

DRAFT DEVELOPMENT PLAN - 2034
GREATER MUMBAI



REPORT ON
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DRAFT DEVELOPMENT PLAN 2034





महापौर, मुंबई

स्नेहल सूर्यकांत आंबेकर

महानगरपालिका सभागृह,

महानगरपालिका मार्ग, सी. एस. टी., मुंबई - ४०० ००९.

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आंतरराष्ट्रीय दर्जाचे शहर म्हणून ओळख असलेल्या आपल्या मुंबई शहरासाठी, आगामी २० वर्षांच्या कालावधीकरीता, बृहन्मुंबई महानगरपालिकेने 'विकास आराखडा २०३४' चे प्रारूप (ड्राफ्ट) तयार केले असून, ह्या आराखड्यामध्ये भविष्यातील मुंबई शहराच्या विकासाचे मूर्त स्वरूप आहे.

ह्या आराखड्याचे प्रारूप तयार करित असतांना, बृहन्मुंबई महानगरपालिकेने सध्या उपलब्ध असलेल्या जागेचा वापर म्हणजे 'भू वापर' नकाशा व आराखडा तयार करण्यासाठी केलेला पूर्वतयारी अभ्यासाचा अहवाल प्रसिध्द करण्यात आली व तत्संबंधात विचारविनिमयासाठी अनेक कार्यशाळा आयोजित करण्यात आल्या. पूर्वीचा विकास आराखडा व विकास नियंत्रण नियमावली, ह्यामध्ये मुंबई शहराच्यादृष्टीने योग्य असा नाविन्यपूर्ण दृष्टीकोन अंगिकारणे, आपल्या सर्वांच्या उत्तम प्रतिसादामुळे व सूचनांमुळे सहाय्यभूत ठरले आहे. मुंबईकरांच्या हिताच्या दृष्टीकोनातून सूचना व हरकती मागविण्याकरीता प्रारूप विकास आराखडा २०३४ प्रसिध्द करण्यात येत आहे.

सदर आराखड्यावरील सूचना व हरकतींवर विचार विनिमय करण्यासाठी स्थायी समितीच्या ३ सदस्यांची आणि राज्य शासनाच्या चार तज्ञ सल्लागारांची नियोजन समिती गठीत करण्यात येईल. सर्व नागरिक सहभागीदार, प्रतिनिधी, लोकप्रतिनिधी, अशासकीय संस्था, सहकारी गृहनिर्माण संस्था, शिक्षण तज्ञ, तसेच व्यावसायिक व्यापारी संस्था ह्यांना माझे असे आवाहन आहे की, आपण, मुंबई शहराच्या विकासाच्या दृष्टीने आपणापुढे प्रसिध्द केलेल्या ह्या प्रारूप आराखड्याचे अवलोकन करून आपले विधायक अभिप्राय सादर करावेत.

बृहन्मुंबई महानगरपालिका आपल्या सर्वांच्या सांघिक सहकार्याने, ह्या विकास आराखड्यास मूर्त रूप देण्यासाठी कटिबद्ध आहे.

महापौर

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दूरध्वनी निवास : २४४४ ९२९९, २४४५ ९०२०

SITARAM KUNTE

I. A. S.

Municipal Commissioner



No. :

Date :



Dear Mumbaikars,

We are pleased to present the Draft Development Plan 2034 of Greater Mumbai for your consideration and constructive suggestions. The draft Plan is a revision of the prevailing Plan that came into force during 1991-94. The revision is due after 20 years of sanctioning the Plan. The preparation of the existing plan that was for the period 1981-2001 began in 1977, draft was completed in 1984 and was finally sanctioned by the state government during 1991-94. We began the work of revision in 2011 and are now ready to present the draft Plan.

In preparation of this draft Plan we have followed different and innovative approaches, which could prove to be path breaking. I would highlight a few important features.

- Consultative Approach: The M.R.&T.P. Act, 1966 requires that the draft Plan once prepared be published for inviting suggestions and objections. Going beyond this legal requirement we adopted a consultative approach to preparation of the draft Plan itself. As a first step we published the Existing Land Use Plan and invited NGOs and citizens to review the plan and point out any inaccuracies. We then published the preparatory studies that brought out the issues and challenges of making the Plan. The gist of the Preparatory Studies was presented to the NGOs, academics and concerned citizens as also to the Corporators. Some of the NGOs very graciously organized thematic workshops to deliberate upon specific aspects of the Plan. Finally detailed presentations were made at very ward office to elicit relevant suggestions at the local level.
- Development Plan as a Broad framework: Realising that the long-term future of Mumbai and the pace at which change will occur is not predictable, we have made a Plan that is not deterministic and prescriptive. Instead we have envisaged the Plan to be a broad framework within which a "Competitive, Inclusive and Sustainable" growth could take place. With this in mind we have followed a flexible land use zoning that allows mixed use development with necessary environmental safeguards.
- Land for Public Purpose: In addition to proposing reservation of land for main public purposes, the Plan has proposed mandatory contribution of land to a pool of land for public purposes at the time of undertaking development. The land from this pool can be put to public use responding to the needs of local community in a participatory manner.

- Inclusionary Zoning: Provisions for inclusionary housing have been made to make it mandatory for plots above 2000 sqm to contribute 10% of the BUA in the form of dwelling units, shops or work places that can be used by the MCGM for rehabilitation of PAPs or for low income housing.
- Local Area Plans: As the Development Plan is seen as a broad framework, it is proposed to be followed by detailed local area plans. Some of the local area plans would be akin to urban design proposals for public realms. Some local area plans like those for large slum settlements or heritage precincts may involve detailed planning and regulations. We will build capacity to undertake such planning.
- Paradigm Shift in FSI Regime: FSI over the years has come to be seen as a panacea for many ills. FSI was seen as an instrument of containment of growth and density, as an instrument of achieving inclusive growth like slum and chawl redevelopment or as an instrument of promoting economic growth of tourism and IT/ITES. In fact restrictive FSI had created a scarcity of development rights in the market with its attendant ills of distorting the market, creating scope for rent seeking and excessively high real estate prices. Finally FSI was seen as an entitlement and many concessions were sought to avail of this entitlement. With the result that the time and cost of transacting development permissions has become a drag on the ease of "Doing Business" in Mumbai. We have therefore adopted a paradigm shift in defining the FSI regime in the draft Plan. The salient features are:
 - FSI is not seen as an instrument of limiting growth and density but as an outer envelope of built-space that responds to consumed FSI and location and accessibility attributes of sites. Transit Oriented Development has been proposed around important transit nodes.
 - FSI is not seen as an entitlement but a facility that could be availed of subject to other conditions being satisfied
 - FSI is composed of three layers – base, TDR and premium
 - Incentive FSI is offered in case of Slum Rehabilitation and Redevelopment of Cessed Buildings. Incentive varies with the relative cost of construction, price of land and residential property prices.
 - Use of TDR will relate to relative prices in originating zone and receiving zone.
- Development Control Regulations: With a number of additions since 1991 the DCRs had become a very complex document difficult of clear and unambiguous interpretation. In the draft DP we have attempted to consolidate and simplify the DCRs. Since FSI is not perceived as a panacea, it has been retained as an instrument of incentive only for slum rehabilitation and redevelopment of cessed buildings. Significant new additions refer to ensuring specific allocation for footpaths in the Right of ways (ROW) of roads, barrier free movement for the physically challenged and environmental sustainability of development. Moreover the DCRs are conceived not as a legal document but as an aid to the architects and developers to formulate their proposals. The DCRs are divided into two sets General Development Control Regulations (GDCRs) and Special Development Control Regulations (SDCRs). As and when detailed local area plans are undertaken, additions to SDCRs will take place.
- Implementation of Plan – Financing and Monitoring and Evaluation: The Plan has estimated the cost of implementation and means of financing. A Plan that is conceived as a broad framework will have to be closely monitored and evaluated at least every five years to see if any change in implementation or revision of the Plan itself is necessary. The Plan has included a schema of Monitoring and Evaluation. We

will build capacity and bring about procedural changes to effectively practice the monitoring and evaluation.

Last but not the least I must acknowledge the efforts and contribution of the consultant and the MCGM team in accomplishing this ambitious task.

I now appeal to all Mumbaikars to carefully see the report of the Draft Development Plan 2034 along with the Development Control Regulations and set of Proposed Land Use Plans and provide us with their valuable feedback, which shall be considered by the Planning Committee specially constituted for the purpose.

Hoping to work together for better Mumbai.

Yours sincerely,



Sitaram J. Kunte

Prologue



Preparing a long term development plan of a city as complex as Mumbai is, to say the least, a very challenging task. Most plans in the past, daunted by the population size have wished to contain growth. Authors of such plans have also implicitly assumed that they know the future of the city and have the means in the form of development control rules to reshape the future. If we retrospect it would be realized that we knew very little of the present twenty years back and we are unlikely to know the future twenty years hence. The limitations of town planners' tools – zoning, density and FSI – are also exposed with respect to shaping the future. In fact they have been the cause of market distortion and making it difficult for people to seek affordable shelter, and they have certainly not been the instruments of containing growth and densities.

In departure with the traditional master plan this draft development plan has been conceived as a broad framework that could respond to the future as it unfolds. It is therefore proposed that a two tier planning approach is followed. Development plan will be followed by detailed local area plans in more participatory fashion. The regulatory framework of the plan is designed to provide an outer envelope within which physical growth could take place to satisfy the spatial demand of the growth. The regulatory framework is designed to minimize negative externalities and help inclusive growth without creating scarcity of development rights and resultant distortions.

A protocol for proactive implementation and monitoring evaluation of development plan has been proposed. By active participation in the process of preparing this draft development plan a team of young planners has come to establish in MCGM. Hopefully this human resource would be deployed in a sustained manner to engage in second tier planning, monitoring and evaluation and responsive revision of the DP as required.

In conclusion, I would urge upon the reader to see this plan through a lens that is not coloured by the ruling axioms. MCGM planners could then look forward to critique that is constructive!

Vidyadhar K Phatak

Advisor, MCGM

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4. Mr. Sudhir Ghate, Former Chief Engineer Development Plan
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6. Mr. R. Balachandran, Chief Engineer (I/C), Development Plan
7. Mr. Dinesh Naik, Town Planning Officer, Development Plan

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We would place on record that the revision of Development Plan is an outcome of collaborative effort of the Consultants and the MCGM Planners.

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List of Abbreviations

ACD	Areas for Comprehensive Development	CTS	Comprehensive Transport Study
ALM	Advanced Locality Management	DCR	Development Control Regulations
APMC	Agriculture Produce Market Committee	DDA	Delhi Development Authority
AR	Accommodation Reservation	DG	Diesel Generator
B(a)P	Benzo(a)Pyrene	DP	Development Plan
BARC	Bhabha Atomic Research Centre	DMIC	Delhi-Mumbai Industrial Corridor
BBMP	Bruhat Bangalore Mahanagara Palike		Dharavi Redevelopment Project
BDD	Bombay Development Department	DRMMP	Disaster Risk Management Master Plan
BEST	Brihanmumbai Electric Supply and Transport Undertaking	DU	Dwelling Unit
BHK	Bedroom, Hall, Kitchen	EEH	Eastern Express Highway
BIT	Bombay Improvement Trust	ELU	Existing Land Use
BKC	Bandra Kurla Complex	EMI	Equated Monthly Instalment
BMC	Brihanmumbai Municipal Corporation	ESA	Existing Situation Analysis
BMEC	Bengaluru Mumbai Economic Corridor	EWS	Economically Weaker Section
BOD	Biochemical Oxygen Demand	FAO-UN	Food and Agriculture Organization of the United Nations
BPCL	Bharat Petroleum Corporation Limited	FBC	Form Based Codes
BPMC Act 1949	Bombay Provincial Municipal Corporation Act, 1949	FCI	Food Corporation of India
BTP Act	Bombay Town Planning Act	FOB	Foot Over Bridge
BUA	Built Up Area	FSI	Floor Space Index
CBD	Central Business District	GDDP/ NDDP	Gross/ Net District Domestic Product
CDP	City Development Plan	GDP	Gross Domestic Product
CIDCO	City and Industrial Development Corporation of Maharashtra Ltd.	GHMC	Greater Hyderabad Municipal Corporation
CNG	Compressed Natural Gas	GIS	Geographic Information System
COI	Census of India	GMP	Greater Mumbai Police
CRZ	Coastal Regulation Zone	GMUA	Greater Mumbai Urban Agglomeration
CST	Chhatrapati Shivaji Terminus	GoI	Government of India
		GoM	Government of Maharashtra
		HIG	High Income Group
		HPEC	High Powered Expert Committee
		HPCL	Hindustan Petroleum Corporation

	Limited
HTL	High Tide Line
ICT	Information & Communication Technology
IIT	Indian Institute of Technology
INR	Indian Rupee
IOCL	Indian Oil Corporation Ltd.
IPT	Intermediate Public Transport
ISBT	Inter-State Bus Terminal
IT/ITES	Information Technology/ Information Technology Enabled Services
ITI	Industrial Training Institute
JnNUR M	Jawaharlal Nehru National Urban Renewal Mission
JTC	Joint Technical Committee
JNPT	Jawaharlal Nehru Port Trust
JVLR	Jogeshwari-Vikhroli Link Road
LAA	Land Acquisition Act 1894
LCA	Land Capability Analysis
LIG	Lower Income Group
LMV	Light Motor Vehicle
LPCD	Litres Per Capita per Day
LTMG	Lokmanya Tilak Medical General (Hospital)
MbPT	Mumbai Port Trust
MBR	Master Balancing Reservoir
MCGM/ BMC	Municipal Corporation of Greater Mumbai/ BrihanMumbai Municipal Corporation
MCZMA	Maharashtra Coastal Zone Management Authority
MHADA	Maharashtra Housing & Area Development Authority
MIDC	Maharashtra Industrial Development Corporation
MIG	Middle Income Group
MLD	Million Litres per Day
MMB	Maharashtra Maritime Board

MMR	Mumbai Metropolitan Region
MMR-EIS	Mumbai Metropolitan Region-Environment Improvement Society
MMRD A	Mumbai Metropolitan Region Development Authority
MoEF	Ministry of Environment and Forest
MPCB	Maharashtra Pollution Control Board
MR& TP Act 1966	Maharashtra Regional and Town Planning Act 1966
MRVC	Mumbai Railway Vikas Corporation
MSDP	Mumbai Sewage Disposal Project
MSRDC	Maharashtra State Road Development Corporation
MT	Metric Tonnes
MTHL	Mumbai Trans Harbour Link
MTNL	Mahanagar Telephone Nigam Limited
MTS	Mass Transit System
MTSU	Mumbai Transformation Support Unit
MUIP	Mumbai Urban Infrastructure Project
MUTP	Mumbai Urban Transport Project
NAINA	Navi Mumbai Airport Influence Notified Area
NASVI	National Alliance of Street Vendors of India
NBC	National Building Code
NDZ	No Development Zone
NHAI	National Highway Authority India
NH	National Highway
NITIE	National Institute of Industrial Engineering
NIUA	National Institute of Urban Affairs
NOC	No Objection Certificate
NPA	Net Plot Area

NPFA	National Playing Fields Association
NRPA	National Recreation and Park Association
NUHHP	National Urban Housing and Habitat Policy
NUHM	National Urban Health Mission
NWDA	National Water Development Authority
P&T	Post & Telegraph
PBC	Place Based Codes
PBX	Private Branch Exchange
PCU	Passenger Car Unit
PG	Play Ground
PH/HD	Public Housing and Housing for Dishoused
PHC	Public Health Centre
PIB	Press Information Bureau
PLU	Proposed Land Use
PP	Per Person
PPP	Public Private Partnership
PPH	persons per hectare
PSC	Public Sanitary Convenience
PSF	Power Supply Facility
RG	Recreation Ground
RFCTLA RR 2013	Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation & Resettlement Act 2013
ROB	Road over-bridges
RUB	Road under-bridges
ROW	Right of Way
ROS	Recreational Open Space
RP	Regional Plan
RTE	Right to Education
RTO	Regional Transport Office
SCADA	Supervisory Control and Data Acquisition
SEEPZ	Santacruz Electronics Export Processing Zone

SEZ	Special Economic Zone
SGNP	Sanjay Gandhi National Park
SPA	Special Planning Authority
SRA	Slum Rehabilitation Authority
SRS	Slum Rehabilitation Scheme
STP	Sewage Treatment Plan
SWM	Solid Waste Management
SWD	Storm Water Drainage
TAZ	Traffic Analysis Zone
TDR	Transfer of Development Rights
TOD	Transit Oriented Development
TPD	Tonnes per Day
TRC	Trade Refuse Charges
UDPFI	Urban Development Plan Formulation and Implementation
ULB	Urban Local Body
UTTIPEC	Unified traffic and transportation infrastructure (planning & engineering) centre
WEH	Western Express Highway
WHO	World Health Organization
WB	World Bank
URC	Urban Renewal Cluster
URS	Urban Renewal Scheme

EXECUTIVE SUMMARY

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1. Introduction to Greater Mumbai, Draft Development Plan 2034

The Municipal Corporation for Greater Mumbai has prepared Draft Development Plan 2034 following the provisions of The Maharashtra Region & Town Planning Act, 1966. The DP 2034 covers the jurisdiction of the Municipal Corporation of Greater Mumbai, excluding the areas under Special Planning Authorities appointed under section 40 of the MR&TP Act 1966.

The main outputs of the DP 2034 are presented in the form of report in two volumes and a set of plans as detailed below:

Report on Greater Mumbai Draft Development Plan 2034 - Volume I

Part I, Context and Challenges: This part of the report includes assessment of the existing situation and gaining an understanding of issues and challenges that Greater Mumbai is expected to face over the next two decades. This includes assessment of distribution of land use (conducted through an extensive primary survey), population, employment and challenges pertaining to spatial provision for social and physical infrastructure, transport and environment of Greater Mumbai. These issues have been addressed at Greater Mumbai, Ward and Planning Sector levels.

Part II, Visualizing the Future, includes population and employment projections for 2034, articulating objectives for the Development Plan, and establishing principles for the formulation of proposals.

Part III, Proposals: This includes proposals for Land Use, provision of land for public purpose including Roads, DCRs, FSI and Zoning, financing the implementation of Development Plan. Following this, a framework for monitoring and evaluation of plan implementation has been elaborated.

Development Control Regulations - Volume II

- General Development Control Regulations
- Special Development Control Regulations

A Set of Plans

- Proposed Land Use Plan showing the proposed land use zones and lands designated and reserved for public purposes;
- Proposed FSI Plan with delineation of Transit Oriented Development zones, Streetscapes and zones for local area Planning.

2. Past Experience

The earliest legal instruments introduced in Mumbai date back to Bombay Municipal Corporation Act of 1888 and the Bombay Town Planning Act (BTP Act) of 1915. However, preparation of formal development plans commenced with the BTP Act 1954, coming into force in 1957. The first Development Plan (DP 1967) for Bombay was sanctioned in 1967. DP 1967 was revised as per the mandate of the MR&TP Act 1966 and sanctioned in parts from 1991 to 1994. A review of past

Development Plans reveals that both, DP 1967 and DP 1991 followed similar approaches explained as under:

- Both DP 1967 and DP 1991 set a lower limit for the projected populations than what the trend suggested. Both plans had as a key premise the decongestion of the Island City and promotion of development in the Suburbs.
- Floor Space Index (FSI) was used as a tool to control developments in both Development Plans. However, the approach towards the use of FSI varied remarkably between the two Plans. While the DP 1967 prescribed differential FSIs in the Island City and in the Suburbs, (ranging from a high of 4.5 to a low of 0.5, varying across geographical locations and uses - residential, commercial and industrial), the DP 1991, prescribed low and uniform FSIs across the Island city and Suburbs (1.33 in the Island City and 1.0 in the Suburb) thus assuming FSI as a tool of containment of growth and density.
- Both Development Plans used 'reservation' as a primary tool for garnering lands for public purpose. In the DP 1991, two policy instruments, "Accommodation Reservation" (AR) and "Transfer of Development Rights" (TDR) were introduced with a view to incentivize private owners to provide built space for designated purpose or make available land for open public purpose respectively. Incentive FSI and TDR were also used for rehabilitation of slums and renewal of older housing stock in dense wards in the Island City, but these have not made sufficient headway. Incentive FSI has also been used to promote conservation of heritage buildings, promoting IT and ITES, hospitality industry, educational and health care facilities.
- Affordable housing was, (and continues to be) a challenge that both plans sought to address. Lands for public housing were reserved in both DP 1967 and DP 1991. However, DP 1991 permitted land owners to develop such lands at minimum prescribed densities with a view to increasing the supply of smaller dwelling units. Exemptions under the Urban Land Ceiling Act also attempted to increase supply of smaller dwelling units. However, both these measures did not yield perceptible results.
- Guided by the goal of restraining population to 9.8 million, DP 1991-limited development to corridors along the railway networks to take advantage of existing public transport networks. Environmental considerations prevented development of coastal areas. As a result land and FSI remained as designed for population of 9.8 million while population itself crossed 12 million. The resultant scarcity of development rights might have reflected in the housing prices and the affordability.

3. Approach and Methodology Adopted for Plan Preparation

With this background, gaining an understanding of the existing situation has been a key premise of the Development Plan 2034. A realistic understanding of the existing situation enables the formulation of land use zoning and regulatory conditions to meet with real demands for the period of the Plan. Hence, the plan preparation exercise conducted primary and secondary surveys that would provide precise data at a fine level of disaggregation. The six key approaches and methods adopted are listed here:

- a) **Technology Enabled Decision Making:** A GIS data base serves as a platform for the integration of all spatial and non-spatial data for Greater Mumbai. This data base has in turn served as a base for conducting assessments and finally is a key resource in formulating proposals and monitoring the implementation of the Development Plan.
- b) **Understanding the Existing Context through the Existing Land Use (ELU) Map:** The ELU 2012 captures land use data at the parcel level. Categories and sub-categories of land uses included in the ELU Map were delineated with substantial degree of detail in order to facilitate detailed analysis.
- c) **Disaggregation of Greater Mumbai into 150 Planning Sectors at the Local Level:** The twenty four (24) administrative wards of Greater Mumbai were further disaggregated into 150 Planning Sectors. Assessment of the existing situation has been conducted at Greater Mumbai, Ward and Planning Sector levels. Assessment of land use distribution, population and employment distribution, existing FSI consumption patterns, access to social and physical infrastructure have been addressed at Planning Sector levels. The understanding of key imperatives arising from this assessment shall serve as a base for formulation of proposed land use.
- d) **A Place Based Approach:** A number of Urban Fabrics in Greater Mumbai were identified as places that exhibit distinctive urban character. These urban fabrics were studied in detail to understand and evaluate existing regulations, their impact and transformatory impulses.
- e) **Parametric Urban Analysis:** Growth scenarios were generated through parametric assessments on the GIS platform.
- f) **A Consultative Approach:** The Municipal Corporation of Greater Mumbai held consultations with other Government organizations, non-profit organizations and citizens from time to time and duly paid attention to their suggestions.

4. Challenges Ahead of Greater Mumbai

Greater Mumbai is witnessing trends of stabilizing population growth rate combined with decreasing household size, increasing workforce participation rate, and increasing per capita income. Greater Mumbai has also experienced marginal increase in proportion of formal sector employment and growing aspirations and increasing demand for space and infrastructure. Mumbai has also experienced significant transformation of its economy. Manufacturing has declined considerably and services particularly financial services have expanded. Now the aspiration is to become international centre for finance, commerce and entertainment. This would need to be enabled by the proposed spatial structure.

On the other hand there is limited availability of land in Greater Mumbai. The City is characterized by inequitable distribution of space, amenity and infrastructure demand, given its vast population that resides in slums. Further, the significance of its eco-system under pressure from urbanization and its protection is imperative.

DP 2034 therefore needs to find strategies, which promote holistic and inclusive city renewal and redevelopment, improved access to transportation and amenities, and preservation of its ecology

and environment. Further, provision of amenities and infrastructure required to sustain growth is one of the key challenges of the DP 2034.

5. Vision 2034

The Vision for future development of Greater Mumbai shall have to take cognizance of macro and micro demands of the City, from catering to its demands of maintaining its economic primacy to meeting the needs for better quality of life for its people.

The DP 2034 therefore envisions:

“Greater Mumbai as a Competitive, Inclusive and Sustainable City.”

The DP2034 serves as a framework with proposals that shall enable transformations in Greater Mumbai that renders it inclusive, healthy, livable and efficient. Enabling regulatory conditions that will foster a quality living environment emerges as one of the main imperatives.

6. Need for a Paradigm Shift: The DP as a Broad Framework

In the face of these challenges will its strengths enable Mumbai to maintain its economic primacy, social inclusion and ecological sustainability? The DP 2034 Greater Mumbai harnesses upon its strengths and attempts to address these concerns.

Given uncertainties in the global market and various technological innovations that are likely to occur but not known at present, it is not possible for planners to be prescriptive and deterministic about development 20 years ahead of time. The DP therefore makes a paradigm shift and conceives it as a broad framework within which it should be possible to respond to unfolding context. The broad categories for Land Use Zoning, simplification of categories and sub categories for reservation and designation of land for public purpose, and liberalization of the FSI regime are demonstrations of this paradigm shift. The objective of the broad framework is to allow the market to operate in a competitive manner.

However, it is essential that the DP has to be accompanied by Sectoral plans for effective service delivery. The sectors would include water supply and sanitation, waste management, roads and transport, primary education and healthcare. Effective service delivery will require attention to both spatial and non-spatial infrastructure needs. Although the DP makes provisions for the spatial needs of infrastructure sectors for the next 20 years, a sectoral plan every 5 – 10 year periods would be required so as to address concerns regarding investments and institutional capacity building for better service delivery. Consultative process followed for DP 2034, revealed that, in the absence of such sectoral plans in the public domain, the expectations are that DP should also deal with all such sectoral plans. However, that is impractical. It is therefore envisaged that these sectoral plans are also placed in public domain.

As a corollary of the DP as a broad framework detailed Local Area Plans are proposed to be prepared as the second tier of plans. The plans may require some changes in the DP, its regulatory framework as also specific investment programs.

MR&TP Act requires that the draft DP must be published for inviting objections and suggestion, but does not require any consultation during the process of preparation of the Draft Plan. In the present case however MCGM followed a proactive process of consultation as an important input to the

formulation of Draft DP. As a first step in the consultative process the Existing Land Use Map was widely published and displayed providing an opportunity to concerned citizens to point out inaccuracies if any in the ELU map. Preparatory Studies indicating the future growth scenarios, vision for DP 2034, issues to be addressed were also widely publicized. A consultative workshop was held with stakeholders belonging to NGOs, academics, professionals, concerned public authorities and utilities to disseminate the findings of the Preparatory Studies. This was followed by thematic workshops organized by the NGOs and professionals. Consultative workshops were conducted at each Ward where people's representatives and citizens could understand the challenges at the Ward level and express their concerns.

Figure: 01: Stakeholder consultation workshops



Figure: 02: Ward level consultation workshops: Ward H/W and Ward L.



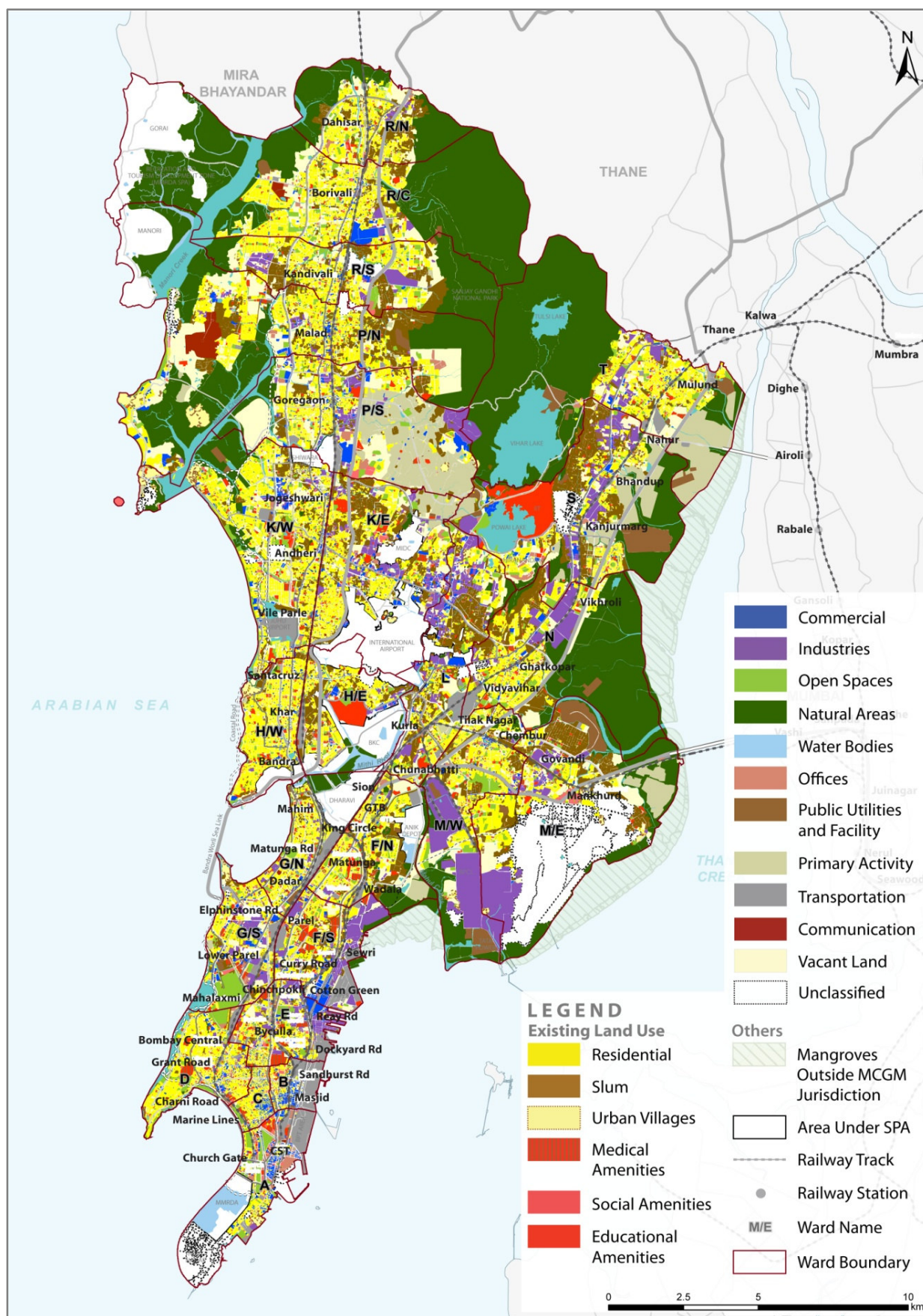
7. Existing Land Use 2012

Preparation of the base map using GIS and Quickbird satellite image was the first step in the commencement of the DP 2034. The base map was then utilized as a key part of a toolkit in conducting the primary survey for mapping Existing Land Use 2013. Existing land use assessed through extensive field surveys and using GIS technology is presented in Table 1. The highlights are:

Table 1: Existing Land Use

Existing Land Use Categories (2012)	Greater Mumbai			
	Area (ha)	% of Total Area	Per Capita Area (sqm)	% of Developed Area
Residential –(Total)	10,327.09	24.88	8.30	38.08
Residential (Non-Slum)	6,930.93	16.70	5.51	25.56
Residential (Slum)	3396.16	8.18	2.73	12.52
Commercial	911.46	2.20	0.73	3.36
Offices	360.96	0.87	0.29	1.33
Industrial	2,242.88	5.40	1.80	8.27
Open Spaces	1,537.78	3.70	1.24	5.67
Education Amenities	853.81	2.06	0.69	3.15
Medical Amenities	318.44	0.77	0.26	1.17
Social Amenities	355.81	0.86	0.29	1.31
Public Utilities and Facilities	693.43	1.67	0.56	2.56
Transport and Communication Facilities	5,306.92	12.79	4.27	19.57
Urban Villages	318.42	0.77	0.26	1.17
Primary Activity (P1, P3, P4, P5 P6, P7)	939.22	2.26	0.75	3.46
Unclassified	1,829.77	4.41	1.47	6.75
Vacant Land (only under Construction)	1,121.97	2.70	0.90	4.14
DEVELOPED AREA	27,117.95	65.34	21.79	100.00
Natural Areas	11,303.82	27.23	9.08	
Vacant Land (excluding under construction)	2,282.82	5.50	1.83	
Primary Activity (P2, P8)	801.11	1.93	0.64	
UNDEVELOPED AREA	14,387.75	34.66	11.56	
TOTAL PLANNING AREA	41,505.71	100.00	33.36	
Area under Special Planning Authority	4,322.79	9.43		
TOTAL AREA GREATER MUMBAI	45,828.49			
Per Capita Land available in Greater Mumbai	36.0 sqm			
Per capita available developed land in Greater Mumbai	21.0 sqm			

Map 1: Existing land use map for Greater Mumbai



Greater Mumbai entails a predominantly mixed land use including residential, commercial, and office uses. Commercial and Office Land Use centralities are primarily observed along major road and rail network.

Particular attention has therefore been paid to documentation of Existing Land Use categories and sub-categories of the various land uses of Greater Mumbai. For example, in order to capture the 'mixed' nature of uses in Greater Mumbai Mixed Land Use Categories like R2C (multi-family apartment with Commercial), R2S (multi-family apartment with shopping) and R4I (Chawls with industrial use) have been incorporated. Moreover, the Residential Land Use takes into account the wide range of housing typologies in use in Greater Mumbai from single-family houses to chawls and slums. Similarly, Existing Land Use categories and sub-categories have been included for Educational, Medical and Social amenities in order to capture detail.

7. Delineation of Planning Sectors

The Planning Area has been disaggregated at three levels: Greater Mumbai, the 24 Administrative Wards and 150 Planning Sectors. This has been done in order to ensure effective distribution and provision of social amenities at fine levels of disaggregation, in the DP 2034 and further ease of implementation of the DP.

Planning Sectors have been delineated using the Ward boundary as a key definitive limit. Physical features such as rivers, wetlands, salt pan lands, transportation networks including road, rail metro rail alignments, areas of homogenous character and Planning Sectors of the DP 1991 have been considered as key premise in their delineation.

For the purpose of delineating the Planning Sectors, the area within Greater Mumbai, 458.28 sqkm, has been first divided into 3 broad Zones, namely, the Island City, Western Suburbs and Eastern Suburbs. The Wards within these Zones have been further subdivided resulting in 150 Planning Sectors excluding areas under the Special Planning Authorities and the National Park.

For ease of analysis and identification of the Planning Sectors, the three Zones, the Island City, the Western Suburbs and the Eastern Suburbs have been named Zone 1, Zone 2 and Zone 3 respectively. The number of Planning Sectors and their areas are given below in Table 2:

Table 2: Zone wise area and number of planning sectors

District	Total area in ha (including SPA)	No. of Planning Sectors (excluding SPA and National Park)
Island City	7,140.71	50
Western Suburbs	22,239.29	62
Eastern Suburbs	16,448.48	38
Greater Mumbai	45,828.49	150

The nomenclature of the Planning Sectors starts with the Ward name (e.g. A, B, C...etc) followed by the Zone name series (e.g. all Island City wards will have the Ward name followed by the number 1 to denote the Zone, western Ward names will be followed by the number 2 and eastern Ward names will be followed by the number 3 to denote the Zone), further followed by the Planning Sector number (usually numbered starting from 01, 02 and so on).

The delineation of Planning Sectors is done also with the objective of monitoring DP implementation at local levels. For example, it will ease the process of monitoring implementation of reservations against the demand and at regular intervals.

8. Population

The population of Greater Mumbai (including the notified areas under SPAs), recorded in 2011 Census is 12.44 million as against the 11.97 million in 2001 indicating a net addition of nearly half a million over one decade. The population growth rate of Greater Mumbai has been experiencing a decline since 1961. However, there has been a sharp decline in the last decade (20.68% between 1991-2001 and 3.87% between 2001 - 2011).

Population Distribution in Greater Mumbai

During the last decade, 2001-2011, Island City has shown a population decline of 262,620 whereas the Western and Eastern Suburbs have shown an increase of 321,841 and 394,702 respectively. Ward P/N in the Western Suburbs has the highest population of nearly one million among all 24 Wards, holding 7.5% of the total population. Whereas, Ward B in the Island City has the lowest population of 140,633 among 24 Wards.

Distribution of Slum Population

Of the total population within MCGM jurisdiction in 2011, 41.85% live in slums including the notified areas under SPAs. The data shows that geographically, there is a clear variation in the distribution of slums in Greater Mumbai. 51.91% of the total population in the Eastern Suburbs resides in slums as compared to 42.69% of the total population in the Western Suburbs and 27.88% in the Island City. Ward S in the Eastern Suburbs has the highest proportion of slums with 72.32% of its population residing in slums. It also has the highest slum population in numeric terms, 537,900, among all 24 Wards.

This represents an urgent need for creation of affordable housing stock. However, slums are not uniformly distributed throughout the city. Distribution of slum population in Greater Mumbai shows that, the Western Suburbs has the highest number of slum dwellers, followed by the Eastern Suburbs, and then the Island City. However, in terms of share of slum population within each zone, the Eastern Suburbs have the highest proportion, followed by the Western Suburbs and then the Island City.

Declining Household Size

The average household size in Greater Mumbai is decreasing and stands today at 4.4. It is further expected to decline and is estimated to be 4.0 by 2034. This would result in increased household formation and consequent increase in housing demand.

Population Projection for 2034

Greater Mumbai has experienced a stabilized population growth between 1991-2001 and 2001-2011. Considering that this trend is expected to continue over the next two decades resulting in a projected population of approximately 13.94 million by 2034. The share of Island City's population in Greater Mumbai is anticipated to further decline to 20% in 2034. The share of Suburban population is anticipated to increase to 80% in 2034.

Table 3: Ward wise population of Greater Mumbai in 2001 and 2011

Zones	Wards	Population 2001	Population 2011	Projected Population 2034	
				Including Notified Areas under SPAs	Excluding Notified Areas under SPAs
Island City	A	210,847	185,014	157,448	84,747
	B	140,633	127,290	100,701	100,701
	C	202,922	166,161	143,051	143,051
	D	382,841	346,866	341,336	341,336
	E	440,335	393,286	342,773	342,773
	F/N	524,393	529,034	452,534	435,384
	F/S	396,122	360,972	359,550	359,550
	G/N	582,007	599,039	589,799	371,820
	G/S	457,931	377,749	323,045	323,045
	Total	3,338,031	3,085,411	2,810,235	2,502,405
Western Suburbs	H/E	580,835	563,445	602,511	468,951
	H/W	337,391	301,375	265,884	235,298
	K/E	810,002	823,885	896,539	789,388
	K/W	700,680	748,688	867,217	849,064
	P/N	798,775	941,366	1,210,660	1,192,095
	P/S	437,849	463,507	536,413	527,697
	R/C	513,077	562,162	604,821	604,604
	R/N	363,827	431,368	655,223	655,223
	R/S	589,887	691,229	937,364	937,364
	Total	5,132,323	5,527,025	6,576,634	6,259,685
Eastern Suburbs	L	778,218	902,225	1,132,709	1,043,751
	M/E	674,850	807,720	1,069,305	1,069,305
	M/W	414,050	411,893	438,360	438,360
	N	619,556	622,853	679,893	679,893
	S	691,227	743,783	867,751	867,751
	T	330,195	341,463	374,825	374,825
	Total	3,508,096	3,829,937	4,562,842	4,473,885
Greater Mumbai		11,978,450	12,442,373	13,949,712	13,235,975

Source: Census 2001 – 2011.

Wards P/N, R/N, R/C, R/S in the Western Suburbs and L and M/E Wards in the Eastern Suburbs are expected to witness high population growth rates at a range of between 13% and 17%. A, B and C Wards will continue to experience a major decline in population growth rate, ranging between 30% and 35%. An overall stabilized growth is expected to be largely residing in the northern parts of the Suburbs of Greater Mumbai, exacerbating the demand for social amenities in these Wards and Planning Sectors.

9. Economy

Greater Mumbai's economy has undergone a significant transformation from manufacturing activity to tertiary activity. The share of manufacturing in Mumbai's NDDP has been falling post 1990. The contribution of the tertiary sector on the other hand has been on the rise.

In the past it was generally observed that the growth rate of Mumbai was a couple of basis points higher than that of Maharashtra and Maharashtra was a shade better than India. The total work participation rate for 2011 is 37.98%.

Real Estate

The household income distribution in 2008 at 2005 prices for Greater Mumbai indicates that only 9% of the population earns more than Rs. 60,000 per month and the median household income is Rs. 20,000 per month. While the lowest price for even a single bedroom public housing unit starts from Rs. 14,00,000 onwards. Given that the cost of housing is several times higher than the affordable range of 4-5 times a family's annual gross income, it is apparent that nearly half of the population is unable to afford to own a house, even of minimum standards.

Employment Projections by Place of Work

In the absence of other data, The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008 has been considered as a valid source for existing and projected employment for the future. This project analyzed demographic and employment profiles of the region for the horizon period of 2031. Various generated scenarios estimated employment in a range between 5.09 million and 10.98 million. Taking cognizance of current trends, it has been estimated that employment for Greater Mumbai would range between 6.25 and 7.35 million.

The growth rate of Mumbai's NDDP at constant prices during the last three years is observed to be 7.7% p.a. If Indian economy were expected to grow at about 6% p.a., Mumbai would have a potential to continue to grow between 7 and 8 % p.a. at constant prices. The growth would of course be cyclical but these cycles cannot be predicted. The key economic drivers would include financial services, insurance, IT, media & entertainment, retail, logistics & export-oriented manufacturing. A long-term growth rate of 7% is therefore adopted. Since economic growth is expected to continue while the population growth is expected to stabilize, it could be inferred that per capita income would continue to grow during the plan period. This would convert into higher aspirations, a lifestyle of greater consumption, demand for more space, in terms of higher per capita area, for residential use, commercial use, amenities, utilities and open spaces. Therefore, one of the major objectives of the DP 2034 is to address the demands for improvement in quality of life. It would also imply increase in vehicle ownership.

Constrained by the City's geography, land available for development, would continue to be a scarce resource for development in future. Despite of this, the Development Plan 2034 addresses adequate provisions for the increasing demand for space. Guided by this challenge, the spatial development strategy for the City addresses availability of land for social and physical infrastructure development and a regulatory framework that enables real estate and housing market to grow competitively.

10. Spatial Development Strategy

It is anticipated that with decreasing household size, increasing per capita income and growing aspirations there will be an overall increase in demand for residential space in the future. The demand for commercial space will also increase with the anticipated increase in proportion of formal sector employment over the next few decades. Given the limited availability of vacant land in Greater Mumbai, the DP 2034 has devised spatial development strategies that will promote holistic,

inclusive urban renewal and redevelopment, improve access to public transit and amenities, and preserve natural areas. It provides a framework for formulating land use and FSI proposals.

Emerging Spatial Structure

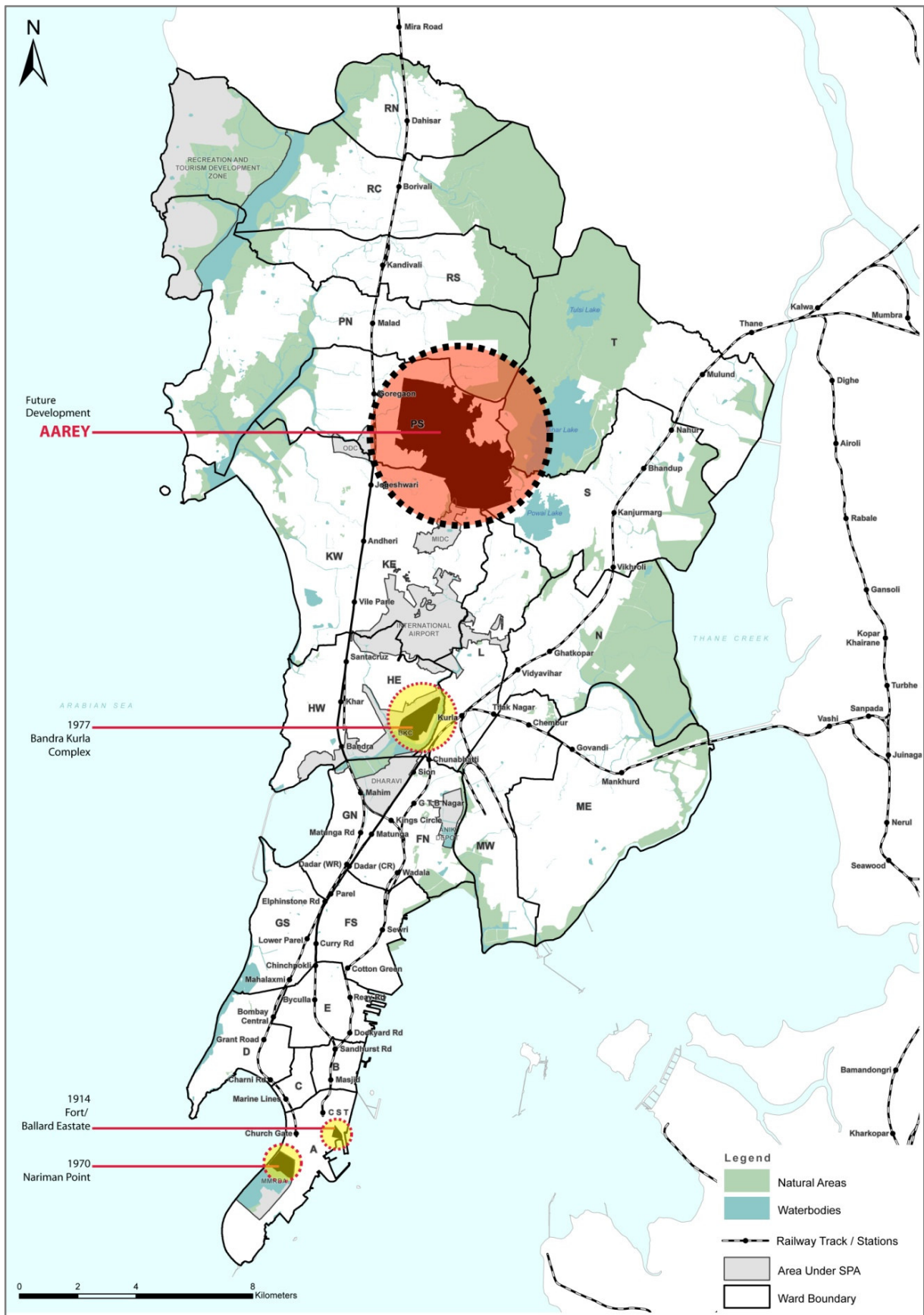
The structure of spatial development in case of Mumbai has decisively changed to polycentric from being mono-centric. This trend is expected to continue and strengthen with additions of metro corridors. Apart from the traditional CBD at Fort and Nariman Point, BKC, Lower Parel, Andheri Kurla Road, SEEPZ and Mind Space at Malad have emerged as employment nodes. Intersections of metro corridors and suburban railways like Andheri, Ghatkopar, DN Nagar, and Chakala might experience transformation.

Spatial Development Strategy

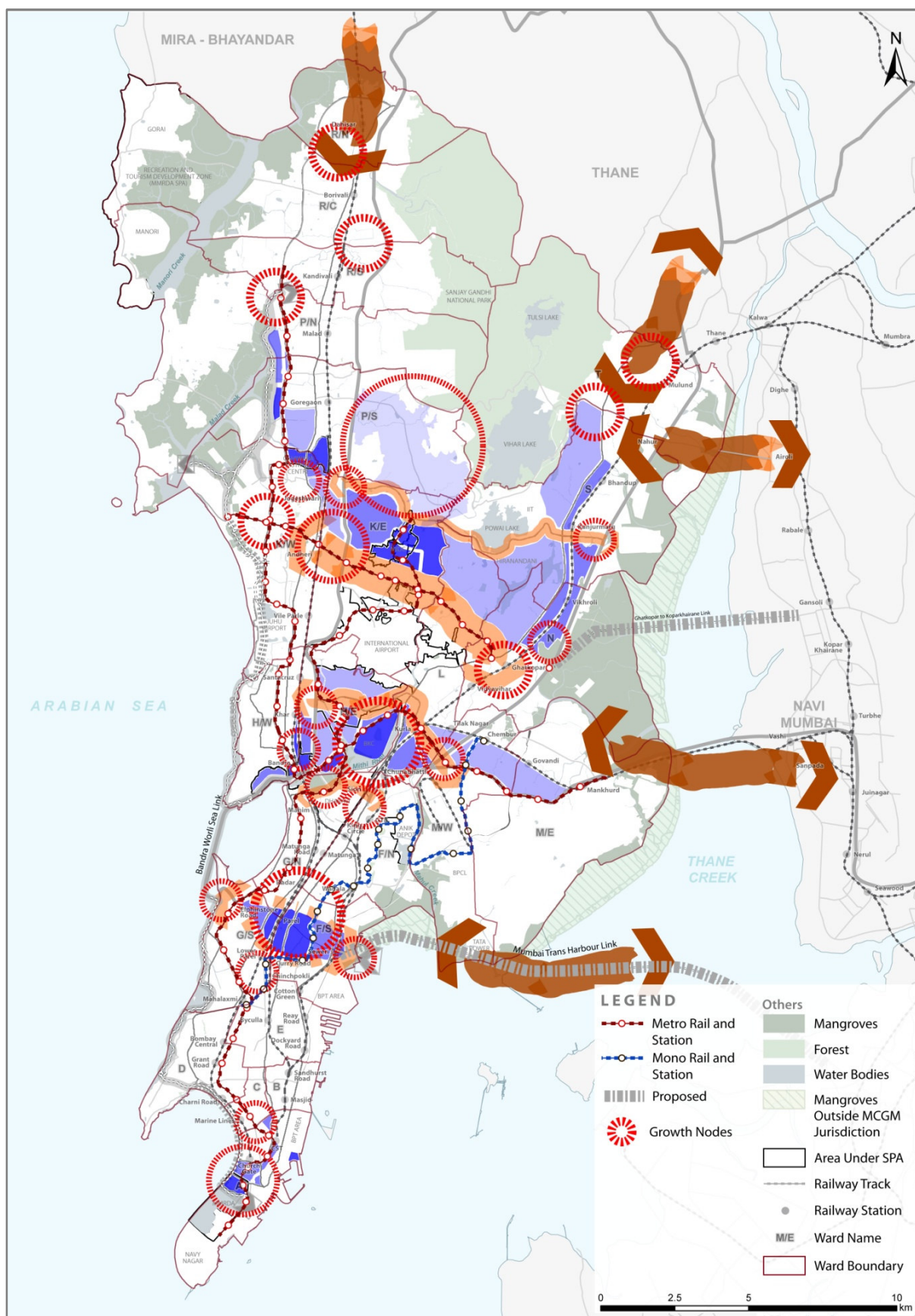
The proposed spatial development strategy adopted in the Draft DP recognises the emerging structure and accordingly shape the land use and FSI policy. The following strategies are formulated for spatial development:

1. A polycentric growth pattern is proposed in order to further strengthen Greater Mumbai's spatio-economic development pattern by reinforcing the existing and emerging commercial & employment nodes.
2. Integration of transportation and Land Use Zoning has been incorporated in the DP 2034 through a Transit Oriented Development framework. Areas in proximity to major suburban and metro have been demarcated as Transit Oriented Development in the Spatial Development Strategy. This strategy also considers various future regional road proposals that connect East-West linkages.
3. Historically key centres for economic growth have developed on public land. Ballard Estate, the Back Bay reclamation area and the BKC have served as anchors to catalyze development. However, similar spatial options for capturing new economic impulses seem extremely limited. Today, as public land, only Aarey Colony offers potential for new economic growth and for augmenting the institutional and public amenity requirements of the Suburbs. Within this broad framework, the DP 2034 suggests that the actual modality of development may be jointly decided by the State Government and the MCGM at apposite time in the future.

Map 2: Emerging growth centres: Aarey land as an opportunity



Map 3: Spatial development Strategy



11. Proposed Zoning

The proposed zoning framework acknowledges the diversity in existing land use pattern. The ELU 2012 reveals that most areas in Greater Mumbai exhibit a mixed land use character. The context of mixed land use offers several advantages including reduced transportation costs, environmental benefits, safety, comfort, employment opportunities at local levels and economies of scale that bring affordability.

The DP 2034 therefore proposes mixed land use zones in Mumbai. These are:

1. **Residential-Commercial (RC) Zone:** In this Zone Residential use is dominant. This zone as shown in Map 4.1 is a mixed use zone, with predominant Residential use and partially Commercial use occupying around 11,775 ha.
2. **Commercial-Residential (CR) Zone:** Here, Commercial land use is dominant. This zone as shown in Map 4 is a mixed use zone, where commercial, residential use & service industries are permitted. The CR zone would largely be commercial in character with office, retail and service spaces. This zone, being mixed use in character will also include residential living spaces. Areas to carry out logistic activities, truck terminals, some non-polluting manufacturing activities which are non-permitted in the RC zone will be permissible in this zone.
3. **Industrial Zone:** Existing industrial areas have been demarcated as I-zone as shown in Map 4. The Industrial zone is an area in which the primary land use includes manufacturing industries. New industrial activity shall be non-polluting, non-hazardous and subject to clearance from MPCB. However, Industrial zones can be converted to RC/CR zones.

The RC, CR and I zones allow in flexibility for future urban transformation.

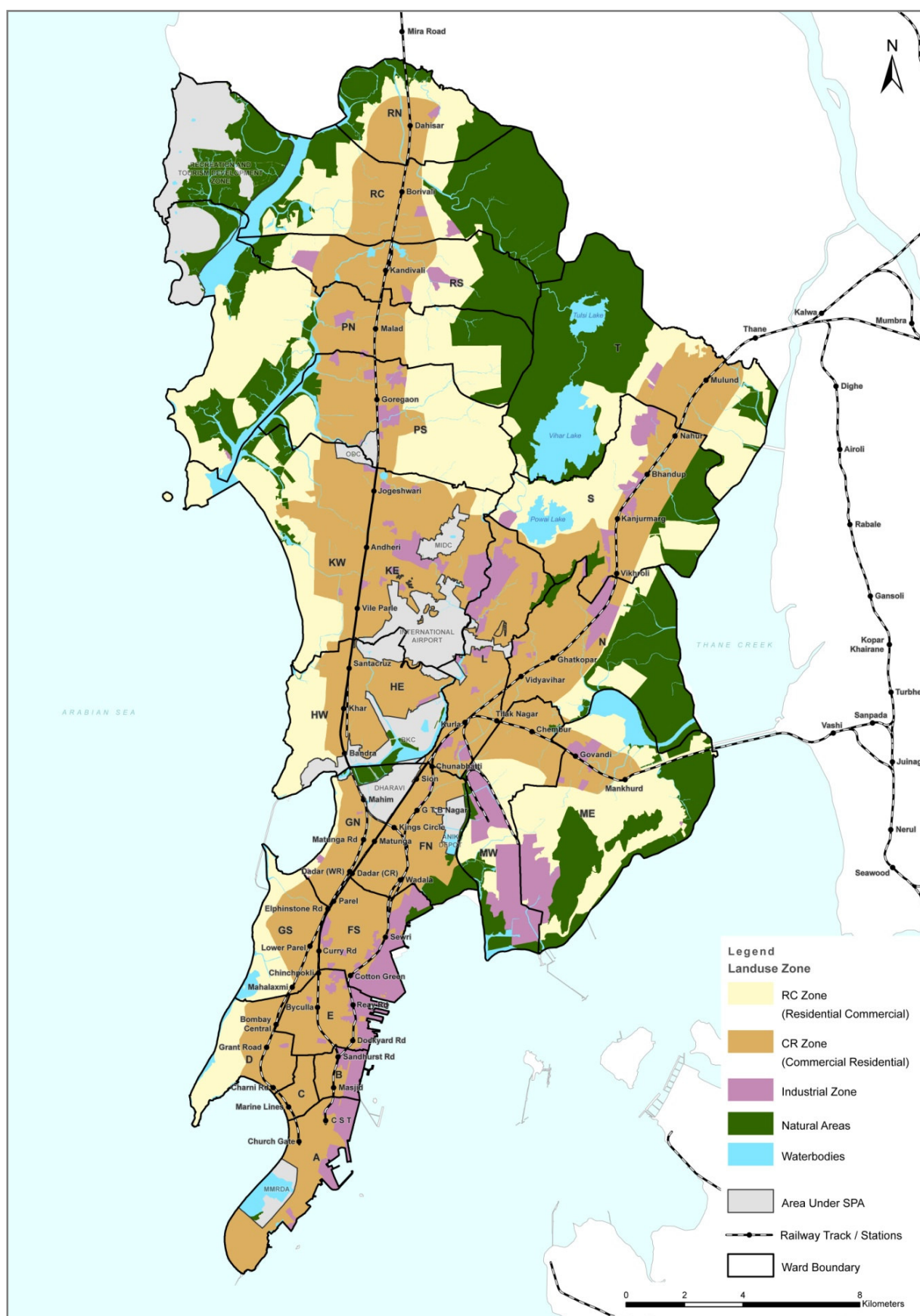
4. **Natural Areas zone:** A zone of Natural Areas is proposed with an objective to conserve existing ecologically sensitive areas like the forest, lakes, rivers, streams, ponds, mangroves and coastal wetlands. These would help retain city's ecology and biodiversity.

Given also the significance of the public transit network in Greater Mumbai and its inter-connectedness with land use, the DP has conducted detailed analyses on establishing hierarchy of railway stations along suburban, metro and mono rail stations and their potential impact on future development on areas in their proximity. Areas best suited as Transit Oriented Development Zones have been identified and although these are not included as zones in the Zoning Plan, these locations have been taken cognizance in the allocation of Proposed FSI and assignment of land use zones. Depending on their hierarchy, TOD areas have been demarcated as Intensive Zones and Standard Zones, within 300 m, 500 m and 1000 m distance from the station respectively.

Draft Development Plan - 2034

GREATER MUMBAI

Map 4: Proposed land use zoning

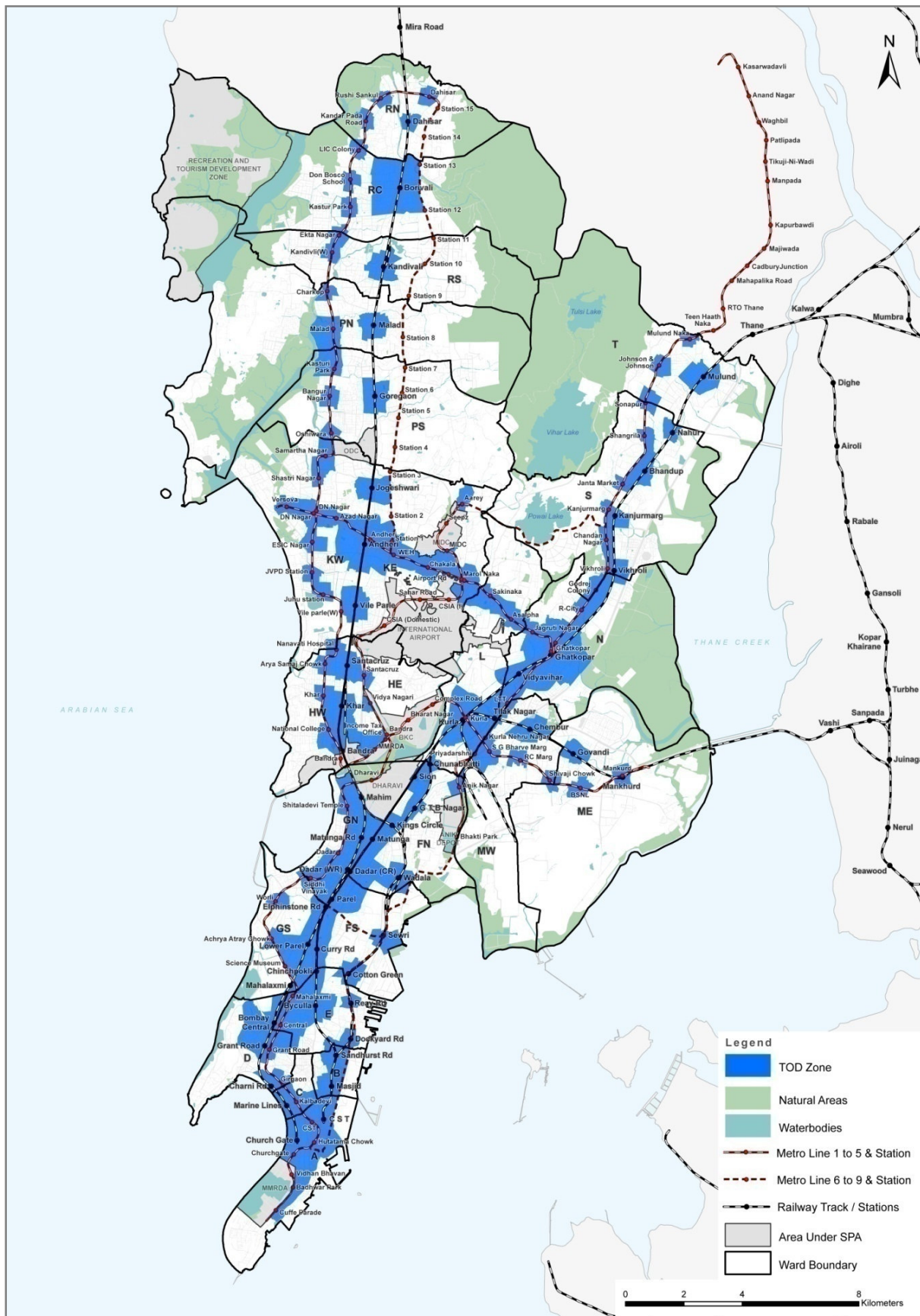


Integrating Transportation and Employment Nodes

The Spatial Development Strategy hinges upon Transit Oriented Development. Proposed Zoning and proposed FSI allocation reflect concentration of employment and intensification of development at existing, ongoing and proposed transit stations.

Building on the existing structure of multiple employment nodes in Mumbai, the DP 2034 promotes the consolidation of employment nodes in the Island City, Eastern and Western Suburbs. These are further integrated with public transit corridors in order to enhance efficiency of movement in the city. Proximity to rail, metros and existing FSI consumed are considered as major factors in defining future centres of employment

Map 5: Transit oriented development zone



12. Floor Space Index

FSI was utilized in the DP 1991 as an important policy instrument. FSI as understood in the present context makes several exemptions for built space often resulting in mis-interpretation and exploitation of the use of FSI. For the purpose of Development Plan (2034), FSI has been computed as bulk FSI, based on total built-up area of a building, including areas exempt from computation of FSI in DCR 1991.

A primary survey was conducted in 2012, at city block level to document the existing Bulk FSI consumed. Net bulk FSI in the city ranges from a high of above 4.0 to a low of 1.0. Areas with concentration of high Net Bulk Floor Space Index (4.00 and above) are located in the older core city areas of the Island City, in proximity to transit stations such as Churchgate, Chatrapati Shivaji Terminus, Dadar; and employment centers such as Fort, Bora Bazaar, Nariman Point, Ballard Estate and Null Bazaar in the Island City. The predominant land use in these areas is mixed use except Nariman Point and Ballard Estate which are predominantly Commercial and Office use. Slum Rehabilitation Schemes in the Eastern Suburbs also have high FSI consumption. Other areas with high and medium Net Bulk FSI (1.33 to 3.00) are predominantly residential such as Powai-Hiranandani (Ward S), Vazira Naka (Ward R/C) etc.

The Island City has very high consumption of Net Bulk FSI, as the concentration of both Commercial and Office land use there is very high. The Eastern Suburbs have high concentration of slums; therefore, the Net Bulk FSI here is low and uniform. It is worth mentioning here that although the FSI consumption is low, yet the population density here is quite high. Accordingly, an assessment was conducted to examine the relation between FSI and density. At Planning Sector level this reveals that there is no direct correlation between FSI and density. FSI may not be an ideal tool to control population densities.

FSI: A Paradigm shift

At present FSI is a tool of containment of growth and density. The new paradigm provides a framework for providing opportunity for securing adequate floor space for anticipated growth, which is more demand driven, flexible & inclusive. In the new paradigm, FSI will not be just entitlement but a maximum that can be attained subject to other regulatory conditions. This the new paradigm defines as outer envelope within which the market can operate without the need or incentives to breach FSI.

Scarcity of development rights due to suppressed FSI led to market distortions and a complex transaction process that is time consuming and also costly. Thus, it is imperative to seek a new paradigm for the FSI regime in DP 2034. The features of the new paradigm are sought to be compared with the present paradigm as follows:

Table 4: New FSI Paradigm

Present Paradigm	Effects	New Paradigm
A tool of containment of growth and density	Could not control either growth or density. But as supply side interventions increased real estate prices.	A framework for providing opportunity for securing adequate floor space for anticipated growth.
FSI as an 'entitlement' with all other requirements considered as subordinate.	Market intervention that impels all land owners to fully exploit permissible FSI and if possible breach the prescribed FSI, wherever possible.	Not an entitlement, but a maximum that can be attained subject to other conditions.
	At any given time leave very little scope for new construction, giving rise to scarcity of development rights and attendant malpractices	Adequate scope for new construction at any time over the plan period.
	Led to multiple ad hoc exemptions and exceptions	
Using scarcity of development rights for achieving policy objectives including raising finances.	The incentives covered Inclusive growth: Redevelopment of slums and Chawls Economic growth: IT/ITES, Star Hotels Social Infrastructure: Schools and Hospitals Raising finances: for GOM and MCGM Others: Relocation of tabelas Market distortions	Avoiding market distortions, but still providing reasonable incentives for inclusive development. Using a layer of premium FSI across the city to raise finances.
	Complex transaction process – increased time and costs	Simplified definition of FSI with minimal exceptions.

Further, the new paradigm of FSI also adopts the MR&TP Act's definition of FSI. FSI here is defined as ratio of the total built up area to the total plot area.

New paradigm directed the policy instrument to develop more rational method to calculate FSI. This involved five steps including:

1. Calculating space demand;
2. Calculating mean FSI to meet the built up area requirement;
3. Allocating FSI across Greater Mumbai;
4. Profiling FSI for promoting urban transformation and monetization;
5. Balancing distribution of TDR.

These are briefly explained below.

1. Calculating space demand

- The existing per capita consumption levels for housing (see ELU 2012 and the Existing FSI map) reveal that the existing pattern of consumption of per capita BUA for housing is 9 sqm with average HH size of 4.8. This assessment was conducted for 150 Planning Sectors approximately 34.67 % of the planning sectors fall under the category of per capita BUA of 4 to 8 sqm, 23.34% of the sectors fall under the category of per capita BUA of 8 to 12 sqm.
- The DP acknowledges that computation of future housing demand for 2034 will depend upon the future income of households, income and price elasticities of housing demand prevalent in the market, access to housing finance etc. The National Habitat Policy has aimed at minimum of 25 sqm carpet area (35 sqm BUA) per household. This works out to 7.8 sqm per capita.
- Given the range of thresholds of existing per capita housing space, six profiles of per capita BUA consumptions are conceived for 2034, ranging from 14 sqm to 50 sqm for year 2034.
- Demand for BUA for housing thus estimated for 2034 is 34,853 ha with average per capita area consumption of 27 sqm.
- Industrial / Office/ Commercial- employment space demand was estimated based on standards established by the National Building Code, at 10 sqm per person. An additional 2.5 sqm was provided for ancillary areas. Employment space demand for Greater Mumbai is 9,190.41 ha
- The total BUA demand for residential and employment space for the city in 2034 is estimated as 44,043.53 ha. This excludes built up area required for educational, healthcare and other community facilities and public utilities.

2. Calculating the Mean FSI to meet the BUA Demand

The mean FSI demand for the city is calculated by dividing the projected BUA requirement by the Net Plot Area of Greater Mumbai.

- Estimating the Net Plot Area involved excluding areas where FSI allocation is not relevant from the Planning Area. Existing and proposed Natural Areas and area under CRZ1, Primary Areas, Open Spaces, Transport & Communication, Infrastructure, Public Utilities, Amenities, areas under Unclassified uses and refineries, land under MbPT, and areas under SPAs were deducted from the Planning Area (45,828 ha). The net plot area, thus computed for the city is 13,991ha.
- Based on the net plot area and the estimated future BUA demand for residential and employment uses, a mean FSI of 3.15 for the entire city can be arrived at. However, the distribution of this FSI has to be varied depending upon the FSI already consumed and accessibility, particularly in areas in proximity to public transit stations, in order to ensure efficiency of use of land.

3. Allocating FSI across Greater Mumbai

- The DP 2034 adopts a variable FSI regime which allocates FSI based on the locational logic of the spatial strategy as well as the existing consumption. Five ranges of proposed Bulk FSI and

the Net Plot Area under them have been formulated. Considering the existing FSI consumed, majority land area (58.12%) is proposed under the FSI of 3.5. FSI of 5.0 and above is only provided in areas well accessed by public transport, mainly areas in proximity to railway stations and the existing and upcoming metro stations. This forms 31.87% of the city's land. Bulk FSI of 6.5 and 8.0 has been provided in the immediate vicinity of major railway stations proximate to CBDs and other employment nodes. 4.55 % of the city is under an FSI of 6.5. Less than 0.5% of Net Plot Area is allocated an FSI of 8.0 and 5 % of the city is under an FSI of 2.0 which is provided in areas not accessible by public transit.

- The proposed FSI structure and resultant BUA was compared with the demand. If the city consumes 100% of the FSI provided, it shall produce a BUA of 56,808.55 ha and a weighted average FSI of 4.06. However, not all plots are expected to redevelop and consume the provided FSI within the next 20 years. Demand projected is expected to be consumed up to a few years after the 20 year plan period. Parts of the city that have recently undergone redevelopment will have inertia to redevelop within the next 20 years, even if they have received a higher FSI under DP 2034. Similarly, property owners in commercial areas that have a high daily income might resist the redevelopment owing to loss of income during the building phase. Also, the FSI provided to a particular plot is not an absolute entitlement. Plots can consume the allocated FSIs only if they comply with the GDCRs related to setbacks and step-backs. As a result small plots that cannot fulfil the GDCR requirements and do not amalgamate with the neighbouring plots, will not be able to consume high FSIs. Further the actual consumption of BUA will depend upon the income and prices in the real estate market. The proposed FSI regime will allow the market to function competitively without being distorted by regulations.

4. Profiling FSI for promoting Urban Transformation

Figure 03: four tiered profiling for consumption of proposed FSI

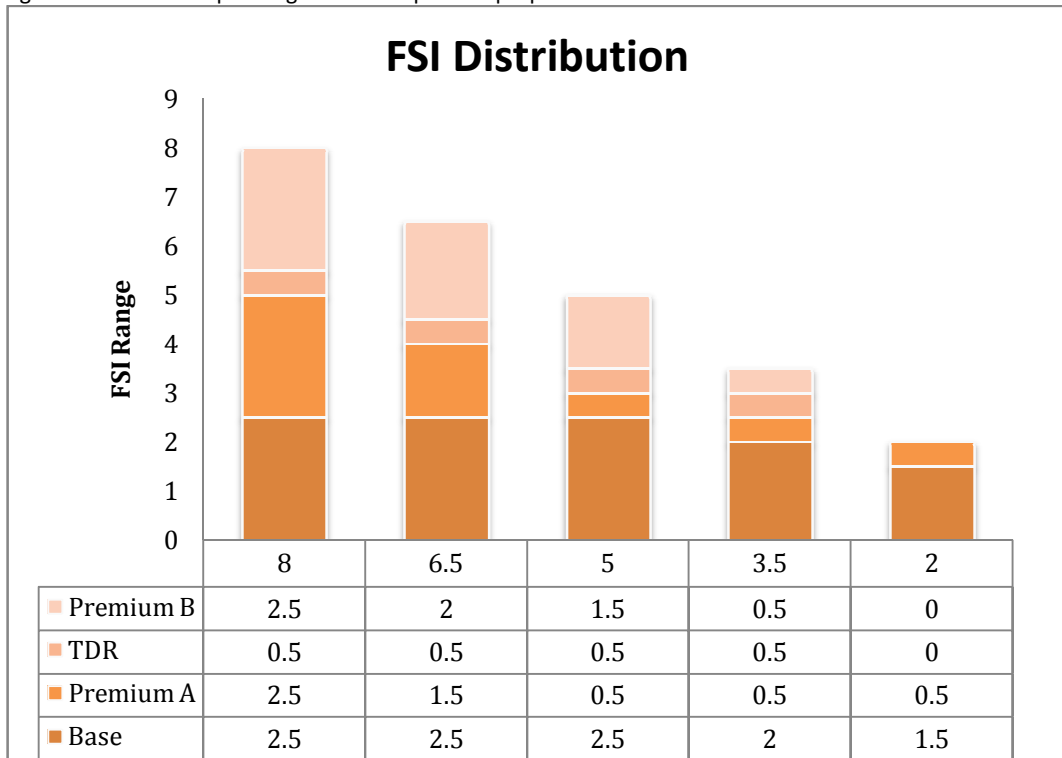
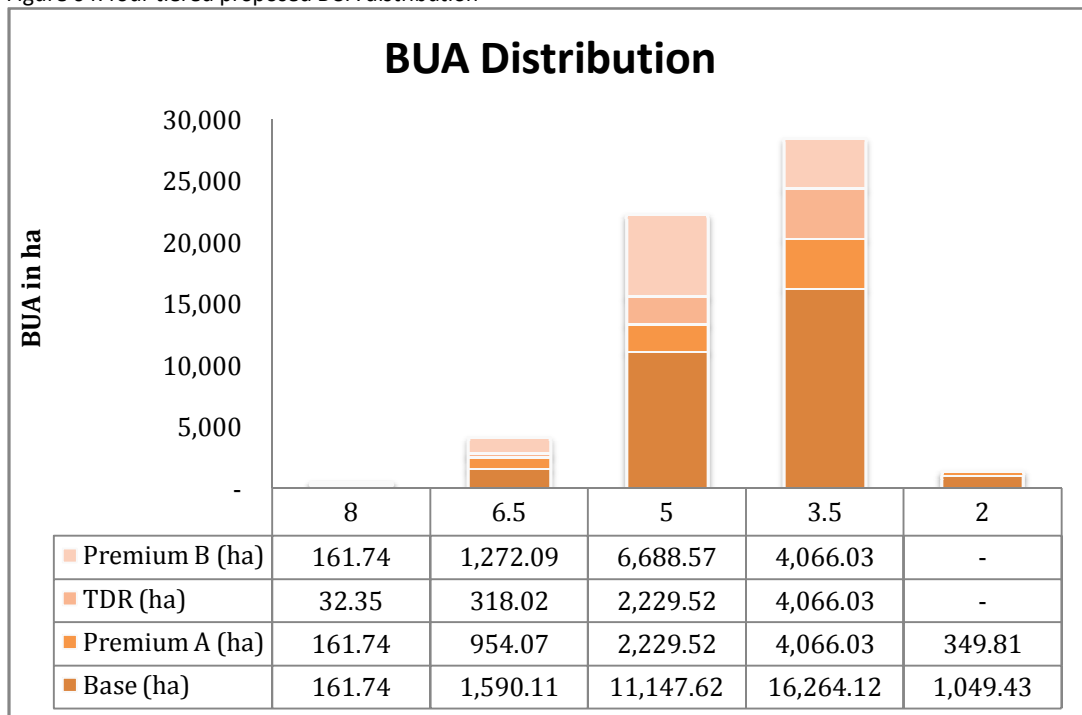


Figure 04: four tiered proposed BUA distribution



The proposed FSI bands in Figure 03 represent the outer limit, or the maximum development right available on a plot, which can be attained in slabs through purchase of rights from the market or the government. The final profile of FSI is proposed to comprise of four layers the Base FSI, Premium FSI A (First rung of FSI that could be availed by paying premium to MCGM), TDR, and the premium FSI B (Second rung of FSI that could be availed by paying premium). The table below represents the four tiered structure. The graph above shows the four layers and quantum of BUA that could be consumed in each layer.

Table 4: Structure for consumption of proposed FSI

FSI	Base	Premium A	TDR	Premium B
8	2.5	2.5	0.5	2.5
6.5	2.5	1.5	0.5	2
5	2.5	0.5	0.5	1.5
3.5	2	0.5	0.5	0.5
2	1.5	0.5	0	0

Notes:

- Premium A FSI can be used in addition to base FSI by paying premium at the rate of 70 % of Ready Reckoner Rates (RR) for Land;
- Premium B FSI will be charged at 100% of Ready Reckoner Rates (RR) for Land and can be availed only after utilization of TDR.

5. Balancing Distribution of TDR based FSI Consumption

Use of TDR is related to land value of the place in which it originates and land value of the plot where it is utilized. Thus, the TDR generated from a high priced area would amount to higher extent of consumption of FSI in a low priced area, and vice versa, weighted by the Ready Reckoner land value at that given time. Such a change in the movement of TDR, ensure that all areas in the City are equally incentivized for surrendering reserved land.

Expected Outcome

With the proposed regime of FSI following outcomes are expected: FSI will be used primarily as a tool of managing physical development;

- It will not distort the market by creating scarcity of development rights but establish a framework within which market can competitively operate;
- The need to use scarcity of development rights as an instrument of policy will be obviated;
- FSI incentive will be used only for slum rehabilitation and redevelopment of cessed buildings;
- As FSI related fiscal instruments have become a significant fiscal source for MCGM, FSI that could be obtained by payment of premium has been introduced. Considering the possibility of sustained demand for floor space, this is expected to continue to substantially contribute to MCGM's finances.
- Simplification of definition of FSI, limiting the incentive FSI to Slum Rehabilitation and Redevelopment of Cessed Buildings, is expected to reduce the transaction cost and time.

FSI and Incentives

Use of FSI as incentive is now proposed to be confined to rehabilitation of slums and redevelopment of cessed buildings.



13. Land for Public Purpose

The MR&TP Act 1966 enables so far as maybe necessary, to designate health, education, open spaces, land for community facilities, areas for transport and communication. The Act also provides for compulsory acquisition of land so designated for public purpose. The MMC Act 1888 interalia stipulates provision of primary health, primary education, and municipal markets as obligatory functions of the MCGM. Given that augmentation of these services are imperative to an improved quality of life, the DP 2034 has laid paramount significance to the assessment of existing status of distribution of amenities and future provision for their equitable distribution.

The assessment of availability of space for amenities is done through two exercises:

- Assessment of per capita availability of space for primary education, primary health, open spaces, roads, social amenities and residential use against the DP 1991 planning standards.
- Assessment of proximity to services through distance based assessment.

Existing Distribution and Provision of Amenities and Open Space

Analysis of Amenity and Open Space provision reveals that at Greater Mumbai level, the availability of area for medical amenities is sufficient, the provision of educational amenities which is slightly lower than the planning standards of DP 1991. The availability of open space is much lower than the planning standards established in the DP 1991. It is also noted that the area available for amenities varies substantially across all Wards and Planning Sectors;

The Island City presents the highest degree of provision of amenities followed by the Western Suburbs and Eastern Suburbs, in that order. Some wards like M/E and L, where more than three fourths of the population lives in slums, exhibit a major inadequacy of amenities in comparison with planning standards of the DP 1991.

The following sections provide detail assessment of existing distribution of amenities in Greater Mumbai.

Open Spaces

The ELU 2012 documents both Natural Areas and provided Open Spaces. Availability of open spaces can be computed in many ways. The per capita open space available in Greater Mumbai is 1.00 sqm per person, if only publicly accessible open spaces are considered and private clubs, gymkhanas and pools are omitted. Open space provision is 1.15 sqm per person if all the provided Open Spaces are considered. If all provided Open Spaces along with beaches and promenades are considered, the per capita Open Space available in Greater Mumbai is 1.24 sqm per person.

Availability of Per Capita Open Spaces

The DP 2034 considers the availability of per capita availability of Open Spaces at 1.24 sqm which excludes all natural areas. When compared to the DP 1991 standards, the provision of open space in the Island City is close to the standard of 2 sqm per person. However the Suburbs seem to be grossly under provided, at 1.15sqm, as compared to the DP 1991 Standard of 6 sq m per capita.

Proximity analysis for Distribution of Open Spaces

A distance based access assessment shows that local parks are well distributed throughout Greater Mumbai, with most residential areas having access to open spaces within a distance of 500 m. However, the quality, maintenance & management of these open spaces, make many of them non-usable. A distance based access assessment of larger recreational spaces shows large provision gaps in the Suburbs.

Medical Amenities

The DP 1991 formulated differential planning standards for provision of medical amenities in the Island City and the Suburbs. These were at 0.20 sqm per person in Island City and 0.39 sqm per person in the Suburbs. It also recommended that primary health be accessible for population within a 500 m radius.

Availability of Per Capita Medical Amenity

A comparison with the differential DP 1991 Standards for medical amenities indicates that the Island City is well provided in terms of health facilities at 0.36 sqm per person, while, the Suburbs seem underprovided at 0.09sqm per person. Historically, MCGM has played a pivotal role in health care provision in Mumbai, however, over the years; private provision of health care has steadily increased.

Proximity Analysis for Distribution of Medical Amenity

A distance based access assessment shows that 60% residential neighborhoods have municipal dispensaries within walking distance. There is an imbalance of distribution of primary level health care amenities across Wards, relative to both ward population as well as slum population. A distance based access assessment of tertiary level health amenities such as Government; Municipal & Private Hospitals shows several areas in the Eastern Suburbs as well as areas farther away from the Suburban Rail line in the Western Suburbs are underserved.

Education Amenities

The DP 1991 planning standards for provision of education amenities in the Island City and the Suburbs were at 0.75sqm per person in Island City and 1.10sqm per person in the Suburbs. It is also recommended that primary schools be accessible for population within a 500 m radius.

Availability of Per Capita Education Amenity

Comparison of the provision of primary and secondary educational amenities indicates that the Island City and the Suburbs are both underprovided in terms of schools.

Proximity Analysis for Distribution of Education Amenity

The assessment of a distance based access shows that most residential areas have access to primary education within walking distance. Even though the municipal education facilities are evenly distributed in Greater Mumbai, their adequacy as per the local population density and local requirement is of concern. This has implications for some wards like L, M/E and M/W that have a higher ratio of slum populations but have fewer schools and are therefore insufficient considering the number of students.

Other Social Amenities

An assessment of per capita availability of social amenities reveals that the Island City and the Suburbs both require augmentation of these services, although the Island City stands at better status. Additional demand for social amenities will be provided for in the DP based on departmental needs.

Cemeteries

There are a number of private and public cemeteries in Greater Mumbai. However, an assessment of a distance based access shows deficiencies in some areas in the northern parts of the Western Suburbs. Additionally, there are specific communities in some areas that may be underserved. The DP addresses these demands based on local requirements assessed through feedback received through Ward level consultation workshops conducted by the MCGM.

A Radar Graph Assessment of Availability of Amenities

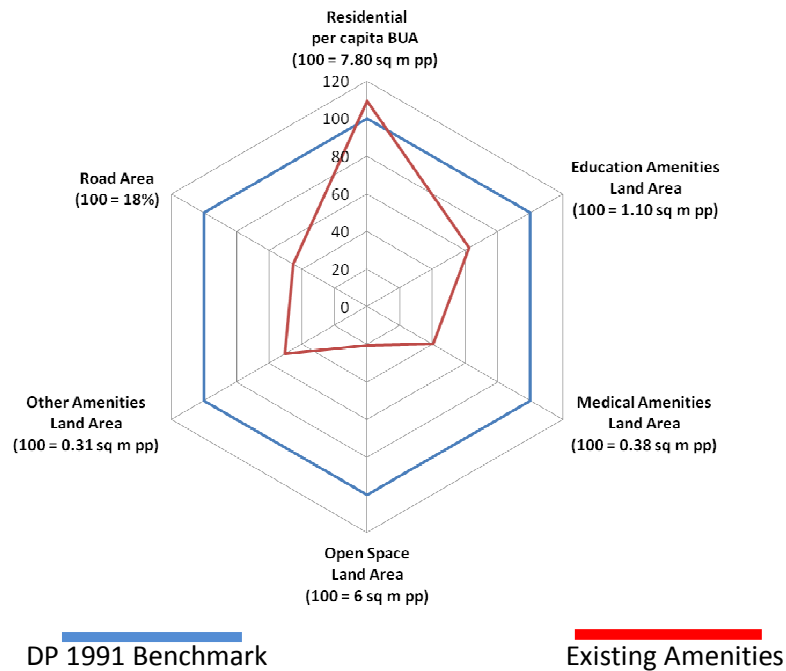
Land constraints in Greater Mumbai and the density it entails pose challenges in ensuring achievement of planning standards for making land available for public purpose. It is therefore essential to prioritize amenity demand at various levels of disaggregation. Therefore, to understand the current provision and the priority for augmentation of amenities, a simultaneous assessment of 6 dimensions has been conducted, against desirable planning standards, at Greater Mumbai, Ward and Planning Sector levels through the use of Radar Graphs. These six dimensions are: Per capita land area for educational amenities, medical amenities, recreational open spaces, social amenities, residential per capita floor space and the percentage of local road area (excluding arterial road network). Planning standards established in the DP 1991 and other development plans in the country were normalized to a per capita unit and considered as benchmarks for measurement of gap.

Greater Mumbai

The Radar Graph for Greater Mumbai reveals that, availability of open spaces requires the highest level of prioritization, followed by need for augmentation of medical, social, road area & educational amenity;

Per capita consumption of residential area is only marginally higher than the minimum standard. This is because more than 70% of Greater Mumbai lives in one room tenements and a large % of the population lives in slums.

Figure 05: Radar graph for existing per capita amenity land at Greater Mumbai level



Island City

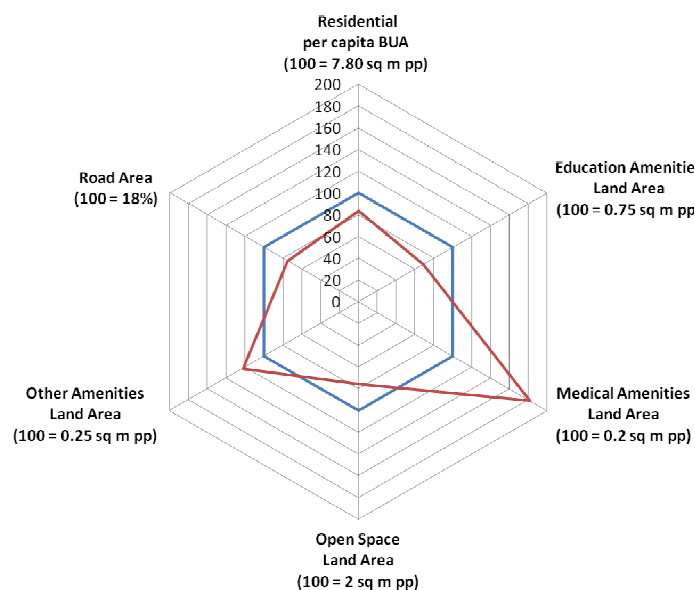
In the island City, the radar graph indicates an excess of medical amenities; this is due to the presence of large scale medical infrastructure;

Social amenities such as fire station, municipal markets and police chowkies are also well provided for in the Island City;

Augmentation of education amenities, roads and open spaces require attention;

Per capita consumption of residential area is lower than the standard. This is because of the presence of a large number of cessed buildings in the Island City which have small dwelling units.

Figure 06: Radar graph for existing per capita amenity land at Island City level

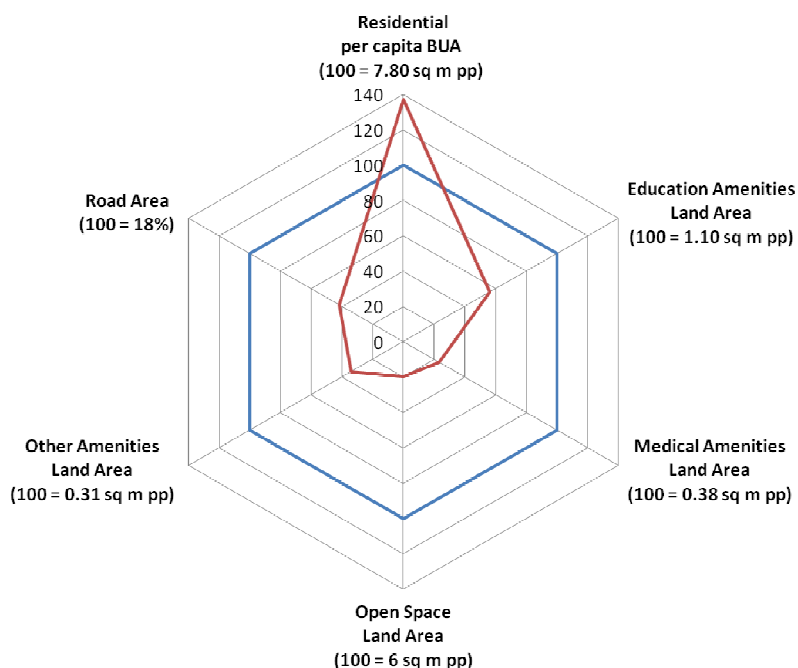


Western Suburbs

In the Western Suburbs, Healthcare is the most underprovided followed by Open Space, Social Amenities, and Roads and Educational Amenities.

Per Capita Residential Space consumption is higher than the minimum residential norms on account of a large number of higher income group residential layouts and clusters.

Figure 07: Radar graph for existing per capita amenity land at Western Suburbs level

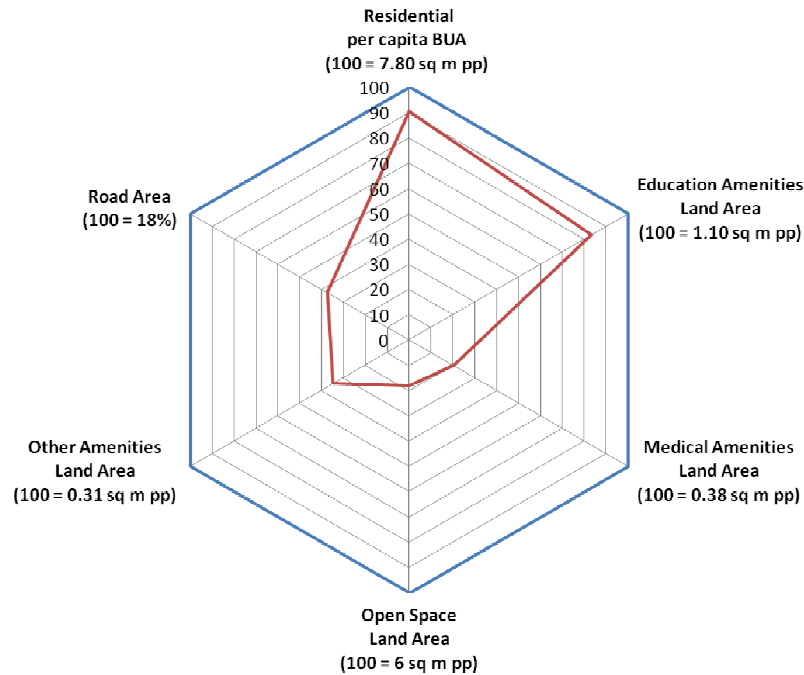


Eastern Suburbs

In the Eastern Suburbs, there is a severe under provision of Medical & Social Amenities, Roads & Open Space.

Availability of Educational Amenities & Per Capita Residential Space is closer to the norms.

Figure 08: Radar graph for existing per capita amenity land at Eastern Suburbs level



Ward and Planning Sector level Assessments

Similar assessments have been carried out at Ward and Planning Sector levels as well. The distribution of amenities varies substantially across all Wards and Planning Sectors.

Wards M/E and L exhibit a major deficit of amenities in comparison with planning standards of the DP 1991;

The Island City presents the highest degree of provision of amenities followed by the Western Suburbs and Eastern Suburbs, in that order.

An assessment of the existing provision of amenities shows that while there may be a shortfall at the Ward and Zone levels, at the Greater Mumbai level provisions may be higher. This is because several amenities serve a much larger catchment beyond Greater Mumbai, and even the Region.

Planning Benchmarks for 2034

A comparison of various local, national and international planning standards of cities with similar scale and density as Greater Mumbai served as a useful reference in establishing planning benchmarks for amenity space provision. For DP 2034, the attempt is to arrive at locally appropriate planning benchmarks that serve as broad recommendations for open space and amenities. Given the high level of population density in Greater Mumbai, proposed benchmarks have been established at four population thresholds. These are at the neighbourhood, planning sector, ward and Sub City levels.

An approach similar to the DDA norms for the Delhi MP 2021 is beneficial for Greater Mumbai, setting the starting threshold slightly higher (in order to account for higher densities and for provision of integrated primary and secondary schools to account for the low land supply), neighbourhood (10,000 population), Planning Sector (1,00,000 population), Ward (5,00,000 population) and Zone/sub-city (10,00,000 population).

Table 5: Planning Benchmarks for provision of amenities

Level	Education	Health	Open Space	Social
Neighbourhood up to 10,000	Primary School,(0.4 sqmpp) Secondary School (0.5 sqmpp) 0.9 sqmpp	Dispensary 0.013 sqmpp	Local Park, Neighbourhood Park, Play Ground	PSC (0.13 sqmpp)**, Local market (0.06) 0.19 sqmpp
Planning Sector 10,000+upto 1L	Special School (0.02 sqmpp) 0.92 sqmpp	Maternity Home/Nursing Home (0.021 sqmpp), 0.034 sqmpp	1.0 sqmpp	Police Chowky (0.01 sqmpp) 0.2 sqmpp
Ward Level 1 L + Up to 5,00,000	Degree College (0.08 sqmpp), Professional College (0.32 sqmpp),Voc Training Institute, (0.04 sqmpp) 1.36 sqmpp	Hospitals (0.351 sqmpp) 0.385 sqmpp	Community Park, Playground City-Level Park (0.01 sqmpp) 2.0 sqmpp	Police Station 0.01 sqmpp, Fire Station 0.05 sqmpp, Cemetery (0.03 sqmpp*) 0.29 sqmpp
Sub-City Level 10,00,000	University Campus (0.01 sqmpp) 1. 37 sqmpp	0.385 sqmpp		Sub-city whole sale market (0.15 sqmpp) 0.44 sqmpp

Note: *Assuming one 1.5 ha site per Ward with 5 L population**Assumptions made: a) Half of the population is underserved b) In Mumbai, computation for total population is therefore double the 0.065 sqmpp arrived at through i) 4.58 sqm per toilet assuming a block of around 14 toilets for men and women. ii) 1 toilet seat serves 50 users at 0.09 sqmpp; iii) 0.4 sqm for additional uses.

Estimating Land Demand for Amenities

Using the benchmarks established above for a projected population of 13.95 million by 2034, the following land demand for amenities is estimated.

Table 6: Zone wise Land Demand for built-up and un-built amenities (in ha)

Amenities	Greater Mumbai	Island City	Western Suburb	Eastern Suburb
Education Demand	1,255.47	252.92	591.90	410.66
Health Demand	537.06	108.19	253.20	175.67
Social-Amenities Demand	125.54	25.29	59.19	41.07
Open Space Demand	2,789.94	562.04	1,315.33	912.57
Total Demand	4708.03	948.44	2219.61	1539.96

The total demand has been further divided into built up and un-built amenity land demand. Land intensive built up amenities include education, medical, social amenities, transport and public utilities and facilities. Unbuilt amenities include Open Spaces (including recreational open spaces and zoo) and Cemeteries.

Table 7: Demand gap estimate (in Ha)

	Greater Mumbai	Island City	Western Suburb	Eastern Suburb
Total Built Up Amenities	1,876.24	377.98	844.56	613.70
Total Un-built Amenities	2,831.79	570.48	1,335.06	926.26
Total Demand	4,708.03	948.45	2,219.61	1,539.96

An assessment of total land demand for amenity at Island City and the Suburbs with respect to existing amenities available and vacant land available for making reservations for public purpose was conducted (Refer Table 8).

Table 8: Amenities space demand gap at Greater Mumbai level

	Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
1. Total Demand	4,708.03	948.45	2,219.61	1,539.96
2. Total existing amenity land available*	2,272.63	827.89	936.21	508.53
3. Demand Gap 1	2,822.39	185.48	1411.68	1225.22
4. Reservations lying vacant	1,590.50	123.06	1,062.13	405.31
5. 50% of currently vacant land	364.06	22.99	208.30	132.77
6. Total vacant land available for reservations DP 2034 **	1,954.56	146.05	1,270.43	538.08
7. Unbuilt Amenities Demand (Gap)	1,557.95	38.21	777.51	742.23
8. Balance vacant land available for Built Up Amenities (6-7)	396.61	107.85	492.92	-204.15
9. Total Demand for Built Amenities (Demand Gap)	1,264.44	147.28	634.17	482.99
10. Built Amenities Demand Gap (8-9)	-867.83	-39.43	-141.25	-687.14

*DP 1991 Designations and Reservations implemented and amenities realized outside of DP1991 Reservations as recorded in ELU 2012.

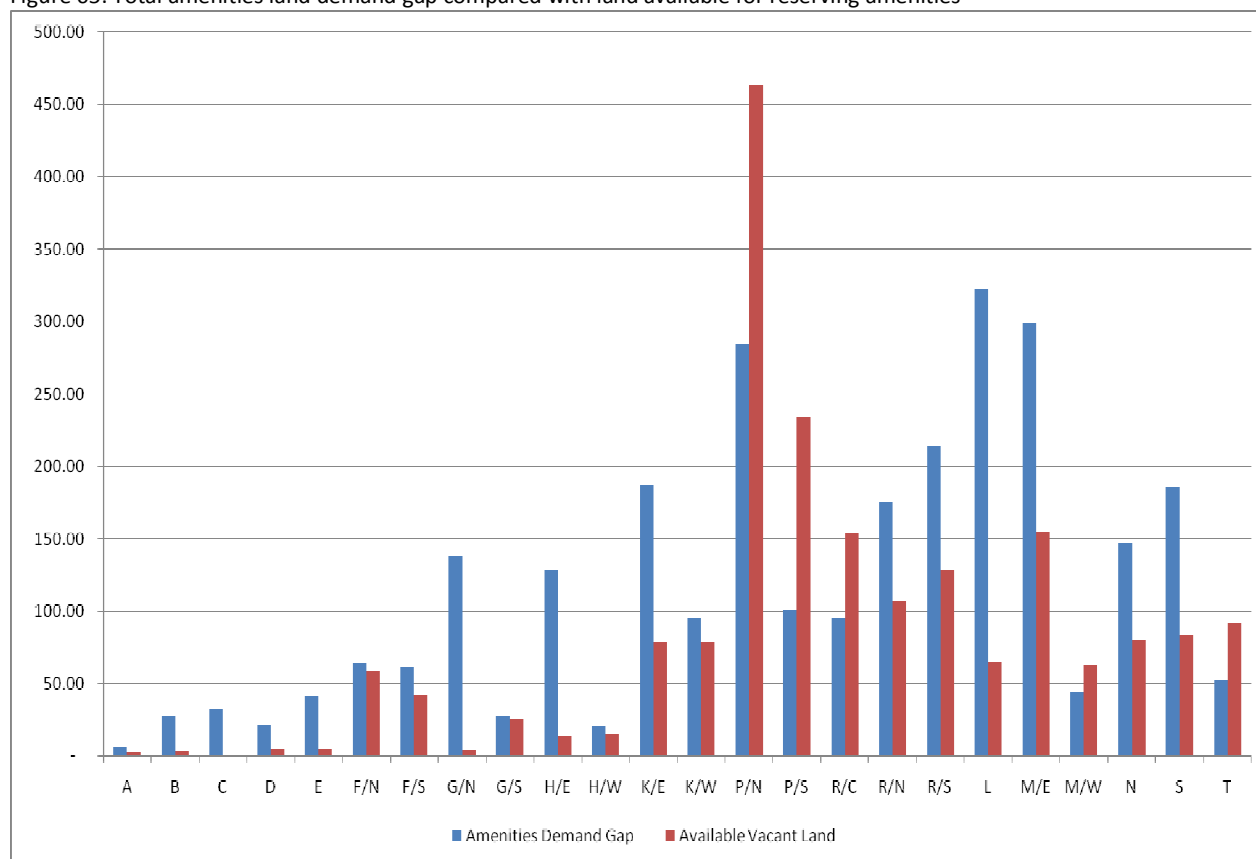
**DP 1991 Reservations lying vacant and 50 % of remaining vacant land.

An assessment of the total built up and un-built amenity land demand gap reveals that while most of the un-built amenity land demand is met with, approximately only 50% of the built amenity land demand can be addressed, given the scarce vacant land resource. On an average the land available for providing requisite amenities is scarce.

Given the scarcity of land in Greater Mumbai and the unmet built amenity land demand, the land demand for built amenities has been re-estimated by factoring in FSI. The demand for land therefore reduces by 70% with reliance on FSI for provision of built up amenities.

The following graph shows the total land demand gap for the 24 Wards in Greater Mumbai against the total land available for allocation of reservations for public purpose.

Figure 05: Total amenities land demand gap compared with land available for reserving amenities



This assessment reveals that in 18 of the 24 Wards, the land demand for amenity far exceeds the land available for reservation. This clearly suggests that the amenity space benchmarks are already higher than the land Greater Mumbai can offer for reserving land for public purpose. Any normative increase in the amenity space benchmarks would not be pragmatic given the stringent land constraints in Greater Mumbai.

Implementation and Policy Instruments

Various policy instruments have been used in the past to make land available for public purpose, but with changing needs of the city, it is necessary to review the success and drawbacks of these tools and propose tools that would allow for optimal use of land in an equitable manner to fulfil these needs.

The DP 1991 prescribed reservation and designation of land for public purpose. Accommodation reservation was applied as a policy instrument for obtaining built amenity space. While acquisition of land remained a challenge most amenities were realized through the accommodation reservation. Further, with the introduction of RFCTLARR Act 2013, the value of compensation of land to the private owner has increased up to twice the prevailing Ready Reckoner price for land, making land acquisition by the public authority extremely challenging. This implies that the DP 2034 will have to rely on instruments such as Transfer of Development Rights and Accommodation Reservation for realization of space for amenities.

An assessment of status of implementation of reservations in the DP 1991 reveals that between 25 to 40% of the total reservations were implemented across the Wards in Greater Mumbai, while most

of the reservations were realized through the application of AR and TDR. This assessment also demonstrated that most reservations prescribed in the DP 1991 were not relevant for changing needs of the population over a 20 year plan period. The DP 2034 has introduced new policy instruments towards catering to evolving needs of the population.

Creating a Pool of Land for Public Purpose

The above assessment on implementation of DP 1991 reveals that the methods of obtaining land for public purposes used so far are at the most relevant where land is currently vacant. However, the extent of vacant land is rather limited in Greater Mumbai. Most development in Mumbai is going to occur through redevelopment. Land for public purposes can therefore be obtained through the process of redevelopment. However in such a case instead of prescribing specific use, the contributions could be for building a pool of land for public purpose. Use of such land could be decided when such land becomes available considering the community needs and priorities at that time. Incremental supply of land for public purpose will also ensure its realization at appropriate locations.

The apprehension about such an approach would be of getting small fragmented pieces of land that would not be of much use. This could be overcome by rationalizing FSI that facilitates redevelopment without compromising the setback requirements. This would incentivize amalgamation and assembly of land in larger parcels. In that case the contribution of land for public purpose would also be of a reasonable size that could be meaningfully used.

This Land Pool would not be tied to any particular reservation demarcated on the Plan. This land pool can then be made available for amenities through a participatory Second tier planning process for prioritized needs of each Planning Sector/Ward.

Therefore, while permitting consumption of higher FSIs, development control regulations mandate a contribution of 10-20% (based on parcel size) of land from plots larger than 2000 sqm for public purpose. Smaller amenities such as PSCs, aanganwadis, health posts, which require smaller parcels of land, could be developed through such contributed land. As such the DP does not make reservations for such smaller amenities, except in areas around slums, so that the creation of such facilities does not have to depend on the rate of redevelopment in those areas.

The current practice has been to insist 15% area of the land for provision of Recreation ground. However, these areas were never insisted to be in public domain and rested with respective plots. During course of time these open spaces were most often put to use as private parking, leading to the loss of open space amenity. The DP 2034 now stipulates reduced contribution of land for public purpose at 10% of the total parcel area being opened to public use. This will serve as a positive feature in ensuring private developer's land contribution for public purpose.

Simplification and Flexibility for Reservation Policy

Development plans in 1967 & 1991 had included very detailed and specific designations. For example open spaces had 25 different designations and educational institutions had over 40 designations.

In a twenty-year perspective it is not possible to estimate and ascertain the requirement in such details. Moreover, designations in such details if incorporated in Development Plan bring in rigidity

in use. Any change that may be required over the years requires a long legal procedure to bring about a change. It is therefore necessary to develop a simplified and flexible policy for reservations/designations.

The first change incorporates simplification of reservation categories from more than 380 categories of reservations of the DP 1991 to 10 basic categories, further broken down to 30 sub-categories. The new categories considered allow mix of amenity uses, therefore bringing flexibility of use of amenities to suit changing demands over time at local area levels. Similarly, designation categories have also been simplified to 11 basic categories and 39 sub-categories, ensuring flexibility in use of these amenities when they redevelop. Unnecessary reservations are hence avoided and this reduces the burden on making land available for each category.

Assigning Land for Public Purpose on the Proposed Land Use Map

Reservation and Designation categories so formulated are assigned to the Proposed Land Use Map. The criteria for making reservations of land for public purpose evolved are as follows:

- Radar Graph Assessments
- Trade-offs within City/Ward/Planning Sector
- Access to Transit and Mobility
- Adjacency to complimentary uses
- Prioritizing Slum areas for amenity provision

Specific attention has been paid to ensuring that the lands reserved are not encumbered. Further, vacant land granted with IOD and CC has not been considered for allocation of reservation.

The following section includes Ward wise allocation of reservations.

Proposals

Table 9: DP 2034 Amenities Reservation-zone wise (in Ha)

	Greater Mumbai	Island City	Western Suburb	Eastern Suburb
Total Built Up Amenities	385.90	23.77	253.91	108.21
Total Un-built Amenities	2245.17	126	1311.69*	807.46*
Total	2631.07	149.77	1565.6	915.67

*Includes reservations in Erstwhile NDZ Areas.

Radar Graph Assessment for Designation and Reservations assigned in DP 2034

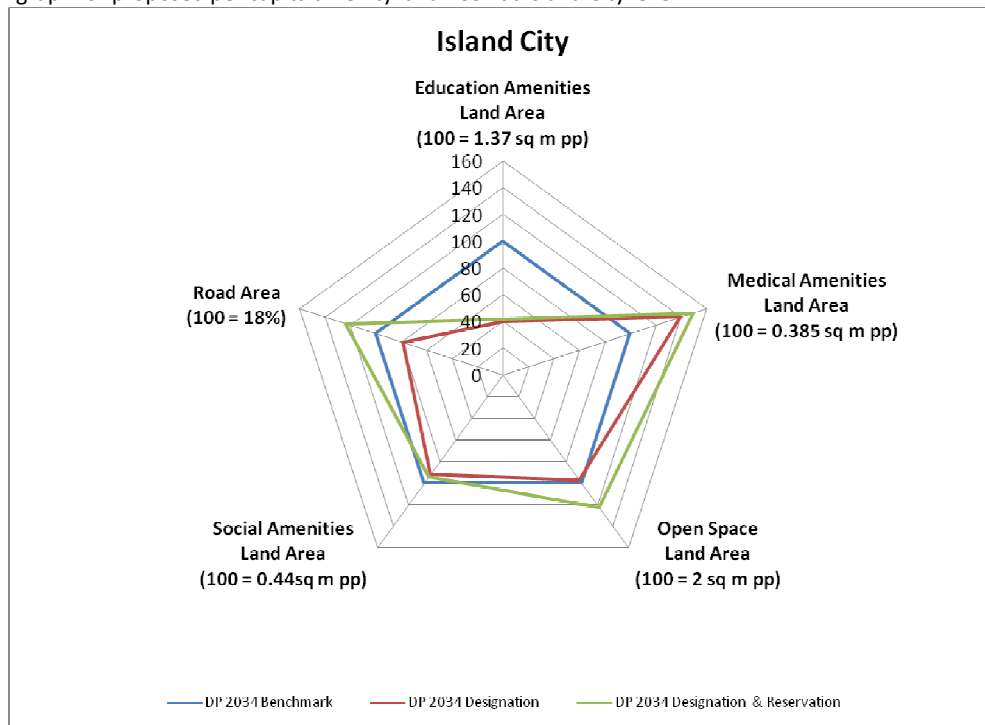
Radar graphs generated for measuring the proposed distribution of amenities at Greater Mumbai, Island City, Eastern and Western Suburbs are presented here.

Island City

The radar graph for Island City reveals that provision of designated medical amenities exceeds the DP 2034 planning benchmark; this is due to presence of large scale city level medical infrastructure. Open Space provision exceeds the DP 2034 benchmark. Provision of roads is marginally higher than

the DP 2034 benchmark. Education amenities provision is significantly lower than the benchmark. Per capita availability of Social amenities is marginally lower than the benchmark.

Figure 09: Radar graph for proposed per capita amenity land 2034 at Island City level



Note:

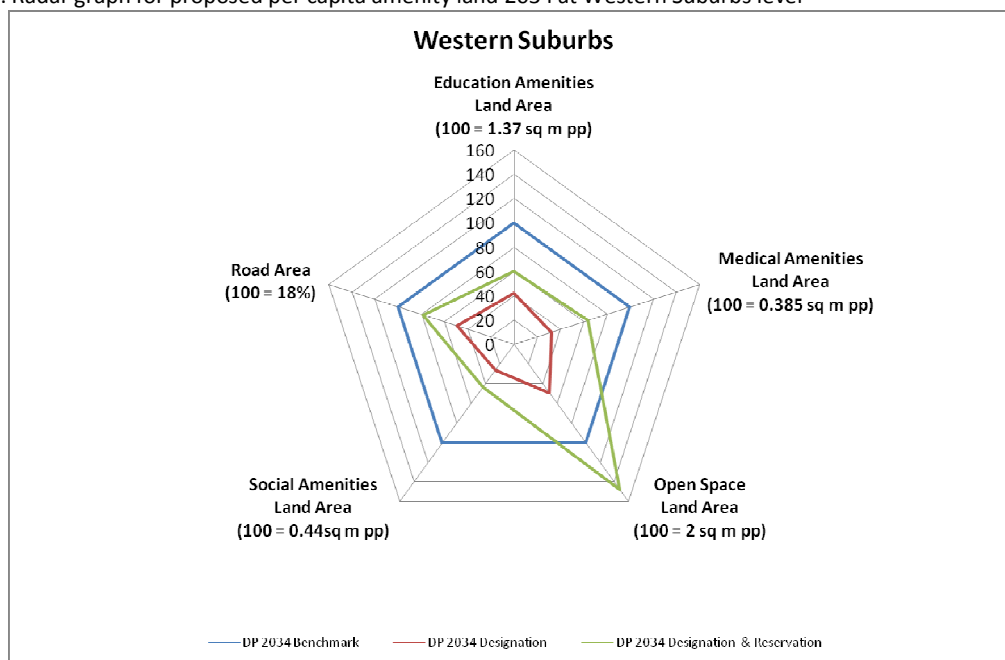
The radar graph for Island City reveals that provision of designated medical amenities exceeds the DP 2034 planning benchmark; this is due to presence of large scale city level medical infrastructure. Open Space provision exceeds the DP 2034 benchmark. Provision of roads is marginally higher than the DP 2034 benchmark. Education amenities provision is significantly lower than the benchmark. Per capita availability of Social amenities is marginally lower than the benchmark.

Per capita Social amenities include Sub-city market (0.15sqm), Cemetery (0.03sqm), Police Station (0.01sqm), Fire Station (0.05sqm), Police Chowkey (0.01sqm), local market (0.06sqm), and PSC (0.13sqm).

Western Suburbs

The radar graph for Western Suburbs reveals that provision of Open space exceed the DP 2034 benchmark. Per capita availability of open spaces has almost increased three times the current availability. Provision of Social amenities is significantly lower than the benchmark. Road area provision is lower than DP 2034 benchmark. Per capita availability of Education and Medical amenities is also significantly lower than the DP 2034 benchmark.

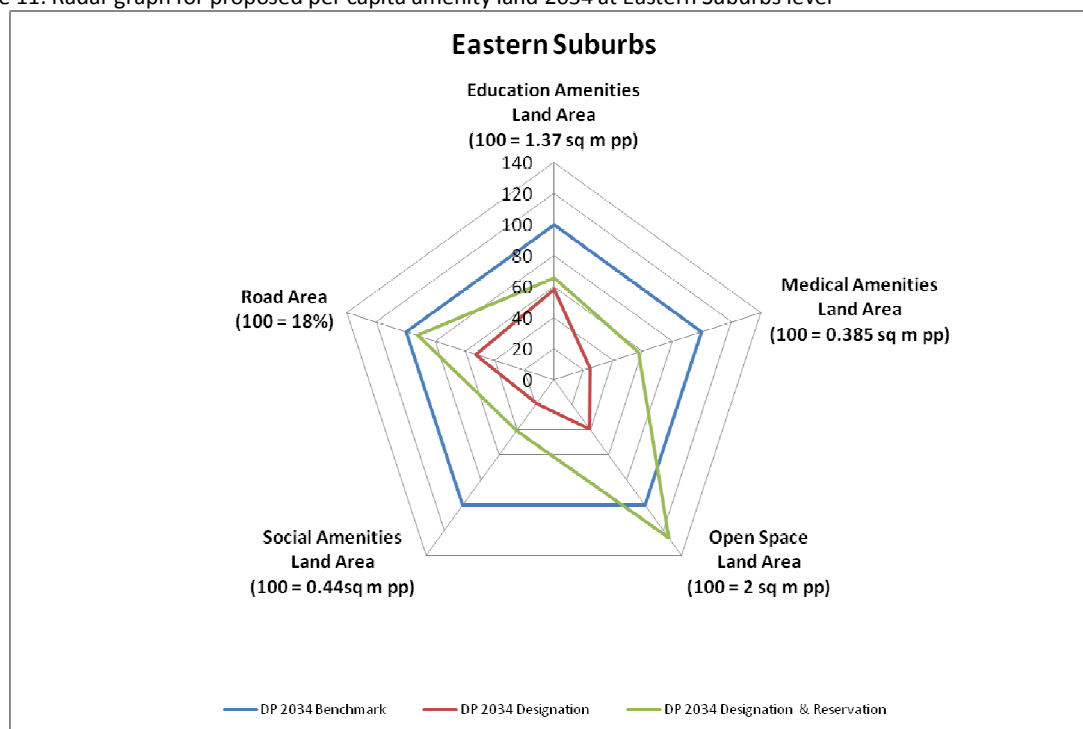
Figure 10: Radar graph for proposed per capita amenity land 2034 at Western Suburbs level



Eastern Suburbs

The radar graph for Eastern Suburbs reveals that provision of Open Space exceeds the DP 2034 benchmark. Per capita availability of Social amenities is significantly lower than the benchmark. The provision of road area is marginally lower than the DP 2034 benchmark. However, per capita availability of Education and Medical amenities is significantly lower than the DP 2034 benchmark.

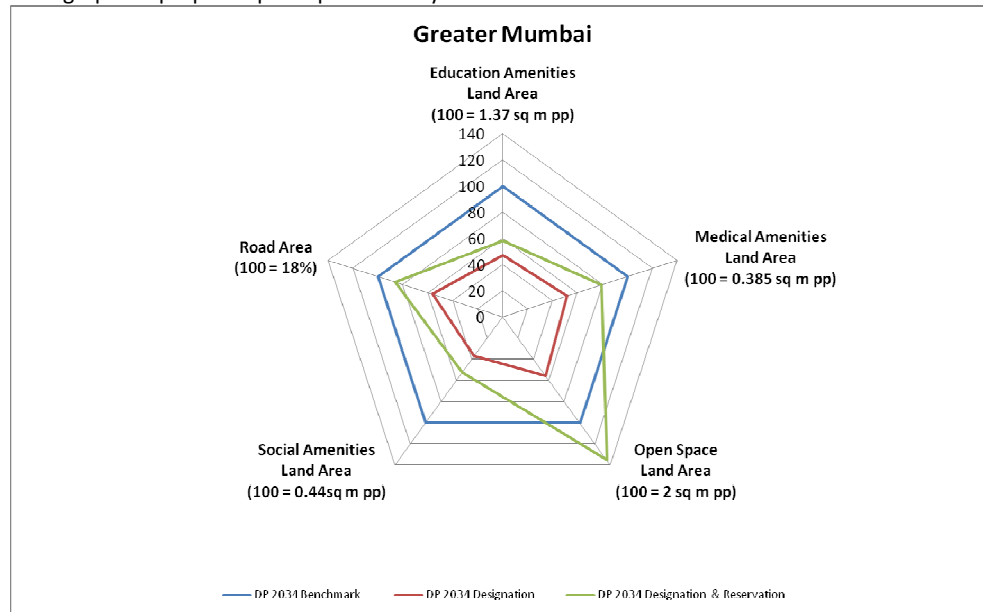
Figure 11: Radar graph for proposed per capita amenity land 2034 at Eastern Suburbs level



Greater Mumbai

At Greater Mumbai level, the radar graph reveals that provision of Open Space is prioritised in DP 2034. As a result, the per capita Open Space allocation at Greater Mumbai level has increased three times, through reservations. Provision of social amenities is significantly lower than DP 2034 benchmark. Provision of road area is marginally lower than the DP 2034 benchmark. Per capita provision of education and medical amenities is also significantly lower than the DP 2034 benchmark.

Figure 12: Radar graph for proposed per capita amenity land 2034 at Greater Mumbai level

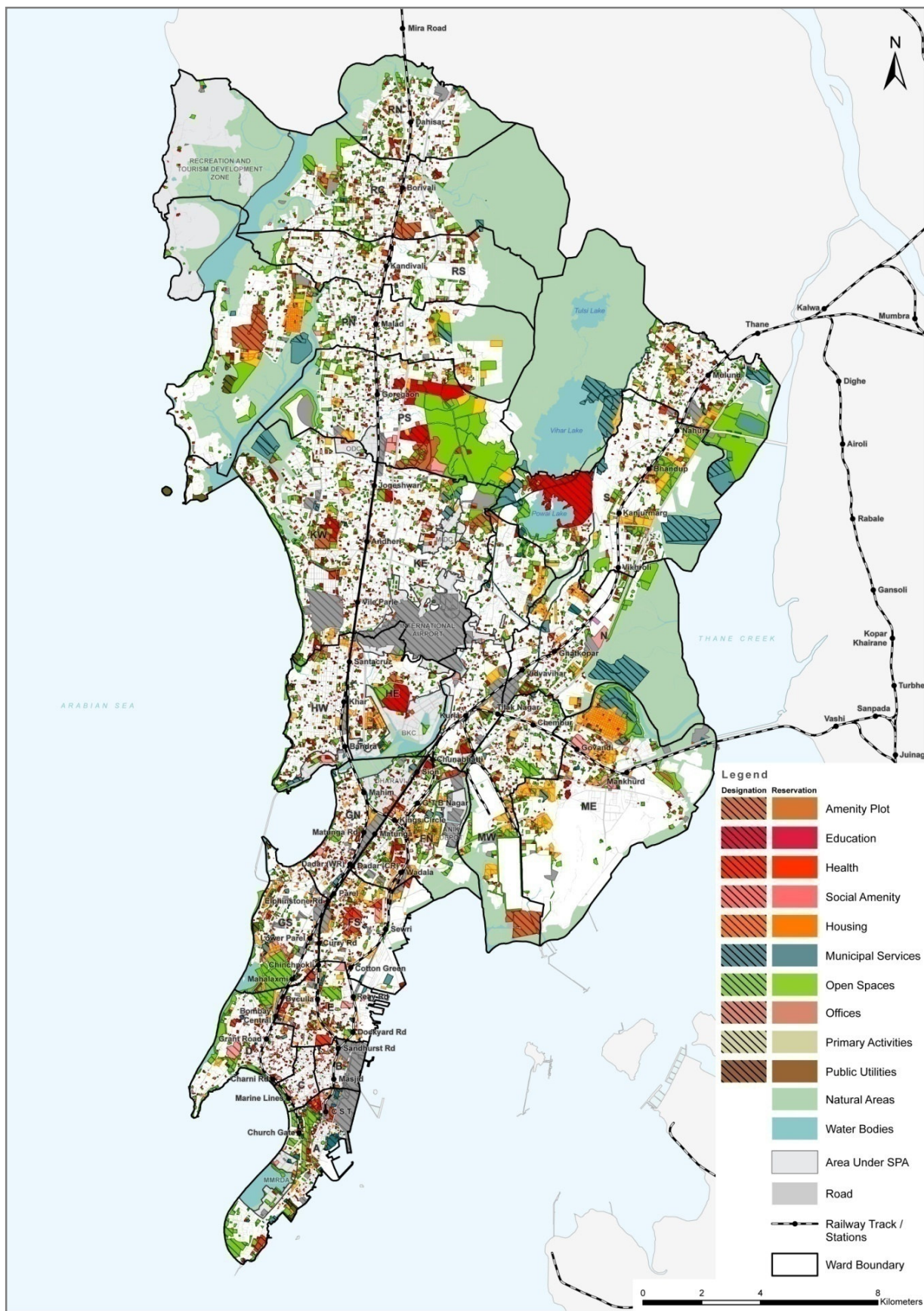


The above assessment reveals that there is a significant shortfall in provision of built amenities which primarily includes education and medical amenities. Provision of un-built amenities, particularly open spaces, has been prioritised.

Note:

- The benchmarks for educational and medical facilities are also expressed in terms of land. However, as they require built up area, with flexible FSI it would be possible to meet the built-up area requirement. Although some augmentation may be possible from the pool of land for public purpose, the deficit of land area may persist;
- The number of amenities included under 'social amenities' individually require small area. It has not been possible to indicate reservations for all of them. However, their requirements can be satisfied by allocation from the pool of land for public purposes;
- Similarly specific reservations for PSC have also not been possible. Instead a provision has been made in the GDCR making it mandatory for all public buildings to provide for PSC.
- In few wards provisions seem to be exceeding the benchmarks. However, in most such cases they serve adjoining wards as well.

Map 7: Designation and Reservation of land for public purpose





Wards in Eastern Suburbs and Western Suburbs have very large populations, some even exceeding population of small towns in India. In order to augment efficient management of service delivery and DP implementation, Municipal Corporators have demanded that these large Wards be divided into two. The DP 2034 includes a recommendation towards the same. The provisions for future Ward offices have also been included in the PLU 2034. The DP 2034 has recommended plausible delineations of these ward boundaries, as shown below (Refer Map 8).

14. Transportation & Road Network

The Existing Situation Analysis (ESA) identifies under provision of rail and road, insufficient coverage of public transit in the outlying areas, an increasing rate of car ownership, inadequate traffic & travel demand management initiatives, poor provisions for pedestrians, as some of the key mobility related issues. Private vehicle ownership increased in Greater Mumbai from 52 per 1000, to 82 per 1000 between 1996 and 2005 and the forecast for 2031 is 197 per 1000. However, Mumbai's transportation sector also exhibits several strengths, 51% of all trips are performed by walk alone. Suburban Rail network accounts for more than 7 million daily trips and the bus transport system accounts for over 5.5 million daily and the bus transport system accounts for over 5.5 million daily trips. These account for 75% of all trips by mechanical modes. Many of the existing stations already exhibit characters desirable in the design of transit-oriented development, such as compact, high-density, mixed, car-free, walkable nodes, which are integrated with other modes of public and Para-transit. It is worth noting that the Greater Mumbai displays a strong interconnectedness between distribution of Land Use and public transport networks.

Further, in terms of road network, Greater Mumbai also has adequate network of major roads, in both the North-South directions but needs strengthening in East West orientations. The Eastern Express Highway and the Western Express Highway cater to the North-South road traffic. The existing Santacruz – Chembur Link Road, Jogeshwari–Vikhroli Link Road cater to the East – West road traffic. Proposed major roads connecting Goregaon to Mulund shall serve the required linkage towards the North. The proposals therefore focus on provision of missing links at the local levels.

MCGM has undertaken a Comprehensive Mobility Plan (CMP) which will extensively deal with transportation and provide a detailed traffic and transportation plan.

Approach to formulation of Proposed Roads

The proposals for the transportation sector of the DP 2034 are:

Proposals for new DP roads and alterations to existing roads

To fulfil the need for improved connectivity via roads in Greater Mumbai, the DP proposes for augmentation of existing roads and alterations to existing ones to cater to the future demands of the city. The DP roads form a part of a larger mobility framework. The current percentage of road area at the Greater Mumbai and Ward level is evaluated and compared with national planning standards and standards adopted in cities of similar scales, in order to assess demand for additional road area. The proposal incorporates strengthening the existing internal streets and creating fine grid of secondary and tertiary road networks in order to facilitate local connectivity. The Comprehensive Mobility Plan undertaken by the Roads and Traffic Department of the MCGM will be taking cognizance of the DP proposals in their transport planning process. The CMP shall incorporate

proposals at macro and local area levels. Therefore, it is envisaged that the DP 2034 shall require amendments in the proposed transportation and road network plan, subsequent to the finalization.

Space provision for Transport related activities

As per demands from City level and Ward level municipal services departments, land area for road depots and transport garages has been reserved in the DP 2034;

- Integrated land use zoning with transit networks;

The DP proposes for special zoning around transit nodes with the focus to ease mobility within Greater Mumbai and encourage public transport in congruence to the growth in these nodes.

- Parking regulations

The GDCR includes regulations for off-street parking, which includes mandatory provision of parking spaces in various land uses and occupancy types.

The GDCR includes regulations for off-street parking, with a mandatory provision of parking spaces in various land uses. This is provided in the form of number of cars for every 100 sqm built-up area. For residential occupancy, 1.33 car parking spaces are mandated for every 100 sqm BUA. Similarly, for commercial establishments, 1 car park is mandated for every 100 sqm BUA. These space mandates vary for residential hotels, lodgings, hotels, educational institutions, medical institutions, auditoriums, shops, restaurants, industrial uses and warehouses. In DP 1991 parking distribution was further categorized as per different tenement sizes, but in DP2034 parking provision is uniform across all tenement types. Additional parking space for visitors is now deleted in the new regulation and is included within the standard norms. Any additional parking space provided, more than the mandatory requirement, would be counted in the FSI.

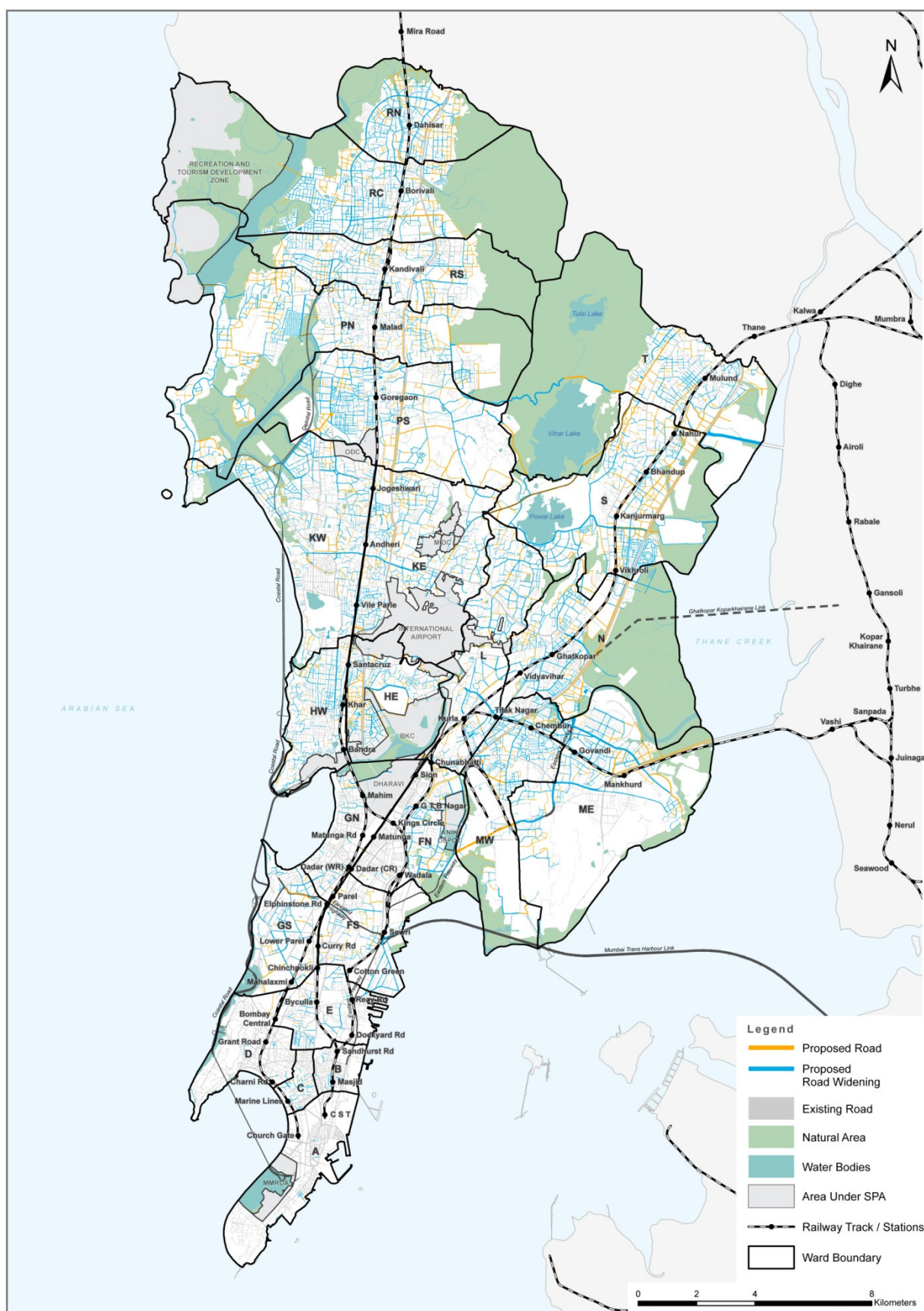
Areas with high FSI are proposed around transit stations. These areas have been created to encourage public transit, reduce vehicular ingress, curb the use of private vehicles and promote walking. Hence, in areas where proposed FSI is 6.5 and above, parking provision is to be half of that provided in the GDCR, for residential, commercial, retail, hotels and industrial land uses.

GDCR has also allowed entire plots to be used for commercial parking, which would be permissible in both RC and CR zones. It could be in the form of Multi Level Car Parking, Mechanized Parking or Puzzle parking where volume to plot ratio will be considered where the maximum allowable ratio would be 12.0. All plots fronting 18.30 m of road could be developed for parking, where 15% of the plot would be used for other commercial purpose as an incentive.

Proposed Roads

The benchmark established for provision of proposed roads in Greater Mumbai is derived from Master Plan for Delhi 2021. The DP 2034 therefore stipulates 18% of the total developed area as desirable road area. At the Planning Sector level a benchmark of 12% has been set with respect to total developed area.

Map 9: Proposed road network map 2034



The percentage of the proposed roads in every Ward varies, where benchmark of 18% has been met in wards B,C,E, F/N, G/N, H/E, H/W, K/E, K/W, L, N, R/C, R/N, R/S and T. The remaining wards have marginally reached the benchmark except M/E ward where proposed roads are only 11% of the ward area, and hence under provided. Wards which do not meet planning benchmarks may be undertaken for further network augmentation at the local area planning level.

The percentage of proposed road network at Greater Mumbai level is 18.25% of the total developed area. This is in tandem with the benchmark established at 18%.

The DP incorporates the following proposals shown in table 10, below:

Table 10: Proposed roads

Proposed Roads	Area in Ha
RL buffer	315.96
Proposed road area	989.28
Proposed road above 18.30	616.12
Proposed road below 18.30	373.15
Proposed road minor road area (upto 9.15)	97.24
Proposed road widening	657.55
Type	Count
No of rail over bridge	21
No of rail under bridge	3
No of nala bridge	13

The MCGM has undertaken detailed site verifications to ascertain the feasibility of proposals for DP Roads.

15. Physical Infrastructure: Departmental Demand & Proposals

While the quantity of water supplied in Greater Mumbai is above standards, coverage of water supply system to slum areas and inequitable distribution are of concern, with the unbilled supply and wastage totalling to around 38%. Not all sewage generated is collected. Very few slums are connected to the sewerage network leaving sewage from the un-serviced areas untreated. The storm water drainage system has surpassed its capacity due to increasing runoff caused from extensive paving activity. Only around 50% of the houses are covered under door to door solid waste collection system.

The DP 2034 brings together various sectoral plans and takes cognizance of existing and proposed infrastructure facilities so as to cater to future demand.

Water

The total demand of water for Greater Mumbai is around 4000 million litres per day but the total planned water supply about 3950 MLD per day which includes water used for domestic, commercial and industrial purposes after execution of Middle Vaitarna Project. The water supply availability varies ward-wise with some wards like B ward showing a shortage of per capita water supply. The focus of the new proposed projects includes augmentation of water resources, replacement of old mains and universal metering. Gargai & Pinjal project (GoM) and Damganga project (NWD) are source development projects, which would increase the yield by an additional 2250MLD by 2025.

The implementation of these projects will ensure that the supply of water will be adequate for the DP 2034 plan period.

Sewerage System

The sewerage system comprises of sewer lines, sewage pumping stations, waste water treatment facilities, marine outfalls, lagoons, manholes and inspection chambers. Only 63% of total sewage generated in the city is collected by the existing system and it lacks the sewerage network for nearly 40% of the city. Untreated sewerage reaches the Malad Creek thereby polluting the ecosystem, rise in amount of sewage generated; dilapidated conditions of sewer lines are some of the main issues of the sewerage system. The Mumbai Sewerage Disposal Project (MSDP) Department is undertaking Sewerage Master Plan for the year 2025 that includes laying new sewers, upsizing or rehabilitation of sewers, proposing pumping stations, construction of collector tunnels, transfer tunnels and marine outfalls. Locations and area demands for these facilities that have been obtained from the department are included as proposals. Additional sewerage pumping stations are proposed at Wards A, D, K/W, H/W, H/E, M/W, L, P/N, R/N.

Storm Water Drainage

The SWD system constitutes network of underground closed or piped drains, road side surface drains, major nallas, minor nallas, to release rainwater and waste water into the sea. The city faces severe flooding and water clogging issues during monsoon and the existing system is incapable of handling high intensity rain. BRIMSTOWAD and Mithi River projects are being undertaken by the MCGM to augment the SWD system. The issues to be addressed to ensure an effective SWD system include deepening and widening of nallas, regular desilting of water beds, removing obstructions that clog or restrict the continuous flow of water, SWD which is capable of handling 50 mm/hr intensity rainfall with runoff coefficient of 1.00 and to construct storm water pumping stations to speed up the drainage. The SWD Pumping stations proposed under the BRIMSTOWAD and Mithi River projects.

Solid Waste Management

The Solid Waste system involves segregation, collection, storage, transfer, transportation, processing and disposal of solid waste. Only 83% of solid waste in the MCGM area is collected through the current system, while the remaining waste from the MCGM jurisdiction and waste on non-MCGM lands (such as Railways lands) is underserved. The city generates 7800 MT of solid waste and additional construction debris of 4700MT per day. The three solid waste disposal sites in Deonar, Kanjur and Mulund have a total of 6,500 MT per day of processing capacity. The current provision is insufficient for the growing increase in per capita waste being generated and increase in construction waste. Hence, there are ongoing projects on these sites which would increase the processing capacity. Also there are sanitary refuse sheds that have been proposed. In accordance with departmental demand, an additional dumping ground has been proposed in T Ward. Refuse transfer stations are proposed at G/S, P/S, F/N Wards. Extension to existing refuse transfer station has been proposed at L Ward. Land for bio-medical waste treatment facility has been reserved at N and T Wards.

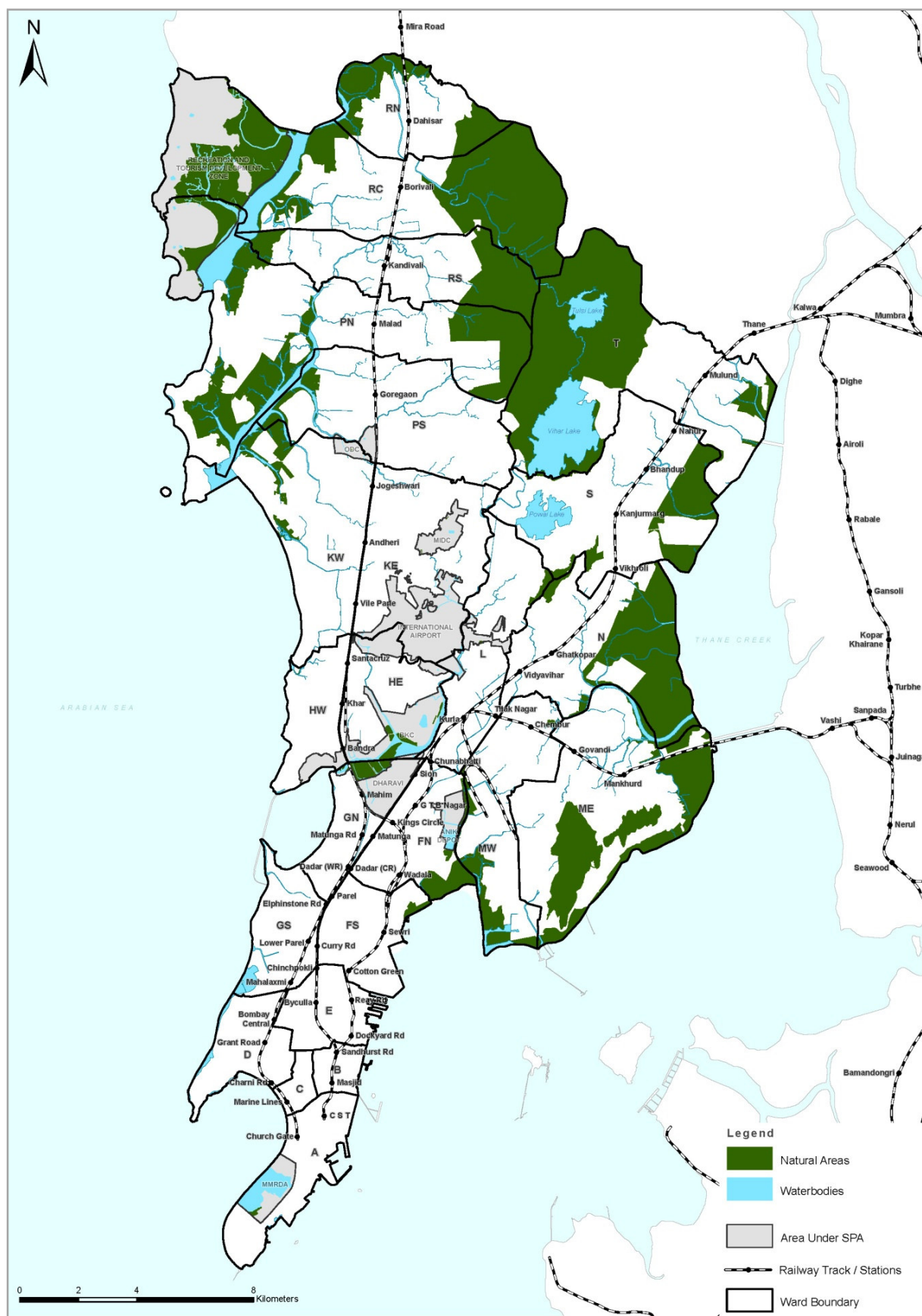
16. Environment

One third of Mumbai's land is under natural areas which include a diverse range of ecologically significant features, forests, rivers, natural drains and lakes, large expanses of vegetation, natural rock formations, hills, beaches, mangroves and mud flats. Natural Areas and Open Spaces constitute about 30.94% of the total area (within Administrative Ward Boundaries) of Greater Mumbai; of which, 88.02% is constituted by Natural Areas which includes protected areas and water bodies and 11.98% area is occupied by Open Spaces. This indicates that a very low proportion of open area is available for public use. Greater Mumbai's environmental health is affected by increasing air pollution (caused by vehicular pollution and construction) and water pollution (caused by inadequacies in the sewerage system) while its coastal location makes the city vulnerable to flooding and landslides especially during the monsoons. Mumbai's development has historically been brought about by altering the natural environment through reclamation, quarrying of hills for construction material, covering and narrowing of drains, clearing mangroves and altering river courses. Owing to the land constraints, a restrictive FSI regime of DP 1991 and demand for more space, areas under the environmental features became far more susceptible to the demand for built space. In many places natural slopes and drainage patterns have been altered irrevocably while the existing water courses largely double up as sewers and drains. Also, the provision of open spaces is affected due to pressure on land for development and exorbitant land prices.

Preservation of natural areas including forests and mangroves is one of the major objectives along with augmentation of existing system of green and blue networks, wherever possible.

The DP 2034 acknowledges the important role environmental features play in sustaining and protecting the city. An important spatial strategy of DP 2034 is therefore to recognize presence of natural features to restore them or ensure that the developments around them occur in a sensitive manner and do not lead to further deterioration. However, a more comprehensive view and approach to environment is deemed necessary.

Map10: Proposed natural areas zone delineated for preservation



17. Development Control Regulations

The original DCR 1991 underwent several modifications over the plan period. Initially, the DCR 1991 covered:

- Provisions for acquiring land designated public purpose by granting TDR in lieu of monetary compensation;
- Allowing development of the plot reserved for public purpose subject to the condition that built up area required for the public purpose along with part of the plot is surrendered to planning authority free of cost. (Concept of AR)
- In Situ slum redevelopment by granting FSI up to 2.5.
- Allowing redevelopment of mill lands by permitting conversion of Industrial use to Residential/ Commercial use by sharing land approximately in proportion of 1/3rd each to mill owner, MCGM for open space and MHADA for mill workers housing.
- Permitting additional FSI in case of star category hotels, Schools, hospitals.
- Allowing change of industrial zones to residential/ commercial purposes.
- Permitting relocations of reservations and allowing realignment of roads within the same holding.
- Different parking norms in city and suburbs as well as in high-end areas like Nepean sea road and JVPD scheme.
- Discretionary powers to M.C. for allowing development by relaxing any dimension except FSI in cases of hardship.
- DCRs 1991 were subsequently amended from time to time as summarized below:
- 1997- Separate set of regulations enabling Slum Rehabilitation was introduced. The entitlement of eligible slum dwellers was defined and the scale of incentive FSI for subsidising slum rehabilitation was also specified. FSI that could not be consumed in situ within the prescribed limit (initially 2.5 later raised to 3.0 in 2000) was allowed to be used as TDR.
- 1999- Heritage buildings and precincts were listed and buildings were categorised into three grades. A separate set of DCRs was prepared and a Heritage Conservation Committee was established to review development proposals in respect of heritage buildings and buildings in heritage precincts.
- 1999- Entitlements of eligible tenants in Cessed Buildings were decided and scale of incentive FSI for subsidising reconstruction of Cessed Buildings were introduced by way of a separate set of DCRs. Unlike in case SRA, the rehabilitation and the incentive FSI could be used in situ without any limit.

- 2002 - The original rule of textile mills was reinterpreted by Government with the result that in the final outcome only @ 5% of land came to MCGM and another 5 % to MHADA.
- 2003 - The permissible FSI for educational and medical use was enhanced to 4 times the permissible FSI.
- 2008 - Redevelopment of MHADA layout was granted FSI upto 2.5.
- 2008 - New provisions for grant of 100% additional FSI to IT/ITES and bio-technology establishments were added.
- 2008 - Provisions for promoting development of Multi storeyed/Parking lots by granting additional FSI were added.
- 2009 -For urban renewal of Cessed Buildings additional FSI was granted.
- 2009- The starred category hotels were granted additional FSI based on the star category to the extent of 5.0
- In 2009, the requirement of parking spaces was enhanced by nearly doubling the parking requirement.
- 2010- Provisions for grant of additional FSI to Buildings of Information Technology and Information Technology Enabled Services were added.
- 2010 - Provisions for considering nalla and appurtenant service road as reservation in DP and granting FSI/TDR were incorporated.
- 2012 - The concept of compensatory fungible FSI was introduced by allowing additional FSI of 35% in lieu of certain areas permitted free of FSI by charging premium. (This is discussed at length in FSI chapter).

In the light of experience of DCR 1991, and approach adopted for formulation of main proposals of DP2034, the approach and structure of DCR2034 is articulated as follows:

- The DP is seen as a broad framework for guiding the development. This has to be followed by undertaking detailed local area plans as and when necessary. Corresponding to this a common set of DCRs called General Development Control Regulations (GDCR2034) has been formulated.

Special Development Control Regulations (SDCR 2034) are formulated for areas and streets where the special character of the place is maintained.

As envisaged earlier local area plans will be of following nature.

- a. Areas where need of special regulations has been recognized. In this plan and a set of SDCRs have been included. These are for redevelopment of cotton textile mills, provisions of arcades along certain stretches of roads and roads along which no front margin is required.

- b. Areas where more detailed plans will be required particularly dealing with public realms such as in TOD. These could be undertaken by MC in due course, along with the necessary SDCRs. Such plans are not expected to require any change in Land Use Zones or FSIs.
- c. Areas that may require detailed local area plans involving change of land use and or FSI would need a legal procedure to be followed for detailed local area plans under section 33 of MRTTP Act related to comprehensive development. Such plans would include Special DCRs.

Distinguishing Features of the DCR 2034

Distinguishing features of GDCR 2034 are presented below.

DCRs so far have been seen as a legal document and interpreted accordingly. The proposed GDCR 2034 and the SDCRs that will follow are additionally conceived as a guidance document to help landowners and the professionals to formulate proposals that are in consonance with the objective of the plan. With this view, the specific objectives of a set of regulations are stated and explanatory tables and illustrations are added to clarify the intent of the regulation.

1) Creating a pool of land for public purposes

In earlier Development Plans, reserving land for all public purposes was considered as effective tool for obtaining land in public realm. But the review of the D.P. implementation reveals that it was not as effective as envisaged. A complimentary strategy of creating pool of public land through contribution of certain percentage of land while developing/redeveloping on large parcels is proposed as a tool of increasing public land supply in following manner:

Table 11: Contribution of land for public purpose

Sr. No.	Requirement of Amenity Space to be handed over to M.C.G.M.	Percentage of Amenity
(i)	Amenity Area for plots with area more than 2,000 SQ.M	10.00%
(ii)	Changing Industrial user of plot to Residential and/or Commercial	15.00 %
(iii)	Development in Cotton Textile Mills	20.00%

The lands made available from such pool are proposed to be assigned for uses such as Recreation Open Spaces, Markets, Welfare centers, Police Chowkies, Libraries, Municipal Chowkies, Dispensaries, Fire Stations and various other uses as listed in GDCR 2034. Assigning uses to the land so procured shall take into account the deficiencies in various amenities in the area and shall decide the priorities by taking help of radar diagrams for each planning sector. Additionally the opinion of Municipal Councilors of respective area and NGOs and citizens could also be considered.

2) Allocation of Right of Way of Roads

Experience in Mumbai so far demonstrates that the carriageways for facilitating movement of vehicles have been widened by progressively reducing the widths of footpaths. This has happened in spite of a significant share of pedestrian movement. This has adversely affected the safe pedestrian movement and has not necessarily helped the vehicles.

The DPs in past indicated the total ROW of the roads. Allocating such ROW for vehicles, pedestrians and other uses was not specified in the earlier plans. In DP 2034 ROWs for roads have been proposed and their allocation for footpaths and carriageways had been allocated in GDCRs.

It is also proposed to empower MC to amend such allocation of ROW in favour of footpaths where high pedestrian volumes and natural propensity of street vending is expected. With such provisions any reduction in allocation of ROW will be considered as amendment to DP and will require legal process to be followed including prior publication and consideration of suggestion/objections received.

3) Simplification of Marginal Open Spaces

The DC Regulation 1991 had prescribed requirement of marginal Open Spaces in different clauses of Regulation making it complicated. For designing any building it was necessary to refer to various sub sections. The requirement of marginal open spaces was such that each and every proposal with FSI more than 1.0 required concessions for condoning marginal open spaces. When the concept of fungible FSI was introduced, the permissible FSI in suburbs reached 2.7 with same old requirement of marginal open spaces requiring condonation almost in every case. This caused delay in proposals thus increasing costs of projects. Further permissible FSI was considered as entitlement by the plot owners/ developers. And to achieve the FSI all kinds of concessions were requested by the way of use of discretionary powers of M.C. under section 64b of DC Regulation 1991.

In GDCR 2034, the requirement of marginal open spaces has been simplified and the concept of setbacks and step backs has been introduced. The power to condone deficiency in marginal open spaces is excluded from the discretionary powers of Municipal Commissioner.

4) Inclusionary housing

Concept of inclusionary housing that is promoted by Ministry of Housing and poverty alleviation is adapted in GDCR 2034.

Plots bigger than 2000 sqm 10% built up area in the form of small tenements are required to be handed over to MCGM. Such dwelling units are proposed to be allotted to project affected households, businesses and community workplaces for restoration of livelihood of displaced households and EWS/LIG households.

