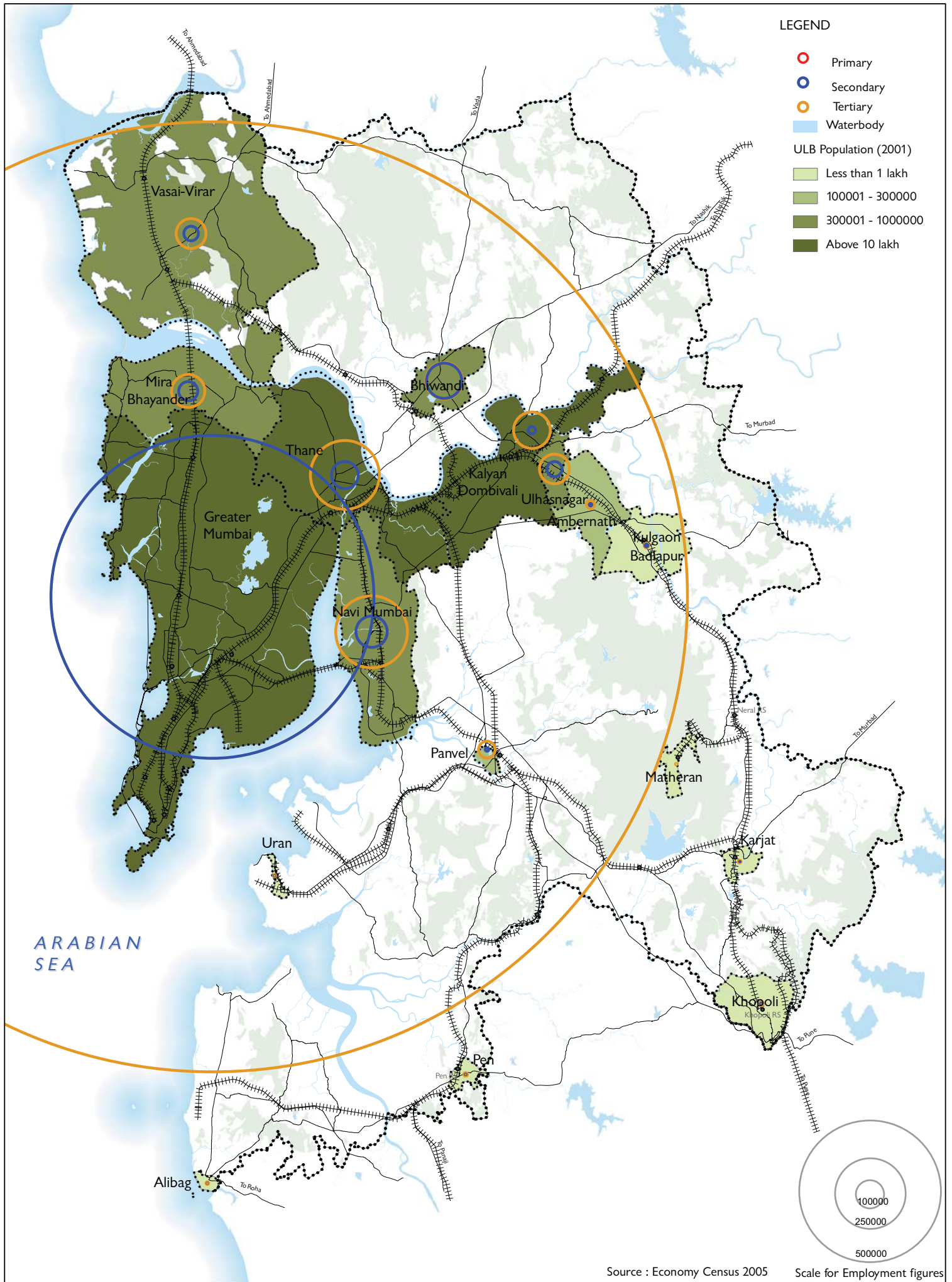
- Basic Metals (CAGR - 22.95 per cent, share increased from 0.87 per cent to 3.09 per cent),
- Tanning and Dressing of Leather, Luggage, Handbags, Saddlery, Harness & Footwear (CAGR - 18.57 per cent, share increased from 1.30 per cent to 3.58 per cent),



LEGEND

- Urban Local Body**
- 25% Below
 - 24 - 0%
 - 1 - 50%
 - 50% Above
- Village (2011)**
- 50% Below
 - 49 - -10%
 - 9 - 0%
 - 1 - 100%
 - 101 - 200%
 - 200% Above

Source : Economy Census 2005
 Note: - 0% represents MMR's average
 - (17% in Urban and 8% in Rural) in formal jobs



Source : Economy Census 2005

Scale for Employment figures

Sectoral Employment 2005

Modified Draft Mumbai Metropolitan Regional Plan 2016-36

- c) Wearing Apparels, Dressing and Dyeing of Fur (CAGR 17.36 per cent, share increased from 6.58 per cent to 16.88 per cent) and
- d) Furniture (CAGR 12.26 per cent, share increased from 7.14 per cent to 13.42 per cent).

The biggest loss of employment during this period is witnessed in the industries related to:

- a) Other Transport Equipment (CAGR -21.94 per cent, share reduced from 5.23 per cent to 0.77 per cent)
- b) Chemicals and Chemical Products (CAGR -4.84 per cent, share reduced from 8.68 per cent to 5.13 per cent) and
- c) Textiles (CAGR -3.76 per cent, share reduced from 27.37 per cent to 17.51 per cent).

The detailed analysis of growth trends and shares of establishment and employment in various major industry groups in Greater Mumbai, Thane and Raigad parts of MMR is presented in Table 18 respectively.

In Greater Mumbai, while the employment has grown in the industries related to Basic Metals at a rate much faster than MMR, the employment in industries related to Tanning and Dressing of Leather, Luggage, Handbags, Saddlery, Harness & Footwear and Furniture at a rate similar to that of MMR but at a significantly lower rate in industries related to Wearing Apparels, Dressing and Dyeing of Fur. In addition, employment in industries related to Machinery and Equipment n.e.c. has grown substantially faster (CAGR 20.19 per cent) in Greater Mumbai as compared to MMR (CAGR – 6.99 per cent) and for industries related to Electrical Machinery and Apparatus n.e.c. in Greater Mumbai (12.50 per cent) as compared to MMR (6 per cent). Employment in industries related to Other Transport Equipment reduced at a high rate like that witnessed in MMR and reduced at a higher rate (CAGR -4.54 per cent) than that for MMR (CAGR -1.69 per cent). However, unlike MMR, the industries related to Textiles (CAGR – 0.88 per cent) and Chemicals and Chemical Products gained employment in Greater Mumbai.

As regards parts of Thane and Raigad districts in MMR, the employment in industries related to Basic Metals and Tanning and Dressing of Leather, Luggage, Handbags, Saddlery, Harness & Footwear has also grown at a faster rate but slower than that of MMR. The employment in Wearing Apparels, Dressing and Dyeing of Fur has grown at a substantially higher rate in Thane (CAGR 32.53 per cent) and Raigad (CAGR 61.19 per cent) and employment in Publishing, Printing and Reproduction of Recorded Media as grown at a significantly higher rate in Thane (CAGR 7.33 per cent) and Raigad (CAGR 10.95 per cent) as compared to MMR. The notable difference for the Raigad district is that the employment in industries related to Furniture (CAGR 37.98 per cent) and Electrical Machinery and Apparatus n.e.c. (CAGR 14.97 per cent) grew at the fastest rate vis-a-vis other districts. Employment reduction in industries related to Other Transport Equipment, Chemicals and Chemical Products and Textiles in Thane and Raigad districts is in tune with the trends observed for MMR. The notable difference for Raigad district is that the employment in Fabricated Metal Products except Machinery and Equipment (CAGR -16.33 per cent) and Rubber and Plastic Products (CAGR -11.55 per cent) reduced at a substantially higher rate than other districts.

2.3.6 Employment in ULBs

It is seen that in MMR, the shares of employment in urban areas were 97.23%, 96.90% and 95.20% during the census periods 1990, 1998 and 2005 respectively. Although, employment in urban area has largest share in MMR's total employment, its share has been decreasing gradually from year 1990 to 2005.

a) Sector and Sub Sectors wise analysis

As per the Economic Census 1998 and 2005, the employment in Primary, Secondary and Tertiary sector in ULBs in MMR is given in Table 20. The employment share in all three sectors as per census 2005 is represented in Map no. 7.

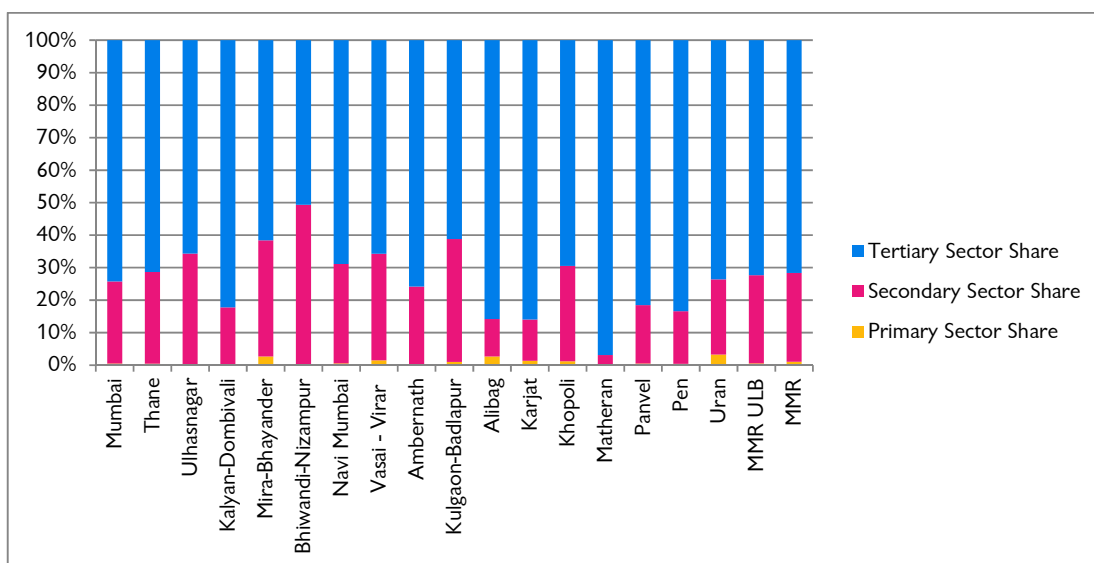


Figure 11: Employment Share of ULBs (2005)

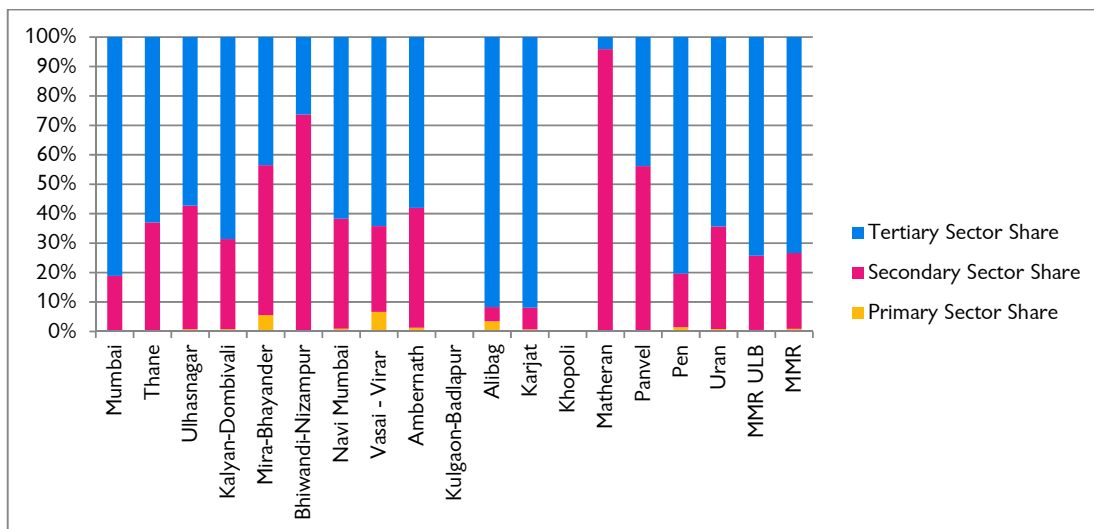


Figure 12: Employment Share of ULBs (1998)

Table 19: Sector-wise Share of Employment in ULBs of MMR

ULBs	Year	Primary Sector			Secondary Sector			Tertiary Sector			PST		
		Employment	Share	Difference of %	Employment	Share	Difference of %	Employment	Share	Difference of %	Employment	Share wrt MMR	Difference of %
		A	B =(A*100) /J	C (2005-1998)	D	E =(D*100) /J	F (2005-1998)	G	H =(G*100) /J	I (2005-1998)	J	K	L (2005-1998)
Mumbai	1998	7059	0.27		488373	18.60		2130435	81.13		2625867	73.70	
	2005	10661	0.47	0.21	568210	25.27	6.67	1669402	74.25	-6.88	2248273	67.41	-6.28
Thane	1998	722	0.41		64721	36.59		111450	63.00		176893	4.96	
	2005	773	0.45	0.04	48249	28.21	-8.37	121986	71.33	8.33	171008	5.13	0.16
Ulhasnagar	1998	510	0.73		29230	41.99		39865	57.27		69605	1.95	
	2005	215	0.27	-0.46	27227	34.02	-7.97	52584	65.71	8.44	80026	2.40	0.45
Kalyan-Dombivali	1998	765	0.76		30960	30.62		69383	68.62		101108	2.84	
	2005	166	0.21	-0.54	13776	17.57	-13.06	64484	82.22	13.60	78426	2.35	-0.49
Mira-Bhayander	1998	3719	5.58		33928	50.90		29003	43.52		66650	1.87	
	2005	2512	2.65	-2.93	33830	35.75	-15.15	58285	61.59	18.08	94627	2.84	0.97
Bhiwandi-Nizampur	1998	287	0.15		143502	73.51		51429	26.34		195218	5.48	
	2005	174	0.14	-0.01	62753	49.17	-24.34	64689	50.69	24.35	127616	3.83	-1.65
Navi Mumbai	1998	845	0.96		32799	37.31		54258	61.73		87902	2.47	
	2005	1008	0.55	-0.41	56097	30.57	-6.75	126411	68.88	7.16	183516	5.50	3.04
Vasai - Virar	1998	2754	6.65		12067	29.13		26610	64.23		41431	1.16	

ULBs	Year	Primary Sector			Secondary Sector			Tertiary Sector			PST		
		Employment	Share	Difference of %	Employment	Share	Difference of %	Employment	Share	Difference of %	Employment	Share wrt MMR	Difference of %
		A	B	C	D	E	F	G	H	I	J	K	L
			$=(A*100)/J$	(2005-1998)		$=(D*100)/J$	(2005-1998)		$=(G*100)/J$	(2005-1998)			(2005-1998)
	2005	1158	1.45	-5.19	26129	32.82	3.69	52330	65.73	1.50	79617	2.39	1.22
Ambernath	1998	287	1.27		9165	40.67		13082	58.05		22534	0.63	
	2005	69	0.35	-0.93	4746	23.83	-16.84	15099	75.82	17.77	19914	0.60	-0.04
Kulgaon-Badlapur	1998												
	2005	150	1.01	1.01	5617	37.80	37.80	9092	61.19	61.19	14859	0.45	0.45
Alibag	1998	246	3.39		352	4.86		6649	91.75		7247	0.20	
	2005	160	2.65	-0.75	695	11.49	6.64	5192	85.86	-5.89	6047	0.18	-0.02
Karjat	1998	32	0.68		350	7.40		4348	91.92		4730	0.13	
	2005	92	1.31	0.63	895	12.72	5.32	6051	85.98	-5.95	7038	0.21	0.08
Khopoli	1998												
	2005	129	1.19	1.19	3173	29.32	29.32	7521	69.49	69.49	10823	0.32	0.32
Matheran	1998	0	0.00		1998	95.92		85	4.08		2083	0.06	
	2005	0	0.00	0.00	77	3.09	-92.83	2415	96.91	92.83	2492	0.07	0.02
Panvel	1998	147	0.44		18516	55.74		14556	43.82		33219	0.93	
	2005	179	0.49	0.05	6534	17.99	-37.75	29600	81.51	37.70	36313	1.09	0.16
Pen	1998	80	1.40		1043	18.23		4598	80.37		5721	0.16	
	2005	32	0.38	-1.02	1381	16.20	-2.03	7113	83.43	3.06	8526	0.26	0.10
Uran	1998	33	0.78		1476	34.89		2721	64.33		4230	0.12	
	2005	186	3.20	2.42	1347	23.21	-11.69	4271	73.59	9.26	5804	0.17	0.06
MMR ULB	1998	17486	0.51		868480	25.21		2558472	74.28		3444438	96.67	
	2005	17664	0.56	0.05	860736	27.11	1.90	2296525	72.33	-1.95	3174925	95.20	-1.47
MMR	1998	31997	0.90		916465	25.72		2614632	73.38		3563094	100.00	
	2005	34410	1.03	0.13	912226	27.35	1.63	2388370	71.62	-1.77	3335006	100.00	0.00

Source : Economic Census, 1998 & 2005

Employment in ULBs has reduced from 96.67 per cent (34,44,438 jobs) in 1998 to 95.20 per cent (31,74,925 jobs) in 2005. Most of the ULBs show reduced employment except Mira-Bhayander, Navi Mumbai, Vasai Virar, Karjat, Matheran, Panvel, Pen and Uran where employment in 2005 is more than 1998. Navi Mumbai's employment share increased from 2.47 per cent in 1998 to 5.50 per cent in 2005. The share of employment in the ULBs within MMR nearly remains same during Economic Census periods 1998 and 2005 (see Table 19).

b) ULB-wise top 10 Employment sub-sectors in MMR

It is observed that among all the sub-sectors across Primary, Secondary and Tertiary Sectors, 'Retail Trade except Motor vehicles' in Mumbai provides the highest employment in MMR. Table 20 indicates the Top 10 employment sub-sectors providing employment in the ULBs of MMR. Further, all the 50 sub-sectors were ranked according to the highest employment in that sector (Table 21).

Table 20: Top Ten Employment Sub-Sectors in ULBs of MMR

No.	ULB	Sub-sector	Employment
1	Mumbai	Retail Trade except of Motor vehicles	4,76,788
2	Mumbai	Public Admin. and defence, Compulsory Social Security	1,51,143
3	Mumbai	Other Business Activities	1,16,149
4	Mumbai	Manuf. of Furniture	1,37,977
5	Mumbai	Manuf. of Wearing Apparels, dressing	84,886
6	Mumbai	Manuf. of Textiles	78,563
7	Bhiwandi-Nizampur	Manuf. of Textiles	52,851
8	Thane	Retail Trade except of Motor vehicles	42,049
9	Bhiwandi-Nizampur	Retail Trade except of Motor vehicles	31,450
10	Navi Mumbai	Retail Trade except of Motor vehicles	29,719

Source: Economic Census, 2005

Table 21 : Ranking of Sub-Sectors based on the Employment Generated in ULBs

Source : Economic Census, 2005

	Employment Economic Sectors and Sub-Sectors (2005)	Ranking of Sub-Sectors	ULBs																
			Mumbai	Navi Mumbai	Thane	Bhiwandi-Nizampur	Mira-Bhayander	Ulhasnagar	Vasai - Virar	Kalyan-Dombivli	Panvel	Ambarnath	Kulgaon-Beelapur	Khopoli	Pen	Karjat	Alibag	Uran	Matheran
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Total Primary Sector		1	4			2		3										
1	Minning and Quarrying	31	1	2	3		4												
2	Fishing	39	3				1		2									4	
3	Agriculture, Hunting and related Services	42	1		2						4		3						
4	Forestry and Logging	50	1			2			3				4						
	Total Secondary Sector		1	3	4	2													
1	Manuf. of Textiles	7	1		3	2			4										
2	Manuf. of Wearing Apparels, dressing	9	1	4	3			2											
3	Manuf. of Furniture	12	1		3		2			4									
4	Manuf. of Fabricated metal Product	15	1	3	4		2												
5	Manuf. of Food products and Beverages	18	1	3	2		4												
6	Manuf. of Chemical and Chemical Product	20	1	2	3		4												
7	Manuf. of Machinery and Equipment	21	1	3	2		4												
8	Publishing and Printing	22	1	2	3					4									
9	Manuf. of Rubber and Plastic Product	23	1	4			3		2										
10	Construction	24	1	2	3					4									
11	Tanning and Dressing of Leather	25	1		4			2		3									
12	Manuf. of Basic Metal	26	1	2			3		4										
13	Manuf. of Electrical machinery and Apparatus.	27	1	2	3					4									
14	Manuf. of Other non-metallic & Mineral Product	28	1	4	3		2												
15	Manuf. of Paper and Paper Product	29	1	4					3	2									
16	Electricity, Gas	30	1	2	3						4								
17	Manuf. of Radio, TV & Communication Equipment	32	1	3	2					4									
18	Manuf. of other Transport Equipment	35	1	4	2		3												
19	Manuf. of Wood and Wood Product	36	1	3			4	2											
20	Manuf. of Motor Vehicles	37	1	3	2					4									
21	Manuf. of Medical, Precision and Optical instrument, watches and Clocks	40	1	3			2			4									
22	Manuf. of Tobacco products	43	1	4	3	2													
23	Manuf. of Coke and Refined Petroleum Product	44	2	1	4						3								
24	Water Collection, Purification & Distribution	45	1	3	2				4										
25	Recycling	46	1	3			2	3											
26	Manuf. of office, Accounting & Computing Machinery	48	2	1	3					4									
	Total Tertiary Sector		1	2	3	4													
1	Retail Trade except of Motor vehicles	1	1	4	2	3													
2	Public Admin. and defence, Compulsory Social Security	2	1	3	2				4										
3	Other Community, Social and personal Service activities	3	1	3	2					4									
4	Other Business Activities	4	1	3	2		4												
5	Hotel and Restaurants	5	1	4	3	2													
6	Education	6	1	3	2					4									
7	Financial Intermediation	8	1	3	2					4									
8	Wholesale Trade and Commission Trade	10	1	2	3		4												
9	Health and Social Work	11	1	3	2					4									
10	Land Transport	13	1	3	2						4								
11	Post and Telecom	14	1	2	3	4													
12	Sale, Maintenance & Repair of Motor Vehicle	16	1	3	2		4												
13	Supporting And Auxiliary Transport Activities	17	1	2	4		3												
14	Computer and Related Activities	19	1	2	3		4												
15	Real Estate	33	1	3	4		2												
16	Renting of machinery and Equipment	34	1	2	3	4													
17	Water Transport	38	1	2	3					4									
18	Air Transport	41	1	2						3									
19	Research and Development	47	1	3	2				4										
20	Extra Territorial Organisation	49	1	2	4						3								

Current Large Employment Generators in MMR: The industries that currently offer the maximum employment in the region (over 1 lakh each) are listed in order based on their contribution to employment (Economic Census 2005):

Table 22: Largest Employment Generating Sub-Sectors in MMR

	Sectors	1998	2005	% change
1	Retail	7,04,428	7,49,124	6.35
2	Travel/Tourism & Hospitality (includes hotels, tourism, cabs)	79,364	2,26,899	185.90
3	Textiles	2,40,483	1,59,001	-33.88
4	Finance	1,92,151	1,33,611	-30.47
5	Apparels	57,824	1,31,474	127.37
6	Fabricated Metal Products	1,24,597	93,727	-24.78
7	Telecommunication	48,355	74,492	54.05
8	Automotive Services	4,295	71,724	1569.94
9	Chemicals	76,284	52,280	-31.47
10	Gems	41,405	48,539	17.23
11	IT/ITES	5,798	45,207	679.70
12	Printing	13,364	36,619	174.01
13	Construction	27,974	31,263	11.76
14	Leather	11,421	28,676	151.08
15	Media/Entertainment	12,794	19,051	48.91
16	Courier	5,714	11,219	96.34
17	Advertising	3576	5,122	43.23

Source: Economic Census 1998, 2005

2.3.7 Office Sector Employment in MMR

Office sector employment continues to be concentrated in Greater Mumbai within MMR; however, it must be noted that Greater Mumbai has recorded negative growth in Office Sector employment over the last two Census periods. Greater Mumbai's share in providing office sector employment has reduced from 88.2 per cent 1998 to 78.89 per cent in 2005 (CAGR -6.11).

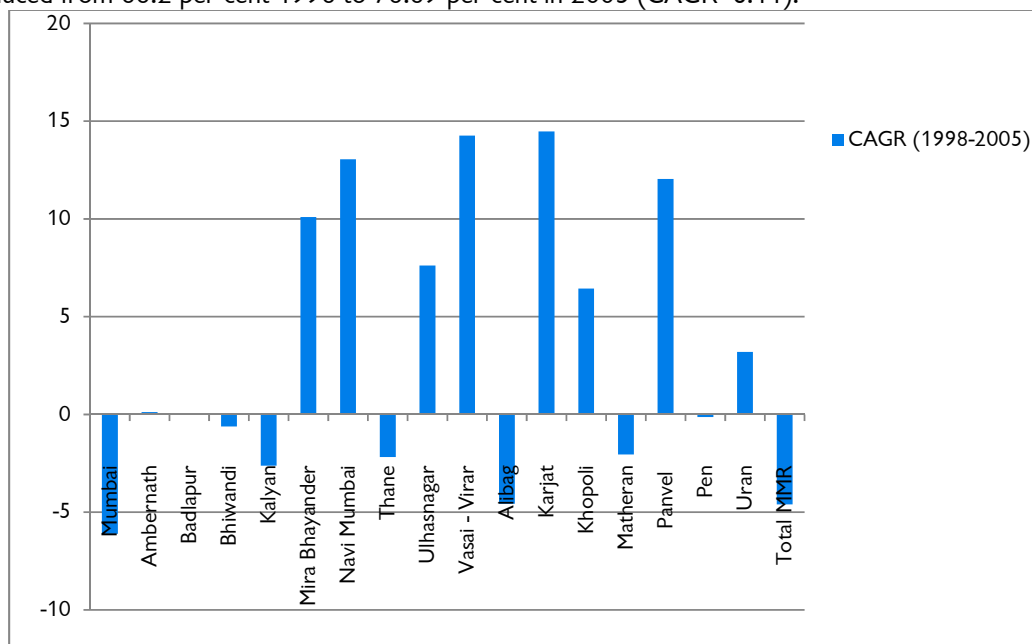


Figure 13: CAGR of Office Sector Employment in ULBs of MMR (1998 -2005)

Some sectors are recording jobless growth, and may partially explain the decreasing employment figures, at the same time, Office Sector employment has increased in Thane and Raigad districts in MMR during the corresponding period. This may be due to very high real-estate prices in Mumbai

resulting in entrepreneurs moving to areas outside Mumbai in order to setup new offices or expand their networks.

To get a clear picture of employment in the Office Sector in ULBs in MMR, Mumbai was excluded and it is found that after Mumbai, Thane is offering the largest employment; followed by Kalyan, Navi-Mumbai and Ulhasnagar, in that order. ULBs in Raigad District show that Office Sector has not grown well. Panvel in Raigad District of MMR is the only ULB where the office sector shows a remarkable increase. Growth rate of the small ULBs is higher than the prominent ones i.e. Mumbai and Thane, whereas Navi Mumbai office sector employment is the exception where growth rate is remarkably high.

2.3.8 Factory Employment

The employment in factories registered under the Factories Act, 1948 has been collected from the Director, Industrial Safety and Health, Maharashtra for Greater Mumbai, Thane and Raigad districts and is presented in Table 23.

Table 23: Factory Employment during 1991, 2001 and 2011

Districts in MMR	Employment in Lakhs						CAGR	
	1991	Share %	2001	Share %	2011	Share %	1991-2001	2001-2011
Gr. Mumbai	4.47	75	3.39	65	2.59	33	-2.73	-2.66
Thane	1.25	21	1.35	26	4.23	55	0.77	12.1
Raigad	0.26	4	0.44	8	0.92	12	5.40	7.65
Total MMR	5.99	100	5.18	100	7.74	100	-1.44	4.1
Share of MMR in Maharashtra		51		43		41.3	-1.69	-0.4
Maharashtra	11.69		12		18.74		0.26	4.56

Source: The Director, Industrial Safety and Health, GoM

It is significant that almost half of the employment in factories in Maharashtra is concentrated in MMR. The share of MMR factory employment in the State's factory employment has reduced from 51 per cent in 1991 to 41.3 per cent in 2011. In MMR, factory employment shows negative growth rate during the period 1991-01. However, during the period 2001 - 2011 employment increased with positive growth rate of 4.1 per cent.

The share of factory employment in Greater Mumbai in that of MMR declined sharply from 75 per cent

in 1991 to 33 per cent in 2011. Greater Mumbai's factory employment reduced from 4.47 lakhs in 1991 to 3.39 lakhs in 2001 and to only 2.59 lakhs in 2011.

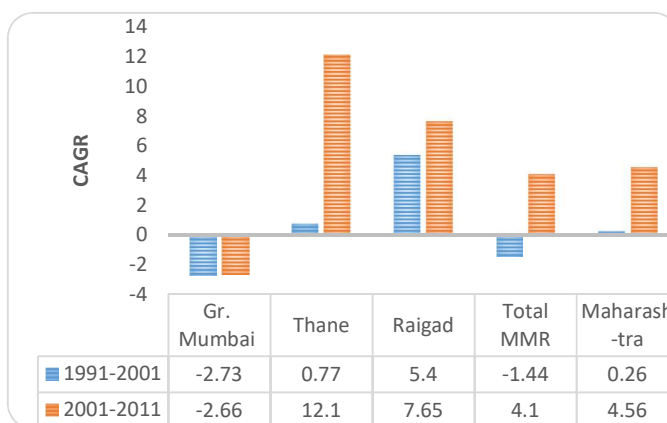
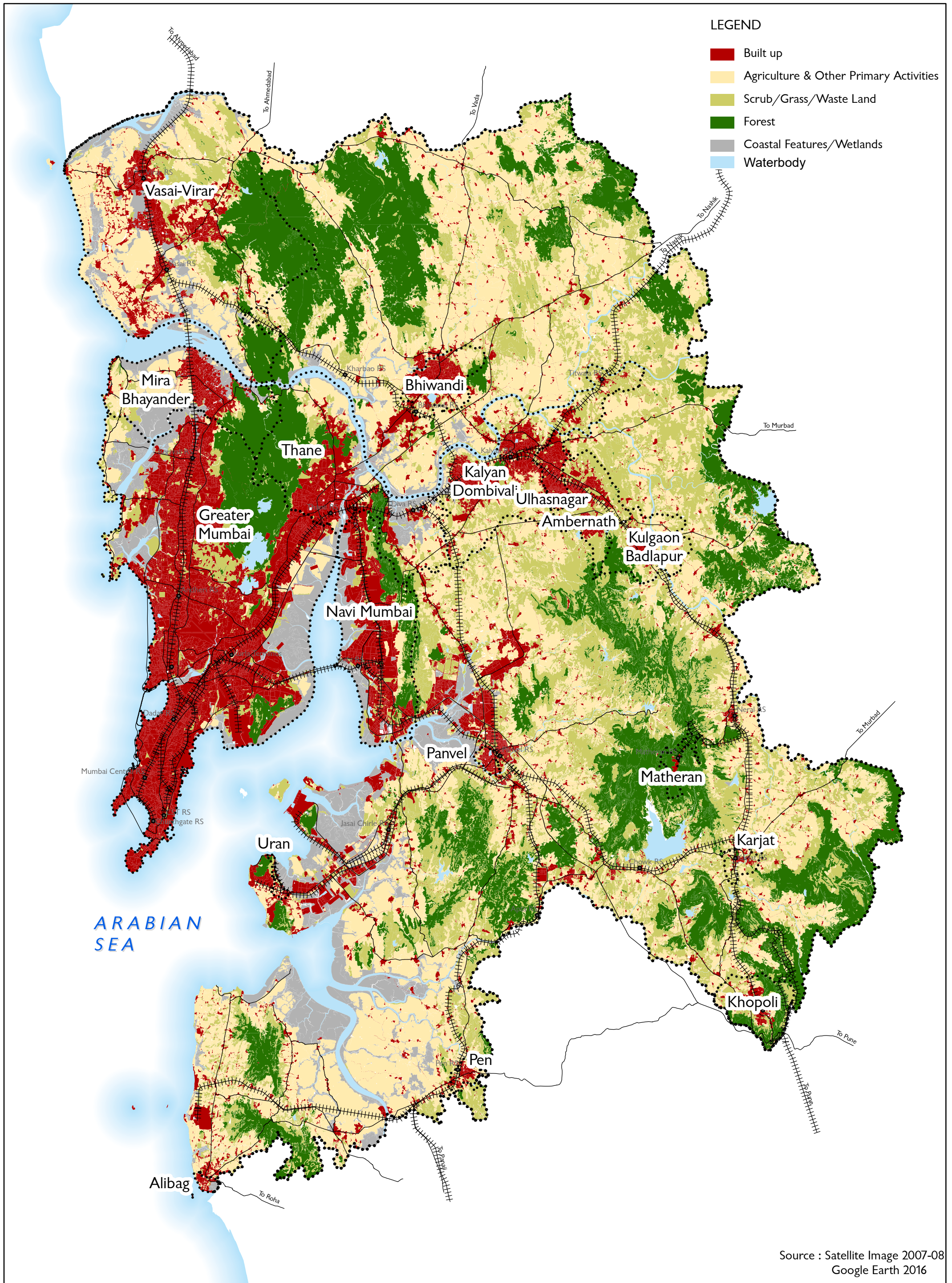


Figure 14: CAGR of Employment in Factories during 1991-2001 and 2001-2011

The employment in Thane district grew marginally from 1.25 lakhs in 1991 to 1.35 lakhs in 2001 and then reached to 4.23 lakhs in 2011. The Raigad district also shows a continuous growth in factory employment from 0.26 lakhs in 1991 to 0.44 lakhs in 2001 and 0.92 lakhs in 2011. The CAGR of employment for Mumbai in the past two decades has gone down whereas in Thane district in MMR it has increased by 12 times. Raigad district in MMR shows slow and steady growth.



LEGEND

- Built up
- Agriculture & Other Primary Activities
- Scrub/Grass/Waste Land
- Forest
- Coastal Features/Wetlands
- Waterbody

Source : Satellite Image 2007-08
Google Earth 2016

Mumbai Metropolitan Region Development Authority
Mumbai Metropolitan Planning Committee

Existing Land-Use, 2016

Modified Draft Mumbai Metropolitan Regional Plan 2016-36

- Railway Stations
- Road
- MMR Boundary
- ULB Boundary
- Rail

Map No.
08

0 1 2 4 6 Km

2.3.9 Establishments and Employment

Higher growth in the number of factories and establishments has not reflected in higher growth of employment. As a result, the factories and establishments have become leaner, either due to new smaller factories and establishments coming up or old ones shedding employment, or both. The workers per factory reduced from 59 to 44 during 1990-2005 and employment per establishment reduced from 10 to 6, with the reduction being more pronounced in Thane and Raigad.

Table 24: Employment Intensity in MMR

Area	Workers per Factory			Employment per Establishment		
	1990	1998	2005	1990	1998	2005
Greater Mumbai	56	53	50	9	8	6
Thane	64	39	32	11	10	7
Raigad	99	76	62		11	6
MMR	59	50	44	10	9	6

Source: Economic Census

The industry group-wise employment per establishment indicates drastic reduction in Basic Metals (from 41 to 6), the industry in which employment growth is highest followed by Chemicals and Chemical Products (29 to 17), Textiles (16 to 8) and Electrical Machinery and Apparatus n.e.c. (14 to 7). The major industry groups in which higher employment intensity noticed was Machinery and Equipment n.e.c. (from 10 to 13) and Other Transport Equipment (14 to 15), which appears more on account of shedding of jobs. The National Manufacturing Policy, 2011 envisages providing special attention to Leather & Footwear and Food Processing industries as these are considered to be employment intensive. However, the Economic Census data for MMR reveals that industries related to Leather & Footwear employ only about 4 to 5 employees per unit and those related to Food Processing only about 4. However, the Capital Goods industry related to Electrical Machinery employed 14 persons in 1998, which declined to 9 in 2005.

2.3.10 Summary

The performance of industrial development in MMR, post revised Industrial Location Policy⁹ of 1993 and Regional Plans 1996-2011, can be summarized as follows:

- 1) In terms of the Net District Domestic Product (NDDP), the Secondary Sector in general, and registered manufacturing in particular, grew at a slower rate than the already low rate of overall NDDP growth and, as a result, their contribution reduced substantially during 1994-2009, with reduction more pronounced in Thane and Raigad Districts. The un-registered manufacturing grew faster than registered manufacturing but its contribution to overall NDDP reduced during this period. Thane District performed better than Greater Mumbai.
- 2) The number of factories as well as factory employment in MMR as a whole grew at a rate slower than Maharashtra even when Thane and Raigad Districts posted substantial growth mainly due to decline in Greater Mumbai. The performance on the employment front was worse than on that on the number of factories. The overall performance on number of factories and employment during 2001-09 was better than 1991-2001.
- 3) The picture of overall industrial employment as observed from the results of Economic Censuses indicates a decline during 1990-98 and growth during 1998-2005 influenced more by performance of Greater Mumbai than the rest of MMR. Simultaneously, it is observed that the share of unregistered industrial units also declined first and then grew back to the 1990 level of 45 per cent, which probably indicates Greater Mumbai's good performance in unregistered units as compared to factory employment during 1998-2005 period.
- 4) The industry groups of Textiles, Rubber, Plastic and Chemicals, which dominated industrial employment in the 1990s appear to be on the decline during 1998-2005 as major employment generators along with Other Transport Equipment and Fabricated Metal Products except

⁹ Industrial Location Policy for MMR was scrapped in 2015

Machinery and Equipment, which lost employment. The industry groups generating substantial employment during 1998-2005 were Basic Metals, Tanning & Dressing of Leather, Manufacturing of Luggage, Handbags, Saddlery, Harness and Footwear, Wearing Apparels, Dressing and Dyeing of Fur and Furniture and related n.e.c.

- 5) The MIDC has played a very important role in the growth of industries in MMR, particularly in Thane and Raigad districts, with the total employment in industries in MIDC areas roughly constituting 44 per cent of factory employment (2009) and 26 per cent of total industrial employment (2005). The number of non-working units and vacant plots indicate the potential for further industrial growth. MIDC's proposals for product specific SEZs and IT Parks in MMR are expected to help in employment generation.
- 6) The case study of industries in Navi Mumbai indicates that they were predominantly SSI consisting of mainly Engineering, Chemical and Fabrication industries. Industrial growth has gathered pace after 1991, with more industries coming up between 2001-2006 and recent growth is more diversified in nature consisting more of industries such as Garment, Stationery, Food Processing etc. Maximum employees were engaged in Engineering and Chemical industries and Food Processing and Electronics were the most employment intensive industries.
- 7) The information available on industrial investments indicates that Greater Mumbai, Thane and Raigad districts together performed better than other regions of the State in terms of number of projects, investments and employment. The share of FDI of Greater Mumbai in the State is very high as compared to other regions but such investment is likely to be in enterprises other than industries.
- 8) Office sector employment continues to be concentrated in Greater Mumbai within MMR; however, it must be noted that Greater Mumbai has recorded negative growth in Office Sector employment over the last two Census periods. At the same, Office Sector employment has increased in Thane and Raigad districts in MMR during the corresponding period.

2.4 Spatial Growth Trends and Land Use

In order to understand the impact of the increasing population and urbanization in the region, an existing land use survey¹⁰ along with urban sprawl analysis was carried out. Additionally, the data pertaining to development permissions was mapped and analysed in order to understand the emerging urbanization trend in MMR.

2.4.1 Preparation of the Base Map

The total area of the region is 4311.75 sq.km as per the computerized maps prepared using the Geographical Information System (GIS). There is a mismatch in the area thus calculated and area of the region arrived at based on Census 2011 the base map (4253 Sq. km.) and the ELU survey exercise (4359.64 sq.km.) carried out by the Science and Technology Park, Pune for MMRDA . This is on account of the corrections that were required to be carried out in order to correct the anomalies with respect to the coastal boundaries of MMR as well as the village maps drawn by the Settlement Commissioner. For all matters connected with the Draft Regional Plan 2016-36, the area of MMR is considered as 4311.75 sq.km.

The existing Land Use maps depict the existing land uses according to a three- level classification system. At Level-I, nine major land use classes (viz. built-up, airport, industry, port/jetty, agriculture/other primary activities, forest, coastal features, grassland/scrubland/wasteland and water bodies) have been identified (refer Map no. 8 and Figure 15). These are further divided into 33 classes at Level-II and 49 classes (including the 12 additional categories that the 'built-up' category is divided into) at Level III. The land use plan at 1:1,00,000 scale shows major land use categories at

¹⁰The Existing Land-use survey of the Mumbai Metropolitan Region was carried out with the help of Science and Technology Park, Pune using high resolution archived Quick Bird satellite imageries and low resolution 23.5 M LISS III satellite imageries (IRS P6) covering 2 scenes procured from NRSA at 1:50000 scale for two seasons - November 2007 and February 2008.

level-I, but the detailed land use maps show details of Level-II category (identified as built-up, agriculture, industrial area, recreation, utilities, transport etc.) and Level- III as the case may be.

2.4.2 Existing Land Use

The Existing Land Use map is prepared by the Science & Technology Park of Pune for MMRDA based on the satellite image of 2007-08 procured by NRSC, Hyderabad. Since the exercise of preparation of Regional Plan took longer than expected and as directed by the Metropolitan Planning Committee in its meeting held on July 8, 2016, the built up area of the Region was re-calculated which was higher than what was indicated in the ELU-2008. The resultant reduction in the other land use zones was made and the final existing land use map was prepared. Therefore, the ELU of MMR is now considered as updated and referred to as ELU-2016.

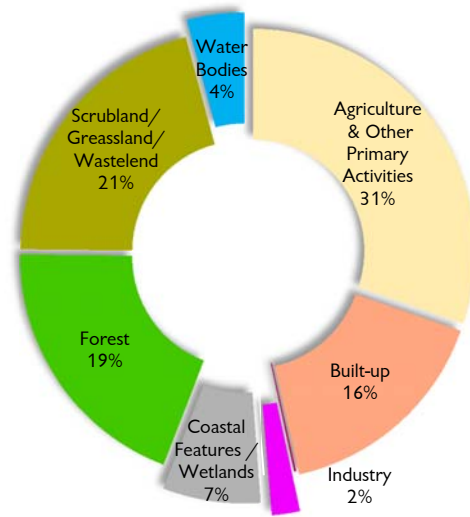


Figure 15: MMR : Land use, 2016

Though largely urban in character, the existing land use pattern of the Region broadly indicates that nearly a third of the Region’s area (30.55 per cent) is under natural features like forests, coastal features and water bodies. The broad Land Use distribution is shown in Table 25 and in Figure 15. These include:

- a. **Forests:** These are classified as evergreen, semi-evergreen and moist deciduous forests and constitute 19.32 per cent of the Region. It is important to note that notified forests are not the same as what the Existing Land Use (ELU) registers as forests. Forests in the ELU only denote areas which have forest cover and are recognizable as forests through interpretation of satellite images. To complement the existing land use data, land ownership data in MMR was procured from District Collector and Forest Depts. of Thane and Raigad districts. Designated Forest land (land under the ownership of the Forest Department) accounts for 24.83 percent of the total MMR area (1070.54 sq.km).
- b. **Coastal features:** Together with the water bodies, the coastal features form 11.23 per cent of the Region’s land use. Coastal features include mudflats with vegetation, swamp/marsh and salt pans account for 7.05 per cent while water bodies (including rivers, creeks, inland water bodies and reservoirs) constitute nearly 4 per cent of MMR.
- c. **Agriculture:** The Existing Land Use Survey reveals that the predominant land use in the MMR continues to be agricultural which constitutes 30.32 per cent of the total land in MMR.
- d. **Built-up:** The built-up area in MMR admeasures 697.01 sq km as per the Existing Land Use Survey (2016). It constitutes 16.17 per cent of the total land area and is one of the significant land-uses within MMR. The ‘Built-up’ area essentially records all developed areas and includes all uses associated with urban areas as well as rural habitation. Transportation networks, open/vacant lands within developed areas, recreational lands, quarries etc are included in this category. These areas are concentrated along the major transportation corridors especially suburban railway networks. Of this, 503.58 sq km (i.e. 72 per cent) is within the area of the ULBs (Municipal Corporations and Councils) in MMR while the remaining is within the 994 villages in MMR and the 35 Census towns.
- e. **Scrub, Grass and Wastelands:** They constitute 20.63 per cent of the region and include pastures.

- f. **Airport and Port/Jetty:** They constitute 0.28 per cent of the region.
- g. **Industry:** Share of industries in The Existing Land Use Survey is 2.04 per cent of the region.

Table 25: Land-Use Distribution in MMR, 2016

Sl. No.	Category	Area (sq. km)	% Share
1	Agriculture & Other Primary Activities	1,307.38	30.32
2	Built-up	697.01	16.17
3	Airport	6.15	0.14
4	Industry	88.02	2.04
5	Port/Jetty	6.12	0.14
6	Coastal Features / Wetlands	304.07	7.05
7	Forest	833.08	19.32
8	Scrubland/Grassland/Wasteland	889.62	20.63
9	Water Bodies	180.30	4.18
	Total Area	4,311.75	100.00

Source: ELU-2008 prepared by S&TP, Pune; Regional Plan-1996 and Google Earth (January 2016)

Land use statements for the broad land use categories at the Tehsil level and the ULB level are given in Table 26, Table 27 and Figure 16. The analysis of the same is presented in the following paragraphs.

Table 26: Tehsil-wise Land Use Distribution in MMR, 2016

(Area in Sq.Km)

Sl. No	Land use/Tehsil	Unit	Mumbai City	Mumbai Suburban	Thane District						Raigad District						Total Area
					Thane	Kalyan	Vasai	Bhiwandi	Ambarnath	Ulhasnagar	Panvel	Pen	Alibag	Karjat	Khalapur	Uran	
1	Agriculture & other primary activities	Area	0.99	20.18	62.14	100.59	154.70	328.71	92.41	0.32	148.56	84.45	104.72	104.82	47.70	57.08	1307.37
		%age	0.08	1.54	4.75	7.69	11.83	25.14	7.07	0.02	11.36	6.46	8.01	8.02	3.65	4.37	
2	Built-up	Area	53.73	188.32	110.06	43.51	63.66	50.92	28.50	10.71	54.76	9.68	20.71	18.57	15.69	28.19	697.01
		%age	7.71	27.02	15.79	6.24	9.13	7.31	4.09	1.54	7.86	1.39	2.97	2.66	2.25	4.04	
3	Airport	Area	0.00	6.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.15
		%age	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4	Coastal Features/wetlands	Area	1.70	63.99	50.12	1.99	38.77	13.81	0.04	0.00	32.46	20.91	35.08	0.14	0.10	44.97	304.08
		%age	0.56	21.04	16.48	0.65	12.75	4.54	0.01	0.00	10.67	6.88	11.54	0.05	0.03	14.79	
5	Forest	Area	0.01	49.42	71.54	31.62	117.42	148.41	72.25	0.01	111.43	2.46	31.92	98.06	77.10	21.44	833.10
		%age	0.00	5.93	8.59	3.80	14.09	17.81	8.67	0.00	13.38	0.30	3.83	11.77	9.25	2.57	
6	Industry	Area	8.12	16.95	12.76	5.2	5.69	10.56	5.23	0.96	15.31	0.08	3.00	0.25	2.07	1.84	88.02
		%age	9.23	19.26	14.50	5.91	6.46	12.00	5.94	1.09	17.39	0.09	3.41	0.28	2.35	2.09	
7	Port/Jetty	Area	2.49	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.39	0.00	0.00	3.07	6.11
		%age	40.75	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.96	6.38	0.00	0.00	50.25	
8	Scrubland/Grassland/Wasteland	Area	0.88	35.58	38.14	116.86	51.30	118.90	115.53	0.90	170.54	25.75	29.72	89.92	60.83	34.79	889.64
		%age	0.10	4.00	4.29	13.14	5.77	13.36	12.99	0.10	19.17	2.89	3.34	10.11	6.84	3.91	
9	Water Bodies	Area	0.35	18.28	24.83	12.72	25.50	20.95	10.41	0.31	16.10	10.77	10.80	6.47	14.29	8.50	180.28
		%age	0.19	10.14	13.77	7.06	14.14	11.62	5.77	0.17	8.93	5.97	5.99	3.59	7.93	4.71	
	Total Area	Area	68.27	398.91	369.59	312.49	457.04	692.26	324.37	13.21	549.16	154.22	236.34	318.23	217.78	199.88	4311.75
	% Total Area	%age	1.58	9.25	8.57	7.25	10.60	16.06	7.52	0.31	12.74	3.58	5.48	7.38	5.05	4.64	

Table 27: ULB-wise Land Use Distribution in MMR, 2016

(Area in Sq.Km)

Sl. No.	Land use/Tehsil	Unit	Gr. Mumbai	Thane	Kalyan-Dombivali	Vasai-Virar	Navi-Mumbai	Mira-Bhainder	Bhiwandi-Nizampur	Ulhasnagar	Ambernath	Kulgaon-Badlapur	Karjat	Matheran	Khopoli	Panvel	Uran	Pen	Alibag	Total Area	
1	Agriculture & other primary activities	Area	21.17	23.60	30.33	100.81	4.44	22.21	6.29	0.32	3.35	10.54	1.76	0.00	3.65	0.13	0.48	1.40	0.19	230.67	
		%age	9.18	10.23	13.15	43.70	1.92	9.63	2.73	0.14	1.45	4.57	0.76	0.00	1.58	0.06	0.21	0.61	0.08		
2	Built-up	Area	242.06	41.90	38.58	55.02	46.38	19.31	14.98	10.71	10.76	8.16	2.33	0.84	4.50	2.66	1.11	2.69	1.59	503.58	
		%age	48.07	8.32	7.66	10.93	9.21	3.83	2.97	2.13	2.14	1.62	0.46	0.17	0.89	0.53	0.22	0.53	0.32		
3	Airport	Area	6.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.15
		%age	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4	Coastal Features/wetlands	Area	65.69	13.40	1.98	27.67	17.65	19.06	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.11	0.00	0.59	146.19	
		%age	44.93	9.17	1.35	18.93	12.07	13.04	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.08	0.00	0.40		
5	Forest	Area	49.43	37.49	0.48	60.04	17.04	16.23	0.96	0.01	1.51	4.92	0.29	6.55	10.30	0.00	0.13	0.02	0.00	205.40	
		%age	24.07	18.25	0.23	29.23	8.30	7.90	0.47	0.00	0.74	2.39	0.14	3.19	5.01	0.00	0.06	0.01	0.00		
6	Industry	Area	25.07	3.66	4.77	5.66	8.17	0.34	0.56	0.96	4.29	0.81	0.01	0.00	1.63	0.00	0.11	0.00	0.00	56.04	
		%age	44.74	6.53	8.51	10.10	14.58	0.61	1.00	1.71	7.66	1.45	0.02	0.00	2.91	0.00	0.20	0.00	0.00		
7	Port/Jetty	Area	2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.54
		%age	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8	Scrubland/Grassland/Wasteland	Area	36.45	12.53	33.77	31.02	11.17	6.06	3.86	0.90	16.42	10.19	2.77	0.07	9.72	0.57	0.47	1.29	0.08	177.34	
		%age	20.55	7.07	19.04	17.49	6.30	3.42	2.18	0.51	9.26	5.75	1.56	0.04	5.48	0.32	0.27	0.73	0.04		
9	Water Bodies	Area	18.63	9.03	6.18	14.28	4.13	11.41	0.71	0.30	0.30	1.23	0.19	0.02	0.25	0.38	0.02	0.14	0.09	67.29	
		%age	27.69	13.42	9.18	21.22	6.14	16.96	1.05	0.45	0.45	1.83	0.28	0.04	0.37	0.56	0.03	0.21	0.13		
	Total Area	Area	467.19	141.61	116.09	294.50	108.98	94.62	27.37	13.20	36.63	35.85	7.35	7.49	30.06	3.76	2.43	5.54	2.54	1395.20	
	% Area	%age	33.49	10.15	8.32	21.11	7.81	6.78	1.96	0.95	2.63	2.57	0.53	0.54	2.15	0.27	0.17	0.40	0.18		

a) **Tehsil-wise ELU distribution:**

The ELU distribution across the various Tehsils of MMR (Table) shows that the maximum share of the built-up area in MMR lies within Greater Mumbai, followed by Thane (with the city of Thane within it) followed by Vasai Tehsil. However, when each Tehsil is considered individually, it is observed that Mumbai District has the largest share of its land area under built up uses (78.70 per cent) followed by Mumbai Suburban (47.20 per cent) and Thane (39.78 per cent) in that order. The share of industries is maximum in Mumbai-Suburban District (19.26 per cent) followed by Panvel and Thane in MMR.

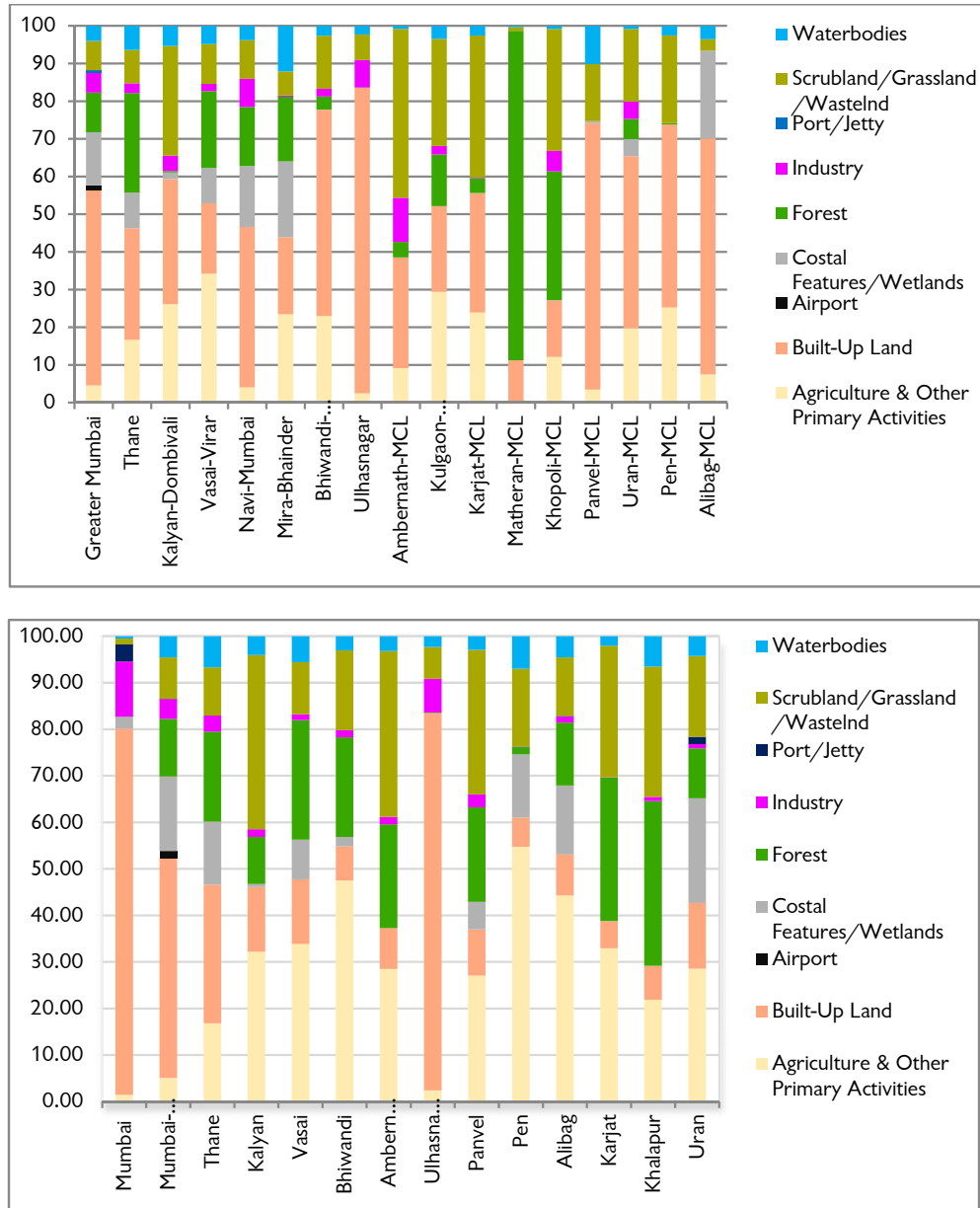


Figure16: Tehsil-wise and ULB-wise broad Land-Use Distribution, 2016

The area under agricultural and primary activities was highest in Bhiwandi Tehsil followed by Vasai and then Panvel in that order. Bhiwandi Tehsil (148.41 sq km) also leads in the extent of forest followed by Vasai (117.42 sq km), Panvel (111.43 sq km) and Karjat (98.06 sq km) in that order. Coastal features were predominantly found in Mumbai followed by Thane and then Uran while water bodies were mostly found in Thane and Vasai followed by Bhiwandi. The Tehsils with the largest area under wastelands were Ambemath followed by Panvel and

Bhiwandi while scrub/grasslands were mostly prevalent in Panvel followed by Kalyan and Bhiwandi (refer Figure 16).

b) ULB-wise ELU distribution:

A comparison of the broad land uses and their shares across ULBs (Table 26) reveals that Mumbai had the maximum area (among all the ULBS in MMR) under built-up uses (242.06 sq km), under coastal features and water bodies and also under scrub/grasslands. Vasai-Virar followed Mumbai in the share of area under built-up uses (55.02 sq km) followed by Navi-Mumbai (46.38 sq km) and Thane (41.90 sq km). The area under industrial use is primarily situated in Mumbai (44.74 per cent) followed by Navi-Mumbai (14.58 per cent). Vasai Virar is the only ULB with a very large area under agricultural use (100.81 sq km). It also has considerable area under natural features with the largest area under forests and the second largest area under water bodies and coastal features. Mira Bhayander and Navi Mumbai also have significant presence of coastal features/wetlands. Wastelands are most prevalent in Kalyan-Dombivali, Vasai-Virar and Ambernath in that order.

However, when land uses within each of the ULBs are compared, it is observed that Ulhasnagar has maximum land area within the city under built up uses (81.14 per cent), followed by BNCMC (55 per cent) and MCGM (52 per cent).. These are the cities that have shown declining population growth rates on account of saturation. Amongst the councils, Panvel (70.74 per cent) and Alibag (62.67 per cent) have maximum area under built up uses. These are old historic settlements which are relatively small in size. It may also be noted that all the municipal areas, with the exception of Panvel, Alibag and Ulhasnagar, have some amount of forest cover. However, in Pen, Kalyan, Bhiwandi and Ambernath, the extent of forest cover is negligible.

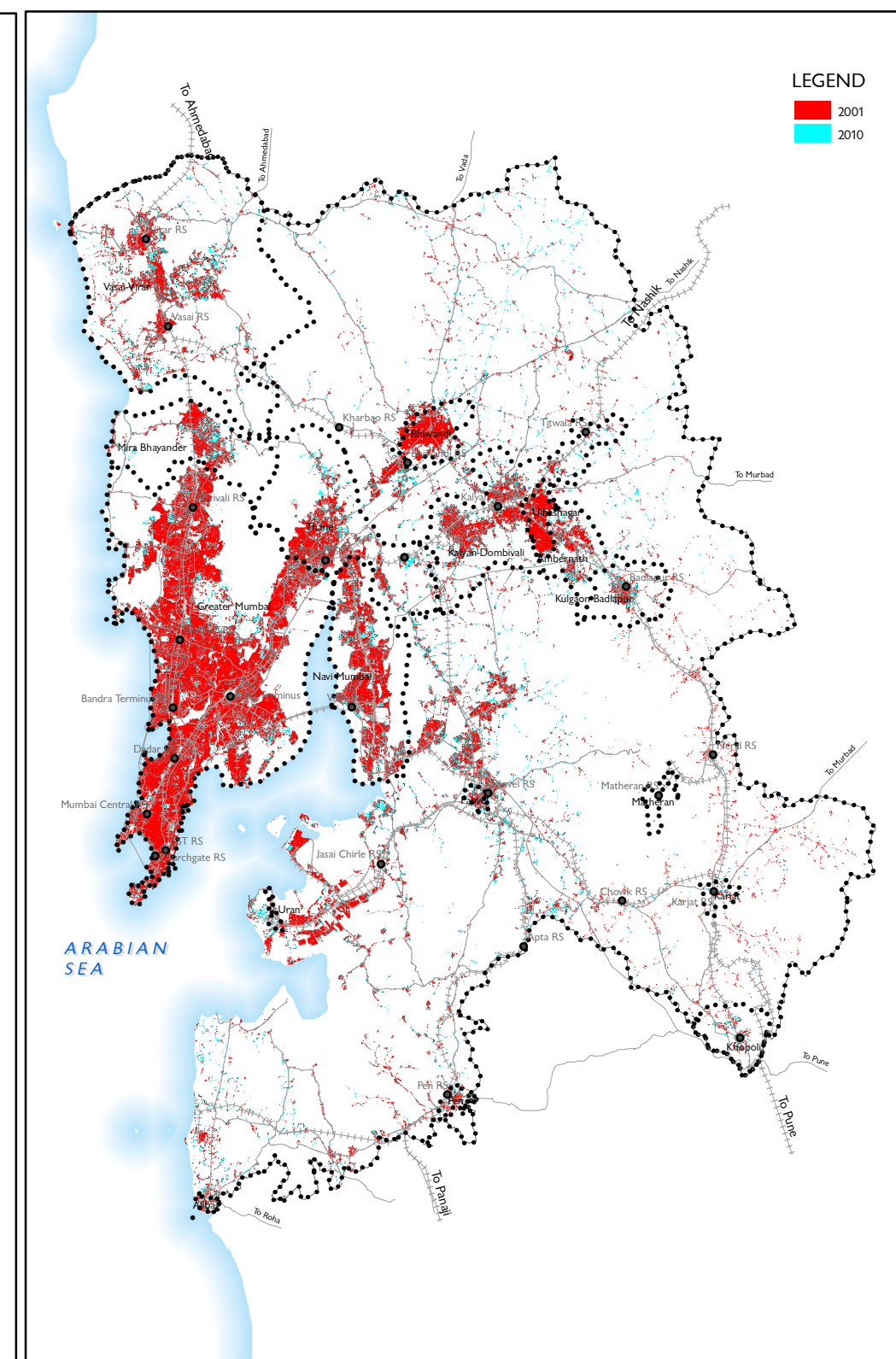
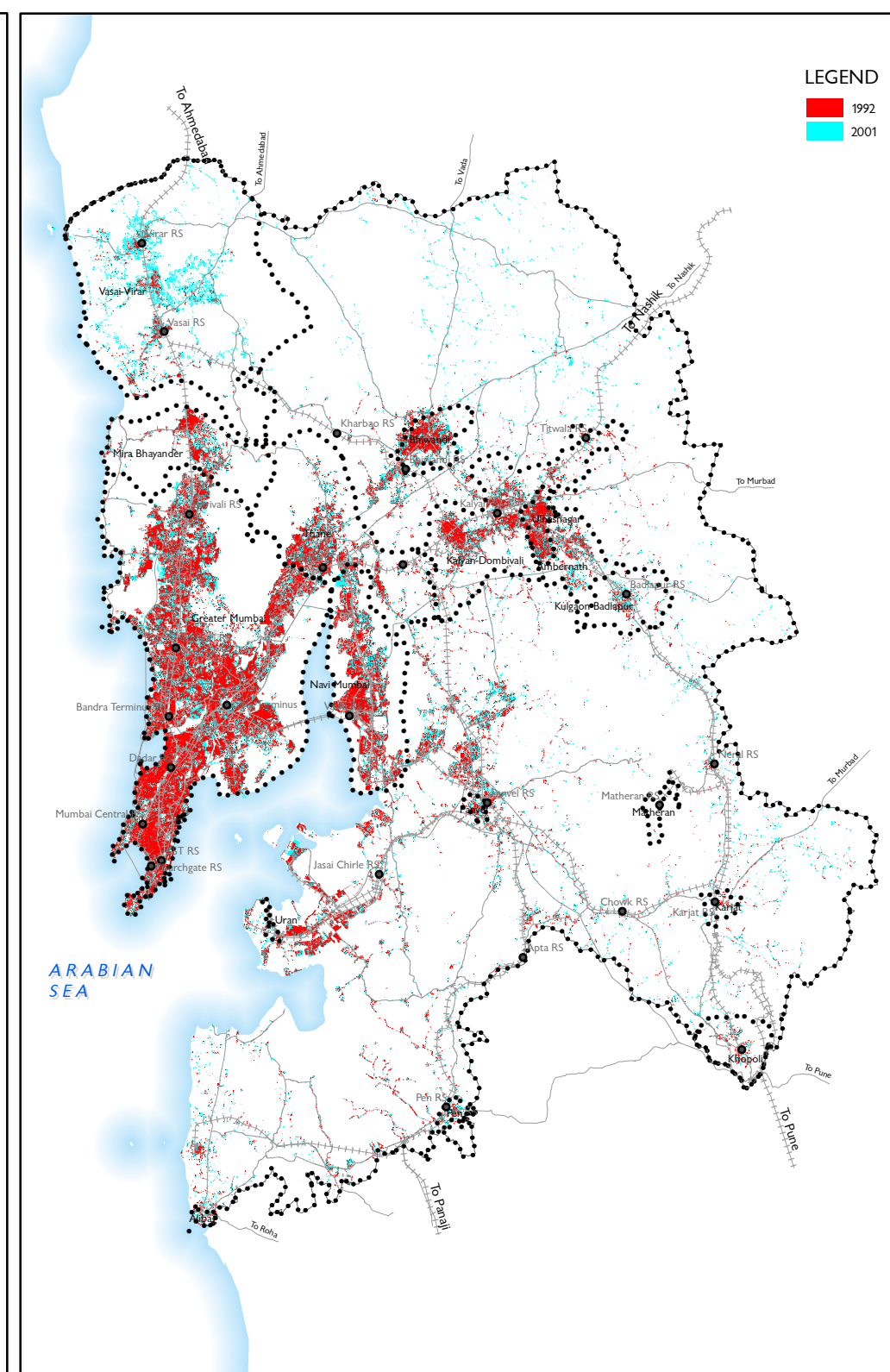
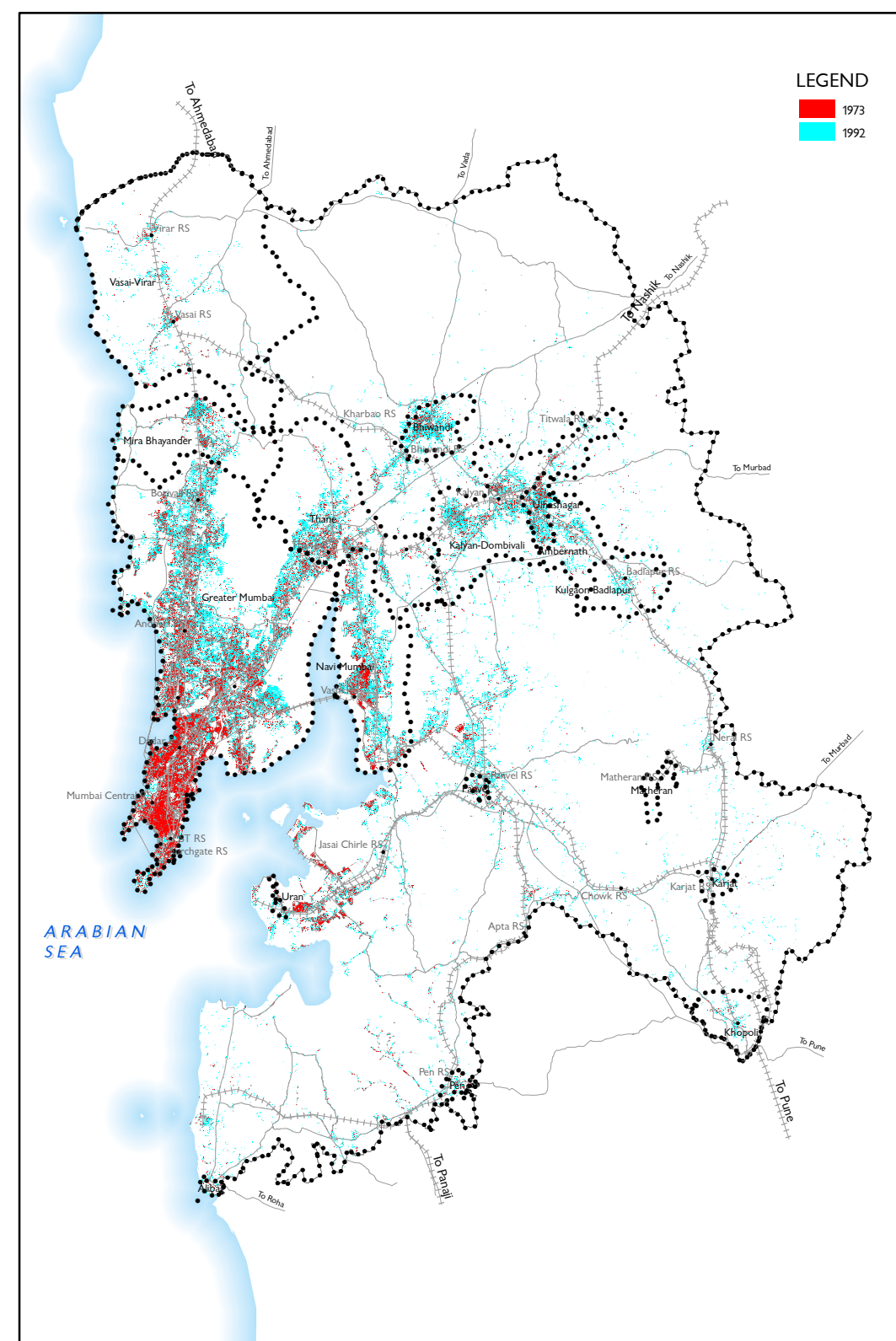
The ELU distribution for MMR is not comparable across time periods because of the subjective interpretation of satellite data. The land uses assigned vary with each interpretation, and there are differences in the classification systems adopted as well. Categories such as scrub and wastelands seem to be subsumed/excluded from either agriculture or forest categories in the previous ELU surveys making it very difficult to compare land uses and extent across different plan periods. Comparisons can be done across time periods at the same time using the same methodology and to that end the urban sprawl analysis was carried out to ascertain the extent of development since the RP 1996 was sanctioned. The present existing land use allocation cannot be compared with the figures of the previous existing land use data from 1987, though desirable, except to the extent made possible by the Urban Sprawl analysis. Therefore, in order to understand the trends in development, it seemed more appropriate to analyse the extent and direction of urban sprawl.