5) Multiple use of open spaces

Due to scarcity of land the requirements of various public utilities could not be satisfied by allocating land by way of reservations. Such requirements where technically feasible are allowed to be provided under the open spaces.

In D.C.R.1991, only parking was permitted under open spaces, however in GDCR 2014 in addition to parking, Electric Substations, storage of harvested Rain Water, Grey Water Harvesting plants Sewerage Treatment Plants etc. area permitted below open spaces

6) Design for physically challenged people

“The persons with disabilities (Equal Opportunities, Protection of Rights and full participation) Act, 1995 requires that equal opportunities are offered to disabled people. As per suggestions received in stakeholders’ workshop a separate section in GDCR for Design of physically challenged people has been incorporated considering the aging population and needs of physically challenged in the City. Availability of lift up to terrace floor with unobstructed terrace floor was one of the demands so as

to enhance the accessibility to terrace by disabled people with easy movement of wheel chairs on the terraces.

7) Design for entrance gate & curb cut

Regulations for curb cuts have been provided for at the traffic signals as well as at entrance to the plot with a view to ensuring easy access to wheel chair and unobstructed movement of wheelchairs and pedestrians on the footpaths.

The regulation has been incorporated for fixing the boundary gates minimum 3.00 M inside the boundary wall so as to avoid the traffic interruptions. It will help unobstructed movement of vehicles on road when the vehicle is entering the premises.

8) Environmental Sustainability

A separate section for environmental sustainability has been incorporated in GDCR 2034 consisting of rain water harvesting, installations of solar water heating system, grey water recycling, sewage treatment plants and waste disposal, energy efficient buildings.

9) Incentive FSI

Use of FSI as incentive is confined to slum rehabilitation and redevelopment of cessed buildings. Consequently other related regulations of DCR 1991 have become redundant.

Special Development Control Regulations

The SDCRs are drafted for areas in Greater Mumbai that exhibit unique characteristics. These areas include old housing fabrics built, vast industrial cotton textile mill lands, slum areas and transit-oriented zones. These are the most congested areas in the city and special attention needs to be paid towards them due to their social, economic, political and legal implications that set them apart from any other development in the city. Rules for the above are already in existence. All the other regulations other than related to incentive FSI have been suitably incorporated as Special Development Control Regulations as listed below.

These regulations include redevelopment for the following:

1. Cessed buildings
2. Building clusters
3. MHADA colonies
4. Slums
5. Cotton Textile Mills

Further, Greater Mumbai comprises of several 'unique places' of distinctive character within the city, which are not only unique and aesthetic but also contribute immensely to the city, be it economically, socially, culturally or physically. Although these places may have similar land use and consumption of FSI, yet they demonstrate varying configurations in the built-form. The Development Plan (2034) has mapped the various urban fabrics in Greater Mumbai that have distinct built form.

There are various streetscapes which lend distinctive character to the City. Detailed studies for these have been conducted. The DP 2034 proposes the continuance of these streetscapes wherever relevant. In course of plan implementation these may be replicated in other areas of Greater Mumbai as well, as locally appropriate locally, through Local Area Plans.

Apart from the above regulations, special regulations have been introduced for streets that lend special character to the city. These are oriented towards enhancing walkability, improving legibility of urban places, improving urban design and aesthetic value of places and providing safety and comfort on the street. Based on the location and the type of the characteristics that needs to be retained or created, streets are categorized into three types.

- Streets requiring arcades to ease pedestrian mobility around station areas;
- Streets with a zero front setback to promote the current trade and commerce activities;
- Streets with a uniform building front line to maintain the character of the area layout.

18. Local Area Plans

In case of metropolitan cities, the need for two tier planning system has been widely recognized. The Town and Country Planning Organization, Ministry of Urban Development has recommended a three tier system comprising Macro (Regional Plan), Messo (Development Plan) and Micro Plans (Local Plans). While Delhi, Jaipur and Bengaluru prepare Zonal Development Plans that follow Master Plans and Ahmedabad prepares strategic Development Plan with local plans, in the form of Town Planning Schemes, in Mumbai, local plans have not been introduced. To enable ease of implementation of the DP, the second-tier planning process must be initiated on priority. DP 2034 therefore has delineated a framework for the preparation of Local Area Plans.

The DP 2034 for Greater Mumbai has been conceived in the form of a long-term broad zoning plan, with allocation of land for city level infrastructure and broad Development Control Regulations. Such a plan needs to be followed by detailed local plans covering following specific purposes including:

- a) Redevelopment plans for large slum or resettlement areas e.g. Shivaji Nagar, Malwani, Golibar, Asalfa Village in L Ward, etc.
- b) Redevelopment plans for urban renewal, e.g. Null Bazaar, Chira Bazaar.
- c) Plans for areas undergoing Land Use changes e.g. from industries to office or residential use e.g. Parel Mill Land area in G/S Ward, industries in Saki Naka K/e Ward & Mulund-Bhandup in S & T Ward.
- d) Plans for Transit Oriented Development around existing and proposed transit stations / hubs e.g. Andheri in KE and KW Ward Dadar-Parel area in G/s & G/N Ward, D. N. Nagar in K/W Ward, and Ghatkopar in N Ward.
- e) Urban design guidelines in certain sectors, including heritage precincts and buildings.
- f) Designs and development of distinctive public spaces and streetscapes, etc.

The M.R.T.P. Act 1966, under Section 33 confers power on the Planning Authority to prepare plans for 'areas of comprehensive development', which should be developed as a whole. Such plans can provide for the following:

- a) Detailed development of specific areas for urban renewal, housing, shopping centres, industrial areas, civic centres, educational and cultural institutions, etc.
- b) Control of architectural features, elevation and frontage of buildings and structure
- c) Dealing satisfactorily with areas of bad layout, obsolete development, with slum areas and relocation of population
- d) Open spaces, gardens, playgrounds and recreational areas.

In preparation of plans for comprehensive development, the planning authority has to follow the same procedure as laid down for the preparation of the Development Plan under Section 25, 26, 27, 28, 30 and 31 of M.R.T.P. Act, 1966. Thus, the planning authority has to prepare plan for comprehensive development, and submit it along with a report containing stages of development for execution along with the estimated cost to State Government for sanction.

19. Financing the Development Plan

The DP 2034 Finance Plan estimates and tests financial feasibility for implementing the DP 2034. It projects optimistic, realistic and pessimistic scenarios to generate expenditure and revenue based on net projected development. The financial inflow is generated by levying development charges and outflow is incurred in providing amenities and acquiring land.

The cost of implementing the DP is expected to be Rs. 580,790 Crores. This includes the cost of acquiring land (Rs. 513,997 Crores) and building roads and amenities. This also includes the cost of building amenities on land acquired through mandatory contribution. This is rather pessimistic scenario as it assures that all the land will have to be acquired by paying monetary contribution and nothing will be available through TDR. The revenue generated if 100% of the city redevelops within the next 20 years is expected to be Rs. 1,086,853 Crores. This is however optimistic scenario. Even if only 35% of the BUA provided by FSI regime is built over next 20 years, it would generate adequate recourses for implementation of Development Plan.

20. Monitoring and Evaluation

The monitoring and evaluation system aims at providing timely feedback on implementation of the Development Plan and in reporting and managing challenges emerging during the plan period. It is set out to check the relevance of the plans and its objectives, under evolving circumstances. With the framework of indicators, the progress towards objectives of competitive, inclusive and sustainable city could be monitored.

For example, the radar diagrams generated at the Planning Sector and Ward levels shall serve as a tool to measure levels of implementation and adequacy of amenities over the plan period.

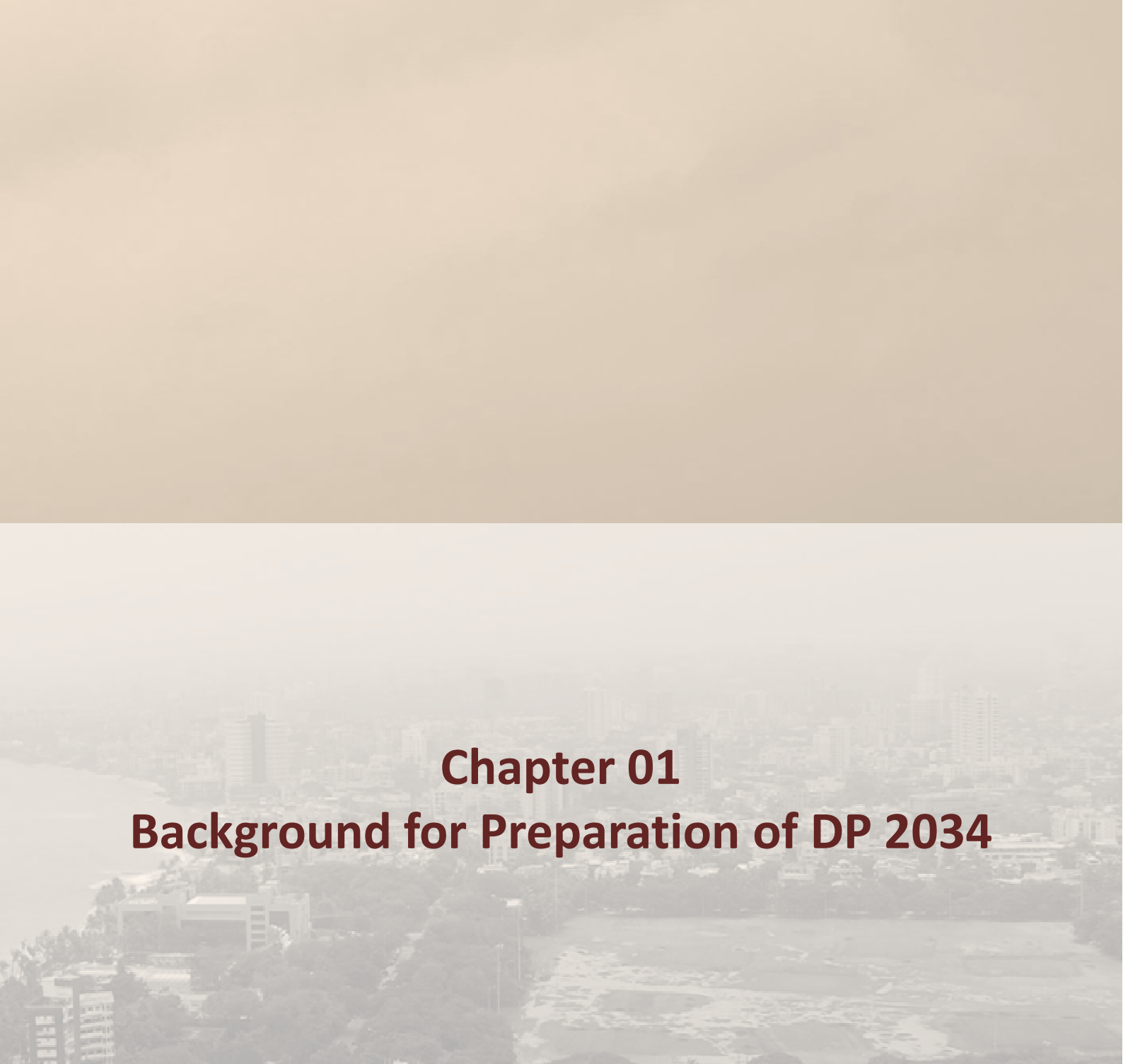
Four aspects are proposed to be regularly monitored as stated below:

1. Economy, demography and indices of competitiveness as changing context of Mumbai
2. Nature and extent of physical development and housing.
3. Outputs of implementation of DP.
4. Resources deployed for implementation of DP.

Such monitoring and evaluation is proposed to be aided by effective use of technology. Based on data compiled for monitoring, annual reports will be prepared that could help in budgetary allocation on implementation of D.P. Every five years a more comprehensive evaluation can be done to assure the need for resource allocation or revision of DP if required.

PART I

CONTEXT AND CHALLENGES

An aerial photograph of a coastal city, likely Mumbai, India. The image shows a dense urban landscape with numerous high-rise buildings and residential structures. A prominent beach and the ocean are visible in the lower right portion of the frame. The sky is hazy, and the overall tone is muted, with a sepia-like color palette.

Chapter 01

Background for Preparation of DP 2034

1. Background for Preparation of DP 2034

Greater Mumbai serves as the core city of the Mumbai Metropolitan Region, which is among the ten most populated urban agglomerations in the world. It has been the country's financial capital, and its main driver of growth. It is also India's most populous city with 12.44 million people. Geographically, Greater Mumbai is severely constrained and occupies a land area of only 458.28 sq km¹.

The city faces significant challenges due to an extremely limited supply of land, proliferation of slums due to non-availability of affordable housing, long commutes as people reside farther away from places of employment, an overburdened public transport system, insufficient social and physical infrastructure and an increasingly degraded physical environment. Since 1991, Mumbai's economy has undergone significant restructuring as a result of the country's economic reforms. There has been a decline in manufacturing and an increase in the services sector activities. For the first time in the last decade, the population growth rate of the Island city was negative and that in Mumbai's suburban areas declined while areas in the MMR grew at a higher rate. While retaining the economic primacy of Greater Mumbai is essential for the continued sustainability of MMR, inclusive development and environmental sustainability need foregrounding for the city to achieve better quality of life for its citizenry. The Development Plan 2034 will have to respond to these imperatives in the context of a complex governance scenario with multiple actors and institutions.

1.1 Legal Mandate: Preparation of Greater Mumbai Development Plan 2034

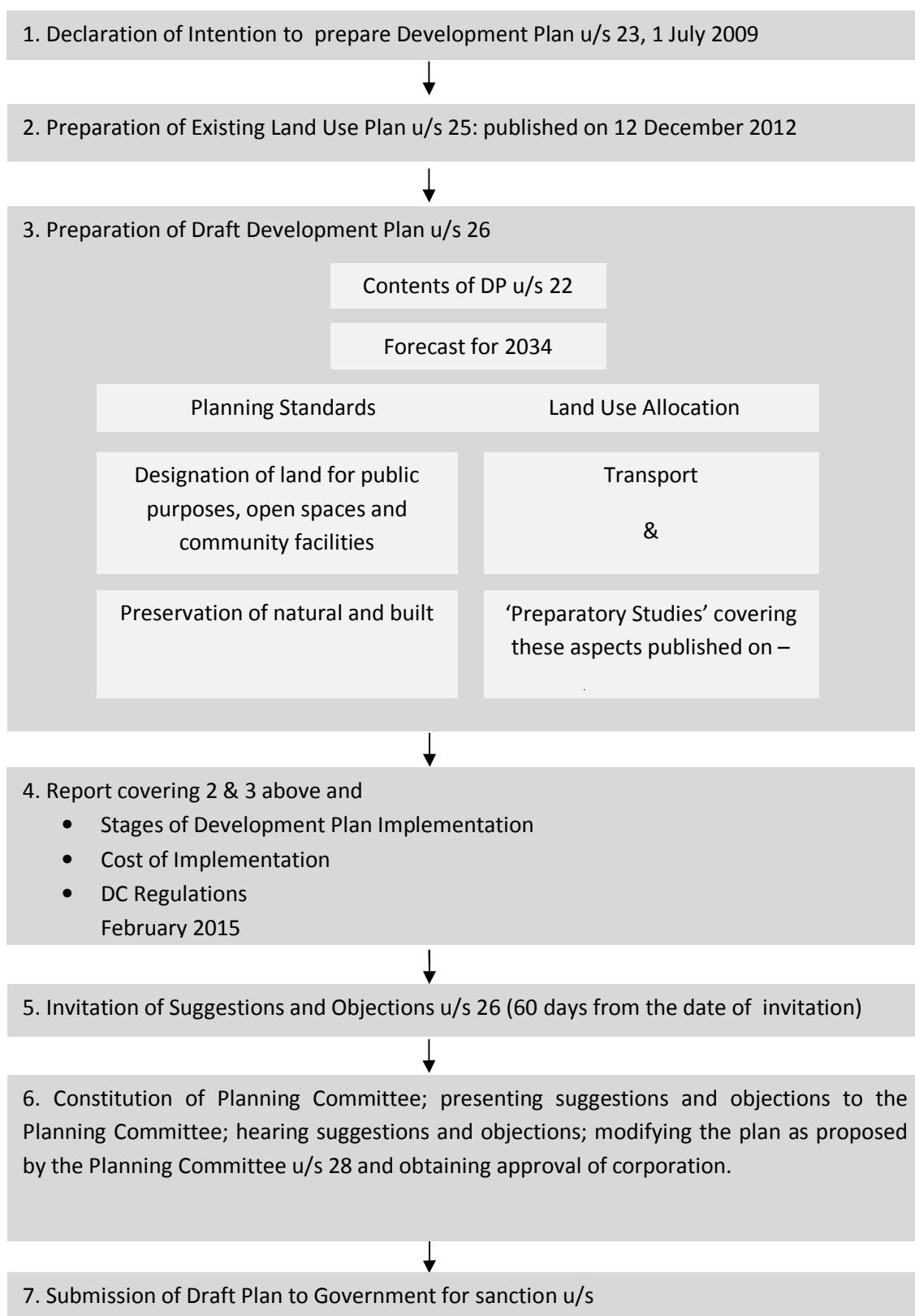
Section 38 of the Maharashtra Regional and Town Planning Act 1966 (MR&TP Act, 1966) stipulates Revision of Development Plan at least once in twenty years. The Development Plan 1991 was approved in parts. The last part of Development Plan currently in force, viz., the M/W Ward, was sanctioned in 1994. Therefore, the revised Development Plan is required to be submitted by 2014. Sections 23 to 31 pertain to procedure of preparing and sanctioning Development Plans. Section 22 of the MR&TP Act defines the contents of Development Plan. It states:

"Development Plan shall provide so far as may be necessary for use of land, designation of land for public purpose, flood control, preservation of natural and built heritage, transport and communication, reclamation or levelling up of low lying lands, provisions for controlling and regulating the use and development of land within jurisdiction including conditions and restrictions in regard to the open space to be maintained for a building, the percentage of building area to be maintained for a plot, number, size, number of stories, character of buildings, parking, area for loading and unloading, hoardings, advertisement signs".

Accordingly, the various stages of Development Plan preparation as provided in MR&TP Act are outlined below including the dates of completion of relevant stages.

¹ Under Section 23 of the MR&TP Act 1966, the MCGM has declared the intention of preparing the Development Plan for Greater Mumbai 2014-34. The map accompanying the declaration showed the 24 Municipal Wards including the creeks within the Ward boundaries. The area of Greater Mumbai shown in this map when measured is 458.28 sqkm. The area included in the revenue records exclude creek land and admeasures 437sqkms.

Figure 1.1 Development Plan preparations



The Corporation has by its Resolution No. 767 dated 20/10/08 accorded sanction to declare the intention of revision of the Development Plan by following the process as laid down under Section

23 of the MR&TP Act. The MCGM has accordingly published a notice on 1st July 2009, declaring its intention to revise the Development Plan as provided under Section 23 of MR&TP Act.

The plan showing the Planning Area, Greater Mumbai, has also been prepared and suggestions / objections were invited from the public as provided under Section 23 of the MR&TP Act.

1.2 Planning Area

The total area of Greater Mumbai is 458.28 sqkm. Several areas in Greater Mumbai are notified by the State Government as areas under Special Planning Authorities (SPAs) under Section 40 of the MR&TP Act 1966. The area under the Special Planning Authorities (SPA's) is 43.22 sqkm, accounting for about 9.43% of the total area. Therefore, the total area of Greater Mumbai within the purview of the Development Plan is 415.05 sqkm, forming the Planning Area for the DP.

Table 1.1: Notified areas and SPAs

Sr. No	Notified Area	Special Planning Authority
1	Back Bay Reclamation Area	MMRDA
2	Wadala Truck Terminal	MMRDA
3	Bandra Kurla Complex	MMRDA
4	Oshiwara District Centre	MMRDA
5	Dharavi Redevelopment Project	SRA
6	Gorai Manori Tourism Zone	MMRDA
7	Marol Industrial Area, SEEPZ SEZ	MIDC
8	Airport	MMRDA

As provided in the MR&TP Act, 1966, the local authority ceases to be the 'Planning Authority' in the notified areas. The DP2034 does not therefore include these notified areas in its scope. It has however taken cognizance of the respective Plans and requirements of these areas in terms of connectivity and tertiary level infrastructure. Therefore, the total Planning Area for preparation of DP 2034 is 415.05 sq km.

1.3 Salient Features of the TOR

MCGM decided to seek services of Consultants for the preparation of DP 2034. The salient aspects of

TOR are listed below:

- Use of GIS technology for the preparation of DP 2014 including the base map, the Existing Land Use Map and the Proposed Land Use Map;
- Conduct assessment of the existing status including the spatial and non-spatial dimensions of Greater Mumbai;
- Assess at a fine grain level, the existing situation in terms of Existing Land Use distribution, availability of Amenities, Open Spaces, distribution of built up space and Floor Space Index in Greater Mumbai, population and density, economy and employment, transport networks, slums and their rehabilitation, environmental vulnerability and areas prone to flooding;
- Develop growth scenarios in terms of population, economy and employment and their spatial distribution;
- Prepare norms for provision of Amenities, Open Spaces and Infrastructure and translate the demand into spatial requirement;
- Estimate demand for Residential and Commercial space and translate the demand into spatial requirements;
- Formulate Zoning Strategy, Proposed Land Use Plans at the Planning Sector level in conjunction with formulation of Development Control Regulations;
- Estimate the cost of implementation of development plan in stages and propose a financing plan that is sustainable;

- Propose a system of monitoring and evaluation of the implementation of the Development Plan and its outcomes;
- Articulate all the above in the form of a Report of the Draft Development Plan for the consideration of the Municipal Corporation and publishing it for inviting suggestions and objections.;
- Assist MCGM in organizing probable consultation workshops with the stakeholders.

The MCGM commissioned the services of, to M/s Egis Geoplan Pvt. Ltd. The Agreement between the MCGM and Egis Geoplan Pvt. Ltd was signed on 20th April 2011. Start date for the project is 12th May 2011.

1.4 The Planning Process

1. The MR&TP Act mandates the preparation of the Existing Land Use Plan within six months of the notification of the intention for the preparation of the Development Plan. A GIS base map of Greater Mumbai was first prepared which then served as the base for the preparation of the Existing Land Use Plan 2012.
2. Assessment of the existing status was conducted utilizing the base map and the ELU 2012 as data sets. For the purposes of planning at a fine level of disaggregation, the various administrative/ planning boundaries that Greater Mumbai comprises, viz., Census Sections, 227 Electoral Wards, 577 Traffic Analysis Zones, Zones and 124 Sub-zones of the Ready Reckoner as well as the Areas under Special Planning Authorities (SPAs) have been assessed. Greater Mumbai's administrative Wards have further been delineated into 150 Planning Sectors.
3. Assessment of existing status was conducted at Greater Mumbai, Ward and Planning Sector levels. The assessments undertaken include sectoral analysis at Greater Mumbai level, including population, economy, social and physical infrastructure, transportation, environment and regulatory conditions. Availability of amenity space (health, education, open spaces and other social amenities), road area and residential space at the Planning Sector levels are assessed at the Ward and Planning Sector levels through a radar graph assessment, against the planning standards established in the DP 1991 and other national level benchmarks. This multi-criteria assessment enabled participatory decision making at the Ward level in establishing priorities for making land available for public purpose. A detailed documentation of existing consumption of bulk Floor Space Index is assessed at the block level. This was superimposed with data sets pertaining to density and per capita consumption of residential and amenity space in informing decision making for proposals.
4. Planning benchmarks were established through a study of various planning standards for cities in India and international cities with comparable densities and urban conditions.
5. Space demand for residential, employment and amenities was estimated through the application of planning benchmarks on the projected population and employment scenarios for 2014, 2024 and 2034.
6. To address the pressing issues that Greater Mumbai faces, a vision, goals and objectives for development were formulated.
7. Strategies for future development were elaborated for the distribution of developable space in integration with public transit, parking, making land available for public purpose and reservation of land for amenities.
8. In a departure from previous Development Plans, a Public Outreach Programme was undertaken by the MCGM during the process of preparation of the Development Plan. This was held in three stages:
9. Suggestions received in the Public Outreach Programme of the MCGM were considered during the finalization of strategies for future development and translated into proposals.
10. The Development Plan for Greater Mumbai is in the form of a long-term broad framework for development which makes allocations for city level infrastructure, broad zoning and

development control regulations. Additionally, local amenity space demands are envisaged to be met through participatory planning processes. The MR&TP Act contains enabling legal provisions to undertake such local planning.

11. This Development Plan has to be followed by detailed local plans for public spaces and specific areas that require adaptation of the DCR of DP 2034 to local needs and comprehensive development.
12. The Draft Development Plan 2034 for Greater Mumbai has been submitted to the Municipal Corporation. The MR&TP Act under Section 26 mandates publication of the Draft DP for inviting public suggestions and objections for a period of 60 days from the date of publication.

This report, the Draft DP 2034, represents a synthesis of the planning process, including assessment of the existing status, growth scenarios, vision and objectives of the DP and the proposals for DP 2034. It also includes a section on financing the Plan and concludes with a Framework for Monitoring and Evaluation.

This report is structured in three parts, including the following:

Executive Summary

Part I: Context and Challenges

Part II: Visualizing the Future

Part III: Proposals

The background image is a composite of two aerial photographs. The top half shows a wide, calm body of water, likely a bay or a large river, with a dense urban area visible on the far side under a hazy sky. The bottom half shows a closer view of a hillside densely packed with buildings and lush tropical vegetation, including many palm trees. The overall color palette is muted, with a light beige overlay on the top half and a darker, more detailed view on the bottom half.

Chapter 02

The Regional Context

2. The Regional Context

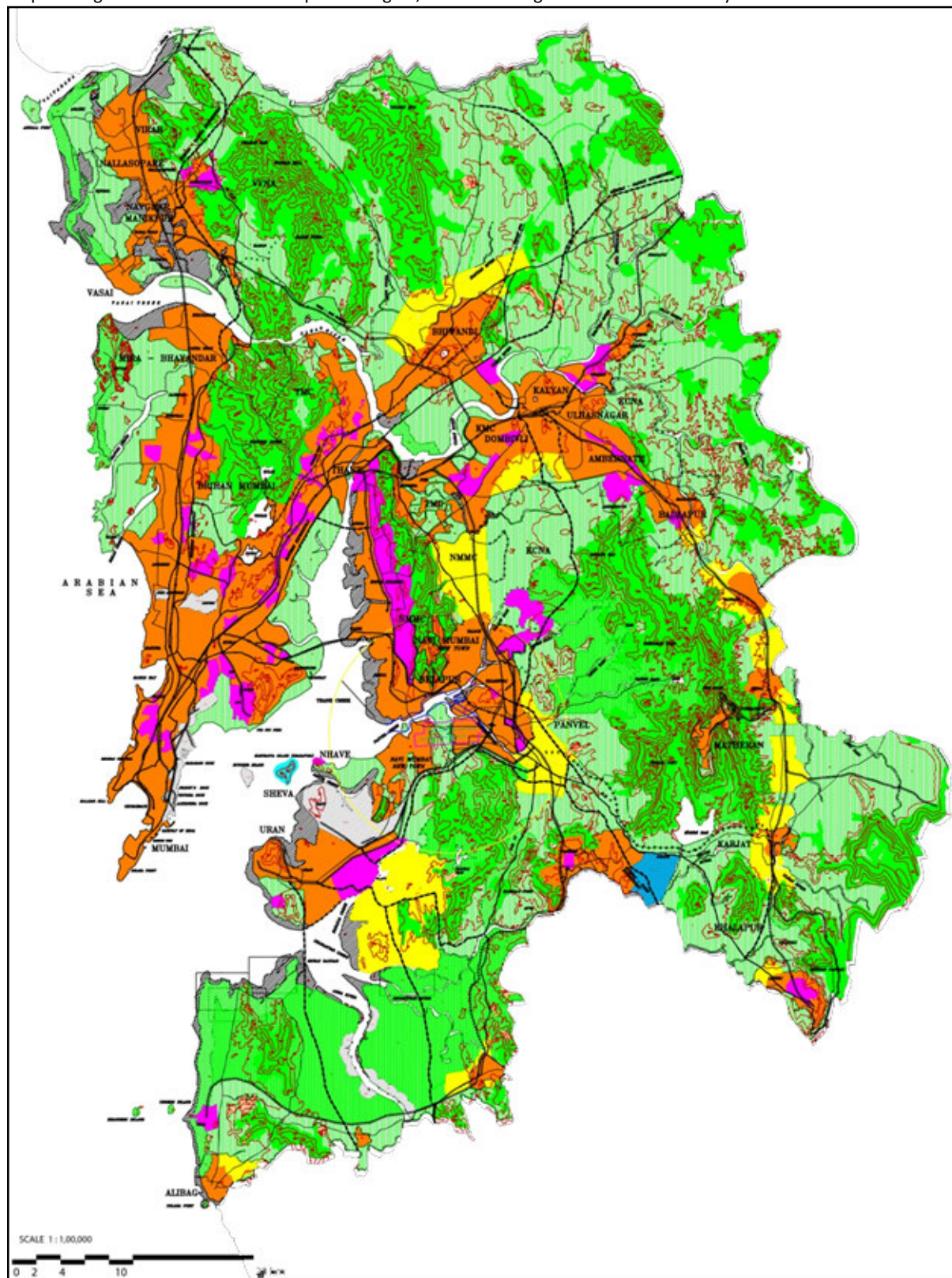
Expanding outwards from Greater Mumbai, its core city, the Mumbai Metropolitan Region extends over 4,355 sqkm. It comprises eight Municipal Corporations including Greater Mumbai, Thane, Kalyan-Dombivli, Navi Mumbai, Ulhasnagar, Bhiwandi-Nizampur, Vasai-Virar and Mira Bhayandar, nine Municipal Councils viz. Ambarnath, Kulgaon-Badlapur, Matheran, Karjat, Panvel, Khopoli, Pen, Uran and Alibaug along with towns and villages in Thane and Raigad Districts. The Mumbai Metropolitan Region is among the ten most populated urban agglomerations in the world today with a population of 22.8 million (Census 2011).

Table 2.1: MMR Population & Growth

POPULATION					
Sr. No.	Urban Local Body	Census 2001 Figures	Annual Compound Growth Rate (%) 1991-2001	Census 2011 Figures	Annual Compound Growth Rate (%) 2001-2011
Municipal Corporations					
1	Municipal Corporation of Greater Mumbai	1,19,78,450	1.90	1,24,42,373	0.38
2	Thane Municipal Corporation	12,62,551	4.62	18,41,488	3.85
3	Ulhasnagar Municipal Corporation	4,73,731	2.53	5,06,098	0.66
4	Kalyan- Dombivali Municipal Corporation	11,93,512	1.64	12,47,327	0.44
5	Mira- Bhayandar Municipal Corporation	5,20,388	11.48	8,09,378	4.52
6	Bhiwandi-Nizampur Municipal Corporation	5,98,741	4.68	7,09,665	1.71
7	Navi Mumbai Municipal Corporation	6,67,611	8.21	11,20,547	5.32
8	Vasai-Vihar city Municipal Corporation	7,58,339	6.67	12,22,390	4.89
Municipal Councils					
1	Ambarnath Municipal Council	2,03,804	4.94	2,53,475	2.21
2	Kulgaon –Badlapur Municipal Council	97,948	6.51	1,74,226	5.93
3	Alibaug Municipal Council	19,496	1.81	20,743	0.62
4	Karjat Municipal Council	25,531	2.37	29,663	1.51
5	Khopoli Municipal Council	58,664	2.68	71,141	1.95
6	Matheran Municipal Council	5,139	0.88	4,393	-1.56
7	Panvel Municipal Council	1,04,031	5.84	1,80,020	5.64
8	Pen Municipal Council	30,201	3.41	37,852	2.28
9	Uran Municipal Council	23,251	2.72	30,439	2.73

10	Census Town	2,16,161	5.27	6,30,841	11.30
11	MMR Rural	11,28,977	3.03	14,74,291	2.70
	TOTAL	1,93,66,526	2.79	2,28,06,350	1.65

Map 2.1 Regional Plan: Mumbai Metropolitan Region, 1996-2011 LegendGreenForestIndustryUrban 2Urban 1



Legend

- | | |
|---|--|
| Urban 1 | Forest |
| Urban 2 | Green |
| Industry | |

2.1 Geography, Geology & Climate

The Mumbai Metropolitan Region is largely comprised of lowlands located west of the Sayhadri hills with an average elevation of less than 100 metres above sea level. The Region has a varied landscape. A series of North-South hill ranges mark the centre and East, several rivers¹ run across the land and there is a long coastline with estuaries, bays and creeks in the North² and the South.

Geologically, the region is in the Deccan lava country with basalt constituting major formations with the exception of Greater Mumbai, which has a different geology. Rocks found here differ from those found in the MMR. Hot springs are found at Vajreshwari, Ganeshpuri and Akloli in the Northern part of the MMR. Other features of geological value include several features within Greater Mumbai viz. Gilbert Hill at Andheri (with hexagonal basaltic columns), Sewri (with pillow lavas), Worli Hills (frog beds- intra-trappean beds of great scientific value) and the raised beaches of Manori (which are a record of significant historical geological processes). The area has no significant mineral wealth.

The climate of MMR is equable with no large seasonal variations. Proximity to the sea results in high humidity. The region experiences a hot, humid summer and a mild winter. The monsoons are marked by particularly heavy rains and the average rainfall is over 2000 mm per annum. Temperatures have been increasing over the years and summers have been getting hotter and winters more severe. Monsoons also have been recording very heavy rains of high intensity within 24-hour duration.

2.2 Population Growth

At the heart of MMR is Greater Mumbai, whose growth has been entirely scripted by its limited land area and its particular geography, bound as it is by the sea on three sides. Early development in Greater Mumbai revolved around the port and the mills to its south. As the city grew, it expanded northwards along its twin suburban railway networks and till 1968 most of the growth in MMR was confined to Greater Mumbai. Post 1968, the Suburbs in Greater Mumbai grew along with areas surrounding Greater Mumbai viz. Thane, Kalyan, Mira-Bhayander, Vasai-Virar and Navi Mumbai. The suburban rail networks have been crucial in this story of urban expansion.

Since 1980, the MMR has been witnessing a higher decadal growth rate than Greater Mumbai. The MMR added 3.44 million people in the last decade. However, the annual compound decadal growth rate (2001-2011) of the MMR, which is 1.65%, is lower than the previous (1991-2001) annual compound decadal growth rate of 2.79%. The rate of population growth both in MMR as well as in Greater Mumbai has been declining over the decades. This follows national as well as global trends of declining growth rates of metropolitan regions. Within the MMR, the fastest growing cities in the last decade (2001-11) are Navi Mumbai, Vasai-Virar, Mira Bhayandar, and Thane.

¹ Rivers Ulhas with its tributaries Kalu and Bhatsai and the river Tansa in the north, Patalganga, Amba, Balganga, Bhogeshwari and Bhogwati in the south and the small Panvel River in the centre

² Major creeks include Versova, Vasai, Manori)

2.3 Transport and Communications

a. Railways

The MMR is connected to Greater Mumbai through the suburban rail networks of the Central and Western Railways, which serve as the lifelines of the region. These railway networks also enable connectivity to the rest of the country. The Western Railway offers links with the Western states and North India while Central Railway provides links with Central, Eastern, Northern and Southern parts of the country. Major railway junctions in the MMR include Kalyan and Panvel. The suburban networks have been extended and strengthened with the Western line now extending upto Dahanu Road (120 kms away) and the Central Line extending upto Karjat, Khopoli and Kasara (approx 60 kms away) on the mainline. New lines connect Dahanu Road to Diva and Panvel through a branch line via Bhiwandi Road- Vasai Road while another is planned to connect Uran to Nerul/Belapur. Urbanisation has rapidly followed wherever extended railway lines and faster train services have ensured connectivity to Greater Mumbai.

b. Roads

Apart from the Railways, the MMR is well connected to Greater Mumbai through several highways and expressways. This includes:

- The Sion-Panvel Highway: It is an important connector which links Greater Mumbai to Panvel via Navi Mumbai;
- The Mumbai-Ahmedabad Expressway: It is part of National Highway 8 (NH8) that connects New Delhi with Greater Mumbai. It passes through almost all the Western Suburbs in Greater Mumbai, where it is known as Western Express Highway. It connects Mumbai with important cities like Ahmedabad, Vadodara, Surat, Jaipur, Udaipur, Ajmer and Gurgaon;
- The Mumbai-Nashik Expressway: It is part of National Highway 3 (NH3) connecting Greater Mumbai to Agra in Uttar Pradesh. It passes through Thane and Bhiwandi in MMR. In Greater Mumbai, the highway is known as Eastern Express Highway.
- Mumbai-Pune Expressway and Sion-Panvel Highway: It connects Greater Mumbai to Pune. The expressway has reduced the travel time between the cities of Mumbai and Pune to approximately two hours. For most practical purposes, it has replaced the older Mumbai-Pune stretch of the Mumbai-Chennai National Highway (NH 4).

c. Ports

The MbPT and the JNPT are the two major ports in the MMR. Jawaharlal Nehru port is the busiest port in the country. Together they account for 60% of the country's trade. The Mumbai Port caters to 10% of the country's sea-borne trade handled by major ports of the country in terms of volume. It caters about 19% of POL Traffic handled by major ports. Although the ports are handling significant trade volumes, substantial investments need to be undertaken in order to position them as truly world class ports capable of handling efficiently the ever- increasing trade of the country. The quantum of trade volume at the port places pressure on nearby infrastructure. The associated infrastructure such as availability of dedicated road connectivity and its integration with rail connectivity to the hinterland needs to be provided for.

d. Airport

Mumbai Airport (with International and Domestic terminals) is an important air traffic node of the country. Air travel projections for the Airport indicate 9% growth of domestic traffic and 6.5% of

international traffic. This implies air transport demand for 2031 is projected as domestic travel increase to 54 million against 9.6 million in 2003-04 and international transport increase to 21 million from 6.1 million.

Currently, Mumbai Airport handles 30.2 million passengers and 0.63 million tons of freight annually. (2012-13). The Mumbai Domestic Airport handles about 685 flights per day. This translates into approximately 1 flight operating (either landing or take off) every two minutes.

2.4 Interdependencies between Greater Mumbai and MMR

Greater Mumbai is closely linked to the cities and settlements within the MMR with 60% of all the jobs in the MMR being concentrated in Greater Mumbai. Existing suburban railway networks facilitate the daily commute by millions of workers from their homes in the MMR (and beyond) to and from Greater Mumbai. The availability of affordable homes in adjoining cities in MMR has meant that people working in Greater Mumbai reside outside Mumbai and commute given the lack of affordable homes in Greater Mumbai. Some cities in the MMR function largely like Suburbs of Greater Mumbai while others have a good mix of employment as well as residences. Since 1980, there has been a decline in the manufacturing sector within Greater Mumbai. In the MMR, the same period post 1980s saw a rise in manufacturing and the secondary sector. Recent socio-economic surveys (by CIDCO) indicate that since the 1980s the population of Navi Mumbai has received a significant share of migrants from Greater Mumbai, from both the Island City as well as the Suburbs.

The MMR has significant industrial zones including the Thane Belapur belt, the Kalyan complex, the Talaja MIDC and the Patalganga and Rasayani industrial areas. Major infrastructural facilities that serve Greater Mumbai are located in the MMR including the JNPT port at Nhava Sheva, major markets like the APMC market in Vashi and the iron and steel market at Kalamboli.

2.5 Regional Plans: Review of Past Plans

Since the delineation of the MMR in 1967 with a view to comprehensively plan the Region, two Regional Plans have been prepared. The First Regional Plan was sanctioned in 1973, which was subsequently revised, and the Second Regional Plan for 1996-2011 was sanctioned in 1999. RP is now due for revision and work on the Third Regional Plan is currently underway. The DP 2034 for Greater Mumbai has to take cognizance of RP 1996.

RP 1973:

The Regional Plan 1973, proposed containment of Mumbai's growth through dispersal of economic activities to new growth centres. Accordingly, Navi Mumbai was planned as a counter-magnet along with new growth centres at Bandra Kurla and Kalyan. Restrictions on new industries within Greater Mumbai were introduced through the Industrial Location Policy. Following RP's recommendation, restrictions were introduced on expansion of BUA for offices and wholesale establishments in the Island City in 1977. Growth was confined to well-defined areas to achieve desirable density targets and population distribution. Bulk land acquisition was seen as the solution to prevent speculation and raise resources for infrastructure. However, in reality, urban growth could not be confined to predetermined areas but spread along transport corridors in Mira-Bhayander, Vasai-Virar and Thane-Kalyan. Bulk acquisition of land was successful only in part in Navi Mumbai.

RP 1996:

The Second Regional Plan 1996-2011 provided a broad framework for regional development management while also serving as a tool for land use planning and development control. It aimed to promote regional economic growth through hi-tech, non-polluting industries in Greater Mumbai, facilitating revival of sick industrial units and directed new industrial growth to underdeveloped parts of the region, while minimising the impact of this growth on environment and civic infrastructure. Also, it proposed BKC as an International Finance and Business Centre and small offices without increasing existing industrial or commercial zones. Urban renewal and redevelopment of older dilapidated areas along with recycling of land and space were also to be promoted through integrated planning and development. In situ up gradation and providing land tenure were initial steps envisaged for slums which were to then eventually redevelop. The Plan recommended the increase in the supply of land and infrastructure so as to facilitate increased shelter provision. The RP 1996 also recommended a market oriented approach to land and exploring alternatives to compulsory land acquisition which included accommodation reservation, TDR, incentive FSIs and models of land readjustment like the TPS. It was in favour of incentivising land assembly in the case of undeveloped lands and in the case of redevelopment, the RP was in favour of holistic renewal as compared to reconstruction of individual building.

RP 1996 also outlined strategies for water supply, transportation strategies and the environment. Of particular relevance to Greater Mumbai were enhanced road networks in Suburbs, the Anik Panjarapol Expressway and E-W links between the Eastern and Western Expressways, the Malad-Dahisar Relief Road, the Airoli bridge and widening of Tilak bridge at Dadar. It recommended the Trans Harbour Link and also demand management measures such as parking control and cordon pricing along with a strategy for publicly managed private bus services.

The RP 1996 is due for revision and preparation of the Third Regional Plan is currently underway.

2.6 Notified Areas under Special Planning Authorities

In addition to the Regional Plan proposals, the DP 2034 takes cognizance of the proposals contained in the sanctioned Development Plans for the notified areas within the jurisdiction of the MCGM. There are eight notified areas that are under Special Planning Authorities who are responsible for their development. (Refer Table 1.1 Introduction) Of the eight areas, six are under the MMRDA³ and the remaining two are under the MIDC and the Slum Redevelopment Authority. The DP 2034 does not cover these areas. The DP 2034 has taken cognizance of the development plans prepared for these areas since they not only have direct and indirect impacts on their immediate surroundings but considering their special functions, they have an impact on Greater Mumbai as a whole as well. A review of proposed plans for these areas follows.

2.6.1 Backbay Reclamation Scheme

The Backbay Scheme was planned by the State Government in 1920 consisting of eight blocks. Of these only 4 blocks were reclaimed by 1930 after which the reclamation was frozen and a policy decision taken in 1978 to freeze development due to public criticism. MMRDA was appointed SPA in 1983 to comprehensively plan and develop the remaining blocks with amenities. The Draft DP was published in 1990 and sanctioned by 2001. The plan provides recreational and cultural amenities in the form of a garden and a promenade and also provides additional parking facilities. The Plan froze reclamation at 1983 scale and was further restricted under CRZ regulation since 1991.

³ All data regarding SPAs under MMRDA accessed March 2014 from <http://www.mmrda.maharashtra.gov.in>

2.6.2 Bandra Kurla Complex

The Bandra Kurla Complex was initially conceived in RP 1973 for internal restructuring to decongest South Mumbai. MMRDA was appointed in 1977 as SPA for this area covering an area of 370 ha. Initially, MMRDA attempted to develop BKC as envisaged by RP 1973. However, after the 1991 economic reforms MMRDA repositioned BKC as a financial and business centre, resulting in restructuring the spatial structure of Greater Mumbai and initially developed 19 ha of housing and several government offices in 'E' Block. Together they offer 1,17,000 sqm. 'G' Block has emerged as a new financial district with headquarters of many banks and financial institutions. More than 2 lakh jobs have been provided already and apart from offices, it also has staff quarters, hospitals, hotels, the Diamond Bourse, and an exhibition and convention centre.

2.6.3 Oshiwara District Centre

This District Centre encompasses 102 ha for which MMRDA as the SPA has drawn up plans which were approved in 1992. According to the implementation policy approved by the Government, the lands are acquired at nominal price of Re.1/- and then leased to the owner for a period of 60 years. With landowner participation, so far the MMRDA has acquired and leased back land measuring 22.39 ha. In 2002, the planning proposals were modified to permit residential use up to 50% in the Core Commercial zone and in the Commercial Transformation Zone, following up on requests from developers. However, it is unlikely that it will achieve its original intention of being a district centre in Western Suburbs. Almost, 50% of the area to the West of S.V. Road is covered by slums and is being redeveloped under SRA. Transformation of industrial use has not occurred as anticipated and available land has been used for housing PAPs of MUDP.

2.6.4 Wadala Truck Terminus

The zoning of Truck terminus (and ISBT) at Wadala was aimed at decongesting South Mumbai by shifting out the existing transport companies, offices and godowns which are concentrated in Wards B & C. Spread over 115.44 hectares, the Wadala Truck Terminal was conceived to decongest Island City, where several warehouses and godowns are located. It was proposed along with the ISBT, to create parking for trucks with multiple consignments, which are parked in Mumbai in areas such as Masjid Bunder, Wadi Bunder and Carnac Bunder as well as along the Western and Eastern Express Highways for supply and collection of goods. A warehousing facility was created for these multiple consignment trucks. A truck terminal authority was also created to regulate the trucking activity. However, due to many reasons, the truck terminal could not develop as intended. Instead, MMRDA was appointed SPA in 2005. The plan being prepared by MMRDA explores the other possibilities of residential and commercial development.

2.6.5 Dharavi Notified Area

Dharavi is a major slum centrally located in Greater Mumbai to the south of Mahim Creek. SRA was initially appointed as SPA for Dharavi Notified Area measuring 178 ha in 2005. Later, the DNA was expanded to include an additional area of 62 ha in 2009. SRA has published draft planning proposals for DNA in 2013 according to provisions of the MR&TP Act. The anticipated population is 437,630. The basic strategy is to provide a 300 sq ft. dwelling unit to all eligible slum dwellers by offering incentive FSI for sale to potential investor. The distinguishing feature of the plan is that unlike SRA scheme, entire sector (in all 5 sectors) will be taken up for renewal by selecting an investor through a transparent bidding process by SRA.

2.6.5 Mumbai (CS) International Airport

On privatization of airport, the MMRDA was appointed as SPA for the Mumbai International Airport Notified area in 2009. MMRDA has prepared the Development Plan. After following due process MMRDA has been published it in 2013 and has submitted to the Government for sanction.

2.6.6 Gorai Manori Uttan Recreation and Tourism Development Zone (RTDZ)

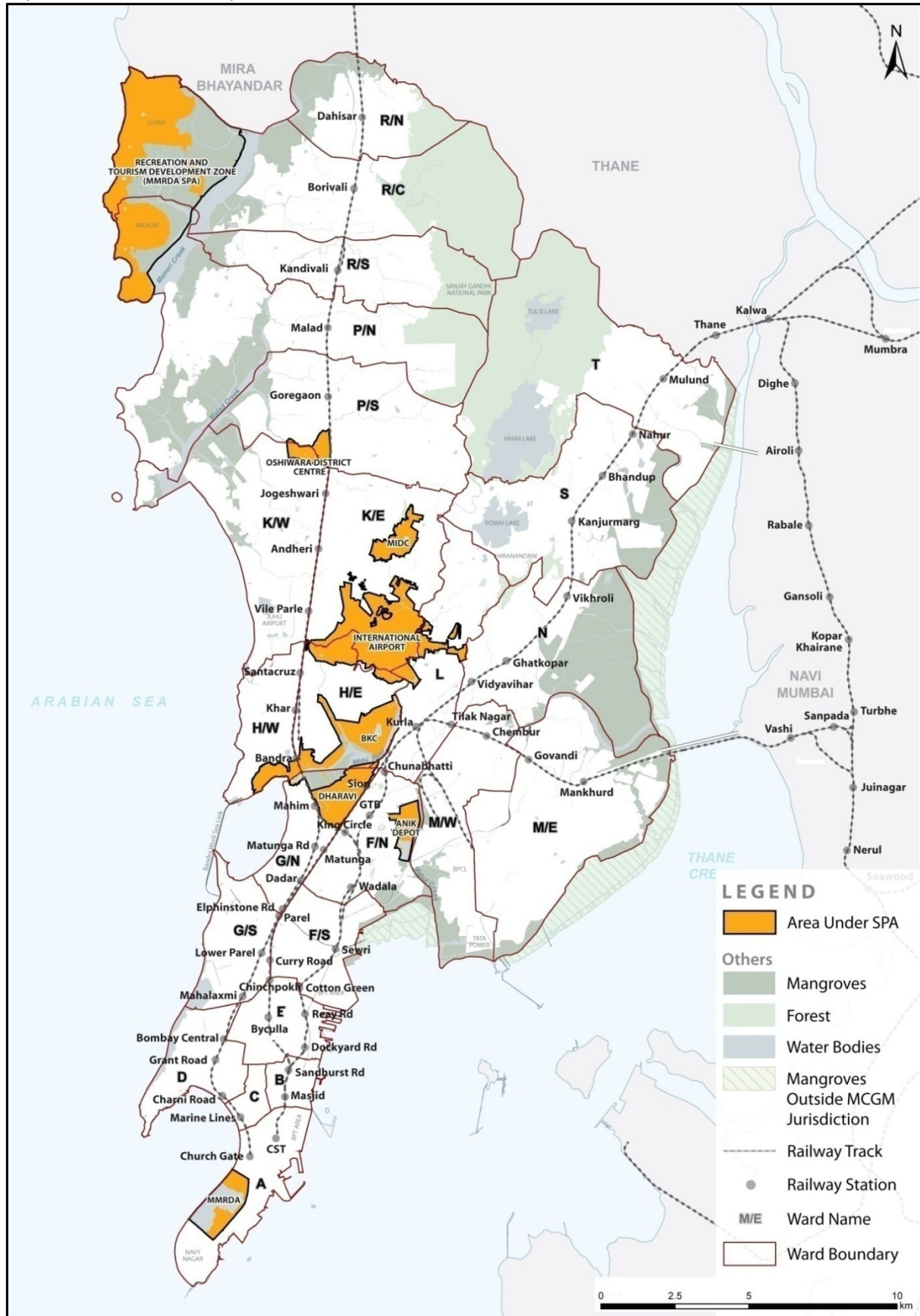
The Manori Gorai Uttan Recreation and Tourism Zone was designated a RTDZ in the RP 1996. Measuring 43.13 sqkm, it includes 8 villages and falls within the jurisdiction of two municipal corporations- Greater Mumbai (19.52 sqkm) and Mira Bhayander (23.61 sqkm). The MMRDA has been notified as the SPA for this area. The Draft Development Plan has been prepared and after following due process has been submitted to the Government for approval in 2012.

2.6.7 Marol Industrial Area and SEEPZ

Spread over 111 acres, SEEPZ was set up in 1973 exclusively for the manufacture and export of electronic items. Land was leased through the Maharashtra Industrial Development Corporation (MIDC), Andheri (East) with the aim of accelerating the progress of electronics manufacturing in India while taking advantage of the growing electronics world market (export and foreign exchange objective). In 1987-88, the manufacture and export of Gems and Jewellery was permitted from SEEPZ given the high potential and pollution free nature of the industry. With a view to overcome the shortcomings experienced on account of the multiplicity of controls and clearances; absence of world-class infrastructure, and an unstable fiscal regime and with a view to attract larger foreign investments in India, the Special Economic Zones (SEZs) Policy was announced in April 2000. SEEPZ was one of the three Export Processing Zones converted as Special Economic Zone w.e.f. 1st November 2000.

Plots are leased for 30 years and built up area is leased for five years on renewable basis. There are several Standard Design Factories, Gems & Jewellery Factories, towers and multi-storied buildings within SEEPZ. An export-manufacturing hub, SEEPZ-SEZ has a Business Facilitation Centre and an in-house Customs clearance facility to enable exporters easy and hassle free export of goods.

Map 2.2: Notified area under Special Authorities



2.7 Significant Regional Planning Initiatives since 1991

Several significant regional planning initiatives have been undertaken since the DP 1991 apart from the Regional Plan 1996.

1. Business Plan for MMR 2021 - by MMRDA (2007): Provides forecasts of economy, population, employment, infrastructure demand and investment needs, and financing plan.
2. Comprehensive Transportation Study for MMR, MMRDA (2008): The report includes findings of household survey covering 66,000 households carried out in 2005, forecasts of population and employment for 2016, 2021 and 2031 and scenario of geographic distribution of population and employment at various levels of geographical disaggregation the finest being over 1000 TAZs (Traffic Analysis Zones) for MMR.
3. Master Plan for Metro Network: MMRDA by using the services of DMRC, prepared Master Plan of Metro Network for Greater Mumbai in 2008.
4. Concept Plan 2054: MTSU on behalf of MMRDA prepared a long term Concept Plan in 2011. The Plan proposed polycentric growth for the MMR with Greater Mumbai retaining its primacy. However, this Concept Plan has no statutory backing.

2.8 Significant Regional Development Initiatives

Other significant developments in the MMR, which will have an impact on Greater Mumbai, include the following:

1. **Navi Mumbai International Airport and Navi Mumbai Airport Influence Notified Area (NAINA):** A second international airport is planned to be developed in Navi Mumbai to ease air traffic congestion at Mumbai's Chhatrapati Shivaji International Airport. Given the rise in population and development in the region post the development of new airport, CIDCO has been accorded the status of the Special Planning Authority for NAINA which encompasses an area of about 20 km radial distance around the proposed airport. CIDCO is currently engaged in preparing DP for this area.
2. **Delhi- Mumbai Industrial Corridor (DMIC):** A mega- infrastructure project of USD 90 billion is being planned between Delhi and Mumbai covering an overall length of 1,483 KMs, with the financial and technical aid from Japan. A multi-modal high axle load dedicated freight corridor (DFC) is being established between Delhi and Mumbai with end terminals at Dadri in the National Capital Region of Delhi and Jawaharlal Nehru Port near Mumbai. An influence region in the form of a band of 150 km has been chosen on both sides of the Freight corridor to be developed as the Delhi-Mumbai Industrial Corridor. "The vision for DMIC is to create strong economic base in this band with globally competitive environment and state-of-the-art infrastructure to activate local commerce, enhance foreign investments, real-estate investments and attain sustainable development. In addition to the influence region, DMIC would also include development of requisite feeder rail/road connectivity to hinterland/markets and select ports along the western coast".⁴ An estimated 180 million people, 14 percent of the population, are to be affected by the corridor's development. It is envisaged that the proposed DMIC project would have a major influence on Mumbai and MMR in the future.
3. **Bengaluru-Mumbai Economic Corridor (BMEC):** The Government of India in partnership with Government of United Kingdom intends to develop the Bengaluru Mumbai Economic Corridor between Bengaluru and Mumbai, which would have an influence area spread across the states of Karnataka and Maharashtra, covering an overall length of 1,000 km approx. The Department of Industrial Policy & Promotion intends to develop the Bengaluru Mumbai Economic Corridor Region as a well-planned and resource-efficient industrial base served by world-class sustainable connectivity infrastructure, bringing significant benefits in terms of innovation, manufacturing, job creation and resource security to the two states. The availability of world class infrastructure along the Corridor is expected to enable increased investments in manufacturing and industrial activity in the two states. It is envisaged that the proposed BMEC project would have a major influence on freight traffic into the JNPT and MbPT Ports. The BMEC project will also impact development along the coast line of Maharashtra Mumbai and spur development of dry ports in the MMR in the future. Given this growth impetus at JNPT, implementation of the MTHL may spur development at the Sewri junction at Greater Mumbai.

⁴ <http://www.dmic.co.in/dmic-introduction.php> (accessed May 26, 2014)

2.9 Challenges and Opportunities

Addressing the needs of the growing population in the MMR and especially in the areas, which are growing at a faster rate, faces many challenges. Transportation networks that adequately provide fast linkages between current jobs and employment (currently 66% jobs are located in Greater Mumbai) and residential areas is one of the major challenges. Affordable housing, amenities and planned infrastructure to ensure a basic quality of life is the need of the hour. A coordinated regional strategy of polycentric growth with increasing decentralisation and greater local planning initiatives within the regional framework is desirable. MMR can offer solutions to Greater Mumbai's pressing problems of housing and transportation.



Chapter 03

Existing Land Use

3. Existing Land Use

To facilitate the Development Plan exercise, a Geographic Information Systems (GIS) enabled planning approach has been adopted for the first time by the MCGM, so as to address the complexity of Greater Mumbai's development dynamics. GIS has been used as an overarching tool in all steps of this exercise, starting from data collection stage itself. GIS enabled planning facilitates a great level of accuracy in an integrated platform.

The Existing Land Use (ELU) Map 2012, a key component of the DP 2034 plan preparation process (mandated in Section 25 of the MR&TP Act, 1966), was prepared based on an exhaustive Existing Land Use survey that recorded existing land uses in Greater Mumbai. The land uses were mapped on the GIS platform so as to create an integrated database of existing spatial and non-spatial data.

Key steps undertaken before the commencement of the ELU survey:

- a) Creating ELU categories;
- b) Creation of a Base Map; and
- c) Delineating Planning Sectors

These steps are detailed below:

3.1 Existing Land Use Classification

For the Existing Land Use Map, several categories of land uses were listed along with utilities and amenities that were then recorded and mapped during the ELU survey. The process of listing the categories and sub-categories entailed an intensive approach taking into consideration typical and specific typologies of developments and diverse cases of land use. In addition, color codes for representation during the mapping of these land use categories were finalized with reference to the DP 1991. These are detailed below.

Main Land Uses: There are significant changes since the DP 1991 in both the categories as well as the nature of classification used for the ELU 2012. To capture the current Existing Land Uses accurately, some new categories have been created (for e.g. Environmentally Sensitive Areas, Urban Villages and Offices) and in addition, each land use is also subdivided into several new sub categories in order to capture the full range of land use types in Greater Mumbai.

The Main Land Use Categories have been illustrated below along with the respective codes and sub codes that have been used to denote them in the Existing Land Use Map.

3.1.1 Creation of GIS Base Map

The Base map is formed through a series of overlays of spatial data layers as provided by MCGM on a base layer of the Quick Bird satellite image. The following is a description of the components used in the base map preparation:

a) Base layer - The Quick Bird high-resolution satellite image (0.61m resolution) of the MCGM jurisdiction, provided by MCGM for the year 2012, has formed the base layer of the Base Map.

b) Data layers - Several layers available in the database provided by MCGM were used as overlays on the Quick Bird satellite image of the area under MCGM, to create the Base Map. These include:

- **Jurisdiction boundaries:** Ward boundaries, areas under Special Planning Authorities, Town Planning Schemes, and other boundaries of spatial disaggregation (detailed later);
- **Physical features:** Street blocks, buildings, property (cadastral parcels as far as data is available);
- **Transportation:** highways, roads, road centrelines, railways, railway stations, airport boundary, water based transportation facilities, BEST bus depots/bus stations, and all other transportation infrastructure parcels and networks;
- **Utility infrastructure:** High tension lines, water pipelines (visible above ground), sewage and solid waste management facilities, etc.;
- **Environmentally sensitive areas:** National park, forests, hills, nallas, water bodies etc.
- **Heritage Conservation areas:** Designated heritage structures and precincts.

3.1.2 Spatial Disaggregation

To form the base map, various levels of disaggregation present within MCGM area were considered viz.:

- 2 District boundaries (Island City and Suburban)
- 3 Zones (Island City, Eastern and Western Suburbs)
- 24 Administrative Ward boundaries.

Apart from the above, several other spatial divisions exist within MCGM area, which include Census Sections, Electoral Wards, Traffic Analysis Zones, Zones and Sub-zones of the Ready Reckoner as well as the Areas under Special Planning Authorities (SPAs).

- The **88 Census Sections** are delineated by the Office of Registrar General and Census Commissioner, Government of India (GoI), Ministry of Home Affairs for the purpose of Census data. The data from this level have been effectively used as reference for verifying distribution of population across various levels of disaggregation (i.e., Zones, administrative Wards, and Planning Sectors).
- The **227 Electoral Wards** are created by the Election Commission of Maharashtra for conducting general elections and election of comparators through municipal elections. The electoral Ward boundaries have been superimposed on the Ward boundaries to check for conformity issues. However, these have not been directly used for analysis since the boundaries are subject to change based on population parameters.
- The **577 Traffic Analysis Zone Sections (TAZ)** within MCGM (out of total 1030 in MMR) as devised by the Comprehensive Transport Study (CTS) for the Mumbai Metropolitan Region (MMR) for assessment of travel demand. The data from these TAZ have been used in

situation analysis for population, employment and transport systems at the Ward and Planning Sector levels for 2005 and 2011.

- The **Ready Reckoner** has 124 subzones based on village boundaries for land and property price data. This data will be used as reference to derive the cost of DP implementation and revenue mobilization.
- The State Government has appointed Special Planning Authorities (SPAs) for areas within the jurisdiction of the MCGM, notified under Section 40 of the MR&TP Act (Refer Table 1.1 in Chapter 1.) MCGM is not the 'Planning Authority' for such areas. These areas together account for an area of 43.22 ha as per the Existing Land Use report. While the population and area under SPAs have been computed and discounted for the purposes of analysis and further projection for the DP 2034, the DP does however address connectivity to these areas from the rest of the City. Tabulation and map generation has been undertaken for these areas based on data availability.

3.1.3 Delineation of Planning Sector

The MCGM jurisdiction with its twenty-four administrative wards has been further sub-divided into 150 Planning Sectors (PS) and multiple blocks within each Planning Sector. The objective of defining Planning Sectors for DP2034 is to have basic workable spatial units to plan for provision of social amenities at the smallest level of disaggregation appropriate to be addressed in the Development Plan. For the purpose of this exercise, the area within the jurisdiction of the MCGM has been first divided into 3 broad zones namely the Island City, Western Suburbs and Eastern Suburbs. The delineation of the three zones respects the delimitations of the 24 administrative Ward boundaries. The Wards within these zones have been further subdivided resulting in 150 Planning Sectors excluding the National Park and the notified areas under SPAs.

The criteria established to arrive at delineation of each Planning Sector are as follows:

- a) Ward boundaries have been maintained as definitive limits. Thus, no Planning Sector spans across two Wards. Adhering to Ward boundaries ensures optimal use of secondary data.
- b) Physical boundaries defined by major transport networks including road and railway networks have been considered as boundaries for defining Planning Sectors;
- c) Major environmental features such as rivers, wetlands, salt pan lands have been taken cognizance of;
- d) Areas that are largely homogenous in character have been correlated;
- e) Areas which either have very clear, separate limits including campuses such as Bhabha Atomic Research Centre, Mumbai University (Kalina Campus) and Indian Institute of Technology, have been carved into separate Planning Sectors.
- f) Planning Sector boundaries of the 103 Planning Sectors of the DP 1991 have been referred to and they form the basis of the new Planning Sectors wherever possible.

Based on the above criteria, the Planning Sectors are located within the administrative Ward boundaries for purposes of accurate analysis, planning and implementation. A total of 150 Planning Sectors have been defined as given in the table 3.1 below.

For ease of analysis and identification of the Planning Sectors, the three Zones, the Island City, the Western Suburbs and the Eastern Suburbs have been named Zone 1, Zone 2 and Zone 3 respectively. The number of Planning Sectors and their areas are given below in Table 3.1 given below.

Table 3.1: Zone wise area and number of Planning Sectors

District	Total area in ha*	No. of Planning Sectors**
Island City	7,140.71	50
Western Suburbs	22,239.29	62
Eastern Suburbs	16,448.48	38
Greater Mumbai	45,828.49	150

*including SPA

**excluding SPA and National Park

The nomenclature of the Planning Sectors starts with the Ward name (e.g. A, B, C...etc) followed by the Zone name series (e.g. all Island City wards will have the Ward name followed by the number 1 to denote the Zone in Western Suburbs, Ward names will be followed by the number 2 and in Eastern Suburbs, Ward names will be followed by the number 3 to denote the Zone), further followed by the Planning Sector number (usually numbered as 01, 02 and so on). Examples of this nomenclature method have been illustrated here for Planning Sectors within one Ward for each Zone:

- Planning Sectors in the Ward A of Zone 1 have been numbered as: A 1.01, A 1.02, A 1.03 and so on up to A 1.09;
- Planning Sectors in the Ward H/E of Zone 2 have been numbered as: H/E 2.01, H/E 2.02 and so on up to H/E 2.05;
- Planning Sectors in the Ward L of Zone 3 have been numbered as: L 3.01, L 3.02, L 3.03 and so on up to L 3.08.

Table 3.2: Ward wise Planning Sector areas⁸

Table 3.2: Ward wise Planning Sector areas				
		Planning Sector	Localities ⁹	Area(ha)
	A – WARD	A 1.01	Back Bay Reclamation, Colaba, Old Navy Nagar	230
		A 1.02	Apollo Bunder, Electric House BEST, Police Colony	139
		A 1.03	Gateway of India, Maharashtra Police Head Quarters	72
		A 1.04	Ballard Estate	9
		A 1.05	MbPT	95
		A 1.06	Bombay Stock Exchange, Bora Bazaar, Flora Fountain, Horniman Circle, Shahid Bhagat Singh Marg, St. Thomas Cathedral	61
		A 1.07	CST Railway Terminus, St. George Hospital	46
		A 1.08	Azad Maidan, Bombay Hospital, Cooperage Ground, Dhobi Talav, Elphinstone Technical Institute, MCGM Head Office, Oval Maidan, University of Mumbai	160
		A 1.09	Braborne Stadium, Churchgate Railway station, Mahindra Football Ground, Wankhede Stadium	72
		SPA (MMRDA)	Backbay Reclamation, Cuffe Parade, Nariman Point	237
		Total		1,121
	B – WARD	B 1.01	Chinch Bunder, Chippi Chawl, Dongri, Koliwada, Masjid Bunder West, Pydhonie, Umerkhadi, Vadgadi	106
		B 1.02	Dana Bunder, Masjid Bunder East, Mazgaon, Mandvi	66
		B 1.03	Malet Bunder Road	93
		Total		266
	C – WARD	C 1.01	Hindu Gymkhana, Police Grounds, Tarapore Wala Aquarium	24
		C 1.02	Anant Wadi, Bhang Wadi, Chandan Wadi, Chira Bazaar, Gai Wadi, Kalbadevi, Tad Wadi, Wagh Wadi	72
		C 1.03	Badam Wadi, Bhuleshwar, Cawasji Patel Tank, Champa Wadi, Chor Bazaar, Gulal Wadi, Joshi Wadi, Kumbharwada, Lad Wadi, Lohar Chawl, Narottam Wadi, Null Bazaar, Panjarpole, Zaveri Bazaar	96
		Total		191
D – WARD	D 1.01	Anand Nagar, Bane Compound, Cumballa Hill, Gowalia Tank, Tardeo, Zoroastrian Colony	316	
	D 1.02	Bharat Nagar, Grant Road Post office	61	
	D 1.03	Bhatwadi, Girgaon, Khetwadi, Mangal Wadi	122	
	D 1.04	Banganga, Dadi Sheth Wadi, Girgaum Chowpatty, Kemps Corner, Malabar Hill, Raj Bhavan, Tower of Silence	332	
	Total		830	
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⁸ Total Ward areas have been rounded off to the last digit. Areas under the sea, which are included in the ward boundaries and some other major water bodies are not included in the area statement.

⁹ The locality names mentioned here describe the broad local context of the area within Planning Sector.

		Planning Sector	Localities ⁹	Area(ha)
	E – WARD	E 1.01	Agripada, Bombay YMCA, Mumbai Central Terminus	75
		E 1.02	Chinchpokli	125
		E 1.03	Dhaku Prabhuchi Wadi, Ghodapdeo	139
		E 1.04	Darukhana	130
		E 1.05	Rly Colony, Tadvadi, Wadi Bunder	148
		E 1.06	Kamathipura, Kazipura, Siddharth Nagar	100
		Total		717
	F/N – WARD	F/N1.01	Five Gardens, Matunga East, UDCT,JTI	284
		F/N1.02	SIES College of Commerce, Shivaji Nagar, Sion Circle	139
		F/N1.03	Pratiksha Nagar	140
		F/N1.04	Kane Nagar	109
		F/N1.05	Nadkarni Park, Nana Phadanwis Bridge	37
		F/N1.06	Antop Hill, CGS Colony	180
		F/N1.07	Korba Mithagar, Panchsheel Nagar	190
		SPA (MMRDA)	Wadala Anik Depot, Wadala Mono Rail Workshop	121
		Total		1,201
	F/S – WARD	F/S 1.01	Bharatmata	128
		F/S 1.02	Jerbai Wadi Road, Govindji Keni Road, Naigaon	55
		F/S 1.03	Bhoiwada, Kidwai Nagar	143
		F/S 1.04	Cotton Green Building, Gandhi Nagar, Sewree, Wadala	420
		F/S 1.05	Abhyudaya Nagar, Azad Nagar, Kala Chowky, Sindhu Nagar	93
		F/S 1.06	Gokuldas Morarji Mills, KEM Hospital, Lal Baug, Parel	127
		Total		965
	G/N – WARD	G/N 1.01	Mayor's Bungalow, Purandare Wadi, Shivaji Park, Siddhivinayak Temple	210
		G/N 1.02	Dadar West, Juwekar Wadi, Our Lady of Salvation Church, Plaza Theatre, Ruparel College	231
		G/N 1.03	Tilak Bridge,Central Rail Workshop Matunga East	94
		G/N 1.04	Hanuman Nagar	10
		G/N 1.05	Mahim Railway Station	18
		G/N 1.06	Lal Bahadur Shastri Marg, Kala Qila	10
		SPA (MMRDA)	Bandra Kurla Complex	80
		SPA (SRA & MHADA)	Dharavi (Ambedkar Nagar, Kumbhar Wada Dharavi, Mahanagar Palika Vasahat)	222
		Total		876
	G/S - WARD	G/S 1.01	Century Bazaar, Gopal Nagar, Hanuman Nagar, Kamgar Nagar, Worli Shivaji Nagar, Worli Village	250
		G/S 1.02	BDD Chawls, Peninsula Towers	134
		G/S 1.03	Jeejamata Nagar, Mahalaxmi Race Course, Nehru Planetarium, Poonam Chambers, Sardar Vallabhbhai Patel Indoor Stadium, Worli Dairy	298
G/S 1.04		Pheonix Mills	121	

PART I – CONTEXT AND CHALLENGES

		Planning Sector	Localities ⁹	Area(ha)
		G/S 1.05	Arthur Road Jail, Mahalaxmi Station	77
		G/S 1.06	Dighe Nagar	50
		Total		929
WESTERN SUBURBS	H/E - WARD	H/E 2.01	Prabhat Colony	188
		H/E 2.02	Kherwadi	25
		H/E 2.03	Kala Nagar, MIG Club Bandra, Subhash Nagar	108
		H/E 2.04	University of Mumbai Kalina Campus	94
		H/E 2.05	Santacruz East, Vidya Nagari	289
		SPA (SRA & MHADA)	Dharavi	9
		SPA (MMRDA)	Bandra Kurla Complex	428
		SPA (MMRDA)	International Airport	148
		Total		1,289
	H/W – WARD	H/W 2.01	Ranwar, Santosh Nagar Bandra, Taj Lands End	136
		H/W 2.02	Chuim, Danda, Hanuman Nagar Khar, Pali Hill	167
		H/W 2.03	Old Khar West	55
		H/W 2.04	Hasmukh Nagar, Podar Educational Complex, Vitthaladas Nagar Housing Colony	98
		H/W 2.05	Ambedkar Nagar Khar, Pali Village	192
		H/W 2.06	Bandra Talao, Patkat Blocks, Jaibharat Society, Ramkrishna Nagar	63
		H/W 2.07	Khar Subway, St. Teresa's Convent School	67
		SPA (MMRDA)	Bandra Kurla Complex (Vaidya Nagar)	85
		Total		865
	K/E WARD	K/E 2.01	Netaji Subhash Nagar, Paranjpe Nagar, Vile Parle	230
		K/E 2.02	Tarun Bharat Society, J B Nagar, Chakala, Sahid Bhagat Singh Colony, Mota Nagar	188
		K/E 2.03	Chimatpada, Marol Village	301
		K/E 2.04	Hanuman Nagar, Bhim Nagar	59
		K/E 2.05	Reliance Training Centre JVL R	162
		K/E 2.06	Gupha Tekdi, Jogeshwari East, Poonam Nagar, Sher E Punjab Colony, Sundar Nagar	452
		K/E 2.07	Hind Nagar, Subhash Nagar Jogeshwari East	275
		K/E 2.08	Air India Road, Santacruz East	10
		SPA (MMRDA)	International Airport	583
		SPA (MIDC)	SEEPZ, SEEPZ Colony, Shanti Nagar	140
		Total		2,400
	K/W - WARD	K/W 2.01	Amrut Nagar, B R Nagar, Bhim Wada, Irla, Iskcon Temple, J W Marroit, JVPD Scheme, Janki Kutir, Juhu Koliwada, Kamala Nagar, Millenium Club, Momin Nagar, Vidyaniidhi, Juhu Chowpatty	578
		K/W 2.02	Bhavans College, Cooper Hospital, Indira Nagar, Mithibai	244

		Planning Sector	Localities ⁹	Area(ha)
			College, Munshi Nagar, Sagar City, Shree Ram Nagar, Yadav Nagar	
		K/W 2.03	Aram Nagar, D N Nagar, Four Bungalows, Nana Nani Park Versova, Rutumbara College, Versova, Versova Village	515
		K/W 2.04	Central Institute of Fisheries Education, Versova Pumping Station	252
		K/W 2.05	Cinemax, Kokilaben Reliance Hospital, Lokhandwala Complex, Mudran Press Colony, S V P Nagar, Shastri Nagar, Suresh Nagar	236
		K/W 2.06	Milat Nagar, Yamuna Nagar	62
		K/W 2.07	Navneet Colony, Andheri Sports Club, Behram Baug, Jogeshwari Nagar, Kadam Nagar, MHADA Colony Jogeshwari	367
		K/W 2.08	Juhu Flying Club	126
		K/W 2.09	Husaini Peer	7
		SPA (MMRDA)	Oshiwara District Centre	54
		Total		2,442
	P/N – WARD	P/N 2.01	Ambujwadi	1,754
		P/N 2.02	Bombay Transmitter Site, Malwani, St. Anthony School, Babrekar Nagar Kandivali, Ambedkar Nagar Kandivali	637
		P/N 2.03	Malad Mindspace	114
		P/N 2.04	Dominic Colony Kandivali, Kanchpada, Mamletdar Wadi, Mamletdar Wadi Kandivali, Chincholi Bunder, Nadiyawala Colony	313
		P/N 2.05	Malad East	220
		P/N 2.06	Dindoshi, Gokul Nagar Malad E, Kurar Village Malad E, Nagri Niwara Society Malad E, Pathan Wadi, Raheja Estate Malad E, Sankalp Colony Malad E	602
		P/N 2.07	Whistling Woods International Film School	5
		SPA (MMRDA)	Recreation and Tourism Development Zone	566
		Sanjay Gandhi National Park	-	460
		Total		4,672
	P/S - WARD	P/S 2.01	Mega Mall Oshiwara	312
		P/S 2.02	BEST Nagar Oshiwara, Bangur Nagar, Bhagat Singh Nagar, Motilal Nagar	291
		P/S 2.03	Motilal Nagar 2& 3, Prem Nagar	125
		P/S 2.04	Hypercity Mall, Inorbit Mall Goregaon	151
		P/S 2.05	Cama Industrial Estate, Sonawala Industrial Estate, Goregaon Station, Dindoshpada	324
		P/S 2.06	Gokuldharm, Yashodham	101
		P/S 2.07	Goregaon East	1,171
		SPA (MMRDA)	Oshiwara District Centre	51
		Sanjay Gandhi National Park	-	5

PART I – CONTEXT AND CHALLENGES

		Planning Sector	Localities ⁹	Area(ha)
		Total		2,529
R/N - WARD	R/N 2.01	Anand Park Dahisar W, Ganpat Patil Nagar Dahisar W	409	
	R/N 2.02	Kandarpada, LIC Colony, Mandapeshwar, Tawde Wadi	284	
	R/N 2.03	Ambawadi, Anand Nagar Dahisar E, Maratha Colony, Shakti Nagar Dahisar E	295	
	R/N 2.04	Chintamani Nagar Borivali E, Kajupada Borivali E, Ketkipada Dahisar E, Mahavir Nagar Borivali E, Vaishali Nagar	212	
	Sanjay Gandhi National Park	-	217	
	Total		1,418	
	R/C - WARD	R/C 2.01	MHADA Colony Borivali West	581
R/C 2.02		Charkop Sector 3, 4, 5, & 6	225	
R/C 2.03		Ashtanayak Nagar, Gorai	209	
R/C 2.04		CKP Colony, Eksar, Prem Nagar, Roshan Nagar, Yogi Jayraj Nagar	159	
R/C 2.05		Babhai, Chiku Wadi, Hari Om Nagar, Saibaba Nagar	301	
R/C 2.06		Asara Colony, Chinchpada Borivali E, Daulat Nagar, Rajendra Nagar	140	
R/C 2.07		Jai Jawan Nagar	117	
R/C 2.08		Abhinav Nagar Borivali E, Krishna Nagar, Kulup Wadi Borivali E, Magathane	203	
SPA (MMRDA)		Recreation and Tourism Development Zone	1,441	
Sanjay Gandhi National Park		-	1,428	
Total			4,803	
R/S - WARD	R/S 2.01	Charkop Village	147	
	R/S 2.02	Charkop Sector 1&2	48	
	R/S 2.03	Charkop Industrial Estate	45	
	R/S 2.04	Gandhi Nagar Kandivali, Ganesh Nagar Kandivali	142	
	R/S 2.05	Dahanukar Wadi Kandivali, Jethava Nagar, Kamala Nagar Kandivali, Mohan Nagar, Patel Nagar Kandivali, Tulaskar Wadi Kandivali	303	
	R/S 2.06	Aarya Chanakya Nagar E, Janata Nagar Malad, Padmaba Nagar, Thakur Complex	259	
	R/S 2.07	Lokhandwala Kandivali, Narsi Pada, Thakur Village	474	
	Sanjay Gandhi National Park	-	412	
	Total		1,831	
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		Planning Sector	Localities ⁹	Area(ha)	
EASTERN SUBURBS	L - WARD	L 3.01	Saki Naka Junction, Police Training Ground	85	
		L 3.02	Chandivali Sangharsh Nagar, Chandivali Lake, Tunga Village, Tunga, Chandivali	338	
		L 3.03	Mittal Industrial Estate	77	
		L 3.04	Asalfa, Ashoknagar, Jari Mari, Kaju Pada, Lokmanya Tilak Nagar Ghatkopar	246	
		L 3.05	Bail Bazaar, Wadia Colony	24	
		L 3.06	Kurla West, Premier Colony, Sheetal Lake Kurla	196	
		L 3.07	Ambedkar Nagar, Kasaiwada, Panchsheel Nagar, Tata Nagar	128	
		L 3.08	Chunabhatti, Everard Nagar, Milan Nagar, Shiv Srishti	340	
		SPA (SRA & MHADA)	Dharavi	4	
		SPA (MMRDA)	International Airport	118	
		Total		1,556	
	M/E - WARD	M/E 3.01	Anushakti Nagar, Cheeta Camp, Tata Institute of Social Sciences, Trombay Koliwada	2,473	
		M/E 3.02	Agarwadi, Dock Labour Board Colony, Govandi E	161	
		M/E 3.03	ACC Nagar, New Gautam Nagar, Sanjay Gandhi Nagar Sector 1& 2	160	
		M/E 3.04	Annabhau Sathe Nagar, Shivaji Nagar Chembur	595	
		Total		3,389	
	M/W - WARD	M/W 3.01	HP Nagar West, Mahul Chembur, Priyadarshini Circle, Rashtriya Chemical Fertilizer, Vashi Gaon	989	
		M/W 3.02	Chembur Golf Course, Collector's Colony, Diamond Garden, Sindhi Colony, Teen Talao	508	
		M/W 3.03	Pestom Sagar Colony, Rajiv Gandhi Nagar, Tilak Nagar, Vatsalabai Naik Nagar	149	
		M/W 3.04	Chedda Nagar, Jyothi Nagar	95	
		Total		1,740	
	N - WARD	N 3.01	Amrut Nagar Ghatkopar West, Azad Nagar Ghatkopar, Barve Nagar, Vikhroli West	388	
		N 3.02	Pant Nagar, Vidya Vihar West	172	
		N 3.03	Adoni Compound	98	
		N 3.04	Godrej Boyce, Laxmi Nagar	178	
		N 3.05	BEST Colony Vidya Vihar, Rajawadi	293	
		N 3.06	Godrej Creekside Colony, Ramabai Ambedkar Nagar	1,407	
Total			2,535		
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	S – WARD	S 3.01	IIT Powai, Powai Lake	583
		S 3.02	Hiranandani Powai, Panchkutir Ganesh Nagar	168
		S 3.03	Godrej Colony, HMPL Surya Nagar, Ramabai Nagar Powai	241
		S 3.04	Kaju Tekdi, Kanjurmarg West, Kendriya Vidyalaya Kanjurmarg, Khindipada Bhandup, Panchsheel Nagar Bhandup, Pratap Nagar Kanjurmarg, Shivaji Nagar Bhandup, Sonapur Bhandup, Tembhipada Bhandup, Utkarsh Nagar Bhandup	464
		S 3.05	Bhandup Industrial Area, Govind Nagar Bhandup, Huma Theatre, Vasant Nagar	246
		S 3.06	Gandhi Nagar Powai, Lokmanya Nagar Powai	41
		S 3.07	Kannamwar Nagar, Tagore Nagar	209
		S 3.08	Adarsh Nagar, Friends Colony Nahur, Kanjurmarg E , Nahur E	404
		S 3.09	Kanjurmarg Municipal Dumping Ground	593
		Sanjay Gandhi National Park	-	25
		Total		2,975
	T – WARD	T 3.01	Johnson & Johnson, Mulund Colony, Mulund ESIS Hospital, Runwal Mall Check Naka, Yogi Hills Mulund	274
		T 3.02	Mulund BEST Depot, Mulund Sonapur, Sarvoday Parshwanath Nagar Mulund, Vishwakarma Nagar	371
		T 3.03	Arunoday Nagar, Hanuman Chowk, LIC Colony Mulund, Neelam Nagar, Sajjan Wadi	289
		T 3.04	Damaji Patil Wadi, MHADA Colony Mulund E	614
		T 3.05	Sahi Banguda	3
		T 3.06	Part of National Park	0.07
		T 3.07	Royal Palms Estate, Royal Palms Golf & Country Club	33
		Tulsi Lake	-	115
		Vihar Lake	-	497
		National Park	-	2,091
		Total		4,288
		Greater Mumbai		45828

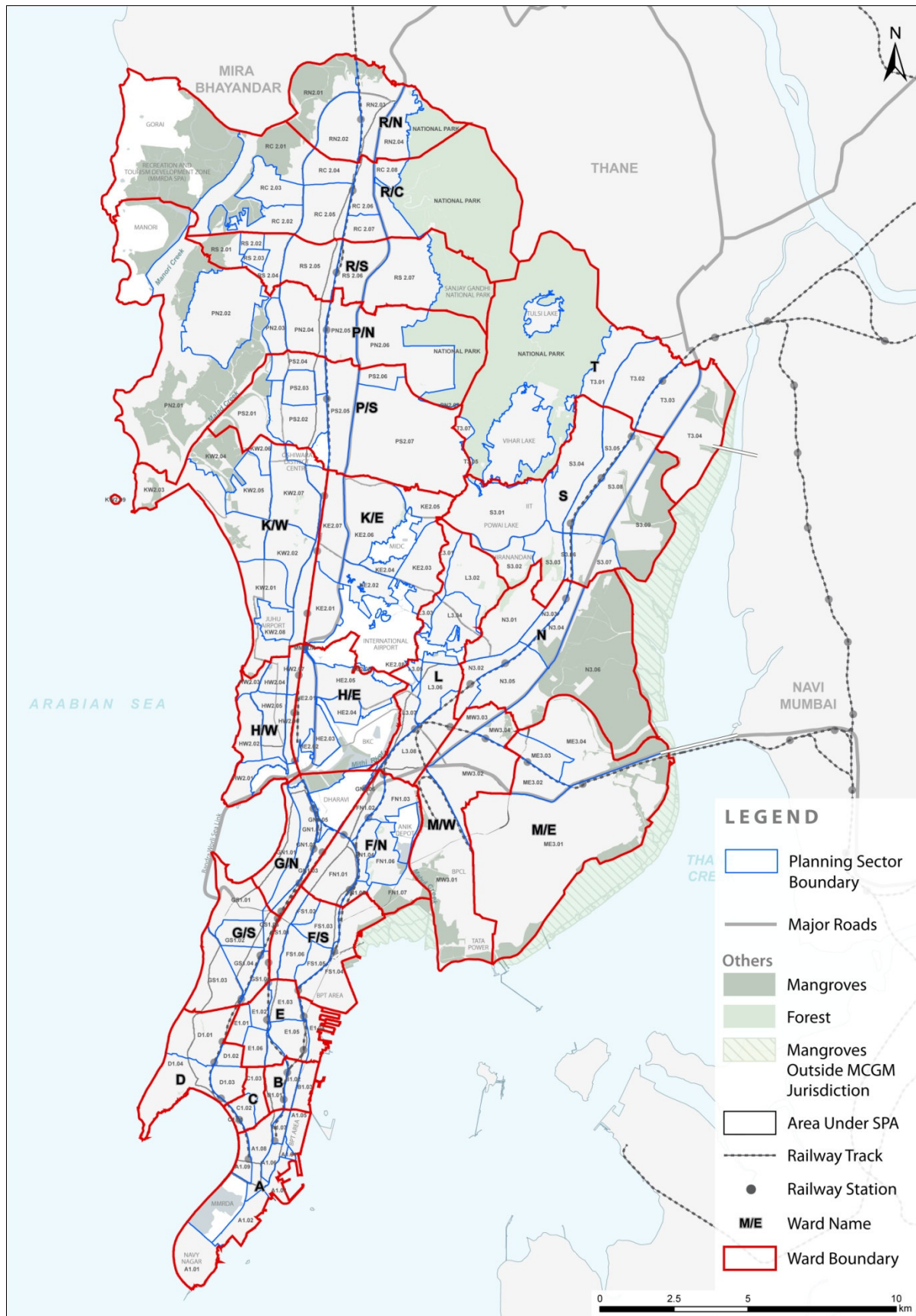
The Table 3.3 below provides details of the larger developments and natural areas which span (in parts) across different Planning Sectors.

Table 3.3: Large developments and Natural Areas spanning across different Planning Sectors

Locality	Area (ha)	Planning Sector
Mumbai University (Kalina)	84	HE 2.05, HE2.04
Indian Institute of Technology	165	S3.01
National Park*	4467	PN, T, RN, RC, RS, PS, S
Aarey Milk Colony	735	PS2.07, S 3.01, KE 2.05
Total	5,451	

* National Park has not been divided into Planning Sectors, only Wards that it spans across are mentioned.

Map 3.1 : Planning Sectors of Greater Mumbai



3.2 Existing Land Use

The data gathered through the extensive Existing Land Use surveys to capture existing land use details of each parcel at block level was used to create the Existing Land Use Map 2012 on a GIS platform for the first time. The ELU 2012 provides information regarding the various uses the land is currently being put to and the extent of development that has taken place since the publication of the DP 1991. Based on the ELU 2012, an assessment of the various land uses and their distribution across the various Wards of the City was done across various scales- at the level of Greater Mumbai, followed by the Ward level and finally the Planning Sector levels. FSI mapping was also carried out for the entire city so as to understand the extent of FSI consumed in various planning sectors so that future provision could accordingly be planned based on the estimated future demand.

A GIS database has been created which includes spatial and non-spatial data pertaining to demography, population, employment, land use, environment, social infrastructure and physical infrastructure, existing FSI at block and PS level. The land use distribution along with other inter - sectoral analyses of Transport Networks, Employment, Environment and Population dynamics helped assess general growth trends, determine areas of opportunity and generate future scenarios. The ELU 2012 also provided data on existing open spaces, social amenities, transport and other physical infrastructure in Greater Mumbai. The level of implementation of the DP 1991 as well as a gap assessment of amenities was carried out through radar diagrams and distance based accessibility mapping of local amenities.

3.2.1 Land Use Distribution

The total area under Greater Mumbai admeasures 458.28 sqkm. Excluding the areas notified for SPAs, the total Planning area for which the Development Plan for Greater Mumbai 2034 is being prepared admeasures 415.05 sqkm. It should also be noted that an area of 14.96 sqkm in Thane Creek has emerged probably through the process of siltation that is outside the current MCGM limits. These wetlands are fully covered by mangroves and are not considered in the calculations since; they are at present beyond the existing MCGM boundary (see Map 4).

The Existing Land Use survey reveals that only 65.34% (271.17 sqkm) of the Planning Area of Greater Mumbai is developed, whereas 34.66% of is undeveloped (refer Map 3.2 and Table 3.4). The undeveloped area includes Natural Areas, Vacant Lands, Plantations and Salt Pans. Of the Developed Area, 38.08% is occupied by Residential uses, 8.27% by Industrial uses, 3.36% by Commercial uses & 1.33% by Offices. Amenities (Education, Medical, and Social Amenities) constitute 5.63%, Open Space 5.67% and Public Utilities & facilities 2.56%. Transport and Communication facilities constitute 19.57% with Roads occupying 13.79% of the total developed area and Railways occupy 2.97%. Together 33.43% of the developed area is under Amenities, Open Space, Public Utilities and Transport.

Map 3.2: Mangroves outside MCGM Jurisdiction

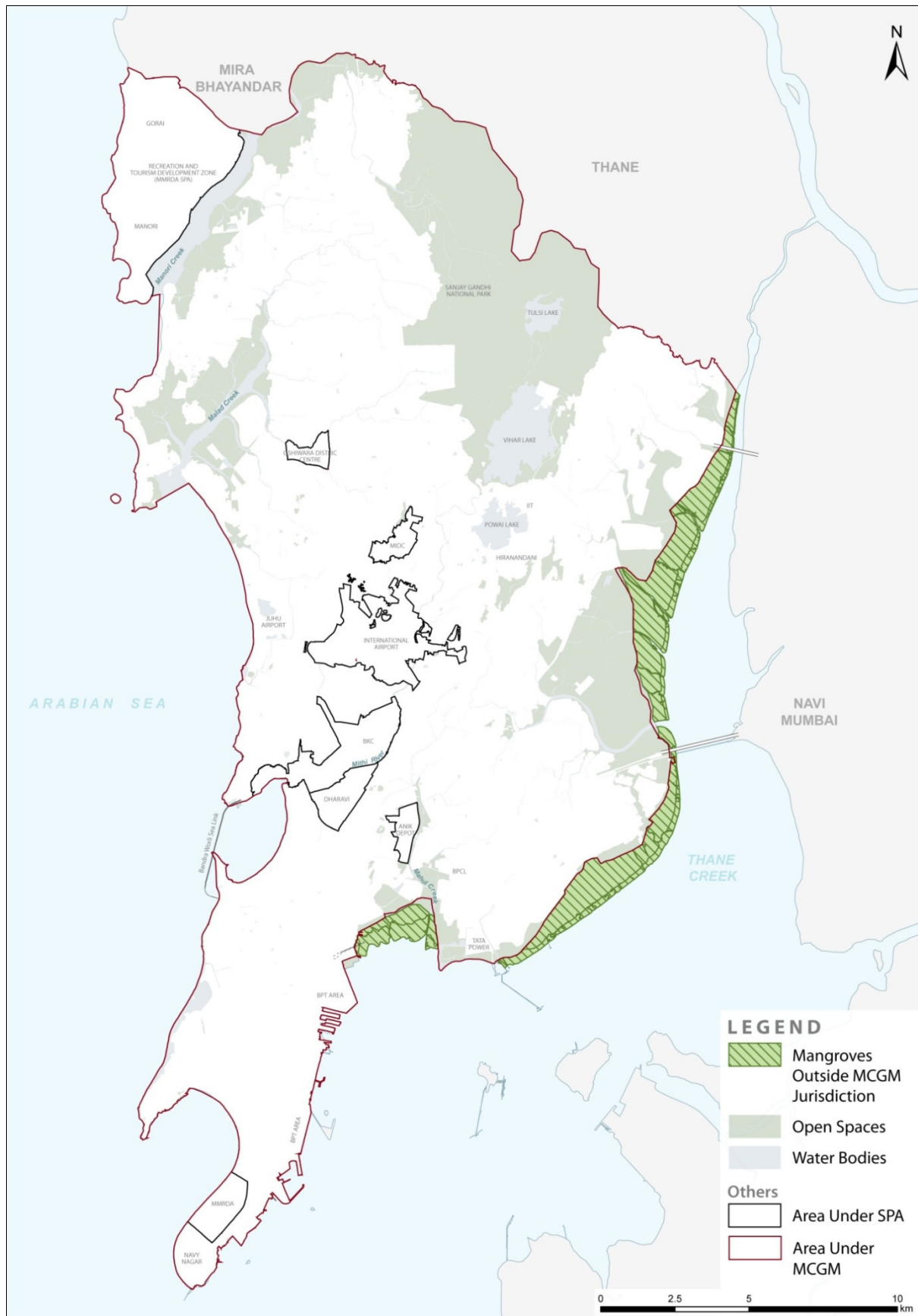


Table 3.4: Existing Land Use distribution for Greater Mumbai 2012

Existing Land Use Categories (2012)	Greater Mumbai			
	Area (ha)	% of Total Area	Per Capita Area (sqm)	% of Developed Area
Residential	10,327.09	24.88	8.30	38.08
Commercial	911.46	2.20	0.73	3.36
Offices	360.96	0.87	0.29	1.33
Industrial	2,242.88	5.40	1.80	8.27
Open Spaces	1,537.78	3.70	1.24	5.67
Education Amenities	853.81	2.06	0.69	3.15
Medical Amenities	318.44	0.77	0.26	1.17
Social Amenities	355.81	0.86	0.29	1.31
Public Utilities and Facilities	693.43	1.67	0.56	2.56
Transport & Communication Facilities	5,306.92	12.79	4.27	19.57
Urban Villages	318.42	0.77	0.26	1.17
Primary Activity (P1, P3, P4, P5 P6, P7)	939.22	2.26	0.75	3.46
Unclassified	1,829.77	4.41	1.47	6.75
Vacant Land (only under Construction)	1,121.97	2.70	0.90	4.14
DEVELOPED AREA	27,117.95	65.34	21.79	100.00
Natural Areas	11,303.82	27.23	9.08	
Vacant Land (excluding under construction)	2,282.82	5.50	1.83	
Primary Activity (P2, P8)	801.11	1.93	0.64	
UNDEVELOPED AREA	14,387.75	34.66	11.56	
TOTAL PLANNING AREA	41,505.71	100.00	33.36	
Area under Special Planning Authority	4,322.79	9.43		
TOTAL MCGM AREA	45,828.50			

Source: ELU 2012

Note: Primary activities under the Developed Areas include – P1 (Fishing / Drying Yard), P3 (Dairy), P4 (Buffalo Stables), P5 (Cattle Pounds), P6 (Quarry), and, P7 (Dhobi Ghat). Primary activities under the Undeveloped Areas include – P2 (Plantation), and, P8 (Salt Pan Lands).

Map 3.3: Greater Mumbai: Existing Land Use 2012

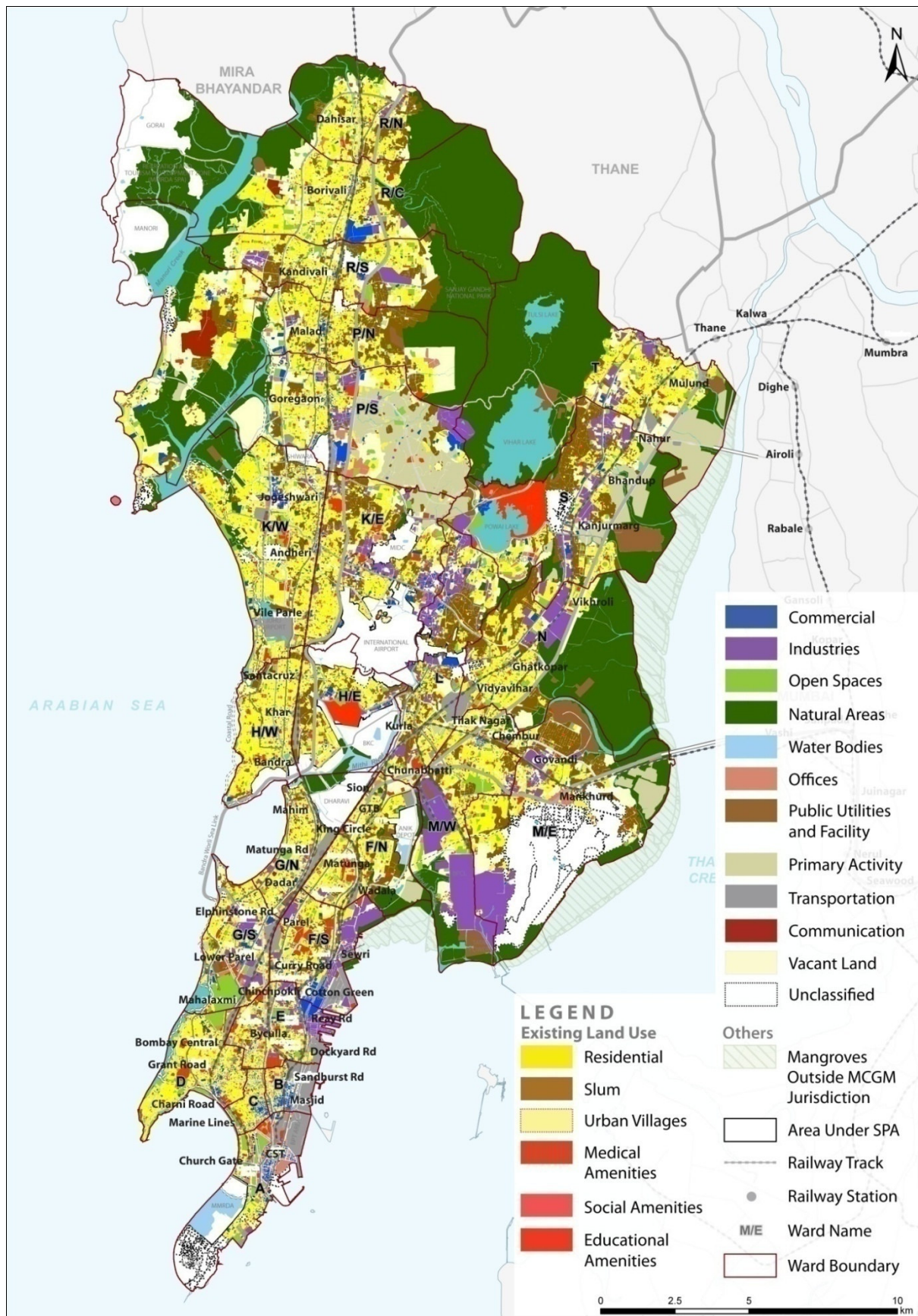
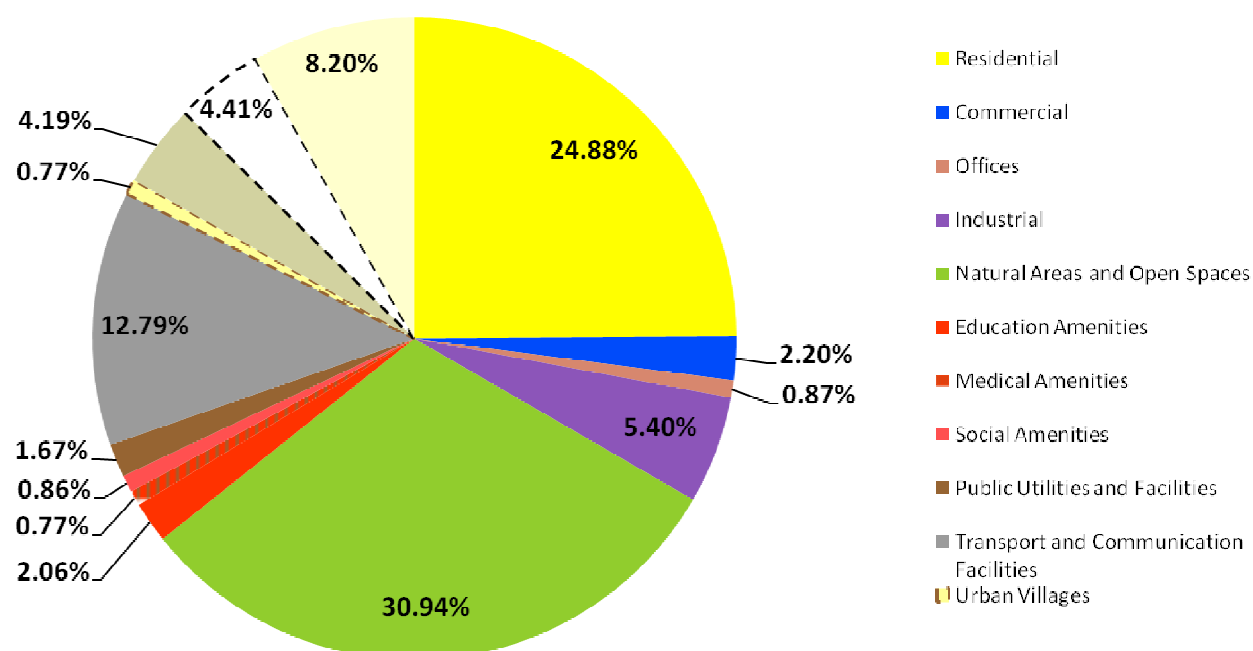


Figure 3.1 Existing Land Use distributions, 2012



3.2.1 Existing Land Use 2012

The current distribution of land uses as per the ELU 2012 indicates some development patterns which are in accordance with proposals of DP 1991, while some others have not yet been actualized. New land use patterns have also emerged.

- Of the total Development Plan Area (415.05 sqkm), 271.17 sqkm is developed area, accounting for about 65% of the total area;
- A more pronounced polycentric pattern has developed with multiple nuclei (several of these are now areas under SPAs and function as employment nodes compared to the erstwhile single CBD in South Mumbai);
- The Oshiwara District Centre has not acquired the intended status of a District Centre although MMRDA was appointed as the SPA. The other district centre, viz., Kanjurmarg District Centre in the Eastern Suburbs has not been realised;
- Development continues to be structured along corridors, largely along transport network.
- However, in the Western Suburbs, in Wards K/W, K/E, P/N, R/C, R/S, areas in proximity to railway corridors have developed into new mixed use centres, eg. areas surrounding Andheri, Goregaon, Malad and Borivali Railway Stations.
- Some of the major proposed transport networks have been realized. The Worli Sea-Link, the Jogeshwari-Vikhroli Link Road, the Santacruz-Chembur Link Road, the Eastern Freeway are have been completed. Yet others, such as Coastal Road are under formulation;
- Greater Mumbai appears to be in a transformative phase of 'redevelopment'. Areas around Lower Parel-Elphinstone Road have emerged as places with a new office concentration

through redevelopment of erstwhile Textile Mills. Industrial Areas are transforming into residential and Commercial Areas (enabled by amendments to the Rule 56b of the DCR DP 1991 and the Industrial Location Policy). Andheri Kurla Road has emerged as a concentration of IT, ITES activities through transformation of Industrial Areas;

- Older Residential Areas are being more intensely redeveloped as mixed use areas;
- Greater Mumbai predominantly comprises a mixed land use, including residential, commercial and office uses. Commercial and Office Land Use centralities are primarily found along road infrastructure and in proximity to existing transit stations. Several areas presently occupied by Industrial Land Use, areas occupied by old dilapidated structures in Cessed Areas and large slums demonstrate a potential for transformation
- The current development patterns observed in the four distinctive Land Uses as per ELU 2012 are detailed below:

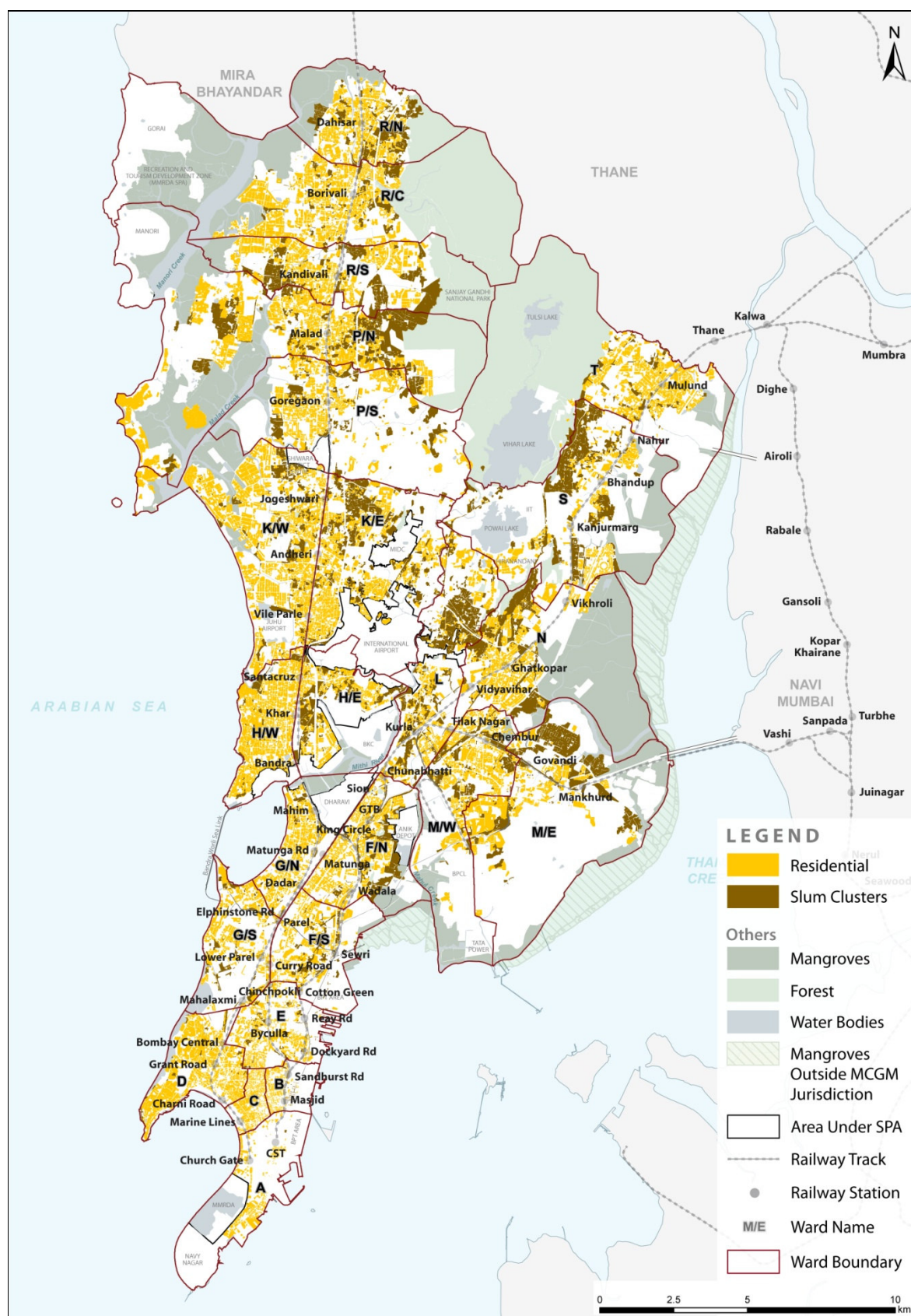
3.2.2 Residential Uses: A context of mixed land uses

The northernmost Suburbs are more residential while the Island City has a comparatively smaller residential land allocation. Formal and informal markets co-exist and are concentrated especially around railway stations.

The ELU 2012 for Western Suburbs of Malad and Dahisar (wards P/N, R/N respectively) and in the Eastern Suburbs of Mulund, Ghatkopar and Chembur-Govandi (T, N and M wards respectively) indicates that these are predominantly residential in use. Industrial uses in these Wards have transformed into high income residential cum retail and entertainment hubs. In the Western Suburbs, the residential development is hemmed in by Natural Areas, and seems wedged in by the sea and the coastal zone on the west and the National Park on the east. In the Eastern Suburb of Govandi (M/E ward), there has been a significant introduction of slum resettlement projects.

As explained earlier, the ELU 2012 incorporates several sub categories for Residential uses, viz., single family dwelling, and multifamily apartments, chawls, Govt. Housing and slums. Of these, the Multi Family Apartments display predominance in occupancy of land in Greater Mumbai, followed by the slums. The ELU 2012 shows significant slum settlements in Malad, Kandivli, Andheri (E) and Bandra -Khar -Santacruz (E) (wards P/N, R/S, K/E, H/E respectively) in the Western Suburbs and in all the Eastern Suburbs – Kurla, Chembur, Govandi, Ghatkopar and Bhandup (Wards L, M/E, M/W, N and S with the exception of Mulund, the T ward). Chawls predominantly occupy the Island City. Urban Villages comprising Gaothans and Koliwadass, that are mainly Residential Areas, constitute 0.77% of the developed Area.

Map 3.4: Greater Mumbai ELU 2012 Residential Uses



3.2.3 Commercial Use

The spatial structure for Commercial Land Use reflects the growth strategy of the Regional Plan 1973 and the DP 1991 of promoting polycentric development. While Nariman Point-Fort, Worli and Bandra Kurla Complex are established centralities for Commercial-Office use, the cluster formed by Prabhadevi - Lower Parel, SEEPZ -Andheri –and Powai are also emerging as strong office areas with a mix of Residential uses. LBS Marg – Ghatkopar - Vikhroli areas are other emerging Commercial Areas. New office and commercial centres have developed (some in SPAs) in Bandra (E), Andheri (E), Lower Parel, Malad and Powai-Kanjurmarg-Bhandup (Wards H/E, K/E, G/S, P/N, S respectively). Large retail and entertainment hubs have also emerged in Andheri (W), Malad, Kurla, Ghatkopar (Wards K/W, P/N, L, N respectively). The mill areas around Parel (in Wards G/S, F/S) reflect a mix of office-commercial use forming a significant node. Areas originally defined as commercial land use in DP 1991 in fact display a mixed land use context.

3.2.4 Industrial Use

There is an increase of service sector activities in Greater Mumbai with a corresponding decrease in manufacturing and industry. This is due to market forces responding to taxes, labour laws, real estate prices, technological obsolescence and high costs of operating in Mumbai as compared to other locations. However, Industrial Land Use in Greater Mumbai has not transformed in significant quantum to non-industrial use. Industrial properties abutting major roads have transformed into commercial uses while inner streets persist in industrial activity. The Commercial use along the major roads may serve as catalysts to spawn Land Use change towards the interior. Supported by existing Suburban Rail linkages (Western and Central lines), proposed metro and mono rail alignments and road networks that link areas along the East-West alignment, these mixed use centres are posited to consolidate this character thereby permitting increased economy and freedom of location for commercial and residential use.

Transformation of Mill lands and industrial uses into retail and entertainment is observed in the Island City in Lower Parel, (Wards G/S, F/S, E). In the Suburbs other industrial uses along LBS Marg in Kurla, Ghatkopar, Powai, Mulund (Wards L, N, S, T) and S.V. Road and Link Road have also converted into office and residential uses. Conversion of Industrial Areas into commercial-office areas is very visible in case of Textile Mills or along Andheri Kurla Road. However quantitatively, transformations of Industrial Areas to non Industrial Areas do not appear to be substantial as observed from the ELU 2012.

3.2.5 Natural Areas and Open Space

The ELU 2012 shows the presence of 27.87% of Natural Areas, which include the protected forests and water bodies. These include the Sanjay Gandhi National Park, mangrove forests, mud flats and creeks. Almost all of these natural areas are equally distributed between the Eastern and Western Suburbs. Only about 1% of the natural area is located in the Island City.

Some of the natural areas were included in the No Development Zone of DP 1991. The NDZ also included water bodies, primary activity areas like plantations and saltpans and some areas where low density/low FSI development was permissible.

3.3. Existing Special Urban Conditions and Characteristics

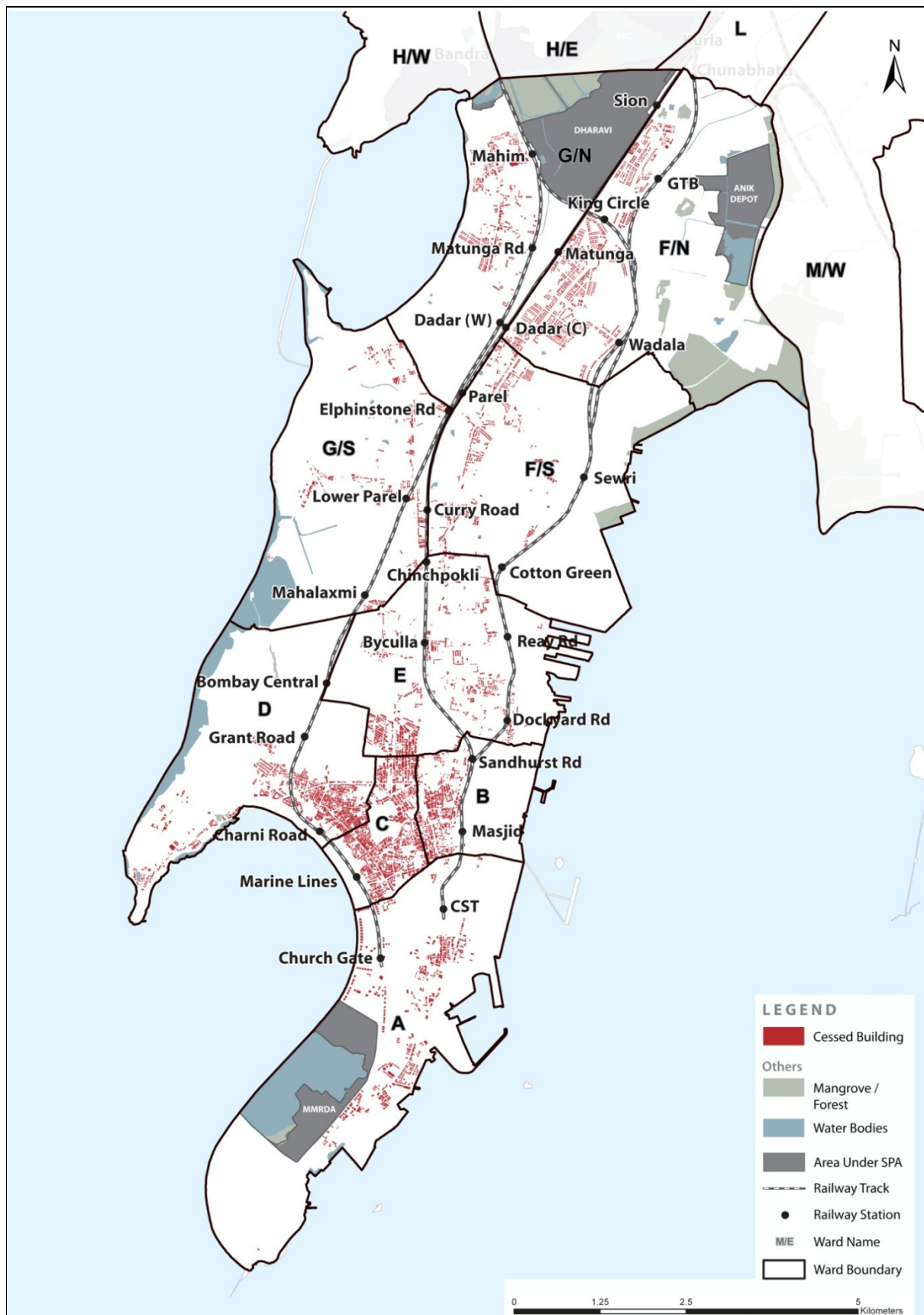
In addition to the above categories of existing land uses, there are certain conditions that need to be recognized in the city which need to be addressed in the DP 2014-34. These include Cessed Buildings, Heritage Buildings and Precincts, and Urban Fabrics, which have distinctive character. Additionally, prevalent regulations like the CRZ affect the development of several areas within the city. These special conditions are described in detail below:

3.3.1 Cessed Buildings

The housing stock in the Island City is an aging stock with several of the buildings over a hundred years old. The Bombay Buildings Repair & Reconstruction Board (BBRRB) was created under the BBRRB Act 1969 “to deal with dilapidated buildings in the Island City of Bombay so as to make them structurally sound and safe for habitation”. A repair cess was levied on rent controlled residential buildings as per the BBRRB Act consequently these buildings are called ‘cessed buildings’, numbering 19,642 in 1969. The BBRRB was later merged under MHADA in 1976. In 2008, according to MHADA there were 16,104 cessed buildings in Mumbai which included 13,360 of ‘A’ category buildings (pre September 1, 1940), 1,474 of ‘B’ category buildings (between September 1, 1940 and 31 December 1950) and 1270 of ‘C’ category buildings (between January 1, 1951 to September 30, 1969).¹⁰ Various FSI concessions have been extended to promote redevelopment of Cessed Buildings.

¹⁰ Some of these buildings have been redeveloped between 1973 and 1998, according to MHADA, 318 projects have been undertaken.

Map 3.5: Map of Island City showing Cessed buildings



3.2.2 Heritage Buildings and Precincts

a. **Archaeological Sites**¹¹: Greater Mumbai has a rich historical past pre-dating the Christian era. In Greater Mumbai, there are seven monuments which are notified as protected monuments under The Ancient Monuments and Archaeological Sites and Remains Act, 1958.

These are,

- Sion fort, along with all ancient Portugese remains of buildings situated to the north, east and south-east sides of the hill, Ward F-North,
- Monolithic Bas relief depicting Shiva, Parel, Ward F-South
- Jogeshwari caves, Majas, Ward K-East
- Kondivate Caves (Mahakali caves) Ward K East
- Buddhist caves, Kanheri, Ward R-Central
- Mandapeshwar caves in Ward R-North7. Old Portuguese Churches, tower, Mandapeshwar, Ward R-North
- Portuguese Monastery over Mandapeshwar cave & large watch tower on the adjoining hill, Mandapeshwar, Ward R-North

The Ancient Monuments and Archaeological Sites and Remains Act, 1958 mandates that a 100 meter distance needs to be left around the monument as prohibited area and 200 meter after the first 100 meters as a regulated development zone. While the Kanheri Caves are well protected due to their location within a protected area like the National Park the other sites are engulfed by urban development. The maps and the tables below give the existing uses within the 100m no development zone and the 200m regulated zone for each of the archaeological sites listed above. These would be useful while framing regulations for development control especially in the 200m zone.

¹¹ http://asi.nic.in/asi_monu_alphalist_maharashtra_mumbai.asp

Map 3.6: Map showing 100m & 200m Buffer zone around ASI Monuments

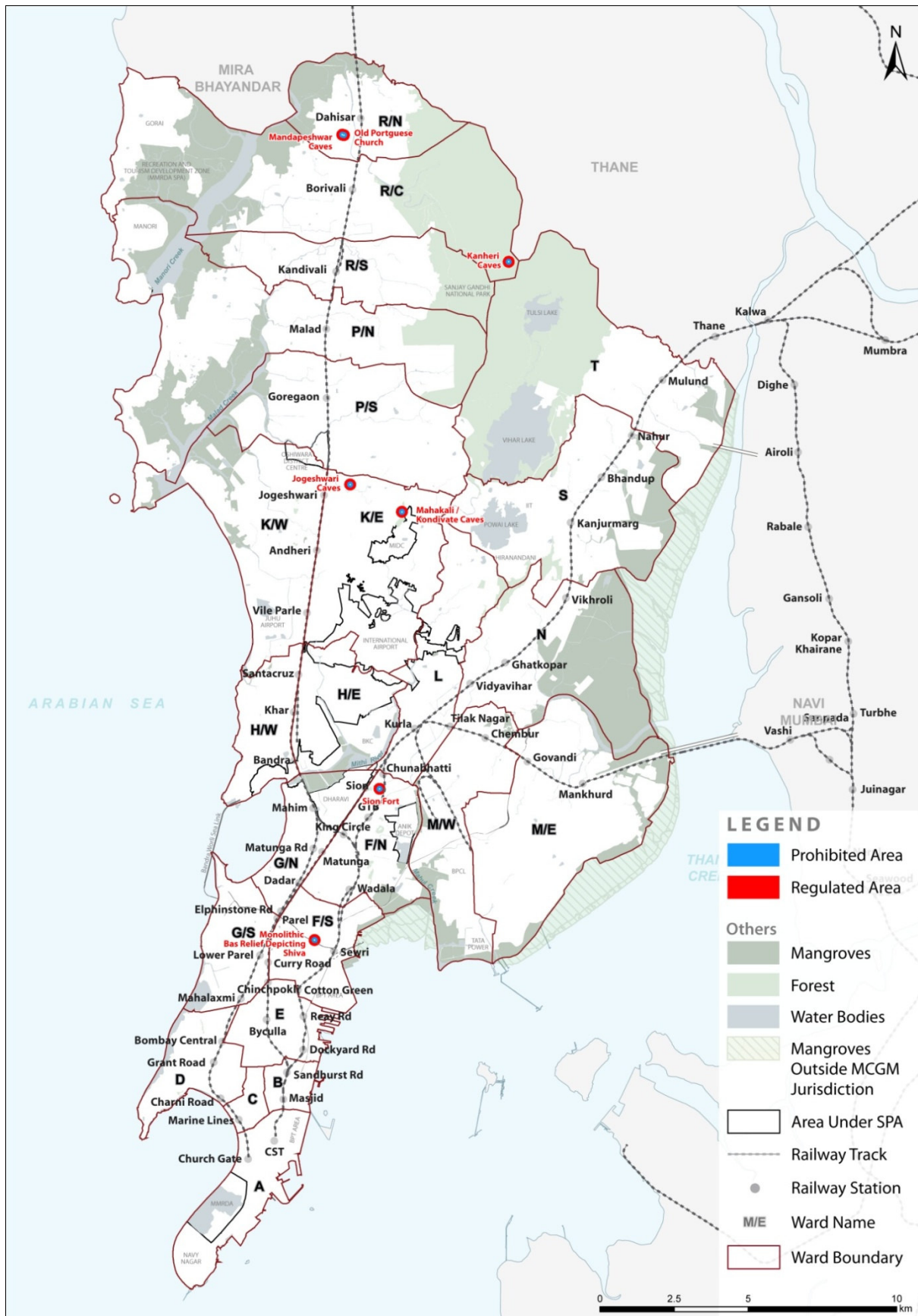


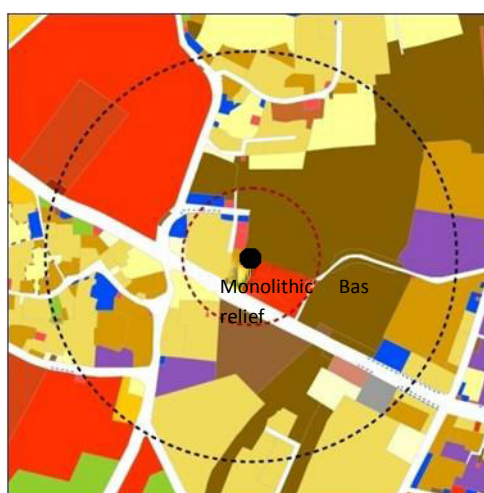
Figure 3.2: 100m & 200m Buffer zone around ASI Monuments in existing land use map 2012

Sion Fort



Jogeshwari caves

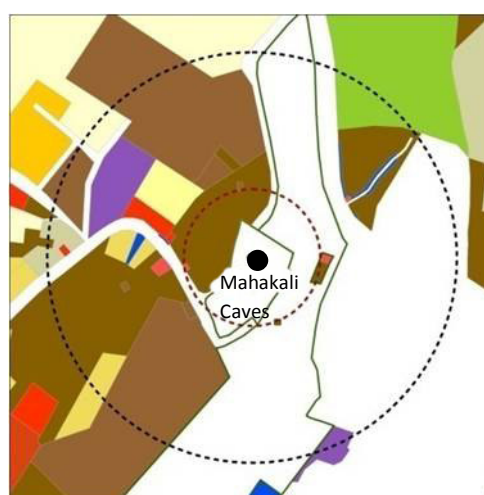
Monolithic Bas relief -Shiva



Mahakali caves



Kanheri caves



Portuguese Church +Mandapeshwar

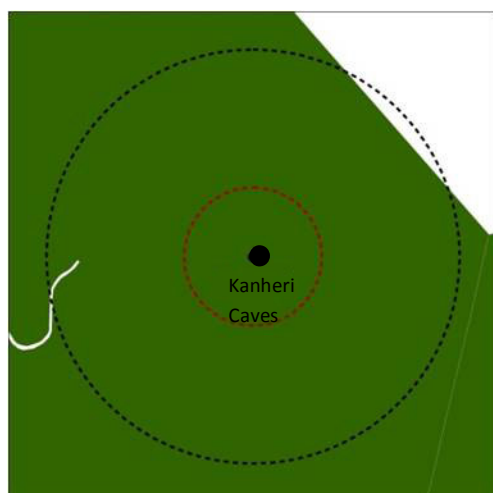


Table 3.5: Existing Land Use within 100 m ASI Buffer - Regulated zone

No.	ASI Monuments	Land use (100 m Buffer)								Total
		Residential + Urban Villages	Commercial + Offices	Industrial	Social Amenity	Natural Areas & Open Spaces	Public Utility & Facilities	Transport & Communications	Others	
1	Sion fort	2.20	0.25	0.00	0.61	96.21	0.00	0.73	0.00	100.00
2	Monolithic Bas relief depicting Shiva in Parel	56.42	2.32	0.00	18.96	0.00	4.38	14.63	3.29	100.00
3	Jogeshwari caves	82.66	0.00	0.00	5.40	3.82	0.00	8.12	0.00	100.00
4	Mahakali caves	32.38	0.00	0.00	0.24	62.22	0.03	5.13	0.00	100.00
5	Kanheri caves	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
6	Old Portuguese Church & Mandapeshwar Caves	28.62	0.24	0.00	22.69	24.34	0.19	9.28	14.64	100.00

Table 3.6 Existing Land Use within 200 m ASI Buffer- Regulated zone

No.	ASI Monuments	Land use (within 100 m Buffer)								Total
		Residential + Urban Villages	Commercial + Offices	Industrial	Social Amenity	Natural Areas & Open Spaces	Public Utility & Facilities	Transport & Communications	Others	
1	Sion fort	29.68	14.09	7.10	5.19	11.45	0.04	23.17	9.27	100.00
2	Monolithic Bas relief depicting Shiva, Parel	54.48	6.08	1.43	15.16	0.44	3.97	10.83	7.62	100.00
3	Jogeshwari caves	62.59	0.44	4.45	3.35	3.23	0.29	21.11	4.55	100.00
4	Mahakali caves	20.93	0.67	4.42	1.49	29.79	27.12	10.12	5.46	100.00
5	Kanheri caves	0.00	0.00	0.00	0.00	99.89	0.00	0.11	0.00	100.00
6	Old Portuguese Church + Mandapeshwar Caves	40.05	2.04	0.17	17.41	14.55	0.00	12.99	12.77	100.00

It is clear from the data above that except for Kanheri Caves, and Sion Fort (to some extent), all the monuments are located in the midst of urban development. Many of these are already overshadowed by the development that has taken place around them.

Listed Heritage buildings and precincts

According to the Heritage Regulations of 1995, 609 buildings have been listed as heritage buildings and 33 precincts have been identified as heritage precincts in Greater Mumbai. They are concentrated in the Island City. The buildings have been graded as either Grade I or Grade II or Grade III structures, based on the significance of the individual structure. The grading also reflects the level of change allowed in each category. The Grade I list includes an elite group of 48 entries that are acknowledged as the most significant heritage structures in the city. The existing Heritage list is currently undergoing revision and a new Draft list of Heritage buildings and precincts has been published. The suggestions and objections phase is currently underway before the list gets notified.

This Draft heritage list includes buildings from the suburbs and also includes water bodies and open spaces along with new precincts.

As per the table 3.10, 28.54% of heritage buildings are mixed use, 23.52% are purely residential while 6.42. % is commercial.

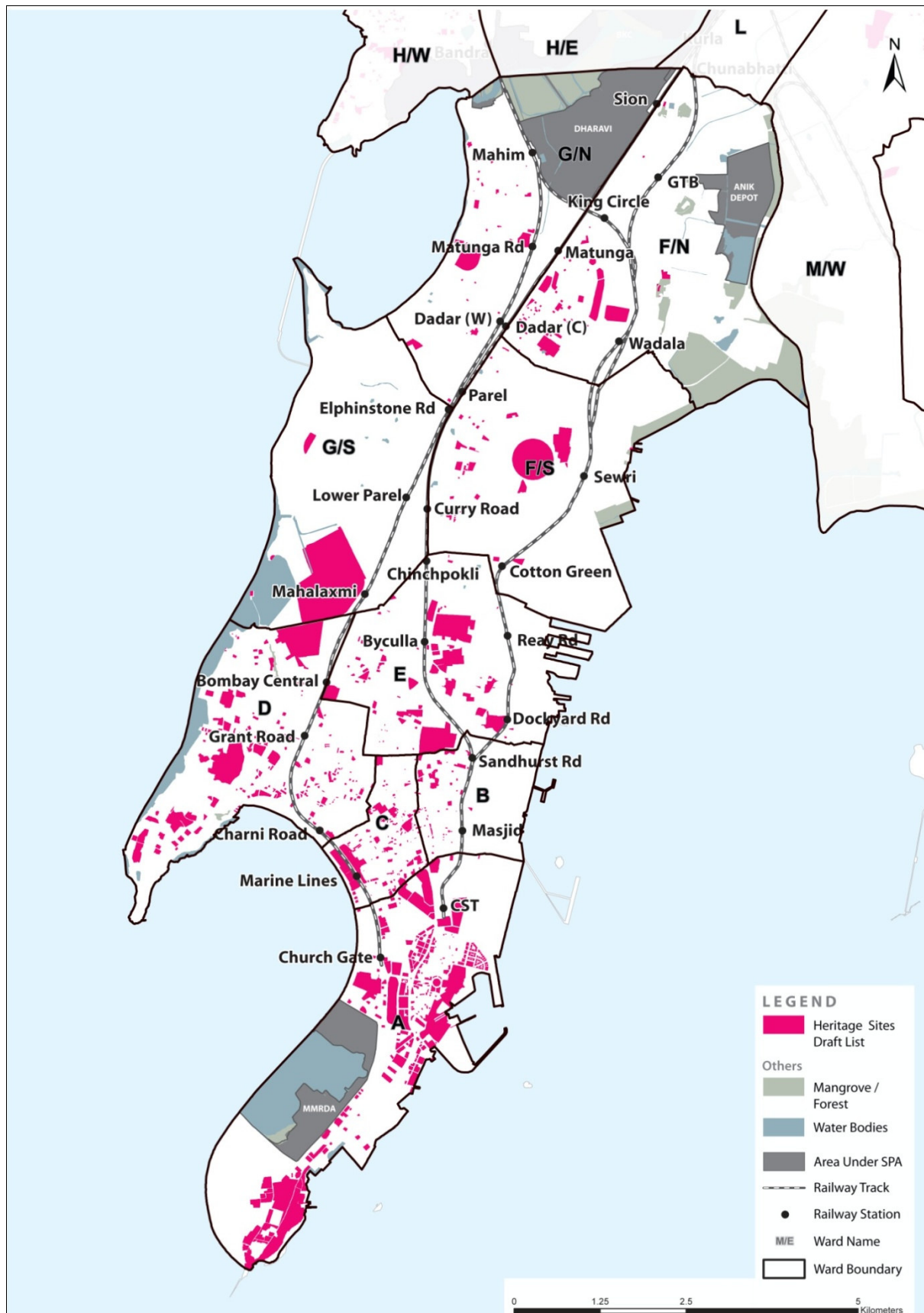
Table 3.7: Heritage buildings and precincts

Heritage Buildings	No.
Grade I	41
Grade II A	166
Grade II B	122
Grade III	252
Total	609
Listed Heritage precincts in the city – 33	

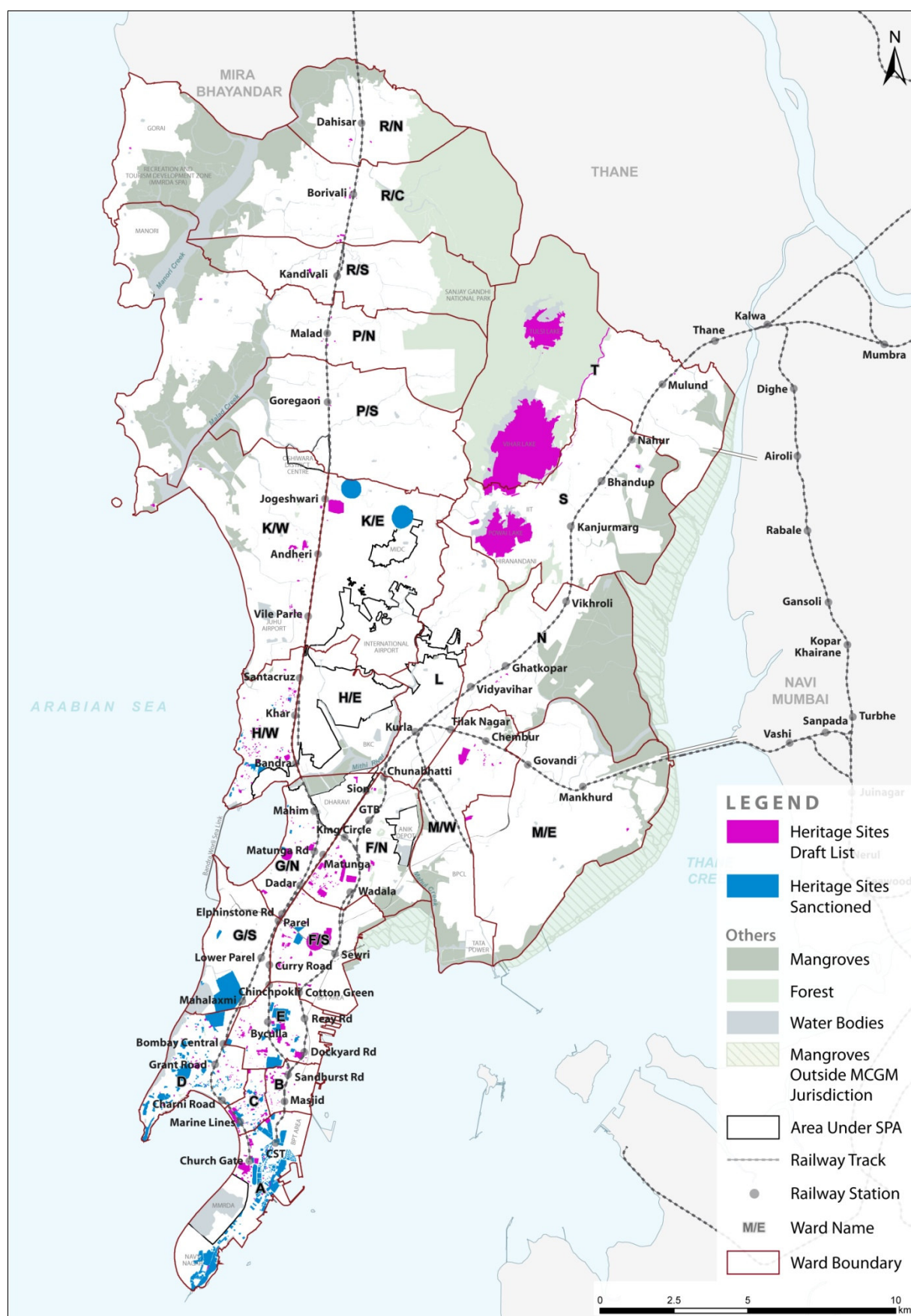
Table 3.8: Existing Land Use of listed heritage properties

Land use	Area (%)
Residential + Urban Villages	23.52
Commercial + Offices	6.42
Industrial	1.12
Social Amenity	11.94
Natural Areas & Open Spaces	29.92
Public Utility & Facilities	0.76
Transport & Communications	5.88
Others	20.46
Total	100.00

Map 3.7: ELU : Heritage sites in Greater Mumbai



Map 3.8: Heritage sites, 2013



3.3.3 Area under Coastal Regulation Zone

According to the approved CZMP prepared under CRZ Notification, 1991 of MoEF, the coastal stretches of Greater Mumbai are divided into following three zones.

1. **CRZ-I:** In case of Mumbai this is essentially an area between the Low Tide Line and High Tide Line. The North West coastal area like Gorai, Uttan, areas around Manori river, area where Mithi river meets Mahim creek and on eastern side Godrej Vikroli grassland and mangrove forest along Thane creek etc are demarcated as CRZ-I, which is environmentally sensitive zone. This CRZ-I area covers 40.44 sqkm in Greater Mumbai. In addition to this, areas along coastal road and allied open space reservations are the new proposals within CRZ-I.
2. **CRZ-II:** This is a coastal area within 500m buffer from sea and 100 m or equal to the width of the creeks whichever is lesser that is already developed. The development is permissible in this zone only on landward side of the existing road or structure, provided the land use and FSI remain same as permissible prior to 13th Feb. 1991. CRZ-II covers 43.48 sqkm of area in Mumbai.
3. **CRZ-III:** It includes areas that are relatively undisturbed and those do not belong to either CRZ-I or II which include coastal zone in the rural areas (developed and undeveloped) and also areas within municipal limits which are not substantially built. Within CRZ-III area up to 200mts from HTL on the landward side in case of seafront and 100 m along tidal influenced water bodies or width of the creek whichever is less is earmarked as “No Development Zone (NDZ)”. CRZ-III covers 13.14 sqkm area in Mumbai. Significant CRZ-III area is located on North Western edges of the MCGM and some parts along Thane creek.

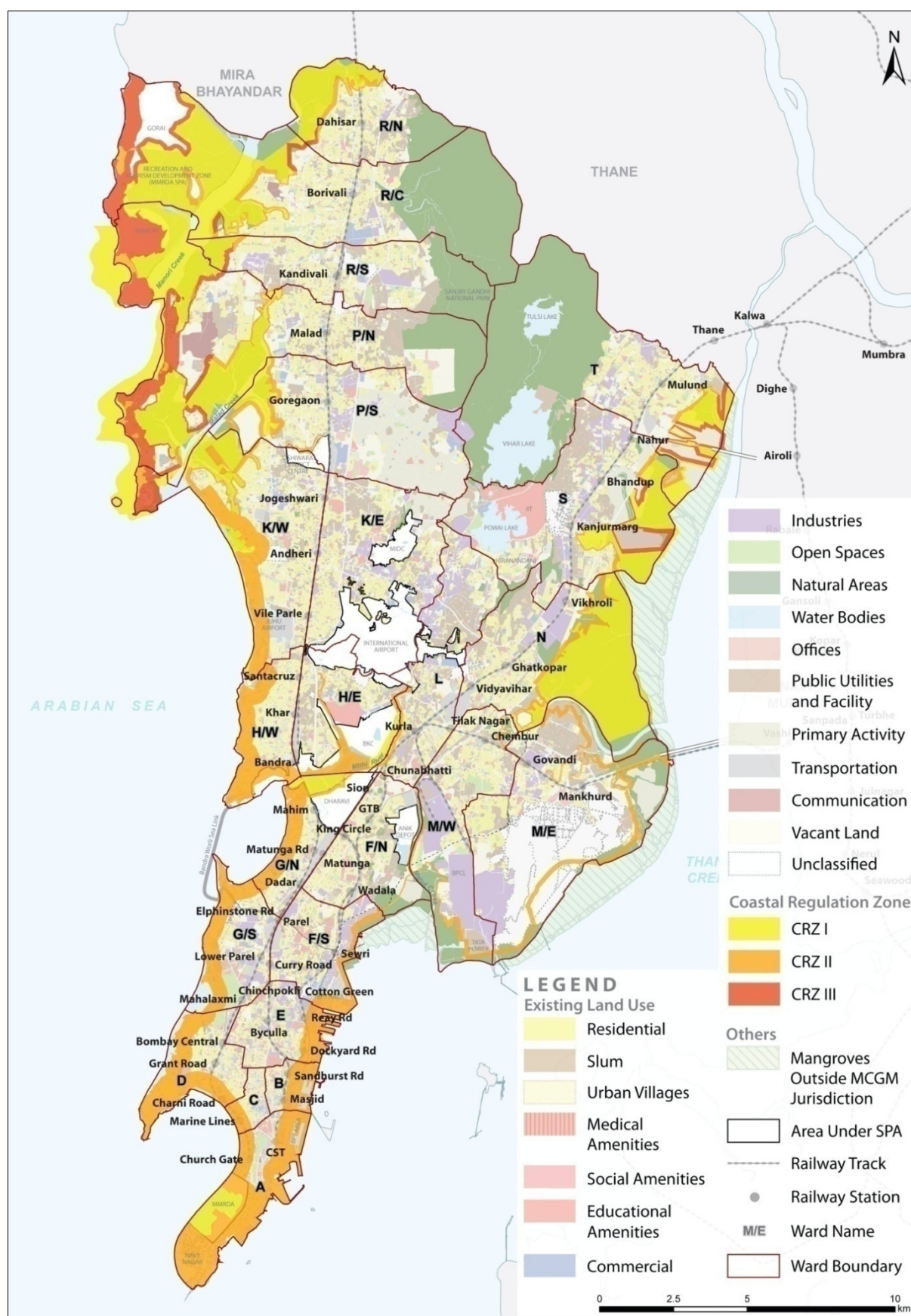
Table 3.9: Greater Mumbai: Total area under CRZ I, II & III

Zone	Total Area (ha)	Area within CRZ (ha)	Area within CRZ (%)
Island City	6,480.56	2,418.09	37.31
Western Suburbs	18,736.89	5,932.38	31.66
Eastern Suburbs	16,228	2,573.85	15.86
Greater Mumbai	41,505.71	10,924.32	26.32

Table 3.10 reveals that 26.32% of the total area of Greater Mumbai is affected by CRZ. About 37.31% of the total area of the Island City, 31.66% of the total area of the Western Suburbs and 15.86% of the total area of the Eastern Suburbs are affected by different types of CRZ.

A new CZMP is to be prepared under a new CRZ Notification, 1991 of MoEF. However, the revised HTL and Hazard Line as specified in the notification are not yet available.

Map 3.9: ELU: CRZ I II & III



3.3.4 Urban Fabrics

The Existing Land Use exercise included a detailed block level FSI mapping of the existing FSI consumption patterns of Greater Mumbai towards gaining an understanding of the existing context. While these exercises provided an understanding of the distribution of the type of use and the development rights they appropriate, it does not convey an understanding of the relationships between the physical, human, political, historical, economic, and cultural factors that affect people and natural environments in these areas. The City has various character-based built assets and precincts, which need to be acknowledged and maintained as far as possible in the future. In order to address these special neighbourhoods within the city, the DP 2034 has adopted an approach towards ‘place-making’, which is a multi-faceted approach to urban planning. Place-making capitalizes on a local community’s assets, inspiration, and potential, towards formulation of proposals for future development, ultimately creating ‘places’ that promote local quality of life. This ‘geography based’ method addresses both development and preservation. Place-making as adapted for DP 2034 appropriates both a legal and a social process.

The DP 2034, therefore, transcends statutory requirements and maps the various places or ‘urban fabrics’ in Greater Mumbai that harness special and particular characteristics. These are places that attribute immense value to Greater Mumbai. Some urban fabrics along with the common characteristics they share include:

- a. Older city Fabrics which include
 1. the planned areas from Colonial times like Ballard Estate, Marine Drive with regular plots and buildings with uniform setbacks on all sides;
 2. Older neighbourhoods like Bhuleshwar, Kalbadevi with hardly any setbacks, but *chowks* for ventilation and light;
 3. Planned layouts like Hindu Colony, Parsi Colony with regular plots, with 1/3 ground coverage and 4 storeyed buildings;
- b. Urban villages –Koliwadas, Gaothans with a smaller plots, ground and one story buildings and organic street patterns.

There are also other urban fabrics that are present in this city (like slums) that are distinctive but which may suggest specific needs for transformation rather than maintenance. The objective of mapping the various distinctive urban fabrics was to enable the formulation of place specific Zoning strategies and Development Control Regulations.

The following section illustrates characteristics of various urban fabrics in Mumbai. Null Bazaar, BDD chawls, Dadar Parsi Colony and Lokhandwala have been included here as examples.



Type A : Bazaar

Null Bazaar

Fabric Level



Location Map

Overview

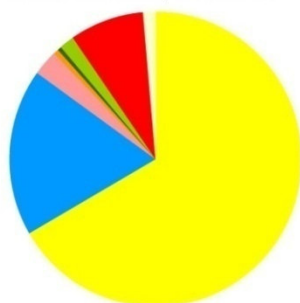
Location	Island City
Ward	C
Planning Sector	C 1.03
Year of Origin	< 1947

Statistics

Area under study	218077.00	21.80 ha
Built Area (Ground Coverage)	139505.68 sq m	63.97 %
Greens	691.51 sq m	0.03 %
Roads	61225.95 sq m	24.07 %
Plots	156851.05 sq m	

Landuse*

	Area	%
R2 Primary Residential Zone / R2C Residential with Commercial / R2S Residential with Shopping	105870.21	51.54
M1.1 Municipal Dispensary / M3.2 Private Hospital	907.65	0.44
E2.1 Secondary School	4466.05	2.17
C1.2 Shopping Centre / C1.4 Informal Market / C3.1 Residential Hotel, Boarding, Lodges / C4.1 Godowns / C5 Other Commercial Activity	29202.94	14.22
N3.3 Parks & Garden	691.51	0.34
P4 Buffalo Stables	2623.78	1.28
S4.1 Temple / S4.3 Mosque / S1.1 Welfare Centre / S1.2 Public Hall	12989.25	6.32
U1.1 Electric Power Plant / U1.2 Electric Transmission Station	55.51	0.03
UC Under Construction / VL Vacant Land	2152.26	1.05



Land Use Distribution

Residential	Social Amenity
Commercial Activity	Public Utility
Educational Amenity	Vacant Lands
Medical Amenity	
Natural Area & Open Space	
Primary Activity	

* from Existing Land Use survey 2011



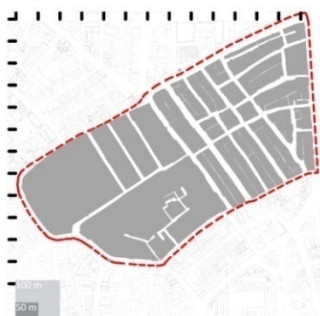
Photo Collage

Site
source : google earth 2010

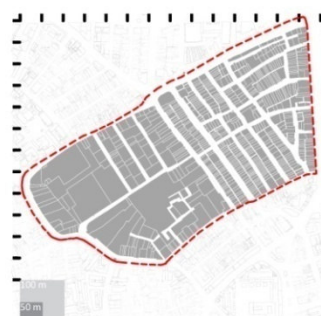
Road Hierarchy



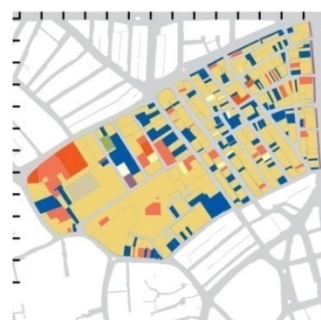
Figure Ground



Blocks



Plots



Existing Land Use*



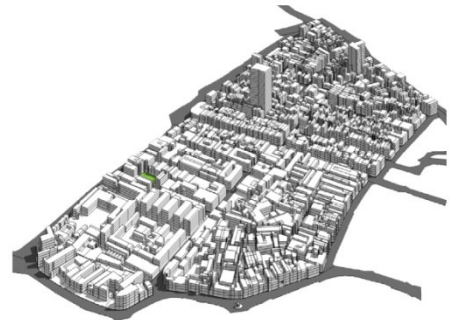
Type A : Bazaar

Null Bazaar

Block Level

Observation -

Null Bazaar fabric shows a diversity, by offering mix type of land uses, tenures, plot size, with visible social enclaves. The fabric is dominated by three to five storied buildings with commercial/godown activities on the ground floor. Proximity to the Railway on the East and West side of the ward and commercial activities in Ward 'A' have a big impact on the fabric. Major trading activities and presence of contract labor on narrow streets causes major traffic obstructions. The buildings are placed extremely close to each other hardly any space between them. These spaces were commonly known as house gullies, which are used for drainage and water system. These have become places of refuse dump today creating an unhygienic living conditions.

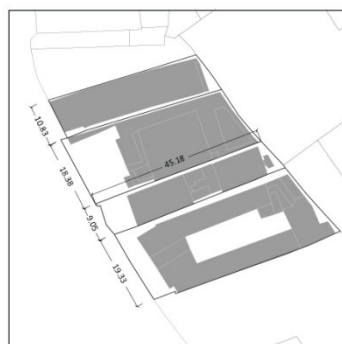
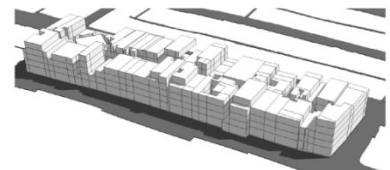
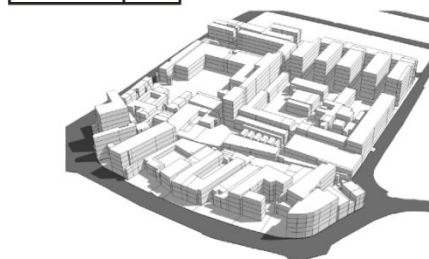
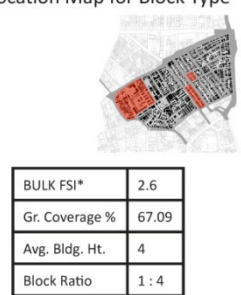
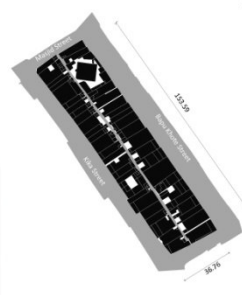
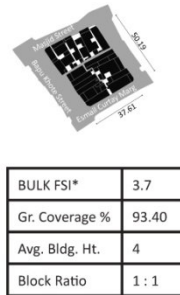
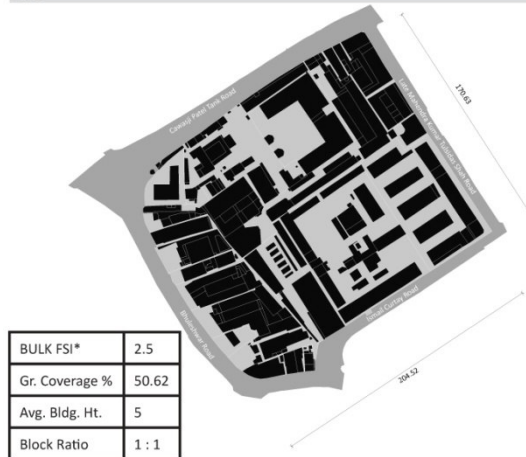


Type A 1
1 : 1

Type A 2
1 : 1

Type B 1
1 : 4

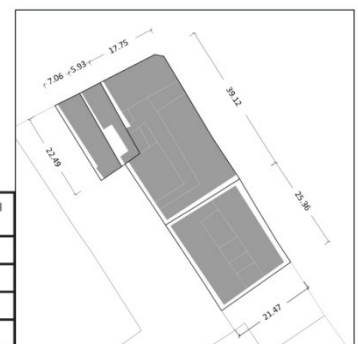
Location Map for Block Type



Sample Plot 1

Bldg no.	Area (sq m)	Plot Ratio	Frontage (in meters)	BULK* FSI
1	416.49	1 : 4	10.83	4.25
2	755.28	1 : 3	18.38	1.39
3	407.55	1 : 5	9.05	2.81
4	974.99	1 : 2	19.33	1.88

Bldg no.	Area (sq m)	Plot Ratio	Frontage (in meters)	BULK* FSI
1	147.58	1 : 3	7.06	3.45
2	122.83	1 : 4	5.93	2.62
3	777.08	1 : 2	17.75	2.79
4	555.03	1 : 1	25.36	4.11



Sample Plot 2

Inference -

Type A1 and Type A2 have same (length : width) ratio, but Type A2 is 24 times the size of Type A1 and having a BULK FSI of 3.7. The ground coverage % shows that Type A2 has the highest of 93% whereas Type A1 is at 50%. Type A2 and Type B1 are compact with similar average floor height of 4 floors.



Dadar Parsi Colony

Fabric Level



Location Map

Overview

Location	Island City
Ward	F/N
Planning Sector	FN 1.01
Year of Origin	< 1947

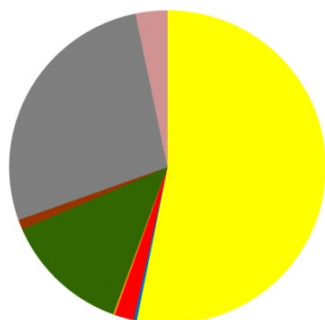
Statistics

Area under study	525753.58	52.57 ha
Built Area (Ground Coverage)	117530.61 sq m	22.35 %
Greens	67928.16 sq m	12.92 %
Roads	142994.92 sq m	27.19 %
Plots	373095.27 sq m	70.96 %

Landuse*

	Area	%
R1,R2,R3 Primary Residential Zone / R2C Residential with Commercial / R2S Residential with Shopping / R4 Chawls Residential / R4S Chawls with Shopping / R5 Slums / R5C Slums with Commercial	279345.61	53.13
M3.1 Municipal Hospital	971.48	0.18
S1.2 Public Hall / S4.1 Temple / S4.5 Parsi Agiary	5336.40	1.02
E2.1 Secondary School / E2.2 Primary cum Secondary School	10334.18	1.97
C1.4 Informal Market / C3.1 Residential Hotel, Boarding, Lodge / C5 Other Commercial Activity	1719.43	0.33
N3.1 Playground / N3.2 Recreational Ground / N3.3 Parks & Garden / N3.4 Clubs & Gymkhana	67928.16	12.92
O1.3 Government Office / UC Under Construction	17123.40	3.26
T1.13 Public Parking / T1.19 Petrol Pump	142994.90	27.20

Land Use Distribution

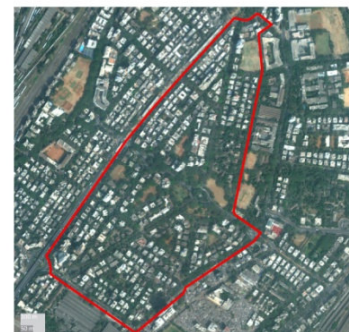


- Residential
- Commercial Activity
- Educational Amenity
- Medical Amenity
- Natural Area & Open Space
- Social Amenity
- Roads
- Others

* from Existing Land Use survey 2011



Photo Collage

Site
source : google earth 2010

Walkability

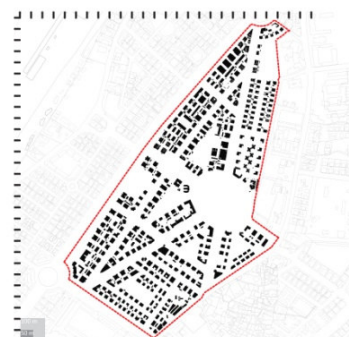
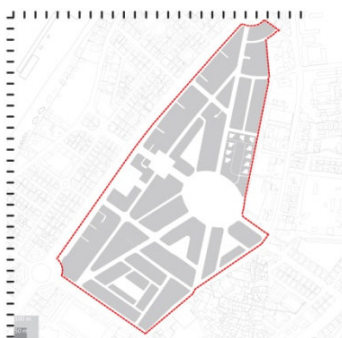
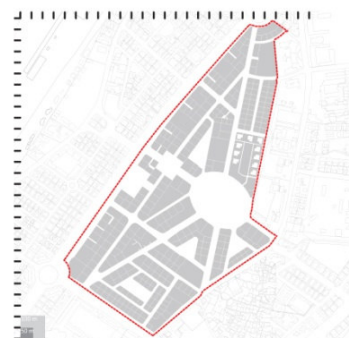


Figure Ground



Blocks



Plots



Existing Land Use*

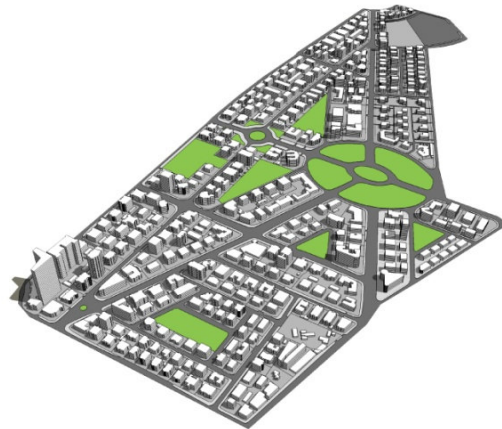


Dadar Parsi Colony

Block Level

Observation -

Dadar Parsi Colony fabric is a planned layout with well laid out street dominated by three to five storied buildings. With a mono-rail alignment to its eastern side and main arterial road Dr. Ambedkar road has made it accessible with other parts of the city. With well spaced buildings and wide roads the buildings derive good light and ventilation from surrounding. Original built form consisted of 1/3rd ground coverage with three storied buildings consuming FSI of 1, in 1964 when the FSI was raised to 1.33 floors got added on the same footprint. DCR 33(7) allowed 50-70% extra FSI and has shown its effects with high rise buildings coming up rapidly destroying the fabric.

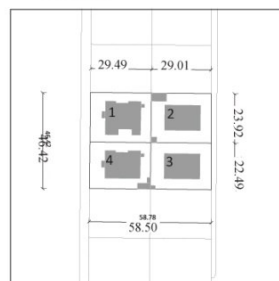
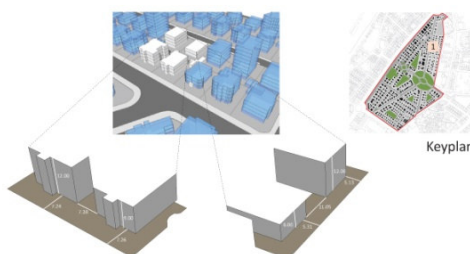
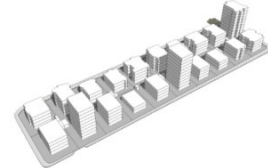
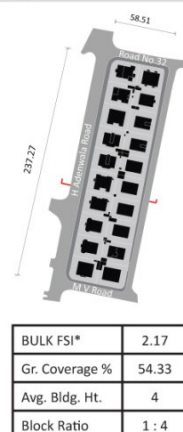
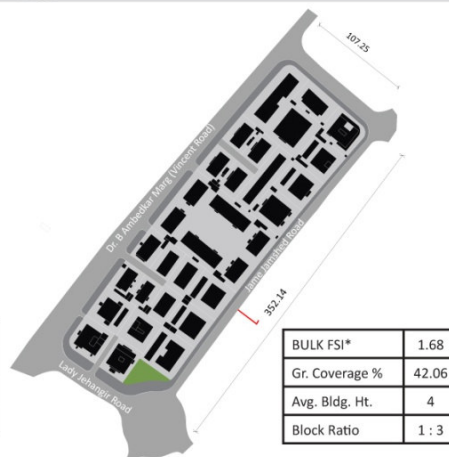


Location Map for Block Type

Type C 1
1 : 3

Type C 2
1 : 3

Type D 1
1 : 4



Sample Plot

Bldg no.	Area (sq m) total built up	Plot Area (sq m)	Plot Ratio	Frontage (in meters)	BULK* FSI
1	1053.08	706.07	1 : 1	16.46	0.65
	12.04			-	
	23.28			-	
2	119.84	697.24	1 : 1	12.39	0.68
	32.44			-	
	870.00			-	
3	435.00	661.05	1 : 1	12.39	1.49
	8.70			-	
4	697.53	664.41	1 : 1	13.65	0.92
	17.46			-	
	9.03			-	

Inference -

Type C1 and Type C2 have same (length : width) ratio, but Type C1 has a BULK FSI of 2.27 as compared to Type C2 having 1.68. Type C1 has larger plots, 3 rows of plots compared to Type C2 which has 4 rows of plots. The ground coverage % shows that Type D1 has the highest of 54% where as Type C1 is at 37%. Type C2 and Type D1 are compact with similar average floor height of 4 floors.



Type D : Townships

Lokhandwala Complex

Fabric Level



Location Map

Overview

Location	Western Suburbs
Ward	K/W
Planning Sector	KW 0.00
Year of Origin	< 19

Statistics

Area under study	579990.68	57.99	ha
Built Area (Ground Coverage)	199542.44 sq m	34.40	%
Greens	37639.13 sq m	6.49	%
Roads	73824.90 sq m	12.72	%
Plots	506165.78 sq m	87.27	%

Landuse*

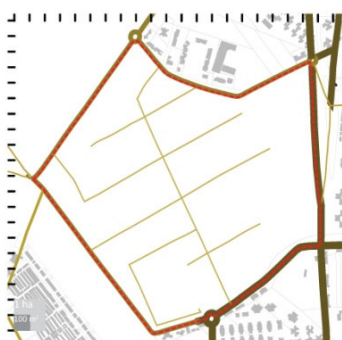
	Area	%
R2 Primary Residential Zone / R2S Residential with Shopping/ R1 Individual Housing	392878.22	67.74
M3.1 Municipal Hospital	1208.83	0.21
E1.1 Municipal Primary School/ E2.1 secondary School	1383.93	0.24
C1.4 Informal Market /C5 Other Commercial Activity	2211.97	0.38
N2.1 Natural Water Courses/N3.1 Playground/N3.3 Parks & Garden/ N3.4 Clubs and Gymkhanas	8491.91	1.46
T1.13 Public Parking/ T1.14 Parking in Buildings	1574.94	0.27
S4.1 Temple / S5 Police Station	19424.10	3.3
UC Under Construction / VL Vacant Land	-	-



Photo Collage



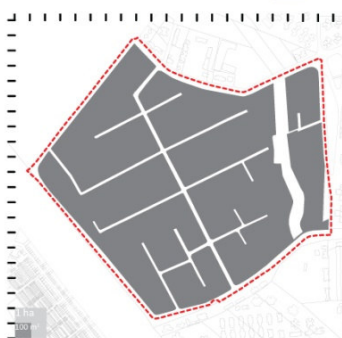
Site
source : google earth 2010



Road Hierarchy



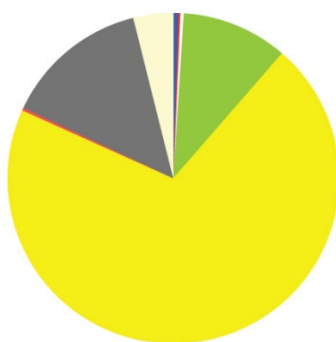
Figure Ground



Blocks



Plots



Land Use Distribution

Residential	Social Amenity
Commercial Activity	parking
Educational Amenity	Under Construction
Medical Amenity	Vacant Lands
Natural Area & Open Space	



Existing Land Use*

* from Existing Land Use survey 2011

Three main findings, somewhat paradoxical, emerge:

a. Different Land Uses, Different FSI Consumption

Greater Mumbai comprises 'places' of distinctive character, each displaying differential land uses and FSI consumption levels. For example, the Null Bazaar, as a mixed use predominantly commercial area, has an FSI that is higher than 4.0. At the same time, commercial centres in Andheri and Jogeshwari have FSIs of 2.5.

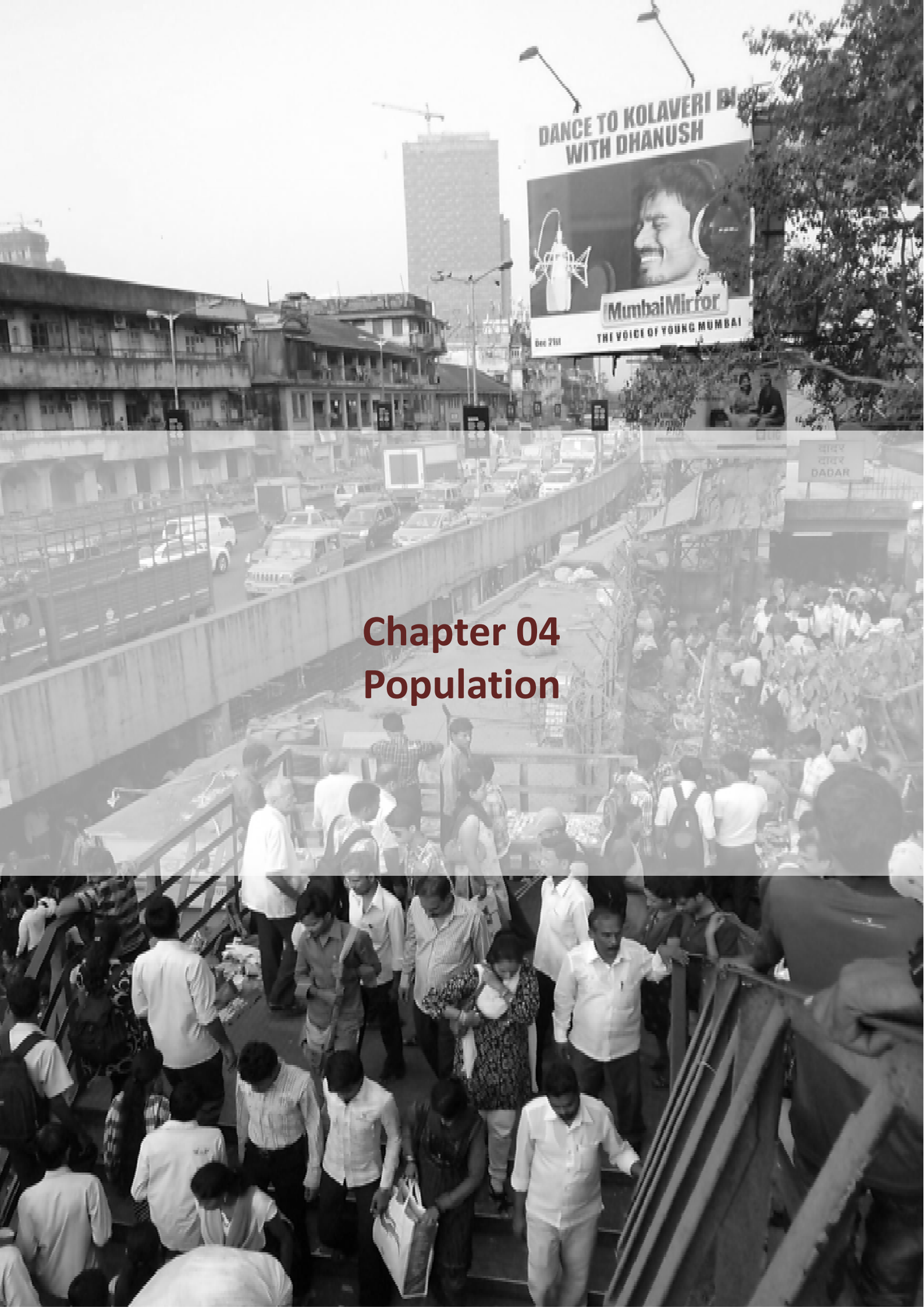
b. Different Built Forms though Similar Land Use and FSI Consumption

There are several 'places', which have the same land use and levels of consumption of FSI, but demonstrate varying configurations of the built form (setbacks, podium step backs, building line). For example, FSI consumption levels in the historical business district of Ballard Estate, which is characterised by buildings that abut the street, are in tandem with those in the Lower Parel area, which are more recent developments with large setbacks.

c. Possible Reproduction of Urban Fabric

It is also noteworthy that a few newer developments have intelligently interpreted the prevailing Development Control Regulations, resulting in built form that resembles urban fabrics in other parts of the City. For example, an arcaded building in Vile Parle (opposite Pawan Hans Helicopter Service), emulates arcaded building typologies of the Island City, demonstrating the potential for the reproduction of specific urban fabric components. The uniform FSI norms of DP 1991 inhibited renewal. Modifications introduced to the DCRs have thereafter resulted in new forms of developments, often less appropriate, within older distinctive urban fabrics.

The distinctive character of these places is a reflection of their occupational, historical, social, economic and cultural geographies. People and places are adaptive to change and maintain and discard practices with time. The DP 2014-34 recognizes these dimensions, coupled with peoples' aspirations to transform and has accordingly formulated place – based codes as special regulations, elaborated in Part III of this report.



Chapter 04 Population

4. Population

Existing Context

The population of Greater Mumbai recorded in 2011 Census is 12.44 million as against the 11.97 million in 2001 accounting for a net addition of nearly half a million over the last decade.

Historical Perspective

Population of greater Mumbai grew at decadal growth rates of around 20% till 1941. However, during the following four decades, in the post- independence era, population grew at decadal growth rates of over 35%. It is from 1991 that the growth rate has significantly reduced and during 2001-11 has sharply reduced to 3.87%. It may also be noted that the population in the towns surrounding Greater Mumbai in the Mumbai Metropolitan Region has continued to grow at higher rate since 1991. Since 1901, the population of Greater Mumbai has grown from just 9.27 lakh to 12.44 million in 2011, an increase of over 13 times.

4.1. Population: Declining Decadal Growth Rate

The population of Greater Mumbai has been continuously growing in absolute numbers; however, the percentage decadal variation shows a steep decline from 43.80% during 1961-71 to 3.87% in 2001-2011.

Table 4.1: Decadal population variation, Greater Mumbai

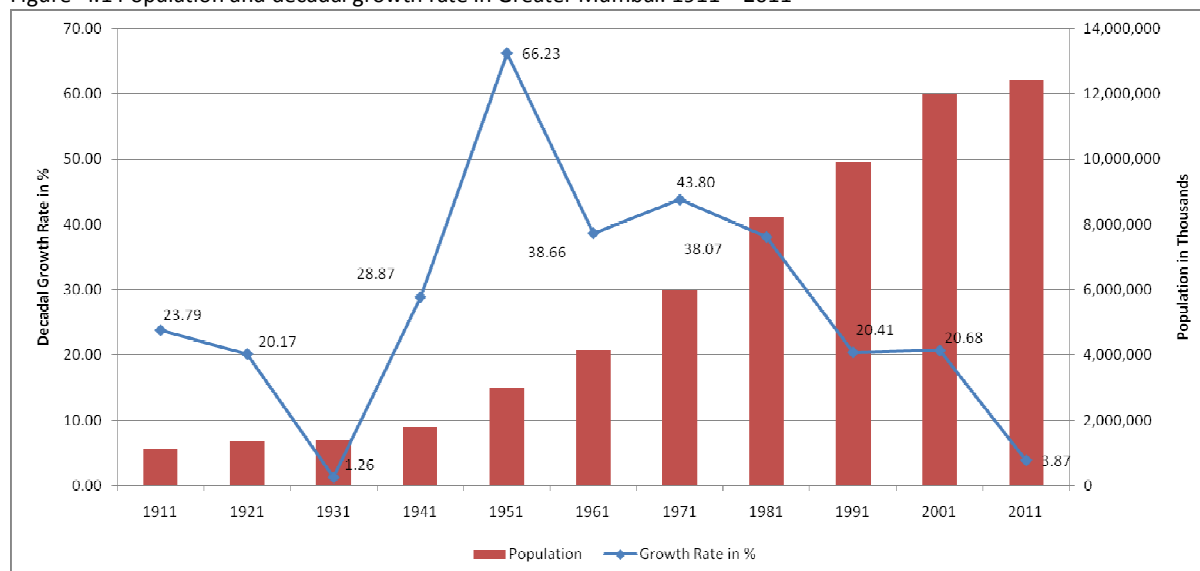
Census Year	Population	Decadal Variation	Percentage Decadal Variation
1901	927,994	--	--
1911	1,148,757	220,763	23.79
1921	1,380,448	231,691	20.17
1931	1,397,812	17,364	1.26
1941	1,801,356	403,544	28.87
1951	2,994,444	1,193,088	66.23
1961	4,152,056	1,157,612	38.66
1971	5,970,575	1,818,519	43.80
1981	8,243,405	2,272,830	38.07
1991	9,925,891	1,682,486	20.41
2001	11,978,450	2,052,559	20.68
2011	12,442,373	463,923	3.87

Source: Census of India, 2001 and 2011

Figure 4.1 below, is the representation of the population trend in absolute numbers. The decadal growth rate of Greater Mumbai between 1911 and 2011 was at its peak in the decade 1941 – 1951 at 66.23% and decreased to 20.41% in 1981 – 1991, 20.68% in 1991 – 2001 and 3.87 % in 2001 – 2011.

Further, the population for the Island City and Suburban District indicate that the population of the Island City increased between 1901 and 1981 reaching near stability from 1981 - 2011. The Suburban District, on the other hand, has continually experienced population growth from 1911 - 2011 with the growth being more consistent during post Independence period.

Figure 4.1 Population and decadal growth rate in Greater Mumbai: 1911 – 2011



The population of the Suburbs stands at 93.56 lakh in 2011 as against 86.4 lakh in 2001 while the Island City population has declined from 33.38 lakh to 30.85 lakh in 2011. The decadal population growth rate for the Suburbs increased between 1951 and 1961 to 107.41 % and between 1961 and 1971 to 110.14 %. Thereafter, it experienced a decline until 2001 - 2011 to 8.29 % (see, Graph 4.2).

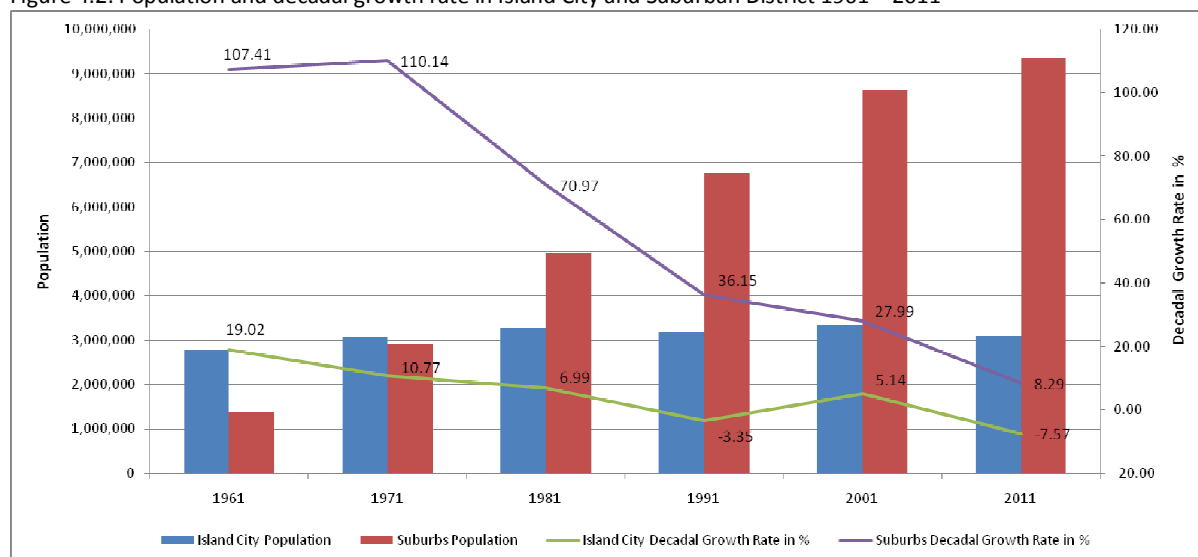
The decadal growth rate for Island City shows a continuous decline from 1951-1961 at 19.02% to -7.57% in the current decade 2001 – 2011 except for the decade 1991-2001 when it increased to 5.14% from -3.35% (see, Graph 4.2). Thus, currently the decadal growth rate reveals is declining both in the Island City and the Suburbs.

Table 4.2: Population and decadal percentage variation of Suburban District: 1961 – 2011

Census Year	Island City			Suburbs		
	Population	Decadal Variation	% Decadal Variation	Population	Decadal Variation	% Decadal Variation
1961	2,771,933	442,913	19.02	1,380,123	714,699	107.41
1971	3,070,378	298,445	10.77	2,900,197	1,520,074	110.14
1981	3,285,040	214,662	6.99	4,958,365	2,058,168	70.97
1991	3,174,889	-110,151	-3.35	6,751,002	1,792,637	36.15
2001	3,338,031	163,142	5.14	8,640,419	1,889,417	27.99
2011	30,85,411	-252,620	-7.57	9,356,962	716,543	8.29

Source: Census of India, 2001 and 2011

Figure 4.2: Population and decadal growth rate in Island City and Suburban District 1961 – 2011



4.2 Work Force

Employment rate of males in Mumbai has been higher than that for urban India for all years. The total participation rate has been consistent between 35-40% since 1961. The male participation rate fell from 61.73% in 1961 to 57.66% in 1971 and has since then been consistent. The female worker participation has been rising steadily, but at 16.38% in 2011, is still considerably lower than the male participation rate. The large gap between worker participation rate between male and female may reduce in future.

Table 4.3: Worker participation rate in Mumbai

Census	Work Participation Rate		
Year	Male	Female	Total
1961	61.73	8.81	40.62
1971	57.66	7.72	36.82
1981*	55.45	8.97	35.21
	[0.59]	[0.41]	[0.51]
1991*	55.08	11.02	35.25
	[0.76]	[0.52]	[0.65]
2001*	56.87	13.06	37.27
	[2.59]	[1.32]	[2.02]
2011*	56.38	16.38	37.98
	[2.65]	[2.02]	[2.36]
*Main and marginal workers, figures in brackets show marginal workers to total population.			

Source: Census of India 1961-2011

Note: Main workers are those workers who had worked for the major part of the reference period of one year (i.e. 6 months or more). Marginal workers are those workers who had not worked for the major part of the reference period of one year (i.e. 6 months or more).

Employment data from the Census 2011 indicates that there are 50,19,419 total resident workers in Greater Mumbai. Of this, the Island City has a total of 1,284,396 resident workers and the Mumbai Suburban District has a total of 3,735,021 resident workers.

4.3. Sex Ratio

The overall sex ratio of Greater Mumbai is 853, which is lower than that of the State average (925) and the National average (940) as per the Census 2011. The sex ratio for population below 6 years of age, during the same period for Greater Mumbai is 913, which is higher than that at the State average (883) and is closer to the National average (914). The overall sex ratios of all the Wards have witnessed positive growth while the same for the population below 6 years of age between 2001 and 2011 has mostly witnessed negative growth rate (refer table 4.4 & graph below). Ward A witnessed the highest increase, i.e. from 733 in 2001 to 828 in 2011, and Ward C had the lowest sex ratio of 587 in 2001, which has increased to 695 in 2011. The total sex ratio of Greater Mumbai increased from 809 to 853 whereas the sex ratio for the population below 6 years has reduced from 922 to 913 during the same period.

Table 4.4: Sex Ratio*

	Overall Sex Ratio				Sex Ratio below 6 years		
	Ward	Census 2001	Census 2011*	Increase between 2001 and 2011	Census 2001	Census 2011*	Increase between 2001 & 2011
Island City	A	733	828	95	910	903	-7
	B	735	807	72	935	907	-28
	C	587	695	108	921	911	-10
	D	863	896	33	911	910	-1
	E	755	820	65	917	920	3
	F/N	791	855	64	927	918	-9
	F/S	831	892	61	902	886	-15
	G/N	800	809	9	932	938	6
	G/S	773	809	36	931	899	-32
	Island City	763	832	69	921	914	-7
Western Suburbs	H/E	800	822	22	931	918	-13
	H/W	894	902	8	937	930	-7
	K/E	837	870	33	931	918	-14
	K/W	847	865	18	924	916	-9
	P/N	819	855	36	925	909	-16
	P/S	791	858	67	917	924	7
	R/C	892	944	52	907	905	-2
	R/N	821	846	25	892	893	2
	R/S	760	822	62	912	901	-12
	Western Suburbs	829	862	33	907	912	5
Eastern Suburbs	L	760	802	42	924	915	-9
	M/E	801	850	49	941	920	-21
	M/W	829	893	64	927	909	-18
	N	855	873	18	913	912	-1
	S	822	865	43	916	909	-7
	T	894	938	44	920	908	-12
	Eastern Suburbs	827	857	30	925	914	-11
Greater Mumbai		809	853	44	922	913	-9

*Note: Ward boundaries are marginally revised after publication of Census 2011, its implications on the Sex Ratio can only be recorded in Census 2021.

Figure 4.3: Overall Sex Ratio 2001-2011

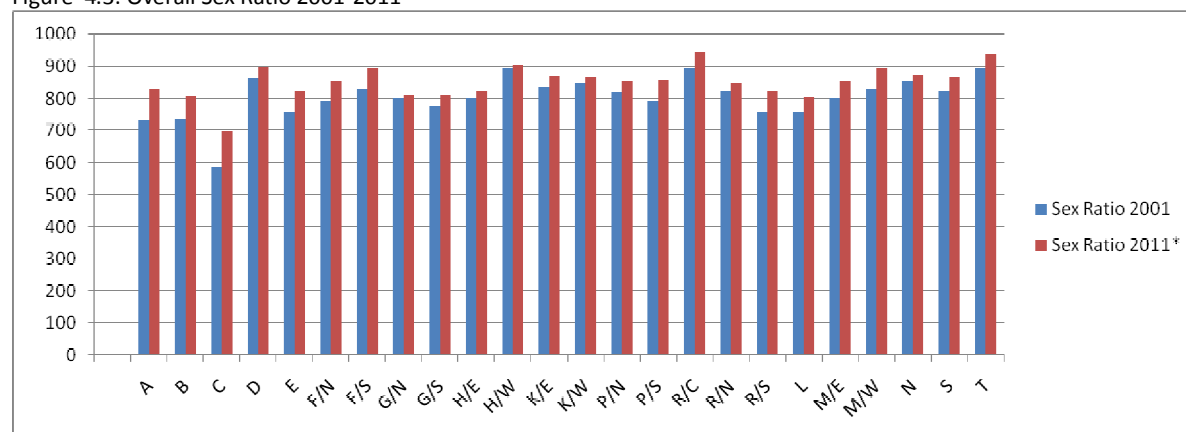
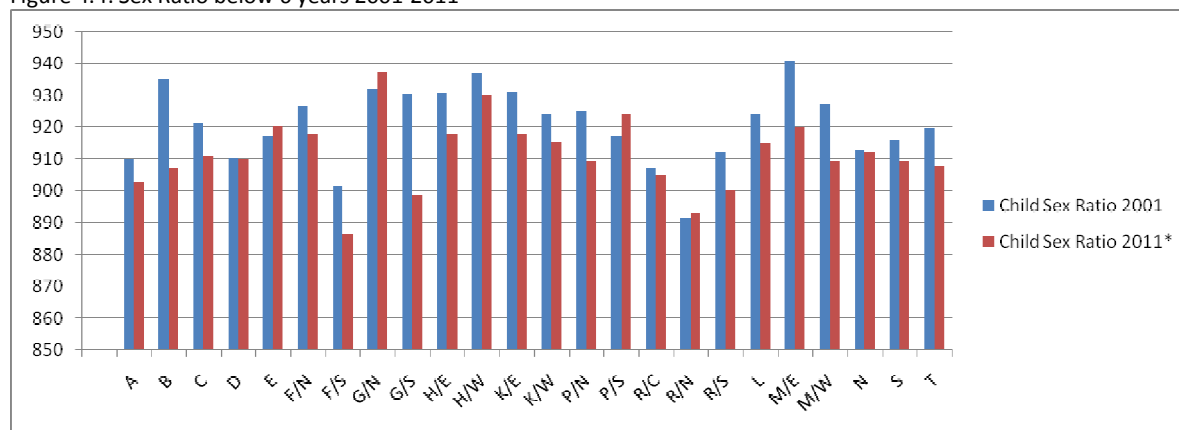


Figure 4.4: Sex Ratio below 6 years 2001-2011



4.4. Literacy Rate

The two Districts of Mumbai lead the State in literacy rates as per Census 2011 with the Mumbai Suburban District having a literacy rate of 89.9 and Mumbai City 89.2. The female literacy rate is a little lower with the rates being 86.5 for Mumbai City and 86.4 for Mumbai Suburban

4.5. Decreasing House Hold Size

The average household size in Greater Mumbai has reduced from 4.8 in 2001 to 4.4 in 2011. The average household size in Island City is greater at 4.6 than the Suburban District at 4.4 in 2011, as per Census 2011.

Table 4.5: Distribution of number of households in Greater Mumbai: 2001 - 2011

District / Ward	No. of Households (Census)		Average Household Size	
	2001	2011	2001	2011
Island City	677,163	706,595	4.9	4.6
Total Suburbs	1,838,426	2,130,451	4.7	4.4
Greater Mumbai	2,515,589	2,837,046	4.8	4.4

Source: Census of India, 2001 and 2011

4.6. Population Distribution

The population distribution within Greater Mumbai indicates that currently the Suburban District has a larger share of the total population. The population share of the Island City has been decreasing consistently over the past several decades while that of the Suburban District has been increasing steadily. This trend is expected to continue.

Table 4.6: Percentage share of population distribution in Greater Mumbai: 1981 – 2011

Area	% of Population to Total Population			
	1981	1991	2001	2011
Island City	39.85	31.99	27.87	24.79
Suburbs	60.15	68.01	72.13	75.21
Greater Mumbai	100	100	100	100

Source: Census 1981-2011

4.6.1 Ward Wise Population distribution

During the last decade, 2001 – 2011, the population of the Island City reduced by 2,52,620 whereas the Eastern and Western Suburbs have shown an increase of 321,841 and 394,702 respectively.

Given below is the Ward wise population distribution for 2001 and 2011

Table4.7: Ward wise Population of Greater Mumbai in 2001 and 2011

Zones	Wards	Area (ha)	Population 2001	Population 2011 ^{12*}	Gross Density 2001 (pp ha)	Gross Density 2011 (pp ha)
Island City	A	1121	210,847	185,014	188	165
	B	266	140,633	127,290	529	479
	C	191	202,922	166,161	1061	869
	D	830	382,841	346,866	461	418
	E	717	440,335	393,286	614	548
	F/N	1,201	524,393	529,034	437	441
	F/S	965	396,122	360,972	410	374
	G/N	876	582,007	599,039	664	684
	G/S	929	457,931	377,749	493	407
	Total	7,097	3,338,031	3,085,411	470	435
Western Suburbs	H/E	1,289	580,835	5,63,445	1289	437
	H/W	865	337,391	3,01,375	865	348
	K/E	2,400	810,002	823,885	2400	343
	K/W	2,442	700,680	748,688	2442	307
	P/N	4,672	798,775	941,366	4672	202
	P/S	2,529	437,849	463,507	2529	183
	R/C	4,803	513,077	562,162	4803	117
	R/N	1,418	363,827	431,368	1418	304
	R/S	1,831	589,887	691,229	1831	377
	Total	22,249	5,132,323	5,527,025	231	248
Eastern Suburbs	L	1,556	778,218	902,225	1556	580
	M/E	3,389	674,850	807,720	3389	238
	M/W	1,740	414,050	411,893	1740	237
	N	2,535	619,556	622,853	2535	246
	S	2,975	691,227	743,783	2975	250
	T	4,288	330,195	341,463	4288	80
	Total	16482	3,508,096	3,829,937	213	232
Greater Mumbai		45828	11,978,450	12,442,373	289	235

*Census 2011 Population for Wards H/E and H/W has been updated to reflect the change in Ward boundaries of these Wards.

The Ward P/N in the Western Suburbs has the highest population of nearly one million among all 24 wards, holding 7.5% of the total population. Ward B in Island City on the other hand, has the lowest population of 127,290 among all 24 Wards.

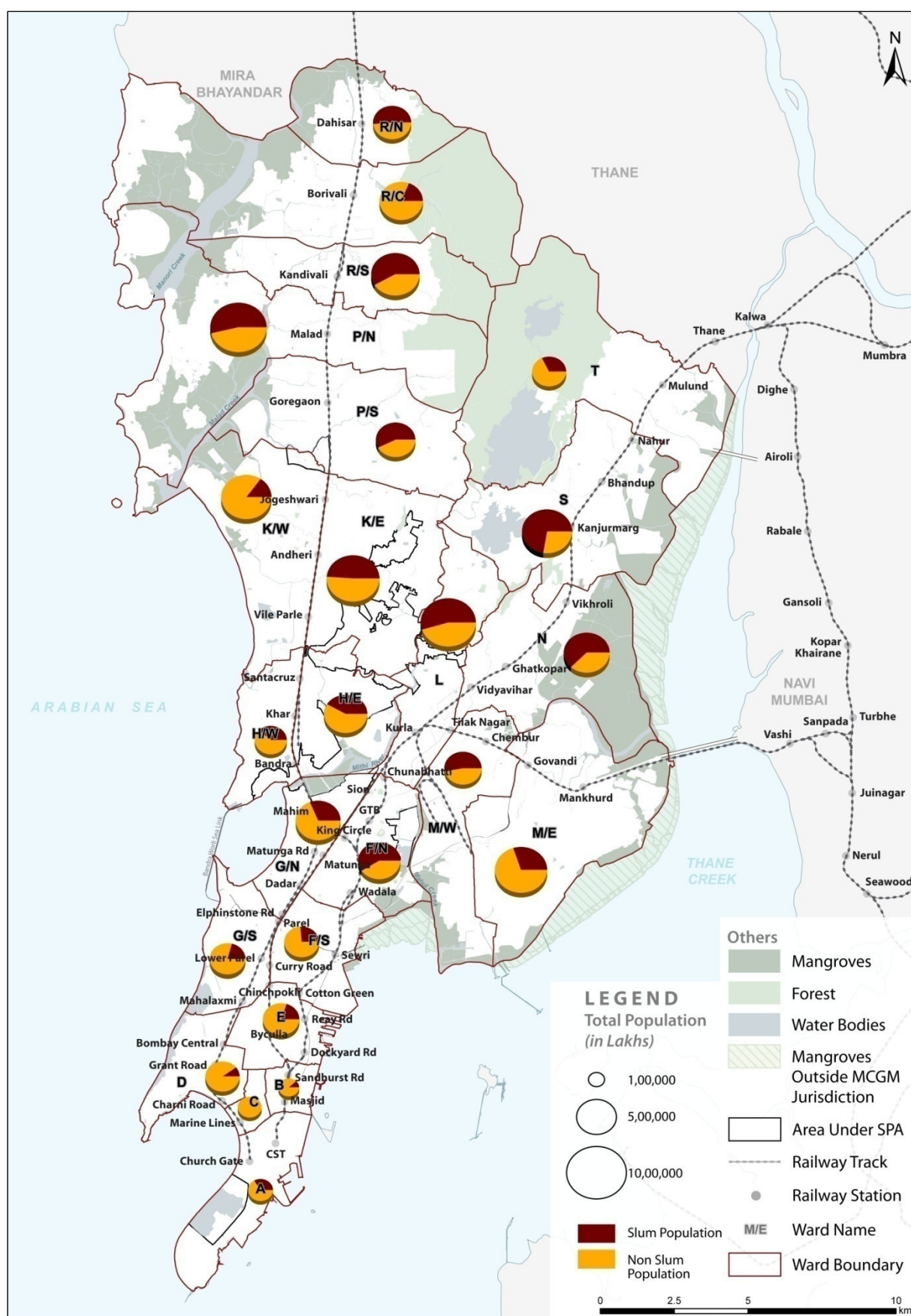
¹² Including areas under SPA

4.6.2 Slum Population

The slum population in the city has been growing in the last decades and constituted 52.52% of the total population in 2001 (excluding the areas notified under SPAs). In 2011, as per the final Census figures, 41.85% of all the city's households (including the notified areas under SPAs) live in slums. The Census 2011 figures indicate a decrease in the number of slum households as compared to the Census 2001 figures for slum households. Satellite images since 2000, however, seem to suggest that slums have increased in extent over the last decade.

Slums are not uniformly distributed throughout the city. Slum pockets are generally found along water courses/creeks, on precarious hillsides prone to landslides, on the periphery of forests, in low-lying areas prone to flooding and along railway tracks. Majority of slums are prevalent in the Suburbs especially in Wards L, M/E.

Map 4.1 Ward wise slum population and non slum population in Greater Mumbai



Based on trends, the Census 2011 figures and the final slum population figures, the total population is accordingly distributed across the various zones (Island City, Eastern and Western Suburbs) and then across the various Wards of the city using the ratio method.

Table 4.8: Ward wise slum population of Greater Mumbai in 2001 and 2011

Ward Name	Slum Population (2001)	Slum Population (2011)*
A	60,893	63,400
B	18,746	14,400
C	0	0
D	38,077	33,000
E	52,230	77,800
F/N	304,500	308,400
F/S	141,653	95,200
G/N	324,886	189,600
G/S	151,506	78,300
Island city	1,092,491	860,100
H/E	457,622	241,006
H/W	138,541	112,294
K/E	472,226	403,800
K/W	316,065	108,800
P/N	508,435	504,500
P/S	210,591	264,000
R/C	173,160	104,300
R/N	169,662	221,500
R/S	326,235	399,200
Western Suburb	2,772,537	2,359,400
L	658,972	490,400
M/E	523,324	245,300
M/W	283,557	217,200
N	435,009	385,600
S	593,300	537,900
T	116,250	111,800
Eastern Suburb	2,610,412	1,988,200
Greater Mumbai	6,475,440	5,207,700

Note: Distribution of slum and non-slum population was further estimated across the 150 Planning Sectors.

*Census 2011 Slum Population for Wards H/E and H/W has been updated to reflect the change in Ward boundaries of these Wards, using ration method.



Chapter 05

Economy

5. Economy

5.1. Greater Mumbai's Primary as Financial Centre of India

Greater Mumbai's economy has undergone dramatic changes over time. From being a major trading port in the British era, it transformed into a manufacturing city, famous for its textile industry. The Regional plan 1973 and the State Industrial Location Policy, 1974 (revised 1991) advocated dispersal and decongestion of industrial activities. In the late 1980s, several factors contributed to the closure of textile mills in the city and the decline of manufacturing activity in Greater Mumbai. In 1991, India undertook the economic reforms that further diversified the economic base- government, finance, insurance and banking, trade and commerce, entertainment, hospitality, IT and ITES. Despite these changes the informal sector continues to have a substantial presence.

Greater Mumbai is the acknowledged financial and commercial capital of India. This is corroborated by several facts. Hotel occupancy at an average of 65% is quite high and the average rates and rentals on office property in Mumbai is ranked between 10 and 15 amongst the most costly cities in the world. It is home to the Indian entertainment industry which enjoys a phenomenal turnover. Of the total deposits with Banks (All India) 17% come from Mumbai. Of the total outstanding credit in India, 27% is from Mumbai. Of the total cheques cleared in India, over 50% are in Mumbai. Indeed in value terms they are one and a half times more than the total of the other three metros viz Kolkata, Delhi and Chennai. The BSE and NSE market caps have been going up exponentially and the two bourses account for 80% of the value of all transactions in stock markets. The telegraphic transfers account for 51% of the total. Annual merchant turnover is of the tune of \$750bn., of which 80% accrues to Mumbai. It also accounts for 85% of G-sec transactions. Eighty percent (80%) of Mutual Funds are registered in Mumbai and 75% of FIIs are in Mumbai. Mumbai makes significant contributions to the country's exchequer. The Income Tax collection Excise and Customs fetch overwhelming proportion of total tax revenue of the central government (25-40%) and are more than all other three metros put together. The prominent role of Mumbai as a driver of growth, has led policy makers and politicians nurturing big ambitions of transforming Mumbai into a 'World Class City' and plans for making Mumbai an International Financial Centre have been discussed for several years now¹³.

5.2. A Review of National & State Government Policies Post DP 1991¹⁴

Several policies have been drawn up at the Central level and State level pertaining to the location of industries, the location of offices and Special Economic Zones since the DP 1991 which have had an impact on the economic opportunities available within Greater Mumbai. In particular, there has been a focus on dispersal of industries with a view towards decongestion of the Island City.

5.2.1 Central Government Policies on Location of Industries

There have been several initiatives by the Central Government since 1956 to reduce regional development disparities and towards this end, several initiatives were commenced towards industrialization and starting 8 heavy industries in backward areas.

The New Industrial Policy was introduced in 1991 to help Indian industry to modernize, increase productivity and competitiveness. Incentives were given to start industries in backward areas. Additionally in million plus cities, no locational clearance was necessary for setting up industry within the industrial area designated prior to 24th July 1991 or any location beyond 25 km from the periphery of these cities. The aforesaid restriction did not apply to non-polluting industries such as

¹³ Source: http://www.mu.ac.in/arts/social_science/eco/pdfs/vibhuti/wp20.pdf

¹⁴ These policies have been compiled from various sources including Regional Plan for Mumbai Metropolitan Region (1996)

electronics, computer software and printing. Industrial location would continue to be regulated by the local zoning and land use regulations and environmental legislations.

The Government of India passed the SEZ Act in 2005 with a view to promote SEZs as drivers of economic growth in the country. The main objectives of the Act were to generate economic activity, promote exports, create employment opportunities and develop infrastructure. It lays down the procedure for setting up of SEZs which may be done either by central or state governments, or any interested person. The Act specifies the fiscal provisions, concessions and exemptions to be awarded to SEZs. It also envisages a crucial role played by the State government in encouraging the setting up of SEZs within their state.

5.2.2 Government of Maharashtra Policies and Documents impacting Location of Industries, Offices, SEZs

State government policy was in favor of decongesting Mumbai between 1958-1968 and discouraging new industries. Accordingly, the Regional Plan 1973 and the Industrial Location Policy 1974 (which underwent several revisions) were drawn up. The Regional Plan for BMR was the first to focus on location of offices and suggest a poly-nucleated structure and dispersal of population and economic activities away from the city. It emphasized relocation of wholesale and office establishments from South Mumbai. Following the Regional Plan, 1973, MMRDA in 1977 introduced a policy & discouraging new growth of offices and wholesale establishments. According to this Policy all developments (Including change of use) accommodating offices or wholesale establishments or exceeding FSI of 1.33 needed prior permissions of MMRDA. This Policy remained in force till 1992, when these provisions were incorporated in DCR 1991.

a. Development Plan 1991

The objective was to guide development of offices in the city using various measures

- The development control measures for office locations regulated the development of offices in the different land use zones. They addressed office use as ancillary use and stated that all ancillary uses shall not exceed 50% of the floor space of the principal use. In C1, that is local commercial zones, shops and offices with a carpet area of forty square meters (40 sqm) were permitted. There were to be no district commercial zones (C2) in the Island City but in areas identified for development as district centres in the suburbs and extended Suburbs. In the purely Residential Zone (R1), professional offices of less than 30 sqm area use were only allowed. In the Residential Zone with Shop Line (R2), professional offices each not exceeding 100 sqm. area were allowed only in the Suburbs and extended suburbs. Data processing units which use computers were also allowed. In independent buildings, business offices on roads of 18 m wide and more outside the Island City, were permitted subject to fulfilment of parking and other requirements. Data processing units using computers were permissible in Service Industries Zones (I1) with certain restrictions on employees and floor space. In General Industries Zone (I2) and Special Industries Zones (I3), existing and newly built up areas could be allowed for offices outside the Island City and as part of a package of measures recommended by Board for Industrial & Financial Reconstruction (BIFR), Financial Institutions and Commissionerate of Industries for revival of potentially viable sick industrial units. Newly built up and existing areas in the cotton textile mills could be used for diversified industrial users with office space as ancillary, subject to FSI of 1 and compliance with all other regulations.
- Development promotion measures included identifying areas outside the Island City, besides the already developing Bandra Kurla Complex for district cum commercial complexes. These were at Oshiwara-Jogeshwari, Kanjurmarg, Vikhroli, and Bangur Nagar.

b. The MMR Regional Plan (1996-2011)

It is suggested that the previous policies of complete prohibition of new offices in the Island City be modified keeping in mind the macroeconomic reforms and the resultant increase in demand for office spaces in central locations. The plan suggested a policy framework that could be linked to the process of recycling of land under non-residential obsolete uses such as, industries, warehousing, etc. This policy focused on the following:

- Equipping Mumbai to host international businesses and financial operations. It suggested developing the Bandra Kurla Complex as an International Finance and Business Centre. Facilitating the development of Mumbai as an off-shore centre for financial market;
- Any development of real estate that may occur due to this policy must take into account and pay for social costs such as congestions and infrastructure strengthening. As a first step, this would require an assessment of properties at their true market values for property tax purposes. The Plan argued that Rent control and Property tax reforms are therefore a precondition for adopting this Office Location Policy;
- No increase in the existing industrial and commercial zones which may bring additional pressure on infrastructure may be allowed in Greater Mumbai. The offices may be allowed to compete with high tech non-polluting industries. Office development, particularly small offices, may be allowed as part of the commercial development;
- Reconstruction of existing office stock located in old buildings may be allowed at consumed FSI;
- Urban renewal may be undertaken to bring about infrastructure and environmental improvement involving changed land uses including office development for large concentrations of old buildings in non-residential zones in derelict areas. Recycling of land and space used for now obsolete activities may be promoted through integrated planning and development.
- The Plan stated that adoption of the policy would require amendments to the sanctioned Development Plan and DCR for Greater Mumbai 1991 and the proposed amendments would have to undergo public scrutiny.

c. New Industrial Location Policy 1992:

Formulated jointly by MMRDA and Industries Department of Government of Maharashtra, the policy divides MMR into 3 zones.

Zone I: Greater Mumbai and Thane Municipal Corporation and Mira-Bhayandar Municipal Council

Zone II: Kalyan and Navi Mumbai Municipal Corporation, Ulhasnagar, Ambernath, Kulgaon-Badlapur Municipal Councils and Bhiwandi, Uran and Vasai-Virar sub regions.

Zone III: Rest of MMR

The policy also classifies the various industries into Schedule I industries comprising non-polluting, high tech, or high value-added units; Schedule II industries comprising highly polluting, hazardous, or obnoxious units, and industries other than Schedule I and II.

- New units and expansion of existing Schedule I units is permitted in zone I. New units or expansion of existing units under Schedule II are prohibited in Zone I. Marginal expansion of

existing units other than schedules I and II is permitted as long as additional power is restricted to 25% of the existing connected load;

- New units other than Schedule II units are allowed freely in Zone II. Schedule II units are allowed only in existing MIDC areas;
- All industries are permitted in Zone III. No locational clearance from the Directorate of Industries is required;
- Construction of new or expansion of existing industrial estates is permitted as long as the type of industries they intend to accommodate are permissible in the zone.

d. Government of Maharashtra Policy regarding setting up of SEZs (2001):

The policy is concerned with different aspects of setting up SEZs such as environmental clearances, water supply and power provision, tax exemptions, labour regulations, among others. It emphasizes on granting several exemptions to the SEZs such as exemption of payment for power for a period of 10 years, exemptions from payment of all state taxes, levies and custom duties. The policy declared SEZs as 'industrial townships to enable them to function as self governing, autonomous municipal bodies'.

Following the passing of the SEZ Act, many SEZs have been set up and have been awaiting approval in MMR. The existence of two important ports and another upcoming international airport has made the region strategically important. The list of notified and formally approved SEZs in Mumbai has been presented in Table 5.1, below.

Table 5.1: Notified and formally approved SEZs in Mumbai

SR. No.	Name of Developer	Location	Type of SEZ	Area (in Ha)
1	SEEPZ SEZ	SEEPZ, Andheri (East) Mumbai	Electronics, Gems, Jewelry	45
2	Zeus Infrastructure Pvt. Ltd.	Mulund, Mumbai	Renewable energy	57
Total				102

Source: www.sezindia.nic.in accessed Jan 17, 2015. This area is notified under SPA

There are 2 notified and formally approved SEZs in Mumbai. These are predominantly for undertaking IT and service related activities. Big SEZ projects in the city are unlikely given spatial constraints. However, many more are slated to come up in surrounding areas in MMR.

It is clear that as a result of State and Central policies, through the creation of new employment centres and promotion of SEZs, polycentric growth has been achieved. Significant dispersal has also been achieved through relocation of wholesale markets from the Island City into the MMR and the setting up of the JNPT at Nava Sheva and development of Bandra Kurla complex and recycling of industrial land for ITES within Greater Mumbai.

The following sections look at some indicators of Greater Mumbai's economic performance and current trends.

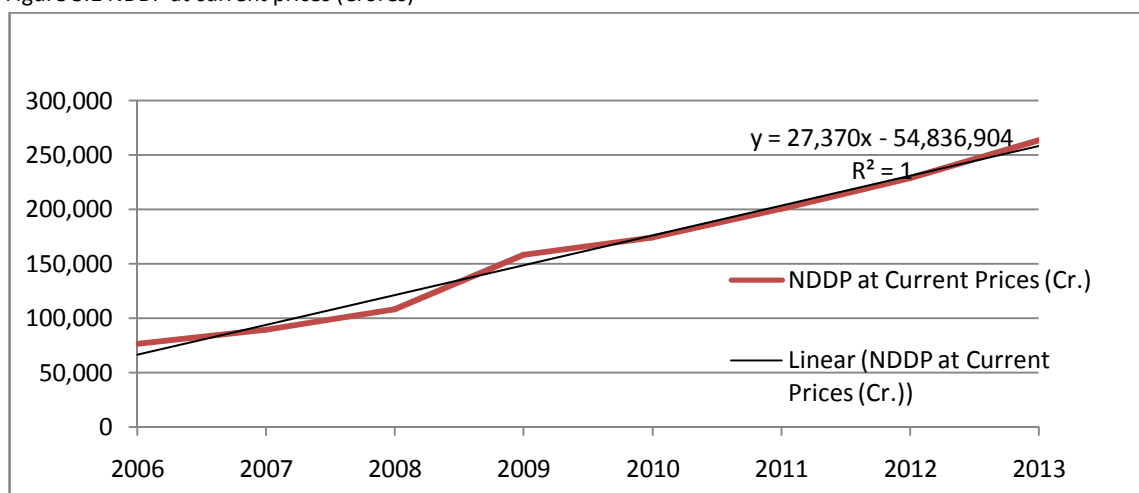
5.3. Trends in Gross District Domestic Product and Per Capita Incomes in Mumbai

Growth of Mumbai in the modern era began with the colonial powers establishing the port in Mumbai. This was followed by cotton textile industry. In the twentieth century Mumbai experienced rapid and diversified growth. Manufacturing besides textiles, trade and commerce, government services, banking, insurance, finance and real estate all had a slow but secular growth till the early 1980s. During the 1980s textile industry declined significantly followed by other manufacturing industries. After the economic liberalization in 1991, Mumbai experienced a spurt in financial services that reflected in Bandra Kurla Complex emerging as a new finance district of Mumbai. However, as the economy has liberalized, economic growth of Mumbai has now become cyclical responding to international trends and events.

However, consistent quantification of these changes is rather difficult. Director of Economics and Statistics Government of Maharashtra estimates GDDP and NDDP (Gross and Net District Domestic Products) and publishes them in annual Economic Surveys. Despite methodological limitations these provide a trend. However, sectoral composition of GDDP or NDDP is not available in public domain. With these limitations, some quantification of growth trends is presented below.

Figure 5.1 below shows the NDDP of Greater Mumbai at current prices. The growth rate over a seven year period is 18% p.a. Even in current prices the dip in NDDP in 2008 – a year of slow down across the globe - is visible.

Figure 5.1 NDDP at current prices (Crores)



Source: Annual Economic Surveys of Maharashtra, Director of Economics and Statistics, Government of Maharashtra

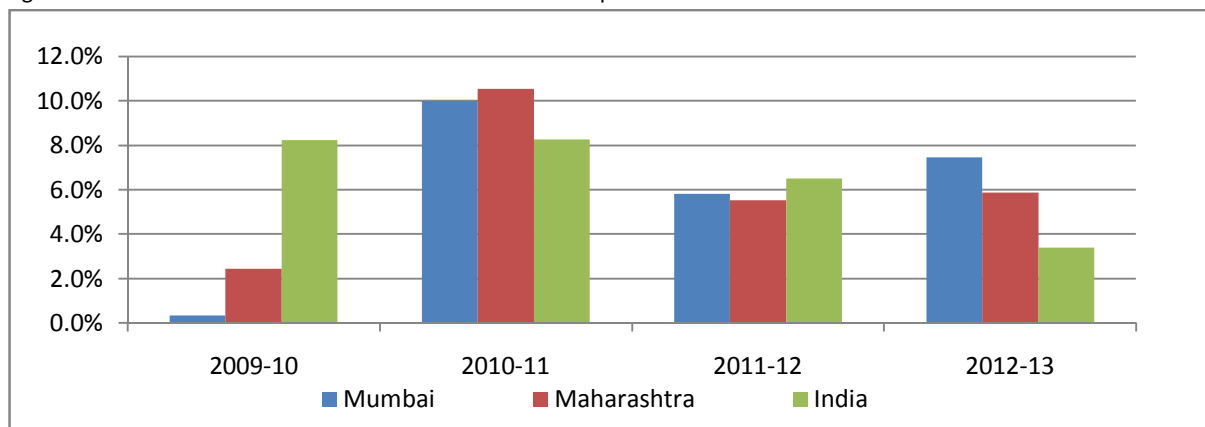
Table 5.2: Domestic product rupees in Crores at constant 2004-05 prices

Net Domestic Product Rs. in Crore at constant 2004-05 prices			
Year	Mumbai	Maharashtra	India
2008-09	138,007	584,179	3,664,388
2009-10	138,474	598,455	3,966,407
2010-11	152,297	661,469	4,293,585
2011-12	161,161	698,086	4,573,328
2012-13	173,162	739,040	4,728,776

Consistent conversion to constant prices of this series is not available due to change of base year. Table 5.2 shows the relative net domestic products of Greater Mumbai, Maharashtra and India at constant 2004-05 prices.

It may be observed that during this period Maharashtra accounted for about 16% of India's NDP and Mumbai's NDP was about 24% of Maharashtra's NDP. In the past it was generally observed that the growth rate of Mumbai was a couple of basis points higher than that of Maharashtra and Maharashtra was a shade better than India.¹⁵ However this not so during 2008 – 12 as may be seen from the Figure 5.2 below:

Figure 5.2: Growth rate of Net Domestic Product at constant prices



After a considerable fluctuation, the pattern has returned to its traditional pattern in 2012-13.

The reasons for this fluctuating growth rates of Mumbai could be many – global economic scene, international trade competition, competition from other Indian cities and Mumbai's own problems comparative real estate prices, infrastructure particularly transport and ease of doing business.

5.4. Emerging sectors of growth and spatial clustering

Economic data in terms of gross domestic product (GDP) is not adequate to identify growth drivers at a finer scale. However, general trends indicate that certain activities are likely to drive MMR's economy over the next few decades¹⁶.

- Financial services including banking and insurance;
- IT and ITES;
- Communications;
- Biotechnology;
- Media and entertainment;
- Retail;
- Logistics and warehousing near the ports; and,
- High end export oriented manufacturing particularly in SEZs.

Mumbai historically developed as a mono-centric city with port, government, banking and insurance, stock exchange and wholesale trade all being concentrated in and around Fort. Development of Navi Mumbai that began in 1970 was the first attempt to create a new centre of growth. Now with diversification of economic growth, conversion of manufacturing sites and expansion of transit

¹⁵ Business Plan for Mumbai Metropolitan Region, 2007

¹⁶ Op.cit

facilities, a clear pattern of spatial clustering is emerging. The spatial clustering is described in Table 5.3 below.

Table 5.3: Spatial clustering

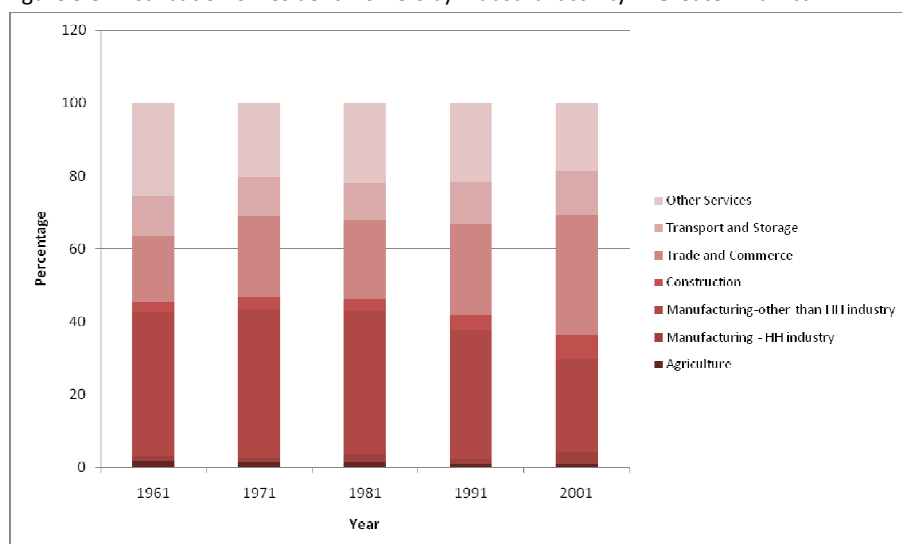
Sr.No.	Key Cluster	Location
1	Financial services including banking and insurance	Fort, Nariman Point, Bandra Kurla Complex
2	IT and ITES	Andheri-Kurla Road, Malad
3	Media and entertainment	Malad - Link Road, Goregaon
4	Retail	Lower Parel Mill District, Malad, Mulund
5	Logistics and warehousing	Wadala Truck Terminus
6	High end export oriented manufacturing	SEEPZ, Andheri

Source: Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

5.5. Employment Characteristics

The employment patterns in Mumbai have witnessed significant restructuring especially since 1990. There has been a rise in service sector employment and a decline in manufacturing employment. The structure of production continues to show a deceleration in industrial activity with around 70% being contributed by the services sector. The share of manufacturing in Mumbai's GDDP has been falling post economic liberalization policies in the early 1990s. Total manufacturing employment, including construction activity fell from 44% to 35% between 1961 and 2001. Total service employment has increased from 55% to 64% in the same period. The contribution of tertiary sector on the other hand has been on the rise. The Figure 5.3 below confirms that manufacturing employment has been falling over the years while that in services is increasing.

Figure 5.3: Distribution of resident workers by industrial activity in Greater Mumbai



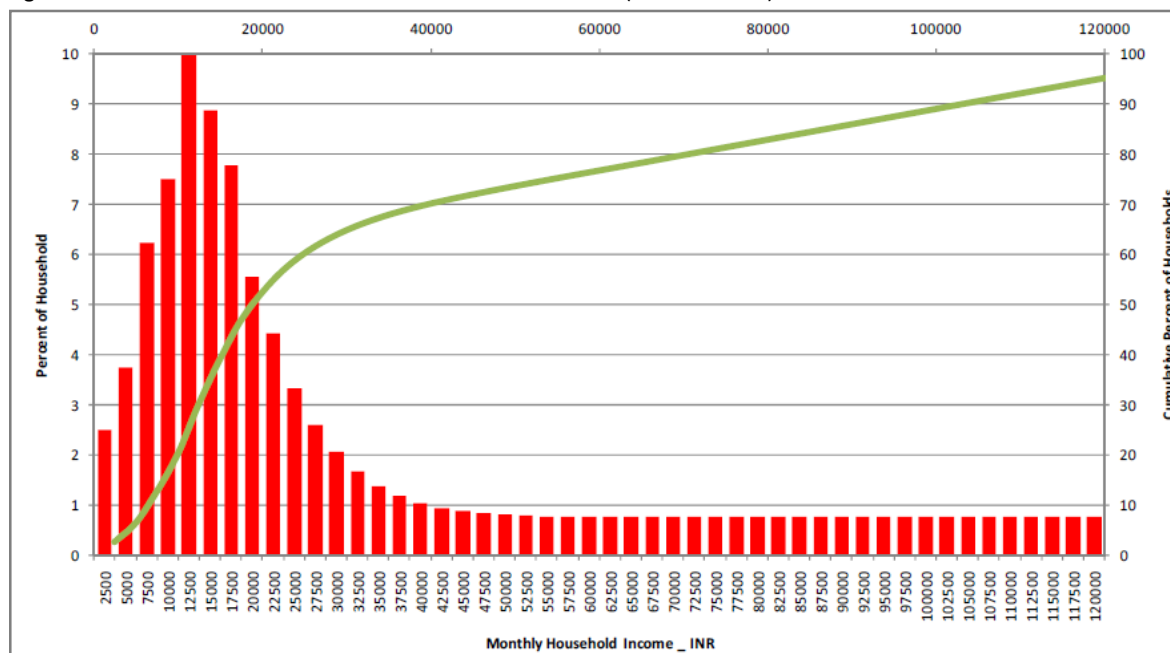
Source: Census 1961- 2001.

5.6. Income Distribution in Greater Mumbai

Household income is not regularly monitored and hence does not find reflection in official statistics. Consumption expenditure is covered by the National Sample Surveys but reported data is for all the urban areas of the State and not for individual cities. A 2010 study (Annez et al) had estimated Greater Mumbai's distribution of households according to monthly household income based on 2005 prices. According to this estimate 25% of households in Greater Mumbai have a monthly

income less than Rs. 12,500. The median monthly income is Rs. 20,000 and only 9% of the households have income in excess of Rs. 60,000 per month.

Figure 5.4: Household income distribution for Greater Mumbai (in 2005 Prices)



Source: Working with the Market - Approach to Reducing Urban Slums in India, WB Policy Research Working Paper 5475, Patricia Clarke Annez, Alain Bertaud, Bimal Patel, V. K. Phatak

Note: In this paper, the income distribution is estimated for 2007-08 at 2004-05 prices.

5.7. Mumbai's Real Estate Market

Mumbai's real estate is one of the most expensive in the world. The real estate market through demand and supply factors is considerably influenced by regulatory regimes and financial markets. It is prone to intense speculative activity particularly when supply is constrained by regulations. Speculative activities, supply side constraints coupled with a strong interest group of real estate developers and builders have contributed to soaring real estate prices.

As has been the experience, property prices in the South and West are considerably higher than those in the East and North. The city wide mapping of the Ready Reckoner rates (refer Map 5.1) reveals that the real estate prices are the highest along the western coast in the Island City and parts of the Western Suburbs, and begin to lower as one moves northeast in the City. The rates are also lower along the south-western periphery of the National Park and around Chembur and Trombay.

Residential property prices show clear geographical preference in Greater Mumbai with areas of the South and Western coast being considerably higher than areas in the East and North. Areas along the Western coastal edge experience highest residential property prices. Accessibility to transport is another significant determinant of real estate prices with areas in proximity to railway stations and along major road networks also experiencing higher residential land price than the surrounding areas.

The median household income is only Rs. 20,000¹⁷ per month, while the lowest price for even a single bedroom public housing unit starts from Rs. 14,00,000 onwards. Given that the cost of housing is much higher than the affordable range of 4-5 times a family's annual gross income, it is apparent that nearly half of the population is unable to afford to own a house, even of minimum standards.

Table 5.4: Housing stock for Greater Mumbai

Sr. No.	House type	Price range INR	% of Stock	Nature of Stock
1	Pavement Dwellers	3,00,000 – 23,50,000	3	Informal
2	Slums		45	Informal
3	Chawls	20,00,000 – 40,00, 000	15	Formal, but non compliant with present standards
4	Slum Rehabilitation		2	Formal initially free to slum dwellers
5	EWS LIG		5	Public Housing
6	MIG HIG	10,20,000 – 85,00,000	2	Public Housing
7	1 BHK Apartments		28	Formal
8	2 – 3 BHK Apartments	65,00,000 –		Formal
9	+ 3 BHK Apartments	25,00,00,000		Formal
	Total		100	

Source: Working with the Market - Approach to Reducing Urban Slums in India, WB Policy Research Working Paper 5475, Patricia Clarke Annez, Alain Bertaud, Bimal Patel, V. K. Phatak, 2010.

¹⁷ Working with the Market - Approach to Reducing Urban Slums in India, WB Policy Research Working Paper 5475, Patricia Clarke Annez, Alain Bertaud, Bimal Patel, V. K. Phatak, 2010.

Map 5.1: Residential land price in Greater Mumbai

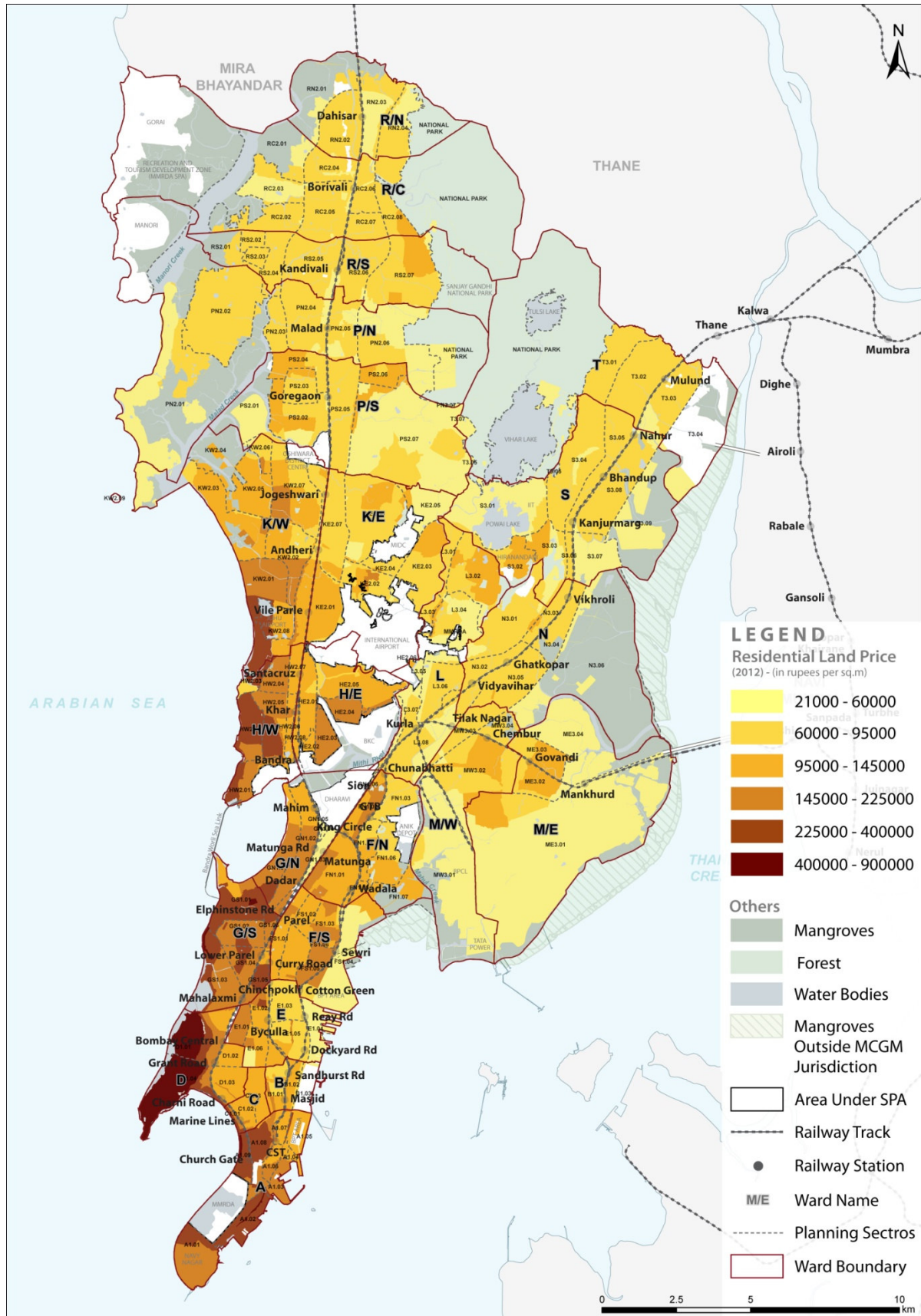
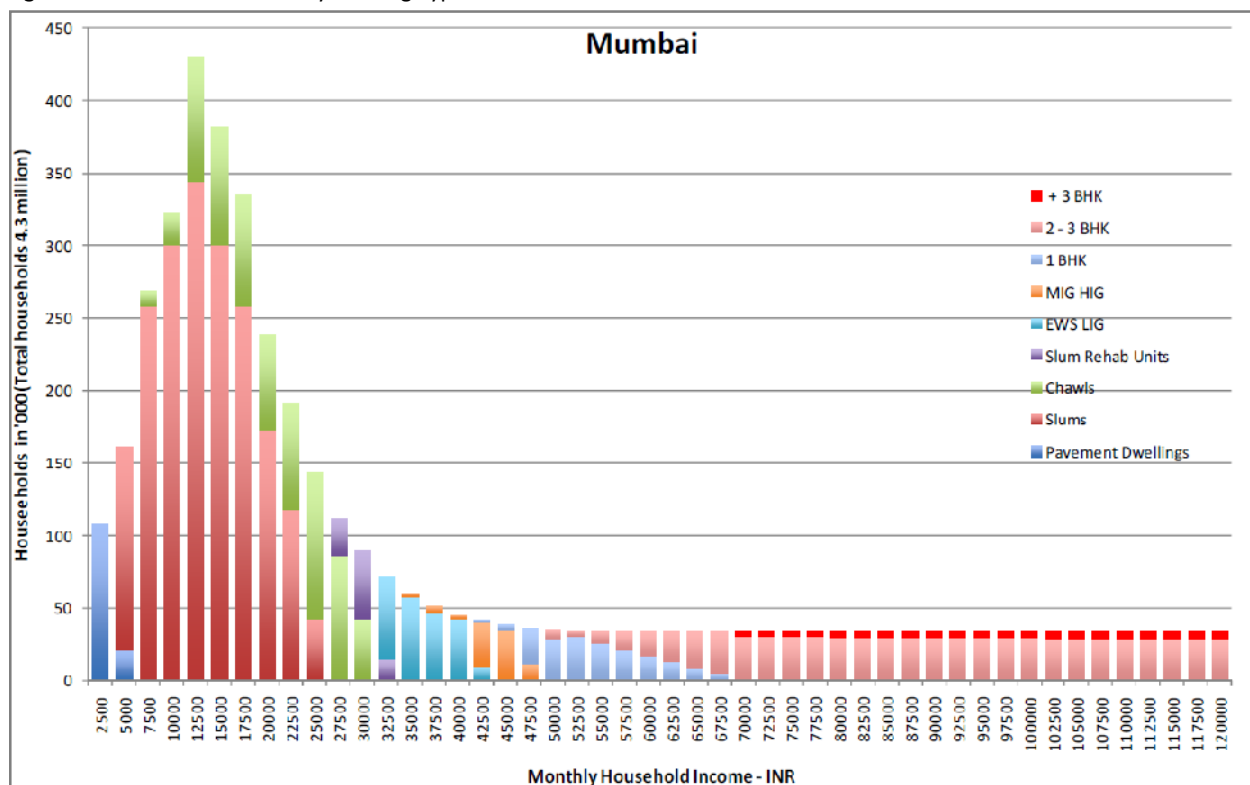


Figure 5.5: Household Income by Housing Type



Source: Working with the Market - Approach to Reducing Urban Slums in India, WB Policy Research Working Paper 5475, Patricia Clarke Annez, Alain Bertaud, Bimal Patel, V. K. Phatak

The Figure above illustrates the housing market equilibrium in Mumbai. Using house price indications, affordability estimates based on the income distribution data, and based on estimates of the stock of various types of housing, the distribution of income classes into various types of accommodation is demonstrated. It is to be noted that high proportion of the middle class and the entire poor population are living in substandard housing because of the high price of land and the highly inadequate supply of housing.

5.8. Conclusion

Greater Mumbai's economy has undergone transformation from manufacturing activity to tertiary activity. The structure of production continues to show a deceleration in industrial activity with around 70% being contributed by the services sector. There is greater informalization of the economy. Greater Mumbai's economy has grown at a remarkable rate of 9%. At constant prices in the year 2008-09, the Gross District Domestic Product of Mumbai was pegged at over Rs. 1,01,103 Crores accounting for around 23% of Maharashtra's Gross State Domestic Product. On the other hand the per capita income in Greater Mumbai has increased by 191% between 2000 - 2001 and 2008-2009 and at around Rs. 80,000, is twice the national average.

The sectoral composition of Greater Mumbai's GDDP shows that while the share of manufacturing sector has been declining post 1990, the share of tertiary sector is growing;

The household income distribution for Greater Mumbai indicates that only 9% of the population earns more than Rs. 60,000 per month and 25% of the households earn less than Rs.12,500 per month. Given that the cost of housing is much higher than the affordable range (median income at INR 20,000/0) of 4-5 times a family's annual gross income, it is apparent that nearly half of the population is unable to afford to own a house, even of minimum standards.



Chapter 06

Transport & Road Network

6. Transport & Road Network

6.1 Transport and Road Network in the Mumbai Metropolitan Region

Greater Mumbai dominates all movement systems in Mumbai Metropolitan Region. Every day on an average, around 4.5 million people come into Greater Mumbai and 4.47 million people move out of Greater Mumbai.¹⁸ Linkages of Greater Mumbai with MMR have a major role in retaining the primacy of Greater Mumbai.

Transport Linkages with the Region:

With increasing urbanization in areas outside Greater Mumbai within the MMR and with Greater Mumbai still being the most important centre for employment, facilities and residential functions, the inter linkages between Greater Mumbai and MMR are vital for the future. Rail and Road are the major existing networks that structure Greater Mumbai and extend to MMR and beyond. The Concept Plan for MMR has conceived a grid of highways with an intermediate spacing of around 3 to 4 km in the region connected with Greater Mumbai by means of multiple trans-harbour links and through landward highways along north and north east of Greater Mumbai.

A critical objective of the CTS 2008 study was to support both intensification and green-field development, in order to overcome the chronic shortage of supply of all forms of urban building space in the MMR at more affordable levels. A range of alternative growth scenarios of population and employment distribution in Greater Mumbai and Rest of the Region (RoR) were evolved in order to determine the sensitivity of the road and transit system networks, in terms of need costs and priorities, for distinctly different development options and strategies.

CTS 2008 Long Term Strategy:

1. Study recommends “Transit First” as a sustainable transportation policy.
2. Hierarchical multi-modal transport system is proposed for effectively integrating the mobility function with local area travel needs.
3. Corridor protection i.e. need for protecting and acquiring the ROW for the Regional Road and Transit Networks has been recommended on priority basis and incorporating the same in a revised MMR Regional Plan and DPs of ULBs has been recommended.
4. Candidate corridors for exclusive bus lane systems have been identified to handle the road based public transport demand efficiently, some of which would serve as a precursor to rail based transit.
5. Multi-modal transport corridors, which are cost intensive and efficient, improving the connectivity to various growing clusters of the region have been proposed. The details of the rail system, highway system and concept of land use intensification focused on transportation corridors for Greater Mumbai are elaborated further in the respective sections of this chapter.

¹⁸ CTS, Transform Report 2008

6.2 Modes of Urban Transport

- Greater Mumbai has a distinct advantage of a high modal share of 76% (excluding pedestrian)¹⁹ in favour of public transport system. It has multiple modes of transport that primarily includes road and rail based transport. The existing Suburban Rail Services, which include the Western Railway and the Central Railway, carry an estimated 7 million passengers every day while the public bus transport system accounts for 5.5 million passengers.²⁰ Mumbai also has a very high percentage of pedestrian traffic, which accounts for 51% of all modes of travel.
- Greater Mumbai's roads and public transport system have not kept pace with the City's growth as it is currently witnessing acute road congestion and overcrowding in trains and buses.²¹ Since the last DP 1991, vehicular traffic volumes and automobile ownership have risen substantially, resulting in a continuous effort of providing more flyovers and undertaking many road widening schemes. These in turn have led to more congestion and pollution. Such road improvements have often been undertaken at the cost of valuable pedestrian space. Air pollution is at an all time high with levels exceeding prescribed limits all over the City. Provision of safe facilities for pedestrians is a major issue in the city where walking is the dominant mode of travel.
- Regional level transportation within the City is largely under the purview of state and central agencies. While the DP may not suggest any major regional trunk links, it will address local level transportation demands through transit-oriented growth, multi-modal transport integration, improved connectivity, enhanced road networks, and creation of a safe pedestrian environment.
- This chapter provides an overview of the assessment of urban passenger transport in Greater Mumbai, focusing on four key modes of transport namely formal public transport, private motorized transport, informal (motorized) transport and non-motorized transport (NMT). The four modes of passenger transport illustrate wide variations in trends and conditions, and thus accessibility.

6.2.1 Private Transport

Private motorized transport is fast becoming the most preferred mode for commuting in Greater Mumbai. The high growth of private vehicles is primarily due to intolerable crowding levels in Suburban trains, increasing income levels and easy availability of loans. Within Greater Mumbai, the proportion of cars is the highest in Island City and lowest in Eastern Suburbs. In January 2013, the total number of motor vehicles in Greater Mumbai was 21.6 lakhs with an annual growth rate of 15.5 %.²² On an average, the proportion of cars in Greater Mumbai and MMR is 44% and 37%

¹⁹ Greater Mumbai City Development Plan (2005-2025)

²⁰ CTS, Transform Report 2008

²¹ ibid

²² MMRDA Diary 2014

respectively.²³ The trends indicate that the proportion of cars in Greater Mumbai as well as in MMR may reach equilibrium over a period of time. This phenomenon may be due to the high accessibility of public transport and IPT modes in the case of Greater Mumbai and less in the case of the rest of the region, although the proportion of cars is high in Greater Mumbai.

6.3 External Road Traffic Entering Greater Mumbai

Greater Mumbai experiences a large volume of entry and egress of passengers and goods traffic on a daily basis. They have a considerable impact on traffic along the main arteries. The traffic survey by CTS along major entrances to Greater Mumbai shows high volumes of traffic exchanges along the connection to Vasai Virar towards North and along connections towards Navi Mumbai.

Table 6.1 Traffic volumes in Greater Mumbai

Location Name	Daily Traffic (Vehicles)	(PCUs)	Bus (%)	Goods (%)	Cars (%)	2-W (%)	Others (%)
NH-8: Near Dahisar Toll Plaza	87,067	90,284	3.61	11.62	26.91	28.16	29.7
LBS Marg: Mulund Toll Plaza	40,153	33,254	4.21	4.33	16.60	44.23	30.63
Old NH-3: Near Kasheli Bridge	25,713	39,292	3.54	39.41	18.09	20.22	18.74
Airoli Toll Plaza	46,892	55,127	3.50	16.11	39.31	35.23	5.85
Vashi Toll Plaza	83,039	1,29,223	8.40	25.30	42.10	16.70	7.5

Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

6.4 Traffic Volume on major roads of Greater Mumbai

- Traffic volumes are important indicators to ascertain levels of traffic congestion in various areas. Modal split explains the traffic characteristics in the particular corridors. This not only helps gain an understanding of the transport network but also informs its relation with Land Use configurations.
- All the main arterial roads have a high percentage of private vehicle traffic (cars) ranging 24% to 51% of total transport volume whereas percentage of bus traffic is very low. This is one of the major reasons for traffic congestion along the corridors.²⁴
- Goods vehicles ply highest on Sion – Panvel highway from and towards Navi Mumbai (42% of total traffic volume) due to presence of JNPT and other goods that are handled in the area. Eastern Express Highway also has a considerable proportion of goods traffic.

²³ CTS, Transform Report, 2008.

²⁴ *ibid*

Table 6.2: Main arterial roads with traffic volumes more than 60,000 PCU/16 hr in Greater Mumbai

1	Netaji Subhash Marg	71,906 PCU/16Hr: Two wheelers, taxi, Car /Jeep constitute 97.8%, buses at 0.7%
2	Palton Road	67,062 PCU/16Hr: Taxis constitute 42% and cars 25%,two wheelers 18.7%
3	Lajpatrai Road	65,087 PCU/16Hr: Cars constitute 51% of the total vehicular traffic
4	Baba Saheb Ambedkar Marg	59,367 PCU/16Hr: Cars and Two wheelers constitute 34% and 30% respectively
5	Sion - Bandra Link Road	1,08,158 PCU/16Hr: Cars 34%, Two wheelers 24% and Goods vehicles 13%,buses at 2.8%
6	Eastern Express Highway	1,01,586 PCU/16 Hr : Cars 33%, Good vehicles 24%, Two wheelers 14%
7	Western Express Highway	66,403 PCU/16 Hr : Cars 29%, Two wheelers 24%, auto rickshaw 14%,Buses 2.6%
8	Sion - Panvel Highway	1,04,714 PCU/16 Hr: Goods vehicles 42%, Cars29%,Two wheelers 15% and Buses 10.4%

Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

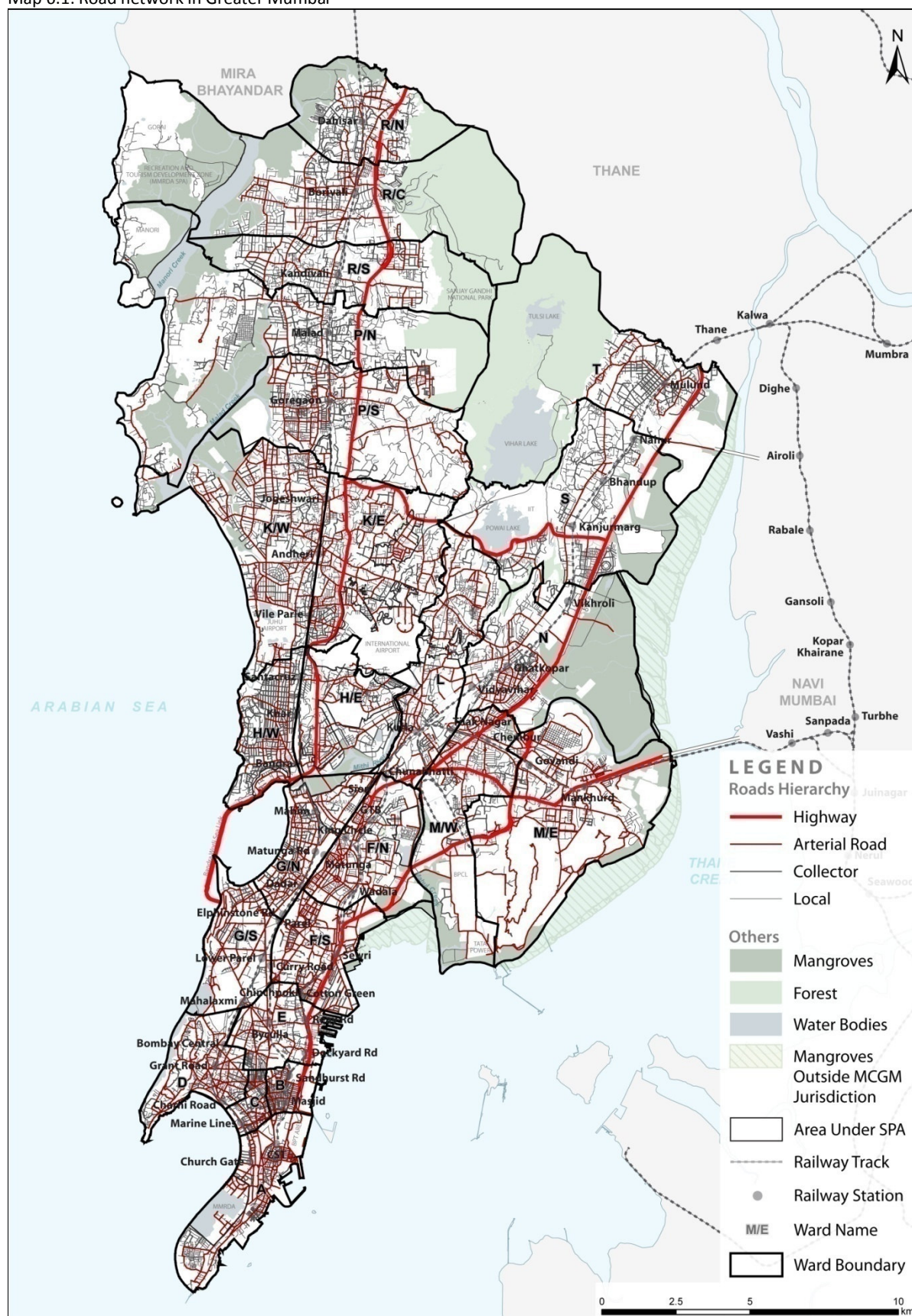
The CTS 2008 also indicates that traffic volumes along the next hierarchy of road networks, shows comparatively higher proportion of IPT traffic, personal vehicles and buses.

Table 6.3 Main arterial roads with traffic volumes 40,000 to 60,000 PCU/16 hr in Greater Mumbai

1	Maharshi Karve Marg	46,150 PCU/16 Hr : Taxi 42%,Buses 4.2%
2	E Moses Road	54,909 PCU/16 Hr: Cars and Taxis 63%, Buses 2.6%
3	S.G Barve Marg	55,810 PCU/16 Hr: Cars 23%, auto-rickshaw 20%, Goods vehicles 16% Two wheelers 12%, Buses 11% and non motorized vehicles at 2.5%
4	BKS Devashi Marg	57,211 PCU/16Hr: cars 40%,auto rickshaws 17%,Two wheelers 17%,goods vehicle 10.5% ,buses 8.9%
5	Link Road (Oshiwara)	41,800 PCU/16 Hr: Cars 25%, auto- rickshaws 25 %,Buses 9% and cycles 8%
6	Approach Road to Domestic Airport	42,026 PCU/16 Hr: Passenger cars constitute the maximum share of traffic
7	Tilak Bridge	57,721 PCU/Hr: cars 38%, Taxis 36% and Two wheelers 16 %,Buses 5.7% and non motorized traffic at 3.7%
8	Mathuradas VasANJI Road	58,503 PCU/16 Hr: Auto Rickshaw 31%, Cars+ Two wheelers 21% and Buses 10%

Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

Map 6.1: Road network in Greater Mumbai



6.5 Public Transport

This section contains assessment of road based, rail based and water based public transport networks.

6.5.1. Road Networks and Road Based Transport Networks

Major North-South arterial road networks in Greater Mumbai are the Western Express Highway, Eastern Express Highway and Sion-Panvel Highway. They extend and connect to important centres in the MMR and are therefore also considered as backbones of the MMR's road transport system. In general there is insufficient East-West cross road links in Greater Mumbai. Street networks in Greater Mumbai are largely narrow in their Right of Way, and their capacity is seriously reduced by lack of appropriate management of traffic and parking.

Main expressways in Greater Mumbai are:

- Western Express Highway connecting Bandra to Dahisar;
- Eastern Express Highway connecting Sion to Thane;
- Sion-Panvel Highway; and
- Eastern Freeway connecting Mankhurd to P. D'Mello Road.

Main arterial roads in Island City are:

- Western corridor (Netaji Subhash Marg, Peddar Road, Anne Besant Road);
- Central corridor (Baba Saheb Ambedkar Road, Senapati Bapat Marg and Maulana Azad Marg);
- Eastern Corridor (P.D'Mello Road and Rafi Ahmed Kidwai Marg).

Main roads in the Suburban District are:

- Swami Vivekananda Road;
- Linking Road and the New Link Road (Western Relief Road); and
- Lalbahadur Shastri Marg.

Major East-West cross-links in Suburban District are:

- Jogeshwari -Vikhroli Road (JVLR);
- Andheri-Ghatkopar Link road;
- Santacruz Chembur Link Road;
- Sion-Mahim Link Road.

6.6 Existing Road Network

- Roads constitute 8.16% of the total area of Greater Mumbai and 14% of the developed areas in Greater Mumbai as per the ELU 2012. In the Island City roads constitute 16% of the developed area as compared to 13% in Suburbs.
- Street networks in most of Greater Mumbai are old, narrow and their capacity is reduced considerably due to on-street parking, pedestrians walking on the streets due to inadequate

footpaths, and hawkers and other encroachments on roads and footpaths. There is lack of traffic and parking management and as a result road network capacity is reduced²⁵.

- Station Areas throughout the city are typically congested. Located in close proximity to Commercial Areas and markets, and surrounded by informal markets; they experience increasing number of vehicles and pedestrians, all competing for limited available road space. Station areas which are neighbourhood downtowns usually have bus routes leading up to them. With increasing population pressures they usually experience bad traffic snarls during peak hours.
- Most areas in the Island City, such as Navy Nagar, Marine Drive, Horniman Circle, Colaba, Mazgaon, Parel, Dadar, Matunga, Sion and Mahim are planned developments, with gridded network of streets. However, the Bazaar areas in the Island city, including Null Bazaar, Bhendi Bazaar areas experience traffic conflicts due to their narrow streets, bazaar activity and high pedestrian movements. Gaothans and Koliwadass face similar issues arising out of narrow pedestrian road networks.
- East-West connectivity across the Western and Eastern Suburbs continues to be insufficient despite the Jogeshwari Vikhroli Link Road, the Andheri-Ghatkopar Link Road and the recently opened Santacruz-Cehmbur Link Road. Hampered by presence of the Sanjay Gandhi National Park in the North forging new East-West linkages is not easy. Additionally, within Western Suburbs, to the North, like Borivali and Kandivli, East and West connectivity across the Western Express Highway and railway corridor is poor leading to heavy congestion especially along main roads leading to and from the stations.
- Due to inadequate road density and due to several missing road links in the overall road network structure, the general mobility and efficiency of flow of traffic in Greater Mumbai is reduced. This is particularly so in the Western Suburbs. While the need for major arterials and highways are addressed comprehensively at the larger scale, there are several areas that need to be addressed at the scale of the locality. Road network inventory of Greater Mumbai shows that 79% of the roads are below a width of 30m and almost half of the roads have two or three lanes only.

6.7 Street Density & Intersection Density Analysis

A street density analysis considering two variables is undertaken. One is the percentage land allocated to the street. The other is the number of crossings per km² of the urban area. Table 6.4, shows Ward-wise land allocated to the streets, varying from 8% to 25% of developed area Ward. Desired area of street is 18% at Ward level²⁶. Street grid density is a measurement of circulation permeability.

The Street density in Wards across Greater Mumbai varies from 93 km/sqkm to 147 km/sqkm, desirable street density is 100 km/sqkm²⁷. Ward-wise number of intersections per km² has been

²⁵ Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

²⁶ Delhi Master Plan 2021.

²⁷ The Relevance of Street Patterns & Public Space in Urban Areas, UN-Habitat Working Paper, April 2013.

recorded in Table 6.4. Intersection density ranges from 23 (Ward M/E) to 239 (Ward C) crossings per km².

Wards with around 100 crossings per km², on average, allows for walking distance between crossing 100 meters apart. This is considered walkable and appropriate in many cities, in order to generate street life and for moving goods and services productively and efficiently. Wards B and C which have more than 100 crossings per km² are older areas with traditional forms of urbanism coming from local culture. Wards A, D, E, G/N, H/W, R/N, R/C with less than 100 crossings per km² indicate that these are planned developments, implying long distances between streets and large crossings but in scarce numbers. Remaining Wards which have significantly less crossings per km² can be considered as weakly planned areas, with lack of adequate streets to connect to the different parts of Greater Mumbai. The distances between intersections are very long, which reduces street life, urban intensity and mobility and facilitates congestion. These are the areas that can facilitate from planned urban extensions to balance the lack of structure and street life.

Table 6.4 Ward wise street grid density in Greater Mumbai¹

Ward	Total Ward Area Excluding area under SPA	Developed area	% Street area to developed area	Total length of streets	Street density	Total no. of intersections	Intersection density for developed area
	sqkm	sqkm	%	km	km/sqkm	Nos.	Int / sqkm
A	8.84	8.78	16.32	140.31	97.92	759	86.45
B	2.66	2.62	20.69	54.61	100.93	304	116.22
C	1.91	1.90	24.71	53.39	113.58	456	239.74
D	8.22	7.53	14.91	126.92	113.03	509	67.56
E	7.27	7.22	15.90	120.47	105.00	517	71.66
F/N	11.09	8.21	18.22	170.59	114.06	422	51.40
F/S	9.79	9.04	14.85	153.96	114.68	399	44.12
G/N	5.73	5.63	18.16	95.78	93.73	376	66.82
G/S	9.29	8.19	12.82	123.81	117.97	251	30.65
H/E	6.58	6.39	15.65	115.42	115.39	367	57.42
H/W	8.11	7.66	16.80	158.65	123.24	739	96.44
K/E	16.76	15.44	14.90	263.09	114.36	902	58.43
K/W	24.03	18.87	14.92	338.14	120.11	1039	55.06
P/N	41.05	19.75	10.32	283.40	139.08	989	50.08
P/S	24.72	20.00	11.07	256.59	115.85	842	42.09
R/N	14.18	7.02	17.45	146.67	119.75	507	72.22
R/C	33.62	12.17	17.97	231.09	105.61	744	61.12
R/S	18.31	11.58	14.25	174.96	106.06	545	47.08
M/E	33.08	25.60	8.54	322.56	147.65	587	22.93
M/W	17.40	13.61	12.79	230.53	132.40	549	40.34
L	14.08	12.76	12.49	207.69	130.29	695	54.47

Ward	Total Ward Area Excluding area under SPA	Developed area	% Street area to developed area	Total length of streets	Street density	Total no. of intersections	Intersection density for developed area
N	25.69	11.63	14.42	212.40	126.70	501	43.09
S	29.75	19.27	12.29	280.07	118.20	709	36.79
T	42.88	10.32	14.46	190.46	127.64	432	41.88
Total	415.06	271.18	13.79	4451.59	119.03	14140	52.14

The Relevance of Street Patterns & Public Space in Urban Areas, UN-Habitat Working Paper, April 2013.

- Accessibility Analysis for Rail and Bus

The accessibility analysis for railways and major bus routes in Greater Mumbai reveal that most of the areas in the city are accessible by both these means of transport. Few areas such as Madh, Marway, Malwani, Kurar Village in Malad, Nagari Niwara, Powai, etc. are inaccessible by Railways, however, these are well served by buses.

Map 6.2: Accessibility by Railways and Major Bus Routes in Greater Mumbai

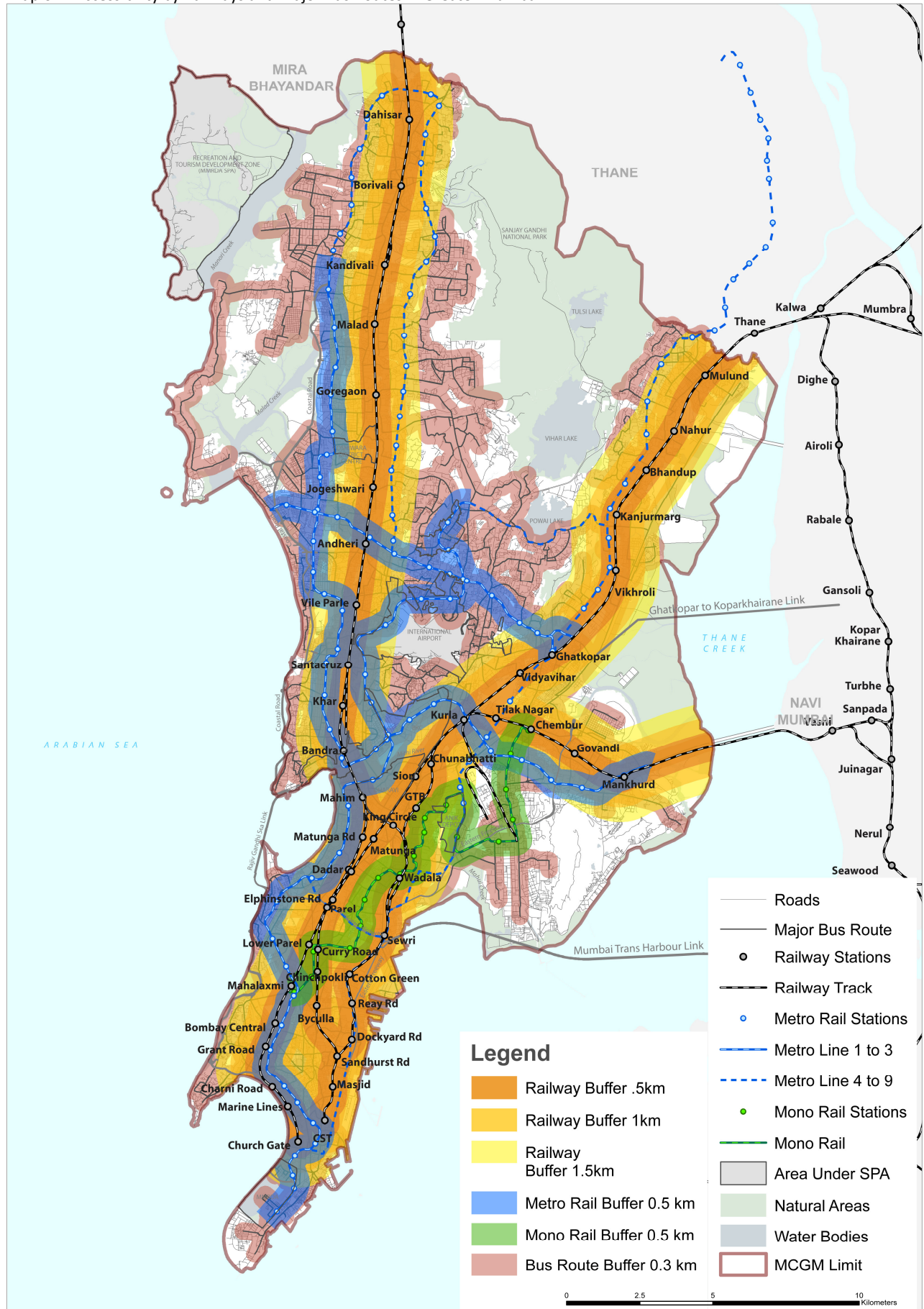


Table 6.5 Road network inventory: Greater Mumbai

Traffic Lanes Distribution		Percentage of Right Of Way (ROW)	
Lanes	%	ROW	%
Single and Intermediate Lane	1.7	ROW (0-15m)	25
Two Lane undivided	26.7	ROW (15-30m)	54
Three Lane and above undivided	21.8	ROW (>30m)	21
Two Lane divided	7.9		
Four Lane divided	12.2		
Six Lane divided	19.1		
Eight Lane divided and above	10.7		
Total	100	Total	100

Source: MCGM GIS Database

6.8 Ongoing, New and Proposed Plans & Projects

There are several transport projects under planning and implementation within Greater Mumbai. In general, these projects are planned with a view of serving transport demand for the next two decades. Major projects such as Metro rail, Monorail, and new expressways/freeways have a major role in shaping the transport scenario for the future. The Development Plan needs to consider the proposals, anticipate their impacts on the overall movement systems and integrate them with Land Use proposals for the future.

6.8.1 Recently Completed Projects

- **Eastern Freeway:** This is a controlled-access freeway that connects the Eastern Suburbs with South Mumbai. It links P. D'Mello Road in South Mumbai to the Eastern Express Highway (EEH) at Ghatkopar. It is 16.8 km long and has been initiated by MMRDA. A 13.59 km stretch of the freeway, comprising two of three segments (from Orange Gate on P D'Mello Road up to Panjarpol, near RK Studios in Chembur) is currently operational, with the remaining stretch under construction. It reduces travel time from 90 minutes to a mere 15 minutes.
- **Santacruz-Chembur link:** the 6.5 km double deck flyover has recently been completed and has reduced journey time from Santacruz to Chembur to 17 minutes.
- **Andheri-Ghatkopar link:** the 7.9 km road connects the Western Express Highway in Andheri to Ghatkopar via Saki Naka and Asalpha is operational but some segments are still to be finished.
- **Sahar Elevated Road connecting to International Airport:** The recently completed 2 km long elevated road connects the Mumbai International Airport to the Western Express Highway.

6.8.2 Proposed Road Links

- **Mumbai Trans Harbour Link (MTHL):** The proposed link will improve connectivity between Greater Mumbai Island city and main land (Navi Mumbai) and would accelerate development of Navi Mumbai area as envisaged about 30 years ago. The connection includes a 22.5 km long 6-lane bridge connecting Sewri on the Island City to Nhava on the mainland with interchanges at Sewri and near Chirle village on NH4B. The road includes a 16.5 km long sea link and 5.5 km viaducts on land. The project is expected to be commissioned in the next 5 years.
- **Elevated Link from Sewri to Worli Sea Link:** The proposed elevated road link intends to connect the areas between MTHL interchange and Worli Sea Link and is expected to ensure rapid connectivity between the main land and the Western Suburbs.
- **Coastal Road (West):** Joint Technical Committee (JTC), Govt. of Maharashtra has proposed access controlled Coastal Road along the western coast from Nariman point to Malad 35.60 km long, with interchanges at 18 locations connecting to other major roads. The JTC proposes two options. The first involves reclaimed roads in the mangrove areas, while allowing free movement of water in the mangroves by bridges. The second option is to replace the reclaimed roads by stilted or elevated roads in a length of about 8 km. The proposed coastal road is expected to provide high-speed connectivity to Western Suburbs and South Mumbai.
- **Goregaon-Mulund Link Road:** It is proposed by the MCGM to strengthen East-West connectivity.

6.9 Bus Network

In Greater Mumbai, Brihanmumbai Electric Supply and Transport Undertaking (BEST) is the largest public bus transport service provider with a fleet strength of 4,699 and operating on 506 routes. BEST operates services within Greater Mumbai, and to major destinations outside Greater Mumbai. Ferry services between Manori and Malad are also run by the organisation. Bus transport is an important feeder system for rail based mass transit, and contributes 25% of total trips (excluding pedestrian). However, the system is ageing and losing popularity due to general traffic congestion²⁸. As per 2011 data there are a total of 4,699 buses in service, including 3,799 non-AC buses accounting to 80% of the total fleet and 412 AC buses. Of the total number of buses 2,985 buses run by CNG accounting to 63.5% of the total buses²⁹.

The CTS projected that the importance of bus transport would face major threat due to growth of personal vehicles and increase of rail based transport such as Metro and Monorail. The study projected that the modal split of bus transport would decline from existing 25% to around 9% in the coming two decades. However, the advantage that bus public transport offers is that it entails lesser operational cost and offers more flexibility.

²⁸ Data received from BEST in 2011

²⁹ Ibid

Several proposals are formulated by para-statal and NGO's to introduce BRT in Greater Mumbai but its feasibility needs to be examined.

6.9.1 Bus Terminals

Major regional bus terminals in Greater Mumbai are Mumbai Central, Parel, and Dadar, located within the Island City. These locations are the major hubs of transit, commercial and institutional activities. Bus terminals such as Kurla, Borivali and Nancy Colony connect to Residential Areas in the Suburbs. Bus Terminals are generally located near suburban railway stations and inter-city railway stations so that public bus transport can also effectively act as feeders to the rail network.

6.9.2 New Bus Terminals and Augmenting infrastructure in Existing Terminals

On analysing the location of existing terminals and accessibility to areas that are under served, CTS notes that new inter-city bus terminals are required between Bandra and Borivali in the Western Suburbs and between Kurla and Mulund in the Eastern Suburbs. It proposes to develop on priority, a dedicated interstate bus terminus near the Wadala Truck Terminal in Greater Mumbai. Parking facilities for private vehicles at the terminals are either nonexistent or needs augmentation. Existing terminals in Dadar, Sion, Kurla-Nehru Nagar, Borivali and Borivali-Nancy Colony bus stations lack basic infrastructure facilities such as waiting hall, drinking water facility, toilets etc.

6.9.3 Bus Depots

There are 41 existing bus depots in Greater Mumbai. Presently, they lack basic infrastructure facilities and require augmentation of capacity. It is observed that the areas occupied by bus depots lack adequate space for primary and secondary depot activities. As per the Traffic Planning Department, MCGM bus depots are required at Mulund East, Dahisar East and at Trombay.

6.9.4 Bus Stations

As per Traffic Planning Department of MCGM, several bus stations need improvement in terms of more space for buses, chowkies and basic amenities; the details are provided in Table 6.6 below.

Table 6.6: Requirements in existing bus stations

	Requirement of Bus stations	Remarks
1	Mulund station West	There are 10 routes functioning whereas there is only a two seat chowky and temporary shelter are available on road
2	Vikhroli station West	Lack of dedicated space for buses
3	Nahur station East	Bus station requires to be planned near the new railway station
4	Kurla station East	Lack of space for manoeuvring of buses whereas the area faces heavy traffic
5	Kurla station East	Lack of dedicated space for buses and operations control are on road
6	Andheri station East	Lack of dedicated space for buses and operations control are on road
7	Jogeshwari station East	Lack of dedicated space for buses and operations control are on road

	Requirement of Bus stations	Remarks
8	Shivshahi Prkalp or Santhosh Nagar	Off loading of Dindoshi bus station and to cater new developments up to Santosh Nagar
9	Malad Railway station West	Operations are controlled from 3 different chowky and lack of dedicated space for buses
10	Borivali station West	There are 12 routes controlled from the chowky whereas there is lack of space
11	Borivali station East	There are 24 routes controlled from the chowky whereas there is lack of space
12	Dahisar station East	There is no chowkey at the vicinity
13	Oshiwara station East or West	Bus station requires to be planned near the new railway station
14	Bandra station East	The operations control point is on road and lack of dedicated space
15	Byculla station West	The operations control point is on road and lack of dedicated space
16	Mahul	The operations control point is on road and lack of dedicated space
17	Refineries	The operations control point is on road and lack of dedicated space
18	Sewri station West	Bus station requires to be planned near the new monorail station and to serve the new linkage planned in BPT premises.

Source: Traffic Planning Department, MCGM

6.9.4 Facilities for Private Bus Stops/Terminals

Private buses also play a major role in intercity movement. At present the pickup and drop-off points by private buses are informally organised. Lack of dedicated space and facilities at these points causes obstruction to general traffic movement and inconvenience to passengers.

Meeting the existing gaps in the road based public bus transport network and providing support towards the sustenance of bus based transport in the future is a challenge the DP 2014-34 needs to address.

6.10 Railways

The Railway system has been considered as the lifeline of Mumbai: connecting people, businesses and goods of not only Greater Mumbai but also of the MMR. Cost of travel by Suburban rail is highly subsidized and reliable; therefore, it serves the highest modal share.

Indian Railways, the national intercity passenger and freight operator of India, plays the crucial role of providing urban railway connectivity in Greater Mumbai and the MMR. The Western Railways and Central Railways serve Greater Mumbai and the MMR. The Western Railway line connects Churchgate Terminus in the Island City to Dahisar running along the western coast. It extends beyond the MMR to link Greater Mumbai to Ahmedabad and Delhi. The Central Railway lines connect the Chhatrapati Shivaji Terminus in the Island City to Mulund. It extends beyond the MMR to link Greater Mumbai to a large part of Central India. The Central and Western Railway Zones

supported by three main railway lines connect the suburban rail in Greater Mumbai to long distance rail and freight traffic services.

- **Western Line:** The Western line runs from Churchgate station in the Island City and exclusively serves suburban passengers. Its operation extends to Dahanu Road, 124 km to the North from Churchgate. Western Railway Suburban line has 36 suburban stations including long distance train terminals such as Mumbai Central, Dadar and Bandra and the other important stations such as Andheri and Borivali.
- **Central Line:** The Central Railway line runs from Chhatrapati Shivaji Terminus (CST) to Kalyan and further to Khopoli (61 km) and Kasara (67 km) to the east of Mumbai. The Central Railway within Mumbai region has 62 suburban stations and in two lines namely main line and harbour line. The important stations on the Main line of Central Railway are CST, Dadar, Kurla, Ghatkopar, and Thane. Central line also carries long distance passenger trains that terminate at Mumbai CST or at Kurla terminal; with intermittent stops at Dadar, Ghatkopar, Thane and Kalyan.
- **Harbour Line:** Harbour line services extend from Mumbai CST station. One branch runs north-west to join the Western Railway line at Bandra and further continues till Andheri, whereas other line continues northwards to Kurla, where a connection is made with CR main line, before turning East to serve Mankhurd, and across the Thane creek to provide access to the Navi Mumbai area till Panvel. Between Mumbai CST and Wadala Road the line is exclusively used for suburban traffic. However, north of Wadala the lines are shared with freight traffic to and from Mumbai docks.

Railway Passenger Movement from MMR in to Greater Mumbai

Commuters from various parts of MMR travel long distances by train to Greater Mumbai for everyday activities such as work, recreation, education and health facilities. Highest daily average passenger movement into Greater Mumbai is along the Central line, at 6,24,000, whereas outgoing passenger traffic is at 5,33,000. Movement in to Greater Mumbai from the Western line is 2,50,000 and-outgoing movement is 2,09,000. The Harbour line entails an inward movement of 4,50,000 passengers. Its outgoing passenger volumes stand at 3,08,000. Rail passenger movement from Thane, Bhiwandi, Kalyan and Navi Mumbai towards Greater Mumbai have a major contribution to commuter traffic volumes in the Western, Central and Harbour lines.

Railway Passenger Movement within Island City in Greater Mumbai

Commuters from various parts of MMR travel long distances by train to Greater Mumbai for everyday activities such as work, recreation, education and health facilities. Highest daily average passenger movement into Greater Mumbai is along the Central line, at 6,24,000, whereas outgoing passenger traffic is at 5,33,000. Movement in to Greater Mumbai from the Western line is 2,50,000 and-outgoing movement is 2,09,000. The Harbour line entails an inward movement of 4,50,000 passengers. Its outgoing passenger volumes stand at 3,08,000. Rail passenger movement from Thane, Bhiwandi, Kalyan and Navi Mumbai towards Greater Mumbai have a major contribution to commuter traffic volumes in the Western, Central and Harbour lines.

Railway Passenger Movement within Island City in Greater Mumbai

The survey conducted by the CTS, 2008, reveals that rail passenger trips for the year 2003-04 were 6,15,000 per day and for 2004-05 were 6,34,000 per day. Survey of Island City cordon shows movement of 2.02 million passengers entering in to the Island city and 2.07 million passengers moving out of the Island City on a daily basis. However, the stations in the central part of Greater Mumbai, such as Dadar, Mahim, Bandra, Andheri, Kurla and Ghatkopar face the highest concentration of passenger movement. Most of these stations are also served by more than one railway line. While Dadar is served by the Western and the Central Railway lines, stations from Mahim to Andheri are served by the Western and Harbour lines. Kurla is served by Central line and Harbour line. These stations act as interchanges between the Western, Central and Harbour lines and hence have major impact on the surrounding Land Uses and transport in the areas.

Intercity Rail Network

A number of intercity trains originate from Greater Mumbai, these include regular (trains that run on all days/weekdays) and staggered trains (trains that run on alternate days or few days in a week). The Western Railway operates 72 intercity trains and the Central Railway in Greater Mumbai operates 152 trains. The inter-city rail passenger terminal stations in Greater Mumbai under the jurisdiction of Western Railway are Mumbai Central, Dadar, Bandra, Andheri and Borivali stations are significant as halt stations. On Central Railway, terminal stations are Chhatrapati Shivaji Terminus, Lokmanya Tilak Terminus and Dadar. These stations form nodes of multiple modes of rail based transit networks.

Gaps in the Existing System

The rail-based transport system predominantly caters to the North-South traffic and has longer trips than the bus system (average trip length of 15-20 km). Passenger traffic in the suburban railway system has increased six times since its inception, but its capacity has been augmented by only about 2.3 times. Hence the system is under immense pressure during peak hours, on an average each train carries about 4500 passengers against its capacity of 1,750 passengers³⁰. East-West railway connectivity has been a major need to disperse the concentration of passenger movement, it is expected that this would be addressed by proposed and under construction Metro Rail and Mono Rail projects.

6.10.1 Goods Movement

Interaction analysis of movement of goods in the MMR by CTS for Mumbai Metropolitan Region reveals that Greater Mumbai attracts the maximum quantum of goods amounting to 46.3% in terms of tonnage recorded in the MMR. Greater Mumbai also attracts 29.8% of movement of goods vehicles in the MMR. A high proportion of goods attracted to Greater Mumbai are from Navi Mumbai contributing to 48.3% of total tonnage. Correspondingly 43.0% of goods vehicles coming

³⁰ Greater Mumbai City Development Plan (2005-2025)

into Greater Mumbai are originated Navi Mumbai. This is due to the location of Jawaharlal Nehru Port, APMC, steel markets and other goods handling in Navi Mumbai.

Therefore in terms of movement of goods vehicles connectivity to Navi Mumbai is of major importance. Other important origin-destinations with respect to goods related connections to Greater Mumbai are Kalyan, Vasai, Virar, and rural areas of MMR and Thane.

6.10.2 Goods Terminals

There are 14 goods terminals located in Greater Mumbai including the Wadala Truck Terminal, Railway Yard Mulund, Railway Yard Goregaon, Reay Road terminal yards, FCI godowns, Borivali, Wadi Bandar Railway Yard, BPCL Sewri Oil Depots, HPCL Sewri Oil Depots, BPCL Sewri Oil Depots, IOCL Sewri Oil Depots, HPCL Terminal II Sewri, HPCL, Terminal I, Wadala, and FCI Godowns Wadala. The CTS has projected a 5.7% growth of goods traffic in MMR and have proposed additional truck terminals at strategic locations in the region. However, none of the proposals in the CTS for additional goods terminals fall within Greater Mumbai.

Map 6.3: Existing transport infrastructure land in Greater Mumbai

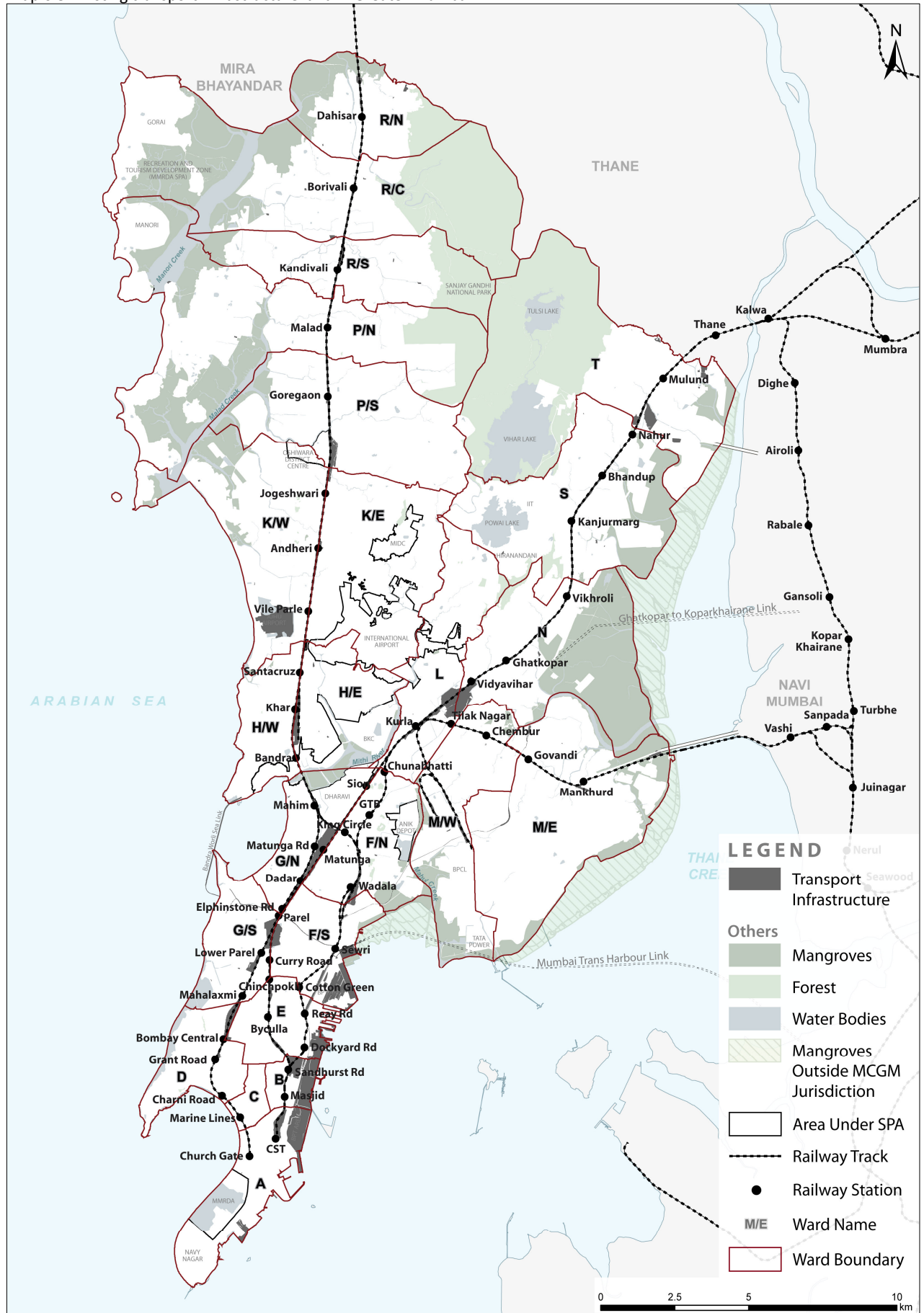
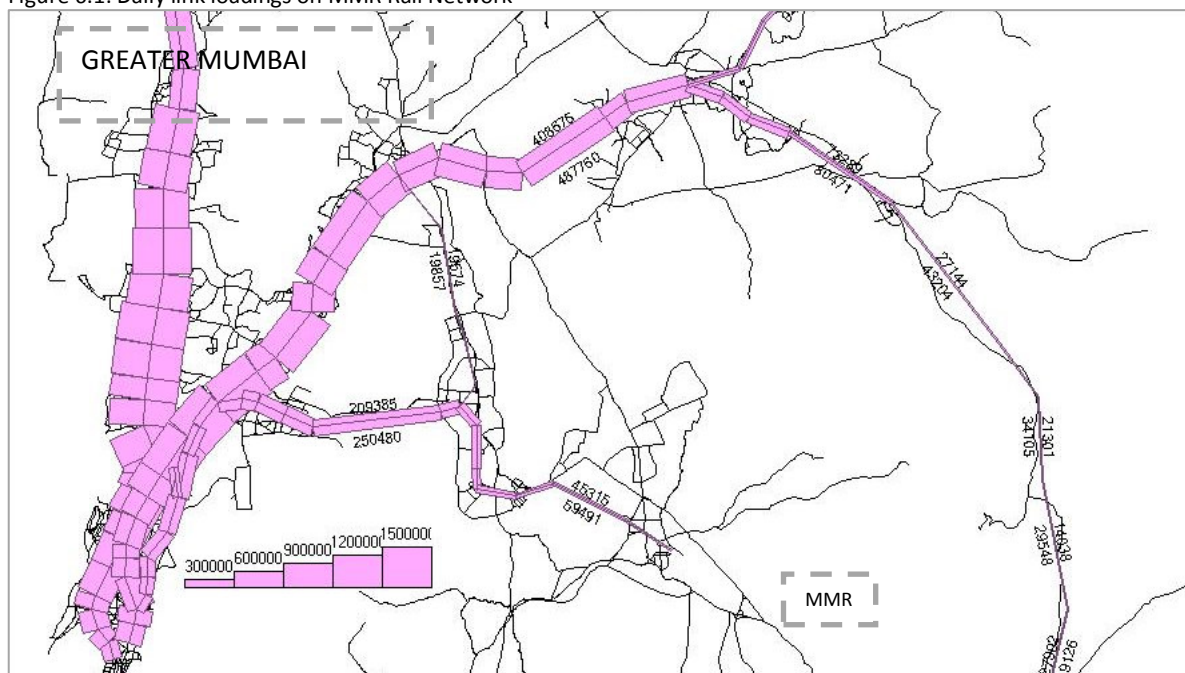
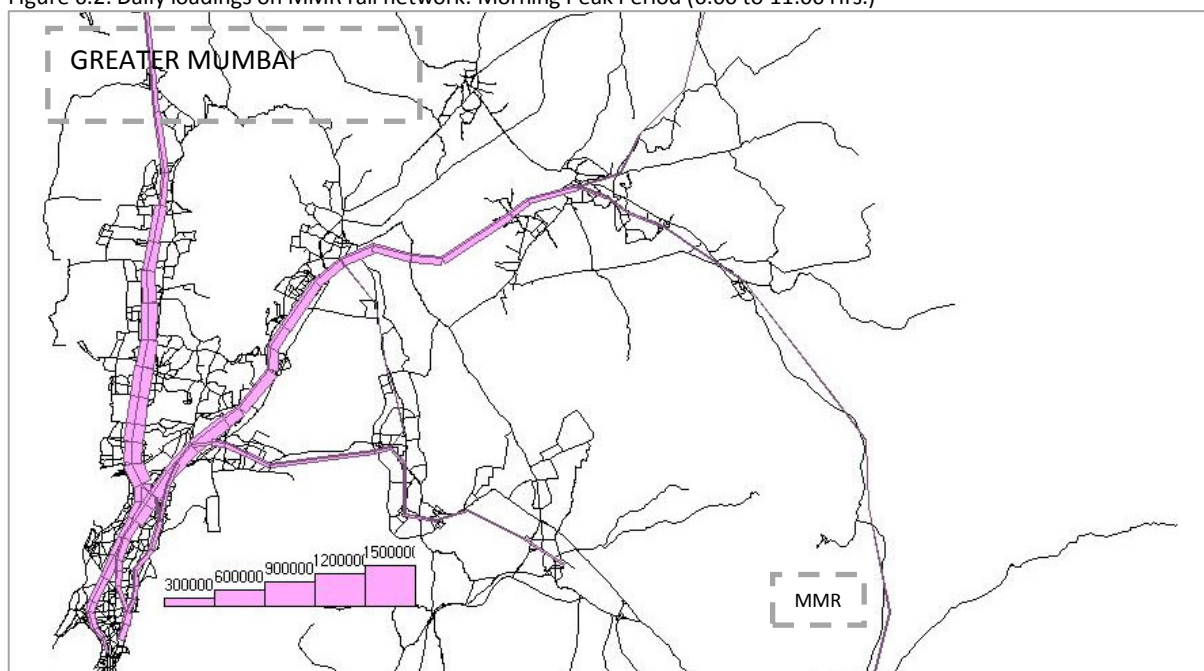


Figure 6.1: Daily link loadings on MMR Rail Network



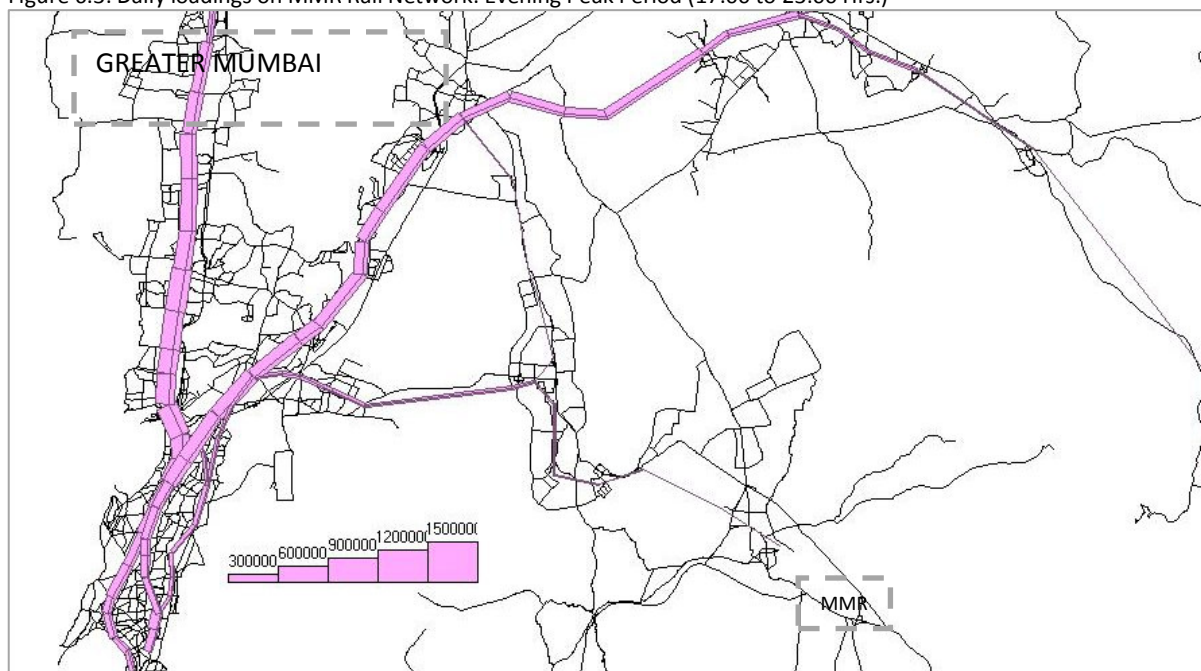
Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

Figure 6.2: Daily loadings on MMR rail network: Morning Peak Period (6:00 to 11:00 Hrs.)



Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

Figure 6.3: Daily loadings on MMR Rail Network: Evening Peak Period (17:00 to 23:00 Hrs.)



Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

6.10.3 Western Railway

Additional elevated rail corridor from Oval Maidan to Virar has been proposed by the Western Railway to be implemented in the PPP mode, in order to cater to the large passenger volumes in this route.

6.10.4 Metro Rail

Historically, the East-West linkages in Greater Mumbai have been weak, due to geographical constraints. There are also several constraints in expanding the capacities of existing rail and road networks, and many areas in the Island City and the Suburban District are not served efficiently, by rail based mass transport system. In order to provide a rail based mass transit connectivity within a convenient walking distance for each of the areas of Greater Mumbai, Metro Rail System is proposed for a total length of 146 km³¹ (within MCGM limits). The following Metro lines are under various stages of implementation and planning.

³¹ Source: MMRDA

Table 6.7 Proposed metro rail routes in Greater Mumbai

Metro Line	Route	Length (km)
Phase- 1: Committed Routes		
Line 1	Versova – Andheri – Ghatkopar corridor (Completed)	12
Line 2	Dahisar-Charkop – Bandra-Mankhurd	39.2
Line 3	Colaba-Bandra-SEEPZ	33
Line 5	Wadala- Ghatkopar – Kasar Vadavali	20
Phase- 2: Recommended Routes		
Line 6	BKC –Airport- Kanjurmarg	19.5
Line 7	Andheri (E)- Dahisar (E)	18
Line 8	Wadala – Carnac Bundar	13.3
Line 9	Sewri - Prabhadevi	3.5

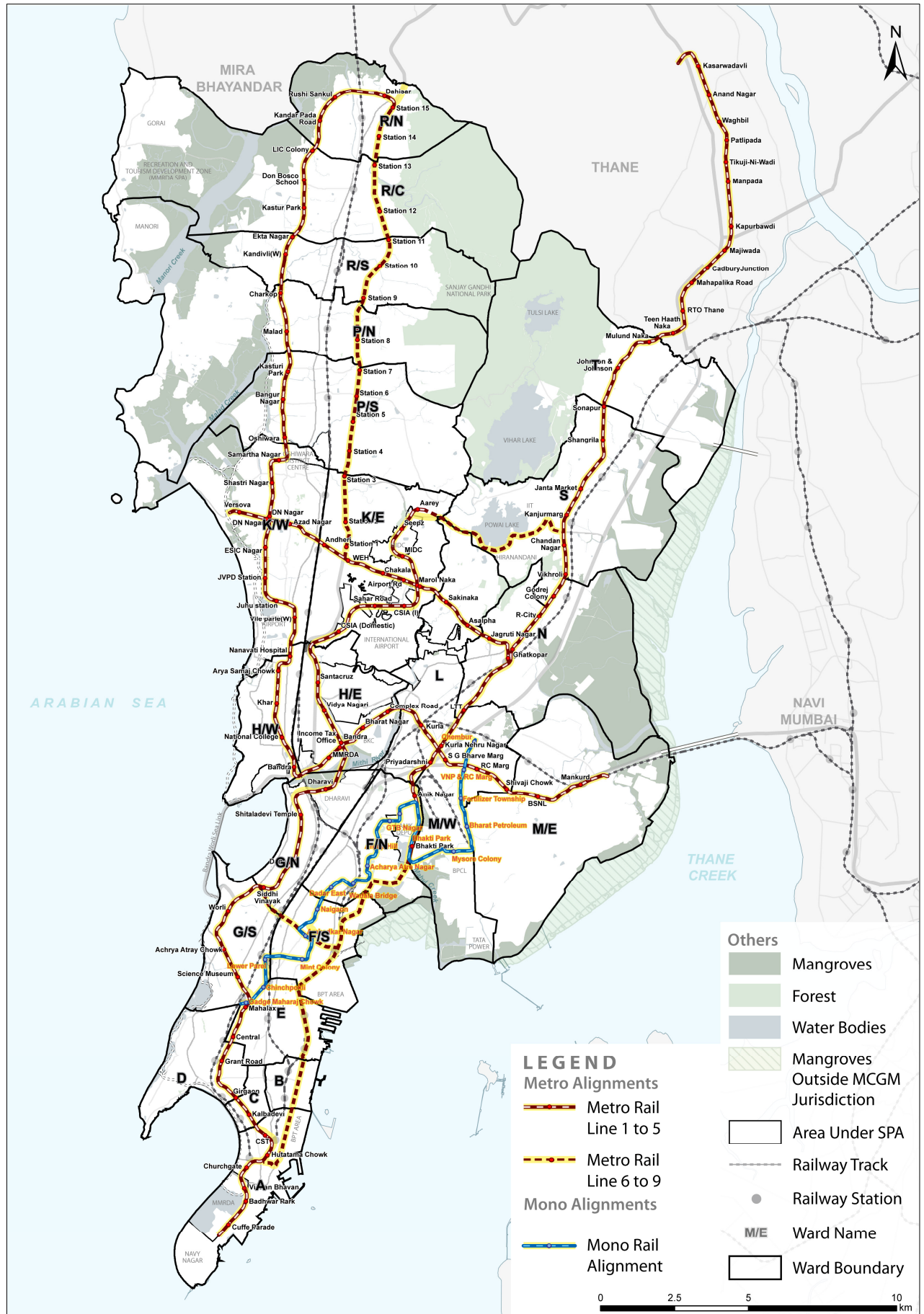
Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

Of the Metro Rail alignments that have been committed, Lines 1 and 2 are above grade and Line 03 runs underground. The CTS underlines the need to extend the Metro rail network to important centres of MMR to ensure balanced development in the Region.

6.10.5 Mono Rail

Monorail is envisaged as a feeder network to mass transit system; it occupies very limited space on ground; can negotiate sharp turns and can climb up and down steep gradients easily. Implementation of about 20km stretch from Sant Gadge Maharaj Chowk (Jacob circle)-Wadala - Chembur with 18 stations as pilot project is under operation.

Map 6.4: Mass Transit Networks in Greater Mumbai



6.11 Airports

Mumbai Airport (with International and Domestic terminals) is an important air traffic node of the country. Currently, Mumbai Airport handles 30.2 million passengers and 0.63 million tons of freight annually. (2012-13). The Mumbai Domestic Airport handles about 685 flights per day. This translates into approximately 1 flight operating (either landing or take off) every two minutes³².

Air travel projections for the Airport indicate 9% growth of domestic traffic and 6.5% of international traffic. This implies air transport demand for 2031 would be domestic travel increase to 54 million against 9.6 million in 2003-04 and international transport increase to 21 million from 6.1 million.³³ This will have a lot of impact on groundside travel needs of air passengers for road and public transport. The likely transport network requirements could be faster access between the existing and proposed new airport, provision of faster connectivity to the existing airport, etc.

Various destinations in the City and the MMR are currently not well linked to the Mumbai Airport. Specific road projects are being developed to address this demand, and the 2nd phase of the metro rail connectivity (connecting Western and Eastern parts of Greater Mumbai to Mumbai Airport).

Juhu Airport which started as India's first civil aviation airport in 1928, currently serves as a heliport and handles all helicopters operations (including private charters) in Mumbai.

6.12 Public Water Transport-Regional Services

The main systems of rail and road are under immense pressure given that Greater Mumbai is facing a rapid increase in demand for transport.. Considering the vast coastline of Greater Mumbai and the Region, inland water transport is one of the alternative modes that may help augment the existing public transport systems. The State Government has tasked the MSRDC with developing passenger jetties with a view to promoting inland water transport between Nariman Point and Borivali and between South Mumbai and Navi Mumbai. Accessibility to public water transport terminals, uncertainty of schedules due to weather conditions, restricted period of operation and need for reliable disaster management systems are prime reasons that have interfered with water transport systems getting underway. Currently, Manori and Versova handle the maximum passengers by ferry launches in the MMR.

6.13 Pedestrian Movement

Presently, 51% of the total trips made in Greater Mumbai are by walking. 72.5% trips for education are also by walking. Workers of economically weaker sections, especially women and children, who often do not afford motorised modes of transport, constitute a significant proportion of pedestrians. In addition, most of the public transport journeys (60%) necessarily start and end as walk trips. The walk trips are also considerably short in length: more than 80% of walk trips to work places or schools are less than 15 minutes.

³² Source: Press Information Bureau, Government of India 2012-13

³³ Source: CTS 2008

Presently, several conditions discourage pedestrian movement. These include several permanent and semi-permanent structures located along edges of the right of way of streets; haphazard parking of vehicles in the absence of footpath; lack of designated hawking area especially around the railway stations; discontinuous footpaths with changing levels at every property entrance and intersections. Moreover, the pedestrian footpaths and facilities are not equipped to serve universal accessibility for differently abled people.

Undesirable and unsafe pedestrian walk environments force commuters to switch to other mechanized modes. Longer North-South rail trips and distances greater than 1 km between places of work/ residential areas and stations (especially in the northern part of the Western Suburbs, for example, at Malad, Kandivali) discourage walking as a mode of travel. The lack of adequate pedestrian footpaths, inadequate traffic management solutions around transit nodes and lack of pedestrian cross over facilities at strategic locations increase conflict in pedestrian and vehicular traffic.

6.14 Challenges and opportunities

6.14.1 Integrated Land use and Transport System

Greater Mumbai has a strong interconnectedness between transport networks and commercial and residential uses. The proposed metro and monorail networks need to be considered as important Land Use structuring elements for future development. Identifying current and future station hubs are a necessary step in establishing a hierarchy within the transportation network, which would then inform future Land Use planning. An assessment of both current and future station hubs based on the confluence of rail networks show that the following stations on the Suburban lines will gain greater significance:

- Churchgate, Dadar, Bandra, Andheri and Borivali stations along the Western Railway line;
- CST and Kurla, Ghatkopar station of the Central Railway Line;
- Wadala station along the Harbour Line and Dadar station on the Main Line: these stations are already well established intercity and intra-city transport hubs, with good connectivity to the City.

Since all these stations have more than one transportation network or utility, they would act as the key potential nodes for Transit Oriented Development in the future in addition to the other stations on the transit corridors. Strengthening the existing significance of these hubs would mean planning for their enhancement as integrated multi-modal transport hubs.

6.14.2 Local Level Street Network

In terms of standards for requirements of roads at (neighbourhood levels) local levels, Delhi Development Authority (DDA), in the Master Plan for Delhi 2021, suggests that 12% of planning area is required as allocation for local roads in order to achieve desirable level of connectivity in terms of providing access to each land parcel. An analysis of proportion of roads available vis-a-vis total area at the Planning Sector level revealed that most of the Planning Sectors in Greater Mumbai require more road area to achieve a reasonable level of connectivity at the local level. Missing road links in

the Suburbs and large land parcels without public thoroughfares (erstwhile industrial lands) in the Island City create traffic bottlenecks and inconvenience for movement of traffic.

6.14.3 Missing Links along Roads, Railway Crossings and Railway Stations

Lack of connectivity between important roads, presence of at grade railway lines and other obstructions also contribute to longer trip lengths by road. This affects smooth flow of traffic and causes bottlenecks along the main road networks. Lack of connectivity in areas that are in proximity to railway stations exacerbate congestion. There is a need for enhanced connectivity across railway lines, expressways in the form of new links, bridges and crossovers not only along main roads but also at local levels across railway lines, highways and at other locations that lack linkages.

6.15 The Comprehensive Mobility Plan for Greater Mumbai

A project of the MCGM, addresses several concerns pertaining to mobility and access at local levels. The project currently underway incorporates the detailed activities which will proactively contribute to ensuring sustainable transportation in Greater Mumbai and at local levels.

The project incorporates detailed primary surveys which would further inform the DP proposal. Some of the surveys that would impact the DP include:

1. Survey of floating population
2. Passengers Survey of transit/ city bus /IPT/ Private transport
3. Workplace surveys
4. Parking surveys
5. Non-Motorized Traffic Surveys
6. Pedestrian surveys
7. Missing links & D.P Roads
8. Give TOD parameters for Mumbai city
9. Study of the physical roadway characteristic (including functional condition of pavement and pedestrian pathways etc. in detail)
10. Study the effect of various alternative development strategies

In addition to the above surveys, the CMP would also review the existing transport scenario to develop an appropriate Land Use Transportation model for evolving future urban and transport network strategies. It would also reflect on the impact of new land use development and/or control policies for evaluating short term management measures. It would take cognizance of the infrastructure development (developed, being developed & proposed) and prepare an impact analysis.



Chapter 07

Physical Infrastructure

7. Physical Infrastructure

Provision of basic physical infrastructure in terms of water, sewerage, storm water collection, solid waste disposal systems and equitable access to these services are fundamental to achieve a better quality of life for citizens. Increasing population inevitably places these services under pressure leading to disparities in terms of access and inadequacies.

Physical infrastructure is provided through different departments within the MCGM which have their own Master Plans. Based on these sectoral Master Plans, specific proposals have been formulated for augmentation of physical infrastructure for Greater Mumbai. These include, the MUIP and projects within the BRIMSTOWAD Report and several of these proposals have been approved and some are under implementation. Previously proposed projects are recorded with a view to understand future levels of provision of physical infrastructure available in Greater Mumbai. For each of the physical infrastructural components, information pertaining to existing availability and projected demand has been gathered from agencies and gaps, if any, identified to be addressed.

The DP 2034 brings together various sectoral plans and takes cognizance of existing and proposed infrastructure facilities so as to ensure that adequate land parcels are reserved for meeting future demand.

7.1. Water Supply

Water supply requirement of Greater Mumbai as per the present population is around 4000 million litres per day (MLD). The total water supplied in present context is about 3,350 MLD³³ including domestic, commercial and industrial uses.

This section analyses the existing water supply system, issues in present context, implementation status of water supply system and existing water supply projects that are being proposed and under implementation by MCGM.

Extent of Supply

As per the Revised City Development Plan by MCGM, there are 3, 61,862 water connections across 3,76,991 properties in Greater Mumbai, with coverage of around 96%. At an average, single domestic water supply connection serves 8 households, where as slum areas are provided with group connections with a standard provision norm of single connection for 15 families. Per capita water supplied is 268 LPCD³⁴ is higher than general Indian standards. However, the per capita water supplied varies widely across various wards. Over the last five years, the average daily production has been 3,470 MLD. Of which, only 2,150 MLD, accounting for 62% of the total water supplied, is billed, while the non revenue water, consisting of unbilled water consumption and apparent and real water losses, accounts for 38% of the total supply.

³³ Source: Revised Gap Analysis report, Revised City Development Plan, MCGM, 2012

³⁴ Ibid

Water Sources

The entire water supply is based on lakes created by impounding rainwater by constructing dams across rivers and valleys at locations surrounding areas as far away as 173 km from Greater Mumbai. The existing water supply system consists mainly of a network of pipelines, tunnels, balancing reservoirs, pumping stations and lakes. Various sources of water and their yield are listed in the Table 7.1.

Table 7.1: Existing source of water supply for MCGM

Sr. No	Source Name	Water Yield (MLD)	Distance from city	Treatment Plant
1	Vihar Lake	90	Within city limits	Vihar
2	Tulsi Lake	18	Within city limits	Tulsi
3	Tansa Lake	472	100 km from city	Bhandup Complex
4	Modak Sagar	455	100 km from city	
5	Upper Vaitarna	635	173 km from city	Bhandup Complex
6	Bhatsa	1,800	100 km from city	Panjarapur: (Part of Bhandup Complex)
7	Sub - Total	3470		
8	En route supply	-120		
	Total supply	3,350		

Source: Revised Gap Analysis report, Revised City Development Plan, MCGM, 2012

The water from the mentioned sources is treated at Yewai and Bhandup complex. The treated water is then stored in the Master Balancing Reservoirs (MBR) namely MBR I at Bhandup Complex having a capacity of 246 million litres and MBR II at Yewai having a capacity of 123 million litres. It is further distributed to 26 service reservoirs spread through the city by a complex network of inlet mains, which remains charged for 24 hours.

From these service reservoirs, water is supplied to the consumers in different water supply zones at varying durations ranging from 2 hours to 6 hours depending on the area of the zone, topography, consumer habits, etc. The pressure in distribution system is in the range of 1 to 1.5 bars during water supply hours.

Water Treatment and Distribution System

Water is mainly treated at two major water treatment plants, which are Bhandup and Panjarapur treatment plants. The backwash quantity generated at Bhandup is released into Vihar Lake, whereas the backwash from Panjarapur is discharged into nallas. The following Table 7.2 explains the capacity of the treatment plants.

Table 7.2: Major water treatment plants

Name of the Water Treatment Plant	Design capacity (MLD)	Peak operational flow (MLD)
Bhandup	1,910	2,100
Panjarapur	1,365	1,365
Vihar	90	-
Tulsi	18	-

Source: Presentation on Municipal Corporation of Greater Mumbai Water Sector Initiatives

The total length of water mains is about 4000 km and has 800 numbers of valves operating daily. The city is divided into 109 distribution zones with 615 leak detection zones.

Quality of Water Supply

As per Environment Status of Brihanmumbai 2010-11 report by MCGM, percentage of samples that met the potable water standards decreased over last few years. In 2011 it was noted that 24.64%³⁵ of the water samples recorded unfit as per standards.

Institutional setup for responsibility of water supply planned, implemented and operated by Water Supply Project Department and Hydraulic Engineering Department.

The Water Supply Project Department plans, designs and lays water networks across the city and on completion of the project hands over to Hydraulic Engineering Department for operations and maintenance. The Hydraulic Engineers department also provides approvals for new connections.