2.4.3 Urban Sprawl Analysis

A built up area temporal trend analysis to understand the extent of urban sprawl was carried out using open source satellite imagery (Land sat) for the years 1973, 1992, 2001 and 2010¹¹ (refer Map no. 9).

Built up land was extracted based on the spectral characteristics and the reflectance of the impervious surface of the satellite image. The built up area analysis was done in order to calculate the actual spread/sprawl area within the region. The limitation to this analysis is that it cannot estimate any densification that has happened over the last 37 years in the MMR.

¹¹USGS Open source Landsat imagery (30m resolution) was acquired online and processed (stacking, mosaic etc).

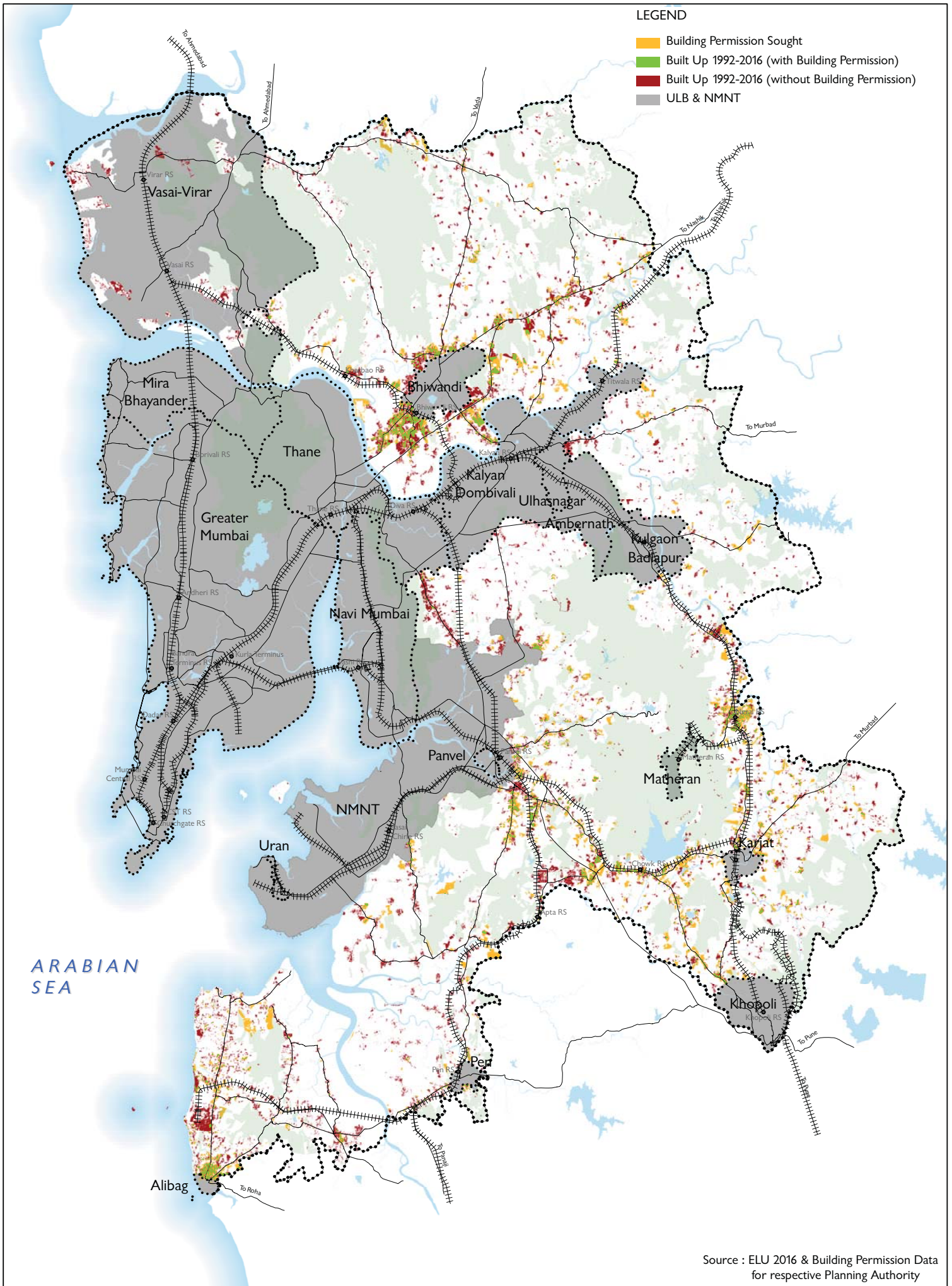


Source : U.S. Geological Survey website <http://www.usgs.gov/>

Urban Sprawl Trends observed in MMR
 Till 1968 : Urban Built up area was largely confined to Greater Mumbai
 Between 1968-1973 : Growth still confined to Greater Mumbai with Suburbs expanding
 Between 1973-1992 : Growth observed within Greater Mumbai as well as beyond Greater Mumbai along transport corridors- Mumbra, Kalyan, Bhiwandi, Badlapur and Navi Mumbai
 Between 1992-2001: areas beyond Greater Mumbai, Nallasopara, Vasai-Virar, Mira-Bhayander, Bhiwandi, Navi-Mumbai grew.
 Between 2001-2011 : Growth observed in urban areas outside Mumbai like Navi Mumbai, Thane, Vasai-Virar and Mira-Bhayander along with rapid growth of peripheral areas of urban MMR like panel and Kulgaon Badlapur

LEGEND

- Building Permission Sought
- Built Up 1992-2016 (with Building Permission)
- Built Up 1992-2016 (without Building Permission)
- ULB & NMNT



Source : ELU 2016 & Building Permission Data for respective Planning Authority

2.4.4 Growth rates of Built-up Area in MMR Constituent Areas, 1973-2010

a) District-wise growth rates of built-up Area

The rate of increase of built up area was calculated to understand the pace of development. The following table gives details of the built up area across the years along with the CAGR. It appears that overall, the built up area grew at a higher rate till 2001 in MMR (4.87 per cent and 4.18 per cent respectively between 1973-92 and 1992-2001). Between 2001 and 2010, the increase in built up area has been at 2.33 per cent which is roughly half the earlier growth rate. Further it is observed that built up area grew fastest in Raigad district in the last decade (2001-10) whereas in the previous decade though both districts, the built up area in Thane and Raigad grew faster than Mumbai, Thane's development grew fastest. Further, this growth in built up area has largely occurred in Raigad and Thane districts with very little addition in Mumbai over the last decade.

Table 28: Urban Sprawl – Built-up Area during 1973 - 2010

Unit	Year				CAGR		
	1973	1992	2001	2010	1973-92	1992-01	2001-10
Mumbai	78.56	153.77	199.21	210.46	3.60	2.92	0.61
Thane	25.35	93.16	155.17	212.35	7.09	5.83	3.55
Raigad	10.88	36.37	55.12	81.3	6.56	4.73	4.41
MMR	114.78	283.3	409.57	504.12	4.87	4.18	2.33



Figure 17 : District-wise CAGR of Built-up Area, 1973-2010

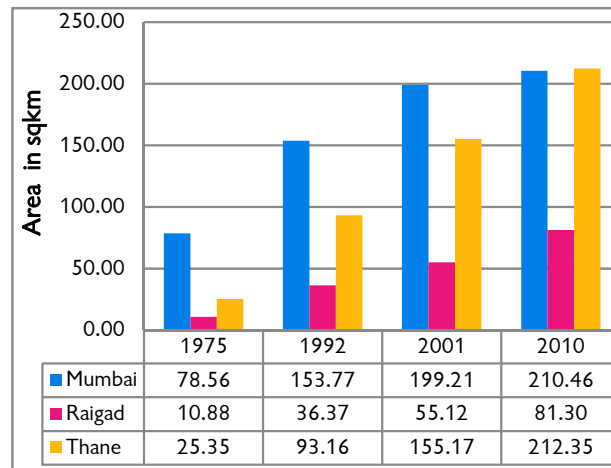


Figure 18 : District wise Built-up Area, 1973-2010

b) Tehsil-wise growth rates of Built-up Area

Analysis of the change in BUA between 1973 and 2010 indicated that overall among all the Tehsils in MMR, there has been a declining trend in growth rates of built up areas. Tehsils of Khalapur, Karjat, Bhiwandi show higher growth rates with respect to Mumbai which shows a growth rate of 3.60 per cent. However Mumbai dominates in terms of contribution to the sprawl of MMR followed by Thane Tehsil. Between 1992-2001 Vasai Tehsil shows striking growth rate of 17.84 per cent over other tehsils of MMR. While tehsils like Thane, Kalyan, Panvel shows declining growth rate compared to earlier decade. In 2001-2010 all tehsils in MMR shows declining growth rate while Panvel dominates with 5.16 per cent growth rate. All Tehsils in MMR show declining growth rate, with Mumbai and Thane as key contributors to urban sprawl in MMR (refer Figure 19).

c) ULB wise growth rates of built-up Area

Most of the ULBs recorded a declining growth rate in urban built-up areas during 2001-2010. However, it was the councils that recorded an increase in the growth of built up areas viz. Badlapur, Panvel, Khopoli and Karjat and among corporations only Kalyan-Dombivli recorded an increase in the growth rate. During the previous decade, 1992-2001, though all the ULBs recorded a declining growth in built up areas, Vasai Virar grew at a very high growth rate along with Alibag and Uran which also

grew at higher growth rates than the previous decade. During this period, apart from Vasai Virar, Pen, Uran and Alibag councils recorded an increase in the rate of growth as well (refer **Error! Reference source not found.20**).

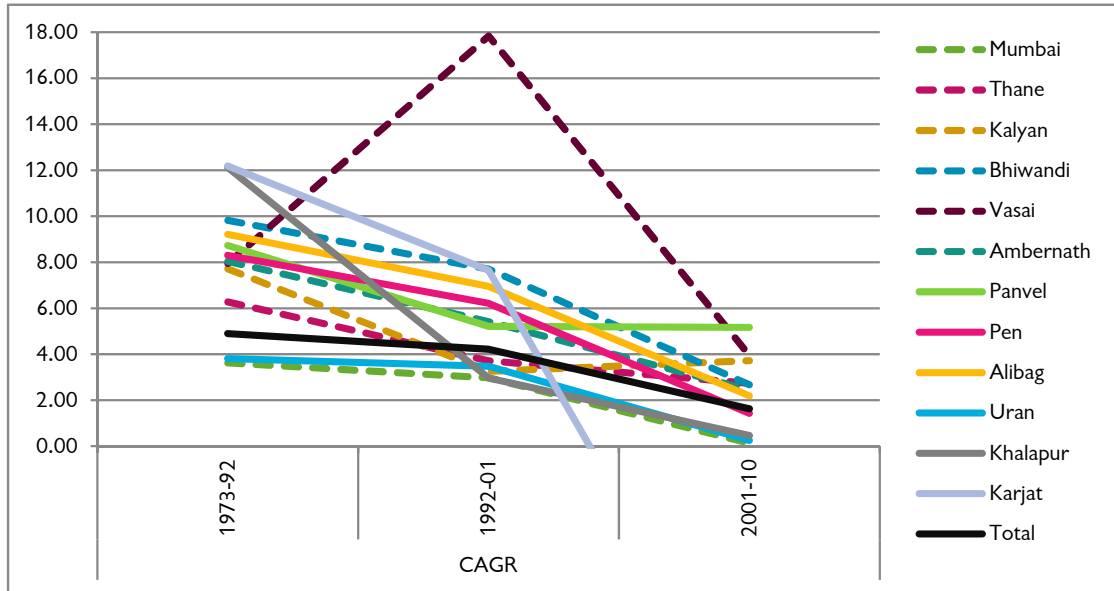


Figure 19 : Tehsil-wise CAGR of Built-up Area, 1973-2010

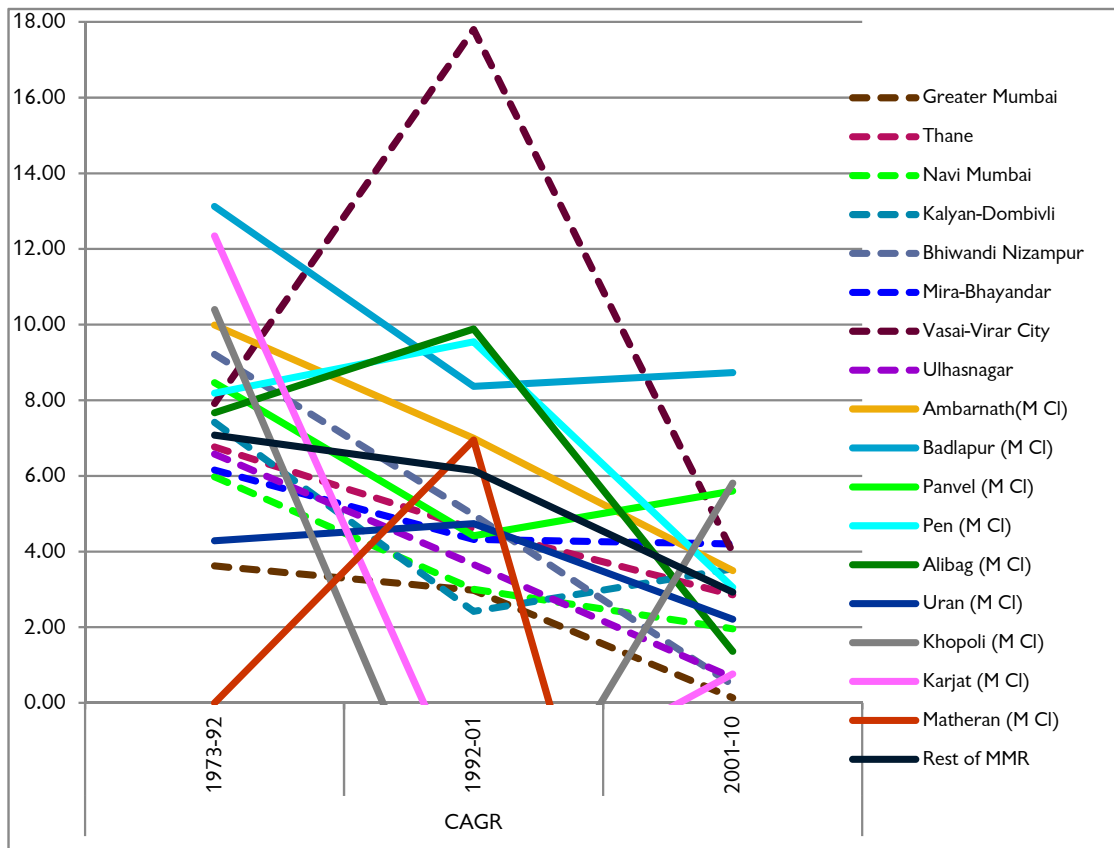


Figure 20 : ULB-Wise CAGR of Built-up Area, 1973-2010

2.4.5 Development Trends in Rural MMR

To understand the growth trends outside the Urban areas, Development Permissions granted in Thane and Raigad Districts (outside municipal areas) between 1991 and August 2014 was analysed. The locations were then mapped to get an accurate idea of development pressures in the region. Raigad district recorded more number of applications for development permissions and more number of permissions were granted, as compared to Thane District.

Table 29: Summary of Development Permissions in Rural MMR

Thane Dist.								Raigad Dist.							
A) No of Development Permissions processed															
Granted		Rejected		In Process		NA	Total	Granted	Rejected			In Process		NA	Total
884		365		36		37	1322	2820	332			50		24	3,226
B) Land-use wise Development Permissions sought (Nos.)															
Resid	Comm	Ind	Instt	Storage	Primary	NA	Total	Resid	Comm	Ind	Instt	Storage	Primary	NA	Total
438	206	327	51	219	46	35	1322	2419	364	78	64	191	97	13	3,226
C) Plot area-wise Development Permissions sought (area in Ha.)															
<0.20		0.2- <0.5	0.5- <1.0	1.0- <10.0	10.0& above	NA	Total	<0.20	0.2- <0.5	0.5- <1.0	1.0- <10.0	10.0 & above	NA	Total	
170		296	187	340	44	285	1322	807	850	623	763	91	92	3,226	
D) Year-wise Development Permissions sought (Nos.)															
1990-1996		1997- 2000	2001- 2005	2006- 2010	2011- 2014	NA	Total	1990- 1996	1997- 2000	2001- 2005	2006- 2010	2011- 2013	NA	Total	
171		109	119	251	277	395	1322	1253	521	476	667	264	45	3,226	

Source: Collectorates of Thane and Raigad Districts, Sub Regional Office of MMRDA at Thane, CIDCO

Analysis of the nature of building permissions and development plots revealed that

- i) There was development of both small and big plots (47 per cent of the applications were under 1 ha) in Thane Dist while in Raigad Dist, nearly 70 per cent of the applications for development permissions were for plots under 1 ha.
- ii) In terms of time period, Raigad seems to have had a spurt of growth between 1990-1996, after which there was a drop in applications between 1997 and 2000. Since then, there has been a steady but growing number of applications.
- iii) In Thane, there has been a steady increase in the number of development permissions granted since 1997, though there was a slight drop between 1997-2000.
- iv) The majority of development permissions were for residential use (74 per cent) in Raigad District while in Thane District, it was predominantly industrial and storage uses (46 per cent) as against only 28 per cent for residential uses.
- v) In terms of the percentage of area utilized zone-wise in MMR since the last RP, maximum area under development in Thane was in G1 Zone followed by U1 zone, while in Raigad, most of the development took place in the U1 Zone followed by G2 zone. Large size developments were occurring in G2 zone in Raigad.
- vi) Tehsil-wise analysis of building permissions reveals that in Khalapur, major developments were in U2, in Alibag and Panvel, though in G1, there were mostly larger size developments (in Alibag it was mostly resorts), Poinad town shows development though no building permissions were received; Karjat has major development in U1 Zone, and larger size developments are coming up in G1 zone, mostly under Gaothan expansion scheme. In Pen, major development was in G2 zone (which were largely without permission) and in U2, there are minor projects noticed. Two proposals of change of zone from G1, G2 to industries were noticed. In Thane district, in Kalyan, Bhiwandi, Vasai and Ambernath, major development proposals were largely in the G1 zone. Development is seen in all zones in Ambernath.
- vii) In rural areas in MMR, it is observed that building permissions have been sought in several areas which are not yet materialized. A significant amount of development is seen without

development permissions being granted in the period post RP 1996. (more than 50 per cent) However, no conclusive statement can be made regarding such developments since there could be data gaps in the data received on building permissions and since the data on building permissions is from 1992, some of the development would be with permissions received prior to 1992 (refer Map no. 10).

- viii) Of the total development in rural MMR post 1992, a significant amount of development is within the 200 m buffer beyond existing Gaothans. (28 per cent). The majority of these seem to have been developed without any building permissions.
- ix) Within MMR, substantial development without permission since 1992 has taken place in G1 Zone, followed by U2 zone. Development with permissions is largely observed within G1 Zone followed by U1 zone.

2.4.6 Areas undergoing Urbanisation

From the preceding section, it is clear that the growth within MMR is now occurring outside Greater Mumbai. The Municipal Councils are growing at faster rates than the Municipal Corporations. Areas outside the municipal areas are also growing rapidly. Growth in Gaothan Extension areas is also noticed. Areas around major transportation corridors are growing, especially in and around Panvel and Bhiwandi. The area surrounding Bhiwandi is being utilised more for economic activities such as godowns and logistics.

From the urban sprawl analysis and the development permissions data, it appears that there is significant growth around several existing municipal areas especially around Bhiwandi, Kalyan-Dombivli, Navi Mumbai, Panvel and Alibag. Recognizing this trend, in these urban areas, there is a case for extension of municipal limits so as to be able to provide municipal services and infrastructure to peripheral areas that are growing haphazardly. This would also increase the tax base and help the urban local bodies provide necessary services.

2.4.7 Constraints to Urban Development

MMR's coastal location and the presence of significant environmental assets in the form of hills, rivers and creeks and forests result in several areas having some constraints that make the land less suited for development. Water bodies in MMR constitute 180 sq km of land, notified forests constitute 1176 sq.km and coastal features such as wetlands occupy 304 sq km. Notified forests and coastal wetlands are protected under the existing laws. Additionally MMR has 42 sq.km of land located on steep slopes (greater than 22.5°) which needs to be protected. This implies that 1597sq.km (37 per cent) of MMR is effectively out of bounds of urban development from environmental sensitivity considerations. In addition to this, some lands are under the Coastal Regulation Zone and has restricted development.

2.4.8 Land Suitable for Agriculture and Dependent/Vulnerable Populations

Within the MMR, a considerable amount of land is devoted to agriculture and in several villages the population is dependent on agriculture. There are lands which are currently under irrigation command areas in Bhiwandi and Pen Tehsils. Additionally, the tail-race waters of Tata Power Plant at Bhivpuri irrigate parts of Karjat Tehsil through a network of canals. A number of villages especially in Thane District have significant tribal populations. There are also smaller tribal clusters of either 10,000 or 5,000 populations where half or more of the population is tribal that have been brought under the purview of Modified Area Development Approach (MADA) or mini-MADA areas respectively in Maharashtra to extend benefits under the various tribal development programmes.

In keeping with the directives of the Draft National Land Utilization Policy, all such lands which are under irrigation command areas, which support populations dependent on agriculture or vulnerable groups, have been identified in MMR so that they can be protected from the ambit of urbanization.

2.4.9 Land Use Strategy

Current growth trends for MMR indicate that there is a decline in the growth rate for the region. It appears that there is sufficient land within the current urban areas of MMR to address the space demands of additional population projected up to 2036 at the gross level. However, this may not be the case at individual city level such as Mira-Bhayandar. The additional population will therefore have the choice to live in denser conditions in existing cities in MMR or live in peripheries of existing cities at lower densities or in a combination of both, which is the most likely scenario. The current gross and net densities of cities in MMR were analysed to understand the extent to which they can absorb future growth.

Table 30 : Municipal Corporations in MMR: Net Population Densities in ppsq.km.

Sl. No.	Unit	Population 2011	Developable Area ELU 2016 (Sq km)	Net Density 2011
1	Greater Mumbai	1,24,42,373	333.4	37,315
2	Thane	18,41,488	81.7	22,542
3	Ulhasnagar	5,06,098	12.9	39,263
4	Kalyan Dombivali	12,47,327	107.5	11,608
5	Mira Bhayander	8,09,378	47.9	16,890
6	Bhiwandi-Nizampur	7,09,665	25.7	27,625
7	Navi Mumbai	11,20,547	70.2	15,971
8	Vasai Virar	12,22,390	192.5	6,350

It may be inferred that several cities like Ulhasnagar, Greater Mumbai, and Bhiwandi have high net densities (above 30,000 ppsq km) currently and seem to be saturated. Other cities seem to have scope for further densification. However, the scope for development in these ULBs will be governed by the respective development plans of these cities and the extent of developable areas permitted by them. Some cities like Vasai Virar and Mira Bhayander, may face increased densification since developable areas as per the Development Plans are much lesser. Depending on growth trends the Development Plans may have to be revisited in the near future to accommodate the projected populations.

2.5 Transportation

The MMR is heavily dependent on transit and its efficiency is largely due to the suburban rail network and the public bus systems that are present in the region. Resident workers in MMR grew from 72 lakhs in 2001 to 91 lakhs in the year 2011. The provisional figures from the Economic Census of 2014 indicate that there are establishments that provide nearly 40 lakh jobs in MMR with 67 per cent located in Greater Mumbai. This imbalance in the location of jobs results in long commutes for a large section of the population who live in the suburbs of Greater Mumbai and elsewhere in MMR.

2.5.1 Travel Scenario in MMR

The dominant feature of passenger movements in Mumbai is the overwhelming dependence on public transport modes such as suburban rail system and bus services. The public transport share has declined from 88 per cent in 1992 to 78 per cent in 2005 which can be attributed to the huge gap between demand and supply in the transport services.

a) Travel Demand-Main Mode

The Government of Maharashtra through MMRDA with technical assistance from World Bank under the Mumbai Urban Transportation Project got a Comprehensive Transportation Study (CTS-2008) done for the MMR in July 2008. The prime objective of this study known as TRANSFORM (TRANsportation Study For Region of Mumbai) was to identify travel pattern of residents and to recommend a long term comprehensive transportation strategy for MMR up to 2031 covering all modes of transport. Various types of traffic related surveys HH surveys were carried out as a part of the CTS-2008. The survey

findings revealed that about 10 million people in MMR make about 28.5 million journeys (trips) every day, counting going-to and coming-back separately. More than half of these journeys, i.e. about 15 million are made entirely on-foot. Another 13.5 million trips are made by a combination of modes, at least one of which is motorized. The details are presented in Table 31 below:

Table 31: Trips in MMR by Mode of Transport, CTS-2008

Sl. No	Main Mode	Trips per day
1	Walk	1,48,50,000
2	Train	69,75,000
3	Bus	35,50,000
4	Rickshaw	10,50,000
5	Taxi	2,25,000
6	Two Wheeler	10,50,000
7	Car	6,25,000
	Total	2,83,25,000

Almost seven million journeys were made by Suburban Rail. It is the most important mode of travel after walk. Equally important are public bus services on which another 3.5 million trips are made. In addition, these buses also functions as an access mode for people who use suburban railways. Out of seven million journeys made by rail, as mentioned earlier, about 1.5 to 2.0 million use buses to reach their railway station of choice. Thus, buses in total carry about 5.5 million passengers. The modal split for the base year 2008 with walk and without walk is presented below:

Table 32: Mumbai Travel Demand – Main Mode, CTS-2008

Sl. No	Mode	Trips per Day (Mn.)	Mode Split with Walk (per cent)	Modal Split without Walk (per cent)
1	Walk	14.85	52.4	
2	Train	6.98	24.6	51.8
3	Bus	3.55	12.5	26.3
4	Rickshaw	1.05	3.7	7.8
5	Taxi	0.23	0.8	1.7
6	Two Wheeler	1.05	3.7	7.8
7	Car	0.63	2.2	4.6
	Total (with Walk trips)	28.33	100.0	100.0
	Total (without Walk trips)	13.48		

A total 55,000 vehicles enter or leave MMR everyday through the three urban arterial roads (Western Express Highway, Eastern Express Highway and Sion-Panvel Highway) which is about 60 per cent of the total external traffic. The Mumbai-Pune Expressway adds another 23 per cent of the total traffic and various State Highways contribute a total of 17 per cent.

MMR also produces on an average day about 110,000 tonnes of freight traffic, and attracts about 104,000 tonnes by roads. Of this, Greater Mumbai produces about 43 per cent and attracts 37 per cent. Navi Mumbai, Bhiwandi and Thane are also important centres of production and attractions for goods traffic. About 16 per cent of the total freight movement is through-traffic, not meant for MMR.

Approximately 6,630 buses enter or leave MMR per day through outer cordon locations of MMR. On an average, the traffic split by private and Government buses is 45 per cent and 55 per cent respectively. On NH8, SH53 and Mumbai-Pune Expressway, operation of private buses are high. While, on SH38 and NH4, operation of Government buses are high.

b) Suburban Railway System

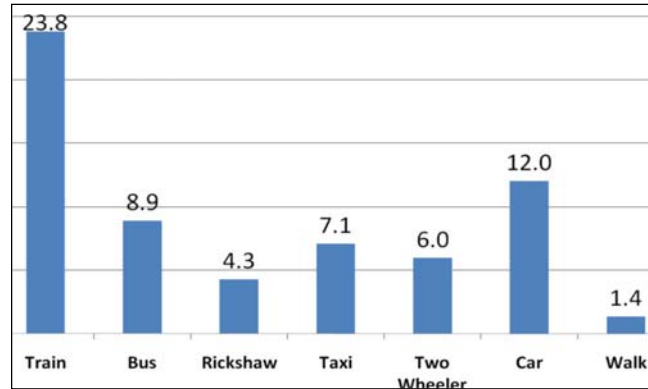
Mumbai Suburban Railway System carries more than 7.34 million people daily. Western Railway operates 1,106 public sub-urban services (up and down) per weekday over 60 km route between Churchgate and Virar including 6 train trips between Mumbai CST and Borivali.

The Central Railway operates 1,559 public sub urban service (up and down) per weekday over 280 km route between Mumbai CST on south, Kasara on north-east, Khopoli on south-east, Panvel via Mankhurd, Andheri on WR and between Thane and Vashi via Ghansoli. The average density on the

suburban rail system is about 12 persons/square meter, as against internationally accepted standard of 6 to 8 persons/square meter.

The highest average commuter density in 2nd Class General (SCG) is observed on Dahisar-Borivali segment which is 9 persons/sq.m. Variation of commuter density within the SCG coach is observed to vary from 6 to 16 persons/sq.m. The average commuter density in First Class and Second Class Ladies assessed is 7 persons/Sq.m. on trains operated by Western and Central Railways.

The average trip length of the commuters is unusually high at almost 24 km. Length of journeys made by all other modes is much less, varying from 7 to 12 km except Auto-Rickshaws which is used for even smaller journeys of 1 to 5 km. The Average Trip Length in km as given below:



Source: CTS 2008

Figure 21 : Average Trip Length in km

c) Bus System in MMR

Bus system is the next predominant mode in MMR, after sub-urban rail system. Daily travel by Bus as a main mode in year 2008 is about 3.55 million trips, which is 26.3 per cent of total travel demand (without walk trips) and is about 5.5 million/day including access/ egress modes with an operation extending over 5,700 routes. Brihanmumbai Electric Supply and Transport Undertaking (BEST) is the largest public bus transport service provider with a fleet strength of 4,700 and operating on 504 routes (2010-11) within Greater Mumbai.

d) Travel by Para Transit Modes

Intermediate Public Transport (IPT) modes i.e. Taxi and Autos play an important role in meeting unstructured travel demands of users in MMR. In MMR, IPT is acting as competent access/ egress mode and competing with road based public transport system, especially on short trip lengths. As per CTS, number of Autos in Greater Mumbai and rest of MMR is 1,02,224 and 1,17,946 respectively (46.4 per cent:53.6 per cent). The number of Taxies in Greater Mumbai and rest of MMR is 56,459 and 17,634 respectively (76.2 per cent:23.8 per cent). Annual growth rate of Auto population and Taxi population in MMR is 4.0 per cent and 3.1 per cent respectively.

e) Travel by Private Vehicles:

Daily travel by private vehicle modes, two wheelers and cars in the year 2005 was estimated to about 1.05 million and 0.63 million respectively, which is 7.8 per cent and 4.6 per cent of total travel demand (without walk trips) of MMR. Forecast of private vehicles in MMR has shown a high growth of private vehicle i.e. in Thane, Kalyan and Pen-Raigad areas compared to Greater Mumbai.

f) Passenger Water Transport (PWT)

Presently Water Transport is being operated by ferry launches/boats at about 17 minor ports in MMR which is catering to about 1.4 crore (Year 2012-13) passengers annually. Government of Maharashtra has decided to implement the East Coast Passenger Water Transport connecting Ferry Wharf/Gateway of India to Mandwa, JNPT, Nerul, Belapur, and Vashi through Mumbai Port Trust (MbPT) and has deferred the West Coast due to operational issues.

g) Key Transport Indicators

MMR has so far been a region with one of the highest public transport shares in the world; however this status is expected to change in future. Following table provides a summary of some changes in key transport indicators for the Region over the period 1991-2005.

Table 33: Key Transport Indicators (Growth per cent), CTS-2008

Sl. No.	Indicator	Per cent Growth (1991-2005)
1	Population Growth	43
2	Sub-urban Train Daily Trips	35
3	Bus Daily Trips (Main Mode + Feeder Trips)	9
4	Registered Cars	137
5	Registered Two Wheelers	306
6	Registered Auto Rickshaws	420
7	Registered Taxis	125
8	Registered Commercial Vehicles	200
9	Airport Passengers	94

The transport indicators indicate that, buses are capturing a much smaller share of travel and suburban services are not keeping pace with population growth. Bus services are losing out to autos and two wheelers for shorter distance trips particularly to the railway stations. The very large increase in the number of autos and two wheelers is a reflection of this trend.

People working in informal sector have a greater propensity to live close to their work places and consequently more people walk to work. The 137 per cent increase in cars, a 306 per cent increase in two wheelers, the 420 per cent increase in autos and 128 per cent increase in taxis during 1991-2005 has created a lethal dose of traffic congestion which has categorised Mumbai and region as one of the most congested cities in the world. Even when several areas of Mumbai seem to be bursting at seams, it keeps providing opportunities for further development, not only for commercial and service employment but also residential intensification. Most of the shift to rest of the region is still limited to either residential accommodation or industrial areas with most of the municipalities outside Mumbai acting as 'dormitories' or 'bedroom communities'. Thus, the city of Mumbai remains the focus of the Region.

2.5.2 Projections and Growth Strategies

All transportation projects in MMR are currently based on the recommendations of the Comprehensive Transport Study (CTS) for MMR (2008)¹² that the Government of Maharashtra through MMRDA with technical assistance from World Bank under Mumbai Urban Transportation Project completed. The prime objective of the CTS was to identify travel pattern of residents and to recommend a long term comprehensive transportation strategy for MMR up to 2031 covering all modes of transport. Accordingly, the CTS advocated a 'Transit First' strategy where public Transport was accorded priority and transportation network planned in such a manner that one should reach from one point to the other within an hour's travel time. Accordingly, the CTS evolved short, medium and long term transportation strategies taking into consideration the population and employment scenarios for the future. Projections made by CTS are as follows:

1. Population projections were 34 million people in MMR and
2. Employment was projected to be 15.3 million jobs by year 2031.
3. The private vehicle population of 2 million vehicles in the year 2005 is estimated to grow by 9 million by the year 2031.
4. Average speeds of private vehicles, IPT modes, projected modal splits, average trip lengths, modal splits were all projected.

¹² Known as TRANSFORM (Transportation Study for Region of Mumbai).

2.5.3 Transport Network for the year 2031, CTS Proposals

A conceptual transport network for horizon year 2031 and beyond was prepared keeping in view the goals and objectives set for the future MMR. It was also based on the existing transport network, planned highway sub-urban and metro corridors by various planning organizations, extending the transport network in to the Greenfield areas and improving the connectivity to various growing clusters of the region. The concept plan develops an integrated land use transport plan and intensification focused on transport corridors (Transport Driven Development).

The travel demand was estimated on the conceptual transport network for all the three short-listed growth scenarios and the transport network for the horizon year 2031 was chosen in such a way that it caters to all the three short-listed growth scenarios.

Following is the summary of recommendation in CTS study:

- The length of metro network for the horizon year 2016 and 2021 is 228 km and 318 km respectively, which further expands to 435 km by 2031. Most of the metro network proposed by 2016 is located in MCGM and Navi Mumbai.
- Total length of new suburban rail network is approximately 248 km. The majority of the new suburban rail network corridors are required by 2016, with minimal addition thereafter.
- The highway network, which includes higher order transport network (fully access controlled) and arterial corridors for the horizon year 2016 and 2021 is 982 km and 1,229 km respectively. The 2021 network is further required to be developed and augmented by another 510 km by 2031 to be extending over 1,740 km.
- Along some of these corridors, Exclusive Bus Lanes (EBL) have been proposed for the horizon years where the travel demands on parallel metro corridors were insufficient to justify investments in a metro line for the time horizons being considered. The approximate length of EBL network proposed by 2016, 2021 and 2031 is 165 km, 112 km and 79 km respectively.
- Based on studies made by other agencies provisions have been made in the budgets for Passenger Water Transport (PWT) on the west coast, east coast and on other routes. The proposed investment by the horizon year 2016 is about Rs.480 crores.
- Road safety measures, traffic management measures are recommended. These measures include intersection improvements, flyovers/ interchanges, pedestrian facilities (FOBs and Subways), ROBs/RUBs, footpath improvements, traffic signal installation/ Area Traffic Control Systems, etc. An approx. investment needed for these is assessed to be Rs. 58.6 billion by 2016.
- Implementation of integrated fare structure and Common Ticketing among existing as well as the proposed public transport systems in MMR has been recommended.
- The total cost of transport network for the horizon year 2031, 2021 and 2016 is Rs. 2,08,000, 1,64,000 and 1,34,000 Crores respectively at 2005-06 prices.

Recommended metro corridors/ lines, sub-urban corridors/lines and Highway corridors for horizon year 2031 are indicated in Map Nos. 11 and 12.

2.5.4 The Transport network proposed in RP 1996 and since implemented

Table 34: Status of Transportation Proposals made in Regional Plan-1996

No	Regional Plan Recommendation	Present Status
1	Railway Development Strategies	
	<ul style="list-style-type: none"> • Construction of fifth line between Santacruz and Borivali and additional corridors from Borivali to Virar and Kurla to Thane; • Construction of Bandra-Kurla link and expansion of railway services in Navi Mumbai; • Replacement of level crossings by road over bridges (ROBs); • Introduction of new rolling stock with radically improved design; • Introduction of longer rakes and running them with 3-min headway 	<ul style="list-style-type: none"> • Implemented Under MUTP 1 • Implemented Under MUTP 1 • Implemented Under MUTP 1 • Implemented Under MUTP 1
2	Road Development Strategies	
	<ul style="list-style-type: none"> • The road development strategies targeted on suburbs and outer areas including: • Anik-Panjrapol expressway; • East-west links between Eastern and Western expressways; • Malad-Dahisar relief road; • Widening of Tilak bridge at Dadar and Airoli bridge; • Mumbai Trans-harbour link and its connection to NH-4 expressway as a Build-Operate-Transfer (BOT) project; • Duplication of Panvel creek bridge and • Improvement of some other links. 	<ul style="list-style-type: none"> • Implemented Under MUIP • Implemented Under MUTP

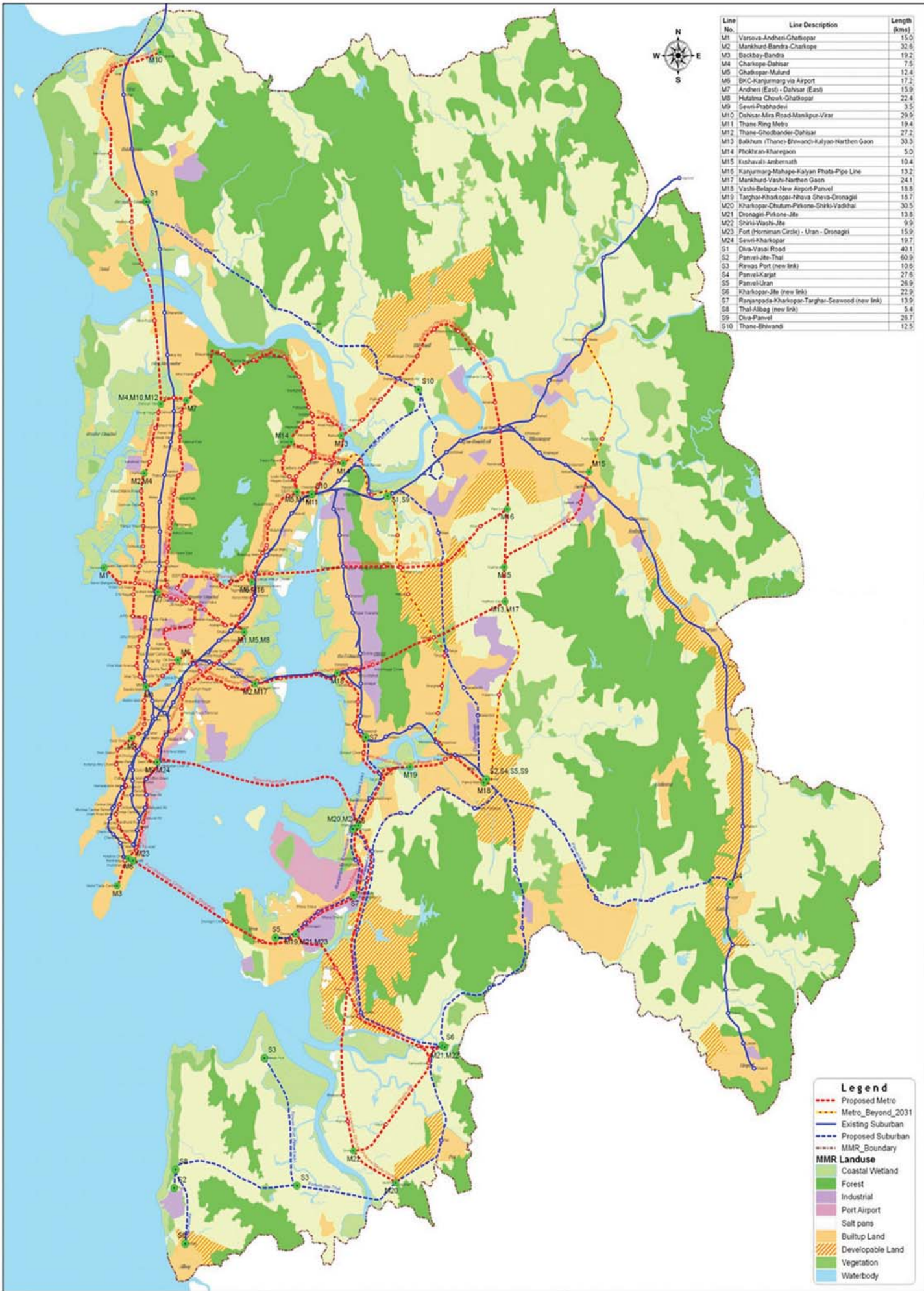
CTS also recommended establishment of Unified Metropolitan Transport Authority (UMMTA)

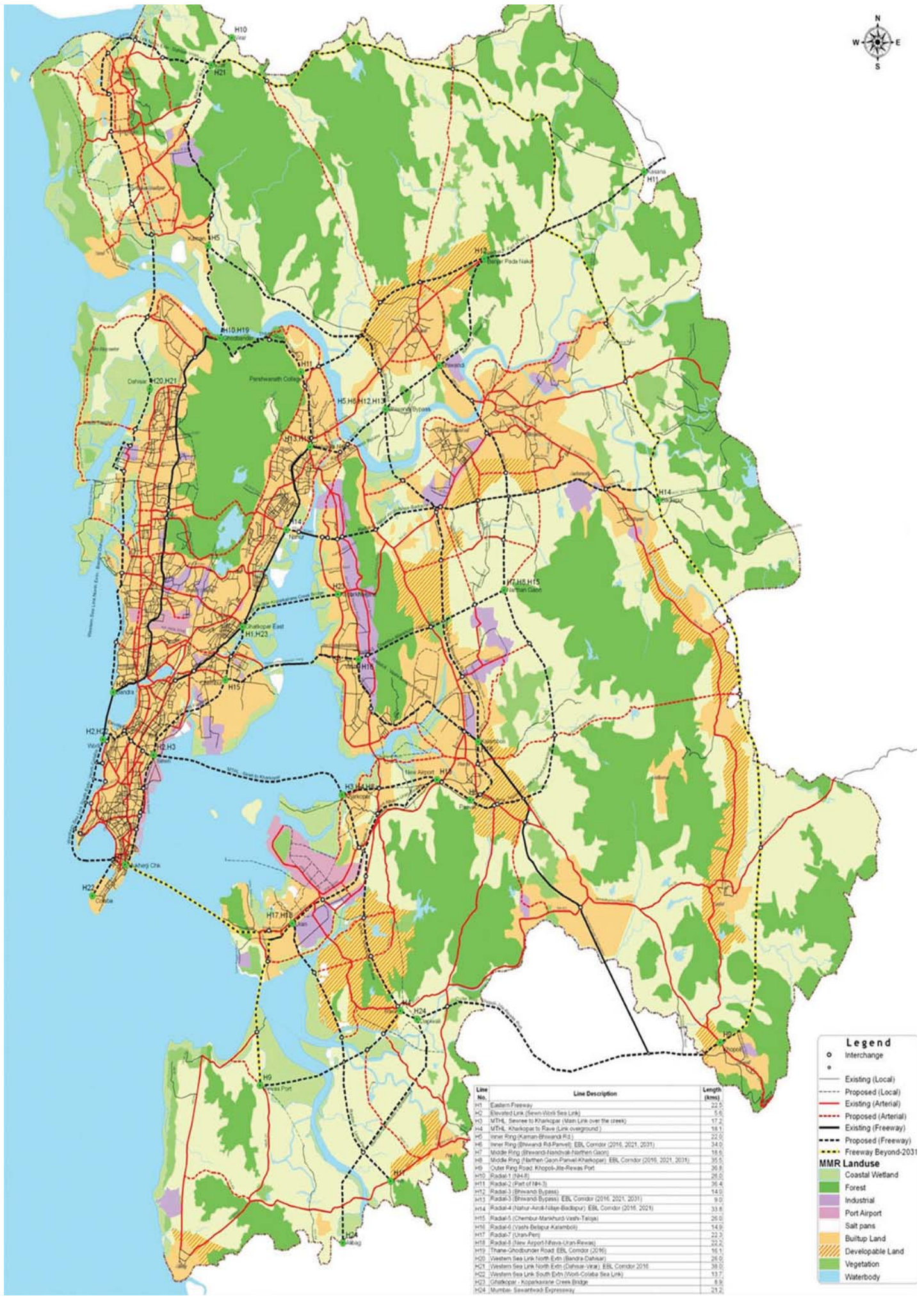
After preparation of Regional plan-1996, various traffic & transportation projects have been undertaken by State Government of Maharashtra, MMRDA, MCGM, Mumbai Railway Vikas Corporation (MRVC) etc. which prominently includes the following:

- a) **Mumbai Urban Transport Project:** The Indian Railways (IR) and Government of Maharashtra, through Mumbai Metropolitan Regional Development Authority (MMRDA), Mumbai Railway Vikas Corporation (MRVC) Ltd. and the World Bank (WB) are involved in implementing a comprehensive investment plan for improving and expanding the transportation network of Mumbai. This investment plan that is partly funded by World Bank (WB) is termed as Mumbai Urban Transport Project (MUTP).

Presently, MUTP (rail upgradation) is being executed in two phases: MUTP-1 (2003 onwards) and MUTP 2A and 2B (2008 onwards). MUTP 1 has provided the extra capacity needed on the rail system to meet with the growing demand and reduce overcrowding. Substantial improvement of the Suburban Railway was to be effected by 2016 under MUTP 2A & 2B projects.

- b) **Mumbai Urban Infrastructure Project (MUIP):** To supplement MUTP which envisaged improvement in Suburban Rail system, MMRDA initiated a road infrastructure improvement project-Mumbai Urban Infrastructure Project (MUIP) with the main objective to improve the road network and create an efficient traffic dispersal system in Greater Mumbai. The major components of MUIP included major express highway upgradations, building the Eastern Freeway and the Sahar elevated access road, flyovers, and traffic mobility improvements
- c) **Extended Mumbai Urban Infrastructure Project:** Extended MUIP i.e. MUIP II was initiated in November 2007 on similar lines to improve road infrastructure in other corporation and council areas in MMR. This is aimed to cater to the road infrastructure needs of Thane, Navi Mumbai, Panvel, Vasai-Virar, Mira Bhyandar and Kalyan Dombivli. MUIP II is implemented by MMRDA, PWD and MSRDC jointly.





Line No.	Line Description	Length (km)
H1	Eastern Freeway	22.5
H2	Elevated Link (Seven Wells Sea Link)	5.6
H3	MTH4, Sewree to Kharakpur (Main Link over the creek)	17.2
H4	MTH4, Kharakpur to Kava Link (overground)	18.1
H5	Inner Ring (Chalvan-Bhivandri Rd.)	22.0
H6	Inner Ring (Bhivandri Rd. Panvel) EBL, Corridor (2016, 2021, 2031)	34.0
H7	Middle Ring (Bhivandri-Bandrabai-Kharakpur)	18.6
H8	Middle Ring (Bhivandri-Bandrabai-Kharakpur) EBL, Corridor (2016, 2021, 2031)	35.5
H9	Outer Ring Road, Kharakpur-Bhivandri	26.8
H10	Radial-1 (NH-3)	26.0
H11	Radial-2 (Part of NH-3)	36.4
H12	Radial-3 (Bhivandri Bypass)	14.0
H13	Radial-3 (Bhivandri Bypass) EBL, Corridor (2016, 2021, 2031)	9.0
H14	Radial-4 (Kharakpur-Bhivandri-Bandrabai)	33.8
H15	Radial-5 (Chembur-Manikpada-Vashi-Talaja)	26.0
H16	Radial-6 (Vashi-Belgaum-Kharakpur)	14.9
H17	Radial-7 (Uran-Panvel)	22.3
H18	Radial-8 (New Airport-Bhivandri-Uran-Bandrabai)	24.2
H19	Thane-Ghodbunder Road EBL, Corridor (2016)	16.1
H20	Western Sea Link North End (Bandra-Dahisar)	26.0
H21	Western Sea Link North End (Dahisar-Vashi) EBL, Corridor 2016	38.0
H22	Western Sea Link South End (Vashi-Colaba Sea Link)	13.7
H23	Chhatrapati Shivaji Maharaj Expressway	9.8
H24	Mumbai-Saanshodh Expressway	21.2

Legend

- Interchange
- Existing (Local)
- Proposed (Local)
- Existing (Arterial)
- Proposed (Arterial)
- Existing (Freeway)
- Proposed (Freeway)
- Freeway Beyond-2031

MMR Landuse

- Coastal Wetland
- Forest
- Industrial
- Port Airport
- Salt pans
- Builtup Land
- Developable Land
- Vegetation
- Waterbody



Mumbai Metro Master Plan			
	LENGTH (KM)		
	UNDERGROUND	ELEVATED	TOTAL
Phase-I	12	51.8	63.8
Phase-II	0	19.9	19.9
Phase-III	20.5	42.3	62.8
TOTAL	32.5	114	146.5

The major initiatives planned under MUIP II included the Manori Creek Bridge, the Kashmiria Bhyandar Gorai Manori Road, Creek Bridge, Thane Dombivli Kalyan Road(improvement), Naigaon Juchandra Bapane Road, Vasai Sativli NH8 to Kaman Road, Arnala Virar Kaner Road NH40, Thane Belapur Road and ROB, Ghodbunder Bypass Road, Dombivali-Mumbra Road, Shirsat (NH4) to Vashind (NH5), Dombivli-Bhiwandi Road and the Mira Bhyandar ROB.

- d) **Mumbai Metro Master Plan:** In order to supplement MUTP improvements and to provide accessibility and connectivity to areas not currently catered by suburban railway systems, the Government of Maharashtra/MMRDA prepared the Master Plan for Mumbai Metro and the Detailed Project Report for priority corridors in 2004. The Master Plan includes nine (9) corridors covering a length of 146.5 km, out of which 32.5 Km is proposed as underground and rest is elevated. The master plan covered important stations like Churchgate, Chhatrapati Shivaji Terminus, Mumbai Central and Bandra Terminus. It also covered the international and the domestic airports. The master plan has undergone revisions in the last decade though it broadly adheres to the CTS recommendations. Presently the total length of Metro Master Plan is 172 km. In addition a high speed Metro corridor connecting Mumbai and Navi Mumbai international Airport is planned with an alignment length of 46 km between Andheri to Panvel via Mankhurd. The proposed projects include interchanges at Sewri with Mumbai Trans Harbour Link, and for Navi Mumbai at Mankhurd suburban station. Interchanges are also proposed at Thane & Mira Bhyander to provide regional connectivity of mass rapid transit system (refer Map no. 13).

Table 36: Revised Mumbai Metro Corridors

SL. No.	Name of Corridor	Length (km)	Estimated Cost (Rs. Cr.)
1*	Versova-Andheri-Ghatkopar	11.40	2,356
2	Charkop-Bandra-Mankhurd	32.00	7,660
3**	Colaba-Bandra-SEEPZ	33.50	24,430
4	Charkop-Dahisar	7.80	4,680
5	Wadala-Ghatkopar-Teen Hath Naka (Thane)	20.70	7,190
6	Teen Hath Naka-Kasarwadavali-Thane-Bhiwandi-Kalyan	34.60	5,031
7	SEEPZ-Kanjurmarg	10.50	4,200
8	Andheri (E) – Dahisar (E)	18.00	10,800
9	Sewri-Prabhadevi	3.50	2,100
	Total	172.00	68,447
10	Andheri-Mankhurd-Panvel fast metro corridor* (Airport-Airport)	46	16585

Note: * Line is in operation now.**Project proposed to be implemented with Japanese Loan Assistance (JICA)

- Charkop-Bandra-Mankhurd has been reconfigured as Line-2 i.e. Dahisar-Charkop-Bandra-Mankhurd (Fully underground).
- Line 3 & Line 6 of the master plan i.e. Colaba-Bandra is reconfigured as Colaba-Bandra-SEEPZ (Fully underground).
- Line 5 & Line 8 of the master plan has been reconfigured and modified as Line-4 i.e. Wadala-Ghatkopar-Thane-Kasarwadavali (Partially/fully underground)
- *High-speed strategic connectivity between two airports

2.5.5 Issues and Challenges in summary:

1. 'Transit First' needs strengthening through provision of good transit infrastructure along with policies that dissuade private transport
2. Passengers experience crush load during peak hours on the suburban railway corridors
3. Low speeds of public bus transport render it increasingly unattractive as a mode of transport. EBLs could be promoted along major highways during peak hours.
4. Increased need for E-W connectors across MMR.
5. Increased car ownership and related peak hour traffic and parking issues.
6. Pedestrian safety needs priority
7. NMT modes need to be strengthened
8. Need for better integration and interchanges across modes.
9. Seamless connectivity across MMR for MMR to function as an integrated metropolitan region.

2.6 Housing

The housing situation in Mumbai Metropolitan Region is grave with a significant section of the population living in slums due to a lack of affordable housing in the Region.

2.6.1 Housing Profile of the MMR

Detailed house-listing census data is available only for municipal areas within urban MMR. Since 91 per cent of MMR's population lives in urban areas, this data gives a good insight into the housing situation in MMR. The general housing data is available at the District level, so data for Mumbai, Thane and Raigad is presented at the District level (data is not separated for Palghar since it is newly constituted) and supplemented by urban detailed house-listing data.

Table 36: MMR Statistics: Total Households and Slum Households

Sl. No.	Description	Description of area	1991	2001	2011
1	Population MMR	T	1,45,52,688	1,93,65,469	2,28,04,355
		U*	1,41,89,616	1,89,41,698	2,23,23,211
		Mun. areas	1,35,31,812	1,78,41,362	2,07,01,218
		SPA areas	6,23,444	10,44,957	15,51,533
		CTs	34,360	55,379	70,460
		Remaining Rural	3,63,072	4,23,771	4,81,144
2	Sex Ratio	T	832	822	862
		U	818	816	859
		R	940	922	911
3	Avg Gross Population density (persons/sq.km.)	T	3,391	4,553	5,361
		U	9,390	12,534	14,772
		R	132	155	175
4	Number of households	T	30,38,139	41,37,921	51,94,614
		U	29,31,739	40,56,038	50,85,014*
		R	71,051	88,102	1,08,366
5	Household size	T	4.79	4.68	4.39
		U	4.84	4.67	4.39
		R	5.11	4.81	4.44
6	Number of urban slum households		-	15,17,361	13,91,685
7	Percentage of HHs in slums to total urban HHs		-	39.29	28.64

Source: Census of India . *Urban refers to Municipal Areas, except here in the population totals where the urban includes all urbanizing areas- so it includes municipal areas, census towns and areas under special planning authorities. Data pertaining to slum households not available for 1991

The following inferences can be drawn from Table 36 :

- MMR is largely urban in character with nearly 91 per cent of the population living in municipal areas and about 3.5 per cent in urbanizing census towns. If areas that are beginning to urbanize are considered, this would include areas under special planning authorities and would encompass as much as 98 per cent of the population (2,23,23,211 persons) out of the total MMR population of 2,28,04,355.
- The household size has decreased significantly over the decades in both urban and rural MMR. This decrease is also on account of formation of new households which has resulted in a corresponding increase in residential space demand in the region.
- It is also observed that little under a third of urban households in MMR live in slums, of this Greater Mumbai has the greatest share of slum population which is nearly 80 per cent. However, the overall proportion of urban slum households seems to have decreased from 39.29 per cent in 2001 to 28.64 per cent in 2011.

This indicates that there is a severe lack of affordable housing options available in urban MMR and people have no choice but to resort to informal housing in slums. This is the single largest issue

facing MMR which has some of the highest real estate prices in the world. People are forced to locate further and further away from the core city of Greater Mumbai (where majority of the formal jobs continue to be located) in search of affordable housing.

2.6.2 Available Housing Stock

In case of MMR, it is not sufficient to check availability of houses on the basis of number of houses produced in the various intervals of time as compared to the growth in the number of families, but it is equally important to analyse the available housing stock on the basis of parameters like Occupancy of the houses, use to which the houses are put to, size of the house and condition of the house.

- a) **Increase in Housing Stock:** At the district level in MMR, 3,58,538 urban households were added and 6,29,586 new houses (which is 1.75 times the additional households) were created between 1991 to 2001. However, between 2001 and 2011 when 9,81,966 households were added at the district level, the housing stock increased by 20,75,336, which is more than double the additional households. The number of new census houses added to the housing stock in Municipal areas is almost twice the number of additional households; and it is almost thrice the additional number of households in Greater Mumbai, Kalyan-Dombivali and Ulhasnagar and 1.5 times the additional households in Mira-Bhayander and Navi Mumbai. In terms of spatial distribution of the housing stock, the housing stock increased at a higher growth rate in Badlapur and Panvel council areas followed by Navi Mumbai, Thane and Mira Bhayander Corporation areas.

The Census 2011 house listing data reveals that the total number of newly added houses between 2001 and 2011 available in major municipal areas in MMR exceeds the number of additional households in MMR by as much as 54 per cent. Technically, this implies that there should be no housing shortage. Despite this there is a dearth of housing in the Region due to the fact that 14 per cent of the houses are vacant and 21 per cent are put to uses other than residential uses.

Table 37 : Overview of Housing in MMR Districts

Sl. No	Census Houses and Households	1991		2001		2011	
1	Total number of census houses	47,62,545	100%	64,51,809	100%	87,63,329	100%
	Number of census houses (U)	39,21,680	83%	53,92,131	84%	74,67,467	85%
	Number of census houses (R)	8,29,920	17%	10,59,678	16%	12,95,862	15%
2	Use to which Census Houses are put to						
	URBAN						
i	Houses used as Residence	27,34,995	72%	36,86,745	70%	46,82,738	64%
ii	Houses used as Residence-cum-other use	80,080		80,468		92,864	
iii	Number of vacant houses	5,82,695	14%	7,27,171	13%	10,16,776	14%
iv	Number of occupied locked census houses	NA		NA		79,553	1%
v	Houses put to other than Residential use	5,34,855	13%	8,97,747	17%	15,95,536	21%
	RURAL						
i	Houses used as Residence	6,10,620	75%	7,39,729	73%	8,64,609	69%
ii	Houses used as Residence-cum-other use	8,880		37,758		31,848	
iii	Number of vacant houses	70,540	8%	1,20,080	11%	1,89,182	15%
iv	Number of occupied locked census houses					7,398	1%
v	Houses put to other than Residential use	1,39,880	17%	1,62,111	15%	2,02,825	16%
3	Number of households with condition of Census House						
	URBAN						
i	Good	NA		23,55,802	63%	35,59,440	74%
ii	Livable	NA		13,07,696	35%	11,68,407	24%
iii	Dilapidated	NA		98,944	2.63%	61,847	1.29%
	Sub-total			37,62,442		47,89,694	
	RURAL						

Sl. No	Census Houses and Households	1991		2001		2011	
i	Good	NA		3,97,300	51%	5,58,919	62%
ii	Livable	NA		3,33,067	43%	3,00,252	33%
iii	Dilapidated	NA		46697	6%	43746	5%
	Sub-total			7,77,064	100%	9,02,917	100%
4	Number of Households by Tenure						
	URBAN						
i	Owned	19,73,380	57%	25,92,908	68%	34,02,298	71%
ii	Rented	13,83,330	40%	10,96,727	29%	12,79,567	27%
iii	Any other	92,480	3%	1,18,093	3%	1,07,829	2%
	Total no. of Households (U)	34,49,190	100%	38,07,728	100%	47,89,694	100%
	RURAL						
i	Owned	5,74,235	89%	6,85,026	87%	7,84,982	87%
ii	Rented	62,460	10%	85,414	11%	1,00,027	11%
iii	Any other	11,520	2%	16,401	2%	17,908	2%
	Total number of Households (R)	6,48,215	100%	7,86,841	100%	9,02,917	100%

Source: Census of India 1991, 2001 and 2011

Note: The above data is for urban Districts (Mumbai, Mumbai-suburban, Thane, Raigad) only, 2011 Census data is not available for Alibaug, Pen, Uran, Khopoli, Karjat, Matheran Municipal Councils and census towns.

- b) **Vacant Houses:** A total of 72,936 houses were added to the vacant housing stock during 1991-01 and another 2,89,605 houses were added during 2001-11. This indicates an increase in the share of the vacant housing stock in the new stock created of the new housing stock from 11.6 per cent during 1991-01 to 14.0 per cent during 2001-11. The number of vacant houses increased at a higher CAGR in Badlapur, Panvel and Thane. This indicates that, though substantial housing stock is getting generated most of it is being bought as speculative investment. There is thus an active speculative market that is investing in real estate and creating substantial housing stock. However, there seem to be considerable disincentives for renting that prevents this stock from actually becoming available as housing (refer Map no.15).

Table 38: Houses put to other than Residential Use in MMR (Urban)

Location	% houses put to non-residential use	Break-up of houses put to non-residential uses						
		Shop/Office	School/College etc.	Hotel/Lodge / Guest house	Hospital/Dispensary etc.	Factory/Workshop/Workshed etc.	Place of worship	Other non-residential
		1	2	3	4	5	6	7
Greater Mumbai (M Corp.)	25.07	38.0	1.1	1.8	1.6	10.5	1.2	45.8
Vasai-Virar City (M Corp)	17.16	36.5	1.2	1.1	1.4	12.5	1.2	46.0
Mira-Bhayandar (M Corp.)	19.08	45.6	1.2	1.6	1.5	12.0	0.9	37.2
Thane (M Corp.)	16.47	46.6	1.3	1.5	2.4	7.3	1.6	39.2
Navi Mumbai (M Corp.)	20.14	48.3	0.8	2.1	1.6	6.7	1.1	39.5
Bhiwandi Nizampur (M Corp.)	23.52	43.7	0.8	2.5	1.8	26.5	1.2	23.6
Kalyan-Dombivli (M Corp.)	16.27	46.6	1.8	1.2	2.5	3.2	1.8	42.9
Ulhasnagar (M Corp.)	27.35	53.7	0.6	1.2	1.2	19.2	2.5	21.5
Badlapur (M CI)	17.01	44.2	1.6	1.3	1.9	5.9	1.7	43.4
Ambarnath(M CI)	14.70	42.3	1.7	1.6	2.3	12.8	3.0	36.2
Panvel (M CI)	18.21	60.4	1.2	2.1	2.6	3.9	1.6	28.2
Navi Mumbai Panvel Raigad (CT)	16.71	34.1	1.3	0.9	1.9	3.4	1.1	57.3

(Source - Housing Census 2011)

Note: Data is not available for Alibag, Pen, Uran, Khopoli, Karjat, Matheran Municipal Councils and Census Towns

- c) **Houses put to other than Residential Use:** The percentage of houses being put to other than residential use (includes educational purposes, commercial establishments, factory/workshop, place of worship, etc.) has substantially increased at District Level from 16 per cent in 1991 to 21 per cent in 2011. Ulhasnagar (27 per cent), Greater Mumbai (25 per cent), Bhiwandi (24 per

cent) and Navi Mumbai (20 per cent) have the largest share of houses put to other uses. These cities also have a high share of employment generating activities. The uses that such houses are mostly being put to are shops, offices or other non-residential use and as factories, workshops or work sheds. Almost 26 per cent of those in Bhiwandi are being used for factory/workshop/work sheds, whereas 60 per cent of the houses not used for residential purposes in Panvel are being used as shops. In Badlapur and Panvel council areas followed by Navi Mumbai, Thane and Mira Bhayander Corporation areas the number of houses put to other uses also increased at a higher CAGR.

If only the additional houses built in the last decade are considered, those put to other non-residential uses constitute a major share of these houses, as against the share of such uses within the entire housing stock of MMR. This share is 64 per cent in Ulhasnagar, 55 per cent of the additional houses in Greater Mumbai (as against 25 per cent when the entire stock is considered); 55 per cent in Kalyan Dombivali (against 16 per cent of the total) and in Bhiwandi, it is 41 per cent of the added houses against 24 per cent of the total stock (refer Map no.15).

This indicates that, there seem to be constraints/disadvantages in the currently available options for workspaces in MMR resulting in people converting residential spaces into workspaces.

- d) **Tenure:** The tenurial arrangements of houses in MMR districts reveal that majority of homes (68 per cent) are owned rather than rented and this trend is on the increase. This is exactly the reverse of the situation in the 1960s when the majority of houses in Greater Mumbai were rented. The percentage of households owning their house significantly increased from 57 per cent in 1991 to 71 per cent in 2011. The percentage of rental housing stock in Gr. Mumbai, Bhiwandi-Nizampur, Kalyan-Dombivali, Ambernath and Panvel decreased substantially over the past decade indicating increasing house ownership along the Central suburban railway line.
- e) **Housing Situation in Rural MMR:** The percentage of dwelling units in rural MMR seems to be decreasing. This is on account of the sizable increase of census houses in urban MMR and a small or no increase in rural MMR. The percentage of vacant houses in rural areas has substantially increased from 8.5 per cent in 1991 to 14.6 per cent in 2011. All of this is indicative of the fact that households could be migrating to the urban areas in search of jobs on account of lack of sufficient employment opportunities in the rural areas. The rental stock in rural MMR has increased from 9.6 per cent in 1991 to 11.08 per cent in 2011. At the same time, the houses being put to other than residential use have increased by about 1.6 per cent over the past decade. Dilapidation seems to be very high in rural MMR as compared to the urban MMR (Table 39).
- f) Most of the housing schemes implemented in MMR were designed to address the urban housing problem. However, there is need to frame housing schemes to promote generation of good quality housing in rural areas.

Table 39: Housing Profile of Rural and Urban MMR at District level

		Thane District			Raigad district			Total		
		1991	2001	2011	1991	2001	2011	1991	2001	2011
Per cent of DUs	R	28.42	23.03	19.73	81.09	75.15	60.67	14.84	16.42	14.79
	U	71.58	76.97	80.27	18.91	24.85	39.33	85.16	83.58	85.21
Vacant	R	7.99	9.93	12.60	9.02	12.81	17.06	8.50	11.33	14.60
	U	14.59	13.19	12.51	3.20	4.75	8.80	11.70	11.27	11.60
Non-residential	R	10.21	12.24	14.24	19.07	18.52	18.65	14.59	15.30	16.22
	U	8.35	10.62	15.26	2.79	3.85	7.68	12.06	13.91	19.11
Rented	R	9.16	9.33	11.21	10.19	12.68	10.90	9.64	10.86	11.08
	U	39.13	30.14	30.10	42.58	38.56	35.68	40.11	28.80	26.72
Dilapidated	R		6.45	5.77		5.32	3.56		5.93	4.84
	U		2.26	1.13		2.70	1.06	-	2.60	1.29

Source: Census data and MMRDA's analysis

2.6.3 Nature of Housing Stock

Size of Dwelling Unit: The majority of households in MMR (57.3 per cent) live in one room tenements or live in constrained situations with multiple families sharing accommodation with no exclusive room, as per Census 2011. The spatial distribution of households by dwelling unit size in MMR shows

that, nearly half or more of the population in all the Municipal Corporations in MMR (with the exception of Mira Bhayander) live under constrained circumstances in small dwelling units. However, barring Vasai-Virar, Ambernath and Badlapur, the number of households living in such constrained units houses has substantially decreased across all the Municipal areas from 2001 to 2011. 70 per cent of the households in Bhiwandi, 65 per cent households in Greater Mumbai, 55 per cent in Vasai Virar, 50 per cent in Thane households, 48 per cent of Navi Mumbai and Ulhasnagar households and 45 per cent of Kalyan-Dombivali reside in houses with “one room” or “no exclusive room”. More than 50 per cent of the households in Kalyan-Dombivali, Mira-Bhayander, Ambernath, Badlapur, Panvel and Navi Mumbai CT live in houses with 2-3 rooms. Almost 13 per cent of the households in Panvel live in houses with 4 rooms and more.

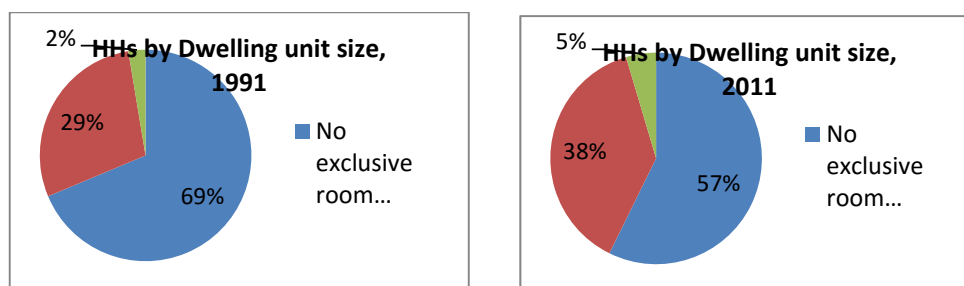


Figure 22 : Households by Dwelling Unit Size (2001 and 2011)

The per capita living space in MMR is 4 to 6 sq.m. As compared to other Asian metropolitan regions it is very low.

2.6.4 Housing Condition

a) Dilapidated Houses:

The quality of available housing stock in MMR districts seems to have improved over the last decade. Data indicates that the rate of dilapidation has gone down in all ULBs and households living in dilapidated houses have decreased significantly. However, Greater Mumbai has a significant share of older building stock in MMR. There are several chawls built as workers/rental housing by textile mill owners/landlords in the first few decades of the past century. Over time, these chawls became crowded and further, freezing of rents at 1940 levels resulted in dilapidation on account of lack of maintenance. There are 16,104 buildings surviving out of the 19,642 cessed¹³ buildings built before 1969 in the city, as per Board published Disaster Management Plan on the MHADA website. These buildings have an estimated 4,83,120 units assuming that they house around 30 tenements each. In addition, the Bombay Development Directorate had built 207 buildings as public housing in the early 1920s which comprise 16,544 tenements.¹⁴ Totally these older housing stock all together contribute an estimated 4,99,664 units and they are entirely located in Greater Mumbai. This would mean an annual supply of 24,983 units to address this need, which can only be met through a redevelopment strategy. In addition to the dilapidated housing stock, one also needs to factor in the replacement of buildings that would get dilapidated in future, while arriving at the future need. A dilapidation rate of 1 per cent could be considered to factor in for the dilapidation of the housing stock in future. This demand is almost entirely located within Greater Mumbai.

b) Slums:

Nearly a third of the MMR's households (27 per cent) is currently living in slums. Of this, Greater Mumbai has the highest share of slum households in MMR (79 per cent with 11,01,655 households). Thane (5.2 per cent with 73,256 households) and Bhiwandi (4.7 per cent with 65,208 households) are other cities with sizeable slum households. The average household size in slums of MMR has also

¹³ which are classified as 'Cessed Buildings' due to a cess (tax) paid by the occupants to MHADA.

¹⁴ There are also 33 BIT built chawls, built before 1920 by the Bombay Improvement Trust numbering 21,387 tenements. However, since their current number is not known, they have not been included in the calculations. Arnold, C. E. (2012). The Bombay Improvement Trust, Bombay Mill owners And The Debate Over Housing Bombay's Millworkers, 1896-1918. *Essays in Economic & Business History*, 30

reduced from 4.83 to 4.63 as per census data. In terms of the percentage of the city population living in slums across various cities in the MMR, it varies widely from 63 per cent to 3 per cent. The largest share of slum population in the city is in Ambernath (63 per cent) followed by Bhiwandi Nizampur (50 per cent) and Greater Mumbai (41.33 per cent) and the smallest is in Vasai Virar MC.

Table 40: Overview of Slum Houses and Households in MMR

Sl. No.	Slum Census Houses and Households	2011	
1	Total number of slum census houses	19,53,072	100%
a	Total number of slum households	13,87,624	100%
2	Use to which Slum Census Houses are put to		
a	Houses used as Residence	13,51,136	71%
b	Houses used as Residence-cum-other use	36,488	
c	Number of vacant houses	1,77,089	9%
d	Number of occupied locked census houses	22,908	1%
e	Houses put to other than Residential use	3,65,451	19%
3	Number of households with condition of Census House		
a	Good	8,36,700	60%
b	Livable	5,22,182	39%
c	Dilapidated	28,742	1%
4	Number of Households by Tenure		
a	Owned	10,05,466	72%
b	Rented	3,62,598	26%
c	Any other	23,621	2%
5	Number of Households by Number of Dwelling Rooms		
a	No Exclusive Room	1,29,292	9%
b	One Room	9,64,972	70%
c	Two Rooms	2,21,133	16%
d	More Than Two Rooms	76,288	5%

Source: Census of India 2011

Size of dwelling unit in slum houses: In MMR, 79 per cent of the slum households live in tenements with “no exclusive room” and “one room” (which is substantially higher than the share of non-slum households living in similar tenements which is 57 per cent), 20 per cent live in tenements with two to three rooms and only 2 per cent of them live in houses with four and more rooms (Table 40). Almost 80 per cent of the slum population live in dwelling units with “no exclusive room” and “one room” in Mumbai suburban district, Kalyan-Dombivali, Mira Bhayander and Navi Mumbai whereas in the municipal council areas, more than 40 per cent of the slum population have access to “two room” and “three room” houses in Ambernath, Badlapur and Khopoli.

Vacant Slum Houses: Census captures the features of slums including vacancy (Table 40). 71 per cent of the occupied houses are being put to residential use, 19 per cent are used for non-residential purposes and 9 per cent of the slum census houses are vacant. Further, it is seen that 70 per cent of the slum population living in Mumbai, Thane, Badlapur and Panvel own their house.

2.6.5 Availability of formal houses:

Out of 69,92,297 census houses in Municipal areas, (28 per cent) are slum houses, 2,39,276 (3%) are unauthorized structures and 28,116 (1 per cent) are dilapidated structures. In addition to this, 11 per cent houses are vacant (excluding slums) and another 14 per cent are put to other than residential use (excluding slums). This implies that formal houses in good condition, being put to residential use are only about 33 per cent of the current stock (refer to Map 14).

2.6.6 Affordability of Housing in the Region

In spite of the per capita income (based on NDDP of Mumbai in the year 2005-06) being Rs. 65,625, which is almost twice that of Maharashtra (Source - Directorate of Economics and Statistics), almost 50 per cent of the households live in slums, dilapidated houses and unauthorized houses in the ULB areas of MMR indicating that a major share of the population does not have access to formal,

affordable housing of an acceptable standard. The per capita living space in Greater Mumbai is the lowest at 4 to 6 sq. m. It is observed that the housing prices are inversely proportionate to the distance from the Island City.

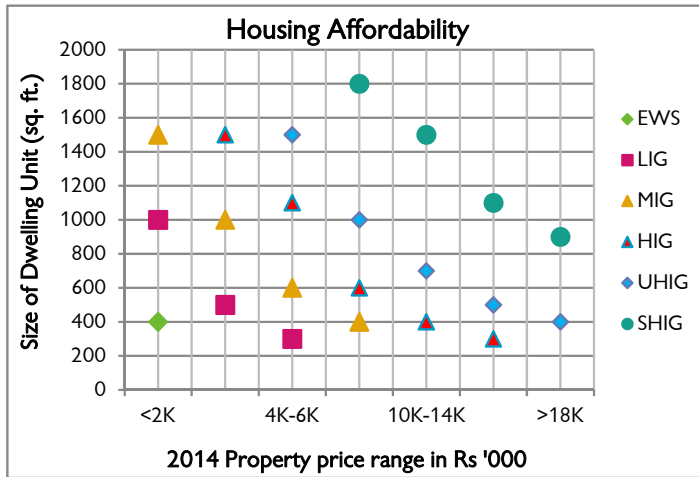


Figure 23: Housing Affordability by Dwelling Unit Size

Correlating MHADA's income classification with price contour maps drawn using Accommodation Times data (refer Map nos. 16 and 16A) and assuming that tenements with an area of 300 sq. ft. are available, an EWS household can afford a house in the peripheral cities of Bhayander, Navgarh Manikpur, Nallasopara and Virar towards the north, Dombivali, Kalyan, Ulhasnagar, Ambernath and Badlapur towards the east and Panvel, Kalamboli and Kamothe towards south-east of Mumbai. Similarly, an LIG household can

afford a house in Goregaon, Malad, Borivali, Kandivali and Dahisar in the north and Sanpada and Belapur to the east of Mumbai. However, since the supply of smaller affordable dwelling units in these areas is negligible, in reality, the options available for the EWS and LIG households are extremely limited. Plotting affordability of various income groups against the dwelling unit size and per sq. ft. sale price as (represented in fig 23) reveals the constraints facing affordable housing in the region. Even an HIG household can afford only a 300 sq. ft. house at a price range of Rs. 14,000-18,000 per sq.ft. which is equivalent to what an EWS and LIG household can afford at a price range of upto 4,000 per sq.ft. at some distant location on the outskirts of the region.

2.6.7 Housing Supply in MMR

Throughout the decades post-independence, there has been a continuing shortfall in the supply of formal housing by public and private sector which has led to either slums, or overcrowding. A review of the shelter supply over the last few decades reveals that over the years and especially since the 1990s, the supply of units by the public sector has been insignificant and decreasing steadily. The average annual supply of the public sector housing has been around 8,133 units over the past few decades (see Table 41).

Table 41 Housing Supply by Public Agencies in MMR

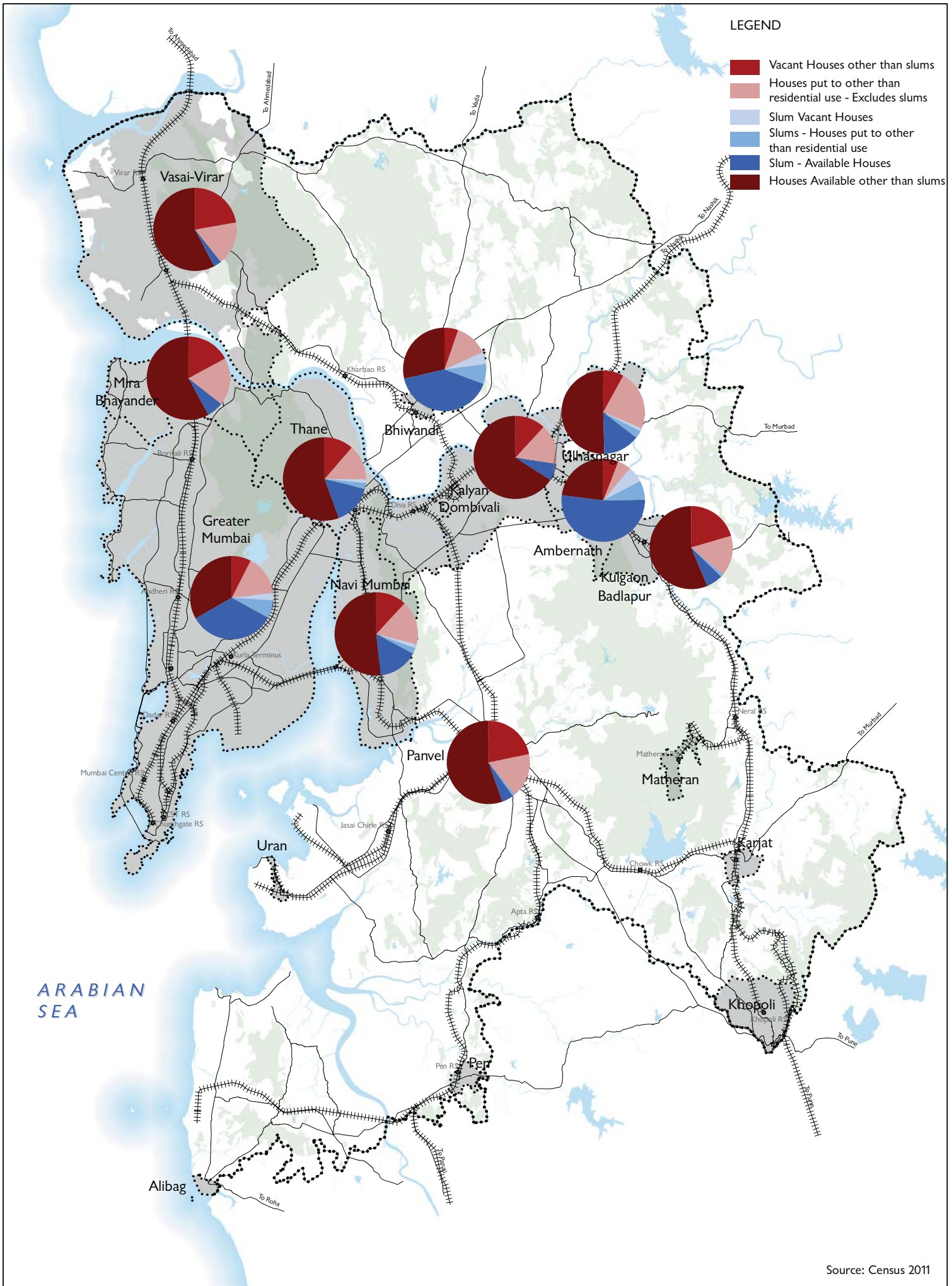
No	Period	CIDCO		MHADA		SRA	MMRDA-SRA	SRA Total	Total Supply	Decadal supply	Avg annual supply
1	1981-85	37670	57090	24984	30678				62654	87768	8777
2	1986-90	19420		5694					25114		
3	1991-95	27817	45158	22933	36510				50750	81668	8167
4	1996-00	17341		13577					30918		
5	2001-07	10488	10488	11130	33723			157726	21618	74543*	7454
6	2006-10	0		22593		1,27,394	30332		2,01,937		
	Total		1,12,736		100911	1,27,394	30,332	1,57,726	39,2991	2,43,979	
	Avg annual supply		1,879		1,682			2,629	6,549	8,133	8,132

*Does not include SRA contribution- through private sector intervention of 1,27,394 units. Total Pvt sector contribution is 1,49, 012 units in this decade, of which 1,17, 726 units are replacement units after considering that approx 40,000 units are free sale units developed through DCR33(10). SRA units (Total) : 1,57,726 (73,751 under DCR 33(10) Clause 3.11; 82,188 under DCR 33(10);1787 under DCR 33(14)D).

Reliable data on the extent and nature of housing supply by the private sector is hard to procure in the absence of any information system that is maintained by concerned agencies. The contribution of the private sector is estimated after deductions for slum houses produced and is around 1,00,000 units annually on average.

LEGEND

- Vacant Houses other than slums
- Houses put to other than residential use - Excludes slums
- Slum Vacant Houses
- Slums - Houses put to other than residential use
- Slum - Available Houses
- Houses Available other than slums

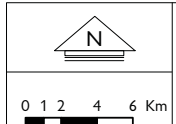


Source: Census 2011

Housing Stock in ULBs, 2011

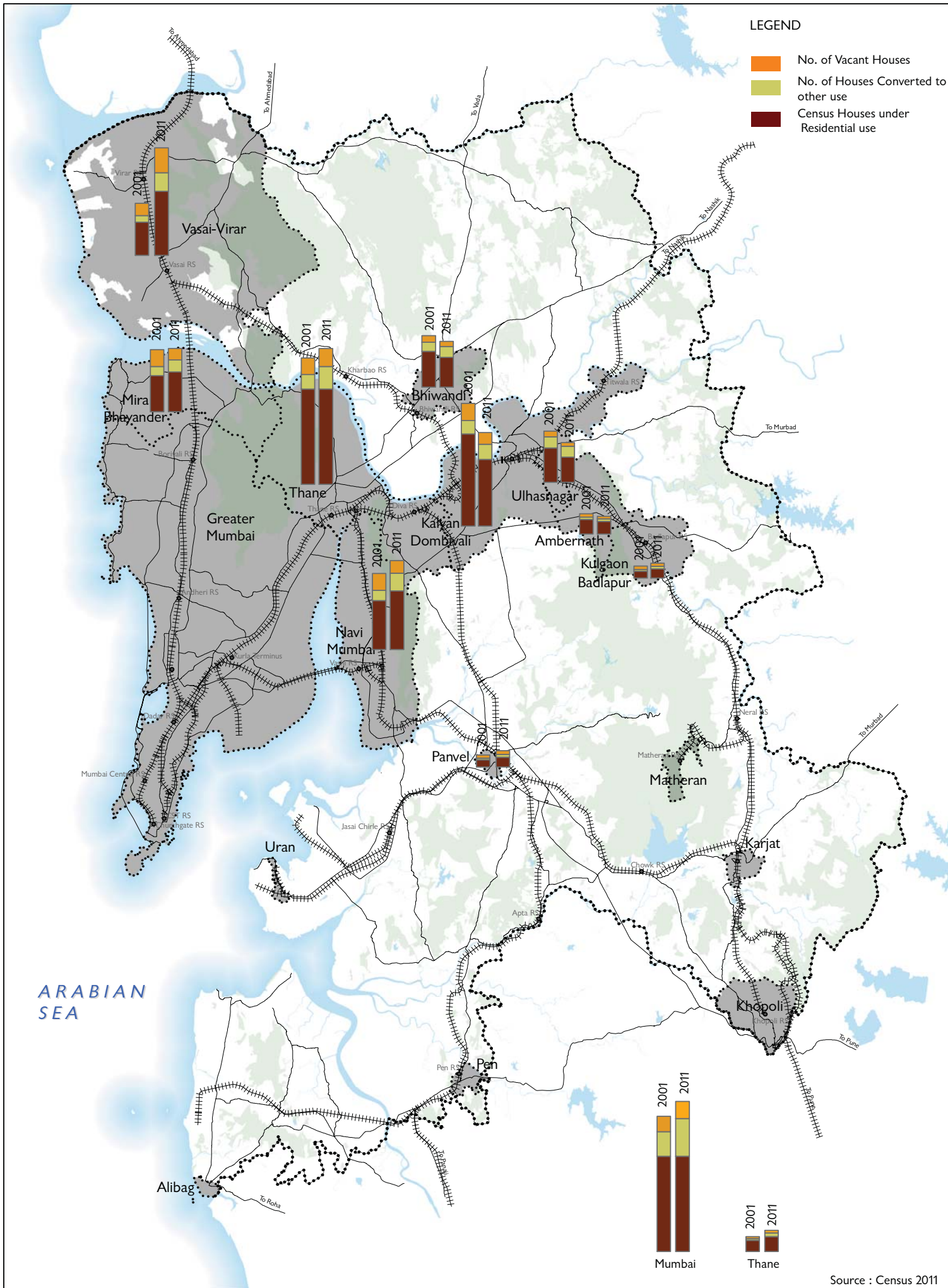
Modified Draft Mumbai Metropolitan Regional Plan 2016-36

- Railway Stations
- Road
- MMR Boundary
- ULB Boundary
- Rail
- Forest
- Waterbody



LEGEND

- No. of Vacant Houses
- No. of Houses Converted to other use
- Census Houses under Residential use

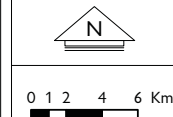


Source : Census 2011

Vacant Houses and Houses Converted to other uses in ULBs

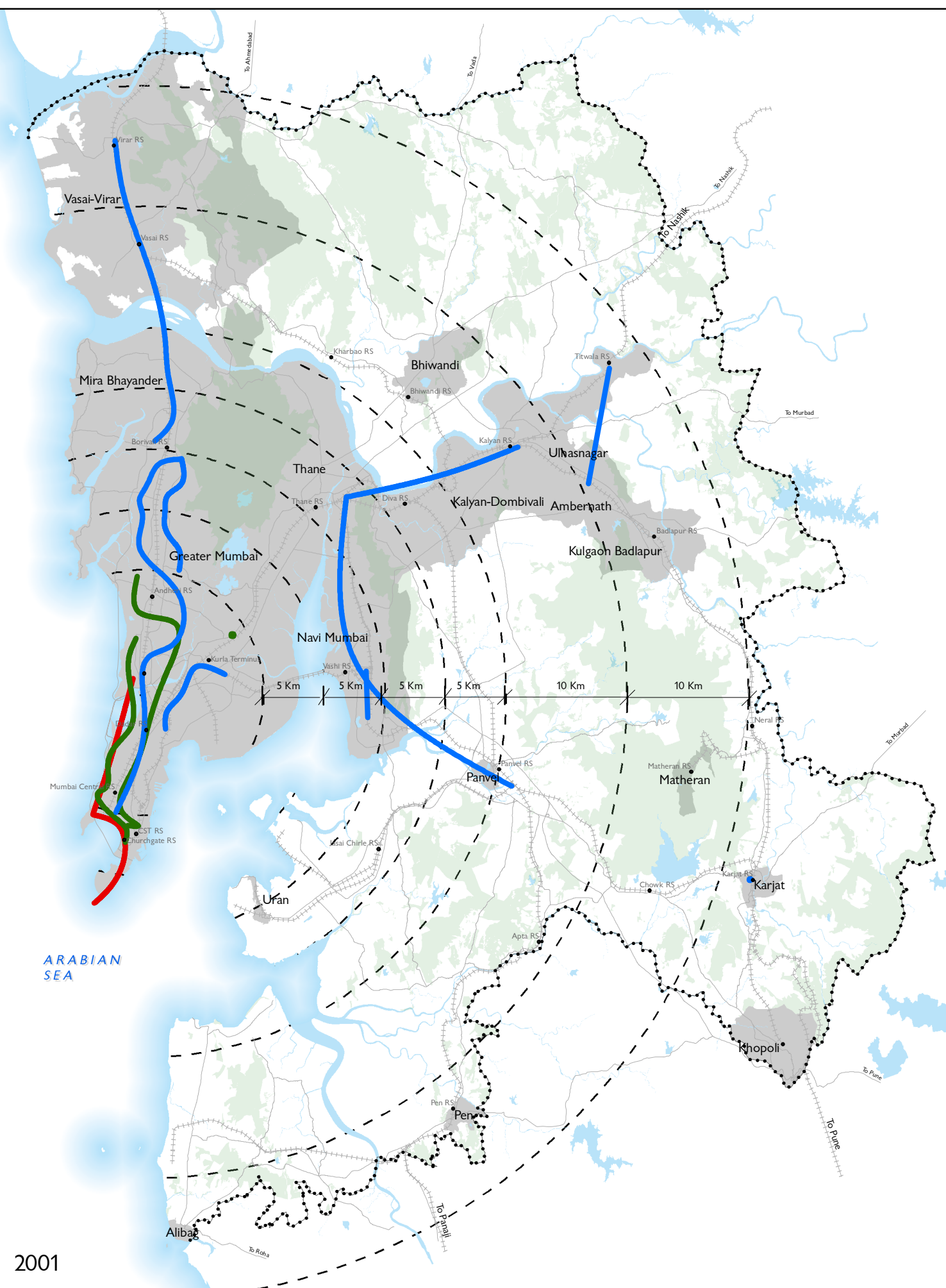
Modified Draft Mumbai Metropolitan Regional Plan 2016-36

- Railway Stations
- Road
- MMR Boundary
- ULB Boundary
- Rail
- Forest
- Waterbody

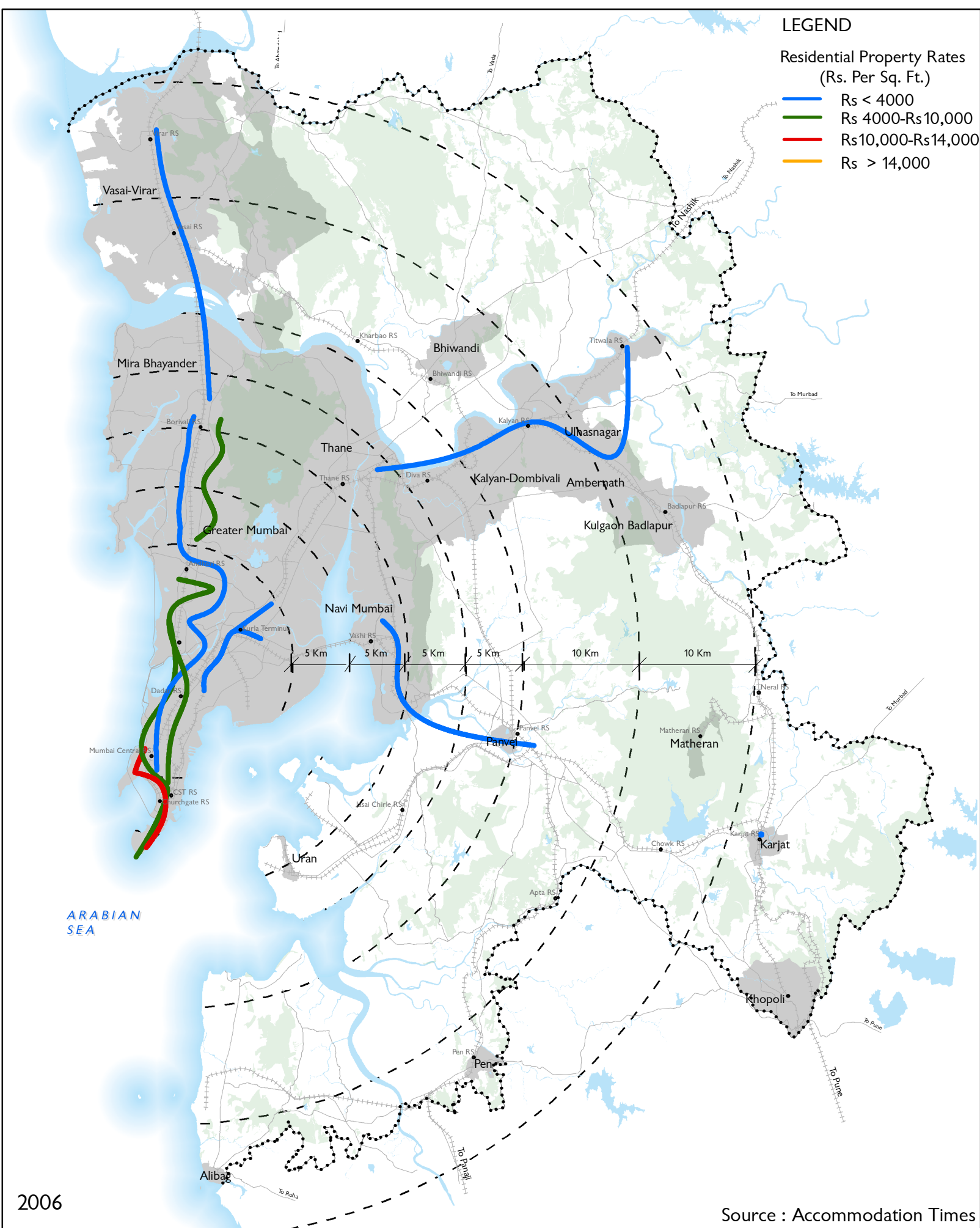


LEGEND

- Residential Property Rates (Rs. Per Sq. Ft.)**
- Rs < 4000
 - Rs 4000-Rs10,000
 - Rs10,000-Rs14,000
 - Rs > 14,000



2001

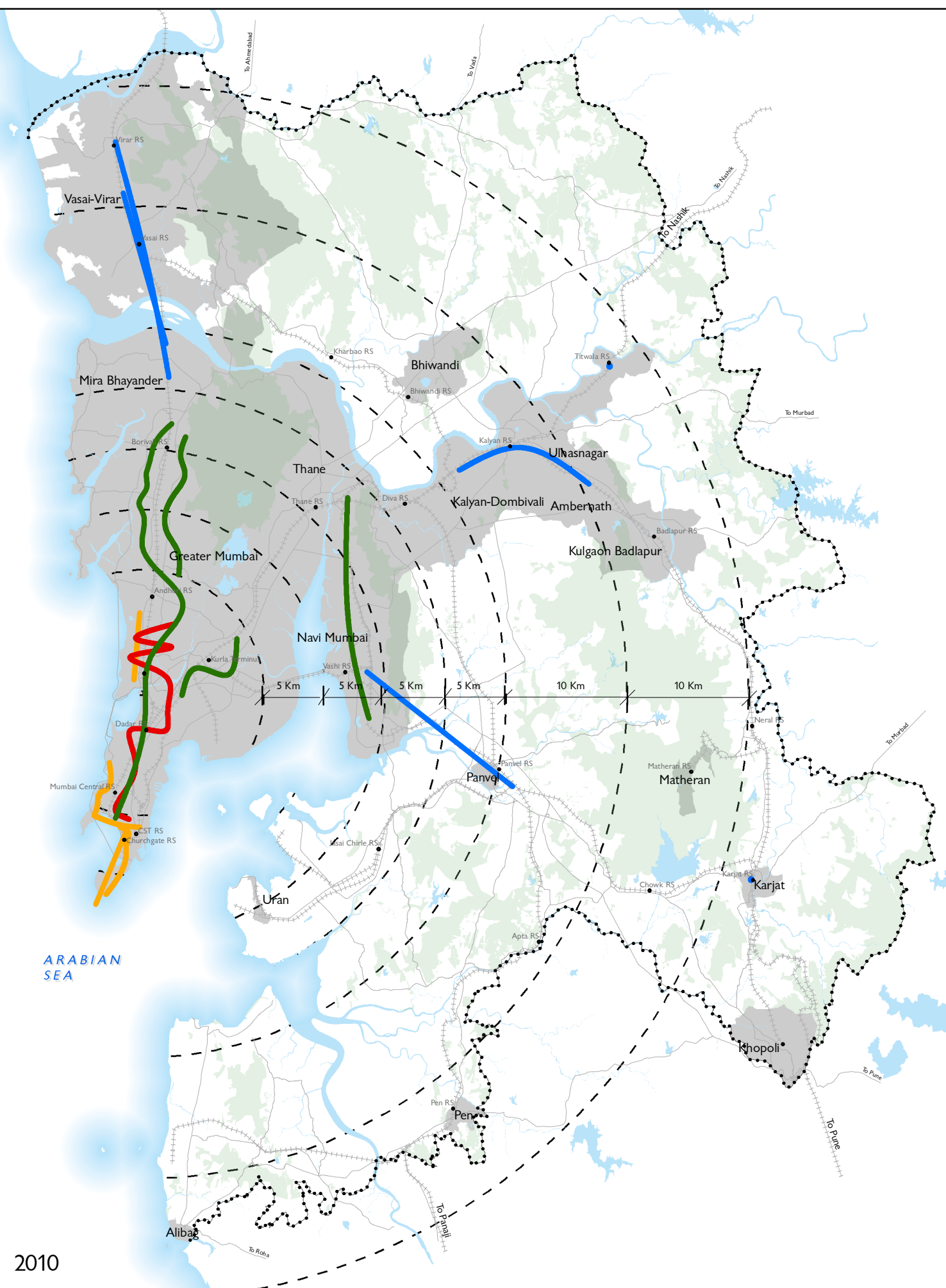


2006

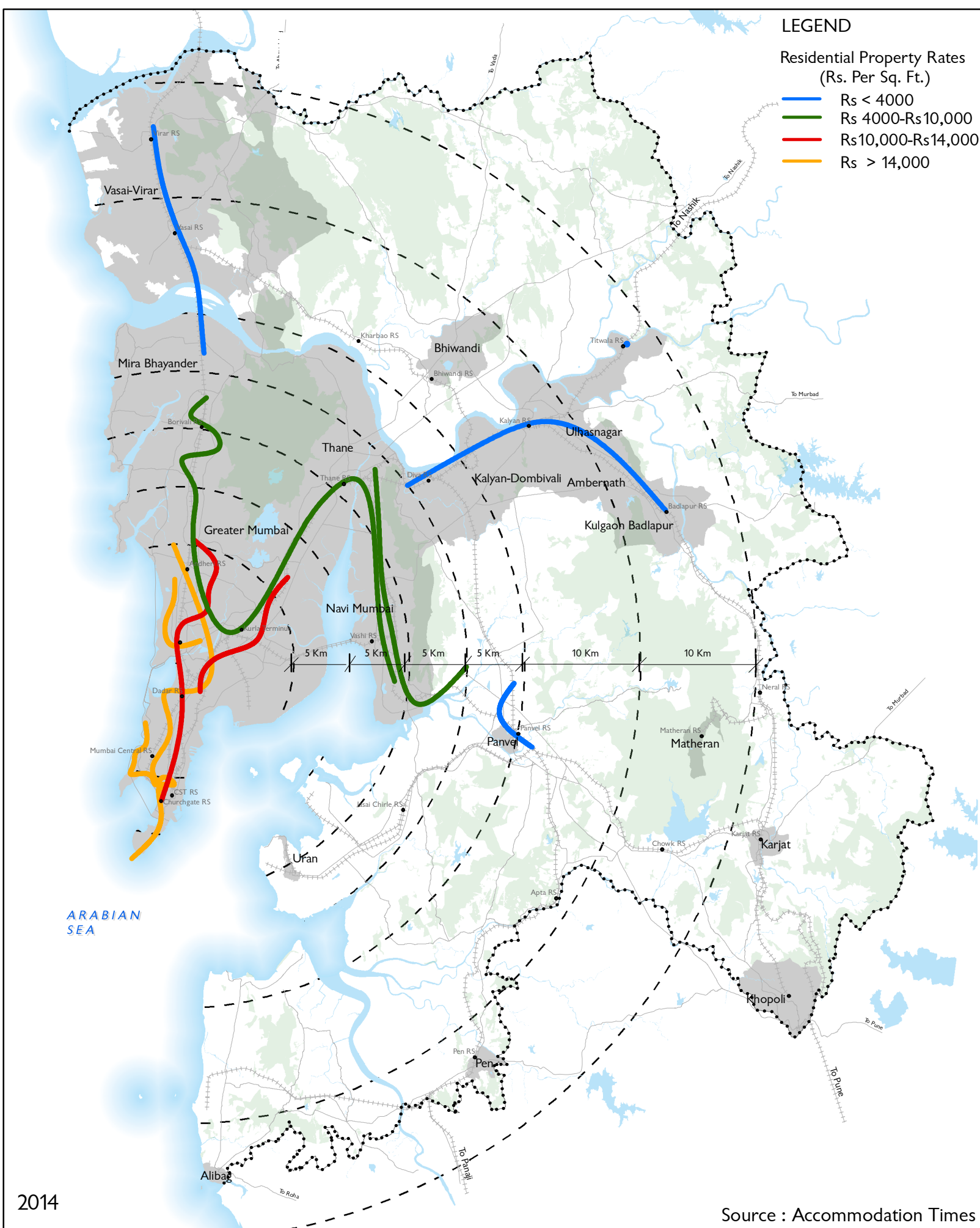
Source : Accommodation Times

LEGEND

- Residential Property Rates (Rs. Per Sq. Ft.)**
- Rs < 4000
 - Rs 4000-Rs10,000
 - Rs10,000-Rs14,000
 - Rs > 14,000



2010



2014

Source : Accommodation Times

The housing stock produced by the private sector by and large does not address the needs of the EWS or the LIG income groups.

The expected average annual new housing stock that will be produced by the public sector in the coming decade 2011-21 is around 50,300 units but of these, only around 8,630 units will be fresh stock since the remaining 41,670 units are replacement units by SRA and MMRDA, as indicated above. However, on perusing the details of housing produced by CIDCO and MHADA, it appears that if these agencies match their best annual performances, and through the use of other policies, the public sector could perhaps supply around 15,000 units annually.

It must be noted that the details above do not capture inputs through some programmes (due to lack of complete data) that have provided houses in the last couple of decades like the Shivshahi Punarvasan Prakalp Ltd (SPPL) and the Basic Services for the Urban Poor program under the JNNURM. The SPPL seems to have delivered around 10,000 units while the BSUP seems to have delivered around 25,000 units under the JNNURM program which is no longer in existence.

Table 42: Expected Supply of Housing Units in MMR (2011-21)

Name of Agency	Decadal Supply 2011-21 (expected)	Average Annual Supply
CIDCO	82,224	8,222
MHADA	4,062	406
MMRDA-Rental	1,06,000	1,060
Total not including replacement units (SRA)	1,12,286	11,228
SRA	3,06,482*	30,648
MMRDA-SRA	4,189*	419
Total	5,02,957	50,295

Sources: CIDCO, MHADA, SRA, MMRDA * replacement stock

2.6.8 Changing Role of the Government

The trajectory of Mumbai's growth from a colonial port to a booming textile and industrial centre to the country's financial capital has been marked by periods of phenomenal growth, largely due to migration of people looking for work, from all parts of the country. Accompanying this population boom at various periods, has been a great demand for housing. The role of Government in the provision of housing has changed dramatically over time from that of being a provider to that of a facilitator. Housing in MMR over the years has been provided through a variety of interventions as under:

1. Public Sector Housing
2. Employers' providing Housing for their Employees
3. Private Sector Housing
4. Cooperative Housing Societies

Post-independence to 1970: The Government was the main provider of public housing. The Bombay Housing Board was formed in 1949 and the earliest housing schemes included houses for industrial workers, subsidized low- income housing and tenant-ownership schemes for all income groups. The major responsibility of housing was assigned to the public sector, industrial and commercial establishments while the private sector was assigned a minor role since their efforts were seen as unreliable and catering to the higher income groups. Employee housing, was largely a Government undertaking in the early decades post-independence with State Governments playing a significant role in creating affordable housing at highly subsidized rate with Central Government funding.

1990 onwards: Since the 1990s, new schemes were introduced to redevelop slums with market intervention. Incentives in the form of additional development rights were offered to private developers to create free affordable housing for slum dwellers. In Greater Mumbai, the Slum Redevelopment Authority was created in 1995.

Of the various housing programmes and schemes implemented in the MMR, the Slum Redevelopment Scheme and Rental Housing Scheme have been analysed below:

SWOT analysis of the Slum Redevelopment Scheme	
<p>Strengths</p> <ul style="list-style-type: none"> • Reduced need for mortgage finance on account of free houses • No burden on the exchequer in spite of heavy subsidy • Enabled access to slum encumbered land for development • Secured property rights, appreciation of property values and improved physical attributes of the house • On-site redevelopment where possible 	<p>Weaknesses</p> <ul style="list-style-type: none"> • High property values – a prerequisite for cross subsidy • Housing subsidy of upto 113 per cent (free house + Rs 20,000 corpus for future maintenance) • 75 per cent consent mandatory, property conflicts • Lack of development finance options as investors wary on account of poor track record of SRS projects • Delivered much less than the expected supply • Resistance from slum dwellers with housing units larger than 225 sq. ft. • Livelihood aspect of housing not considered • Addresses pre-2000 slum dwellers only, slum dwellers on unbuildable locations left unaddressed
<p>Opportunities</p> <ul style="list-style-type: none"> • Can remove the stigma of slums by greatly improving the quality of housing • Possibility of beneficiary contribution may be explored to make the scheme more viable 	<p>Threats</p> <ul style="list-style-type: none"> • Relaxation of land and building development regulations - adverse effect of standard of living • Increased housing supply on account of SRS likely to adversely affect the market rates, thereby deter the cross subsidy • Established a legacy for free housing for non-slum dwellers as well
SWOT analysis of the Rental Housing Scheme	
<p>Strengths</p> <ul style="list-style-type: none"> • Policy objective: Prevention of new slums by providing affordable rental housing • No burden on the exchequer in spite of heavy subsidy • Permissible only on unencumbered land, hence no entitlement for free houses to original occupants 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Extremely high density of 2,000 dwelling unit/Ha • Mode of management of rental housing stock not worked out • Allotment policy not detailed out • Families with domicile certificate eligible for allotment – migrants from outside Maharashtra excluded • Provision of physical infrastructure is an issue
<p>Opportunities</p> <ul style="list-style-type: none"> • Creation of substantial rental housing stock 	<p>Threats</p> <ul style="list-style-type: none"> • Relaxation of land and building development regulations to accommodate high density - adverse effect of standard of living • Creation of extremely high density pockets with 4.0 FSI in very low density areas (G1 zone with 0.2 FSI)

2.6.9 Constraints to Housing Development

From the discussion of the current housing scenario, it emerges that there are several constraints to housing development in MMR.

- a. Land is scarce in Greater Mumbai (which has the major share of formal jobs in the region) and highly priced resulting in it being one of the costliest real estates in the world. Additionally, the Coastal Zone Management Regulations, 1991 amended in January 2011 has further constrained land supply. It has affected new construction in the CRZ areas¹⁵. Also, the policies of the State do not apply to land under Central Government. This has kept a large chunk of land from being utilized for affordable housing. The current spatial distribution of the population in MMR is a direct result of the availability of affordable housing in MMR (along transit corridors).
- b. The public sector is playing an increasingly diminished role in the direct provision of affordable housing and houses provided by the private sector cater largely to the high income groups and are beyond the reach of the majority of the population. Renting is not encouraged. There are therefore not many rental options available. People are therefore either
 - i) forced to locate themselves in distant suburbs, further and further away from Greater Mumbai, in search of affordable housing at locations that are connected by suburban rail to Greater Mumbai often commuting for a couple of hours in each direction.
 - ii) Left with no option but to provide for themselves through informal solutions like slums or illegal housing (27 percent) of all of households in MMR live in slums) or live in overcrowded conditions.

2.7. Physical Infrastructure

Availability of good infrastructure is the backbone of economic growth. Quality of life in the metropolitan context is closely linked to the quality of available urban infrastructure. Efficient water supply systems, sewerage systems and solid waste collection and disposal systems are essential for good urban health and for leading productive lifestyles. An overview of the existing situation in MMR is presented below followed by the issues and challenges.

2.7.1. Water

The MMR is part of the North Konkan Sub-Basin and completely falls within the Mumbai Hydrometric area (MHA) which comprises of four major river valleys of Vaitarna, Ulhas, Patalganga and Amba. MMR's water is largely drawn from the Vaitarna river basin (66.5 per cent), while the Ulhas river basin supplies 20 per cent of the water required and the Patalganga river basin supplies 11.5 per cent. The Amba basin provides a relatively minor share of 2 per cent of the requirement. The MHA has the potential to supply more than 7890 M.Cu.M of water¹⁶. The needs of MMR's urban and rural areas are met through a water supply system that taps water from these rivers through dams, reservoirs and river water supply systems (refer Map no. 17).

The estimation of the dynamic ground water resources of Maharashtra¹⁷, with the water shed as the unit of the assessment, showed that only 11 per cent of Thane's and 13 per cent of Raigad's total ground water resource is currently being utilized for irrigation, domestic and industrial uses.

a) Water Resource Development Plans for MMR

To address the water needs of Mumbai and the metropolitan region, several plans and schemes have been prepared over the years. The earliest schemes were in colonial times to address Bombay's water requirements. Since then, there have been several plans drawn up for the region. These include the Survey of Water Sources for the Region conducted prior to the RP 1970, the Feasibility report on Water Resources Study of Bombay Hydrometric area (1977) done for BMRDA by Kirlsolkar consultants, the Water Resource Development Plan (1983): MMRDA submitted to the State

¹⁵Though the basic objective of the regulation is to protect ecologically sensitive coastal areas particularly the wetlands, mangroves and salt pans, it froze development within CRZ areas as per the 1991 Development Plans and Development Control Regulations thereby curtailing any new development. MMR has a significant stretch under CRZ. Redevelopment of dilapidated houses and construction of houses for EWS/LIG is permitted in CRZ areas, which is inadequate.

¹⁶ Planning Committee Report, 1994

¹⁷ Conducted by Ground Water Surveys and Development Agency (GSDA) in collaboration with CGWB as per the recommendations of GEC 1997 Methodology(2007-2008)

Government for 2001 and the latest being the Report of Committee for Finalisation of Water Resources for MMR (excluding Mumbai), 2005 (Chitale Committee Report).

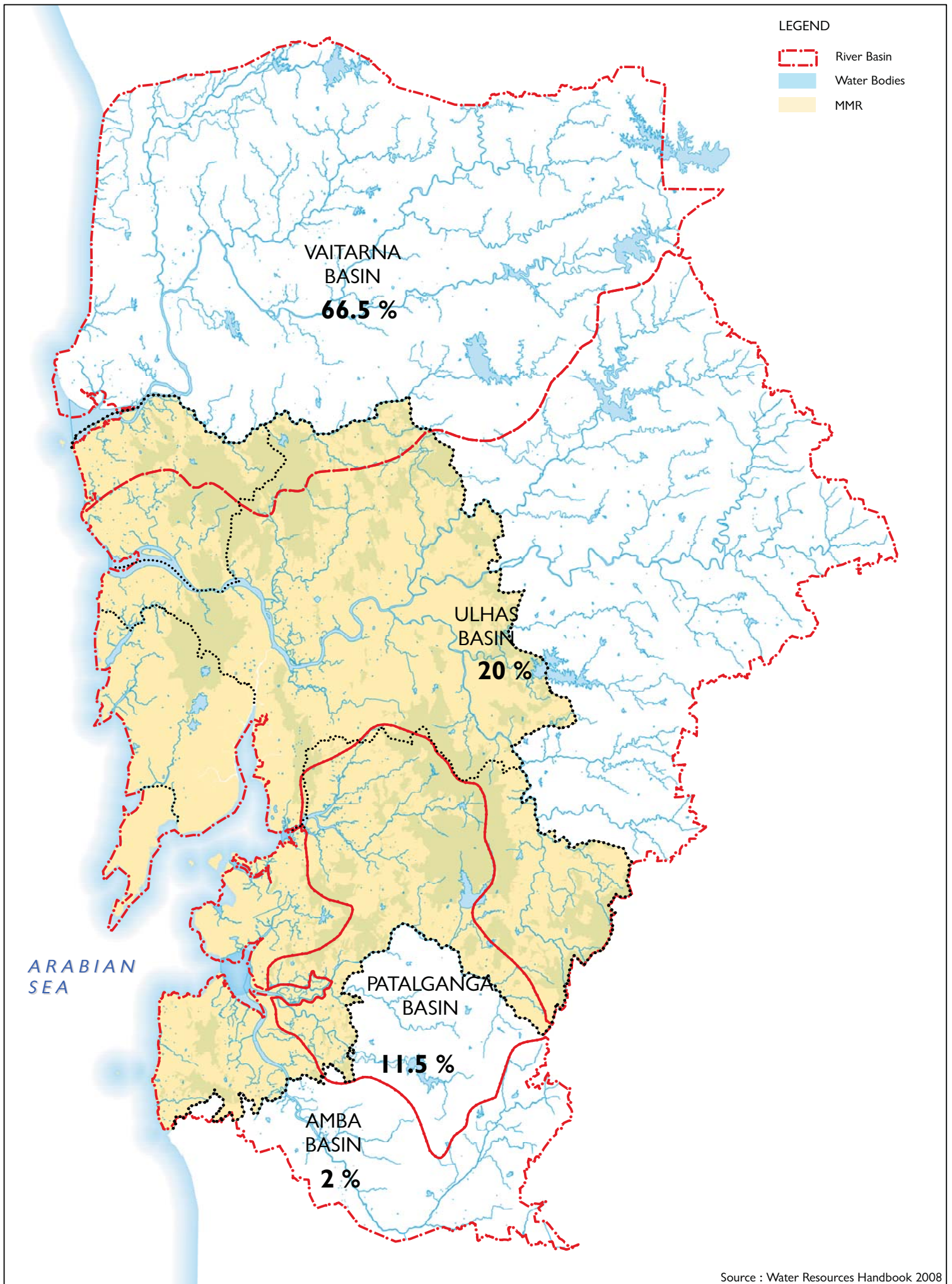
The Chitale Committee divided the MMR into 8 zones viz. Mumbai (Zone I), Mira Bhayander and Urban and Rural areas of Vasai Virar (Zone II), Urban and rural areas of Thane district in MMR (Excluding Mira Bhayandar and Vasai Virar) (Zone III), the water demand was estimated for 2011 was 7610 MLD and 11279 MLD for 2034, water norms considered were 200 LPCD for large urban towns (except Mumbai where it was considered 240 LPCD), 150 LPCD for small towns, 70 LPCD for rural areas, the Chitale Committee Report identified potential sources of water for development and recommended projects to be developed in future along with timelines. However, due to several limitations the development of water sources did not materialize as planned.

b) Current Water Sources in MMR: These include surface and ground water sources. The storage capacity of the dams and allocation details are mentioned in the table below:

Table 43: Sources of Surface Water in MMR

Sl. No.	Name of Dam	Storage		Water Allocation in MCuM			Dam Ownership
		Gross	Live	Domestic	Industrial	Irrigation	
Vaitarna Basin							
1	Upper Vaitarna *	350.72	328.06	221.82			MCGM
2	Middle Vaitarna*	193	193	193			MCGM
3	Modak Sagar *	204.98	152.49	128.75			MCGM
4	Tansa *	184	160.07	145.08			MCGM
5	Bhatsa **	976.1	711.86	509.60		87.5	WRD
6	Surya **	299.01	286.32	65.70	45.60	175.02	WRD
7	Usgaon ^	5.16	4.96				VVCMC
8	Pelhar ^	3.68	3.56				VVCMC
Ulhas Basin							
9	Ulhas River (Bhivpuri Andhra Dam) ++	NA	339.14	163	40.75	33.25	Tata
10	Barvi **	176.9	173.14	176.86			MIDC
11	Vihar *	41.76	36.81				MCGM
12	Tulsi *	10.41	8.04				MCGM
13	Papadkhind Dam @	0.515	0.35				VVCMC
14	Kalu River (Titwala)	NA	NA				KDMC
15	Chikloli (Ambarnath)***		1.9	1.65			MJP
16	Varala Lake (Bhiwandi)						BNCMC
17	Pej River (Dahivali)	NA	NA				Karjat MCI
18	Palasdari Dam (Karjat)						
19	Charlette Lake						Matheran MCI
Patalganga Basin							
20	Patalganga (Khopoli)		100		100		
21	Hetawane (Navi Mumbai)++		144.98	2.05	17.98	124.95	WRD
22	Morbe ++	165.4	162.25	129.80	32.45		NMMC
23	Dehrang (Panvel)***		3.63		3.63		Panvel MCI
24	Ambhegar Dam (Pen)			0.42			
25	Bhogawati River (Pen)	NA	NA				
26	Ransai (Uran, JNPT) +	10.00	7.15				MIDC
Amba Basin							
27	Amba (Nagothane) ***			292	292		

Sources: 1. *MCGM Data Book, ** Water Resources Handbook 2008, +MIDC website, *** Chitale Committee Report, ++ KIDC, @MJP's DPR, ^ VVCMC. 2.



Source : Water Resources Handbook 2008

1. Surface Water

These sources are used for a variety of purposes ranging from domestic uses in municipal areas, to non-domestic uses like industrial uses and irrigation purposes.

- i. **Municipal Domestic Use:** The current water supply for domestic use from surface source to the different ULBs is 5354.51 MLD. In the urban areas, the municipal corporations and councils supply water for domestic and in some cases industrial use. The detailed allocation of the total water supply to the different ULBs for domestic use is given in Table 44. It is observed that 7 ULBs have reported that they have been able to achieve 100 per cent population coverage of piped water supply in their jurisdiction. In Alibag, only 30 per cent of the population is covered with piped water supply, which is the lowest in MMR.
- ii. **Industrial Use:** MIDC supplies 562.2 MLD of water through its dammed reservoirs of Barvi, Ransai and head works on Patalganga River and at Shahad Temghar for industrial uses in the region. Individual ULBs also supply some water for industrial use from its water allocations within its jurisdictions. MCGM supplies 352 MLD of water for industrial use through its own dammed sources in its jurisdiction which includes MIDC areas. In addition there are private industrial areas within the municipal areas and rest of MMR who have water reservations through permission from the Government of Maharashtra to draw water through different schemes and sources.
- iii. **Rural water supply:** The rural areas depend on a variety of sources for their water needs. These range from piped water from reservoirs, rivers, lakes and ground water sources. Zilla Parishads are responsible for supplying potable water for rural domestic use. All villages in MMR have access to a water source however only 59 per cent villages have population coverage in terms of access to water supply; 64 per cent have 100 per cent access to piped water supply while 19 per cent have no access to piped water supply.¹⁸ However, in terms of supply, none of the villages in MMR have the recommended 70lpcd water supply as per CPHEEO standards; 60 per cent villages have 40-69 LPCD of water supply and 24 per cent villages have water supply below 40 lpcd. The MIDC supplies approximately 27.5 MLD of water to some villages through which their pipelines pass.
- iv. **Non-Domestic Use:** There are additional surface water sources in MMR that are used for purposes other than domestic use. The major ones are GIP water tank, Jambhiwali, Hattipada, Dhamani, Usaran and Thakurwadi.

2. Ground Water

The watersheds in the MMR are in a reasonably good state. Amongst the different Tehsils in the MMR, Panvel, Uran and Alibag are the three Tehsils which have a high stage of ground water development. In addition to the surface water sources, the municipal council areas and rural areas in MMR also utilise the ground water available in the region. Ground water is being utilized for both urban and rural water supply in MMR. ULBs depend on ground water sources for another 2.825 MLD of water of their water requirement. The rural areas of Bhiwandi and Karjat Tehsils have maximum number of hand pumps (Bhiwandi has 53 per cent of the total hand pumps of MMR followed by Karjat which has 12 per cent of the total) in MMR indicating dependency of ground water as the source of water supply. Kalyan and Vasai also show dependency on ground water.

Table 44: Municipal Domestic Water Supply

Zone No.	Zone	Jurisdiction (Litres/capita/day*), per cent covered	Available Source		Dam Ownership/ Implementing Agency
			Location	(MLD)	
1	Greater Mumbai	Greater Mumbai (252 LPCD) 100%	Upper Vaitarna	635.00	MCGM
			Middle Vaitarna	455.00	MCGM
			Modak Sagar	455.00	MCGM
			Tansa	325.00	MCGM
			Vihar	150.00	MCGM
			Tulsi	18.00	MCGM
			Bhatsa	1590.00	WRD
			Total**	3276.00	

¹⁸ Source: NRDWP website was referred to assess the population covered with access to water supply in rural areas.

Zone No.	Zone	Jurisdiction (Litres/capita/day*), per cent covered	Available Source		Dam Ownership/ Implementing Agency
			Location	(MLD)	
2	Western Region	Vasai - Virar City (70 LPCD urban, 40 LPCD rural) 80%	Pelhar	10.00	VVCMC
			Usgaon	20.00	VVCMC
			Surya (Maswan Weir)	100.00	WRD
			Papadkhind Dam	1.50	VVCMC
			Total	131.50	
		Mira-Bhayander (105 LPCD) 90%	Ulhas River, Shahad Water Supply Scheme	86.00	STEM
	Barvi	50.00	MIDC		
	Total	136.00			
3	North Eastern Region	Thane (211 LPCD) 99%	Bhatsa (TMC's Own)	210.00	WRD
			Tansa & Vaitarna	60.00	WRD
			Ulhas River, Shahad Water Supply Scheme	102.00	STEM
			Barvi Dam (MIDC tapping Point)	120.00	MIDC
		Total	492.00		
		Ulhasnagar (135 LPCD) 100%	Ulhas River, Shahad Water Supply Scheme	115.00	MIDC, UMC
			Barvi system Pale Tapping Point	50.00	
			Total	165.00	
		Kalyan-Dombivali Municipal Corporation (193.5 LPCD) 100%	Ulhas River, Shahad Water Supply Scheme	147.00	KDMC
			Kalu River (Titwala)	4.50	KDMC
			Ulhas River (Mohili)	117.00	KDMC
			Barvi	6.00	MIDC
		Total	268.50		
		Bhiwandi-Nizampur City Municipal Corporation (100 LPCD) 90%	Ulhas River, Shahad Water Supply Scheme	73.00	STEM
			Tansa & Vaitarna	40.00	WRD
			Varala Lake	2.00	BNCMC
			Total	115.00	
		Ambarnath Municipal Council (125 LPCD) 92%	Barrage Head Works On Ulhas river	43.00	MJP
Chikholi Dam	6.00		MJP		
Barvi Dam (MIDC tapping Point)	10.00		MIDC		
Total	59.00				
Kulgaon-Badlapur MCI 90%	Barrage Head Works On Ulhas river	37.00	MJP		
	Total	37.00			
4	Navi Mumbai	Navi Mumbai Mun. Corp.(240 LPCD) 100%	Morbe Dam	360.00	NMMC
			Barvi Dam (MIDC tapping Point)	60.00	MIDC
			Total	420.00	
		Navi Mumbai excluding NMMC	Hetawane	130.00	CIDCO
			Morbe	35.00	NMMC
			Morbe	25.00	MJP
Total	190.00				
5	Panvel - Uran Region	Panvel (135 LPCD) 100%	Dehrang Dam	12.00	Panvel Mun. Council
			MJP Tapping (Patalganga)	4.71	Panvel Mun. Council
			MJP Tapping (Patalganga)	5.29	Panvel Mun. Council
			MIDC Tapping (Patalganga)	3.00	MIDC
			MIDC Tapping (Patalganga)	3.00	MIDC
			MIDC Tapping (Patalganga)	1.50	MIDC
			Total	29.50	
		Uran (92.3 LPCD) 93.4 %	Ransai Dam (MIDC tapping Point)	3.50	MIDC,Uran Mun.Cl.
6	Neral-Karjat Region	Karjat (135 LPCD) 65%	Pej River	8.52	Karjat Mun. Council
			Palasdari Dam	2.50	Karjat Mun. Council
			Total	11.02	
		Khopoli 100%	Patalganga River	6.20	
			Ulhas River-Kumbhe	0.80	MJP
		Matheran 100%	Charlotte Lake- Matheran	0.60	MJP
Total	1.40				
7	Pen-Alibag	Pen 80%	Bhogawati River	6.00	Pen Mun. Council
			Ambheghar Dam	1.39	
			Total	7.39	
		Alibag (135 LPCD) 30%	MIDC tapping on Amba River	5.50	MIDC
			Total	5.50	
		Total MMR		542.7	

Note: * LPCD as reported by ULBs. This list does not include other minor dams in rural MMR that primarily serve local needs.