7.1.1 Proposals and Status of Implementation of Projects

Bombay II Project: Work commenced in July 1979. Under this scheme, City's water supply was augmented to 2,425 MLD.

Bombay III Project: Additional source capacity of 455 MLD is proposed to be sourced to Greater Mumbai through the project, which was scheduled to be completed by 2006. Completion of this phase would facilitate utilizing Bhatsa water to the maximum extent possible.

7.1.2 Ongoing and Proposed Projects

Middle Vaitarna Project (455 MLD)

- The Scheme has been conceived to harness the catchment area between Upper Vaitarna and Vaitarna and also to conserve the spills from Modak Sagar into Tansa.
- A dam has been proposed at around 12 Km, downstream side of Upper Vaitarna.

Gargai & Pinjal (1320 MLD)

- Once completed Gargai project will be able to provide up to 455 MLD to Greater Mumbai and Pinjal would contribute 865 MLD.
- The Gargai project (2014-2018) involves construction of dam on Gargai River and 2.5 km long underground tunnel for conveyance of water from dam to Modak Sagar³⁶.

³⁵ Source: Revised Gap Analysis report, Revised City Development Plan, MCGM, 2012

³⁶ Source: Report on Environment Status Of Brihanmumbai 2010-2011

- In case of Pinjal project (2014-2021), construction of main dam on Pinjal River will be executed by MMRDA. MCGM will carry out rest of the works such as conveyance (through 55 km underground tunnel), treatment, pumping, storage, distribution, etc. MCGM is to get 697 MLD out of the total capacity with proportional contribution to the total estimated cost.

Table 7.3: Future sources of water supply

Sr. No	Sources	Proposed Yield in MLD	Ownership	Expected Year of Completion
1	Middle Vaitarna	455	MCGM	2012
2	Gargai	455	GoM	Engineering and Environmental study in Progress
3	Pinjal	865	GoM	
4	Damanganga	1586	NWDA	2025
5	Kalu	590*		
6	Shai (in PWC report)	940**		
	Total	4891		

Note: NWDA – National Water Development Authority

Source: Hydraulic Engineer's Dept, MCGM

* Presentation on Municipal Corporation of Greater Mumbai Water Sector Initiatives

** Source: ULB Assessment Report – Group 1: Financing Strategy and Advice for Mumbai, Maharashtra by PwC

7.1.3 Comprehensive Water Supply Distribution Improvement Programme

In addition to the above proposals, Hydraulic Engineer's Dept, MCGM, undertakes comprehensive water supply distribution improvement programme. This programme focuses on the following for Water Distribution Management and reduction of non-revenue water:

- Digital mapping of the water supply utility lines on GIS compatible base maps;
- Hydraulic modelling of the entire network;
- Hydraulic model of DMA, each comprising about 1000 connections;
- 100% consumer metering, bulk metering and district metering set-ups;
- Water balance and estimation of non revenue water;
- Leakage detection, repairs /rehabilitation /replacement plan;
- To monitor water balance and if non revenue water is within limits then 24X7 supply to be implemented;
- Introduce pressure regulating devices for equitable distribution;
- To introduce or upgrade distribution management tool such as Supervisory Control and Data Acquisition (SCADA).

7.1.4 Challenges pertaining to the Water Supply System

Water supply system is required to be upgraded at multiple dimensions to meet the future demand. There are several projects being planned by MCGM to meet the existing deficiencies in the system, however following are the major issues identified to address for the future.

- MCGM supplies about 268 LPCD of water (ex-treatment), which is much above the adequate standard. However, coverage of water supply network remains an issue. Of the total domestic connections on an average 8 households are served by a single connection whereas it serves 15 households in the case of slums. Moreover, many slums, which have developed post 1995, are not provided with water connections.
- Ageing of pipeline network in the city causes risk of water contamination as water pipes run parallel and close to the sewers.
- Need for improving efficiency and reduce non-revenue water levels and unaccounted water in the system.
- Inequitable distribution ranging from 2 to 24 hours of supply is of major concern.

If the proposed schemes progress as scheduled, current shortfall and future demands can be met. Further, Greater Mumbai faces issues of water losses, contamination and disparities in supply.

7.2. Sewerage System

Considering a large portion of Greater Mumbai's population lives in slums, provision of sanitation services continues to be a major challenge. As per Revised City Development Plan, MCGM, 2012, Greater Mumbai generates around 2,680 MLD of sewage whereas only about 1,700 MLD of the total sewage generated is collected accounting for nearly 63% of the total sewage generated.

Existing System: It is an obligatory function of MCGM to provide sanitation and waste water disposal facilities to the citizens of Mumbai. Major sewage works of the Mumbai city are taken up or planned in two stages, Stage-I: Sewerage Master Plan (1979-2005) and Stage-II: Mumbai Sewage Disposal Project (MSDP)-II (2005-2025). Currently 60% of the Greater Mumbai area and 42% of population³⁷ and about 2% of the slum population³⁸ is connected with piped sewer lines.

Table 7.4: Existing sewerage system details

Sr.No.	Particulars	Details
1	Length of Sewer Lines	1,500 kms
2	No. of Sewage Pumping Station	53 nos
3	No. of Waste Water Treatment Zones / Facilities	7 nos
4	No. of Outfalls	3 nos
5	No. of Lagoons	3 nos

³⁷ Source: Report on "Fact Finding Committee on Mumbai Floods" Vol.I, committee chaired by Dr. Madhavrao Chitale, 2006

³⁸ Source: Report on "Disaster Risk Management Master Plan", section on City Profile of Greater Mumbai, 2011

6	No. of Connections up to property level manholes	95,000
7	Inspection chambers	53, 000
8	Total estimated sewage generated	2,680 MLD
9	Total sewage collected in conveyance	1,700 MLD
10	Pumping capacity installed	5,579 MLD
11	Total treatment capacity	2,826 MLD
12	Size of Maximum Sewers	6' dia and 6' x 9' in case of ellipsoid sections

Source: Revised Gap Analysis report, Revised City Development Plan, MCGM, 2012

7.2.1 Institutional Setup

Sewerage in Greater Mumbai is planned, implemented and operated by two departments of MCGM, viz., Sewerage Project Department and Sewerage Operations Department. The Sewerage Project Department plans, designs and lays sewer networks across the city and on completion of the project hands over to Sewerage Operations Department for operations and maintenance. The department also provides approvals for new connections. The Sewerage Operations Department is responsible for maintenance and operations of the entire sewerage network, 53 pumping stations, treatment facilities and the marine outfalls. Treatments in all the plants are being improved under MSDP-II project.

Table 7.5 Zone wise Sewage Collection, Conveyance and Treatment System

Zone	Zone-1	Zone-2	Zone-3	Zone-4	Zone-5	Zone-6	Zone-7
Zone Name	Colaba	Worli	Bandra	Versova	Malad	Bhandup	Ghatkopar
Area (Ha)	574	3891	7730	2140	11500	4274	7730
Wards Covered 3	A	A north end, B, C, D, E, F/S south end, G/S, G/N south end	F/S, F/N, G/N, H/W, H/E, K/W south end, K/E Eastern side, L Western side& north	K/W, K/E Western side	K/W north end, P/N, P/S,R/N, R/C, R/S	L north tip, S, T	M/E, M/W, L south Eastern, N, S southern @ Vikhroli
Population Served 2 (in Millions)	0.2	2.0	3.4	0.95	2.85	1.2	2.0
Sewerage network in km	32	339	350	149	329	110	174
Network density per sqkm	5.3	8.7	4.5	7.1	2.9	2.6	2.3
Sewage collected in MLD	36	470	540	209	202	164	149

PART I – CONTEXT AND CHALLENGES

Zone	Zone-1	Zone-2	Zone-3	Zone-4	Zone-5	Zone-6	Zone-7
Zone Name	Colaba	Worli	Bandra	Versova	Malad	Bhandup	Ghatkopar
Waste water reaching WWTF in %	90	90	60	80	50	40	30
Pumping stations	6	16	16	2	6	3	1
Pumping capacity installed	101	1,820	1,910	295	530	370	553
Treatment capacity in MLD	41	787	797	131	600	170	300
Treatment	Preliminary			3 stage lagoons	Preliminary	Single stage lagoon	
Disposal	Outfall to marine in Mumbai Harbour	In Arabian sea through marine outfall	In Arabian sea through marine outfall	Direct to Malad creek	Direct to Malad creek and Erangal outfall (proposed)	Direct to Thane creek	Direct to Thane creek
Pollution compliance	Colaba, Worli and Bandra marine outfalls achieve pollution control compliance only during high tide.			Lagoons are provided and pollution compliance is met	Sewage is discharged with preliminary treatment and pollution compliance not met.	Lagoons are provided and pollution compliance is met.	

7.2.2 Proposal and status of Implementation: Sewerage Master Plan-I and II

The major sewerage projects undertaken or planned by MCGM in the last half century can be broadly put under two sewerage master plans, MSDP-I between 1979-2005 and MSDP-II, 2005-2025 respectively.

The main objective of the MSDP-I project is to strengthen the capacity of MCGM in all aspects of the management of the sewerage services including planning, design, construction, supervision quality management, operation and maintenance, improving health and environmental conditions. The works under this first master plan have been completed in 2003.

The Sewerage Master Plan – II for the period from 2005 to 2025 with an expenditure amounting to Rs. 5,570.4 Crores (year 2001 base) is to be implemented in five phases, including sanitation facilities for slum areas.

However, it is noted that, despite these projects being implemented, connectivity to sewerage network and environmentally friendly means of disposal of sewage continues to be a challenge in Greater Mumbai.

7.2.3 Challenges Pertaining to the Sewerage system

There is a lack of sewerage network up to the last mile for nearly 40% of Greater Mumbai.

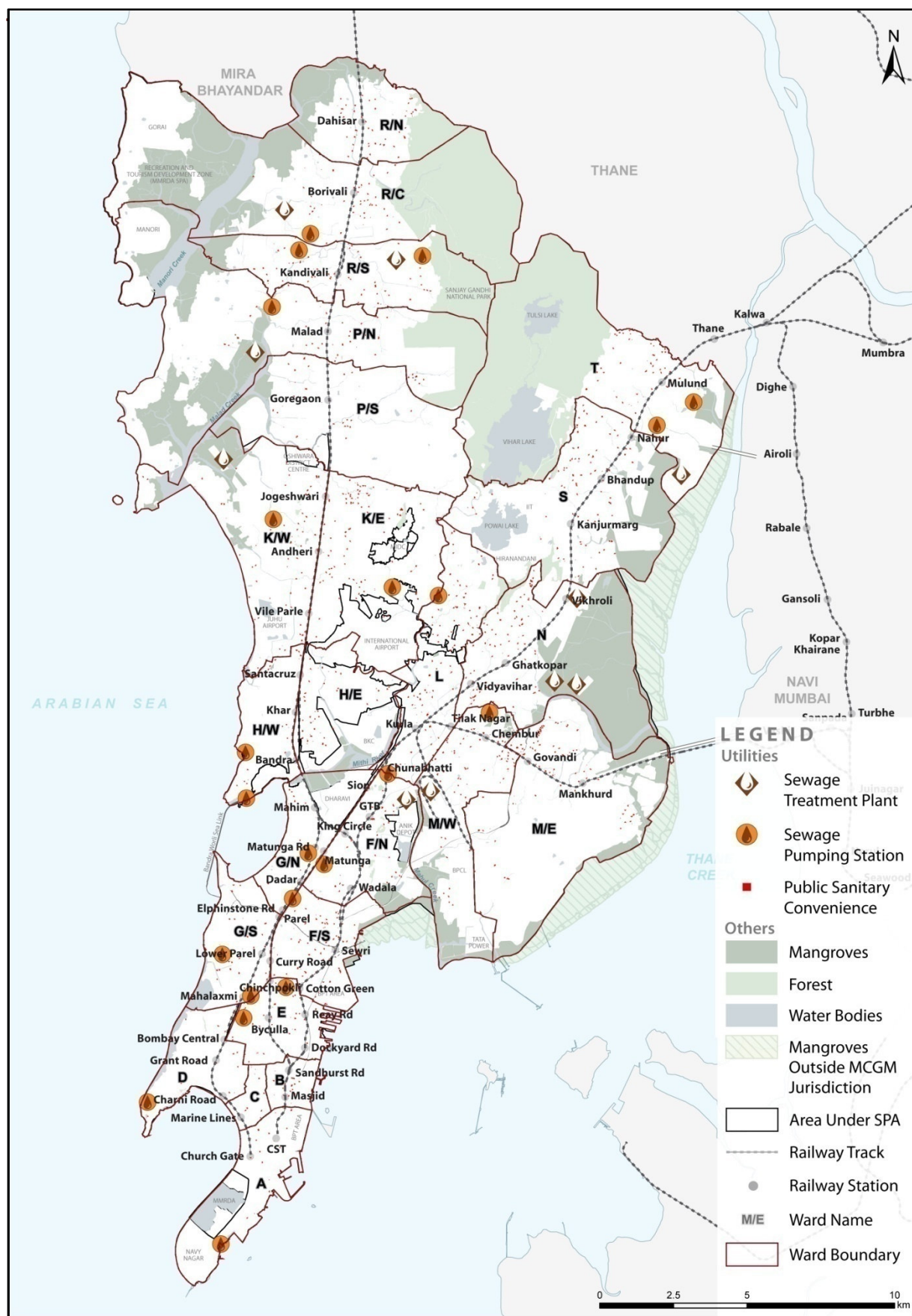
Compliance with pollution control standards is inadequate.

In the existing situation, Malad Creek receives a large volume of untreated sewerage from diverse sources in addition to preliminary treated effluent discharges from Versova and Malad.

Though the capacity of the sewerage network and the capacity of treatment plants to handle the sewage volume are quite high, not all generated sewerage is captured. While the demand for water is increasing due to changing life styles, the amount of sewage generated is also correspondingly increasing.

Sewer lines in many places are more than 100 years old and are in dilapidated condition; therefore, there is a concern regarding environmental pollution due to leaking sewers.

Map 7.1 Existing Sewage Treatment Plants, Pumping Stations and Public Sanitary Convenience



7.3 Storm Water Drainage

Storm water drainage system is central to addressing the long term sustainability of the city. Greater Mumbai receives monsoon rainfall from June to September. Average rainfall is around 2000mm of which 70% of the rainfall is received during July and August. The original geography of the area is intercepted by a network of creeks, rivers and system of drains that play a major role in storm water drainage in Greater Mumbai. This Storm Water Drainage (SWD) network of rivers, major and minor nallas, underground drains and closed pipes is also affected by tidal variation while releasing water into the sea.

7.3.1 Existing System

The present SWD system in the city is more than 150 years old and constitutes a network of underground drains and laterals, about 440 km long, in the Island City, road side surface drains, about 2000 km long, mainly in the Suburbs, major nallas 215 km long and minor nallas 156 km long with 176 outlets in to Arabian sea. The SWD system is capable of handling rain intensity of 25 mm per hour at low tide. The flow from the open SWD is discharged either into nallas, culvert, creek or sea which is intercepted by number of creeks. The tidal variation is a major consideration in the system of storm water drains (SWD) for releasing rainwater as well as wastewater into sea.

Of the 176 outfalls, 85 major outfalls are in Island City releasing storm water into Arabian Sea, whereas 8 discharge into Mahim creek and 12 into Mahul creek. In Western Suburbs there are 29 outfalls releasing storm water into the sea and 14 of them drain into Mithi River which joins the sea at Mahim creek. In Eastern Suburbs, 14 of the outfalls discharge into the Thane creek and 6 discharge into the Mahul creek.

Table 7.6: Storm water drainage system outfall details (in numbers)

Outfall discharge	Island city	Western Suburbs	Eastern Suburbs	Total
Arabian Sea	85	29	0	114
Mahim Creek	8	14	8	30
Mahul Creek	12	0	6	18
Thane Creek	0	0	14	14
Total	105	43	28	176

Source: Revised Gap Analysis report, Revised City Development Plan, MCGM, 2012

Table 7.7: Summary on storm water drainage

Drain Hierarchy/ Type (km)	Island City (km)	Eastern Suburbs (km)	Western Suburbs (km)	Total (km)
Major Nallas (width > 1.5m)	23.37	90.20	101.50	215.07
Minor Nallas (width < 1.5m)	48.00	66.40	42.10	156.50
Arch /Box Drains	82.35	40.00	51.93	174.28

Drain Hierarchy/ Type (km)	Island City (km)	Eastern Suburbs (km)	Western Suburbs (km)	Total (km)
Road Side Open Drains	20.00	669.48	1297.50	1986.98
Closed Pipe or Dhara Drains	443.00	36.20	86.03	565.23
Total SWD length	616.72	902.28	1579.07	3098.07
Road Length	506.46	927.65	507.05	1941.16
Number of Water Entrances	34972	609	1706	37287

Source: Greater Mumbai CDP 2005-2025

The overall drainage network length is around 3,098 km as compared to the road length of 1941 km. The ratio between drainage network length and road length in Greater Mumbai is 1.6. The ratio is higher in Western Suburb at 3.1 whereas in the Island city and Eastern Suburbs the ratio is 1.1 and 1.0 respectively.

7.3.2 Institutional setup for Storm Water Drainage

Storm Water Drainage services are provided by Storm Water Drainage Department and respective Ward offices, under jurisdiction of Director (Engineering Services and Projects) and Additional Commissioner (City) for Administrative functions.

7.3.3 Proposals, Projects and Status of Implementation

- To overcome the problem of storm water during monsoon, pumps of high capacity were proposed to be established to pump out storm water into sewers.
- In order to solve the problem of flooding, at the time of high tide, it was proposed to have sluice gates, to check back flow of sea water from flooding the low lying areas and to discharge storm water in the sea during low tide.

Priority towards storm water drainage system for Greater Mumbai is to implement remaining works of BRIMSTOWAD as well as Mithi river projects. The following Table 7.8 shows the status of their implementation.

Table 7.8: Storm water drainage projects implementation status

Phase	Physical progress as per original DPR	Financial progress with DPR cost
BRIMSTOWAD Phase-I	83.7%	132.67%
BRIMSTOWAD Phase-II	43.1%	119.47%
Storm water pumping station phase-I	55.0%	133.02%
Storm water pumping station phase-II	0%	0%
Mithi river project	40%	51.35%

Source: Revised Gap Analysis report, Revised City Development Plan, MCGM, 2012

Efficient storm water drainage system is essential to ensure long-term sustainability of Greater Mumbai. Major floods faced in the past have caused major disturbance to everyday life and economic activities of Greater Mumbai. The major issues faced by the system are noted below:

7.3.4 Challenges pertaining to the Storm water Drainage system

Structural deficiencies of age old, partly dilapidated Storm Water Drainage system in the city is of concern. The system was designed for rainfall intensity of 25 mm / hr and a run-off coefficient of 0.50 whereas the runoff is increasing due to increased paved areas and further pressurizing the drainage system³⁹;

Natural drainage and rain water holding capacity have been visibly affected by urban building activity, Open Spaces with inadequate holding capacities, unauthorized construction causing reduction in the width of nallas and dumping of domestic and industrial waste along the drains;

Technical issues such as low level of outfalls and system that does not address natural contours;

Till recently, there was a lack of contour map of the MCGM jurisdiction⁴⁰. While a detailed contour map is now available, comprehensive mapping of drainage network interlinked with other municipal services and the Development Plan is essential⁴¹.

7.4. Solid Waste

Solid waste management is one of the major issues related to environmental sustainability. Conservancy/ Solid waste management is an obligatory duty of Municipal Corporation. It involves segregation & collection, storage, transfer, transportation, processing and disposal of solid waste.

7.4.1 Existing System

Every day about 7800 metric tons (MT) of solid waste is generated in the city which translates into 630 g per person per day⁴². Additionally construction and demolition waste collected is about 4700 MT per day.

Table 7.9: Solid waste in Planning Area of DP

1	Solid Waste Type	
	Wet organic material	54%
	Dry organic material	15%
	Recyclables and paper	19%
	Inert material	13%
2	Garbage Collection	
	Number of community Collection Points	3,751
	Garbage collection from community points	48%
	Garbage collection from houses	52%

³⁹ Source: Fact Finding Committee on Mumbai Floods, VSolum-1 March 2006

⁴⁰ ibid

⁴¹ ibid

⁴² Source: Revised Gap Analysis Report, Revised City Development Plan, MCGM, 2012

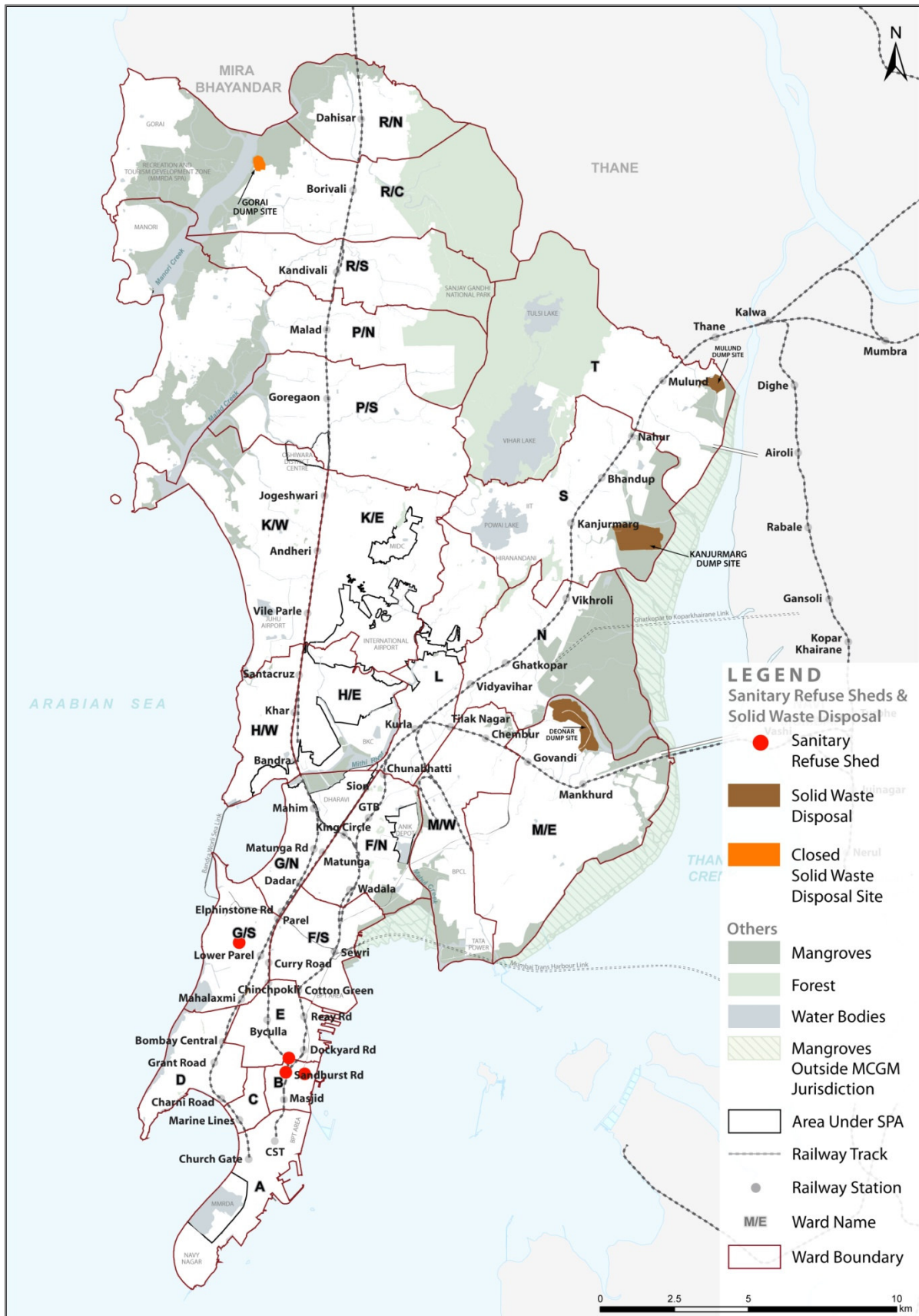
3	Dumping Sites in operation in numbers (Deonar, Mulund and Kanjur)	03
4	Total length of streets swept everyday (in kms)*	1,800
5	Total biomedical waste generated by various municipal and private medical institutions	Around 9 tonnes/day

Source: Environmental Status of Brihanmumbai, 2010-11, Report by MCGM* Report on “Fact Finding Committee on Mumbai Floods” Vol.I, committee chaired by Dr. Madhavrao Chitale, 2006

Table 7.10: Capacity of dumping sites in Mumbai

Disposal Site	Area (Ha) of Filling (m)*	Maximum R.L. filling (m)	Minimum R.L. of filling (m)	Total Vol. (in Metric Tonnes)
Deonar	132.00	47.00	26.00	37.00
Mulund	25.00	44.00	28.00	2.00
Kanjur Village Landfill Site	141.77	4.03	1.03	-

Map 7.2: Existing sanitary refuse sheds and solid waste disposal sites



7.4.2 Institutional setup for Solid waste Management:

There are two separate wings in MCGM namely Solid Waste Management and Transport to handle Municipal Solid Waste in Greater Mumbai.

7.4.3 Challenges pertaining to the Solid waste Management

The following are the issues related to solid waste management system in Greater Mumbai.

- The total recovered waste including recyclables is 619 MT per day, which is only 10% of the total municipal waste generated. Around 369 MT per day of the solid waste generated is treated by converting it into organic manure, vermi-composting, vermi-culture. Recycling is decentralized while segregation at various levels enables recovery of another 250 MT per day of recyclables. The rest of the entire solid waste collected including construction and demolition waste and municipal waste are dumped in the land fill sites without any treatment.
- Only around 50% of the houses are covered under door to door collection system. Community collection dustbins cause inconvenience and unpleasant conditions.
- Only around 83% of the municipal solid waste is collected. Thus, there is a possibility of remaining waste being dumped in unaccounted areas causing environmental damage.
- Over 40% population of Mumbai resides in slums. Waste collection, storage and removal in these areas, does not occur in an organized way due to limited access, the specific nature of waste generated and frequency of generation of refuse. Waste is often dumped into open streams/nallas due to the lack of proper solid waste management measures. Desilting of storm water drains and disposal of silts have become an annual challenge.
- Lack of segregation of waste causes operational difficulties and eventually environmental damage at treatment sites. Land constraints and very high land prices pose a challenge towards identification of land for locating sorting centres.
- The proposed processing plant projects at Mulund, Kanjur and Deonar are expected to provide 6500 MT per day as processing capacity and 750 MT as residue land filling capacity, accounting for around 11.5% of processed waste. With change in lifestyles in the future the amount of solid waste generated would also face major increase. This would pose major challenges for enabling environmentally sustainable solid waste management.
- BMC Act does not provide provisions for any tax chargeable on consumers; only Trade Refuse Charges (TRC) is applicable for commercial establishments. In order to install a scientifically appropriate processing and sanitary land fill and operation of the same requires higher amount of funding for MCGM. The BMC Act lacks provisions for levying conservancy taxes on users⁴³.

⁴³ Such provision is available in other similar acts such as BPMC Act 1949.

A grayscale photograph of a park. In the foreground, there is a grassy field with a long, dark shadow cast across it. In the middle ground, there is a paved area where several people are walking or standing. The background is filled with a dense line of trees. The sky is visible at the top, showing some clouds.

Chapter 08

Social Infrastructure

8. Social Infrastructure

The MR&TP Act, 1966 enables the provision of the following amenities in the Development Plan:

- Proposals for designation of land for public purpose, such as schools, colleges and other educational institutions, medical and public health institutions, markets, social welfare and cultural institutions, theatres and places for public entertainment, or public assembly, museums, art galleries, religious buildings and government and other public buildings as may be from time to time be approved by the State Government;
- Proposals for designation of areas for open spaces, playgrounds, stadia, zoological gardens, green belts, nature reserves, sanctuaries and dairies;
- Transport and communications, such as roads, highways (railways, water ways, canals and airports) including their extension and development; and
- Reservation of land for community facilities and services.

With reference to the above, an assessment of the existing area available for social infrastructure has been carried out with respect to the DP 1991 Planning Standards.

8.1. Existing Distribution and Provision of Amenities and Open Space

The DP 2034 undertook an exercise of comparing the existing distribution and provision of social amenities in Greater Mumbai with the standards of DP 1991 and other relevant benchmarks in order to assess levels of access to Social Amenities and Open Spaces. Accessibility analysis of primary level amenities has also been conducted in order to determine areas that are presently underserved.

DP 1991 had adopted planning standards with different units. For ease of comparison, these have been translated into per capita land requirement as given below (Table 8.1).

Table 8.1 DP 1991 Space norms

AMENITY	DP 1991 STANDARD	PER CAPITA NORM
EDUCATION⁴⁴		
Primary School	1/9,000 Population (Island City) 1/6,000 Population (Suburbs) 3.76 sqm/ pupil (including playground) (Island City) 5.52 sqm /pupil (Suburbs) 2.09 sqm/ pupil (with no playground)	0.376 sqm pp (Island City) 0.552 sqm pp (Suburbs)
Secondary School	1/12,000 Population (Island City) 1/9,000 Population (Suburbs) 3.76 sqm/ pupil (with playground) (Island City) 5.52 sqm /pupil (Suburbs) 2.09 sqm/ pupil (with no playground)	0.376 sqm pp (Island City) 0.552 sqm pp (Suburbs)
AMENITY DP 1991 STANDARD PER CAPITA NORM		
MEDICAL AMENITIES		
Dispensary	1/50,000 - Area of site 668.9 sqm, covering an area of 1.5 km radius	0.013 sqm pp
Maternity home	50 beds for 1,00,000 population (1bed for 60 confinements) Area of site, 41.8 sqm/bed in the Island City and 83.61 sqm/bed in the Suburbs	Island City- 0.021 sqm pp Suburbs- 0.042 sqm pp
Hospital	4 beds/1,000 population. For 300 to 500 beds, Island City site- 41.8 sqm/bed Suburbs site- 83.61 sqm/bed	Island City- 0.167 sqm pp Suburbs- 0.33 sqm pp
SOCIAL AMENITIES		
Fire station	50,000 to 3, 00,000 population-4500 sqm (with staff quarters), 3000 sqm (without staff quarters). This includes 2 fire engines, 1 ambulance, 1 pumping unit; After 3, 00,000 population, 1 pumping unit for each 1,00,000 population.	0.05 sqm pp Average
Burial ground & Cemetery	1 Cemetery of 1.6 ha per ward	
Market	Island City site- 0.20 ha/50,000 population Suburbs site- 0.20 ha/20,000 population	Island City- 0.04 sqm pp, Suburbs- 0.1 sqm pp
OPEN SPACES		
	Island City- 0.20 ha/1,000 population Suburbs- 0.60 ha/ 1,000 population (excluding additional 0.80 ha in form of larger parks & woodlands etc. and 0.20 ha in the form of layout Open Spaces)	Island City 2 sqm pp, Suburbs 6 sqm pp

⁴⁴ Assuming 10% of the population as student population

8.1.1 Per capita Provision of Amenities and Open Space

The existing availability of land area for Open Spaces is given in Table 8.2. Also, the per capita availability of these Amenities and Open Space has been arrived at and compared against DP 1991 standards so that an overview of the amenity provision is possible.

a) Open Spaces

The ELU 2012 documents both Natural Areas and provided Open Spaces. Natural Areas includes Forests, Mangroves, Mud Flats, Hills, River/ Creeks/ Natural Water Bodies, Lakes, Tanks/ Ponds, while Open Spaces includes Playgrounds, Recreation Ground, Parks and Garden, Club & Gymkhana, Promenade, Beach and Swimming Pool. The per capita access to Open Space amenity has been computed in the four different ways based on access to public and private Open Spaces and incorporating natural areas.

Per Capita Natural Areas and Open Space Availability

1. Considering only Open Spaces that are completely public and are accessible to all

Per Capita Open Space = 1.09 sqm

A: Open Spaces (refer ELU 2012: N3.1+N3.2+N3.3+N3.5+N3.6) = 13.60 sqkm

N3.1 = Playground

N3.2 = Recreational Ground

N3.3 = Parks and Garden

N3.5 = Promenade

N3.6 = Beach

2. Considering all provided Open Spaces (publicly accessible as well as clubs, gymkhanas, and Swimming Pools, which have limited accessibility).

Per Capita Open Space = 1.24 sqm

B: If Open Spaces (refer ELU 2012: A + N3.4 + N3.7) = 15.37 sqkm

N3.1 = Playground

N3.2 = Recreational Ground

N3.3 = Parks and Garden

N3.5 = Promenade

N3.6 = Beach

N3.4 = Clubs and Gymkhana

N3.7 = Swimming Pool

3. Considering all Open Spaces and Natural Areas (including National Park)

Per Capita Open Space = 4.83 sqm

C: If Open Spaces (B + N1.1) = 60.11 sqkm

N3.1 = Playground

N3.2 = Recreational Ground

N3.3 = Parks and Garden

N3.4 = Clubs and Gymkhana

N3.5 = Promenade

N3.6 = Beach

N3.7 = Swimming Pool

N1.1 –Sanjay Gandhi National Park

4. Considering all Natural Areas and Open Spaces are included

Per Capita Open Space = 10.32 sqm

D: If Open Spaces (refer ELU 2012: C + N1 + N2) = 128.41 sqkm

N1.1 - Sanjay Gandhi National Park

N1.2 - Mangroves

N1.3 - Mud Flats

N1.4 - Hills

N2.1 - River/ Creeks/ Natural Water Bodies

N2.2 - Lakes

N2.3 - Tanks/ Ponds

N3.1 - Playground

N3.2 - Recreation Ground

N3.3 - Parks & Garden

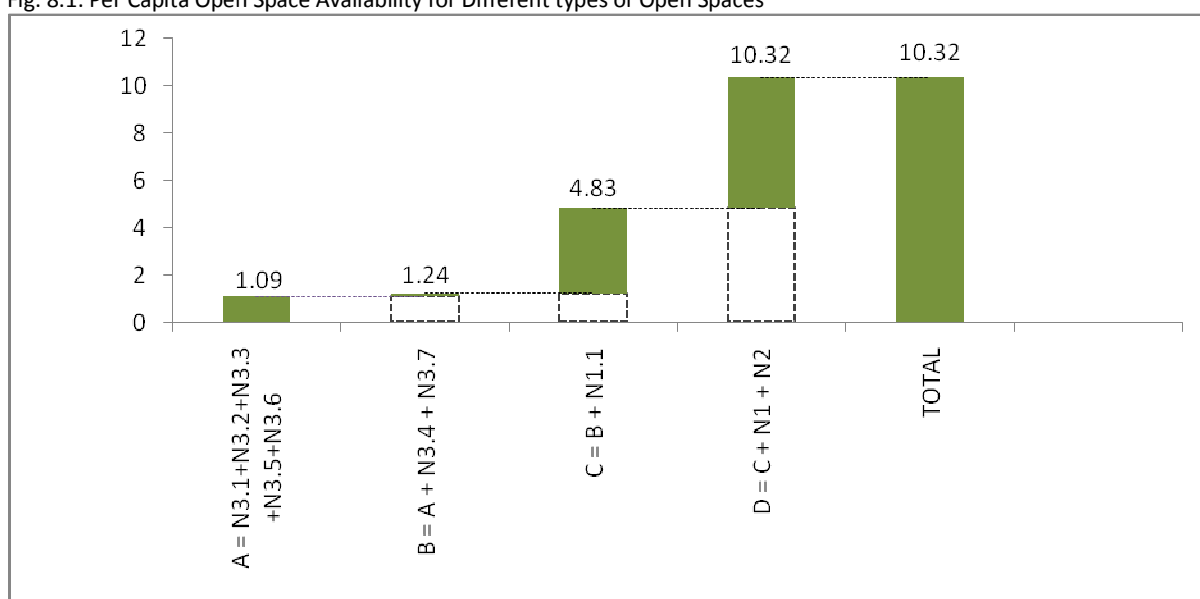
N3.4 - Club & Gymkhana

N3.5 - Promenade

N3.6 - Beach

N3.7 - Swimming Pool

Fig. 8.1: Per Capita Open Space Availability for Different types of Open Spaces



Note: Natural Areas and Open Space Categories include

N1.1 – Forest / Sanjay Gandhi National Park	N3.1 - Playground
N1.2 - Mangroves	N3.2 - Recreation Ground
N1.3 - Mud Flats	N3.3 - Parks & Garden
N1.4 - Hills	N3.4 - Club & Gymkhana
N2.1 - River/ Creeks/ Natural Water Bodies	N3.5 - Promenade
N2.2 - Lakes	N3.6 - Beach
N2.3 - Tanks/ Ponds	N3.7 - Swimming Pool

The per capita for Open Spaces as per DP 1991 standards is 2 sqm per person for the Island City and 6 sqm pp for the Suburbs (excluding layout open spaces). However, the average per capita Open Space available in Greater Mumbai is only 1.24 sqm pp as per the ELU 2012. This indicates that there is a severe shortfall of open spaces in the city. However, it must be noted that in this analysis, the open spaces included are limited to only the provided open spaces (parks, gardens, playgrounds, recreational grounds, Clubs and Gymkhanas and pools) and includes Promenades and Beaches and does not include layout open spaces (largely in Suburbs) or Natural Areas (like Sanjay Gandhi National Park, mangroves and water bodies) as per the ELU 2012. If the Sanjay Gandhi National Park is included in the calculations, the per capita open space increases nearly fourfold to 4.83 sqm per person. If all Natural Areas in the city (mangroves, mud flats and water bodies) are included in the calculations of open space along with the provided recreational spaces, then the total per capita open space provision increases dramatically to 10.32 sqm per person.

Table 8.2: Area for Open Space as per existing land use, 2012

Land Use Categories		Area (ha)			
		Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
Recreational Open Spaces	Playground	520.12	88.09	252.27	179.77
	Recreation Ground	302.61	181.69	70.09	50.83
	Parks and Garden	427.36	104.65	201.80	120.91
	Clubs & Gymkhanas	172.83	58.95	49.34	64.54
	Promenade	12.43	9.01	3.42	0.00
	Beach	97.22	21.76	75.46	0.00
	Swimming Pool	5.21	2.02	1.59	1.60
	Total	1,537.78	466.17	653.97	417.65
	Per Capita (sqm)	1.24	1.51	1.18	1.09

A comparison of Recreational Open spaces across the 3 Zones reveals that the Island City has 1.51 sqm per person as against the per capita for Open Spaces as per DP 1991 standards is 2 sqm per person whereas the Western Suburbs has 1.18 sqm per person and the Eastern Suburbs has 1.09sqm per person excluding layout open spaces in comparison with the DP 1991 standard of 6 sqm pp for the Suburbs that included layout open spaces.

b) Medical Amenities

The availability of land area for Medical Amenities is given below (Table 8.3). MCGM has historically played a pivotal role in health care provision in Mumbai. Over the years, the private provision of

health care has steadily increased with a three-tier system of service provision currently in place that is shared both by MCGM as well as private providers. MCGM provides primary level care through health posts, dispensaries and post partum centres; secondary care through maternity clinics, peripheral and specialty hospitals and tertiary care through hospitals including medical college. Existing situation analysis shows the level of public provision is insufficient to cater to the demands of a growing metropolitan population. Currently the MCGM is operating 26 maternity homes, 161 Dispensaries, 167 health posts and 10 Municipal Hospitals as per MCGM data.

Table 8.3: Area for Medical amenities as per existing land use, 2012

Land Use Categories		Area (ha)			
		Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
Medical Amenities	Municipal Dispensary	6.97	2.80	2.27	1.90
	Community Dispensary	3.39	0.77	1.87	0.75
	Veterinary Dispensary	1.06	0.50	0.15	0.41
	Municipal Maternity Home	3.63	0.96	1.58	1.09
	Municipal Hospital	56.05	32.70	16.27	7.08
	Private Hospital	62.79	20.55	27.12	15.11
	Government Hospital	58.57	54.18	0.77	3.62
	Other Medical Services	3.59	1.73	1.80	0.05
	Sub-total	196.05	114.19	51.83	30.01
	Hindu Traditional or Electrical	36.52	13.19	13.44	9.89
	Muslim Cemetery	39.33	18.10	9.98	11.26
	Christian Cemetery	24.00	15.33	7.12	1.55
	Buddhist Cemetery	0.23	0.00	0.23	0.00
	Composite Cemetery	0.63	0.00	0.63	0.00
	Jewish Cemetery	2.56	2.56	0.00	0.00
	Tower of Silence	18.73	18.73	0.00	0.00
	Others	0.37	0.26	0.00	0.11
	Sub-total	122.37	68.17	31.40	22.81
Total		318.42	182.36	83.23	52.82

Note: Cemeteries, crematoria and burial grounds are classified under Medical Amenities in the ELU since they are managed by the Health Department. However while analyzing the provision of amenities they have been computed under Social Amenities

Review of the location of municipal health amenities reveals an imbalance of distribution across Wards relative to both the Ward population as well as the slum population in each Ward. There are a large number of general practitioners, private nursing homes and hospitals and private super specialty hospitals that take care of the gaps in the public healthcare system. It must be noted that in general all medical uses which occupy a plot of land are captured by the ELU. However, whenever private dispensaries, maternity home, consulting clinics etc. are located within a floor of a building used for residential/commercial purpose, these are not captured in the ELU 2012 and therefore, are not accounted.

According to ELU 2012, the area under Medical Amenities 196.05ha, the average per capita availability of Medical Amenity space in Greater Mumbai is 0.17 sqm per person. Further, in the Island City, the medical amenity space provision is 0.37 sqm per person which is significantly higher than the DP 1991 standard of 0.2 sqm per person while in the Suburbs it is only 0.09 sqm per person, as compared to DP 1991 standards of 0.385 for the Suburbs.

c) Educational Amenities

The availability of land area for Educational Amenities is given below (Table 8.4). The MCGM has been providing free primary education as a major obligatory function since Independence. At present it runs 1255 primary schools, 109 secondary schools and 430 private aided primary schools⁴⁵. Education in Greater Mumbai is provided by MCGM along with private institutions. Even though the municipal education facilities are evenly distributed in Greater Mumbai, their adequacy as per the local population density and local requirement is of concern. This has implications for some wards like L, M/E and M/W wards that have a higher ratio of slum populations but have fewer schools and are overcrowded. Provision of secondary education is not under obligatory functions of the MCGM.

An area of 853.81 ha is under all Educational Amenities in Greater Mumbai. The average per capita space availability for all levels of Educational Amenities is 0.69 sqm in Greater Mumbai. The average per capita space availability in Greater Mumbai for Municipal Primary educational facilities is 0.05 sq m pp; in the Island City it is 0.05 sqm pp and 0.11 sqm pp for the Suburbs as compared with DP 1991 standard of 0.376 sqm pp (Island City) and 0.552 sqm pp (Suburbs). The average per capita space in the Island city for secondary educational uses is 0.15 sq m pp as against 0.20 sq m pp in the Suburbs. This indicates that the Island City and the Suburbs are both grossly underserved as far as primary and secondary education is concerned when compared with the DP 1991 standards.

Table 8.4: Area for Educational amenities as per existing Land Use, 2012

Land Use Categories		AREA (ha)			
		Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
Educational Amenities	Municipal Primary School	63.67	15.37	25.43	22.88
	Secondary School	143.25	46.66	66.52	30.08
	Primary cum Secondary School	94.87	17.78	52.46	24.63
	Special School	6.42	3.70	0.93	1.79
	College	111.50	33.91	56.95	20.64
	Polytechnic	22.99	2.16	12.88	7.95
	Professional College	113.40	27.20	17.61	68.59
	University/IIT	276.71	8.29	99.17	169.25
	Civic Training Institute	9.50	0.17	6.51	2.82
	Others	11.48	3.20	5.38	2.90
	Total	853.81	158.44	343.86	351.51

⁴⁵ Bansal Committee Report

d) Social Amenities

According to classification of ELU 2012, Social Amenities include cultural, religious and civic amenities such as welfare centres & public halls, cinemas & theatres, temples, mosques & churches, police chowkies and prisons, etc. while Public Utility & Facilities also includes amenities pertaining to provision of security, viz., fire stations and public sanitary conveniences and other physical infrastructure. (See Table 8.5 below).

The previous Development Plan for Greater Mumbai reserved lands for a number of social amenities in Greater Mumbai. These include amenities like markets-both wholesale and retail, reservations of fire stations, police stations, cemeteries, post-offices, telephone exchanges and other essential uses at various scales ranging from city level recreational facilities like the zoo and aquarium to local libraries and welfare centres of public sanitary facilities. Some of these uses have slowly decreased in their importance like the telephone exchanges or entirely relocated facilities like wholesale markets, however, area allocation for important functions such as fire stations, police stations, cemeteries, local markets and public sanitary conveniences are required.

Table 8.5: Area for Social amenities as per existing land use, 2012

	Land Use Categories	Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
		Area (Ha)			
Social Amenities	Welfare Centre	18.86	7.25	9.05	2.56
	Public Hall	51.53	14.83	23.34	13.36
	Auditorium / Theater	7.75	4.13	2.72	0.90
	Cinema / Multiplex	17.65	8.50	4.41	4.74
	Open Air Theater	1.52	0.75	0.77	0.00
	Cultural Centre	1.43	0.52	0.76	0.15
	Art Gallery	0.46	0.46	0.00	0.00
	Museum	5.57	5.57	0.00	0.00
	Aquarium	0.49	0.45	0.05	0.00
	Temple	70.88	13.83	40.81	16.25
	Church	28.00	8.24	15.20	4.56
	Mosque	32.17	14.01	9.99	8.17
	Gurudwara	4.20	0.91	1.90	1.39
	Parsi Agiary	6.17	5.25	0.84	0.08
	Jain Temple	15.14	4.31	7.58	3.25
	Synagogue	0.26	0.26	0.00	0.00
	Buddhist Temple	3.67	0.74	0.73	2.20
	Other Religious	4.12	1.37	1.82	0.92
	Police Station	16.17	6.92	5.61	3.64
	Police Chowkey	5.74	1.90	2.36	1.48
	Court	7.87	5.95	1.23	0.68
	Prison	5.25	5.18	0.06	0.00
	Other Social Amenities	50.93	3.52	23.82	23.59
	TOTAL	355.81	114.86	153.03	87.93
Public Utilities & Facilities	Electric Power Plant	62.56	0.00	0.00	62.56
	Electric Transmission Station	9.67	2.58	3.50	3.59
	Transmissions lines / HT Lines	0.00	0.00	0.00	0.00
	Receiving Station	31.72	6.40	16.87	8.45
	Water Trunk Mains/Aqueducts	23.66	0.37	4.34	18.95
	Water Treatment Plant	74.93	0.00	0.53	74.40
	Water Reservoirs	75.18	7.56	37.15	30.47
	Water Pumping Station	9.26	2.64	4.60	2.01
	Sewage Treatment Plant/ Aerated Lagoons	53.20	0.18	15.84	37.19
	Sewage pumping Stations	30.36	15.49	10.44	4.44
	Public Sanitary Convenience	14.91	3.06	5.90	5.95
	Solid Waste Disposal	290.49	1.59	16.96	271.95
	Sanitary Refuse Shed	0.00	0.00	0.00	0.00
	Fire Brigade Station/ Command Centre	13.23	3.27	5.84	4.11
	Other Utilities	4.25	1.16	0.37	2.73
	TOTAL	693.43	44.29	122.35	526.79

Note: For the purpose of Social Amenity computation, categories were chosen from across the ELU categories and include Municipal Markets, Fire station, Police Station, Cemeteries and Public Sanitary Conveniences. Municipal Markets were included under the Commercial Land Use category in the ELU.

Security:

An area of 16.17 ha is under Police Stations and 13.23 ha are under Fire Brigades Station/ Command Centre in Greater Mumbai. Currently there are 40 police stations in Greater Mumbai. There are 30 fire stations in Greater Mumbai. However, additional demand by police department and fire department is necessary to be incorporated in the DP.

Municipal Markets:

There are a number of Municipal markets in Greater Mumbai and a few semi-wholesale markets are located in various areas. Total of 21.73 ha area of Municipal markets and 1.44 ha area (largely in the Island City) of wholesale markets are located in Greater Mumbai.

Cemeteries:

There are a number of private and public cemeteries in Greater Mumbai. There are 46 municipal cemeteries as per MCGM data. As per the ELU 2012 data, cemeteries and burial grounds currently occupy 122.37ha. As against the previous DP standard of 1 cemetery to be provided in each ward, there are more numbers provided and there seems to be a large number of cemeteries across wards differentiated across religions. Despite this, there may be communities in specific areas that may be underserved.

Public Utilities and Facilities:

The per capita space available for Public Utilities and Facilities is 0.56 sqm pp. These include public sanitation conveniences among other facilities.

Social Amenities:

Selected amenities were considered for analyzing available provision of social amenities in the city. These included police stations, fire stations, cemeteries, municipal markets and public sanitation conveniences. The average per capita space available in Greater Mumbai for these social amenities is 0.16 sqm pp.

In order to make demand assessment for amenity provision studies were carried out to understand provision at the Ward level and finally, within Wards at Planning Sector level. Details are as below:

8.1.2 Levels of amenity Provisions

Based on the Existing Land Use Maps 2012, radar graphs were generated in order to ascertain levels of provision of health, education, roads, open spaces, other social amenities and residential space using per capita space available and comparing them against per capita planning standards set by DP 1991.

The benchmark for per capita residential built up area has been derived from the National Urban Housing and Habitat Policy 2007 for the purposes of the preparation of the DP 2034. The policy focuses on provision of affordable urban housing with special emphasis on the urban poor. Within this mandate it specifies a minimum residential space standard of 25 sqm of carpet area per household as a basic requirement.

The existing residential per capita built-up area available is just above the standards prescribed by the Ministry of Housing and Urban Poverty Alleviation; however, the guideline per capita area is much lower than the prevalent standards across other major global cities and other cities in India. Standards established for social amenities, health and education facilities by the UDPFI Guidelines are generally twice the standards established in the DP 1991 for Greater Mumbai. For example, the per capita space standards for open space in the DP 1991 were established at 2-6 sqm per person whereas the UDPFI stipulates the same at 10-12 sqm per person (for details, see section on Planning Benchmarks, Part III). For assessment of adequacy of provision of roads at Greater Mumbai, Ward and Planning Sector levels, the standards established by the Delhi Development Authority in the Master Plan for Delhi 2021, at the relevant scales has been adopted (for details, see section on Planning Benchmarks, Part III).

The Existing situation analysis shows that with reference to the DP 1991 planning standards, the area within the jurisdiction of MCGM is underserved with regards to educational amenities, well served as regards medical amenities and poorly served in terms of Open Spaces. However, there are disparities that exist within the city across the three Zones, Island City and the Eastern and Western Suburbs, with respect to adequacy of access to amenities.

Further, there are major variations between Wards in terms of meeting the standards. Further, analysis was carried out to determine the ease of accessibility in terms of distance considering the physical location of amenities with respect to existing Residential Areas.

8.2. Assessment of area available for Amenities in Greater Mumbai

The area within MCGM jurisdiction is under provided in terms of the total area that is under amenities such as education, medical, open spaces, other social amenities and road area. The provision or availability of residential per capita space is marginally higher than the minimum standard prescribed by the National Urban Housing and Habitat Policy 2007. This assessment was conducted by maintaining per capita space availability for each indicator as a unit. The total area available for each use is based on ELU 2012 data.

The per capita floor space per person is purposely shown in the same diagram. In a given area of a Planning Sector, if roads and amenities are to be improved it would be at the cost of net plot area. This would imply increase in FSI. If per capita floor space is to also increase, it would also require further increase in FSI. Thus, formulating proposals will require a trade-off between per capita floor space, FSI and per capita amenity area, considering the constraints on available development space.

Assessment of Availability of Per Capita Amenity Space through Radar Diagrams

6 dimensional radar diagrams are used to visually portray the present availability of space as against the desirable target. The six dimensions are:

- Per capita land area for educational facilities,
- Per capita land area for medical facilities
- Per capita land area for recreational open spaces

- Per capita land area for social amenities
- Percent of local road area (excluding arterial road network); and
- Per capita residential floor space

For the first four dimensions the existing situation is compared with the standards proposed by the DP 1991. For the 5th dimension the norm used is 12 % at planning sector and 18 % at Ward. In case of 6th dimension the existing situation is compared with minimum proposed in the housing policy of Government of India (minimum carpet area per dwelling unit according to this policy is 25 sqm which is equivalent to 35 sqm of built up area. With 4.5 persons per household minimum per capita built up area works out 7.8 sqm). It may be noted while dimensions 1 to 5 compare existing with desirable, dimension 6 compares existing with the minimum.

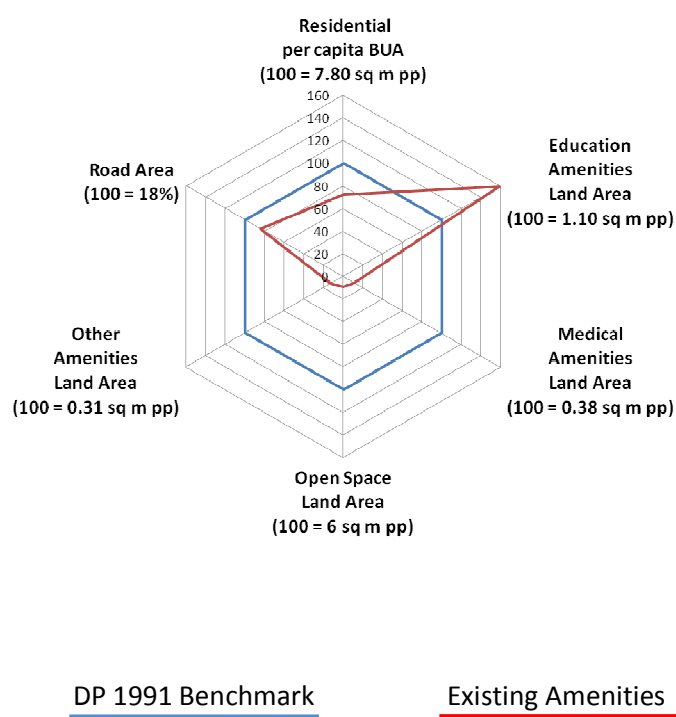
The radar diagrams are developed for Planning Sectors, Wards and Zones (Island City, Western Suburbs and Eastern Suburbs). The blue line shows the desired benchmarks as 100%, whereas, the red line shows the existing situation. These diagrams could be interpreted as:

At an individual planning sector if vertex on red line lies beyond the blue vertex it could be interpreted that the area available is more than adequate. However this could be on account of the fact that a particular facility serves a much larger catchment. In that case diagrams at Ward or Zonal level will have to be referred to. Relative distances between the red and the blue vertices would indicate the priority that the particular dimension deserves. As the area of planning sector is defined and cannot be increased, if area available for dimensions 1 to 5 is to be increased, area available for housing will reduce and consequently FSI will have to be increased to maintain the existing per capita built up area. If the per capita built up area is also to be increased, FSI will have to be further adjusted.

The radar diagram assessment is presented for the overall City level and the three Zones, Island City, Western Suburbs and Eastern Suburbs.

This methodology of assessing gap with respect to availability of space for amenities against planning standards offers two advantages. First, the radar graph itself serves as a tool that highlights current levels of demand against the standard. Further, it also provides indications as to where the possible tradeoffs could occur for distribution and redistribution of available vacant land for specific types of public purpose. Most importantly, the tool is a powerful and user friendly method of communicating levels of provision and gap to the general public at large. This method contributes towards formulating proposals through a participatory approach.

Fig. 8.2: Existing Situation Assessment for Greater Mumbai: per capita areas compared with DP 1991 standards



The radar graph at MCGM jurisdiction level shows the comparison of existing per capita area available in red outline compared with the standards outline in blue as prescribed in Development plan 1991 in blue outline. The standards for per capita provision of Amenity and Open Space as prescribed by DP 1991 are as follows:

- Medical Amenity (all levels): 0.2 sqm per person for the Island City and 0.385 sqm per person for the Suburbs;
- Educational Amenity (primary + secondary levels): 0.75 sqm per person for the Island City and 1.10 sqm per person for the Suburbs;
- There are varying standards prescribed by the DP 1991 for Social Amenities such as Cemetery, Fire Station, Police and Local Market;
- Open Spaces: 2 sqm per person for the Island City and 6 sqm per person for the Suburbs.

For assessment of per capita provision at Greater Mumbai Level, the standards prescribed by DP 1991 for Suburbs have been considered.

8.2.1 Assessment of area Available for Amenities in the Island City

Ward performance with respect to availability of amenities, in the Island City, varies significantly across the Wards. Ward A outperforms the DP 1991 standard while Ward G/N that is severely underprovided with respect to DP 1991 standards. In 3 of 9 Wards, Healthcare and Education are both underprovided, except Wards A, F/S, E and D while Open Space is underprovided in 4 Wards of the 9 Wards viz., Wards B, C, E and F/N.

Island City has significantly varied performance across the Wards in terms of meeting the standard requirement of amenities, road area, Open Spaces and residential built up area. Ward A, D, E, F/S, and G/S have much higher provision of area for medical amenities than the standards. This is because of the presence of large scale Greater Mumbai level amenities in these Wards. Other social amenities are also better provided than the required standards in majority of the Wards.

8.2.2 Assessment of area Available for Amenities in the Western Suburbs

All Wards in the Western Suburbs are underprovided, sometimes severely, on three out of four amenities, except for Ward K/W. Open Spaces are the most underprovided among all the amenities in the Western Suburbs. In general provision for Educational use is better than the provision for Medical amenities. The levels of access to amenities for Ward H/E need to be analyzed keeping in mind that a major part of the Ward area is under SPA.

8.2.3 Assessment of area Available for Amenities in the Eastern Suburbs

The Wards in Eastern Suburbs are also underserved. Healthcare amenities and open Spaces are the most underserved in Eastern Suburbs as a whole. Most of the Wards do not achieve more than half of the required standard. Availability/ provisions of Education amenities also rarely achieve half or more of the standard except in S and T Wards. All the other Wards are provided with less than half the standard in the cases of two or more amenities. It is to be noted that some of the wards have less than a quarter of the standard requirement of amenities especially in healthcare..

For primary educational amenities, there is a significant gap in provision currently at all the zonal levels as well as Ward levels. However, in terms of open spaces as well as combined levels of medical health amenities (primary + secondary + tertiary), the Island City overall, as well as several Wards in the Island City, seem well provided when compared with the standards. These are due to the presence of several large city level facilities present in the Island City.

A comparison of area of the Zones and Wards to the combined amenity space demand (including primary and secondary education, primary, secondary and tertiary medical amenities and open space) as per the DP 1991 standards was very revealing. In several wards especially in the Island city, the Ward area falls short of the area stipulated as per the DP standard for amenities. Clearly, the DP 1991 standards are not viable and cannot be implemented given the paucity of land availability.

An assessment of the existing provision of amenities shows that while there may be a shortfall at the Ward and Zone levels, at the Greater Mumbai level provisions may be higher. This is because several amenities serve a much large catchment beyond the City, and even the Region.

Fig. 8.3: Existing Situation Assessment for Island City, Western Suburbs & Eastern Suburbs: per capita areas compared with DP 1991 standards

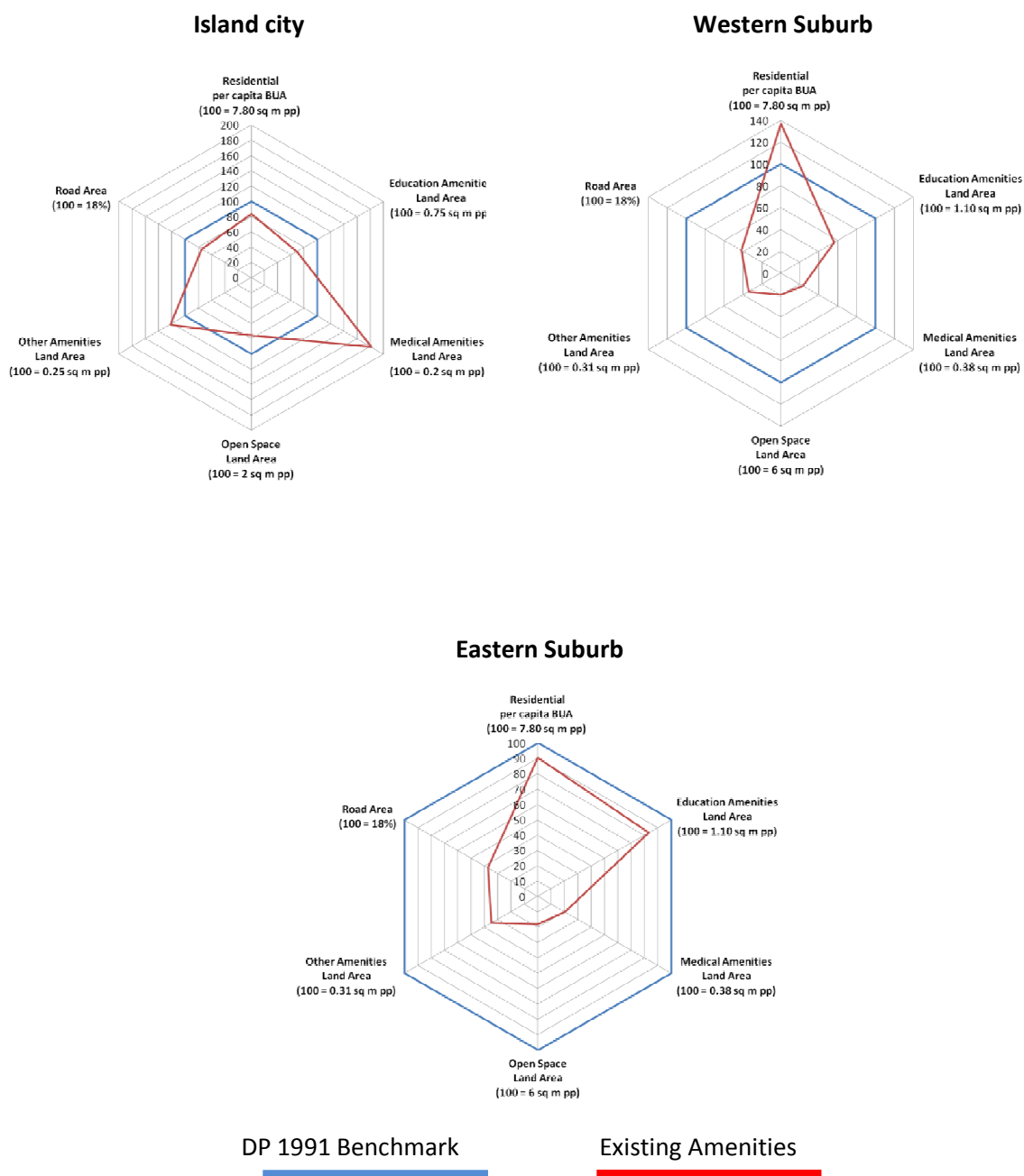


Fig. 8.4: Per capita area available for amenities: Ward wise, Greater Mumbai

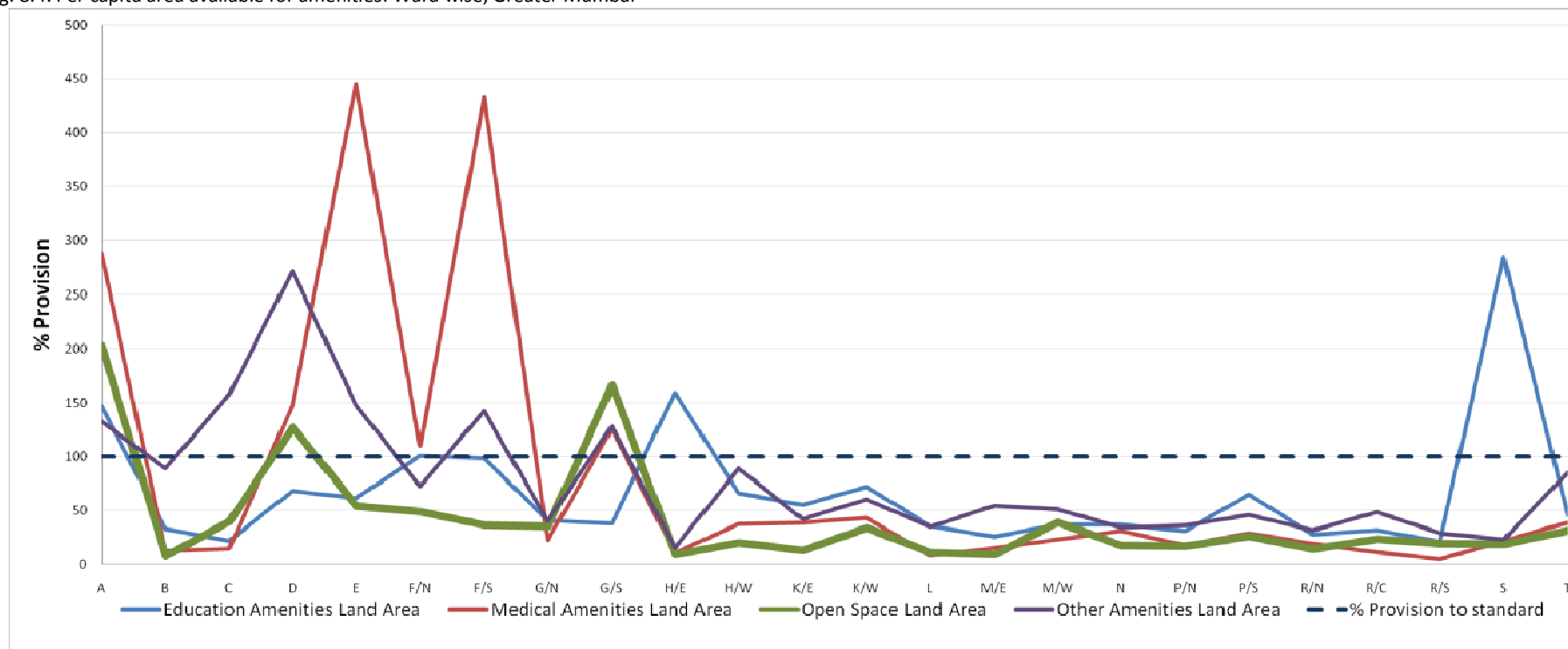


Fig. 8.5: Per capita area available for amenities: Planning Sector wise, Island City

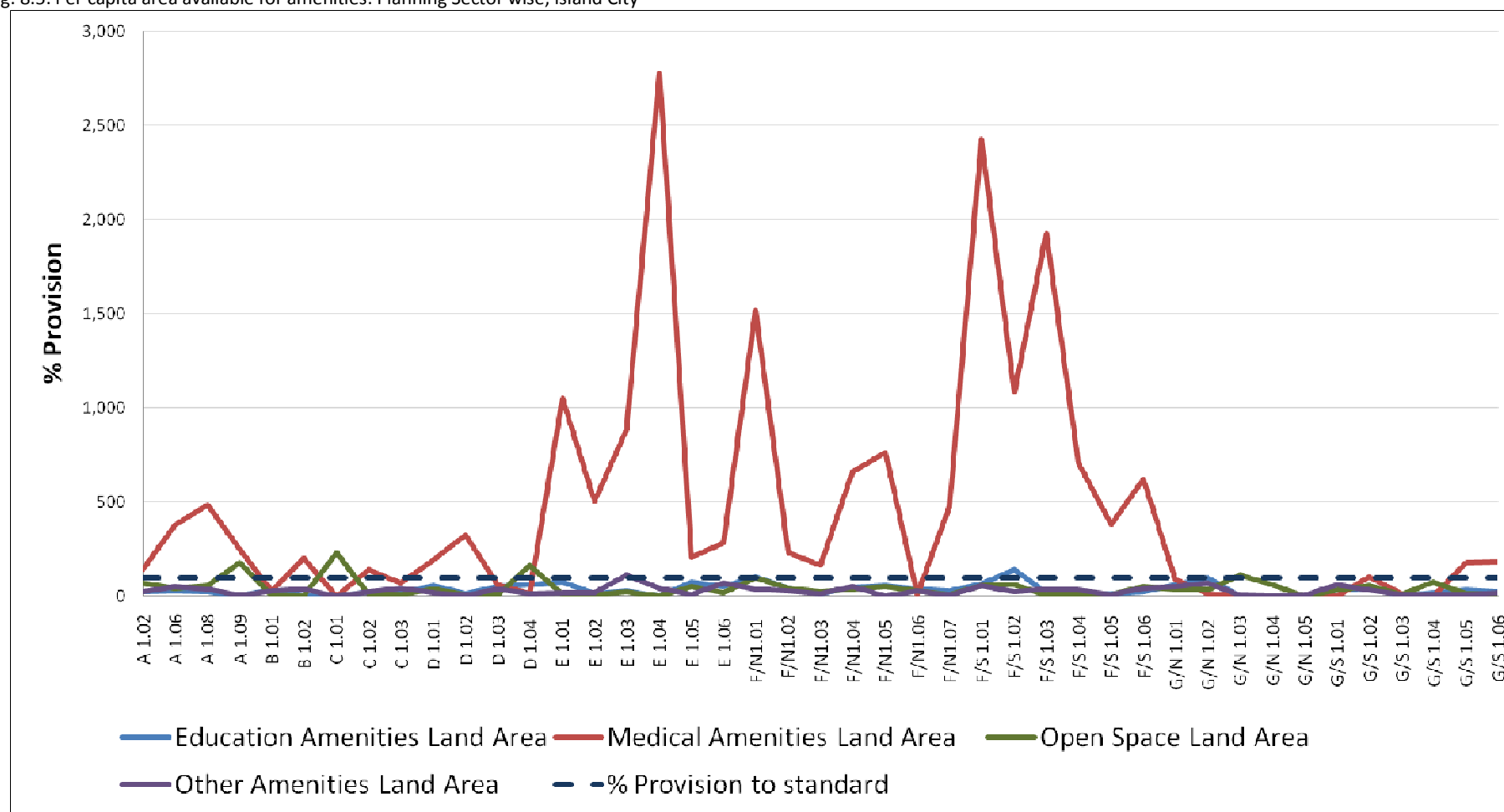


Fig. 8.6: Per capita area available for amenities: Planning Sector wise, Western Suburbs

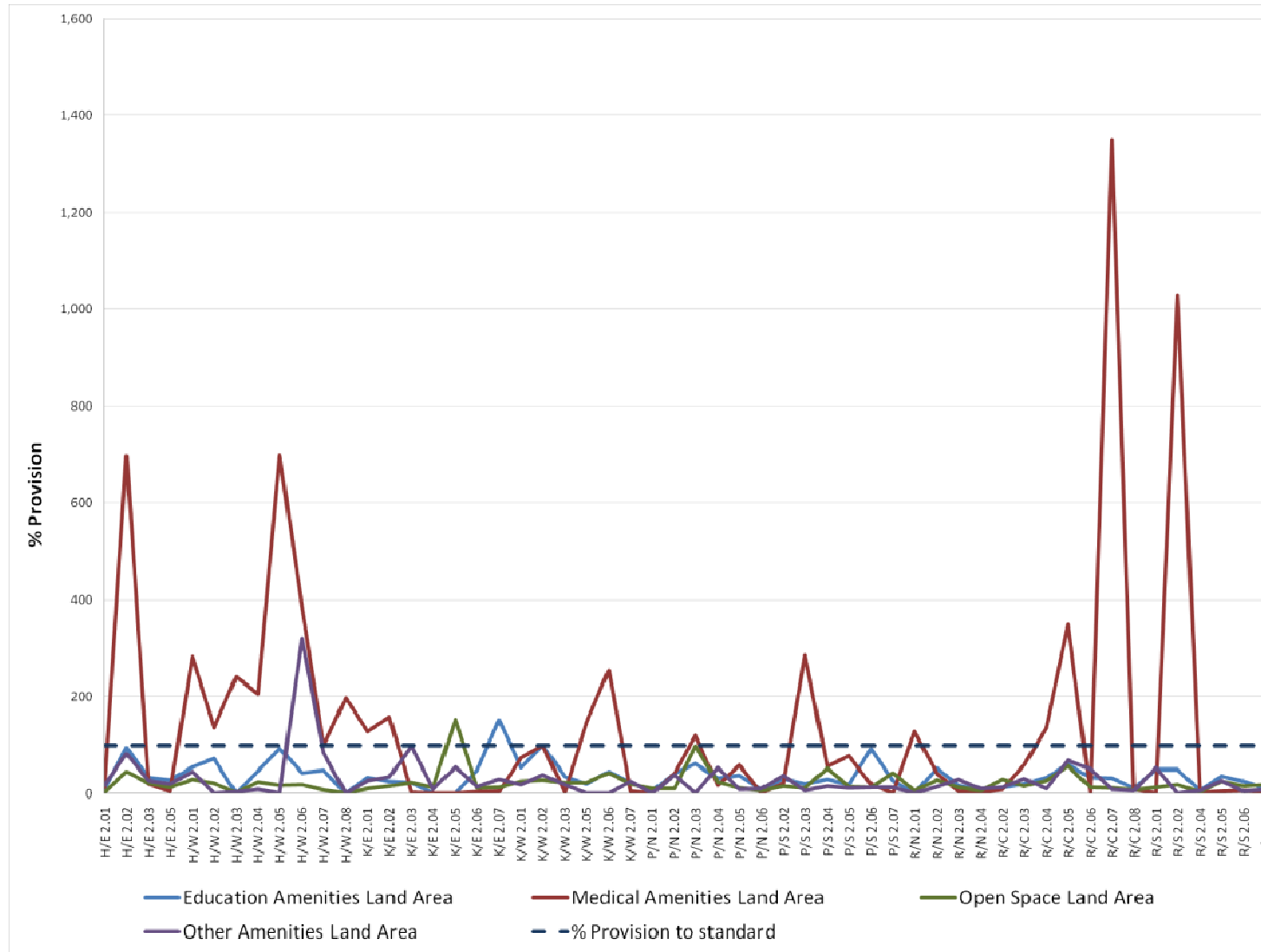


Fig. 8.7: Per capita area available for amenities :Planning Sector wise, Eastern Suburbs

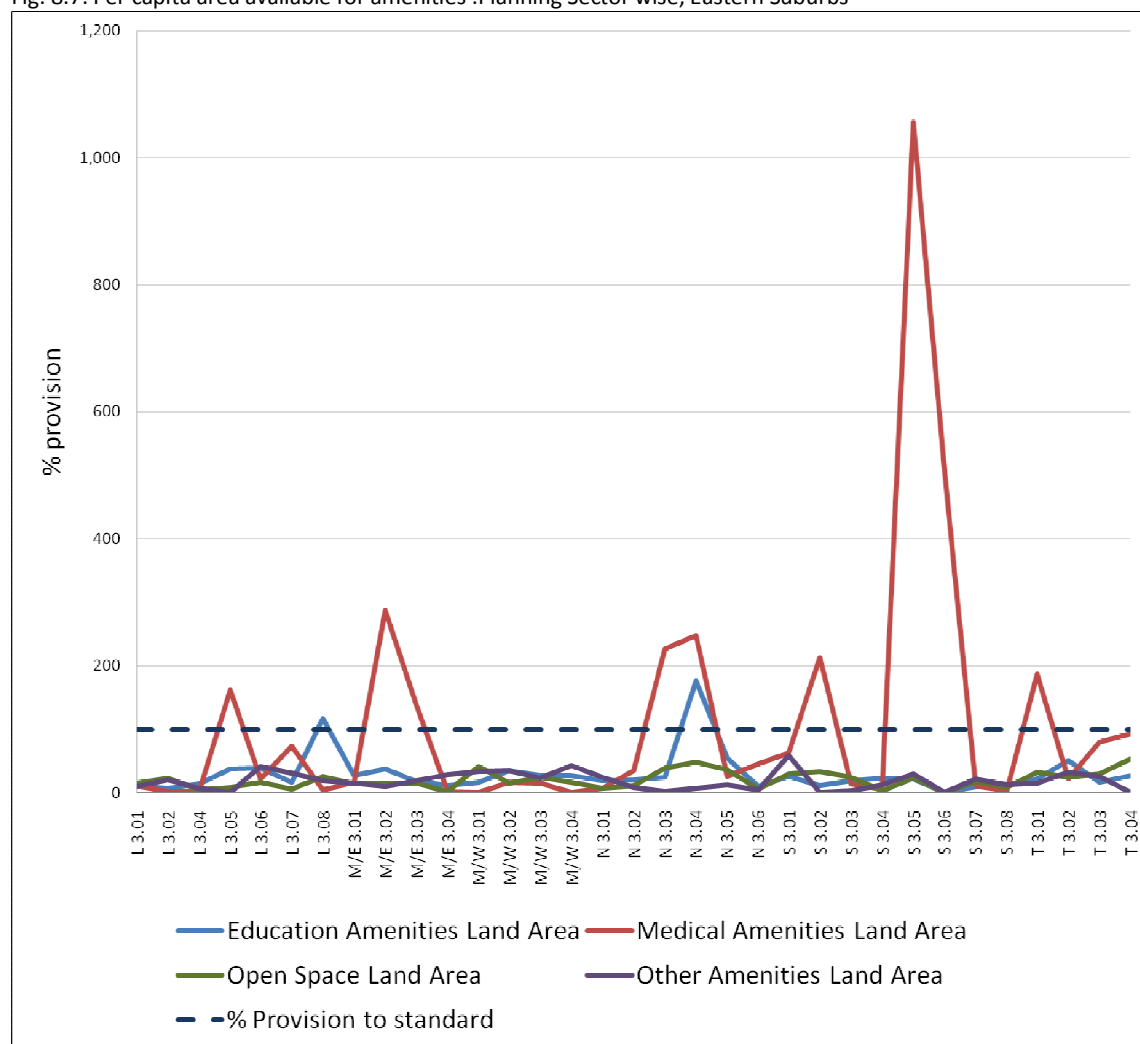
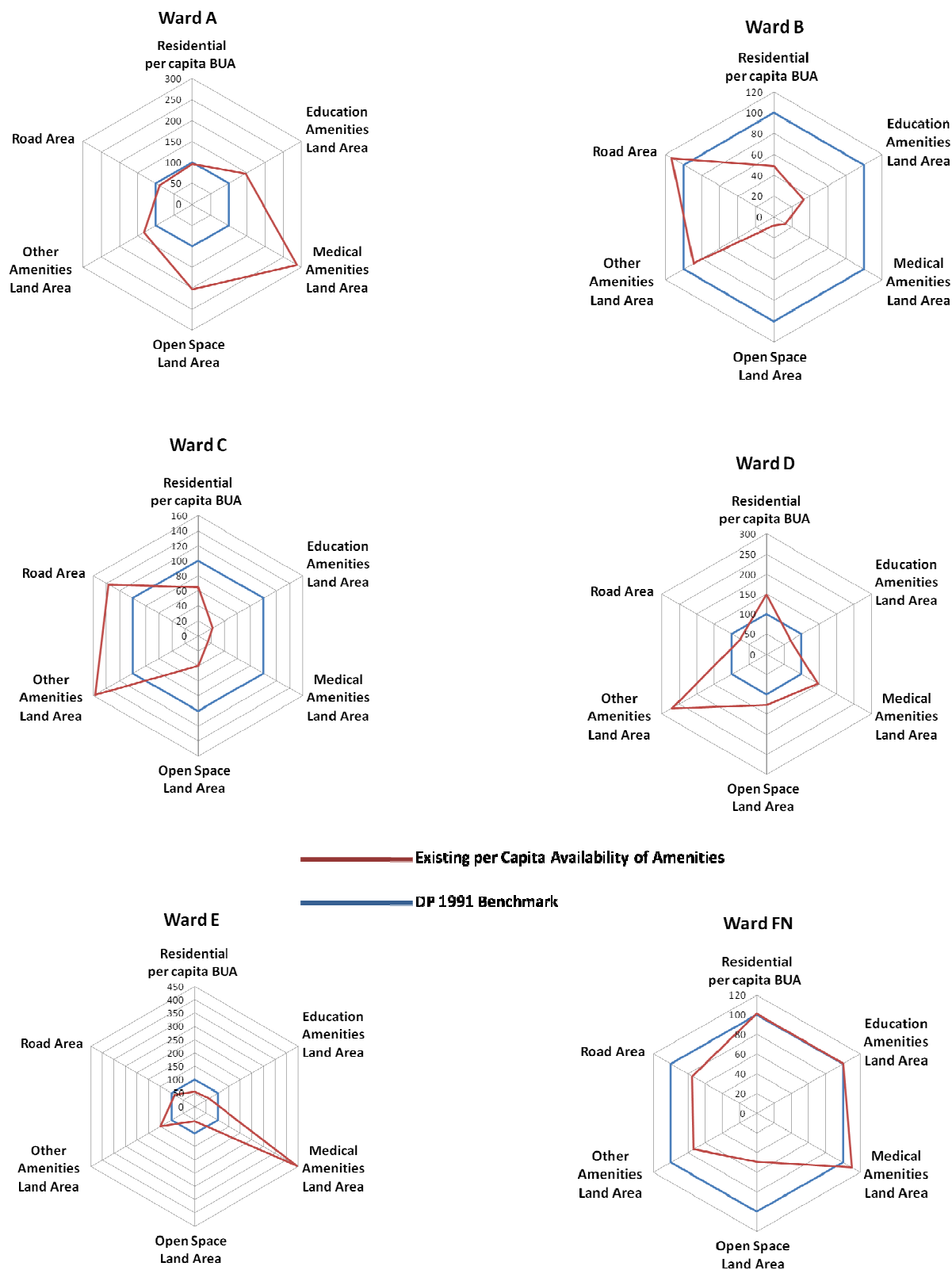
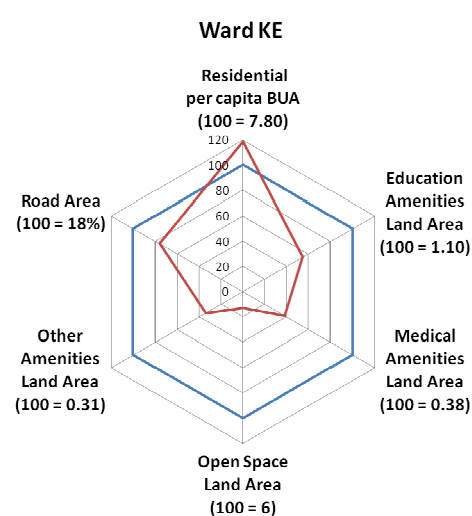
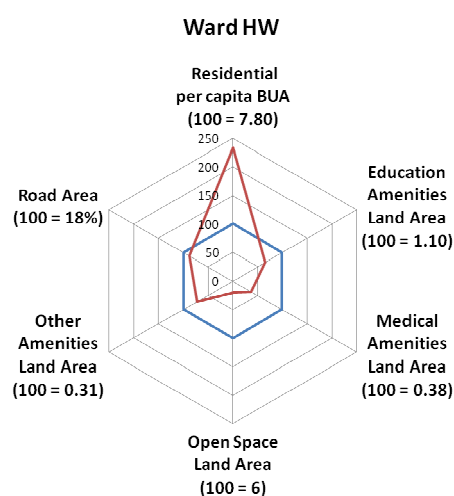
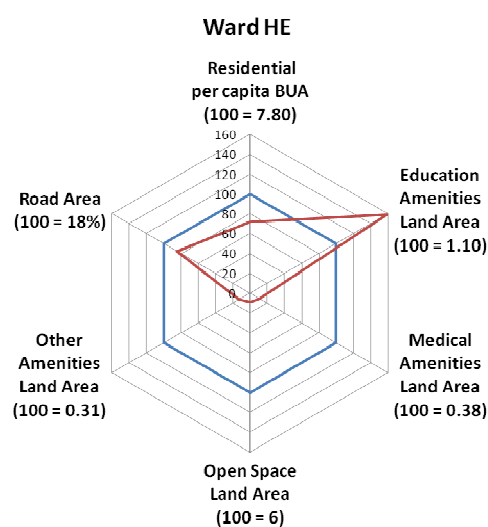
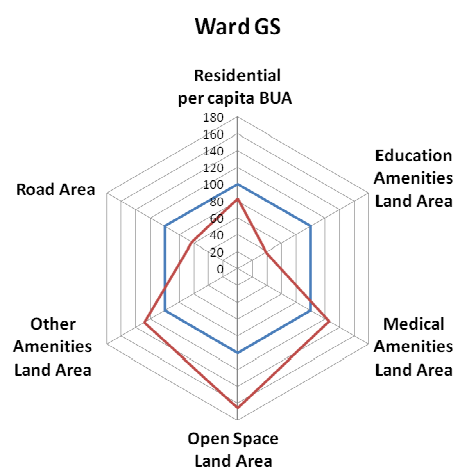
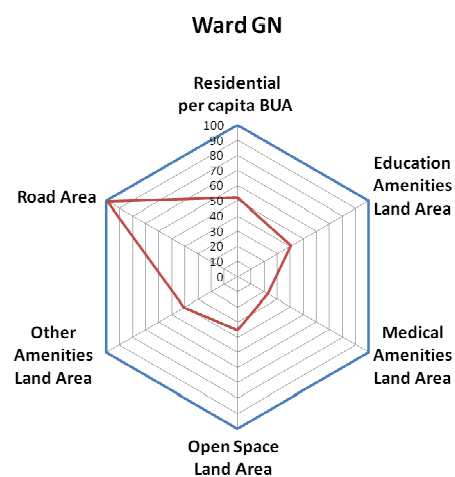
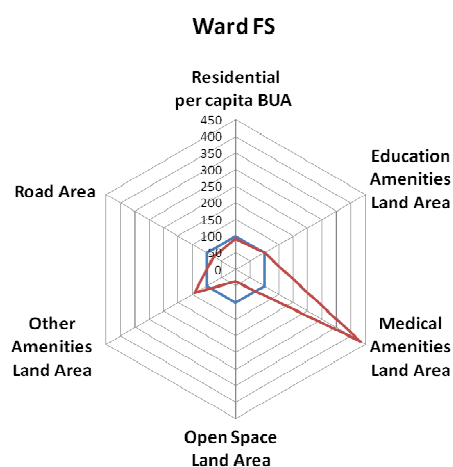


Fig. 8.8: Assessment of Social amenities provision for 24 Wards

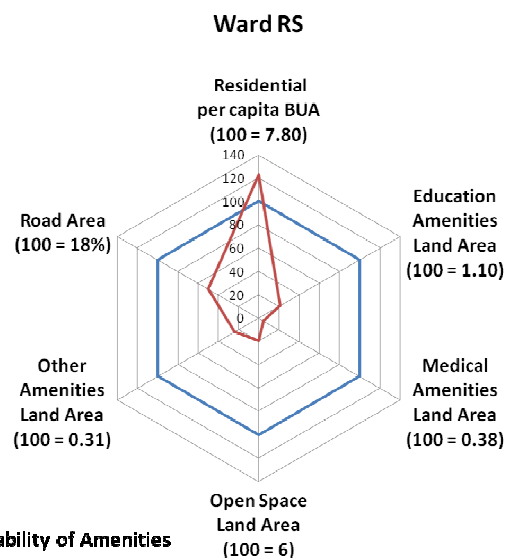
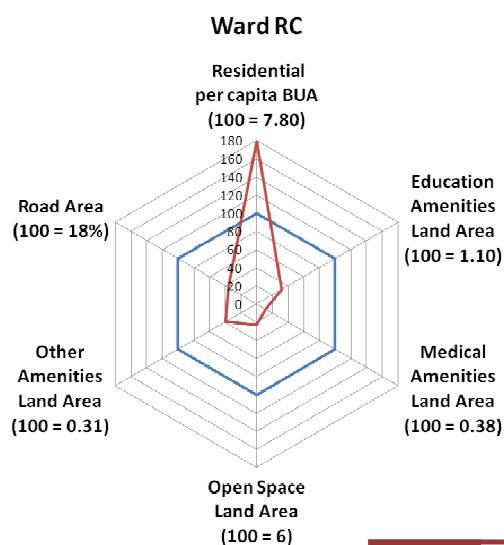
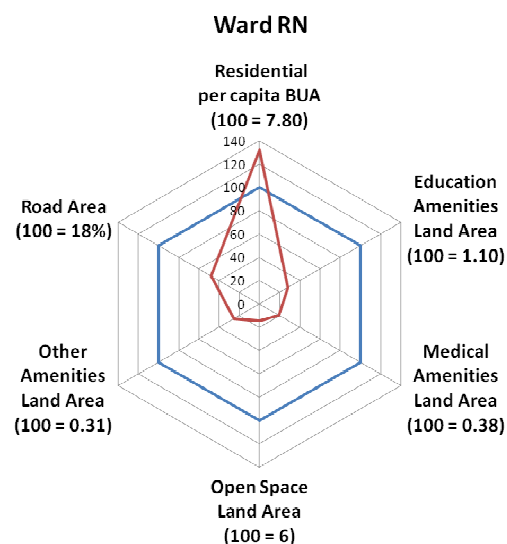
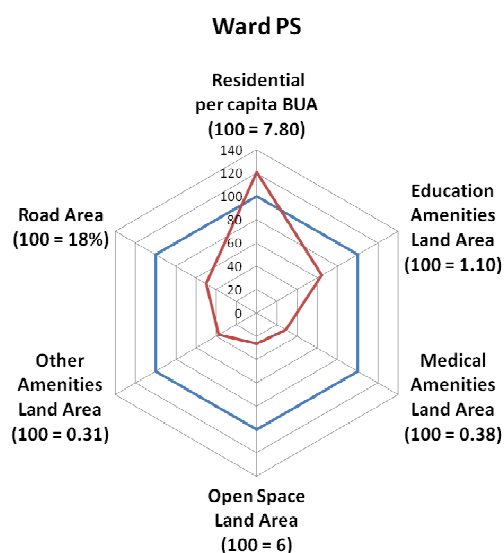
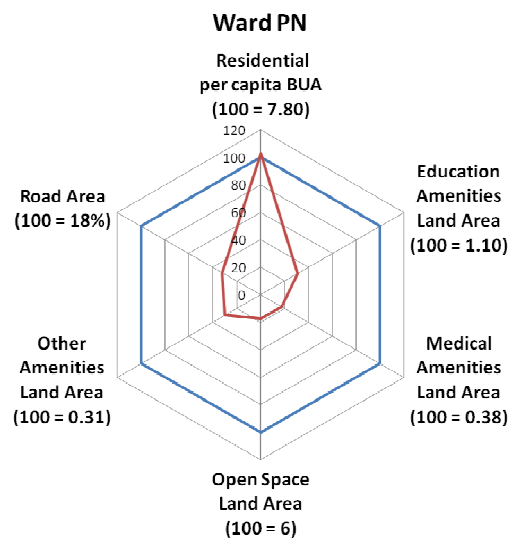
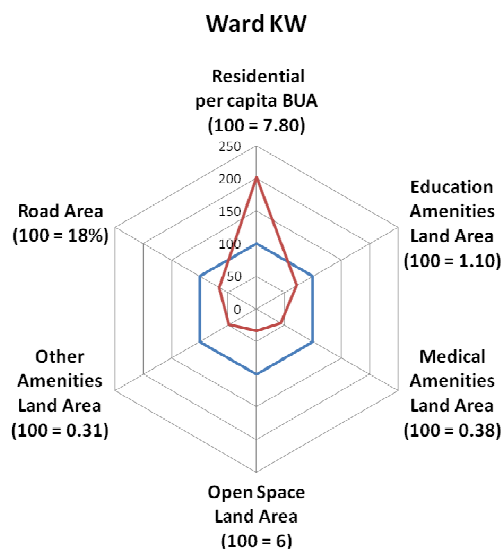
(Note: *Other Amenities include Social amenities such as, Fire stations, Police station, Police chowkey, wholesale markets, Municipal markets, Cemeteries and PSC)





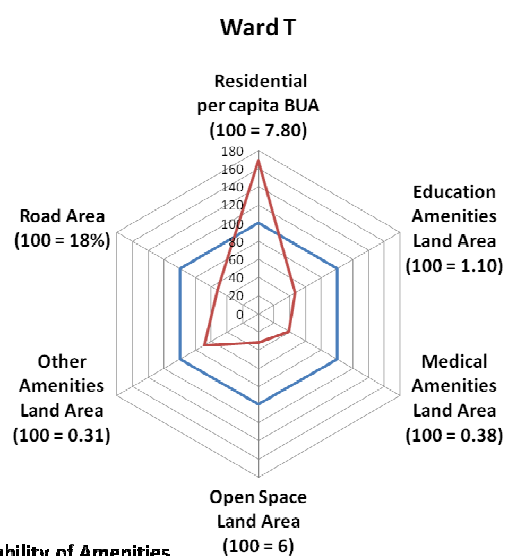
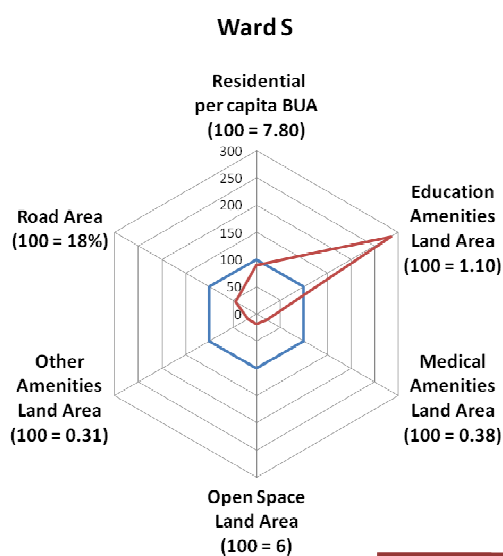
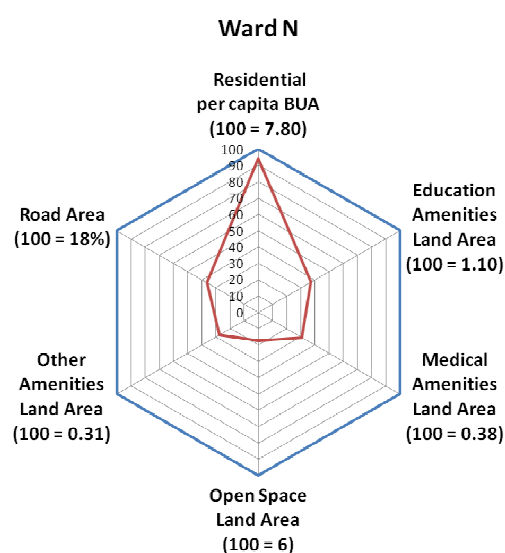
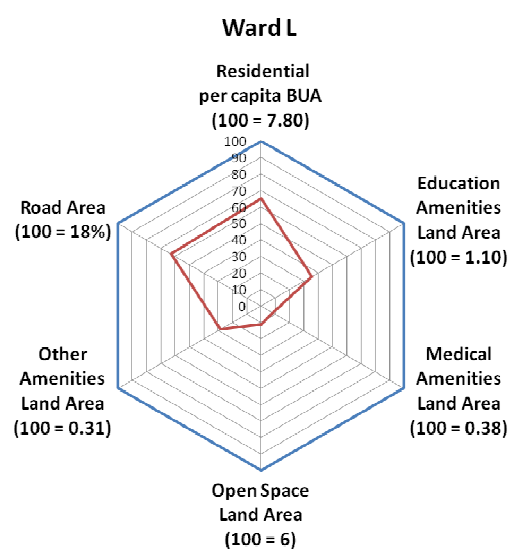
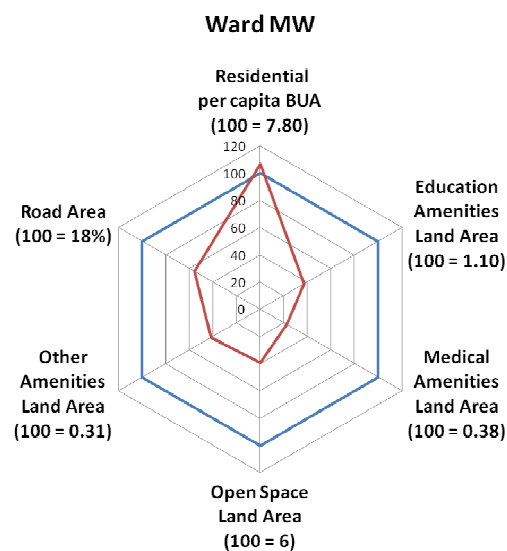
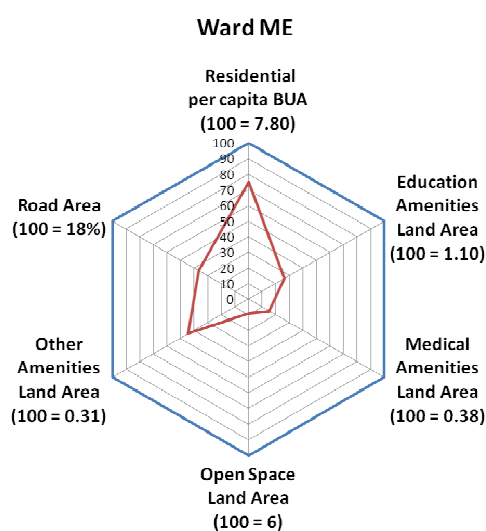
Existing per Capita Availability of Amenities

DP 1991 Benchmark



Existing per Capita Availability of Amenities

DP 1991 Benchmark



— Existing per Capita Availability of Amenities

— DP 1991 Benchmark

8.3. Accessibility to Amenities

In addition to the assessment on levels of provision of amenities against the DP 1991 standards, a spatial accessibility assessment was also undertaken. Levels of Access to primary level amenities (primary school, municipal dispensary and open spaces) from Residential Areas were mapped at 500m, 1 km and 5 km radius based on street/ road hierarchy on the GIS platform. The mapping reveals that Open Spaces and Primary Schools are very well distributed at the neighbourhood level within the Residential Areas in terms of distance and proximity. Every residential area has Open Spaces within walkable distance of 500 m. Similarly, almost entire Greater Mumbai has a primary school located within 500m indicating a relatively good accessibility to basic education. However, municipal dispensaries are not as easily accessible from Residential Areas, since in several areas, especially in the Suburbs, dispensaries are located beyond a distance of 1 km.

8.3.1 Accessibility to Education Amenity

In Greater Mumbai there is quite an even distribution of Education Amenities, with approximately 94.59% of Residential Areas located within 1km access to a Municipal education facility. The assessment is a spatial one and does not take into account the number of schools needed to serve the population size, sufficiency of class room space, teachers and facilities availability or management related issues.

8.3.2 Accessibility to Medical Amenity

In Greater Mumbai there is fairly even distribution of Medical Amenities with some underserved areas where people need to travel more than 1 km distance to access medical facility. 59.86% of Residential Areas have accessibility to Municipal Medical facility within 1 km distance whereas 93.02% of Residential Areas have a Municipal Medical facility within 2 km distance. However, the accessibility does not relate to the number of facilities needed to serve the population size, management related issues and facilities availability specific to areas.

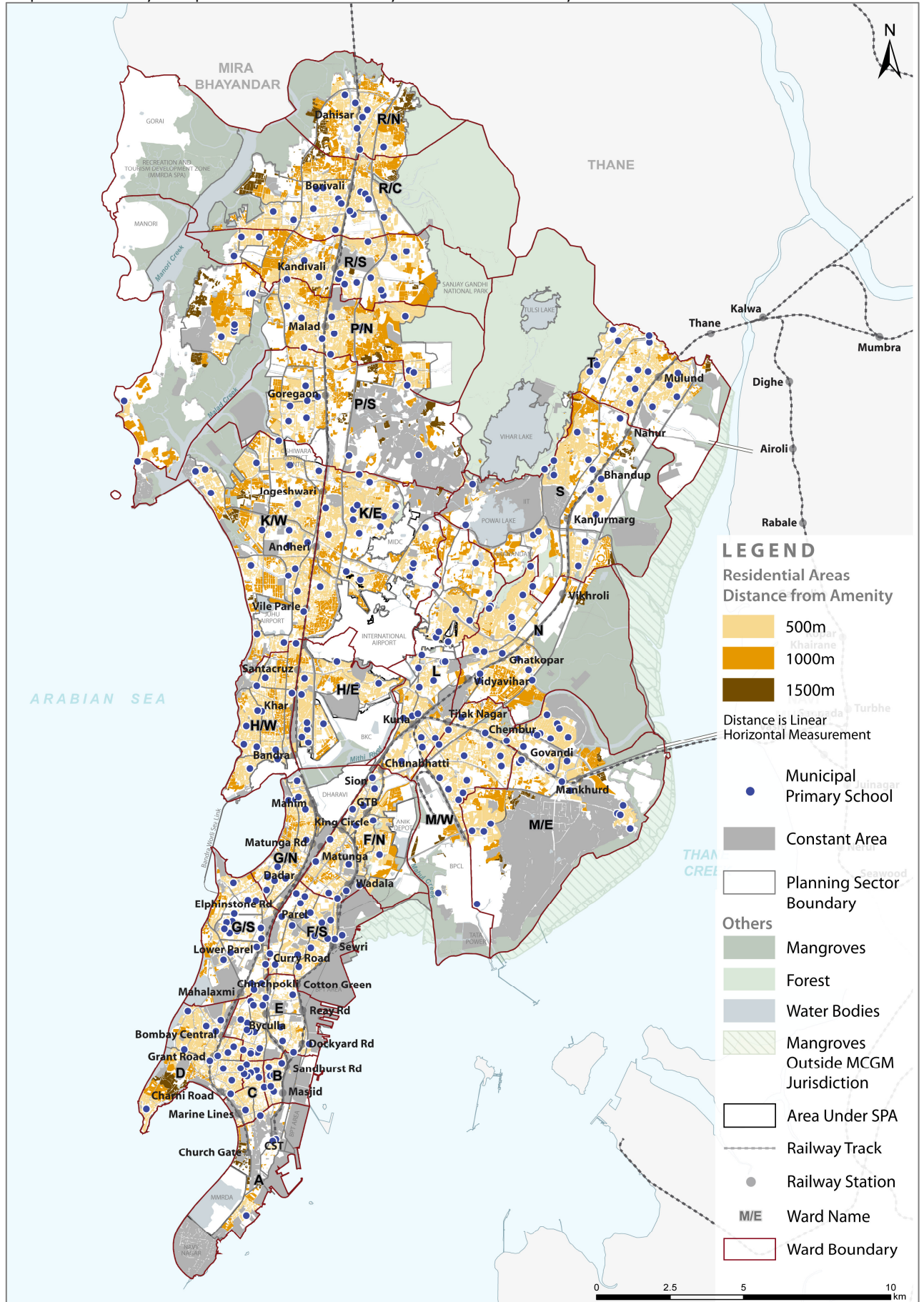
Note: Spatial accessibility assessment does not take into account private dispensaries, maternity homes, clinics and hospitals which form part of residential or commercial buildings.

8.3.3 Accessibility to Open Spaces

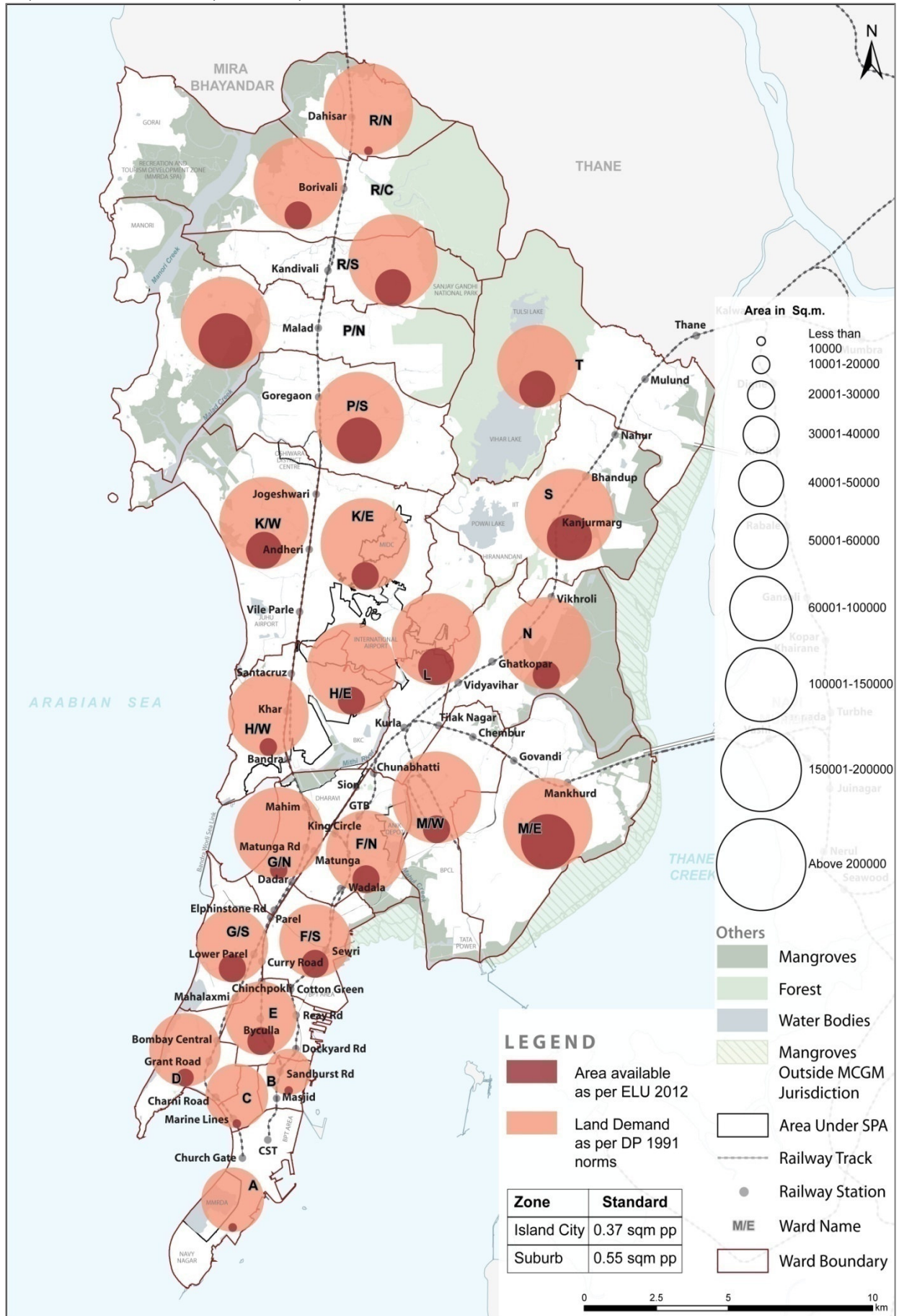
In Greater Mumbai there is a fairly even distribution of Open Spaces with 99.88% of the Residential Areas having some form of Open Spaces available within 1 km distance. However, size and number of Open Spaces necessary for the size of population to be served, public access, crowding in the Open Spaces (due to high population density and low per capita availability) and accessibility to safe and well-maintained Open Spaces are of concern.

The following maps indicate accessibility and spatial distribution of primary level Educational facilities, Medical Amenities, and Open Spaces for Greater Mumbai.

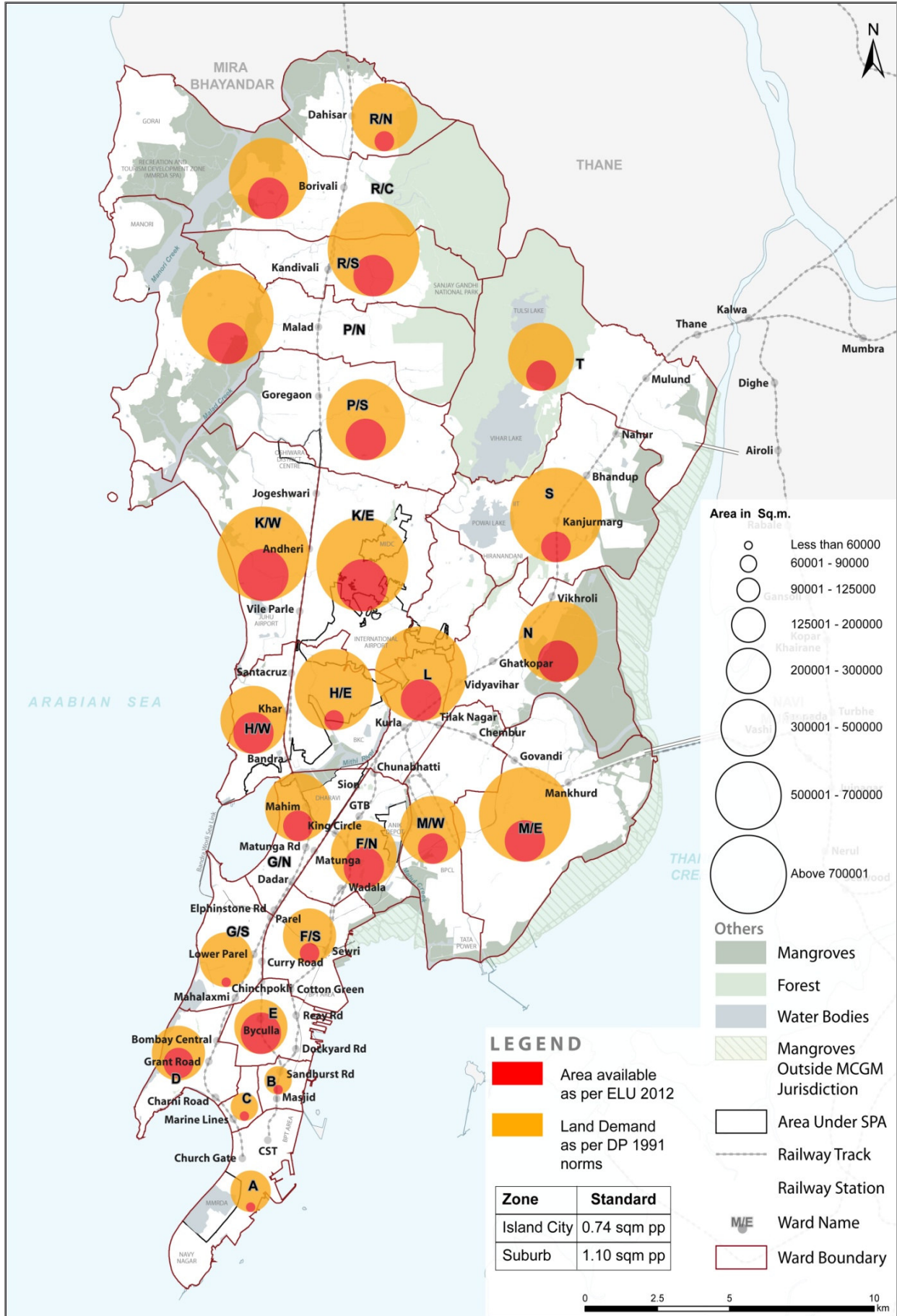
Map 8.1 Accessibility and Spatial Distribution of Primary Level Education Amenity



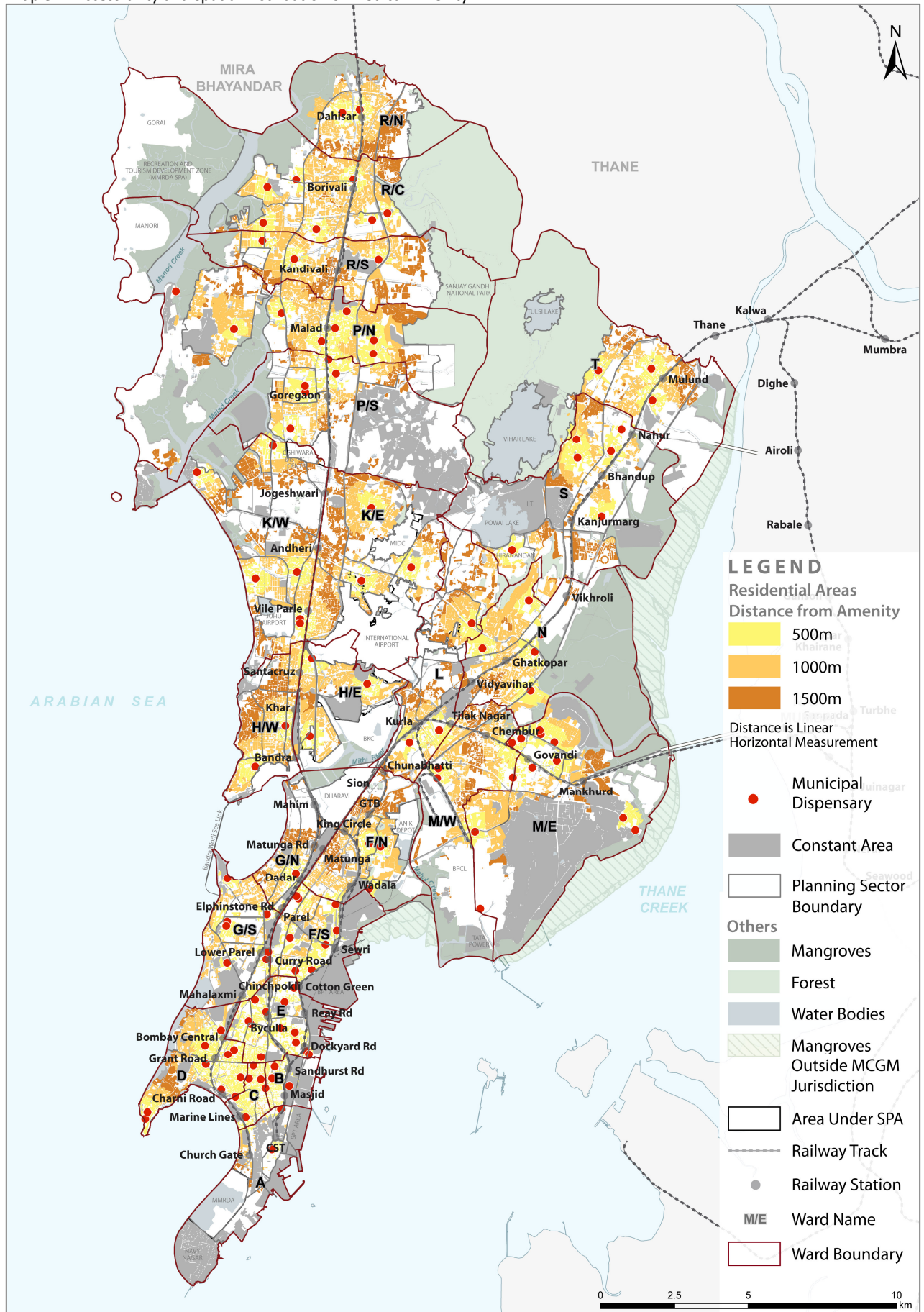
Map 8.2: Current Demand Gap for Primary Education



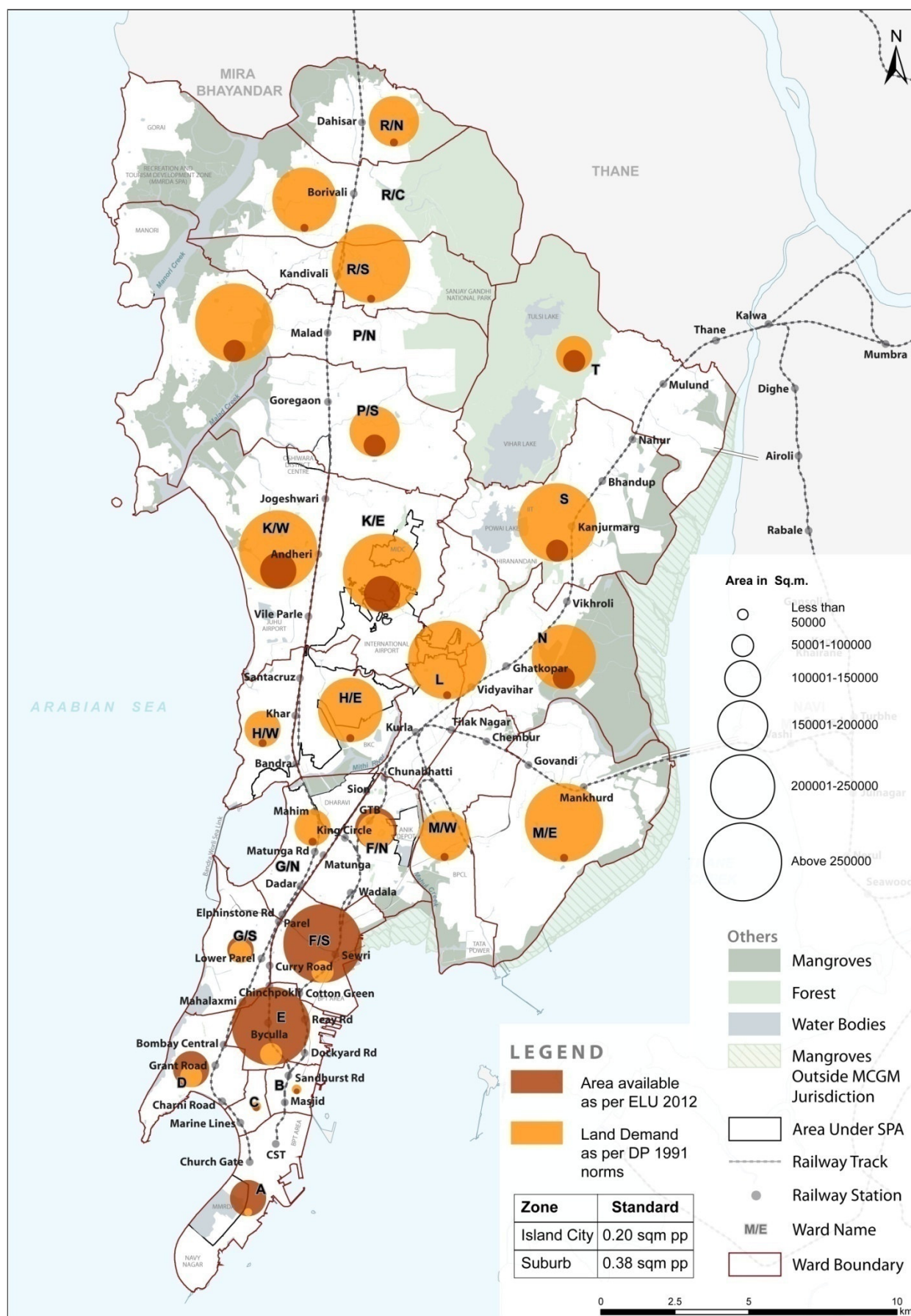
Map 8.3: Current Demand Gap for Primary and Secondary Education



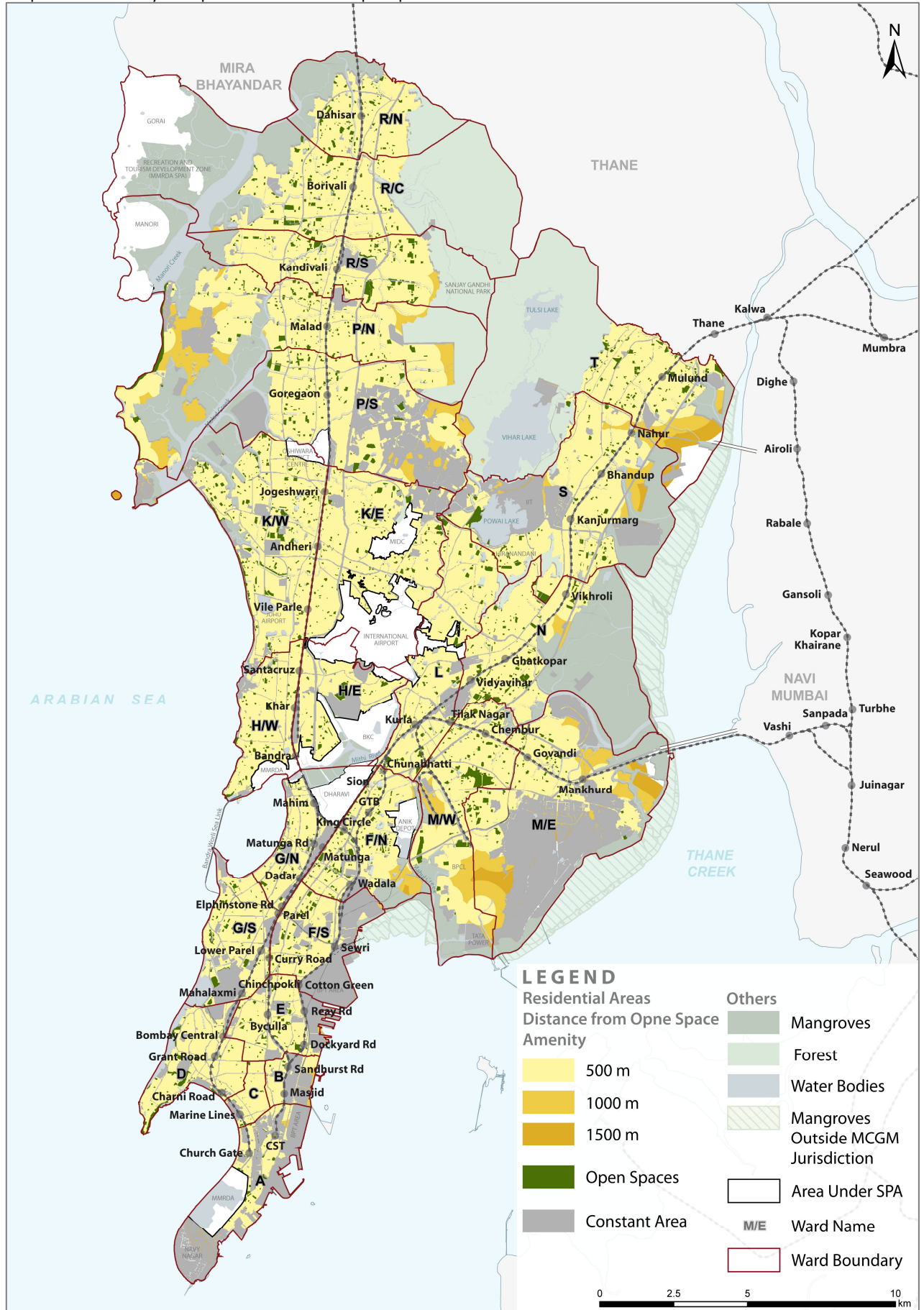
Map 8.4: Accessibility and Spatial Distribution of Medical Amenity



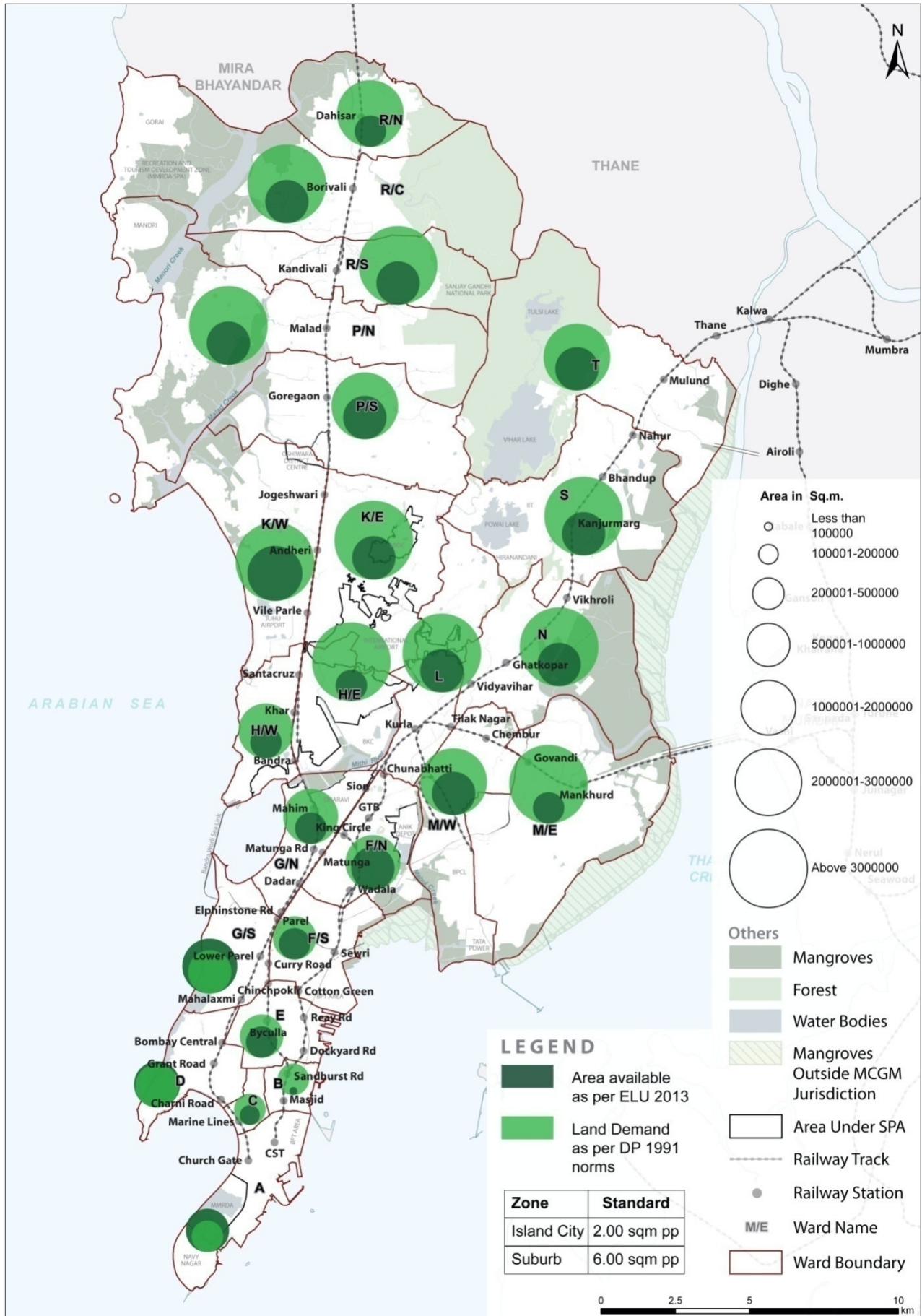
Map 8.5: Current Demand Gap for Medical



Map 8.6: Accessibility and Spatial Distribution of Open space



Map 8.7: Current Demand Gap for Open Space



8.4. Levels of Access to Open Spaces

In comparison to the DP 1991 standards, the ELU 2012 data reveals that only 7 wards out of 24 wards in Greater Mumbai attain the standards. Ward level data indicates that 3 of the 9 Wards in the Island City - Wards A, D, G/S, have per capita Recreational Open Space in excess of 2 sqm per person (which was the Open Space standard as per DP 1991 for the Island City) while in the Suburbs only 3 Wards in the Western Suburbs-P/N, R/C, R/S have per capita open space close to/in excess of the standard of 6 sqm per person and only Ward T in the Eastern Suburbs exceeds the standard. Wards K/W, R/N and M/W have per capita open spaces beyond 2 sqm per capita. Further, though open spaces are well distributed throughout the city and are easily accessible to people at the neighbourhood level within 500-800m from their homes, as per MMREIS data, only 47.63% of the existing open spaces are free and open to the public implying that there is much lower actual per capita open space availability.

8.4.1 Accessibility to Open Spaces

Table 8.6: Distribution of Natural Areas and Open Spaces: Ward wise

Zones	Ward	Population 2011	Open Space Land Area (Ha)*	Open Space Per Capita Land Area (sqm pp)	Natural Areas per ward** (Ha)	Total Open Space and Natural Areas (Ha)	Per Capita Natural Areas and Open Space Land Area (sqm pp)
Island City	A	185014	74.86	4.05	3.37	78.24	4.23
	B	127290	2.03	0.16	0.00	2.03	0.16
	C	166161	13.23	0.80	0.00	13.23	0.80
	D	346866	87.95	2.54	63.11	151.07	4.36
	E	393286	42.41	1.08	0.37	42.78	1.09
	F/N	529034	51.95	0.98	170.49	222.44	4.20
	F/S	360972	26.57	0.74	30.69	57.27	1.59
	G/N	599039	42.01	0.70	5.74	47.75	0.80
	G/S	377749	125.15	3.31	83.88	209.03	5.53
Western Suburbs	H/E	557239	30.65	0.55	2.95	33.60	0.60
	H/W	307581	37.15	1.21	28.86	66.01	2.15
	K/E	823885	64.46	0.78	32.45	96.92	1.18
	K/W	748688	155.92	2.08	411.72	567.63	7.58
	P/N	941366	557.69	5.92	1151.68	1709.38	18.16
	P/S	463507	77.46	1.67	184.96	262.41	5.66
	R/N	431368	203.61	4.72	418.82	622.43	14.43
	R/C	562162	1478.31	26.30	576.10	2054.42	36.54
	R/S	691229	489.53	7.08	115.01	604.54	8.75
Suburbs	L	902225	61.91	0.69	55.78	117.68	1.30

Zones	Ward	Population 2011	Open Space Land Area (Ha)*	Open Space Per Capita Land Area (sqm pp)	Natural Areas per ward** (Ha)	Total Open Space and Natural Areas (Ha)	Per Capita Natural Areas and Open Space Land Area (sqm pp)
	M/E	807720	45.05	0.56	438.30	483.35	5.98
	M/W	411893	96.53	2.34	297.02	393.55	9.55
	N	622853	65.28	1.05	1336.48	1401.75	22.51
	S	743783	111.39	1.50	658.43	769.82	10.35
	T	341463	2070.10	60.62	764.16	2834.26	83.00
Greater Mumbai		12,442,373	6,011.22	4.83	6,830.38	12,841.60	10.32

Source: Existing Land Use Survey, 2012

* **Includes:** Playground, Recreational Ground, Parks and Garden, Clubs and Gymkhana, Promenade, Beach, Swimming Pool and Sanjay Gandhi National Park

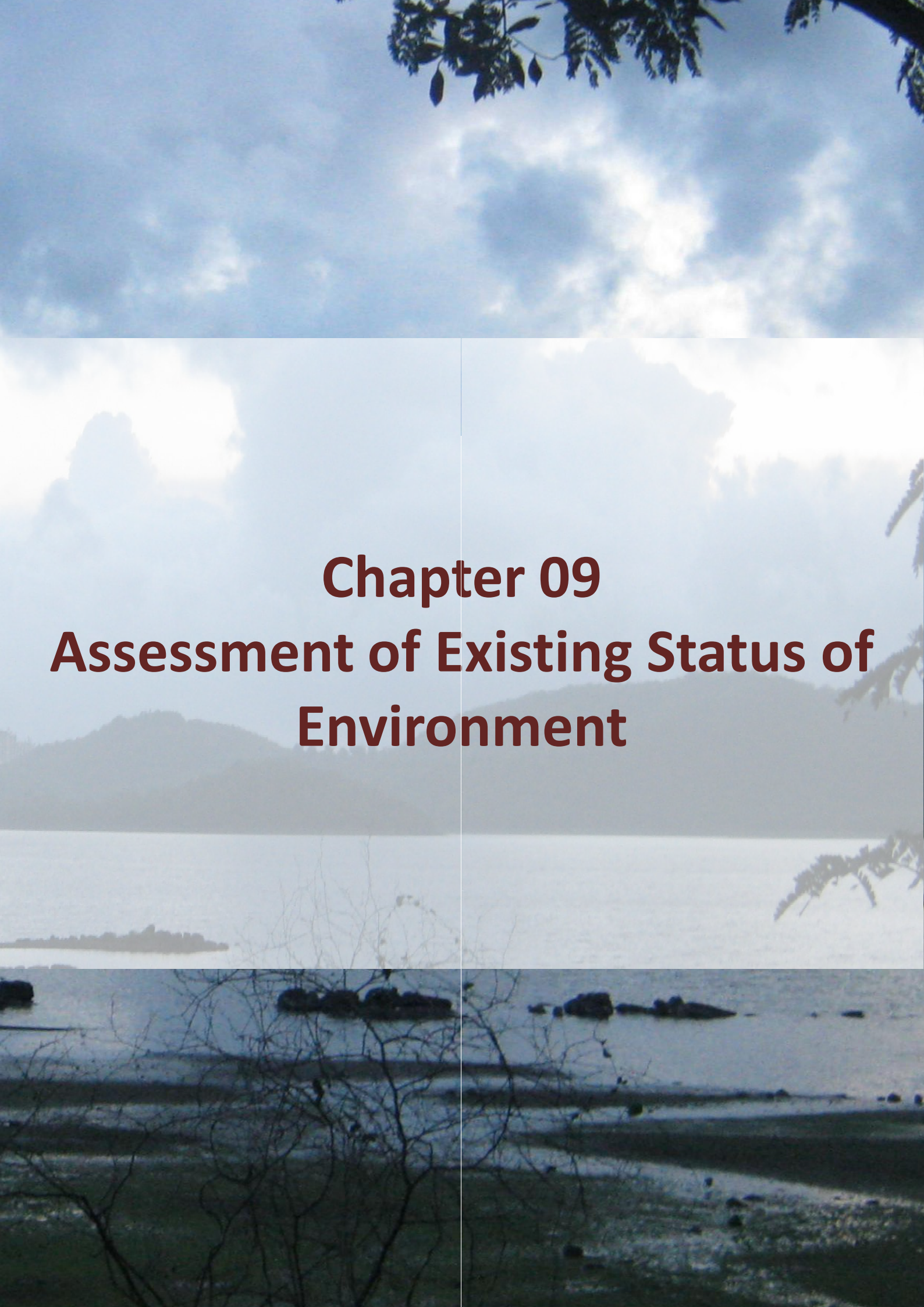
****Includes:** Sanjay Gandhi National Park, Mangroves, Mud Flats, Hills, River/ Creeks/ Natural Water Bodies, Lakes, Tanks/ Ponds

8.5. Summary of Access to Land for Amenity and Open Space

DP 1991 had differential planning standards for the Island City and the Suburbs. As per these differential standards, the Island City is well provided only in terms of Medical amenities while for primary and secondary educational amenities and open space it is under provided. The Suburbs are underprovided in terms of all amenities and open space as well. The distribution of amenities however varies substantially across all Wards and Planning Sectors.

- The Island City presents the highest degree of provision of amenities followed by the Western Suburbs and Eastern Suburbs, in that order. Wards M/E and L exhibit a major deficit of amenities in comparison with planning standards of the DP 1991;
- Most of the Residential Areas are provided with basic amenities such as primary education and open spaces within walking distance while 60% of the residential neighbourhoods have municipal dispensaries within walking distance. It is important to note that distance based accessibility does not incorporate sufficiency of per capita space, maintenance and management related issues;
- The average per capita availability for Open Spaces in Greater Mumbai is 1.24 sqm pp. As compared to the 2.0 sqm per person (Island City) and 6.0 sqm per person (Suburbs) prescribed by DP 1991 standards, the per capita availability of Open Spaces in the Island City is 1.51 sqm pp, in the Eastern Suburbs is 1.09 sqm pp, and in the Western Suburbs is 1.18 sqm pp.

In Greater Mumbai the average per capita availability of all Medical Amenities is 0.17 sqm pp, the average per capita space available for all educational Amenities is 0.69 sqm, space for Social Amenities is 0.16 sqm per person and space for Public Utilities and Facilities 0.56 sqm per person.



Chapter 09

Assessment of Existing Status of Environment

9. Assessment of Existing Status of the Environment

The natural systems of Greater Mumbai consist of hills and bays, coastal ecosystem, natural drainage system including rivers, and the forest areas. Greater Mumbai has 26 km of coastline along its western edge. A third of the area of Greater Mumbai is under natural Open Spaces including forests, water bodies, mangroves and wetlands. It is also one of the few cities in the world to have a National Park (Sanjay Gandhi National Park) within city limits. Greater Mumbai has three lakes (Powai, Vihar and Tansa), four rivers (Mithi, Oshiwara, Dahisar, and Poisar) and several creeks and hills. Owing to the geographical location and the rapid development of the city, large areas under marsh and mangroves have been reclaimed to accommodate an ever-growing population which in turn creates flooding in several areas during the monsoon season. The recent Fact Finding Committee (FFC) report analyzed the reasons behind natural calamities in Greater Mumbai and put a major onus of such a situation on the ever-growing urbanization and development of the city, along with other causes.

9.1. Evaluation of Environmental Considerations in DP 1991

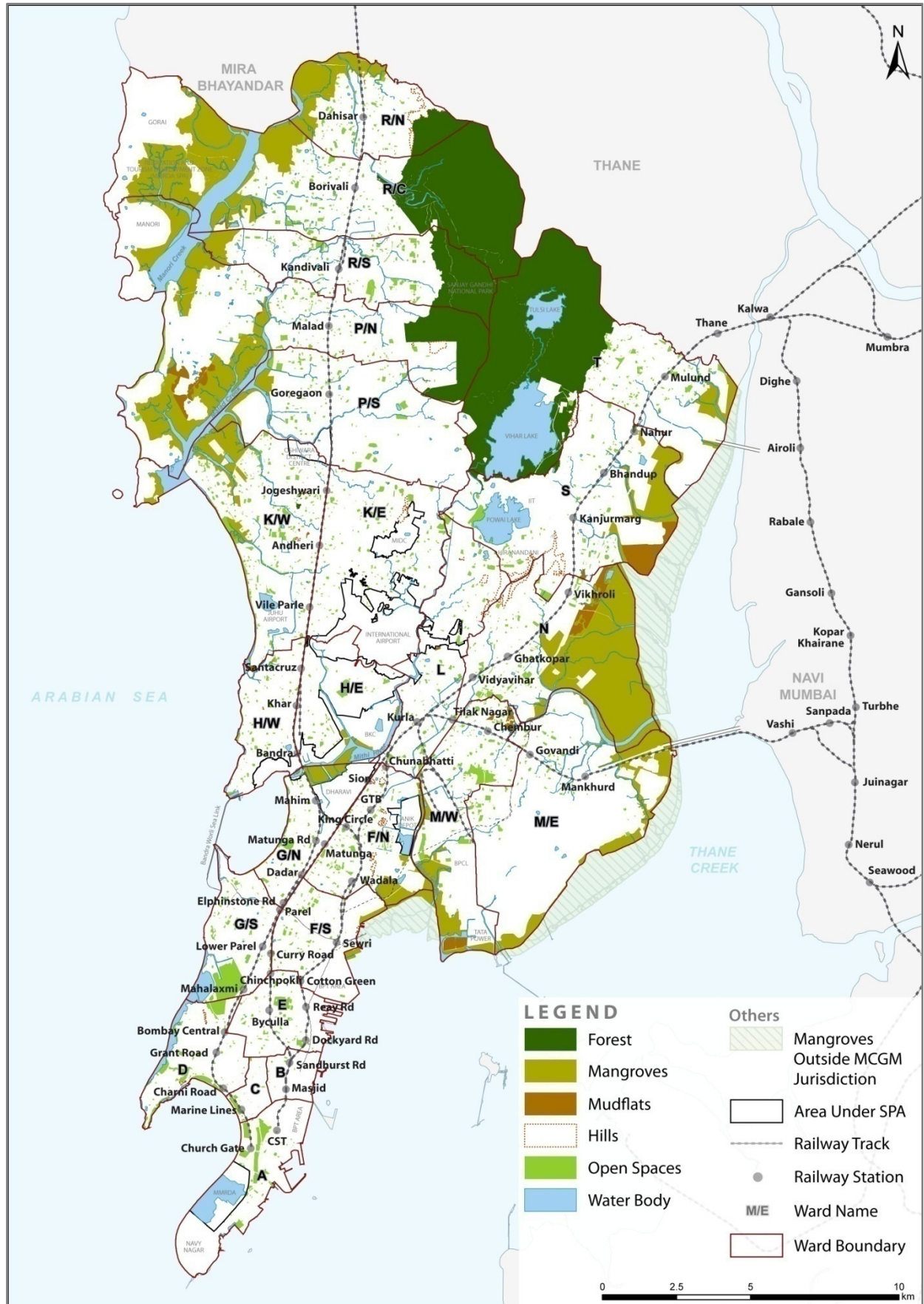
The Revised DP-1991 focused on development e.g. creation of CBDs, shifting of whole sale market, reduction of industrial area to be replaced by housing, FSI, up-gradation of mass transport systems, housing policy, NDZ etc. However, issues related to the environment, including ecology, biodiversity, and sustainability is conspicuous by their absence in the Revised DP-1991. This is a big shortcoming of the existing DP 1991.

An enhanced ecological condition and biodiversity is essential to maintain a balance between the built and natural environments. An ecological approach would not only help sustain livelihoods but also mitigate various problems associated with air, water and environmental pollution.

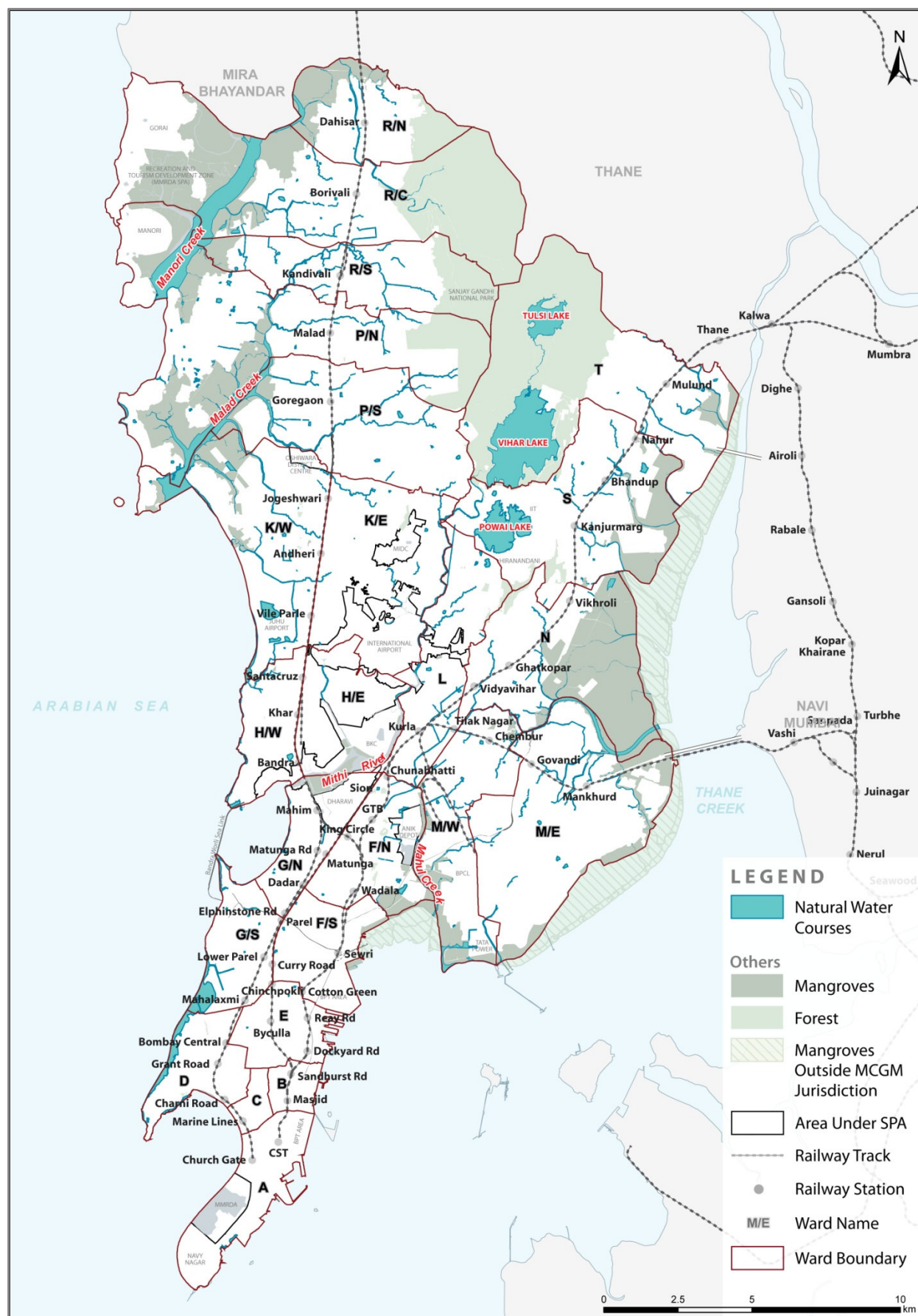
The DP 1991 covers several aspects which directly impact the environmental condition of Greater Mumbai, viz. solid waste management; Drainage network and sewerage management; Mobility, public transport and Open spaces, green areas and water bodies.

The integration of all the above and reflection of the same in formulating the zoning and development control regulations in order to address the larger agenda of ecology, bio diversity and sustainability was not a consideration in Revised DP 1991 for Greater Mumbai. Similarly, aspects of climate change and energy efficiency were not deemed part of DCRs in the prevailing Development Plan.