** 352 MLD water supplied to the Industrial areas within MCGM has been deducted.

Table 45: Existing Water Deficit

All figures in MLD for year 2016

Sr. No.	M. Corp/ Council/ SPAs/ Rural	Exist. Domestic Water Supply	Domestic Demand*	Domestic Water supply Shortfall	Industrial Demand	Comm-ercial Demand	Gross Water Demand	Gross Water Availability	Gross Water Deficit
1	2	3	4	5	6	7= 2% (6+4)	8 = 4+6+7	9=3+6	10= 8-9
1	Greater Mumbai	3,276.0	4,324.58	1,049.00	352.00	93.50	4,770.11	3,628.00	1,142.11
	Zone 1	3,276.0	4,324.58	1,049.00	352.00	93.50	4,770.11	3,628.00	1,142.11
2	Vasai-Virar City	131.50	330.79	199.00		6.60	337.41	131.50	205.91
3	Mira-Bhayander	136.00	216.54	81.00	50.00	5.30	271.88	186.00	85.88
4	VVSNA (24)	3.28	17.59	14.00		0.40	17.94	3.28	14.65
5	Vasai (14)	1.00	2.50	2.00		0.10	2.55	1.00	1.55
	Zone 2	271.78	567.42	296.00	50.00	12.40	629.78	321.78	307.99
6	Thane	492.00	434.78	-57.00	7.00	8.80	450.62	499.00	-48.38
7	Kalyan-Dombivli	268.50	280.56	12.00	20.00	6.00	306.57	288.50	18.07
8	Bhiwandi-Nizampur	115.00	164.65	50.00		3.30	167.94	115.00	52.94
9	Ulhasnagar	165.00	111.33	-54.00		2.20	113.56	165.00	-51.44
10	Ambarnath	59.00	62.44	3.00	50.00	2.20	114.69	109.00	5.69
11	Kulgaon Badlpur	37.00	47.16	10.00		0.90	48.10	37.00	11.10
12	Kalyan 27 Villages	12.53	31.33	19.00		0.60	31.96	12.53	19.43
13	BSNA (61)	11.24	28.09	17.00		0.60	28.65	11.24	17.42
14	AKBSNA (58)	5.05	12.62	8.00		0.30	12.88	5.05	7.83
15	Ambarnath (41+1CT)	1.97	4.94	3.00		0.10	5.03	1.97	3.06
16	Kalyan (50)	1.96	4.90	3.00	2.20	0.10	7.24	4.16	3.08
17	Bhiwandi (161+ 4 CT)	7.81	19.52	12.00		0.40	19.91	7.81	12.10
	Zone 3	1,177.06	1,202.32	26.00	79.20	25.50	1,307.15	1,256.26	50.90
18	Navi Mumbai	420.00	296.04	-124.00	47.00	6.90	349.90	467.00	117.10
19	Panvel	29.50	48.20	19.00	44.00	1.80	94.05	73.50	20.55
20	Uran	3.50	7.50	4.00		0.10	7.65	3.50	4.15
21	Navi Mumbai New Town (56)	190.00	122.09	-68.00		2.40	124.53	190.00	65.47
22	Uran Rural	0.03	0.06	-		0.00	0.07	0.03	0.04
	Zone 4	643.03	473.89	-169.00	91.00	11.20	576.20	734.03	157.83
23	Khopoli	6.20	15.98	10.00		0.30	16.30	6.20	10.10
24	Karjat	11.02	6.85	-4.00		0.10	6.99	11.02	4.03
25	Matheran	1.40	0.70	-1.00		-	0.71	1.40	0.69
26	Karjat (102+1CT)	4.74	11.84	7.00		0.24	12.08	4.74	7.34
27	Khalapur (5)	0.16	0.39	-		0.01	0.40	0.16	0.24
	Zone 5	23.52	35.76	12.00	-	0.65	36.48	23.52	12.96
28	NAINA (270)	14.85	37.14	22.00		0.70	37.88	14.85	23.02
29	Khopla (33)	2.31	5.77	3.00		0.10	5.88	2.31	3.57
30	Panvel (1)	0.01	0.02	-		-	0.02	0.01	0.01
	Zone 6	17.17	42.93	25.00	-	0.80	43.78	17.17	26.60
31	Pen	7.39	9.00	2.00		0.20	9.18	7.39	1.79
32	Pen (2)	0.09	0.22	-		0.00	0.22	0.09	0.14
	Zone 7	7.48	9.22	2.00	-	0.20	9.40	7.48	1.93
33	Alibag	5.50	4.73	-1.00		0.10	4.82	5.50	0.68
34	Alibag (116+2CT)	5.68	14.20	9.00	53.00	1.34	68.54	58.68	9.86
	Zone 8	11.18	18.93	8.00	53.00	1.44	73.36	64.18	9.18
	Total	5,427.22	6,675.05	1,249.00	625.20	145.69	7,446.26	6,052.42	1,551.67

Note: Calculation based on per capita LPCD requirement

Source: Data compiled from ULBs and various agencies

a) Current Zone-wise Water Supply Situation

The water availability in MMR from current sources is 6052 MLD with a current water deficit of 1552 MLD (2016). Of this, 359 MLD (2016) is currently required in the northern areas of MMR viz. rural and urban areas of Thane & Palghar in MMR (Zones 2 and 3) while 51 MLD is the deficit in the southern regions of MMR (Zones 4, 5, 6, 7 & 8) (2016). The deficit has been arrived at by assuming differential per capita norms based on current provision and standards (Mumbai 240 lpcd, Urban 200 LPCD, Rural Area transforming towards Urban Area 150 LPCD and rural 70 LPCD). The current water supply situation and deficit in MMR, zone-wise, in the eight zones demarcated by the Chitale Committee Report, are detailed out below (refer Map no. 18):

- 1) **Zone 1 (Municipal Corporation of Greater Mumbai):** The current water demand (2016) calculated for the zone is 4770 MLD. The current water supply to MCGM from U. Vaitarna, M. Vaitarna, Tansa, Bhatsa, Modak Sagar, Tulsi and Vihar is 3628 MLD. The current estimated water deficit is 1049 MLD for domestic use and gross water deficit is 1142 MLD.
- 2) **Zone 2 (Vasai Virar Sub-Region and Mira-Bhayander City Municipal Corporation):** The current water demand (2016) calculated for the zone is 630 MLD. The current water supply to this zone through Surya, Barvi, Usgaon, Papadkhind and Pelhar Dam is 322 MLD. For the rural areas of VVMC, 7 MLD is supplied from Pelhar reservoir and 15 MLD from well and tankers. The current estimated water deficit is 308 MLD.
- 3) **Zone 3 (Urban and rural areas of Thane, Ambernath, Ulhasnagar, Bhiwandi and Kalyan Tehsils):** The current water demand in the region is 1307 MLD. The zone receives marginal water supplies from Bhatsa, Tansa & Vaitarna reservoirs, Chikhloli dam and the major water supply sources of Barvi and Shahad Temghar water supply schemes. It receives around 1256 MLD of water from its current sources. The region has a current estimated domestic water deficit of 51 MLD.
- 4) **Zone 4 (Navi Mumbai Municipal Corporation, Navi Mumbai new town area, Panvel M.C.I., Uran urban and rural areas):** The current water demand for this zone is 576 MLD. The current water sources for the zone are Morbe, Hetwane, Patalganga River, Barvi and Dehrang which is expected to be sufficient till 2021.
- 5) **Zone 5 (the hilly areas of Khopoli, urban and rural areas of Karjat tehsil and 5 villages of Khalapur tehsil):** The current water demand for the region is 36 MLD. Currently the Ulhas River provides 24 MLD to the zone which means there is a current water deficit of 12 MLD.
- 6) **Zone 6 (SPA areas of Khopta and NAINA with one village of Panvel tehsil):** The current water demand for the region is 44 MLD with a gross water availability of 17 MLD from Patalganga and other local sources. The region already had a water deficit of 27 MLD.
- 7) **Zones 7 and 8:** For planning purposes, of the Chitale Committee Report are assessed together for their water requirements in this report. The combined current water requirement for these two zones is 83 MLD. The zone receives its current water supply of 72 MLD from the Amba River, Patalganga River, Ambeghar Dam and other local surface and ground water sources. Pen receives its major water through ground water sources. The current water deficit is 11 MLD.

b) On-going and Proposed Water Projects and Programmes in the Pipeline

The Chitale Committee Report identified potential sources of water for development as given in Table . It also recommended projects to be developed in future along with timelines. The water supply projects and proposals that are currently underway or in the pipeline are as under:

1. **For Zone 1,** the Chitale Committee Report had identified and recommended the construction of Middle Vaitarna, Pinjal, Gargai, Shai, Kalu, and Damanganga dams to meet the demands of Greater Mumbai. The middle Vaitarna project was funded through JNNURM and was completed in 2014 and is providing about 455 MLD of water to the Zone. The dam on Damanganga River is proposed to be built by the National Water Development Agency (NWDA) and the Central Water Commission (CWC), through the river interlinking project. This dam is set to divert water from the Damanganga to the proposed Pinjal dam through a tunnel. MCGM is in the planning stage of developing the Pinjal (yielding 1250 MLD) and Gargai Dams. Approx. 452 MLD from Gargai and 350 MLD from Pinjal are expected, which would be able to address the needs to MCGM till 2036.
2. **For Zone 2,** dams on Susari and Surya Rivers are proposed for current and future requirements. The total water available from Susari and Surya rivers would be 318 MLD. According to the current proposal around 100 MLD to VVCMC and 218 MLD to MBMC is allocated from Surya Dam. It is further proposed to supply MBMC an extra 75 MLD from MIDC through a project under the Maharashtra Urban Renewal Mission (MURM).

3. **For Zone 3** the Chitale Committee Report had identified the Poshir as the source of water. The work on the Poshir has not yet commenced. Work on the Kalu dam has started with investments from MMRDA.
4. **Zone 4** has water sufficiency till 2021. Any future need could be met from the dam being built on Balganga River by CIDCO.
5. The Chitale Committee Report has identified Gadhi River as the source of water for **Zone 5**.
6. **Zone 6**, owing to the formation and development of the SPA areas like NAINA and Khopta would see a higher water demand in future. CIDCO has identified Kondane as the source of water for the region.
7. The Hetwane dam has been identified as the source of water for **Zone 7**.
8. The Amba River has been identified as a source of water for **Zone 8**. Alibag Municipal Council has only 30 per cent piped water coverage. This project would be the key to a greater water supply to Alibag.
9. Planned extension to Barvi Dam is underway.

Table 46: Identified Potential Sources of Water

Sl. No.	Proposed Dams	Gross Storage	Live Storage	Water allocation for Drinking Water Supply	Water allocation for Industrial use	Water Allocation for Irrigation	Water Source owned by
1	Pinjal	1364.81	1200	865		50	
2	Gargai		440	440			
3	Susari		220.18	151.80	42.90	25.48	WRD
4	Kawadas Weir		51.81	51.81	0.00	0.00	WRD
5	Deherji	315.48	307.63	46.16	30.78	207.94	
6	Extension of Barvi		561	448.8	112.2	0	WRD
7	Kalu Dam		1316.50	858.00	353.10	105.40	WRD
8	Shai Dam		1166.25	1049.63	116.62	0.00	WRD
9	Poshir						
10	Kondane		341.62	326.07	0.00	15.51	WRD
11	Balganga		396.23	396.23	0.00	0.00	WRD
	Total in MMR	1680.29	5561.22	3328.50	655.60	404.33	

Source : Chitale Committee Report, 2005

c) On-going Projects:

Currently the work of extension of the flood gates of Barvi dam is undertaken by MIDC. This will allow an additional of 560 MLD of water to be available for use in the region by 2015. Source development on Balganga River is undertaken by CIDCO which is likely to provide another 400 MLD of water in the region. In the light of the declining growth trends in MMR, and in the light of the latest population distribution and projects, there is a need to re-evaluate the proposals and re-allocate the water resources across the zones in the region.

2.7.2. Sewerage

The population of MMR is largely in urban areas and sewerage systems are primarily present in Municipal Corporation areas. However, since a major share of this urban population lives in slums, a significant share of the households are not connected to a sewer system. In the absence of neighbourhood level sewerage system, the predominant disposal method is the septic tank. Sewage in MMR is collected either through open or underground system and discharged either without treatment or after partial treatment to the adjoining rivers, creeks or directly to the Arabian Sea. The existing sewerage system in MMR is elaborated upon in terms of network coverage, sewage treatment, existing and proposed STPs and network augmentation along with current challenges in the following section.

a) Sewage Generation:

The total sewage generated from the entire MMR is presently estimated at about 4342 MLD while treatment is provided to only about 2275 MLD (which is 50 per cent of sewage generated). Out of the total treated sewage, 96 per cent is being treated by Municipal Corporations themselves, (the major share is within MCGM and NMMC at 1700 MLD and 242 MLD respectively) and the rest is treated by the Municipal Councils through private participation.

b) Network Coverage:

The coverage of waste water collection system exists mainly in Navi Mumbai (85 per cent), Greater Mumbai (84 per cent), Ulhasnagar (60 per cent), Bhiwandi (48.82 per cent), Thane (47.5 per cent), and Mira Bhayander (15 per cent). Presently there are no sewage treatment facilities in several councils such as Karjat, Matheran, Khopoli, Uran, Pen, Alibag and in the rural parts of MMR.

c) Access to Sewage System:

Census 2011 data pertaining to access to sanitation and to toilets for ULBs underlines the limited access to sanitation available to over half of the population in MMR. It may be observed that there is a direct correlation between extent of slum population and access to sanitation network. In most of the Municipal Corporation areas, less than half of the households have access to the sanitation network, with the exception of Navi Mumbai where 67 per cent of the households have access. Bhiwandi is extremely poorly served with only a third of the population covered (20 percent by the network or 14 percent having access to septic tanks). Slum households are primarily dependant on public toilets. Provision of services is complicated by legal status and tenure conditions.

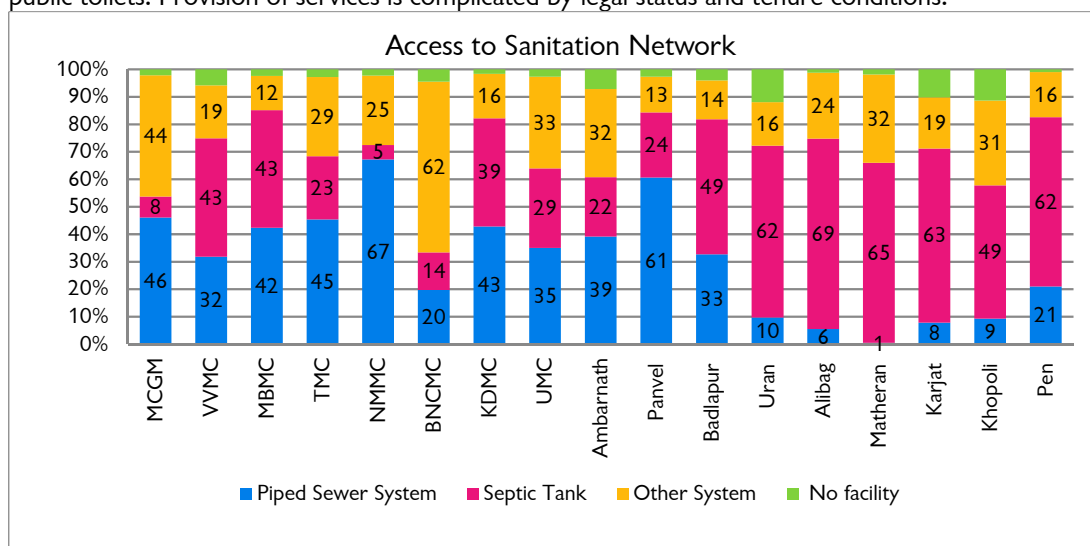
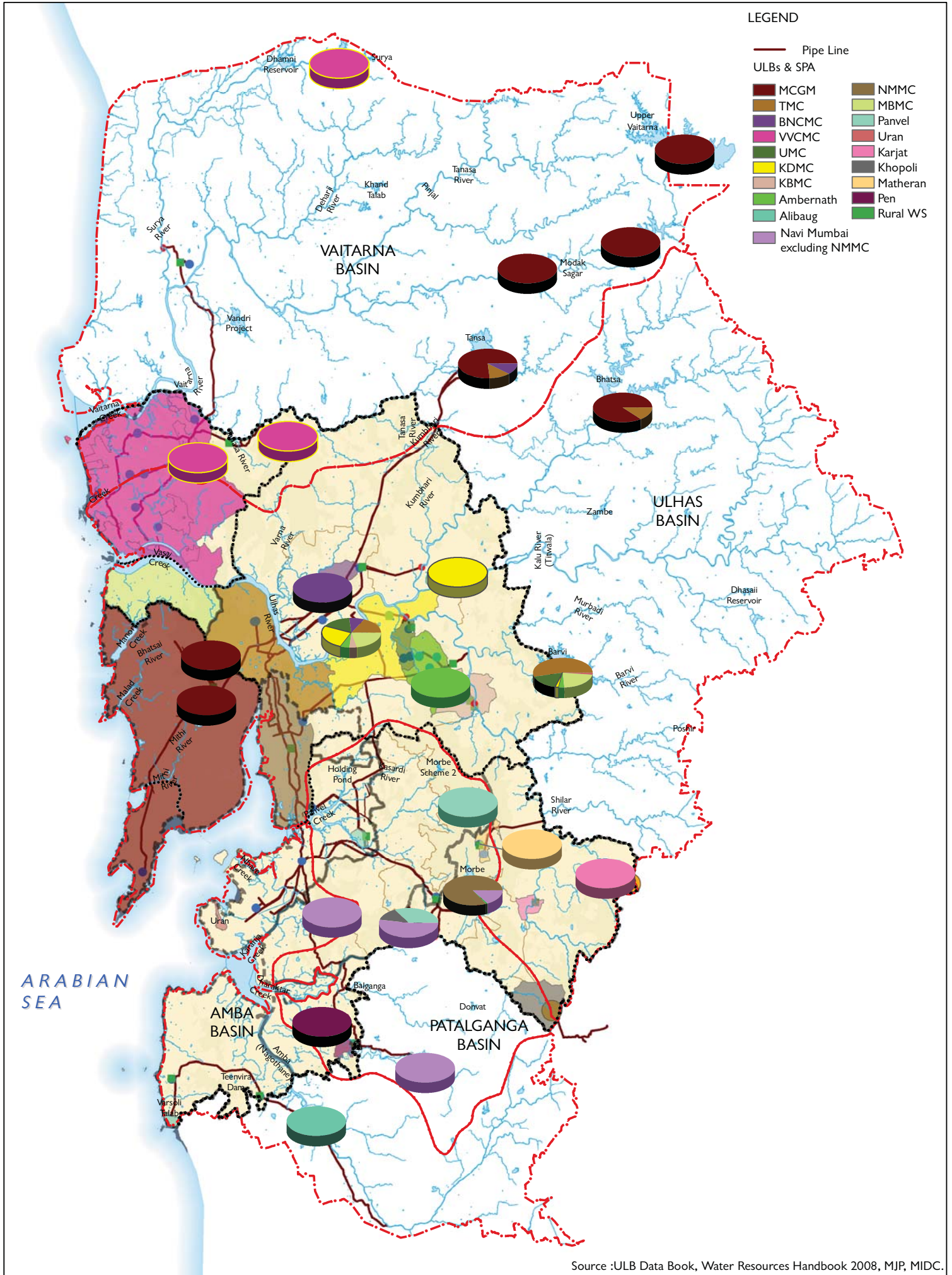


Figure 24: Percentage of Households in ULBs with access to Sanitation Network

d) Estimating the Gap in Sewage Treatment

Presently, all Class I cities and Class II towns within MMR together generate an estimated 4342 MLD sewage (using population figures and estimated at 80 per cent of water supply) of which 2275 MLD is treated. Thus there is a gap of 2067 MLD between the total sewage generation and the sewage treatment. However, the total installed sewage treatment capacity is 3753 MLD indicating only a small shortfall of 816 MLD (refer Map no. 19).

A summary of the existing sewerage systems in various parts of MMR is presented in Table 47 and distribution of sewage treatment plants across MMR is shown in Map no. 20.



LEGEND

- Pipe Line
- ULBs & SPA
- MCGM
- TMC
- BNCCMC
- VVCCMC
- UMC
- KDMC
- KBMC
- Ambernath
- Alibaug
- Navi Mumbai excluding NMMC
- NMMC
- MBMC
- Panvel
- Karjat
- Khopoli
- Matheran
- Pen
- Rural WS

Source :ULB Data Book, Water Resources Handbook 2008, MJP, MIDC.

Table 47: Status of Existing Sewerage Network and STPs in MMR

Sl. No.	ULB	Coverage of Sewerage Network	Percentage of Households connected to Sewer System	Coverage of Toilets (per cent)	Length of sewer Lines (Km)	No. of Existing STPs	Total Installed Capacity of STPs (MLD)	Disposal Area
1	MCGM	84	46.09	88	1636	7	2826	Mahim, Thane, Malad Creek
2	TMC	47.5	45.40	99	69.2	3	252	Thane Creek
3	NMMC	85	67.24	97	308	8	385	Thane Creek
4	MBMC	15	42.35	90	15	4	11	Septic Tank & through Open Gutters
5	KDMC	18	42.86	97	80	3	80	Kalyan Creek
6	BNCMC	48.82	19.75	61	32-35	1	17	Kamawari River
7	VVCMC	NA	31.85	85				Open & Closed drain system
8	UMC	60	35.04	62	112	1	28	Ulhas River through Waldhuni nala
9	KBMC	NA	32.72	94		-		Ulhas River
10	Ambernath M.CL.	41.3	39.18	83	56	1	28	Arabian Sea through Waldhuni nala
11	Panvel M.CL.	30	60.67	91	9.5	-		Patalganga River
12	Karjat M.CL	NA	7.84	89		-		Through Open Gutters
13	Matheran M.CL	NA	0.52	91		-		Soak pits & through open Gutters
14	Khopoli M.CL	NA	9.26	98		1	Not Working	Panvel Creek
15	Uran M.CL	NA	9.74	87		-		Karanja Creek
16	Pen M.CL.	NA	21.01	99		-		Through open gutters
17	Alibag M.CL.	NA	5.51	73		-		Arabian sea through Open Gutters
18	Navi Mumbai New Town					3	125	

Source: Compiled from data collected from Municipal Corp./Municipal Council in MMR & Census 2011

e) Planned Capacity of Sewerage Treatment

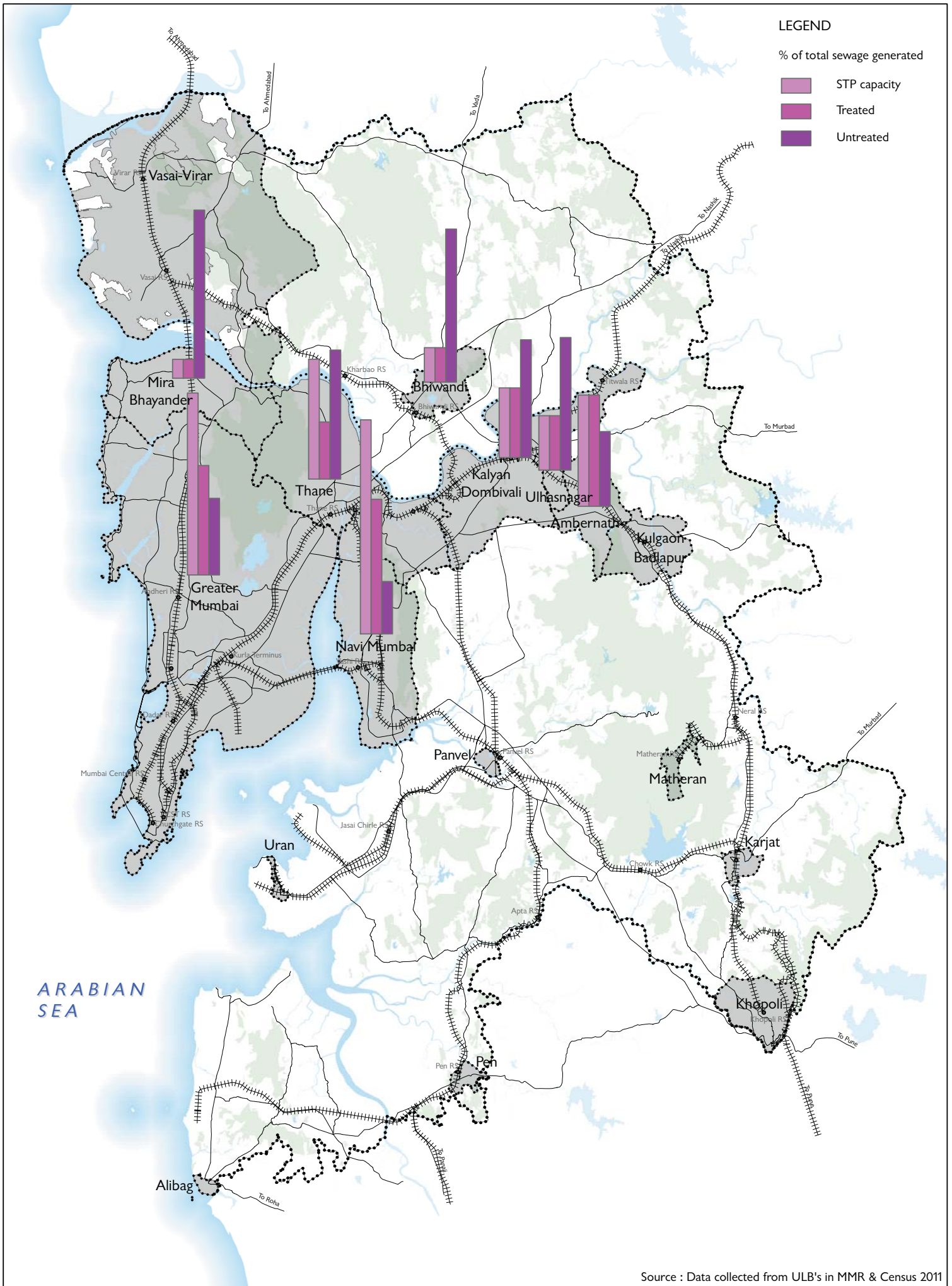
Currently network upgradation schemes and few more STPs of 1856 MLD capacity are in the pipeline to be completed by the year 2036 by the ULBs. Thus, in the year 2036 the sewage generation in MMR is estimated to be 6545 MLD and the total capacity of the sewage treatment plants in MMR is expected to be 5609 MLD. The summary status of sewage generation, treatment and planned capacity is given in Tables 48 and Table 49.

Table 48: ULB-wise Sewage Collection, Conveyance and Treatment System (2016)

Sl. No	Unit	Existing Water Supply (MLD)	Existing Sewage Generated	Amount of Sewage Collected & Treated (MLD)	Present Installed Capacity of STPs (MLD)	Present Gap (MLD)
A	Municipal Corporations					
1	Greater Mumbai	3,276	2620.8	1700	2826	1202.4
2	Thane	492	393.6	120	252	273.6
3	Kalyan-Dombivali	268.5	214.8	80	80	134.8
4	Vasai - Virar City + VVSNA(24)*	134.78	107.824	0	0	107.824
5	Navi Mumbai	420	336	242	385	94
6	Mira-Bhayander	136	108.8	11	11	97.8
7	Bhiwandi-Nizampur	115	92	17	17	75
8	Ulhasnagar	165	132	28	28	104
	Sub-Total (A)	5,007	4006	2198	3599	1808
B	Municipal Councils					
9	Ambernath	59	47.2	28	28	19.2
10	Kulgaon-Badlapur	37	29.6	0		29.6
11	Panvel	29.5	23.6	0	0	23.6
12	Khopoli	6.2	4.96	0		4.96
13	Pen	7.39	5.912	0		5.912
14	Uran	3.5	2.8	0		2.8
15	Karjat	11.02	8.816	0		8.816
16	Alibag	5.5	4.4	0		4.4
17	Matheran	1.4	1.12	0		1.12
	Sub-Total (B)	160.51	128.408	28	28	100.408
C	SPA Areas					
18	Navi Mumbai New Town + NAINA	204.85	163.88	49	125	114.88
19	Khopota	2.31	1.85	0		1.848
20	Kalyan 27 Villages	12.53	10.02	0		10.02-4
21	BSNA	11.24	8.99	0		8.992
22	AKBSNA	5.05	4.04	0		4.04
	Sub-Total (C)	235.98	188.784	49	125	139.784
	Urban MMR (A+B+C)	5,404	4,323	2,275	3,752	2,294
	Census Towns & Rural MMR					
	Thane District	12.734	10.19	0		10.1872
	Raigad District	10.67	8.54	0		8.536
	Total Census Town & Rural MMR	23.404	18.7232	0	0	18.7232
	Total (MMR)	5,427	4,342	2,275.00	3,752.00	2,067

Source: Data compiled from ULBs and MMRDA Analysis

* Note: The existing sewage generation is calculated assuming 80 per cent of the water supplied by the respective ULB



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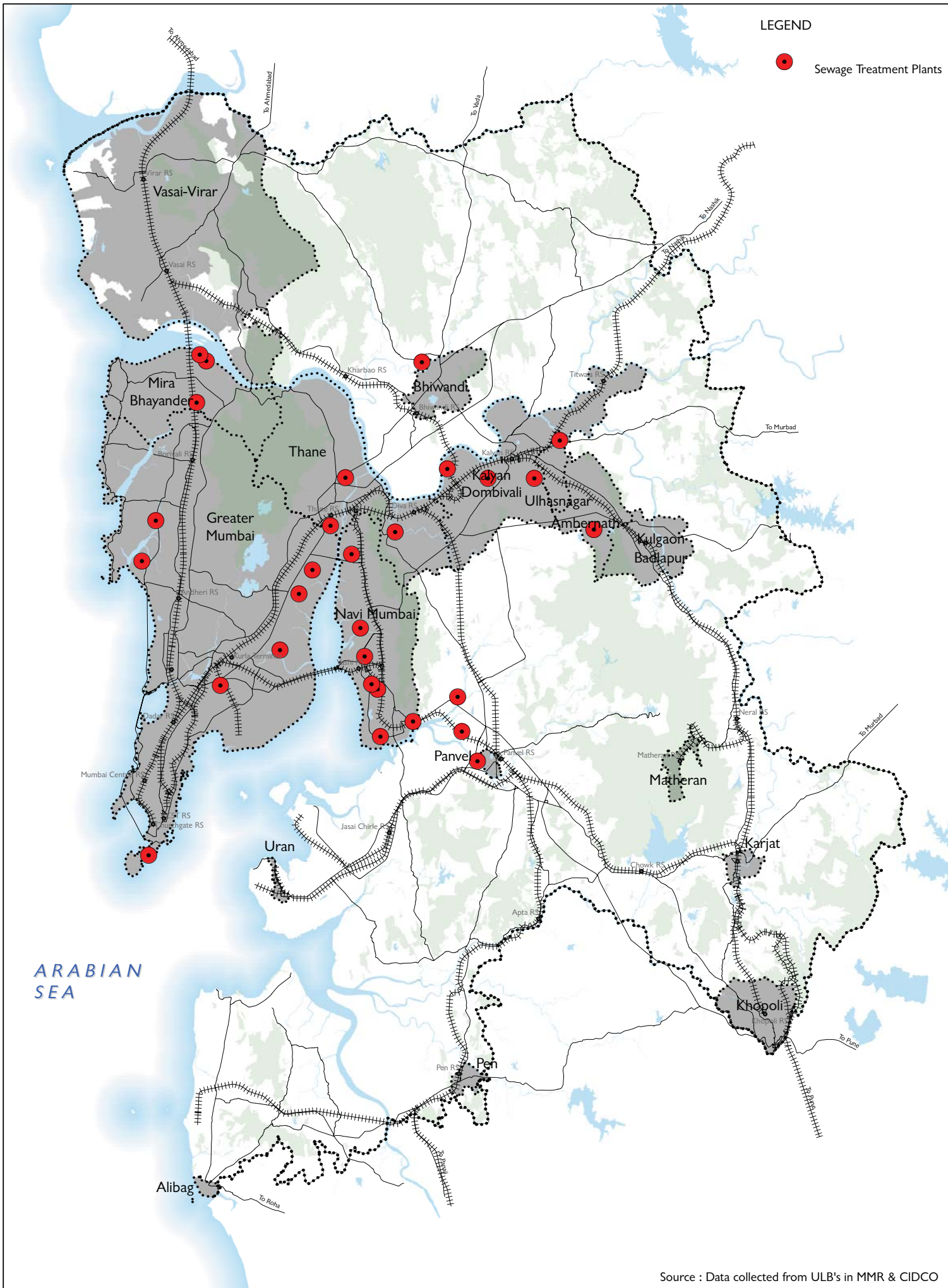
% of total sewage generated

- STP capacity
- Treated
- Untreated

Source : Data collected from ULB's in MMR & Census 2011

LEGEND

● Sewage Treatment Plants



Source : Data collected from ULB's in MMR & CIDCO

Sewage Treatment Plants, 2016

Modified Draft Mumbai Metropolitan Regional Plan 2016-36

Table 49: Status of Planned STPs in ULBs

ULB/Area	Current Status		Planned STPs to be Completed by the year		Total STP capacity
	2016		2036		
	STP Capacity	No. of STPs	STP Capacity	No. of STPs	
MCGM	2826	7			2826
TMC	252	3	372	6	624
KDMC	80	3	200	16	280
VVMC+ Surrounding villages	NA	0	352	20 (7+13)	352
NMMC	385	8	160	3	545
MBMC	11	4	110	10	121
BNCMC	18	1	171	2	188
UMC	28	1	135	1	163
Ambernath	28	1	26	1+Augm. of Older STP	54
Kulgaon Badlapur	NA		22	1	22
Panvel	NA		14	1	14
Navi Mumbai New Town	125	3	294	8	419
Total	3753	31	1856	68	5609

Source: Data as provided by the ULBs of MMR and the Detailed Project Reports of ULBs

Issues and Challenges

- Large slum populations in the cities without proper access to safe sanitation.
- Low household coverage of the sanitation network.
- STPs not running to peak capacities due to a variety of reasons ranging from improper sewage collection systems, insufficient coverage, or poor operation and maintenance.
- Whenever there is no underground system, and septic tanks are used, especially in the rural areas of MMR, the waste water is often let into the nearest open surface drain.
- Considering the urgency of preventing pollution of our water bodies and preserving our precious water resources, sewage treatment and reutilization of treated sewage need to be accorded higher priority.
- Very few cities in MMR have a comprehensive storm water network. Master planning of storm water systems is imperative given the high monsoon incidence in MMR and routine inundation of large areas of the cities during the monsoons.

2.7.3. Solid Waste

Solid waste management in Mumbai Metropolitan Region (MMR) is critical due to the scale of solid waste generated by the rapidly urbanizing region. The problems pertaining to solid waste management range from collection issues, nature of waste and safe disposal. Poor solid waste management has direct implications on the environmental health of the region and has a significant bearing on the quality of life of citizens.

a) MMR Solid Waste Generation:

Currently the Region generates about 16,500 TPD of Solid Waste at the rate of @ 750 gm/capita/day. Out of the total waste generated, almost 99 per cent is contributed by the urban areas with 94 per cent being generated by the Municipal Corporations that account for 94 per cent of MMR's population. Greater Mumbai alone contributes about 75 per cent of the total solid waste generated in MMR. Three of the other Municipal Corporations in MMR are million plus cities which are the other major waste generators.

b) Composition of Waste :

Solid waste comprises of Municipal Solid Waste, Hazardous Waste, Bio-medical Waste and E-waste. Of the 16,500 TPD of solid waste generated in MMR, the major portion is Municipal Solid Waste (91 per cent) followed by hazardous waste (8 per cent) while the share of bio-medical and e-waste is minuscule (1 per cent).

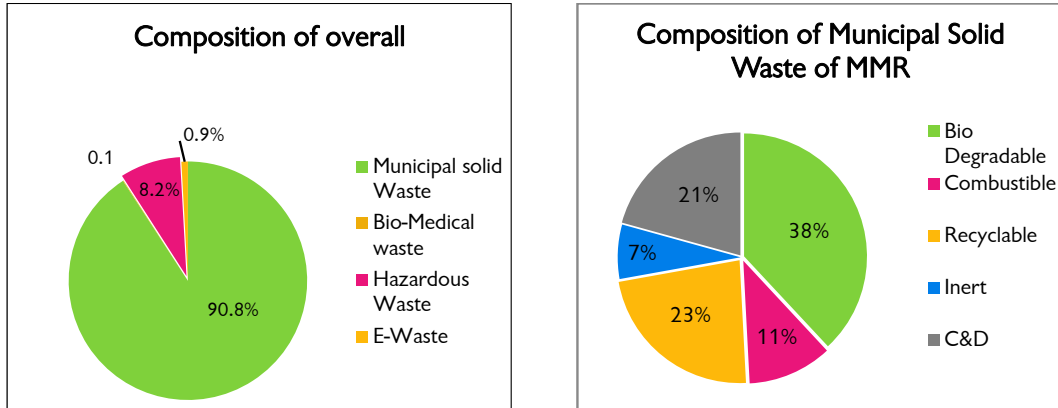


Figure 25 : Composition of Solid Waste in MMR

The Municipal Solid Waste of MMR can be categorized into four categories, viz. Bio-degradable, Recyclable, Combustible and Inert. The largest quantum of it is Bio-degradable mass. The percentages of other components namely recyclable, combustible and inert waste vary depending on the ULB.¹⁹ Additionally, there is a sizeable portion of construction and debris (C&D) that is generated in the ULBs in MMR. For MCGM, the quantity of C & D waste is almost 25 per cent and for MMR it is 19 per cent of total waste.

Hazardous waste can be classified into three categories depending on the method of treatment. For MMR, more than 50 per cent of the hazardous waste is recyclable, (which increases the environmental hazard if not handled properly), 13 per cent is incinerable while 35 per cent needs to be disposed off in a secured landfill.

Bio-medical waste can be classified into incinerable and non-incinerable waste based on the type of treatment. Data pertaining to MMR cannot be isolated since data is available zone-wise for Maharashtra. Data for five of these zones have been considered for understanding the situation in MMR viz. Kalyan, Mumbai, Navi Mumbai, Raigad, and Thane. The nature of biomedical waste generated in MMR is largely incinerable with Navi Mumbai's waste being more incinerable than the rest of the Zones.

c) Solid Waste Generation ULB wise:

The current scenario in MMR in terms of Waste generation and treatment in each of the ULBs is detailed out in terms of municipal solid waste, bio-medical waste, hazardous waste and e-waste.

²⁰Several existing sites are nearing closure like the Deonar dumping ground in Greater Mumbai and the dumping site in Thane. There are new proposed sites in UMC, KDMC, and in the 27 villages SPA. There is local opposition to the siting of dump sites in MBMC, BNCMC and Ambernath, due to which proposed sites have not been actualized or not operating efficiently. MMRDA is developing a Regional Landfill (RLF) site of 126 Ha at Taloje for 7 ULBs in the Region (refer Map no. 21).

¹⁹Source Solid waste Characterization Report for Development of Regional Municipal Solid Waste Management System for MMR, 2011 by National Environmental Engineering Research Institute.

²⁰ Since data across MMR i.e. all ULB's, SPA areas and rural areas for the same time frame was not available from the various data sources, the norm is adopted for estimation of solid waste generation from JnNURM Toolkit for this report.

Table 50: Solid Waste Management in MMR

Agency	SW Generated (Tonnes/day)	Location	Total Area/Capacity	Area Available for future use (Ha)	Status	Type of Treatment	Recycling	Landfill
CORPORATIONS								
MCGM	7465.20	Kanjur marg	141 Ha	70.00	Operational	Bio-reactor		Bio-reactor
		Deonar MSW		1.4	Operational			Dumping
		Mulund	25 Ha		Operational			Dumping
NMMC	672.60	TTC area, Turbhe	26.32 Ha	6.58	Operational	RDF, Aerobic Composting	Plastic	Sanitary Landfill
TMC	1104.60	Khardi	4.04 Ha		Exhausted			Dumping
		Mumbra	15 Ha	7.00	Operational			Dumping
		Kalwa	15TPD		Operational	Bio methanation		
BNCMC	177.50	Chavindra	2.5 Ha		Operational			Dumping
		Dapoda	26 Ha		Proposed			
KDMC	748.20	Aadhar-wadi	30 Ha		Operational	Bio methanation		Dumping
		Umbarde	19 Ha		Proposed			Dumping
UMC	126.50	Maharal	4Ha		Operational			Dumping
		Kambe	18 Ha		Proposed			
		Shantinagar			Closed			
MBMC	202.25	Pali, Uttan	31 Ha	19.00	Operational			Dumping
		Saiwan			Proposed	RDF (proposed)		
VVCMC	733.20	Gokhivare	19.33 Ha	10.54	Operational			Dumping
COUNCILS								
AMC	53.13	Chikhloli	13.58 Ha		Proposed	Vermi-composting (not operational)	15 MT Plastic	Dumping
		Moriwali			Operational			Dumping
KBMC	36.54	Valavali	6.56 Ha		Operational		Composting	
Matheran	0.84	S.No.102,S-2/3	1 TPD		Operational	Bio methanation		Dumping
Uran	6.30	Bori Pakhadi	1 Ha		Operational			Dumping
Alibag	4.41	Badane	1 Ha		Operational	Bio methanation		Dumping
Panvel	48.60	Karanjade, Chal	14 Ha	7.00	Operational	RDF, Composting		landfill
Khopoli	14.91	Mil	3.25 Ha		Operational	Bio methanation		Dumping
Pen	7.77	Ambeghar			Operational			Dumping
Karjat	6.09	Dahiwale, Karjat			Operational			Dumping
Rest of MMR*	441.66	1						
27villages SPA	57.00	Hedutane & Bhopar		27.00	Proposed			
MMRDA RLF		Usatne	126.00	126.00	Proposed			Sanitary Landfill

Note: 1. *Rest of MMR – There are two proposals within rest of MMR. Only one SPA area has a proposed facility, The proposed MMRDA RLF will serve several ULBs – TMC, BNCMC, KDMC, UMC, VVCMC, Ambarnath and Kulgaon Badlapur Municipal Councils. No Rural areas are served by any facility currently and there is no future proposal.

It is planned to develop more RLF sites in future since the ULBs are unable to implement and sustain separate and independent projects to enable scientific collection, management, processing and disposal of MSW. This is mainly due to lack of financial and technical expertise and scarcity of resources, such as land and manpower, with the authorities, which makes it difficult for them to discharge their obligations individually in relation to scientific collection, management, and processing and disposal of MSW. Local opposition to landfill sites is also an important hindrance due to which landfill sites cannot be developed.

d) Bio-Medical Waste Management in MMR

The state has been divided by the MPCB different regions for pollution control and monitoring. MMR falls within part of five such regions of Maharashtra namely Kalyan, Mumbai, Navi Mumbai, Raigad,

and Thane. The data for bio-medical waste pertaining to these entire five regions has been considered as MMR data for this Regional Planning exercise.

Table 51: Total Quantity of BMW Generated and Treated In MMR Districts

Type	Generated	Treatment	Gap	Remarks
	kg/day	kg/day	kg/day	
Non - Incinerable	2,255	3,217	962	Excess treatment capacity
Incinerable	11,621	12,457	836	
Total	13,876	15,674	1,798	

Source: MPCB: BMW Status Report 2011

Currently, bio-medical waste treatment is done by private sector enterprise. There are a total of five treatment facilities within MMR as shown in map above. These are located more to the north of MMR and the centre of MMR based on quantum of generation of bio-medical waste. Apart from collection, installations are also given responsibility to register new HCEs in the region. This may ensure the collection of BMW. Currently, there is sufficient capacity to treat the waste generated in MMR, though the installations currently receive and treat waste received from other regions as well. However there is discrepancy in the incinerator runtime as seen in Table 52 which indicates the need for monitoring the same in order to ensure that balance waste quantities are transported to installations as per capacities. The capacity and run times of incinerators at each site are as follows:

Table 52: Capacity of Incinerators

Bio Medical Waste Site	Capacity (KG/hr)	Incinerable waste	Waste Received (KG/day)	Run Time (Hr)
Deonar	700	88%	10,401	13.12
Kalwa	50	54%	2903	31.13
Umbarde	90	81%	884	7.99
Taloja	150	96%	1486	9.51
Total	990		15,674	12.27

Source: MPCB, BMW Status Report, 2011

e) Hazardous Waste Management Scenario

As in the case of BMWMMR the MPCB data for the whole of the five regions of the state was considered for this study. Two of the four treatment facilities in Maharashtra are located in MMR at Mahape (NMMC) and Taloja. This is justified considering that more than half of the industrial area of the state is within MMR districts. However, there is a huge gap between generation and treatment of hazardous waste implying that the current capacity of installation is not fully utilized as per Mumbai Waste Management Ltd. This may be due to the generation which is estimated considering maximum production, and may change as per change in technology. The table below indicates the total quantity of Hazardous Waste generated (estimated as per authorization data) and treated in MMR (regions as defined by MPCB).

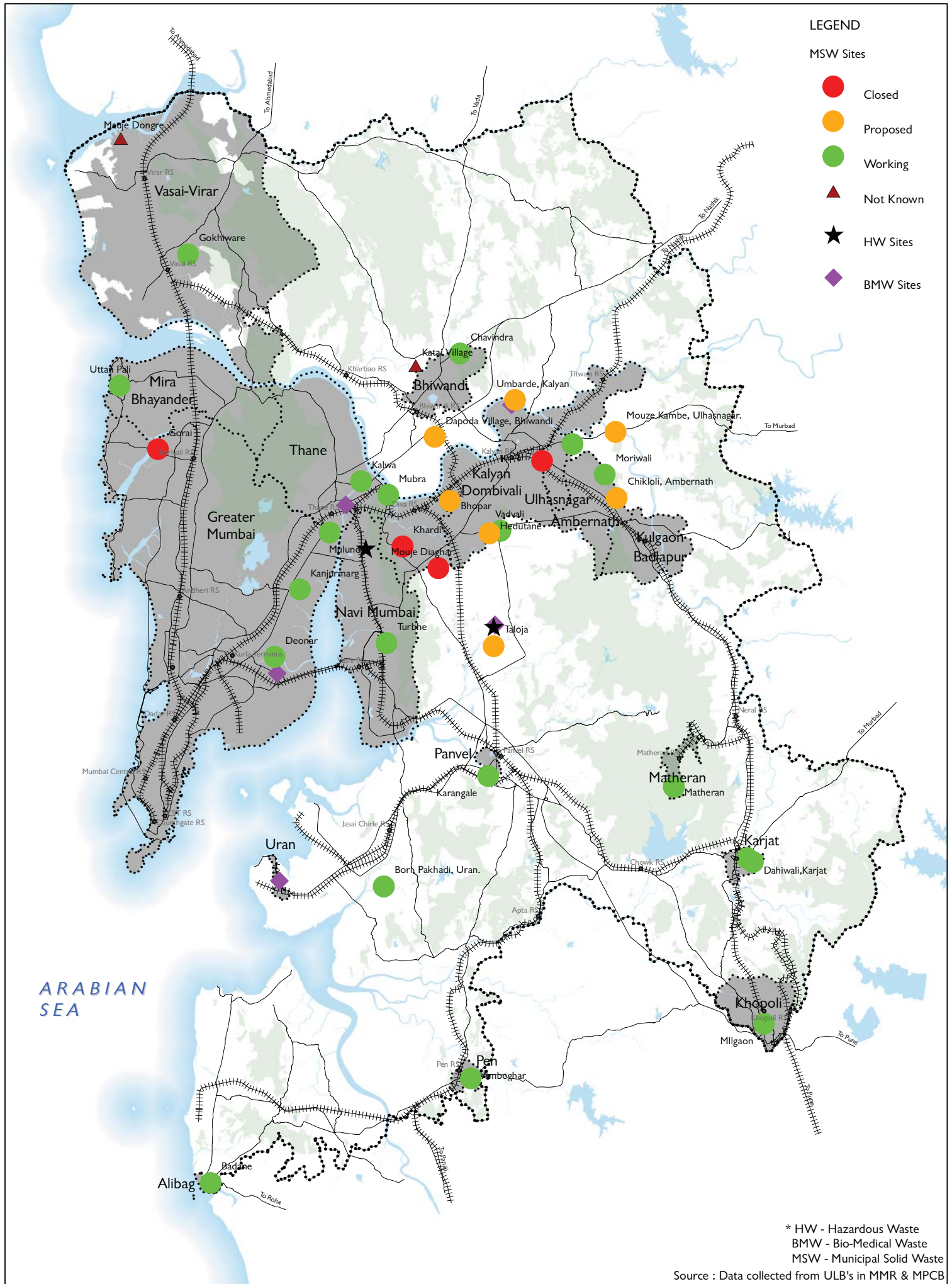
Table 53: Total Quantity of Hazardous Waste Generated and Treated

Type	Generated	Treatment	Gap	
	MTPA	MTPA	MTPA	%
Secured landfill	3,25,994	95,988	2,30,006	71
Incinerable	1,26,285	12,176	1,14,109	90
Total	4,52,279	1,08,164	3,44,115	
Recyclable	4,92,383			

Table 54: Capacity of installations at each Site

Area	Area/ Capacity	Life (Year/ Ha)	Waste Received (MTPA)	Landfill Capacity (MTPA)	Incineration
Mahape	7 Ha	30 years	1,08,164	10,000	2.5 TPH 2 no.
Taloja	40 Ha			1,20,000	

Source: MPCB: HW inventory 2014, HW Status Report 2014



Recyclable waste is almost 50 per cent and is mostly processed locally. But the recyclers are authorized and submit annual returns to MPCB. The recycling processes are validated. This may ensure the proper recycling. Since the regions demarcated by MPCB are such that Raigad region includes Sindhudurg, Ratnagiri, and Southern part of Raigad outside MMR, the region covered seems very vast to be served effectively by the HW treatment facility in MMR.

f) E- Waste Management in MMR

Currently the e-waste sector is largely handled by the informal sector so there is no control on the process and there is difficulty in inventorisation of e-waste generation and treatment.

There are four dismantling centers in MMR dismantling 19,520 MTPA and there are 15 recyclers in MMR and Pune recycling 10,640 MTPA and 22 Collection Centers. The annual growth rate of E-waste generation is 20 per cent for MMR and Pune as against 10 per cent for India. As of now only one study was done by IRG systems on E-Waste of MMR in which only four products have been considered in E-waste generation. Also obsolescence period considered for each product is uncertain. Table 55 indicates Total Quantity of E-Waste Generated and recycled in MMR considering regions as defined by MPCB.

Table 55: Total Quantity of E-Waste Generated and Recycled

Item	MTPA		Annual Growth rate
	2007	2016	2007-2015
E-waste Generation, Mumbai & Pune	24,000	53,500	20 %
E-waste recycling-6 per cent	1,440	3,210	

Source: MPCB, Report on Assessment of E-waste in Mumbai-Pune Area, 2007

Issues and Challenges

1. Municipal Solid Waste:

The huge quantity of solid waste generated (11,850 TPD, excluding the C&D waste which is 4,130 TPD) makes its management a difficult task.

a. Collection and Segregation:

- At the household level, the coverage of households is not 100 per cent.
- Most ULBs follow centralized systems of management which leave very little scope for segregation of waste and also for decentralization of treatment and disposal. Due to centralization, there is a lack of recycling facilities for recyclable waste, lack of C & D waste handling facility and sanitary landfill sites.
- There is no segregation of dry and wet waste either at source or at community and city level leading to mixing of all kinds of waste including discarded medicines, batteries, rodent killer, hazardous waste and bio-medical waste from dispensaries and clinics. etc. Lack of separate collection and processing of bio-degradable waste generated from hotels and vegetable markets increases the quantum of waste reaching landfill sites.
- Mixing of C&D and the waste generated through road sweeping etc with organic waste or combustible waste increases the rejects and reduces the quality in case of compost and decreases the calorific value in case of combustion or incineration.
- Lack of mechanical segregation at city level makes the huge quantity of waste unmanageable resulting in mere dumping of the waste and increases the tipping fee for transportation of waste to the Regional landfill sites.

b. Processing:

- Systems of transport, processing and disposal of waste are deficient in most ULBs.
- Lack of local level treatment such as vermi-composting at neighbourhood unit level, composting at community level, bio-methanation plants for hotels and vegetable market waste and lack of C& D handling facility.

- Inadequate recycling plants mostly run by private and informal agencies and absence of inventorisation of agencies involved in recycling is a hurdle in the effective management of recyclable waste.
 - Lack of waste to energy projects such as Bio-reactor, RDF (Refuse Derived Fuel) etc.
- c. **Disposal:**
- All the ULBs are not fully compliant with the MSW Rules, 2000 especially with regard to the disposal of their waste. There is only one Scientific Disposal site within MMR, at Navi Mumbai.
 - The capacity of the existing sites is quickly exhausted due to the practice of indiscriminate dumping. There is no scientific procedure being followed for recycling or waste reduction or treatment. Direct dumping of the waste increases the land locked period of the landfill.
 - Percolation of leachate results in environmental degradation of soil and groundwater.
 - Non-availability of land for landfill sites is an issue that confronts most ULBS due to lack of land reservation for such a facility in the statutory Development Plan of the City or Town.
2. **Bio-medical waste (BMW):**
- Enforcement is lax despite existing government rules regarding bio-medical waste disposal.
 - BM waste collection and treatment needs to be better implemented to include all private hospitals and rural health centres which are currently not part of the collection system.
 - There is no easily accessible BMW facility for health centres in Alibag, Pen. People have to commute all the way to Kalwa to dispose BMW which is a major deterrent.
3. **Hazardous Waste (HW):**
- In order to make the current HW treatment facilities serve existing needs, there is a need to reduce transportation from Ratnagiri and Sindhudurg which are served by treatment facilities in MMR,
 - Household generated hazardous waste like medicines, batteries do not get recycled or addressed.
4. **E-Waste :**
- Manual system of processing creates health and environmental hazards.
 - Change in technology will cause huge change in e-waste quantity, type and treatment.

2.8. Status of Rural MMR

MMR has always had around 1000 villages within its jurisdiction. According to the 2011 Census, rural MMR comprises of 994 villages with a population of nearly 15 lakh (14,72,296) almost equally divided between the rural areas of Thane (8 lakh population) and rural areas of Raigad (7 lakh population). The growth rate of the population of the rural areas of MMR has also slowed down in the last decade as compared to the previous decadal growth rate. Rural Raigad has always been growing at a much slower rate than Thane rural since the 1980s.

Table 56: Population Growth of Rural Areas in MMR

Sl. No.	Unit	Population	CAGR			
		2011	1971-1981	1981-1991	1991-2001	2001-2011
	Rural (MMR)	14,72,296	2.61	2.49	3.45	2.45
1	Thane	15,623	1.48	4.19	13.00	-8.11
2	Ambarnath	1,25,011	2.00	5.32	3.27	3.95
3	Vasai	93,145	7.19	10.67	4.78	1.76

Sl. No.	Unit	Population	CAGR			
		2011	1971-1981	1981-1991	1991-2001	2001-2011
4	Kalyan	2,83,192	1.88	2.14	12.42	6.73
5	Bhiwandi	2,77,646	2.23	2.56	2.48	1.93
	Thane District Rural	7,94,617	2.40	3.83	5.22	3.26
1	Alibag	1,12,162	1.88	0.75	1.63	0.61
2	Karjat	94,449	1.62	1.72	1.50	1.56
3	Khalapur	57,364	2.41	2.42	2.36	0.76
4	Panvel	2,45,769	2.68	2.15	2.45	2.50
5	Pen	77,107	2.69	1.25	1.39	0.99
6	Uran	90,828	6.43	1.45	2.08	1.63
	Raigad District Rural	6,77,679	2.74	1.62	1.97	1.59
	Total(MMR)	2,28,04,355	3.62	2.77	2.90	1.65

Source: Census of India

2.8.1. Growth around ULBs

Tehsil-wise, Kalyan has the highest share of rural population in MMR followed by Bhiwandi and Panvel in that order. It is observed that there is a clustering of villages with high population at strategic locations or near ULBs. 27 villages around Kalyan Municipal Corporation have a combined population of about 2.5 lakhs while several villages around Bhiwandi (Katai, Khoni, Shelar and Kiravali along with Kalwar and Rahanal,) together have a population of about 2.5 lakhs (refer Map no. 22). Villages such as Kalundre, Phalasppe Vadghar, Palidevad, Shillotar Raichur and Usarali Khurd in Panvel, Ambivali, Rees and Wasambe in Khalapur, Chendre, Varsoli and Veshvi in Alibag, Katai, Khoni, Shelar and Kiravali in Bhiwandi and Mharal Budruk, Kambe and Varp in Kalyan apart from 27 villages around KDMC are forming clusters of population more than 20,000.

2.8.2. Social Amenities

Villages in MMR display significant variation in terms of access to physical and social infrastructure depending on their location, topography and their proximity to municipal areas and access to transportation networks.

2.8.3. Agricultural villages

The Eastern part of the region is predominantly agricultural. The eastern part of Karjat, Ambarnath, Kalyan and Bhiwandi Tehsils has high per cent of people involved in agricultural activities. Villages located in the foothills of Matheran from Panvel and Khalapur Tehsil, villages along Amba River in Pen and Alibag Tehsil still retain the major share of employment in agriculture sector. Even though some of these areas are close to urban centres such as Panvel, but due to the uneven terrain and poor accessibility most of the villages are still agrarian (refer Map no. 24).

2.8.4. Tribal Villages and Forest Villages:

The Maharashtra Government has identified areas with significant tribal populations and these are covered under a variety of schemes. In MMR, 73 villages in Bhiwandi Tehsil are covered under the Tribal Sub Plan of the Government. Additionally, there are areas in Vasai, Karjat, and Alibag Tehsils in MMR which also have identified pockets of tribal population. Additionally, tribal clusters, Mini Modified Area Development Approach (MADA) or MADA, have been identified by the Government of Maharashtra where tribal populations are in excess of 5,000 or 10,000 respectively. Such pockets exist in Pen Tehsil which has 135 villages with significant tribal population (refer Map no. 25).

2.8.5. Access to Transportation Networks

The suburban networks are the lifelines of MMR and they also enable easy access to urban amenities to the villages that have railway stations close by or major roads in the vicinity. Due to easy access to suburban railway and proximity to ULBs, Wangani and Neral in Karjat have grown and have

populations more than 10,000 each. However, all these villages lack higher order governance framework to provide necessary services and physical and social infrastructure. An analysis of proximity of villages to major regional roads in MMR was done to determine levels of accessibility to urban areas. It was observed that majority of the villages in MMR are located within one km from regional networks. However, the far eastern belt of Karjat, Ambarnath, Kalyan and Bhiwandi talukas are not as accessible. Villages located between the Amba and Patalganga Rivers also do not have major road access. The villages located on the western foothills of Matheran are similarly disadvantaged (refer Map no. 23).

Amenities available in rural MMR based on Census 2001 data were mapped and accordingly the level of access to health and educational facilities in rural MMR was analysed and presented below.

2.8.6. Access to Educational Facilities:

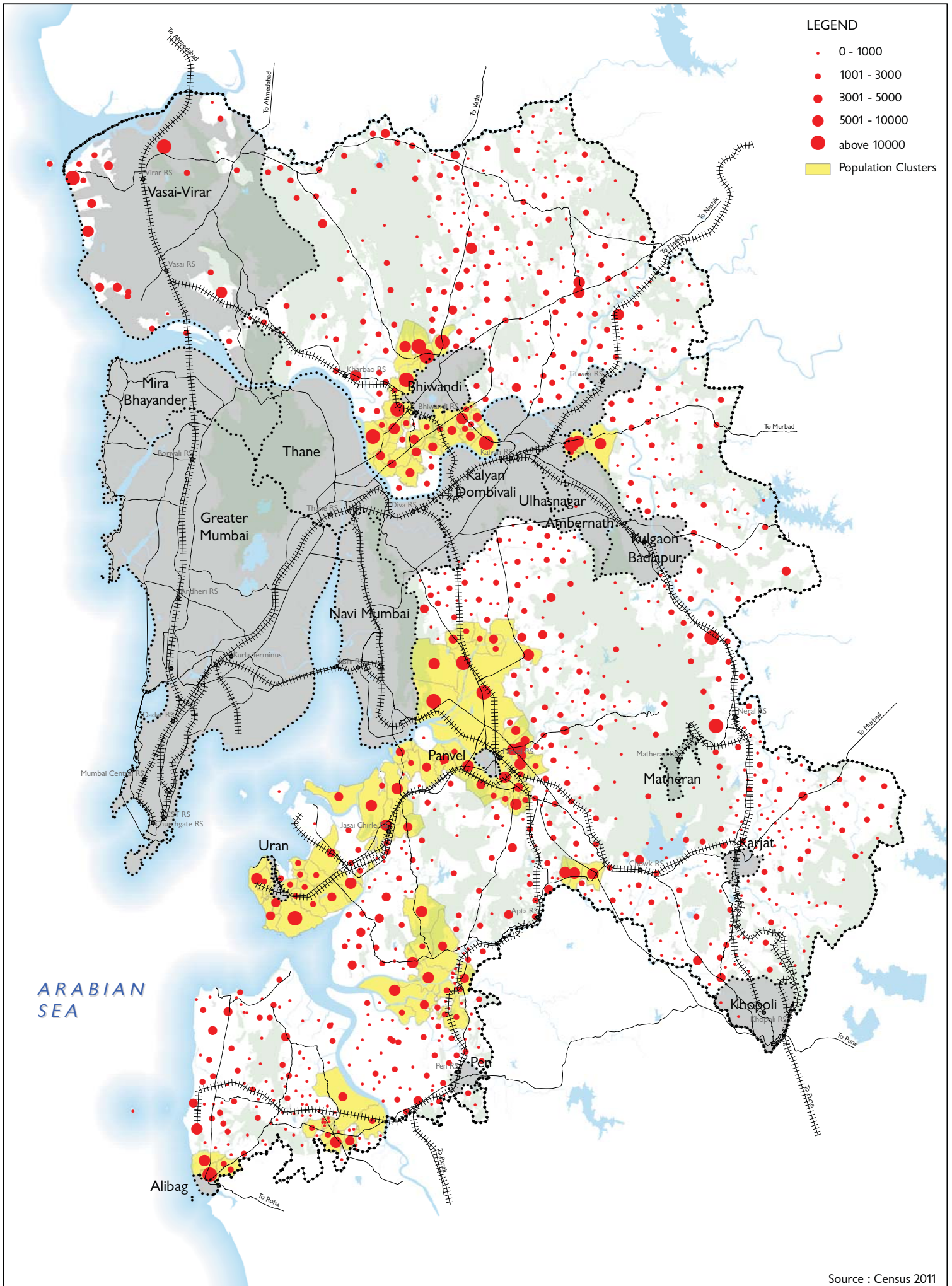
Distance based analysis was carried out for educational facilities and the following issues were observed : (refer Map no. 26):

- a) By and large, rural MMR is well served in terms of primary level educational amenities. However, middle school and the higher secondary educational facilities are concentrated only at few locations.
- b) Thane district is underserved by educational facilities as compared to Raigad.
- c) Bhiwandi tehsil and eastern parts of Kalyan and Ambarnath Tehsil are underserved.
- d) The villages at the foothills of Matheran and Tungreshwar have poor educational facilities.
- e) There is a concentration of higher educational facilities near Rasayani and Uran which suggests that these areas have larger influence areas than other settlements.
- f) There are a few villages in MMR that do not have a primary school.
- g) Higher order educational facilities such as senior secondary schools and colleges are located either in urban areas or around major transport nodes.

2.8.7. Access to Health Facilities

In MMR, urban areas within the metropolitan region are better served in terms of health facilities, which is to be expected. Medical facilities in rural MMR range from a Primary Health Care Sub centre, to a Primary Health Centre or a Health Centre. These are typically strategically located in a few villages. The following issues were observed with respect to access to health facilities in Rural MMR (refer Map no. 27):


- a) The Eastern part of MMR is underserved in terms of medical facilities due to its lack of connection to urban centers. The area needs special attention for providing health facilities and rural connectivity.
- b) Areas around Vajreshwari in Bhiwandi, eastern parts of Ambarnath Tehsil and Karjat Tehsil are underserved and need intervention to improve medical facilities network in the region.
- c) There is clustering of higher order facilities such as health centres or hospitals at a few locations such as Ambadi in Bhiwandi, Rasayani and Mohopada in Khalapur and Taloje in Panvel Tehsil. Due to better accessibility, these areas are developing as clusters with medical as well as other facilities. However, such clusters are developing without any physical planning and require intervention.
- d) Due to uneven terrain and difficult accessibility, there are only few centres serving the hilly parts of MMR. In the western foothills of Matheran, the village of Nere is an important centre catering to the medical facilities of most of the villages in this zone. Similarly, Goveli is an important centre as it is the only village with a hospital in the eastern part of Ambarnath and Kalyan Tehsil while the population in the eastern part of Karjat Tehsil has to rely on facilities available in Karjat Municipal Council since there is no higher order facility for this area except for a PHC at Kadav. Apart from medical facilities, these villages also serve as hubs for villages in their immediate vicinity with facilities such as market place,



LEGEND

- 0 - 1000
- 1001 - 3000
- 3001 - 5000
- 5001 - 10000
- above 10000
- Population Clusters

Source : Census 2011

 Mumbai Metropolitan Region
Development Authority

Mumbai Metropolitan
Planning Committee

Emerging Village Clusters by Population Size

Modified Draft Mumbai Metropolitan Regional Plan 2016-36

- Railway Stations
- Road
- MMR Boundary
- Forest
- ULB Boundary
- Waterbody
- ||||| Rail
- ULB

N

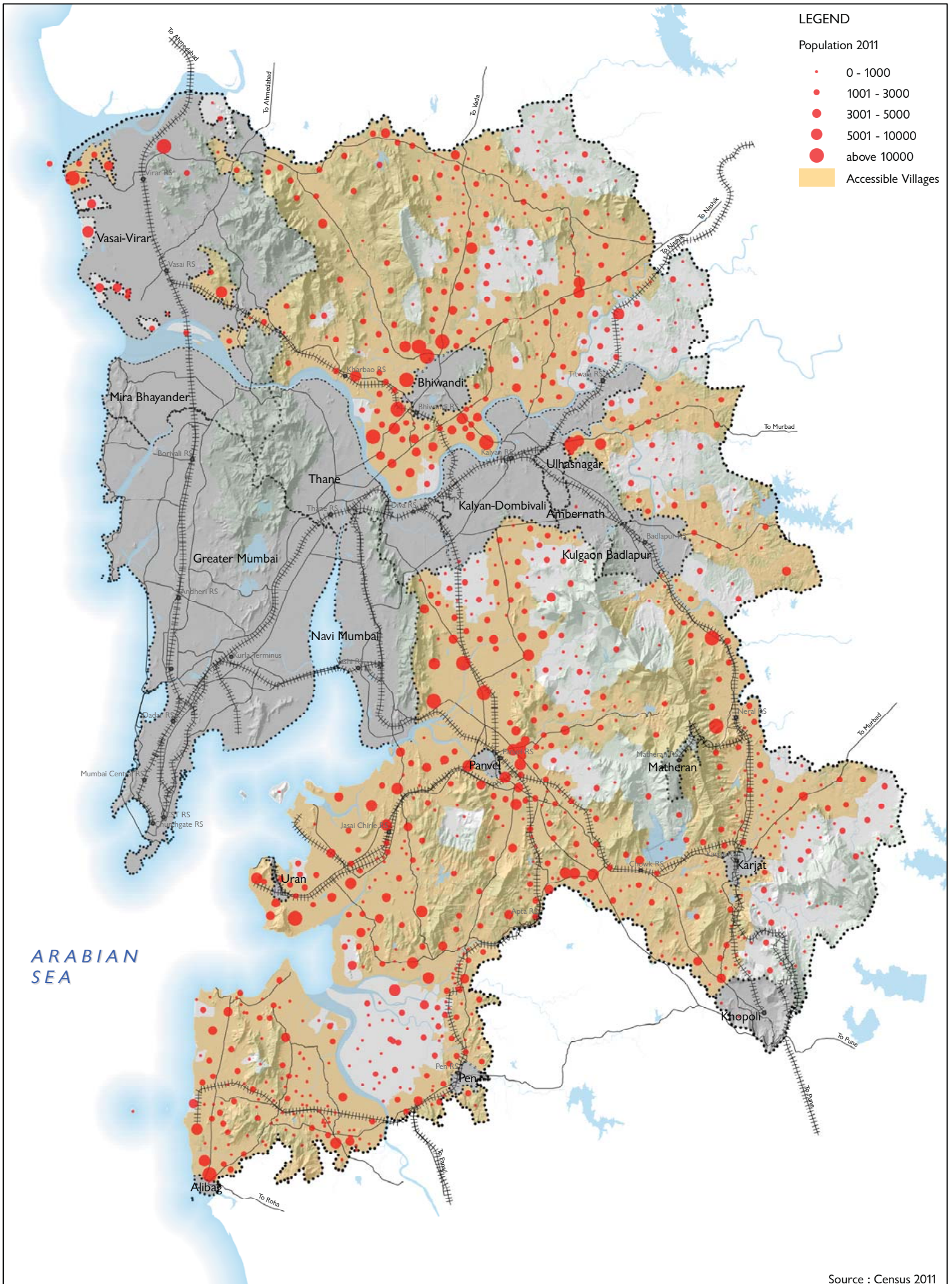
0 1 2 4 6 Km

Map No.
22

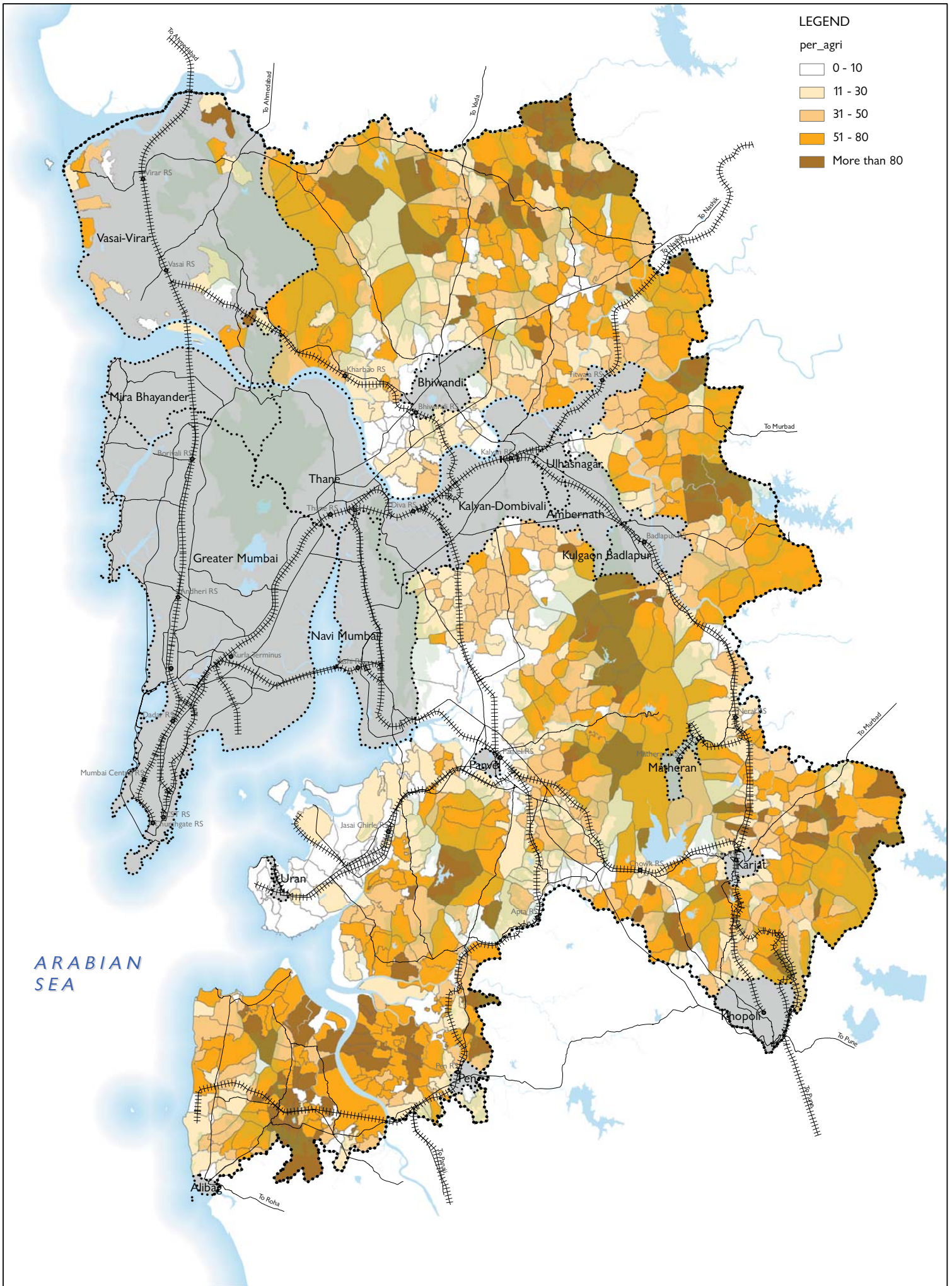
LEGEND

Population 2011

- 0 - 1000
- 1001 - 3000
- 3001 - 5000
- 5001 - 10000
- above 10000
- Accessible Villages



Source : Census 2011



LEGEND
 per_agri
 0 - 10
 11 - 30
 31 - 50
 51 - 80
 More than 80

LEGEND

Forest

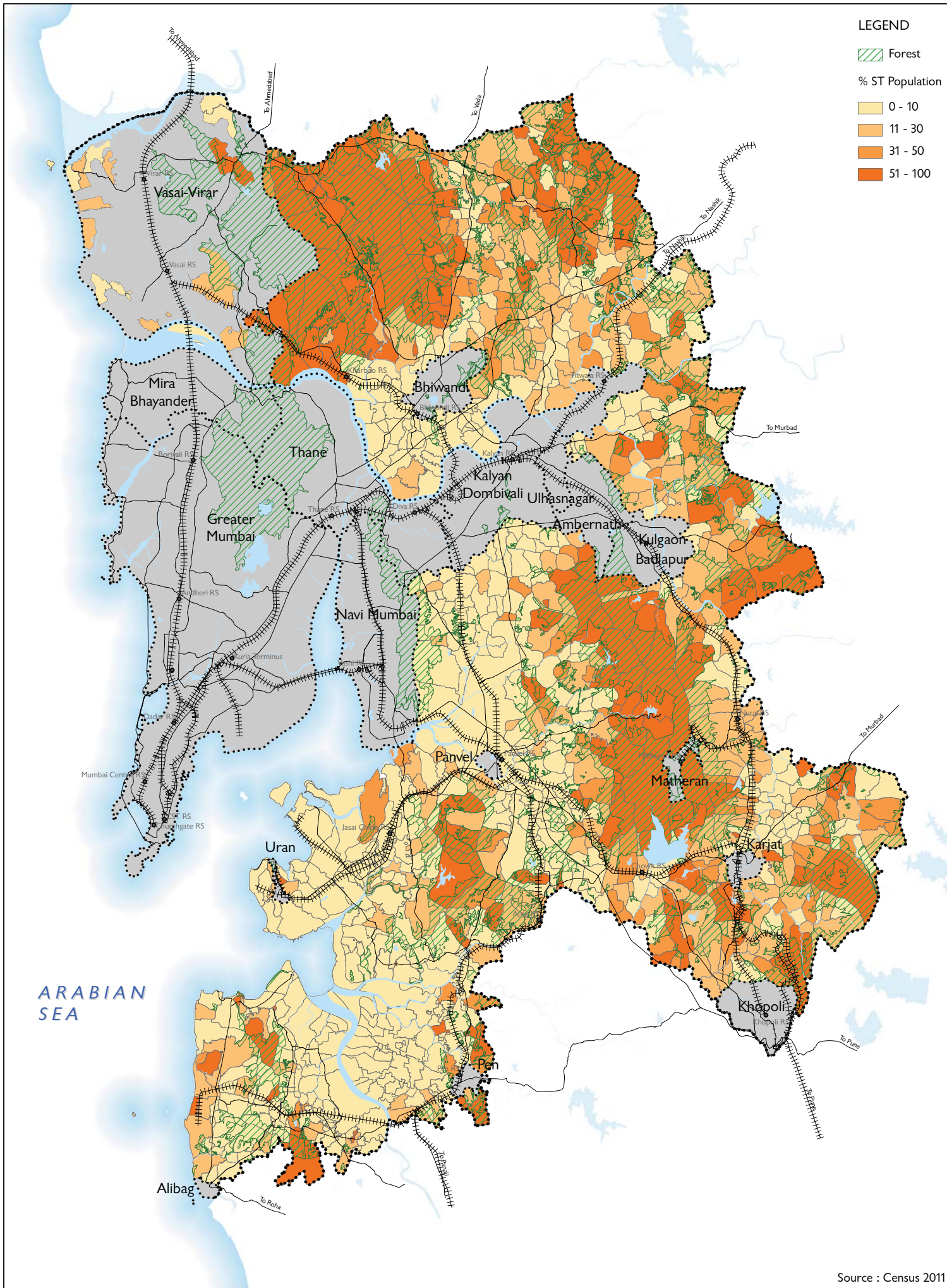
% ST Population

0 - 10

11 - 30

31 - 50

51 - 100



Source : Census 2011

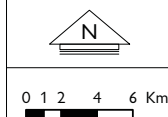
Mumbai Metropolitan Region
Development Authority

Mumbai Metropolitan
Planning Committee

**Villages by percentage of
Tribal Population, 2011**

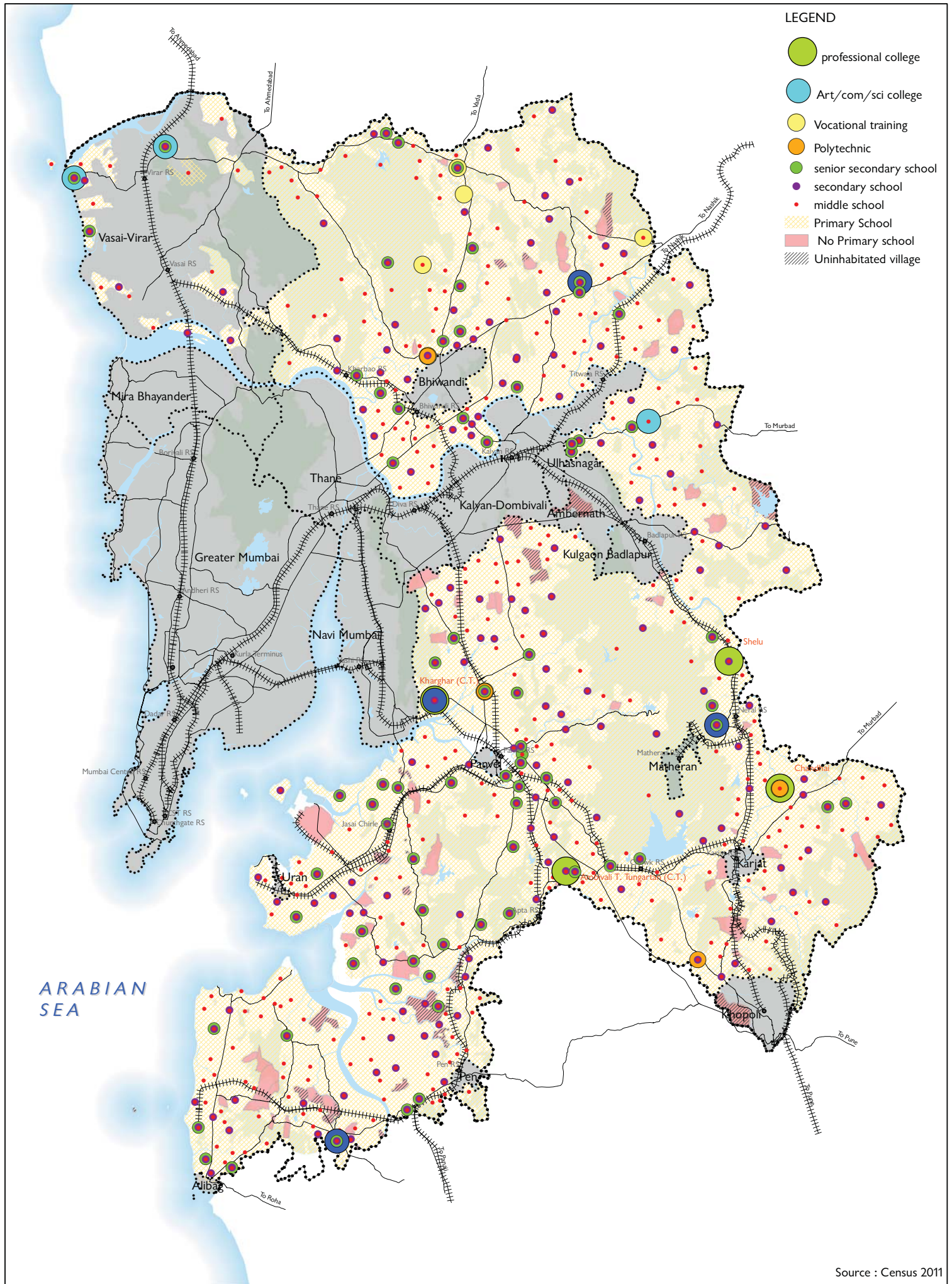
Modified Draft Mumbai Metropolitan Regional Plan 2016-36

- Railway Stations
- MMR Boundary
- ULB Boundary
- ||||| Rail
- Road
- Waterbody



Map No.

25



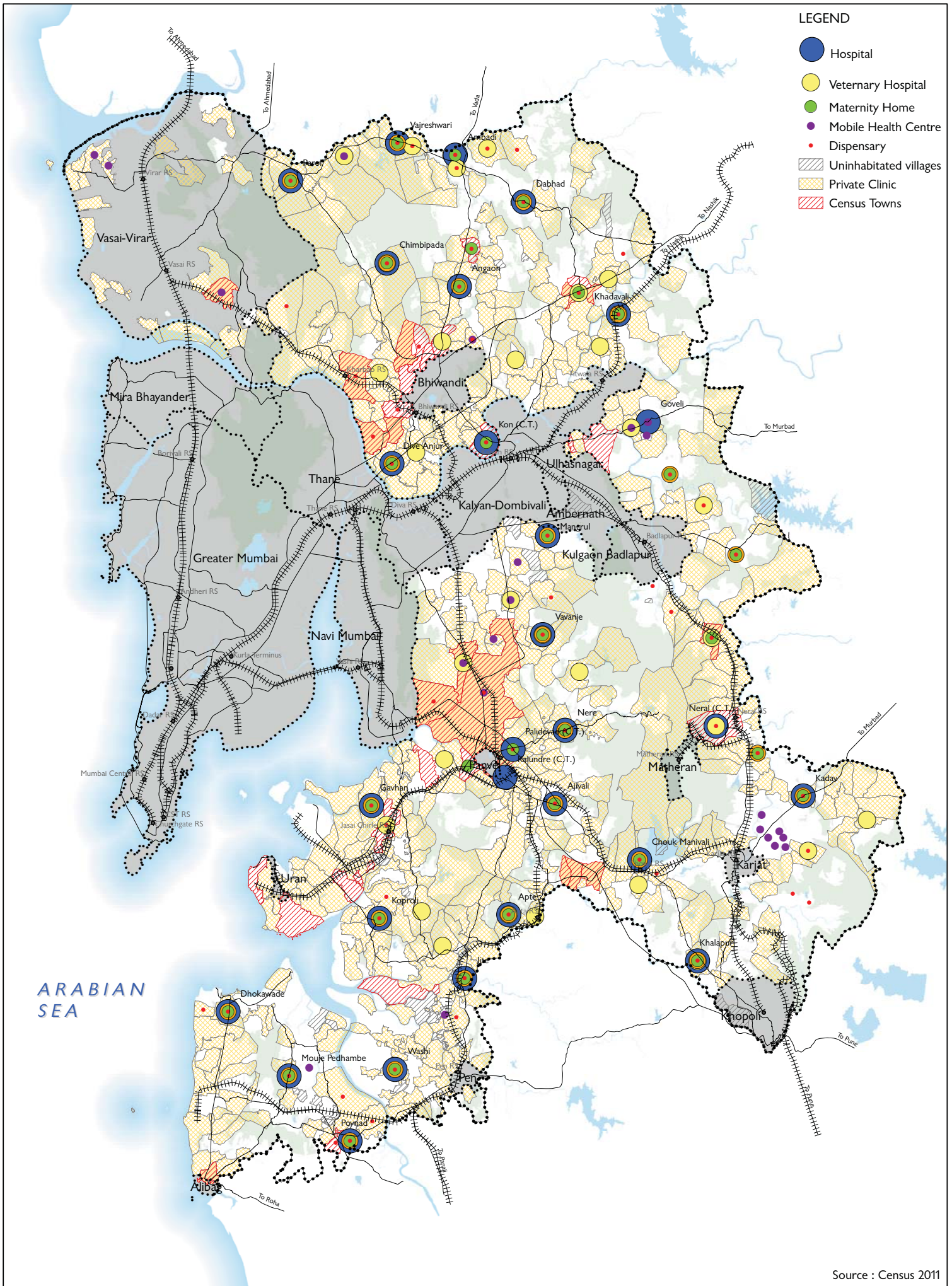
LEGEND

- professional college
- Art/com/sci college
- Vocational training
- Polytechnic
- senior secondary school
- secondary school
- middle school
- Primary School
- No Primary school
- Uninhabited village

Source : Census 2011

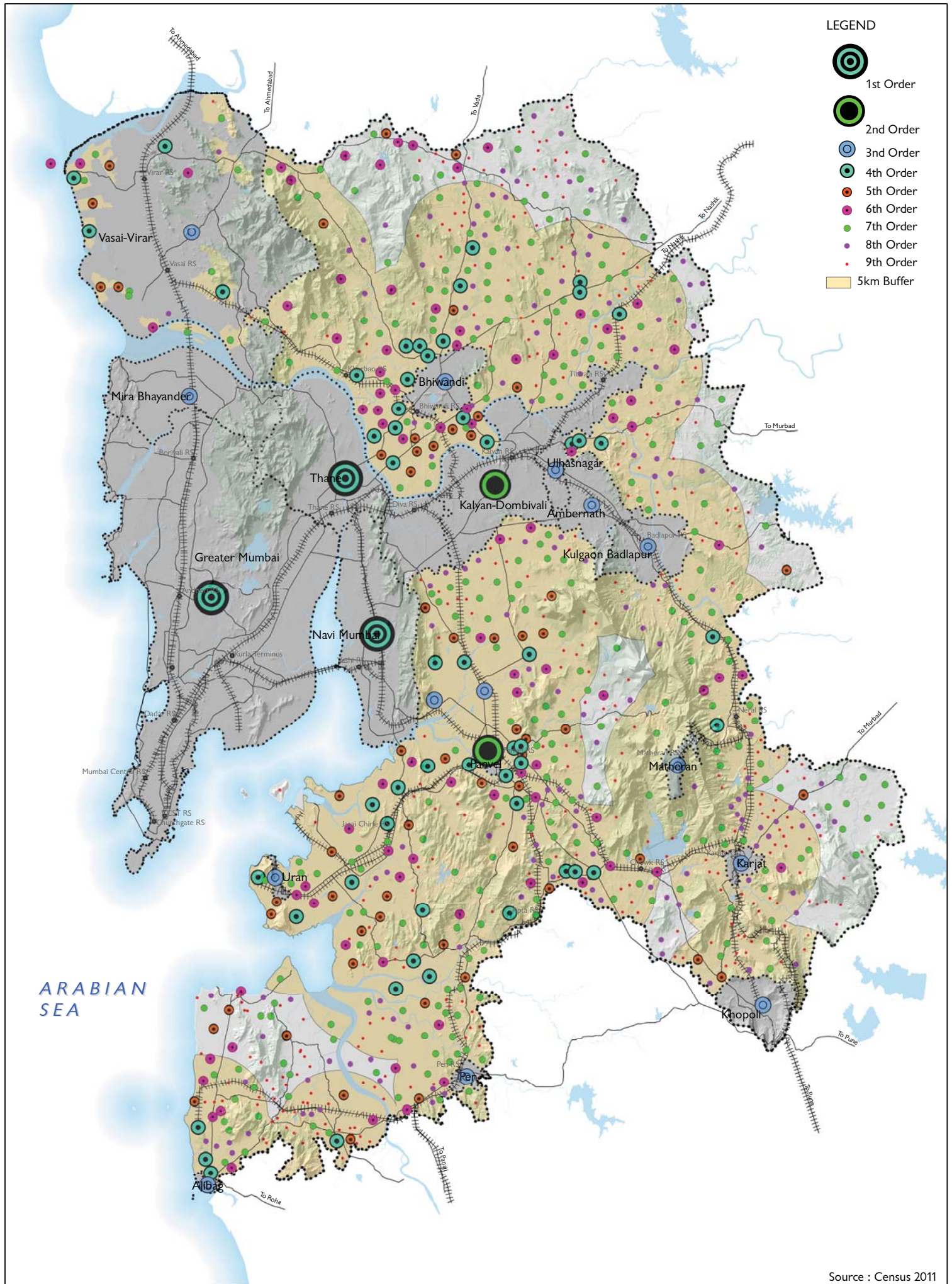
**Educational Facilities
in Rural MMR, 2011**

Modified Draft Mumbai Metropolitan Regional Plan 2016-36



- LEGEND**
- Hospital
 - Veterinary Hospital
 - Maternity Home
 - Mobile Health Centre
 - Dispensary
 - Uninhabited villages
 - Private Clinic
 - Census Towns

Source : Census 2011



LEGEND

- 1st Order
- 2nd Order
- 3rd Order
- 4th Order
- 5th Order
- 6th Order
- 7th Order
- 8th Order
- 9th Order
- 5km Buffer

Source : Census 2011

educational centres, credit institutions etc. Such villages need to be further strengthened in terms of infrastructure and connectivity to other major urban centres in the vicinity.

Analysis through Guttman scalogram was conducted to understand the existing hierarchy of rural settlements based on the extent of amenities available in the villages. It was observed that (refer Map no. 28):

- a) Around ULBs there were low order settlements indicating dependencies on urban infrastructure and amenities. In the case of 27 villages around Kalyan and Bhiwandi, there is higher level of amenities present, presumably to cater to the increased urbanization trend.
- b) At intersections/major nodes (eg, Ambadi, Rasayani) there is a clustering of higher order settlements, indicating that they are either serving as local hubs or responding to urbanization trends in the vicinity.
- c) The presence of next level of settlements in the hierarchy were observed to be dispersed quite uniformly across MMR except in the eastern part of MMR, (areas which are hilly or interrupted by water courses) and around the existing ULBs.
- d) Influence zones of higher order settlements were identified up to third order with the intention of understanding distance based under provision of social amenities. This indicated that there are currently areas in Panvel, Bhiwandi, eastern Ambarnath and Karjat which have very few higher order settlements. Villagers in these areas would therefore be compelled to travel much longer distances to avail higher level of health and educational facilities.
- e) The underprovided areas in rural MMR suggest the need for increased provision of specific amenities and increased connectivity along with the need to identify new strategically located settlements that could serve as future local hubs for a range of local needs viz. social, economic and transport.

2.9. Status of Environment

Environmental resources are under stress due to increasing urbanization in MMR. The management of urban and industrial processes is critical for maintaining the environmental resources of the region. Environmental sensitivity mapping along with vulnerability mapping were also carried out for MMR, with a view to inform planning decisions. An overview of the current status of the environment in terms of the quality of air, water and land within MMR follows.

2.9.1. Issues regarding Air Quality in MMR

- a) **Poor AQI:** Several locations within MMR have poor air quality and high levels of pollution. The air quality is monitored by measuring the levels of RSPM, NO_x and SO₂ etc. Poor air quality is a result of industrial emissions, heavy traffic, congested roads and idling emissions from vehicles, (resulting in high levels of NO_x concentrations), construction and demolition and quarrying activities (resulting in high RSPM levels). Industrial areas like Dombivali, Ambarnath, Taloja, and Ulhasnagar recorded Moderate and Poor AQI for more than 50 per cent of the observations. While Sion recorded Good Air Quality for a mere 26 per cent of the observations, recorded Poor Air Quality for more than 42 per cent of the times (refer Map no. 29).
- b) **Critically Polluted Areas:** Three locations in MMR, Dombivali, Chembur and TTC Industrial Area (Navi Mumbai) feature in the national list of critically polluted areas for which action plans have been prepared by MPCB. The most polluted sites have been recorded in Kalyan (Ambarnath and Dombivali) region. Both the areas have as many as 1400 chemical companies with a major share of red and orange category industries in the region, fabrication units, dye companies,

pharmaceuticals companies and so on. Both these regions are also seeing increasing growth owing to affordable pricing thus indicating increasing risk and vulnerability in coming years.

- c) **High RSPM levels** are of great concern in MMR. All areas recorded high levels of RSPM and violated the annual standards ($60\mu\text{g}/\text{m}^3$) of RSPM set by CPCB. Since these are fine respirable particles they have severe health impacts in terms of cardio-vascular, respiratory tract and lung related diseases. Panvel ($168\mu\text{g}/\text{m}^3$), Taloja ($129\mu\text{g}/\text{m}^3$) and all the AAQMS in Navi Mumbai regions recorded high RSPM levels in MMR. These areas have large quarry sites and construction activities. A correlation may be seen in the increased cases of respiratory diseases that have been reported in various studies conducted in Greater Mumbai by the Chest Medicine & Environmental Pollution Research Centre, KEM Hospital.
- d) **NO_x concentrations:** The annual standards were found to be violated at 16 of 25 monitoring stations in MMR. The regions of Kalyan and Navi Mumbai recorded high levels of NO_x concentrations. Owing to heavy traffic, congested roads and idling emissions from vehicles the NO_x levels at Sion region are the highest at $106\mu\text{g}/\text{m}^3$ in MMR followed by Dombivali ($94\mu\text{g}/\text{m}^3$), Ambernath ($91\mu\text{g}/\text{m}^3$) and Ulhasnagar ($81\mu\text{g}/\text{m}^3$), areas which are highly industrially influenced.
- e) **Inadequate monitoring systems:** Emission inventory identifying sources of pollution has rarely been undertaken in MMR. Current numbers and locations of monitoring stations are inadequate, frequency and number of parameters monitored is varied and not consistent in all areas. The monitored sites are not representative and do not consider certain concentrated timed activities such as building construction/development sites or quarries. There is often duplication of data between MPCB and the ULBs due to lack of sharing/linking of findings. The existing monitoring mechanism and complaint redressal systems do not ensure timely action. Regional air monitoring information integration has not been undertaken due to lack of an institutional mechanism for centralized data collection, verification and validation. This further leads to issues with regional data gaps, authenticity and consistency of data, creating challenges on research, comparative and periodic analysis and timely action.

2.9.2. Issues related to Water Quality in MMR

Many of the important rivers that are sources of drinking water or under threat of industrial pollution along with creeks and estuaries are being monitored by MPCB at the regional scale as per the norms and standards of CPCB. Water quality index maps were prepared for pre-monsoon and post-monsoon period as shown below. Further subsets for pH, BOD, DO and Faecal coliform have also been indicated (refer Map no. 30). The major findings were as follows:

- a) **River WQI:** All the river Water Quality Monitoring Station (WQMS) indicated 'Good to excellent' water quality during post monsoon period except at Mithi River. Whereas during pre-monsoon period, 2 locations (on Ulhas and on Patalganga River) indicated medium to good water quality and WQMS on Mithi River indicated 'Bad to Very Bad' water quality. The water quality was largely affected due to the increase in the faecal count which may be due to direct discharge of domestic sewage, faecal waste of animals, agricultural and storm runoff. CETPs that exceed permissible limits for COD and BOD. The rivers in Mumbai are not being monitored and are observed to be used as drains for dumping waste and sewage, and are highly polluted. The Mithi River epitomizes the condition of our rivers when they pass through urban areas. The DO (less than limit), BOD and ammonia for past 5 years have exceeded permissible limits. The possible reason may be due to discharge of untreated waste from industries and since the river passes through slum areas where sewage is discharged untreated resulting in poor water quality. There is effluent discharge from industries into the Patalganga River causing increased BOD values.
- b) **Sea/Creek WQI:** The seafront/creek water quality during post monsoon was found to be good except at a sampling location near Oshiwara River whereas during pre-monsoon, 21 WQMS (87

per cent of the sampling locations) revealed bad water quality due to higher BOD and Faecal Coliform (FC) content.

- c) **Inland water quality:** From secondary sources, it is estimated that there are nearly 431 water bodies within the jurisdiction of various ULBs in MMR. Of these 107 water bodies are in Mumbai and 324 water bodies in rest of ULBs of MMR. 36 water bodies (24 lakes and 12 holding ponds) are in Navi Mumbai, 150 water bodies in CIDCO area, 25 lakes in Thane, 9 lakes in Kalyan Dombivali, 90 lakes in Vasai Virar, 8 in Panvel and 3 lakes each in Bhiwandi Nizampur and Mira Bhayander. As per the Land use and Land cover analysis there are 2211 Inland water bodies with an area of 2288 ha. In MMR. This is in addition to the dams and reservoirs. Issues around water bodies in the various ULBs were as under:
- 1) In Mumbai, issues identified around the water bodies were mainly encroachment, dumping of solid waste and construction debris, embankment of edges and deteriorating water quality.
 - 2) In Navi Mumbai, there are 24 lakes and 12 holding ponds. These water bodies are regularly monitored by NMMC. The water quality assessment for the year 2011-12 revealed that the pH and DO were within the permissible limit. However the BOD at maximum water sampling locations was higher than the standards (in the range of 13 to 316). The possible reason for the exceedance may be organic and religious waste disposal.
 - 3) In Thane, most of the lakes are rain fed and are not used for supplying drinking water to the city. The pH and ammoniac nitrogen values were well with the desirable limits of MPCB. But the BOD at 14 locations and DO at Diva monitoring station exceeded the permissible limits. The possible reason for the exceedance may be disposal of organic waste and release of untreated sewage. Around 21 lakes have been taken up under various Central and State schemes for conservation by TMC.
 - 4) In BNMC, there are 3 lakes and the common issues are mushrooming of slums and concretization of the catchment area. One of the lakes is used for supplying drinking water.
 - 5) VVMC has around 90 lakes, some of which are notified (Pelhar Lake) and some are preserved with minimal human interference (Netaji, Shirgaon and lake near Wagholi Naka). Also lakes are developed for recreational purposes (Chakreshwar Lake) had disposal facilities and were well maintained and preserved. Other lakes (Nirmal and lake near Wagholi ZP School) adjacent to the roads were very polluted and used for dumping of waste.
 - 6) Lakes in KDMC and PMC face similar threats of encroachment and eutrophication.

Clearly, inland water bodies are facing pollution due to dumping of waste of all kinds and encroachments/mushrooming of slums along the water edges.

- d) **Ground water:** The ground water trends of 44 monitoring points reveals that 34 per cent i.e. 15 wells, showed normal trend; 43 per cent i.e. 19 wells, exhibited decreasing trend and the data for remaining 23 per cent i.e. 10 wells, was not available for assessment (refer Map no. 31).

Vasai tehsil shows decreasing water level trend. The reason could be over-extraction of water for increasing demand for agriculture, floriculture, horticulture and for increasing residential demands due to insufficient municipal water supply. Decreasing trend in Bhiwandi, Kalyan, Thane and Panvel may also be because of over-extraction of ground water to meet the water demand of the region.

Preliminary analyses have indicated that monitoring sites are few and do not represent the water condition in the region well. Frequency and parameters of monitoring are poor and inconsistent. There is no linking of the monitored data of ULBs and MPCB. Nallas, rivers and ground water are not adequately monitored, reducing timely action on pollution sources.

2.9.3. Land Use Related Issues in MMR

- a) **Agriculture:** Land under agriculture is critical as it contributes to the food security of the region. Although, the demand of the region is way beyond the productive capacity of the agricultural

areas in the region, nonetheless these areas need to be protected for the future. It is observed that although there are two Dam projects i.e. Bhatsa and Hetawane on Amba River providing irrigation water in the region, the Bhatsa project command area has yet to be fully developed whereas the tail water from the Bhivpuri hydro project is being used for agriculture. These command areas are critical for encouraging local agriculture.

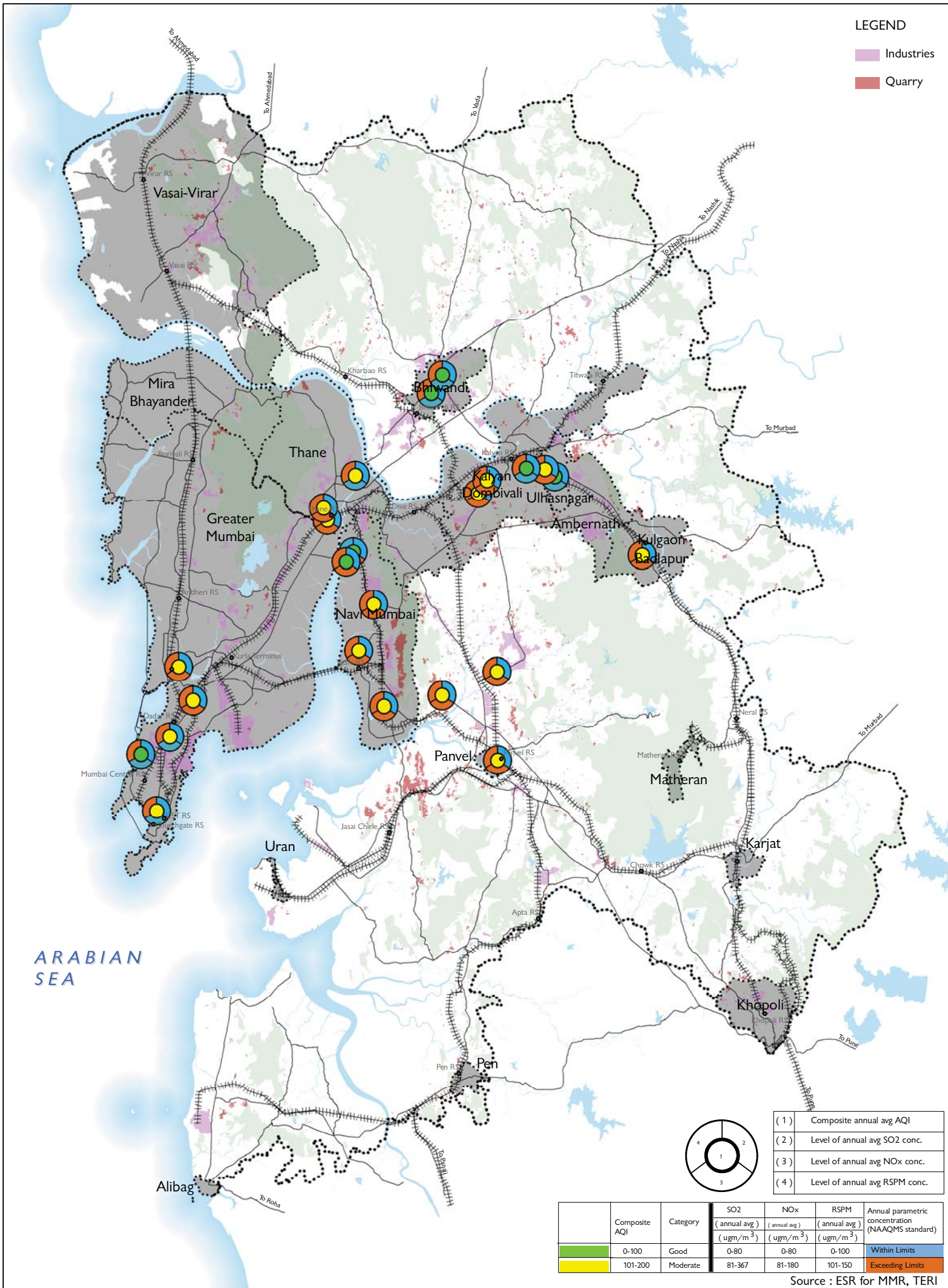
- b) **Quarrying:** The area under quarrying activity adds to a total of 43 sq km area within MMR. (refer Map no. 32). As on January 2014, there are about 219 operators in MMR who have been provided leases to undertake stone quarrying and stone crushing activities. The active sites under quarrying add to a total of 4.5 sq. km area within MMR, which are undertaken in the tehsils of Thane, Bhiwandi, Panvel and Kalyan. Other than these, there seem to be illegal quarrying. Quarrying is being carried out along the hills endangering steep erosion prone areas as also creating air quality issues with high SPM observed in certain areas.
- c) **Physiography:** Critical areas are observed to be mainly within protected areas including the National parks, Wild Life Sanctuaries and Eco-sensitive areas.
- d) **Salt Pans:** Salt pans are not only important from a livelihood, economy and salt production perspective, but are critically important from the point of view of flood protection. The salt pans today face serious threat given the limited land supply in the region leading to a mild decline in their overall area and salt production.

2.9.4. Issues related to Protected Areas and Areas of Natural Biodiversity

- a) Encroachment and quarrying at the edges and foothills of forests, protected areas and steep slopes are leading to degradation of forested areas and erosion. Since urban areas are located in close proximity to protected areas, there are man-animal conflicts resulting from non-conforming uses around such areas. Forest fires have been also reported in Sanjay Gandhi National Park (refer Map no. 32).
- b) Dumping of construction and demolition waste in coastal areas and rivers are a threat to coastal wetlands including mangroves and mudflats also leading to flooding. Solid waste management sites located on coastal wetland areas that lack scientific management, also contribute to pollution of creeks. These are a further threat to marine life.
- c) Physical infrastructure has not kept pace with urbanization leading to pollution of water bodies and in turn affects flora and fauna.
- d) Urbanisation is directly leading to biodiversity decrease and development. Greenery provided usually non-native, decorative, invasive are not sensitive to augmenting local biodiversity.
- e) There are a number of patches of notified forests and protected areas in MMR that are observed to have no forest cover. These are potential areas for afforestation programmes.

LEGEND

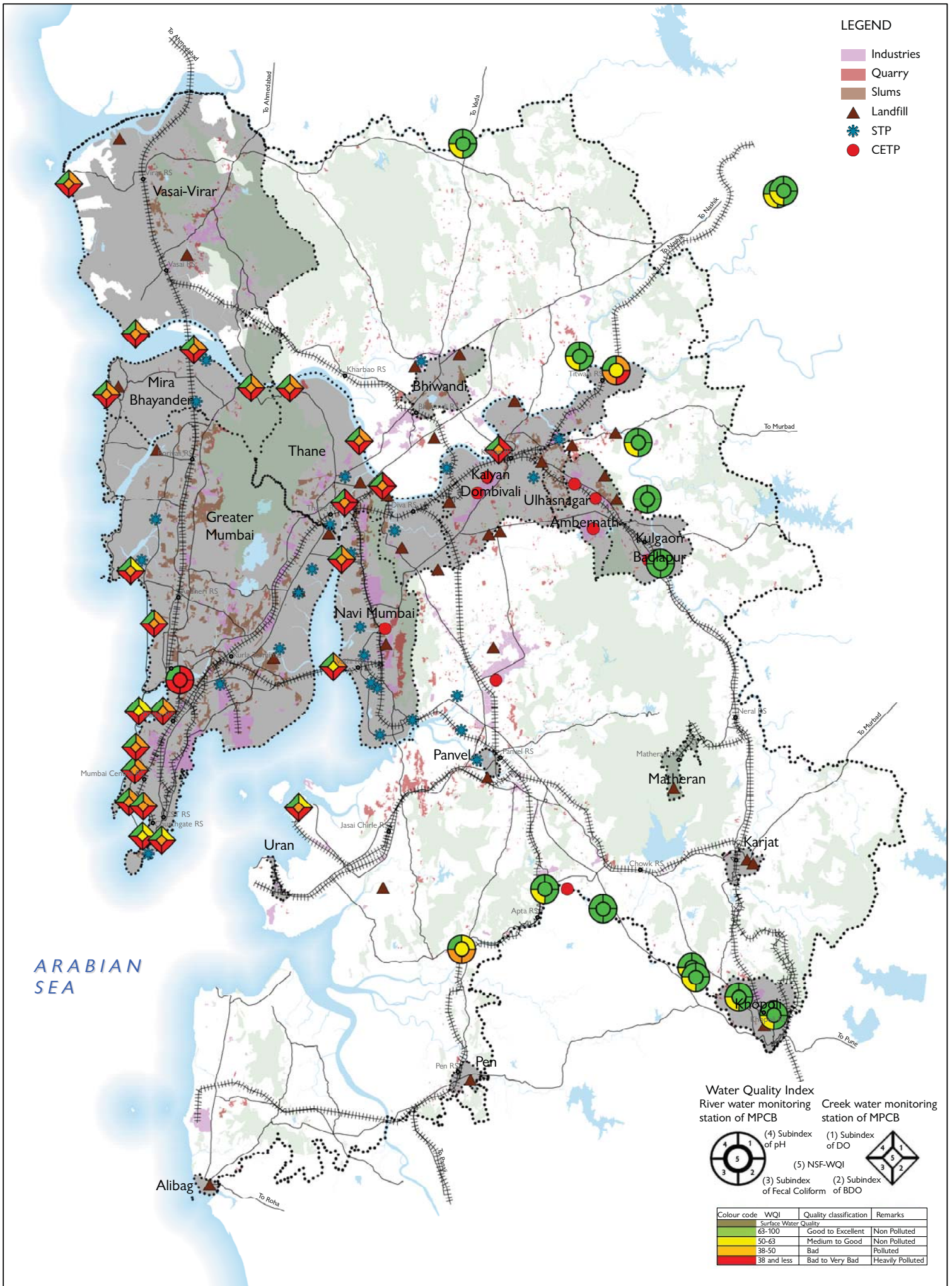
- Industries
- Quarry



- (1) Composite annual avg AQI
- (2) Level of annual avg SO2 conc.
- (3) Level of annual avg NOx conc.
- (4) Level of annual avg RSPM conc.

Composite AQI	Category	SO2 (annual avg) (ugm/m ³)	NOx (annual avg) (ugm/m ³)	RSPM (annual avg) (ugm/m ³)	Annual parametric concentration (NAAQMS standard)
0-100	Good	0-80	0-80	0-100	Within Limits
101-200	Moderate	81-367	81-180	101-150	Exceeding Limits

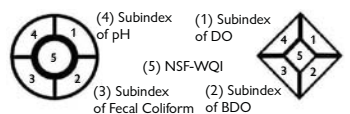
Source : ESR for MMR, TERI



LEGEND

- Industries
- Quarry
- Slums
- Landfill
- STP
- CETP

Water Quality Index
 River water monitoring station of MPCB
 Creek water monitoring station of MPCB

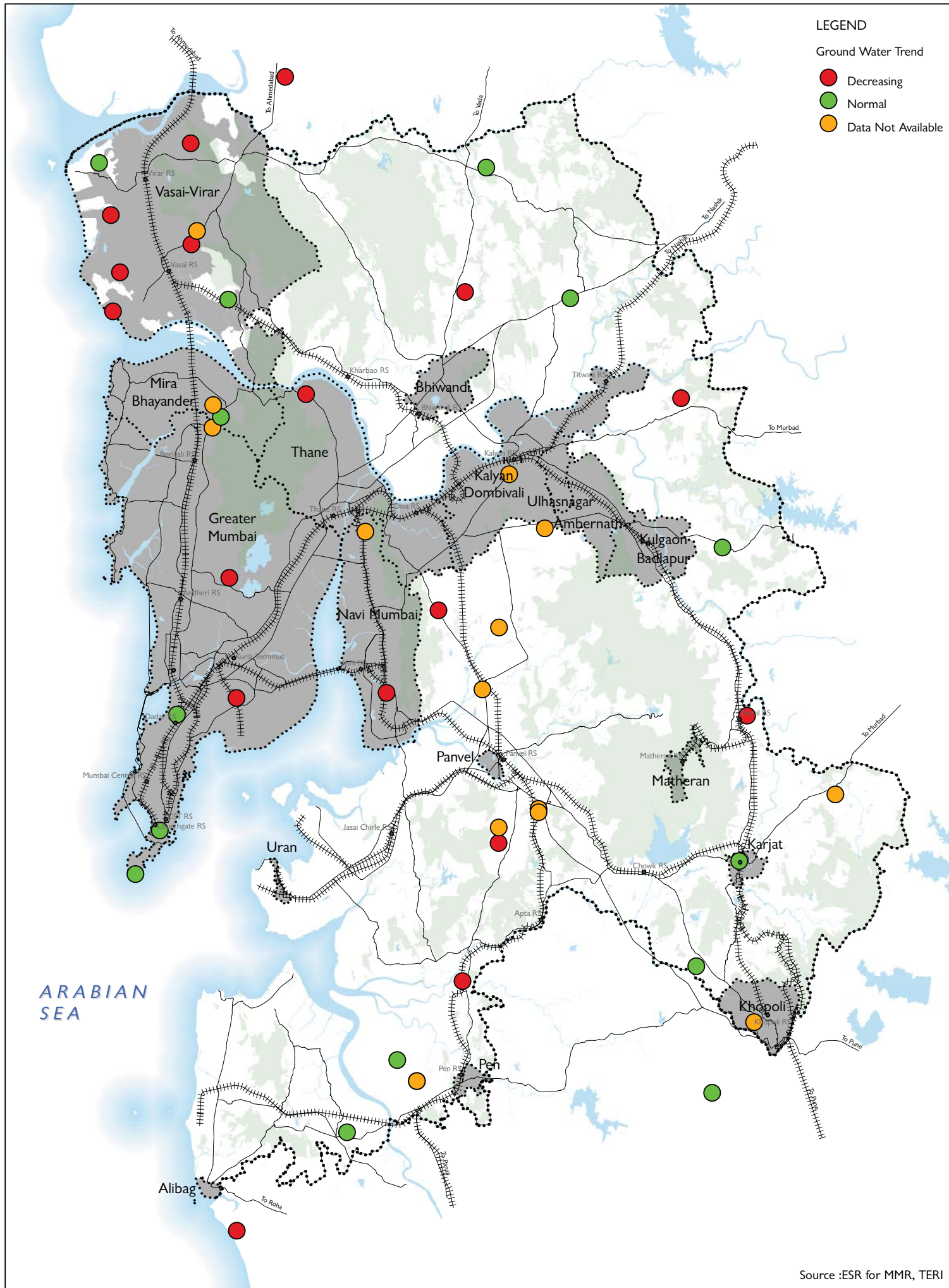


Colour code	WQI	Quality classification	Remarks
	63-100	Good to Excellent	Non Polluted
	50-63	Medium to Good	Non Polluted
	38-50	Bad	Polluted
	38 and less	Bad to Very Bad	Heavily Polluted

LEGEND

Ground Water Trend

- Decreasing
- Normal
- Data Not Available

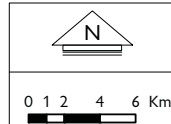


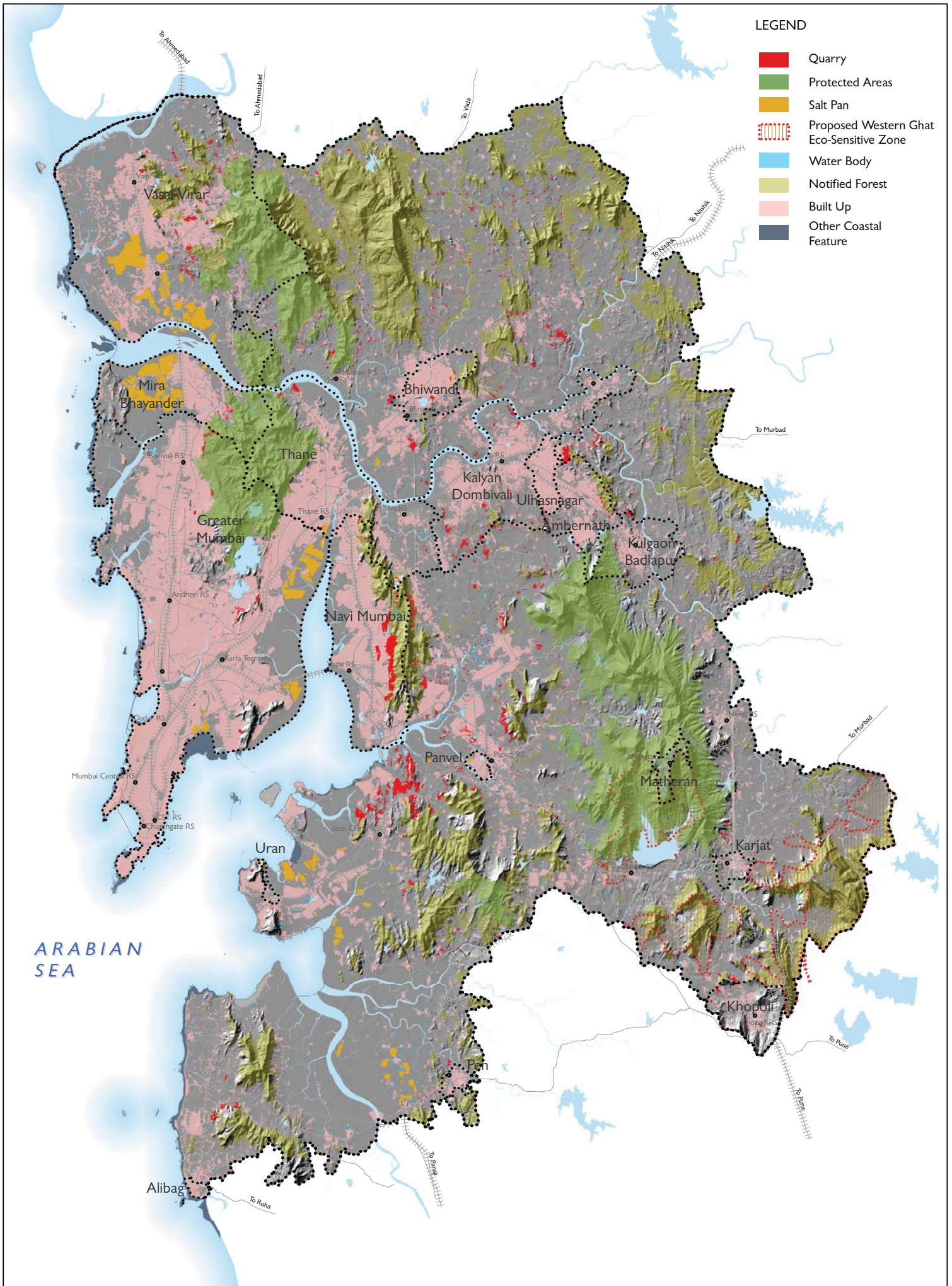
Source :ESR for MMR, TERI

Ground Water Status 2011

Modified Draft Mumbai Metropolitan Regional Plan 2016-36

- Railway Stations
- MMR Boundary
- ULB Boundary
- ||||| Rail
- Road
- Forest
- Waterbody





LEGEND

- Quarry
- Protected Areas
- Salt Pan
- Proposed Western Ghat Eco-Sensitive Zone
- Water Body
- Notified Forest
- Built Up
- Other Coastal Feature

ARABIAN SEA

3.0 Issues Requiring Planning Interventions

- 3.1 Regional Issues
- 3.2 Regional Plan 2016-36 : Goals and Objectives
- 3.3 Regional Plan 2016-36 : Strategies

CHAPTER – 3

ISSUES REQUIRING PLANNING INTERVENTIONS

3.1. Regional Issues

The survey of the region enabled identification of structural deficiencies in the region that need redressal and specific areas that need intervention either through land use proposals or through policy and project interventions. Sectoral and cross-sectoral analyses have also helped identify the issues that need to be addressed through the Regional Plan.

A number of consultations were held during 2013-2015 towards identification of issues to be addressed by the Regional Plan 2016-36, starting with brain storming exercises and consultations within MMRDA. These included consultations with the concerned government departments and agencies; Municipal Corporations and Councils; Planning Authorities; various stakeholders representing academic, environmental, non-governmental, chambers of housing, industry and commerce, and the real estate and market research institutions. Global consultations were also held with regional planning institutions from across the world. Lastly, individual sectoral experts were consulted for specific inputs.

The following issues emerged after the analysis of the situation of the region and the above consultations.

3.1.1. Economy and employment:

- The secondary sector in the region has been declining since the 1990s following globalization and liberalization. This period has witnessed the flight of manufacturing from the region, starting with the closure of the textile mills in Greater Mumbai and the increasing non-availability of skilled jobs. The lack of jobs that match the skilled manpower available within the region has led to increasing informalisation of work. The CAGR of the contribution to the NDDP of MMR of the secondary sector between the periods 2000-2009 had decreased to 4.56 as against 6.27 during 1999-2003. In terms of employment in manufacturing in MMR, though the figures indicated an overall drop in total employment from 8,78,325 in 1998 to 8,67,058 in 2005, they did not give an indication of the extent of decline in specific sectors. Employment in textile manufacturing declined from 2,40,483 in 1998 to 1,59,001 in 2005; manufacturing of transport equipment dropped dramatically from 45,965 in 1998 to 7583 in 2005; chemicals and chemical products registered a drop from 76,284 to 52,280 in the same periods; manufacturing of fabricated metal products (except machinery and equipment) dropped from 1,24,597 in 1998 to 93,727 in 2005.
- Policies encouraging the conversion of industrial lands to residential use also aided this decline of the secondary sector and enabled the growth of the real estate market at the expense of manufacturing.
- A concentration of employment opportunities in Greater Mumbai has resulted in imbalanced growth in the region. Currently, sixty percent of all the formal jobs in the region are located in Greater Mumbai, though there is an increasing movement northwards to the suburbs from the Island city. Since publishing the Regional Plan 1996, new CBDs have emerged in Greater Mumbai at Bandra-Kurla, Lower Parel, Andheri and Powai, which is now indicating a polycentric growth pattern within Greater Mumbai. However, with the exception of Navi Mumbai and Bhiwandi, there are not many employment opportunities in the cities outside Greater Mumbai, resulting in long commutes from the cities beyond Greater Mumbai that largely serve as dormitory cities.

3.1.2. Rural-Urban Imbalance:

There is an imbalance between the development of urban and rural areas in the region in terms of access to social and physical infrastructure, and livelihood opportunities. The urban areas of the region have better access to infrastructure while several pockets of inadequacy exist in the rural areas of the region especially in the largely tribal north eastern belt.

3.1.3. Lack of governance:

The region has eight Municipal Corporations and nine Municipal Councils. Around several of the Municipal Corporations, especially around Bhiwandi, Kalyan Dombivli, and Navi Mumbai, there is a significant amount of peri-urban growth that has taken place. Census 2011 also indicates that several new Census Towns have emerged during the last decade, 2001-2011. These Census Towns, largely located in peri-urban areas, that are rapidly urbanizing, are currently governed by village panchayats that are not equipped to handle issues related to urbanization and hence are outside any effective governance framework. This has resulted in a 'degenerated periphery'²¹, with compromised living conditions due to a lack of access to physical and social infrastructure.

3.1.4. Housing:

The demand for housing in MMR stems from a variety of issues including the nature of current policies as elaborated below:

- Slum Proliferation: The urban poor lack of access to affordable formal housing and lack access to housing finance resulting in growth of slums.
- Limitations of the existing Slum Rehabilitation Schemes (SRA) approach of Greater Mumbai:
 - Not all slums can have in-situ redevelopment: Even though pre-1995 slum households are eligible for free-housing, the households living in slums in hazardous areas and land reserved for Development Plan reservations are required to be rehabilitated elsewhere. Redevelopment of slums in coastal areas is permitted on a pre-condition that the State Government must own 51 per cent stake in such redevelopment, making the scheme unviable.
 - Free Housing: Introduction of free housing in the slum segment meant redevelopment at no cost to the owners or tenants. The scheme was tailored in a manner that attracted the residents as well as the developers. However, the free housing scheme did not stay confined to slums and the poor. It created a legacy for regulations that made the non-poor also eligible for free houses under various schemes.
 - Poor Quality of Life: Since the scheme is market driven, the FSI has gone up resulting in high density pockets. Further, the Development Control Regulations are modified to make the proposition more profitable for the market. This is detrimental to the quality of life in such dwelling units as the regulations meant to ensure health and safety are compromised.
 - Pockets of High Density: The cohesion and city level vision is lost as a result of the high FSI being "scheme based" rather than "broad based". Schemes are floated by developers, based on locations that give maximum profits, resulting in patchwork pockets of redevelopment. Lack of comprehensive slum improvement master plan is resulting in poor level of amenities as well as creation of pockets of high density and specific areas have become low income slum rehabilitation areas.
 - Poor infrastructure: The impact of high FSI for low income housing has resulted in very high density pockets with inadequate supporting social and physical infrastructure.
- Vacant Houses: The fact that almost 14% of the houses in the region are vacant but are still not available to the market indicates that the speculative buyers have invested in these houses thereby causing a spiralling effect on the real-estate market. It is imperative that a strategy be worked out

²¹ Kundu et al, 2002.

to unlock these vacant houses and make them available for renting or sale which has the potential to bring down the dwelling units to affordable size.

- Conversion of residential units: The percentage of census houses being put to other than residential use has increased substantially over the past two decades from 16 per cent in 1991 to 21 per cent in 2011. Reasons for the same should be studied and corrective measures to prevent this trend should be taken.
- Inadequate Space: Though the percentage of households living in tenements with “no exclusive room” and “one room” has decreased from 69 per cent in 1991 to 57 per cent in 2011, the percentage of households living in inadequate housing space is very high.
- Limited Good Residential Stock: In 2011, out of the 69,92,297 census houses in municipal areas, 19,53,072 (28 per cent) are slum houses, 2,39,276 (3 per cent) are unauthorized structures and 28,116 (1 per cent) are dilapidated structures. In addition to this, 11 per cent houses are vacant (excluding slums) and another 14 per cent are put to other than residential use (excluding slums). This implies that formal houses in good condition, being put to residential use are only about about 33 per cent of the current stock.
- Enormity of the Need: The number of households are expected to increase from 51,94,614 in 2011 to 77,71,268 in 2036. The household size has decreased from 4.68 to 4.39. Assuming an average household size of 4.2, 4.0 and 3.86 for the years 2021, 2031 and 2036 respectively, this translates into an additional need of 27,26,532 units. However, an additional stock of nearly double that (50,18,585 units) is required to take care of the housing need by 2036 to address the replacement needs of the current housing stock.
- Rural Area Need: The percentage of both dilapidated structures and temporary structures is more in the rural MMR than Urban MMR. Special redevelopment schemes for rural areas need to be introduced.

3.1.5. Transportation:

The suburban rail transit network is the backbone of the region’s economy. This suburban rail network is currently stretched beyond its maximum capacity. Peak hour commuters are subject to inhuman levels of crowding with each car carrying more than double the stated carrying capacity of 1800 passengers. Limited land availability is a major constraint to augmenting services which are currently run at maximum efficiencies. However, not all existing rail lines in the region are commuterised. If services on such lines are augmented or if the suburban networks are extended, it would be beneficial.

3.1.6. Environment:

- Environmental pollution due to increasing urbanization is resulting in poor quality of life and directly impacting the livelihoods of those engaged in fishing and agriculture in the region. Increased air and water pollution is observed across the region due to increased vehicular emissions, industrial pollutants, construction activity, quarrying, untreated or poorly treated effluent discharge from domestic as well as industrial sources as well as inadequate solid waste disposal capacities and measures.
- Increased noise pollution is observed and there is a direct impact on the urban health of residents in the region with increasing morbidity and mortality due to hypertension, respiratory diseases and cardiovascular diseases.
- Depleting ground water resources, increased salt water ingress due to increased ground water withdrawal is observed along the coastal areas with water supply not keeping pace with urbanization.

3.1.7. Infrastructure:

- Dense living conditions in several metropolitan areas in the region, viz. Greater Mumbai, Bhiwandi and Ulhasnagar have resulted in inadequate provision of social infrastructure.
- Peri urban areas have poor social and physical infrastructure given the lack of governance frameworks available in these areas. SPAs are unable to provide infrastructure services where land resource is not available to them to raise finances.
- Significant proportion of the urban areas, along with the rural areas in the region, is underprovided in terms of sanitation systems and in terms of effective solid waste management systems.

3.1.8. Development Control Regulations:

- Certain sections of the current DCRs meant for MMR are not easily comprehensible to the general public and have built-in circular references. There is a need for simple and clear regulations that are not open to interpretation. There is also a need for greater coherence while detailing out the uses permitted in the various zones. The uses permitted in specific zones in the Regional Plan are currently not exclusive as the case of 'Quarry Zones'. Quarrying is permitted in other zones apart from the 'Quarry zones'.

The complex and numerous DCRs operating in the Development Plan areas of MMR have also created a situation of differential development opportunities across the region. Common DCRs which are currently under consideration of the government for the Municipal Corporation areas of MMR may help improve this situation.

3.1.9. Data paucity:

- Currently, since the MMR boundaries do not coincide with district boundaries, MMR-specific data needed for comprehensive planning is not available. Further, data which is sector-specific, for monitoring contributions towards economic growth is not available for sectors that are relevant for MMR's growth viz. IT/ITES or Media and entertainment or Office sector. Data is also not available in a timely manner; it is often not in a form that is easily accessible; data sharing across organizations is also not easily achieved. Additionally, there are gaps in the data available with some significant areas completely not addressed, for example data pertaining to informal employment or income or environment or new developments. A comprehensive information system that is integrated with the GIS data base is lacking. The regional planning exercise has to be carried out in the absence of updated data sets and implementation and monitoring also suffer as a result.

3.1.10. Need for Comprehensive outlook:

- There is a need to have a larger perspective while drafting the Regional Plan. There are regulatory conditions that have emerged outside the jurisdictional boundaries of the region that impact the development of the region. Similarly, environmental networks are not bound by regional boundaries and have to be viewed holistically.

3.1.11. Lack of regional identity:

- The Mumbai Metropolitan Region and its boundaries are not common knowledge. There is a need to work towards creating a unifying identity for the region that is widely recognized. Currently, the constituent parts of the region, do not work as an integrated whole with seamless connectivity. For the region to maximize its potential, a seamless and efficient connectivity is essential.

3.2. Regional Plan 2016-36 : Goals and Objectives

Regional Plan 2016-36 seeks to provide a broad framework for future urbanisation and the regional level infrastructure while providing for the needs of the projected future population and while addressing the issues identified that need planning interventions. Towards this end, the strategic goal of RP 2016-36 is to promote a more balanced growth of the region through increasing inter-connectedness and integration of its constituent parts that work together as a single entity - viz MMR.

This basic goal can be translated into the following specific objectives:

1. To facilitate a more balanced growth of the region through a dispersal of employment opportunities across the region,
2. To facilitate and promote the economic growth of the region, with an emphasis on the secondary sector, in order to provide skilled employment opportunities in tune with the available skillsets in the region,
3. To augment public transit across the region with a view to increase connectivity and integration of the region,
4. To enable the emergence of MMR as an integrated whole, leveraging the specific strengths of individual cities to collective advantage,
5. To earmark conservation areas and suggest strategies for enhancing their strength,
6. To suggest the extent and direction of future urbanisation in areas that can be well served along with the institutional framework for governance, and
7. To enable better quality of life through the creation of an integrated regional open space network and regional infrastructure.

Accordingly, a series of strategies to achieve these objectives have been detailed out below.

3.3. Regional Plan 2016-36 : Strategies

3.3.1 Enable balanced regional development

- Create new growth centres/employment hubs dispersed across the Region
- Create Local Development Centres (LDCs) as rural hubs
- Promote tourism
- Encourage primary sector livelihood opportunities

3.3.2 Encourage manufacturing in MMR

- Demarcate new Industrial Zone in the region
- Provide logistic parks in the vicinity of the port
- Encourage SMEs across the region

3.3.3 Increase public transit connectivity in the region

- Extend suburban rail connectivity to peripheries of MMR
- Increase suburban stations
- Create new transit corridors as per CTS
- Develop Multi-Modal Corridor
- Use transit to spur development in current under-developed areas

3.3.4 Create regional scale open space networks

- Create a blue-green regional network that links heritage sites and tourist sites
- Create a greenway along the Multi-Modal Corridor
- Preserve all surface Water Bodies in the region

- Maintain a buffer around all major rivers, water bodies and forests and create a network of open spaces throughout the region

3.3.5 Extend governance framework to peri-urban areas

- Extend current municipal boundaries to include peri-urban areas that are rapidly urbanizing
- Create decentralised sub-regional offices of MMRDA to realise local strategies

3.3.6 Suggesting a framework for addressing the housing problem in terms of

- Policy to enable the market to meet the need
- Creating land-banks for intervention by the government
- Regulatory and institutional arrangement for housing in MMR

3.3.7 Creation of Regional Infrastructure

- Provide regional scale infrastructure like regional parks, sports complexes, large hospitals, educational institutions, fire services, landfills etc.