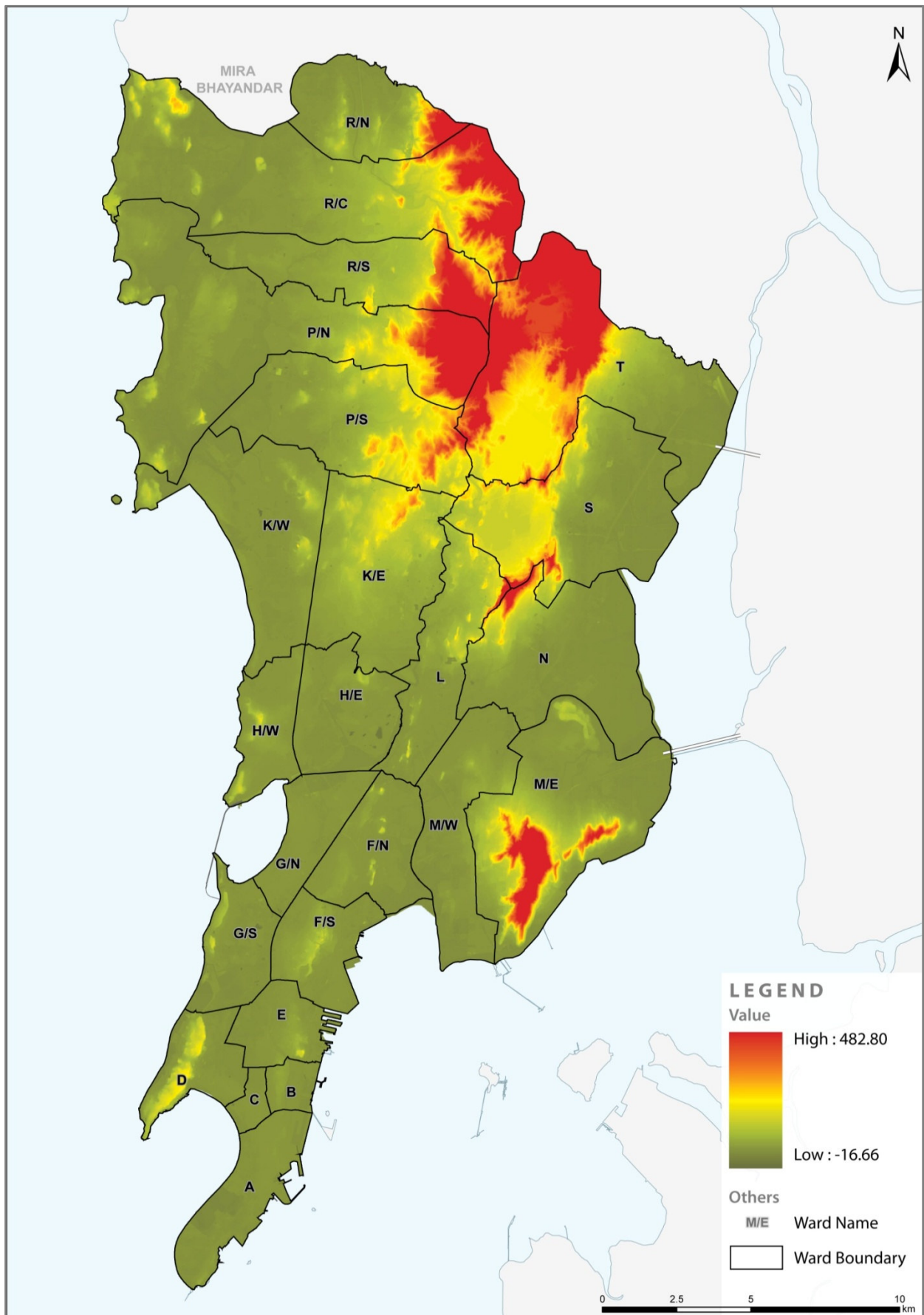
Map 9.1: Existing Natural Areas and Open Spaces



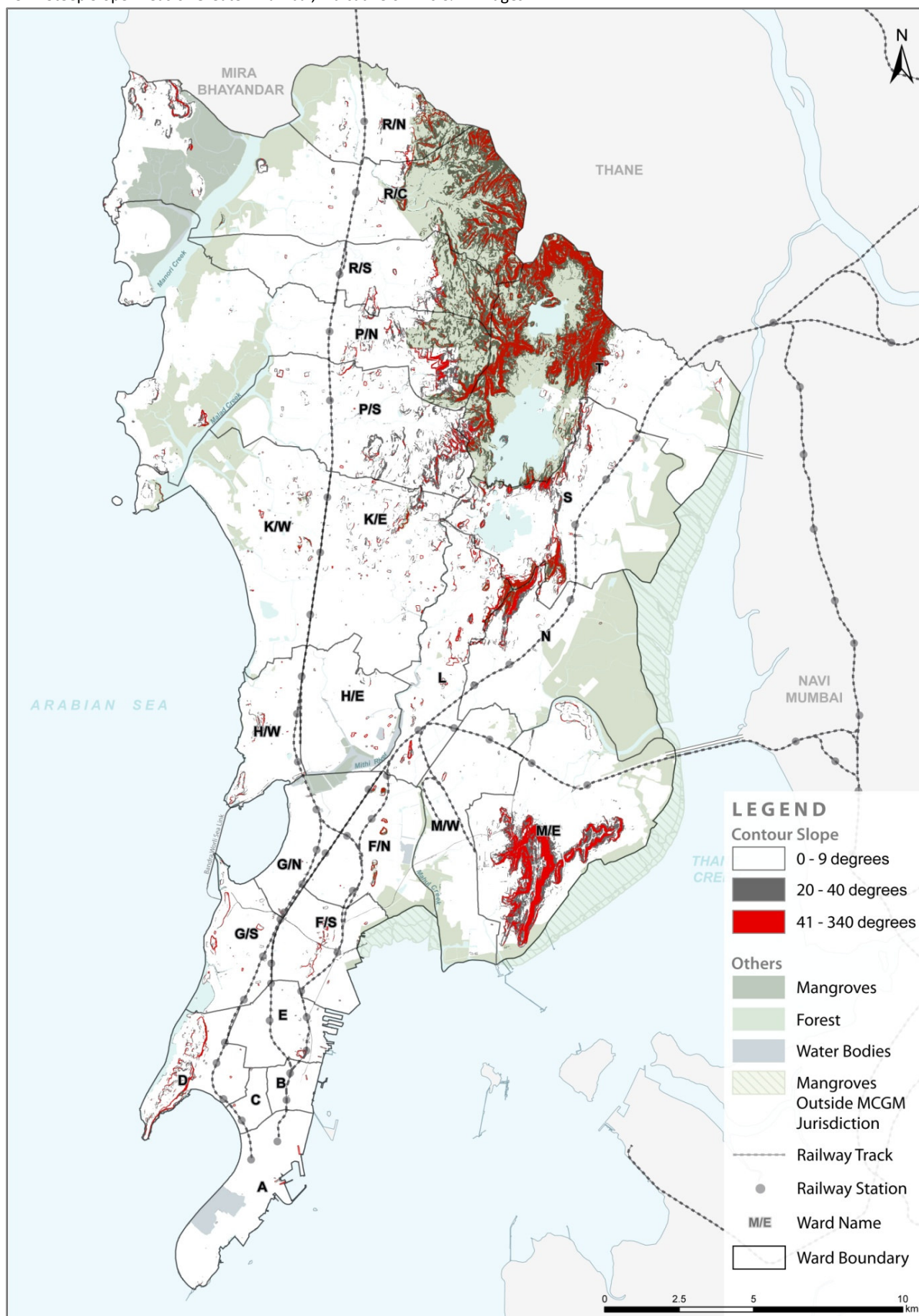
Map 9.2: Rivers and watercourses of Greater Mumbai



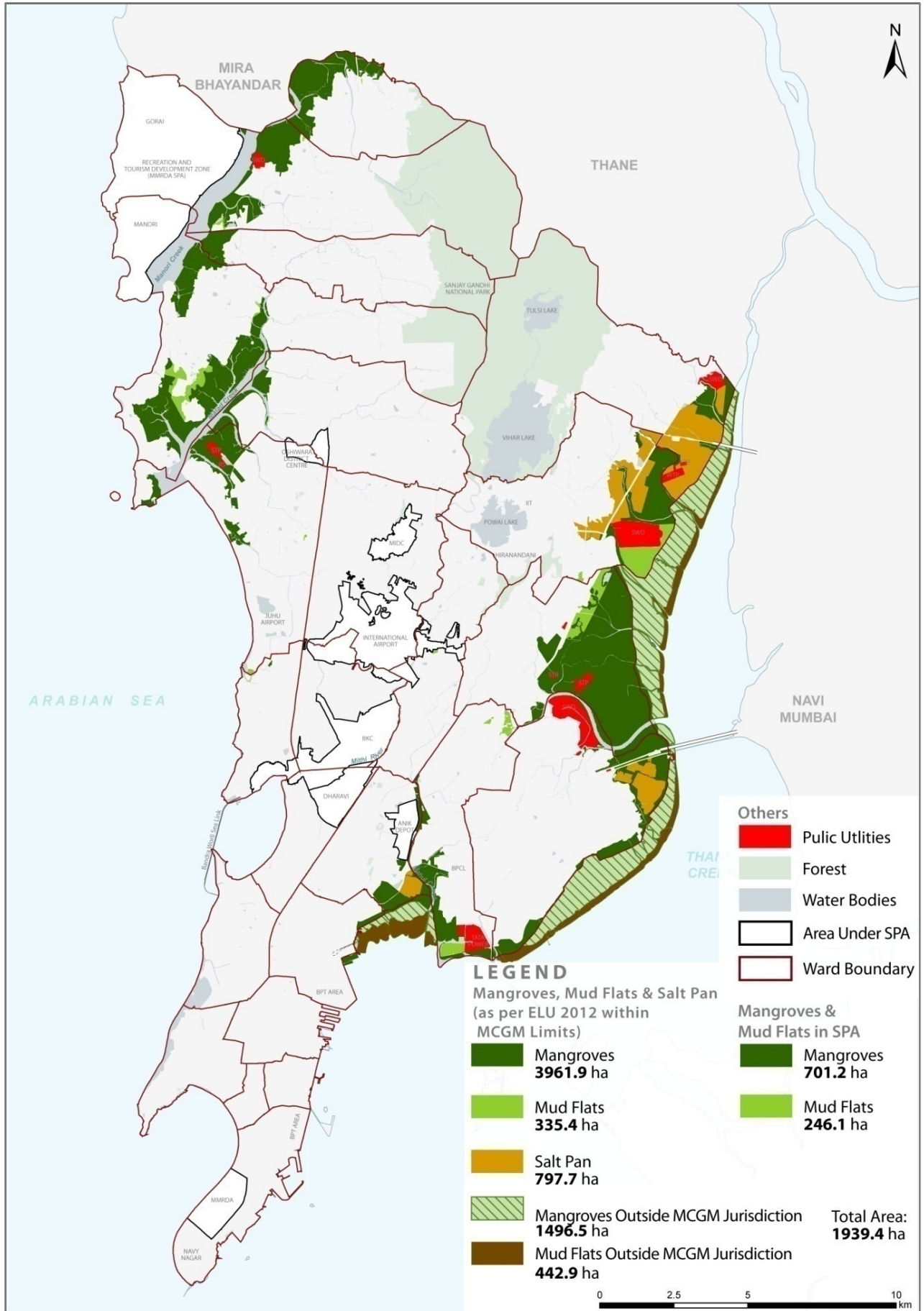
Map 9.3: Elevation Map of Greater Mumbai



9.4: Steep Slope Areas of Greater Mumbai, indicative of hills & hill ridges



Map 9.5: Mangroves, mudflats & salt pans in Greater Mumbai



9.2. Status of Environment

Currently, Greater Mumbai's environmental health is severely compromised due to increasing air pollution largely caused by vehicular pollution; increasing water pollution due to inadequate sewerage system and industrial pollution along with non-segregated garbage and plastic waste clogging drainage systems. Inadequate and poorly managed landfill sites are yet another cause of environmental pollution.

The overall status of the environment is analyzed in terms of standard indicators that measure air quality, water quality and noise level:

9.2.1 Pollution Indicator

a) Air Quality

The key causes for air pollution include industries, automobiles, dust due to construction activity and movement of vehicles, foul gases due to unattended sewage and garbage etc. This also includes industrial pollution from industries in the neighbouring MMR on which MCGM does not have control. The air quality for MCGM is monitored against a set of six major pollutants at fixed monitoring sites at six places (Worli, Khar, Andheri, Bhandup, Borivali, Maravli). While three of them have shown presence of pollutants in air within CPCB standard limits, the other three have exceeded the same (refer Table 9.1). However, ambient air pollution levels have largely met CPCB standards. Seasonal fluctuation due to wind direction, monsoon etc, and variations in air quality could be noted. With industries being mainly located in the North - North Eastern part of MCGM, high pollution levels are recorded during winter when the predominant wind direction is from North - North East. Although emission load from transport sector has decreased, it still remains the single major contributor to air pollution in MCGM (refer Table 9.1).

Table 9.1: Comparison with CPCB standards (annual avg.) at fixed air monitoring sites in 2010-2011

Sr.No.	Unit	SO ₂	NO ₂	NH ₃	SPM	LEAD	B (a)P**
1	Range*	7 - 10	14-50	37-242	125-642	0.07-0.37	0.3-0.9
2	Maximum at	Maravli & Bhandup	Maravli	Maravli	Maravli	Maravli	Maravli & Khar
3	CPCB Standards Annual Average	50 µg/m ³	40 µg/m ³	100 µ/m ³	140 µ/m ³	0.5 µ/m ³	1 ng/m ³
4	Comparison with Standards	Not Exceeded	Exceeded at Maravli & Khar	Exceeded Maravli	Exceeded at all sites except Borivali	Not Exceeded	Not Exceeded
* Unit µ/m ³ ; ** Unit ng/m ³							

Source: Environmental Status of Brihanmumbai 2010-2011, MCGM and * Benzo(a)Pyrene

Table 9.2 Emission load of Mumbai city in the year 2010-2011 (Tonnes/Day)

Sr.No.	Use	SO ₂	Particulate Matter	NO _X	CO	HC	Total
1	Domestic	4.41	9.15	29.23	93.81	34.74	171.34
2	Industrial	24.01	0.21	0.05	-	-	24.27
3	Refuse burning	0.16	1.56	0.32	5.99	2.22	10.25
4	Transport						
4.1	Transport (Diesel)	5.96	2.48	34.15	18.12	7.16	67.87
4.2	Transport (petrol)	0.66	0.18	18.2	265.3	39.05	323.39
	Total	35.2	13.58	81.95	383.22	83.17	597.12

Source: EIG, MCGM

Table 9.3 Annual levels of SO₂, NO₂, RSPM, CO at traffic junctions during 2008-2011

Site	SO ₂			NO ₂			RSPM			CO		
	08 - 09	09 - 10	10 - 11	08 - 09	09 - 10	10 - 11	08 - 09	09 - 10	10 - 11	08 - 09	09 - 10	10 - 11
Worli	10	6	8	137	64	68	298	223	196	1	0.4	0.3
Wadala	10	6	11	254	89	72	341	271	209	1	0.3	0.4
Andheri	11	7	12	187	102	75	265	353	205	1	0.5	0.4

UNIT: CO= mg/m³ Other parameters : µg/m³

Source: Environmental Status of Brihanmumbai 2010-2011, MCGM

Table 9.4 Site wise percentage of samples exceeding CPCB (24 hrs standards in the Year 2008-2011 average)

Sr. no.	Site	SO ₂			NO ₂			NH ₂			SPM			LEAD		
		08 - 09	09 - 10	10 - 11	08 - 09	09 - 10	10 - 11	08 - 09	09 - 10	10 - 11	08 - 09	09 - 10	10 - 11	08 - 09	09 - 10	10 - 11
1	Worli	0	0	0	46	6	7	0	0	0	41	45	36	0	1	0
2	Khar	0	0	1	47	9	2	1	0	0	59	60	50	0	0	0
3	Andheri	0	2	0	46	16	2	1	0	0	60	57	39	0	0	0
4	Bhandup	0	0	0	37	2	0	0	0	0	60	52	48	0	0	0
5	Borivali	0	0	0	2	0	0	0	0	0	9	12	11	0	0	0
6	Maravli	0	1	0	44	30	9	20	24	17	71	84	88	1	2	6
Source: Environmental Status of Brihanmumbai 2010-2011, MCGM																

The tables 9.3 and 9.4 show trend of air pollution in all three zones in the MCGM area at specific locations including variations and fluctuations across type of pollution index.

For example, in Worli located in Island City, the site wise percentage of samples exceeding CPCB standards varies across type of pollutants (higher in case of NO₂ and SPM). However, the ambient air quality levels in Worli again substantiate the above finding; it also shows substantially high levels of concentration in other pollutant categories (i.e., NH₂). The monthly average pollution index for Worli reveals higher levels of pollution in the winter season (specifically from December to February), leading to unsatisfactory pollution index. The consecutive three years data show a small level of decrease in some of the pollutant categories like SPM, NO₂, SO₂. However, increase in levels of NH₂ and lead is noted.

In Andheri in Western Suburbs and Bhandup in Eastern Suburb, all the three indicators discussed above follow a similar pattern. However, between these three locations in three different zones, there is certain degree of variation. Andheri in Western Suburbs generally shows a higher polluting level than other two locations in Island City and Eastern Suburbs.

Health Impacts of Increased Air Pollution

Outdoor air pollution is associated with increased mortality and morbidity across all ages; adult cardiovascular diseases and lung cancer are associated with long term exposure to air pollution, and respiratory diseases depending on exposure levels and intensity of pollution. In fact, as per the WHO Report 2002, outdoor air pollution was found to account for approximately 1.4% of total mortality, 0.5% of all disability-adjusted life years (DALYs) and 2% of all cardiopulmonary disease.

b) Water Quality

Drinking Water Quality

The major source of water contamination is in the form of bacteriological content. During 2010-11, about 25% samples show trace of contamination, with maximum contamination in Ward E, Regular monitoring and quality check is done by the corporation for maintaining drinking water quality standards. Various projects are being carried out for this purpose. The water quality data shows a general increase in the percentage of unfit samples in all three zones and across most wards between 2008 - 09 to 2009 -10. However, that has come down slightly in the next year. The wards having particularly higher percentages of unfit samples (ranging above 30%) are Ward A and Ward E in the Island City, Ward P/S in the Western Suburbs and Ward L in the Eastern Suburbs. On the other hand, the wards having particularly lower percentages of samples (ranging below 20%) are Ward P/N in the Western Suburbs and Ward N in the Eastern Suburbs and none in the Island City.

Table 9.5 Ward wise % of unfit water samples April 2008 to March 2011

No.	Ward	% of unfit samples 2008-2009	% of unfit samples 2009-2010	% of unfit samples 2010-2011
1	Reservoir	10.1	22.6	16.03
Island City				
2	A	17.51	31.7	32.5
3	B	16.47	26.2	26.97
4	C	16.74	27.9	26.6
5	D	14.92	29.2	25.41
6	E	16.67	29.6	36.68
7	F/N	10.83	22.9	22.67
8	F/S	10.46	25.2	27.71
9	G/N	10.86	23.4	22.5
10	G/S	9.59	26.0	26.34
Western Suburbs				
11	H/E	15.67	27.1	23.86
12	H/W	10.83	21.3	20.3
13	K/E	13.59	23.6	26.91
14	K/W	15.89	29.1	21.49
15	P/N	9.21	19.9	18.51
16	P/S	25.5	39.3	32.24
17	R/C	15.3	25.5	27.32
18	R/N	12.49	24.3	22.04
19	R/S	11.76	26.4	22.52
Eastern Suburbs				
20	L	19.13	30.5	32.94
21	M/E	10.43	25.1	22.97
22	M/W	10.3	25	21.16
23	N	11.42	28.4	16.82
24	S	21.01	29.1	27.03
25	T	8.25	24.7	21.64
	Total	13.8	26.1	24.64

Source: Water testing Laboratory, G/N ward office, Dadar, MCGM

Coastal Water Quality

Most of the coastal water tested had higher than permissible levels of BOD (except Malabar Hill) and Faecal Coliform (except at Haji Ali). This clearly shows the pollution outcomes of the lack of adequate sanitation and secondary level sewage treatment.

Table 9.6 Coastal water quality of Mumbai - 2010-2011

Location	pH	DO in ppm	BOD in ppm	Faecal Coliform
Gateway Of India	7.81	5.20	9.31	758
Nariman Point	8.00	5.48	5.45	900
Malabar Hill	8.08	5.95	4.60	1600
Haji Ali	8.08	5.43	5.75	500
Worli Seaface	7.92	5.21	8.45	882
Shivaji Park	7.92	5.54	5.08	1600
Juhu Beach	7.68	4.95	5.65	1750
Versova Beach	7.84	4.69	8.71	1070
Mithi river	7.31	3.27	30.11	1800
SW-IV Standards (Harbour Waters)	6.50 - 9.00	3.00	5.00	500

BOD: Biochemical Oxygen Demand; DO: Dissolved Oxygen

Source: MPCB

Health Impacts of Poor Water Quality

The drinking water quality of Greater Mumbai is of concern since it directly leads to water borne diseases like Cholera, Gastroenteritis, E Coli, Jaundice, Dysentery, Diarrhea, Typhoid, Hepatitis A, etc.

c) Noise Level

The prevailing daytime noise levels in all areas across the city (residential, commercial, airport and silent zones) are uniformly higher than the permissible PCB standard of 55 db.

The maximum noise levels are recorded in Airport and Industrial areas apart from traffic zones in MCGM. The locations of silent zones have been identified in each Ward as per court order. However, even the residential areas and the silence zones have recorded high noise levels, more than recommended standards. Noise levels observed in various zones is given in the Table 9.7 below.

Table 9.7: Range of noise levels observed with respect to the standards, 2010-2011

Area	Prevailing Noise Levels in Mumbai	C.P.C.B. Standard	
		Day db (A)	Night db (A)
Residential	60-73	55	45
Commercial	59-79	65	55
Traffic	65-85	65	55
Airport Area	80-88	65	55
Silence Zone	55-78	50	40
Industrial	60-74	75	70
Indicative Sound Level During Festival & Processions			
Ganesh Festival	78-108	-	-
Diwali Festival	69-91	-	-

Source: Central Pollution Control Board and EIG, MCGM; Environmental Status of Brihanmumbai, 2010-11, MCGM

Clearly, the above table indicates that noise pollution is a serious issue in Greater Mumbai with noise levels exceeding the standards in almost all zones except Industrial Zones. In most zones, the noise levels exceed the limit by 5 to 15 db and in traffic; the noise exceeds the prescribed limits by as much as 20 db.

Health Impacts of Increased Noise Pollution

Increased noise pollution can lead to a variety of health issues. As per the WHO, “Excessive noise seriously harms human health and interferes with people’s daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psycho physiological effects, reduce performance and provoke annoyance responses and changes in social behaviour.”⁴⁶

9.3. Environmental Vulnerability

Greater Mumbai areas are prone to three potential natural hazards of flooding, landslides and earthquake. Of these, flooding is considered to be major threat by various studies because of its greater impact on life and property seen in the past. The section below describes the areas prone to these hazards.

9.3.1 Areas Prone to Flooding

- The unusual geography and location of Greater Mumbai renders it vulnerable to environmental risks like flooding and landslides, caused due to heavy annual rainfall.
- Its estuarine setting, coupled with continuous reclamation and development in marsh lands and low lying areas have lead to an obstruction in the natural flow of water bodies and drains.
- The increased surface runoff makes the city prone to potential natural hazards including flooding triggered by high intensity rainfall.
- Most of Greater Mumbai is on reclaimed lands that are almost flat, which makes the city naturally prone to flooding. Prime city locations are lower than high tide level.
- Similarly, low lying coastal edges and river floodplains are susceptible to flooding.

⁴⁶ (<http://www.euro.who.int/en/health-topics/environment-and-health/noise/noise>) accessed 18 March 2014

There are several areas in Greater Mumbai that have been identified as chronic flooding spots. These are:

Table 9.8: Chronic flooding spots in Greater Mumbai

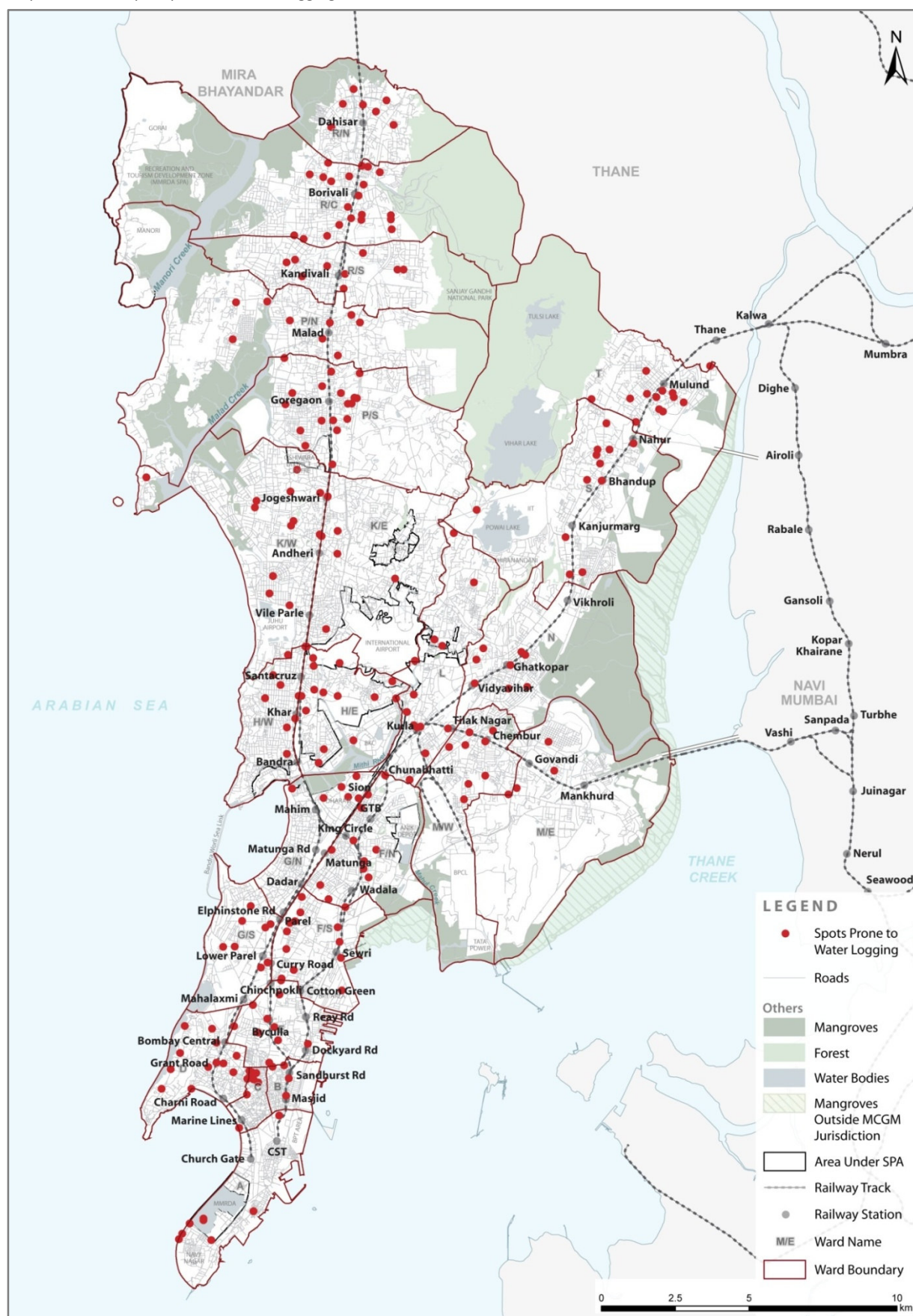
Island City	Western Suburb	Eastern Suburb
S.V.P Low level	Juhu Tara Road and S.V. Road junction, Santacruz (W)	Kurla station (W)
Sandhurst Road	Milan Subway – Santacruz (W)	L.B.S. Marg, C.S.T. junction to Sheetal cinema, Kurla (W)
Burnhi College	Andheri Subway, Andheri (W)	From Premier Road to Milind Nagar nalla, Kurla (W)
Mumbai Central	Marol Market, Andheri Kurla Road, Andheri (W)	Shanti Nagar, Baigan Wadi
King Circle	Vidyanidhi Complex, JVPD North, Vile Parle (W)	Sindhi Society, Chembur (W)
Hindmata	Gazdar Bundh, Santacruz (W)	Between 21st Road and Subhash Nagar Road, Jeevan Bhar Society, Chembur (W)
Sakhubai Mohite Marg	Bhogale Chowk, Vileparle (E)	Shanta Jog Marg, Tilak Marg, Chembur (W)
Wadala Station	Junction of M. G. Road, Subhash Road Vileparle (E)	Savan Bazar, N.G. Acharya Marg, Chembur (W)
Maratha Mandir	Veera Desai Road, Andheri (W)	Kirol Road, Near Fatima High School, Ghatkopar
	Kotkar nalla, Goregaon (W)	New Pant Nagar from Vallabh Baug extension, lane up to Railway Police Quarters, Ghatkopar(E)
	Piramal Nagar nalla, Goregaon	Naval Dockyard at L.B.S. Marg, Jn. of Chirag Nagar Road, Ghatkopar (W)
	Rani Sati Marg, Akrani Pada, Malad (E)	Bhandup village Road, near progressive steel co. Bhandup (W)
	Valnai Hutment colonies, Kandivali (W)	
	Link Road, Guri Pada, Malad (W)	
	Malad Subway, Malad (E) and (W)	
	Opposite to Kandivali Fire station, S.V. Road, Kandivali (W)	
	Sambhaji Nagar, Dahisar (E)	
	Dahisar Subway, Dahisar (E) and (W)	

Source: Revised Gap Analysis report, Revised City Development Plan, MCGM, 2012

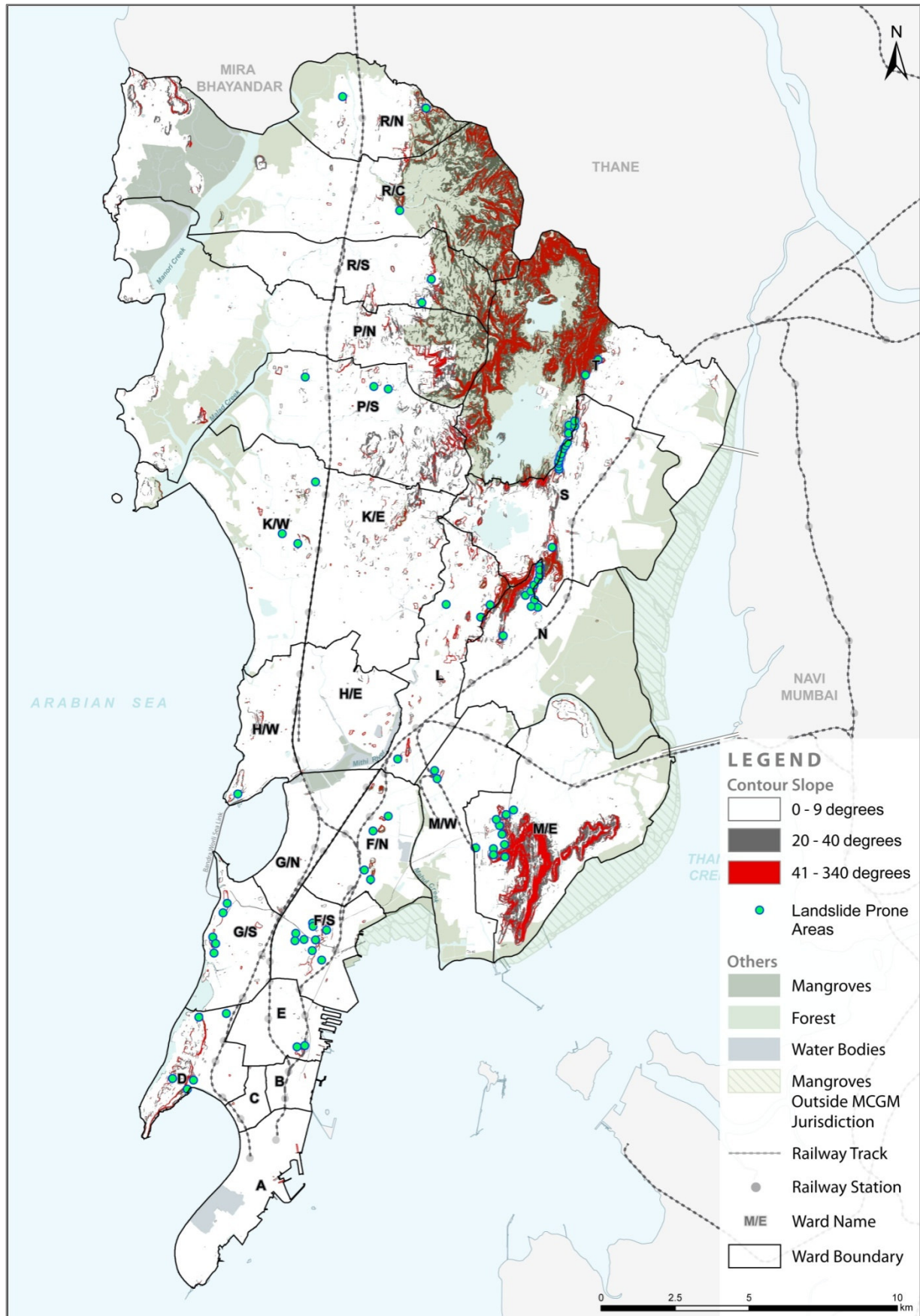
9.3.2 Areas Prone to Landslides

Several areas around hill slopes in Greater Mumbai are prone to landslides. The risk is more during the monsoon and heavy rains. Areas around hill slopes in Ghatkopar, Bhandup and Kurla in the Eastern Suburbs are prone to landslides resulting in increased exposure of slopes to erosion and water infiltration. Slum populations residing on these hill slopes are at high risk.

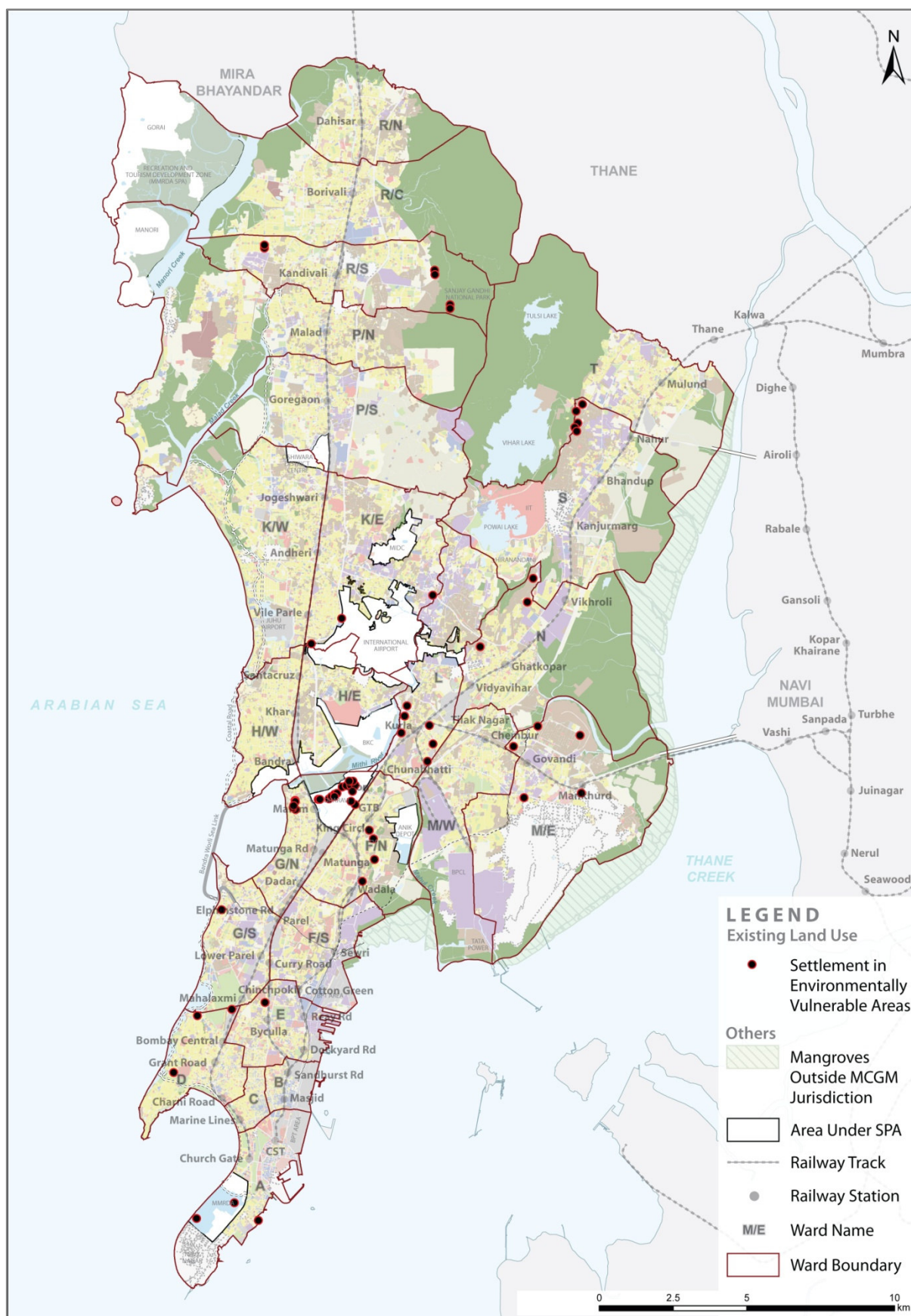
Map 9.6: Areas/ spots prone to water logging



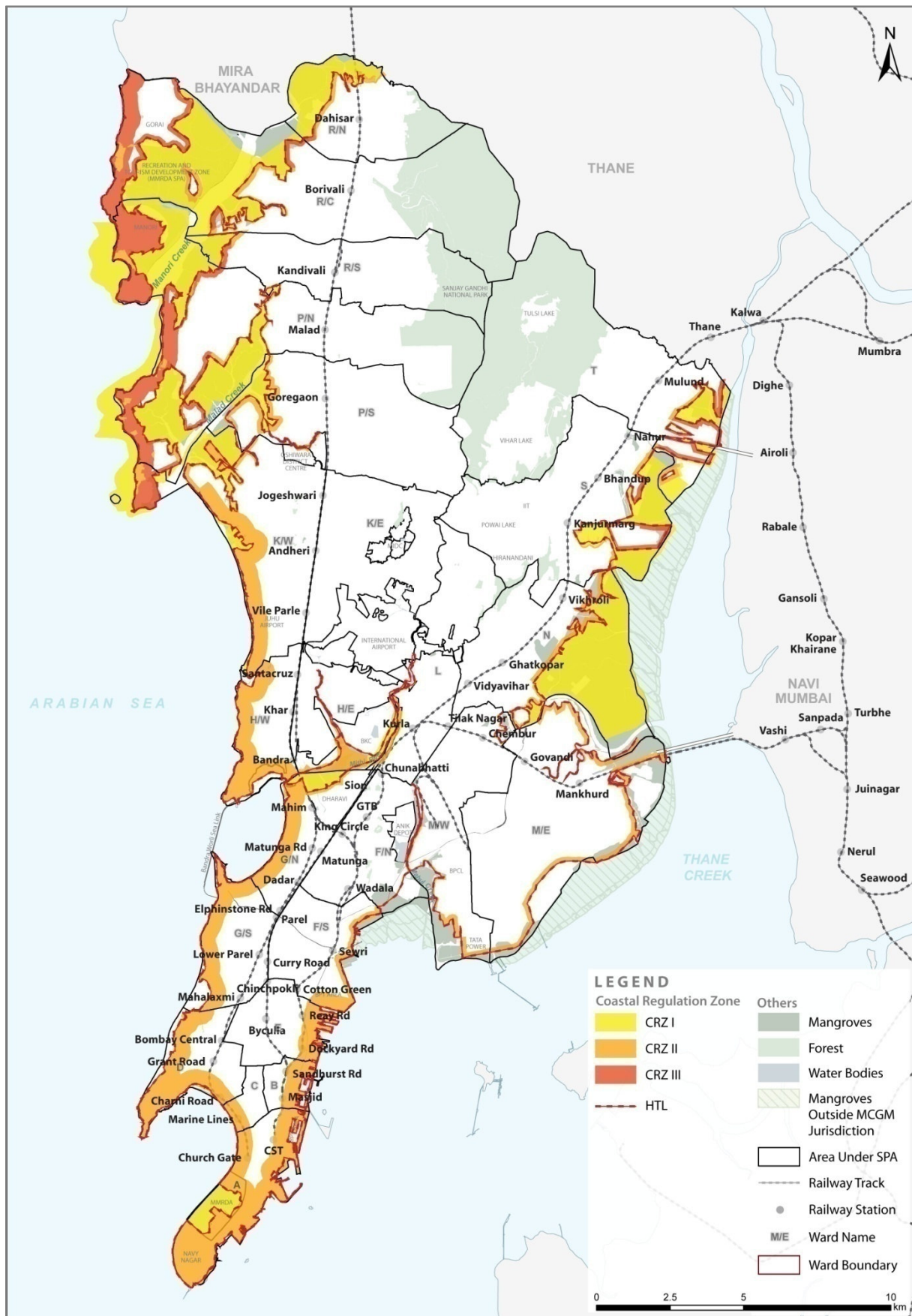
Map 9.7: Steep Slope areas and landslide prone area



Map 9.8: Settlements in environmentally vulnerable areas in Greater Mumbai



Map 9.9: Coastal Regulatory Zone boundaries & high tide line in Greater Mumbai



Source: HTL data. .Source: CZMP, 2000

9.3.3 Climate change risk

Increased intensity of climatic events like increased rainfall, floods, unseasonal rain or drought, intense heat, sea level rise, cyclonic storm surges and increasing outbreaks of tropical diseases and epidemics are all predicted outcomes of climate change and accompanying global warming. Greater Mumbai's coastal location along with a large population living in close proximity to the coast render it highly vulnerable to a range of effects due to climate change, especially sea level rise and flooding. The fact that most of Mumbai is only a few metres above sea level and the city has four rivers that flow through it further increases its vulnerability to flooding.

MCGM has prepared a separate storm water drainage plan to deal with the risks of flooding.

9.4. Health & Hygiene Impacts of Pollution and Current Infrastructure Management

Public health impacts are largely attributed to environmental pollution, in particular, the illnesses and diseases spread as a result of the following environmental problems:

- Poor Air quality (pollutants from transportation, domestic and construction-demolition activities)
- High levels of noise pollution
- Flooding during rains
- Poor quality of potable water
- Inadequate light and ventilation
- Inadequate sanitation facility
- Insufficient water and sanitation facility at schools

The top five sensitive diseases in Greater Mumbai are diarrhoea, tuberculosis, hypertension, malaria and diabetes⁴⁷. These diseases are directly a result of either environmental pollution or due to the state of the current infrastructure management, with water related diseases forming the majority.

9.5. Environmental Impacts on Livelihoods and Economy

The link between the state of the environment, health and therefore economic well being has been written about and is well established. In Mumbai's context, the floods of 2005 caused havoc and resulted in huge economic losses. Some of the environmental costs are direct and tangible while others are less obvious. Livelihoods of 50,000 Koli fisher folk are directly dependant on the state of our coastal environment while adivasipadas are dependent on forest lands. Many more people would be directly affected by the pollution of Mumbai's coastal waters and by poor quality of drinking water. Many residents especially children in the city are adversely impacted due to poor air quality in the city. Increased morbidity due to poor environmental conditions results in decreased productivity and poor quality of life. The poor are at increased risk due to the degraded environments that they live in. Lack of access to basic sanitation and water supply compound the risks that they are exposed to. Enhancing biodiversity and mitigating pollution will have a direct impact on the quality of life of all residents of the city regardless of income.

⁴⁷ MCGM Health Department 2011.

An aerial photograph of a city, likely Singapore, showing a dense urban landscape. The image features a mix of high-rise buildings, including several prominent skyscrapers, and lower-rise residential or commercial structures. Green spaces and trees are interspersed among the buildings. The overall scene is a high-angle view of a sprawling city.

Chapter 10

Floor Space Index

10 Floor Space Index

FSI as a tool of managing physical development was first introduced in 1967. Since, then its use as policy instrument has evolved covering a wide range of objectives. It would therefore be necessary to first understand the existing pattern of consumption of FSI.

10.1 Assessing Existing Consumption of FSI

The basic definition of FSI included in DCR 1991 is “the quotient of the ratio of the combined gross floor area of all floors, excepting areas specifically exempted under these Regulations, to the total area of the plot”, viz: -

$$\text{Floor Space Index (FSI)} = \frac{\text{Total covered area on all floors}}{\text{Plot area}}$$

Various types of covered areas ranging from staircases to fitness centre are excluded from computation of FSI. Furthermore, additional FSI by way of TDR or incentive FSI as in case of public parking is also available

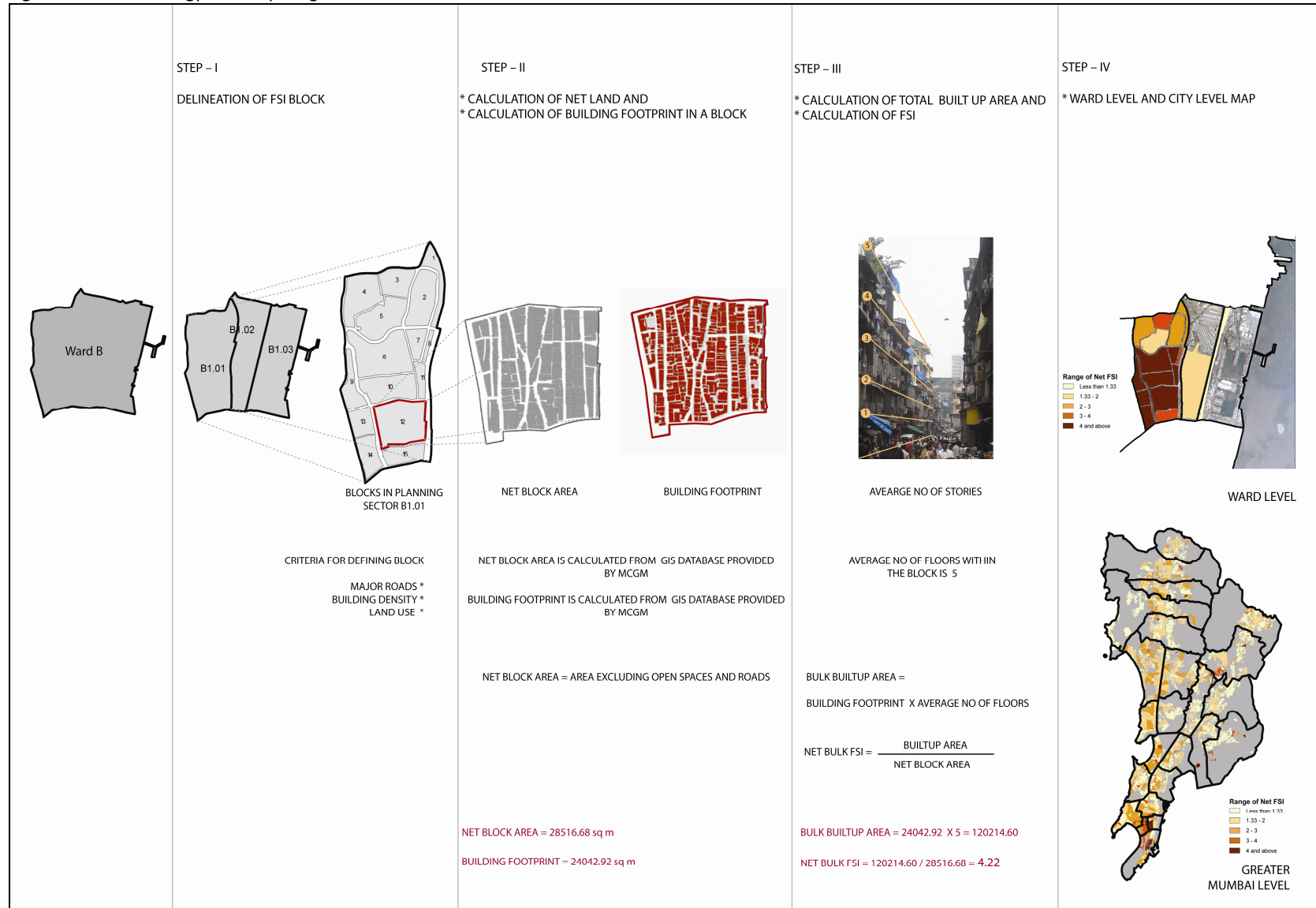
10.1.1 Methodology of FSI Computation for ELU 2012

The Building Proposals and Development Plan Departments do not have processed data that can readily give plot wise information of net regulatory FSI and FSI including exempted covered areas. It was considered appropriate to resort to following method of assessment.

- a) Blocks comprising number of plots surrounded by streets were identified. Blocks also cover slum areas;
- b) Area footprints of buildings in each block is calculated;
- c) An average number of storeys of the structures in the Block is noted;
- d) The total of footprint area ('b' above) in the Block is then multiplied by the average number of storeys ('c' above) to obtain the total built up area;
- e) Bulk Built Up Area so derived is then divided by block area to calculate FSI.

It may be noted that in this method, it is not possible to distinguish the floor area exempted from FSI computation. This FSI would always be larger than statutorily permitted FSI and is therefore called as **Bulk FSI** and since it is calculated on net plot area, it is called **Net Bulk FSI**. The difference between the Net Bulk FSI so assessed and the statutory FSI would be particularly significant in new buildings with larger above ground parking areas.

Figure 10.1 Methodology for Computing Net Bulk FSI



10.1.2 FSI Consumption Pattern

Greater Mumbai displays a Net Bulk FSI consumption ranging from 0.93 to 7.35 and above. FSI Consumption patterns are as under:

Island City

In the Island City the pattern of consumption of Net Bulk FSI is as indicated below:

- Areas with FSI range between 1.33 and 2.00 are in Apollo Bunder (Ward A); Cumballa Hill, Tardeo (Ward D); Agripada, Chinchpokli, Siddharth Nagar (Ward E); Naigaon, Lalbaug, Parel (Ward F/S); Shivaji Park, Purandare Wadi, Juvekar Wadi (Ward G/N) and Phoenix Mills (Ward G/S). The predominant Land Use in these areas is commercial except Shivaji Park and Cumballa Hill which are predominantly Residential;
- Areas with FSI range between 2.00 and 3.00 include areas near the MCGM Headquarter, Bombay Hospital, Churchgate Station (Ward A); Bhang Wadi, Wagh Wadi, Chira Bazaar, Kalbadevi (Ward C) and Gowalia Tank, Anand Nagar (Ward D). The predominant Land Use in these areas is commercial and residential;
- Areas with FSI range between 3.00 and 4.00 include Ballard Estate (Ward A); Masjid Bunder, Chinch Bunder, Chippi Chawl (Ward B) and areas near Chandan Wadi and Gai Wadi (Ward C). The predominant land Use in these areas is commercial, except Ballard Estate which is predominantly office use;
- Areas with FSI of 4.00 and above are located in Ward A; these include the Bombay Stock Exchange, Horniman Circle, Flora Fountain, Bora Bazaar, areas around Shahid Bhagat Singh Marg. The predominant land use in these areas is commercial and office use, except Bora Bazaar, which is predominantly, mixed use. There are a few redeveloped Cessed buildings where FSI substantially exceeds 4.00.

Western Suburb

In the Western Suburbs, the pattern of consumption of Net Bulk FSI is as under:

- Areas with FSI range between 1.00 and 2.00 include Hanuman Nagar, Bhim Nagar (Ward K/E); Kamala Nagar, JVPD Scheme, Vidyanidhi (Ward K/W); Chincholi Bunder, Mamletdar Wadi, Kanchpada (Ward P/N); Saibaba Nagar, Chiku Wadi, Babhai Naka (Ward R/C) and Charkop Village (Ward R/S). The predominant Land Use in these areas is residential;
- Areas with FSI range between 2.00 and 3.00 include Vithaldas Nagar Housing Colony, Podar Educational Complex, Hasmukh Nagar (Ward K/E); Dahisar Ganpat Patil Nagar and Anand Park (Ward R/N) and Jai Jawan Nagar (Ward R/C). The predominant Land Use in these areas is residential, except the Podar Educational Complex, which is an Educational Land Use.

Eastern Suburb

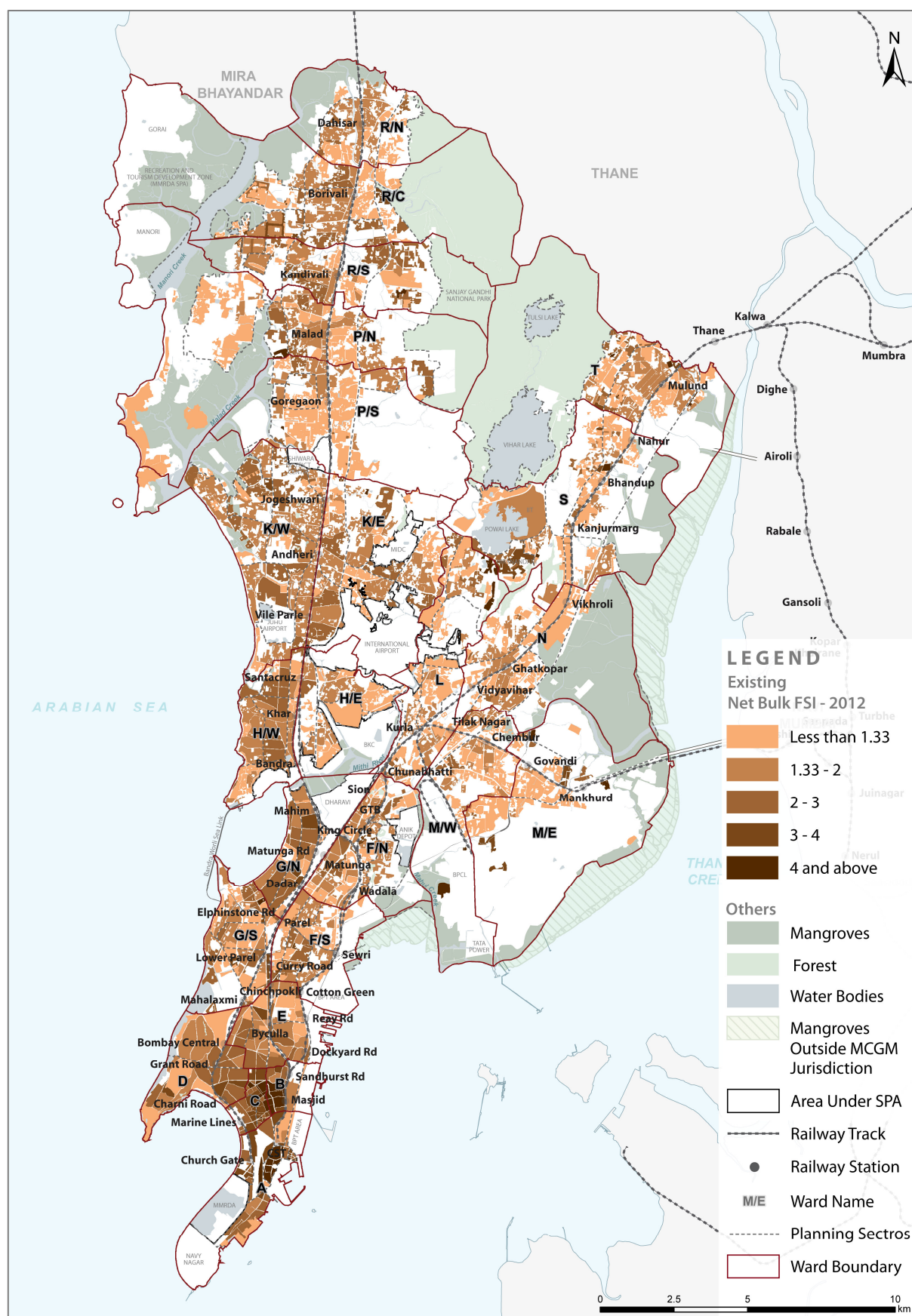
In the Eastern Suburbs the pattern of consumption of Net Bulk FSI is as follows:

- Areas with FSI range between 1.00 and 2.00 include Saki Naka Junction (Ward L) and Mulund Colony, Johnson and Johnson, Mulund Bus Depot, Mulund Sonapur (Ward T). The

predominant Land Use in these areas is residential, except Johnson and Johnson, which is an Industrial Land Use;

- Areas with FSI range between 2.00 and 3.00 include Annabhau Sathe Nagar and Shivaji Nagar Chembur in Ward M/E and Hiranandani Powai and Panchkutir Ganesh Nagar in Ward S. The predominant Land Use in these areas is residential. Areas with the highest Net Bulk FSI ranging between 2.00 and 3.00, with the exception of Powai and Panchkutir Ganesh Nagar, are all Slum Rehabilitation Schemes;
- Although the Net Bulk FSI consumption is low, the population density is high.

Map 10.1: Existing net bulk FSI in Greater Mumbai, 2012



10.1.3 Areas with High FSI

There are several areas in Greater Mumbai that display relatively high consumption of FSI. These include:

- **Development Nodes:** A study of the ELU 2012 and the Existing FSI Consumption maps reveal that there is a direct relation between location of employment nodes and higher consumption of FSI. The distribution of FSI in Greater Mumbai makes clear the structure of existing and emerging employment centres. In the Island City, the highest concentration of FSI is centred around Nariman Point and in areas close to Dadar railway interchange. The areas with the highest consumption of FSI in the Island City are located in Wards A, B and C which house the Central Business District (CBD) of Greater Mumbai. These are areas, which are easily accessible from CST and Churchgate, which are major Suburban rail terminals. A number of Wards in the Island City, Wards E, F/S, G/N and G/S also show relatively high Net Bulk FSI and correspond to the transforming textile mill areas of the city that are now emerging as new hubs for commerce, offices and entertainment.
- The Western Suburbs also display employment nodes and/ or commercial centres of high FSI consumption along the major railway stations. Higher FSIs are also concentrated at intersections of major roads such as S.V Road and Linking Road at nodes that are in proximity to railway stations. The Eastern Suburbs indicate relatively high FSI at the Bhandup-Mulund cluster.
- **Road and Transport Networks:** Transport (both rail and arterial road) networks have a major role in determining the FSI distribution pattern in Greater Mumbai. Most of the areas which have Net Bulk FSI in the range of 1.5 and 3.0 are located near or along the major road and rail corridors (Refer Net Bulk FSI map). In general, the Western Suburbs and the areas along the transportation corridor of the Western Express Highway and the major arterial S.V. Road display pockets of higher FSI ranging from 1.33 to 2. Along the Western Suburb the areas along the railway lines and main road network have higher FSI in the form intermittent nodes such as Andheri, Jogeshwari, Malad, Kandivali and Borivali. Areas adjoining the Western Express Highway in the wards of R/S, R/C and P/N have high FSI pockets.
- **Slum Rehabilitation Schemes:** In the Eastern Suburbs the pockets that have very high FSI are not directly connected to the railway corridors. These largely correlate to the slum rehabilitation areas around BPCL (Ward M/W), Govandi and Mankhurd (Ward M/E).
- Policies such as rehabilitation of slum areas cause concentration of high FSI, which in turn is related to policies granting incentive FSIs and land availability with Government agencies to plan resettlements.

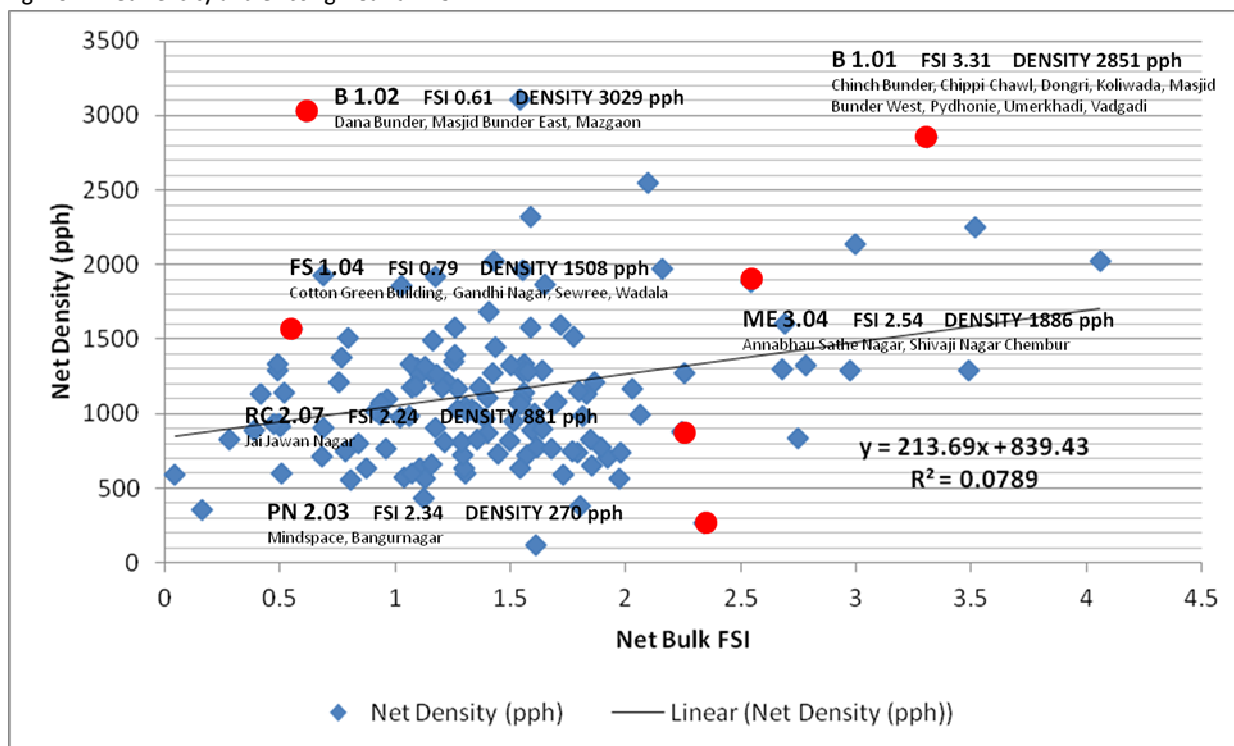
10.1.4 Density

DP 1967 and DP 1991 both had included maximum permissible densities along with FSI as a regulating parameter. 250 dwelling units per hectare at FSI 1.00 (or 1250 persons/ha) was generally prescribed. Exploring co-relation between FSI and density is also therefore important.

The Graph 10.1 below indicates relation between existing Net Densities and existing Net Bulk FSI of Planning Sectors of Greater Mumbai. It reveals that majority of Planning Sectors that have a Net Density of 500 to 1,500 pph span a wide range of Net Bulk FSI from 1.00 to 2.00. On one hand, there are areas with high FSI and high density (old areas in the Island City and slum rehabilitation schemes) on the other hand there are areas with high FSI and low density (areas which are predominantly commercial or have larger dwelling units) and low FSI and high density (chawls, slums) as well. The graph clearly shows that there is no consistent co-relation between FSI and density, for Greater Mumbai.

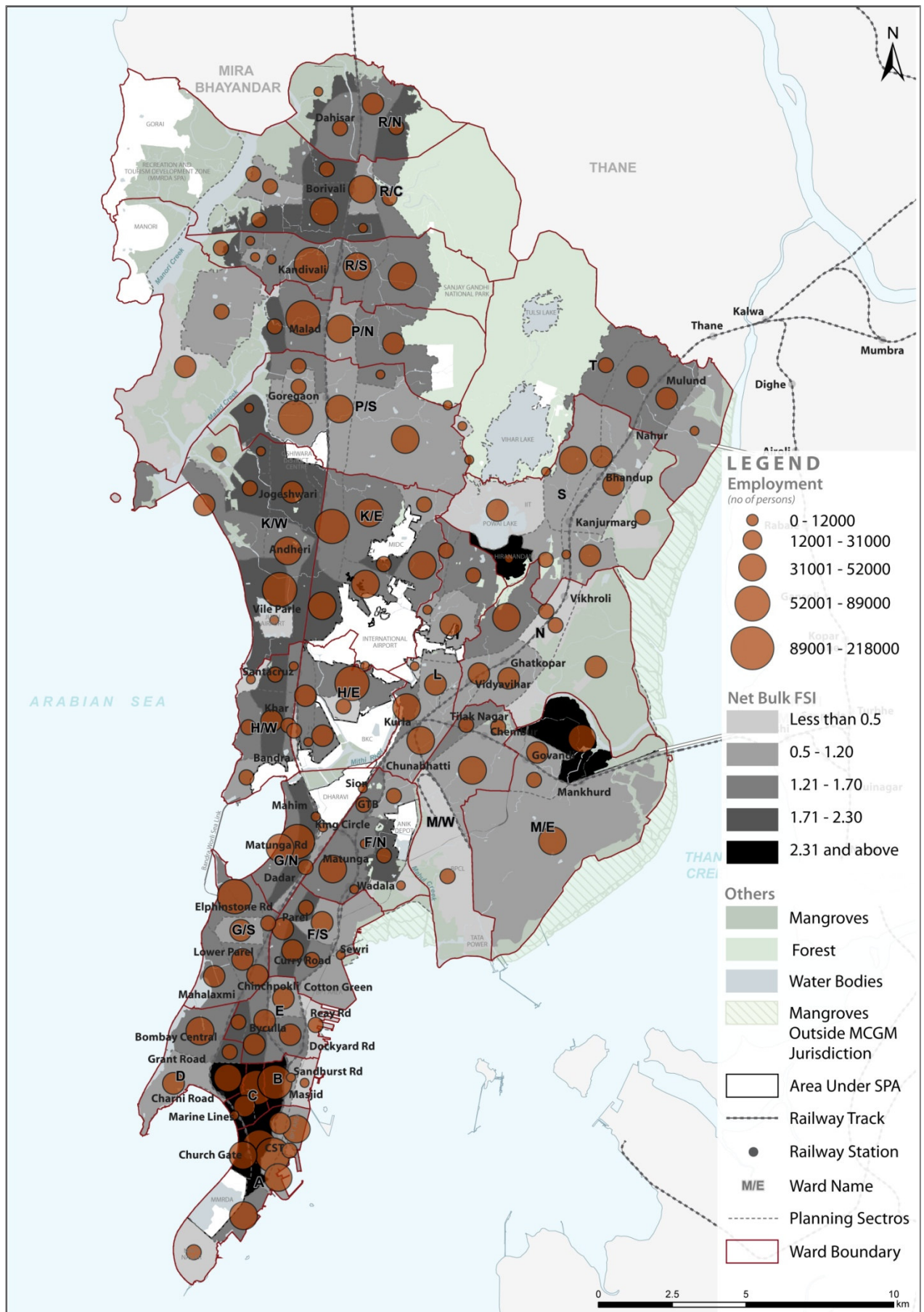
- Areas with high density and high FSI (2.00 to 4.00) include Annabhau Sathe Nagar and Shivaji Nagar Chembur in M/E 3.04 with net densities between 1,500 pph and 2,000 pph. Chinch Baunder, Chippi Chawl, Dongri in B1.01 has net densities above 2,000 pph. Also, Chira Bazaar, Null Bazaar and Bhuleshwar in Planning Sector C 1.03 have high net density ranging between 2,000 pph and 2,500 pph;
- Areas with high density and low FSI (1.33 to 2.00) include areas near Apollo Bunder in Planning Sector A1.02 and Kurar Village, Pathan Wadi, Dindoshi in P/N 2.06 with net densities between 1,000 pph to 1,500 pph. Cotton Green, Gandhi Nagar in F/S 1.04 and Masjid Bunder East, Mazgaon and Dana Bunder in B 1.02 have net densities above 1,500 pph. In addition, Indian Oil Nagar in M/E 3.04 (1887 pph) and ACC Nagar in the M/E 3.03 (1,854 pph) have high net densities;
- Areas with low density and high FSI (2.00 to 4.00) include area in proximity to the Hindu Gymkhana, Police Grounds in Planning Sector C 1.01 with Net Densities between below 1,000 pph. Prem Nagar slums and Prem Nagar in Planning Sector P/N 2.03 have net densities below 500 pph;
- Areas with low density and low FSI (1.33 to 2.00) include Cumballa Hill and Zoroastrian Colony in D 1.01 and Jai Jawan Nagar in RC 2.07 with net density below 1000 pph; Juhu, Danda, Pali Hill, Pali Village in Ward H/W have net densities between 500 and 600 pph; Saibaba Nagar, Vazira Naka in Planning Sector R/C 2.05 and Spenta Residency near Chimatpada in Planning Sector L 3.03 have net densities between below 500 pph.

Fig. 10.2: Net Density and existing Net Bulk FSI



Source: Existing Land Use Survey, 2012

Map 10.2: Floor Space Index and Employment



10.1.5 Comparison of FSI distribution and ratio of Employment to total population

The relation between per capita employment space consumed to existing distribution of FSI was mapped. The Map 10.2 reveals the following:

- Areas with high FSI (Above 2.30) and high Employment to Population ratio include Ballard Estate, Fort, Bora Bazaar in Ward A, Masjid Bunder in Ward B and Kalbadevi in Ward C;
- Areas with high FSI (Above 2.30) and low Employment to Population ratio include Hiranandani Powai in Ward S and Marine Lines in Ward C;
- Areas with medium FSI (1.21 to 2.30) and high Employment to Population ratio include Dadar in G/N, Andheri in Ward K/W and Chincholi Bunder in Ward P/N;
- Areas with medium FSI (1.21 to 2.30) and low Employment to Population ratio include Antop Hill, CGS Colony in Ward F/N; Khar and Bandra in Ward H/W and Sarvodaya Parshwanath Nagar Mulund, Vishwakarma Nagar in Ward T;
- Areas with low FSI (less than 0.50 to 1.20) and high Employment to Population ratio include MbPT in Ward A, Motilal Nagar, Bangur Nagar in Goregaon, Ward P/S;
- Areas with low FSI (less than 0.50 to 1.20) and low Employment to Population ratio include Malabar Hill in Ward D, Vidyavihar in Ward N, Gorai in Ward R/C and Malwani in Ward P/N;

Island City has a very high concentration of employment in the high and medium FSI zone and along the movement corridors in the Western Suburb. Eastern Suburbs have many areas of low and medium FSI supporting substantial employment.

It is significant to note that per capita consumption of employment space is higher in Planning Sectors that are in proximity to Suburban Rail stations and along major infrastructure corridors.

10.1.5 Integration of Transport Network and FSI in Greater Mumbai

- Areas with concentration of high Net Bulk FSI are located in proximity to transit stations such as Churchgate, Chhatrapati Shivaji Terminus, Dadar; and employment centres such as Fort, Bora Bazaar, Nariman Point, Ballard Estate, and Null Bazaar in the Island City. The predominant land uses in these areas is Commercial uses and Offices.
- In the Eastern Suburbs, the pockets that have the highest Net Bulk FSI are not directly connected to the railway corridors. These largely correlate to the slum rehabilitation areas around BPCL (Ward M/W), Govandi and Mankhurd (Ward M/E) which have a high ground coverage hence high FSI consumption;

The DP 2034 takes cognizance of areas with potential for intensification of development, their proximity to transit stations and the existing levels of FSI consumed in formulation of proposals for distribution of FSI for 2034.



Chapter 11

Obtaining Land for Public Purpose

11. Obtaining Land for Public Purpose: A Review of Existing Tools

Ensuring adequate land for public purposes is one of the key objectives of DP. A review of the existing and past tools for obtaining land for public purpose in Greater Mumbai was carried out to assess their efficacy. It revealed that the implementation of amenities as per standards through the existing tools of ‘reservation’ and land acquisition was not very encouraging as regards DP 1967. The rate of implementation of amenity provision through the tool of accommodation reservation and TDR in DP 1991 has been better but still not sufficient enough.

Designated amenities in the DP 1991 covered 21.3 sqkm and proposed reservations covered 41.9 sqkm. In the MCGM jurisdiction, presently, 37.5 sqkm of land are covered by amenities. Some of these amenities came up without being reserved in the DP.

A brief review of the tools that have been used in previous DPs for obtaining lands for public purpose is given below:

11.1. Land Acquisition

MR&TP Act declares that any land reserved or designated in a Development Plan for a public purpose shall be deemed to land needed for public purpose within the meaning of LA Act 1984 (Sec. 125). The Act further empowers the Planning Authority to acquire the land by agreement or by granting TDR or applying to the State Government for compulsory acquisition under LA Act 1894 (Sec. 126). The LA Act 1894 has now been repealed by Right to Fair Compensation & Transparency in Rehabilitation & Resettlement Act 2013 (RFCTLARR 2013). An assessment was conducted to evaluate the status of implementation of DP 1991. The exercise revealed that at Ward level, amenity implementation ranged between a negligible 5% to approximately 40%, owing mostly to challenges that acquisition of land poses. The RFCTLARR further enhances the value of compensation for land acquisition at four times the guidance value price (Ready Reckoner price). Although the full implications of RFCTLARR are yet to be well understood particularly in the context of the DP, nevertheless compulsory land acquisition within the provisions of the RFCTLARR does not seem to be an effective tool for obtaining land for public purpose in Greater Mumbai.

The assessment of implementation status of DP 1991 also revealed that most of the amenity reservations realized was through Accommodation Reservation and TDR. It further also brought forth that a substantial quantum of amenities were realized outside of the DP 1991 provision, made available through the market, catering to changing needs of the people.

11.2. Accommodation Reservation (AR)

The DP 1991 introduced this planning tool to incentivize the private owner to develop the amenity on a land sharing basis. Usually only a fraction of the site is released for the amenity. It was a means to involve the private owner in the implementation of the Plan and to some measure counter the stiff resistance of the owners to compulsory acquisition on their plots. While this tool succeeded in some measure and benefited MCGM in obtaining built public amenities, the actual ‘quality and design’ of public goods obtained has been inconsistent. Public amenities obtained through AR often lie vacant since no implementation policy is in place through which the Estates Department of the MCGM can handover the spaces obtained for actual use. A mechanism needs to be put in place for monitoring and implementation amenities that are acquired through AR tool.

11.3. Transferable Developmental Rights (TDR)

The only mechanism of developing designated land provided in the MR&TP Act, 1966 was by way of compulsory land acquisition. Recognizing the limitations of this approach the DP 1991 adopted an alternative strategy mainly involving TDR & Accommodation Reservation. MR&TP Act, 1966 was amended in 1994 with retrospective effect from 25th March 1991 to provide legal basis for TDR as a substitute for monetary compensation.

TDR was first promoted in the Development Plan of 1991 for Greater Mumbai. Its unstated objective was to enable the MCGM to obtain land reserved for proposed public purposes. The purpose of this regulation was to enable the realization of the land reserved for public purpose through a compensatory mechanism of area based development rights instead of direct monetary payment as a form of compensation.

Transfer of Development Rights (TDR) has been the most successful tool in procuring amenities at no extra cost to MCGM. However, the application of the tool is not monitored closely and implementation of the reservation often remains partial, thereby not responding to the real needs at the local level, driven instead by pure profit seeking by the developers. However there has been a drop in the amenities obtained through this scheme since the introduction of TDR for Slum redevelopment, which offers higher incentives to the developers.

11.4. Reservation for Public Housing

In DP-1967 large tracts of land were reserved for Public Housing and Housing the Dishoused (PH / HD). However, these lands could not be acquired for developing public housing. Realizing the impossibility of large scale compulsory acquisition, in DP 1991 the plots reserved for Public Housing/ High Density Housing/ Housing for Dishoused are allowed to be developed by landowner subject to handing over of 40% of the built up area in the form of tenements of 269 sqft. The restrictive tenement density of 500 tenements/ha is insisted with a condition of 50% tenements of size 25 sqm on the plot. Prior to 1991 under the Urban Land (Ceiling and Regulation) Act 1976, surplus vacant lands were exempted from acquisition if the landowners agreed to develop smaller dwelling units less than 40 sqm in area.

However, experience shows that such smaller dwelling units did not reach the intended beneficiaries. In many cases they were combined into bigger units and allotted to higher income households. This was on account of inadequacy of housing across the income groups and scarcity of development rights in the market on account of severely restricted FSI. On account of the proposed rationalization of FSI, such scarcity of development rights will no longer persist. This offers an opportunity to revisit the provisions of affordable housing in the DCR.

Under the present DCR there are provisions for rehabilitation of existing slums but there are no provisions for ensuring affordable housing for the growing population. Moreover, in the current SRA model existing slum dwellers are accommodated in less than 50% of slum area making the slum rehabilitation extremely dense. At present 41.85% of the population occupies only 8.18% (33.96 sqkm) of the total planning area (415.05 sqkm). Post-rehabilitation the slum population is expected to reduce substantially. What is therefore required is to ensure a steady supply of affordable houses spread over wider area that could reduce the further densification of the slums.

11.5. Simplification of the Reservation Policy

Development plans in 1967 & 1991 had included very detailed and specific designations. For example, Open Spaces had 25 different designations and educational institutions had over 40 designations.

In a twenty-year perspective, it is not possible to estimate and ascertain the requirement in such detail. Moreover, if designations in such detail are incorporated in Development Plan it would bring in rigidity of use. Any change that may be required over the years, involves a long term legal procedure to bring about a change. It is therefore necessary to develop a simplified and flexible policy for reservations/ designations.

The assessment of implementation status, DP 1991 tells that the method of reserving lands for public purpose used and obtaining such land for actual use has not been very satisfactory. DP 2034 recognizes the limitations of these instruments and accordingly has proposed new regulations or modifications to existing tools. The DP 2034 also addresses the simplification of the reservation policy.

PART II

VISUALISING THE FUTURE

The background of the slide is a high-angle, wide-area photograph of a city. The top half shows a hazy, distant view of a skyline with several tall skyscrapers. The middle and bottom halves show a more detailed, closer view of a densely packed urban area with numerous mid-rise apartment buildings, some green spaces, and a network of streets. The overall color palette is muted, with a lot of greys, browns, and soft blues, giving it a professional and somewhat somber feel.

Chapter 12

Growth Scenarios

12. Growth Scenarios

The current population of Greater Mumbai as per 2011 Census stands at 12.44 million. The future growth of the City for the period 2014-2034 has been envisioned both from an economic perspective as well as from demographic projections. The economic projections give a general direction as to dominant and emerging sectors while the demographic projections, comprising of the projected population, projected household size, and projected employment, would form the basis of estimations of future spatial demands for the DP 2034.

12.1 Economic Projections

Mumbai's economy, in terms of GDP in current prices, has been growing at an average of 13% over a 13-year period from 1993-94 to 2010-11. Its share in India's GDP has been steady at around 3%. The base case economic growth scenario, which is a normal or business-as-usual scenario, has been presented.

Economic Growth Projections

The quantitative dimensions of Mumbai's economy are presented in Part I. The growth rate of Mumbai's NDDP at constant prices during the last three years is observed to be 7.7% p.a. If Indian economy were expected to grow at about 6% p.a., Mumbai would have a potential to continue to grow between 7 and 8 % p.a. at constant prices. The growth would of course be cyclical but these cycles cannot be predicted. A long term growth rate of 7% is therefore adopted. With this assumption the NDDP of Mumbai and per capita NDDP at 2012-13 prices in 2014, 2024 and 2034 are indicated in Table 12.1 below.

Table 12.1: Mumbai's NDDP Mumbai's Growth at Constant Price

Year	NDDP in Rs. Crores	Population in Million	Per Capita NDDP in Rs.
2013	263,602	12.51	210,713
2014	2,82,054	12.66	222,679
2024	554,843	13.32	416,383
2034	1,091,461	13.95	782,409

While NDDP is expected to grow at 7% per annum population is expected to grow at less than 0.5% p.a. This would imply that the per capita NDDP in 2034 would be 3.5 times the one in 2014. This would have significant impact on demand for housing and other assets as well as consumption patterns – particularly on demand for quality public services. Nature of such changes is difficult to anticipate and quantify.

12.1.2 Sectoral Composition of Mumbai's NDDP

The sectoral composition of Mumbai's NDDP has been analyzed over time to understand sectoral share and hierarchy. At present, the primary sector, comprising of agriculture and allied activities, accounts for only 1%. The secondary sector, comprising manufacturing and construction industries forms 31%, and the tertiary sector, comprising the service related activities, including communications, trade, hospitality, banking and finances among others, is 68% of the total NDDP. Over the last four decades, there has been a continuing decline in the primary and secondary sectors with a corresponding increase in the tertiary sector. Assuming that there will be a 'business as usual' scenario, (i.e., no sharp changes in the trends in

production structures, and no revolutionary technological innovations over the next twenty years) the shares of primary, secondary and tertiary sectors in Greater Mumbai's NDDP would be approximately, 0.5%, 21%, and 80.5% respectively.

12.1.2 Emerging Sectors of Growth and Spatial Clustering

Economic data in terms of gross domestic product (GDP) is not adequate to identify growth drivers at a finer scale. Mumbai historically developed as a mono-centric city with important economic activities such as the port, government offices, banking and insurance services, the stock exchange, and wholesale trade, all being concentrated in and around the Fort area. Development of Navi Mumbai that began in 1970, was the first attempt to create a new centre of growth. The development of a new business district at the Bandra Kurla Complex (BKC), which was flagged off in the 1970s, has now gained substantial importance in the City. Now, with diversification of economic growth, conversion of manufacturing sites and expansion of transit facilities, many new economic clusters have emerged in Greater Mumbai. New patterns of spatial clustering are emerging as described in Table 5.3 in the Economy chapter of this report.

12.1.3 The Risks and Uncertainties of Growth

The increasing share of service sector in Greater Mumbai's economy is also indicative of its dependence on external – international economic growth. Retaining Mumbai's competitive advantage will be crucial in this context. Many macro economic reforms will be necessary. However, from the perspective of the DP, two critical factors will be "quality of life" and "cost of real estate". The DP will have to create a spatial strategy that provides land for social and physical infrastructure to develop, and a regulatory framework that enables real estate and housing market to grow competitively.

12.2 Demographic Projections

12.2.1 Comparison of population projections in other recent planning initiatives

Since DP 1991, a number of plans have been prepared for Greater Mumbai and the Mumbai Metropolitan Region. A review of these plans shows that population projections have been attempted at different times for different horizon periods. Though the rationale and approaches adopted by the plans for population projections have been varying, it is notable that the projections are not drastically different from each other and there is a narrow range that can be observed, especially by the recent planning attempts made through CTS for MMR (2031), the Business Plan for MMR (2031), and the Concept Plan for MMR (2032, 2052).

Table 12.2: Future Projected Population for MCGM by Past and Recent Planning Initiatives

Name of the Plan	Projected Population In Million					
	2001	2008	2011	2021	2031-32	2052
			MCGM: RoMR ratio shown in brackets			
DP 1991: Base Case	13.70					
DP 1991: Strategic Intervention	9.87					
RP 1996			12.99			
CTS 2008: Trend Scenario			14.22	16.33	18.02 (53:47)	
CTS 2008: Dispersal Scenario			14.17	15.71	15.99 (47:53)	
Business Plan 2009			Same estimates as adopted in CTS 2031			
Concept Plan 2010 :Base Case					17.7	20.4 (50:50)
Concept Plan 2010:Moderated Case					15.39	17.28 (45:55)
Concept Plan 2010:Stretched Case					14.92	17.48 (40:60)

Source: MCGM, 2011; Regional Plan (1996 – 2011); Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008; Business Plan for Mumbai Metropolitan Region, March 2009 and Concept Plan for Mumbai Metropolitan Region; April 2010.

Among the important past attempts in projecting population for Greater Mumbai are, the previous DP 1991 for Greater Mumbai and the Regional Plan 1996 -2011. The RP 1996 projected a population figure of 12.99 million for MCGM in 2011, which is closer to the current reality. The DP 1991 projected 13.7 million for 2001 in base case, which has proved to be higher than the current reality. However, the enhanced scenario in the DP 1991 projections, which factored in several strategic interventions, projected a lower growth range (refer Table 12.2 above).

Importantly, the three recent estimates were attempted prior to availability of 2011 census results. Thus, the population projection exercise for preparation of DP 2034 has the opportunity of using 2011 census database to update all previous projections and attempt more realistic forecasts for the DP 2034.

Discussed in the following sections are the methodologies for population projection adopted for DP 2034.

Comparison of Population Growth of Greater Mumbai with Major Indian Cities, Urban Agglomerations and Metropolitan Regions

The decadal growth rate of population in Greater Mumbai has been decreasing over the last four decades. However, this is in keeping with national trends of major cities and metropolitan regions, as well as other larger metropolitan Indian cities like Delhi and Kolkata, which show a declining growth rate of population. The Table 12.3 below illustrates the decadal growth rate of major cities in India from last three census decades.

Table 12.3: Decadal growth rate (in %) of major cities in India: 1981 – 2011

Municipal Corporations	Decadal Growth Rate (In percentages)		
	1981 - 1991	1991-2001	2001-2011
Delhi	26.13	37.08	11.42
Bengaluru	33.35	30.25	95.89
Kolkata	33.13	3.93	-1.88
Hyderabad	20.40	19.50	87.22
Greater Mumbai	20.41	20.68	3.87

Source: Census of India, 1981, 1991, 2001 and 2011

Major urban agglomerations in India also display a similar declining growth rate. The trend of decadal growth rate from 1981-2011 for major metropolitan regions like Delhi Urban Agglomeration, Kolkata Urban Agglomeration and Mumbai Urban Agglomeration all record a decline in growth rate. Hyderabad and Bangalore Urban Agglomeration show a decline from 1981-1991 to 1991-2001 followed by an increasing growth rate 2001-2011. Hyderabad and Bengaluru show a trend of increasing growth rate from past three census decades. The reason behind the increase in decadal growth rate for Hyderabad and Bengaluru in 2001-2011 can be attributed to the extension of the Municipal Corporation of Hyderabad⁴⁸ and Bengaluru Mahanagara Palike (BMP)⁴⁹ limits.

Table 12.4: Decadal growth rate (in %) of major urban agglomerations in India: 1981 – 2011

Urban Agglomerations	Decadal Growth Rate (In percentages)		
	1981 - 1991	1991-2001	2001-2011
Delhi - NCT	51.45	47.02	20.96
Bangalore UA	44.85	37.98	45.53
Kolkata UA	19.88	19.81	6.87
Hyderabad UA	70.62	32.18	34.96
Greater Mumbai UA	52.76	30.52	17.01

Source: Census of India, 1981, 1991, 2001 and 2011

⁴⁸ As per the notification released on 16th April 2007 by the Government of Andhra Pradesh, the limits of Municipal Corporation of Hyderabad (MCH) covering an area of 173 sqkm. has been increased to incorporate 12 other Municipalities and 8 Gram Panchayats. Including the erstwhile MCH, the new Municipal Corporation of Hyderabad covers an area of 626 sqkm. The new limit thus formed is under Greater Hyderabad Municipal Corporation (GHMC).

⁴⁹ As per the notification released on January 2007 by the Government of Karnataka, the limits of Bangalore Municipal Corporation (BMC) have been increased to incorporate 8 neighbouring Municipal Councils and 110 villages. The new limit thus formed is under Bruhat Bangalore Mahanagara Palike (BBMP) or Greater Bangalore City Corporation.

Comparison of Population Growth of Greater Mumbai with Major International Cities, Urban Agglomerations and Metropolitan Regions

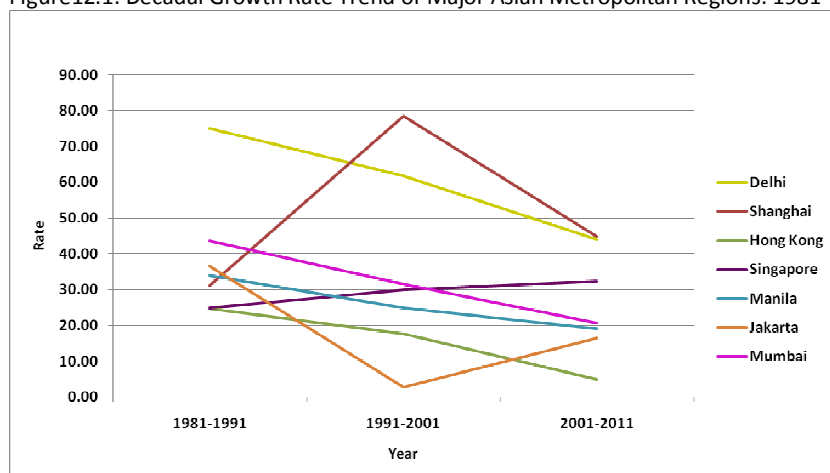
Major Asian metropolitan regions such as Shanghai, Hong Kong, and Manila also record a trend of declining growth rate during the past three census decades with the exceptions of Singapore and Jakarta where there is a trend of increasing growth rate during the same period.

Table12.5: Decadal growth rate of major Asian metropolitan regions: 1981 – 2011

Major Asian Metropolitan Regions	Population (In thousands)			
	1980	1990	2000	2011
Delhi	5,558	9,726	15,732	22,654
Shanghai	5,966	7,823	13,959	20,208
Hong Kong	4,623	5,766	6,708	7,122
Singapore	2,415	3,017	3,919	5,188
Manila	5,955	7,973	9,958	11,862
Jakarta	5,984	8,175	8,390	9,769
Mumbai	8,658	12,436	16,367	19,744

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision and World Urbanization Prospects. Figures mentioned are as per the source.

Figure12.1: Decadal Growth Rate Trend of Major Asian Metropolitan Regions: 1981 – 2011



Analysis of the population trend shows that the population of Mumbai is not in a state of drastic increase, but in a state of stabilization. This is in line with the normal trends of larger metro cities around the world, where after a period of high growth, the population growth plateaus. In such cases historical trends are no longer a valid method for future projections. Hence, in the case of Greater Mumbai, an alternative method needs to be adopted.

12.2.2 Existing Growth & Distribution of Population in Greater Mumbai Urban Agglomeration⁵⁰

The Table 11.6 below illustrates the distribution of population and decadal growth rate of Maharashtra, GMUA and Greater Mumbai. The decadal growth rates of urban population of Maharashtra, Greater Mumbai Urban Agglomeration (GMUA) and Greater Mumbai have been decreasing in the past four decades. However, the trend of reduction is higher in Greater Mumbai than the larger geographical boundaries.

Maharashtra Urban shows a slowing trend in population growth. A similar trend is also observed in GMUA and Greater Mumbai. The trend of slowing population growth rate is particularly significant in the last census decade 2001 – 2011. The decadal growth rate of Greater Mumbai reduced from 20.68% in 1991- 2001 to 3.87% in 2001-2011.

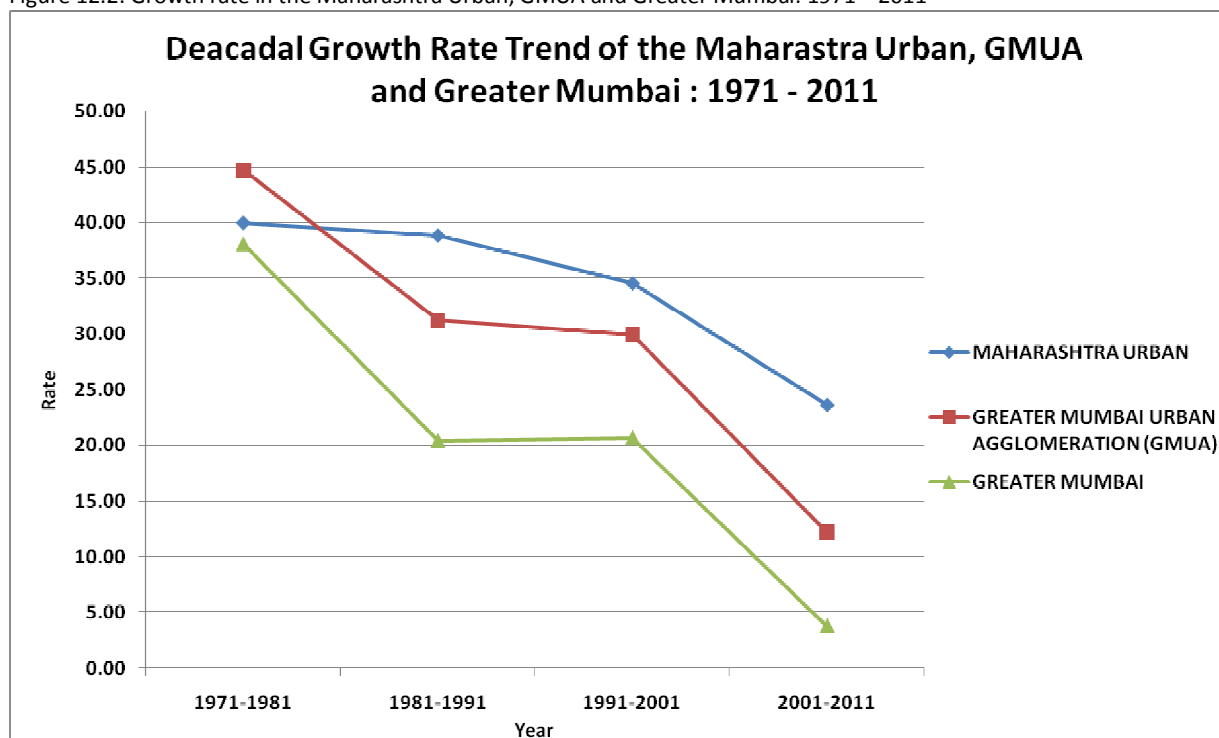
Table 12.6: Population distribution & decadal growth rate of Maharashtra, GMUA & Greater Mumbai

Region	Census				
	1971	1981	1991	2001	2011
Population (In absolute numbers)					
Maharashtra	50,412,235	62,782,818	78,937,187	96,878,627	112,374,333
Maharashtra Urban	15,711,211	21,993,594	30,541,586	41,100,980	50,818,259
Greater Mumbai Urban Agglomeration (GMUA)	6,632,158	9,596,682	12,591,938	16,368,124	18,368,671
Greater Mumbai	5,970,575	8,243,405	9,925,891	11,978,450	12,442,373
Decadal Growth Rate (In percentages)					
Maharashtra Urban	--	39.99	38.87	34.57	23.64
GMUA	--	44.70	31.21	29.99	12.22
Greater Mumbai	--	38.07	20.41	20.68	3.87

Source: Census of India, 1971, 1981, 1991, 2001 and 2011

⁵⁰ As per Census 2001: Greater Mumbai Urban Agglomeration includes Greater Mumbai Municipal Corporation, Thane Municipal Corporation, Kalyan - Dombivali Municipal Corporation, Ulhasnagar Municipal Corporation, Navi Mumbai Municipal Corporation, Mira-Bhayander Municipal Council, Ambarnath Municipal Council, Badlapur Municipal Council. Though technically not a part of GMUA, as defined in Census 2001, Vasai- Virar City Municipal Corporation has been considered as a part of urban agglomeration as this is contiguous to Greater Mumbai's urban expansion.

Figure 12.2: Growth rate in the Maharashtra Urban, GMUA and Greater Mumbai: 1971 – 2011



12.2.3 Regional dynamics of population dispersion from Greater Mumbai to the Greater Mumbai Urban Agglomeration

The percentage share of population of Greater Mumbai in GMUA over the past four census decades shows a steady decrease.

The Table 12.7 below shows the decline in percentage share of Greater Mumbai's population to Maharashtra's urban population which is around 24.48% in 2011 as compared to 38.00% in 1971. Similarly, the percentage share of Greater Mumbai's population in GMUA has shown a decline from 90.02% in 1971 to 67.73% in 2011. It is essential to note that the population share of Greater Mumbai in Maharashtra Urban also shows a steady decline, which is indicative of competing urban growth taking place elsewhere in Maharashtra.

Table 12.7: Distribution of share of Greater Mumbai in Maharashtra and GMUA: 1971 – 2011

Region	Census				
	1971	1981	1991	2001	2011
% Share of Greater Mumbai (In percentages)					
Maharashtra Urban	38.00	37.48	32.50	29.14	24.48
Greater Mumbai Urban Agglomeration	90.02	85.90	78.83	73.18	67.73

Source: Census of India, 2001 and 2011

Existing Household Size

As per the Census 2011 provisional data, the average household size in Greater Mumbai has reduced to 4.4 from 4.8 in 2001. The trend of Island City having greater average household size than the Suburban District continues, with 4.9 and 4.7 respectively by 2001, and 4.6 and 4.4 respectively in

2011. Reduction in household size implies an increase in demand for housing, which is expected to continue to grow in the future.

12.3 Greater Mumbai Population Projections Based on Past Trends

The various mathematical population projection methods widely used for planning purposes are trend based. The population for past eleven census decades has been studied to understand Greater Mumbai's population trend and two methods, namely, Linear and Logarithmic were explored for projecting Greater Mumbai's population. However, Ratio Method is considered to be more suitable method for this exercise. This is because the population change in Greater Mumbai is highly related to dynamics of population growth in the larger geographic boundaries within which Greater Mumbai is located. Moreover, the ratio method involves projections at a much larger geographical areas, which tend to have a higher accuracy for prediction compared to smaller areas.

12.3.1 Population projection by ratio method

The 'Ratio Method'⁵¹ recognizes that the population growth of a city is influenced by the larger area/boundary to which it belongs indicating the growth forces operating outside the city. This implies the population of a given area depends upon the growth of the larger area in which it is located. Applying the ratio method to the case of Mumbai, the variations in the trend of the population distribution between Greater Mumbai and levels of spatial aggregation beyond Greater Mumbai, are studied and projected for the future.

Population distribution at varying scales over 4 decades has been analyzed:

- Growth trend of population of Island City and Suburban District is compared with respect to that of Greater Mumbai Urban Agglomeration (GMUA);
- The population growth trend of Greater Mumbai has been compared against that of GMUA;
- Growth trend of population of GMUA is compared against that of Maharashtra Urban and;
- The population growth trend of Maharashtra Urban is compared with respect to that of Maharashtra State.

The Population for the MMR as a whole has not been considered in this exercise, as the Population Census Abstracts for 2011 for the towns below the population of 100,000 has not been released at the time of this exercise.

12.3.2 Methodology

The first step is to understand the past trends (1971 – 2011) of population growth in the selected six areas: Maharashtra, Maharashtra Urban, GMUA, Greater Mumbai, Island City and Suburban District. Subsequently, the ratio of population of Maharashtra Urban to that of Maharashtra, GMUA to that of Maharashtra Urban and Greater Mumbai to that of GMUA in the year 1971, 1981, 1991, 2001 and 2011 have been calculated.

⁵¹ In the absence of data such as birth, death and migration rates, the Ratio Method is a more suitable method for projections of sub-national and city population. The use of this method has also been extended to compute population at Ward and Planning Sector Levels.

Table12.8: Distribution of population of Maharashtra, Maharashtra urban, GMUA, Greater Mumbai, Island City and Suburban District along with share of area-wise population from 1971 - 2011

Region	Population (In absolute numbers)				
	1971	1981	1991	2001	2011
Maharashtra	5,04,12,23 ₅	6,27,82,818	7,89,37,187	9,68,78,627	11,23,74,33 ₃
Maharashtra Urban	1,57,11,21 ₁	2,19,93,594	3,05,41,586	4,11,00,980	5,08,18,259
Greater Mumbai Urban Agglomeration (GMUA)	68,25,068	98,50,327	1,29,89,546	1,67,65,732	1,96,17,302
Greater Mumbai	59,70,575	82,43,405	99,25,891	1,19,78,450	1,24,42,373
Island City	30,70,378	32,85,040	31,74,889	33,38,031	30,85,411
Suburban District	29,00,197	49,58,365	67,51,002	86,40,419	93,56,962
Share of area-wise population in the past (Ratio)					
Maharashtra Urban / Maharashtra	0.31	0.35	0.39	0.42	0.45
GMUA / Maharashtra Urban	0.43	0.45	0.43	0.41	0.39
Greater Mumbai / GMUA	0.87	0.84	0.76	0.71	0.63
Island City / GMUA	0.45	0.33	0.24	0.20	0.16
Suburban District / GMUA	0.42	0.50	0.52	0.52	0.48

Source: Census of India, 2001 and 2011

Then, by examining the trend of past ratios (1971 – 2011) of smaller area population to that of the larger area and also the ratios computed from the projected population by various Plans, assumptions for the required ratio projections were made for the years 2021, 2031 and 2041.

Table12.9: Projected ratio of population computed across different levels of disaggregation: 2021 – 2041

Region	Actual Ratios (as per census)					Projected Ratios		
	1971	1981	1991	2001	2011	2021	2031	2041
Maharashtra Urban / Maharashtra	0.31	0.35	0.39	0.42	0.45	0.47	0.49	0.51
GMUA / Maharashtra Urban	0.43	0.45	0.43	0.41	0.39	0.37	0.35	0.33
Greater Mumbai / GMUA	0.87	0.84	0.76	0.71	0.63	0.59	0.57	0.56
Island City / GMUA	0.45	0.33	0.24	0.20	0.16	0.13	0.12	0.11
Suburban District / GMUA	0.42	0.50	0.52	0.52	0.48	0.46	0.45	0.45

Source: Census of India, 2001, 2011 and Projected, 2021, 2031 and 2041

Further, based on the ratios, populations for the projected years were calculated. For this, the future population estimate of the larger area of Maharashtra Urban was required. In the absence of such data, the projected estimates for the year 2021, 2031 and 2041 for Maharashtra by “The Future Population of India – A Long-range Demographic View” by Population Foundation of India and Population Reference Bureau in the year 2007 are used. Considering Maharashtra’s projected population as base, population for Maharashtra Urban was calculated based on the trend, then

based on Maharashtra Urban population, the population for GMUA was calculated and accordingly, based on GMUA's projected population, population for Greater Mumbai, Island City and Suburban District has been projected. The estimated proportions of Island City and Suburban Districts for the future take a positive view of population stabilization in Greater Mumbai with reference to GMUA.

Table12.10: Projected population (in thousands) of Greater Mumbai for 2021, 2031 and 2041

DISTRICT / WARD	2011	2021	2031	2041
	(in thousands)			
Island City	3,085	2,959	2,817	2,794
Total Suburbs	9,357	10,157	10,932	11,585
Greater Mumbai	12,442	13,115	13,749	14,379

Source: Projections, 2012

The Greater Mumbai population of 12.44 million in 2011 is projected to increase upto 13.11 million by 2021 and 13.75 million by 2031. The Island City district which is already showing a sign of decline during 2001-11, is expected to further decline and would have population of 2.96 million in 2021 and 2.81 million in 2031. Whereas, the Suburbs are expected to grow upto 10.15 million in 2021 and 10.93 million in 2031.

Subsequently, the populations for Greater Mumbai and the Districts within, for the years 2014, 2024 and 2034 have been interpolated linearly.

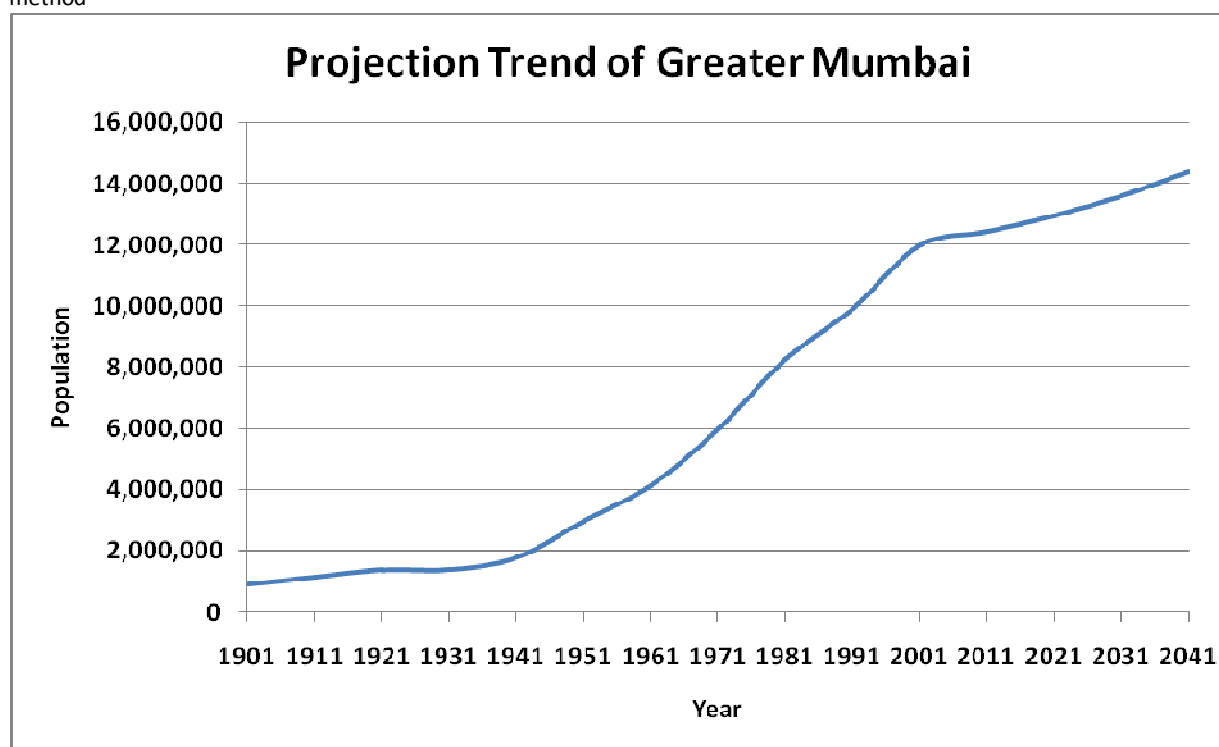
Table12.11: Projected population (in thousands) of Greater Mumbai for 2014, 2024 and 2034

District / Ward	2014	2024	2034
	(in thousands)		
Island City	3,049	2,918	2,810
Total Suburbs	9,617	10,407	11,139
Greater Mumbai	12,666	13,325	13,949

Source: Projected, 2012

The Figure 12.3 below shows the population curve of Greater Mumbai for the horizon period. The 'S' shape growth curve of the graph indicates that the population of Greater Mumbai is stabilizing.

Figures 12.3 Population projection for Greater Mumbai using ratio method



12.3.3 Population Projections for Wards within Greater Mumbai by 2034

Population projection estimated for Greater Mumbai through the ratio method was then distributed at the Ward level. A two step process was followed: a) Greater Mumbai's projected population for 2014, 2024 and 2034 were first distributed at the two District levels (Island City and Suburban Districts); b) Based on District to Ward population ratio trend assessment, the District level projected population was then distributed at the Ward level.

Table 12.12: Population projections for Wards (in thousands)

District / Ward	Census Population				Projected Population			
	1981	1991	2001	2011	2021	2031	Horizon Year 2034	2041
A	168	195	211	185	172	158	157	156
B	147	118	141	127	115	101	101	99
C	271	199	203	166	156	144	143	142
D	384	400	383	347	344	341	341	341
E	517	411	440	393	370	344	343	340
F/N	815	431	524	529	494	454	453	448
F/S		417	396	361	360	360	360	359
G/N	446	560	582	599	595	590	590	589
G/S	537	445	458	378	353	324	323	320
Island City	3,285	3,175	3,338	3,085	2,959	2,817	2,810	2,794
H/E	707	452	581	563	581	598	603	612
H/W		318	337	301	285	270	266	257

K/E	529	693	810	824	856	888	897	915
K/W	396	576	701	749	802	853	867	897
P/N	368	604	799	941	1,062	1,179	1,211	1,278
P/S	296	351	438	464	496	528	536	555
R/N	389	619	364	432	1,113	1,229	655	1,327
R/C			513	562			605	
R/S	173	335	590	691	802	909	937	999
L	434	617	778	902	1,006	1,106	1,133	1,190
M/E	566	471	675	808	925	1,039	1,069	1,135
M/W		352	414	412	424	435	438	445
N	878	507	620	623	648	673	680	694
S	--	567	691	744	799	853	868	899
T	223	289	330	341	356	371	375	383
Total Suburbs	4,958	6,751	8,640	9,357	10,157	10,932	11,139	11,585
Greater Mumbai	8,243	9,926	11,978	12,442	13,115	13,749	13,950	14,379

Source: Projected, 2012

Note: The Ward R/C was a part of Ward R/N until 1995. Therefore, for convenience, population projection for the years 2021, 2031 and 2041 has been done as a cumulative figure and later for the years 2014, 2024 and 2034 the cumulative figure has been distributed based on the ratio method by projecting the ratios.

12.3.4 Projection of Number of Households

The average household size of Greater Mumbai shows a decline from 4.8 in 2001 to 4.4 in 2011.

Further, Ward R/N in Mumbai Suburbs has the lowest average household size in 2011 at 4.1 and Ward E in Island City has the highest at 5.0 in 2011.

The average household size for Greater Mumbai is further expected to decline and is projected at 4.4 by 2014, 4.2 by 2024 and 4.0 by 2034.

Table 12.13: Projected households in Greater Mumbai for 2014, 2024 and 2034

District / Ward	Projected Number of Households		
	2014	2024	2034
Greater Mumbai	2,890,000	3,190,000	3,480,000

Source: Projected, 2012

Consequently, the average increase in number of households per year in Greater Mumbai is 30,000 and 29,000 for the two decades 2014 -2024 and 2024 -34, respectively.

12.4 Employment Projections

12.4.1 Employment Projections by Place of Work

In the absence of other data, The Comprehensive Transportation Study for Mumbai Metropolitan

Region, July 2008, could be considered as a valid source for existing and projected employment for the future. The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008; analyzed scenario of demographic and employment profiles of the region for the horizon period of 2031.

Table12.14: Range of employment levels as per the comprehensive transportation study for Mumbai metropolitan Region, July 2008 (in Millions)

Clusters	Employment (in millions)				
	2005	2031 E1	2031 E2	2031 E3	2031 E4
Island City	2.26	4.03	3.62	2.84	2.05
Western Suburbs	2.30	4.80	4.15	3.08	1.93
Eastern Suburbs	1.14	2.15	1.93	1.44	1.11
Total Greater Mumbai	5.70	10.98	9.70	7.36	5.09
Rest of MMR	2.07	4.32	5.6	7.96	10.21
Total	7.77	15.30	15.30	15.30	15.30

Source: The Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008

Four growth scenarios with share of population in Greater Mumbai ranging from 60% to 40% were envisaged in the CTS, 2008 and four employment growth scenarios, E1, E2, E3, E4, with share of employment in Greater Mumbai ranging from 33% to 75% were defined. The projected employment for 2031 ranged between 5.09 and 10.98 million. The decadal growth rate between 2001 and 2011, as per Census 2011 is lower than the estimated population growth rate of the CTS, 2008. Therefore, taking cognizance of current trends, it has been estimated that employment for Greater Mumbai would range between 6.25 and 7.35 million.

12.4.2 Population and Employment Projections at Planning Sector Levels

The Ward level population has been distributed across all 151 Planning Sectors using the net residential area in each Planning Sector. The ratio method has been used and population is distributed based on the same proportions as 2011 Census, with the inherent assumption that no major change in the population distribution is expected.

Similarly, employment for planning sectors have been calculated through reference of the TAZ level employment data projected in CTS. The employments as seen at the TAZ level have been correlated with the Planning Sector area to arrive at the employment figures for the current and projected employments.

Table12.15: Ward Wise Planning Sector population and employment: 2011 and 2034

Ward	Area (ha)	Population 2011	Population 2034	Employment 2011	Employment 2034
A	1,120.95	185,014	157,448	693,555	909,903
B	265.82	127,290	100,701	116,630	150,336
C	191.30	166,161	143,051	156,233	207,981
D	830.20	346,866	341,336	189,738	248,143
E	717.25	393,286	342,773	220,819	285,516
F/N	1,200.68	529,034	452,534	137,343	173,755

F/S	965.30	360,972	359,550	179,437	232,442
G/N	876.41	599,039	589,799	251,988	327,749
G/S	929.24	377,749	323,045	308,067	405,142
Island City	7,097.15	3,085,411	2,810,235	2,253,811	2,940,966
H/E	1,289.31	563,445	602,511	235,546	275,202
H/W	865.03	301,375	265,884	144,482	183,573
K/E	2399.87	823,885	896,539	443,844	561,181
K/W	2,442.07	748,688	867,217	293,447	363,953
P/N	4,671.67	941,366	1,210,660	295,244	365,115
P/S	2,519.10	463,507	536,413	313,382	391,983
R/N	1,417.88	431,368	655,223	90,959	93,271
R/C	4,802.80	562,162	604,821	244,057	279,960
R/S	1,831.31	691,229	937,364	264,958	330,143
Western Suburbs	22,248.78	5,527,025	6,576,634	2,325,920	2,844,381
L	1,556.07	902,225	1,132,709	251,024	319,517
M/E	3,388.56	807,720	1,069,305	200,391	259,469
M/W	1,740.36	411,893	438,360	173,082	218,743
N	2,534.62	622,853	679,893	233,401	296,863
S	2,975.23	743,783	867,751	275,079	342,169
T	4,287.53	341,463	374,825	101,517	130,222
Eastern Suburbs	16,482.39	3,829,937	4,562,842	1,234,494	1,566,982
Greater Mumbai	45,828.32	12,442,373	13,949,712	5,814,225	7,352,330

12.5 Implications of the Growth Scenario for the Development Plan

GDDP of Mumbai is one of the highest in the country. Considering macro economic conditions and various other factors, it is expected that the economic growth of Greater Mumbai would continue in the future. Whereas the population growth rate of Greater Mumbai has been reducing, it is expected that it would stabilize in the future. Since economic growth is expected to continue while the population growth is expected to stabilize, it could be inferred that per capita income would continue to grow during the planning period.

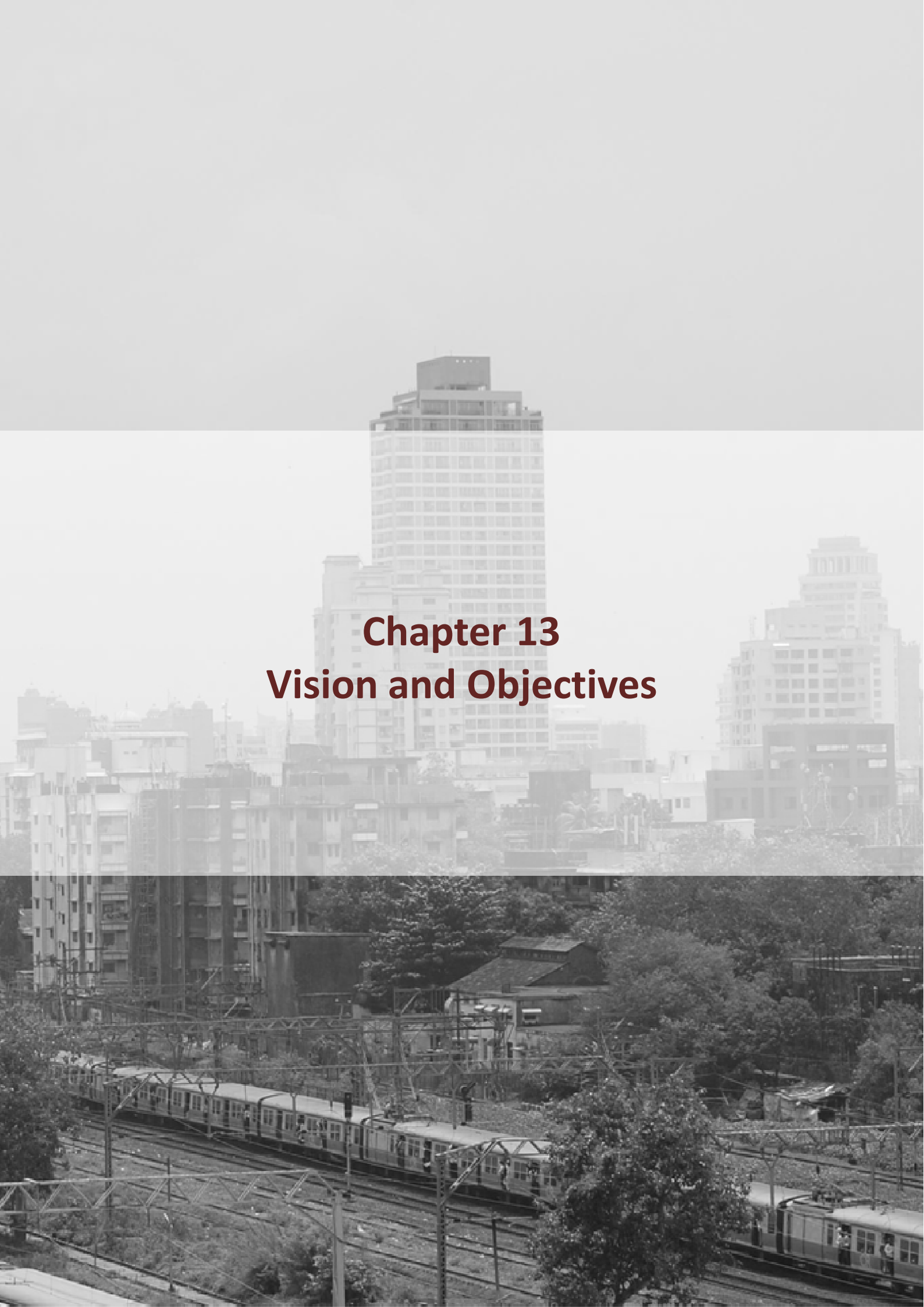
Growth of income would contribute to improvement in overall living conditions and better lifestyles. This would convert into higher aspirations, demand for more space, in terms of higher per capita area, for residential use, commercial use, amenities, utilities and open spaces. It would also imply increase in vehicle ownership.

In this light, one of the major objectives of the DP 2034 would be to address the demands arising out of this expected improvement in quality of life. This would need to be backed by an increase in the provision of public transport connectivity.

Constrained by the City's geography, land available for development, would continue to be a scarce resource for development in future. Despite of this, the Development Plan 2034 needs to ensure adequate provisions for the increasing demand for space and connectivity. Guided by this challenge,

the spatial development strategy for the City would need to ensure availability of land for social and physical infrastructure development and provide a regulatory framework that enables real estate and housing market to grow competitively.

Given the stabilizing population growth of Greater Mumbai and the decreasing household size, the per capita income would increase. The decrease in household size also implies rise in number of housing demand. Simultaneously, a higher per capita income would contribute to an aspirational increase in demand of per capita space requirement for various purposes and an increase in vehicle ownership. Therefore, the Development Plan 2014-34 needs to take into account the increasing demand for space and strategize on augmenting land supply for future provisions.



Chapter 13

Vision and Objectives



13. Vision and Objectives

The urbanization vision projected by the 11th Five Year Plan mentions that Indian cities would be the centre of economic growth over the next two decades and would play an important role in realizing a GDP growth of 9-10%. To achieve this, it is important to make Indian cities more liveable, inclusive, bankable and competitive⁵². The 12th Five Year Plan emphasized objective⁵³ of the competitive, inclusive and sustainable city therefore the 'Inclusive and Sustainable City' forms the overarching principle for formulating the vision for the Development Plan of Greater Mumbai 2034.

13.1 Past Visions for Mumbai and the Context of the DP

A vision agreed by all stakeholders, is necessary to drive a diverse agenda for planning and development by multiple actors. Concerns about Greater Mumbai's future fuelled several reports and visions for Greater Mumbai and MMR in the last decade. The first among these was 'Vision Mumbai', by Mumbai First and McKinsey & Company. All subsequent visions have been largely influenced by it.

Table13.1: The Visions envisaged for Mumbai and its region by various reports

Report	Vision
"Vision Mumbai", 2003 by Mumbai First and McKinsey & Company.	"Transforming Mumbai into a world-class city by 2013"
"Transforming Mumbai into a World-Class City", 2004 by the Chief Minister's Task Force	By 2013, Mumbai should possess "the twin elements of a world-class city - dynamic, job-creating growth; and a comfortable quality of life".
City Development Plan, 2005 by MCGM	"Transforming Mumbai into a City of the Millennium".
"Making Mumbai an International Financial Centre", 2007 by the High Powered Expert Committee (HPEC)	"Making Mumbai an International Financial Centre".
Business Plan for the Mumbai Metropolitan Region (MMR), 2009, by MMRDA	"Transforming MMR into a world class metropolis with a vibrant economy and globally comparable quality of life for all its citizens".

⁵² 11th Five Year Plan 2007-12, Planning Commission, Government of India

⁵³ 12th Five Year Plan 2007-12, Planning Commission, Government of India

Concept Plan for the Mumbai Metropolitan Region, 2010, for MMR

By 2032, “Transforming MMR into a “World Class Metropolis” with a vibrant economy, a globally comparable quality of life, and a healthy and attractive environment for all its residents”.
By 2052, “Elevating MMR to be a “Global City” with a unique identity and global recognition as an international business hub, a leading technological innovator, a melting pot of local and cosmopolitan cultures, and a centre of excellence for urban environmental management”.

There is congruence among all previous plans that have been drawn up, in that they all have a common vision of transforming Greater Mumbai into “*a World Class City*”. Realizing the above visions requires policy support, investment strategy, and a conducive world economy. Unlike these, the Development Plan is largely a spatial plan and, therefore, has a narrower sphere of operation.

The vision for the DP 2034 is conceived as a broad framework for future development that would allow flexibility of action for multiple actors. The Development Plan for Greater Mumbai forms a framework within which Mumbai’s future development could evolve. One of the major mandates of the Development Plan (see Section 22, MR&TP Act 1966) is to ensure adequate space for social, medical, educational and recreational amenities for all. Similarly, the Plan has to create a framework for development of land and built space that can fulfil the aspirations of all sections of the society. Being a 20-year long-term plan, it cannot be deterministic and can only provide a spatial framework within which various public service investments can be planned and evolved, and within which the real estate market can function competitively and efficiently. The vision for DP has, accordingly been articulated in this context.

13.2 The overarching approach for the DP 2034

The DP 2034 adopts an overall approach focusing on **People, Places and Infrastructure**, with the overarching objective towards improvement in **Quality of Life** in Greater Mumbai. This approach has guided formulation of all the strategies, proposals and plans of the DP.

- **People:** The DP intends to promote inclusive and equitable development for all groups of people considering all economic, social, gender, and age profiles.
- **Places:** The DP intends to respect the diversity of places that exist in the city and aims to promote optimized development of all places as per their inherent potentials.
- **Infrastructure:** The DP creates a framework of infrastructural improvements – physical, social, and environmental, to ensure that Mumbai caters to a better quality of life.



13.3 Vision DP 2034

Based on this overarching approach, the Vision adopted for the DP 2034 for Greater Mumbai is:

“To enable the transformation of Greater Mumbai into a Global City that is Inclusive, Sustainable, Liveable, and Efficient.”

To achieve this vision, DP 2034 elaborates a variety of strategies that are markedly different from previous Development Plans. Presented below are the goals, objectives and strategies suggested for enabling Greater Mumbai’s transformation into a City, which is Competitive, Inclusive & Environmentally Sustainable.

Goals

This vision statement of DP 2014-34 is further translated into three key dimensions of growth for Greater Mumbai:

Goal 1. Competitiveness

Goal 2. Inclusivity

Goal 3. Environmental Sustainability

The key objectives that the Plan adopts to further the Vision along these key dimensions are detailed in the section that follows.

Goal 1. A Competitive City

Greater Mumbai is India’s premier financial city. In the last five years, the real growth in Mumbai’s economy has shown a remarkable rate of about 13%. Its growth rate has been cyclical and fluctuating, i.e., -5% in 2001 to 13% in 2004. Given the share of Mumbai’s GDP in Maharashtra (27%), fluctuation in Mumbai’s growth affects that of Maharashtra as well. Currently, sky-rocketing real estate prices, limited floor space and overburdened infrastructure are decreasing the attractiveness of the city for business and investment. A restrictive development control regime

affects competitiveness and inclusivity. Increasingly, Mumbai is losing out to other cities in India like Bangalore, Gurgaon, and Hyderabad, as businesses seek more affordable and attractive locations.

Mumbai has the distinction of having some of the highest office rentals globally, accompanied by a relatively low quality of life. Among 30 Asian countries, India is set to witness the second highest demand for commercial space in 2014⁵⁴. However, rents of commercial properties in Greater Mumbai are 4 to 7 times that of other cities, which is increasingly making businesses rethink about locating in Greater Mumbai.

Taking cognizance of the need for Mumbai to have a leading edge over other cities, the Municipal Commissioner in his 2014 budget speech said that, *“Keeping in view the fact that Mumbai is the financial capital and business hub of India, it is proposed to create a new department in MCGM, namely ‘Department of Business Development’. This department is proposed to target the index of ‘Ease of doing Business’ in Greater Mumbai. It will deal with single window clearances, attracting new investments into Mumbai in sun rise sectors and development of connectivity & infrastructure in Central Business Districts located in Mumbai.”*

In line with the goal to increase Greater Mumbai’s global and local competitiveness, within the ambit of the Development Plan, the DP 2034 aims to:

- Create a flexible regulatory climate as against a restrictive and over-regulated one, so as to bring down real estate prices and rentals through competitive market operations;
- Allow mixed uses as a rule, to facilitate the operations of the market;
- Create multiple development nodes, especially around existing and upcoming public transit hubs, so as to create a range of accessible, compact, vibrant, economic centres;
- Enhance linkage between public transportation networks, transport infrastructure and development potential, so as to improve city efficiency;
- Augment access to recreational, educational, health & socio-cultural amenities, to improve quality of life of residents;
- Devise adequate revenue streams to ensure timely implementation of DP proposals;
- Review institutional frameworks and simplify regulatory controls, to increase transparency, minimize transaction time and ensure continual monitoring & evaluation of the implementation of the DP.

Goal 2. An Inclusive City

Greater Mumbai is marked by extreme disparities of income. The city has a large informal workforce and nearly 41.85% of the population lives in slums with varying access to social and physical infrastructure. Market led renewal schemes benefit selected land pockets which offer easy and high returns, rendering several large areas unattractive for redevelopment. In addition, the blanket regulatory controls, the regularly introduced policy interventions in response to the restrictive

⁵⁴ Economic Times, quoting a Cushman-Wakefield Report

development rights, exhibit little consideration for the varied character & value of the different places in Mumbai. In line with the goal to promote inclusivity, the DP 2034 aims to:

- Devise policy instruments to increase supply of land for public purpose and ensure equitable access to social amenities;
- Augment and improve access to public transportation;
- Create policies which promote social mix and inclusionary housing;
- Formulate means to integrate informal markets into the Plan;
- Adopt flexible and mixed use zoning to incorporate all uses and to facilitate new economic activities to occur;
- Formulate place-based development regulations to acknowledge the distinctiveness of the old and the new urban fabrics in the city;
- Promote a barrier free environment that provides ease of mobility for the differently-abled, and for persons of all ages and gender;
- Enable transparency in the development control regulation and remove scheme-specific variances, to ensure proper habitability standards in all developments across the city;
- Ensure supply of redevelopment incentives for developments with public purpose, which ensure market attractiveness;
- Build in processes which would enable participatory local planning throughout the course of the implementation of the DP.

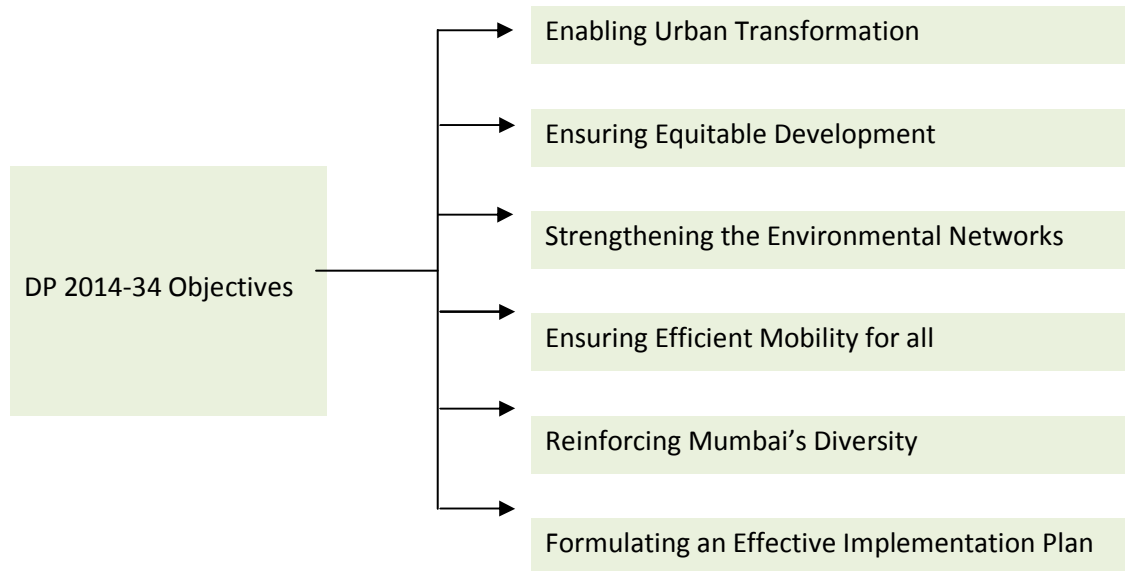
Goal 3. An Environmentally Sustainable City

Given the limited area of Greater Mumbai and the expanding economy, there is a constant pressure of development on its environmental resources. Ensuring environmental sustainability would directly translate into better quality of life and better health for citizens. In order to achieve a balanced development, a comprehensive framework for environmental sustainability is essential. In line with the goal to enhance environmental sustainability, the DP 2034, aims to:

- Protect ecologically sensitive natural areas;
- Divert development intensity away from and enhance the ecological value of the city's natural assets;
- Enhance urban biodiversity through augmenting provision of land for public open space;
- Set in place measure to address environmental vulnerability such as flooding and landslides;
- Institute green technologies and sustainability controls within the utility systems as well as the plot-level control mechanisms to mitigate climate change;
- Introduce measures to combat environmental pollution, such as promotion of use of public transit and walkability within the city, reduction of vehicular emissions, and augmentation of tree cover.

Objectives & Development Strategies

DP 2034 adopts a multi-pronged approach that integrates the vision for Greater Mumbai with bottom-up perspectives as under:



These major approaches and strategies for the DP 2014-34, are elaborated in detail below:

Objective 01: Enable Urban Transformation

The DP 2034 envisages an efficient, polycentric spatial structure for Greater Mumbai, which aids in accommodating economic growth, enhancing access to public transport and social infrastructure, whilst preserving the ecologically sensitive areas of the city. To align such structural transformation, the DP suggests the following strategies:

Strategy 01: Promote Polycentric Development

DP 2034 seeks to continue and promote the ongoing polycentric city development by strengthening the existing and emerging commercial and employment nodes, so as to create multiple intensive, compact, walkable, mix-use growth nodes.

Strategy 02: Strengthen Transit Oriented Development (TOD)

Greater Mumbai is an example of a compact and efficient city model, with a great interconnectedness between its transport networks and development patterns. In continuation of the objective of polycentric growth, and in order to manage and facilitate the efficient circulation of people and material within the city, the DP seeks also to structure growth along established and emergent public transit nodes.

The plan seeks to strengthen the influence zone of important public transport nodes like railway stations and existing and proposed metro stations.

Strategy 03: Create a Responsive Development Framework

Moving away from the restrictive policies that created artificial scarcity of development rights, which in turn resulted in unaffordability of real estate and large-scale proliferation of informal housing stock; the Plan adopts an anticipatory framework of development rights, which respond to the aspirational needs of people as they evolve over time.

It provides an enabling development rights framework, which ensures adequate supply of affordable space for the present and future demand, while allowing competitive market operations. Such adequacy of development rights nullifies the need for variances and exemptions in the development control regulations, thus ensuring good quality built spaces for all types of users.

It proposes a variable developments rights regime, which incentivizes urban renewal. Through a system of variable FSI, the DP seeks to unlock the developmental potential of existing and emerging employment nodes and attempts to structure them around the principle of TOD.

Strategy 04: Initiate Local Area Plans

The DP lays out a framework for a two-tier planning process, through which it fosters urban design of the public realm and attempts to build comprehensive

area development plans for areas that have specific local needs that cannot be addressed at the scale of a Development Plan.

Several older areas in Greater Mumbai, with distinct social and cultural characteristics need comprehensive urban renewal, which is sought to be initiated through sensitive planning interventions. Similarly, large slums, would need more careful and detailed planning to address the complexities of tenure, livelihoods, social and economic disparities and gross under provision of amenities and infrastructure. LAPs shall also consider design of streets and public places.

The DP 2034 acknowledges these areas as places deserving of planned 'transformation'.

Objective 02: Foster Equitable Development

The DP 2034 adopts planning measures that foster 'Inclusive Development' through the inclusionary housing policy along with an inclusive zoning strategy to address the needs of slum dwellers, pedestrians, the differently-abled, hawkers and the informal trade activities. As per its objectives of inclusivity, DP 2034 has adopted these strategies for greater equity:

Strategy 05: Plan for Equitable Access to Amenities

The Plan adopts amenity and space provision norms which are uniform and are based on per capita requirements, thus ensuring equal access to amenities for all people and all localities of the city.

It also adopts a multi-criteria allocation method, which focuses on adequacy of space provision, provision as per various hierarchies of needs, and distribution of amenities as per distance based physical access, ensuring that all neighbourhoods have equal access to basic amenities.

It proposes revisions to the reservation policies towards better implementability. In view of the constrained supply of vacant land, it suggests innovative strategies to augment land for public purpose. It moves away from a rigid amenity classification system, and moves towards creation of a common pool of land for public purposes.

Through a flexible and participatory decision making process, it fosters a participatory process at the local level in order to respond to changing need for amenities, thus ensuring appropriate allocation and use of land from the common pool.

Strategy 06: Facilitate Inclusionary Housing

Besides ensuring adequacy of development rights to cater to housing supply and increase affordability, the DP adopts policy measures that seek to create a

continuous supply of affordable housing, which would come through the process of redevelopment as mandatory inclusionary housing contribution. It also makes provisions for a flexible development framework, which would allow various models of repair as well as redevelopment to operate.

Strategy 07: Strengthen Livelihoods

DP 2034 attempts to strengthen the existing sources of livelihoods by recognizing and supporting the claims made on the city's public areas by natural informal markets. It suggests sensitive guidelines for street of designs and public spaces, which are purposed to address these conflicting claims on the public realm.

Strategy 08: Plan for Universal Access

The DP 2034 includes several national as well as international norms on provision of universal access to ensure a barrier-free environment, both within buildings and in the public realm. It also attempts to suggest guidelines for retrofitting existing buildings and public facilities to improve access for people with all types of mobility needs.

Objective 03: Strengthen Existing Environmental Networks

The DP 2034 recognizes and supports the contribution Greater Mumbai's environmental resources make towards health and quality of life for all its citizens. The Plan suggests the following strategies towards conservation and enhancement of the city's ecology through spatial augmentation towards ultimately encouraging biodiversity, improvement of health and lifestyle quality indicators, and mitigation of environmental pollution, vulnerability to hazards:

Strategy 09: Preserve the ecologically sensitive areas

The DP 2034 captures the city's natural areas and preserves their ecological importance. This includes the forests, lakes, rivers, streams, ponds, mangroves and coastal wetlands. The spatial strategy attempts to reinforce the city's natural ecological and biodiversity networks through reservation of additional land for open space infrastructure and recognition of lung spaces as environmental assets which although may not be publically accessible.

Strategy 10: Green the Grey

The Plan encourages the development of green infrastructure with an aim to mitigate environmental risk vulnerability, pollution and climate change.

Strategy 11: Mandate Environmental Sustainability Codes

It also hopes to conserve natural resources, water and energy by mandating appropriate green codes at the city, the site and the building level.

Objective 04: Plan for Efficient Mobility for All

The DP seeks to ensure efficient mobility of goods and people by optimizing circulation and ensuring connectivity to all parts of the city through public transit. It hopes to achieve this by augmenting public transit as well as access to public transit, optimizing the network of street grids, managing on-street and on-plot parking, improving walkability, and suggesting design of streetscapes that are inclusive, adhere to barrier free codes, and cater to different types of mobilities, as suggested in the following strategies:

Strategy 12: Transit First

The DP 2034 aims to optimize on the locational advantages of existing and upcoming transit lines, as well as proposes augmentation of public transit access in underserved areas. It adopts 'Transit First' as a guiding principle and, in turn formulates a spatial plan which promotes Transit Oriented Development. It envisages the Transit Oriented Zones as dense, compact, efficient & vibrant mix-use clusters with quick and easy access to public transit, where access of private vehicles is regulated and minimized. It suggests station area improvement guidelines through which suggest multi-modal integration.

Strategy 13: Optimize the Road Networks

The DP 2034 builds on the road network provision of both the past Development Plans, and adopts a strategy towards optimization and augmentation of road space, which is based on differential conditions of the various areas of the city. Road network optimization is undertaken on a series of principles such as, ensuring proper hierarchy and spacing of roads, adequate grid density, and augmentation of road layout of new roads. The DP adopts an overarching approach of creating a fine grid of streets at various hierarchies, particularly at local levels, in order to facilitate ease of movement.

Strategy 14: Create Inclusive Streets

The DP introduces several street improvement strategies towards ensuring better management of road space for all users. Based on the context and scale of the place, it prioritizes pedestrian movement, considering walking currently constitutes the large modal share in the city. It makes suggestions towards facilitation of bus movement, regulation of carriageway space, on-street parking space, as well as inclusion of street-vending spaces in high pedestrian

traffic & mixed use areas. These street standards are complimentary with several on-plot streetscape control regulations which enhance the intent.

Strategy 15: Adopt a Parking Demand Management Approach

The DP adopts a paradigm shift and moves away from parking provision towards a parking demand management approach. It views parking as a private good, and suggests rationalized on-plot parking provision norms, which also vary based on location depending on availability of public transit access. It attempts to promote different tools to manage public parking spaces in the city, which includes variable regulations and management mechanisms for on-street parking and public car parks within private plots.

Objective 05: Reinforce Mumbai's Diversity

The DP takes cognizance of Mumbai's existing structure of socio-economic ties that have evolved over time and attempts to continue these systems through an un-inhibiting framework of mixed land use zoning. In addition, it seeks to preserve the characteristic urban fabrics in the city through a framework of regulations applicable to precincts, layouts and plots.

Strategy 16: Continue a Pattern of Mixed Land Use

The Plan adopts flexible Land Use Zoning to facilitate new economic activities to occur and allows mixed Land Uses subject to environmental safeguards.

Strategy 17: Adopt a Place-based Development Regulation Framework

The DP recognizes the significance of the various distinctive places in the city, in terms of their development pattern, built-form, heritage value, socio-economic ties, and locational advantages, and proposes special purposes regulations towards the advancement of the specific planning intentions for such places.

Objective 06: Formulate an Effective Implementation Plan

Towards implementation of the Development Plan, the following three strategies are proposed:

Strategy 18: Explore new Financing Mechanisms

To ensure implementability over the planning horizon, the DP explored several innovative concepts for financing the development plan, which focus on creation of new revenue streams through the process of the development.

Strategy 19: Develop a Robust Monitoring & Evaluation Framework for Plan Implementation

The DP 2034 also suggests a framework to monitor and evaluate the various planning intentions and objectives of the DP. The plan seeks to measure development realized through the inputs and outputs of the DP against objectives and goals established. Through an assessment of outcomes the purpose of the M&E framework is to make suitable alterations in the planning and financing strategies for plan implementation. It also suggests institutional strengthening strategies to ensure effective implementation and timely monitoring and review.

PART III

PROPOSALS



Chapter 14

Approach to the formulation of Development Plan

14. Approach to the formulation of Development Plan

Part III of the Draft Development Plan for Greater Mumbai 2034 presents the proposals based on Part I: Context and Challenges and Part II: Vision, Objectives and Strategies. However, before describing the details of the Draft DP, the approach to plan formulation is described.

14.1. Development Plan as a Broad Framework

The previous two development plans of Mumbai were detailed plans for meeting the end state assumed for the plan period of 20 years as envisaged in the MR&TP Act. These plans did not take recourse to making plans for areas of comprehensive development as provided for in section 33 of MRTTP Act or to Town Planning Schemes as provided in Chapter VI of the Act as instruments of local planning. The result was that the plans ended in deciding use and intensity of every square meter of land in a prescriptive manner to attain the assumed end state. 1967 plan assumed the population target of 7 million whereas 1991 Plan assumed a target of 9.98 million both proved to be gross underestimates. Such plans are based either of the two myths – planners know what the future would be or planners can decide what the desirable future should be and can realize that through means at their command. For example, planners of DP 1991 could not visualize (no one could have) the demise of textile mills and other manufacturing industry, economic liberalization of 1991 and its impact on growth of financial services in Mumbai, expansion of housing finance, growth in income and its impact on formal housing demand, emergence of BKC as new banking district and dispersal employment. Planners' tools of land use zoning and FSI could not restrain growth but probably fuelled real estate prices. In case of basic municipal services too, many municipal primary schools have lost patronage and buildings obtained under the policy of Accommodation Reservation for a particular purpose have remained underutilized or vacant.

On the other hand BKC that was initially meant to decongest South Mumbai by relocating wholesale markets in cotton textile became eminently successful by seizing the opportunity to reposition itself as the new banking district.

It is clear that planners cannot accurately anticipate and should therefore digress from formulating over deterministic and prescriptive plans. Instead, the long term plan could be a broad framework within which, market could operate to respond to evolving needs of the citizens. The plan may minimally intervene to control negative externalities that market may generate and help the poor that market may not serve. However, it may be noted that the poor are served in larger number by the informal market than that served by the formal state interventions. It is plausible that the coming decades will witness a more rapid change than that experienced in the past and it will not be possible for urban planners (or others) to plan for an unanticipated demand. In order to avoid the risks associated with planning too many details too far in advance, it is proposed that DP 2034 serves as a broad framework within which several transformations could occur within a larger vision. The DP 2034 therefore simplifies the land use zoning structure and introduces a mix of permissible uses. Further, it rationalizes the cumbersome reservation policy for making land available for public purpose, by bringing flexibility of use. Instead of solely relying on acquiring particular plots of land for specific public purpose it proposes to seek contribution of land towards creating a pool of land that can be used for public purpose responding to community needs. Most importantly, Floor Space Index is conceived not as an instrument of constraining growth and density but as a framework

within which market could function competitively to respond to demand. Thus, the DP attempts to support competitiveness, inclusivity and sustainability as mutually constitutive objectives.

As a corollary of DP as a broad framework, it is also proposed to undertake detailed local area plans over a period of time after the DP is sanctioned. While the broad framework of the DP 2034 establishes General Development Control Regulations (GDCR), it also elaborates Place Based Codes through Special Development Control Regulations (SDCR), crafted specifically for places with distinct character and needs in Greater Mumbai. The DP 2034 elaborates upon a process for local area planning through which local stakeholders may shape place specific regulations through a collaborative process.

Finally, as the DP 2034 takes effect, it is imperative to ensure that the Plan itself is revised periodically in order to reflect changing priorities of the people. In addition to the mandates of the MR&TP Act 1966, for the preparation of the DP, the DP 2034 is conceived as a rolling plan and defines a mechanism through which the Plan itself shall be reviewed on a periodic basis. A digitally driven monitoring & evaluation system has been proposed which shall capture data, essential to gaining an understanding of effectiveness of the DP. The M&E system will capture the trends of growth, monitor physical development, assess the nature of urban transformation and implementation of the plan with a view towards undertaking mid course correction if required and provide orientations for revisions to be ushered in the DP 2034.

The DP 2034 recommends that concurrent to implementation of the DP, Sectoral Plans and Local Area Plans need to follow, which are explained below.

14.2. Local Area Plans

As mentioned earlier, the DP 2034, as a long-term development plan, is not over prescriptive but creates a broad framework to respond to unfolding trends to achieve basic developmental goals. For this purpose a second tier Local Area Planning is proposed. The DP establishes methodologies under which area specific plans can be further developed or modified, making them receptive to accommodate unforeseen changes in time.

The social, economic and cultural geographies of places in Greater Mumbai entail a great diversity and consequently these reflect in its heterogeneous urban fabric. Regardless, the Development Control Regulations of DP 1991 prescribed uniform development rights across Greater Mumbai. The provisions in DP 2034 for preparation of Local Area Plans address these specificities.

The LAP framework serves as a platform for the MCGM to take up detailed local area plans with active stakeholders' participation covering land use, reservations, DCR and urban design. Legal provisions for these have been further explained in *Chapter.21 Local Area Plans*, of this report.

14.3. Sectoral Master Plans

Development in its wider sense would include economic growth that is inclusive, human development that could be accomplished through education, health care and inculcating values enshrined in Indian Constitution and the notion of environmental sustainability. In contrast 'development' as defined in the MRTP Act is confined to the physical manifestation of the process of

development. The twenty year development plan along with set of development control regulations can therefore act only as land use allocation framework that enables development of public good and minimize the negative externalities that might occur in the process of development in public and private realms.

In parallel to such spatial plans it is necessary to have sectoral plans for physical infrastructure services like water supply, sewerage, solid waste management, storm water drainage, streets, traffic management and transportation that are within the jurisdiction of MCGM. Similar sectoral plans are necessary for delivering the social services like education, health care and recreation.

Public consultation with respect to the preparatory studies carried out for the DP revealed that the citizens expected the DP to deal with all these sectors. However, this could not be accomplished as part of the development plan for the following reasons.

- (a) Each of these sectors require a distinct expertise that cannot be brought into preparation of development plan;
- (b) Moreover such Sectoral plans – particularly in social services sectors – have to be more concerned with institutional capacity building and investment in developing required infrastructure and less so with long term spatial requirements;
Sectoral plans could be more meaningful in terms of short (5 years) to medium term (10 years) periods. Such plans could then bring about spatial requirements for revising the DP.

During the preparation of DP it was also realized that there are few formal Sectoral Plans and none in public domain. It would therefore be useful to prepare Sectoral Plans and convey them through non-technical language to citizens at large.

The plans for each sector may cover:

- (a) Current status of delivery of the service highlighting the spatial variation where relevant;
- (b) Sectoral objectives including service delivery benchmarks;
- (c) Five yearly investment and institutional capacity building programmes to achieve;
Sectoral objectives including use of DP facilitation and its adequacy;
- (d) Participation of private sector envisaged where relevant.

The sectors to be covered by such a process of Sectoral plan may include:

- (a) Water supply;
- (b) Sewerage and sanitation;
- (c) Storm water drainage;
- (d) Solid waste management including hazardous and bio-medical waste;
- (e) Streets, footpaths, streetlights, traffic management including on-street parking;
- (f) Primary education;
- (g) Health care services;
- (h) Parks, playgrounds and other social and recreational facilities;
- (i) DP implementation- not covered by above Sectoral plans.

Such plans may in essence follow a process of preparing draft plans for public consultation, then finalizing them for resource allocation through annual budget. These will have to be monitored by measuring the outcomes against the objectives of the plans in iterative and cyclical manner.

It would also be useful to bring together the project and investments in these sectoral plans in a consolidated five yearly 'Capital Investment Plan' (CIP). Such a plan could then be a useful tool to mobilize additional resources and decide inter- sectoral priorities across sectors. City Development Plan required to be proposed under JNNURM had CIP as its component. However, instead of being a onetime exercise it should become an ongoing process of inter-sectoral coordination and priority setting.

14.4. A Consultative Process

The MR&TP Act 1966 has laid down both procedural and legal aspects of formulating the Regional Plan, Development Plan and Town Planning Schemes for the State of Maharashtra. The Section 23 to 31 of the MR&TP Act prescribes the procedure to be followed in formulating the Development Plan. The Act provides for public display of the Draft Development Plan after it is formulated for inviting suggestions and objections within a period of 60 days from the date of notice in the Official Gazette. The plan so kept for inspection includes the report on the existing land use map, provisions of the draft development plans, development control regulations, report on the proposed plan and approximate estimate for the implementation of the plan. The Section 28 of the Act provides for giving the hearing to any suggestions and objections relating to the Draft Development Plan. The planning committees after giving the hearing may modify or change the plan in such a manner as it thinks fit. The Development plan if so modified by the Planning Committee is then submitted to the Planning Authority and then to State Government for sanction.

MRTTP Act however does not mandate any public consultation during the formulation of draft DP. The DP 2034 however, has taken a progressive initiative in conducting public consultation workshops during the various stages of the plan preparation, in order to follow a more transparent and inclusive process.

The outputs of the DP were shared with the stakeholders and public at three stages:

1. The Existing Land Use Plan 2012;
2. The Preparatory Studies Report, comprising assessment of the existing status, projections for 2034 and vision for development for Greater Mumbai;
3. Ward level consultation workshops for assessment of priority amenity space demand at local levels.

The following section summarizes various public consultation/participation initiatives undertaken by the MCGM at different stages of plan preparation.

14.4.1. Existing Land Use

The existing land use map for the Planning Area was prepared as stipulated in the section 25 of the MR&TP Act. The ELU 2012 was published after its completion to invite citizen's comments on the existing land uses as reflected in the map. The ELU 2012 has a bearing on the planning proposals and accuracy is the key. These maps, for each Ward were displayed in the respective Ward offices and were also made available on the MCGM web portal in both English and Marathi. These were accompanied by the ELU 2012 report. Initially public comments were requested in the form of letters and emails for a time period of 30 days. However, due an overwhelming response the period

was extended by 3 months. The comments were scrutinized and each site was then inspected by the MCGM. Depending on the relevance of the comments the ELU 2012 maps were updated.

14.4.2. Thematic Workshops for Preparatory Studies

The Preparatory Studies report includes assessment of the existing situation, population and employment projections for 2034. It provides an understanding of issues and challenges that the Greater Mumbai is expected to face over the next two decades and establishes objectives for development plan and principles for the formulation of proposals.

The MCGM pro-actively consulted the various stakeholders with the objective of receiving their ideas, comments and suggestions towards envisioning future development of Greater Mumbai. Stakeholders were identified based on their interests, relevance of expertise and experience in the context of Greater Mumbai. These included bodies such as Mumbai Transformation Supply Unit (MTSU), Youth for Unity and Voluntary Action (YUVA), Urban Design Research Institute (UDRI), Tata Institute of Social Science (TISS), Practicing Engineers Architects and Town Planners Association (PEATA), Maharashtra Chamber of Housing Industry (MCHI), Conservation Action Trust (CAT), Geography and Economics Departments of Mumbai University, etc. It was ensured that all the relevant groups, including the economically weaker section, are included.

A comprehensive presentation of preparatory studies was made to the stakeholders in December 2013 – January 2014. This included the outcome of ELU 2012, various statistics, projections, planning benchmarks, vision for the DP 2034 and policy related questions for soliciting their responses/comments on the various aspects of the DP 2034.



Source: MCGM, Stakeholder consultation workshop, 2013-14

It was decided to conduct theme based workshops upon the request of the stakeholders and accordingly workshop themes were identified based on the debates generated during the presentation. The workshops were conducted based on various themes as shown below in Table 14.1.

MCGM encouraged active participation of NGOs. The various NGOs, individuals working in their specialized domain were identified and entrusted with tasks such as anchoring the thematic workshop, identifying interest groups, initiating interaction and concluding the workshop with various recommendations from each group. Findings from these workshops were documented and transcribed as issues related to policies that are largely addressed within DCR or listed as managerial

issues to be undertaken by the respective MCGM departments. The outcomes of various theme based workshops are given below.

Table 14.1: Workshop Themes, NGO's In-Charge and Date of Hosting

Sr.No.	Workshop Theme	NGO In-Charge	Date
1.	Transport	MTSU	17.12.2013
2.	Simplification of DCR's	P.E.A.T.A	07.01.2014
3.	Education	U.D.R.I., Pratham	08.01.2014
4.	Environment & Sustainable City	C.A.T.	09.01.2014
5.	Informal Housing	YUVA, Nivara Haq, C.R.H, S.R.S, Housing Development	11.01.2014
6.	Urban Form	U.D.R.I.	15.01.2014
7.	Water	YUVA, Pani Haq Samiti	16.01.2014
8.	Gaothan, Koliwada and Adivasipada	K.R.V.I.A	18.01.2014
9.	Gender Sensitization	Akshara	20.01.2014
10.	Solid Waste Disposal & Waste Water Management	S.M.S., Aakar Mumbai	21.01.2014
11.	Informal sector	YUVA, Pani Haq Samiti	22.01.2014
12.	Physical Infrastructure	MCHI	25.01.2014
13.	Formal Housing	MCHI, TISS	25.01.2014
14.	Health	U.D.R.I.	29.01.2014
15.	Digital Inclusion	IIT, U.D.R.I.	05.02.2014

Source: MCGM, Stakeholder's Workshop conducted in 2013-2014.



Source: MCGM, Thematic workshop, 2013-14

14.4.3. Outcome of Thematic Workshops

The Preparatory Studies Report highlighted the need for digression from several current planning practices and raised these as questions for receiving inputs from stakeholders. The thematic workshops resulted in suggestions for the proposals at various levels. While several vision based suggestions were made, particularly in the transportation, urban design forums, others such as the

ones on health, education, open spaces and amenities focused on the priorities for certain types of amenities and a need for increase in per capita standards. Specific requirements were received from the inhabitants of Gaothans, Koliwadas and representatives of slum dwellers. Details of suggestions received in each thematic workshop from the participants are listed below:

Formal housing & Physical Infrastructure

The existing situation analysis revealed that the household income distribution for Greater Mumbai indicates that the median household income is Rs. 20,000 per month. Given that the cost of housing is much higher than the affordable range of 4-5 times a family's annual gross income, it is apparent that nearly half of the population is unable to afford to own a house, even of minimum standards.

Suggestions & Recommendations

- Require simplification of DCR and Building approval process;
- Ensure affordability of MHADA housing even after redevelopment;
- Provide infrastructure and amenities proportionately for development of residential and employment uses;
- Provide illustrations in DCR;
- Avoid multiple NOCs from various departments and create one window clearance for building permits.