3.3.8 Simplified Zoning and DCRs

3.3.9 Create a Regional Information System (RIS)

4.0 Projections and Assessment of Needs

- 4.1 Population Projections
- 4.2 Housing Need

CHAPTER – 4

PROJECTIONS AND ASSESSMENT OF NEEDS

4.1 Population Projections

4.1.1 Population Projection Methods

A number of methods are available for general population projections. These include arithmetical increase method, geometrical increase method, incremental increase method, simple graphical or graphical extension method, graphical comparison method and the ratio method or apportionment method.

In the context of MMR, the ratio method seems more appropriate to arrive at regional population projections and thereafter the mathematical projections can be used to arrive at the population projections for each of the constituent units of MMR for greater accuracy. However, the vital demographic data about birth, death and fertility rates in respect of the constituent areas of MMR are not available at the desired level of disaggregation. It is observed that curve fitting technique or simple trend extrapolation method gives suitable estimates for smaller units of Corporations, Councils and other such units. This is primarily because data is available about past population and therefore the form of trend equation so derived is statistically efficient.

It is thus proposed to use ratio method with demographic inputs, trend based method using household formation rate and population separately to get three outputs to estimate the population MMR up to the year 2041 so that the more appropriate one can be selected and adopted. The brief description of these methods is given below.

4.1.2 MMR Population-2031 projected in various Study Reports

The population projections for MMR have been carried out for various purposes. The Chitale Committee Report (2006) arrived at population projections for MMR while estimating the water demand of MMR for year 2031. The Comprehensive Transportation Study (CTS-2008) of Mumbai Metropolitan Region projected MMR's population to arrive at the future traffic and transport infrastructure requirements of MMR for 2031. The Concept Plan for MMR (2011) projected the MMR population for year 2031.

Table 57: Population Projections as per various Study Reports

(In thousands)				
No.	Source	2011	2021	2031
1	Regional Plan-1996 (based on 1991 census)	22,414	25,561	25,753
2	Chitale Committee (2006) (based on 2001 census)	24,317	29,919	36,030
3	CTS (2008) (based on 2001 census)	24,000	30,000	34,000
4	Concept Plan (2011) (based on 2001 census)	-	-	35,000

The recorded (2011 Census) population of MMR of 22.8 million is closest to the Regional Plan-1996 population projection.

4.1.3 Population Projection by Ratio Method (Method 1)

This method recognizes that population growth of a city is a reflection of growth forces operating in the external area. The population growth of Mumbai or MMR is greatly influenced by migration besides birth and death rates. In the ratio method the share of city's population in a larger region, as observed in the past, can be taken as an indicator of the future. The Regional Plan-1996 has estimated the population of MMR and MCGM by using this method up to 2031. In the projection, MMR is taken as a smaller area and Maharashtra as a larger one and further, India is taken as the larger area for Maharashtra. To understand the growth dynamics of and within MMR the population, Compound Annual Growth Rate (CAGR) and Population share of Greater Mumbai, MMR, Maharashtra and India are compared in Table 59.

Table 58: Population Growth of Mumbai, MMR, Maharashtra and India

(Population in Millions)

Year	Gr. Mumbai	Other Municipal Corps. in MMR	Urban MMR	MMR	Urban Maharashtra	Maharashtra	Urban India	India
1971	5.97	1.04	7.27	7.76	15.71	50.41	109.10	529.00
1981	8.24	1.81	10.43	11.08	21.99	62.72	159.72	658.00
1991	9.93	3.24	13.73	14.55	30.50	78.92	212.87	844.00
2001	11.98	5.29	18.21	19.37	41.00	96.88	285.36	1027.01
2011	12.44	7.46	21.33	22.80	50.82	112.37	377.11	1210.57
Population Growth Rate (CAGR in %)								
1971-1981	3.28	5.68	3.68	3.62	3.42	2.21	3.89	2.21
1981-1991	1.87	6.00	2.79	2.77	3.33	2.32	2.91	2.52
1991-2001	1.90	5.02	2.86	2.90	3.00	2.07	2.97	1.98
2001-2011	0.38	3.48	1.59	1.65	2.17	1.49	2.83	1.66

Source: Census of India

During the period 2001 to 2011, the population growth of Greater Mumbai has dropped from 1.90 to 0.38, population growth of MMR has shown decreasing trend from 2.90 to 1.65, population of India has shown declining growth rate from 1.98 to 1.66 and Maharashtra and Urban Maharashtra have also shown declining population growth rates. This shows that there is a natural reduction in population growth rate from 2001 to 2011.

Table 59: Population Share of Mumbai, MMR, Maharashtra and India (in per cent)

Year	Urban India/India	Maharashtra/India	Urban Maharashtra/Urban India	Urban Maharashtra/Maharashtra	MMR/Maharashtra	MMR/Urban Maharashtra	Greater Mumbai/MMR	Other Corps in MMR/MMR
1971	20.62	9.53	14.40	31.16	15.40	49.43	76.89	13.43
1981	24.27	9.53	13.77	35.06	17.66	50.37	74.43	16.36
1991	25.22	9.35	14.33	38.65	18.44	47.71	68.21	22.29
2001	27.79	9.43	14.37	42.32	19.99	47.23	61.85	27.34
2011	31.15	9.28	13.48	45.23	20.29	44.87	54.56	32.70

Source: Census of India

Though the overall population growth is declining, population share of Urban India to India is increasing which indicates growth of urbanisation in India. Maharashtra's population share in India and Urban Maharashtra's share in Urban India is decreasing which indicates that population growth and urbanisation of other states is faster than Maharashtra. Similarly, population share of Urban MMR to

Urban Maharashtra is decreasing which indicates that other cities in Maharashtra are growing faster than MMR cities. The trends are shown graphically in Figure 26 and Figure 27 above. As MMR population is mostly urban, it's population is compared with that of Urban Maharashtra's for Population projection. Share of Greater Mumbai in MMR's population reduced from 76.89 % to 54.56% between 1971 to 2011 while that of other Municipal Corporations increased from 13.43% to 32.70 % during the same period.

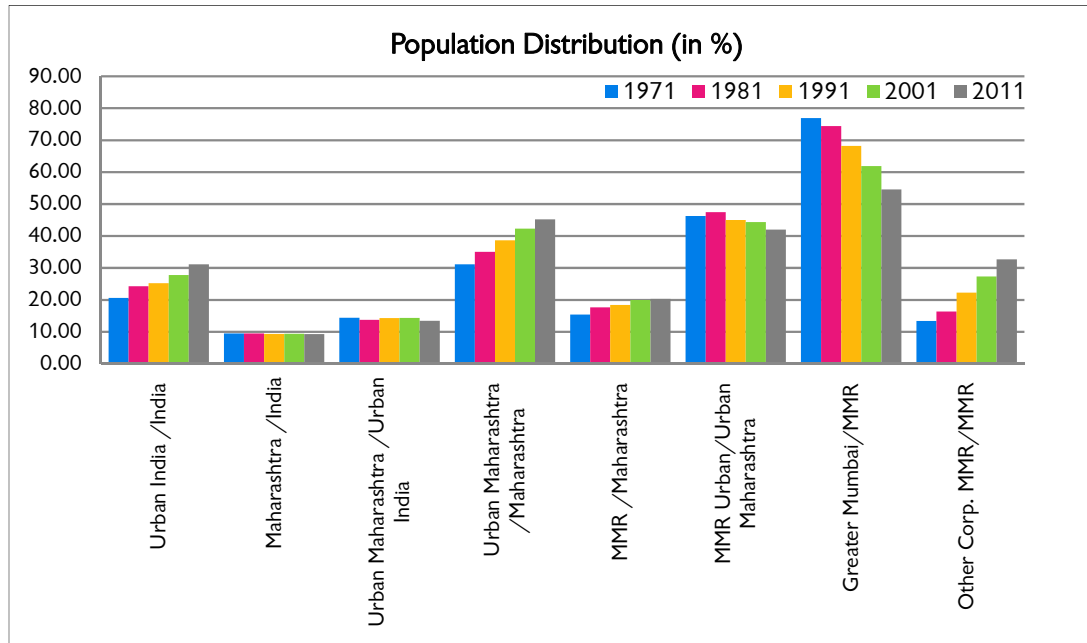


Figure 26: Population Growth trend of India, Maharashtra and MMR

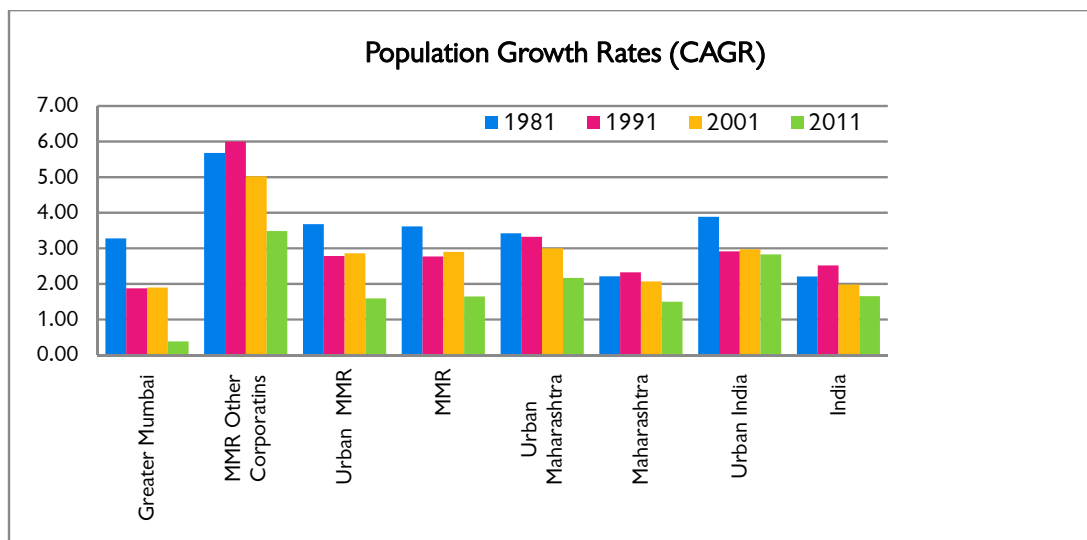


Figure 27: Population of India, Maharashtra and MMR

Table 60: Population Distribution within MMR (Based on 2011 Census areas)

% share of population	1981	1991	2001	2011
MCGM	74.43%	68.21%	61.85%	54.56%
Municipal Corporations in Thane Dist	16.36%	22.29%	27.34%	32.70%
Municipal Councils in Thane Dist	1.20%	1.22%	1.56%	1.88%
Municipal Councils in Raigad Dist	1.13%	1.27%	1.38%	1.64%

% share of population	1981	1991	2001	2011
Census Towns in Thane Dist	0.38%	0.47%	0.80%	0.92%
Census Towns in Raigad Dist	0.70%	0.89%	1.11%	1.85%
MMR Rural of Thane Dist	2.15%	2.38%	2.98%	3.48%
MMR Rural of Raigad Dist	3.66%	3.27%	2.99%	2.97%

The increasing population share of other Municipal Corporations in MMR shows that growth has shifted to these cities against Greater Mumbai.

Population of a given area depends upon the growth of the larger area in which it is located. Thus, if the future population estimates of the larger area are available, then by examining the trend of past ratios of smaller area populations to that of the bigger area, projections for the smaller area can be made. For this purpose, the trend of ratio is used in projecting the ratio into the future under the geometric or exponential model. In the present task, MMR is taken as a smaller area and Maharashtra as a larger one and further, India is taken as the larger area for Maharashtra. Consequently, for using this method to project the population of MMR, it would be necessary to project the overall population figures for India up to 2041. To this end, a demographic method based on the vital statistics viz. birth rate and death rate, is used as given Table 61. The ratio of population of Maharashtra to that of India in the year 1971, 1981 and 1991 and the corresponding ratios for the other areas are given in Table 62.

Table 61: Projected Vital Rates for India

Scenario	Vital rates	2001-06	2006-11	2011-16	2016-21	2021-26	2026-31	2031-36	2036-41	2041-46
Growth Rate	CBR	23.20	21.30	19.60	18.00	16.00	14.40	13.30	12.20	11.10
	CDR	7.50	7.30	7.20	7.10	7.20	7.08	7.03	7.01	6.99
	GR	15.70	14.00	12.40	10.90	8.80	7.32	6.27	5.19	4.11

Table 62: Share of Area-wise Population

Region	1971	1981	1991	2001	2011	2021	2031	2041
Maharashtra/India	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.08
Urban Maharashtra /Maharashtra	0.31	0.35	0.39	0.42	0.45	0.49	0.52	0.56
MMR /Urban Maharashtra	0.49	0.50	0.48	0.47	0.45	0.44	0.44	0.43
Gr. Mumbai / MMR	0.77	0.74	0.68	0.62	0.55	0.52	0.48	0.42

Table 63: Population Projection by Ratio Method

Region	Population in thousands					
	1991	2001	2011	2021	2031	2041
India , by using Projected Vital Rates	8,44,324	10,27,015	12,10,193	13,58,802	14,72,377	15,58,951
Maharashtra , by using projected population for India	78,950	96,752	1,12,374	1,25,825	1,34,722	1,41,241
Urban Maharashtra , by using projected population for India	30,500	41,000	50,820	60,396	68,708	74,858
MMR , by using projected population for Urban Maharashtra	14,588	19,367	22,804	26,155	28,779	29,885
Gr. Mumbai , by using projected population for Total MMR	9,930	11,978	12,442	12,626	11,929	10,358

The population was first projected for India for 2031 at 150 crores. based on the vital rates (Table 61) provided by the National Commission on Population (Population Projections for India and States 2001-2026, May 2006). The population for Maharashtra and Urban Maharashtra were then projected as a share of this projected population for India, followed by the projection of MMR's

population based on Urban Maharashtra's population share. This is on account of more than 90% of MMR's population being urban. The projected population thus arrived at (by ratio method) for MMR is 2.88 Crores for 2031 and 2.99 Crores for 2041.

4.1.4 Population Projection by Trend Based Method using Household Formation Rate (Method 2)

Average household size of India as per Census 2011 is 5.3, that of Maharashtra is 5.0 while that of MMR is 4.39. The average Household Size in MMR is lower than both India and Maharashtra and has been decreasing over time. Throughout MMR the House hold size is steadily decreasing since 1991 except in Thane where it increased in 2001.

The Number of Households and the household size is another vital rate that determines the growth rate of population. Population projection based on household formation rate is calculated by multiplying the projected households with the projected household size. Having done this using the figures from Census years 1981, 1991, 2001 and 2011 and by using Microsoft Trends (66), the projected population of MMR is calculated as 2.99 Crores for the year 2031.

Table 64: Population Projection by Trends in Household Formation Rate

No	Unit/Year	1981	1991	2001	2011	2021	2031	2041
1	No. of Households	21,84,879	30,38,155	41,36,452	51,90,106	64,16,365	75,94,155	87,75,850
2	Household Size	5.07	4.79	4.68	4.39	4.22	3.94	3.72
3	Population	1,10,76,501	1,45,52,688	1,93,65,469	2,28,04,355	2,70,77,060	2,99,16,414	3,26,23,345

4.1.5 Population Projection by Trend Based Method using trends in Constituent Areas (Method 3)

Trend forecasting is a useful way to look at past population growth, determine possible trends from that data and use the information to extrapolate what could happen in the future. Trend forecasting is quantitative as it is based on tangible, concrete numbers from the past. It uses time series data, which is data where the numerical value is known over different points in time. Different types of patterns tend to appear on a time-series graph such as Linear, Exponential, Logarithmic and Polynomial. A particular pattern is appropriate for a given context and time. Microsoft Graph is used to project these trends. The detailed projections are available from the sectoral report on Demography.

MMR population for 2031 is arrived by projecting the actual population of the various census units of MMR such as Municipal Corporations, Municipal Councils, Census Towns and Rural areas (Tehsil wise). The population of individual units is projected based on past growth trends and considering locational importance and development initiatives such as notification of areas SPAs. Accordingly, the population for the years 2021, 2031 and 2041 has been projected based on trends (65). Their resultant compound annual growth rates and percentage share of MMR's projected population are indicated in Table 65.

Population of each constituent unit is plotted for three decades to project the likely population for the next one decade. For ex : population of 1981-2011 is plotted to arrive at the population for the year 2021 by Linear, Logarithmic and Polynomial patterns. The absolute numbers of projected population of three patterns are calculated from the formula derived from the graph. Out of the three patterns best-fit-curve (i.e. $R^2=1$) is considered the most suitable and adopted for 2021 population. To get a reasonable projection across a long period, for each of the years, 2021, 2031 and 2041 the trend observed in the preceding three decades is taken into consideration (i.e. 1991-2021 is considered for projecting 2031 population and 2001-2031 is considered for projecting 2041 population). The projected population of MMR is given in 65. As an example, the projections made for Thane Municipal Corporation area are given below in Figures 28, 29 and 30.

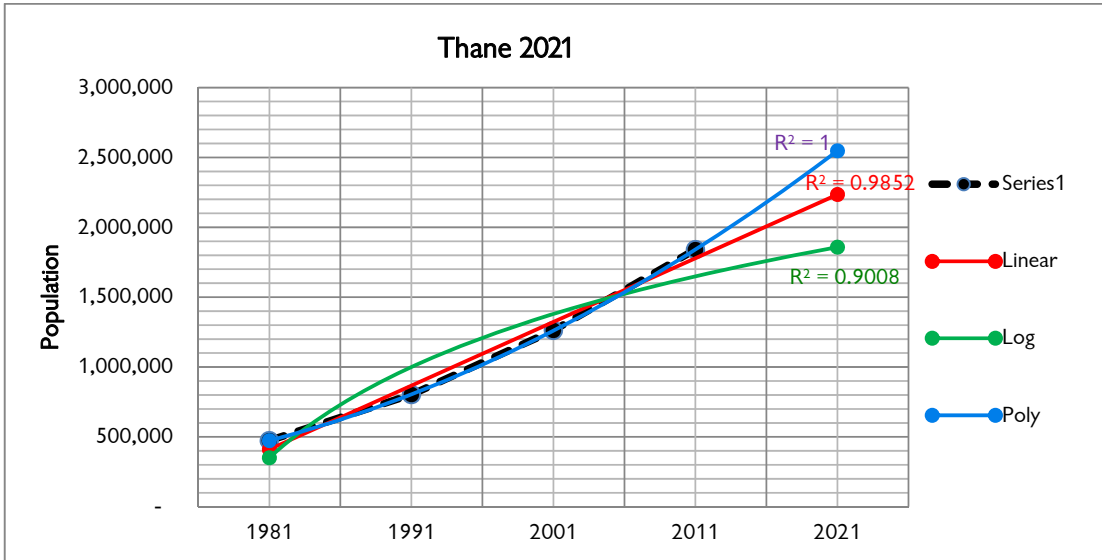


Figure 28: Population Projection for Thane Municipal Corporation, 2021

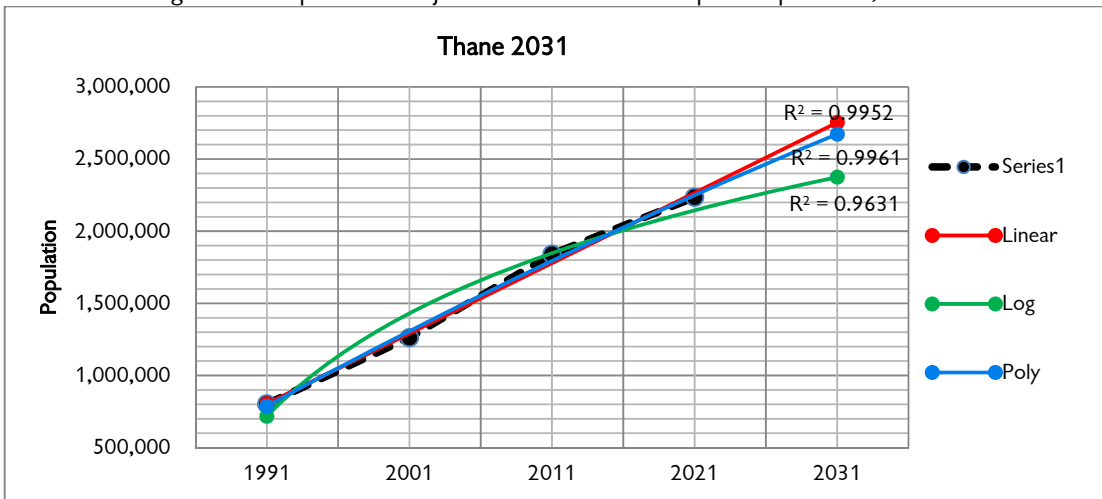


Figure 29: Population Projection for Thane Municipal Corporation, 2031

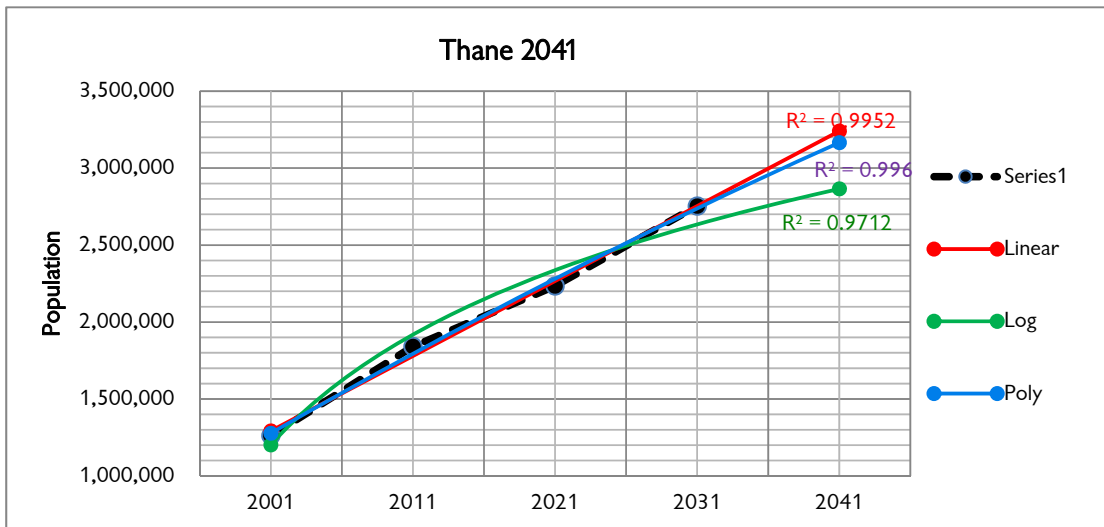


Figure 30: Population Projection for Thane Municipal Corporation, 2041

4.1.6 Population Projection and Distribution in MMR for 2031

The population projections of MMR for year 2031 by the three methods described above is given in the following Table no. 67.

Table 67: Population of MMR for the year 2031 Projected by various methods

No.	Projection Method based on	Population of MMR			Expected Growth
		2021	2031	2041	
1	Ratio	2,61,55,000	2,87,79,000	2,98,85,000	Low
2	Trend	2,65,19,469	2,93,16,072	3,21,69,179	Moderate
3	Household Formation Rate	2,70,77,060	2,99,16,414	3,26,23,345	High

Being nearly the medium of the three projections, the projected population of MMR for year 2031 is adopted as 2,93,16,072 as per the Trend based method. The constituent unit-wise population projected for year 2031 by trend based method, the resultant CAGRs and share of each constituent are given in table 65 and 66.

The population share of Greater Mumbai in MMR has reduced from 77 per cent in 1971 to 55 per cent in 2011. It is projected that Greater Mumbai will show negative population growth trend by 2031 and its share in MMR's population will reduce further to 33 per cent by 2041.

The population projection for the year 2036 using the CAGR for the decade 2031-41 is made for MMR and the individual constituent units and placed in Table 68.

The distribution of projected population in MMR is also indicated in Figure 31 and the resultant likely population density is indicated in Figure 32.

The projected population of MMR of 3,05,75,623 in 2036 forms the basis for calculation of housing, infrastructure and land requirements.

Table 65: Population Projection for MMR based on Trends of Constituent Areas (adopted)

Sl. No	Unit	Area (sqkm)	Census year					Projected Population		
			1971	1981	1991	2001	2011	2021	2031	2041
1	Greater Mumbai	437.71	59,70,575	82,43,405	99,25,891	1,19,78,450	1,24,42,373	1,27,86,692	1,19,09,633	1,06,37,526
2	Thane	128.23	2,54,045	4,74,438	8,03,389	12,62,551	18,41,488	22,35,545	27,54,594	32,41,091
3	Kalyan-Dombivali	56.14	2,46,038	4,40,310	8,36,602	10,76,316	12,47,327	13,74,279	14,38,698	14,54,440
4	Vasai - Virar City	319.39	1,91,916	2,47,444	3,71,910	6,95,482	12,22,390	19,49,462	28,79,076	40,09,449
5	Navi Mumbai	108.63	40,063	89,907	3,07,724	6,67,611	11,20,547	17,03,298	23,88,289	31,96,202
6	Mira-Bhayander	79.40	31,860	67,195	1,75,605	5,20,388	8,09,378	12,61,700	17,13,009	22,86,565
7	Bhiwandi-Nizampur	26.41	1,05,793	2,10,712	3,79,070	5,98,741	7,09,665	8,31,887	8,90,082	9,40,743
8	Ulhasnagar	13.00	1,72,947	2,81,728	3,69,077	4,73,731	5,06,098	5,33,372	5,05,158	4,59,251
A	Municipal Corporations	1,168.91	70,13,237	1,00,55,139	1,31,69,268	1,72,73,270	1,98,99,266	2,26,76,233	2,44,78,538	2,62,25,266
9	Ambernath	38.00	58,303	99,655	1,25,801	2,03,804	2,53,475	3,34,956	4,03,140	4,91,858
10	Kulgaon-Badlapur	36.05	19,201	32,801	52,154	97,948	1,74,226	2,77,956	4,11,412	5,72,888
11	Panvel	12.17	26,602	37,073	58,986	1,04,058	1,80,020	2,81,074	4,11,568	5,68,241
12	Khopoli	30.17	18,152	24,545	45,039	58,664	71,141	78,179	82,997	87,078
13	Pen	9.82	11,754	14,772	21,588	30,201	37,852	46,610	54,924	63,957
14	Uran	2.29	12,616	15,168	17,775	23,251	30,439	40,207	51,904	66,017
15	Karjat	7.50	14,423	16,136	20,204	25,531	29,663	34,441	38,483	42,938
16	Alibag	1.81	11,913	14,051	16,289	19,496	20,743	23,466	25,087	27,540
17	Matheran	7.24	3,397	3,000	4,708	5,139	4,393	2,395	2,238	1,680
B	Municipal Councils	145.05	1,76,361	2,57,201	3,62,544	5,68,092	8,01,952	11,19,283	14,81,751	19,22,196
18	Navi Mumbai NT (56)	236.09	75,251	1,09,181	1,54,837	2,36,592	4,49,485	7,22,237	11,08,307	15,67,600
19	NAINA & MSRDC (270)	725.80	1,40,127	1,79,174	2,31,610	3,14,854	3,49,351	3,94,767	4,15,789	4,38,904
20	Kalyan 27 Villages (26)	48.43				1,17,196	2,71,435	3,61,659	3,87,868	3,50,072
21	BSNA (61)	156.20	51,507	80,163	1,18,342	1,84,493	2,44,163	3,23,192	4,02,200	4,95,721
22	AKBSNA (58)	138.06	26,785	34,894	41,906	81,293	1,05,731	1,50,713	1,89,619	2,42,414
23	VVSNA (24)	64.23	994	6,201	35,009	62,857	77,138	87,307	96,348	1,02,022
24	Khopta (33)	98.12	17,139	36,117	41,740	47,672	54,230	61,176	68,690	76,635
C	SPA Areas	1,466.93	3,11,803	4,45,730	6,23,444	10,44,957	15,51,533	21,01,051	26,68,820	32,73,369
25	Thane District	22.74	9,260	11,624	16,944	28,117	35,957	47,354	57,139	69,190
26	Raigad District	17.06	10,818	11,340	17,416	27,262	34,503	43,920	51,928	61,215
D	Census Towns	39.80	20,078	22,964	34,360	55,379	70,460	91,274	1,09,067	1,30,405
27	Thane District Rural	911.94	1,22,665	1,48,828	2,01,962	2,34,614	2,71,553	2,94,202	3,16,494	3,27,980
28	Raigad District Rural	520.85	1,20,527	1,45,469	1,61,110	1,89,157	2,09,591	2,37,426	2,61,402	2,89,964
E	Rural (MMR)	1,432.79	2,43,192	2,94,297	3,63,072	4,23,771	4,81,144	5,31,629	5,77,896	6,17,944
	Total (MMR)	4,253.48	77,64,671	1,10,75,331	1,45,52,688	1,93,65,469	2,28,04,355	2,65,19,469	2,93,16,072	3,21,69,179

Table 66: Resultant CAGR and Population Share in MMR as per Projected Population

Sl. No.	Unit	CAGR							Percentage Share of Population							
		71-81	81-91	91-01	01-11	11-21	21-31	31-41	1971	1981	1991	2001	2011	2021	2031	2041
1	Greater Mumbai	3.28	1.87	1.90	0.38	0.27	-0.71	-1.12	76.89%	74.43%	68.21%	61.85%	54.56%	48.22%	40.62%	33.07%
2	Thane	6.45	5.41	4.62	3.85	1.96	2.11	1.64	3.27%	4.28%	5.52%	6.52%	8.08%	8.43%	9.40%	10.08%
3	Kalyan-Dombivali	5.99	6.63	2.55	1.49	0.97	0.46	0.11	3.17%	3.98%	5.75%	5.56%	5.47%	5.18%	4.91%	4.52%
4	Vasai - Virar City	2.57	4.16	6.46	5.80	4.78	3.98	3.37	2.47%	2.23%	2.56%	3.59%	5.36%	7.35%	9.82%	12.46%
5	Navi Mumbai	8.42	13.09	8.05	5.32	4.28	3.44	2.96	0.52%	0.81%	2.11%	3.45%	4.91%	6.42%	8.15%	9.94%
6	Mira-Bhayander	7.75	10.08	11.48	4.52	4.54	3.11	2.93	0.41%	0.61%	1.21%	2.69%	3.55%	4.76%	5.84%	7.11%
7	Bhiwandi-Nizampur	7.13	6.05	4.68	1.71	1.60	0.68	0.56	1.36%	1.90%	2.60%	3.09%	3.11%	3.14%	3.04%	2.92%
8	Ulhasnagar	5.00	2.74	2.53	0.66	0.53	-0.54	-0.95	2.23%	2.54%	2.54%	2.45%	2.22%	2.01%	1.72%	1.43%
A	Municipal Corporations	3.67	2.73	2.75	1.43	1.31	0.77	0.69	90.32%	90.79%	90.49%	89.20%	87.26%	85.51%	83.50%	81.52%
9	Ambarnath	5.51	2.36	4.94	2.21	2.83	1.87	2.01	0.75%	0.90%	0.86%	1.05%	1.11%	1.26%	1.38%	1.53%
10	Kulgaon-Badlapur	5.50	4.75	6.51	5.93	4.78	4.00	3.37	0.25%	0.30%	0.36%	0.51%	0.76%	1.05%	1.40%	1.78%
11	Panvel	3.37	4.75	5.84	5.63	4.56	3.89	3.28	0.34%	0.33%	0.41%	0.54%	0.79%	1.06%	1.40%	1.77%
12	Khopoli	3.06	6.26	2.68	1.95	0.95	0.60	0.48	0.23%	0.22%	0.31%	0.30%	0.31%	0.29%	0.28%	0.27%
13	Pen	2.31	3.87	3.41	2.28	2.10	1.65	1.53	0.15%	0.13%	0.15%	0.16%	0.17%	0.18%	0.19%	0.20%
14	Uran	1.86	1.60	2.72	2.73	2.82	2.59	2.43	0.16%	0.14%	0.12%	0.12%	0.13%	0.15%	0.18%	0.21%
15	Karjat	1.13	2.27	2.37	1.51	1.50	1.12	1.10	0.19%	0.15%	0.14%	0.13%	0.13%	0.13%	0.13%	0.13%
16	Alibag	1.66	1.49	1.81	0.62	1.24	0.67	0.94	0.15%	0.13%	0.11%	0.10%	0.09%	0.09%	0.09%	0.09%
17	Matheran	-1.24	4.61	0.88	-1.56	-5.89	-0.68	-2.82	0.04%	0.03%	0.03%	0.03%	0.02%	0.01%	0.01%	0.01%
B	Municipal Councils	3.85	3.49	4.59	3.51	3.39	2.85	2.64	2.27%	2.32%	2.49%	2.93%	3.52%	4.22%	5.05%	5.98%
18	Navi Mumbai NT (56)	3.79	3.56	4.33	6.63	4.86	4.38	3.53	0.97%	0.99%	1.06%	1.22%	1.97%	2.72%	3.78%	4.87%
19	NAINA & MSRDC (270)	2.49	2.60	3.12	1.05	1.23	0.52	0.54	1.80%	1.62%	1.59%	1.63%	1.53%	1.49%	1.42%	1.36%
20	Kalyan 27 Villages (26)	0.00	0.00	0.00	8.76	2.91	0.70	-1.02	0.00%	0.00%	0.00%	0.61%	1.19%	1.36%	1.32%	1.09%
21	BSNA (61)	4.52	3.97	4.54	2.84	2.84	2.21	2.11	0.66%	0.72%	0.81%	0.95%	1.07%	1.22%	1.37%	1.54%
22	AKBSNA (58)	2.68	1.85	6.85	2.66	3.61	2.32	2.49	0.34%	0.32%	0.29%	0.42%	0.46%	0.57%	0.65%	0.75%
23	VVSNA (24)	20.09	18.90	6.03	2.07	1.25	0.99	0.57	0.01%	0.06%	0.24%	0.32%	0.34%	0.33%	0.33%	0.32%
24	Khopta (33)	7.74	1.46	1.34	1.30	1.21	1.17	1.10	0.22%	0.33%	0.29%	0.25%	0.24%	0.23%	0.23%	0.24%
C	SPA Areas	3.64	3.41	5.30	4.03	3.08	2.42	2.06	4.02%	4.02%	4.28%	5.40%	6.80%	7.92%	9.10%	10.18%
25	Thane District	2.30	3.84	5.20	2.49	2.79	1.90	1.93	0.12%	0.10%	0.12%	0.15%	0.16%	0.18%	0.19%	0.22%
26	Raigad District	0.47	4.38	4.58	2.38	2.44	1.69	1.66	0.14%	0.10%	0.12%	0.14%	0.15%	0.17%	0.18%	0.19%
D	Census Towns	1.35	4.11	4.89	2.44	2.62	1.80	1.80	0.26%	0.21%	0.24%	0.29%	0.31%	0.34%	0.37%	0.41%
	Urban MMR (A+B+C+D)	3.67	2.79	2.93	1.66	1.53	1.01	0.94	96.87%	97.34%	97.51%	97.81%	97.89%	98.00%	98.03%	98.08%
27	Thane District Rural	1.95	3.10	1.51	1.47	0.80	0.73	0.36	1.58%	1.34%	1.39%	1.21%	1.19%	1.11%	1.08%	1.02%
28	Raigad District Rural	1.90	1.03	1.62	1.03	1.25	0.97	1.04	1.55%	1.31%	1.11%	0.98%	0.92%	0.90%	0.89%	0.90%
E	Rural (MMR)	1.93	2.12	1.56	1.28	1.00	0.84	0.67	3.13%	2.66%	2.49%	2.19%	2.11%	2.00%	1.97%	1.92%
H	Total (MMR)	3.62	2.77	2.90	1.65	1.52	1.01	0.93	100%	100%	100%	100%	100%	100%	100%	100%

Table 68: Population Projection for MMR: 2036

Sl. No	Unit	Area (Sqkm)	Census Population			Projected Population					
			1,991	2,001	2,011	2,021	2,031	2,041	2016	2026	2036
1	Greater Mumbai	437.71	99,25,891	1,19,78,450	1,24,42,373	1,27,86,692	1,19,09,633	1,06,37,526	1,26,13,358	1,23,40,373	1,12,55,622
2	Thane	128.23	8,03,389	12,62,551	18,41,488	22,35,545	27,54,594	32,41,091	20,28,972	24,81,535	29,87,957
3	Kalyan-Dombivali	56.14	8,36,602	10,76,316	12,47,327	13,74,279	14,38,698	14,54,440	13,09,265	14,06,120	14,46,548
4	Vasai - Virar City	319.39	3,71,910	6,95,482	12,22,390	19,49,462	28,79,076	40,09,449	15,43,698	23,69,103	33,97,574
5	Navi Mumbai	108.63	3,07,724	6,67,611	11,20,547	17,03,298	23,88,289	31,96,202	13,81,530	20,16,920	27,62,870
6	Mira-Bhayander	79.40	1,75,605	5,20,388	8,09,378	12,61,700	17,13,009	22,86,565	10,10,540	14,70,137	19,79,118
7	Bhiwandi-Nizampur	26.41	3,79,070	5,98,741	7,09,665	8,31,887	8,90,082	9,40,743	7,68,350	8,60,493	9,15,062
8	Ulhasnagar	13	3,69,077	4,73,731	5,06,098	5,33,372	5,05,158	4,59,251	5,19,556	5,19,073	4,81,658
A	Municipal Corporations	1168.91	1,31,69,268	1,72,73,270	1,98,99,266	2,26,76,233	2,44,78,538	2,62,25,266	2,11,75,269	2,34,63,754	2,52,26,408
9	Ambarnath	38	1,25,801	2,03,804	2,53,475	3,34,956	4,03,140	4,91,858	2,91,381	3,67,470	4,45,295
10	Kulgaon-Badlapur	36.05	52,154	97,948	1,74,226	2,77,956	4,11,412	5,72,888	2,20,062	3,38,163	4,85,482
11	Panvel	12.17	58,986	1,04,058	1,80,020	2,81,074	4,11,568	5,68,241	2,24,942	3,40,119	4,83,601
12	Khopoli	30.17	45,039	58,664	71,141	78,179	82,997	87,078	74,577	80,552	85,013
13	Pen	9.82	21,588	30,201	37,852	46,610	54,924	63,957	42,003	50,597	59,268
14	Uran	2.29	17,775	23,251	30,439	40,207	51,904	66,017	34,984	45,682	58,537
15	Karjat	7.5	20,204	25,531	29,663	34,441	38,483	42,938	31,963	36,406	40,649
16	Alibag	1.81	16,289	19,496	20,743	23,466	25,087	27,540	22,062	24,263	26,285
17	Matheran	7.24	4,708	5,139	4,393	2,395	2,238	1,680	3,244	2,315	1,939
B	Municipal Councils	145.05	3,62,544	5,68,092	8,01,952	11,19,283	14,81,751	19,22,196	9,45,217	12,85,566	16,86,069
18	Navi Mumbai NT (56)	236.09	1,54,837	2,36,592	4,49,485	7,22,237	11,08,307	15,67,600	5,69,767	8,94,684	13,18,098
19	NAINA & MSRDC (270)	725.8	2,31,610	3,14,854	3,49,351	3,94,767	4,15,789	4,38,904	3,71,365	4,05,142	4,27,190
20	Kalyan 27 Villages (26)	48.43		1,17,196	2,71,435	3,61,659	3,87,868	3,50,072	3,13,316	3,74,534	3,68,486
21	BSNA (61)	156.2	1,18,342	1,84,493	2,44,163	3,23,192	4,02,200	4,95,721	2,80,912	3,60,538	4,46,519
22	AKBSNA (58)	138.06	41,906	81,293	1,05,731	1,50,713	1,89,619	2,42,414	1,26,234	1,69,051	2,14,398
23	VVSNA (24)	64.23	35,009	62,857	77,138	87,307	96,348	1,02,022	82,065	91,716	99,144
24	Khopta (33)	98.12	41,740	47,672	54,230	61,176	68,690	76,635	57,599	64,824	72,554
C	SPA Areas	1,466.93	6,23,444	10,44,957	15,51,533	21,01,051	26,68,820	32,73,369	18,01,258	23,60,489	29,46,388
25	Thane District	22.74	16,944	28,117	35,957	47,354	57,139	69,190	41,264	52,017	62,877
26	Raigad District	17.06	17,416	27,262	34,503	43,920	51,928	61,215	38,928	47,756	56,380
D	Census Town	39.8	34,360	55,379	70,460	91,274	1,09,067	1,30,405	80,194	99,775	1,19,260
	Urban MMR (A+B+C+D)	2820.69	1,41,89,616	1,89,41,698	2,23,23,211	2,59,87,841	2,87,38,175	3,15,51,236	2,40,01,939	2,72,09,583	2,99,78,124
27	Thane District Rural	911.94	2,01,962	2,34,614	2,71,553	2,94,202	3,16,494	3,27,980	2,82,651	3,05,145	3,22,186
28	Raigad District Rural	520.85	1,61,110	1,89,157	2,09,591	2,37,426	2,61,402	2,89,964	2,23,075	2,49,126	2,75,313
D	Rural (MMR)	1432.79	3,63,072	4,23,771	4,81,144	5,31,629	5,77,896	6,17,944	5,05,726	5,54,271	5,97,499
E	Total (MMR)	4253.48	1,45,52,688	1,93,65,469	2,28,04,355	2,65,19,469	2,93,16,072	3,21,69,179	2,45,07,665	2,77,63,853	3,05,75,623

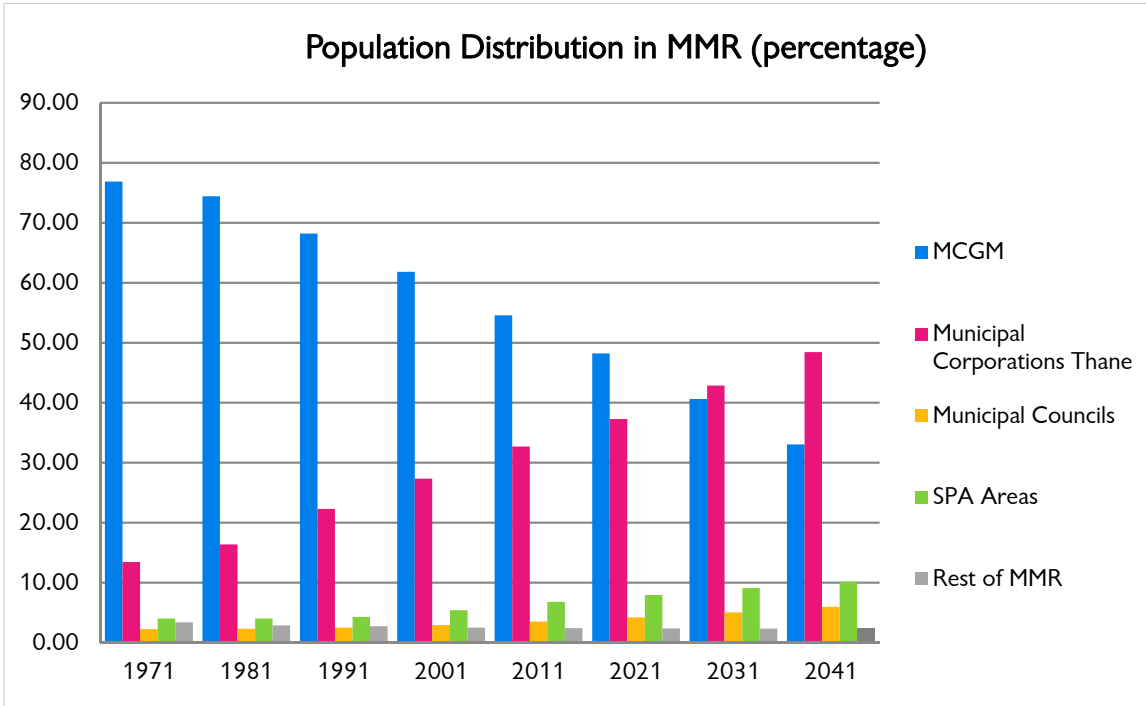


Figure 31: Distribution of Population in MMR: 1971-2041

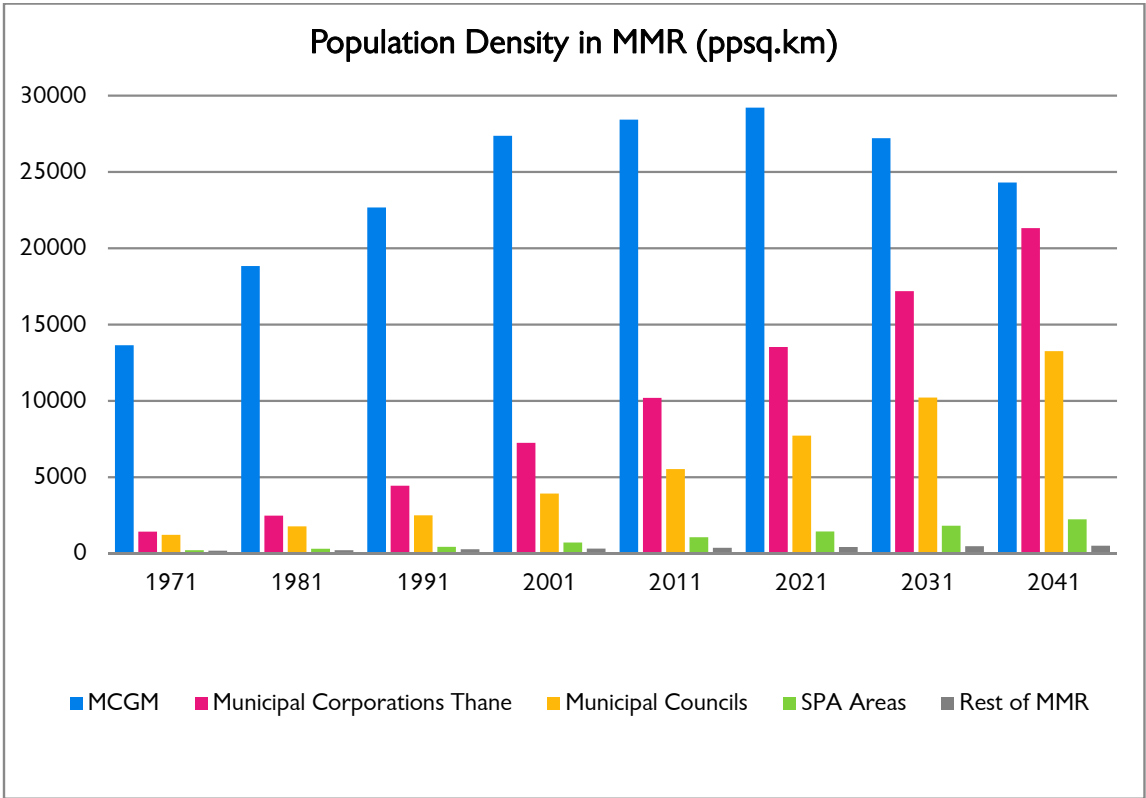


Figure 32: Density of Population in MMR: 1971-2041

4.2 Housing Need

4.2.1 Components of Housing Need

Housing need assessment for MMR is done on the basis of existing scenario of housing within the region and by taking into consideration the following components ;

1. Current shortage
 - Households in slums
 - Households in dilapidated buildings
 - Households in unauthorised buildings
 - Houseless households (negligible in MMR)
2. Shortage on account of future dilapidation
3. Incremental requirement upto the horizon year

4.2.2 Assumptions forming the basis for calculation of housing need for MMR upto 2036

- a. Census data was the source of population, number of households, number of slum households and household size. The population of MMR in 2036 is adopted from the population projection made earlier in this chapter. Average household size of MMR is adopted as 4.2, 4.0 and 3.86 for the years 2021, 2031 and 2036 respectively, from the projections made earlier in this chapter.
- b. As per census 2011, total households living in the slums are 13,91,685 and number of slum houses are 19,53,072. It is assumed that the housing need should take in to consideration only the slum households and not the houses. It is assumed that the percentage of households living in slums will continue to be 27 per cent (2011 Census) in 2036 if there is no intervention. With appropriate policy interventions, it is assumed to be around 6 per cent in 2036.
- c. It is assumed that the percentage of households living in slums calculated over the previous decade will be 85 per cent, 60 percent and 70 per cent at the end of 2021, 2031 and 2036 respectively on account of number of years in the decade available for action. The percentages include new slum formations in the future.
- d. The census data records 1.4 per cent of the households in Gr. Mumbai as living in dilapidated structures. However, for greater accuracy, the number of dilapidated buildings in Greater Mumbai comprising of Cessed buildings, BDD and BIT chawls is taken from the survey conducted by MHADA and the study conducted by MTSU. The earlier past redevelopment of cessed buildings had an average of 30 tenements per building which is adopted for determining the tenements in the remaining cessed buildings. 25 per cent of the households in cessed buildings are expected to be rehoused by 2021 and the remaining 75 per cent by 2031. 100 per cent of the tenements in BDD chawls are expected to be reconstructed by 2021.
- e. The percentage of households living in dilapidated houses in MMR (as per census data) has decreased from 2.4 per cent in 2001 to 1.2 per cent in 2011 at a CAGR of -4.89. The redevelopment/reconstruction of old buildings is expected to be higher in the coming decades than what it was during 2001-2011. It is therefore assumed that the number of dilapidated structures will reduce at a CAGR of -4.89 up to 2036.
- f. The dilapidated houses in Gr. Mumbai (Cessed buildings, BDD & BIT chawls) forms 12% of the total houses. It is assumed that the dilapidated houses in other municipal areas of MMR will be 4% of their total houses in 2011.
- g. The annual rate of dilapidation is assumed as 1.5 per cent of the new houses constructed every year. Assuming that the annual housing supply rate required in future is about 1,60,000 units,

the future dilapidation will be approximately 2500 houses per year. In the 20 years (2016-2036), around 50,000 houses will be dilapidated other than the existing dilapidated stock.

- h. The demand arising out of households living in congested situations has not been taken into consideration assuming that their need will be gradually met as new housing stock is created through a progressive moving up of households in search of better housing.
- i. The unauthorized housing stock (excluding slums) that needs to be addressed was differentially estimated based on their specific context. In the Municipal Areas of Thane district (urban) where the percentage of unauthorized structures is exceptionally high, they were estimated at 8 per cent. It is assumed that 4 per cent of the houses in Raigad (urban) are unauthorized. It is further assumed that 50 per cent of the total number of unauthorized buildings can be regularized while the rest would need to be reconstructed. Of the total number of households in MMR, the percentage of unauthorized structures is projected to be 1.5 per cent, 1.0 per cent and 0.33 per cent by the end of 2021, 2031 and 2036 respectively.

Based on the assumptions listed above, the following figures are arrived at for assessment of the housing need in MMR by the year 2036.

Table 69: Basic figures adopted for Assessment of Housing Need of MMR, 2036

No.	Description	Population
1	Population of MMR in 2011	2,28,04,355
2	Projected Population of MMR in 2036	3,05,75,623
3	Additional Population of MMR by 2036 (2036-2011)	77,71,268
4	Additional households in MMR by 2036	27,26,532
5	Households living in Slums in MMR (2011)	13,91,685
6	Households living in Cessed buildings and BDD chawls in Gr. Mumbai	4,99,664
7	Housing stock in rest of MMR in dilapidated structures @ 6% of stock	1,10,828
8	Households living in Unauthorized Structures (8% in Thane and 4% in Raigad districts.	2,39,876

4.2.3 Estimation of Total Housing Need for MMR, 2036

Table 70: Housing Need of MMR up to 2036

No	Housing Need	Housing Units Required	Avg Annual Supply Need (2016-2036)
1	Incremental households by 2036	27,26,532	1,36,326
2	Replacement units – slums	13,91,685	69,584
3	Replacement units-dilapidated units in Gr. Mumbai (Cessed buildings, BIT and BDD chawls)	4,99,664	24,983
4	Replacement units-dilapidated units in rest of MMR	1,10,828	5,541
5	Replacement units-future dilapidation in entire MMR	50,000	2,500
6	Replacement units-unauthorized houses (8% and 4% in Thane and Raigad Districts-urban)	2,39,876	11,994
	Total Need	50,18,585	2,50,928

4.2.4 Rationalization of Housing Need

Using policy instruments, the housing need can be rationalised by way of :

- a. unlocking the vacant units (13% of housing stock in urban areas of MMR districts is vacant)

- b. restoring the residential units converted to other purposes (22% of housing stock in urban areas of MMR districts is put to non-residential use)
- c. regularising the unauthorised constructions provided the land use, and health and safety norms are not compromised while doing so (assuming only 50% can be regularised)

If the above measures, the interventions regarding which are explained in Chapter-5, are undertaken, the housing need can be rationalised as given below.

Table 71: Rationalized Housing Need of MMR up to 2036

No.	Strategy	Assumption	Existing unavailable Housing Stock (Excluding Slums)	Housing Stock expected to be opened up till 2036
1.	Unlocking vacant Houses	Through policy interventions, percentage of vacant houses (excluding slums) can be brought down by 5%, 15% and 25% of preceding decade by the end of 2021, 2031, and 2036. Thus, 2,94,642 units become available.	7,47,111	2,94,642
2.	Restoring the residential units converted to other uses	Percentage of houses put to other than residential use (excluding slums) can be brought down in stages, through provision of more workspaces and commercial spaces, by 2%, 5% and 10% of preceding decade by the end of 2021, 2031, and 2036. Thus, 1,61,275 residential units will become available.	9,94,908	1,61,275
3.	Regularization of Unauthorized structures	It is assumed that 50% of the unauthorized housing stock will be regularized in due course.	2,39,876	1,19,938
4	Total available housing stock that can be brought in to market		19,81,895	5,75,855

Projected total housing need by 2036 : 50,18,585 units

Utilisation of existing stock as suggested above : 5,75,855 units

Rationalised housing need by 2036 : 44,42,730 units

5.0 Proposals of the Regional Plan

- 5.1 Regional Structure
- 5.2 Urban Sprawl and Municipal Extensions
- 5.3 Land-use Zoning
- 5.4 Development Control Regulations
- 5.5 Growth Centres
- 5.6 Local Development Centres (LDCs)
- 5.7 Transportation Network
- 5.8 Housing
- 5.9 Infrastructure
- 5.10 Environment
- 5.11 Regional Information System for Planning and Action Research

PROPOSALS OF THE REGIONAL PLAN

5.1 Regional Structure

5.1.1 Mumbai Metropolitan Region was dominated by Mumbai in its population, employment, nature of spatial development and infrastructure until the end of 1990s. Several indicators point out that this situation is now changing with the rest of the region exhibiting similar trends. This is also reflected in the spatial structure of the region with Mumbai-Thane-Navi Mumbai triangle emerging as the core of MMR and the radials spanning in the directions of Ahmedabad, Nashik, Murbad, Pune, Goa and towards Ratnagiri via South Mumbai. Mira-Ghodbandar-Panvel-JNPT will form the first ring, Vasai-Kharbao-Bhiwandi-Kalyan-Matheran road-Jite forming the second ring and finally, Virar-Vajreshwari-Ambadi-Padgha-Badlapur-Karjat-Rees-Jite forming the third ring. The three rings seem to represent cities at three different stages of consolidation. Nodes on the rings become a strong choice for placing the new growth centres in the proposed Regional Plan. Figure: 33 below indicates the emerging spatial structure of MMR.

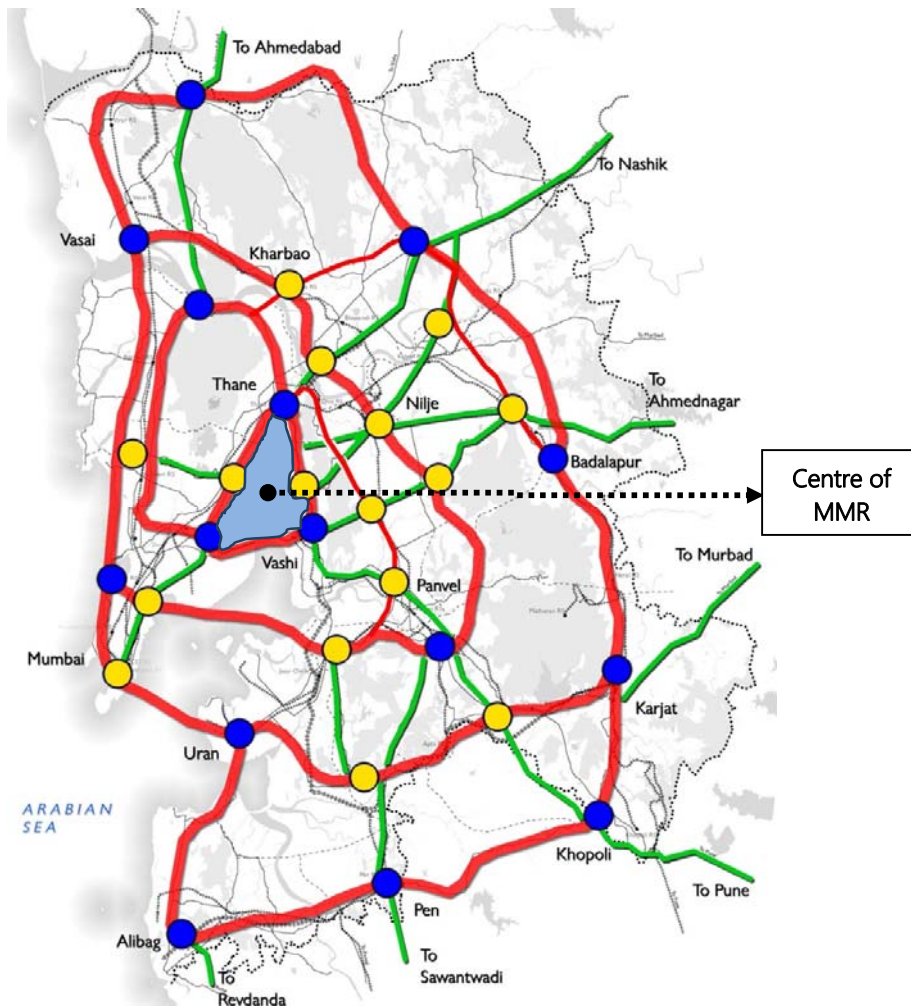


Figure 33: Emerging Structure of MMR

5.1.2 Important areas for locating future growth centres

a. Bhiwandi surrounding area

Roads entering MMR from Palghar and Nashik directions are very important from the goods movement consideration. 80 percent of JNPT traffic is northbound and uses these two roads as entry and exit points. The traffic on these two roads has two alternatives to reach the rest of the region, via Kaman-Anjur phata road on the north of Vasai creek or the Ghodbandar road on the south of Vasai creek. The creek can be crossed at two points, one at Mira-Bhayandar and the other at Thane. The area between the north-south roads and between the two bridges is narrow and partly consists of ecologically fragile areas of Sanjay Gandhi National Park, Tungreshwar Wildlife Sanctuary and the coastal wetlands along the Vasai creek. Vasai-Diva-Panvel rail line passes along the northern road and provides public transportation access while a metro is planned along the Ghodbandar road. Thus the enclosed pocket of land is highly accessible, has a very scenic setting and having access to water front and thus can be seen as an ideal location for a new growth centre. Two opportunities can be considered in this context. One, the Delhi Freight corridor originating at JNPT has a landing station proposed at Kharbao railway station located close to Bhiwandi area. Second, Vasai-Virar, Mira-Bhayandar and Bhiwandi are lacking in employment opportunities, particularly in office sector. Therefore, a new Growth Centre extending on both sides of Vasai creek, with a new bridge connecting them may offer a mix of office jobs, ancillary activities to goods traffic management and regional recreational centres that can capitalise on the opportunities. This will require reorganisation of land-uses in the Thane Development Plan.

b. Katai Naka area in Kalyan-Dombivali area

Katai naka area is part of the 27 villages that were excluded from KDMC in 2003 by which their development potential was equated with rural areas in MMR. However, a new Development Plan was sanctioned for this area soon after which the villages were once again merged with KDMC in March 2015. Katai naka is well connected by road with Thane, Kalyan, Panvel, Ambernath and Bhiwandi; and by rail to Panvel, Thane and Vasai from Nilje station. A large housing complex under the Megacity scheme has already come up in the vicinity and a not so functional MIDC industrial area is also present in the area. The sanctioned Development Plan of the area has earmarked a Growth Centre at Katainaka thus making it an appropriate location for a multi-functional centre where office sector jobs, R&D facilities, regional education centres and transport hub can be integrated in one complex.

c. Panvel area

The area close to Panvel will be densified with activities and issues such as :

1. Rail terminus where four suburban corridors of Panvel-CST, Panvel-Diva-Vasai, Panvel-Karjat and Panvel-Roha converge
2. Regional Multi Modal Corridor (MMC) and Mumbai Pune Expressway pass close to Panvel
3. Traffic from JNPT and Navi Mumbai International Airport has to disperse by road or rail through Panvel area
4. MTHL and MMC are expected to join Mumbai-Pune expressway through to Panvel.
5. The Central Railway has also proposed a railway coaching factory near Panel railway station.
6. MRVC identified lack of space for providing adequate facilities at the present Panvel railway station location as an issue for utilising its full potential.

In view of the above, it may be necessary to identify an area south of Panvel town for accommodating the long distance rail terminus with connectivity to existing Panvel station, to create a new growth centre to utilise the potential offered by the opportunities being created in the vicinity but at the same time to have space and connectivity to accommodate it in a planned manner. Hence a new Growth Centre near Chowk junction may be an attractive proposition.

5.1.3 Urban Concentrations in MMR

As per Census 2011, MMR housed 5 Million Plus (M+) Cities out of the 10 in Maharashtra. As per the population projections of MMR constituents, 2 more cities might join this category by 2031, i.e., Mira-Bhayandar and Bhiwandi-Nizampur. As per the municipal extensions and new municipalities being suggested in MMR, it is likely that 2 more M+ cities shall emerge in MMR by 2031. These are Panvel Municipal Corporation and Ambernath+Badlapur+surrounding villages.

By then 5 more cities in the rest of Maharashtra may become M+ (those presently over 500,000 population). Thus by 2031, MMR shall house 9 out of the 14 M+ cities in Maharashtra. With the spatial and population order mentioned above, 5 mega urban clusters may emerge in MMR by 2031. They are :

1. Mumbai
2. Mira-Bhayandar and Thane
3. Vasai Virar
4. Bhiwandi, Kalyan, Ulhasnagar, Ambernath and Badlapur
5. Navi Mumbai and Panvel

These clusters may require reorganisation of governance, spatial planning and infrastructure provision.

5.2 Urban Sprawl and Municipal Extensions

In MMR, urban sprawl is observed around many cities falling in areas that have already been notified as SPA areas. If well timed and well planned infrastructure is developed in these areas, they may provide an opportunity for urban extensions. It may however, be appropriate for the already densely developed portions around urban areas to be included in the municipal areas by extending their current boundaries so that they can be brought under urban governance framework and civic services can be provided. After studying the trends in urban sprawl and population growth, and the on-going or committed regional infrastructure developments, it appears that there is a case for extending the boundaries of VVCMC, BNCCMC, KDMC and NMMC and also create new Municipal Corporations of Panvel and Ambernath-Badlapur, and new Municipal Councils/Nagar Panchayats of Neral-Mamdapur, and Rees-Mohapada and Paynad-Ambepur. It is also necessary to extend the boundaries of Karjat, Pen and Alibag Municipal Councils.