Amenities Provision

Using the ELU 2012 as base, a radar graph assessment was conducted at Ward levels. These were displayed in the workshops in order to ascertain levels of provision of Health, Education, Roads, Open Spaces, other Social amenities and residential space using per capita space available and comparing them against per capita planning standards set by DP 1991.

The Existing situation analysis showed that there are disparities that exist within the city across the three Zones, Island City and the Eastern and Western Suburbs, with respect to adequacy of access to amenities. Further, there are major variations between Wards in terms of meeting the standards. Analysis was also carried out to determine the ease of accessibility in terms of distance considering the physical location of amenities with respect to existing residential areas.

Suggestions & Recommendations

- Improve amenities provision in the Eastern Suburbs especially Wards M/E and M/W which have a significant shortfall;
- Provide integrated health and education facilities;
- Prepare Master Plans for Health and Education which shall be integrated with the DP;
- Improve per capita availability of open space on a priority basis along with provision of efficient road infrastructure as this affects access to amenities;
- Enhance geriatric care and facilities;
- Incorporate equitable distribution of primary health centres;
- Increase planning benchmarks.

Environment

The assessment of the existing situation highlights Greater Mumbai's vulnerability to natural hazards like floods and earthquakes. It suffers from a lack of adequate infrastructure, such as water supply and sanitation.

Suggestions & Recommendations

- Map and preserve Natural Assets;
- Encourage rain water harvesting and grey water recycling;
- Decentralize Solid Waste Management (SWM).

Informal housing

At present 41.85% of the population occupies only 8.18% (33.96 sqkm) of the total Planning Area (415.05 sqkm). The present DCR has provisions for rehabilitation of existing slums but there are no provisions for ensuring affordable housing. Moreover, in the current SRA model existing slum dwellers are accommodated in less than 50% of slum area making the slum rehabilitation extremely dense.

Suggestions & Recommendations

- Reserve slum sites for public housing and ensure better quality of life;
- Revisit free housing policy. Partnership model is desirable, and may include the State government, MCGM and slum dwellers;
- Analyse density, population and area of slums for measuring amenity provision;
- Discourage allocation of incentive FSI to slum rehabilitation schemes.

Urban Form

The assessment of existing status documented distinct urban fabrics that attribute cultural value to Greater Mumbai. Characteristics of urban fabrics such as Null Bazaar, Dadar Parsi Colony, B.D.D. Chawls, Nariman Point in Greater Mumbai were illustrated and findings of this exercise were listed.

Suggestions & Recommendations

- Formulate regulations to encourage different housing typologies and communal spaces;
- Incentivise repairs and restoration of old building stock;
- Encourage adaptive reuse to avoid increasing densities and loading existing infrastructure;
- Encourage rental housing;
- Lower parking norms.

Water

The existing situation analysed the water supply system, issues in present context, implementation status of water supply system and existing water supply projects that are being proposed and under implementation by MCGM.

Suggestions & Recommendations

- Include strategies for rainwater harvesting, water recycling and thus increasing the water supply availability.

Urban Villages

The ELU reveals that Urban Villages which include Gaothans and Koliwadas occupy an area of 318 ha (0.77%) area in Greater Mumbai. These are dispersed across the city. Most Gaothans and Koliwadas fall under heritage so that they are protected.

Suggestions & Recommendations

- Provide separate DCR for Adivasipadas, Gaothans and Koliwadas;
- Allow self-redevelopment;
- Facilitate the demarcation of Adivasipadas, Gaothans & Koliwadas, their houses and lands on the proposed land use maps;
- Provide roads, healthcare, cultural facilities, schools, municipal markets, etc. in Adivasipadas.

Gender Sensitization

This workshop focused on amenity provision and urban design concerns that cater to gender based specific spatial needs, hygiene, safety and convenience.

Suggestions & Recommendations

- Encourage mixed land use areas with round-the-clock activities;
- Enhance public space accessibility for women through urban design guidelines;
- Incorporate equitable distribution of amenities such as public toilets, day-care centres, libraries, primary and pre-primary schools; also consider their accessibility within a walkable distance;
- Promote resettlement schemes in the same Ward, so as not to disturb work-live relationship for women;
- Formulate special guidelines for areas that are expected to transform in order to shape a good scale of developments that foster safety and comfort.

Informal Sector

The assessment of the existing status reveals that employment in the informal sector (wage labour, hawkers) is reported to be growing at a faster rate than the formal sector. Studies indicate there are about 2,00,000 hawkers in Greater Mumbai.

Suggestions & Recommendations

- Provide wider footpaths for on street natural markets;
- Provide basic amenities, especially PSCs for hawkers.

Digital Inclusion

The DP envisions Greater Mumbai to be an inclusive city. To endorse this vision, various means for inclusivity are being considered.

Suggestions & Recommendations

- Consider provision of city wide internet as one of utilities required for making Greater Mumbai a competitive city;
- Provide access to/ framework for citywide ICT network – with fibre optical network to all intersections and curbs, catering to each plot.

Besides the above suggestion there were other specific issues such as conservation of places of historic importance, increasing walkability in neighborhoods, creating children friendly city, designing inclusive streets, etc. These issues have been considered and attempts have been made to address them in the DP 2034 and DCRs to the extent possible.

The stakeholders at the thematic workshops emphasized the need to conduct workshops for each Ward to gain an in depth understanding of the community needs at the local level. Following this suggestion, the MCGM undertook Ward level consultation workshops. The following section describes the process and outcome of these workshops.

14.4.4. Ward Level Consultation Workshops

The next level of consultation was held in each of the 24 Wards to assess local level needs. The Ward consultation workshops were held simultaneously in Island City, Western Suburbs and the Eastern Suburbs. The various stake holders involved in the workshops included, Ward Councillors, MCGM Ward Officers, local residents, members of the ALM's, NGOs, etc. It aimed at creating awareness among the stakeholders of the Wards regarding existing situation viz. population and employment, assessment of amenities provision, population and employment projections, etc. Challenges and opportunities pertaining to each Ward were highlighted. Feedback forms were given to each of the stakeholders to provide their valuable suggestions for prioritising amenities required in their Ward.



Source: MCGM, Consultation workshops in Wards M/W and A

The suggestions received at Ward level are categorised as given below:

Education Amenities

Wards B, C and G/N in the Island City, M/E, M/W, L in the Eastern Suburbs; R/N, Malwani, Ambujwadi in P/N demanded an increase in provision of education facilities; which is in congruence

with the radars diagrams. Majority of the Wards emphasized the need for MCGM to maintain the existing stock of school buildings and allow for multiple uses to take place during the non-school hours. Design of school facilities pertaining to criteria such as light and ventilation, open space, separate toilets for boys and girls, etc. was a concern. Wards M/E and M/W expressed specific demand for special schools as these are not located within walking distance of slums.

Health Amenities

An increasing emphasis was laid on preventive healthcare provision. Majority Wards in the Eastern Suburbs (especially Wards M/E and M/W); Ambujwadi, Malwani in Ward PN, Sangam Nagar Prateeksha Nagar in Ward F/N demanded better provision and distribution of primary healthcare facilities. Representatives of Ward P/S and K/E expressed specific demand for TB hospitals. Some municipal health care officials shared that non-functional maternity hospital buildings acquired by the MCGM under AR policy was a concern in Ward FN. Difficulty posed by Eastern Express Highway (EEH) in accessing Sion Hospital was expressed. Geriatric day care centres were demanded in majority of the Wards.

Social Amenities

Majority of the Wards in the Western Suburbs such as R/N, R/C, P/S, K/W, K/E demanded social facilities such as cultural centre, library, reading rooms, welfare centre, etc. Wards L, M/E, M/W and S in the Eastern Suburbs and, P/N and K/E in the Western Suburbs expressed similar demands but in addition need for Mahila Aadhar Kendra, counselling centre for women and children was highlighted. Wards K/E and S expressed specific demand for juvenile justice centre whereas Ward G/N demanded local Markets. As revealed in the radar diagram, Wards A, R/C and R/N demanded Cemeteries.

Open Spaces

Provision and maintenance of Open Spaces was a concern in all Wards especially, D, G/N, K/W, R/C, R/N, R/S, P/N and P/S. Wards L, M/E, M/W demanded open space provision to be given highest priority. Ward H/W expressed the need to make Bandra *Talao* (Lake) accessible to the public. Protection of Natural Areas such as mangroves in Wards R/N, R/C, P/N and K/W was suggested to be taken on priority basis. Ward S demanded salt pan lands to be reserved as recreational ground in the DP 2034. Redevelopment of mill lands to generate public open spaces and utilities was demanded in Ward G/S. Ward R/C demanded demarcation of sites for Ganapati Visarjan such as ghats/lakes in the DP 2034.

Roads

All the Wards in Greater Mumbai expressed concern over existing quality of road infrastructure. Improving East-West connectivity in Greater Mumbai was emphasized. There was a significant opposition to installing paver blocks on roads as these cause inconvenience to vehicles. Wards B and C expressed strong opposition to road widening alignments demarcated on Cessed buildings. Ward FN expressed specific need to assess feasibility of connectivity from Chunabhatti to BKC from the point of view of potential public transport. Ward KW demanded need for road widening and provision of access roads within these areas. Wards P/S, D, H/W, K/W and R/C demanded seamless footpaths for improved pedestrian movement especially for physically challenged, elderly and children. Ambujwadi and Malwani in Ward P/N demanded addition road linkages from the New Link

Road at Malad. Ward K/E emphasized incorporating long term planning of underground utilities in road design.

DCR and Policy Level Intervention

Majority of the Wards in Island City such as A, B, C, D and G/N demanded removal of DP 1991 reservation on existing buildings. Removal of reservation on slums, rehabilitation of PAPs and resettlement of slums in the same Ward and was supported strongly in all the Wards. Also, emphasis was laid on ensuring that the slum rehabilitation schemes follow the DCR for marginal open spaces for adequate light and ventilation provision. Significant among these were Wards L, M/E, M/W, K/E, P/S and R/N. Ward K/E demanded self development model for slums. Repealing DCR 33(7) was suggested in Ward P/N. Linking allocation of FSI to amenity provisions was suggested in Wards B, C and K/W.

Parking Management

Levying charges for all on-street parking was widely supported in all the Wards of Greater Mumbai. Majority Wards in the Island City demanded multi-level public parking structures to reduce congestion on road caused due to on-street parking. Ward R/C expressed specific demand for providing bus parking near Western Express Highway (WEH).

Environment

Ward K/E demanded stringent laws to be formulated against felling of trees and also that tree plantations should be regulated. Since Deonar Landfill site is located in Ward M/E it was demanded to create an environmental management plan such that the surrounding neighbourhood is not affected. Ward R/S expressed specific demand to widen Poisar river and provide publicly accessible open space along its edge. Also, this Ward demanded a digression from the BRIMSTOWAD approach to training of Nallas, towards a more environmentally sensitive approach. Creating mangrove parks to generate awareness among the citizens for protection of mangroves was suggested in Ward K/W. Ward G/N expressed specific concern over flooding in this Ward during the monsoons.

Local Area Planning

Several comments received in these workshops were pertinent to planning and implementation at local levels.

These ranged from preparation of specific projects for heritage precincts that would ensure maintenance of historic character of precincts to design of inclusive streets and devising place specific development regulations for places with distinct character in Wards such as G/N, G/S, F/N, F/S, B, C, D and E Wards. Design of large parks and gardens and design alternatives to training of nallahs were suggested in some Wards, especially in the Western Suburbs.

TOD strategy to serve as a tool to station area improvement and not merely reflect increased FSI was suggested in Ward F/N. In response to failure of skywalks, Ward D demanded mandating impact assessment of inserting new infrastructure. Ward GS expressed specific demand for mandating preparation of station area plans for Mono Rail and Metro Rail. It was suggested that the MCGM should identify areas for cluster development in Ward B.

Gender sensitive Geriatric Day Care Centres and Night Shelters and solid waste segregation facility at local level were demanded from various Wards. Also, there is an increasing demand for public toilets

in all the Wards as these are severely lacking in the city; its importance especially from the point of view of women safety and for people with lifestyle diseases like diabetes. These may be provided appropriately at local levels based on assessment of specific needs and evolving needs.

Apart from the above mentioned Ward specific demands, certain general demands were also expressed in Greater Mumbai. In addition, it was suggested that heritage conservation should not be limited to the precincts with colonial architecture only, but must also include places that served the purpose of community formation such as Chawls.

The DP 2034 has carefully considered all the above issues, concerns, suggestions and recommendations received towards formulation of proposals. Many of these demands were in conflict with one another. They have been addressed in the DP 2034 and DCRs to the extent feasible, as may be seen in the succeeding chapters.



Chapter 15

Spatial Development Structure

15. Spatial Development Structure

Parts I & II of this report highlight growth trends in Greater Mumbai and future orientations for development. It is anticipated that with decreasing household size, increasing per capita income and growing aspirations there will be an overall increase in the demand for residential space in the future. It is also anticipated that there will be increasing proportion of formal sector employment in the next few decades, which would translate into a demand for more commercial space and infrastructure. On the supply side, however, there is a limited availability of land in the city with very few vacant lands available as revealed by the Existing Land Use survey. DP 2034 therefore has evolved spatial development strategies, which promote holistic city renewal and redevelopment, improve access to transportation and amenities, preserve natural areas and provide a framework for formulating land use and FSI proposals.

Greater Mumbai is an example of a compact, dense and efficient city model, which is progressively transforming and restructuring itself around new infrastructure and employment nodes. The old historic business and trading hub of the city was located in South Mumbai and until the early eighties, Greater Mumbai was largely a mono-centric city. Due to changing economic trends and policies, expansion of the transit network, and conversion of land uses, Greater Mumbai has now evolved from a mono-centric city model to a polycentric model, with several large and small business nodes, which have emerged over the last few decades, and are distributed across the city.

Currently, 12.44 million people occupy a developed area of only 27,117 ha leaving minimal potential for lands available for new developments. Further, several Wards in the Island City have structures that are over a hundred years old and several in dilapidated conditions urgently needing renewal. Over 40% of the inhabitants live in slums with poor access to sanitation and solid waste collection. Further, there are increasing numbers of private automobiles. Mumbai has also witnessed an increase in environmental degradation, marked by air pollution, water pollution and very low per capita open space. Social and physical infrastructure demand has risen and will require attention with increase in demand for quality of life.

Greater Mumbai exhibits a great interconnectedness between its transport networks and development patterns, with development intensity concentrated along the three main Suburban Rail routes. However, with parallel road infrastructure developed in the Suburbs, the development intensity has also expanded into areas further from the Suburban Rail lines. Furthermore, changes in the employment characteristics have resulted in diverse travel patterns across the city, differing from the previous, largely North-South movement. Yet, there is still a lack of adequate East-West connectivity, both across the Western and Central Railway lines, as well as across the Western and Eastern Suburbs.

Presently, several local and regional transport (road and rail) projects, which have been recently launched, or are up-coming in the near future, offer connectivity along new routes, and are likely to enhance the development potential of several areas in the city. Such new nodes and connectivity will have major impact on the city development pattern. The DP 2034 proposes a spatial strategy that builds on these trends and helps create an efficient and sustainable spatial structure for Mumbai.

15.1. Orientations for envisaging Spatial Development Structure

The DP envisages a city structure, which responds to and optimizes the potential of existing and upcoming growth nodes and transport networks, while acknowledging the city's natural areas. The spatial structure proposed for Greater Mumbai is built around the principles of polycentric growth, transit-oriented development, anticipatory programming for future needs, and preservation of its natural areas.

These strategies are detailed out as under.

15.1.1 Polycentric Development

The DP 2034 aims to channelize the redevelopment of the existing, emerging and potential growth nodes across the city into high-intensity, compact business, employment and activity nodes. This policy would work towards further enhancing the economic primacy of Greater Mumbai in the region. The following nodes have been identified:

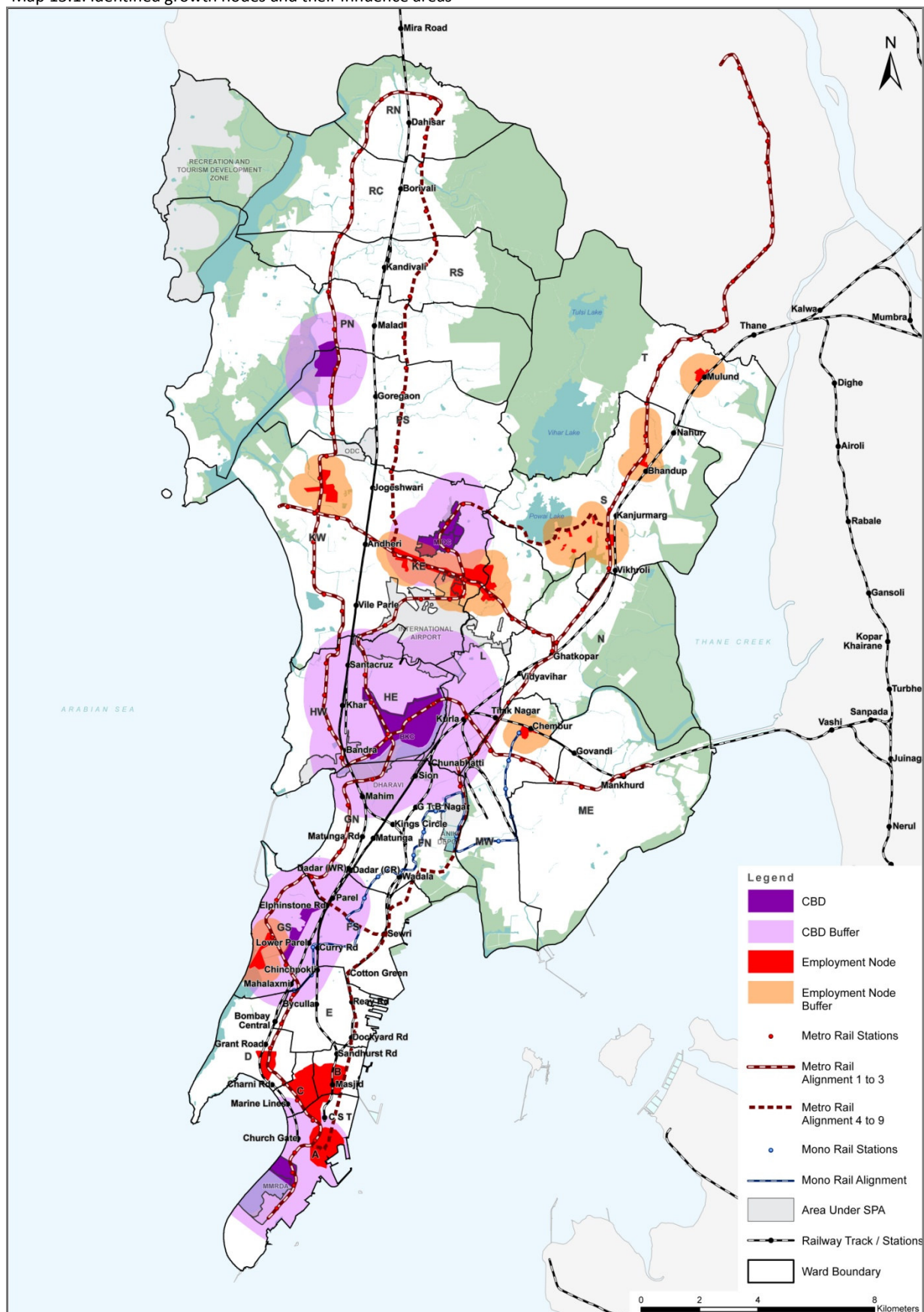
- a) Established CBDs and employment nodes include Fort & Ballard Estate, Nariman Point, the inner city bazaars, Worli, BKC, SEEPZ & MIDC at Andheri.
- b) Areas that have recently emerged, which are developing through the processes of industrial transformation; these include areas such as the mill lands redevelopment in Lower Parel. Renewals that have occurred in response to new infrastructure investments, such as at Mindspace at Goregaon, areas along Andheri-Kurla road, Powai, Bhandup, Mulund, Vikroli-Kanjurmarg.
- c) Locations with high potential for transformation on account of strategic connectivity, at the intersections of existing and proposed regional links. The DN Nagar Metro station, the entire Versova -Ghatkopar Metro alignment and the Worli - Sewri belt between MTHL and the Worli Sea Link are potential emerging centres because of their strategic locations relative to the new infrastructure that is proposed.

DP 2034 proposes to augment development potential around these nodes, assuming that, given a responsive development climate, these areas will develop at a higher intensity in the future. These nodes have been further categorised as per the order of their prominence and correspondingly their existing, as well as, expected influence areas have been defined, in order to ensure compatible planning of places around them.

- Nariman Point, BKC, SEEPZ, MIDC, Mill Lands area at Lower Parel, Fort and Ballard Estate have been identified in the DP 2034 as major nodes with a 1 km to 2 km influence zone;
- Areas around Andheri – Kurla road, Andheri Link Road, Bhandup, Mulund, Chembur, Powai, Vikroli-Kanjurmarg, Worli, Mindspace, have been considered as minor nodes with a 0.5 km influence zone;
- Inner City Bazaars, Fort, Girgaon-Opera House did not yield an influence zone.

The following Map 15.1 indicates the broader spatial strategy for polycentric development in Greater Mumbai.

Map 15.1: Identified growth nodes and their influence areas



15.1.2 Transit-Oriented Development

Development in Greater Mumbai has always been oriented around public transit, with the spatial form of the city following the alignment of railway networks. The previous DP 1991 also strengthened this linear corridor development along the railway networks while restricting development immediately on either side of the rail corridors in order to ensure accessibility. Further, the development paradigm of DP 1991 does not acknowledge the locational advantages of areas well served by public transit. The DP 2034 seeks to rectify this by promoting Transit Oriented Development (TOD) primarily around new and proposed metro lines along with existing important Suburban Railway lines.

Accordingly, growth bands within 1.0 km⁵⁵ influence zones on either side of the 3 Suburban Rail lines (the Western, Central & Harbour Railway lines), and 0.5 km influence zones along metro rail Line 01 corridor have been identified. Only metro rail line phases 01, 02, 03, 04, 05 which are considered to have a perceptible influence on the development pattern of the city within the 20 year planning period of this DP have been considered.

The TOD strategy adopted for the DP 2034, also suggests intensification of land uses in the influence areas of the important Suburban Rail and Metro Rail, so as to facilitate compact high-density, mixed-use developments, which have higher dependencies on public transit, and reduced usage of cars. Such new Transit Oriented Zones would become recognizable centres and employment hubs created through a process of development, redevelopment and intensification, and would further the strategy of polycentric growth.

TOD Zones have been identified around all Suburban Rail stations, and around the metro line 01, 02 03 & 04, as well as the monorail stations. These TOD zones have been classified into a hierarchy of importance based on:

- **Passenger Volume Survey:** Surveys conducted by MRVC (2013)⁵⁶ along the Western and Central Railways lines and harbour line (MRVC, 2012) provides passenger boarding and alighting count at stations during peak hours (Refer Graph 15.1). DP 2034 uses this data to create a hierarchy of the stations as per passenger volumes, whereby stations with higher passenger volumes have been accorded higher weightages.
- **Interchanges, Fast Stations and Terminals:** Stations that are interchanges between the Western Rail, Central Rail, Harbour Rail, Metro Rail or outstation train stations have been accorded additional weightage to account for their potential as nodes connecting different parts of the city. Similarly additional weight has been given to fast and terminal stations.

⁵⁵ UTTIPEC identifies a maximum of 2,000m on both sides of a major public transport corridor, and 500m on either sides of a minor public transit route as the range of influence. Based on this, the range of influence for the various rail lines in Mumbai have been worked out.

⁵⁶ MRVC, Mumbai Suburban Rail Passenger Survey and Analysis (2013) – for Western, Central lines and (2012) for Harbour Lines.

Using the above logic, the DP 2034 has categorized the train stations in their order of importance and proposes higher intensity TOD zones of corresponding sizes around them⁵⁷, as presented below:

- **Order 1 stations** are proposed to have a larger area of influence of 1 km radius. This distance can be easily covered using Intermediate Public Transport or cycles;
- **Order 2 stations** have a lower intensity than Order 1 stations and are proposed to have an influence radius of 500 m from the railway station. This distance can be covered by walk;
- **Order 3 stations** have the least intensity and an influence area with a 300 m radius.

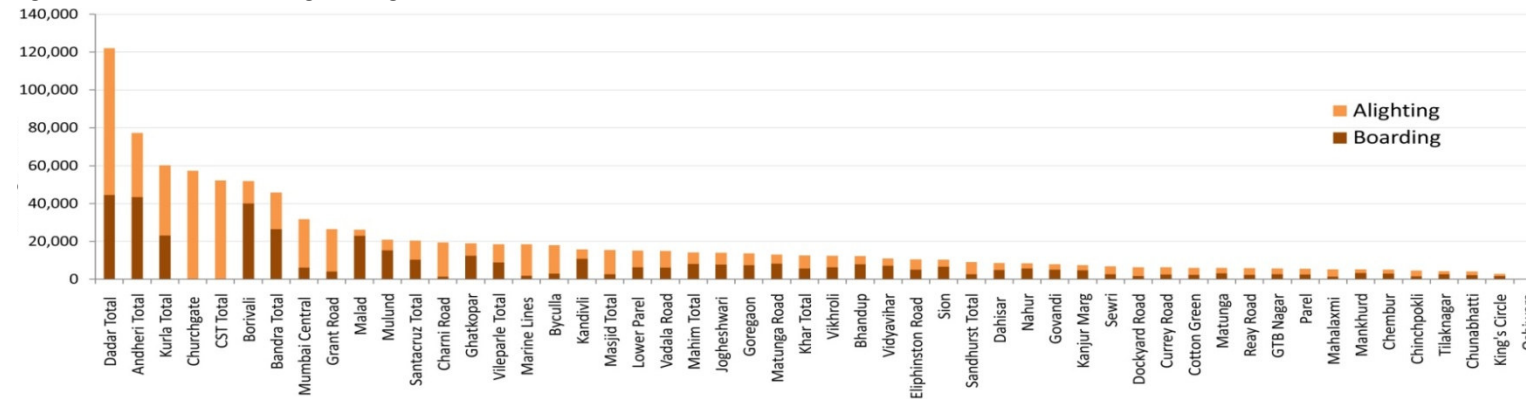
Graph 15.1 presents the hierarchy of rail stations, which has been determined by their passenger volumes and interchange potential between lines.

⁵⁷ UTTIPEC identifies 300 m at the intensive zone around a station, 800 m (10 minute walking distance) as the standard zone, and 2000 m (10 minute cycling distance / commute by taxi or rickshaw) as the transition zone. Based on these distances, the influence distances of major and minor order stations in Greater Mumbai have been worked out.

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Figure 15.1: Peak Hour Existing Passenger Volume



Source: MRVC (2012 and 2013)

Figure 15.2: TOD weightage for suburban railway stations

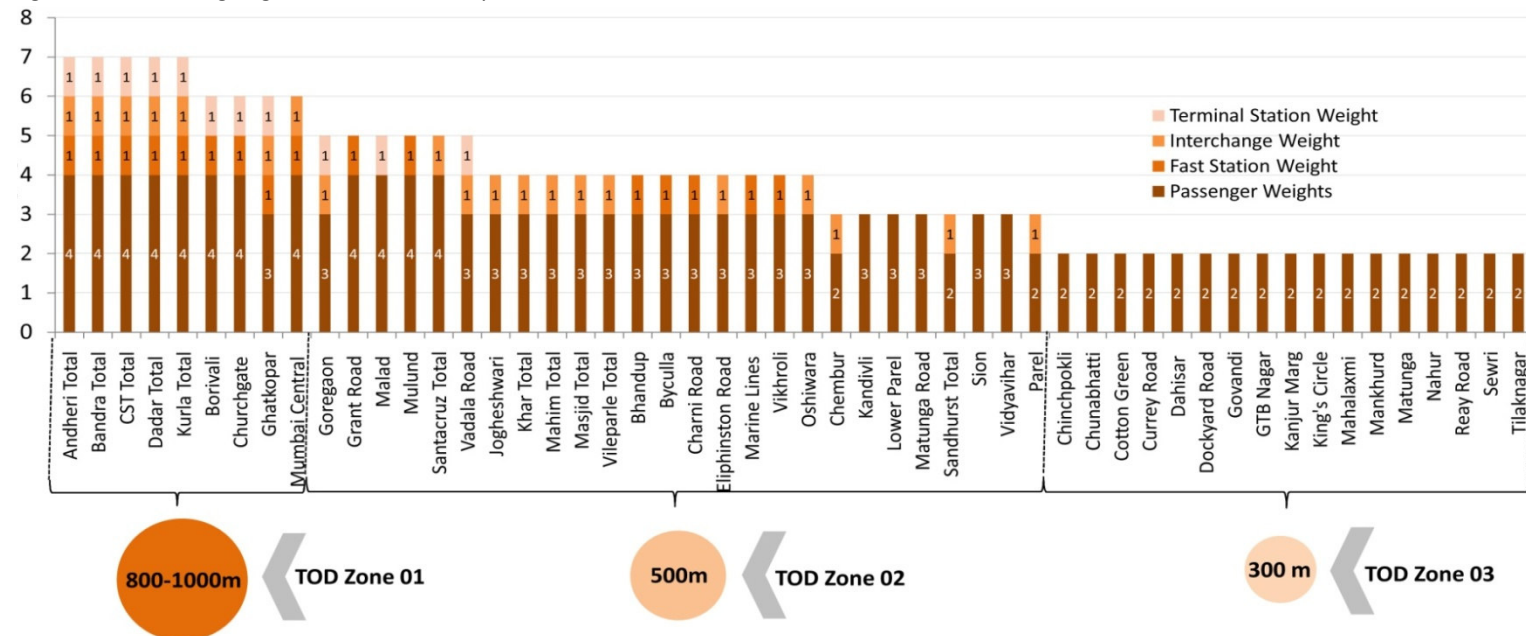
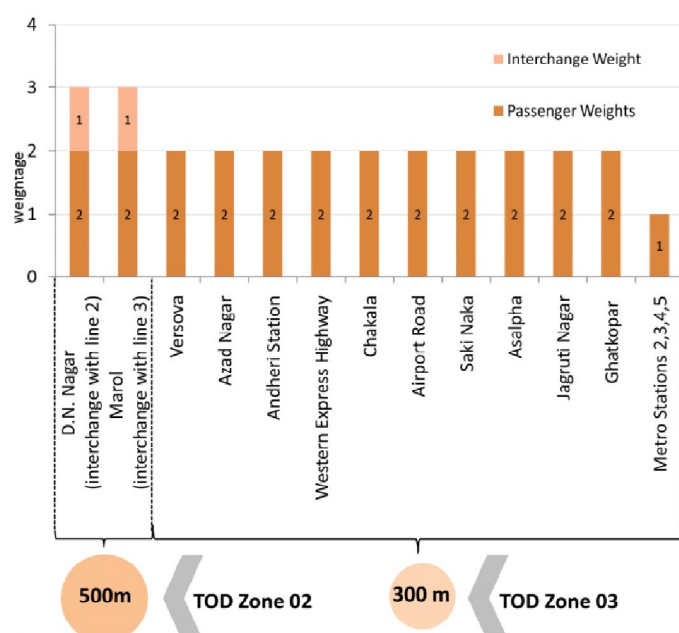


Figure 15.3: TOD weightage for metro rail stations



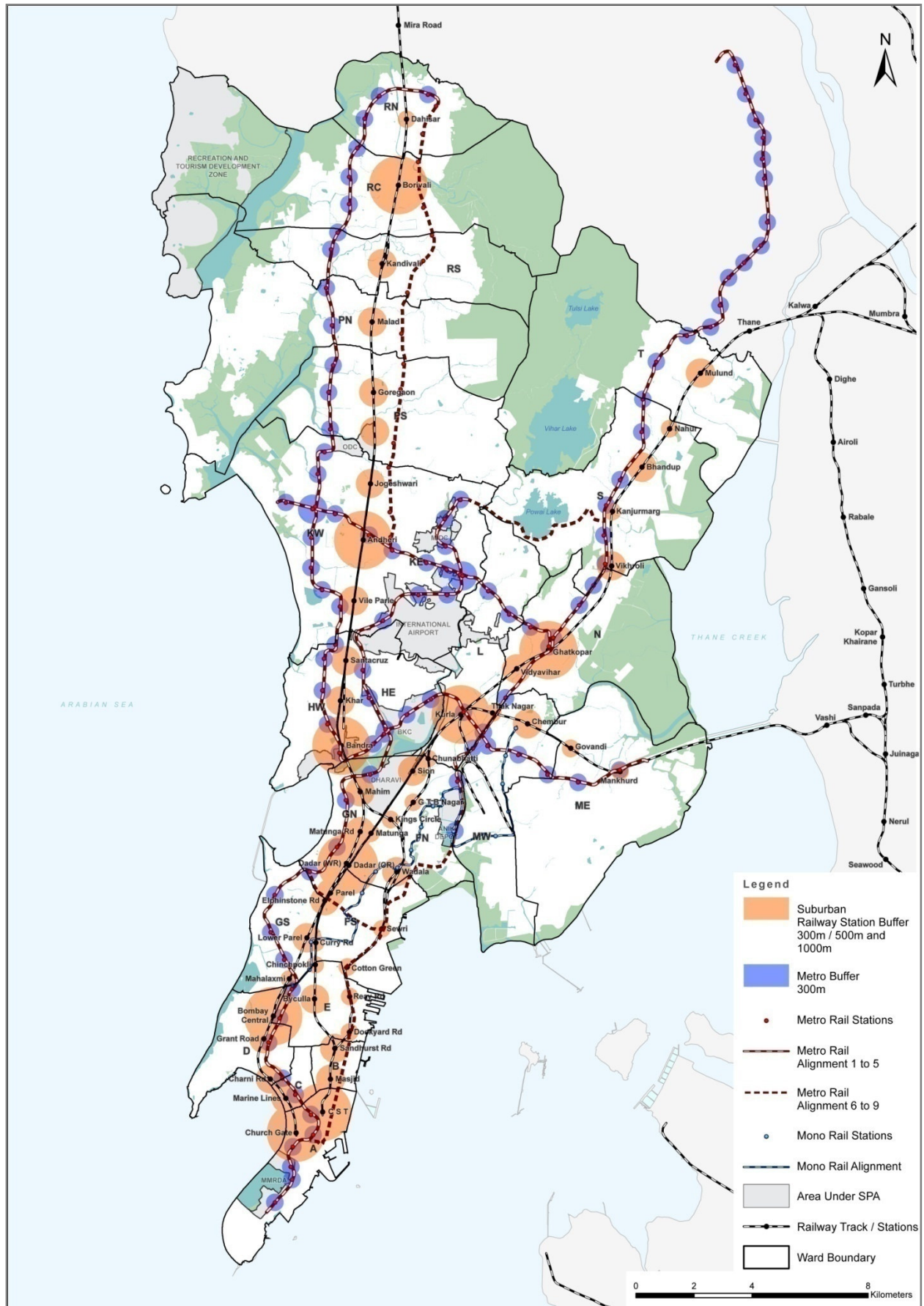
Graph 15.2, 15.3 & Map 15.2 present the hierarchy of stations as per the order of their importance, and the corresponding sizes of the TOD zones around them. The proposed land zoning for intensive and influence zone is largely Commercial-Residential so as to develop them as major employment nodes. However, the zoning varies depending upon the importance of the node and existing land uses.

Table 15.1: Identified Transit Oriented Zones around rail stations

Hierarchy and Influence Buffer	Railway line	TOD Node
Order 01 1.0 km influence buffer	Suburban Railway	Dadar*, Andheri*, Kurla*, CST*, Borivali, Bandra*, Mumbai Central, Ghatkopar, Churchgate.
Order 02 0.5 km influence buffer	Suburban Railway	Santacruz, Churchgate, Grant Road, Malad, Mulund, Vile Parle*, Masjid*, Mahim*, Khar*, Charni Road, Marine Lines, Byculla, Kandivli, Lower Parel, Wadala Road, Jogeshwari, Goregaon, Matunga Road, Vikhroli, Bhandup, Vidyavihar, Elphinstone Road, Sion, Sandhurst Road*, Chembur, Oshiwara.
	Metro Rail	D.N. Nagar (Interchange with Line 2), Marol (Interchange with Line 3).
Order 03 0.3 km influence buffer	Suburban Railway	Dahisar, Nahur, Govandi, Kanjur Marg, Sewri, Dockyard Road, Currey Road, Cotton Green, Matunga, Reay Road, GTB Nagar, Parel, Mahalaxmi, Mankhurd, Chinchpokli, Tilaknagar, Chunabhatti, King's Circle.
	Metro Rail	All Metro Stations of line 1, 2,3,4,5 except D.N. Nagar and Marol,

*Indicates stations which are interchanges of different suburban lines or a suburban line with a metro line.

Map 15.2: Identified Transit Oriented Zones around Rail Stations



15.2. Evolving New Growth Centres

Evolution of the spatial structure of Mumbai with its economic transformations has been significantly influenced by the development of land. Historically, during the colonial period the Fort area and Ballard Estate provided the nucleus of growth for financial services and business. In the post-independence era, during the 70s, the Backbay Reclamation was developed as space for government institutions and private offices. In the post liberalisation era, the MMRDA envisioned Bandra-Kurla Complex as the new finance district, on available public land. While these distinct nodes of employment have offered structure to the southern and central parts of Greater Mumbai, the northern parts of the Suburbs presently face a lacuna in the development of a similar node which offers essential space not only for generating employment but also for augmenting the large scale public amenity requirements of the Suburbs and Greater Mumbai. The Nariman Point, the Ballard Estate, the Bandra Kurla Complex were all lands owned by public authorities, which were harnessed upon in the making of business districts, through the evolution of Greater Mumbai (Refer to Fig. 15.3).

Today, as public land, only Aarey Colony offers potential for significantly restructuring the growth of the Suburbs and Greater Mumbai over the next couple of decades. The DP 2034 seizes this opportunity and presents the vision of Aarey Colony as a future growth node with potential to accommodate new commerce, cultural and institutional activities, combined with provision of large open space infrastructure that the Suburbs much require. Within this broad framework, the DP 2034 suggests that the actual modality of development may be jointly decided by the State Government and the MCGM at apposite time in the future.

Another area with potential as a similar future growth node is the MTHL gateway node at Sewri. A conceptual framework for these developments is presented below.

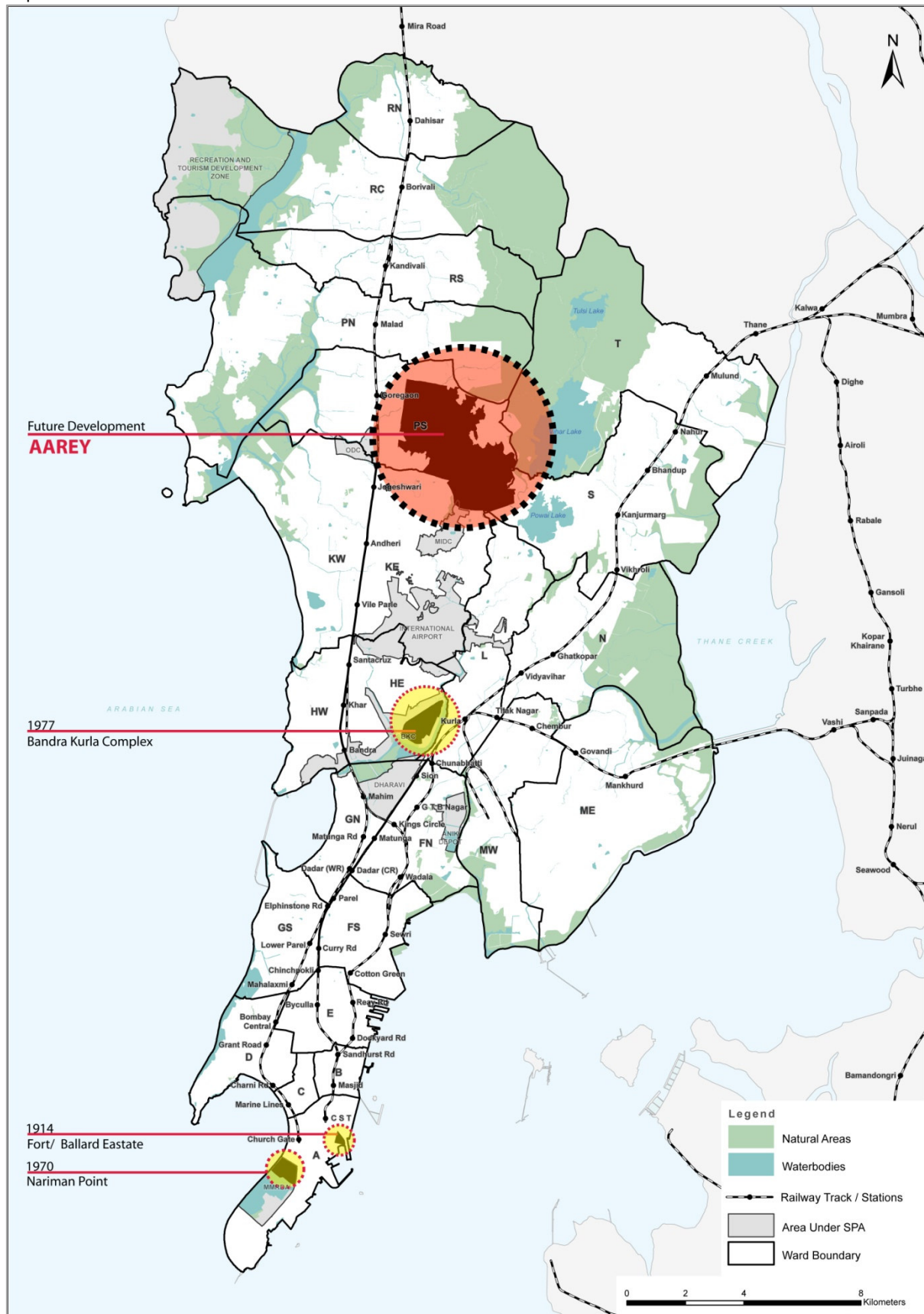
15.2.1 Aarey- An Opportunity for creating large scale public infrastructure for the City

Aarey Colony occupies a total area 900 Ha in Goregaon East and is located in the heart of the city. Although Aarey land has been designated as 'No Development Zone' in the DP 1991, over the last 2 decades, the land under Primary Activities within Aarey has been gradually transforming. New uses have been added in an ad hoc manner over time for state and private infrastructure, slum rehabilitation and industries. As shown in Table 15.2, 377.54 ha (Source: ELU 2012) have been committed to various projects. Besides this, several other uses such as a cemetery, a crematorium, petrol pumps, etc. have also progressively cropped up within the Aarey limits.

Table 15.2: Various development projects within Aarey

Project	Area (in ha)
Existing uses	
Film City	133.14
SRA proposals	72.84
Mahananda dairy	10.92
Force One	39.65
JVLR	3.64
MHADA colony	10.52
Proposed uses	
International Zoo	76.89
Metro III Coach Depot	29.94
Total Area occupied	377.54

Map 15.3: Evolution of Growth Centers on Public Land in Greater Mumbai



Hence, it would be critical to prepare a master plan for Aarey which would discourage ad hoc developments and allows for planned growth catering to strategic long-term interests of the city.

There is paucity of land for accommodating large institutions in the city. Due to this, in the past, renowned national level institutions like IRDA, ISB, IIHS, and NICMAR chose to locate in other metropolitan cities. Aarey creates opportunity to house these large institutions and serve as an institutional node for the Mumbai region.

If this prime land, owned by the State, is not properly planned, it may amount to a great loss of opportunity for the city to overcome deficiencies and provide large scale public infrastructure.

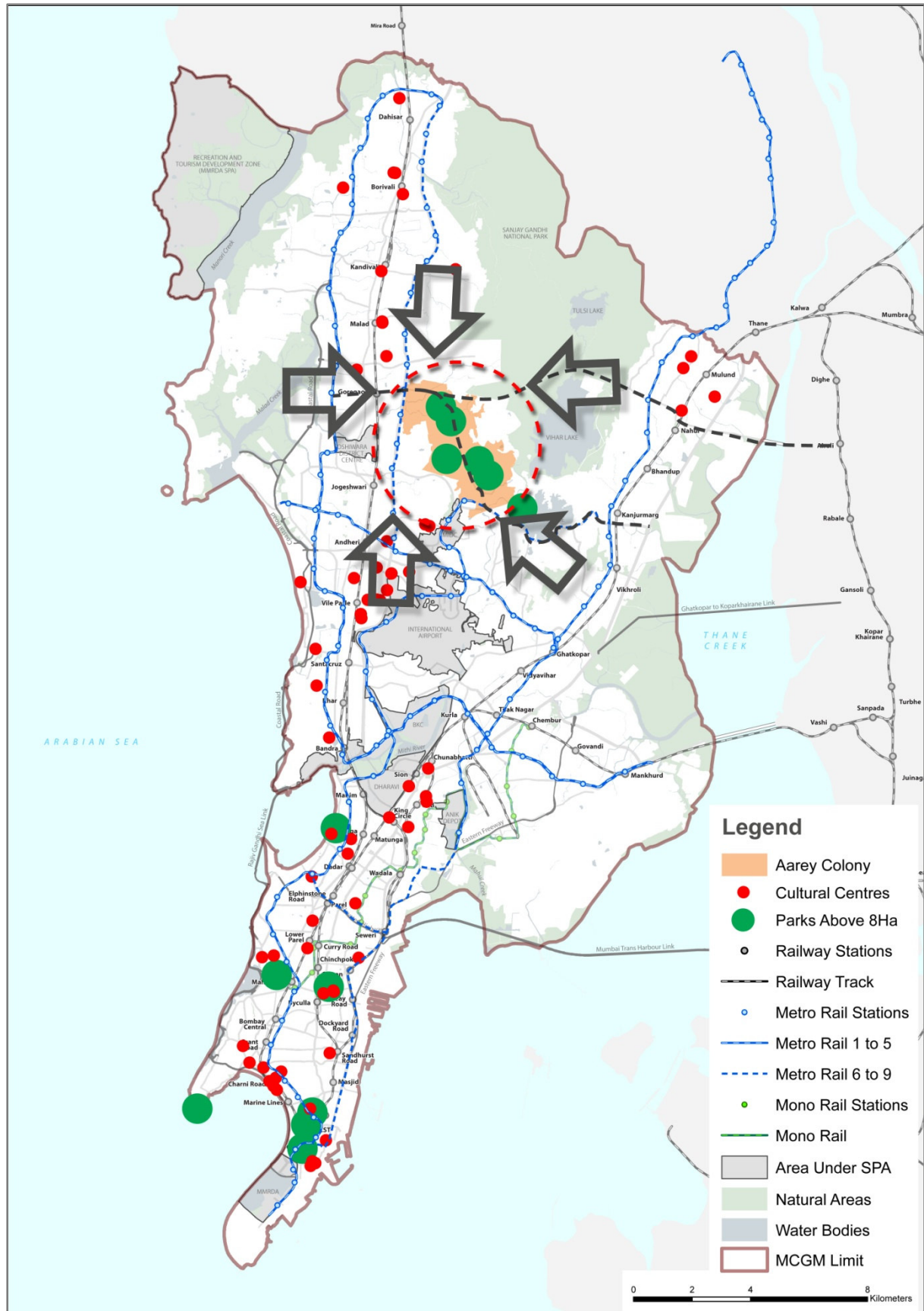
The DP seeks to effectively plan and utilise the latent potential of Aarey Colony to provide land for institutions and much needed amenity deficit in open spaces, social and physical infrastructure to the Island City, and especially the Suburbs.

Aarey is envisaged as a new institutional area for the city with large recreational parks and spaces for conducting cultural activities. Large scale and specialized educational, research, and medical institutes could find place here in the future. Aarey could also become a venue for national and regional sporting events, exhibitions. Large city parks within accessible distance, which are deficient in the Suburbs, are proposed in Aarey. The shifting of the city zoo, as recently directed by the Forest Department, could also be accommodated in Aarey.

An existing road, which runs through Aarey linking the Western Express Highway and the JVL, is proposed to be upgraded to create a high speed East-West link, which allows for the operation of express East-West bus routes. This would largely improve connectivity across the Suburbs in the North, and could be considered as an alternative to the Goregaon-Mulund link road, thus avoiding the associated environmental damage within the National Park. Aarey is planned to receive rail connectivity through the 3rd line of the metro, which has received approval to build a rail depot within Aarey. This has been utilized as an opportunity to develop a rail-based TOD node with mixed use zone around the rail terminus.

The DP anticipates that with proper planning of Aarey it could be posited as large scale Open Space infrastructure and a significant institutional, recreational and economic hub in the Suburbs.

Map 15.4: Aarey an opportunity for creation of large public infrastructure in the Suburbs



Suggested Programmes in Aarey

DP 2034 proposes Aarey land to primarily cater to provision of large scale open space infrastructure, which the Suburbs require as priority. A total of approximately 80% of the total area of Aarey land has been proposed as Open Space and Cultural & Institutional land use.

The concept proposed for the development of Aarey is structured around a centrally located East – West city link, with institutional development nodes anchored at the two entry points of this central spine, and the internal areas preserved largely for open spaces and recreational uses, covering 2/3rd of the land.

The zoo is proposed to be located at the periphery of the National Park in order to ensure compatibility of uses. The central areas are proposed to be developed as a large open space infrastructure, modelled around New York's Central Park & London's Hyde Park⁵⁸. In the central area, there is also provision for a large sports complex, which will offer Mumbai an opportunity to host large national and regional sporting events⁵⁹. Events and exhibition spaces for national and international trade shows, performing arts festivals and other arts and cultural events are also proposed.

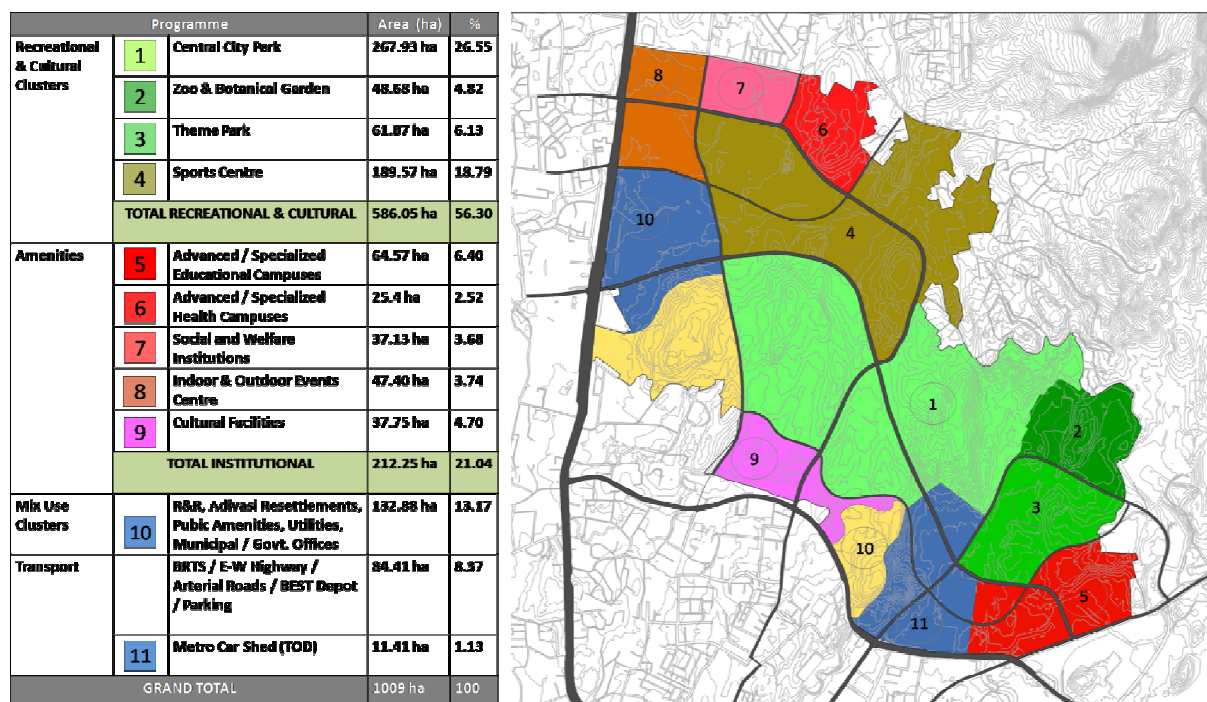
The institutional nodes, along the Western Express Highway and along the JVLR, are proposed to house large and specialized educational campuses, such as National or State Institutes of Urban Planning, Management Studies, Finance, Fashion, Design, Technology, etc; medical and research campuses such as bio-technology; and high-end research, training and processing units.

An express bus transit route is proposed to operate on the central road link, offering East-West public transit connectivity. Higher density clusters of housing for resettlement of project affected persons, amenities, retail, services, if required by the large city functions as part of their operational requirements, are proposed to be located along this express bus route. The entry from the JVLR is proposed as a transit-oriented node developed around the metro rail phase III terminus.

⁵⁸ New York's Central Park = 343.62 ha; London's Kensington Gardens and Hyde Park = 111 ha;

⁵⁹ London's Olympic Village = 225 ha

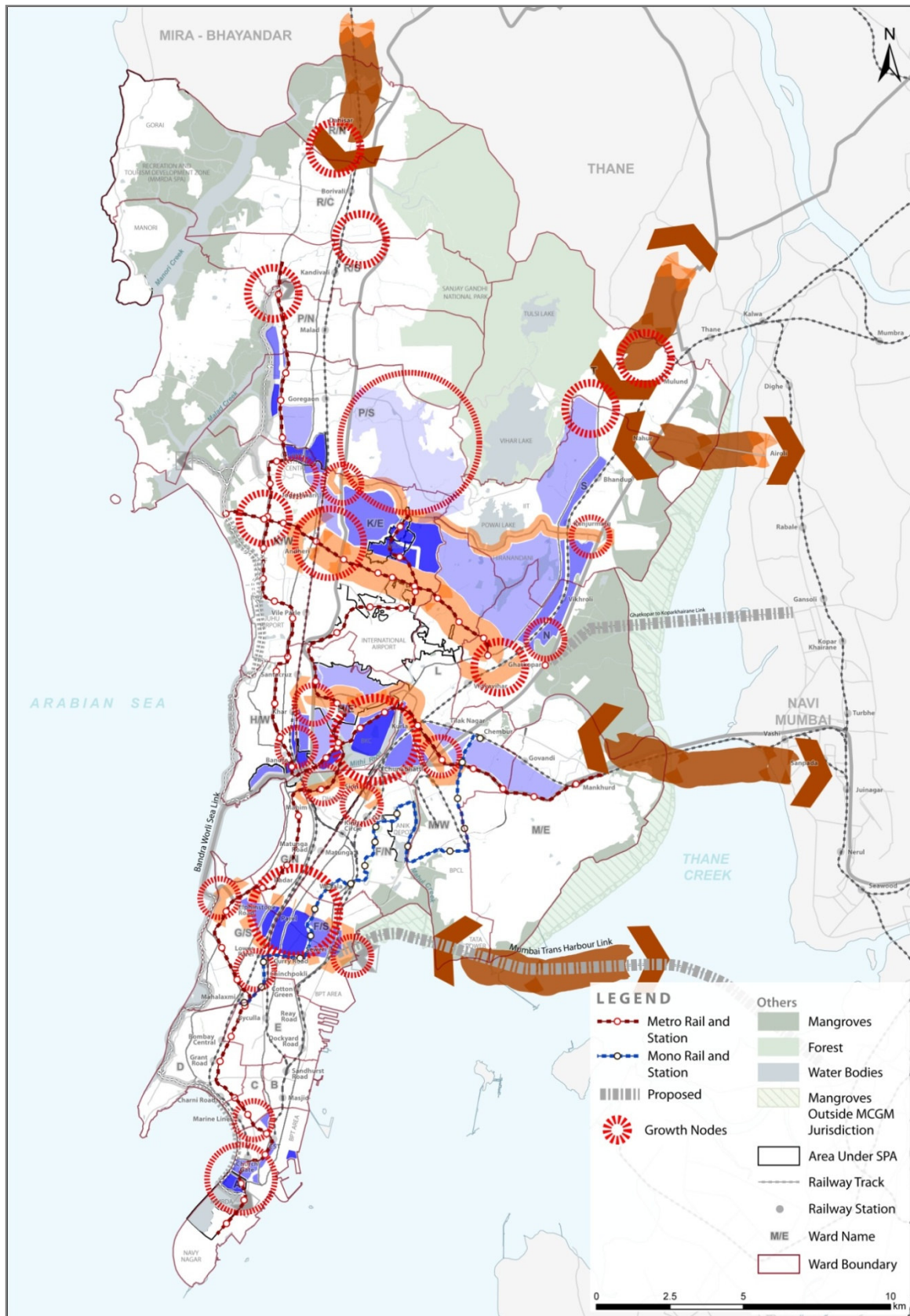
Map 15.5: Proposed Land Use framework at Aarey land



MTHL Gateway node, Sewri

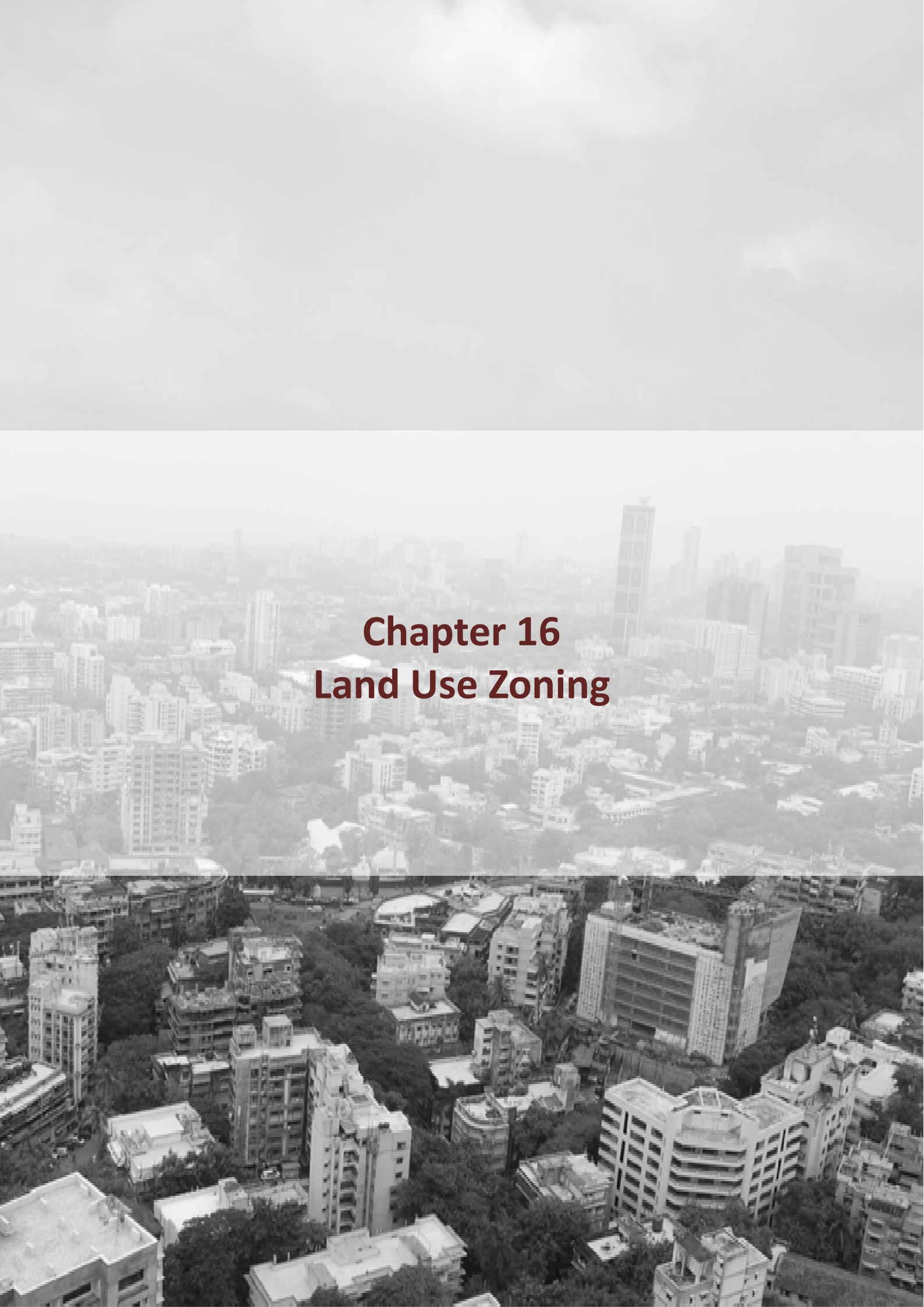
Due to the proposed Mumbai-Trans Harbour Link, the northern edge of the port in Sewri, occupies a strategic location along the Mumbai connection with MMR. Additionally, in future, if in keeping with global trends, the Mumbai port activities decline, this node would be an important anchor in any renewal schemes envisaged for the Eastern Waterfront of Mumbai. As such, the DP envisages this northern area of the port, currently under non-strategic operations, as an important gateway node, which allows for the creation of new uses for the city along with larger civic, social, and recreational infrastructure. Hence, within the spatial framework, the DP denotes this area as a strategic future growth node.

Map 15.6: Spatial Development Structure



15.3 Proposed Spatial Development Structure for Greater Mumbai

The DP has adopted parametric analysis to shape the future spatial structure for Greater Mumbai. The above three criteria, viz, promotion of a polycentric development pattern, strengthening of transit-oriented development, anticipatory programming for the future, have been synthesized through a GIS platform, to determine the locations of growth intensity and employment concentration. The map above, shows future orientations for spatial development that structure the development potential and the land uses within the city along with enhanced connectivity.

The image is a grayscale aerial photograph of a city, likely Hong Kong, showing a dense urban landscape with numerous high-rise buildings and green spaces. The top portion of the image is covered by a semi-transparent dark gray overlay. Centered within this overlay is the chapter title in a dark red, serif font.

Chapter 16

Land Use Zoning

16. Land Use Zoning

Zoning is a tool used by local governments in urban planning for controlling land use and consequently the building use, by dividing land into zones and permitting specific uses within those zones.

ELU 2012 of Greater Mumbai reveals that 65.34% of the Planning Area is developed. The remaining 34.66% contains Natural Areas, Vacant Lands, Plantations and Salt Pans. 24.88% is occupied by Residential uses, 5.40% by Industrial uses, 2.20% by Commercial uses and 0.87% by Offices. The DP 1991 had demarcated zones for Residential, Commercial and Industrial as individual categories. However, the ELU 2012 reveals that there is a large proportion of mixed use of residential and commercial land use across Greater Mumbai which has to be retained. There are distinct urban fabrics which need special attention while planning due to their character, history or socio-economic relevance. The DP 2034, has taken cognizance of all these existing land uses and accordingly proposed larger flexible zones within which other land uses for amenities have been superimposed. The natural areas that help protect the city environmentally are an asset to the city and need to be protected; these are delineated as non-developable lands in the DP 2034.

16.1 Land Use Zones

Following are the proposed land use zones:

- **Residential- Commercial Zone (RC):** The Residential-Commercial Zone as shown in Map 16.1 is a mixed use zone, with predominant Residential use and partially Commercial use. Areas in Greater Mumbai have been predominantly demarcated as RC zone and occupy around 11,775.62 ha of total Planning Area. These zones will be residential in character where commercial activity allowed in this zone would serve retail local needs for the surrounding residential neighborhoods. Activities like manufacturing, logistics, ware-house and wholesale establishments that can cause pollution or are harmful to be carried out in residential neighbourhoods are not permitted. (Refer Table 9 of the DCR for a detailed list of permissible and non-permissible uses in the zone).
- **Commercial- Residential Zone (CR):** The Commercial-Residential Zone as shown in Map 16.1 is a mixed use zone, where Commercial, Residential use & Service Industries are permitted. The CR zone would largely be Commercial in character with Office, Retail and Service spaces. This zone being mixed use in character will also include residential living spaces. Areas to carry out logistic activities, truck terminals, some manufacturing activities that deal with rubber, plastic, metal, electronic goods, leather, etc which are non-permitted in the RC Zone are permissible in this zone. However, warehousing activities of hazardous materials, manufacturing and processing of chemicals, textile products etc would not be permissible in this zone. (Refer detailed list in Table 9 of DCR for permissible and non-permissible uses in the zone).
- **Industrial Zone (I):** Existing industrial areas have been demarcated as I-zone as shown in Map 16.1. The Industrial Zone is an area in which the primary land use includes manufacturing industries. New industrial activity shall be non-polluting, non-hazardous and subject to clearance

from MPCB. Existing Industrial users are protected subject to certification from MPCB. However, conversion of land use to RC or CR can be permitted as specified in the DCR *Section 13.3.3*. No residential development shall be permitted adjacent to existing hazardous industries in Industrial Zone to ensure safety and insulate residential communities from industrial traffic and other irritants, and to shield industry from complaints generated from nuisance. (Refer to Table No. 11 in the DCR for setback-segregation distances from adjoining plots under industrial use).

In RC Zone, regulatory conditions for Commercial and Industrial uses are applicable in order to maintain the residential character of the Zone. For example, the DCR stipulates separate access for Commercial and Industrial use located in RC Zone. In CR and I Zones, these regulatory conditions shall not be insisted.

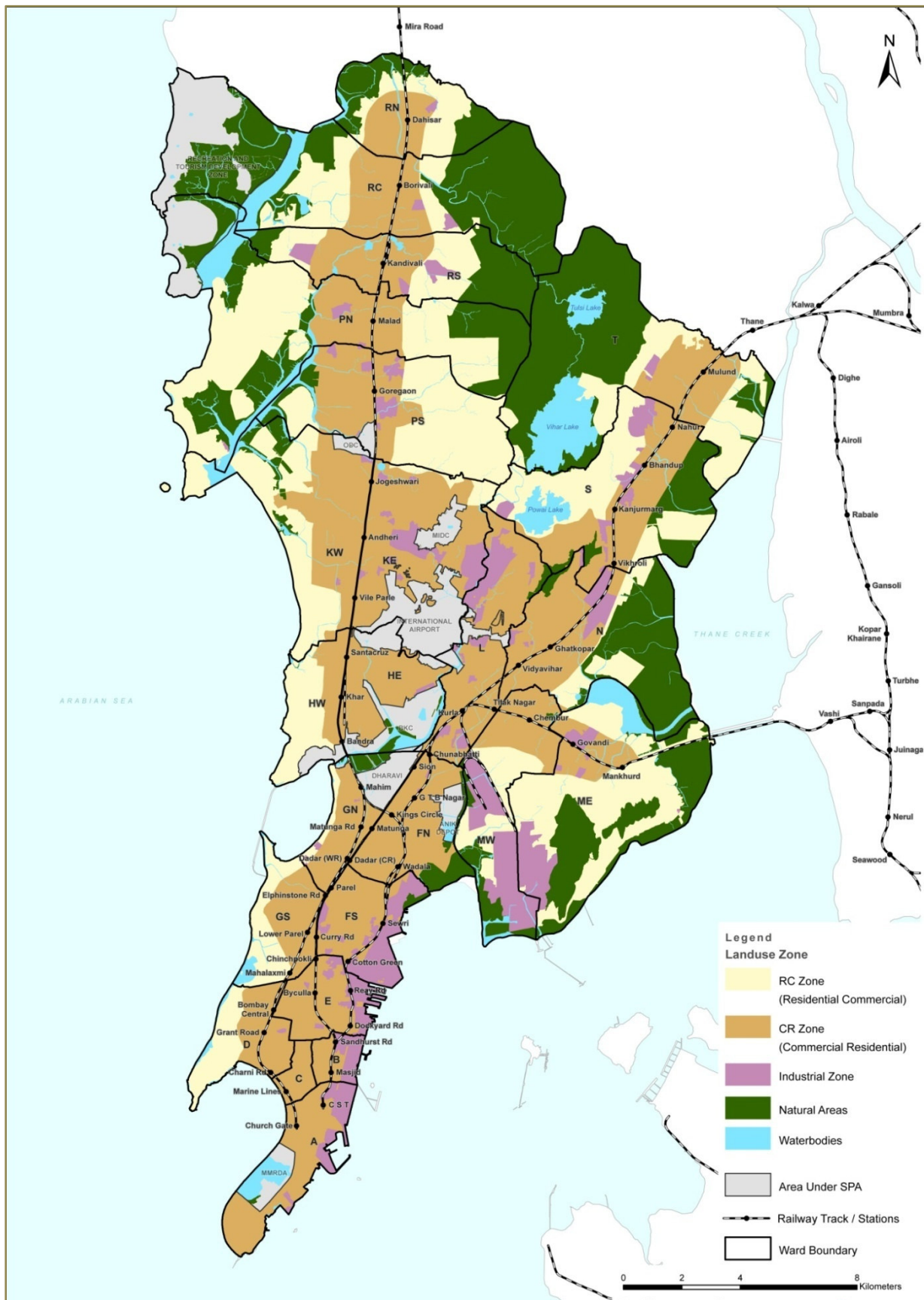
- Natural Area Zone** Demarcation of Natural Areas has been proposed to conserve existing ecologically sensitive areas like the forest, lakes, rivers, streams, ponds, mangroves and coastal wetlands. These allow in strengthening city's ecology and biodiversity. The major highlights of Mumbai's natural biodiversity are the protected forests, namely Sanjay Gandhi National Park and a few estuarine mangrove patches. These areas have helped in maintaining the balance of natural biodiversity in the Metropolitan region of Mumbai. Rapid developments like housing, industrialization, pollution and increasing population have resulted into degradation of natural areas (Forest, Mud flats and Mangroves). Proposed land use includes natural areas as a separate category where no development is permissible. (Refer Map 16.2).

Table 16.1 : Total areas of Land use Zones of Greater Mumbai for 2034

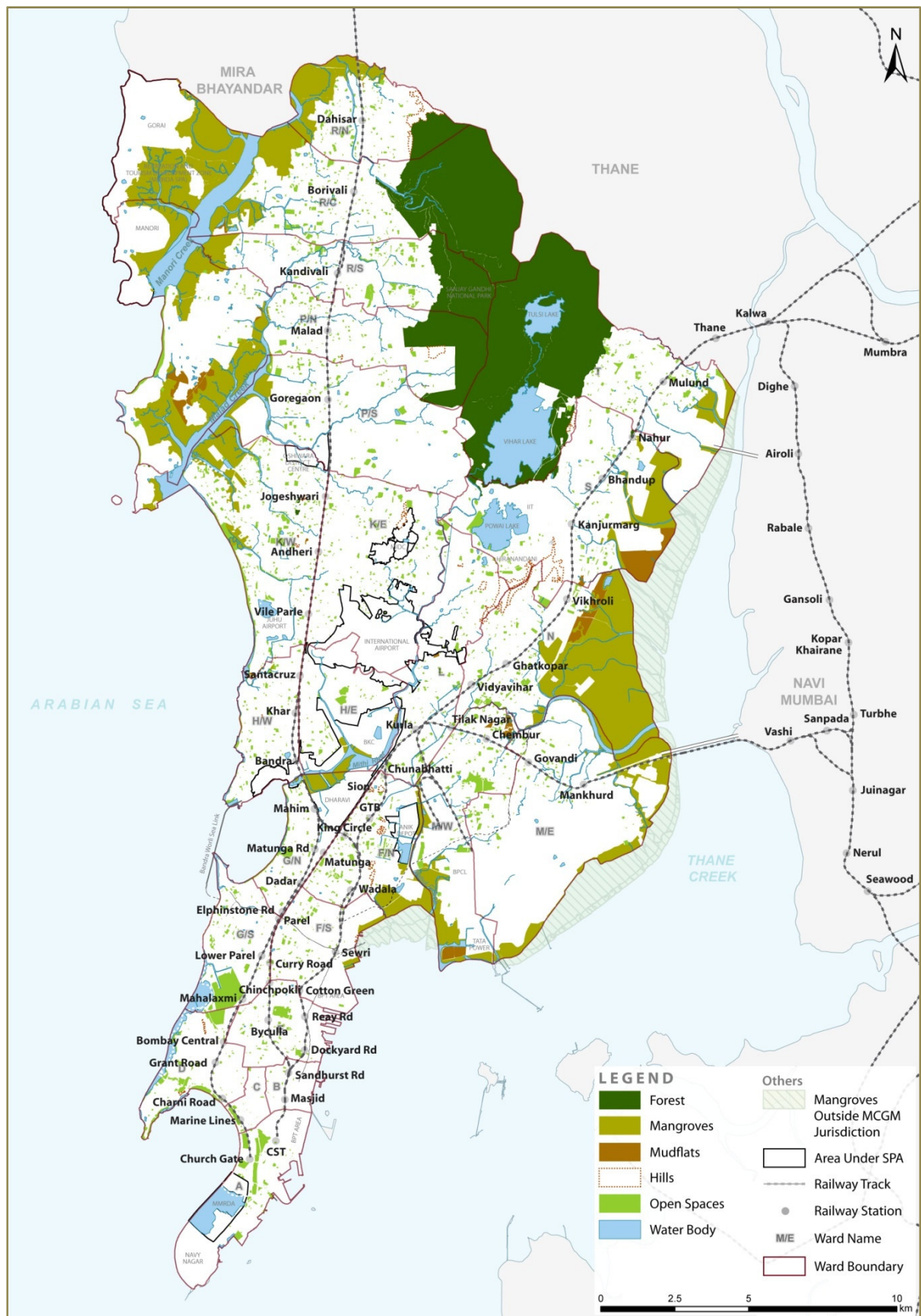
Zones	Island City (ha)	Western Suburbs (ha)	Eastern Suburbs (ha)	Greater Mumbai (ha)
Commercial-Residential (CR)	4,128.03	4,228.62	6,091.48	14,448.15
Residential-Commercial (RC)	775.42	6,689.31	4,310.86	11,775.62
Industrial (I)	1,236.36	887.14	1,903.89	4,027.40
Natural areas (N)	297.54	5,074.95	5,916.70	11,289.21

Table 16.1 shows total area allocated for land use zones in the Island city, Western Suburbs, Eastern Suburbs and across Greater Mumbai. The area for CR zone is the highest occupying 14,448 ha, followed by RC zone with 11,775 ha and Industrial occupying 4,027 ha. Natural Areas occupy a total area of 11,289 ha.

Map 16.1: Mixed use and industrial zones



Map 16.2: Natural Area Zone



16.2 Erstwhile No Development Zone

The DP 1991 demarcated environmentally sensitive lands such as marshy lands along the creek, hilly areas, agricultural lands, high tide areas and barren lands and some lands under primary activity as No Development Zones. These erstwhile NDZ areas occupy a total area of 13,706 Ha. The Table 16.2 below delineates the list of proposed land use categories included for erstwhile NDZ areas, in PLU 2034. Of the total area forests, water bodies, areas under SPAs, Unclassified area and area under CRZ I cover majority of the land use, at 75.52% of the total area under erstwhile NDZ. Of the balance land, 17.29% is presently under Gaothans, Slums and Industries; 12.49% of this has been included as designation and reservation of land for public purpose.

From the table below, it is clear that only 7.18% of the total erstwhile NDZ land has been made available for development.

Table 16.2 : Composition of lands under No Development Zone

Sr.No.	Land Use	Area in ha	Area %
1	NDZ	13,706.32	100.00
2	Forests	7,835.48	57.17
3	Water Bodies	1,051.07	7.67
4	SPA's	992.33	7.24
5	Unclassified Area	94.71	0.69
6	CRZ I	378.01	2.76
7	Total (2 to 6)	10,351.59	75.52
8	Balance Land 1 (1-7)	3,354.72	24.48
9	Gaothan	86.20	0.63
10	Slums	356.29	2.60
11	Industries (BP,HP)	58.92	0.43
12	Existing Road	156.94	1.15
13	PLU (Reservation/ Designation)	1,711.96	12.49
14	Total (9 to 13)	2,370.32	17.29
15	Land Available for Development (8+14)	984.41	7.18

16.3 Transit Oriented Development (TOD) Zones

As discussed in the *Chapter 15. Spatial Development Structure*, the DP 2034 proposes a transit oriented development model (Refer Table 15.1 and Map 15.2) for Greater Mumbai on the basis of the existing growth pattern that has emerged around the public transit stations. The sizes of the TOD Zones correspond to the hierarchy of the existing railway stations and new/proposed metro stations, based on their importance.

Railway station areas are some of the densest activity pockets and exhibit a vibrant mix of retail, hawking, office, institutional and residential uses. The TOD zones serve as a locational advantage to reinforce the vibrancy and activities of the station areas and intensify mixed use land uses that would promote increased use of rail transit and reduce dependency on private vehicles.

The objectives for development in TOD zones are as follows:

1. Create Poly-centric growth nodes around public transit stations

Currently within Greater Mumbai large employment nodes are concentrated in few areas, like BKC, Nariman Point, Fort area, Lower Parel or Worli which are becoming growth centres. All of these nodes are located away from the rapid transit route networks, creating a need of additional transportation from the transit stations. Each rapid transit node has the potential to be a growth centre in itself as there are thousands of commuters who access it daily. Instead of further moving to another location for employment these nodes would be more convenient and would develop faster as growth centers. Tapping the existing trend of high commercial activity and markets, these areas would aid this process of creating poly-centric growth nodes in Greater Mumbai.

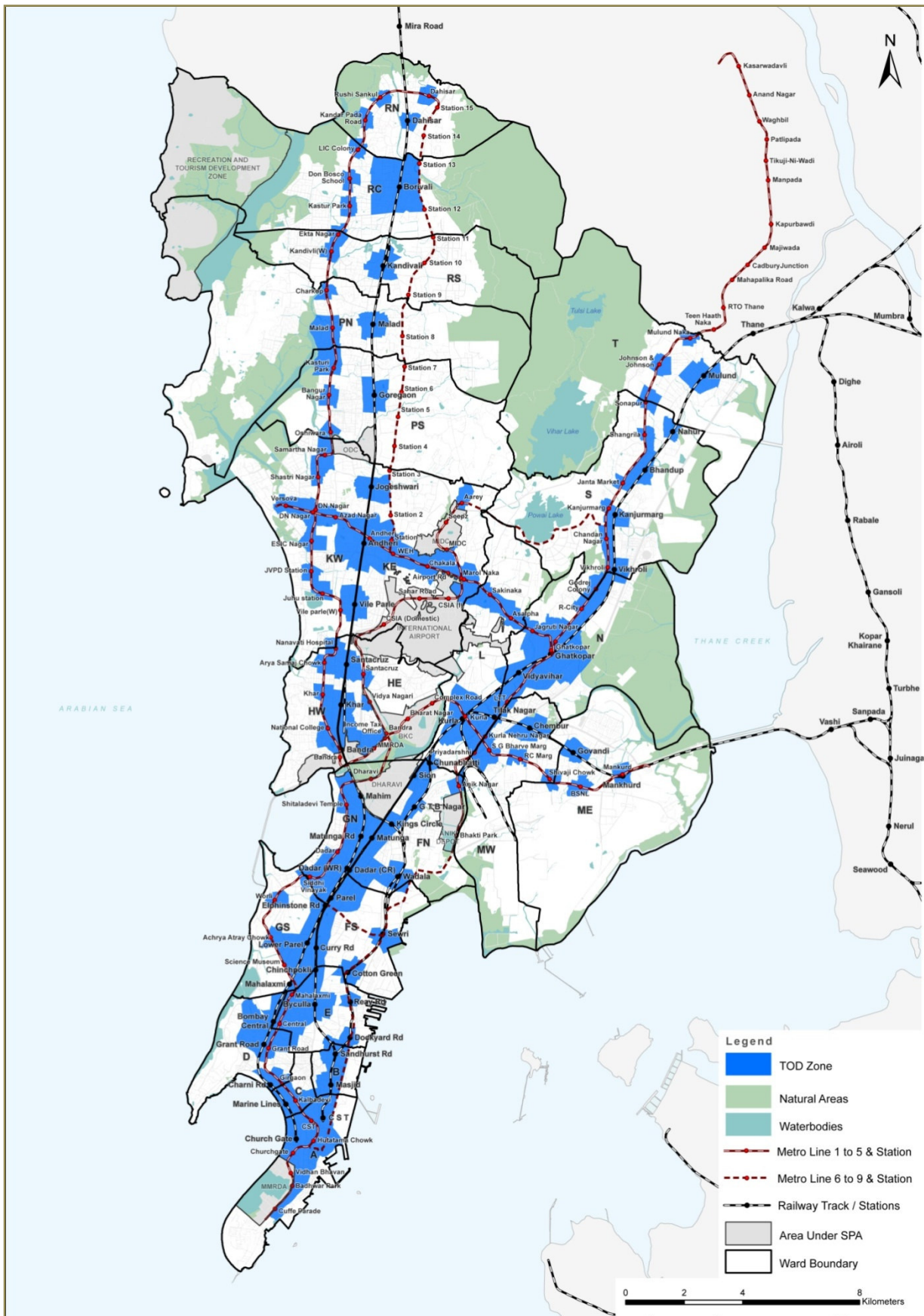
2. Reduce use of cars, promote sustainable development, decongest roads & promote efficient travel

Transit-Oriented Development Zones are intensive, high density compact mixed-use areas which foster residential and small scale commercial space within a walkable distance of the railway station, reducing the travel distance of the commuters to work spaces. This helps to reduce use of additional private transport, thus diminishing the need of private vehicles in the area and helping the city optimize its carbon footprint. The TOD Zones would promote walking and use of other feeder public transport systems, like buses, by promoting pedestrian friendly spaces and curbing the use of private vehicles with regulated parking and road use in the zone.

3. Promote affordable housing stock around station areas

The station area is anticipated as one of the most suitable areas for affordable housing as it gives easy access to rapid transit areas without any means of additional transportation. The TOD objective of curbed parking norms and reduced private vehicle access is anticipated to discourage housing for higher income groups and be an advantage in creating areas for affordable housing and housing stock catering to the middle income and lower middle income groups. Affordable housing is anticipated to assist, to some extent, in decreasing the number of people commuting to a station from far away affordable residential areas.

Map 16.3: Transit Oriented Development Zones



Proposals


1. The TOD Zones are as shown in the Map 16.3. These zones currently portray mixed use development on plots, narrow roads occupied by street vendors, high vehicular traffic with limited walkability. The proposals for these zones have reflected in the PLU and FSI zoning maps.
2. The Special Regulations for Streetscapes within the TOD Zones stipulates on-plot control for buildings which lie in this zone. (Refer to SDCR 7. Streetscapes) These regulations focus on enhancing pedestrian mobility by creation of an active interface between the building frontage and the station roads.
3. In coordination with these, regulations with reduced parking norms within these areas have been proposed so as to reduce overall ingress of private vehicles (Refer to Section 20.2(5) in GDCR for Parking).

16.4 Overlay Zones:

There are several regulatory boundaries presently in force in Greater Mumbai that are incorporated into the DP 2034, in addition to the above Land Use Zones. External regulations impacting development in Greater Mumbai are:

- Height restrictions are in force in areas adjoining the airports and in areas within aircraft flight path;
- CRZ Act 1991 imposes development restrictions in areas demarcated as CRZ I, II and III. In environmentally sensitive CRZ I areas no development is permitted while CRZ III are essentially undeveloped areas where limited development is permitted. Both these zones are observed in Draft DP 2034. However CRZ II is recognised as already developed. In spite of that MoEF Notification of 1991 has frozen the development of this zone to DCR 1967. Moreover, it has granted a status of CRZ III to open spaces- existing or proposed. This is anachronistic and not conducive to integrated development of CRZ II with adjoining areas. DP 2034 therefore has not followed the stipulations of CRZ Notificant 1991 in respect of CRZ II. A new CZMP is required to be prepared under MoEF Notification of 2011. This is under progress but the outcomes were not available at the time of preparation of draft DP 2034.
- Development is controlled within the protective buffer zone around listed Archaeological Sites, as per 'The Ancient and Historical Monuments and Archaeological Sites and Remains (Declaration of National Importance) Act, 1951 (No LXXI of 1951)'. In Greater Mumbai, the listed sites include Sion Fort, Mahakali Caves, Jogeshwari Caves, Kanheri Caves, Mandapeshwar Caves, Monolithic bas relief depicting Shiva in Parel, Old Portuguese Church;
- All railway lands are governed by conditions stipulated by the Railway Authority. For development, No Objection Certificates (NOCs) are required for all properties upto 30m from railway lands;
- Development on all lands under the Ministry of Defence is governed by Defence Authorities;

These overlay zones have been incorporated in the Proposed Land Use Maps which imply applicability of the respective acts unless otherwise mentioned in the Development Control Regulations.



Chapter 17

FSI : A Tool for Managing Physical Development

17. FSI: A Tool for Managing Physical Development

17.1 Genesis

FSI, particularly since 1991, has emerged as an important policy instrument. It has been used for a wide range of policy objectives ranging from slum redevelopment to relocation of buffalo stables. However, FSI in Mumbai had a modest genesis as a simple physical planning instrument.

Concerns regarding poor light and ventilation, inadequate water and sanitation facilities and also the structural safety of buildings has led the MCGM and government to adopt building codes to control, guide and monitor building construction. Building bye laws of Mumbai used parameters like ground coverage, maximum height, light angle, height in relation to width of the road to control the volume of built up area on a given plot of land. In 1964, the concept of Floor Space Index (FSI) was introduced for the first time in the draft Development Control Rules (1964 DCRs) of Mumbai formulated under the then Bombay Town Planning Act 1955. With the emergence of reinforced cement concrete and high-speed lifts, control of building volume through the parameters mentioned earlier was seen to be too restrictive. Instead FSI was seen to be flexible as it only specified the ratio of total floor space (on all storeys) to the plot area. This gave architects adequate flexibility in designing individual buildings. This simple physical ratio however soon acquired many connotations: some explicitly stated, some imputed. It would be relevant to sketch this growing complexity since 1964.

17.2 Evolution

The 1964 DCRs prescribed the highest FSI for the Nariman Point reclamation of 4.5 based on the dual rationale that high land and property prices and high cost of construction (piling etc. in the reclaimed land) justify higher FSI. However, in already developed areas like Colaba and Marine Drive FSI of 2.45, which was an outcome of earlier set of DCR was maintained. Surprisingly, however, for more densely built up areas like Kalbadevi, Girgaon, Mandvi FSI of 1.66 was prescribed as against the consumed FSI of over 3. This was perhaps because by specifying lower than existing FSI, planners expected redevelopment of these areas at lower densities. For areas around Worli, Dadar and Sion, FSI of 1.33 was assigned. This was perhaps with a view to allowing one additional floor where buildings were constructed according to earlier rules with 1/3 ground coverage and 3 storeys (implicit FSI of 1). For the rest of Greater Mumbai FSI of 1 was adopted. In fact this legacy of 1/3 ground coverage explains why FSI of 1, 1.33 and 1.66 were chosen. The choice of FSI of 1.66 where development had already occurred at FSI in excess of 3 was the first indication that FSI was believed to be not only a limiting factor for new development but also as instrument to cause redevelopment at lower FSI that could reduce population and density. This theme of 'decongestions' continued through 1991 when a flat FSI of 1.33 in Island City and 1 in Suburbs was prescribed.

Within five years of introduction of FSI a major deviation had to be granted. Many rent controlled tenanted buildings in the Island City were in the dire need of repairs as the land owners had chosen to neglect these assets which did not yield them any returns. In 1969 government decided to step in and constituted what was called Bombay Building Repairs and Reconstruction Board. The Board could not have reconstructed these buildings within the stipulated FSI and at the same time accommodated all the existing tenants. The Board was allowed 2.4 times the permissible FSI. This

was the first casualty to FSI as an instrument to shape the city pattern particularly in terms of "decongestion".

As conceived in 1964, FSI was to be applied on the Net Plot Area. Other areas designated for public purposes such as roads and gardens and playground did not have any FSI and were to be compulsorily acquired under the Land Acquisition Act 1894. However, a minor exception was introduced in early 70s when FSI was assigned to road land and was allowed to be used on the adjoining buildable plot if the road land is given free of cost and free of encumbrances to the municipal authority. This was for the first time that FSI was used as a way of attaching "Development Rights" to land which according to the plan was not supposed to have any and granting them as transferable rights in lieu of monetary compensation for land acquisition.

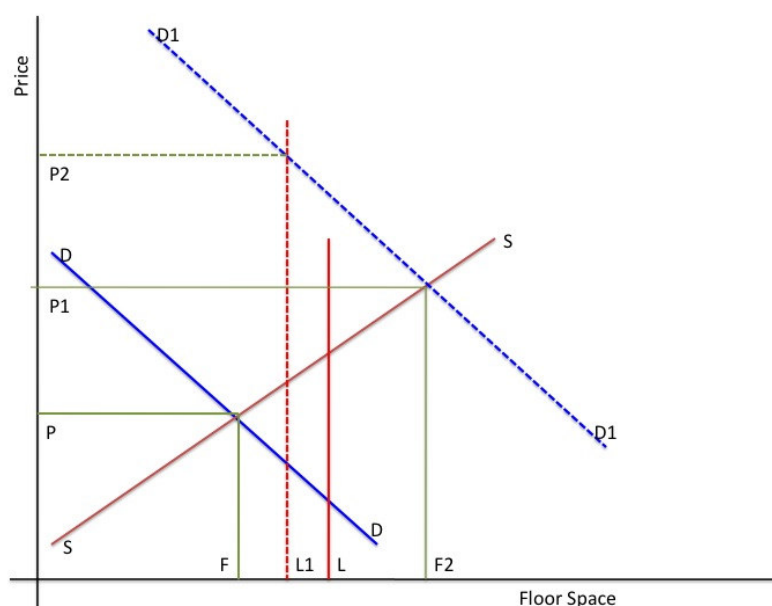
The draft Regional Plan for the Mumbai Metropolitan Region in 1970, (later sanctioned in 1973) argued for reorienting growth of Mumbai from its then south north orientation to west east orientation across the harbour by developing a large city of 2 million population on the mainland (later called as Navi Mumbai). Apart from the recommendation of developing Bandra Kurla Complex as a new centre of growth, the plan also recommended restraints on the industrial and office growth in Greater Mumbai and following this recommendation, MMRDA in 1977 introduced a rule that required its permission for developments in Island City involving offices, wholesale establishments and FSI in excess of 1.33. This discretionary regulation was converted into a mandatory provision in the 1991 DCRs of MCGM, with the result that Island City had a flat FSI of 1.33 and the Suburbs 1. Although prescribed FSI was flat, urban land is not 'flat' in terms of location attributes particularly the accessibility. Flat FSI could then imply inefficient use of land.

17.3 Post 1991 Scenario

While public policy was aiming to restrict growth of Mumbai both in terms of economy and population through restrictive FSI, Mumbai's economy continued to grow at a rapid rate through transformation from a manufacturing city to a services city. The resultant increase in household income and ease of housing finance increased the demand for per capita space. One BHK apartments that were common during 60s and 70s gave way to 2 and 3 BHK apartments. With the establishment of National Housing Bank in 1987 housing finance expanded resulting in increased demand in floor space by those who could access housing finance. Land available for development also shrunk in 1991 as compared to earlier plan of 1967 mainly due to CRZ but also on account of introduction of NDZ in DP 1991. The sites and services development that took place at Charkop for low income housing by developing coastal wetlands in the 80s was no longer possible after the 1991 CRZ Regulations. Reduction in developable land and reduced FSI (supply side restrictions) did not reduce population or economic growth and the resultant demand for floor space but reflected only in increased prices.

The cumulative impact of reducing the land available for development and reduced FSI can best be illustrated in the following diagram.

Figure 17.1. FSI and land price dynamics in Greater Mumbai



In 1964, the demand curve for floor space was D-D and the supply curve was S-S. This produced the floor space F at the equilibrium price P. The land zoned for development and the FSI proposed represented the limit L. Since the limit was initially larger than F, it did not, at that point in time, affect the equilibrium. Two decades later, the demand curve moved to D1-D1 due to growth in population, growth of per capita income and access to housing finance. However, the limit to floor space construction was lowered to L1 due to CRZ, NDZ and reduced FSI in the Island City. The market could not construct the floor space F2, at the new equilibrium price P1. Instead, the floor space L1 at the price P2 was permissible. In case of concentric cities on the mainland, such regulations are bypassed through the expansion of the city in peri-urban areas through unauthorized layouts and subdivision. However, this option is not available in Mumbai due to its geography. Consequently, L1-F2 was the scarcity that caused the P1-P2 rise in price, thereby adversely affecting affordability. Evidence of this could be seen in the virtually stagnant per-capita housing space over the period 1961–2001 and in the increase in slum population, despite rise in household income.

After 1995, instead of relaxing zoning and FSI constraints to moderate prices, the policy tended to continue with these constraints that sustain high prices by only selectively relaxing FSI constraints for variety of policy objectives as illustrated below:

- Inclusive growth - Incentive FSI was offered for redevelopment of slums and providing free houses to eligible slum dwellers. (DCR 33(10) in 1997). Similarly, incentive FSI was offered for redeveloping cessed buildings and offering free redeveloped dwelling units to eligible chawl dwellers (DCR 33(7) in 1999);
- Provision of social infrastructure - First double the permissible FSI was permitted for schools and hospitals and then increased to 4;
- Promoting economic growth and tourism - Double the permissible FSI was allowed for buildings constructed for IT / ITES and star category hotels;

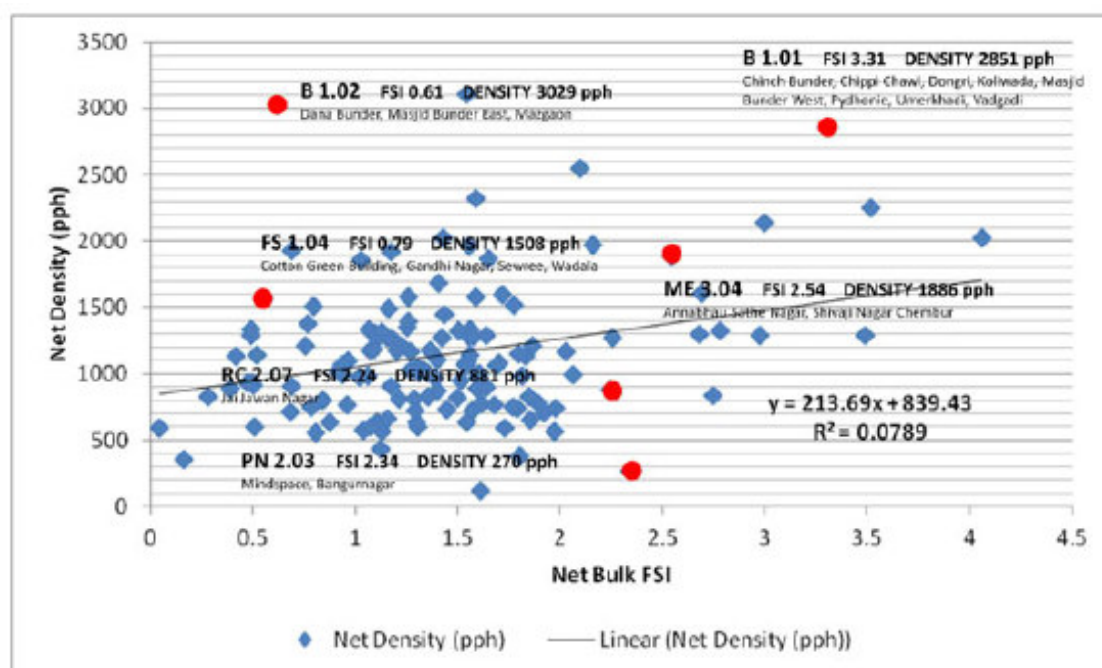
- Raising finances - Finally FSI was used as a fiscal instrument. Additional FSI of 0.33 was offered in the Suburbs at a premium and the revenues shared between the state government and MCGM.

Note: The actual list of incentives as included in DCR 33 is long, covering 24 items and is given in Annexure 02 for Chapter 17.

17.3.1 FSI and Density

Ironically, expectation that restrictive FSI would restrain population growth control densities and help achieve a balance between demand and supply of infrastructure services proved to be naïve. Empirical study of FSI and density showed that there is little correlation between FSI and densities as shown in graph below:

Figure 17.2: FSI and Density correlation



Above graph plots the planning sectors according to average bulk FSI and average net densities. DCR 1991 had introduced a minimum density concept where earlier plan had reserved land for public housing (PH) and housing the dis-housed (HD). Similarly, smaller dwelling units were required for exemption under the Urban Land Ceiling. However, such developments of smaller units at high densities are not particularly noticeable in the Suburbs.

17.3.2 FSI for achieving inclusive growth

Instead of relaxing land use zoning and FSI constraints to moderate real estate prices, government decided to use the scarcity of development rights and resultant high prices to help the slum and chawl dwellers. This was favoured as it was seen as off-budget measure by the state. But in fact it is a tax imposed on new home buyers as new construction was largely dependent on gaining development rights by rehabilitating slums or redeveloping cessed buildings. Such a tax must have had a proportionate impact on the prices and affordability of new housing.

17.3.3 Complex Transaction Process

To reduce the severity of FSI constraints, first a long list of types of 'covered areas' that were excluded from computation of FSI (DCR 35 as shown in Annexure 1 for Chapter 17) was added. This

list included 'covered area' like staircases and lifts. It also clarified that features, which could have never been construed as 'covered areas' like compound walls, will not be counted for computation of FSI. This was apparently necessary to curb the rent seeking opportunities while scrutinising the development proposals. Notwithstanding such provisions market cunningly used these exemptions to inflate the permissible FSI to provide larger apartments effectively exceeding the permissible FSI. Such practices had to be finally restrained in 2012 by what is called 'compensatory fungible FSI' that limited the exempted FSI to 35% of the permissible FSI for which a premium is charged.

Thus, the scarcity of development rights caused by restrictive FSI has led to a complex transaction process that is time consuming and also costly. (CRZ Regulations, Environment Clearance, Heritage Regulations and High Rise Review procedure requiring scrutiny by separate organisations have also substantially added to the transaction costs and time).

17.4 FSI: New Paradigm

Thus, it is imperative to seek a new paradigm for the FSI regime in DP 2034. The features of the new paradigm are sought to be compared with the present paradigm in Table 17.1 below:

Table 17.1: Comparison of FSI in the present and new paradigm

Present paradigm	Effects	New paradigm
Tool for containment of population and density	Did not have desired result. Scarcity created high property prices and rentals and resulting increase of slumming. Uniform FSI led to underutilization of development potential of existing land resulting in a distorted land market.	Framework for providing opportunity for adequate floor space for anticipated growth.
FSI as an 'entitlement' with all other requirements considered as subordinate.	Restricted possibility of consumption of FSI led to selective modification, relaxation and exemptions to the DCR.	Not an entitlement, but a maximum possible subject to other conditions.
Market intervention that impels all land owners to breach the prescribed FSI, wherever possible.		Defining an outer envelope within which the market can operate.
Rendering development rights scarce leading to attendant malpractices	Increase in rent seeking.	Adequate scope for new construction at any time over the plan period.
Using scarcity of development rights for achieving policy objectives and raising finances.	Use of public policy for institutional gain.	Avoiding distortions, providing incentives for inclusive growth. A layer of premium FSI to raise finances.

The FSI regime for DP 2034 has therefore been designed by following the steps listed below:

17.4.1 Definition of FSI

The term FSI as defined in the MR&TP Act means a ratio of “Covered Area / Plot Area”. However, DCRs have made it very complex by including a long list of areas exempted from computation of FSI. With flat low FSI, development rights became scarce, which in turn probably created space for rent seeking. To avoid that architectural or engineering features that by no stretch constitute ‘covered area’ (e.g. compound wall) have also been listed as exempted from computation of FSI. Such long list of exemptions was cunningly used by the market to bypass the pernicious FSI control. The evidence showed that actual FSI used was 2 to 3 times the permissible FSI. Features like flowerbeds and lily ponds acquired notorious connotations. Finally, in 2012 a limit of 35% had to be imposed on many of the exempted areas subject to payment of premium. The details of original DCR 35 and the modifications brought about in 2012 are shown in Annexure 01 for Chapter 17. It is therefore further proposed to further streamline the areas exempted from FSI. The exemptions are proposed to be confined to minimum level of parking, areas required for installations requiring human occupation only for repairs and maintenance and areas covered by canopies, porches and arcades. Other features that do not constitute ‘covered area’ will be illustratively listed for the purpose of clarifying that they will not be counted in FSI. Thus, for comparison present FSI will be approximately equal to 70% of new FSI or the equivalence of new and present FSIs will as given in Table 17.2 below:

Table 17.2: Equivalence of Proposed FSI to Existing FSI

Proposed FSI	Equivalent present FSI
8	5.7
7	5.0
6	4.3
5	3.6
4	2.8
3	2.1

17.5 FSI as incentive

In the present DCR (DCR 33) there is a long list of activities that are eligible for incentive FSI. Under the proposed regime except for the incentives for inclusive development all other incentives would become irrelevant and redundant and therefore are proposed to be deleted. The changes proposed in the present scheme of incentives are presented in Annexure 02 for Chapter 17.

17.5.1 FSI as Incentive for Inclusive Development

The incentives related to objectives of inclusionary housing in present DCRs relate to slum rehabilitation and redevelopment of Cessed buildings. Government adopted a policy that promises free houses to eligible slum dwellers and eligible tenants of Cessed buildings by offering incentive floor space that could be sold at market prices. The slum rehabilitation policy was adopted in 1997 where the entitlement of slum dweller was 225 sqft. (20.90 sqm.). This was later increased to 25 sqm (269.10 sqft.) in terms of carpet area. The incentive floor space ranges between 100% and 133% of the rehabilitation built-up area (BUA). The incentive floor space has to be used at the slum site up to the limit where the FSI reaches 3. Remainder of the incentive floor space can be used as TDR. In case of redevelopment of Cessed building, according to the policy adopted in 1999, the entitlement of the eligible tenant is the existing carpet area occupied subject to a minimum of 25 sqm. and a maximum of 70 sqm. The incentive floor space ranges between 50% and 80% of the rehabilitation

BUA. Similar incentives have been offered for redevelopment of Municipal and MHADA properties. The cost of construction and the real estate prices have increased since mid 1990s. However, the increase in real estate prices has been much steeper as compared to increase in construction cost. This is illustrated in Table 17.3 below. It may be observed that while construction cost increased at the rate of about 10% pa over a 14 year period of 2000 to 2014, the residential prices have increased by nearly 25% pa.

Table 17.3: Relative cost of construction and residential property prices

Year	Sub Zone	Cost of construction Rs./sqm	Min Res. PriceRs./ sqm	Max Res. PriceRs. / sqm
2000	City	5000	1555	15640
	Sub	5000	840	7870
2005	City	8500	7000	100000
	Sub	7500	10500	95000
2010	City	13000	9600	205400
	Sub	11000	17500	173800
2014	City	19200	16800	400200
	Sub	17600	29100	327200
CAGR – 2000-2014	City	10.09%	18.53%	26.06%
	Sub	9.41%	28.82%	30.51%

Source: Ready Reckoner of respective years.

Given the rapid increase in residential real estate price, it has become evident that the present policy of offering uniform incentive in physical terms has led to iniquitous outcomes. Where prices are low the redevelopment is unviable and has not attracted investment. On the other hand where prices are favourable developers have garnered handsome profits. It is therefore necessary that the reformed policy, instead of relating the incentive floor space merely to the physical parameters, takes into account relative costs of construction and real estate prices.

17.5.2 Incentive formula

The scale of incentive floor space is derived as described below:

A normal real estate project involves following cost components.

- Cost of land
- Cost of Construction
- Statutory fees for obtaining permissions
- Financing costs e.g. interest during construction

If the returns on account of sale of floor space net of marketing and transaction costs represent a competitive rate of return, the project could be considered as financially viable.

However, in case of redevelopment projects of slums and Cessed buildings, cost of land is partly substituted by cost of negotiating with existing occupants, cost of providing transit accommodation during construction, contribution to corpus fund, a longer term defects liability period etc. However, these elements are uncertain, vary from project to project and difficult to capture in a formula. It is therefore assumed that 50% of the price of developed vacant land as represented in the Ready Reckoner would account for all these costs in case of redevelopment of land encumbered by slums

or cessed buildings. With this background the formula for incentive development rights could be derived as follows.

Re=Entitlement of eligible households in terms of carpet area (sqm) according to Government policy

Rb=Rehabilitation built-up area assumed to be 1.4 times Re -sqm

I=Incentive built-up area – an unknown

C=Cost of Construction as per Ready Reckoner - Rs./sqm

P=Area of plot in sqm

L=Price of developed vacant land at FSI 1 as per Ready Reckoner - Rs/sqm

DCl=Development charge for land @ 0.5 % of L applied to P

DCC=Development charge for construction @ 2% of L applied to (Rb+I)

S= Residential sale price according to Ready Reckoner – Rs./sqm

Project Cost= Land Cost + Construction Cost + Development Charge

Project Cost= $L \cdot 0.5 \cdot Rb + C \cdot (Rb+I) + 0.005 \cdot L \cdot P + 0.02 \cdot L \cdot (Rb+I)$

(Since L is represented in terms of FSI 1, land cost would be $L \cdot Rb/P \cdot P$, where Rb/P is the consumed FSI)

Interest during construction could be 27% of project cost reckoned at 18% p.a. for a period of 18 months.

Total Project Cost= $1.27 \cdot [L \cdot 0.5 \cdot Rb + C \cdot (Rb+I) + 0.005 \cdot L \cdot P + 0.02 \cdot L \cdot (Rb+I)]$

Project Revenue = $I \cdot S$; this will have to be equal to or greater than 1.4 times the Total Project Cost, assuming a return of 40% of the project cost.

$$I \cdot S \geq 1.4 \cdot 1.27 \cdot [L \cdot 0.5 \cdot Rb + C \cdot (Rb+I) + 0.005 \cdot L \cdot P + 0.02 \cdot L \cdot (Rb+I)]$$

$$I = 1.778 \cdot [0.5 \cdot Rb \cdot L/S + C/S \cdot (Rb+I) + 0.005 \cdot L/S \cdot P + 0.02 \cdot L/S \cdot (Rb+I)]$$

Substituting L/S by RI (Ratio of land price to sale price and C/S by Rc (ratio of cost of construction to sale price) the equation could be rewritten as:

$$I = 1.778 \cdot [0.5 \cdot RI \cdot Rb + Rc \cdot Rb + Rc \cdot I + 0.005 \cdot RI \cdot P + 0.02 \cdot RI \cdot Rb + 0.02 \cdot RI \cdot I]$$

$$I - 1.778 \cdot I \cdot [Rc + 0.02 \cdot RI] = 1.778 \cdot [0.5 \cdot RI \cdot Rb + Rc \cdot Rb + 0.005 \cdot RI \cdot P + 0.02 \cdot RI \cdot Rb]$$

$$I = 1.778 \cdot [0.5 \cdot RI \cdot Rb + Rc \cdot Rb + 0.005 \cdot RI \cdot P + 0.02 \cdot RI \cdot Rb] / [1 - 1.778 \cdot [Rc + 0.02 \cdot RI]]$$

It may be noted that if P is 1, Rb represents FSI required for rehabilitation and I represents Incentive FSI. I is defined by the RI and Rc - ratios of land price to sale price and cost of construction to sale price.

17.6 Typical cases in City Suburbs

Typical cases of high and low price areas in the City and Suburbs are shown in table 17.4 below:

Table 17.4: Incentive FSI in typical Areas of Island city and suburbs

Incentive FSI in typical Area of Island City and Suburbs							
				Rb>	1.50	3.00	4.00
City	Land price	Res Rate	RI	Rc	I	I	I
Byculla- Kamathipura	21,400	56,900	0.38	0.31	0.92	1.83	2.44
<i>I as percent of Rb</i>					61%	61%	61%
Tardeo - Nana Chowk	128,100	236,600	0.54	0.07	0.83	1.65	2.19
<i>I as percent of Rb</i>					55%	55%	55%
Suburbs							
Mandale	10,900	28,500	0.38	0.61	1.30	2.63	3.51
<i>I as percent of Rb</i>					86%	88%	88%
Vile Parle east	79,000	131,600	0.60	0.13	0.99	1.96	2.61
<i>I as percent of Rb</i>					66%	65%	65%

It would be seen that in high priced area of Nana Chowk incentive FSI of 55% of rehabilitation FSI would be adequate which is closer to current regulation. However in low value area of Kamathipura the incentive FSI will have to be enhanced to 61% of the rehabilitation FSI. In the low valued Suburban area of Mandale the incentive FSI of 86% of rehabilitation FSI will be required (this is closer to current SRA policy) whereas in high value area of Vile Parle 66% of rehabilitation FSI as incentive will suffice.

17.7 Operationalizing the Policy

The formula given in section 17.5.2 could be incorporated in the DCR to decide the incentive FSI. This could apply to both Slum Rehabilitation and Redevelopment of Cessed Buildings where existing occupants are to be rehabilitated free of cost. The policy of incentive FSI may work as follows:

- Where Rb and I together are less than the Zonal permissible base FSI, Zonal permissible base FSI would be permissible and TDR and Premium FSI could also be used.
- Where Rb is more than Zonal base FSI, Rb may be allowed to be consumed in situ and I will be awarded in the form of TDR which could be used on the site till the Zonal TDR and Premium FSI are fully exhausted without actually paying the premium. If Rb and I together exceed maximum FSI (Base+TDR+Premium) excess will be granted as TDR.

The formula in Section 17.5.2 above could be further simplified as :

$$I/Rb = 0.92 * (RI + Rc) * 100$$

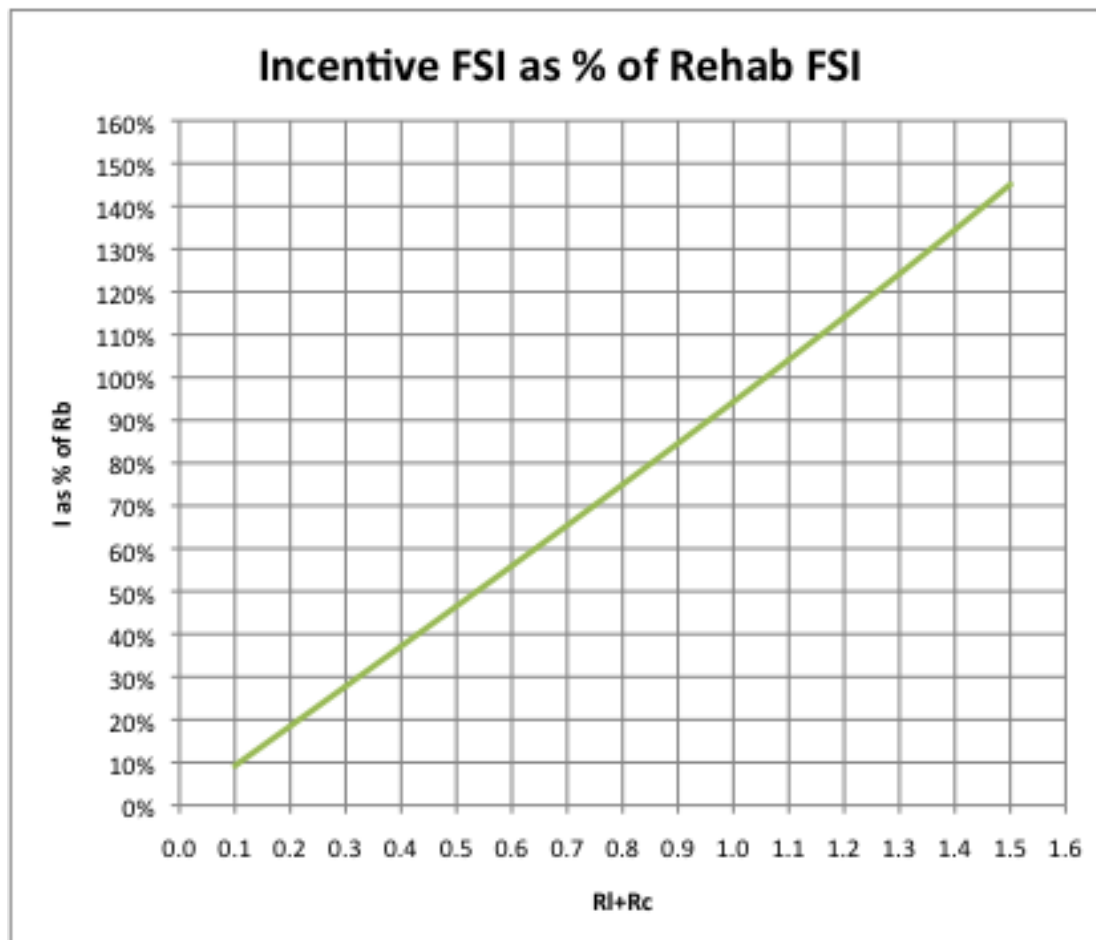
Where;

I/Rb = Ratio of Incentive FSI to Rehabilitation FSI in percent

RI = Ratio of land price to sale price

Rc = Ratio of construction cost to sale price

Figure 17.3: Incentive FSI as percentage of rehabilitation FSI



17.8 Expected outcome

With the proposed regime of FSI following outcomes are expected:

- FSI will be used primarily as a tool of managing physical development;
- It will not distort the market by creating scarcity of development rights but establish a framework within which market can competitively operate;
- The need to use scarcity of development rights as an instrument of policy will be obviated;
- FSI incentive will be used only for slum rehabilitation and redevelopment of cessed buildings;
- As FSI related fiscal instruments have become a significant fiscal source for MCGM, FSI that could be obtained by payment of premium has been introduced. Considering the possibility of sustained demand for floor space, this is expected to continue to substantially contribute to MCGM's finances. (Details of estimated revenue are provided in Chapter 23);
- Simplification of definition of FSI, limiting the incentive FSI to Slum Rehabilitation and Redevelopment of Cessed Buildings, is expected to reduce the transaction cost and time.

17.9 Proposed FSI Framework

The following sections show the methodology adopted in estimating space demand for population and employment for 2034 and further distribution of this space demand as FSI for DP 2034, based on the new FSI paradigm. The following steps have been followed in formulation of the proposed FSI framework and map.

17.9.1 Step 1 : Calculating Space Demand

Population and Employment Projections

Population and employment are the main determinants of floor space requirement. Population of Greater Mumbai in 2011 was 12.44 million. It is projected at 13.95 million by 2034. The projected population has been distributed across the 150 Planning Sectors and SPAs within the Planning Area. However, data on 'employment by place of work' is not available through official sources. The only reliable estimate is available in the CTS 2008, which has provided the employment projections at the level of the 577 TAZs. The employment estimates available in CTS 2008 at the TAZ level have therefore been used to arrive at employment estimates at Planning Sector and Ward levels for 2034.

Existing Per Capita Consumption of Built Up Area for Housing

The first step followed in estimating the BUA required for housing was to take cognizance of the per capita consumption levels for housing in the existing situation. Based on ELU 2012 and the Existing FSI map, the existing pattern of consumption of per capita BUA for housing was computed. The methodology adopted was as follows:

- The current population of Greater Mumbai was divided into a decile;
- The carpet area and built up area for Residential use was attributed to the decile, based on the existing per capita space consumed.

This is presented in Table 17.5 below

Table 17.5: Per Capita Consumption of BUA for housing, 2012

Decile of Households	Household Income Rs./month	House Type	Average BUA / Household (sqm)	Per capita BUA (sqm)
10	7,500	Pavement and Slum Dwellers	7	1
20	11,250	Slum and Chawl Dwellers	9	2
30	13,750	Slum and Chawl Dwellers	12	3
40	16,250	Slum and Chawl Dwellers	18	4
50	20,000	Slum and Chawl Dwellers	25	5
60	26,250	Chawl and Slum Rehab Homes	30	6
70	40,000	EWS-LIG-MIG Apartments (1BHK)	45	9
80	72,500	MIG - HIG Apartments (2-3 BHK)	80	17
90	106,250	HIG Apartment (2-3 BHK)	100	21
100	Above 106,250	HIG Apartment (2-3 + BHK)	125	26
Mean			45	9

*It may be noted that the household income given above is in 2005 prices and the distribution is as estimated in 2010. Thus, with an average household size of 4.8 the average per capita BUA in 2012 could be estimated to be 9 sqm.

This can be reckoned with assessments conducted based on data obtained from the ELU 2012 survey. This is recapitulated in Table 17.6 below:

Table 17.6: Planning Sectors distributed according to Per Capita BUA for housing

Per Capita BUA 2012 (sqm)	Planning Sectors	Population 2011	Existing Housing BUA (ha)	Per Capita BUA (sqm)
0.01 – 4	15	510,793	143.37	3
4.01 – 8	52	5,464,418	3,188.78	6
8.01 – 12	35	3,146,126	3,002.94	10
12.01 - 16	15	1,624,365	2,316.37	14
16.01 - 20	13	720,022	1,252.59	17
20 and above	9	258,091	706.97	27
Total	139	11,723,815	10,611.02	9

Note: 12 Planning Sectors that have negligible residential area are not considered in the above table. The total population does not include the population in SPA areas.

Future Housing BUA Demand

Per Capita BUA demand for 2034 will depend upon the future income of households, income and price elasticities of housing demand prevalent in the market, access to housing finance etc. Moreover, welfare policies of the state may intend to assure minimum floor space for a household. For example, the National Habitat Policy has aimed at minimum of 25 sqm carpet area (35 sqm BUA) per household this works out to 7.8 sqm per capita. The purpose of defining the FSI would therefore be not to be deterministic or prescriptive but to provide an outer envelope for the market to operate competitively. With this in view 6 profiles of per capita BUA consumptions have been conceived corresponding to the 6 ranges observed in Table 17.6. These are presented in Table 17.7 below:

Table 17.7: Profiles of Consumption of BUA for housing

	Housing Area Consumption Profiles (sqm)					
Deciles of Households	1	2	3	4	5	6
10	35	35	50	50	65	100
20	35	35	50	65	100	100
30	35	50	65	65	100	150
40	50	50	65	100	100	150
50	50	65	100	100	150	150
60	50	65	100	150	150	200
70	65	100	150	150	200	200
80	65	100	150	200	200	200
90	65	150	200	200	375	375
100	100	200	200	375	375	375
Mean BUA / HH	55	85	113	146	182	200
Per Capita BUA	14	21	28	36	45	50

The per capita BUA presented in Table 17.7 above may appear to be optimistic as compared to those observed in the ELU (Table 17.6). However, this is on account of three reasons. Firstly, average household income is likely to substantially increase; secondly, household size is likely to reduce to 4

persons per household and thirdly, BUA is all inclusive with practically no exemptions for FSI computation.

The total demand for housing BUA by 2034 is estimated in Table 17.8 below:

Table 17.8: Demand for BUA for housing in 2034

Per Capita BUA 2012 (sqm)	Number of Planning Sectors	Population in Planning Sector (2034)	Projected Per Capita (sqm)	Total Projected BUA (ha)
0.01 - 4	15	537,703	14	752.78
4.01 - 8	52	6,194,794	21	13,009.07
8.01 - 12	35	3,448,755	28	9,656.51
12.01 - 16	15	1,817,919	36	6,544.51
16.01 - 20	13	810,038	45	3,645.17
20 and above	9	249,015	50	1,245.07
Total	139	13,058,223	27	34,853.12

Note: 12 Planning Sectors that have negligible residential area are not considered in the above Table 17.8. The total population does not include the population in SPA areas.

The total demand for housing space thus estimated for Greater Mumbai is 34,853.12 ha.

Employment space demand:

The employment space standard considered is 10 sqm per person in accordance with the National Building Code, 2005. Accounting for an additional 2.5 sqm for ancillary areas, a per capita standard of 12.5 sqm has been adopted for calculating employment space demand. The total demand for employment space thus estimated for Greater Mumbai (excluding SPA requirement) is 9,190.41 ha.

Total BUA space demand for Greater Mumbai:

The total BUA demand for residential and employment space for the city in 2034 is estimated as 44,043.53 ha. This explicitly does not include built up area required for educational, healthcare and other community facilities and public utilities. However, built-up area for total employment including that engaged in such services it is assumed to be covered by the overall estimate.

17.9.2 Step 2: Calculating the Mean FSI to meet the BUA Demand

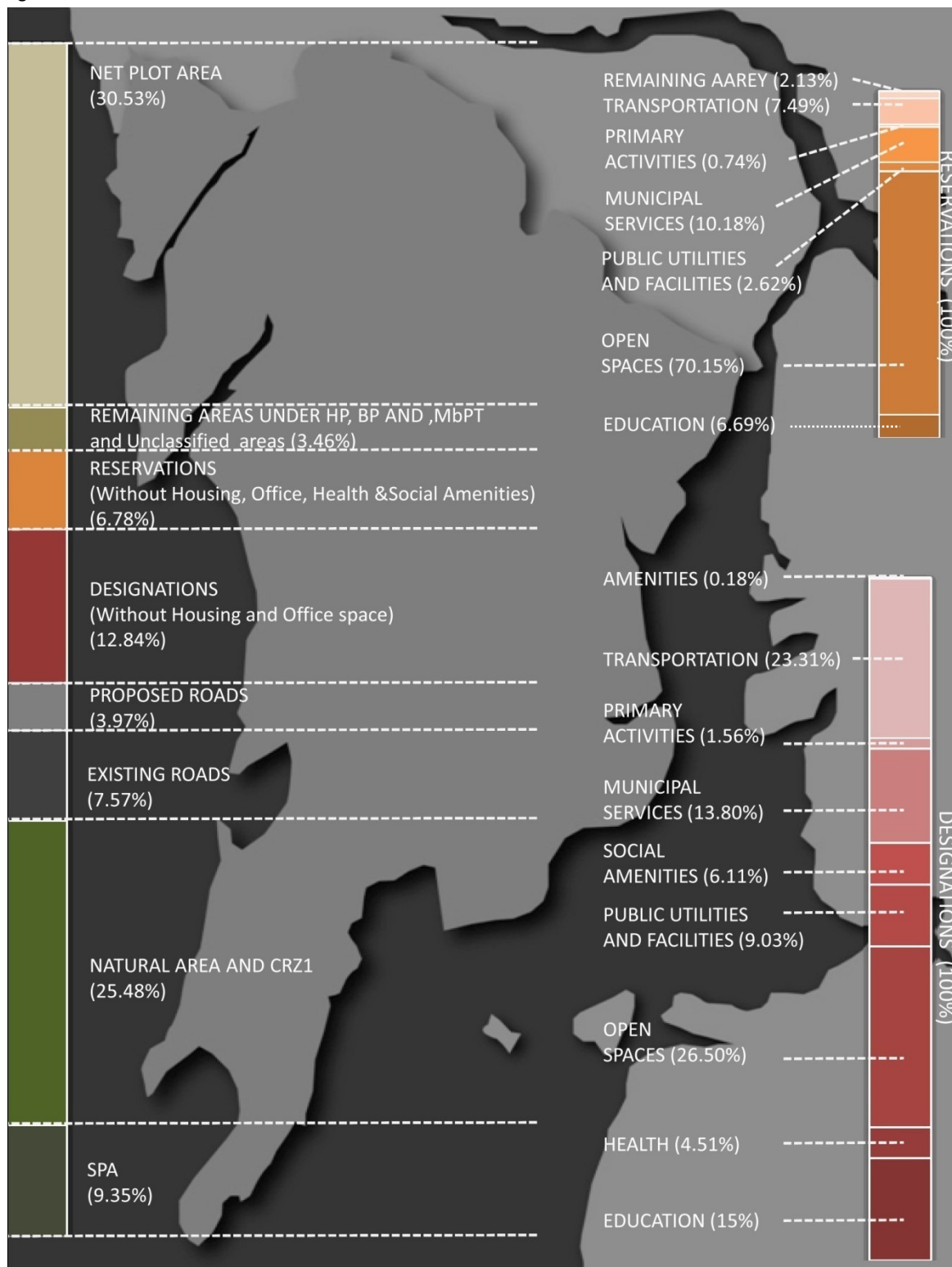
The mean FSI demand for the city is calculated by dividing the projected BUA requirement by the Net Plot Area of Greater Mumbai.

Estimating the Net Plot Area

From the total area of Greater Mumbai (45,828.31 ha), areas where FSI allocation is not relevant, were discounted, in order to arrive at the Net Plot Area for FSI allocation. This includes existing and proposed natural areas, primary areas, open spaces, transport & communication infrastructure, public utilities, amenities areas under unclassified uses, Hindustan petroleum, Bharat petroleum and MbPT, and areas under SPAs. The development of these areas would be subject to their zonal FSI allocations, as well as to their various departmental norms.

The Net Plot Area, thus computed for the city is 13,991.47 sqkm. Table 17.9 lists the areas exempted from the Net Plot Area.

Figure 17.4: Net Plot Area Calculation



Note: The above chart illustrates a deductive method of arriving at the Net Plot Area from the Total Planning Area. Percentage of land use distribution and road area is to Net Plot Area. However, the above computation may incur over laps in land use classification, stated above. Road network occupies a larger component in developed area, as mentioned in Chapter 19; Section 19.3.

Table 17.9: Net Plot Area

	Area (ha)	% of Total City Area
Total City Area	45,828	100.00%
Areas Excluded From Net Plot Area	31,837	69.47%
Net Plot Area	13,991	30.53%

Areas Excluded From Net Plot Area	Area (ha)	% of Total City Area
SPA	4,287	9.35%
Natural Areas and CRZ 1	11,677	25.48%
Existing Road Area	3,471	7.57%
Proposed Road Area	1,821	3.97%
Designations (Except Housing and Office Areas)	5,886	12.84%
Education	882	
Health	265	
Open Spaces	1,560	
Public Utilities and Facilities	532	
Social Amenities	360	
Municipal Services	812	
Primary Activities	92	
Transportation	1,372	
Other Amenities	10	
Reservations (Except Housing, Office, Health and Social Amenities*)	3,109	6.78%
Education	208	
Open Spaces	2,181	
Public Utilities and Facilities	81	
Municipal Services	316	
Primary Activities	23	
Transportation	233	
Remaining areas under Aarey	66	
Remaining Unclassified Areas, Refineries and MbPT	1,585	3.46%
Total	31,837	69.47%

*Reservations for Health and Social Amenities can be developed through Accommodation Reservation. As a result, a part of their land area shall add to BUA for Residential and Office space. Hence, they have been considered a part of the Net Plot Area.

Arriving at the Mean FSI

Based on the Net Plot Area and the estimated future space demand for residential and employment uses, a mean FSI of 3.15 for the entire city can be arrived at. However, the distribution of this FSI has to be varied depending upon the FSI already consumed, proposed land use zoning, and accessibility, particularly, areas in proximity to public transit stations, in order to ensure efficiency of use of land.

It needs to be noted that FSI prescriptions adopted in DP 2034 is Bulk FSI, and differs from the Net FSI as understood in the present context, which makes several exemptions for built space. As a general rule, the Net FSI in present terms, is about 70% of the Bulk FSI as proposed by the DP 2034. So, the mean FSI in present terms is 2.75, which is in range of the permissible outer FSI limit in the Suburbs (FSI of $2.7 = 1 \text{ base} + 1 \text{ TDR} + 0.7 \text{ fungible}$). The adoption of Bulk FSI is a move towards prevention of mis-use and manipulation of the use of FSI, by cutting down the list of areas exempted from computation of FSI, to a bare minimum for all types of developments. Consequently, the process of granting building permits will also be simplified, reducing transaction time and cost.

17.9.3 Step 3: Allocating FSI

Table 17.10: FSI for Greater Mumbai

FSI	Net Land Area (ha)	Net BUA (ha)	Net Land as % of Net Plot Area	Net BUA as % of Total BUA Area
8	64.69	517.56	0.46%	0.91%
6.5	636.04	4,134.29	4.55%	7.28%
5	4,459.05	22,295.24	31.87%	39.25%
3.5	8,132.06	28,462.21	58.12%	50.10%
2	699.62	1,399.25	5.00%	2.46%
Total	13,991.47	56,808.55	100%	100%

The DP 2034 adopts a variable FSI regime which allocates FSI based on the locational logic of the spatial strategy discussed in the sections above, as well as the existing consumption. Five ranges of proposed Bulk FSI and the Net Plot Area under them is presented in Table 17.10. Considering the existing FSI consumed, majority land area (58.12%) is proposed to be under the FSI of 3.5. Higher FSI of 5.0 and above is only provided in areas well accessed by public transport, mainly areas in proximity to railway stations and the existing and upcoming metro stations. 31.87 % of the city is under an FSI of 5.0. Bulk FSI of 6.5 and 8.0 has been provided in the immediate vicinity of major railway stations proximate to CBDs and other employment nodes. 4.55 % of the city is under an FSI of 6.5 and less than 0.5% of Net Plot Area is allocated an FSI of 8.0. Remaining 5.0 % of the city is under an FSI of 2.0 and is provided in areas not accessible by public transit.

Comparing FSI with Demand

As shown in Table 17.10, if the city consumes 100% of the FSI provided, it shall produce a BUA of 56,808.55 ha and a weighted average FSI of 4.09. However, not all plots are expected to redevelop and consume the provided FSI within the next 20 years. Demand projected is expected to be consumed upto a few years after the 20 year plan period. Parts of the city that have recently undergone redevelopment will have inertia to redevelop within the next 20 years, even if they have received a higher FSI under DP 2034. Similarly, property owners in commercial areas that have a high daily income might resist the redevelopment owing to loss of income during the building phase. Also, the FSI provided to a particular plot is not an absolute entitlement. Plots can consume the allocated FSIs only if they comply with the GDCRs related to setbacks and step-backs. As a result small plots that cannot fulfill the GDCR requirements and do not amalgamate with the neighbouring plots, will not be able to consume high FSIs.

After accounting for these reasons, if we assume that approximately 80% of the plots shall consume the FSI provided over the next 20 years, the city shall produce a BUA 45,446.84 ha and a weighted average FSI of 3.25 which is close to the FSI demand of 3.15.

17.9.4 Step 4: Profiling FSI for promoting Urban Transformation & Monetization

The DP 2034 defines an adequate outer envelope within which the market can operate competitively without distortions. However, it should be noted that the permissible FSI on a plot is not an entitlement but the maximum development right that the property can avail subject to other conditions. These include norms for heritage preservation, norms for restricted building height from the aviation department.

It is also important to note that the change in the FSI pattern of the city is based on and accompanied by corresponding increase in road and rail infrastructure, which is either approved or proposed as part of the DP 2034.

The proposed FSI bands represent the outer limit, or the maximum development right available on a plot, which can be attained in slabs through purchase of rights from the market or the government. The final profile of FSI is proposed to comprise of four layers (refer to Fig. 17.5 below) the Base (as entitlement), TDR (to absorb transferable development rights originating from land surrendered for public purposes), and the premium FSI (that could be availed by paying premium).

Base FSI –The Base FSI is the development right that the plot is allocated and is, generally, equal to or more than the FSI already consumed.

After utilizing the Base FSI if the developer wishes to maximize FSI consumption, so as to develop up to the permissible FSI limit on a plot, then this may be done through purchase of premium FSIs from the MCGM and TDR from the market.

Premium FSI A and B –The premium FSI is divided into two parts, A and B. Premium FSI A is to be consumed before TDR at 70% the Ready Reckoner rate. Premium FSI B can be consumed after consuming TDR at 100% the Ready Reckoner rate. The premium FSIs are expected to form a revenue stream that can be diverted towards implementation of the Development Plan.

TDR FSI –TDR is the development right that can be bought on the market and transferred to the plot. The DP 2034 allows plots to consume a fixed quantity TDR once the base FSI is consumed. It is expected that allocation of a band of TDR, before being able to access FSI through Premium B, will ensure a healthy TDR market, and consequently support land availability for public purposes. The TDR shifts are monetized as per the Ready Reckoner price of land in which it is generated and consumed, thus ensuring equity in development potentials for all areas of the city.

Figure 17.5: A Four Tiered FSI Consumption Structure

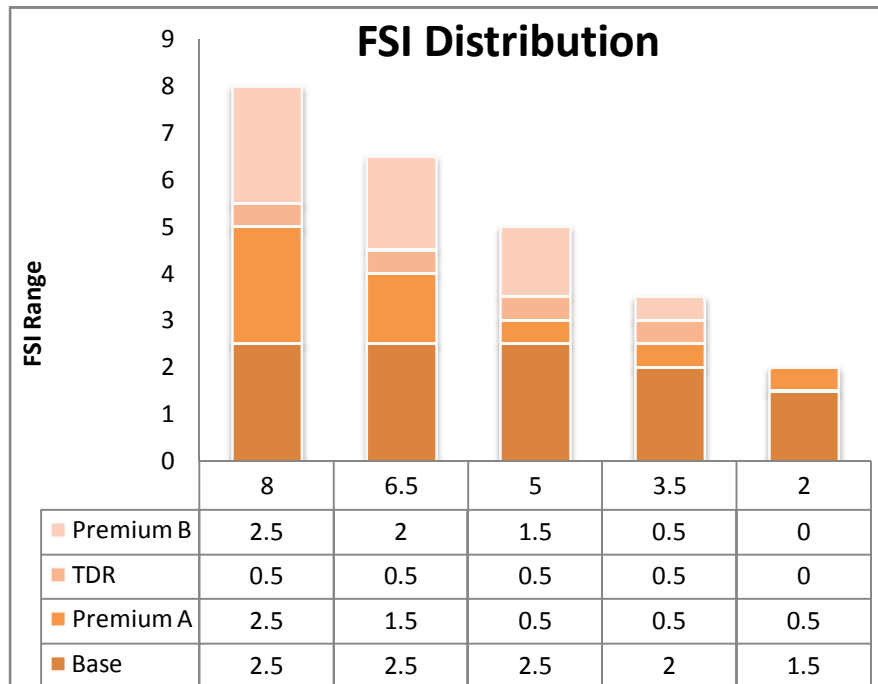
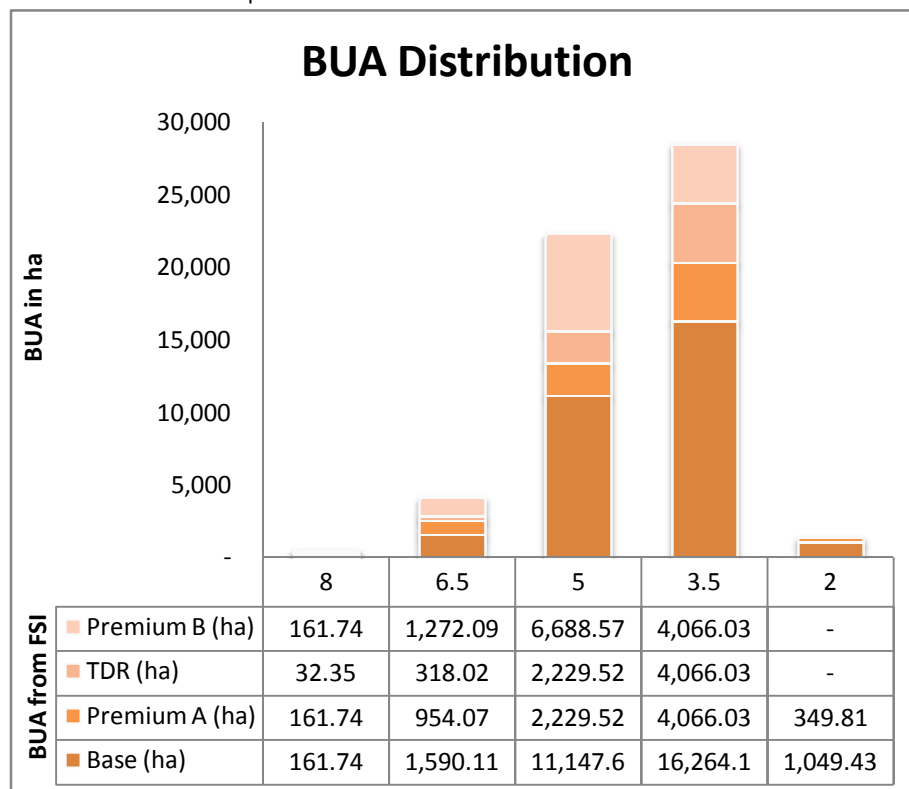


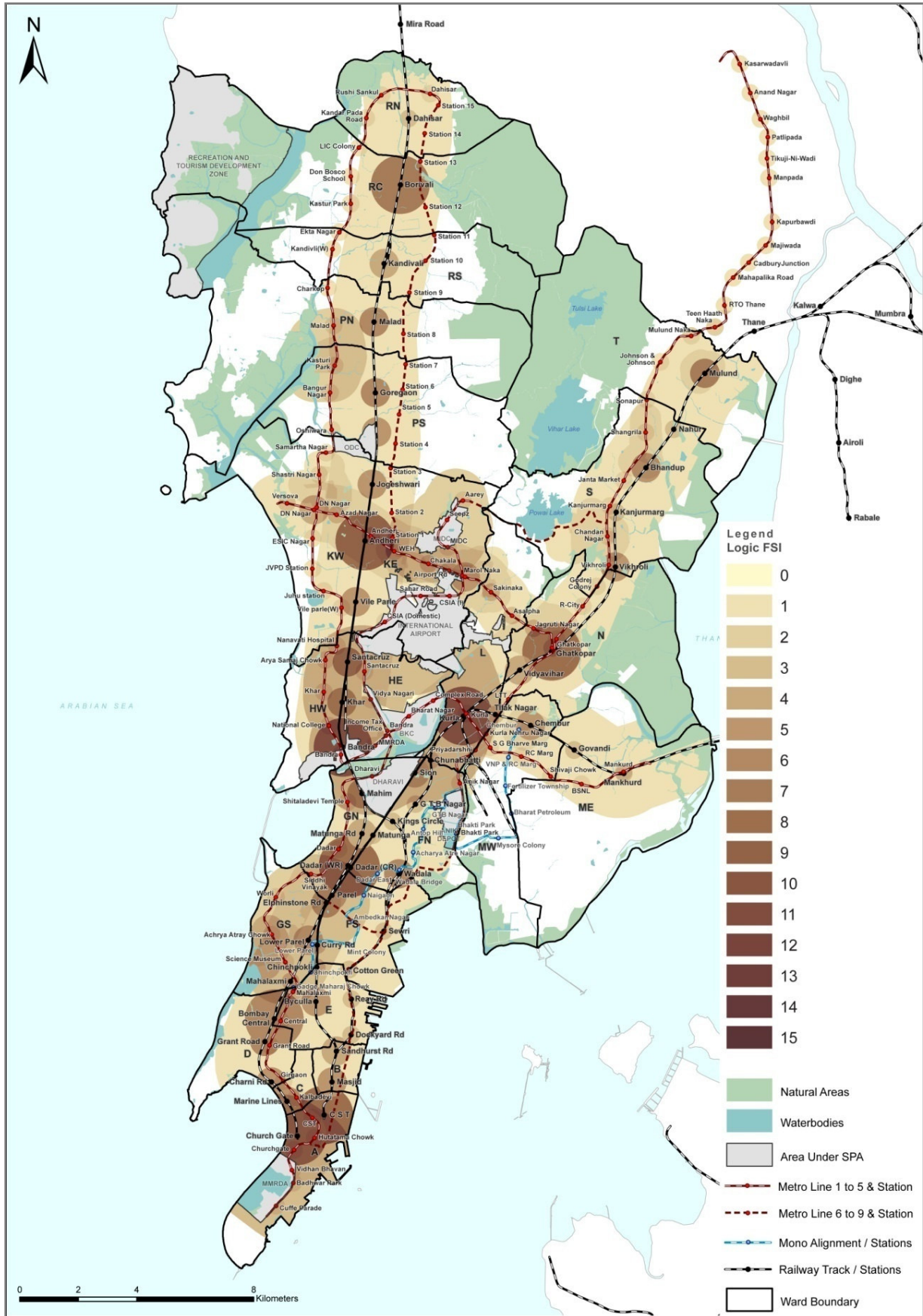
Figure 17.6: A Four Tiered BUA Consumption Structure



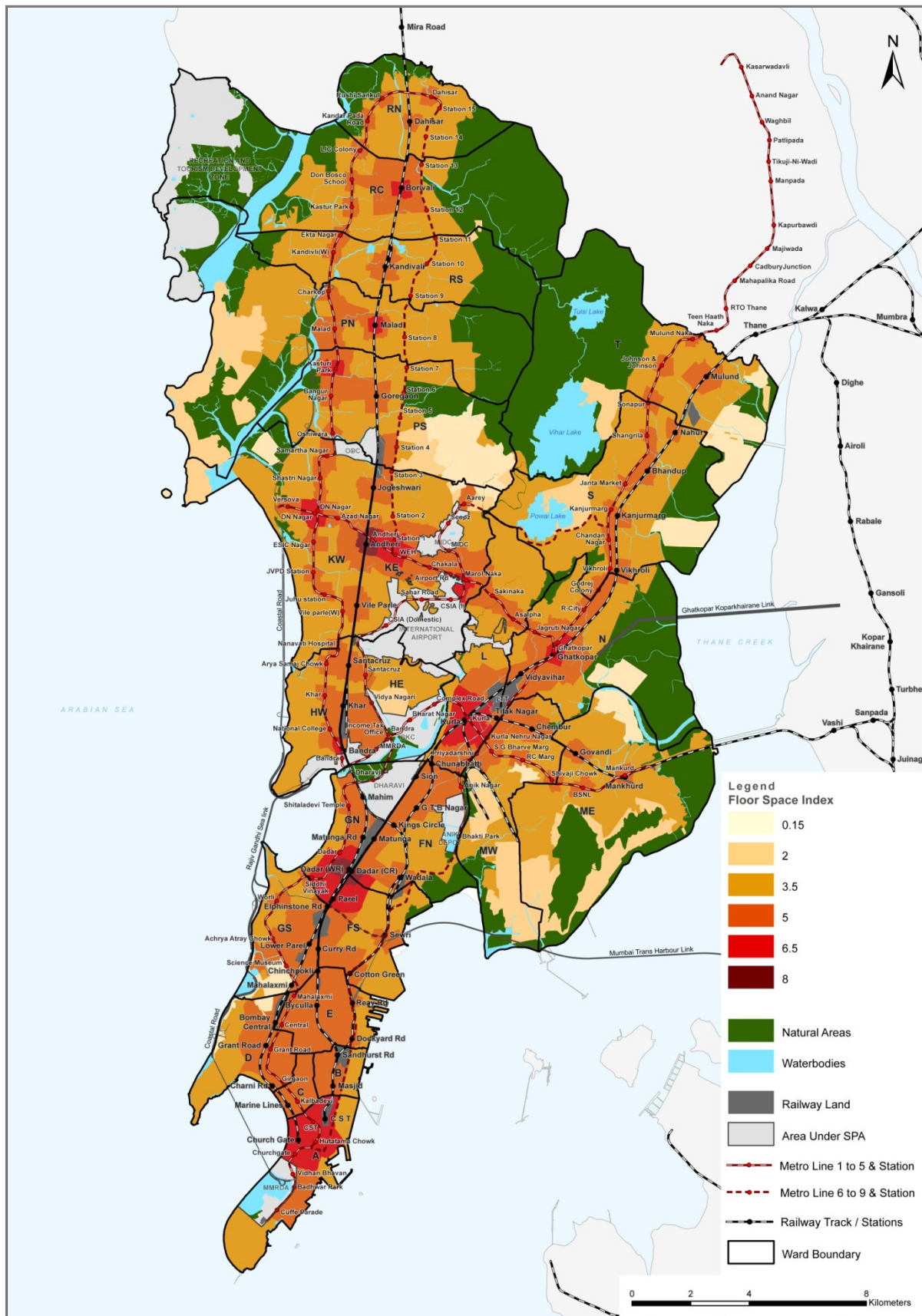
Notes:

1. Premium A FSI can be used without the use TDR;
2. Premium A FSI could be priced at 70% of Annual Statement of Rates (ASR) for land;
3. Premium B FSI will be charged at 100% of ASR for Land.

Map 17.1: FSI Logic map for Greater Mumbai



Map 17.2: Proposed FSI Map for Greater Mumbai



Plots used for educational purposes and healthcare services can use the maximum permissible FSI without obtaining TDR or paying premium for additional FSI.

17.9.5 Step 5: Balancing Distribution of TDR based FSI Consumption

Use of TDR is monetized by land value of the place in which it is consumed and generated. Thus the TDR generated from a high priced area would amount to higher extent of consumption of FSI in a low priced area, and vice versa, weighted by the Ready Reckoner land value at that given time. Such a change in the movement of TDR, ensures that all areas in the City are equally incentivised for redevelopment.

A total of 3,721.90 ha of land has been reserved for public purpose. If all the reserved land is made available through TDR compensation, TDR of 7,205.58 ha would be generated. However land reserved for health and social amenities, that form 9% of this land, are likely to be developed through AR without generating any TDR. After taking this into account, the net TDR generation would come down to 6,482.21 ha. The Proposed FSI plan provides for the use of TDR to the extent of 6,700.87 ha. Thus, adequate provision has been made for utilisation of TDR that is likely to be generated.

However, TDR is a market dependent technique of land obtaining land for public purpose. Since real estate market in Mumbai is essentially cyclical the generation and use of TDR needs to be closely monitored.

As explained in Chapter 15, Spatial Development Strategy, the allocation of Floor Space Index follows the logic of transit oriented development. FSI has been both liberalized and contextualised to place.

The Map17.1 above presents the locational logic on which the Proposed FSI Map for Greater Mumbai is based. The distribution of FSI in the proposed FSI map follows a logic already established in the spatial development strategy. Existing and emerging business districts/ commercial districts, areas in proximity to railway and metro stations, and existing FSI consumed form the key parameters that define the logic of distribution of proposed FSI. A cumulative map factoring these parameters was prepared to propose the placement of variable FSI in the city (Refer Map 17.2).

The background image is a grayscale aerial photograph of a coastal city. The top half shows a dense urban landscape with numerous high-rise buildings and a hazy sky. The middle section features a wide, sandy beach with waves breaking onto the shore. The bottom half shows a closer view of residential buildings, many with flat roofs and balconies, interspersed with lush tropical vegetation, including palm trees.

Chapter 18

Land for Public Purposes

18. Land for Public Purpose

Section 22 of the MR&TP Act enables, so far as maybe necessary, to designate and reserve:

- Schools, colleges and other medical and educational institutions, public health institutions, markets, social welfare and cultural institutions, places for public entertainment, public assembly, museums, art galleries, religious buildings and government and other public buildings;
- Areas for open spaces, playgrounds, stadia, zoological gardens, green belts, nature reserves, sanctuaries and dairies;
- Areas for transport and communication such as roads, highways, railways, water ways, canals and airports;
- Reservation of land for community facilities and services;
- Service industries and industrial estates;
- Proposals of the Central, State government, Planning Authority or Public Utility undertaking.

The Act also provides for compulsory acquisition of land so designated for public purpose. The scope of the DP is largely confined to fulfilling the spatial requirements of providing equitable access to social and physical infrastructure to all parts of Greater Mumbai. The larger sectoral goals are not within the purview of the DP. For example, larger educational goals such as increasing literacy rate, providing free and compulsory education (RTE, 2009⁶⁰), monitoring quality of teaching staff and administrative management, etc; are outside of the scope of the DP.

This chapter presents estimates for land demand for public purpose for the period 2014-2034 and proposals for obtaining required land.

18.1. Provisioning for Amenities

To estimate the land demand for amenities and open spaces for 2014-2034, appropriate benchmarks for each amenity have been developed. Against these benchmarks the adequacy of access to amenities has been evaluated. A comparison of various local, national and international planning standards along with benchmarking of amenity space provisions for cities of similar scale and density as Greater Mumbai served as a useful reference to determine adequate space provision for each of the amenities. Proposed planning benchmarks were contextualised considering the land constraints in Greater Mumbai.

The per capita benchmark for each amenity has been applied at the Ward and Planning Sector levels to estimate total area demand. In addition to these, area for municipal services received from other public departments of the MCGM and amenity demands received through participatory workshops has been included.

The following section is an assessment of Planning Standards employed in DP 1991, for provision of amenities, and challenges faced in implementation.

⁶⁰ Right to Education Act, 2009

18.1.1 Review of DP 1991 Planning Standards

The DP 1991 had differing Planning Standards for the Island city and the Suburbs, which were based on differential population densities that were prevalent then. The Planning Standards for the various amenities were arrived at after referring to various standards adopted by local and state level bodies. The derived standards were much lower than those stipulated by the Government circulars “considering non-availability of vacant land and high land values” (DP 1991 Report). Further, the DP 1991 put an artificial limit on projected population of 9.8 million, for the plan period. The provision of amenities as per DP 1991 Planning Standards have proven insufficient for the present population that has far exceeded the cap.

In addition, the open space provisions took into account natural areas in the overall computation to prove compliance with standards (12 sqm per person).

18.1.2 Contextualizing Planning Benchmarks for Greater Mumbai

Greater Mumbai’s unique geographical context has resulted in a constrained availability of land for development and very high population densities. While recommending space norms for Greater Mumbai the following was considered:

- a) **Non-applicability of National/Global standards to Greater Mumbai:** It is evident that standard planning norms like UDPFI guidelines that are routinely used for the rest of the country, cannot be directly applied to Greater Mumbai since they would be **unachievable** for many parts of Mumbai. For example, as per the UDPFI guidelines, open space norm of 10 sqm per capita, for the Island City’s current population of nearly 3 million, would be more than 40% of the total land area (71.40 sqkm) of the Island city which would be unachievable.
- b) **Limited Vacant Land Available:** Due to limited availability of vacant land, achieving existing standards through ‘reservation’ of vacant land for amenities is extremely difficult in the context of Greater Mumbai. Acquiring built up properties for ‘reservation’ faces the formidable challenge of resettlement and rehabilitation of existing occupants of such properties.