While the Regional Plan was under preparation, the Government has already taken the following initiatives regarding urban extensions in MMR :

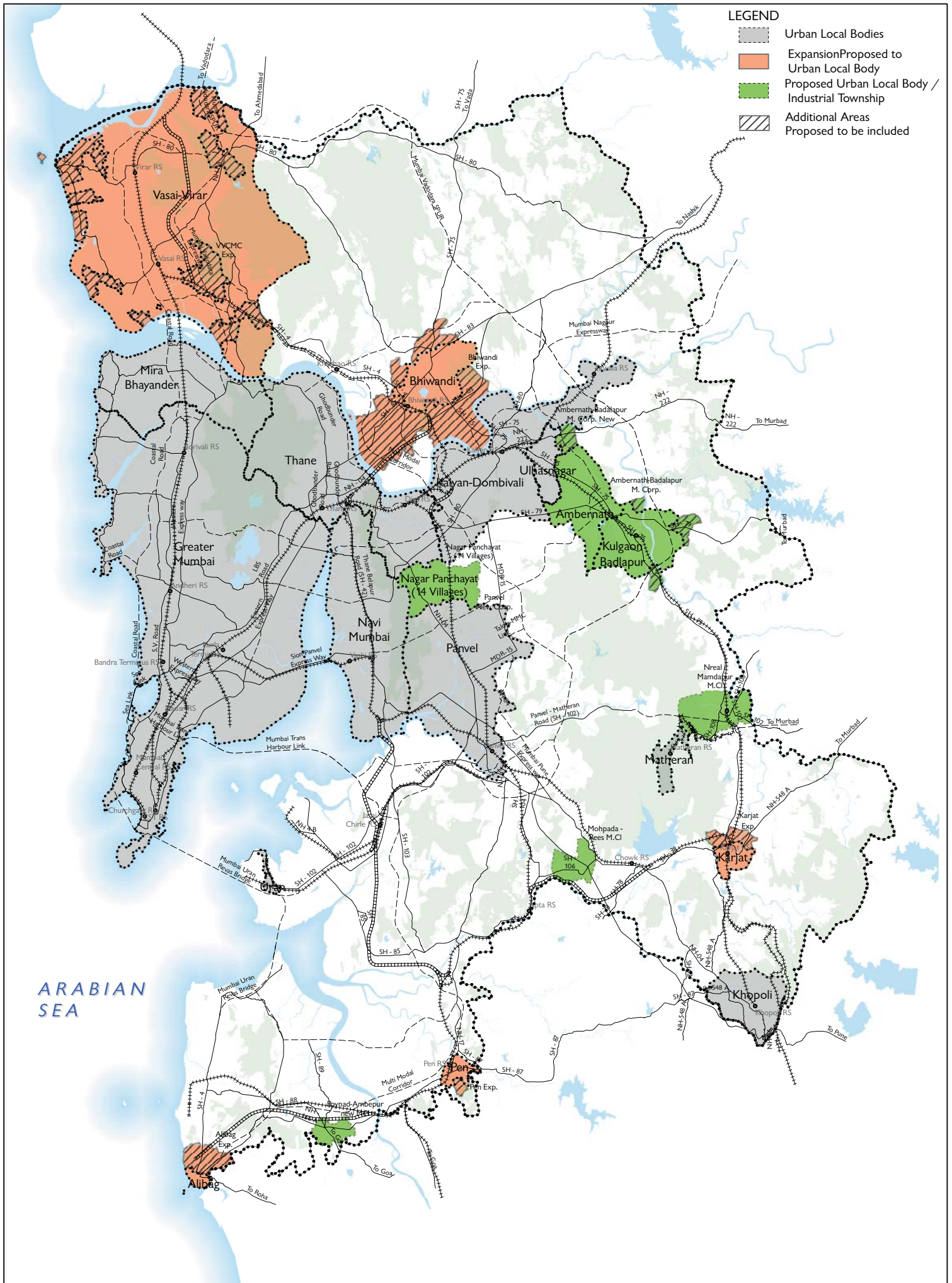
- a. appointment of VVCMC as SPA for the 23 villages for which earlier CIDCO was the SPA,
- b. inclusion of 2 villages in VVCMC from its SPA area.
- c. inclusion of the 27 villages in KDMC (which were earlier excluded from KDMC),
- d. formation of Khalapur Nagar Panchayat,
- e. appointment of MSRDC as SPA for 41 villages from Panvel and Khalapur Tehsils of MMR by removing the same from NAINA SPA and as NTDA for 5 villages from Kalyan Taluka
- f. formation of Panvel Municipal Corporation by including 29 villages in Panvel Municipal Council
- g. announcing the intention to merge Ambernath and Kulgaon-Badlapur to form a new Municipal Corporation, and
- h. announcing the intention to form a new Nagar Panchayat of the 14 villages earlier excluded from NMMC
- i. merging Ambernath and Kulgaon-Badlapur Municipal Council areas to form a new Municipal Corporation along with adjoining villages is also under consideration by the government.

In view of the above recent initiatives of the Government, Municipal Extensions are proposed as indicated in Map No. 33.

Table 72: Details of Proposed Extensions to Urban Local Bodies

Sl. No.	Municipal Expansion	Villages	No. of villages			Proposed Addl. Area			Pre-sent Area	Prop. Total Area	Additional Population			Pre-sent Popln.	New Total Popln.	Remarks
			CTs	Villages	Total	CTs	Villages	Total Addl Area			CTs	Villages	Total Addl. Popln.			
1	VVCMC	Chandrapada (C.T.), Actan, Arnala, Arnala Killa, Dolivpada, Kalamb, Khairpada, Khardi, Khochivade, Kolhapur, MalajiPada, Mori, Mukkam, Pali, Patilgaon, Rangaon, Sarjamori, Satpale, Tarkhad, Tembhi, Tivari, Tokare, Vaslai	1	22	23	4.72	51.74	56.46	326.89	383.35	7750	57,177	64,927	1234690	1299617	2 villages already added to VVCMC, VVCMC is SPA for 23villages
2	Bhiwandi Nizampur	Kalher (C.T.), Khoni (C.T.), Kon (C.T.), Purne(C.T.),Rahanal (C.T.), Shelar (C.T.), Karivali (C.T.), Dapode, Dive Anjur, Gholgaon, Gove, Gundavali, Kasheli, Kopar, Mankoli, Ovali, Pimpalas, Pimpal-gaon, Pimpalner, Ranjnoli, Saravali,SawandheSonale, Kailasnagar, Rajnagar, Thakurgaon, Pimpalghar, Val	7	21	28	24.10	40.35	64.45	26.41	90.86	111206	55697	166903	709665	876568	Covers the developing part of the BSNA SPA
3	Karjat	Haliwali, Ladiwali, Deulwadi	0	3	3	0.00	5.11	5.11	7.50	12.61	0	3716	3716	29663	33379	Covers the peripheral development
4	Alibag	Chendhare (C.T.), Gondhalpada, Varasoli, Veshvi	1	3	4	1.73	6.80	8.53	1.81	10.34	11039	10229	21268	20743	42011	Covers the substantially developed area
5	Nagar Panchayat	Goteghar, Nighu, Mokashi, Bale, Bamali, Navali, Uttarshiv, Bhandarli, Narivali, Waivali, Nagaon, Vakalan, Dahisar, Pimpri		14	14	0.00	24.38	24.38	0.00	24.38	0	15623	15623	0	15623	Area earlier excluded from NMMC. In 2015, Govt. declared the intention to form a new Nagar Panchayat of the 14 villages
6	Ambernath - Badlapur	MharalBk (C.T.), MharalKh.(N.V), Varp, Rahatoli, Sai, Sape, Chamtoli	1	6	7	1.04	9.64	10.68	74.05	84.72	29462	11130	40592	427701	468293	The two councils are proposed to be merged to form a Corporation. 7 villages from Kalyan and Ambernath Tehsils are proposed to be added
7	Neral – Mamdapur New M.Cl.	Neral (C.T.), Mamdapur, Bopele, Borle, Dhamote, Kolhare	1	5	6	10.93	10.17	21.10	0.00	21.10	18429	5748	24177	0	24177	New Municipal Council is proposed covering the approved layout plus 2 villages
8	Rees- Mohapada New M.Cl.	Rees (C.T.), Mohpada Alias Wasambe (C.T.), Ambivali T. Wankhal (C.T.), Bhokarpada, Chambharli	3	2	5	8.01	2.39	10.40	0.00	10.40	24823	3325	28148	0	28148	Presently serves the Rasayani Industrial area. Proposed as a new Mun. Council
9	Pen	Vadgaon	0	1	1	0.00	1.32	1.32	9.82	11.14	0	1582	1582	37852	39434	The new Development Plan of Pen included an additional village. The same is proposed as an extension to the Municipality
10	Poynad- Ambepur	Poynad, Ambpur, Divland, Ghasawad, Pezari, Talanikhar, Talband, Walawade	1	7	8	2.10	4.45	6.55	0.00	6.55	5035	6595	11630	0	11,630	New Municipal Council is proposed covering the developments that have already taken place along the road.
		Total	15	84	99	52.63	156.35	208.98	446.48	655.45	207744	170822	378568	2460314	2838880	

Notes : 1. Population and areas are as per Census 2011 2. All areas are in sq.km.



LEGEND

- Urban Local Bodies
- Expansion Proposed to Urban Local Body
- Proposed Urban Local Body / Industrial Township
- Additional Areas Proposed to be included

If the above proposals are implemented, the area under urban local bodies in MMR will increase from the present 1489 sq.km to 1698 sq.km (35% to 39% of MMR). The population (@ Census 2011 level) living in the municipal areas will increase from 2,10,31,099 to 2,13,53,921(% to 94%).. Table 72 and Table 73 give the details and summary of the Municipal Extension proposals.

Table 73: Summary of Proposed Extensions to Urban Local Bodies (areas in sq.km)

SL. No.	ULB/ Area	Census Area (sq.km.)	Addl area proposed (sq.km)	Total area (sq.km)	No. of villages added	Remarks
1	VVCMC	326.89	56.46	383.35	23	2 villages already added to VVCMC, VVCMC is SPA for 23village,
2	BNCMC	26.41	64.45	90.86	28	Covers the developing part of the BSNA SPA
3	Karjat	7.50	5.11	12.61	3	Covers the peripheral development
4	Alibag	1.81	8.53	10.64	4	Covers the substantially developed area
5	Nagar Panchayat	0.00	24.38	24.38	14	Area earlier excluded from NMMC. In 2015, Govt. declared the intention to form a new Nagar Panchayat of the 14 villages
6	Ambernath +Badlapur new Corp	74.05	10.68	84.72	7	The two councils are proposed to be merged to form a Corporation. 7 villages from Kalyan and Ambernath Tehsils are proposed to be added
7	Neral- Mamdapur	0.00	21.10	21.10	6	New Municipal Council/Nagar Panchayatis proposed covering the approved layout plus 2 villages
8	Rees- Mohapada	0.00	10.40	10.40	5	Presently serves the Rasayani Industrial area. Proposed as a new Mun. CouncilNagar Panchayat/Industrial Township
9	Pen	9.82	1.32	11.14	1	The new Development Plan of Pen included an additional village. The same is proposed as an extension to the Municipality
10	Poynad- Ambepur	0.00	6.55	6.55	8	New Municipal Council/Nagar Panchayat is proposed covering the developments that have already taken place
	Total	446.48	208.98	655.75	99	

5.3 Land Use Zoning

5.3.1 Past trends

The Regional Plan 1996 envisaged renewal of Mumbai's economic potential by removing all the restrictions imposed on its further growth, particularly in the industrial and office sectors, which were by then perceived to be impediments. While continuing to acknowledge and respect the objectives of the Regional Plan-1970 to disperse economic activities across the region and adopting the polycentric pattern of regional development, the Regional Plan-1996 adopted the approach of enabling the markets to assemble lands and undertake developments. The Development Control Regulations offered incentives by way of increased construction potential for larger plots. As against the publicly funded development of new growth centres, the Plan identified areas for future growth where Special Planning Authorities could have been established to prepare detailed plans and to implement the plans. The government declared Special Planning Area jurisdictions much later and hence the impact of such an effort on planned development of such areas is not adequately visible.

The effectiveness of Special Planning Authorities in implementing their respective Development Plans in an area without public ownership of land was observed to be far less than in the areas where the Authorities had ownership of lands. Town Planning Scheme (TPS) as a tool for implementation of the Development Plans in a manner where lands for public purposes and for raising revenue for development of infrastructure could be obtained in an effective and quick manner, was not available in the state of Maharashtra until 2014. Land use zoning can be judicious and without too much hardship to land owners with the newly revised TPS of 2014 which can now be used as an instrument for plan implementation outside of total land acquisition.

5.3.2 Emerging trends

The Regional Plan 1996 expected development to be concentrated close to transportation corridors, both rail and road and thus zoned linear corridors for urbanisation along the Thane-Bhiwandi-Kalyan-Karjat road and rail networks. In addition, growth was expected to occur adjacent to Bhiwandi, Panvel, Rasayani Industrial area and in Khopta near JNPT. The rest of the region was divided primarily into Green-1 and Green-2 zones based on the environmental characteristics. Table No. 74 indicates the land use zones along with their respective areas in the 1970 and 1996 Regional Plans.

Regional Plan 1970 :

- Development areas : 22% (Urbanisable, Industrial and Recreation Zones)
- Low Development areas : 52% (Green Zone)
- Conservation areas : 26% (Forest Zone)

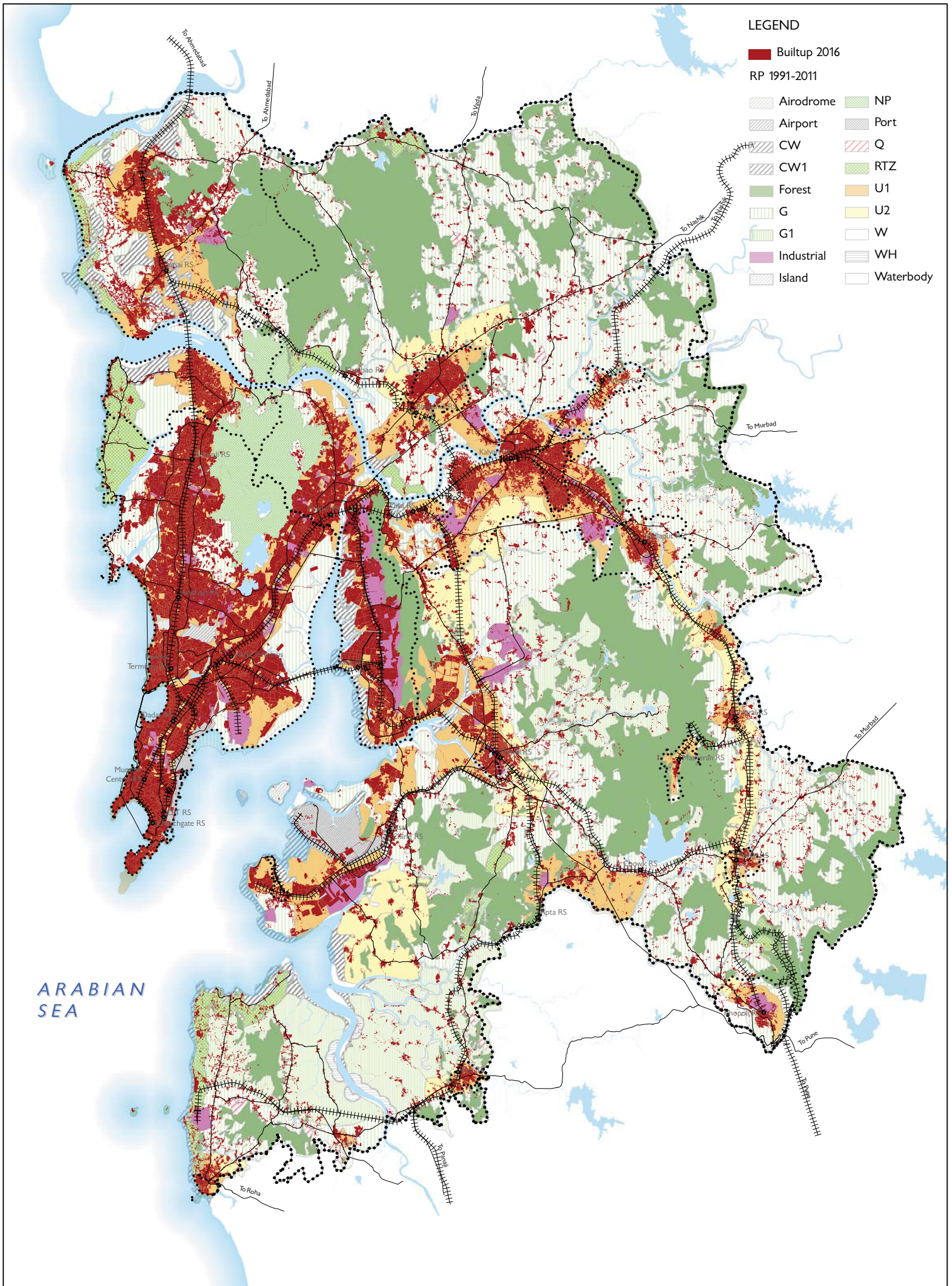
Regional Plan 1996 :

- Development areas : 30% (Urbanisable, Industry and Tourism Zones)
- Low Development areas : 39% (Green Zones)
- Conservation areas : 31% (Forest, Wetlands and others)

Analysis of the urban sprawl from 1973 to 2016 has been carried out using satellite images. The annual growth rate of new land opening up for development and its spatial distribution was explained in the second chapter. To understand the performance of RP-1996, urban sprawl was superimposed on the development permissions sought during the period 1991-2014 corresponding to the areas where the regional DCRs were made applicable, i.e., in the areas of MMR where Draft or Sanctioned Development Plan was not available during this period.

This indicated that less than 20% of the built up area had development permissions. The scenario is very similar in respect of Gaothan Expansions where higher intensity of development is permissible. Even though some of the developments may have taken place after 1991 using the permissions obtained prior to 1991, the scale of developments outside of legal permissions as well as the extent of land on which permissions were taken but developments did not take place indicating speculation, are both alarming. The highest proportion of authorised development was on the Green Zone-1 and the least on Green Zone-2. The proportion of unauthorised developments as well as development not occurring despite obtaining permissions is also highest on the Green Zone-1. One of the reasons for this could be the high proportion of Green Zone -1 out of the total land and the other could be affordable price of land on account of low development potential in Green Zone -1.

The analysis of spatial distribution of sprawl indicates that developments are clustering around urban areas and transportation nodes and also along the transportation corridors. Substantial proportion of the new developments are by way of utilising the higher FSI potential offered for the Gaothan Expansion Scheme upto 200 m around the Gaothan boundaries. However, this trend is prevalent in certain Tehsils, particularly in Panvel. Map No. 34 shows the sprawl superimposed on the Land use zones of RP-1996.



LEGEND

- Builtup 2016
- RP 1991-2011
- Airodrome
- Airport
- CW
- CW1
- Forest
- G
- G1
- Industrial
- Island
- NP
- Port
- Q
- RTZ
- U1
- U2
- W
- WH
- Waterbody

ARABIAN SEA

5.3.3 Proposed Land Use Zoning

The two Regional Plans of 1970 and 1996 for MMR followed the principle of identifying broadly developable and conservable areas and classified them into land-use zones and through Development Control Regulations, specified the permitted activities and the extent to which they are permitted within each zone. The Regional Plan, 2016-36 aims to follow the same considerations for land use zoning.

Conservation area : The environmentally sensitive and legally protected coastal wetlands, water bodies and designated forests have been classified as conservation areas.

Urbanisable area : The population projection for MMR shows that about 76 lakh new people will be living in MMR between 2011 and 2036. This is about half of what was assumed in earlier studies such as Comprehensive Transportation Study (CTS) and Concept Plan. Therefore the need for increasing urbanisation in the region does not justify substantial addition of Urbanisable area. The projections show that the municipal areas themselves are projected to absorb over 40 lakh new population. The sprawl at the peripheries of municipal areas is observed to be absorbing considerable amount of the remaining new population. Considering the high densities in cities, the proposed municipal extensions over such peripheries may help absorb the additional population better. Specific pockets are also designated for industrial purpose. The extent of present SPA areas may have to be reviewed in view of the above.

With reducing population growth rate of the region, developments, residential in particular, sprawling over the entire developable part of the region will require extension of services to these areas which may be difficult. Containment of urbanisation to areas that are already serviced or have committed projects may be more appropriate. The land-use zoning of the Region has been carried out with this approach. The methodology adopted and the resultant zones are explained below.

5.3.3.1 Methodology adopted for Land-use Zoning:

- a. Area of the region: The total area of the region is 4311.75 sq.km as measured from the base plan on GIS platform is considered for further distribution as land-use zones. This is larger than the administrative area of the region as per Census 2011 which measures 4253.48 sq.km.
- b. Forest Zone: Forest Zone is delineated on the basis of designated forest lands the details of which are obtained from the forest department.
- c. The Coastal Wetlands Zone: The Coastal Wetlands Zone is delineated on the basis of Existing Land Use map (based on the Satellite Image of 2008) subject to rationalisation to the extent that fragmented pockets are not indicated. However, the actual development permissions shall be based on approved local Coastal Zone Management Plans.
- d. The Water Bodies: The water Bodies are delineated on the basis of Existing Land Use map (based on Satellite Image of 2008) as well as the Survey of India maps to the scale of 1:50,000.
- e. Areas with sanctioned Development Plans (municipal areas, SPA areas and Layouts): Forest Zone, Coastal Wetlands Zone and Water Bodies are first delineated as described above. The industrial, warehousing/storage and Special Economic Zone land-uses in the sanctioned Development Plans are zoned as Industries in the proposed Plan. The large green land uses in the Development Plans are zoned as Green-1 and all the remaining area of the Development Plans is zoned Urbanisable.
- f. The details of each land use zone in the proposed plan are given below.

5.3.3.2 Urbanisable Zone

The Urbanisable Zone broadly consists of the following:

Municipal Areas: The 17 Municipal Corporations and Councils in MMR cover an area of 1,489 sq.km as per Census 2011. The municipal extensions and new municipalities proposed cover an additional area of 209 sq.km taking the total up to 1,698 sq.km. It is proposed to indicate as urbanisable, the

present municipal areas as well as those proposed newly for urbanization. However, as explained above, the large green areas in their respective Development Plans, industrial-SEZ-warehousing zones, coastal wetlands and forests from these areas are not proposed to be included in the urbanisable area.

Special Planning Authority Areas : The population projections for MMR-2036 indicate that the current SPAs open up areas for urbanisation in excess of the requirement, which will provide choices of places of stay and work. Studying the pattern of contribution of these areas to decadal additional population, SPAs of BSNA and NAINA are not expected to contribute much to the projected population. However, BSNA area is expected to substantially accommodate economic activities, which is reflected in its sanctioned Development Plan. In the case of NAINA, the part located closer to Panvel is considered urbanizable during the Regional Plan period of 2016-36.

Growth centres : In order to create opportunities for tertiary sector employment across the region in a decentralized manner, four growth centres are identified at Vasai, Bhiwandi, Kalyan and Panvel Tehsils over pockets of 5 to 13 sq.km area each. Together they constitute 36 sq.km out of the urbanisable area. Except the Growth Centre at Kharbao in Bhiwandi Tehsil (partly in TMC and partly in Bhiwandi rural area), all the others are located in municipal and SPA areas.

Areas along Transportation Corridors : In addition to the ULB, SPA and Growth Centre areas, Urbanisable zone is also proposed along the Badlapur-Karjat road, Chowk-Karjat road, between old Mumbai-Pune road and the Expressway, along Kalyan Padgha road (from Gandhari bridge to SPUR) where development trend is observed.

In all, the urbanisable zone is earmarked over an area of 1,130.64 sq.km.

5.3.3.3 Industrial Zone

In order to attract industrial development, specific industrial zones are proposed as well as industries are proposed to be permitted in the Urbanisable Zone and Green Zone-1. Six pockets of land are identified in Bhiwandi, Talaja, Khalapur, along Amba River in Alibag taluka, and Khopta for industrial development. These pockets total an area of 63.33 sq.km. In addition, the lands designated for Industries-SEZs-Warehousing from the various Development Plans of cities and SPA areas are indicated as Industrial Zone in the Regional Plan. Together with the new pockets identified in the Regional Plan, the area zoned for industrial development is 205.69 sq.km.

5.3.3.4 Green Zones

The natural elements in the region such as forests and coastal wetlands are legally protected and hence zoning them for conservation is a logical step. Similarly it is proposed to protect the steep slopes in urbanizable zone as well from development by way of DCR provisions. The remaining areas can be green zone with low development potential. For continuity with the Regional Plan-1996 provisions, the Green Zone is divided into Green Zone-1 and Green Zone-2. Command areas of irrigation projects, areas having a network of canals, pockets of land surrounded by designated forests, areas having large presence of tribal population and the areas currently exhibiting signs of very slow growth and having lesser connectivity are proposed as Green Zone-2 and permitted low order activities while the remaining green zone is proposed as Green Zone-1 and is permitted more activities. 1058.54 and 420.23 sq.km of area is earmarked for G-1 and G-2 zones respectively.

5.3.3.5 Forest, Heritage Site, Coastal Wetlands and Water Bodies

1175.63 sq.km of notified forest is earmarked as Forest Zone irrespective of whether the area is found to be forested in the existing land use or not. This includes the water spread areas along the water bodies in the village maps but excludes the forest area on Elephanta Island. Elephanta (Gharapuri) Island in Raigad district housing the Archaeological monuments, covering an area of 2.16 sq.km is designated a Heritage Site which includes the forest area on the island. Coastal wetlands from the existing land use of 2008 are rationalized for zoning purpose and cover an area of 172.52 sq.km. The water bodies constituting lakes, reservoirs, rivers and creeks located in MMR have been identified in the existing land use but were rationalized for the purpose of zoning, based on the Survey of India maps. The area zoned as water bodies covers an area of 146.34 sq.km.

Map no 35 shows the distribution of various Land Use Zones proposed.

Table 74: Proposed Land Uses in MMR

Sl. No.	Land Use Zone	Areas covered in the Zone	MMR Area-in (Sq.kms)	Effective RP Area (Sq.kms)
1	Urbanisable Zone	1. Municipal Corporation and Council areas 2. SPA areas of Navi Mumbai New town (excluding NMMC), AKBSNA, BSNA and IDP component of NAINA 3. Extensions proposed for the present municipal boundaries and the areas proposed as new Municipal Corporations, Councils and Nagar Panchayats 4. Proposed Growth Centres at Vasai, Kharbao, Nilje and Shedung 5. Lands along transportation corridors where development trend is observed	1052.48	92.17
2	Industrial Zone	1. Large industrial areas designated in the various Dev. Plans 2. Six new industrial areas proposed at Bhiwandi, Taloja, Khopoli, Alibag along Amba river and Khopta.	205.69	37.06
3	Airport	1. Chhatrapati Shivaji International & Juhu Airports in Mumbai and Navi the proposed Mumbai International Airports	18.25	0
4	Port	1. Mumbai Port, Jawaharlal Nehru Port, and the proposed Rewas Port	59.91	25.33
5	Green Zone-2	1. Command areas of irrigation projects 2. Lands surrounded by designated forest 3. Areas that are not well connected and did not show much sign of development in the last two decades (north of Nashik road in Bhiwandi and south of Murbad road in Karjat taluka except a one kilometre stretch, entire rural Pen taluka)	420.22	295.04
6	Forest Zone	1. Lands designated as reserved, protected, acquired and mangrove forests as per the maps, statements and letters furnished by the forest dept..	1175.63	721.15
7	Water Bodies	1. Rivers, streams, reservoirs, ponds and lakes located within the boundary of MMR	146.34	34.12
8	Coastal Wetlands	1. Using the existing land use of 2008, rationalized larger pockets.	172.52	8.74
9	Heritage Site	1. The Elephanta (Gharapuri Island)	2.16	2.16
10	Green Zone-1	1. All the remaining area of MMR	1058.55	431.78
	Total		4311.75	1647.55

Table 75 :Proposed Land-Use Statement

No.	Proposed Use Zone	MMR Area		Effective RP Area	
		Area (Sq.Km.)	Percentage	Area (Sq.Km.)	Percentage
1	Urbanisable Zone	1052.48	24.41	92.17	5.59
2	Industrial Zone	205.69	4.77	37.06	2.25
3	Airport	18.25	0.42	0.00	0.00
4	Port	59.91	1.39	25.33	1.54
5	Green Zone-1	1058.55	24.55	431.78	26.21
6	Green Zone-2	420.22	9.75	295.04	17.91
7	Forest Zone	1175.63	27.27	721.15	43.77
8	Water Body	146.34	3.39	34.12	2.07
9	Coastal Wetlands	172.52	4.00	8.74	0.53
10	Heritage Site of Gharapuri Island	2.16	0.05	2.16	0.13
	Total	4311.75	100.00	1647.55	100.00

Table 76: Distribution of Proposed Land Uses amongst ULBs, SPAs and Rest of MMR (Effective RP Area)

Sl. No.	Land Use Zone	ULBs		SPAs		Effective RP Area		Total	
		Sq.km	%	Sq.km	%	Sq.km	%	Sq.km	%
1	Urbanisable Zone	706.21	47.42	258.61	22.01	92.17	5.59	1056.99	24.51
2	Industrial Zone	98.33	6.60	65.60	5.58	37.06	2.25	200.99	4.66
3	Airport	6.68	0.45	11.57	0.98	0.00	0.00	18.25	0.42
4	Port	8.08	0.54	25.98	2.21	25.33	1.54	59.39	1.38
5	Green Zone-1	266.08	17.87	391.52	33.32	431.78	26.21	1089.38	25.27
6	Green Zone-2	2.07	0.14	101.20	8.61	295.04	17.91	398.31	9.24
7	Forest Zone	242.92	16.31	231.47	19.70	721.15	43.77	1195.54	27.73
8	Water Body	38.08	2.56	46.15	3.93	34.12	2.07	118.35	2.74
9	Coastal Wetland	120.81	8.11	42.84	3.65	8.74	0.53	172.39	4.00
10	Heritage Site	0.00	0.00	0.00	0.00	2.16	0.13	2.16	0.05
	Total	1489.25	100.00	1174.94	100.00	1647.55	100.00	4311.75	100.00%
		34.54%		27.25%		38.21%		100.00%	100.00%

Map No.36 shows the distribution of various Land Use Zones proposed on the 38% of the region where the DCRs of MMR are directly applicable.


The Regional Plan-2016 had the benefit of data sourced from higher resolution satellite images and digital information such as cadastre maps and primary data of Economic Census. However, for the same reason, it has been difficult to directly compare with the trend analyses carried out in the past. It was not possible to carry out the change detection of land use categories from the previous Regional Plans due to the resolution of the satellite images used being different each time. The proposed Land Uses, however, can be compared with the proposals of Regional Plan-1970 and Regional Plan-1996. It appears logical to divide the land uses into Development, Low Development and Conservation Zones. The distribution of areas under these broad categories in Regional Plan-1996 and what is proposed now are similar. Table 74 shows the comparative picture.

Table 77: Comparison of Land Use Proposal of Regional Plan 2016-36 with earlier Regional Plans

Sl. No.	Land Use Zone	Zone	RP 1970-1991		RP 1996-2011		Mod. Draft RP 2016-36	
			Area (Sq.Km)	%	Area (Sq.Km)	%	Area (Sq.Km)	%
1	Urbanisable Zone-1 (Incl Ports & Airports)	U1	705	17	830	19	1131	26
2	Urbanisable Zone-2	U2			217	5		
3	Industrial Zone	I	143	4	129	3	206	5
4	Recreation & Tourism Dev. Zone	RTD	35	1	111	3	0	0
A	Total of Development Zones		883	22	1288	30	1336	31
6	Green Zone-1	G-1	2110	52	1359	32	1058	25
7	Green Zone-2	G-2			303	7	420	10
B	Total of Low Development Zones		2110	52	1662	39	1478	35
8	Forest	F	1075	26	1091	26	1176	27
9	Water Bodies, Coastal Wetlands and Heritage site	WB, CW			196	5	321	7
C	Total of Conservation Zones		1075	26	1287	31	1497	34
	Total of all Zones		4068	100	4236	100	4312	100

 Development Zones

 Low Development Zones

 Conservation Zones

5.4 Development Control Regulations

Government of Maharashtra u/s 37(AA)(c) and Section 20(4) of the M.R&T.P. Act, 1966 sanctioned the Unified Development Control and Promotion Regulations for all Planning Authorities and Regional Plan Areas excluding Eco-Sensitive/ Eco- Fragile Regions notified by MoEF&CC and some other areas as mentioned in Notification No. TPS-1818/CR/236/18/DP & RP/Section 37(1AA) (c) and Section 20(4)/UD-13, dated 02.12.2020 is applicable to Mumbai Metropolitan Region Area.

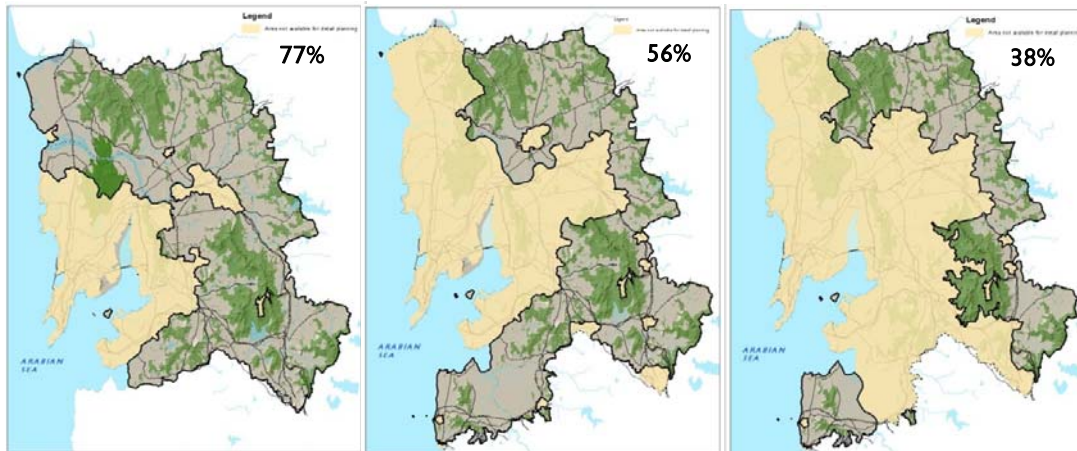


Figure 34: Extent of area where DCRs of Regional Plan are applicable

5.5 Growth Centres

To facilitate employment creation in the tertiary sector, new Growth Centres (GCs) are proposed at locations that are served by rail as well as road networks. Three rail networks are already proposed to be upgraded to suburban systems which are Panvel-Diva-Vasai, Panvel-Karjat-Khopoli and Panvel-Roha where occasional shuttle services are already in operation. Immediate upgradation of the first two services will create opportunity for development of growth centres to serve Vasai-Virar, Bhiwandi, Thane, Kalyan-Dombivali and Panvel areas. Four locations are proposed at Gass in Vasai-Virar, Kaman-Kharbav near Bhiwandi, Nilje near Dombivali and Shedung near Panvel. While Gass GC is located in VVCMC, Nilje in KDMC but in MMRDA's SPA area, Shedung in NAINA and MSRDC's SPA area; the Kharbav GC is located outside municipal and SPA boundaries.

In addition to the Growth Centres, seven large pockets of land are zoned for Industrial development. While the Virar pocket is located in VVCMC, Taloja in NAINA SPA, Khopoli in MSRDC's SPA, Khopta in CIDCO's SPA, Bhiwandi pockets outside municipal and SPA boundaries, and the last one on both sides of Amba river is located partly in NAINA and partly outside municipal and SPA boundaries.

The objective of introducing such proposals is to bring jobs to where people live and to boost economy and generate employment in manufacturing and tertiary sectors. The development proposals of Growth Centres and Industrial pockets are indicated on Map No.38.

The Growth Centres are envisaged as integrated complexes with opportunities for office sector employment, research and development, education and recreational facilities and the necessary housing and infrastructure. It is proposed to prepare detailed plans for these areas after the RP is approved which may include area allocations for institutional, research and other regional facilities, strategies for development and expanded Development Control Regulations.

Table 78: Details of Proposed Growth Centres

Sl. No	Location	District	Village Name	Area (sq km)
1	Vasai	Palghar	Nallasopara, Vasai- Virar Municipal Corporation	6.18
2	Kharbav, Bhiwandi	Thane	Kharbav, Malodi, Paye, Paygaon, Nagle, Thane Municipal Corporation	13.08
3	Nilje, Kalyan	Thane	Bhopar , Sandap, Hedutane , Gharivali , Usarghar, Katai, Nilje, Kole	10.83
4	Shedung, Panvel	Raigad	Ajiwali, Barwai, Bhingar, Bhingarwadi, Borle, Khanavale, Mohope, Poyanje, Sangde, Shedung	5.77
Total area				35.86

Table 79: Details of Proposed Regional Industrial Areas

Sl. No	Location	District	Village Name	Area (sq km)
1	Bhiwandi-1	Thane	Angaon, Nivali, Supegaon	4.09
2	Bhiwandi-2	Thane	Sape, Vahuli, Borivali Tarf Sonale, Bhoirgaon, Kukase, Amane, Kurund, Talavali Tarf Sonale, Arjunali, Vashere, Atkone	13.06
3	Taloje	Raigad	Chindharan, Mahodar, Kherane Kh., Nitalas, Vavanje,	4.12
4	Khalapur	Raigad	Talawali, Anjrun, Ghodivali, Kandroli Tarf Boreti, Kelavali, Halkhurd, Mankivali, Navandhe, Wangani, Dolivali, Bid Khurd, Jambrung	11.78
5	Along Amba River in Alibag taluka	Raigad	Dherand, Mankule, Narangi, Shahabaj, Shahapur	16.76
6	Khopta	Raigad	Aware, Bandhpada, Dhasakhosi, Govthane, Jui, Kacherpada, Koproli, Pale, Pirkone, Sangpalekhar, Talbandkhar	13.52
Total area				63.33

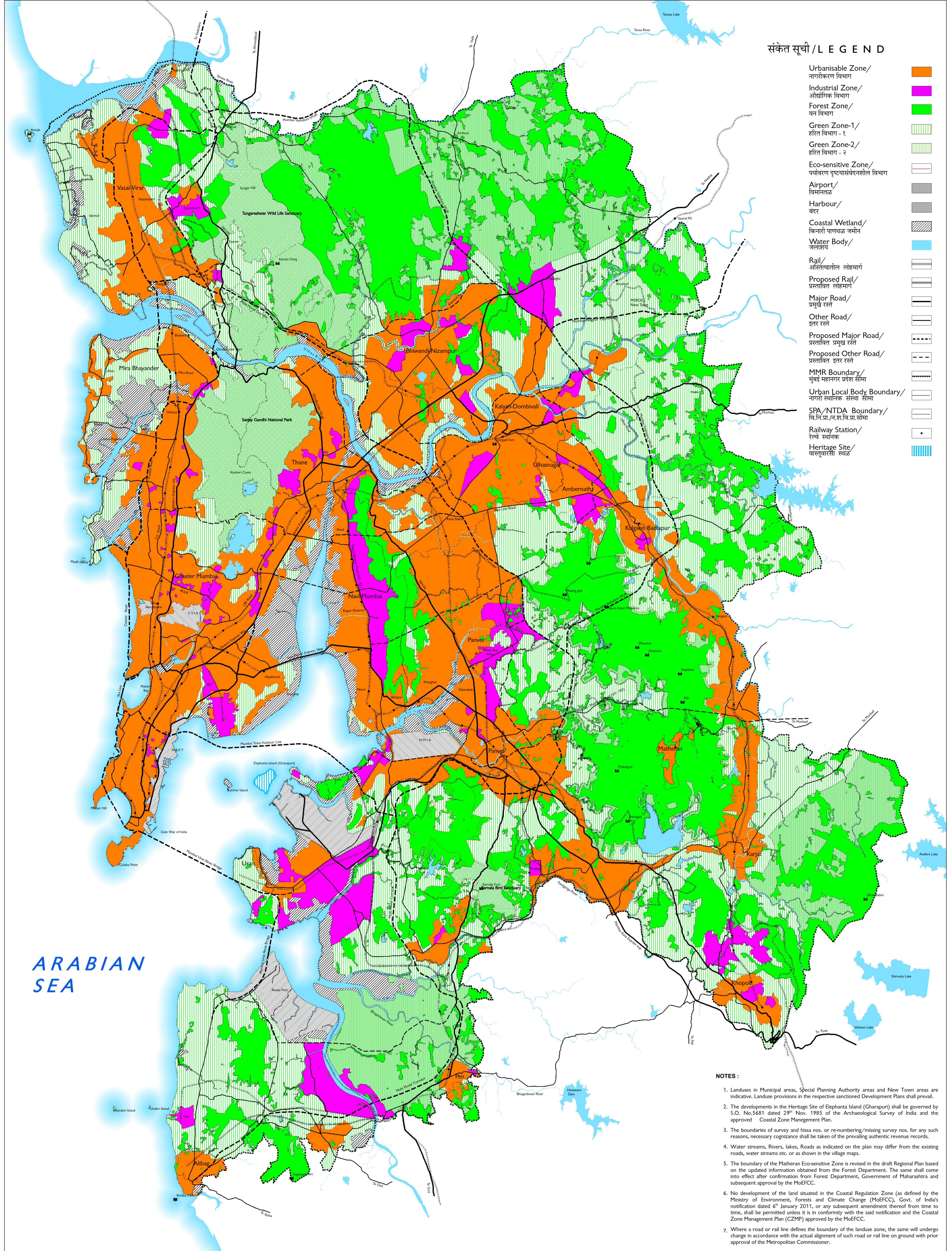
5.6 Local Development Centres (LDCs)

5.6.1 Cluster Level LDCs

The status of rural areas in MMR in terms of availability of social and physical infrastructure, access and employment both resident and at workplaces is presented in Chapter-2. Clusters of villages in Bhiwandi, Kalyan, Ambernath, Karjat and Alibag Tehsils emerge as deficient in all the above. Using the available infrastructure as potential and natural boundaries, rural MMR is divided into 29 deficiency clusters. Each cluster has some centres as well as a large catchment area that is dependent on such centres. It is proposed to promote a Local Development Centre in each cluster to initiate development of the cluster of villages.

Of the 29 clusters, 22 need Local Development Centres while the remaining 7 are located in urban peripheries and are depending on nearby urban areas for making good the deficiencies. One village in each of these 22 clusters is identified as LDC. Of the 22 such villages, seven villages are currently not serving as rural hubs. These are envisaged to be upgraded by increasing the level of amenity provision in these villages. The remaining thirteen villages are already serving as local hubs for social and educational needs of the surrounding villages and could be further promoted by establishing LDCs to function better in their current roles and to serve the entire cluster of villages.

In order to trigger development of LDCs, availability of government lands and strategic location with good access was used as criteria for prioritizing the first phase of action. Nine such locations are identified, the details of which are given in Table 78. Map No.39 indicates the infrastructure status of the clusters and the location of 9 LDCs.



संकेत सूची / LEGEND

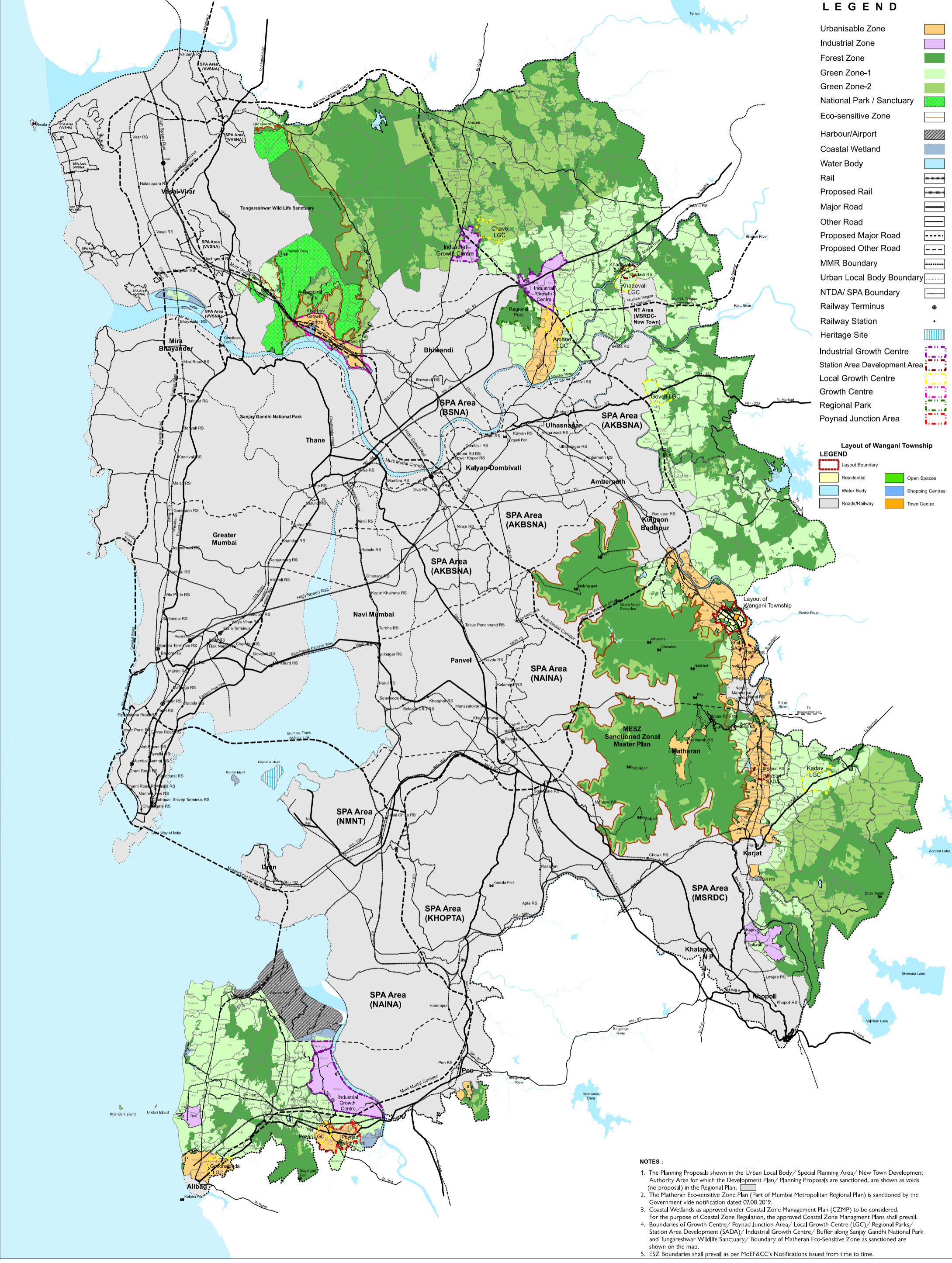
- Urbanisable Zone/ नागरीकरण विभाग
- Industrial Zone/ औद्योगिक विभाग
- Forest Zone/ वन विभाग
- Green Zone-1/ हरित विभाग - १
- Green Zone-2/ हरित विभाग - २
- Eco-sensitive Zone/ पर्यावरण दृष्ट्यासंवेदनशील विभाग
- Airport/ विमानतट
- Harbour/ बंदर
- Coastal Wetland/ किनारी पाणथळ जमीन
- Water Body/ जलाशय
- Rail/ अस्तित्वातील लोहमार्ग
- Proposed Rail/ प्रस्तावित लोहमार्ग
- Major Road/ प्रमुख रस्ते
- Other Road/ इतर रस्ते
- Proposed Major Road/ प्रस्तावित प्रमुख रस्ते
- Proposed Other Road/ प्रस्तावित इतर रस्ते
- MMR Boundary/ मुंबई महानगर प्रदेश सीमा
- Urban Local Body Boundary/ नागरी स्थानिक संस्था सीमा
- SPA/NTDA Boundary/ वि.नि.प्रा./न.श.वि.प्रा.सीमा
- Railway Station/ रेल्वे स्थानक
- Heritage Site/ वास्तुवैरासी स्थळ

- NOTES :**
1. Landuses in Municipal areas, Special Planning Authority areas and New Town areas are indicative. Landuse provisions in the respective sanctioned Development Plans shall prevail.
 2. The developments in the Heritage Site of Elephanta Island (Gharapuri) shall be governed by S.O. No.5681 dated 29th Nov. 1985 of the Archaeological Survey of India and the approved Coastal Zone Management Plan.
 3. The boundaries of survey and hissa nos. or re-numbering/missing survey nos. for any such reasons, necessary cognizance shall be taken of the prevailing authentic revenue records.
 4. Water streams, Rivers, lakes, Roads as indicated on the plan may differ from the existing roads, water streams etc. or as shown in the village maps.
 5. The boundary of the Matheran Eco-sensitive Zone is revised in the draft Regional Plan based on the updated information obtained from the Forest Department. The same shall come into effect after confirmation from Forest Department, Government of Maharashtra and subsequent approval by the MoEFCC.
 6. No development of the land situated in the Coastal Regulation Zone (as defined by the Ministry of Environment, Forests and Climate Change (MoEFCC), Govt. of India's notification dated 6th January 2011, or any subsequent amendment thereof from time to time, shall be permitted unless it is in conformity with the said notification and the Coastal Zone Management Plan (CZMP) approved by the MoEFCC.
 7. Where a road or rail line defines the boundary of the landuse zone, the same will undergo change in accordance with the actual alignment of such road or rail line on ground with prior approval of the Metropolitan Commissioner.

LEGEND

- Urbanisable Zone
- Industrial Zone
- Forest Zone
- Green Zone-1
- Green Zone-2
- National Park / Sanctuary
- Eco-sensitive Zone
- Harbour/Airport
- Coastal Wetland
- Water Body
- Rail
- Proposed Rail
- Major Road
- Other Road
- Proposed Major Road
- Proposed Other Road
- MMR Boundary
- Urban Local Body Boundary
- NTDA/ SPA Boundary
- Railway Terminus
- Railway Station
- Heritage Site
- Industrial Growth Centre
- Station Area Development Area
- Local Growth Centre
- Growth Centre
- Regional Park
- Poynd Junction Area

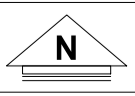
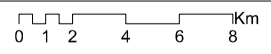
- Layout of Wangani Township**
- LEGEND**
- Layout Boundary
 - Residential
 - Water Body
 - Roads/Railway
 - Open Spaces
 - Shopping Centres
 - Town Centre



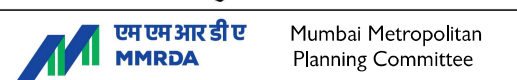
- NOTES :**
1. The Planning Proposals shown in the Urban Local Body/ Special Planning Area/ New Town Development Authority Area for which the Development Plan/ Planning Proposals are sanctioned, are shown as voids (no proposal) in the Regional Plan.
 2. The Matheran Eco-sensitive Zone Plan (Part of Mumbai Metropolitan Regional Plan) is sanctioned by the Government vide notification dated 07.08.2019.
 3. Coastal Wetlands as approved under Coastal Zone Management Plan (CZMP) to be considered. For the purpose of Coastal Zone Regulation, the approved Coastal Zone Management Plans shall prevail.
 4. Boundaries of Growth Centre/ Poynd Junction Area/ Local Growth Centre (LGC)/ Regional Parks/ Station Area Development (SADA)/ Industrial Growth Centre/ Buffer along Sanjay Gandhi National Park and Tungreshwar Wildlife Sanctuary/ Boundary of Matheran Eco-Sensitive Zone as sanctioned are shown on the map.
 5. ESZ Boundaries shall prevail as per MoEF&CC's Notifications issued from time to time.

Final Regional Plan of Mumbai Metropolitan Region - Proposed Land-Use
मुंबई महानगर प्रदेशासाठीची अंतिम प्रादेशिक योजना - प्रस्तावित भू -वापर

Disclaimer:
 This map is a certified copy of the Final Regional Plan of Mumbai Metropolitan Region as sanctioned by the Government on 07.08.2019 & 20.04.2021.
 In case of any discrepancy, the sanctioned Final Regional Plan of Mumbai Metropolitan Region shall prevail.

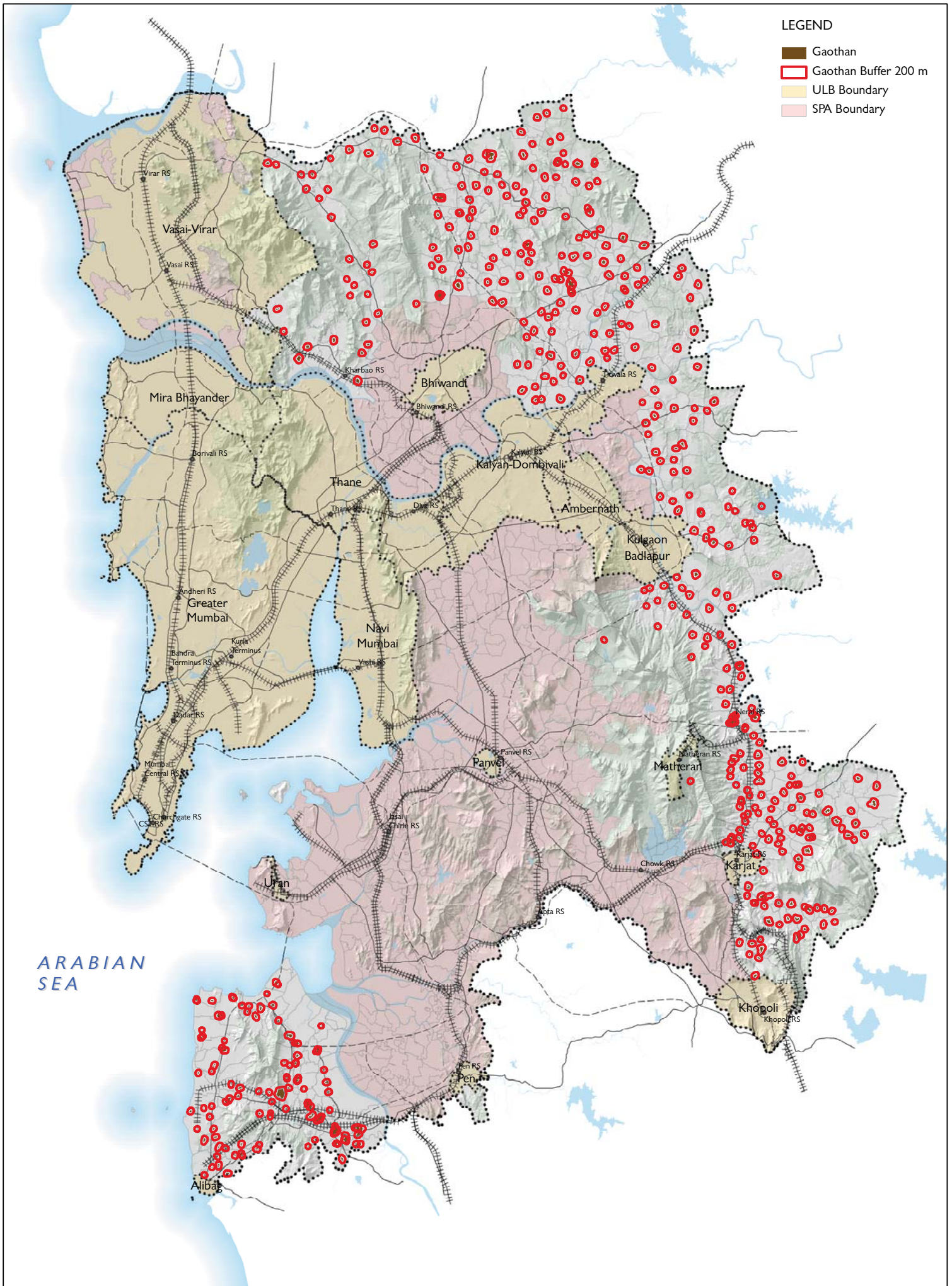


Scale 1:100000



PLAN SANCTIONED U/s 15(1) of Maharashtra Regional & Town Planning Act, 1966 by Government in Urban Development Department vide Notification No.: TFS-1218/1665/C.R.-79/20/UD-12, dated 20th April, 2021, and shall come into force from date 20th June, 2021.

Map No. 36

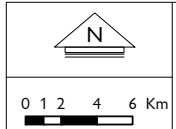


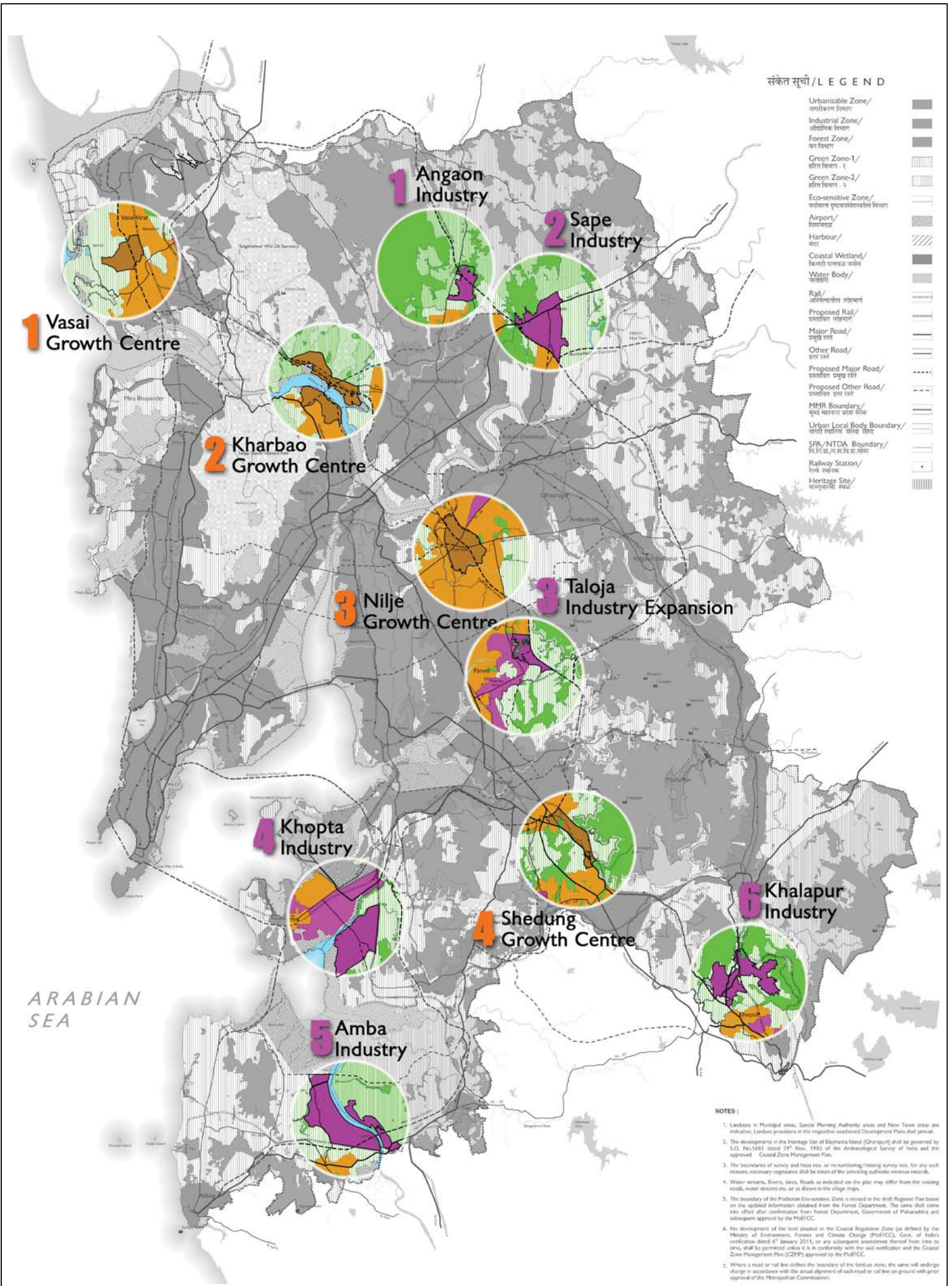
- LEGEND**
- Gaothan
 - Gaothan Buffer 200 m
 - ULB Boundary
 - SPA Boundary

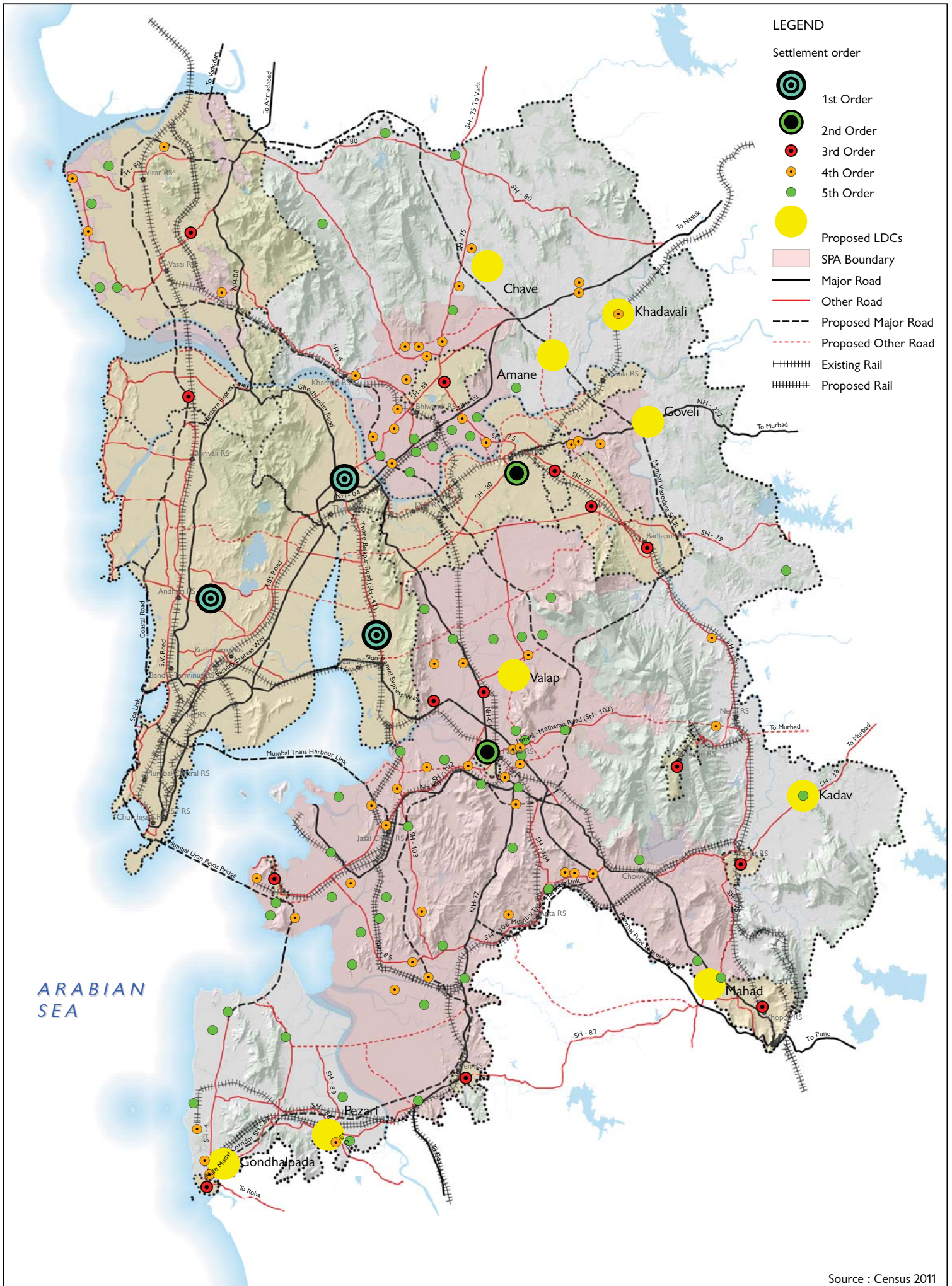
ARABIAN SEA

Gaothan Expansion Boundaries

- MMR Boundary
- ULB Boundary
- Existing Rail
- Proposed Rail
- Existing Road
- Forest
- Waterbody
- Railway Stations
- Proposed Road







LEGEND

- Settlement order
- 1st Order
 - 2nd Order
 - 3rd Order
 - 4th Order
 - 5th Order
- Proposed LDCs
- SPA Boundary
 - Major Road
 - Other Road
 - Proposed Major Road
 - Proposed Other Road
 - Existing Rail
 - Proposed Rail

Source : Census 2011

Table 80: Proposed Local Development Centres

Sl. No.	District	Tehsil	Village	Population in 2011	Nearest Town
1	Thane	Bhiwandi	Amane	2,683	Kalyan
2			Chave	1,997	Bhiwandi
3		Kalyan	Goveli,	1,264	Ulhasnagar
4			Khadavali	5,234	Kalyan
5	Raigad	Panvel	Valap	2,236	Panvel
6		Karjat	Kadav	3,204	Karjat
7		Khalapur	Mahad	976	Khopoli
8		Alibag	Gondhalpada	1,788	Alibag
9			Pezari	1,652	Alibag, Pen

It is expected that these LDCs will:

- a) Serve as local market centres
- b) Enable economic development which is in tune to local needs and skillsets
- c) Rectify current deficiencies in physical and social amenities
- d) Serve as centres for local skill upgradation
- e) A point of convergence of Governmental schemes

After the Regional Plan is sanctioned, action plans for each LDC can be worked out and institutional and financial mechanisms can be put in place to execute them. Broadly, it is envisaged that Govt. can hand over the lands to MMRDA for establishment of LDCs, MMRDA can invest in creating building and other infrastructure for developing the centres, and a Joint Action Committee of the representatives of the concerned government departments and MMRDA can then implement the action plans for each LDC. The representation can be from the District Collector, rural and tribal development departments, agriculture and horticulture departments, education and tourism departments etc. depending on the type of intervention proposed. Based on further inputs the locations may change.

Detailed studies will be undertaken to match the proposed development with the local needs.. It is envisaged that with the establishment of LDCs, the level of access to physical and social amenities in rural MMR would improve to more acceptable levels. The LDC can help improve the local infrastructure and at the same time become a convergence point of opportunities for the entire cluster.

5.6.2 Tourism villages

Villages in the region that are part of existing tourism circuits or that have tourism potential could be promoted to boost local economy. The villages can be identified based on the following criteria:

- a. Hiking/trekking base villages around Matheran, Karnala and in Alibag
- b. Fishing villages along the western coast with access to good beaches
- c. Around cultural heritage sites
- d. Villages around birding and turtle nesting sites with potential for environmental tourism

The strategy for development of the tourism villages can be similar to what is suggested for the Cluster level LDCs. The additional inputs could be support to the existing economic activity in fishing villages and tourism promotion in co-ordination with the concerned government departments and agencies (Map no. 42).

5.7 Transportation Network

The Comprehensive Transportation Study (CTS) for MMR, 2008 and the various Integrated Mobility Plans (IMPs) prepared for local areas within MMR form the basis for understanding the transportation requirements of the region. However, CTS proposals were made on the basis of the following assumptions:

- a) Projections of 3.4 Crore population by 2031,
- b) Special Economic Zones (SEZs) succeeding as envisaged, and
- c) Uran-Pen sub-region driving development of MMR in future

From the post-CTS scenario it is evident that population growth is going to be substantially less, SEZs have not materialized and as a consequence, the development may not happen in Uran-Pen area as

envisaged. Some of the CTS proposals are being implemented while others have undergone modification. New transportation proposals have also emerged. In view the above, transportation proposals in the region are proposed to be reconfigured in the following manner.