These special conditions make obtaining land for public purpose in Greater Mumbai extremely challenging and increasingly restrict sizes of amenities that are land dependent. With this background, per capita benchmarks have been established for built and un-built amenities in Greater Mumbai for making land available for public purpose. Given the land constraints in Greater Mumbai, the space norms for built-up amenities can be achieved through a built-up area provision. Acknowledging the current situation, a methodology has therefore been devised in order to derive planning benchmarks through a bottom-up approach, considering that these benchmarks⁶¹ would primarily serve only as a useful starting point for estimating ‘future land demand’ and cannot be treated as a rigid target that needs to be achieved.

⁶¹ DP 2014-34, adopts planning benchmarks as reference for amenity provision rather than a normative approach in establishing planning standards.

18.1.3 Review of Various Norms and Standards for assessing land demand for amenities

Various planning standards at national and international levels were reviewed. The following national norms were referred to:

- a) Urban Development Plan Formulation and Implementation Guidelines (UDPFI), GoI
- b) Social Infrastructure norms for the Delhi Master Plan 2021 drafted by the Delhi Development Authority (DDA)
- c) Navi Mumbai Social Facility norms drafted by CIDCO
- d) Planning Standards utilized for the Development Plan 1991 drafted by MCGM
- e) National Building Code (NBC)
- f) Report of the Committee on Planning Standards, Govt of Maharashtra, October 2001
- g) National Institute of Urban Affairs (NIUA)
- h) Right to Education (RTE) Act provisions
- i) National Urban Health Mission

Amenity space standards formulated by these various authorities were reviewed. For Open Space provision, since the DP 1991 had specified extremely low open space standards as compared to the UDPFI guidelines, before making recommendations, it was considered necessary to study not only prevalent international norms but also benchmark open space provision in cities with comparable densities and populations. Several internationally prevalent norms were additionally reviewed such as:

- a) WHO/ UN- FAO norms;
- b) National Playing Fields Association (NPFA) open space norms, UK;
- c) National Recreation and Park Association (NRPA) standards, USA.

The review of the various local, national and international norms clarified that,

- Typically standards for space norms for amenities are expressed in either one of the following parameters or as a combination of these parameters: *Population served per unit, Size of the amenity, Proximity norm*. For example, the DP 1991 stipulates standards for a primary school based on population, at 1 per 5,000 population within ½ km walking distance and 2.09 sqm per student.
- In terms of approaches, the UDPFI and the DDA norms are the most comprehensive. The UDPFI specifies space standards for each level of amenity. The DDA sets out various population thresholds based on hierarchy levels and the amenities that need to be provided at each level. The DDA has 5 population thresholds namely, housing area (up to 5,000 population), neighbourhood (up to 10,000 population), community (up to 1,00,000), district (up to 5,00,000), and Zonal/Sub City (up to 10,00,000).

An approach similar to the DDA norms for the Delhi MP 2021 would be beneficial for Greater Mumbai, setting the starting threshold slightly higher (in order to account for higher densities and for provision of integrated primary and secondary schools to account for the low land supply), neighbourhood (10,000 population), Planning Sector (1,00,000 population), Ward (5,00,000 population) and Zone/sub-city (10,00,000 population).

Computing Area per Capita

- Comparing the various Planning Standards, it is evident that population catchments served by an amenity often differed in the various Planning Standards reviewed. Further, some Planning Standards did not cater to all levels of service - primary, secondary and tertiary. For example, education amenities at the primary level viz. primary schools may have been covered; however, no Standards may have been formulated for provision of tertiary level facilities viz. colleges or universities.
- In order to arrive at effective comparisons, various existing norms for amenity provision needed to be normalized to a common denominator, in to reflect the area (in sqm) per capita required per amenity (based on the size of the amenity and the population served per unit amenity). These have then been compared so as to help unify differing population thresholds and corresponding Planning Standards envisaged by different institutions.

Accessibility

- Measuring levels of access to amenities is an important parameter to determine adequacy of provision of amenities. Accessibility is based on several factors including quality of service, management of resources, hierarchy of roads and distance parameters. Since several factors that determine accessibility cannot be easily measured or controlled, benchmarks for accessibility cannot be derived. Yet, it is understood that for primary level activities the facility should ideally be within 'walkable distance' from the residence, usually ranging from 500m to 800 m (up to a maximum for primary health care to 1,500 m).

18.1.4 Benchmarking Amenity Space Provisions and Deriving Rationale for establishing Amenity Space Benchmarks for Greater Mumbai

To arrive at appropriate social infrastructure benchmarks for Greater Mumbai, the existing per capita amenity space usage in Greater Mumbai was compared with the space standards and usage of similar amenities across various local, national, international contexts.

The amenities that were compared are categorised as follows:

1. Educational amenities: Include primary, secondary schools and schools for higher education;
2. Health Amenities: Include dispensaries, maternity homes and hospitals;
3. Social amenities: These include fire stations, police stations, cemeteries and local markets;
4. Open Spaces: These include all public recreational open spaces.

The comparative assessment of national amenity space norms with current provision in Greater Mumbai was conducted in order to arrive at the most appropriate rationale for establishing realistic planning benchmarks for amenities for DP 2034.

A. Health Amenities

The MCGM runs a large public healthcare system including several large municipal hospitals, municipal dispensaries, maternity clinics and health posts. The major health amenities are largely concentrated in the Island City. These municipal amenities are complemented by a large number of private hospitals, nursing homes and clinics.

Current national norms for health provision at various levels of care are as under:

Table 18.1: National Amenity Space Norms in Comparison to Current Provision: Health Amenities

Category	UDPFI (sqm pp)	DDA (sqm pp)	CIDCO (sqm pp)	DP 1991 (sqm pp)	Committee on Planning Standards, GoM (sqm pp)	Current ELU 2012 (sqm pp)
HEALTH						
Health Amenities (Total-dispensary, Maternity home& hospital)	0.83 -1.28	0.345-0.604	0.19	0.2 Island City 0.385 Suburbs	0.2375	0.15 Greater Mumbai
Dispensary	0.0134	0.08-0.12	0.06	0.013	0.0375	0.009 MCGM
Maternity Homes	0.08-0.53	0.02-0.04		0.021 Island City 0.042 Suburbs		0.003 MCGM
Hospital	0.74	0.185-0.34	0.13	0.167 Island City 0.33 Suburbs	0.2	0.21 MCGM

Current Provision

Average per capita space across city for health amenities is 0.15 sq m. However, in most wards the actual provision is much lower. Few wards in the island city show high per capita medical space due to the presence of city level medical amenities.

Future Provision

Healthcare in the city needs to be augmented to achieve at least the DP1991 MCGM norm of 4 beds/1000 persons, as against the international WHO standard for hospital provision which is 5.5 beds/1000 persons. Since health care is central to citizen welfare, a conscious attempt should be made to at least achieve the current MCGM norm of 4 beds per 1000 persons with provision to be

made in underserved Suburbs. As per NUHM (National Urban Health Mission), at the community level, there has to be community outreach service, followed by one Swasthya Chowkey for every 10000 pop at the sub community level, one PUHC for every 50000 pop or every 25000-30000 slum pop as the primary level health care facility and finally a First Referral Unit provided either by public or empanelled private secondary/tertiary providers.

Recommended Space Norm for Greater Mumbai

Based on the above norms, and on current provision, the recommended minimum space norm to achieve all levels of health care needs (primary, secondary and tertiary) of the population is 0.385 sq m per person for Greater Mumbai.

B. Educational Amenities

In Mumbai, the provision of primary education (Std I-VII) is an obligatory function of the MCGM while both pre-primary as well as secondary are discretionary functions. As a result, the MCGM runs a large number of primary schools in Greater Mumbai. However, the majority of secondary schools in Greater Mumbai are privately run, with only a small number of secondary schools being run by MCGM.

Table 18.2: Educational Amenities: National Norms in Comparison to Current Provision

Category	UDPFI (sqm pp)	DDA (sqm pp)	CIDCO (sqm pp)	DP 1991 (sqm pp)	Committee on Planning Standards, GoM (sqm pp)	Current ELU 2012 (sqm pp)
EDUCATION						
Educational Amenities (Total including primary, secondary and higher education)	3.58	1.152	1.23	0.752 Island City 1.104 Suburbs (Excluding higher education)	0.7 (Excluding higher education)	0.69 MCGM
Primary Schools	0.8	0.4	0.39	0.376 Island City 0.552 Suburbs	0.3	0.05 Greater Mumbai
Secondary Schools	2.13	0.6	0.39	0.376 Island City 0.552 Suburbs	0.4	0.11 MCGM
Category	UDPFI (sqm pp)	DDA (sqm pp)	CIDCO (sqm pp)	DP 1991 (sqm pp)	Committee on Planning Standards (sqm pp)	Current ELU 2012 (sqm pp)
Higher Education (College)	0.65	0.152	0.45	Not specified	Not specified	0.09 MCGM

Current Provision

Schools need open space provision- however considering the space constraints of Mumbai, there are several schools in Greater Mumbai which do not have playgrounds or have very insufficient open space.

Current average allocation for all levels of educational amenities across wards in Mumbai is 0.57 sq m per person.

Future Provision

Intensification of existing schools and integrated educational institutions, combining primary and secondary schools (rather than separate schools for different levels of education) would be more desirable considering the limited availability of land.

With increasing privatization of education there is an increasingly lesser role being played by Government in this sphere. Further, the recent Supreme Court endorsement of the RTE Act (2009) making it mandatory for private schools to reserve 25% of its seats free for underprivileged children between the ages 6-14 years means that there is a diminished need now for land reservations for educational needs, considering that there are a large number of private primary and secondary schools in Greater Mumbai. If the provisions of the RTE Act are actively enforced, it would help make quality education more accessible to many underprivileged children in the city.

Recommended Space Norm for Greater Mumbai

Based on above norms and on existing provision in Greater Mumbai, a uniform norm that is close to the prevailing MCGM norms has been set. A space provision of 0.4 sqm pp for primary education, 0.5 sqm pp for secondary education and 0.47 sqm pp for special and higher education needs is recommended. The recommended minimum space norm to achieve all levels (primary, secondary and higher levels) of educational needs of the population is set at a minimum of 1.37 sqm per person for Greater Mumbai.

C. Social Amenities

Social amenities cover a variety of amenities ranging from safety provisions such as fire stations and police stations to other amenities such as markets, public halls, welfare centres and burial grounds.

This paper addresses only some of the major social amenities which have implications for land in the Development Plan. These include amenities such as cemeteries, fire and police stations, and markets.

Table 18.3: Social Amenities: National Norms in Comparison to Current Provision

Category	UDPFI (sqm pp)	DDA (sqm pp)	CIDCO (sqm pp)	DP 1991 (sqm pp)	Committee on Planning Standards, GoM (sqm pp)	Current ELU 2012 (sqm pp)
SOCIAL AMENITIES						
Cemetery	2 sites for 5L population	0.01-0.02	Not specified	1.5 ha per ward, 15 m green belt	Not specified	0.10
Fire Station	0.03-0.05	Not specified	Not specified	0.03-0.05	0.05	0.01
Police	0.2	0.02	Not specified	Not specified	Not specified	0.02
Local Market	0.22 Cluster level 0.88 District Level	Not specified	Not specified	0.04 Island City 0.1 Suburbs	0.06	0.02

Current Provision

Average per capita space across city for social amenities is 0.16 sqm. This calculation reflects the provision of Public Sanitary Conveniences, Municipal markets, Cemeteries, Police stations and Fire stations in the city.

Recommended Space Norm for Greater Mumbai

Based on the above norms, the recommended minimum space norm for cemeteries can be set at 0.03 sqm pp, for fire stations 0.05 sqm pp, 0.01 sqm for police stations, 0.01 for police chowky and for local markets 0.06 sqm pp so as to achieve these specific social needs of the population.

D. Recreation/Open Spaces

Open spaces are necessary to serve both the active and passive recreational needs of citizens. They range from local (residential/ neighbourhood level) open spaces to more centrally provided (community level) open spaces to larger scale (city level) open spaces that serve the city or region as a whole. In addition to these areas there are natural eco-sensitive areas like forests, coastal protection areas that are excluded from these standards.

A study of current national standards for open spaces shows the following range:

Table 18.4: Open Space Amenities: National Norms in Comparison to Current Provision

Category	UDPFI	DDA	CIDCO	Committee on Planning Standards, GoM	MCGM- 1991 DP
Open Space	10-12 sqm pp	4.258-4.758 sqm pp	3 sqm pp	3.1 sqm pp	2 sqm pp- city- 4 sqm pp- suburbs

International Norms for open spaces vary widely from 9 sq m per person to 40 sq m per person. While the European Union standards for open space are 20 sq m per person, the norms in various countries in Europe display a wide range between 5 and 26.5 sq m per person as under:

Table 18.5: International Open Space Norms

WHO/ FAO- UN	NPFA, UK	NRPA, USA	Other European Standards	
9 sq m pp Minimum Urban Green for urban dwellers	24 sqm pp (16 sqm pp for Outdoor Play, 8 sqm for Indoor Play)	40 sqm pp	EU Italy Spain Switzerland	20 sqm pp 26.5 sqm pp 5 sqm pp 5 sqm residents, 8 sqm workers

Note: World Health Organisation (WHO), Food and Agriculture Organisation of the United Nations (FAO-UN), National Playing Fields Association (NPFA), National Recreation and Park Association (NRPA)

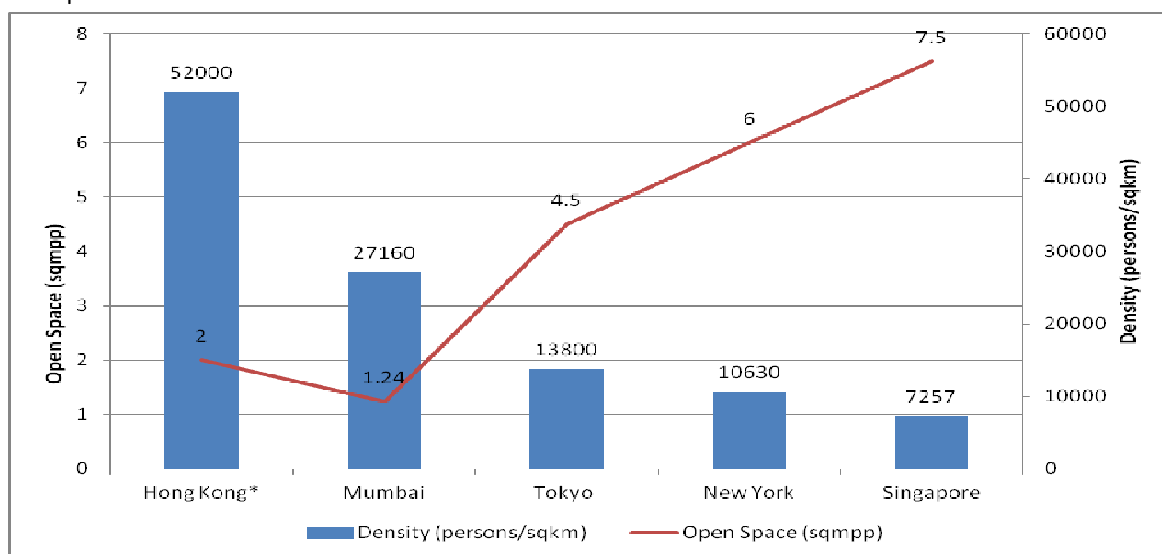
Similarly, the range of open space provision in the cities that are similar to Greater Mumbai in terms of density and population varies from 26 sq m in New York to 2 sq m in Hong Kong excluding natural green areas from calculations.

Table 18.6: Open Space Provision – Comparable International Examples

City	Area	Pop	Density	Max densities	Open space
Mumbai	458.58 sqkm	12.44 million	27,160 pp/sqkm	max 110000pp/sqkm	1.24 sqm pp
New York city	1214 sqkm	8.1 million	10630 pp/sqkm	Manhattan Borough 27394 pp/sqkm	26 sqm pp
Tokyo (special wards)	621 sqkm	8 million	13800 pp/sqkm	max 20000pp/sqkm	4 sq m pp
City	Area	Pop	Density	Max densities	Open space
Hong Kong	1068 sqkm	7 million	6480 pp/sqkm	some areas 400000 pp/sqkm	2 sqm pp
Singapore	714 sqkm	5.18 million	7257 pp/sqkm	-	7.5 sqm pp (1992)

With regards to the open space provision, it emerges that there is a wide diversity in existing norms globally. Further, a comparison across cities globally reveals that per capita open space provision is, by and large, inversely proportional to population densities. Greater the population density, lower is the open space provision. Given the fact that population density (both gross and net density) prevalent in Greater Mumbai very high, the per capita open space availability in the city is extremely low.

Figure 18.1: Densities and per capita open space for International examples



As seen in Fig 26, the maximum density in Hong Kong in Kwun Tong district is 52,000 persons per sq.kms, and the Open spaces provision is 2 sqm pp. This population density is higher than the total population density of Mumbai; hence the per capita open space benchmark is comparable to that of Honk Kong.

Current Provision

An analysis of the open space availability based on the Existing Land Use 2012 exercise was conducted. Natural areas including forests, mangroves and water bodies comprise 27% of Greater Mumbai. In order to get a more realistic understanding of truly accessible open spaces in Greater Mumbai, The natural areas (forests, water bodies and coastal environmental zones) were excluded from assessment. Further, open spaces that are not freely accessible to the public (private clubs, gymkhanas etc) were also excluded from the open spaces calculation. This exercise revealed that the actual open space available to the city residents in majority of the wards is 1 sq m per capita. However, on including beaches and promenades (because they account for some of the most heavily used and highly valued public spaces in the city), the available per capita open space increases to 1.09 sq m pp.

The Development Plan for Mumbai currently categorizes open spaces as Parks & Gardens, Recreational Grounds (RG) and Playgrounds (PG). Parks and Gardens range in size from the small local park to the big city level gardens and are meant for more passive functions like walking and may have demarcated children's play areas within them. Playgrounds cater to school going children while the Recreational grounds are meant to serve as larger community level open spaces and for adult/adolescent active play. However, some of these categories are quite confusing since they range across scales and as far as implementation goes, there are strict controls on the uses permitted in each of these open space categories. Considering the very scarce provision of open spaces in the city, all open spaces should ideally support diverse uses across age groups.

Future Provision

Considering the limited land area available and the success of Hong Kong in delivering good open spaces despite low per capita provision, it was decided that it would be appropriate to set the same

per capita standard for Greater Mumbai as for Hong Kong, which would be realistic and achievable. The needs of different age groups for open spaces are to be realized through 4 levels of open spaces for various levels of active play areas and open spaces that are envisaged at two scales- Local and Ward Level as under:

Local Level: 1 sq m pp to support

- a. Neighbourhood Parks- 0.6sqm pp (for toddlers and senior citizens)
- b. Community Parks 0.4 sq m pp (for school going children)

Ward Level: 1 sq m pp to support

- a. Ward Level Parks 0.5 sq m pp (for adolescents and adults)
- b. City Level Parks 0.5 sq m pp (for all ages)

Over and above these local level parks, there should be city-level facilities that could be addressed through natural areas.

Quantity, quality and accessibility of open spaces all have a role in the number of people using open space. Diversity of spaces also increases use. At the same time every small space can be put to diverse uses ensuring maximum use of scarce resources. The MMR-EIS Study on Open Spaces in Greater Mumbai highlighted the fact that Mumbai has good distribution of open spaces within easy reach of residents. The problem as per the study was non-maintenance or non-accessibility due to privatization. The answer to the issue of low levels of open space in Greater Mumbai lies in intensive development of available open spaces, management and maintenance of existing resources along with opening up of natural greenways along floodplains of rivers in the city.

Recommended Space Norm for Greater Mumbai

The minimum space norm to achieve the open space requirements of the population is 2 sq m per person- 1 sq m pp local level and 1 sq m per person ward level (not including the natural areas).*

*It should be noted that the open space norms do not address the indoor and outdoor recreation and sport facilities (at 1 sq m pp minimum) to take care of the active recreational needs of the citizens.

18.1.5 Proposed Hierarchy for Amenity provision DP 2034

An approach similar to the DDA norms for the Delhi MP 2021 has been applied to Greater Mumbai, with four levels of population thresholds defined at the outset viz. Neighbourhood (up to 10,000), Planning Sector (up to 1,00,000), Ward (up to 5,00,000) and Zone/Sub-city (up to 10,00,000).⁶². The amenities to be provided at each level of hierarchy are as under:

⁶² The lowest population thresholds are set slightly higher than those established in MPD 2021, considering that instead of just primary schools, integrated primary and secondary schools have been included in order to address Mumbai's higher densities and low land supply.

Note: *Assuming one 1.5 ha site per Ward with 5 L population; **Assumptions made: a) Half of the population is underserved b) In Mumbai, computation for total population is therefore double the 0.065 sqm pp arrived at through i) 4.58 sqm per toilet assuming a block of around 14 toilets for men and women. ii) 1 toilet seat serves 50 users at 0.09 sqm pp; iii) 0.4 sqm for additional uses

Table 18.7: Hierarchy of Urban Development

Level	Education	Health	Social	Open Space
Neighbourhood-upto 10,000	Primary School, Secondary School Special School	Dispensary	PSC, Market	Neighbourhood Park, Play Ground
Planning Sector 10,000+upto 1L	Degree Colleges,	Maternity Home, Nursing Home,	Market, Police Chowky, Cemetery	Community Park, Play Ground
Ward 1 L + Upto 5,00,000	Professional Colleges,	Hospitals	Police Station, Fire Station	Ward level Park, Playground
Zone/Sub-City upto 10,00,000	University Campus		Whole Sale Market	Metro Park

18.1.6 Per Capita benchmarks for Amenities

To synthesize all the above series of benchmarks for 2034, across the proposed population thresholds for Greater Mumbai, per capita space for each of the urban hierarchy levels for each amenity is proposed as under:

Table 18.8: Hierarchy of Urban Development, Amenities required, Amenity Planning Benchmarks

Level	Education	Health	Social	Open Space
Neighbourhood up to 10,000	Primary School,(0.4 sqm pp) Secondary School (0.5 sqm pp) 0.9 sqm pp	Dispensary 0.013 sqm pp	PSC (0.13 sqm pp)** , Local market (0.06) 0.19 sqm pp	Local Park, Neighbourhood Park, Play Ground 1.0 sqm pp
Planning Sector 10,000+upto 1L	Special School (0.02 sqm pp) 0.92 sqm pp	Maternity Home/Nursing Home (0.021 sq ppp), 0.034 sqm pp	Police Chowky (0.01 sqm pp) 0.2 sqm pp	
Ward 1 L + Up to 5,00,000	Degree College (0.08 sqm pp), Professional College (0.32 sqm pp),Voc Training Institute, (0.04 sqm pp) 1.36 sqm pp	Hospitals (0.351 sqm pp) 0.385 sqm pp	Police Station (0.01 sqm pp), Fire Station (0.05 sqm pp), Cemetery (0.03 sqm pp*) 0.29 sqm pp	Community Park, Playground (0.09 sqm pp) City-Level Park (0.01 sqm pp) 2.0 sqm pp
Sub-City 10,00,000	University Campus (0.01 sqm pp) 1. 37 sqm pp		Sub-city whole sale market (0.15 sqm pp) 0.44 sqm pp	

18.2 Estimating Land Demand for Amenities 2034

The Amenity Planning benchmarks established above have been used to estimate the total land requirement for amenities in Greater Mumbai, for a population of 13.95 million for 2034. Land demand is estimated for amenities including Health, Education, Social and Open Spaces. For provision of physical infrastructure, viz., water supply, sewerage, solid waste and utility infrastructure, including power supply, space benchmarks have not been established. The demand for these public utilities and facilities is given by different departments of the MCGM, like Fire Safety, Police, Sewerage, Water Supply, Solid Waste Management and other State government departments. Spatial provisioning is therefore based on specific departmental needs, included subsequently, in this chapter. In addition, amenities demand from stakeholders' workshop and ward consultation workshop are taken into consideration.

The population in SPA areas is also taken into consideration when estimating the amenities land demand for Greater Mumbai DP 2034. However, these areas are not under the MCGM jurisdiction. As a result, future amenities provisions for these areas are made within the Planning Area of the DP 2034.

Similarly, amenities demand for population in areas under Unclassified land use, like Navy Nagar, BARC, etc. has been taken into consideration for DP2034. These areas have restricted access and the existing amenities in these areas are accessible to the resident population only. Therefore, when estimating amenities land demand gap, the existing amenities in these areas have not been taken into consideration.

18.2.1 Amenities Land Demand based on Planning Benchmarks

The land demand for education amenities, medical amenities, social amenities and open spaces is estimated based on the proposed per capita benchmarks for DP 2034.

The process to calculate the total area required for these amenities is as shown below:

- a. Area demand for Educational Amenities = Projected Population 2034 * Per Capita Benchmark set for each educational amenity;
- b. Also, the number of schools to be provided is estimated from the population threshold shown in table 2.9. The planning standards suggest that 2 schools should be provided for every 10,000 population threshold. Hence,
- c. Total number of primary and secondary schools to be provided = Projected population * 2 / 10000;
- d. Area demand for Medical Amenities = Projected Population 2034 * Per Capita Benchmark set for each medical amenity;
- e. Open Space Land Area Demand = (Higher of Projected Population 2034 or Projected Employment 2034)* Per Capita Benchmark of open spaces set up for the city (ie. 2sqm pp);

- f. Social Amenity Area demand = Projected Population 2034 * Per Capita Benchmark;
- g. Area demand for Roads = Developed Area at Ward/Planning Sector level * % Benchmark at Ward/Planning sector level.

The table below shows the land demand for Education, Medical, Open Spaces and Social Amenities at Greater Mumbai level. These are further segregated into built and un-built amenities. Built amenities comprise of Education, Medical and Social Amenities, whereas the un-built amenities include Open Spaces and Cemeteries.

Table 18.9: Total Land Demand for Amenities at Greater Mumbai Level

Amenities	Population Threshold	Per Capita Benchmark (sqm pp)	Total Land Demand (ha)
Education		0.90	1,255.47
Primary & Secondary school	10,000	0.90	1,255.47
Health		0.385	537.06
Hospitals	5,00,000	0.351	489.63
Maternity Hospital	1,00,000	0.021	29.29
Dispensary/Health Post	10,000	0.013	18.13
Open Space		2.00	2,789.94
Social Amenities		0.90	125.55
Cemetery	5,00,000	0.03	41.85
Municipal Market/ Retail market	10,000	0.06	83.70
Greater Mumbai			4708.03

The table above reveals that amenity land demand for open spaces is the highest followed by Education, Medical, Social Amenities, in that order. Although the planning benchmarks propose a hierarchy of amenities for all population thresholds, some of these amenities are not taken into consideration for estimation of amenities land demand for DP 2034. These are listed below:

Note:

- a. Colleges at Ward level are not included in mandatory list of amenities to be provided by the MCGM. The land area demand for colleges for Greater Mumbai in 2034 is estimated to be 613 ha. One fourth of this, viz., 171 ha is already designated, leaving a land demand gap of 442 ha to be provided for the future. Colleges form 32% of education land demand and 11% of the total land demand for amenities. However, since provision of colleges is not a mandate of the MCGM, the land demand gap for colleges is not taken into consideration in the land demand for amenities.
- b. A widely accepted view by many experts suggests that mainstreaming special needs children into regular classroom rather than assigning them exclusively to special education classes would provide for the best possible learning environment and thus lead to inclusion of children with special needs into the mainstream. The DP 2014 -34, therefore, proposes integration of special schools within regular schools through DCR. These are included as

permissible uses in primary and secondary schools in the DCR. As a result, per capita area benchmark for special schools of 0.02sqm at Planning Sector level is not taken into consideration in the land demand for amenities.

- c. The DP 2034 proposes a per capita benchmark of 0.15 sqm for provision of whole sale markets in Greater Mumbai. The estimated land demand for whole sale market in 2034 is 209 ha. As per the APMC Act, wholesale activity is now relocated outside Greater Mumbai. However, a large number of trucks carrying essential goods traverse the city daily causing inconvenience for movement of vehicles. In order to prevent this, small multi-purpose markets ranging between 1 to 2 hectares are reserved near city entrance/exit gates.
- d. Universities in Greater Mumbai are well provided. The existing per capita area of 0.17sqm for University exceeds the DP 2034 benchmark of 0.01sqm. The provision for University is therefore considered only at the site of Aarey Milk Colony. Thus, harnessing the potential of land for public cause and promoting Greater Mumbai as a hub for higher education.

18.2.2 Stakeholder Demands

Stakeholder workshop and Ward level consultation played an important role in defining the local land demands. Greater Mumbai level priorities towards requirements for amenities and suggestions related to various policies were communicated to the MCGM through stakeholder workshops while specific requirements of every Ward were communicated through Ward consultation workshop. These have been additionally incorporated in the Planning Benchmarks established within the relevant population thresholds that correspond with Ward, Planning Sector and Neighbourhood levels. The stakeholder's workshop received additional space demand for social amenities. The workshops held on the themes of Education, Medical and Gender and Space recorded additional requirements for family planning centres, health posts, multi-purpose community welfare centres, aanganwadis and balwadis.

Most of these amenities require smaller area for operation and hence can be accommodated within larger facilities. As such, family planning centres may be attached to Maternity Homes for integrated healthcare provision. Similarly, health posts may be attached to Dispensary/Maternity Homes and space for aanganwadis and balwadis may be attached to Municipal Primary Schools. Alternatively, these may also be allocated on land derived from mandatory contributions towards public purpose (explained in section 18.6 below).

The stakeholders had specific requirements for geriatric day care centre, hostels for working women and students, livelihood resource centre, counselling centre for women and children and community hall. The DP 2034 has proposed multi-purpose community welfare centres, one per Ward that will accommodate these requirements based on priority and evolving needs of the population. Provision for cultural centres has also been included, based on stakeholder suggestions. These may include multiple facilities such as art galleries, auditoria, theatres, museums and archives. The facilities mentioned could be developed as singular uses or in combination with other uses.

In order to meet the requirements for community hall, library, reading rooms, study rooms, crèche and facilities for transgender and sex workers as and when required, one community centre per Planning Sector has been recommended in the planning benchmarks. Decentralized sorting centres

for solid waste have also been recommended in the Planning Benchmarks, at the Planning Sector Level.

In terms of translation of this additional space demand into proposed land use, one Rehabilitation Centre (under Medical Amenity) of approximately 2000 sqm may be provided at the Ward level. Under Social Amenities, one each of Multi-purpose Community Welfare Centre and Cultural Centre/ Drama Centre of area 2000 sqm and 5000 sqm respectively, may be provided at Ward level. One Night Shelter of area 1000sqm may be provided at Planning Sector level. In addition, one community centre of area 500 sqm may be provided at Planning Sector level; it is recommended to be derived from mandatory contribution of land for public purpose. The provision of these amenities in the Proposed Land Use are based on suggestions received from the Ward Level Workshops.

18.2.3 Zone wise Land Area Demand for Amenities

Zone wise amenity land demand is estimated based on planning benchmarks. The table below includes the summary of total land demand for Amenities:

Table 18.10: Summary of Land Demand Amenities at Greater Mumbai Level, Island city, Western Suburbs and Eastern Suburbs

Amenities	Greater Mumbai	Island City	Western Suburb	Eastern Suburb
Education	1,255.47	252.92	591.90	410.66
Health	537.06	108.19	253.20	175.67
Social-Amenities	125.55	25.29	59.19	41.07
Open Space	2,789.94	562.05	1,315.33	912.57
Total Land Demand	4,708.03	948.45	2,219.62	1,539.96

The table above reveals that the demand of land for amenities for Greater Mumbai is 4,708.03 ha. The amenity land demand in the Western Suburbs is the highest, followed by the Eastern Suburbs and the Island City. However, the vacant land available to accommodate these amenities is only half the requirement, at 2,318.42 ha. It is therefore essential to optimize the use of available land. As a result, proposals for amenities have been segregated into built up and un-built amenities. Un-built amenities include open space (including parks, play grounds, recreation ground etc.) and cemeteries while the built amenities, which can be provided through built up area, include schools, hospitals, social amenities, etc. The table below provides a summary of amenity land demand for built up and un-built amenities.

Table 18.11: Land Demand for Built-up and Un-built Amenities

	Greater Mumbai	Island City	Western Suburb	Eastern Suburb
Total Built Up Amenities*	1,876.24	377.98	844.56	613.70
Total Un-built Amenities**	2,831.79	570.48	1,335.06	926.26
Total Land Demand	4,708.03	948.45	2,219.61	1,539.96

Note: Area in Hectares

*Land intensive built up amenities include education, medical, social amenities, transport and public utilities and facilities.

**Unbuilt amenities include Open Spaces (including recreational open spaces and zoo) and Cemeteries.

The stakeholder and Ward level workshops conducted brought forth the need for prioritizing provision of Open Spaces in all Wards in Greater Mumbai. These have been thus prioritised for reservation of land for public purpose. Simultaneously, demand for city level utility infrastructure obtained from respective departments of the MCGM was also prioritized. The remaining vacant land is reserved for Ward level amenities like cemetery, hospitals, cultural centre, multi-purpose community welfare centre and wholesale market although it is a city level amenity.

The table below gives a detailed Ward wise land demand for built and un-built amenities:

Table 18.12: Ward wise Land Demand for Amenities

Wards	Total Land Demand for Amenities (ha)	Land Demand for Un-built Amenities (ha)	Land Demand for Built Up Amenities (ha)
A	53.14	31.96	21.18
B	33.99	20.44	13.54
C	48.28	29.04	19.24
D	115.20	69.29	45.91
E	115.69	69.58	46.10
FN	152.73	91.86	60.87
FS	121.35	72.99	48.36
GN	199.06	119.73	79.33
GS	109.03	65.58	43.45
HE	203.35	122.31	81.04
HW	89.74	53.97	35.76
KE	302.58	182.00	120.58
KW	292.69	176.05	116.64
PN	408.60	245.76	162.83
PS	181.04	108.89	72.15
RN	221.14	133.01	88.13
RC	204.13	122.78	81.35
RS	316.36	190.28	126.08
L	382.29	229.94	152.35
ME	360.89	217.07	143.82
MW	147.95	88.99	58.96
N	229.46	138.02	91.45
S	292.87	176.15	116.71
T	126.50	76.09	50.41
Greater Mumbai	4,708.03	2,831.79	1,876.24

Note: Area in Hectares

The table above reveals that Wards P/N, K/W, K/E, R/S, L, M/E, and S have the highest amenity land demand in comparison with other Wards in Greater Mumbai. This is in tandem with the high population growth rates in these Wards. It is now essential to evaluate the extent of vacant land available in each Ward for allocation of reservations with respect to the demand. The following section assesses the demand gap with respect to land available for public purpose in Greater Mumbai.

18.3. Assessing Land Demand Gap for Amenities

An assessment of total demand for amenity land at Island City and the Suburbs with respect to existing amenities available and vacant land available for making reservations for public purpose was conducted.

- Step 01: Estimating total amenity land demand;
- Step 02: Calculation of total amenity land presently available;
- Step 03: Estimation of Demand Gap 1: this includes presently unmet amenity land demand and those required upto 2034;
- Step 04: Assessing vacant land available for making reservations for 2034;
- Step 05: Assessing un-built amenities land demand;
- Step 06: Prioritize allocation of reservations for Open Spaces, Greater Mumbai level amenities and public utilities on available Vacant Land;
- Step 07: Assessing built amenities land demand;
- Step 08: Calculate total land available for allocation of reservations for built up amenities;
- Step 09: Allocating reservations for built up amenities;
- Step 10: Estimating unmet amenity land demand gap.

For this evaluation, the extent of available Vacant Land (ELU 2013) is considered. It comprises of DP 1991 reservations lying vacant and remaining vacant land. Of the remaining vacant land it is assumed that 50% would have been granted permissions for commencement of construction. Therefore, for all calculation purposes DP 1991 reservation lying vacant and 50% of the remaining vacant land have been considered.

Table 18.13: Amenities Land Demand Gap at Greater Mumbai Level

	Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
1. Total Demand	4,708.03	948.45	2,219.61	1,539.96
2. Total existing amenity land available*	2,272.63	827.89	936.21	508.53
3. Demand Gap 1	2,822.39	185.48	1,411.68	1,225.22
4. DP 91 Reservations Lying Vacant	1,590.50	123.06	1,062.13	405.31
5. 50% of Remaining VL	364.06	22.99	208.30	132.77
6. Total vacant land available for reservations DP 2034 **	1,954.56	146.05	1,270.43	538.08
7. Unbuilt Amenities Land Demand Gap	1,557.95	38.21	777.51	742.23
8. Balance vacant land available	396.61	107.85	492.92	-204.15

	Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
for Built Up Amenities (6-7)				
9. Built Amenities Land Demand Gap	1,264.44	147.28	634.17	482.99
10. Unmet Land Demand Gap for Built Amenities (8-9)	- 867.83	-39.43	-141.25	-687.14

*DP 1991 Designations and reservations implemented and amenities realised outside of DP1991 reservations as recorded in ELU 2012.

**DP 1991 Reservations lying vacant and 50 % of remaining vacant land.

The above assessment reveals:

- Vacant land available for reserving built up amenities is consistently lower than the land demand for Island City, Western Suburbs and Eastern Suburbs;
- The Eastern Suburbs has the largest demand gap for built amenities accounting to 687.14ha followed by Western Suburbs with 141.25ha and the Island City with 39.43ha;
- As a result, there is still a substantial demand gap for built up amenities in the Island City and the Suburbs.

As the next step, an assessment was conducted at Ward level, comparing the amenity land demand gap for built and un-built amenities with the extent of vacant land available (DP 1991 reservations lying vacant and 50% of the balance vacant land as per ELU 2012) for making reservations for public purpose. The table below shows Ward wise amenities land demand gap in comparison to the vacant land available for reservation of these amenities in the respective Wards.

Table 18.14: Ward wise Land Demand for Amenities

Wards	Projected Population 2034	Un-built Amenities Land Demand Gap	Built-up Amenities Land Demand Gap	Total Amenities Land Demand Gap	Available Vacant Land for Reservation*
A	157,448	0.47	5.86	6.34	2.40
B	100,701	18.09	9.54	27.63	3.37
C	143,051	16.90	15.32	32.22	0.94
D	341,336	-	21.60	21.60	4.62
E	342,773	24.08	17.12	41.21	4.51
F/N	452,534	35.53	28.21	63.74	58.84
F/S	359,550	37.69	23.43	61.13	42.25
G/N	589,799	76.22	61.90	138.12	3.88
G/S	323,045	-	27.60	27.60	25.25
Island City	2,810,235	208.99	210.58	419.58	146.05
H/E	602,511	61.82	66.27	128.09	13.60
H/W	265,884	7.97	12.49	20.46	14.50
K/E	896,539	110.70	76.58	187.28	78.52
K/W	867,217	35.16	59.45	94.61	78.09
P/S	536,413	49.80	51.15	100.95	233.44
P/N	1,210,660	147.44	136.39	283.84	463.71
R/S	937,364	113.10	100.92	214.02	128.19
R/C	604,821	36.11	58.75	94.86	153.62
R/N	655,223	102.17	72.92	175.09	106.76

Wards	Projected Population 2034	Un-built Amenities Land Demand Gap	Built-up Amenities Land Demand Gap	Total Amenities Land Demand Gap	Available Vacant Land for Reservation*
Western Suburbs	6,576,634	664.28	634.91	1299.19	1270.43
L	1,132,709	189.71	132.87	322.58	64.98
M/E	1,069,305	173.74	124.75	298.49	155.01
M/W	438,360	-	44.14	44.14	62.92
N	679,893	80.78	66.22	147.00	79.95
S	867,751	93.22	91.99	185.21	83.42
T	374,825	28.89	23.05	51.94	91.80
Eastern Suburbs	4,562,842	566.34	483.01	1049.35	538.08
Total Demand	13,949,712	1,439.61	1,328.50	2,768.12	1,954.56

Note: Area in Hectares

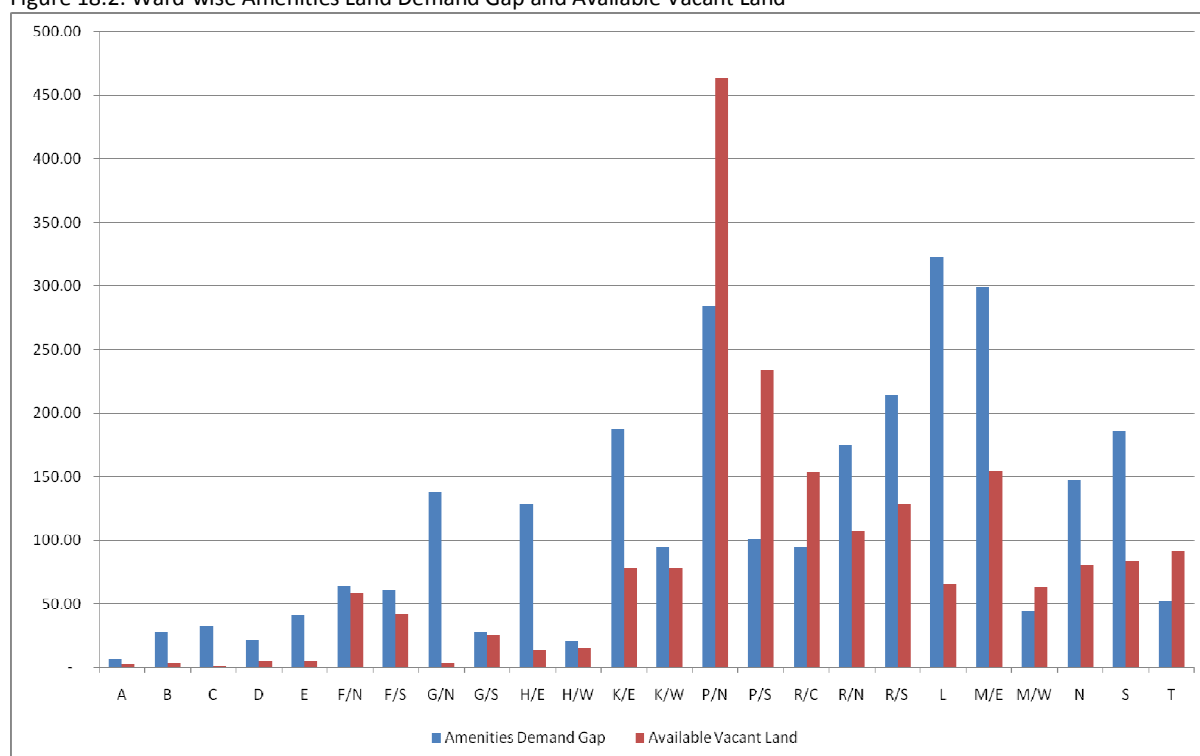
*DP 1991 Reservations lying vacant and 50 % of remaining vacant land.

The table above reveals that the un-built amenities land demand gap is highest at 13% in L Ward and 12% in M/E Ward in the Eastern Suburbs. In Western Suburbs it ranges between 7% and 10% in Wards such as K/E, R/N and R/S. In Island City Ward G/N has the highest 5% un-built amenities land demand gap. The lowest un-built amenities land demand gap is in the Island City ranging between 1% and 3%.

Similarly, built amenities demand gap is the highest at 10.27% in P/N Ward in the Western Suburbs followed by 10% in L Ward and 9% in M/E Ward in the Eastern Suburbs. The lowest built amenities demand gap is in the Island City ranging between 1% and 2%.

The available vacant land for reservation varies among the three zones with 61% of the vacant land located in the Western Suburbs, 28% in the Eastern Suburbs and about 7% available in the Island City. Within the zones also there is a huge variation in available vacant land with P/N Ward accounting to largest 24% followed by P/S Ward with 12%. Wards G/S, H/E and H/W have the lowest area of vacant land accounting to only 1%. The table above is represented into a graph as shown below:

Figure 18.2: Ward-wise Amenities Land Demand Gap and Available Vacant Land



The graph above reveals that in 19 of the 24 Wards, the demand for amenity land significantly exceeds the land available for reservation. This clearly suggests that the amenity space benchmarks are higher in comparison to the land available in Greater Mumbai for reserving public purpose amenities. Any normative increase in the amenity space benchmarks would not be pragmatic given the stringent land constraints in Greater Mumbai; which means that, even a per capita increase of 1 sqm in the planning benchmarks would mean an additional 14 sqkm of land area requirement.

Given the priority for open space provision in Greater Mumbai, most of the un-built amenity land demand is met with whereas approximately only 50% of the built amenity land demand can be addressed, given the scarce vacant land.

The DP 2034, therefore, considers it important to create adequacy of Built Up Area instead of adequacy of land area. The following section reassesses the space demand for amenities for Greater Mumbai through FSI provision for built up amenities.

18.4 Re-estimating Amenity Space Demand for 2034

Given the scarcity of land in Greater Mumbai and the unmet built amenity demand, the space demand for built amenities is re-estimated considering FSI. This is also taking into consideration that the DP 1991 assigned higher FSI for developing built amenities citing land constraints in Greater Mumbai. For example, the DP 1991 allocated thrice the permissible FSI to develop Hospitals, Schools and develop Colleges. The space demand for built-up amenities significantly reduces considering FSI, as shown in table below:

- Step 01: Estimating total amenity land demand;
- Step 02: Calculation of total amenity space presently available considering FSI 3.5 for built amenities. This gives the total BUA consumed by existing built-up amenities;
- Step 03: Estimation of Demand Gap 1: this includes presently unmet amenity space demand and those required upto 2034;
- Step 04: Assessing total land available for making reservations for 2034;
- Step 05: Prioritize allocation of reservations for Open Spaces, Greater Mumbai level amenities and public utilities on available Vacant Land;
- Step 06: Calculate total land available for allocation of reservations for built up amenities;
- Step 07: Allocating reservations for built up amenities and assuming that these will have to be developed at an FSI to meet the demand gap 1 (for meeting un-built amenities demand for 2034 an FSI of 1 is assumed for hospitals and FSI of 3.5 for schools);
- Step 08: Estimating unmet amenity space demand gap.

Table 18.15: Re-estimating Amenity Space Demand for Amenities

	Greater Mumbai	Island City	Western Suburbs	Eastern Suburbs
1. Total Demand	4,708.03	948.45	2,219.61	1,539.96
2. Total existing amenity land available* (Considering FSI 3.5 for built-up amenities)	3600.10	1338.32	1,456.21	805.56
3. All Amenities Land Demand Gap 1	1,858.07	38.21	891.68	928.18
4. DP 91 Reservations Lying Vacant	1,590.50	123.06	1,062.13	405.31
5. 50% of Remaining VL	364.06	22.99	208.3	132.77
6. Total vacant land available for reservations DP 2034 **	1,954.56	146.05	1,270.43	538.08
7. Un-built Amenities Land Demand Gap 1	1,557.95	38.21	777.51	742.23
8. Vacant land available for Built Up Amenities (6-7)	396.61	107.84	492.92	-204.15
9. Built Amenities Space Demand Gap 1	300.12	-363.15	114.17	185.95
10. Unmet Built Up Amenities Space Demand Gap	185.95	-	-	185.95

Note: Area in Hectares

*DP 1991 Designations and reservations implemented and amenities realised outside of DP1991 reservations as recorded in ELU 2012.

**DP 1991 Reservations lying vacant and 50 % of remaining vacant land.

The above table reveals that the built-up amenities space demand gap falls by 3 times with the allocation of FSI of 3.5 for existing built-up amenities. As such existing schools and hospitals are allocated FSI 3.5. Excluding Eastern Suburbs majority of the built-up amenities demand in the Island City and Western Suburbs is now accommodated within available vacant land through provision of FSI. However, there is variation at Ward level indicating an unmet demand gap for amenities. This is shown in the table below:

Table 18.16: Re-estimating Ward wise land area demand and provision considering FSI for built up amenities

Ward	Amenities Demand			DP 2034 Designation*		Demand Gap 1		DP 2034 Reservation**		Unmet Demand Gap	
	Un-built	Built	Total	Un-built	Built	#Un-built	Built	Un-built	Built	#Un-built	Built
A	32	21	53	145	112	0	(91)	6	0	(5)	(91)
B	20	14	34	4	12	18	1	1	1	17	-
C	29	19	48	17	14	17	5	0	0	17	5
D	69	46	115	111	79	-	(33)	29	3	(29)	(36)
E	70	46	116	56	183	24	(137)	3	3	21	(140)
F/N	92	61	153	61	107	36	(46)	44	13	(8)	(59)
F/S	73	48	121	44	140	38	(92)	8	3	30	(95)
G/N	120	79	199	48	50	76	29	12	17	64	12
G/S	66	43	109	135	43	-	1	23	6	(23)	(5)
H/E	122	81	203	60	46	62	35	13	8	49	27
H/W	54	36	90	49	74	8	(38)	17	2	(9)	(40)
K/E	182	121	303	72	139	111	(18)	102	29	9	(47)
K/W	176	117	293	148	181	35	(65)	77	35	(42)	(100)
P/N	246	163	409	99	83	147	80	218	88	(71)	(8)
P/S	109	72	181	61	66	50	6	656	313	(606)	(307)
R/C	123	81	204	88	62	36	20	110	72	(74)	(53)
R/N	133	88	221	31	44	102	44	64	48	39	(4)
R/S	190	126	316	77	77	113	49	55	59	59	(10)
L	230	152	382	43	61	190	91	67	37	123	54
M/E	217	144	361	46	65	174	79	138	38	36	41
M/W	89	59	148	99	50	-	9	60	32	(60)	(23)
N	138	91	229	57	84	81	8	78	19	2	(11)
S	176	117	293	83	81	93	36	191	52	(98)	(16)
T	76	50	127	51	87	29	(37)	273	36	(245)	(73)
GM	2,832	1,876	4,708	1,685	1,939	1,440	(63)	2,245	916	(806)	(979)

Note: Area in Hectares; GM is abbreviation for Greater Mumbai; All numbers have been rounded off to the closest decimal. Numbers in bracket indicate over provision of amenities.

*Built amenities designations are assumed to have developed at FSI 3.5, these include schools and hospitals;

**Built amenities reservations of schools and hospitals are presumed to develop at FSI 3.5 and 1 respectively in future.

#Unbuilt amenities incorporate Open Spaces and Cemeteries. In general it is observed that provision of Cemeteries in Greater Mumbai is adequate when compared to DP 2034 planning benchmark of 0.03 sqm pp. When estimating demand gap 01 for unbuilt amenities, only the underprovided amenities are considered. For example, in Ward B, the total demand for inbuilt amenities is 20.44 ha. Of this the demand for open space is 20.14 ha and Cemeteries is 0.30 ha. While the designated Open Space accounts for 2.05 ha, existing Cemeteries account for 1.81 ha. The provision of Cemeteries exceeds

the demand by 1.5 ha. Therefore, the land demand gap for unbuilt amenities is primarily for Open Spaces where there is a shortfall of 18.09 ha.

The table above reveals that majority Wards in Greater Mumbai have met with the land demand for un-built amenities. Few Wards have an unmet land demand gap for built amenities even with allocation of FSI. This includes, Wards C and G/N in the Island City; Ward H/E in the Western Suburbs and Wards L, M/E in the Eastern Suburbs. It is now clear the vacant land presently available in Greater Mumbai is inadequate to meet this demand. The DP 2034 therefore has considered alternative strategies for increasing supply of land for public purposes. The DP 2034 proposes creating a pool of public land in each Ward/ Planning Sector through the process of urban renewal and mandatory contribution of land for public purpose for development/ redevelopment on large parcels.

Having estimated the demand gap for provision of amenities for 2034, assessed the available land for public purpose and devised strategies for its optimal use, policy instruments for making land available for public purpose were elaborated. These include reservation of land for public purpose, which utilizes land acquisition, transferable development rights and accommodation reservation as compensatory tools. Further, reservation⁶³ of land for amenities has been translated into the Proposed Land Use Map through a set of criteria that aim to provide amenities based on local demand and priority. The following sections cover details pertaining to policy instruments for making land available for public purpose and the methodology followed in their allocation in the Proposed Land Use Plan 2034.

18.5 DP 2034 Proposals for Obtaining Land for Public Purpose

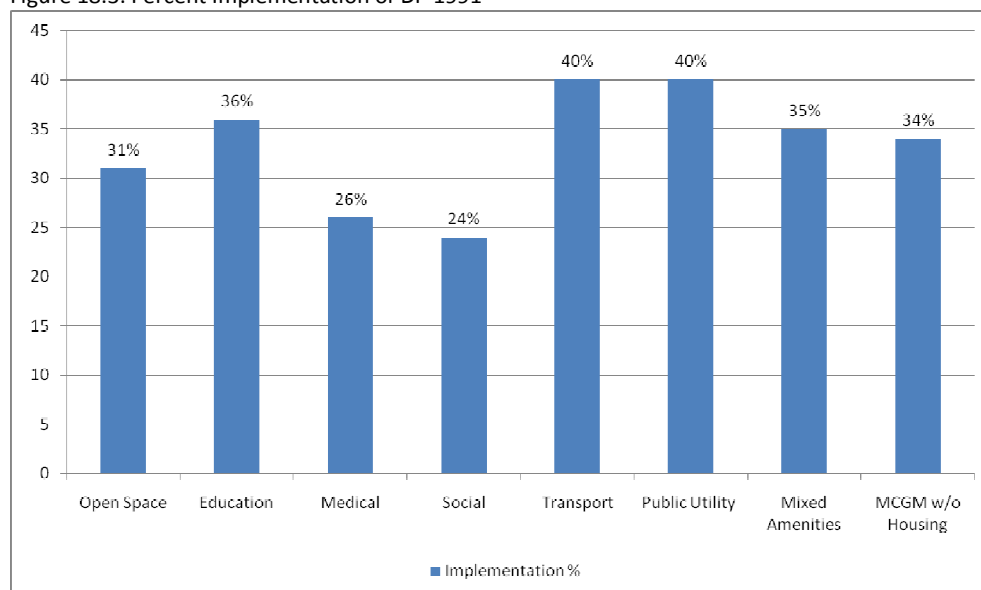
Considering the successes and drawbacks of the earlier policies, as explained in Chapter 11, Part I, of this report, the DP 2034 has proposed improvements to existing policies. Before elaborating upon proposals for DP 2034, it is important to recapitulate briefly, the challenges faced in the implementation of DP 1991.

18.5.1 DP 1991-Assessment of implementation status of designated/reserved lands

The only mechanism of land reserved for public purpose designated land provided in the MR&TP Act, 1966 was by way of compulsory land acquisition. This tool allowed for acquiring the land compulsorily for plots demarcated with the 'reservations' for various amenities. The land owners were not satisfied with their land being compulsorily acquired for public purpose for a compensation that would be less than the market rates. Also, due to indecisive status of the property, encroachments were common. The procedures followed to acquire the land were cumbersome and time consuming as well. An assessment of the extent of implementation of DP 1991 reveals that less than 40% of amenities reserved have been realized in the plan period, which is very low.

⁶³ The tool applied to make the acquisition was 'reservations' which was introduced in 1964 as per the MRTP Act.

Figure 18.3: Percent Implementation of DP 1991



Source: MCGM

Recognising the limitations of this approach the DP & DCR 1991 adopted an alternative strategy mainly involving TDR⁶⁴ & Accommodation Reservation.

18.5.1 Accommodation Reservation, 1991

The Development Control Regulations, 1991 gave the policy for development of various buildable reservations which were allowed to be developed with the Accommodation Reservation policy by handing over certain percentage of built up area to MCGM and then allowing the owner to develop the remaining land as per the Zonal regulations. Accommodation reservation is used to make the provision for the amenity and on plots where the resultant FSI cannot be consumed on the same plot, the development rights will be transferred, hence the TDR instrument will be used to make the policy viable. DP 2034 adopts this policy instruments for making land available for public purpose.

18.5.2 Right to Fair Compensation & Transparency for Land Acquisition, Resettlement & Rehabilitation Act, 2013 (RFCTLARR 2013)

In 2013, the Land Acquisition Act was replaced by Right to Fair Compensation & Transparency for Land Acquisition, Rehabilitation and Settlement Act in 2013. As per the RFCTLARR, 2013, the land to be acquired for public purpose would need the State Government to compensate the land owner and rehabilitate & resettle all Project Affected Persons (PAPs). Under this new legislation, the land owner would receive a compensation that is twice the Ready Reckoner rate in urban areas, hence favouring the land owner. The policy favours the land owners and affected families in urban areas. However, since the land prices in Greater Mumbai are exorbitant, it means that the cost of acquiring land is so high that it is financially unviable for the government to purchase it for providing public amenities.

18.5.3 Transfer of Development Rights

Transferable Development Rights (TDR) is a form of Floor Space Index (FSI) which entitles a land owner to construct additional built up area on his/ her plot. This entitlement is over and above the

⁶⁴ MR&TP Act, 1966 was amended in 1994 with retrospective effect from 25th March 1991 to provide legal basis for TDR as a substitute for monetary compensation.

permissible base FSI of the plot. TDR has to be generated from an 'Originating Plot' before it can be claimed as additional FSI for use on a 'Receiving' plot. The 'Originating' parcels are those identified in the DP as plots reserved for public purpose specified as Recreation Ground, Playground, School, Market, Road etc.

In the context of Mumbai, the TDR has been used as a fiscal tool more than a planning tool. The purpose of this Regulation was to enable the realization of the land reserved for public purpose through a compensatory mechanism of area based development rights instead of direct monetary payment as a form of acquisition. Regardless, Transfer of Development Rights (TDR) has been the most successful tool in procuring amenities at no extra cost to MCGM.

Various types of TDR are:

1. Roads
2. Heritage
3. Slums
4. Reservation

DP 2034 employs the use of TDR as a tool for making land available for public purpose. Accompanied by careful monitoring, this will be an effective policy instrument.

18.5.3 Town Planning Schemes, 1915

The Town Planning Scheme is followed as an alternative method to land acquisition and helps to assemble land for planned urban development activities in a participatory and financially affordable manner. TPS is conceptualized as a Joint Venture (JV) between local authority and the owners of land who voluntarily pool their land or sometimes the authority takes the land, plans it and redistributes the reconstituted plots of land and share the development cost among the owners. When land is pooled under TPS it usually provides for roads and other public purposes like garden, school, playground etc and when the scheme is finalized, the land so carved out for public purpose is vested in the local authority and the remaining land redistributed to the owners respectively. Though TPS has been used extensively in Maharashtra between 1915 and 1985, subsequently, it has not been applied in the State.

Various tools have been used in the past to make land available for public purpose, however, with limited success in achieving the targets of the DPs. Further, with rapidly changing needs of the city during the plan period, the nature of reservations envisaged and prescribed in DP 1991 seldom have remained relevant. Therefore, DP 2034 envisages new policy instruments.

18.6. Creating a Pool of Land for Public Purpose

As seen above previous Development Plans reserved land for specific public purposes as provided for in the MR&TP Act. Land under such 'reservations' was expected to be compulsorily acquired. During the Implementation of DP 1967 problems of acquisition, in terms of scale of compensation and rehabilitation of affected persons were experienced. In DP 1991 therefore Transfer of Development Rights (TDR) and Accommodation Reservations (AR) were introduced as tools to help implement these reservations. TDR helped in obtaining vacant land for open uses. AR helped in getting built space for designated use. However, reservations on encumbered (by developments

whether authorized or unauthorized) land could not be obtained. AR did, to some extent, succeed in getting built space for public purposes specified in the DP. However, in many cases, the use may have lost its relevance and built space remained either unused or used for purpose other than the specified use.

Thus, the methods of obtaining land for public purposes used so far are at the most relevant where land is currently vacant. However, the extent of vacant land is rather limited. Most development in Mumbai is going to occur through redevelopment. Land for public purposes can therefore be obtained through the process of redevelopment. However, in such a case instead of prescribing specific use, the contributions could be for building a pool of land for public purpose. Use of such land could be decided when such land becomes available considering the community needs and priorities at that time. Incremental supply of land for public purpose will also ensure its realization at appropriate locations.

The apprehension about such an approach would be of getting small fragmented pieces of land that would not be of much use. This could be overcome by rationalizing FSI that facilitates redevelopment without compromising the setback requirements. This would incentivize amalgamation and assembly of land in larger parcels. In that case the contribution of land for public purpose would also be of a reasonable size that could be meaningfully used.

This Land Pool would not be tied to any particular reservation demarcated on the Plan. This land pool can then be made available for amenities through a participatory Second tier planning process for prioritized needs of each Planning Sector/Ward.

The proposed mechanism is as follows:

18.6.1 Mandatory contribution of Land for Public Purpose

Formulating development regulations and planning tools that allow mandatory contribution of land for public purpose from parcels is a strategy that has been proposed to garner lands for public amenities.

- The DP 2034 has allocated development rights (FSI), as a means to devise realistic regulations and support market mechanism to function;
- A number of parcels in Greater Mumbai are smaller than the size required for consuming higher development rights (FSI). Demand for consumption of higher FSIs therefore necessitates amalgamation of plots;
- While permitting consumption of higher FSIs, development control regulations mandates a contribution of 10-20% (based on parcel size) of land from amalgamated parcels, for public purpose. Smaller amenities such as PSCs, anganwadis, health posts, which require smaller parcels of land, could be developed through such contributed land. As such the DP does not make reservations for such smaller amenities, except in areas around slums, so that the creation of such facilities does not have to depend on the rate of redevelopment in those areas;
- The DP 2034 further stipulates how these should be located and planned so that they would actively serve the neighbourhood.

18.6.2 Regulation for Mandatory Contribution of Land for Public Purpose

The GDCR proposes lands made available from such pool to be assigned for uses such as Recreation Open Spaces, Markets, Welfare centres, Police Chowkies, Libraries, Municipal Chowkies, Dispensaries, Fire Stations and various other uses. Assigning uses to the land so procured shall take into account the local demand. Priorities shall be assigned through a participatory process involving elected representatives, NGOs, Resident's Welfare Association etc., and weighing trade-offs between multiple demands for amenity provision. The following table indicates percentage of land to be handed over to the MCGM for public purposes.

Table 18.17: Contribution of Land for public purpose

Sr. No.	Requirement of Amenity Land to be handed over to the M.C.G.M.	Percentage of Amenity Area
1.	Amenity Area for plots with area more than 2,000 sqm	10.00%
2.	Changing Industrial user of plot to Residential and/or Commercial	15.00 %
3.	Development in Cotton Textile Mills	20.00%

Having made assessments of the effectiveness of policy instruments for making land available for public purpose, the next step involved the definition of designation and reservations applicable to Greater Mumbai for 2034.

18.7. Introducing a Flexible Classification System for Designations and Reservations

Several challenges were faced in the effective implementation of the 'Reservation' policy. Often, land acquisition of reserved lands was not possible. Further, if acquired, often, these were not put to use. Finally, if amenity reservations were acquired, the use specified was complex and cumbersome, making allocation and management tedious.

Recognising the need for reviewing the planning standards and the policy of reserving land for public purposes in D.P., Govt. in U.D.D. appointed a Committee in 2001 under the chairmanship of Shri D.M. Sukhatankar for this purpose. Acknowledging the issue of cumbersome categories for 'Reservation' of land for public purpose, the Committee in its Report addressed the question of purposes for which reservations may be made.

18.7.1 Recommendations of the Sukhatankar Committee Report on Planning Standards

The purposes for which reservations may be made include educational institutions at various levels, medical & public health institutions, markets, social welfare & cultural institutions, theatres and places for public entertainment or public assembly, museums, art galleries & govt. & other public buildings, open spaces, play grounds, zoological gardens, stadia, sanctuaries, dairies, infrastructure requirement land as water supply, drainage etc. This is a very long list & the words 'such as' indicate that the land can be reserved for any other purpose too, provided it can qualify for being called a 'public purpose'.

The MR&TP Act, 1966 does not lay down any guidelines about which the reservations must be included and which may be treated as discretionary, and leaves the whole matter to the good judgment of the planner. However, the Mumbai Municipal Act makes clear distinction between the 'obligatory' & 'discretionary' duties of Municipal Authority. The obligatory duties in so far as they

relate to the provisions of the land therefore generally include primary education, sewerage, drainage & solid waste disposal, construction and maintenance of public streets, fire protection, public hospitals, places for disposal of dead, public markets, slaughter houses and cattle pounds. Further, provisions of MMC Act also do not provide much guidelines to the planner about minimum reservation categories which must be included in DP e.g. provisions of Gardens, PG, etc. are included in discretionary duties but D.P. without any provisions of these purposes would definitely be branded as highly unsatisfactory. List of reservations which can be developed by Planning Authority and allowed to be developed by owner is listed in Table No. IV of D.C. Regulation No. 9 of DCR 1991 which is attached in Annexure.

During the course of time after sanction of DP 1991, it was revealed that certain reservations were proposed in the Development plan but the development mechanism was not incorporated in DCR, i.e. the reservation name was not in the list of Reservations – ‘how to develop’, referred to as Table 09. Hence it became necessary to obtain clarification from UDD, for development mechanism of every such reservation not listed in Table 09.

If the list of reservations is referred, it can be seen that some of the reservations were name & location specific. Further combined names of reservations were also proposed in 1991 D.P. without specific guidelines about proportion of each use. MRM + M, Library + Dispensary, Library + Dispensary + Welfare Centre etc. Hence every time, it was necessary to obtain clarification from U.D. regarding permissible % and development policy.

The Sukhatankar Committee report therefore has proposed that new categorization of public purposes needs to be made, which can be ‘core functions’ which must be attended to and provided for by every municipality in its DP & peripheral functions which may be included if finances permit.

The Director of Town Planning vide Circular dated 3rd April 2012 has clarified that reservations for Planning Authorities or Public Agencies alone be made in the Development Plan.

18.7.2 Simplification and Flexibility for Reservation Policy

Development plans in 1967 & 1991 had included very detailed and specific designations. For example open spaces had 25 different designations and educational institutions had over 40 designations.

In a twenty-year perspective it is not possible to estimate and ascertain the requirement in such details. Moreover, designations in such details if incorporated in Development Plan, brings in rigidity in use. Any change that may be required over the years requires a long legal procedure to bring about a change. It is therefore necessary to develop a simplified and flexible policy for reservations/designations.

1991 DP contained a long list of the location/ name based narrowly defined reservations. A small change or inclusion of additional user therefore required modification under section 37 of MR&TP Act, 1966 or a clarification under section 62(3) of MR&TP Act had to be sought from Government.

For example, the reservations of Park, Garden, Play Ground, and Recreation Ground are all open space reservations. 15 % built-up area is permitted only in case of Recreation Grounds. For a 20 years DP such fine distinction in the beginning is not necessary. Once the open space is secured, its use could best be decided through a participatory approach by the local community.

It is therefore necessary to rationalize categories of reservations, define permissible uses with a degree of flexibility. Such categorisations proposed for DP 2034 is shown in Annexure with corresponding reservations/ designations in DP 1991.

In the changed context of the DP 2034 the more refined strategy has been developed.

18.7.3 Simplification of Reservation and Designation categories

The DP 2034 makes several departures from the existing regime of making reservations and increasing supply of land for public purposes. The first change incorporates simplification of reservation categories. The DP 1991 had more than 380 categories of reservations, which have been rationalized to 10 basic categories, further broken down to 30 sub-categories. The new categories considered allow mix of amenity uses, therefore bringing flexibility of use of amenities to suit changing demands over time at local area levels. Similarly, designation categories have also been simplified to 11 basic categories and 39 sub-categories, ensuring flexibility in use of these amenities when they redevelop. Unnecessary reservations are hence avoided and this reduces the burden on making land available for each category. Table below represents the proposed categories for reservations and designations.

Table 18.18: Proposed list of reservations

Broad Category		Intermediate Category		Detailed Category	
RE	Education	RE1	School	RE1.1	Primary & Secondary School
		RE2	Higher Educational Institution	RE2.1	University
RH	Health	RH1	Primary Healthcare Facility	RH1.1	Maternity Hospital
				RH1.2	Dispensary/Health Post
		RH2	Tertiary Healthcare Facility	RH2.1	Hospitals
		RH3	Other medical Facility	RH3.1	Rehabilitation Center
ROS	Open Spaces	ROS1	Public Open Space	ROS1.1	Public Open Spaces
		ROS2	Recreational Facility	ROS2.1	Municipal Sports Complex
				ROS2.2	Zoo
				ROS2.3	Sports Complex
RSA	Social Amenities	RSA1	Markets	RSA1.1	Municipal Market
				RSA1.2	Municipal Wholesale Market
		RSA2	Welfare Facilities	RSA2.1	Multi Purpose Community Welfare Centre
				RSA2.2	Night Shelter
		RSA3	Cultural	RSA3.1	Museum
				RSA3.2	Cultural Centre/Drama Theatre
		RSA4	Cemetery	RSA4.1	Cemetery
		RSA5	Exhibition Centre	RSA5.1	Exhibition Centre
RPU	Public Utility and Facilities	RPU1	Fire Brigade Services	RPU1.1	Fire Station
		RPU2	Fuel Station	RPU2.1	Fuel Station
		RPU3	Law & Order	RPU3.1	Police Station
				RPU3.2	Police Chowky
				RPU3.3	Court
				RPU3.4	Police Facilities
				RPU3.5	Correction Facilities
		RPU4	Power	RPU4.1	Electricity Transmission & Distribution Facility
RR	Housing	RR1	Staff Quartres	RR1.1	Police Staff Quarters
				RR1.2	Municipal Staff Quarters
				RR1.3	Government Staff Quarters
		RR2	Rehabilitation & Resettlement	RR2.1	Rehabilitation & Resettlement
RMS	Municipal Services	RMS1	Municipal Ward level Services	RMS1.1	Road Depot
				RMS1.2	Municipal Chowky
				RMS1.3	Municipal Store
				RMS1.4	Municipal Workshop
		RMS2	Municipal City level Services	RMS2.1	Transport Garage
				RMS2.2	Municipal Central Store
		RMS3	Solid Waste	RMS3.1	Refuse Shed
				RMS3.2	Refuse Transfer Stations
				RMS3.3	Solid Waste Disposal
				RMS3.4	Solid Waste Sorting Center
		RMS4	Sewerage	RMS4.1	Sewage Treatment Plant
				RMS4.2	Aerated Lagoon
				RMS4.3	Sewage Pumping Station
		RMS5	Water	RMS5.1	Reservoir
				RMS5.2	Water Pumping Station

Broad Category		Intermediate Category		Detailed Category	
RT	Transport			RMS5.3	Water Treatment Plant
				RMS5.4	Hydraulic Engineering Store/Office
		RMS6	Storm Water Drainage	RMS6.1	Storm Water Pumping Station
		RT1	Road Transport	RT1.1	Truck Terminus
				RT1.2	State Transport Depot
				RT1.3	BEST Bus Depot
				RT1.4	BEST Bus Station
				RT1.5	Parking Lot
		RT2	Water Transport	RT2.1	Water Transport Terminal
				RT2.2	Jetty
		RT3	Railway	RT3.1	Metro/Mono Rail Crashed
RO	Offices	RO1	Municipal	RO1.1	Municipal Office
		R02	Government	RO2.1	Government Office
RP	Primary Activities	RP1	Fishing	RP1.1	Fish & Net Drying Yard
				RP1.2	Fish Cold Storage/Godown/Fishing Related Industries

Table 18.19: Proposed list of designations

Broad Category		Intermediate Category		Detailed Category	
DE	Education	DE1	School	DE1.1	Municipal School
				DE1.2	Primary & Secondary School
				DE1.3	Special School
		DE2	Higher Educational Institution	DE2.1	Colleges
				DE2.2	University/IIT
		DE3	Other Education	DE3.1	Other Education
DH	Health	DH1	Municipal Heath Center	DH1.1	Municipal Dispensary/Health Post
				DH1.2	Municipal Hospitals
				DH1.3	Municipal Maternity/Post Partum Center
		DH2	Government Health Center	DH2.1	Government Hospital
		DH3	Institutional Health Care	DH3.1	Charitable Dispensary
				DH3.2	Private Hospitals
				DH3.3	Rehabilitation Center
				DH3.4	Veterinary Hospital
				DH3.5	Other Medical Facility
DOS	Open Spaces	DOS1	Public Open Spaces	DOS1.1	Tanks/Ponds
				DOS1.2	Promenades
				DOS1.3	Beach
				DOS1.4	Play Ground/Garden/Park
		DOS2	Public Recreational Facilities	DOS2.1	Clubs / Gymkhana
				DOS2.2	Swimming Pool
				DOS2.3	Zoo
				DOS2.4	Municipal Sports Complex
				DOS2.5	Sports Complex
				DOS2.6	Recreation Ground
DSA	Social	DSA1	Markets	DSA1.1	Municipal Retail Market

Broad Category		Intermediate Category		Detailed Category	
	Amenities			DSA1.2	Retail Market
				DSA1.3	Wholesale Market
		DSA2	Welfare Facilities	DSA2.1	Beggars Home
				DSA2.2	Children Home
				DSA2.3	Orphanage
				DSA2.4	Old Age Home
				DSA2.5	Welfare Center
				DSA2.6	Women Hostel
				DSA2.7	Student Hostel
				DSA2.8	Library
				DSA2.9	Night Shelter
		DSA3	Cultural Facilities	DSA3.1	Auditorium
				DSA3.2	Cinema Theater
				DSA3.3	Drama Theater
				DSA3.4	Art Gallery
				DSA3.5	Museum
				DSA3.6	Open Air Theater
				DSA3.7	Aquarium
				DSA3.8	Public Hall
				DSA3.9	Planetarium
		DSA4	Cemetery	DSA4.1	Hindu Traditional/Electric Cemetery
				DSA4.2	Muslim Cemetery
				DSA4.3	Christian Cemetery
				DSA4.4	Buddhist Cemetery
				DSA4.5	Composite Cemetery
				DSA4.6	Jewish Cemetery
				DSA4.7	Tower of Silence
				DSA4.8	Cemetery Others
		DSA5	Other Social Amenity	DSA5.1	Other Social Amenity
				DSA5.2	Abattoir
DPU	Public Utility and Facilities	DPU1	Fire Brigade Services	DPU1.1	Fire Station/Command Center
		DPU2	Fuel Station	DPU2.1	Fuel Station
		DPU3	Law & Order	DPU3.1	Police Station
				DPU3.2	Police Chowky
				DPU3.3	Correction Facilities
				DPU3.4	Police Facilities
				DPU3.5	Court
		DPU4	Communication	DPU4.1	Post & Telegraph
				DPU4.2	Telephone Exchange
				DPU4.3	Radio Transmission
				DPU4.4	Television Station
				DPU4.5	Wireless Station
		DPU5	Power	DPU5.1	Electric Power Plant

Broad Category		Intermediate Category		Detailed Category	
				DPU5.2	Electricity Transmission & Distribution Facility
		DPU6	Other Public Utilities	DPU6.1	Other Public Utilities
DR	Housing	DR1	Staff Quartres	DR1.1	Municipal Staff Quartres
				DR1.2	Police Staff Quartres
				DR1.3	Government Staff Quartres
				DR1.4	BEST Staff Quartres
		DR2	Rehabilitation & Resettlement	DR2.1	Rehabilitation & Resettlement
DMS	Municipal Services	DMS1	Municipal Ward level Services	DMS1.1	Road Depot
				DMS1.2	Municipal Chowky
				DMS1.3	Municipal Store
		DMS2	Municipal City level Services	DMS2.1	Transport Garage
				DMS2.2	Municipal Central Store
				DMS2.3	Asphalt Plant
				DMS2.4	Municipal Laboratory
				DMS2.5	Municipal Workshop
		DMS3	Solid Waste	DMS3.1	Refuse Shed
				DMS3.2	Refuse Transfer Station
				DMS3.3	Solid Waste Disposal Centre
				DMS3.4	Solid Waste Sorting Centre
		DMS4	Sewerage	DMS4.1	Sewage Treatment Plant
				DMS4.2	Aerated Lagoon
				DMS4.3	Sewage Pumping Station
		DMS5	Water	DMS5.1	Reservoir
				DMS5.2	Water Pumping Station
				DMS5.3	Water Treatment Plant
				DMS5.4	Water Trunk Main/Acqueduct
				DMS5.5	Hydraulic Engineering Store & Office
		DMS6	Storm Water Drainage	DMS6.1	Storm Water Pumping Station
DT	Transport	DT1	Road Transport	DT1.1	Truck Terminus
				DT1.2	State Transport Depot
				DT1.3	Regional Transport Office
				DT1.4	BEST Bus Depot
				DT1.5	BEST Bus Station
				DT1.6	Parking Lot
		DT2	Water Transport	DT2.1	Water Transport Terminal
				DT2.2	Jetty
		DT3	Air Transport	DT3.1	Airport /Heliport
		DT4	Railway	DT4.1	Railway Station
				DT4.2	Railway Terminus
				DT4.3	Railway Yards
				DT4.4	Metro/Mono Rail Carshed
DO	Offices	DO1	Municipal	DO1.1	Municipal Octroi Naka

Broad Category		Intermediate Category		Detailed Category	
				DO1.2	Municipal Printing Press
				DO1.3	Municipal Office
		DO2	Government	DO2.1	Government Office
		DO3	Other Public Offices	DO3.1	Other Public Offices
DP	Primary Activities	DP1	Fishing	DP1.1	Fish & Net Drying Yard
				DP1.2	Fish Cold Storage/Godown/Fishing Related Industries
		DP2	Dobhi Ghat	DP2.1	Dobhi Ghat
		DP3	Cattle Pound	DP3.1	Cattle Pound
		DP4	Dairy	DP4.1	Dairy
DAM	Amenity Plot	DAM	Amenity Plot	DAM	Amenity Plot

18.8 Parameters for Reserving Land for Public Purpose

This section explains the criteria established for assigning reservation of land for public purpose in the Proposed Land Use Map 2034.

Locational and distance-based access criteria for amenity reservations

Besides proposing per capita land-based benchmarks to guide provisioning of amenities, certain location-based principles have also been adopted to ensure even distribution of amenities, which are easily accessible within short commuting distances. Parameters for allocating amenity reservations are devised for all the amenities at each population threshold. Amenity location for reservation is assessed based on criteria such as physical access radius, size of land parcel, priority areas and, preferred and non-preferred locations. Broadly, large city-scale amenities are located along major public transit & road nodes, whereas, smaller neighbourhood scale amenities are located within communities to ensure safe, pedestrian access within quick walking distances.

The criteria to locate each amenity is based on the minimum land area required for the amenity to serve the population as per the threshold hierarchy; accessibility to closest transit nodes to allow for efficient mobility and its proximity to other land uses that are complimentary to the amenity to be provided.

Radar Graph Assessments

Amenity provision is prioritised based on radar assessments at City, Ward and Planning Sector levels. The demand gap for amenities against planning benchmarks is assessed through the radar graphs. It serves as a tool that highlights current levels of demand against the DP 2034 benchmark for amenities provision.

Adjustment of Provision of Reservation across City/Ward/Planning Sector

If a Planning Sector A1 is deficient in vacant land for open spaces, then adequate open space is reserved in adjoining Planning Sector A2 to compensate for that demand in Planning Sector A1.

Access to Transit and Mobility

Amenities are provided based on their proximity to the closest railway station, bus stop and main roads. For example, large city level open space to be provided has been located close to major railway station/roads to make it accessible to all.

Adjacency to complimentary uses

Amenities are located by taking into account other complimentary land uses around it. For example, while allotting a local park, in a neighbourhood, its proximity to a school or public community facilities has been considered. It gives users the added advantage of using the park and school together.

Prioritising amenity provision for slum areas: To ensure equitable distribution of amenities in the city, all the areas which lack basic amenities have been given priority. Slum areas currently lack basic amenities. Hence, they have been prioritised for provision of certain basic amenities.

Table 18.20 presents the locational principles, which have been established to guide the distribution of amenity reservations on PLU 2034.

Table 18.20: Parameters for Open Space Amenities Reservation

Criteria	Sub-City Level	Ward Level	Planning Sector Level	Neighborhood Level
Amenity	City Level Park	Ward Level Park +PG	Community Park/PG	Local Park
Land Area	Above 8ha	1-8ha	0.60 upto 1ha	below 0.60ha
Physical Access Radius	To be accessible by major public transport	3-4km	1-3km	Up to 1km
Location Criteria	Near Nature Areas	Along arterial roads	Along collector roads	Along local access roads
Preferable Location	Near major centres of activity	Near tertiary level education & medical amenities	Near schools/special schools	Near schools/special schools
	City level waste disposal sites under closure or already closed	Along major water courses	Within residential neighbourhoods	Within residential neighbourhoods
	Hills	Surrounding natural water bodies	Adjacent to public community facilities	Adjacent to local activity centres
	Along major water courses	Near large residential areas/ CBDs		
	Surrounding public utilities such as lagoons, water reservoirs, etc.	Adjacent to existing open spaces in order to allow for expansion		
		Adjacent to cultural facilities		

Table 18.21: Parameters for Education Amenities Reservation

Criteria	Ward Level	Planning Sector Level	Neighbourhood Level
Amenity	College	Special School	Primary & Secondary School
Land Area	Above 0.50ha	0.20ha	0.40-0.50ha
Physical Access Radius	5-10km	1.5-3km	1-2km
Location Criteria	Along or in proximity to arterial roads	Along arterial/local access roads	Along local access
Preferable Location	In proximity to railway stations/ metro-mono stations	In proximity to bus depots/ bus stations	At walking distance within residential neighbourhood
	Near/ adjacent to professional colleges	Within residential neighbourhoods	Within residential neighbourhoods
	Adjacent to open spaces	Adjacent to open spaces	Adjacent to open spaces
	In proximity to slum areas	Within slum areas adjacent to existing school	Within slum areas and adjacent to existing schools to allow for extension
	In proximity to large residential/ commercial areas	Adjacent to planning sector level cultural facilities	Adjacent to neighbourhood level community facilities
	Adjacent to sports facilities		
	Adjacent to cultural facilities		

Table 18.22: Parameters for Medical Amenities Reservation

Criteria	Ward Level	Ward Level	Planning Sector Level	Neighborhood Level
Amenity	Rehabilitation Centre	Hospital	Maternity Home	Dispensary
Land Area	Above 0.20ha	Above 0.50ha	Above 0.10ha	Above 0.01ha
Physical Access Radius	1km	3-5km	1-3km	0.5-1km
Location Criteria	Adjoining or in proximity to nature areas	Along or in proximity to major arterial roads	Along collector roads	Along feeder roads
Preferable Location	In proximity to medical amenities	In proximity to railway stations/ metro-mono stations/bus depots	Accessible by IPT	At walking distance within residential neighbourhood
		Adjacent to public open spaces	Adjacent to public open spaces	-
		In proximity to slum areas	Within slum areas	Within slum areas
		In proximity to industrial areas	Along collector roads	Along local access roads
		Adjacent to police station		

Table 18.23: Parameters for Social Amenities Reservation

Criteria	Sub-City Level	Ward Level	Ward Level	Planning Sector Level
Amenity	Wholesale Market	Cultural Centre	Multipurpose Community Welfare Centre	Community Centre
Land Area	1-2ha	Above 0.50ha	Above 0.20ha	0.05-0.1ha
Physical Access Radius	Along major road	3-5km	3-5km	1-3km
Location Criteria	Express highways	In proximity to public transit	Station areas	Along local access/ pedestrian street
Preferable Location	National highways	Arterial roads	Arterial roads	Adjacent to existing/ proposed open space
	Industrial areas	Mixed-use neighbourhoods	Mixed-use neighbourhoods	Mixed-use neighbourhoods
	City entrance gates	Adjoining/in proximity to open space	Adjoining/in proximity to open space	Adjoining/in proximity to open space
		Near tourist attraction	Adjoining college	Adjoining schools
		Defunct industrial areas with a potential to become public spaces	Adjoining medical amenity	

18.8.1 Method for allocating reservations

The following method has been adopted in making reservations for amenities.

Step 1: Mapping designations

The first step towards reserving amenities on the map, involved designating existing amenities. The existing amenities include all previous designations from DP 1991, review of amenities that came through reservations of the DP 1991, and amenities that have actualized on the lands that were not reserved in the DP 1991. These designations have been reclassified as per the new designation categories, and segregated as per the various population thresholds.

This process enabled the assessment of current levels of amenity provision.

Step 2: Assessing demand gap

As seen in *Chapter 4. Space demand for public purpose in 2014-34*, specific benchmarks have been proposed for each amenity, at various hierarchical thresholds and departmental space needs have also been recorded, so as to get the total space demand for amenities during 2014-2034. Accounting for the reserved designated amenity space, the future demand gap for amenity land is calculated.

For example, for Primary and Secondary Schools;

The Demand Gap = (Space Demand for schools in 2034) – (Space designated for schools)

Step 3: Assessing unimplemented reservations of DP 1991

In order to meet the demand gap, firstly, the unrealized reservations of the DP 1991 have been assessed to ascertain if the reservation is lying vacant, or if it is encumbered. In the case of encumbered reservations, the status of land acquisition has been a key factor in deciding whether to continue the reservation or not. For example, if the encumbered land has already been acquired by MCGM, then it would be reserved for rehabilitation and resettlement housing. If it has not been acquired by the MCGM and is encumbered then the reservation has been cancelled. (Refer Figure below) Some of the DP 1991 reservations were made on cessed buildings and slums. The Government has directed reservations on cessed buildings to be deleted. In case of slums, the current slum rehabilitation policy causes densification of already dense slum pockets by confining the redevelopment to less than half of the original plot.

Figure 18.4: Process of Reserving land on PLU, DP 2034



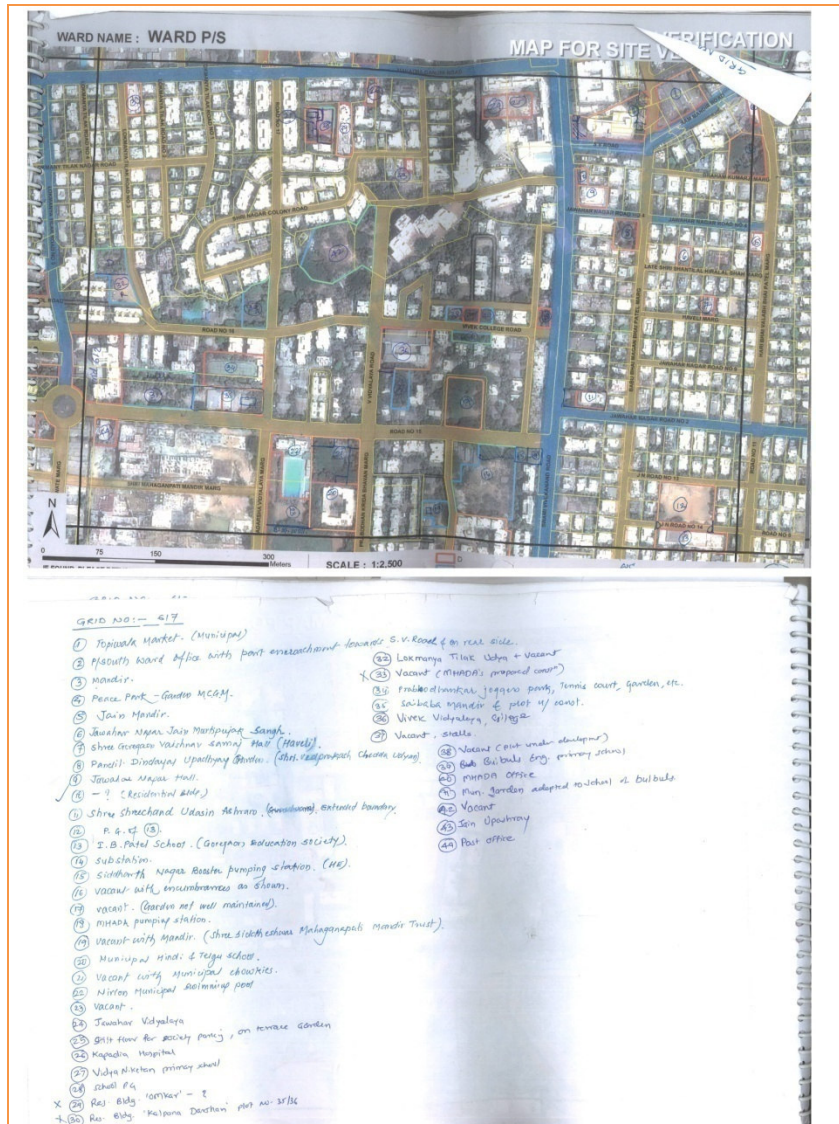
Generally, encumbered reservations on private land and slums have been deleted, considering the low implementability of such cases in the past.

In case of reservations lying vacant, the type of reservation has been reconsidered, based on an assessment of the relative demand for various amenities in the given context. Generally, DP 1991 open space reservations currently lying vacant have been continued as open space reservations in DP 2034.

The MCGM conducted detailed parcel wise field verification to ascertain the availability of the land parcel for reservation for public purpose. In this course it was learnt that a substantial number of

parcels were under construction. Therefore, only 50% of the total Vacant Land available has been considered as available for making reservations for public purpose.

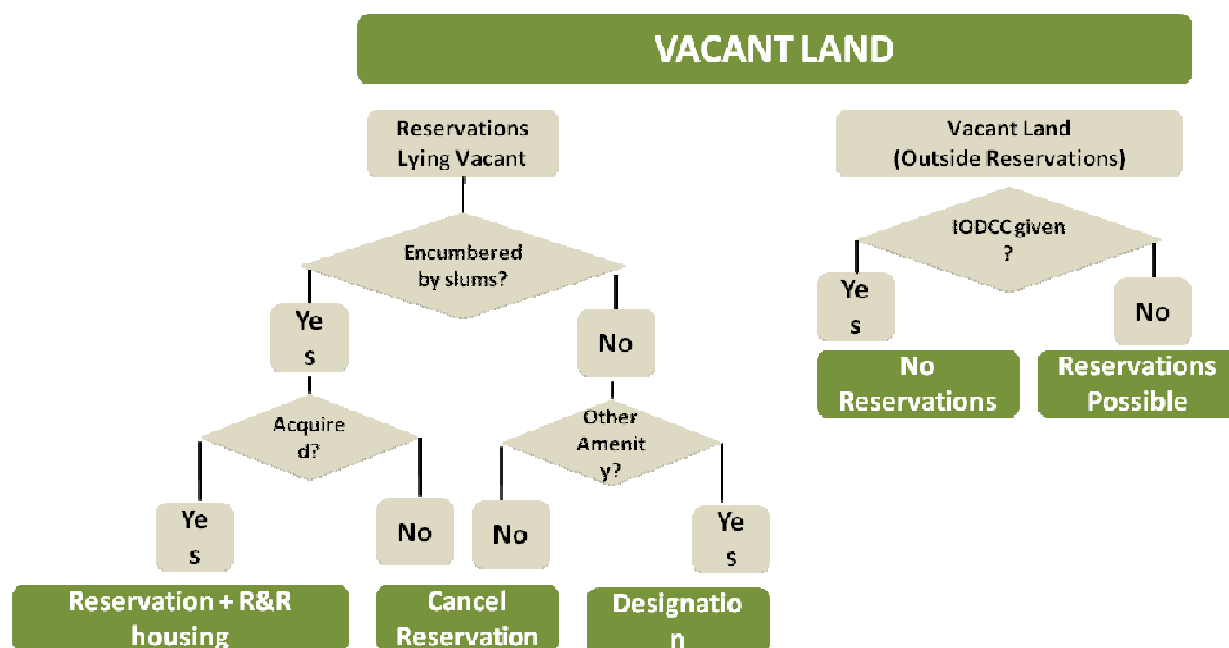
Figure 18.5: Process of Site Verification for PLU 2034 Reservations and Designations



Step 4: New reservations on vacant land

Through a ground level review of vacant land in the city, an assessment has been made of the available vacant land for new reservations. New reservations have then been proposed based on the priorities for the particular area, recommended parcel sizes and configurations, and the locational criteria discussed earlier. For ensuring the availability of vacant land the following process of assessment was adopted which took cognizance of IOD/CC permissions granted:

Figure 18.6: Process of Reservation on Vacant Land, PLU 2034



Step 5: Prioritizing Amenities Provision

Given Greater Mumbai's densities, and limited available vacant land, it became clear that the amenity benchmarks for all the uses could not be simultaneously achieved. Therefore, the allocation of reservations has been based on the following priorities:

- 1) In order to ensure provision of all scales of amenities, the larger sub-city & ward level amenities were first reserved, such that larger parcels would remain available for larger functions. The planning sector and neighbourhood scale amenities were then allocated on the remaining smaller plots of appropriate sizes.
- 2) In order to provide equitable access to amenities, preference has been first given to areas with severe lack of amenities, in terms of provision in numbers and accessibility. As such, wards that have a high projected population, high percentage of slum and a high demand gap are given priority. Using this logic, the identified high priority wards are P/N, L, R/S, S, N, KE, R/N, and M/E. The medium priority wards are P/S, M/W, H/E, G/N, R/C, T, K/W, F/N, and the low priority wards are H/W, F/S, G/S, E,B,D,A,C.
- 3) Using the radar assessment, the priorities for different types of amenities have been decided. The amenities with lowest levels of provision are, generally, accorded higher priorities, unless the context of that place suggests otherwise.
- 4) Open spaces, amongst other amenities, have severe shortage, and have been accorded highest priority at all levels of disaggregation.

- 5) Pure land based amenities, such as open spaces and some critical public utilities have also been given priority.
- 6) Prioritization is also greatly based on the feedback and demand garnered through the various stakeholders', ward level, as well as sectoral workshops.

This process enabled the preparation of the proposed Land Use Map, DP 2034, shown in the following section, for health, education, open spaces and social amenities.

18.9 Radar Graph Assessment for Designation and Reservations assigned in DP 2034

Radar graphs generated for measuring the proposed distribution of amenities at Greater Mumbai, Island City, Eastern and Western Suburbs are presented here.

Greater Mumbai

At Greater Mumbai level, the radar graph reveals that provision of Open Space is prioritised in DP 2034. As a result, the per capita Open Space allocation at Greater Mumbai level has increased three times, through reservations. Provision of social amenities is significantly lower than DP 2034 benchmark. Provision of road area is marginally lower than the DP 2034 benchmark. Per capita provision of education and medical amenities is also significantly lower than the DP 2034 benchmark (Refer Fig. 18.5).

Island City

The radar graph for Island City reveals that provision of designated medical amenities exceeds the DP 2034 planning benchmark; this is due to presence of large scale city level medical infrastructure. Open Space provision exceeds the DP 2034 benchmark. Provision of roads is marginally higher than the DP 2034 benchmark. Education amenities provision is significantly lower than the benchmark. Per capita availability of Social amenities is marginally lower than the benchmark (Refer Fig. 18.5).

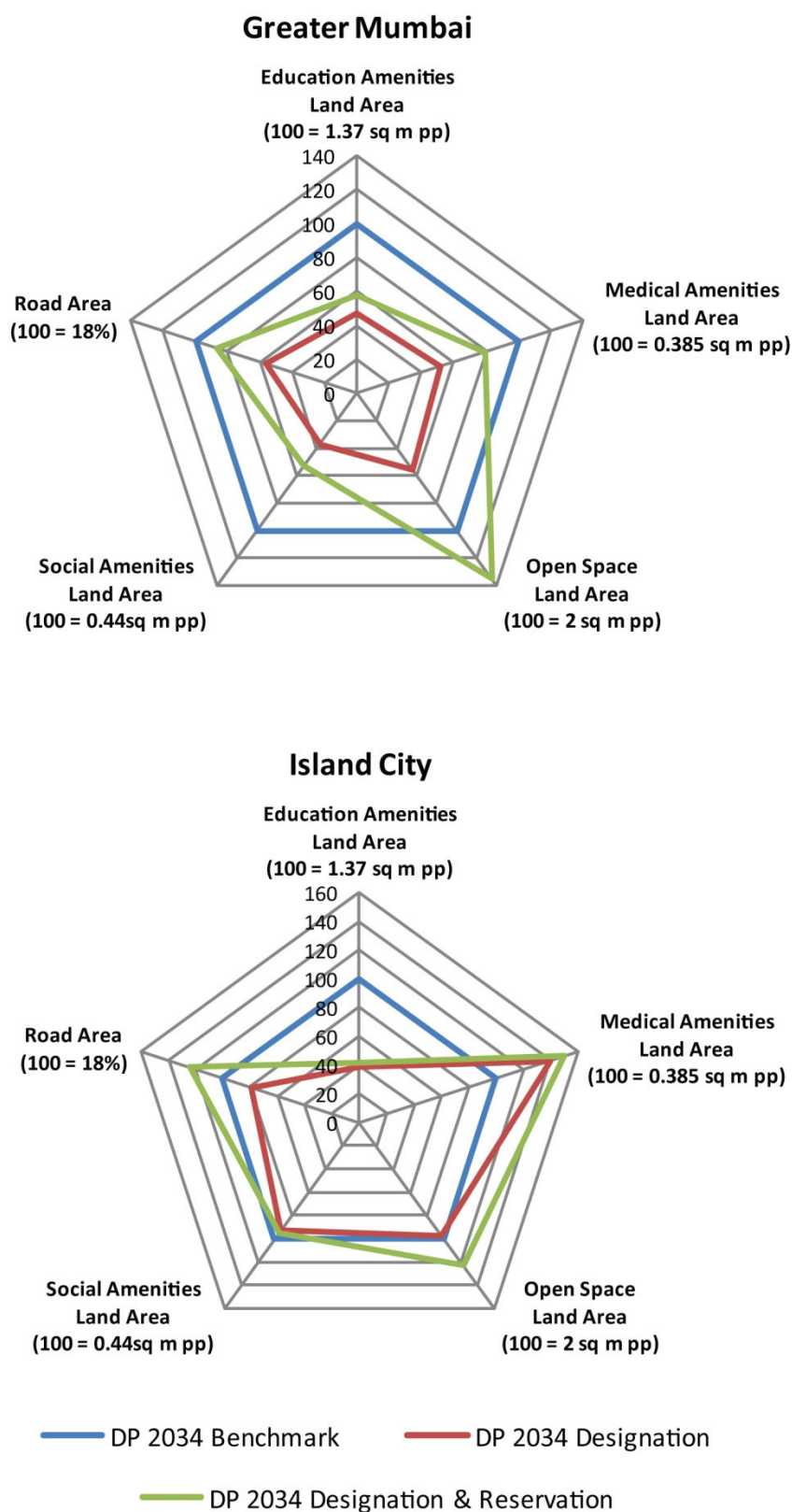
Western Suburbs

The radar graph for Western Suburbs reveals that provision of Open space exceed the DP 2034 benchmark. Per capita availability of open spaces has almost increased three times the current availability. Provision of Social amenities is significantly lower than the benchmark. Road area provision is lower than DP 2034 benchmark. Per capita availability of Education and Medical amenities is also significantly lower than the DP 2034 benchmark (Refer Fig. 18.6).

Eastern Suburbs

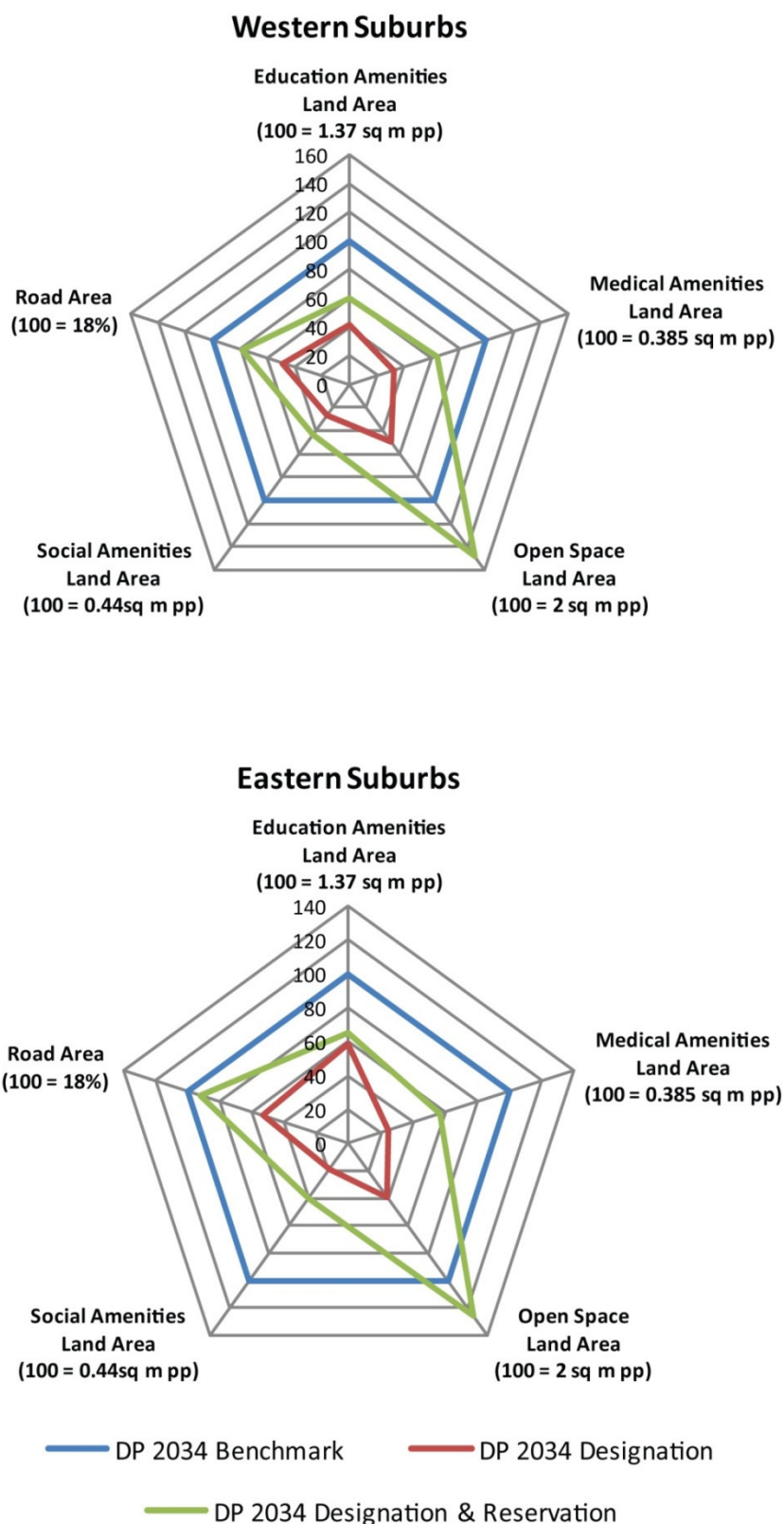
The radar graph for Eastern Suburbs reveals that provision of Open Space exceeds the DP 2034 benchmark. Per capita availability of Social amenities is significantly lower than the benchmark. The provision of road area is marginally lower than the DP 2034 benchmark. However, per capita availability of Education and Medical amenities is significantly lower than the DP 2034 benchmark (Refer Fig. 18.6).

Figure 18.7: Radar Graph for Proposed per capita Amenity Land Area for Greater Mumbai and Island City for 2034



Note: Per capita Social amenities include Sub-city market (0.15sqm), Cemetery (0.03sqm), Police Station (0.01sqm), Fire Station (0.05sqm), Police Chowkey (0.01sqm), local market (0.06sqm), and PSC (0.13sqm).

Figure 18.8: Radar Graph for Proposed per capita Amenity Land Area for Western Suburbs and Eastern Suburbs for 2034



Note: Per capita Social amenities include Sub-city market (0.15sqm), Cemetery (0.03sqm), Police Station (0.01sqm), Fire Station (0.05sqm), Police Chowkey (0.01sqm), local market (0.06sqm), and PSC (0.13sqm).

The above assessment reveals that there is a significant shortfall in provision of built amenities which primarily includes education and medical amenities due to scarcity of vacant land. Provision of un-built amenities, particularly open spaces, has been prioritised.

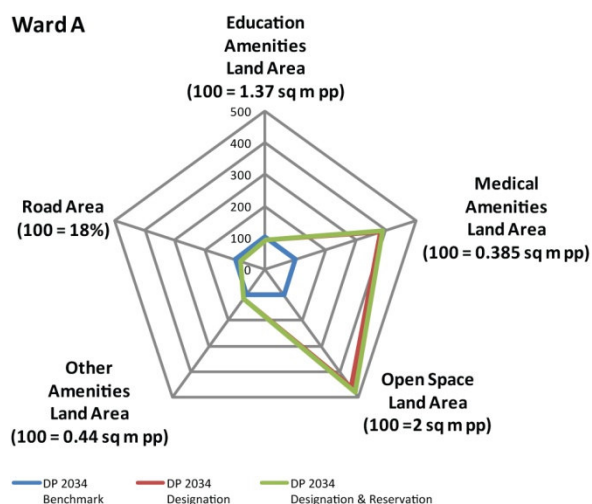
Notes:

- The benchmarks for educational and medical facilities are also expressed in terms of land. However, as they require built up area, with flexible FSI it would be possible to meet the built-up area requirement. Although some augmentation may be possible from the pool of land for public purpose, the deficit of land area may persist;
- The number of amenities included under 'social amenities' individually require small area. It has not been possible to indicate reservations for all of them. However, their requirements can be satisfied by allocation from the pool of land for public purposes;
- Similarly specific reservations for PSC have also not been possible. Instead a provision has been made in the GDCR making it mandatory for all public buildings to provide for PSC.
- In few wards provisions seem to be exceeding the benchmarks. However, in most such cases they serve adjoining wards as well.

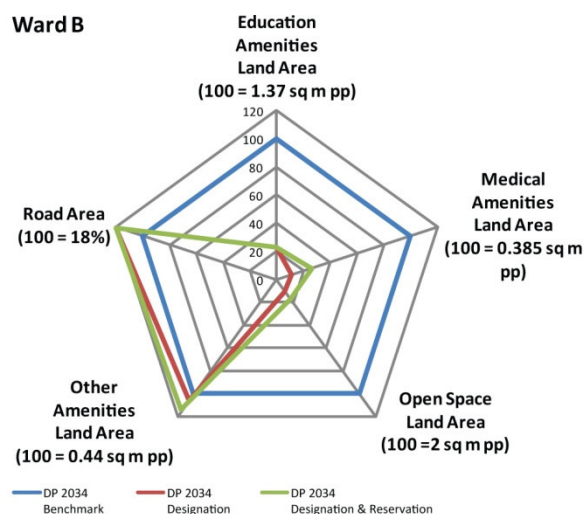
Ward performance with respect to availability of amenities varies across the three zones. A radar graph assessment of the proposed amenities against the existing provision for all 24 Wards is given below:

Figure 18.9 Radar Graphs for Proposed Reservations& Designations at Ward Level

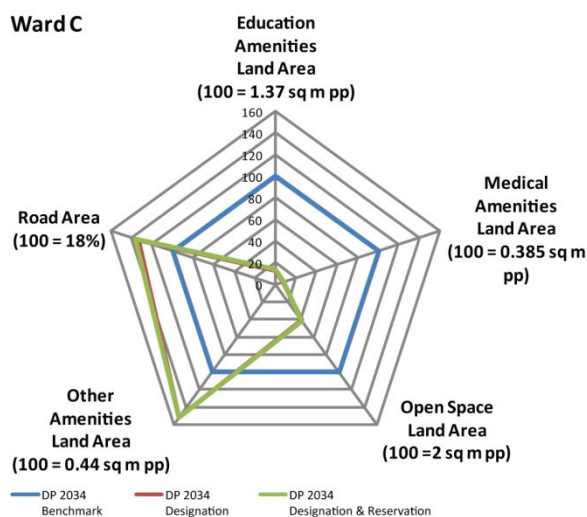
Ward A



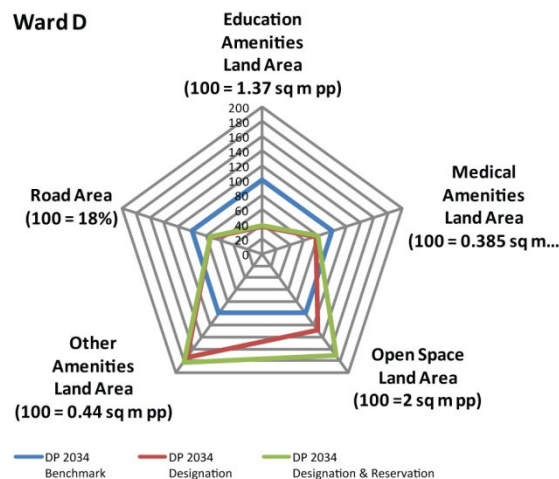
Ward B



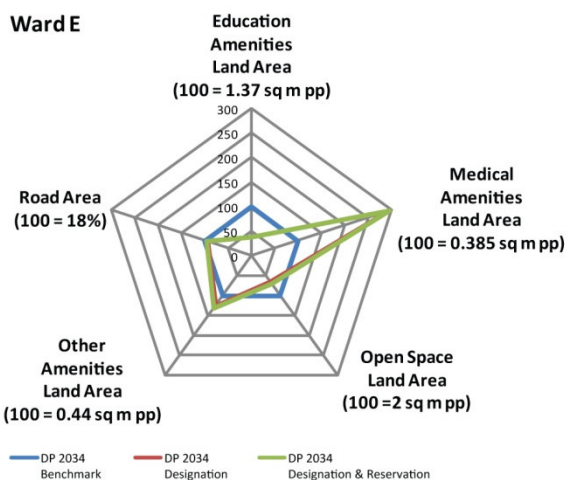
Ward C



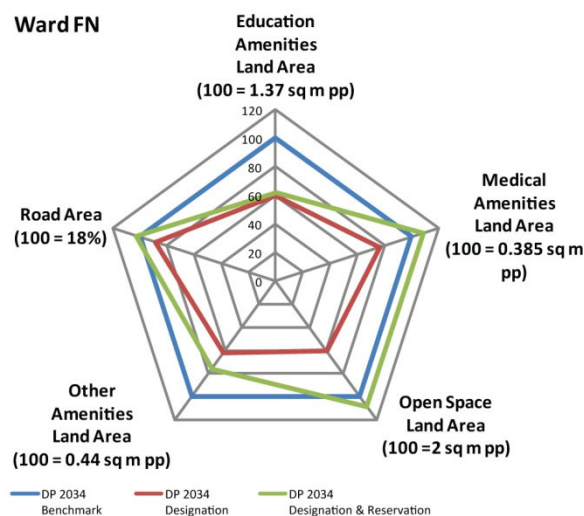
Ward D



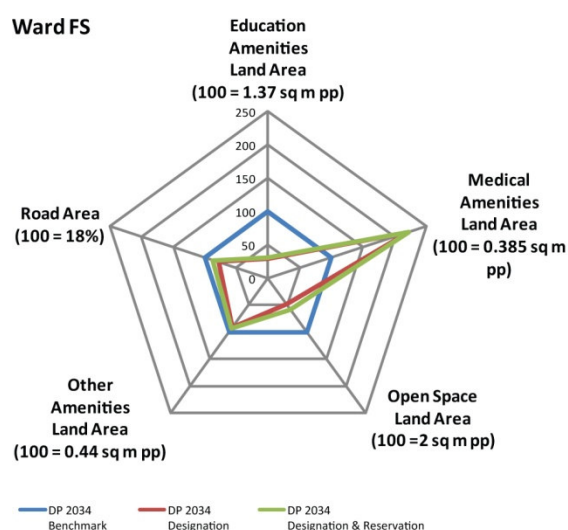
Ward E



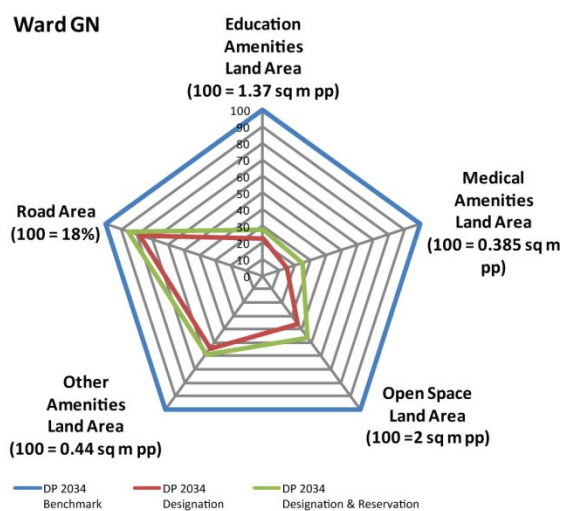
Ward FN



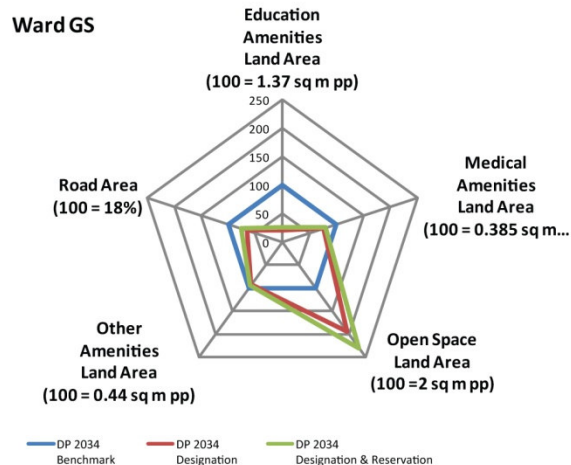
Ward FS



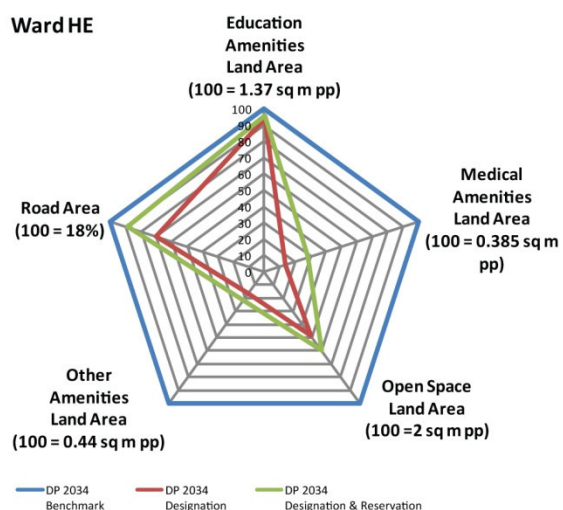
Ward GN



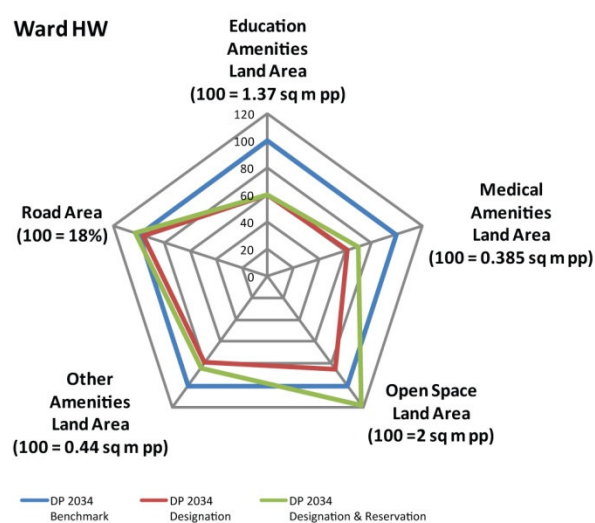
Ward GS



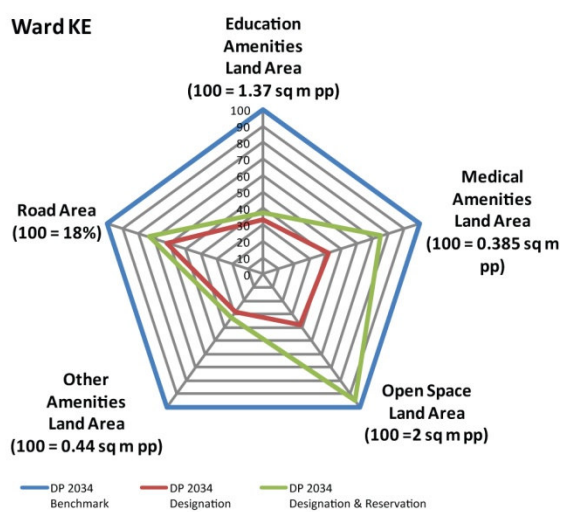
Ward HE



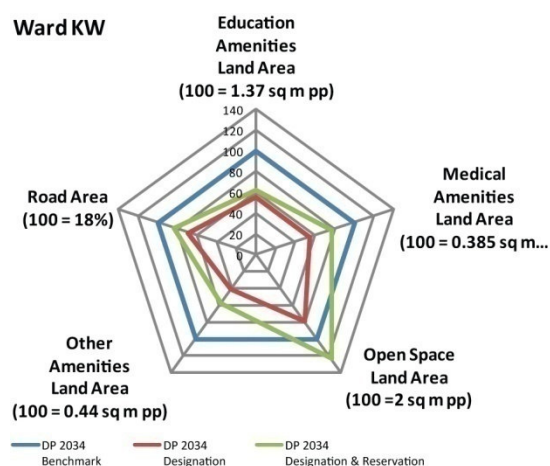
Ward HW



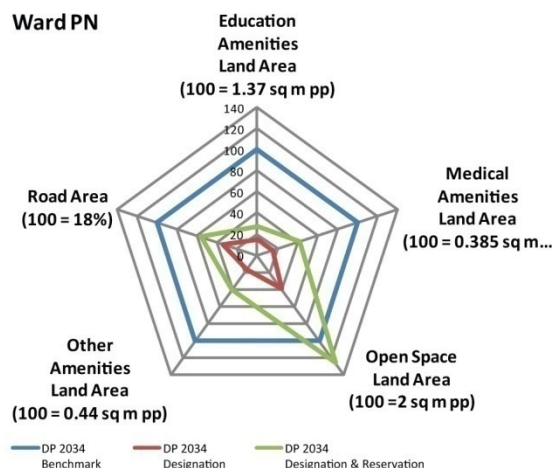
Ward KE



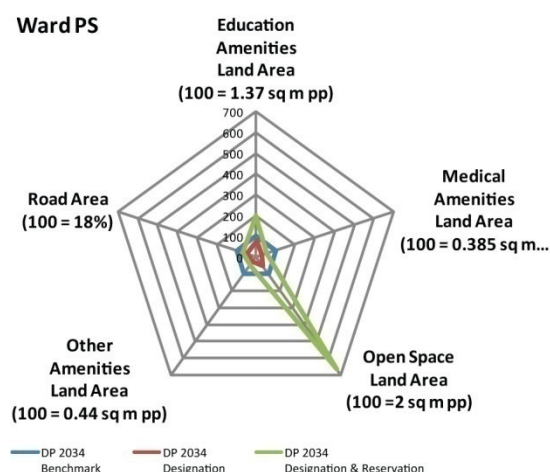
Ward KW



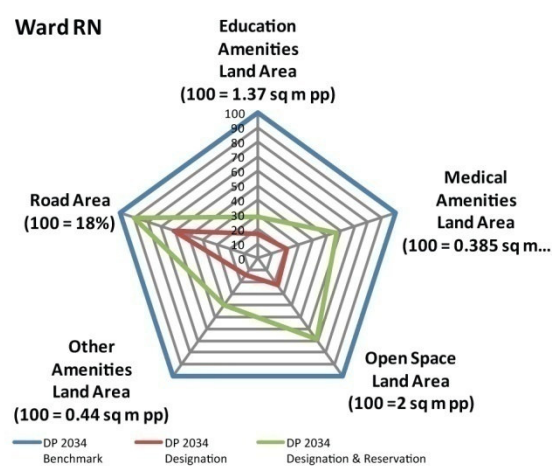
Ward PN



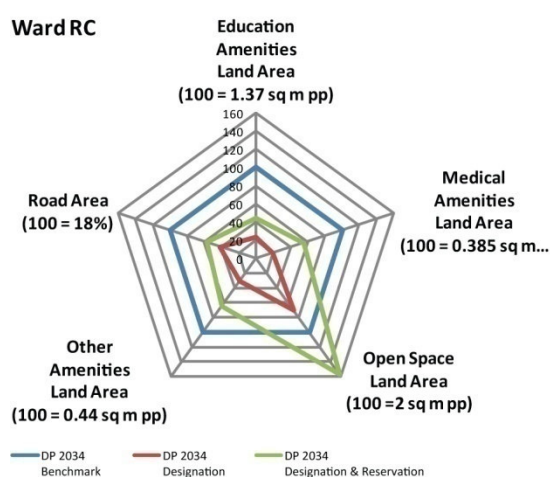
Ward PS



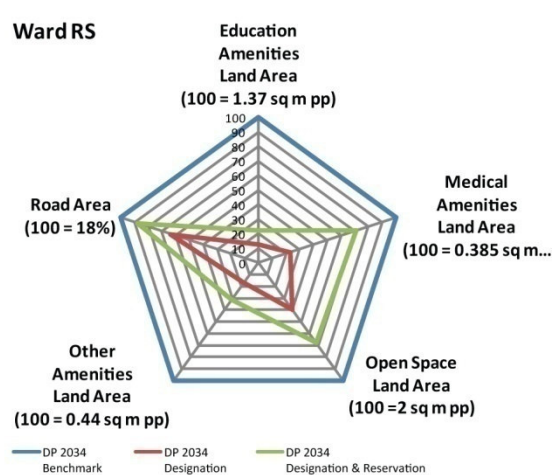
Ward RN



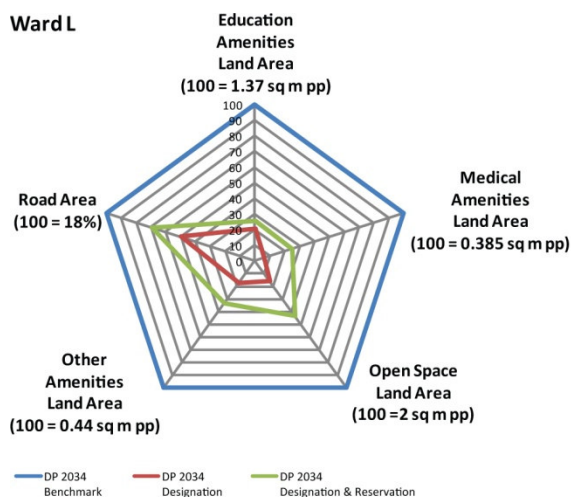
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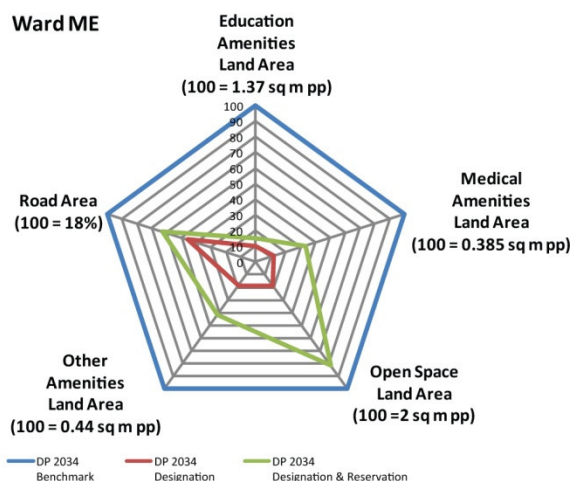
Ward RS



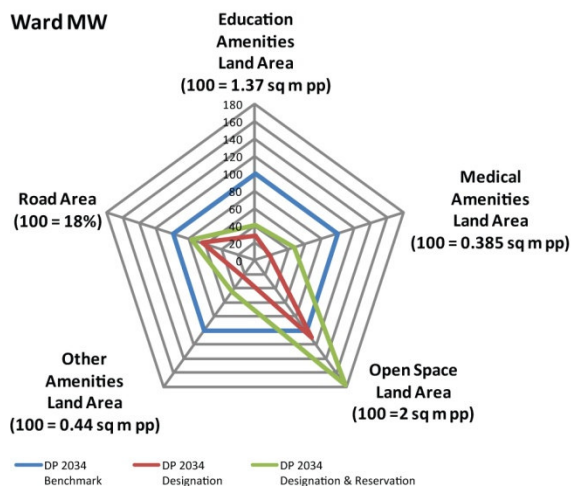
Ward L



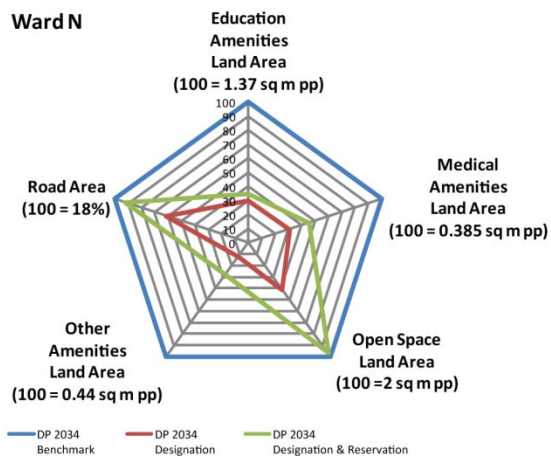
Ward ME



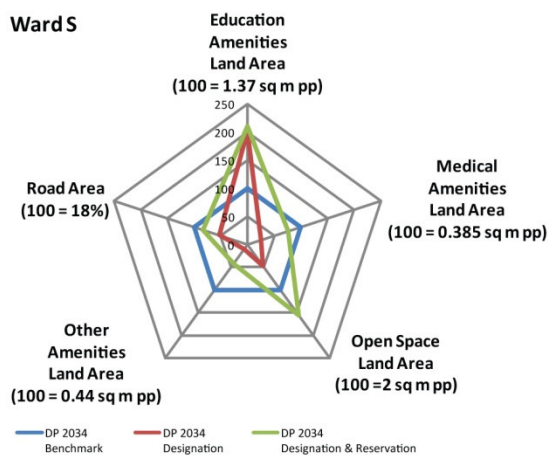
Ward MW



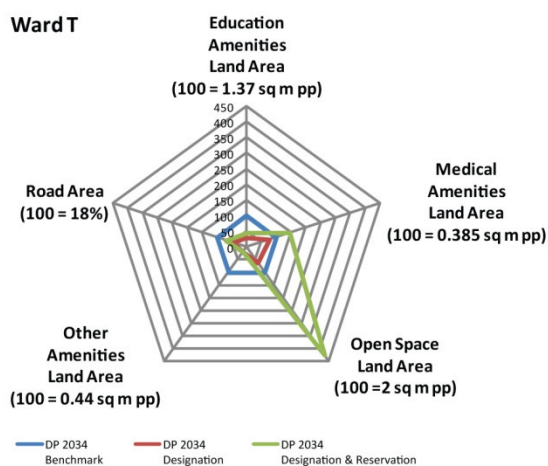
Ward N



Ward S



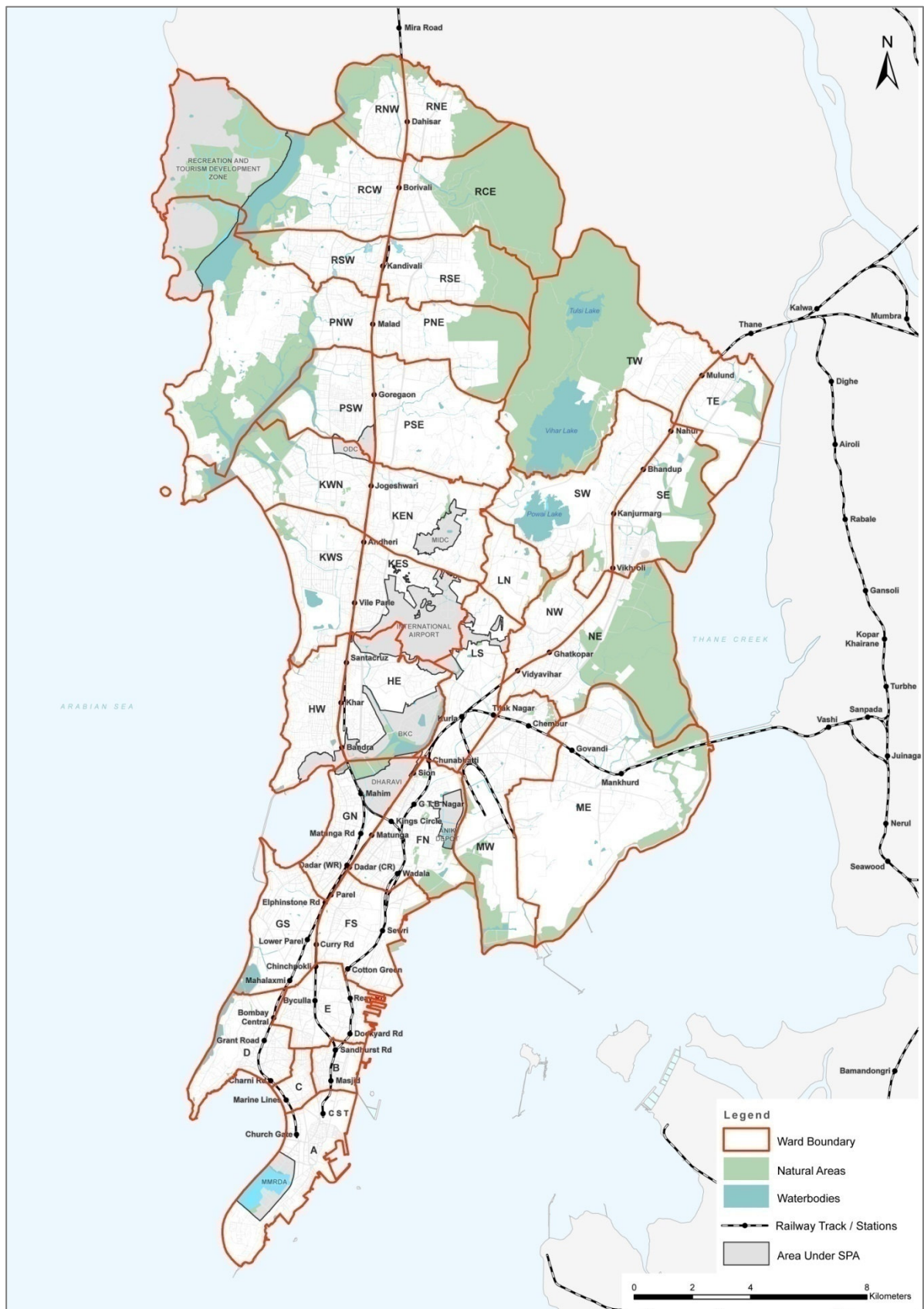
Ward T



With the application of various planning instruments like utilizing FSI, introduction of TDR, Accommodation Reservation, Land Acquisition, etc, to make land and built up areas available for public purpose, the next step was to ensure that land demand for utility infrastructure domains were met with. This section follows.

Wards in Eastern Suburbs and Western Suburbs have very large populations, some even exceeding population of small towns in India. In order to augment efficient management of service delivery and DP implementation, Municipal Corporators have demanded that these large Wards be divided into two. The DP 2034 includes a recommendation towards the same. The provisions for future Ward offices have also been included in the PLU 2034. The DP 2034 has recommended plausible delineations of these ward boundaries, as shown below (Refer Map 18.1).

Map 18.1: Proposal for Subdivision of Administrative Ward boundaries



18.10. Demand for Public Utilities and Services

Adequate space and access to city wide services like water supply, solid waste disposal, sewerage and storm water drainage needs to be provided for equitably. The supply of these services is provided by departments within the MCGM. Information pertaining to existing availability and projected demand of these services has been gathered from respective departments of MCGM. The MCGM departments catering to utility services have multiple projects that are not unified into one larger master plan. These projects are neither coordinated with other utility departments nor planned alongside the Statutory Development Planning process. There is no mandate for having a comprehensive sectoral master plan for each department that could be combined with the DP.

The DP 2034 takes cognizance of the requirements of the respective MCGM departments and has gathered land demand from these individual departments to reserve adequate land parcels in DP 2034. The land demand from departments is given below.

18.9.1 Storm Water Drainage (SWD)

The SWD system constitutes network of underground closed or piped drains, road side surface drains, major nallas, minor nallas, to release rainwater and waste water into the sea. The city faces severe flooding and water clogging issues during monsoon and the existing system is incapable of handling high intensity rain. BRIMSTOWAD and Mithi River projects are being undertaken by the MCGM to augment the SWD system. The issues to be addressed to ensure an effective SWD system include deepening and widening of nallas, regular desilting of water beds, removing obstructions that clog or restrict the continuous flow of water, SWD which is capable of handling 50 mm/hr intensity rainfall with runoff coefficient of 1.00 and to construct storm water pumping stations to speed up the drainage. The SWD Pumping stations proposed under the BRIMSTOWAD and Mithi River projects and the corresponding area demands are given in Table 31 below.

Table 18.24: Proposed Storm Water Pumping Stations and status of implementation

Facility Location	Area Demand (ha)	Implementation status
Haji Ali	0.50	Completed
Gazadharband	0.46	Ongoing
Irla	0.94	Completed
Britania	0.26	Ongoing
Mankhurd	0.39	Proposed
Mogra	0.81	Proposed
Mahul	0.25	Proposed
Total	3.61	

18.9.2 Sewerage system

The sewerage system comprises of sewer lines, sewage pumping stations, waste water treatment facilities, marine outfalls, lagoons, manholes and inspection chambers. Only 63% of total sewage generated in the city is collected by the existing system and it lacks the sewerage network for nearly 40% of the city. Untreated sewerage reaches the Malad Creek and polluting the ecosystem, rise in amount of sewage generated, dilapidated conditions of sewer lines are some of the main issues of the sewerage system. The Mumbai Sewerage Disposal Project (MSDP) Department is undertaking Sewerage Master Plan for the year 2025 that includes laying new sewers, upsizing or rehabilitation

of sewers, proposing pumping stations, construction of collector tunnels, transfer tunnels and marine outfalls. Following are the locations and area demands for these facilities that have been obtained from the department.

Table 18.25: Proposed Sewerage Pumping Stations

Wards	Locations	Area Demand (ha)
K/W	To be notified	0.72
H/W	To be notified	0.44
M/W	To be notified	1.44
L	Brahmanwadi	0.06
H/W	Chimbai	0.04
D	Nepansea Road	0.07
K/W	Versova	1.43
E	Chinchpokli	0.08
D	Harve road	0.03
H/E	Khar	0.79
P/N	Malad	1.49
A	Afghan Church	0.16
R/N	Vallabhnagar	0.42
	Total	7.17

18.9.3 Solid Waste Management (SWM)

The Solid Waste system involves segregation, collection, storage, transfer, transportation, processing and disposal of solid waste. Only 83% of solid waste in the MCGM area is collected through the current system, while the remaining waste from the MCGM jurisdiction and waste on non-MCGM lands (such as Railways lands) is underserved. The city generates 7800 MT of solid waste and an additional construction debris of 4700MT per day. The three solid waste disposal sites in Deonar, Kanjur and Mulund have a total of 6,500 MT per day of processing capacity. The current provision is insufficient for the growing increase in per capita waste being generated and increase in construction waste. Hence there are ongoing projects on these sites which would increase the processing capacity. Also there are sanitary refuse sheds that have been proposed. These spatial requirements are included in the DP 2014-34 as shown in the table.

Table 18.26: Solid Waste department area demands

Facility	Ward	Area (ha)
Dumping Ground	T	48.91
Extension to already existing Refuse transfer station	L	0.09
Refuse Transfer station	K/E	1.43
Refuse Transfer station	G/S	0.30
Refuse Transfer station	P/S	1.84
Refuse Transfer station	F/N	1.82
Bio-medical waste treatment facility	N	1.84
Bio-medical waste treatment facility	T	1.67
	Total	57.91

18.9.4 Water Supply

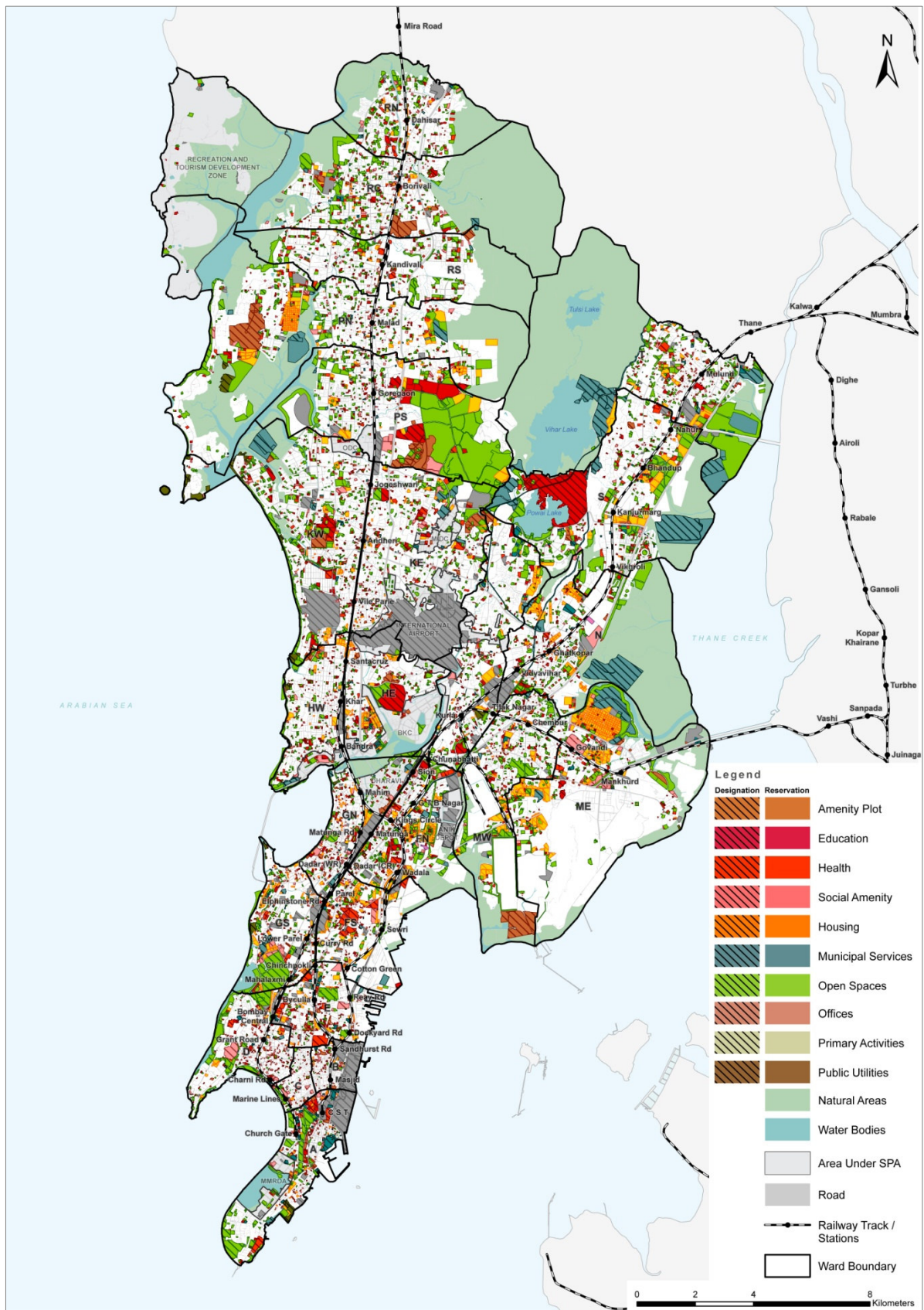
The total demand of water for Greater Mumbai is around 4000 million litres per day but the total planned water supply about 3750 MLD per day which includes water used for domestic, commercial and industrial purposes. The water supply availability varies ward-wise with some wards like B ward showing a shortage of per capita water supply. The focus of the new proposed projects includes augmentation of water resources, replacement of old mains and universal metering. Middle Vaitarna Project (by MCGM), Gargai & Pinjal project (GoM) and Damganga project(NWDA) are source development projects which would increase the yield by an additional 2451 MLD by 2025.

Table 18.27: Summary of Departmental Demands

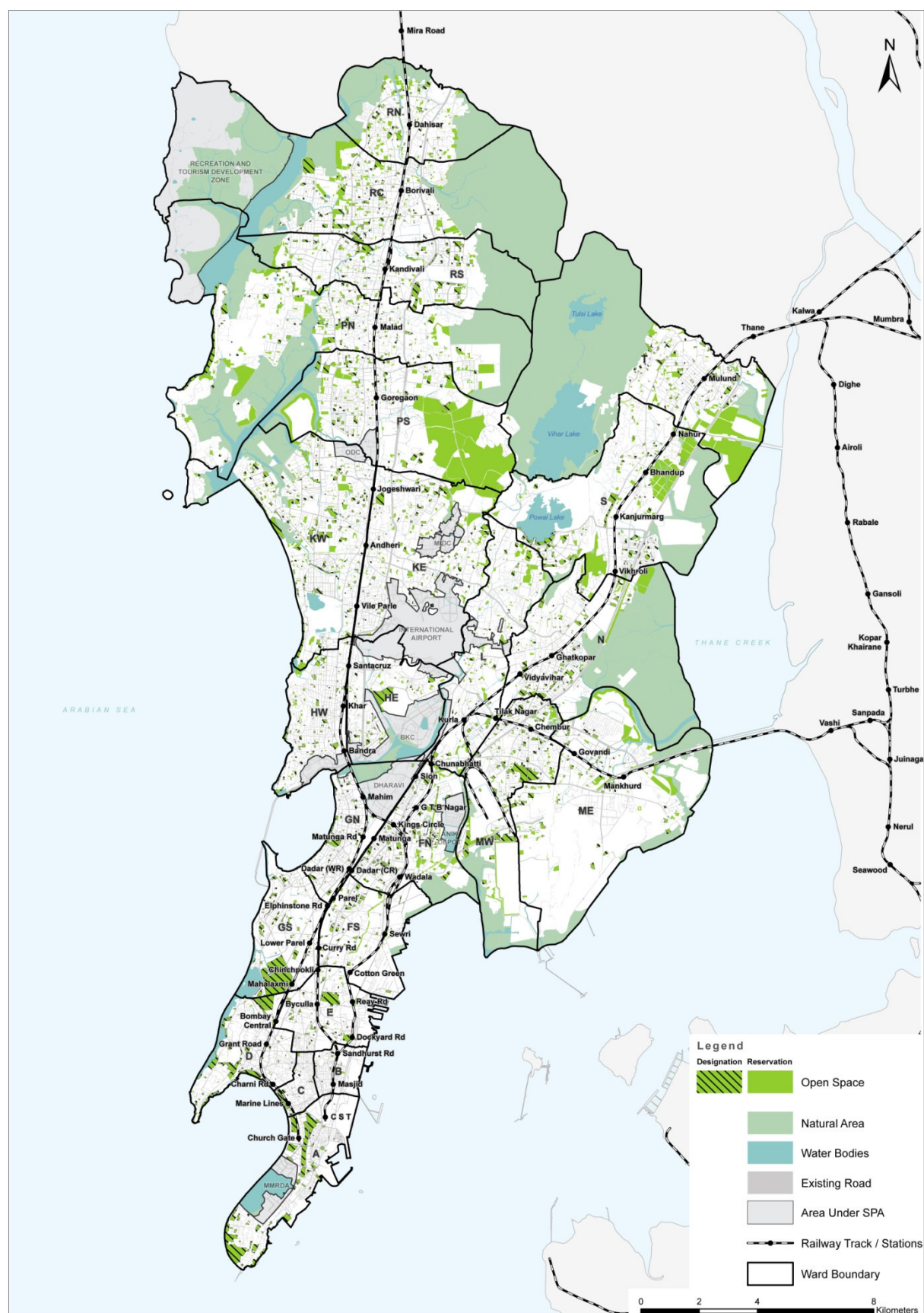
Broad Category		Intermediate Category		Detailed Category		Land Area Demand (ha)
RPU	Public Utility & Facility	RPU1	Fire Brigade Sevices	RPU1.1	Fire Station	5.03
				RPU1.2	Fire Command Centre	
		RPU2	Fuel Station	RPU2.1	Fuel Station	18.82
		RPU3	Law & Order	RPU3.1	Police Station	3.60
				RPU3.3	Court	1.20
				RPU3.5	Correction facilities	12.00
		RPU4	Power	RPU4.1	Electric Transmission and Distribution Facility	10.95
					Total	51.60
RMS	Municipal Services	RMS1	Municipal Ward Level Services	RMS1.1	Road Depot	7.55
				RMS1.2	Municipal Chowky	1.11
				RMS1.3	Municipal Store	3.60
				RMS1.4	Municipal Workshop	1.23
		RMS2	Municipal City Level Services	RMS2.1	Transport Garage	4.45
		RMS3	Solid Waste	RM3.1	Refuse Shed	7.55
				RMS3.2	Refuse Transfer Stations	6.47
				RMS3.3	Solid Waste Disposal	120.00
				RMS3.4	Soiled Waste Sorting Centre	7.55
		RMS4	Sewerage	RMS4.1	Sewage Treatment Plant	1.82
		Total				161.33
		Total Land Demand from Departments				212.93

The DP 2034 employs diverse strategies for making land available for public purpose such as ‘reservation’ on one hand, and on the other hand contribution of land for public purpose from private developments in order to meet changing and evolving needs.