5.7.1 Major departures from previous assumptions

a. Projections:

Population and employment projection and distribution in the region have been different from what was assumed in the CTS. Accordingly, CTS proposals of road and transit proposals have been rationalized.

b. Transport proposals

1. The Vadodara-Mumbai expressway passing through Vasai-Virar area is recast by NHAI as a spur from Shirsat phata near Virar through Nashik highway to Badlapur and then to Panvel and JNPT.
2. Sawantwadi Expressway across Pen Tehsil connecting Mumbai to southern coast of Maharashtra is recast by PWD as a Coastal Garland road from west coastal road of Mumbai through Colaba-Uran and Karanja bridges to Alibag and then to Ratnagiri, bypassing Pen.
3. The PWD proposal to connect Panvel to Bhimashankar by way of tunnel under the Matheran hills, which will boost the Panvel-Neral-hinterland connection.
4. The diversion of goods movement through earlier proposed peripheral connector Virar-Vajreshwari-Ambadi-Nashik road-Karjat is not expected to happen during the current plan period. Therefore, regional transportation networks are not indicated in this area.

c. Spatial trend of development

Based on the population projections, it is expected that development in the current Regional Plan period will mostly occur in Vasai-Virar, Mira-Bhayandar, Kulgaon-Badlapur and Navi Mumbai areas and their surroundings whereas peripheries of MMR may develop thereafter. Further, the emergence of Palghar as a district, that is sharing a boundary with MMR at Virar may result in developments at the Virar end as it will act as gateway to MMR from Palghar side. Similarly, with the Delhi-Mumbai Industrial Corridor development at Nasik and surrounding areas, the periphery of MMR along Nasik road or along the newly proposed Mumbai-Nagpur Samruddhi Corridor may become a gateway to DMIC development in future. In the same way, with Coastal Garland road development, Alibag and its vicinity may become a gateway to southern Maharashtra.

5.7.2 The Transportation Proposals

The primary objective of the transportation proposals is to enable seamless connectivity across MMR with a view to achieve greater speed and efficiency. Towards this end, the principal strategy adopted is 'Transit First' as advocated by CTS 2007. Recognising that transit has always been the driver of development in the region, the following proposals are envisaged:

1. Suburbanization of all existing rail networks in MMR with dedicated tracks:

There are existing rail lines in MMR that are currently not part of the suburban network. It is proposed that all existing railway networks in MMR should be suburbanized on priority, in view of the current spatial trends and to boost development in the peripheries of MMR with a view towards more balanced regional development. With Panvel emerging as a major node in the region due to convergence of various transport networks, and with the CST-Panvel fast train services planned shortly, development of all existing lines beyond Panvel would enable effective integration of these areas into the metropolitan region. These include the

- a) Panvel-Diva-Vasai,
- b) Panvel-Karjat-Khopoli and
- c) Panvel-Roha lines.

2. New suburban rail networks

- a) **Rasayani to Chowk:** This new line is envisaged to promote East-West connection across existing and emerging industrial areas in the South of MMR. This suburban connector would enable the creation of a short direct route linking Khopoli to Pen and Alibag without having to take a longer detour via Panvel. This 'industrial rail line' would connect existing industrial areas in Khopoli and the planned new industrial areas by MIDC, Rasayani and the proposed Rees-Mohopada new municipality, to Jite (another emerging future node).
- b) **Ulwe to Pen:** This suburban link would help complete the suburban loop connecting Nerul-Ulwe-Pen-Panvel. This would also enable the development of Khopta new town and also facilitate dispersal of MTHL and JNPT traffic.

3. East-west connectivity improvement:

Creation of East-West connections across MMR has always been difficult due to the presence of environmentally sensitive features like Sanjay Gandhi National Park in Greater Mumbai, creeks and other North-South running hill ranges. To address this issue, some major East-West connectors are proposed as under:

- a) The following four new regional metro networks are proposed :
 - JVLR-Koparkhairane-Kalyan,
 - Mira Bhayander- Kharbav-Nashik Road,
 - Thane-Bhiwandi-Kalyan, and
 - Mankhurd-Vashi-Kharghar-Ambarnath

With these networks, three transit loops are created- Mumbai-Mira Bhayander-Thane- Mumbai; Thane-Kalyan-Bhiwandi-Thane and Mumbai- Mira-Bhayander-Thane-Bhiwandi- Kalyan-Navi Mumbai-Mumbai. The proposed Multi-Modal Corridor (MMC) would cut across these loops, further improving connectivity across modes.

- b) The following three new tunnels are proposed :
 - Airoli-Katai naka across Parsik Hills which connects to Goregaon-Mulund Link Road proposed in the Mumbai DP,
 - Vashi-Kharghar across Parsik Hills, and
 - Panvel-Bhimashankar across Matheran hills
- c) The following three new creek bridges are proposed :
 - JVLR to Koparkhairane - across Thane Creek-,
 - Thane to Kharbav – across Ulhas Creek (to better connect Thane and Mira-Bhayandar to north of Ulhas Creek, particularly to the proposed northern Bhiwandi bypass, and to facilitate the Growth Centre at Kharbav), and
 - Uran to Rewas - across Dharamtar Creek

4. Improving North-South connections between Virar to Alibag

- a. Multi Modal Corridor
- b. Coastal road with the already committed creek bridge connecting Mira-Bhayander to Vasai across Vasai Creek
- c. Uran to Rewas - across Dharamtar Creek

5. Improving connectivity to the new International Airport at Panvel

- a. With a proposed road MTHL-Airport-Panvel to Matheran road, and
- b. By extending Navi Mumbai metro from Taloja to the airport and then to Mankhurd for connecting to Mumbai.

Map No.40 and 41 indicate the proposed road and transit networks.

The transit network loops that will be formed as a result of the above Plan proposals are indicated in Figure: 35 below.

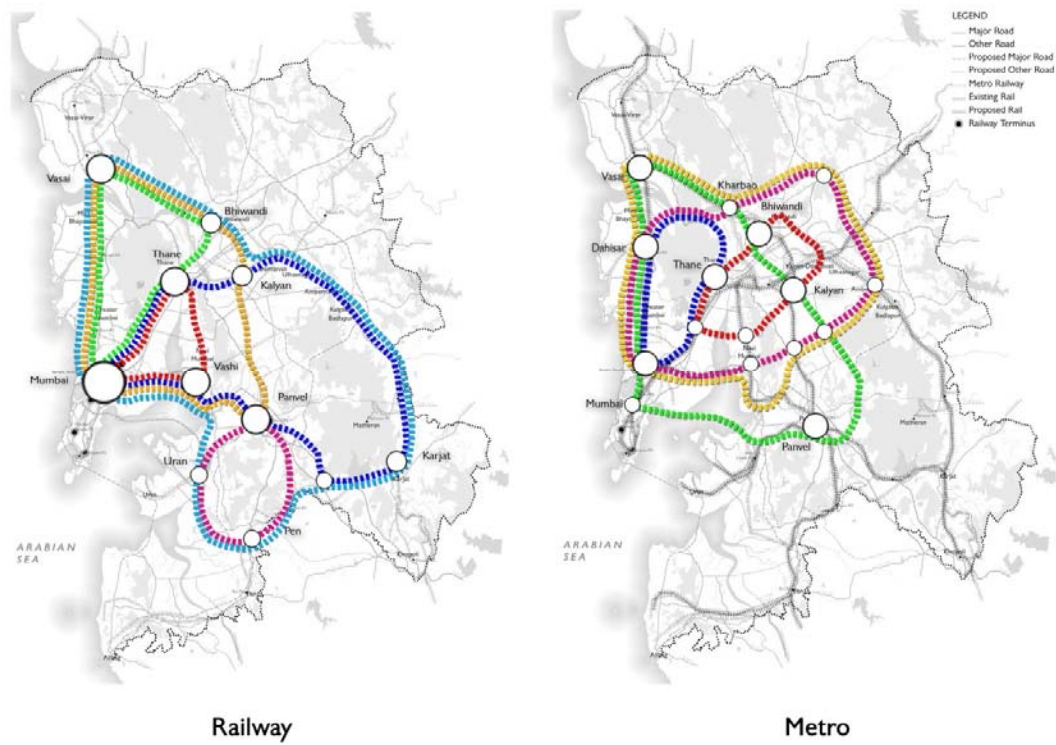


Figure 35: Transit Network Loops

5.8 Housing

As calculated in Chapter-4, the housing need for MMR by 2036 is 44,42,730 dwelling units. The Plan proposes to address the housing situation by indicating how the supply requirements can be met which is a quantitative measure as well as by suggesting a policy framework.

5.8.1 Meeting the quantitative Housing Need

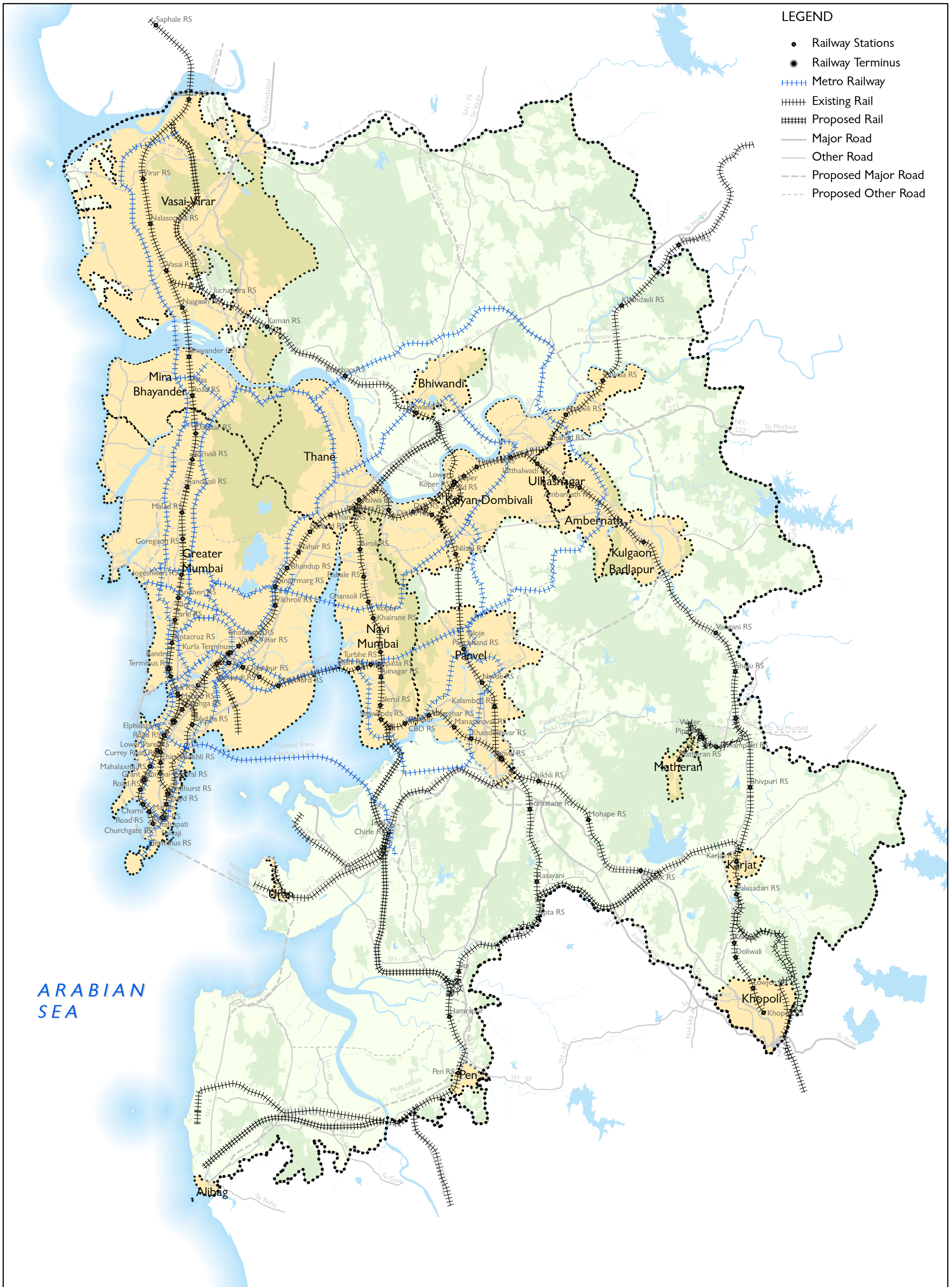
This is proposed to be done by way of both redevelopments as well as new construction. While the redevelopments will be to the extent represented in the assumptions (Chapter-4) the balance requirement is proposed to be met by way of new construction. The details are given below.

5.8.1.1 Redevelopments:

If the present redevelopment schemes are extended to the whole of MMR and continued through the Plan period, the quantitative housing need can be addressed by way of redevelopments on-site as well as new constructions on new lands.



- LEGEND**
- Proposed Major Road
 - Major Road
 - Other Road
 - - - Proposed Other Road
 - Existing Rail
 - Proposed Rail
 - Railway Terminus
 - Railway Stations



- LEGEND**
- Railway Stations
 - Railway Terminus
 - ++++ Metro Railway
 - ===== Existing Rail
 - ===== Proposed Rail
 - Major Road
 - Other Road
 - - - Proposed Major Road
 - - - Proposed Other Road

Table 81: Meeting the Housing Need through Redevelopment

No.	Housing Type	Number of Dwelling Units (2011)	Number of Dwelling Units Expected to be redeveloped (2036)	Assumption
1.	Slum Households	13,91,685	8,94,853	6% households will still remain in slums in 2036. Calculated over the previous decade this will be 85%, 60% and 70% at the end of 2021, 2031 and 2036 respectively on account of no. of years in the decade available for action. This includes new slum formations in the future.
2.	Cessed bldgs. BIT and BDD chawls in Gr. Mumbai	4,99,664	4,99,664	100% of the tenements are expected to be reconstructed.
3.	Dilapidated houses in rest of MMR	1,10,828	88,662	80% of the Dwelling Units will be redeveloped
4.	Future dilapidation	50,000	40,000	80% of the Dwelling Units will be redeveloped
	Total	20,62,117	15,23,179	

Thus, redevelopment schemes of slums and dilapidated structures are expected to meet the housing need to the extent of 15,23,179 out of the 44,42,730 units. This is on the assumption that the incentive FSI based market mechanisms for such redevelopments will continue through the Plan period and shall be made applicable not only in Gr. Mumbai but across the Municipal areas in the region. The redevelopment schemes, being market based, shall necessarily have the component of additional saleable housing units. Such additional saleable housing units, over and above the rehabilitation housing units, will also contribute to meeting the housing need. Their numbers are estimated as one unit for every two or four of the rehabilitation units as given in the following table.

Table 82: Additional Housing Stock through Redevelopment

No	Re-development Component	No. of Dwelling Units expected to be redeveloped	Addl. Dwelling Units likely to be generated through redevelopment @50% of 3	Assumption
1	2	3	4	5
1.	Slum Houses	8,94,853	4,47,426	Two rehab units will give rise to one additional unit
2.	Cessed bldgs. + BIT and BDD chawls	4,99,664	2,49,832	Two rehab units will give rise to one additional unit
3.	dilapidated houses	1,28,662	42,887	Four rehab units will give rise to one additional unit
	Total	15,23,179	7,40,145	

Thus redevelopments will provide additional new housing stock of 7,40,145 units. Both the rehabilitation units as well as the above calculated additional housing units for sale are assumed to be on-site redevelopments and therefore will not require new lands.

The housing need to be fulfilled by way of new developments requiring land now stands at :

• Total Housing Need	: 44,42,730 units
• Rehabilitated dwelling units through redevelopment	: 15,23,179 units
• Additional sale units through redevelopment	: 7,40,145 units
• Balance stock to be created on new land	: 21,79,406 units

5.8.1.2 New Developments:

The land required for construction of new dwelling units, excluding redevelopments, is given in the following table.

Table 83: Land Requirement for Construction of New Houses

No	Land requirement for Construction of houses	
1	New dwelling units required (nos.)	21,79,406
2	Built-up area requirement @ 50 sq.m. per unit (Ha)	10,897
3	Net Land required for housing @ FSI 1 (Ha)	10,897
4	Gross Land required @ 100% additional land for roads, amenities and open spaces (Ha)	21,794

The requirement of land for new housing units is separately calculated for individual ULBs, SPAs and rural MMR based on their respective projected population and their respective applicable FSIs. This exercise brought down the land requirement for the 21,79,406 housing units from 21,794 Ha to approximately 10,000 Ha.

By superimposing the Development Plans of ULB and SPA areas in MMR on the Google Earth image of 2014, the vacant lands from those zoned for residential use are estimated. This information, together with the applicable FSI for the respective Development Plan areas reveals that :

1. Thane, Vasai-Virar, Navi Mumbai, Mira-Bhayander, Ulhasnagar, Kulgaon-Badlapur, Panvel and Alibag do not have sufficient land for creation of housing stock required for their projected populations.
2. In the remaining cities and SPA areas, adequate vacant developable land is available to accommodate the estimated housing need, which is to the tune of approximately 1,000 Ha.
3. The requirement of land for new housing development in the rest of MMR can be met by the urbanisable zones proposed in this Plan in their vicinity.

It is expected that the new housing requirement of the land deficient cities will be fulfilled by the municipal extensions proposed in the following manner:

Table 84: Meeting the Housing Needs of Land Deficient Cities

No.	City	Potential
1	Vasai-Virar	By extending its municipal limits over its surrounding SPA area as proposed in this Plan
2	Mira-Bhayandar	In the extended area of Vasai-Virar
3	Thane, Ulhasnagar, Kulgaon-Badlapur	By accommodating the additional requirement in the proposed extension of Ambernath-Badlapur Municipal Corporation and the increased KDMC area and in NAINA SPA
4	Navi Mumbai, Panvel	By accommodating the additional requirement in the proposed Panvel Municipal Corporation area
8	Alibag	By extending the municipal limits over its surrounding area as proposed in this Plan

5.8.2 Housing Policy Framework

To make housing affordable to all thereby minimising the scope for the current problems to continue in future, two types of policy interventions are proposed, one regarding measures to improve the housing supply situation to meet the demand and two, an institutional arrangement to realise the same. The same are explained below.

A) Overall Framework

In addition to the measures suggested in Chapter-4, the residential housing stock can be increasing by maximizing the use of existing residential units using the following measures

- a. Encourage Renting out : make renting out of houses easy by modifying the Rent Control Act suitably and by making legal renting out impediment-free using measures such as taxation and utility charging at residential rates;
- b. Heavily tax the vacant properties in order to free up locked houses and arrest speculation which will also lead to demand for medium sized dwelling units
- c. Encourage market to deliver medium sized dwelling units which may result in middle income households moving from slums to formal housing
- d. Link subsidised/free house to the needy and not to the structure
- e. Interlink information to arrest leakage of benefits and to target the needy
- f. Make the problem of slums addressable by disaggregating the problem into what can be addressed through policy interventions such as the above, and what requires direct action by the govt.
- g. Decrease the tendency to convert houses to other uses by making housing societies responsible for preventing incompatible uses and Planning Authorities responsible for increasing the availability of affordable non-residential space at approximate locations.
- h. Increase public housing supply including by way of PPPs and use the tenements procured through PPPs as employees housing
- i. Rationalise the concept of free housing across the housing typologies and income groups
- j. Define affordable housing for the low income groups not only by size of unit, but also by specifications so that the price of the unit is kept low.
- k. Curb the tendency to lower the Planning standards and regulations to ensure that the quality of life and health and safety are not compromised.

B) Institutional Arrangement

A number of public agencies are involved in creation of housing directly or through PPP at present. Except for a few, housing is not a mandated activity for others. Therefore, their approaches and abilities to deal with housing issue differ which will result in the outcomes being not necessarily aligned with the objectives of public housing. Therefore, it is proposed to undertake a study to identify the strengths of housing organisations towards undertaking various actions leading to affordable housing. For example, all land assembly by a single agency, housing development by one agency and the infrastructure provision by another. This way each agency can play to the best of their core competency and the combined strength can produce better results.

- a. Role of MHADA : MHADA could play a more active role in increasing the supply of public housing and be a nodal agency for facilitating all redevelopments.
- b. Role of SRA : As is being discussed already, the role of SRA should extend to entire MMR and it should prepare a city-wide comprehensive plan and a strategy to address it.
- c. A new Rental Housing Agency can be established and the EWS/LIG housing stock created through various regulatory instruments and projects should be handed over to this agency to be used as rental housing stock. Stock other than EWS/LIG can be used by the agency for facilitating employees housing.

5.9 Infrastructure

Strategies envisaged for MMR infrastructure in terms of water, sewerage and solid waste range from immediate priority inputs and solutions to a longer term strategy of shifting towards the transformation of the existing grey infrastructure to 'green infrastructure'. Several strategies are accordingly proposed sectorally.

5.9.1 Water

Several projects are on-going and proposed to meet the future water demand for MMR. The water availability in MMR from current sources is 6052 MLD with a current water deficit of 1552 MLD (2016). Of this, 359 MLD (2016) is currently required in the northern areas of MMR viz. Rural and urban areas of Thane & Palghar in MMR (Zones 2 & 3) while 51 MLD is the deficit in the southern regions of MMR (Zones 5, 6, 7 & 8) (2016). If we consider the water investment requirements for

each of the eight zones in MMR demarcated by the Chitale Committee Report individually, the following observations are made.

Projects

Currently the work of extension of the flood gates of Barvi dam is completed by MIDC. This will allow an additional of 560 MLD of water to be available for use in the region. Source development on Balganga River is undertaken by CIDCO which is likely to provide another 400 MLD of water in the region. Hence there will be an additional requirement of 1245 MLD of water by 2026 and 3142 MLD of water by 2036. The Chitale Committee Report identified potential sources of water for development as given below. It also recommended projects to be developed in future along with timelines.

1) Zone 1:

The current deficit of Greater Mumbai is 1142 MLD. The Chitale Committee Report has identified and recommended the construction of Middle Vaitarna, Pinjal, Gargai, Shai, Kalu, and Damanganga dams for this zone. The middle Vaitarna project was funded through JNNURM and was completed in 2014. It is providing around 455 MLD of water to the zone. Population projections and the growth trends indicate that the city will show decreased growth rate. The dam on Damanganga River is being built by the National Water Development Agency (NWDA) and the Central Water Commission (CWC), through the river interlinking project, which would transfer water to the Pinjal dam. MCGM is in the planning stage of developing the Pinjal (yielding 1250 MLD) and Gargai Dam. Approx. 440 MLD from Gargai and 700 MLD from Pinjal would be able to suffice the needs to MCGM till 2036. The remaining water from Pinjal could be allocated to Zone 2 (Mira Bhayander) and Zone 3 (Bhiwandi Tehsil).

2) Zone 2:

The current water deficit is 308 MLD which is expected to increase to 1159 MLD in 2036. Dams on Susari, Pinjal and Surya Rivers are allocated for the future requirements of the zone. The total water available from Susari and Surya would be 318 MLD. The remainder of 841 MLD would need to be taken from Pinjal. According to the current proposal around 100 MLD to VVCMA and 218 MLD to MBMC is allocated from Surya Dam. This results in total drawl of 418 MLD from Surya. The current combined domestic and Industrial water reservation in Surya is 366 MLD. This means that another 52 MLD will have to be diverted from the irrigation allocation. However, if the Pinjal Dam is built and 442 MLD of water is allocated to Zone 2, the irrigation water from Surya will not be needed. In such a scenario, 52 MLD from Surya (Kawadas Weir) and 195 MLD from Susari dam would suffice to meet the water demand of Zone 2. The Surya project is expected to cost Rs. 1110.68 crores as per the DPR prepared in 2013.

3) Zone 3:

Currently has a water deficit of 51 MLD which will increase to 982 MLD by 2036. The Chitale Committee Report has identified Poshir as the source of water for this zone. The extension of Barvi can supply around 150 MLD of water to this region. The Gargai and Pinjal dams are being planned and developed by MCGM. MCGM is supposed to undertake source development with 50% funding from MMRDA and 50% self-funding. This would mean that there would be a dependency of the other ULBs on MCGM on water. A separate source for Zone 3 will still be required to meet the remainder 830 MLD water requirements of this zone. This can be met by the development of the dam on Kalu River which can yield up to 1316 MLD of water. MMRDA has carried out the feasibility study and DPR for the dam on Kalu River. The estimated cost of the dam is 940 crores, out of which Rs. 800 crores is estimated to be the cost of source development. The cost of conveyance and distribution is estimated to be Rs. 1200 crores each. Rs.110 crores has already been invested. The project started in March 2011 and was stalled in 2012. Hence the Kalu dam project needs to be given the required momentum. In this case, the development of a dam on Poshir will not be needed for the water requirements till 2036.

4) Zone 4:

Has water sufficiency till 2021. The per capita consumption of water is comparatively high in this zone. However the zone will require 822 MLD of additional water by 2036. This requirement can be met

by allocating 522 MLD of water from the dams being built on Balganga and Kondane rivers by CIDCO. Additional 300 MLD could be supplied from the Barvi dam.

5) Zone 5:

Currently has a deficit of 13 MLD which is likely to rise to 36 MLD by 2036. The Chitale Committee Report has identified Gadhi River as the source of water for this zone. If the dam on Kalu River is built, the water lifted from the Shahad Temghar Waterworks could be reduced, and the Ulhas River will be able to provide the required 36 MLD of water to zone 5 without having to invest in a separate source development.

6) Zone 6:

Currently has a deficit of 27 MLD. The region owing to the formation and development of the SPA areas like NAINA and Khopta would see a higher water demand. It is estimated that by 2036 the Zone would require 195 MLD of water. CIDCO has identified Kondane as the source of water for the region, which would yield around 320 MLD of water for non-irrigational use. The dam across the Balganga will have a total yield of 400 MLD, of which 200 MLD will be required for Zone 4. If 200 MLD of water allocation is made from the Balganga to Zone 6, then water from Kondane would not be required till 2036.

7) Zone 7:

Currently has a deficit of 2 MLD which will rise to 8 MLD by 2036. The Hetwane dam has been identified as the source of water for this zone. However, the deficit can be covered by developing the Balganga source. There would be costs involved in conveyance and distribution.

8) Zone 8:

Has a current deficit of 9 MLD which will increase to 40 MLD by 2036. The Amba River has been identified as a source of water for this zone. Although the Balganga dam has the potential to provide water for this zone till 2036, it is suggested that the water requirements should be met by the source at Amba (Nagothane). This is because bringing water from Balganga to Zone 8 (Alibag Tehsils) would incur costs in treatment and conveyance.

Table 85: Identified Potential Sources of Water

No.	Proposed Dams	Gross Storage	Live Storage	Water allocation for Drinking Water Supply	Water allocation for Industrial use	Water Allocation for Irrigation	Source
1	Damanganga	1600					
2	Pinjal	1364.81	1200	865		50	
3	Gargai		440	440			
4	Susari		220.18	151.80	42.90	25.48	WRD
5	Kawadas Weir		51.81	51.81	0.00	0.00	WRD
6	Deherji	315.48	307.63	46.16	30.78	207.94	
7	Extension of Barvi		561	448.8	112.2	0	WRD
8	Kalu Dam		1316.50	858.00	353.10	105.40	WRD
9	Shai Dam		1166.25	1049.63	116.62	0.00	WRD
10	Poshir						
11	Kondane		341.62	326.07	0.00	15.51	WRD
12	Balganga		396.23	396.23	0.00	0.00	WRD
	Total In MMR	1680.29	5561.22	3328.50	655.60	404.33	

Source : Chitale Committee Report, 2005

The following short term and long term strategies are envisaged:

- a) **Water Projects:** Augmentation of water sources is needed to satisfy immediate gaps in water supply in the region especially in VVMC, BNCMC, MBMC, Panvel, Uran, Khopoli councils and in rural MMR.

- A few key projects need to be realized viz. Pinjal, Gargai, Barvi extension, Surya, Susari, Kalu, Balganga, Amba to meet the existing and future water requirements of MMR
 - Some reallocation and sharing of water across existing water zones is necessary to achieve greater efficiency.
- b) **Surface Water Bodies:** This is a water resource rich region that receives average rainfall of 1393 mm with 67 rainy days. It records a max rainfall of 548 mm in 24 hrs.
- This water needs to be effectively utilized and stored through
 - the creation of city-level holding ponds that should be planned in all municipal areas (at appropriate locations at the base of hilly outcrops, in valleys);
 - the protection and maintenance of the 2500 existing ponds and wells in the region to serve as drinking water sources;
 - Studies need to be commissioned towards understanding the hydrology of these ponds, so that regional watersheds and aquifers can be protected and nurtured. This is an essential long-term strategy.
- c) **Reducing water demand:** In view of the impending water stress that the country is headed towards, it is imperative to reduce urban water demand by various measures:
- work to reduce water losses in conveyance and distribution,
 - introduce higher water taxes to curb demand,
 - institute mandatory water harvesting measures,
 - introduce dual piping systems to segregate grey and black water and recycle water for non-potable uses at all scales.
 - Adopting flush that uses less water
- d) **Regional Water Source Development Agency:** To enable efficient water source development, allocation and distribution, a regional agency that plans and allocates water in the region is necessary who coordinates and distributes resources to multiple ULBs.
- e) **Irrigation needs of rural agriculture:** Micro irrigation projects need to be urgently undertaken in the rural areas of MMR that are agriculture dependent rain-fed underdeveloped areas could transform into highly productive horticultural zones providing essential fruits and vegetables to the metropolitan region.¹

5.9.2 Sewerage

The environmental health of our water systems and the health of future generations² are inextricably linked to better sanitation systems. The total amount of sewage to be treated in MMR is estimated to increase to 6545 MLD³ by 2036. Towards this estimated demand, by 2036 the total capacity of sewage treatment plants in MMR would be 5609 MLD through augmentation of the existing capacities of STPs and construction of new STPs. Keeping in view the nature of demand, the resources at hand and the environmental setting of MMR, the following short term and long term strategies are envisaged for sewerage systems in the region:

a) **STPs and network augmentation:**

- A number of proposals are currently underway to treat the current gap in sewerage treatment in all the municipal corporations in MMR and in the major municipal councils of Ambernath, Kulgaon Badlapur and Panvel.

¹ These could be developed under the 'Vegetable initiative for Urban Clusters' (2011) of the Rashtriya Krishi Vikas Yojana.

² Latest research has firmly linked lack of access to sanitation as causing malnutrition and stunting the physical development of children without access to sanitation. Spears, D. "The nutritional value of toilets: How much international variation in child height can sanitation explain?" (<https://d3gxp3iknbs7bs.cloudfront.net/attachments/902b86b5-eb72-4f97-9a72-aa4f758be1aa.pdf>, accessed July 30, 2015)

³ The projected sewage generation is calculated by assuming the quantity of sewage as 80% of the total water supplied by the ULBs per capita per day. I.e. 80% of 8181 MLD.

- For the future population projected for 2036, sewerage treatment and network distribution will have to be augmented in phases in Mira Bhayander, Bhiwandi and Vasai Virar corporations along with the SPA areas depending on their population growth.
- b) **Slum Areas:**
For all slum areas, sanitation provision is necessarily a combined package with housing solutions. Till that is achieved, the needs of slum dwellers will have to be addressed through public toilets that need to be well managed and maintained considering that they serve larger numbers of people. This is extremely important since slums house nearly half of the population in Greater Mumbai and Thane and constitute 28% of MMR.
- c) **Fiscal incentives for sustainable wastewater management:**
Water availability is necessary for ensuring sufficient flows and effective sewage treatment.
- It is imperative that recycling of grey water⁴ is made mandatory so as to reduce water demand and so that the per capita supply of potable water could then be increased. Bifurcation of sewage and sullage (black water and gray water), on-site treatment and re-use of sullage in all large residential, commercial complexes and new constructions should become mandatory.
 - Compliance can be encouraged by a rebate in property taxes for those who comply and penalties for new buildings which do not. The cost of such rebates could be a fraction of the cost needed to transport and effectively treat this water at a centralized location.
 - State Government may consider providing liberal tax rebates for institutions/industries adopting recycled waste water to compensate for the cost involved in treating waste water for recycling.
- d) **Recycling and Irrigation:**
Emphasis should be given to development of 100% treatment capacity up to secondary level of treatment and diversion of treated sewage for its utilization in irrigation of crops in ULBs where there are agricultural lands nearby. Treatment of domestic sewage and subsequent utilization of treated sewage for irrigation will help prevent pollution of water bodies, reduce the demand for fresh water in irrigation sector and result in huge savings in terms of fertilizers given the high nutrient value of sewage.
- e) **Waste-water minimization and decentralised local systems:**
- About 80% of fresh water consumed goes out as waste-water, and 80% of this is gray water (from bathing and washing) which is easily re-used for gardening and only the 20% black water needs treatment. The low cost of treating such small volumes can be easily spread among the various units in an apartment or commercial complex. Construction of small STPs needs to be encouraged for groups of residential and commercial complexes.
 - Highly treated waste water from these small STPs could be reused for recharge of lakes or other purposes.
- f) **Alternative measures could be adopted:**
- A range of alternative measures for treating waste water are available which could work well in MMR. Eg. construction of 'green bridges'⁵, near nallahs to help clean polluted streams like those that crisscross most of our cities, decentralized natural treatment systems and constructed urban wetlands, energy generation from sludge digestion or gasification.
 - Studies could be commissioned to study the feasibility and the scalability of these solutions.

⁴ all waste water generated in homes or offices without fecal contaminants generated from hand washing, laundry and bathing

⁵ (Green Bridge - This technology uses filtration power of biologically originated cellulosic/fibrous material with the growth of green plants. A simple but very good filter is developed from fibrous material like coconut coir to form a bridge/porous wall-like structure strengthened by stones and sand. It's useful for nallas, odhas, and rivers. [2])

5.9.3 Solid Waste

Future demand: It is estimated that by 2036, the Municipal Solid Waste generation will be 15,002 TPD⁶. 99% of which will be generated by urban areas i.e. Corporations, Councils and SPA. The total cumulative Municipal Solid waste generated till 2036 is estimated at 10.08 Cr. Tonnes. This would effectively translate into an area requirement of 6.85 sq km in area for the regional landfill site⁷.

Considering growing future need, the following long term and short term strategies are proposed:

- a) **Municipal Solid Waste:** Though each ULB in MMR,(in keeping with MSW Rules 2000), has identified a solid waste disposal site, with the exception of NMMC, none of the ULBs has so far developed a Sanitary landfill site for scientific disposal of MSW. Greater Mumbai,Thane Kalyan –Dombivali corporations and smaller councils like Matheran, Alibag and Khopoli have developed bio-methanation plants for hotel and vegetable waste. MCGM is also in the process of adopting Bio-Reactor technology for its bio-degradable waste. Given this situation, the following is proposed :
- Apart from the Regional Landfill (RLF) site of 126 Ha at Taloje being developed by MMRDA for 7 ULBs in the region, if minimum treatment of waste is assumed, four additional regional landfill sites of 150 ha each will be required in the region. If maximum waste treatment is assumed then only two additional Regional landfills of 75 ha each will be required for future needs of ULBs.
 - Existing dumping sites are used for sorting and segregating waste.
 - There is need to adopt an integrated system at local and regional level which can cater to mixed Municipal Solid Waste, considering that land availability is a major issue in ULBs. Such integrated waste treatment plants along with recycling and C& D waste plants should be installed in current MSW sites of ULBs.
 - Segregation at source and local level treatments are to be made mandatory to reduce load on RLFs of Municipal Solid Waste. For the treatment of MSW, the use of RDF or bio-reactor should be encouraged. To reduce waste reaching landfill site, it is essential to consider mandatory community level vermi-composting plants, bio-methanation projects for hotels, vegetable markets etc at local level. These could be encouraged through tax breaks.
 - Financial support could be extended to ULBs for mechanical segregation, developing plants and landfill sites for municipal solid waste.
- b) **C&D waste:** Three regional level C&D recycling facilities located in Northern area of MMR and 11 integrated /RDF plants are proposed for management of Municipal Solid Waste of MMR. The RDF plants are proposed on existing Solid Waste reservations in ULBs.
- c) **Bio Medical Waste:** Two more Bio-Medical Waste installations in one in CIDCO area and other in the North of MMR are proposed considering future needs, transportation distance and need to reduce incinerator run time of the existing plant.
- d) **E-Waste:** Three integrated facilities for E-waste management in MMR are under consideration, according to MPCB. However, before developing them, a detailed study needs to be undertaken to inventorise E-waste to understand the type of waste, its generation and the technologies of processing and treatment needs to be undertaken so as to have an appropriate management solution for E-waste.
- e) **Waste Minimization, Recycling and Recovery of Resources:**
- i) In view of the limited availability of land for use as landfill sites, zero waste policy should be adopted for MMR.

⁶ Appendix: Estimate of Solid Waste Generation for MMR 2036

⁷ Assuming 100% of the biodegradable and 50% of the compostable and recyclable waste is sent to landfills without any recycling

- ii) The practices of 4 R's i.e. Reduce, Reuse, Recycle and Recover should be adopted as a policy at the regional, sub-regional and the local body levels and made mandatory
- f) **Inclusion of Informal Sector:** The informal sector participation in our system of rag pickers, door to door collectors, etc. who currently are the recyclers in our context should be integrated into the system.

5.10 Environment

The environmental resources of the region provide an opportunity to work as a sink to help mitigate flooding risks and increase the region's resilience towards climate change effects like water scarcity or sea level rise. The environmental resources in MMR are currently overstressed due to pressure from urbanization. A series of strategies are envisaged with a view to conserve existing resources, create a much needed open space network in the metropolitan area and create an integrated green and blue web across the region; promote infrastructure systems like public transport that will actively mitigate environmental pollution and help transform and augment existing natural systems. They include projects, zoning, DCRs and policy interventions.

5.10.1 The Plan proposes to adopt five strategies to connect and create a network of water and green areas across the region.

1. The large and important river corridors are identified and it is proposed to have stretches of land reserved as green corridors along the identified river banks.
2. The region has large green areas like the Sanjay Gandhi National Park and the Tungreshwar Wildlife Sanctuary; the Parsik hills, the Matheran Eco-Sensitive Zone, the Karnala Wildlife Sanctuary; the Kankeshwar hill and the Sagargad region. An attempt is made to connect these large greens by identifying land pockets for plantation and afforestation. Consideration is also given to connect the greens in the region to the large greens that are on the periphery and outside the region. These connectors serve the purpose of seamless continuity of a green corridor for movement of fauna in the region. At the same time, it will reduce the environmental degradation, channelize the urbanisable areas and also serve as lungs to the developed areas.
3. Greenways along roads connecting important green areas to the rivers and creating cycle tracks along roads connecting important recreational places and places having tourism development potential.
4. Certain heritage sites having regional significance are identified along the corridors. These sites are proposed to be promoted as regional heritage sites. Sites which are not directly connected to heritage are connected through green ways or other provisions.
5. Certain villages form base for trekking, other adventure trails and other tourism activities. Such villages are proposed to be identified where basic facilities required for tourism can be augmented. A few such villages are identified and listed.

The above five strategies are detailed out below:

a) **River Corridors:**

These projects are envisaged to serve several objectives- to ensure a riverine buffer that would help propagate biodiversity in the riparian belt, check water pollution, act as a flood control measure, provide a major recreational space, enable riverfront tourism along the river and activate water transport. These river corridors would help connect proposed regional parks and areas of heritage value. Edge interventions are proposed which would include uninterrupted green corridors, controls through urban design guidelines and provision of critical infrastructure and amenities.

- **The Ulhas River Green Corridor Project:** The Ulhas river traverses the length of MMR and is an important connector of all the major regional greens in the region viz, Matheran, Parsik Hills, Sanjay Gandhi National Park and Tungreshwar Wild Life Sanctuary. The Ulhas River and stretches along its tributaries Bhatsai, Kamvadi and the Barvi have been considered in this project. The project is proposed with several objectives: for a majority of MMR cities along

the Ulhas river viz. Badlapur, Ulhasnagar, Kalyan, Dombivli, Bhiwandi, Thane, Mira Bhayander, Vasai Virar, this river could serve as an important open space resource and as a flood control measure.

- Gadhi River Project: Connects Gadhi dam to Panvel Creek – potential to provide recreational green to Panvel city
- Patalganga River Project
- Urban creeks have a major role in the health of rivers and need to be appropriately addressed within cities through appropriate technologies. Watercourses like the Waldhuni nallah, Kharghar nallah and nallahs in Mumbai need focused attention.

b) Regional Parks:

Several regional parks are envisaged based on specific site context and regional significance around areas rich in biodiversity and of heritage value. These include:

- Kharbav Regional Park
- Lonad Regional Park
- Regional Park near Matheran

These parks could be developed as regional open spaces, accordingly their specific context near heritage sites, near biodiversity areas and could help create regional scale facilities like zoos, archaeological museums etc. Several other local and city level parks could also be developed around Vasai Fort, geological features in Uttan, Thana Creek Mangroves, Uran birding sites, Kankeshwar Temple, Sagargad Fort, Pandvakada Waterfalls, Bhatsa Hills Regional Park .

c) Green Connectors:

Contiguous notified forests that are not currently forested are proposed to be afforested so that large regional forests and greens get connected. These connectors serve the purpose of seamless continuity of green corridors that would enable movement of fauna in the region.

d) Quarry Site Restoration Projects :

Specific exhausted quarries like sections of the Parsik Hills, quarries in Ambernath and Kalyan (as indicated in the Environmental Proposals map) and Matheran have the potential for being developed as large urban greens and could also be combined with water harvesting, agriculture, habitat creation and provision of social amenities.

e) Grey to green infrastructure projects:

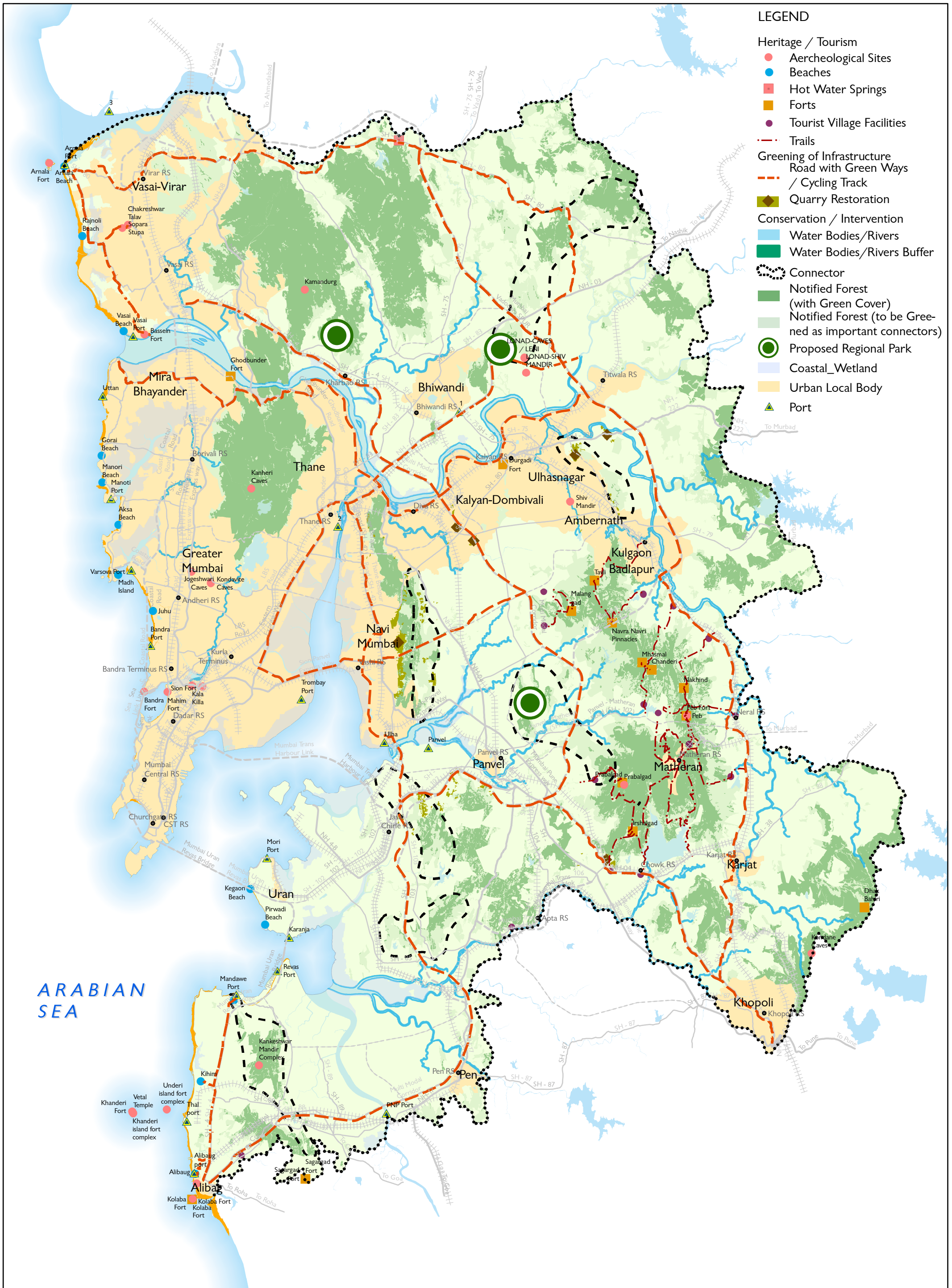
- Landfill sites: All landfill sites in the ULBs in MMR which are nearing closure should be proactively greened and their potential for public open spaces maximized. The Adharwadi solid waste ground in Kalyan and Deonar dumping grounds could be priority projects for such action.
- Greenways – Certain roads have been identified along regional roads and city roads on the basis of their connections to sites having tourism/recreational potential or because they serve as connectors to regional greens. These are to be developed as ‘greenways’ which would be provided with cycle tracks, special urban design guidelines and signage controls. These would also provide important green linkages between large regional greens These include the proposed MMC (Alibag to Vasai Virar), new proposed Ulhas river road connecting Mira Bhayander to Ulhasnagar, road connecting Arnala to Agashi to Vajreshwari, internal city road from Vasai fort to Sopara Stupa to Arnala beach, Old Mumbai Pune highway from Panvel to Khopoli (NH4)

f) Heritage sites:

There are several heritage sites in MMR that could be integrated with the blue-green network both at the regional scale and at city scale. The prominent sites include Lonad caves, sites in Vasai Virar, Ashoka Stupa, Arnala Fort, Akloli Kund, Kanheri Caves, Forts in Central Mumbai, Elephanta, Kandheri-Undheri Forts, Ambernath temple and Matheran forts- Prabalgad, Malangad, Peb.

g) Villages currently having tourism potential:

Fishing villages with good access to beaches, villages around major cultural sites, and those serving as hiking base currently can all be promoted. The hiking base villages could be part of an environmental tourism circuit, boost local economy, securing trails, securing heritage vistas,



LEGEND

- Heritage / Tourism**
- Archeological Sites
 - Beaches
 - Hot Water Springs
 - Forts
 - Tourist Village Facilities
 - Trails
- Greening of Infrastructure**
- Road with Green Ways / Cycling Track
 - Quarry Restoration
- Conservation / Intervention**
- Water Bodies/Rivers
 - Water Bodies/Rivers Buffer
 - Connector
 - Notified Forest (with Green Cover)
 - Notified Forest (to be Greened as important connectors)
 - Proposed Regional Park
 - Coastal_Wetland
 - Urban Local Body
 - ▲ Port

managing the volumes of hikers/adventurers, and guided activity as part of larger management plan of Matheran Eco-sensitive Zone.

5.10.2 Zoning

Areas that need conservation have to be kept out of the ambit of urbanization. Forests, wetlands can be zoned distinctly as conservation areas.

5.10.3 DCRs

- Slopes more than 22.5% are considered steep slope and should not be taken up for development. Most of these slopes are observed in protected areas and are not be considered as part of the developable areas.
- Irrigation Command areas and areas of high agricultural productivity need to be protected and kept out of the ambit of urbanization
- River Buffers and heritage buffer areas should have regulated development
- DCRs should be written with environmental guidelines for climate conscious buildings (water harvesting guidelines, solar water heating, etc.) and material specifications to prevent urban heat island effect, and for site control so as to reduce surface run off and increase soil permeability
- Recreational Feasibility studies are needed to determine watershed extent and aquifers, so that they can be adequately protected and water harvesting measures undertaken in future. Feasibility studies to finalise all the above projects listed need to be commissioned.

The environmental proposals are indicated on Map no. 42.

5.11 Regional Information Systems for Planning and Action Research

Planning in the absence of appropriate data is an issue in MMR. The issues related to information are jurisdictions for which data sets are available, parameters covered, periodicity of coverage as related to other data sets, timing of availability of data, ease of access to data, and authenticity. For effective regional planning, development and for monitoring its performance, information will be required in the areas of population characteristics, employment, economic growth, spatial development trends, infrastructure adequacy and investments, institutional arrangements for planning and development of the region, housing supply and demand, real estate trends and environmental parameters. Information pertaining to the above vital aspects on a periodic basis was also discussed in the RP of 1996. While the requirement was felt and highlighted in the RP, establishment of the institution did not take place. The current state of affairs in MMR in this context is indicated in the Annexure enclosed.

Establishment of a Regional Information System for MMR is presently under active consideration. Discussions are being held with various national and international institutions established similarly and a concrete proposal is expected to be pursued after submission of the RP. Such an institution can even serve requirement of the region beyond regional spatial planning and development; and can also undertake studies and research covering all aspects of MMR. The institution can take the shape of a regional laboratory for information systems, regional research and also address regional training needs.

Establishment of the system will require needs assessment and institutional arrangement to start with and then identify roles for various institutions and establish protocols for information gathering, storage and dissemination. The Lab can serve the needs of all government agencies operating in the region and provide authentic data for facilitating market research as well.

Table 86: Current state of affairs of Regional Performance Indicators

No	Features that need to be captured in RIS	Current state in the context of MMR
1		Spatial development trends
	<ul style="list-style-type: none"> • Development permissions granted by various Planning Authorities • Compliance with statutory plans • Land-Uses on ground • Population and job densities • Spatial distribution within region • Availability of infrastructure 	<ul style="list-style-type: none"> • Developments in MMR are in its 17 cities and 1000 villages. Those in the rural areas are concentrated around the village settlements, along the transportation corridors and near scenic areas. Most people living in the rural parts of MMR still work in cities. In 2011, 94% of MMR's population of 22.8 million lived in the 17 cities and 35 Census towns. • Regular receipt of • Many special schemes with high density for residential and industrial development are permitted in rural areas. They take long time to come up due to land purchase negotiations. • While many developments are compliant with the permitted land-uses, some come up without permissions and then seek regularization. • There is no statutory time frame or institutional responsibility fixed for infrastructure development in rural part of MMR hence the high density development coming up can't be serviced adequately.
2		Infrastructure
	<ul style="list-style-type: none"> • Institution-wise Proposals • On-going works • Modes of execution • Costs and timeframes 	<ul style="list-style-type: none"> • MMRDA is a dedicated institution for the development of MMR, but many institutions provide infrastructure such as roads, railways, electricity, storm water drainage, water supply, and sanitation services. • These institutions operate at municipal, state and federal levels. • Each institution has its own vision for future, annual budgets, programmes and projects. • It is very important to understand the overall regional requirement and channelize these programmes. • Such data must be available on a continuous basis
3		Environmental parameters of air, water, soil, vegetation, precipitation and temperature
	<ul style="list-style-type: none"> • Spatial distribution, adequacy and location of monitoring stations • Institutions collecting data • Parameters covered • Periodicity, regularity and authenticity • Accessibility 	<ul style="list-style-type: none"> • The Central and State Pollution Control Boards, the Ports, Municipalities, Irrigation dept., Indian Met Dept., and industrial estates are presently generating data on regular basis. • More than 150 air quality monitoring stations are available in MMR. However as they are operated by different institutions that use different protocols, it does not provide cohesive and trust-worthy picture. • It is observed that precipitation and temperature are rising and their impacts are under study at the moment. • Of the RIS, the environmental info is the most important to collect and monitor.
4		Economic growth indicators such as GDP, per capita and household incomes, infrastructure, industries, bldg. construction
	<ul style="list-style-type: none"> • Sources of information, authenticity, periodicity • Sample or census • Appropriateness of level at which info is available • Spatial and sectoral trends in jobs, turnover, sectors 	<ul style="list-style-type: none"> • The main sources are the Directorate of Economics and Statistics, and Census of India. Census does not recognise MMR as a unit for compiling data. While the Directorate provides soft data, Census does not provide the same, for the regional compilation to be done. • Economic Census and Population Census provide employment data at place of residence and place of work respectively but the timing and type of employment enumerated is not the same. • GDP data is available only at district level and MMR consists of part districts making it necessary to use full district data which does not adequately reflect the regional scenario. Due to inflation, constant adjustment is necessary. • Industrial data is elaborate on employment but not on turnover • Data on infra investments is also weak • Most of the available data is compiled and analysed
5		Property values
	<ul style="list-style-type: none"> • Source, adequacy and authenticity of data • Generation of contours 	<ul style="list-style-type: none"> • Maharashtra has a system of annual fixation of property values which is very helpful as a guide

No	Features that need to be captured in RIS	Current state in the context of MMR
	<ul style="list-style-type: none"> • Household incomes versus property prices 	<ul style="list-style-type: none"> • A property based tabloid provides fortnightly property prices across MMR and this information is already compiled for many years • Market research institutions do not provide reliable data • Rental data is not adequately available • Data on employees housing is not easily available even for large public sector organisations such as defence, railways, ports and banks • Demand and supply of housing units is not easily available. • Development permission data, if sourced, can be used for this purpose
6		Institutions engaged in its planning and development
	<ul style="list-style-type: none"> • Institutions responsible for planning and infrastructure development 	<ul style="list-style-type: none"> • About 40 institutions are involved in planning and development control, and even more in providing infrastructure. • Their listing, budgets and programmes are compiled on need base, but a constant flow of information will be useful to critically examine their overlapping/complementary/conflicting roles

6.0 Strategy for Implementation and Monitoring

- 6.1 Implementation through Statutory Provisions
- 6.2 Modifications to the Development Plans
- 6.3 Implementation through Projects
- 6.4 Implementation through State Interventions
- 6.5 Costing and Prioritization of Plan Proposal

CHAPTER - 6

STRATEGY FOR IMPLEMENTATION AND MONITORING

6.1 Implementation through Statutory Provisions

Land use Zoning

- a. 32% area is under ULBs, 30% is under SPAs, and the remaining 38% of the Region will be under direct land use and development control as per the provisions of the Regional Plan, 2016-36.
- b. Urbanisable Zone which is non-municipal will be developed through intensive development with urban extensions, creation of new economic and employment opportunities in Growth Centres; Green zone with low rise low density as a transition area between forest and urbanisation; railway station areas and areas around village settlements for intensive development due to accessibility and infrastructure.

6.2 Modifications to the Development Plans

ULBs and SPAs have to review and reconcile their sanctioned and on-going development plans to conform to the Regional Plan. All major RP proposals including roads passing through ULBs and SPAs that need reconciliation are as under:

Modification to Land Use Zoning

- a) Not all areas under SPAs are under U zone of the Regional Plan (since zoning for Urbanisation was based on trends and population projection and environmental considerations). Parts of SPA areas are also zoned as green G1 and G2 where lower intensity of development is expected during the Regional Plan period
- b) Sanctioned Development Plans of Vasai Virar and Thane need amendments to accommodate proposed regional growth centres and industrial zones. Similarly, DP of MBMC may need revision to accommodate its own projected population.
- c) Development Plan for NAINA needs to take cognizance of the Regional Plan provisions

Table 87: Modification to Development Plans in view of Proposed Regional Transportation Network

Sl. No.	Proposed Roads	Cities/Towns where DP amendment may be necessary	Remarks
1	New bridge across Vasai creek	MCGM, MBMC and VVCMC	Appropriate modifications to the Development Plans of ULBs and SPAs needed
2	Proposed bridge from proposed Bhiwandi northern bypass to Ghodbunder road across Vasai Creek	TMC	
3	Vadodara Mumbai Expressway spur	KDMC and KBMC	
4	proposed NH3- MMC link road (Padgha-Ambernath-Taloja)	NMMC, NAINA, AKBSNA and Navi Mumbai	
5	Proposed Virar-Alibag Multi Modal Corridor (MMC)	VVCMC SPA, BSNA, KDMC (27 villages), AKBSNA, NAINA, Navi Mumbai, Khopta New Town	
6	Taloja Vashi Link from MMC to Thane Belapur road	Navi Mumbai, NMMC, AKBSNA, NAINA	
7	New Thane creek bridge connecting JVLR to Koparkhairane	MCGM and NMMC	
8	Dronagiri to Wadkhal via Dadar village	NAINA	

6.3 Implementation through Projects

- a) Transportation Projects
- b) Development of Growth Centers through TPS or other appropriate models
- c) Extending support to Industrial Development
- d) Establishment of Local Development Centres
- e) Environmental Proposals (Blue-Green network, Regional Parks, Heritage Tourism)
- f) Establishment of RIS as a project

6.4 Implementation through State intervention

- a) Land for implementation of projects
- b) Creation of Land banks for housing and regional infrastructure
- c) Extension of Municipal Boundaries and notifying new municipalities
- d) Development of LDCs (convergence of Govt. Schemes, transfer of govt. land, establishment of Joint Committees)
- e) Directives to other Planning Agencies to undertake necessary modifications in their Development Plans
- f) Govt. support for resource generation, legal support to set up Regional Development Fund
- g) Directives to concerned agencies (Census, DES), to share data at MMR level and directions to ULBs and SPAs to share data to enable comprehensive building up of RIS
- h) Policy interventions: i) Vacant tenements tax ii) employee housing iii) rental housing easing up iv) Common DCRs for Municipal Corporations in MMR

6.5 Costing and Prioritisation of Plan Proposals

The Regional Plan includes Land use proposals, Economic Development, Environmental and Transportation proposals. Sector-wise total investment required for implementation of the major proposals as well as the investment required in the next ten years is given in Table 88 below.

Table 88: Total Sectoral Investment Requirement

Sl. No.	Description	Total Cost in Rs. Cr.	Investment requirement during 2016-26 (Rs. Cr.)
A. Transportation			
1	Roads and Bridges	79,370	35,520
2	Railways	12,500	6,000
3	Terminals (Rail, Bus, Truck)	5,629	1,000
	Total	97,499	42,520
B. Physical Infrastructure			
1	Water Supply	5,500	2,750
2	Regional Solid Waste Management	1,000	200
	Total	6,500	2,950
C. Environment Improvement			
1	Regional Parks	1,000	600
2	Theme Parks	30	20
3	River Bank Improvement	450	250
4	Afforestation	7	7
3	Air Quality Monitoring Stations	35	24
	Total	1,522	901
D. Rural Development			
1	Local Development Centre	290	200
2	Development of Tourist Villages	15	15

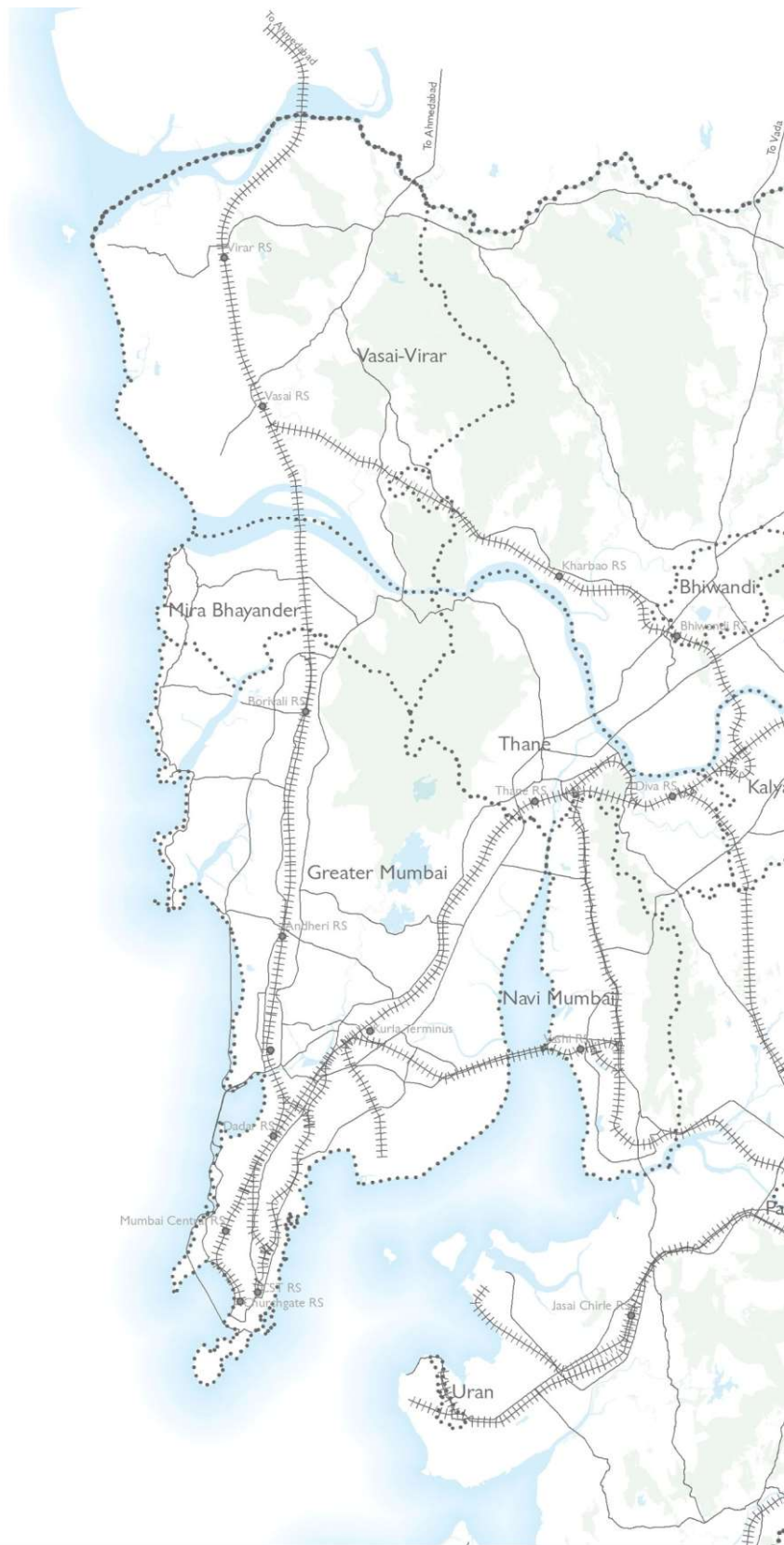
Sl. No.	Description	Total Cost in Rs. Cr.	Investment requirement during 2016-26 (Rs. Cr.)
	Total	305	215
	E. Growth Centres	9,000	4,200
	Grant Total	1,14,521	50,571

The costs estimated and presented in Table 88 are exclusive of the development cost of Ports, Airports and metro networks. The economic and environmental proposals will require the support of certain transportation proposals in order to be successful. Keeping this in view, a matrix has been worked out identify the priority transportation projects and the same is presented in Table 89 below. The prioritisation of transport network in Table 89 assumes that the projects on X-axis are all equally important.

Table 89: Prioritisation of Transportation Projects

Code	Road / Rail Corridor Name	Width (m)	Approximate Length (km)	Growth Centers				Industry						Port/Airport		Priority	
				Kharbav	Nilje	Vasai	Shedung	Amba (Pen & Alibag)	Khopta	Khalapur Industry	Taloja Industry Expansion	Sape, Bhiwandi	Angaon, Bhiwandi	Virar	Navi Mumbai International Airport		Rewas port
Road																	
H3	Multi Modal Corridor	100	129	•	•	•	•	•	•	•	•	•	•	•	•	•	1
H1	Mumbai Vadodara Express way	60	85				•				•	•	•	•			2
H6	Mumbai Trans Harbour Link	60	29				•	•							•		3
H8	Mumbai Uran Rewas Bridge	60	28					•	•							•	4
A1	Bhiwandi Northern Bypass	60	20	•							•	•					5
A17	Outer Ring Road : Khopoli-Jite-Rewas Port	60	20				•	•								•	6
H2-A	Dahisar Naigaon Road (Vasai creek bridge)	60	16			•								•			7
H2-B	Naigaon-Shirsat road	60	20			•								•			8
H3-A	MMC extension to Naigaon	60	8	•		•											9
H4	Coastal Road	60	49			•									•		10
A19	Rewas Pen Road	45	7				•									•	11
H9	Rewas Alibag Coastal Road	60	15													•	12
H10	Kaman-Kharbao road	60	5	•													13
A15	MTHL-New Airport Road	60	9												•		14
A13	Taloja MMC Link	45	2							•							15
A2	Thane Creek Road	45	14	•													16
A3	Amane-Ambernath Road	45	22								•						17
A6	Kalyan Ring Road	45	23		•												18
A8	Thane Dombivli Road	45	7		•												19
A10	Radial - 4 Airoli - Katai Road	45	12		•												20
A11	Kanjurmarg- Koparkhairane Bridge	45	8		•												21
A16	Uran Bypass	45	2					•									22
A5	Mankoli Dombivli Road	30	4		•												23
A12	Vashi Ambernath Road	45	26							•							24
A14	Panvel-Neral-Bhimashankar Road	45	14														26

Code	Road / Rail Corridor Name	Width (m)	Approximate Length (km)	Growth Centers				Industry						Port/Airport		Priority
				Kharbav	Nilije	Vasai	Shedung	Amba (Pen & Alibag)	Khopta	Khalapur Industry	Taloja Industry Expansion	Sape, Bhiwandi	Angaon, Bhiwandi	Virar	Navi Mumbai International Airport	
	Total		574													
New Suburban Railway Lines																
1	Chowk-Apte Rail		9				•			•						1
2	Thane-Bhiwandi Suburban Extension		10	•												2
3	Jasai-Pen Suburban Extension		19					•								3
4	Pen-Alibag Rail		18				•									3
5	Navi Mumbai-Uran suburban extension		14					•								2
	Total		70													
Proposed Suburbanisation of Railway Lines																
1	Panvel - Diva - Vasai-Virar		75	•	•	•				•						1
2	Panvel - Karjat-Khopoli		41				•		•							2
3	Panvel - Wadkhal		49				•									3
	Total		165													



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