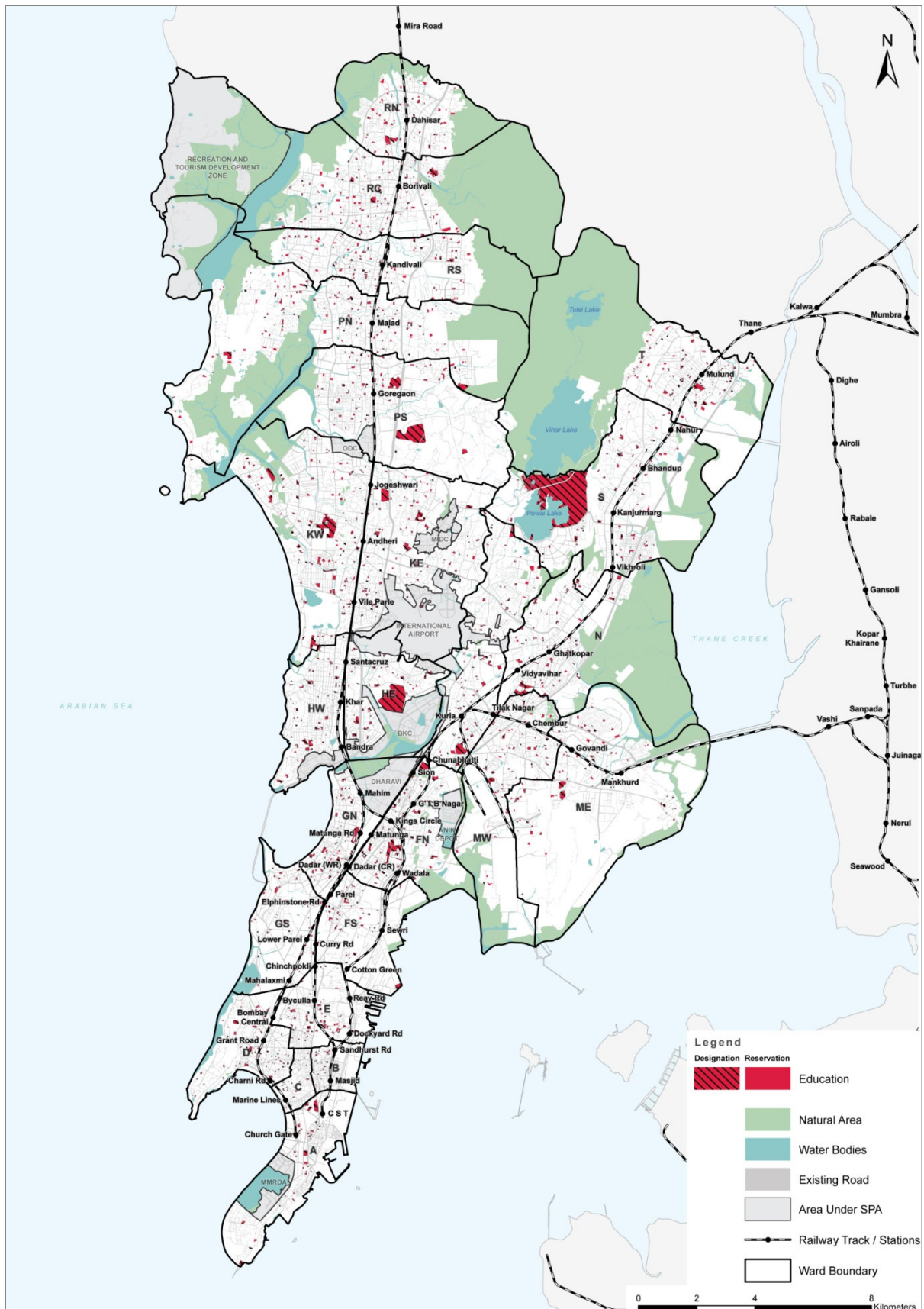
Map 18.2: Proposed Land Use – Amenities for Greater Mumbai



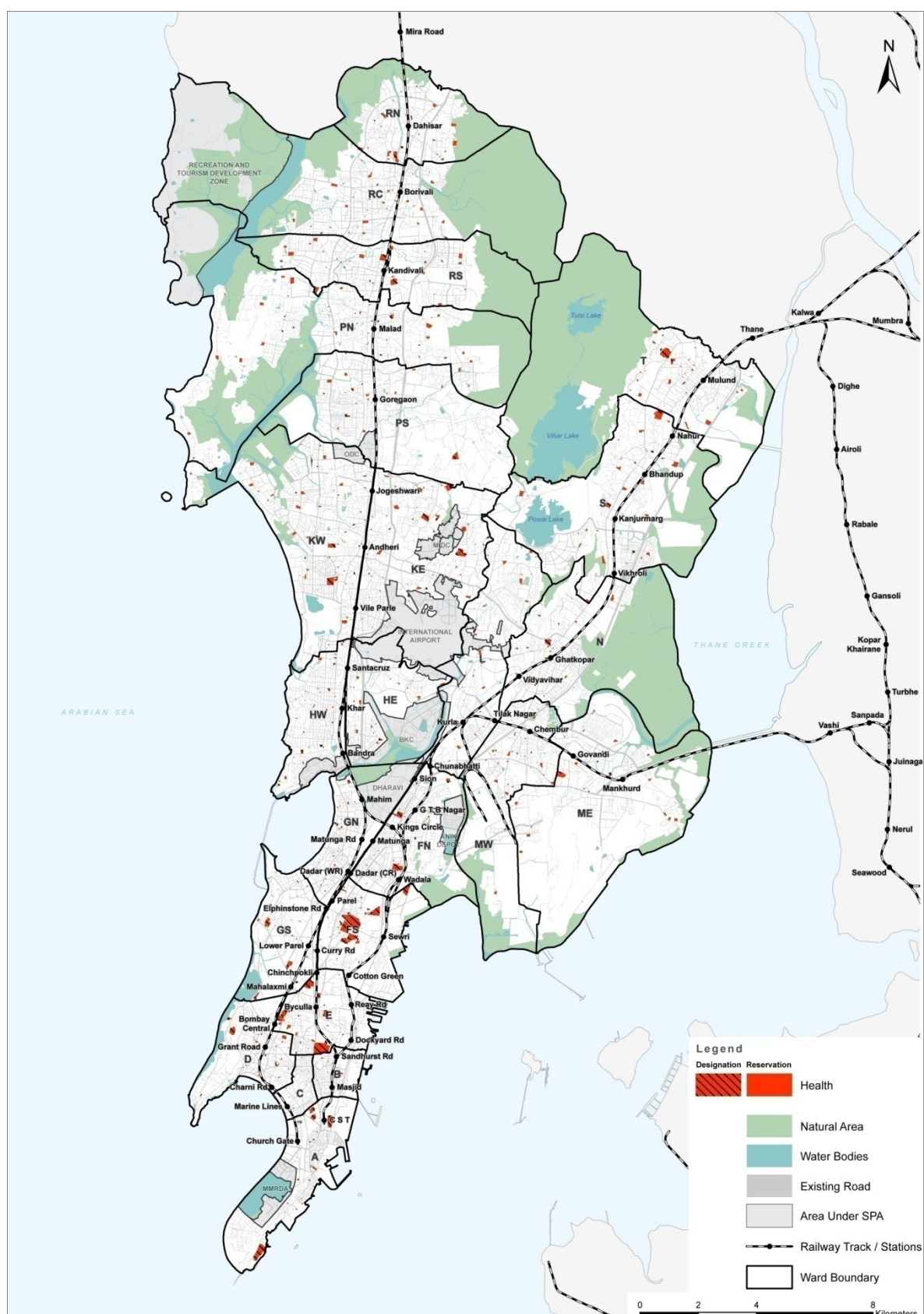
Map 18.3: Proposed Open Spaces for Greater Mumbai



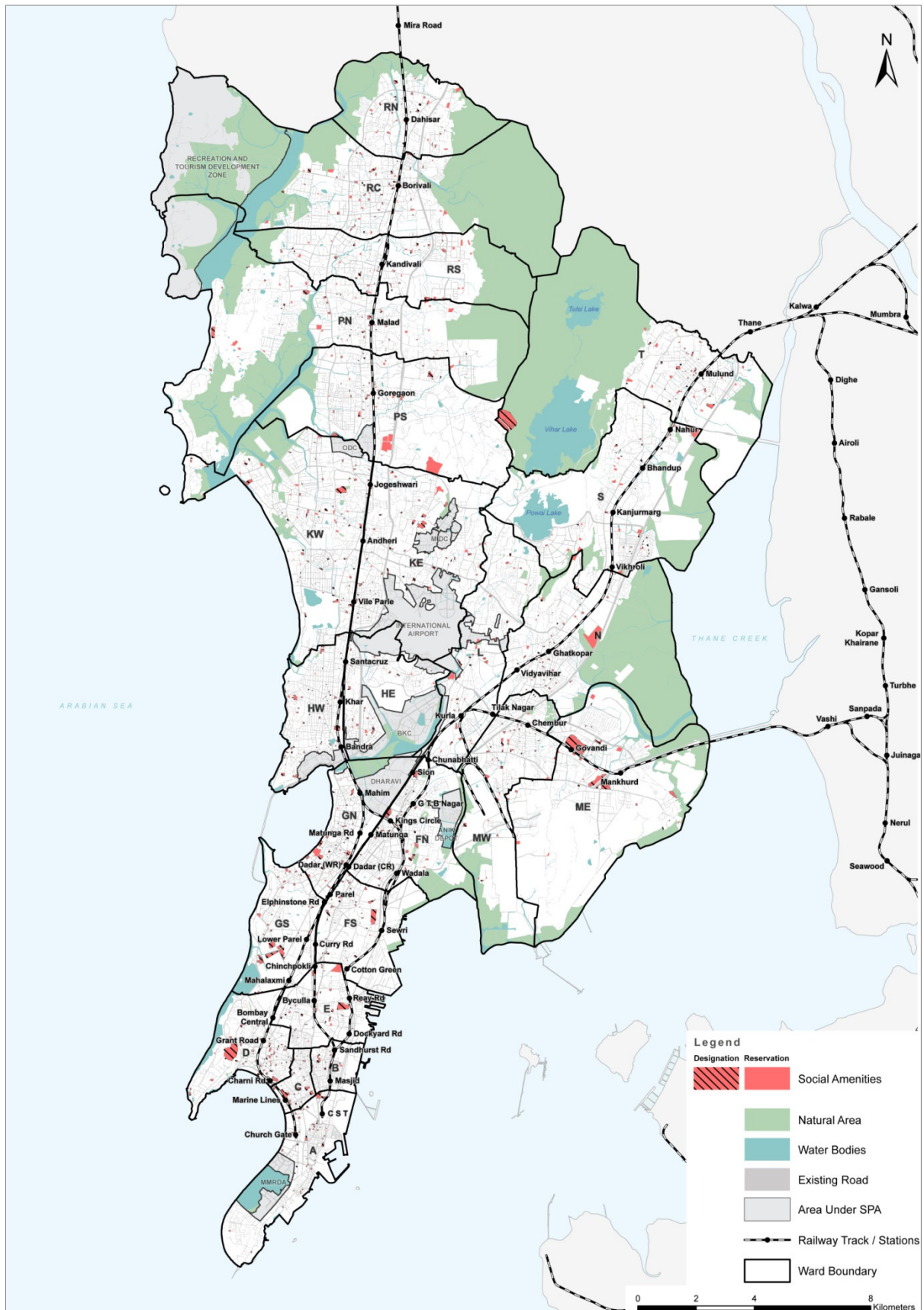
18.4: Proposed Education amenities for Greater Mumbai

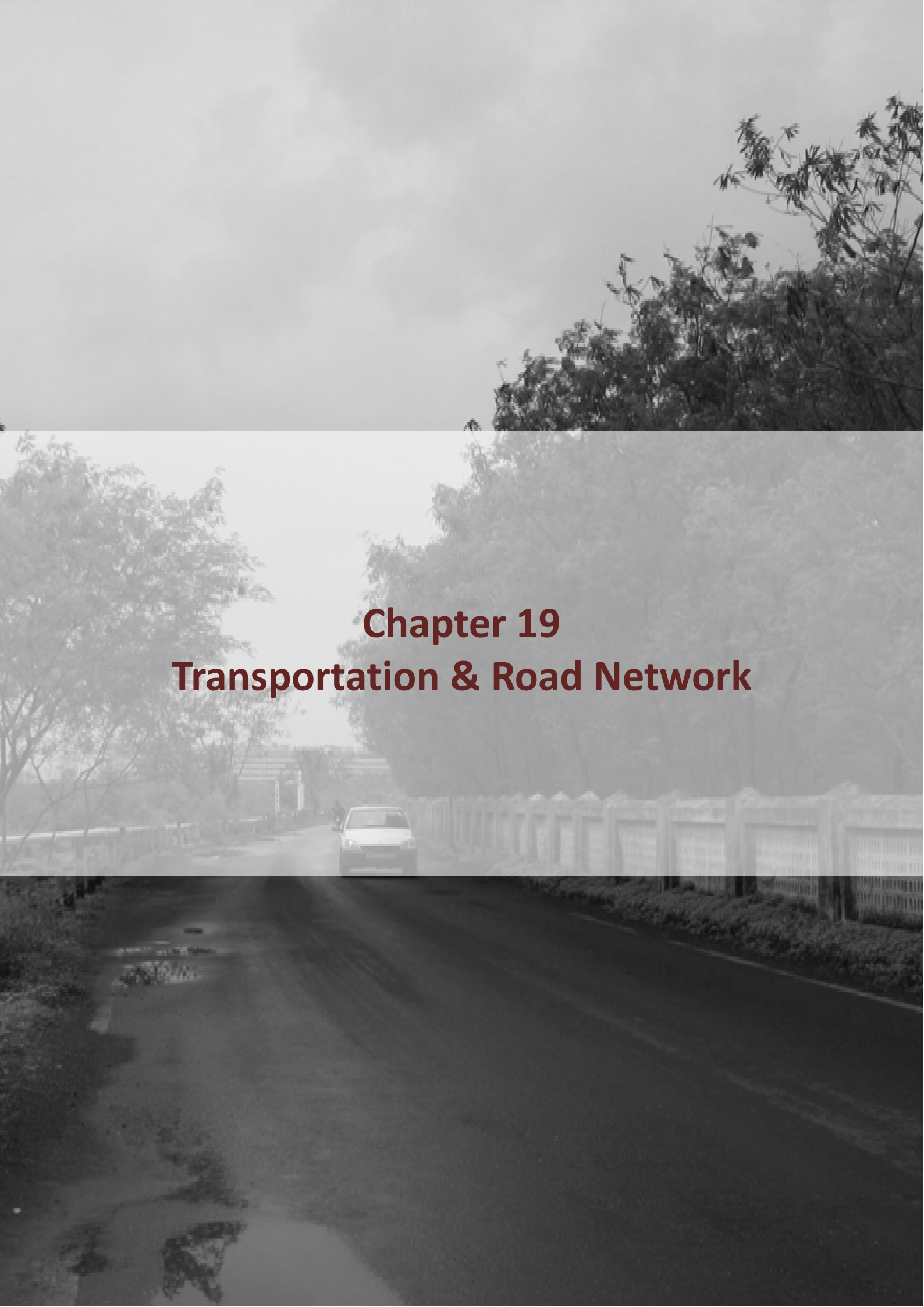


Map 18.5: Proposed Health amenities for Greater Mumbai



Map 18.6: Proposed Social amenities for Greater Mumbai





Chapter 19

Transportation & Road Network

19. Transport and Road Network

Transportation is often cited as being amongst one of the biggest challenges facing Mumbai today. The Existing Situation Analysis (ESA) identifies under provision of rail and road, insufficient coverage of public transit in the outlying areas, an increasing rate of car ownership, inadequate traffic and travel demand management initiatives, poor provisions for pedestrians, as some of the key issues related to transport. However, Mumbai's transportation sector also exhibits several strengths, in that, there is a very high modal share in favour of public transit, and that more than half the trips are by walking. Many of the existing stations already exhibit characters desirable in the design of transit-oriented development, such as compact, high-density, mixed, car-free, walkable nodes, which are integrated with other modes of public and para-transit.

19.1 The DP and the Comprehensive Mobility Plan

Greater Mumbai's development already demonstrates integration of transport and land use that needs to be strengthened. Historically, statutory development plans and non-statutory transport plans have been separately and successively undertaken. Similarly, presently, a Comprehensive Mobility Plan (CMP) for Greater Mumbai has been initiated in 2014 by the Roads and Traffic department of the MCGM.

While the CMP is an integrated plan, which focuses on road infrastructure and traffic management, the DP focuses on provision of space for transportation facilities.

The scope of work of the CMP (CMP, 2014, MCGM) is, to suggest effective traffic and travel demand management strategies for the medium to long term. The goal of this study is to ensure comprehensive mobility by all modes including walking, cycling and IPT, increase the efficiency and capacity of the existing road network, and maintain the viability of public transport services, through least cost solutions.

The key outputs of the CMP are:

- Take cognizance of the road, land use and other spatial proposals of the DP 2034 and suggesting new road linkages, road widening and existing road improvements. This would be done through travel demand analysis and forecast, which would entail an analysis of the various household and employment / workplace survey, origin-destination surveys, traffic counts and estimating trip attraction variables;
- Suggest measures to increase vehicular speed through incorporation of traffic-engineering devices, junction improvements, road marking, signage, directional boards, variable messaging signboards (VMS)& real time indication. This would be done through speed and journey time surveys and an estimation of the speed flow functions, as well as an inventory survey of the roads, footpaths, drains, lights, signs, marking etc;
- Suggest TOD parameters for Mumbai city, as well as multi-modal transit integration (suburban rail, metro, monorail, buses and IPT) strategies around mass transit stations.
- Propose parking demand management strategies, for on-street and off-street parking. This would be done through a detailed parking survey;
- Suggest improvement for pedestrians and non-motorized transit (NMT). This would be done through pedestrian and NMT surveys, as well as a study of the physical roadway characteristic, including functional condition of pavement and pedestrian pathways, etc;
- Suggest management strategies for commercial vehicles including parking and restrictions on road usage;

- Suggest road safety measures through traffic signage, road markings, etc;
- Recommend overall improvements in air quality through better traffic & travel demand management and the associated reduction in emissions;
- Formulate a medium-term investment plan and transport financing strategies and conducting opinion survey regarding willingness to pay, willingness to charge and capacity to pay for various services;
- Recommend institutional mechanism for inter agency co-ordination.

Regional level transportation within Greater Mumbai is largely under the purview of State & Central agencies. The CMP, Greater Mumbai shall consider and incorporate the spatial proposal of DP 2034, pertaining to new road alignments, road widening and RL buffers. The DP focuses on local-level transportation improvement strategies such as enhancing the road networks, transit-oriented development, parking demand management & creating a safe pedestrian environment based on the principles of universal access.

The outputs of the CMP study were not available during the making of the DP. Hence, the proposals of the CMP will have to be evaluated and incorporated through amendments of DP, if required.

With this background the main transport related proposals of the DP 2034 are:

- **Proposals for new DP roads and alterations to existing roads**

To fulfil the need for improved connectivity via roads in Greater Mumbai, the DP proposes augmentation of new roads and alterations to existing ones to cater to the future demands of Greater Mumbai.

- **Space provision for Transport related activities**

Land area for road depots and transport garages have been reserved in the DP 2034 in order to address demands from Greater Mumbai level and Ward level municipal service departments.

- **Integrated land use zoning with transit networks**

The DP proposes special zoning around transit nodes with the focus to ease mobility within Greater Mumbai and encourage public transport in congruence to the growth in these nodes.

- **Parking regulations**

The GDCR includes regulations for off-street parking, which includes mandatory provision of parking spaces in various land use zones, land uses and occupancy types.

- **Universal Access**

To allow for barrier free access to all citizens including physically challenged and less able individuals, the DP have introduced regulations in the DCR for sensitive and inclusive design within buildings and public areas.

This chapter includes the following sections:

- Rationale and methodology used for proposing roads
- Integration of proposed public transport network with the land use plan of Greater Mumbai
- Future proposal for multi-modal interchanges
- Parking regulations

19.2 Transport Improvement Strategies and Proposals

Proposal for Roads

Currently, the Island City is well provided with a dense network of streets, whereas many parts of the Suburbs are under provided in terms of roads. Both movement and access for many areas within Greater Mumbai are inadequate. Roads presently occupy 9% of the total developed area of Greater Mumbai. In order to maintain adequate provision of connectivity through roads in the city, a minimum benchmark of 18% should be provided, according to benchmarks established in the Master Plan for Delhi 2021. Therefore, DP 2034 has proposed a planning benchmark of 18% of total developable area for roads at a Ward level and 12 % of total developable area for roads at a Planning Sector level.

The hierarchy of streets in various parts of Greater Mumbai vary and were provided in different stages of development of the city through incremental initiatives in reference to the local context and need of that time. Given Mumbai's current situation, it is not possible to have a distinctively hierarchical road network. Instead, the objective is to improve the current road frameworks, with reference to the proposed road hierarchy to the extent feasible, within the limitations of the existing local context.

Principles followed for Road Network Provision and Augmentation

In accordance to the above objectives, following principles were followed while proposing for modification, additions and improvements to the existing local road networks.

1. Proposals for regional connectivity have been identified and incorporated where necessary;
2. Missing links of the DP 1991 existing road have been completed wherever necessary and feasible;
3. Proposal for roads have taken cognizance of the existing roads in slums and other areas when proposing missing links;
4. In case of encroachment on some parts of the DP 1991 roads, Road Line buffers have been taken into account while widening and the road width is then adjusted based on site condition;
5. Bottlenecks have been resolved in existing East-West linkages by proposing alternative linkages or new linkages;
6. Roads have been proposed along the edges of existing vacant land parcels in order to avoid sub division in case of multiple land ownership;
7. Through block linkages have been enabled in large parcels such as industrial lands;
8. Dead ends have been avoided;
9. Adding ROBs and RUBs across railways for dispersal of traffic;
10. The main expressways and arterial roads networks already exist in Greater Mumbai in the road development plan and have been retained.

Following are six main types of interventions that are illustrated below:

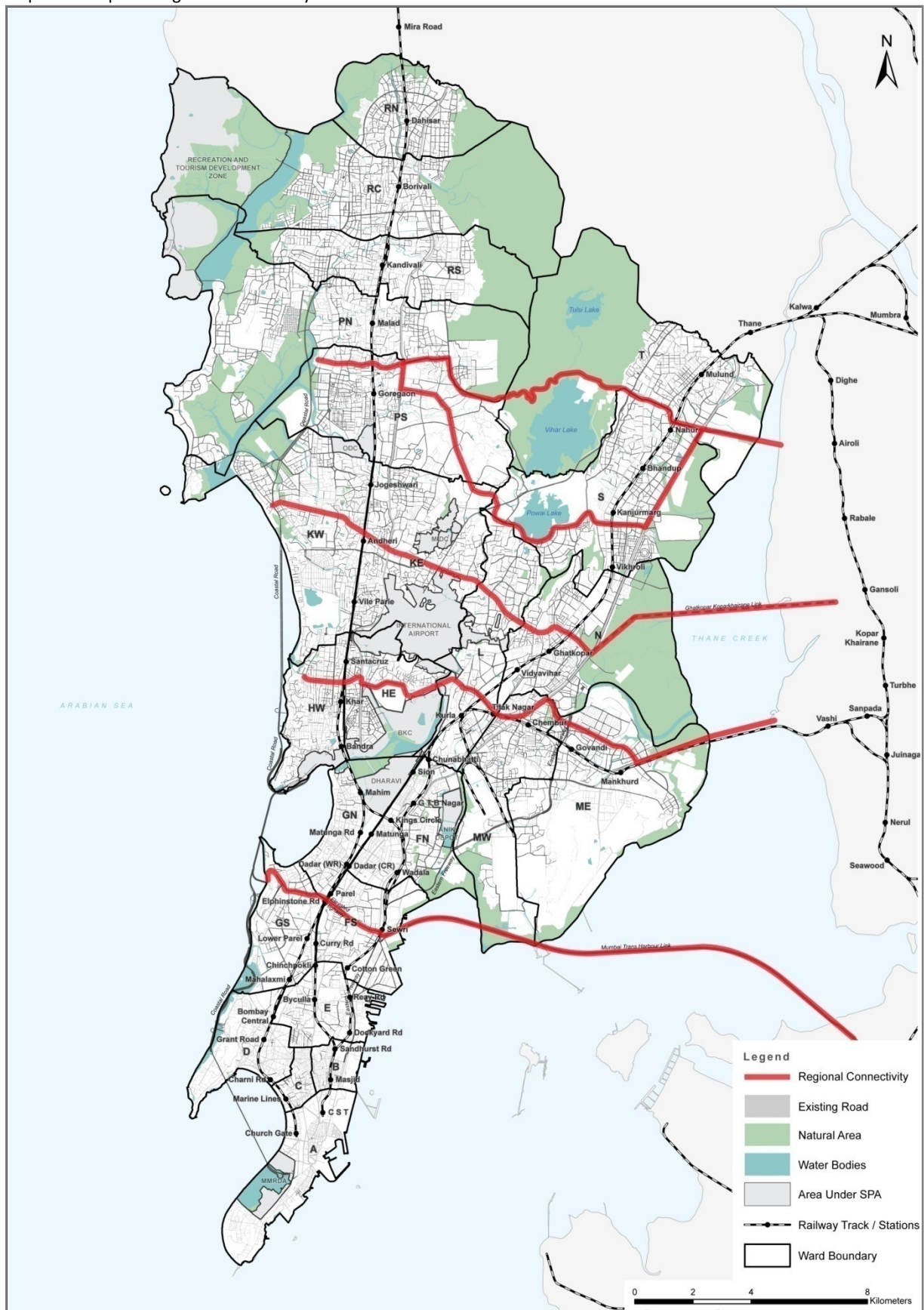
1. Establishing regional connectivity

Three new roads are being proposed to enhance the regional connectivity of the city to the surrounding region:

- **Ghatkopar-Koparkhairane Link Road;**
- **Mumbai Trans Harbour Link;**
- **Goregaon- Aarey- Mulund – Airoli bridge**

These will be the new roads linking Navi Mumbai to Mumbai. This project will help decongest the existing two link roads namely Sion-Panvel Expressway and Ghatkopar-Mulund and will speed up the journey to the far eastern suburbs.

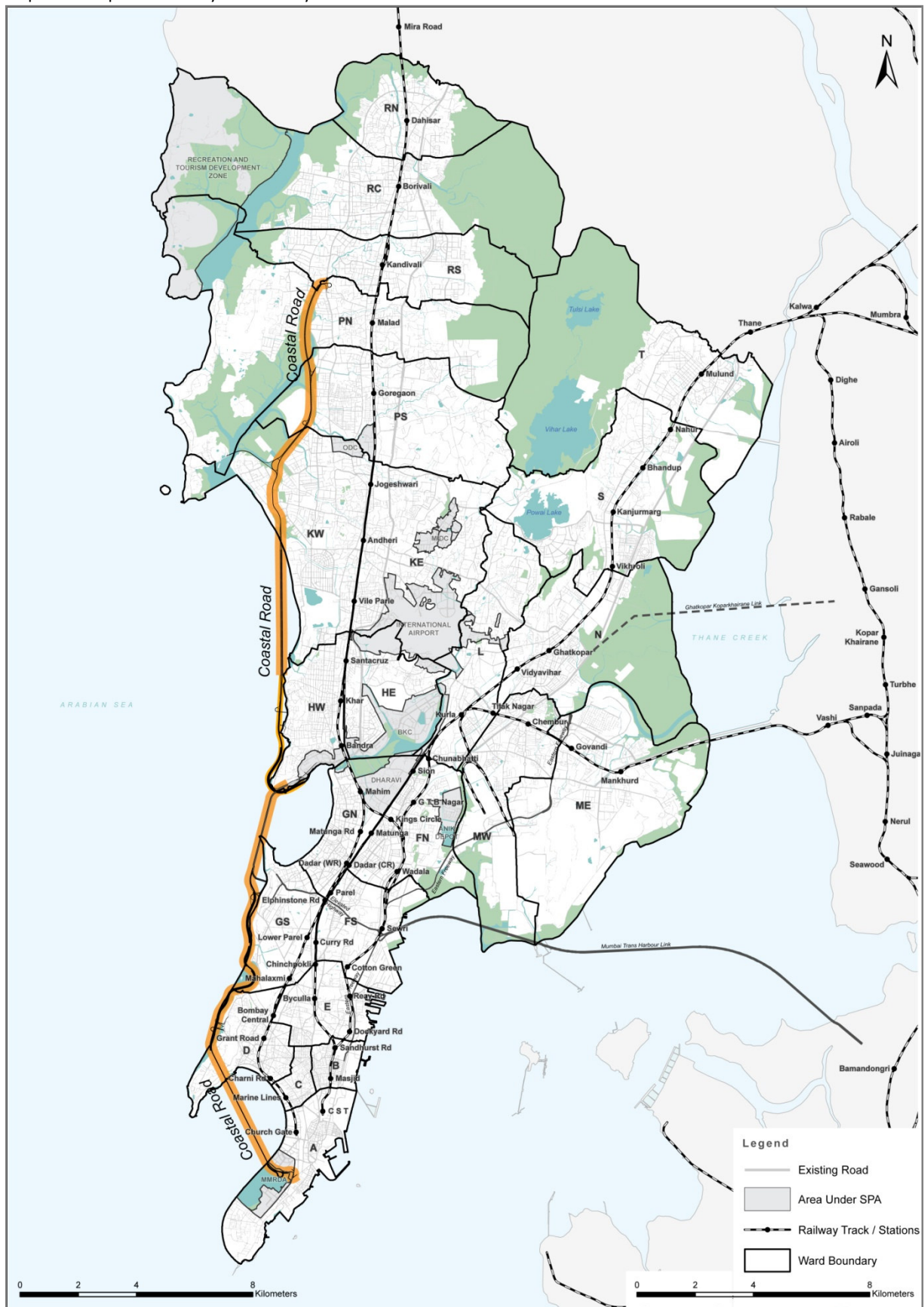
Map 19.1: Proposed regional connectivity



2. Intracity connectivity

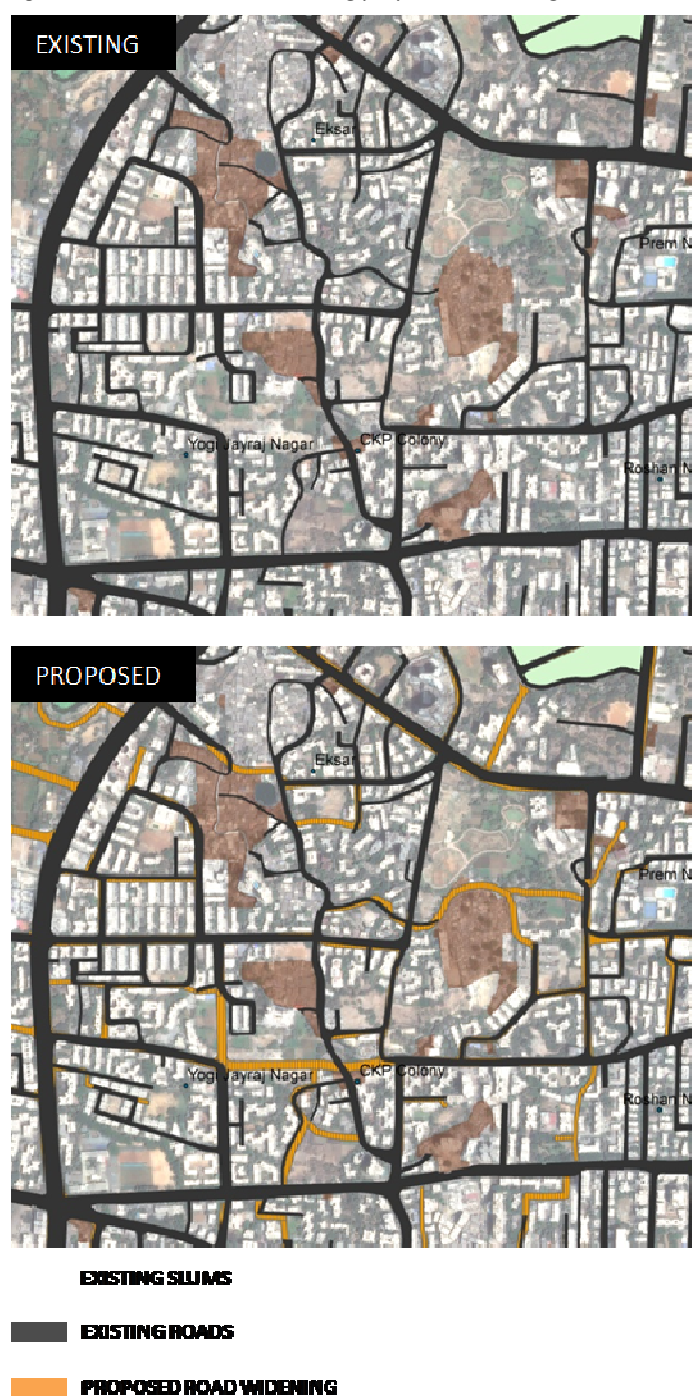
New western coastal road has been proposed as an expressway with a width of 45 m, which has access control and stretches from Charkop metro station to Bandra Sea Link to Nariman Point. The proposed regional roads mentioned earlier viz. Ghatkopar-Koparkhairane Link Road, Mumbai Trans Harbour Link, and Goregaon- Aarey- Mulund – Airoli Bridge, also provide east-west intra city connectivity.

Map 19.2: Proposed intracity connectivity: Coastal road



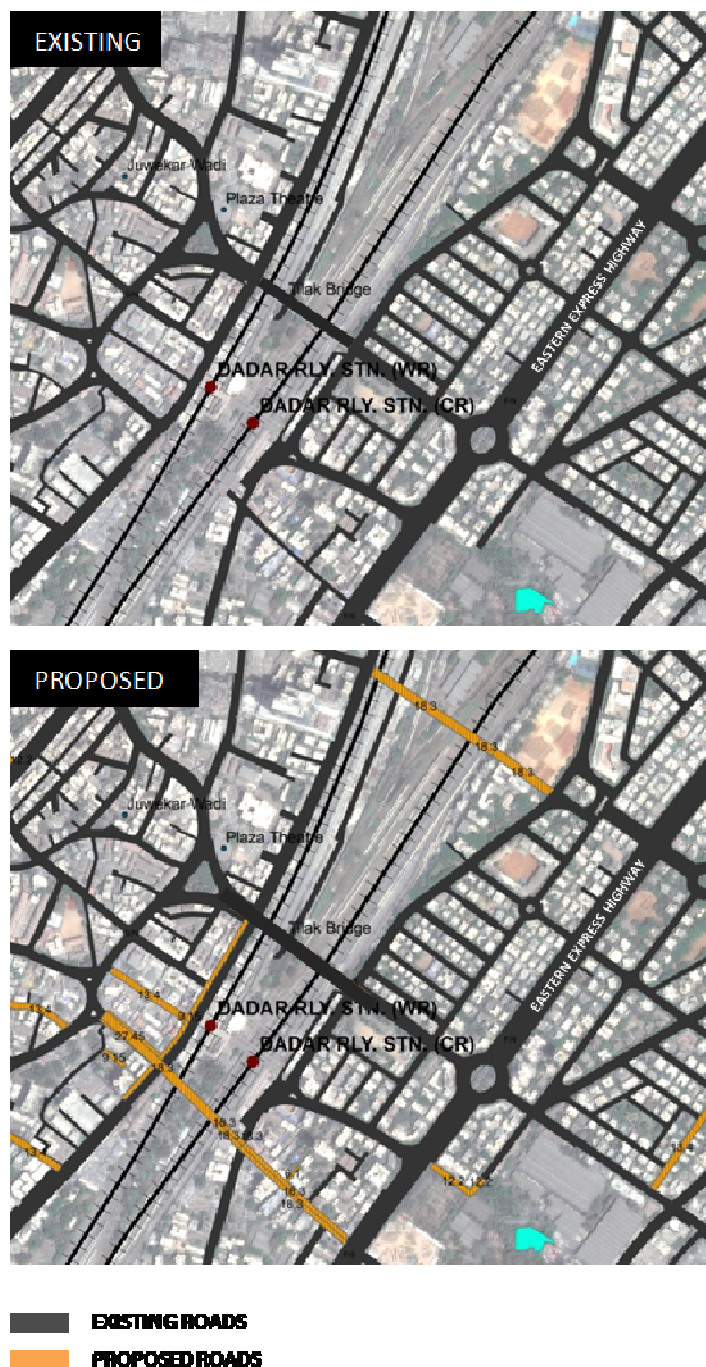
3. Missing links: Certain roads in Mumbai demarcated in the Development Plan 1991 as proposed DP Roads, are yet to be constructed. The DP 2034 has taken them into account for further augmentation. For example, as shown in Fig. 19.1, some under-developed roads in Yogi Nagar area located in Borivali (W), abutting the Link Road are being extended to establish links between the arterial roads in the area. Further, based on the over-arching objective to create a fine grid of streets in Greater Mumbai, missing links that complete the formation of this grid have been identified and proposed as DP Roads in DP 2034. Proposed roads in slum pockets respect existing road alignment and link slum pockets to surrounding areas.

Figure19.1: Demonstration showing proposal for missing road link



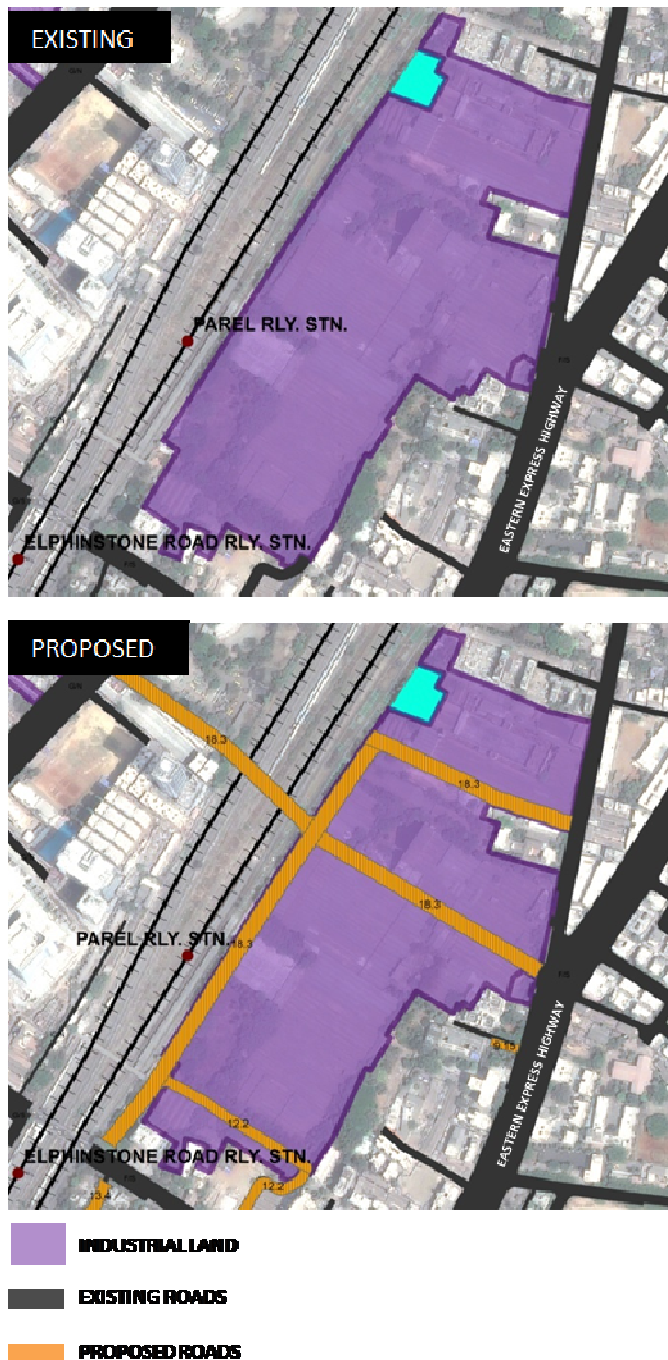
5. East-West connectivity across railway lines: The proposal to have East-West connectivity across railway lines intend to release the burden of traffic on existing E-W links. For example, as shown in Fig 19.3, Tilak Bridge in Dadar, which provides E-W connectivity, is observed to be heavily congested during peak hours. To release the traffic load from it, two new E-W connectivity roads, one on either side of Tilak Bridge, have been proposed across the railway line.

Figure19.3: Demonstration showing East-West connectivity across railway lines



6. Connectivity through large industrial and vacant land parcels: Public thoroughfares have been proposed through large industrial tracts and vacant lands in order to increase connectivity and promote walk-ability in the area. For example, a new road has been proposed through an industrial land near Parel railway station, to ease the traffic movement in the area by connecting the Eastern Express Highway to the West. In the absence of these thoroughfares traffic bottlenecks often result along roads that abut the large industrial parcels.

Figure 19.4: Demonstration showing road connectivity through industrial land



19.3 Proposed DP Roads

The National Standards stipulate, an average of 12% of the total planning area is the minimum required space benchmark for the provision of roads at Planning Sector level and 18% of area at Ward level. Accordingly, the minor roads in each Planning Sector have also been taken into consideration for the computation of desirable road area requirement at the Planning Sector level.

Table 19.1: Proposed roads as a component of Developed Area

Classifications	Area (ha)	% of total developed area
SPA	42.88	9.34%
Existing roads	34.91	7.61%
Sanctioned Road Line (RL)	3.12	0.68%
Proposed road widening	6.10	1.33%
Existing tunnel	0.03	0.01%
Proposed road	9.00	1.96%
Proposed bridge	0.00	0.00%
Proposed ROB	0.25	0.05%
Proposed RUB	0.00	0.00%
Proposed tunnel	0.10	0.02%
Water	21.33	4.65%
Natural areas	90.15	19.64%
CRZ I	11.48	2.50%
Unclassified	11.42	2.49%
HP/BP/MbPT	9.73	2.12%
Aarey (except area proposed as RC or CR Zone)	8.73	1.90%
Designation	51.40	11.20%
Reservation	18.31	3.99%

The above table highlights the total existing and proposed area occupied by road network, in Greater Mumbai, with respect to the total developed area. Details as follows:

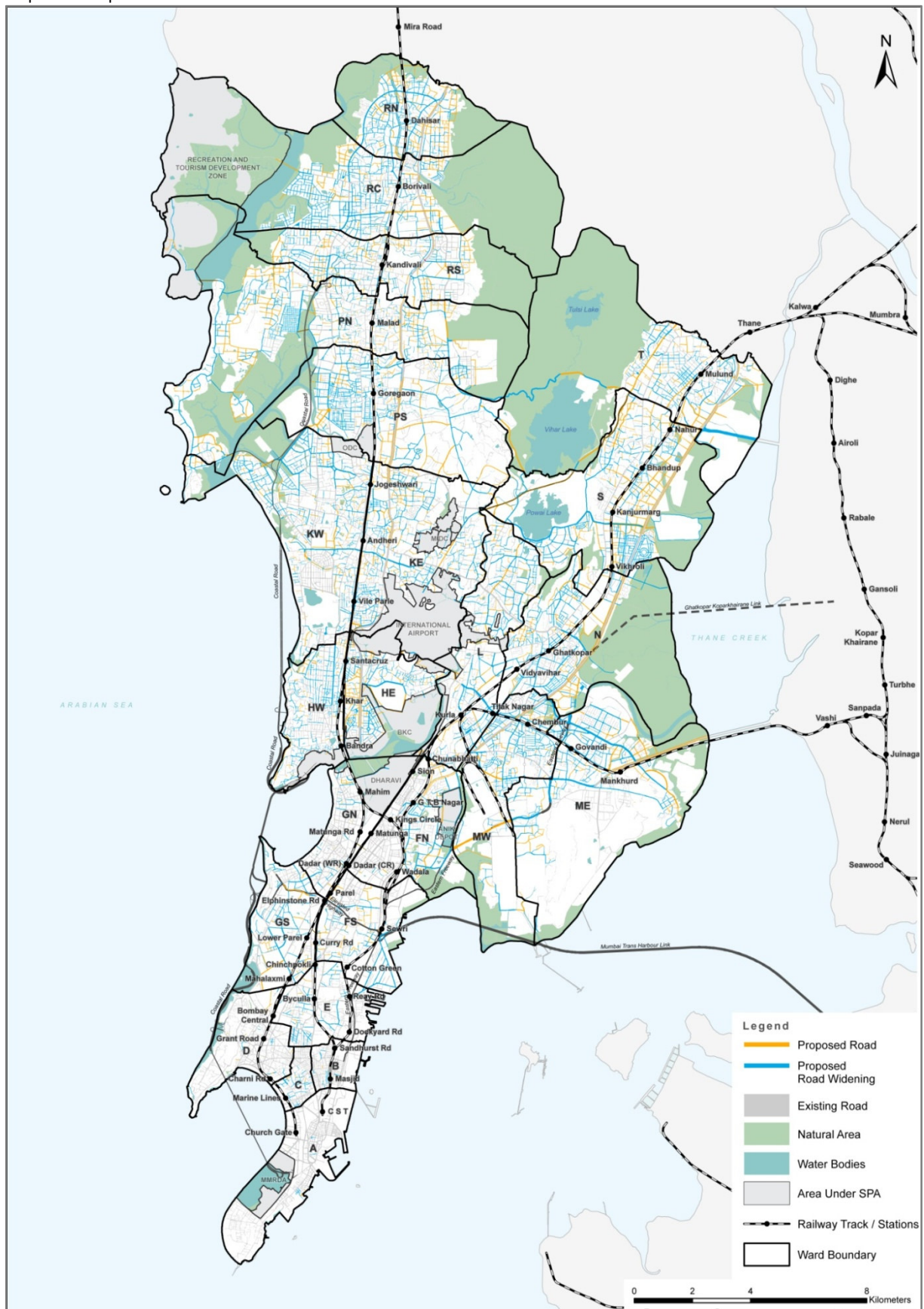
- The Net Plot Area for Greater Mumbai is 140 sqkm;
- Total area occupied by existing and proposed roads, in the developed area is 53.52 sqkm;
- Area occupied by other constant areas including large industries and reservations and designations is 99.60 sqkm;
- Total developed area, comprising Net Plot Area, Road network, and large industries is 293.16 sqkm;
- Road network occupies a total of 18.25% of the total developed area of Greater Mumbai.

Note: Chapter 17: FSI: A Tool for Managing Physical Development includes explanation of deductive methodology used for arriving at the Net Plot Area for Greater Mumbai. Please note, in Section 17.9.2, Figure 17.4 of this chapter, the percentage of road area to Net Plot Area is included.

For purposes of evaluating adequacy of road access, at local levels major roads and the roads that have defined boundaries for the various Planning Sectors have been treated as constant areas and are excluded from computation.

Maps 19.3 shows roads proposed for widening and to be newly constructed at Greater Mumbai level. In Table 19.1, the road area demand derived from benchmarks is compared with the proposed road areas at each Ward level to evaluate which Wards have inadequacy in terms of road provision. The MCGM has undertaken detailed site verifications to ascertain the feasibility of proposals for DP Roads.

Map 19.3: Proposed roads at Greater Mumbai level



The following table shows the comparison of existing road area to the proposed road areas in each ward

Table 19.2: Proposed roads at Ward level

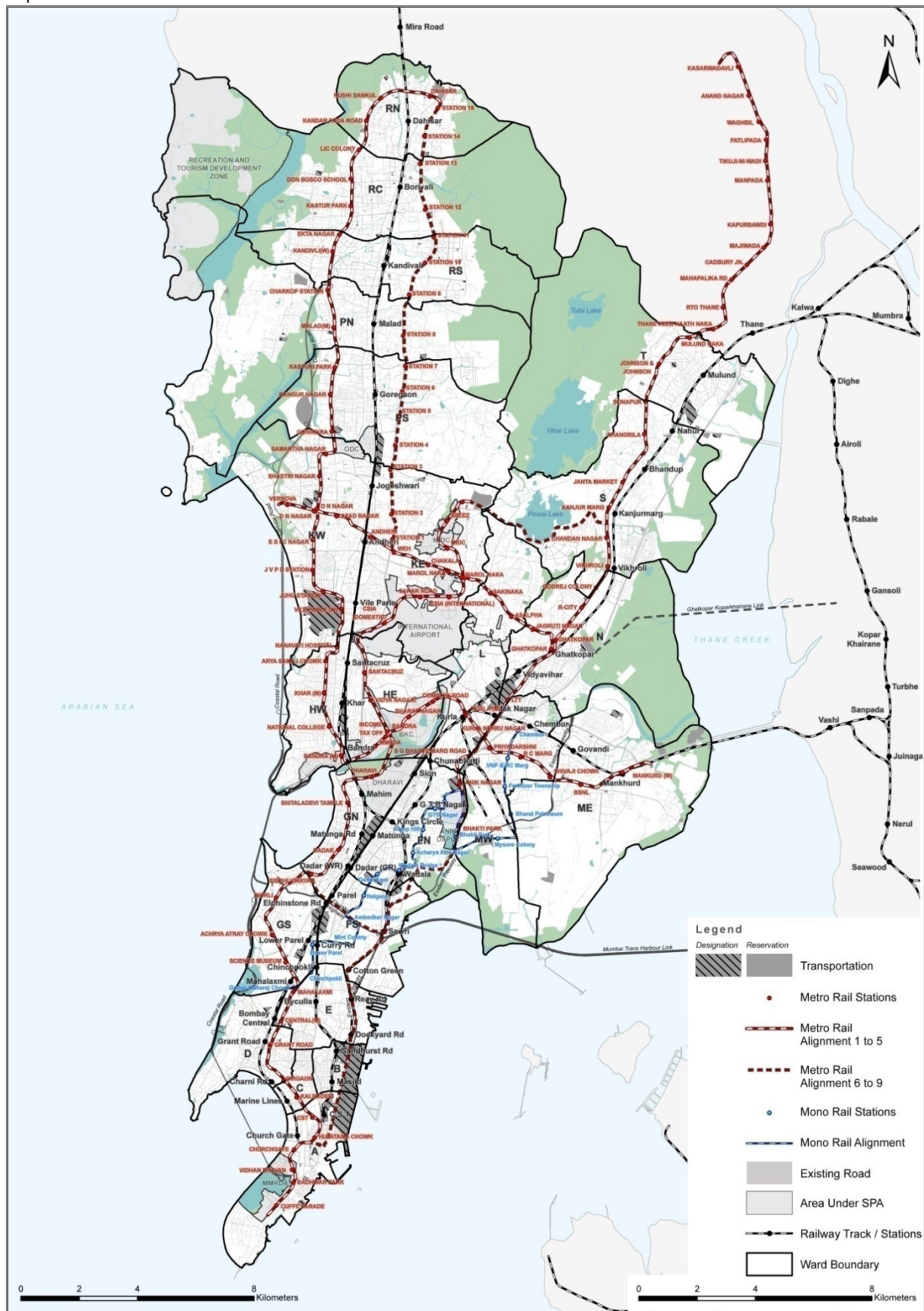
Wards	Developable Ward Area (A) (in ha)	Demand [18% of(A)]	Existing Area for roads (ELU, 2012) (ha)	Additional Proposed Area, 2034 (ha)	Total Provision (ELU+Proposed Roads)	% of total provision to developable area
A	1117.17	201.09	169.83	11.31	181.14	16%
B	265.82	47.85	57.20	5.00	62.21	23%
C	191.30	34.43	45.99	12.01	58.00	30%
D	796.30	143.33	105.52	22.94	128.46	16%
E	717.25	129.10	121.63	18.81	140.44	20%
F/N	1036.01	186.48	164.58	45.78	210.36	20%
F/S	942.25	169.60	134.20	43.67	177.87	19%
G/N	868.86	156.39	122.87	14.65	137.52	16%
G/S	864.35	155.58	101.86	39.97	141.83	16%
H/E	1280.70	230.53	161.97	61.82	223.79	17%
H/W	854.04	153.73	148.23	39.08	187.31	22%
K/E	2378.15	428.07	263.74	102.75	366.49	15%
K/W	2176.43	391.76	269.27	114.85	384.12	18%
L	1511.01	271.98	136.33	95.44	231.77	15%
M/E	2260.01	406.80	186.79	117.19	303.98	13%
M/W	1452.73	261.49	169.68	70.07	239.75	17%
N	1421.59	255.89	157.77	126.91	284.68	20%
P/N	3141.18	565.41	192.69	212.99	405.68	13%
P/S	2342.48	421.65	204.85	119.83	324.69	14%
R/C	2869.92	516.58	217.97	85.48	303.45	11%
R/N	872.51	157.05	95.34	78.96	174.30	20%
R/S	1259.43	226.70	144.45	85.90	230.35	18%
S	2296.61	413.39	219.99	197.55	417.54	18%
T	1621.10	291.80	137.86	137.18	275.04	17%

The percentage of the proposed roads in every ward varies, where benchmark of 18% has been met in wards B,C,E, F/N, F/S, H/W, K/W, N, R/N, R/S and S. The remaining wards have marginally reached the benchmark except R/C ward where proposed roads are only 11% of the ward area and M/E ward where proposed roads are only 13% of the ward area, and hence underprovided. For Wards which do not meet planning benchmarks shall be undertaken for further network augmentation at the local area planning level.

19.4 Proposed Public Transport Networks

There are several transport projects under planning and implementation within Greater Mumbai. In general these projects are planned with a view of serving transport demand for the next two decades. Major projects such as Metro rail (As shown in Table 6.7 in *Part I: Chapter 6. Transport and Communication*), Monorail, and new expressways/freeways have a major role in shaping the transport scenario for the future. The Development Plan 2034 has considered these proposals, anticipated their impacts on the overall movement systems and integrated them with Land Use proposals for the future.

Map 19.4: Mass transit networks in Greater Mumbai



Multi-modal integration around station areas: To provide seamless connectivity between different transport modes and optimise convenience in travelling, multi-modal transport integration at station areas is recommended to be taken up at a local area plan. The stations that have more than one transportation network or utility, high pedestrian activity and immediate access to IPT, could be strengthened and planned for their enhancement. The most important stations that could be given priority for this intervention are as follows:

- Churchgate, Dadar, Bandra, Andheri and Borivali stations along the Western Railway line;
- CST and Kurla, Ghatkopar station of the Central Railway Line;
- Wadala station along the Harbour Line and Dadar station on the Central Line: these stations are already well established intercity and intra-city transport hubs, with good connectivity to the City.

However, considering that all railway station areas have multiple modes of transit converging at them, this intervention will be detailed at the local area plan level.

19.5 Parking

Parking is a vital link between transportation and land use. While major public investments are being made on improving public transport, ownership of private vehicles is increasing rapidly in Greater Mumbai. As per the CTS 2008, it is expected that number of private vehicles in 2005 would get nearly doubled by 2031. The on-plot parking requirements in Greater Mumbai have been periodically increased in response to ever increasing demand for vehicle ownership. While increasing private car ownership is a result of increasing income, provision of parking is seen as a public responsibility. Consequently, 'parking lot' is included as a reservation for public purpose in the development plan. Various concessions are being granted to increase supply of 'parking places' though there are severe space constraints on increasing the networks capacity that can facilitate 'movement' of cars. The apprehension is that if adequate off street parking is not provided cars will be parked on the street further limiting the street capacity for movement of cars.

However, major Asian cities such as Singapore, Seoul and Hong Kong are undergoing a paradigm shift from conventional auto centric approaches towards parking to multi-objective demand management approach to parking. Studies⁶⁵ show that a parking demand management approach through a market oriented parking policy is more suitable than the conventional approaches for Asian Cities, which have high density, low car ownership and relatively better patronage of public transport.

Providing road for 'movement' of cars is a 'public good' as it meets the essential criterion of non-excludability. In contrast, space for a parked car is a 'private good'. In principle, public goods are justifiably provided by public agencies and private goods are best provided by the market. However, cars easily use up roads for parking making it necessary to control such private use of a public good. A summary of existing parking regulations in Greater Mumbai is provided here:

- **Off-street Parking Requirements**

- 1) Despite having lower levels of car ownership and high dependency on public transport, off street parking requirements within plots in Greater Mumbai, in general, are much higher than that of corresponding parking requirements of cities such as Hong Kong, Singapore and Delhi.

For every 100 sqm of offices floor space, in Singapore parking space requirement ranges from 0.22 to 0.5 based on the location. In Hong Kong it varies between 0.33 to 0.5 car spaces per 100 sqm and in Delhi it is 2 to 2.4 cars. In Greater Mumbai it is 2.66 for first 1,500 sqm and above 1,500 sqm additional 1.33 car space for every additional 100 sqm.

For every 100 sqm of residential floor space, in Singapore 1 car space is required for every residential unit, in Hong Kong the requirement ranges from 0.16 to 0.63 based on the location and in Delhi 2 car spaces are required. In Greater Mumbai the requirement ranges from 0.71 to 4.44 based on size of the unit and location.

For every 100 sqm of commercial shops floor space, in Singapore car space requirement ranges from 0.25 to 0.66 based on location, in Hong Kong the requirement ranges from 0.33 to 2.5 based on location and in Delhi at 2 to 2.4. In Greater Mumbai it is 2.5 car spaces per 100 sqm up to 800 sqm area and for every 100 sqm exceeding it 1.25 additional car spaces are required.

⁶⁵ Parking as a Mobility Management Tool, Parking Policy in Asian Cities, Asian Development Bank, 2011

- 2) Parking regulations in Greater Mumbai permit a very high provision of parking. The current regulations in Greater Mumbai, stipulate minimum off street parking requirements that are not counted in FSI for various types of land uses. Additionally 25% of total parking space is exempt from FSI without paying premium, 25% for visitors parking is exempt from computation of permissible FSI in case of residential uses and 10% of total parking space for using mechanical means for parking in non-residential buildings is also exempt from FSI calculation.
- 3) The parking requirements initially stipulated by the parking regulations of DP 1991, at the parcel level, also have been increased time to time to meet the demand for parking space.
- 4) The current requirements apply to new developments. However, requirements of already developed areas are not catered through these permissions.
- 5) Often parking spaces are sold bundled with floor space by developers. Therefore, cost of development of parking also tends to be loaded on the floor space. This denies the option of not buying parking space for those who do not want to own cars thus affecting the housing affordability.

- **Multi Storied Parking**

Under the Regulation 33 (24) of current DCR, FSI incentives are provided for development of multi storied parking in private plots, which are not reserved as parking lots, the parking so developed is handed over to MCGM free of cost.

- **Underground Parking**

As per Regulation 68 of current DCR, with exceptions of some of the major open spaces, development of underground parking is allowed on lands reserved for recreational ground / play ground/ gardens/ parks and open spaces and DP Roads.

- **On-street Parking**

Although considerable attention is paid to off-street parking of cars, parking of taxis, auto-rickshaws, tempos, trucks and private buses happens on streets - some of it during non-peak hours without affecting the general traffic. However such parking also needs to be properly regulated.

9.5.1 Proposals for Parking

Parking is a specific domain and has to be comprehensively addressed in terms of on-street parking, off-street parking and parking within TOD areas. It includes conducting traffic and parking surveys, management plans, enforcement of parking norms and pricing of on-street parking. This could be achieved through enforcement and pricing.

The DP has confined itself to standards of off-street parking in the GDCR. A comprehensive parking policy will be formulated by the CMP and detailed parking management will have to be taken up at the local area planning level.

With this background, the following proposals are formulated:

Regulations for off-street parking

Off-street parking regulations can be divided into two parts, mandatory requirement for on-plot developments and enabling regulations for public parking spaces to be developed.

A. On-plot parking

1. Decreasing the number of spaces available for parking

The GDCR includes mandatory provision of parking spaces in various land uses. This is provided in the form of number of cars for every 100 sqm built-up area. For example, for residential occupancy, 1.33 car parking space is mandated for every 100 sqm BUA. Similarly, for commercial establishments, 1 car park is mandated for every 100 sqm BUA. These space mandates vary for residential hotels, lodgings, hotels, educational institutions, medical institutions, auditoriums, shops, restaurants, industrial uses and warehouses. As per DP 1991 parking distribution was further categorised as per different tenement sizes, but in DP 2034 parking provision does not consider tenement size as a regulatory parameter. Additional parking space for visitors is included within the standard norms. Any additional parking space provided, more than the mandatory requirement, would be counted in the FSI.

Hence, the new regulation has decreased the number of spaces required for parking and intends to de-incentivize increase in private vehicle ownership and encourage public transit.

2. Creating restricted provisions within high pedestrian areas

TOD areas surrounding stations where pedestrian volumes are high and vehicular ingress is to be controlled, parking provision has been restricted. In demarcated TOD areas (where FSI is 5.0 and higher), parking provision is half of that provided in other zones for Residential, Commercial, Retail, Hotels and Industrial land uses.

3. No direct access to stilt parking from public road, but through side open spaces.

Many developments have its frontage as access from the street to the building plots, creating a barrier for pedestrian pathways on the road. To minimize this, the regulation has made it mandatory to provide for access to the stilts only through side setbacks

4. Common parking spaces by multiple property owners

For mutual benefit of property owners, common shared space for parking has been allowed by the regulations as long it meets the regulatory requirements.

B. Public parking

5. Underground parking below recreational open spaces (DCR) and spaces below flyovers

To make provision for additional parking space in public areas and restrict on-street parking, underground parking below recreational open spaces to a limited extent of roadside boundary, has been allowed. Spaces below flyovers have also been made accessible for public parking.

6. Multi Level Car Parking/ Mechanized Parking/ Puzzle Parking

GDCR has permitted off-street parking in the form of the entire plot being used for commercial parking, permissible in both RC and CR zones. In this case, volume to plot ratio is considered where the maximum allowable ratio would be 12.0. All plots fronting 18.30 m ROW be developed for parking, where 15% of the plot will be used for other commercial purpose as an incentive. The pricing for commercial provision of parking will depend upon on-street parking pricing and controls.

19.6 Design of Inclusive Street

When compared to other metropolitan cities in India, such as Delhi, Bangalore, and Chennai, Greater Mumbai has lower levels of road provision, in terms of total road space per capita, road use as part of land use, total length of road per capita, and the widths of the rights-of-way of individual category of roads. To add to this, a range of users, such as pedestrians, hawkers, buses, taxis, auto rickshaws, private vehicles, service & emergency vehicles, jostle with each other in the limited road spaces, leading to congested streets. This is worsening due the increase in vehicular ownership. As a majority of the city is already developed, there are limited opportunities to augment road space, especially in the dense areas of the Island City, and around station areas.

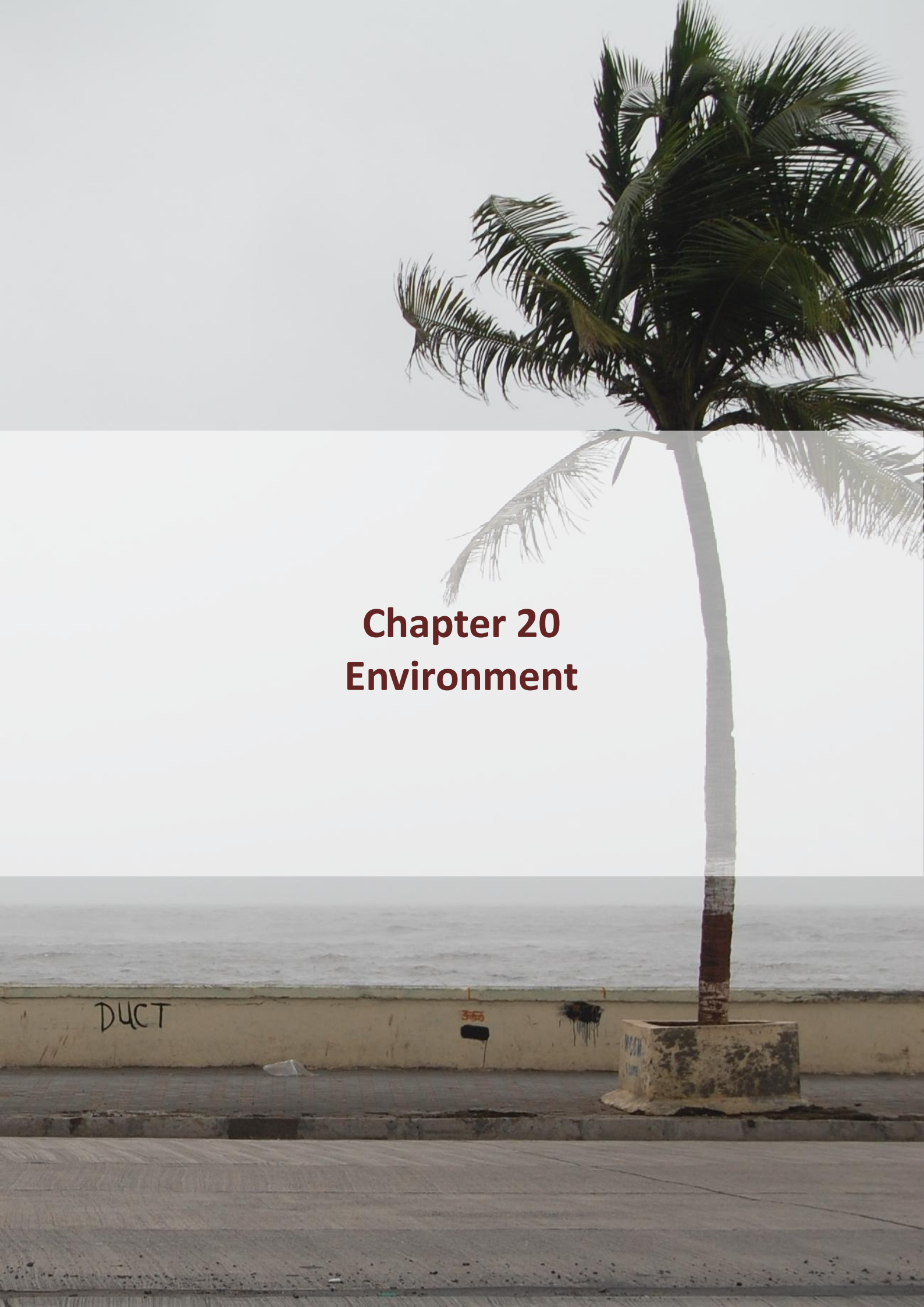
As discussed in the situation analysis in *Volume I-Context and Challenges*, 51% of the total trips made in Greater Mumbai are by walking, however, except for a few planned areas, footpath space is largely of sub-standard quality or completely absent, especially in the suburbs. Footpaths cater to street vendors, and pedestrians among other claimants. Carriageways are also often reduced by on-street parking. One of the worst affected groups of road users are the differently-abled, whose mobility is restricted due to unavailability of design for universal access.

An inclusive street design would include effective space utilisation of footpaths, with provision of spill-out from adjoining buildings, pathway for pedestrian movement, spaces for street vending, drop-off areas, bus stops, universal accessibility for people with differential physical needs and on-street parking areas.

Greater Mumbai already includes inclusive streets such as Lady Jamshetji Road and the arcaded streets in Colaba and in the Fort area.

These serve as desirable precedents for the formulation of street standards and streetscapes for Greater Mumbai (See *Chapter 21*. for Special Regulations for Streetscapes)

Local area plans will have to be undertaken to incorporate the desirable conditions for an inclusive street design. These plans can be at the locations where the street with ROW of 27 m and above and footpath space of 3 m and above exists or is proposed.

A photograph of a coastal scene. In the foreground, there is a concrete sidewalk and a low concrete wall. On the wall, the word "DUCT" is written in black graffiti. To the right, a palm tree stands in a concrete planter. The background shows the ocean and a grey, overcast sky.

Chapter 20

Environment

20. Environment

Environment is a fundamental component of city's resource base. It's planning, design, development and management/maintenance influences the quality of life of existing and future communities. Green infrastructure serves multiple purposes such as habitat for wildlife, spaces for recreational and cultural activities; it also delivers ecological benefits, flood protection and climate control. It includes natural areas forming environmental systems.

Environmental sustainability is one of the three main goals of the DP 2034 vision.

One third of Mumbai's land is under natural areas which include a diverse range of ecologically significant features, forests, rivers, natural drains and lakes, large expanses of vegetation, natural rock formations, hills, beaches, mangroves and mud flats. Mumbai's development has historically been brought about by altering the natural environment through reclamation, quarrying of hills for construction material, covering and narrowing of drains, clearing mangroves and altering river courses. Owing to the land constraints, a restrictive FSI regime of DP 1991 and demand for more space, areas under the environmental features became far more susceptible to the demand for built space. In many places natural slopes and drainage patterns have been altered irrevocably while the existing water courses largely double up as sewers and drains. Also, the provision of open spaces is affected due to pressure on land for development and exorbitant land prices.

The DP 2034 acknowledges the important role environmental features play in sustaining and protecting the city. An important spatial strategy of DP 2034 is therefore to recognise presence of natural features to preserve them or ensure that the developments around them occur in a sensitive manner and do not lead to further deterioration.

Some of the key environmental issues facing the city today include:

- **Environmental degradation and urban flooding:** Rapid urbanization, severe land constraints and speculation have resulted in settlements occupying space wherever available including disaster prone hillsides, floodplains and along water courses;
- **Public Health & Pollution:** Less green coverage per inhabitant due to high densities and low land reservation for open space and increased motorization and car oriented city have resulted in increased levels of air and noise pollution.

The DP is a spatial plan and within this premise takes into consideration the above mentioned challenges and issues. Following section highlights objectives and strategies for addressing environmental concerns in Greater Mumbai.

Objectives:

The objective is preservation of existing Natural Areas and augmenting green cover in Greater Mumbai, through greater provision of open spaces at macro and parcel levels that will in-turn support increased bio-diversity.

20.1 Proposals for Environmental Sustainability

The DP 2034 proposes, preservation of the city's Natural Areas, explained below:

20.1.1 Protecting Natural Areas

The DP 2034 proposes preservation of all major watercourses which includes major rivers such as Oshiwara, Poisar, Dahisar and Mithi; and the major creeks like the Mahul Creek, Irla Creek, Versova – Malad Creek and Manori–Gorai Creek and water bodies like tanks and ponds.

Greater Mumbai's ecology and biodiversity is very rich in spite of excessive urban growth. The key features of the region are Sanjay Gandhi National Park and the Marine Ecosystem along Mumbai's West and East coast. Mumbai is the only mega city in the world having a National Park within its boundaries. Other Natural Areas include mangroves, salt pans & hills.

For Greater Mumbai the environmental features play a crucial role-the mangroves guard against tidal erosions and support an ecosystem of flora & fauna; rivers & natural drains prevent flooding and the greens function as lungs aside from supporting flora & fauna. In addition to maintaining ecological balance the environmental features can become excellent recreational spaces, improve the quality of urban environment, increase land values and contribute to the city's image. With Greater Mumbai aspiring to be a sustainable global city, the significant amount of land remaining these features can be utilized smartly to transform Mumbai into a very attractive and liveable city, offering great quality of life.

In order to conserve all ecologically sensitive areas which includes, forests, mangroves, water bodies and all areas under CRZ-I, the DP 2034 has demarcated these as Natural Areas. A separate category called Natural Areas has been formed in the Proposed Land Use to reflect these environmental features, where developments are not permitted.

20.1.2 Preserving Large Urban Greens

The limited availability of land proves to be a restraint for making provision of large open spaces in the city for DP 2034. The DP has incorporated proposals for reservation and designation of land for Open Space amenity at Greater Mumbai, Ward and Planning Sector levels which cumulatively exceed the per capita land demand benchmark of 2 sqm pp, for Open Spaces. In addition, existing large urban greens in Greater Mumbai, such as the BARC, IIT, TISS and Mumbai University (Kalina) Campuses may serve as lung spaces, if a balance between development, green cover and open space is maintained. These areas will require special attention by the respective agencies for integration of all environmental networks to enhance the ecology and biodiversity of the city.

Relatively large urban greens are areas that have a significant concentration/intensity of flora and fauna, support natural ecosystems, are in a natural condition, are ecologically significant even if they are not publically accessible.

20.1.3 Disaster Risk Management

Greater Mumbai is vulnerable to different disasters in varied degrees with the floods and landslides causing maximum hazard. The DP 2034 takes cognizance of the Mumbai Disaster Risk Management

Master Plan which has studied disaster issues in detail and holistically. The DP 2034 suggests following strategies to mitigate these hazards.

Address areas prone to landslides

Greater Mumbai's geography consists of hills (See table 20.2 below). Most of the hills were razed to accommodate the increasing demand for space or quarried to provide construction material for new developments. Of the remaining hills many are encumbered by slums for lack of affordable housing in the city. During monsoons due to soil erosion these are prone to landslides causing damage to property and loss of human life. The DP 2034 suggests the following approach to mitigate landslides.

- **Protect hills and with Steep Slopes**

Additionally, regulations have been introduced to protect slopes which are steeper than 40% and development on such slopes is curtailed as these are prone to landslides. Some steep slopes are currently encumbered by informal settlements and many are located on slopes steeper than 40%. These are now zoned as Natural Areas in DP 2034 with restrictions on development. This is taking into consideration the danger that steep slopes pose to human life due to landslides caused by heavy rains in Greater Mumbai. In order to protect the people residing on these steep slopes and conserve these areas for increasing biodiversity, the DP 2034 recommends rehabilitation and resettlement of the existing inhabitants of these settlements to be undertaken on a priority basis.

- **Recommendations for Flood water management**

The city has several low-lying areas that are prone to seasonal flooding whenever heavy rainfall coincides with high tides. To mitigate the flood vulnerability of the city several strategies have been introduced in DP 2034 as under:

- **Forming a Green-Blue Web through Local Area Plans**

Buffers along rivers and creeks of adequate width have been demarcated on either side of the water courses, which are to be maintained as development free zones. This buffer zone will help reduce flooding risks by permitting water bodies to flood their banks without affecting people. These buffers, wherever possible, is recommended to be integrated into a larger city-wide open space network that connects parks and public spaces, thereby forming a green and blue web. These projects may be explored at the second tier plan preparation through Local Area Plans.

20.1.4 Recommendations for Sectoral Plans

The suggestions for the sectoral plans are stated below:

- **Greening the Grey**

Concerns about water shortage and pollution have received increased attention over the past few years. The strategy is to establish appropriate proposal for treatment of segregated domestic black and grey water. In addition strategy for developing alternative sources for meeting the future water demand for Greater Mumbai is also highlighted.

- **Rainwater Harvesting**

Greater Mumbai receives maximum rainfall with an average of 2,000 mm annually. About 65% of the city is already developed; indicating that there is a large percentage of built surfaces such

as rooftops, terraces, balconies, etc. These surfaces invariably present an opportunity for RWH in the city. The quantity of rainwater that can be harvested works out to approx. 590 MLD (assuming 50% roof surfaces and 70% water is collected) this water may be utilized for non potable uses. It is therefore necessary to bring majority of the areas in the city under rainwater harvesting. Environmental codes that address water harvesting, reduction of water demand though grey water recycling for non-potable uses have been included in the regulations in DP 2034. To enable this DP 2034 has reduced the plot size limit for mandatory implementation of RWH. This will encourage the smaller plots in the city which form a significant percent of the city's area to take up rainwater harvesting. RWH is now applicable for all plots not less than 300 sqm as opposed to the 1,000 sqm proposed by DP 1991.

- **Solid Waste Management**

Commercial capital Greater Mumbai, generates large amount of waste every day. Municipal solid waste includes commercial and residential waste generated from areas under the MCGM and SPA's. Current practice involves the municipal body collecting waste from surrounding areas, transferring it to collection stations and dumping it at three dumping ground

1. Deonar
2. Kanjurmarg
3. Mulund

With an increase in solid waste generation due changes in lifestyle, processing is a concern. This is further exacerbated with lack of land fill sites for future due to significant resistance at local level. This would pose a major challenge for enabling environmentally sustainable solid waste management. The DP 2034 recommends following strategies for sustainable solid waste management

Reduce solid waste entering landfills

Current solid waste practices that use landfills are an environmental hazard. Though MCGM promotes segregation of solid waste at source, ensuring local treatment at neighborhood level can ensure better resource management and reduce landfills and their impacts. The DP 2034 demarcates all existing Sorting sheds as lands for neighborhood level segregation centers and has additionally reserved one sorting centre per Planning Sector/Ward depending on local condition and availability of vacant land.

The existing landfill at Deonar which has been in operation from 1927 has reached its capacity and is slated for scientific closure after which it will serve as a much needed large open space in the Eastern Suburbs. Similarly, the landfill site at Gorai which is under scientific closure will also serve as public open space in the Western Suburbs.

The DP 2034 provides a broad framework for improving environmental sustainability through conserving natural areas, increasing green cover, preserving primary activities and protection against natural hazards. Given the multitude of factors that directly or indirectly affect environment, the recommendation suggested above address these larger issues of the environment at the basic level and these require a more detailed assessment at the 2-tier level.

The GDCR specifically incorporates regulations that address environmental sustainability. These include mandatory rainwater harvesting of housing societies and new construction/reconstruction, waste water recycling, energy efficient buildings through mandatory adherence to ECBC codes and tree plantation provisions for landscaping.

An aerial photograph of a densely populated urban area, likely in Asia, showing a mix of high-rise apartment buildings and lower-rise structures interspersed with greenery. The image is used as a background for the chapter title.

Chapter 21

Development Control Regulations

21 Development Control Regulations

The DCRs form an important element of a Development Plan. They aim to ensure that development takes place in accordance with the plan. Land Use Zoning and FSI form main components of DCRs. These have been described in detail in earlier chapters and are not therefore considered here.

21.1. Legal provisions

Section 22 of MRTP Act, specifying the contents of Development Plan, particularly specifies the scope of the regulation in clause (m). The parameters to be regulated mentioned in Section 22(m) include:

Provisions for permissions to be granted for controlling and regulating the use and development of land including imposition of conditions and restrictions in regard to different dimensions of development such as:

- a. Open spaces to be maintained around the building;
- b. The percentage of of building area for a plot;
- c. The location, number, size, height, number of storeys;
- d. Character of buildings;
- e. Density of population allowed in a specified area;
- f. The use and purposes to which buildings or specified areas of land may or may not be appropriated;
- g. The sub-division of plots;
- h. The discontinuance of objectionable users of land in any area in reasonable periods;
- i. Parking space and loading and unloading space for any building;
- j. The sizes of projections;
- k. Advertisement signs and boards;
- l. Imposition of fees, charges and premium at such rate as may be fixed by State Govt. or the planning authority from time to time, for grant of additional FSI or special permissions or for use of discretionary powers under relevant DCRs.

21.2. DCR 1991

Content of DCR 1991 initially covered the following:

- Provisions for acquiring land designated public purpose by granting TDR in lieu of monetary compensation;
- Allowing development of the plot reserved for public purpose subject to the condition that built up area required for the public purpose along with part of the plot is surrendered to planning authority free of cost (Concept of AR);
- In Situ slum redevelopment by granting FSI up to 2.5;
- Allowing redevelopment of mill lands by permitting conversion of Industrial use to Residential/ Commercial use by sharing land approximately in proportion of 1/3rd each to mill owner, MCGM for open space and MHADA for mill workers housing;
- Permitting additional FSI in case of star category hotels, Schools, hospitals;
- Allowing change of Industrial Zones to Residential/ Commercial purposes;
- Permitting relocations of reservations and allowing realignment of roads within the same

holding;

- Different parking norms in Island City and Suburbs as well as in high-end areas like Nepean sea road and JVPD scheme;
- Discretionary powers to M.C. for allowing development by relaxing any dimension except FSI in cases of hardship.

21.3. Amendments to DCR 1991

DCRs 1991 were subsequently amended from time to time as summarized below:

- 1997- Separate set of regulations enabling Slum Rehabilitation was introduced. The entitlement of eligible slum dwellers was defined and the scale of incentive FSI for subsidising slum rehabilitation was also specified. FSI that could not be consumed *in situ* within the prescribed limit (initially 2.5 later raised to 3.0 in 2000) was allowed to be used as TDR.
- 1999- Heritage buildings and precincts were listed and buildings were categorised into three grades. A separate set of DCRs was prepared and a Heritage Conservation Committee was established to review development proposals in respect of heritage buildings and buildings in heritage precincts.
- 1999- Entitlements of eligible tenants in Cessed buildings were decided and scale of incentive FSI for subsidising reconstruction of Cessed Buildings were introduced by way of a separate set of DCRs. Unlike in case SRA, the rehabilitation and the incentive FSI could be used *in situ* without any limit.
- 2002 - The original rule of textile mills was reinterpreted by Government with the result that in the final outcome only about 5% of land came to MCGM and another 5 % to MHADA.
- 2003 - the permissible FSI for educational and medical use was enhanced to 4 times the permissible FSI.
- 2008 - redevelopment of MHADA layout was granted FSI up to 2.5
- 2008 - New provisions for grant of 100% additional FSI to IT/ITES and bio-technology establishments were added.
- 2008 - Provisions for promoting development of multi storeyed/parking lots by granting additional FSI were added.
- 2009 -for urban renewal of Cessed buildings additional FSI was granted.
- 2009 the starred category hotels were granted additional FSI based on the star category to the extent of 5.0.
- 2009- the requirement of parking spaces was enhanced by nearly doubling the parking requirement.
- 2010- Provisions for grant of additional FSI to Buildings of Information Technology and Information Technology Enabled Services were added.
- 2010 - Provisions for considering nalla and appurtenant service road as reservation in DP and granting FSI/TDR were incorporated.
- 2012 - The concept of compensatory fungible FSI was introduced by allowing additional FSI of 35% in lieu of certain areas permitted free of FSI by charging premium. (this is discussed at length in Chapter 17 on FSI).

21.4. Approach of DCR 2034

21.4.1 GDCRs and SDCRS

In the light of experience of DCR 1991, and approach adopted for formulation of main proposals of DP2034, the approach and structure of DCR 2034 is articulated as follows.

As explained in earlier chapters the DP is seen as a broad framework for guiding the development. This has to be followed by undertaking detailed local area plans as and when necessary. Corresponding to this a common set of DCRs called General Development Control Regulations (GDCR 2034) has been formulated.

Special Development Control Regulations (SDCR 2034) are formulated for areas in this plan. As envisaged earlier local area plans will be of following nature.

- a. Areas where need of special regulations have been recognized. In this plan a set of SDCRs have been included. These are for redevelopment of cotton textile mills,, redevelopment of Cessed Buildings, redevelopment of cluster of Cessed Buildings and rehabilitation of slums.
- b. Areas where more detailed plans will be required particularly dealing with public realms such as in TOD Zones. These could be undertaken by Municipal Commissioner in due course, along with the necessary SDCRs. Such plans are not expected to require any change in Land Use Zones or FSIs.
- c. Special Regulations for streetscapes are included in SDCR these are explained in Section 21.5 of this Chapter
- d. Areas that may require detailed local area plans involving change of land use and or FSI would need a legal procedure to be followed for detailed local area plans under Section 33 of MR&TP Act related to comprehensive development. Such plans would include formulation of specific SDCRs.

21.4.2 Distinguishing Features

Distinguishing features of GDCR 2034 are presented below.

1) *Creating a pool of land for public purposes*

In earlier Development Plans, reserving land for all public purposes was considered as effective tool for obtaining land in public realm. But the review of the D.P. implementation reveals that it was not as effective as envisaged. Alternative strategy of creating pool of land for public purpose in each Ward/Planning Sector through contribution of certain percentage of land while developing large parcels is proposed as a tool of increasing supply of land for public purposes in following manner

Table 21.1: Land contribution for public purpose

Sr. No.	Requirement of Amenity Space to be handed over to M.C.G.M.	Percentage of Amenity Area
(i)	Amenity Area for plots with area more than 2,000 sqm	10.00%
(ii)	Changing Industrial user of plot to Residential and/or Commercial	15.00 %
(iii)	Development in Cotton Textile Mills	20.00%

The lands made available from such pool are proposed to be assigned for uses such as Recreation Open Spaces, Markets, Welfare centers, Police Chowkies, Libraries, Municipal Chowkies, Dispensaries, Fire Stations and various other uses as listed in GDCR 2034. Assigning uses to the land so procured shall take into account the deficiencies in various amenities in the area and shall decide the priorities by adapting the methodology of radar diagrams for each planning sector as explained in Part I of this report. Additionally the opinion of Municipal Corporators of respective Electoral Wards and NGOs and citizens could also be considered.

2) *Allocation of Right of Way of Roads*

Experience in Mumbai so far demonstrates that the carriageways for facilitating movement of vehicles have been widened by progressively reducing the widths of footpaths. This has adversely affected safe pedestrian movement and has not necessarily helped vehicular movement.

The DPs in past indicated the total ROW of the roads. In DP 2034 ROWs for roads have been proposed and their allocation for footpaths and carriageways had been allocated in GDCRs. Allocating such ROW for vehicles, pedestrians and other uses was not specified in the earlier plans.

It is also proposed to empower MC to amend such allocation of ROW in favor of footpaths where high pedestrian volumes and natural propensity of street vending is expected. With such provisions any reduction in allocation of ROW for footpath will be considered as amendment to DP and will require legal process to be followed including prior publication and consideration of suggestion/objections received.

3) *Simplification of Marginal Open Spaces*

The DC Regulation 1991, had prescribed requirement of marginal Open spaces in different clauses of regulation making it complicated. For designing any building it was necessary to refer to various sub sections. The requirement of marginal open spaces was such that each and every proposal with FSI more than 1.0 required concessions for condoning marginal open spaces. When the concept of fungible FSI was introduced, the permissible FSI in suburbs reached 2.7 with same old requirement of marginal open spaces requiring condonation almost in every case. This caused delay processing the proposals. Further permissible FSI was considered as entitlement by the plot owners/ developers. And to achieve the FSI all kinds of concessions were requested by the way of use of discretionary powers of Municipal Commissioner under Regulation 64b of DCR 1991.

In GDCR 2034, the requirement of marginal open spaces has been simplified and the concept of setbacks and step backs has been introduced. The power to condone deficiency in marginal open spaces is excluded from the discretionary powers of Municipal Commissioner.

4) *Inclusionary housing*

Concept of inclusionary housing that is promoted by Ministry of Housing and Poverty Alleviation is adapted in GDCR 2034.

In case of plots larger than 2000 sqm in area, 10% built up area in the form of small tenements are required to be handed over to MCGM. Such dwelling units are proposed to be allotted to project affected households, businesses and community workplaces for restoration of livelihood of displaced households and EWS/LIG households.

5) *Multiple use of open spaces*

Due to scarcity of land the requirements of various public utilities could not be satisfied by allocating land by way of reservations. Such requirements where technically feasible are allowed to be provided under the open spaces.

In DCR 1991, only parking was permitted under open spaces, however in GDCR 2034 in addition to parking, Electric Substations, storage of harvested Rain Water, Grey Water Harvesting plants Sewerage Treatment Plants etc. area permitted below open spaces.

6) *Provisions for physically challenged people*

“The persons with disabilities (Equal Opportunities, Protection of Rights and full participation) Act, 1995 requires that equal opportunities are offered to disabled people. As per suggestions received in stakeholders’ workshop a separate section in GDCR for Design of physically challenged people has been incorporated considering the aging population and needs of physically challenged in the City. A separate chapter incorporating design guidelines for ensuring barrier free environment for the physically challenged is included in the GDCR 2034. Availability of lift up to terrace floor with unobstructed terrace floor has been provided for as that was one of the demands of the stakeholders for enhancing the accessibility to terrace by disabled people with easy movement of wheel chairs on the terraces.

7) *Design for entrance gate & curb cut*

Regulation for curb cut has been provided for at the traffic signals as well as at entrance to the plot with a view to ensuring easy access to wheel chair and unobstructed movement of wheelchairs and pedestrians on the footpaths.

The regulation has been incorporated for fixing the boundary gates minimum 3.00m inside the boundary wall so as to avoid traffic interruptions. It will help unobstructed movement of vehicles on road when the vehicle is entering the premises.

8) *Environmental Sustainability*

A separate section for environmental sustainability has been incorporated in GDCR 2034 consisting of rain water harvesting, installations of solar water heating system, grey water recycling, sewage treatment plants and waste disposal, energy efficient buildings.

21.4.3 Redundant Regulations

With long usage certain rules with their associated numbers have become a part of common language amongst the architects and developers. In GDCR 2034, many of them have become redundant and do not find place in GDCR 2034. These are listed below.

Table 21.2: Redundant regulations from DCR 1991

Sr.No.	DCR 91 Reg. No	Description
1	33(1)	Road widening and Construction of new Roads
2	33(2)	Building of Educational and Medical Institutions and Institutional Buildings
3	33(2) (A)	Buildings of Private Medical Institutions
4	33(3)	Buildings of Government and semi-Government offices and public sector undertakings
5	33(3)(A)	Buildings of Government and the Corporation being used for staff quarters
6		Buildings of Department of Police, Police Housing Corporation, Jail and Home Guard of Government of Maharashtra for use as their Staff Quarters
7	33(4)	Building of Starred Category Residential Hotels
8	33(5)	Housing Schemes of MHADA
9	33(6)	Reconstruction of buildings destroyed by fire or which have collapsed or which have been demolished. Etc
10	33(8)	Construction for housing the dis-housed
11	33(11)	Sites and Services, Small Size tenement, under the Urban Land (Ceilings and Regulations) Act., 1976
12	33(12)	Development by Maharashtra Housing and Area Development Authority with World Bank Assistance
13	33(13)	Development of sites reserved for Resettlement and Rehabilitations of Project Affected Persons
14	33(15)	Redevelopment of contravening structures included in the Final Plot of a Town Planning Scheme
15	33(16)	Buildings of Information Technology Establishments
16	33(17)	Shifting of cattle sheds outside Greater Mumbai
17	33(19)	Reconstruction/Redevelopment in Gaothan area
18	33(20)	Buildings of Biotechnology Establishments
19	33(24)	Development of Multi storied /Parking lots
20	33(25)	Additional FSI to Religious building

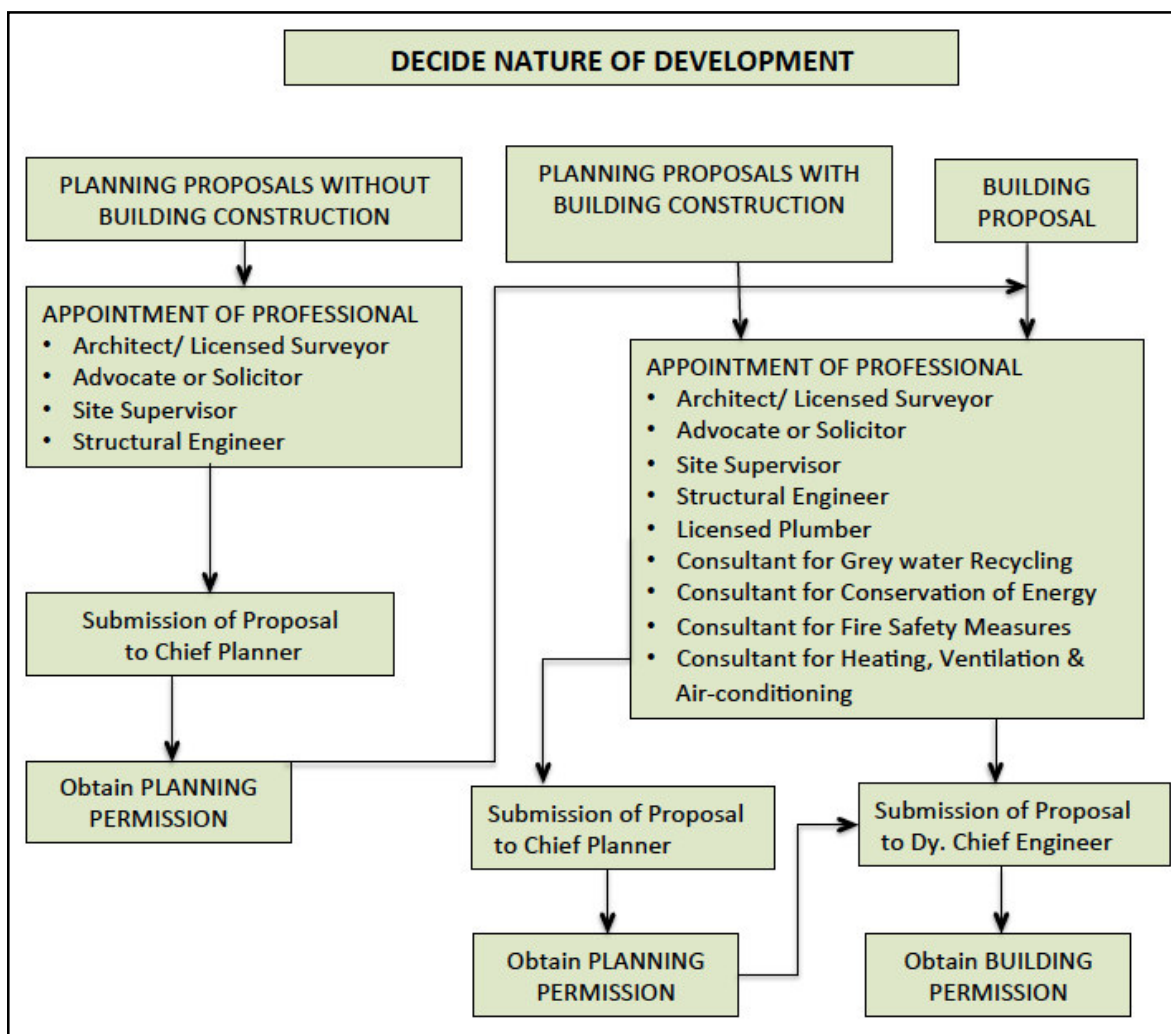
A Two Stage Procedure for Grant of Development Permission

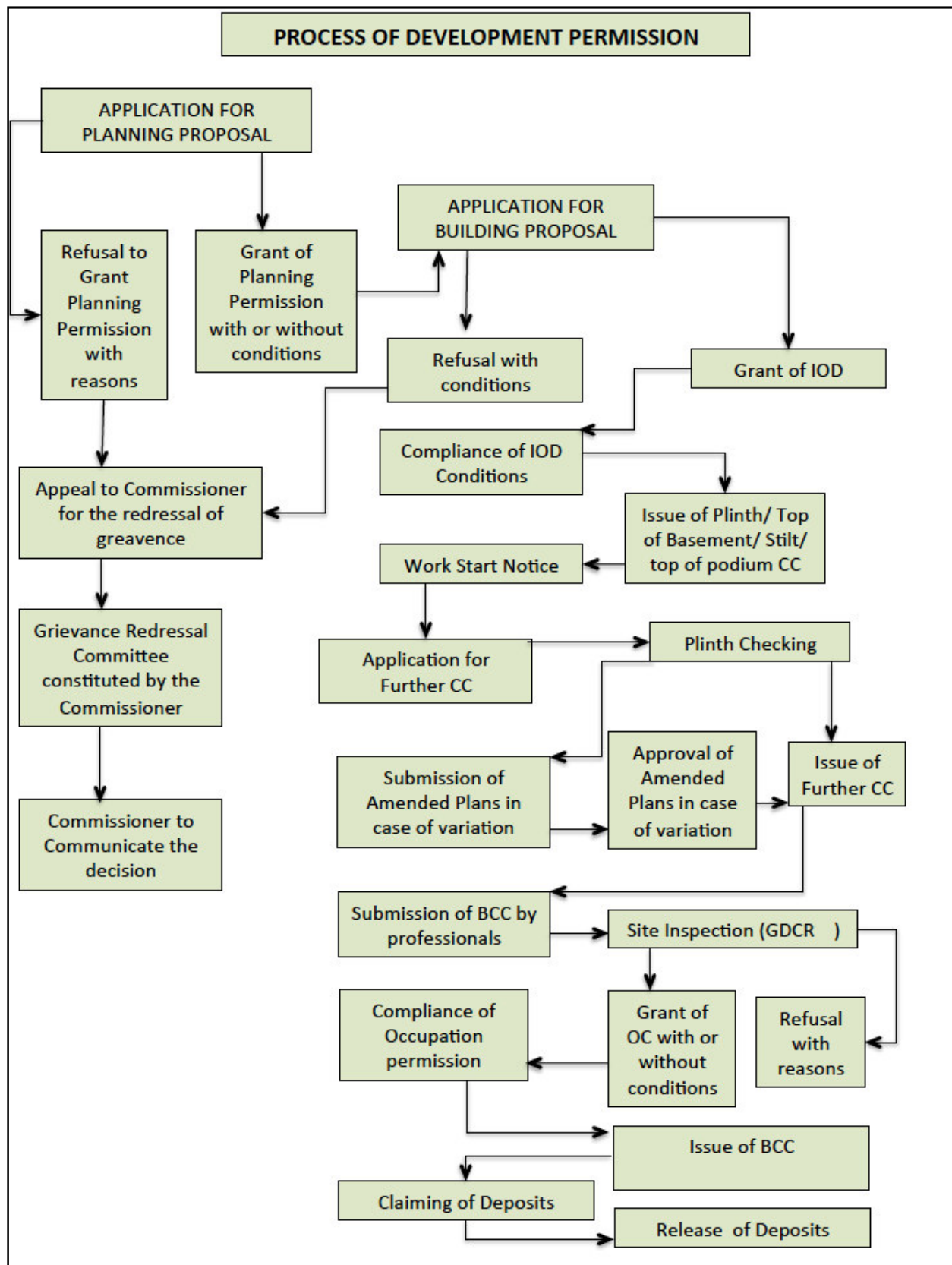
In GDCR 2034, the procedure for grant of development permission is divided in two stages. These are Stage I: Planning permission and Stage II: Building permission.

Planning permission covers the following:

1. Change of User from Industrial to Residential/ Commercial
2. Layout/Subdivision/Amalgamation
3. Development Permission under accommodation
4. Development permission for reservation categorized under non-accommodation reservation
5. Development of plots designated for public purpose
6. Grant of TDR
7. Development of plots of Cotton Textile Mills
8. Development in Heritage Precincts
10. Redevelopment proposals of Cessed Buildings and Cluster of Cessed Buildings

The application for building permission will follow the planning permission where required. The detailed description of the procedure for granting permissions is incorporated in the GDCR. The stages of permission and the process of communicating decision in respect of development permissions are described as shown in the flow chart below.





21.4.4 Grievance Redressal

MR&TP Act under Section 47 allows for an appeal to the State Government against the decision of a Planning Authority. In addition to this provision, the GDCR 2034 allow for grievance redressal as shown in the above chart. This will provide for formal channel of grievance redressal.

21.4.5 GDCRs as Guidance Document

DCRs so far have been seen as a legal document and interpreted accordingly. The proposed GDCR 2034 and the SDCRs that will follow are additionally conceived as a guidance document to help landowners and the professionals to formulate proposals that are in consonance with the objectives of the DP 2034. With this view, the specific objectives of a set of regulations are stated in the GDCR and SDCR. This is intended to aid interpretation of a regulation in case of a dispute. Similarly, explanatory tables and illustrations are added to clarify the intent of the regulation.

21.5. Special Development Control Regulations

The DP 2034 designates areas within Greater Mumbai that portray unique characteristics in terms of types of built form. Special DCR have been drafted for these areas since they need special attention in terms of addressing specific built form. These distinguished areas include old housing fabrics, cotton textile mill, heritage precincts, urban villages, slum areas, and Transit-Oriented Development.

21.5.1. Redevelopment of Cessed Buildings and Urban Renewal Clusters

Several Wards in the Island City with closely built up, dense urban fabric and high population densities have a large stock of older dilapidated buildings. Several buildings built before 1969 have remained in a state of disrepair as a result of the Rent Control Act 1947. The MHADA Act 1976, considers these unsafe and unsuitable for occupancy. A repair cess is levied on old dilapidated tenanted buildings under the provisions of this Act. Hence, these are categorized as cessed buildings. They are classified into three types, buildings built before 1940, buildings built between 1940 to 1950 and ones built between 1951 to 1969.

Government has formulated separate set of regulations for individual Cessed Buildings and a Cluster of Cessed Buildings called Urban Renewal Cluster. Their adapted versions have been incorporated in the SDCR. The entitlements of the eligible tenants and occupants have been retained as per the Government regulation. However, the incentive FSI is made available according the provisions of GDCR.

21.5.2. Redevelopment of MHADA colonies

Government has formulated a separate set of regulations enabling redevelopment of MHADA layouts through private participation. These regulations have been adapted as SDCR with an exception that incentive FSI available will be according to the GDCR.

21.5.3. Slum Rehabilitation

A separate set of regulations was in existence for rehabilitation of slums. These regulations are operated by the SRA. An adapted version of these regulations has been incorporated as SDCR where incentive FSI is to be computed as per the provisions of GDCR.

21.5.4. Development/Redevelopment of Cotton Textile Mills

Separate provisions for redevelopment of land of Cotton Textile Mills existed in DCR 1991. These in an amended form have been included as SDCR. The requirement of contributing land to pool of land for public purpose has been clearly specified.

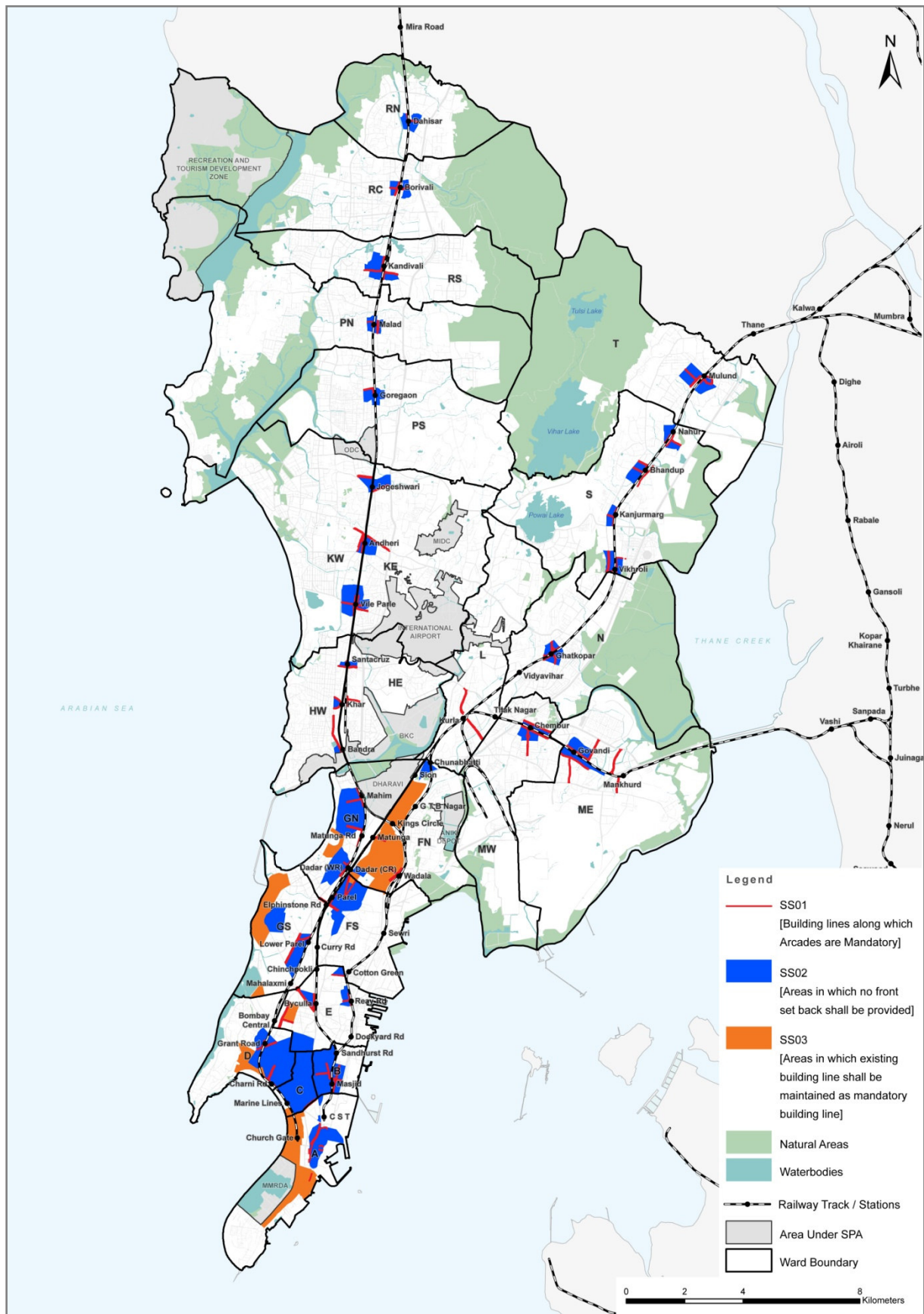
21.5.5. Special Regulations for Streetscapes

Streets lend special character to places in the city. Greater Mumbai has several distinctive street typologies including arcades along D. N. Road, buildings on street edge in the Island City and areas which have a strong building line such as on Marine Drive. The arcades in the Fort area which lend a special character to D. N Road provide welcome shade to both the hawker as well as the pedestrian. Streets such as Ambedkar Road between Dadar and Sion, main streets in Dadar, Matunga, Sion, Marine Drive and Lady Jamshedji Road, enhance walkability for the pedestrian.

SDCR for Streetscapes have been included with a view to enhancing walkability, incorporate inclusive zoning for street vendors, improve legibility of urban places, improve urban design and aesthetic value of places and provide safety, comfort and security on the street. The DP 2034 has formulated Streetscape templates for 3 types of streets in Mumbai. All the three types will follow regulations for allocation of right of way of public streets as provided in GDCR. Following are the Streetscapes:

- **Streets requiring arcades:** Existing major pedestrian road access to railway stations are proposed as arcaded streets. These arcades will provide uniform, shaded and unrestricted walkways for pedestrians. The SDCR specifies size of the arcade, front step-back, provisions for access to fire engine etc. Separate provisions for corner plots are also included.
- **Streets where developments do not require any front setback:** Several areas in Greater Mumbai have streets with zero front setbacks. The SDCR proposes to retain this edge.
- **Mandatory building line:** Several areas in Greater Mumbai have uniform building line. To maintain the character of streetscapes of such areas, the SDCR proposes to follow the existing dominant front setback in the area for future developments.

Map 21.1: Streetscapes for Greater Mumbai



21.5.6. Parking Regulations for areas with extremely high FSI

Areas with FSI of 5 and above are proposed around transit stations. In the demarcated TOD areas (areas around railway stations having an FSI of 5.0 and above), parking provision is reduced to half of that provided in the GDCR for residential, commercial, retail, hotels and industrial land use. These areas have been created to encourage public transit, reduce vehicular ingress, curb the use of private vehicles and promote walking.

A photograph of a meeting room with several people seated around a long table. The room has large maps on the wall and air conditioning units. The image is semi-transparent, serving as a background for the text.

Chapter 22

Local Area Plans

22. Local Area Plans

In case of metropolitan cities, the need for two tier planning system has been widely recognized. The Town and Country Planning Organization, Ministry of Urban Development have recommended a three tier system comprising Macro (Regional Plan), Messo (Development Plan) and Micro Plans (Local Plans). In Delhi, Master Plan and Zonal Plans are in practice. In Ahmedabad, strategic Development Plan with local plans, in the form of Town Planning Schemes (TPS), has been successfully used. In case of the Mumbai Metropolitan Region, statutory Regional Plan and Development Plan for the municipal /local jurisdictions have been in practice since 1966. Local level planning in the form of TPS have not been very successful in the recent past due to land disputes and long periods of time taken up for their implementation. However, with amendments to the TPS and acknowledging the framework for 'Comprehensive Development' in the MR&TP Act, the DP encourages development initiatives at a local area level.

Greater Mumbai has diverse urban fabrics and there is a need for a framework to allow formation of regulations adapted to local context of these urban fabrics. The legal arrangement for local area plans has been made in the MR & TP Act, 1966, where Planning Authority is conferred power to prepare plans for 'Areas of Comprehensive Development', which should be developed as a whole. Such plans would provide for the following:

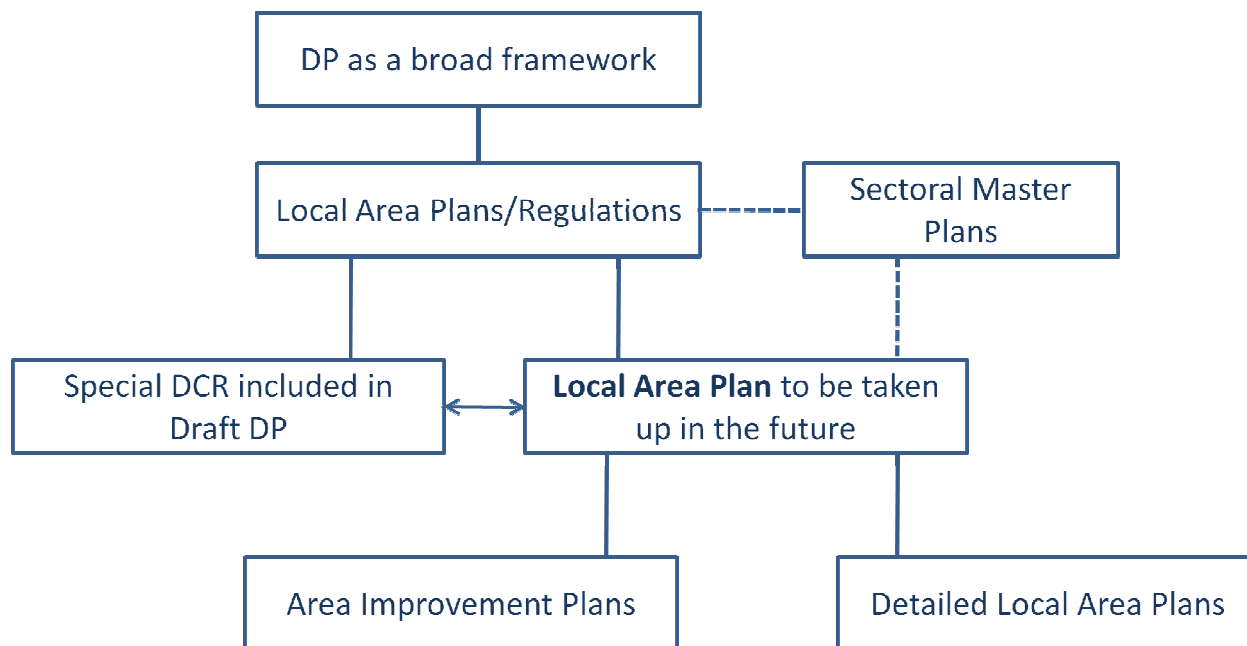
- (a) Detailed development of specific areas for urban renewal, housing, mixed use development, industrial areas, civic centres, educational and cultural institutions, etc.
- (b) Control of architectural features, elevation and frontage of buildings and structure;
- (c) Dealing satisfactorily with areas of bad layout, obsolete development, with slum areas and relocation of population;
- (d) Open spaces, gardens, playgrounds, recreational areas and streetscape design.

In preparation of plans for comprehensive development, the planning authority has to follow the same procedure as laid down for the preparation of the Development Plan under Section 25, 26, 27, 28, 30 and 31 of MR&TP Act, 1966. Thus, the planning authority has to prepare plan for comprehensive development, and submit it along with a report containing stages of development for execution along with the estimated cost to State Government for sanction. The State Government has to sanction the plan within three months.

However, it is imagined that there would be proposals which require quick planning responses in specific local areas or area improvement proposals which can be easily tackled at a local level by the MCGM and where a State level procedure may not be required.

The following chart puts local area plans in context within the larger framework of the DP.

Figure 22.1 : Classification of local area plans



As seen in the above chart, Local Area Plans will be undertaken at consequent level of planning within the broad frameworks formulated in the DP.

Special DCR includes place-based regulations enforcing specific controls in areas such as textile mills, heritage areas, special streetscapes, areas with cessed buildings and slums. However, there would be a need to address area specific issues at the local level, with inputs from stakeholders and participation from local inhabitants. These area specific local plans can be classified into two types as shown below:

22.1. Area Improvement Plans

Areas where detailed plans will be required mainly dealing with public realms such as in TOD Zones. These could be undertaken by Municipal Commissioner in due course, along with the necessary SDCRs. Such plans are not expected to require any change in Land Use Zones or FSIs.

For example, proposals for parking in public areas, design of street ROW, on street parking plan, pedestrian pathways, design of parks, connection of public buildings to station areas, public realm improvements in station areas, infrastructure provision in bazaar areas, demarcating hawking zones and other urban design improvements in the public realm maybe undertaken as Area Improvement Plans.

Figure 22.2: Illustration of Skywalk connection at Ghatkopar station as a probable area improvement plan



22.2. Detailed Local Area Plans

Areas that may require detailed local area plans involving change of land use and or FSI would need a legal procedure to be followed for detailed local area plans under section 33 of MR&TP Act related to comprehensive development. Such plans would include formulation of specific SDCRs. These detailed plans could also be undertaken under the Town Planning Schemes, as amended in 2014. These plans would need intensive local community and stakeholder participation within the planning process so as to cater to the needs of the people. For example:

- Heritage precincts that have restrictive development rights but have been allotted a high FSI. However, the logic of allocation of FSI for these precincts will have to be specifically revisited given that conservation of heritage supersedes all other regulatory conditions. These areas will therefore have to undergo a detailed Local Area Plan in order to determine appropriate development control regulations for new developments therein, which are non heritage structures. The preparation of a Local Area Plan for Heritage Precincts will incorporate detail urban design guidelines and regulations including frameworks for land use, builtform, transport, amenities, streetscape, tree-scape, street network, façade articulation, material specifications etc.
- Also in case of Gaothans or Old City fabrics, specific local needs shall have to be addressed. Accordingly, the Gaothan precincts could be re-configured in terms of land use and FSI for better designed neighbourhoods.
- Public fronts along rivers and nallas and recreational open spaces, could be considered for detailed Local Area Plans.
- Large SRA schemes or Town Planning Schemes could also be proposed for detailed Local Area Plan, where reconfiguration of land use and consumption of FSI would be allowed, in order to bring better conditions of livability. For example, a detailed Local Area Plan can be undertaken at Malwani, since there is a lack of amenities and infrastructural provision in the area. The community could become a part of the decision making process by initiating mutual

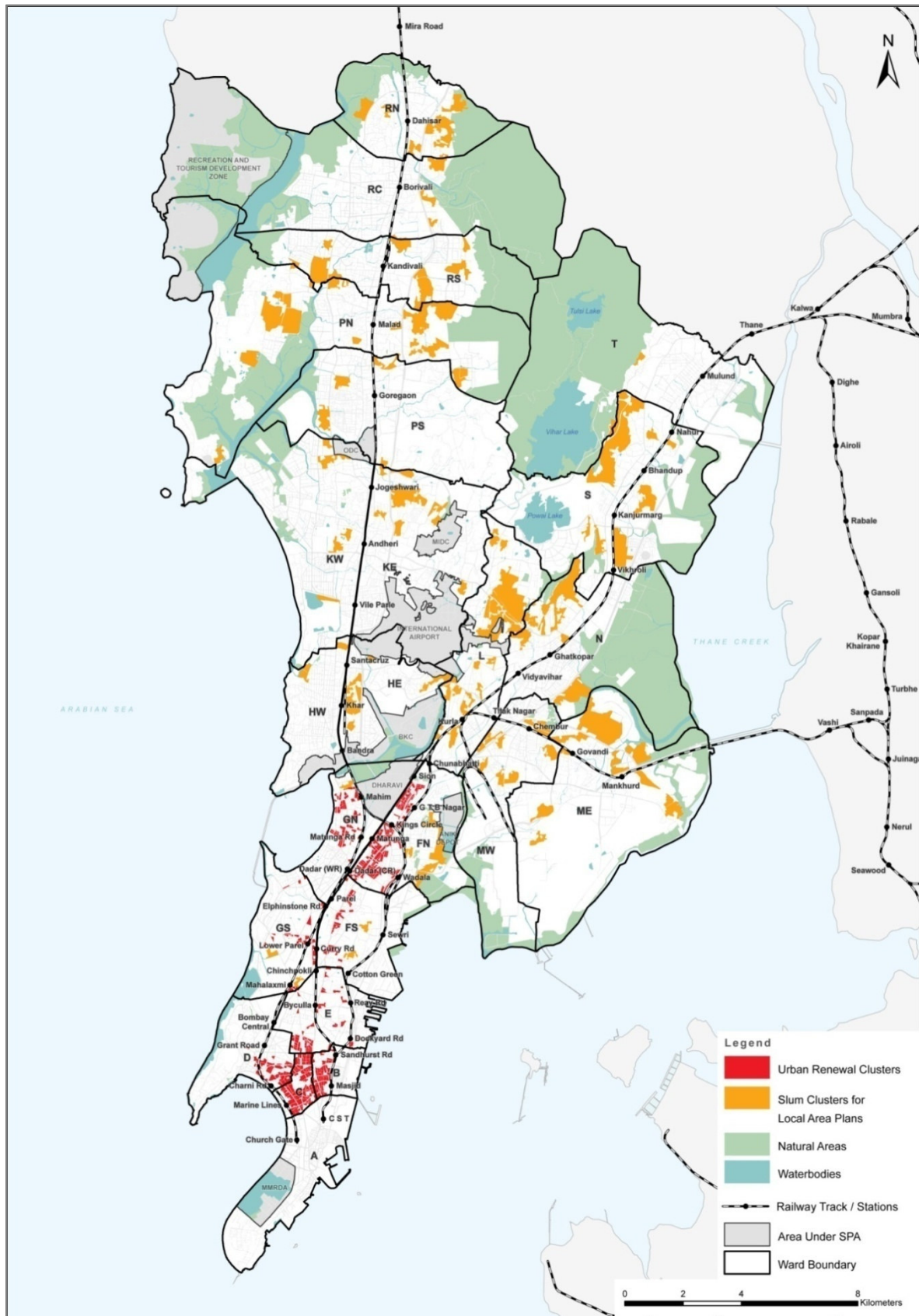
readjustment of land for amenities and open spaces may be proposed through the TPS mechanism in existing urbanized areas in order to cater to specific needs of the local area .

The Draft Development Plan indicates the 'Areas for detailed Local Area Plan' and also indicates the priorities for undertaking preparations of such plans (as shown below). Notwithstanding this, the areas demarcated for a Local Area Plan will be covered by the Proposed Land Use and DCR. Development permissions will be continued to be granted according to the GDCRs till plans for Local Area Development come into force. The areas mentioned below have been included in the Draft DP 2034 and PLU as probable priority areas to initiate the detailed local area planning process.

- Comprehensive LAPs for large slum or resettlement areas e.g. Shivaji Nagar, Malwani, Golibar, Asalfa Village in L Ward;
- Comprehensive LAPs for urban renewal, e.g. Null Bazaar, Chira Bazaar.
- Comprehensive LAPs for areas undergoing land use changes such as, industries to office or residential use; e.g. Parel Mill Land area in G/S Ward, industries in Saki Naka K/E Ward & Mulund-Bhandup in S & T Ward.
- Plans for Comprehensive Development in Transit Oriented Zones around existing and proposed transit stations / hubs e.g. Dadar-Parel area in G/S & G/N Ward, D.N Nagar in K/W Ward, and Ghatkopar in N Ward.

However, local area plans will not be limited to only these demarcations (Refer to Map 22.1 for demarcations of probable detailed local area plans) and would allow consideration of other areas that need attention and that have been brought to the forefront through local initiative.

Map 22.1 Areas to be undertaken for Local area planning



22.3 Execution of Local Area Plans

Following is a step by step approach towards the execution of the Local Area Plans which is outlined as follows:

1. **Reconnaissance surveys** for familiarization with site and user groups;
2. **Delineation of the Local Planning Area;**
3. **Establish the key stakeholders** (Public Authority, Elected Representatives, NGOs, Professionals, Private firms/ real estate groups, Community groups/ RWAs etc);
4. **Workshop 01:** with Key Stakeholders
 - a. Verification of Local Planning Area;
 - b. Understanding strategic issues and strengths of place upfront
 - c. Requirements of the stakeholders on prescriptions ensuing from the DP 2034.
5. **Base map preparation** at 1: 1000, 1: 500 and 1: 100 scales. Base map to include the following details:
 - a. Levels of disaggregation: Administrative, elected ward boundaries, planning sector boundaries, other micro level associational boundaries;
 - b. Planning Area;
 - c. Cadastral data: Property boundaries, CTS Nos.
 - d. Building footprint;
 - e. Physical infrastructure alignment: above grade, at grade and underground;
 - f. Utility infrastructure alignment;
6. **Primary Surveys: Findings to be incorporated on the GIS data base**
 - a. Existing land use survey;
 - b. Existing building use survey;
 - c. Existing building height survey;
 - d. Existing building condition survey;
 - e. Existing FSI at block and building level;
 - f. Existing street use survey;
 - g. Hawkers and street vendors location;
 - h. Socio-economic sample survey;
 - i. Traffic surveys;
 - j. Parking survey;
 - k. Vegetation;
 - l. Detailed amenity reservation use;
 - m. Street hierarchy and ROW;
 - n. Others, depending on demand at local level.
7. **Situation Analysis:**
 - Definition of renewal clusters;
 - Population (slum, non-slum, Koliwadass, Gaothan);
 - Economy-livelihood (formal, informal);
 - Status of access to health, education, social amenities (at neighbourhood/ cluster levels);
 - Disease profile; hygiene, solid-waste, water, drainage, physical infrastructure and utility, local requirements at cluster level and listing of possible projects/ sites for redevelopment and improvement;

- 8. Workshop 02: Benchmarking;**
- 9. Mapping of institutional landscape:** Social and economic relations between the stakeholder groups.
- 10. Constraints and Opportunities**
- 11. Demand for programmatic and non-programmatic spaces;**
 - a. Demand for floor space consumption: inhabitation and employment, built amenities and utility infrastructure;
 - b. Demand for un-built amenities.
- 12. Projectization: Listing of priority projects driven by the public sector;**
 - a. Private realm;
 - b. Public realm.
- 13. Workshop 03: Solicit suggestions from the stakeholders on situation analysis, stakeholders to vote for list of projects to be undertaken;**
- 14. Concept Scheme;**
- 15. Regeneration Plan:** Sequence of undertaking redevelopment/ renewal for buildings, clusters and city blocks;
- 16. Urban Design policies, proposals and guidelines:**
 - a. Economic development framework;
 - b. Population (re)distribution framework;
 - c. Land use zoning framework;
 - d. Mobility framework;
 - e. Street networks framework;
 - f. Open space framework;
 - g. Environment framework;
 - h. Utility infrastructure framework;
 - i. Social infrastructure framework;
 - j. Urban form framework;
 - k. Urban finance framework;
 - l. Urban management framework.
- 17. Planning priority Sites/ Projects;**
- 18. Workshop 03:** Solicit suggestions on Design Options/ Scenarios;
- 19. Detail Design and Planning,** construction drawings for projects in the public realm,
- 20. Preparation of BoQ** for projects in the public realm;
- 21. Community workshops;**
- 22. Finalization of detail design and working drawings, BoQ** for projects driven by public sector;
- 23. Investment Plan:** Frameworks for participatory budgeting/ evolving finance models for project financing;
- 24. Frameworks for participatory Monitoring & Evaluation**
- 25. Project Structuring for Implementation.**



Chapter 23

Financing the Development Plan

23 Financing Implementation of the Development Plan

23.1. MCGM's Finances

Under the provisions for preparation of the Development Plan, Section 26(2) (5) of the MR&TP Act requires formulation of a Finance Plan for implementation of the DP.

Municipal Corporation of Greater Mumbai is established under the provisions of the Mumbai Municipal Corporation (MMC) Act, 1888. Its day-to-day functions are governed by the provisions of aforesaid Act. MCGM is responsible for provision of urban basic services to the entire city of Greater Mumbai. The Act provides for a 'Municipal Fund' to be kept with the corporation for receiving all income. Besides, the State Government may, under appropriation, make a grant to the corporation as regards the income of the entertainment duty levied and collected by it under the relevant acts.

Under the MMC Act, the Commissioner is required to prepare estimates of income and expenditure of the Corporations for the next financial year and present them to the Standing Committee/ Education Committee. The Standing Committee, after due consideration, is required to finalise the budget proposals. The budget estimates prepared by Standing Committee are to be approved in the annual general body meeting of the Corporation. In case the budget estimates are not finally adopted by the general body on or before the 31 March, the estimates recommended by the Standing Committees should be deemed to be the budget estimates finally adopted by the Corporations until the estimates are so adopted.

Municipal Corporation of Greater Mumbai follows a cash-based system of accounting across various heads (except in case of Budget G). Planning and management of separate responsibilities are governed by separate budgets as provided for, in the MMC Act, 1888.

These budget heads constituting separate budgets as provided in MMC Act, as follows: -

- a. Budget A – General budget comprising all incomes accruing pertaining primarily to General Tax, Octroi, Wheel tax, Fire tax, License tax, Market Fees, Secondary education, Deonar Abattoir and Entertainment tax and expenses on urban services other than those covered by separate budget listed below.
- b. Budget B – comprising all incomes and expenses pertaining primarily to improvement schemes of Bombay Improvement Trust properties taken over by the corporation in 1933
- c. Budget C – comprising all incomes and expenses pertaining primarily in respect of B.E.S.T undertaking
- d. Budget E – comprising all incomes primarily accruing from education cess and receipt on account of government grant and expenses for educational services.
- e. Budget G – comprising all incomes and expenses pertaining primarily on account of Water supply and Sewerage projects and operations being undertaken by the corporation

f. Tree Authority Budget –pertains primarily to expenditure on preservation, plantation and maintenance of trees in Greater Mumbai area.⁶⁵

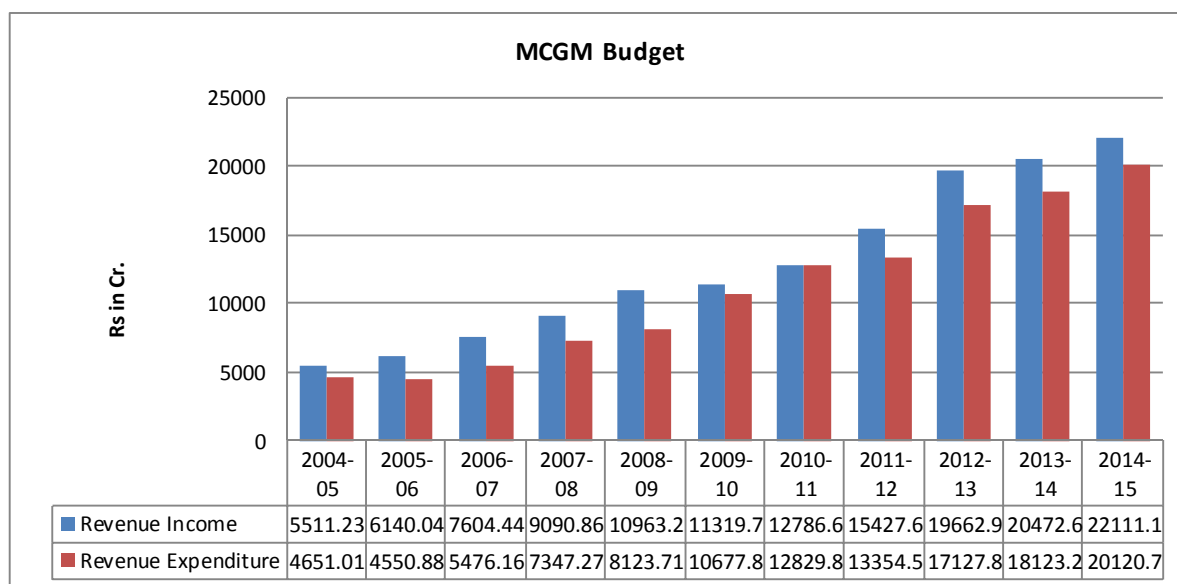
Budget C is for B.E.S.T undertaking, an autonomous organization with independent management responsible for maintaining its accounts.

Tree Authority Budget is primarily being funded from contributions by Budget A, B, E, G and C.

For accounting purposes, Budgets A, B, E and Tree Authority are grouped together, with consolidated budgeting and financials. Budget “G” is without transfers of finances to and from other budgets. Budget “C” is wholly separated from other budgets of MCGM.

The size of the budget of MCGM has been steadily increasing over the period. The steady increase in the income from Octroi and Property Taxes has raised the size of the budget.

Figure23.1: MCGM Budget

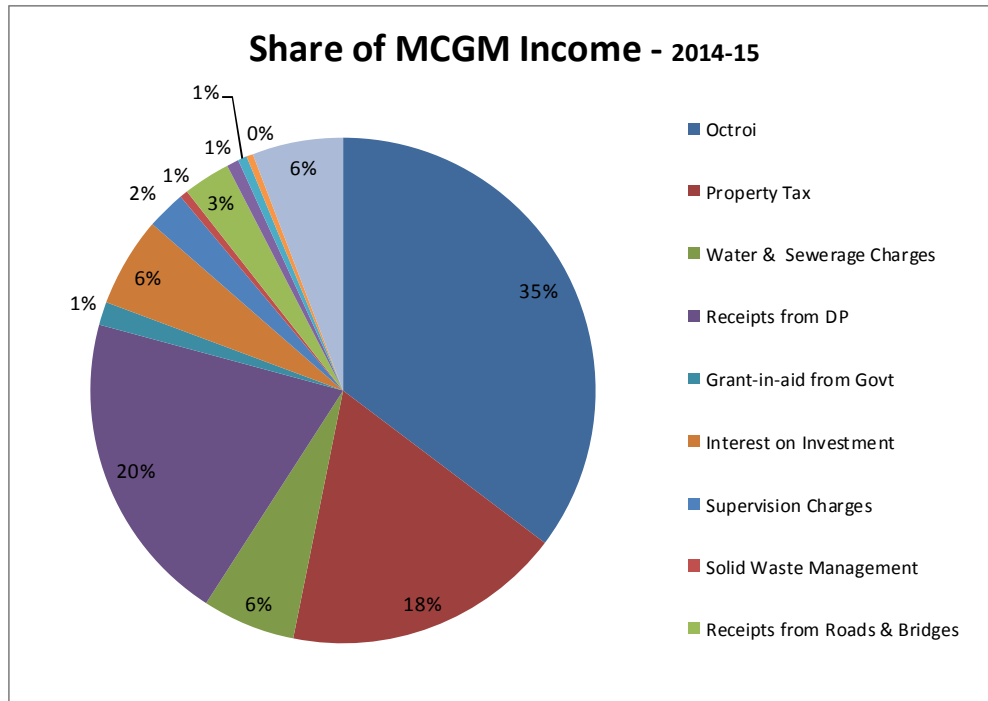


Source: MCGM

The major sources contributing to the budget for the year 2014-2015 are as follows:

⁶⁵ Source : Web-site of MCGM

Figure 23.2: Share of MCGM Income



Source: MCGM

Budget A, B and E: Revenue Receipts

The primary sources of revenue receipts are on account of Octroi, Receipts from Development Plan and Property taxes. Octroi is a tax levied by the Municipal Corporation on all goods and commodities entering into its jurisdiction.

Octroi is the single largest source of income for MCGM, accounting for 35.28 per cent of the revenue income. The Octroi receipts of the Corporation have grown from Rs. 4159 crores in 2007-08 to Rs. 7800.00 (BE) Crore in 2014-15 at a CAGR of about 10 per cent.

The receipts from Development Plan mainly comprise Development Charge levied under the provisions of MR&TP Act, 1966, premium charged for additional 0.33 FSI in suburbs and premium charged for Compensatory Fungible FSI.

MCGM levies a consolidated Property Tax upon all lands and buildings within the city, as per provisions under the MMC Act, 1881. This revenue head accounts for about 18 per cent of the total revenue income of MCGM. The consolidated Property Tax components were levied as a percentage of the Ratable Value (RV) of the property till the year 2013. The MCGM now levies the property tax on the capital value from the year 2014.

The following comprises of broad categories constituting the Budget A, B, E and G for the Budget Estimate of year 2014-2015.

23.2. Budget A, B and E: Revenue Expenditure

The revenue expenditure of MCGM comprises expenditures pertaining to:

a. Establishment - salaries and pensions (accounting for about 48 per cent of the total revenue expenditure).

b. Operation and Maintenance of civic services and contingencies on other operations, including power and fuel charges, stationery, spare parts for plant equipment and machinery, bulk water charges, etc. (accounting for about 16 per cent of the total revenue expenditure).

c. Debt Servicing (about 1 per cent of the total revenue expenditure).

The total revenue expenditure of MCGM has grown from Rs.7,711.03 Crore in 2008-2009 to Rs.20,120.73 (BE) crore in 2014-2015 at CAGR of 17 per cent. The following broad categories constituting the revenue expenditure in the Budget Estimate 2014-15:

Wages and Salaries: - 50 %

Operations and Maintenance: - 15%

Revenue Grants, contributions and subsidies: - 23%

Moreover, significant proportion of revenue expenditures (6 per cent) is entailed as contributions to capital expenditures.

23.2.1 Overall Status: Revenue Account

The overall position of the revenue account for Budget head A, B and E is assessed based on the operating surplus attained by the corporation. As evident, the surplus of receipts over expenditures of MCGM on account of these budget heads is just about sufficient to cater to capital works and contribution to various funds. On cash basis, it can be seen that the fund has a surplus of approx. Rs.1991.24 crore in year 2014-15 Budget Estimate.

23.2.2 Budget A B and E: Capital Account

The capital income comprises primarily of loans raised by MCGM for capital works from time-to-time. MCGM has utilized the capital receipts including transfers from revenue account in undertaking implementation works on schemes such as traffic operations, roads and bridges, storm water drains, solid waste management, health and medical services, slum improvement and primary education.

23.2.3 Budget G: Revenue Account

Budget G of the BMC comprises water tax, water benefit tax, sewerage tax, sewerage benefit tax, water charges and sewerage charges. Water charges and sewerage charges are the predominant components of the revenue account, followed by the benefit taxes.

23.2.4 Budget G: Capital Account

The receipts in Budget G are primarily utilized for meeting routine establishment and O&M commitments, while the surpluses are applied towards capital expenditures on account of projects such as Water Supply Project, Sewerage Project, and Water O&M etc.

23.3. Receipts from Development Plan Department

The Development Plan department of MCGM contributes to the MCGM budget by way of Development Charges u/s 124A of MR&TP Act, 1966, Premium from 0.33 FSI, and Premium from

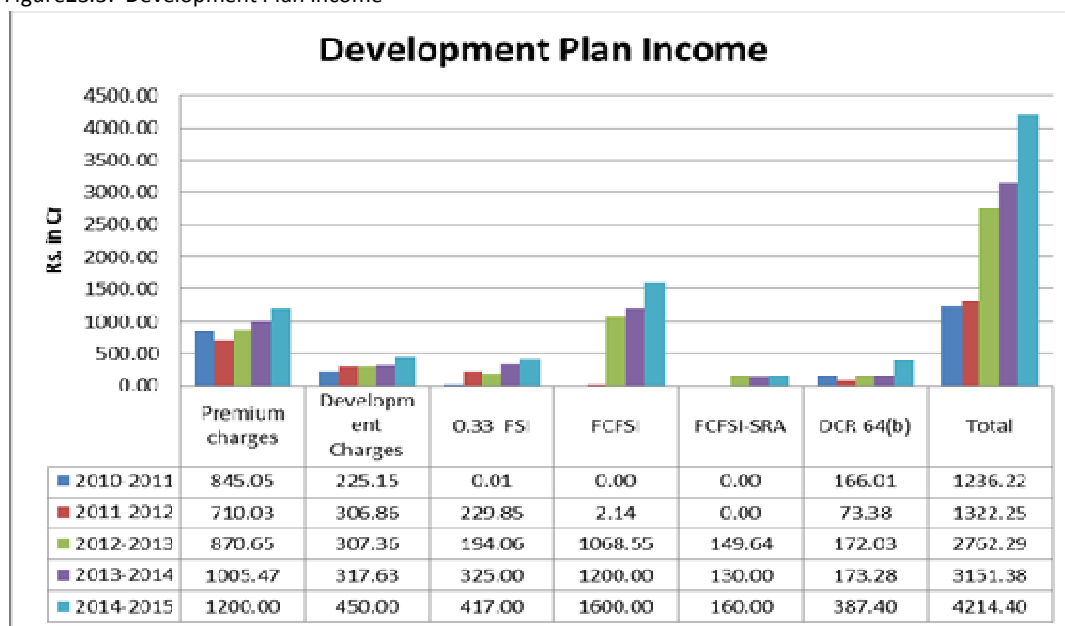
staircase and revenue from one of the provision of DCR i.e. 64(b) by way of condonation of open space deficiency.

The rate on which the Development Charges are levied is specified in section 124B of MR&TP Act, 1966. The contribution from the Development Charges is one of the major sources in the MCGM budget. Moreover various amendments in Development Control Regulations & MRTP Act made by the State Government have also resulted into a sizable increase in the municipal revenue. The new source of premium against fungible FSI has fetched Rs.1200 crore in year 2013-14. Further, the premium charges received against additional 0.33 FSI in suburban area in the period 2013-14 is Rs. 325 crore as against the revenue collection for year 2012-13 of Rs.229.85 crore from this source.

The contributors of income towards DP over the last five years are as follows:

- Premium charges
- Development charges
- FSI
- FCFSI
- FCFSI-SRA
- DCR 64(b)

Figure23.3: Development Plan Income



Source: MCGM

23.3.1 Development Charges

The section 124A of MR&TP Act 1966 stipulates that the Planning Authority shall levy within the area of its jurisdiction development charge on the institution or use or change of use of any land or building, or development of any land or building, for which permission is required under provisions of the Act. This development charge is classified as per the user of the land viz. Industrial, Commercial, Residential and Institutional. The rates at which the development charges are levied are prescribed in Second Schedule of the Act. As per the provision of the Act the development charges for the development of land for residential or institutional use involving building or construction is 0.5+ 2.0 percent of the rates of developed land mentioned in the Stamp Duty Ready Reckoner of

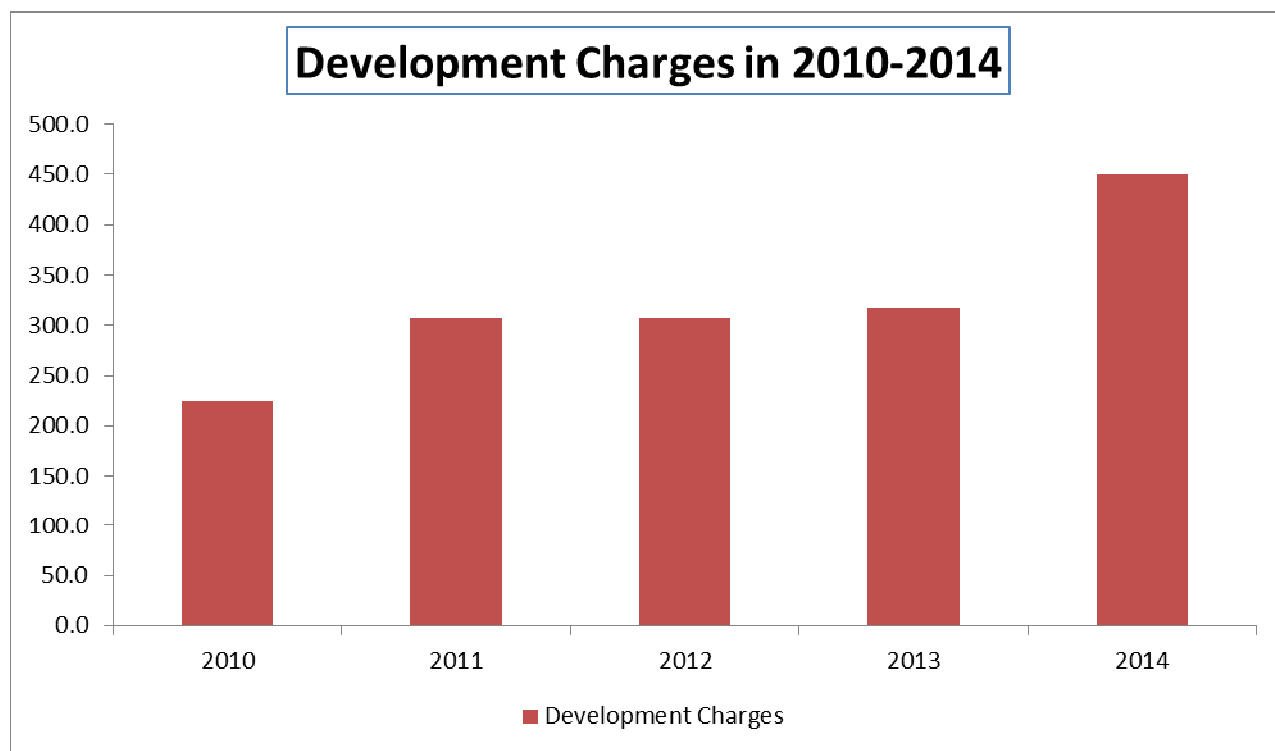
that year. The rates for industrial and commercial developments are respectively one and half times and two times the rates of development charges as specified in the Act.

The rates are dependent on the Stamp Duty Ready Reckoner published by the Chief Controlling Revenue Authority & Inspector General of Registration Maharashtra State.

The Ready Reckoner Rates for current year 2014 in Mumbai city and suburbs (up to Dahisar in western suburbs and Mulund in eastern suburbs) reveal that rates have seen an increase of 5-20% across the market. There is a similar increase in year 2012 and year 2013 due to continued increase in residential prices across Mumbai City and Suburbs. The rates in certain pockets have increased by over 50% over period of 2011-14; this is in keeping with the rise in saleable rates for Mumbai city/suburbs⁶⁶.

The income from Development Charges under section 124A of MR&TP Act has shown a steady rise in the period 200-2014. This source has shown a steady rise in income in the budget of MCGM from Rs.225.10 Cr in year 2010-2011 to Rs. 450.00 Crore (BE).

Figure23.4: Development Charges 2010-2014



23.3.2 Other Charges and Fees

The section 22 of the MR&TP Act 1966 specifies the Contents of the Development plan. It stipulates that a Development Plan shall generally indicate the manner in which the use of Development land in the area of a Planning Authority shall be regulated and also indicate the manner in which the development of land shall be carried out.

The sub-section 22(m) of MR&TP Act 1966, gives powers to Planning Authority for imposition of fees, charges and premium, at such rate as fixed by the planning authority from time to time for

⁶⁶ http://www.hdfcsec.com/research/researchdetails.aspx?report_id=3000404

grant of an additional floor space index or for the special permissions or for the use of discretionary powers under the relevant Development Control Regulations. This section has given powers for imposition of conditions and restrictions in regard to the open space/ setbacks to be maintained around building, the percentage of building area for a plot, the location, number, size, height, number of storeys etc.

The above section has been exploited for charging the additional FSI in respect of grant of an additional FSI for the buildings of educational, medical and government institutions, recovering of additional 0.33 FSI for the buildings in suburbs, grant of Fungible Compensatory FSI and recovering the premium on account of deficient open spaces provided around the buildings. The charges/fees have become a major source of revenue after the Octroi and property taxes.

23.3.3 Premium Charges

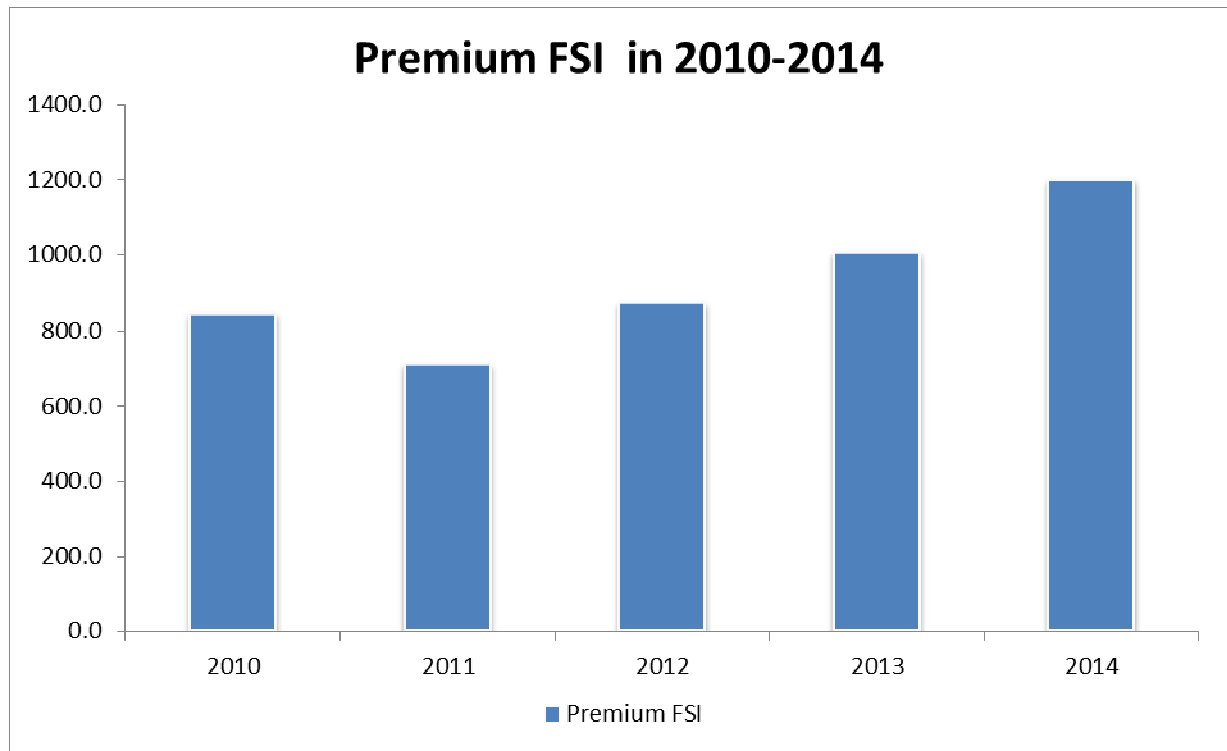
The Regulation 33(2), 33(3) and 33(4) of Development Control Regulation 1991 has exploited the aforesaid provision for charging the premium for grant of additional FSI in respect of buildings on independent plots of educational, and medical institutions and institutional buildings of Government or public authorities or of registered public charitable trusts or of Medical Institutions run on co-operative basis established for charitable purposes and starred category hotels. Such additional FSI is permissible subject to the payment of premium to Government as may be decided by Government, out of which 50% is payable to the Corporation.

Similarly, the Development Control Regulation has also made provision for charging premium for the areas covered by staircases/ lift wells including lobbies as specified, excluding those covered under D.C.Regulation No.35 (2) (iii) with special written permission of the Commissioner.

This source is one of the major sources of income for the MCGM.

The above provision has shown a steady rise in income in the budget of MCGM from Rs.845.05 Crore in year 2010-2011 to Rs. 1200.00 Crore (2014-15).

Figure 23.5: Premium FSI 2010-2014

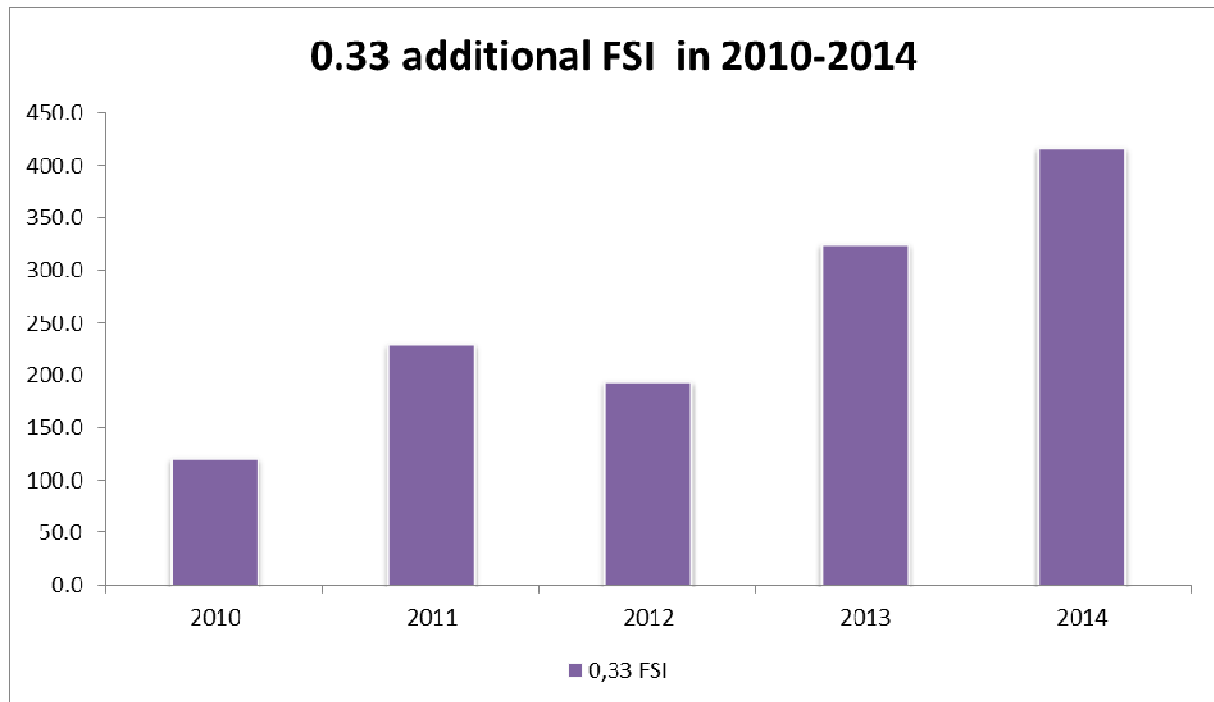


23.3.4 Premium towards 0.33 FSI

This amendment in the Development Control Regulations 1991 was as per the section 22(m) of MR&TP Act 1966, which gave powers to Planning Authority for imposition of premium, at rate as fixed by the planning authority.

The income from additional 0.33 FSI offered in the Suburbs under regulation no.32 of Development Control Regulations has shown a steady rise from Rs.121 Crore in year 2010-2011 to Rs. 417 Crore (BE).

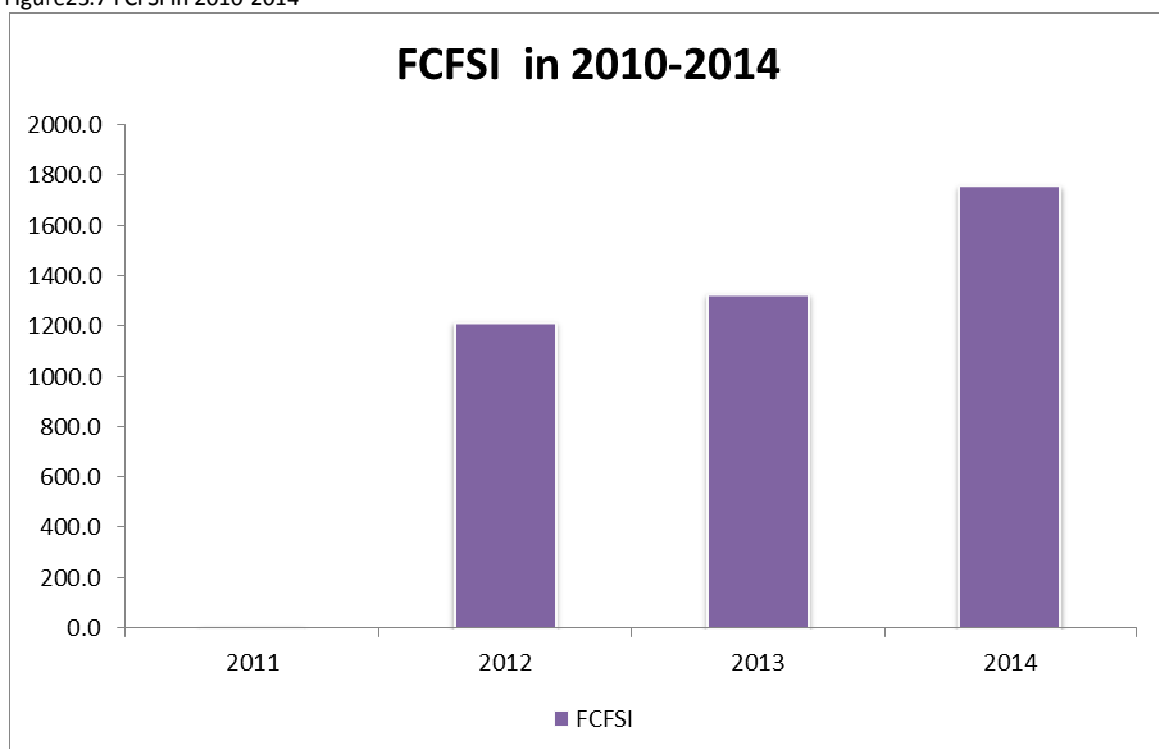
Figure23.6: 0.33 Additional FSI 2010-2014



23.3.5 Fungible compensatory Floor Space Index (FCFSI)

The premium charged towards FCFSI has now become one of the major sources of income from the development plan department accounting for 42% share in the income from development plan. The income from FCFSI in the year 2012-2013 was Rs.1,218 Crore which is growing at a CAGR of 20%. In the current budget of MCGM for the year 2014-2015 the Budget Estimate from this source is Rs.1716 Crore.

Figure23.7 FCFSI in 2010-2014



23.3.6 Income under DCR 64(b)

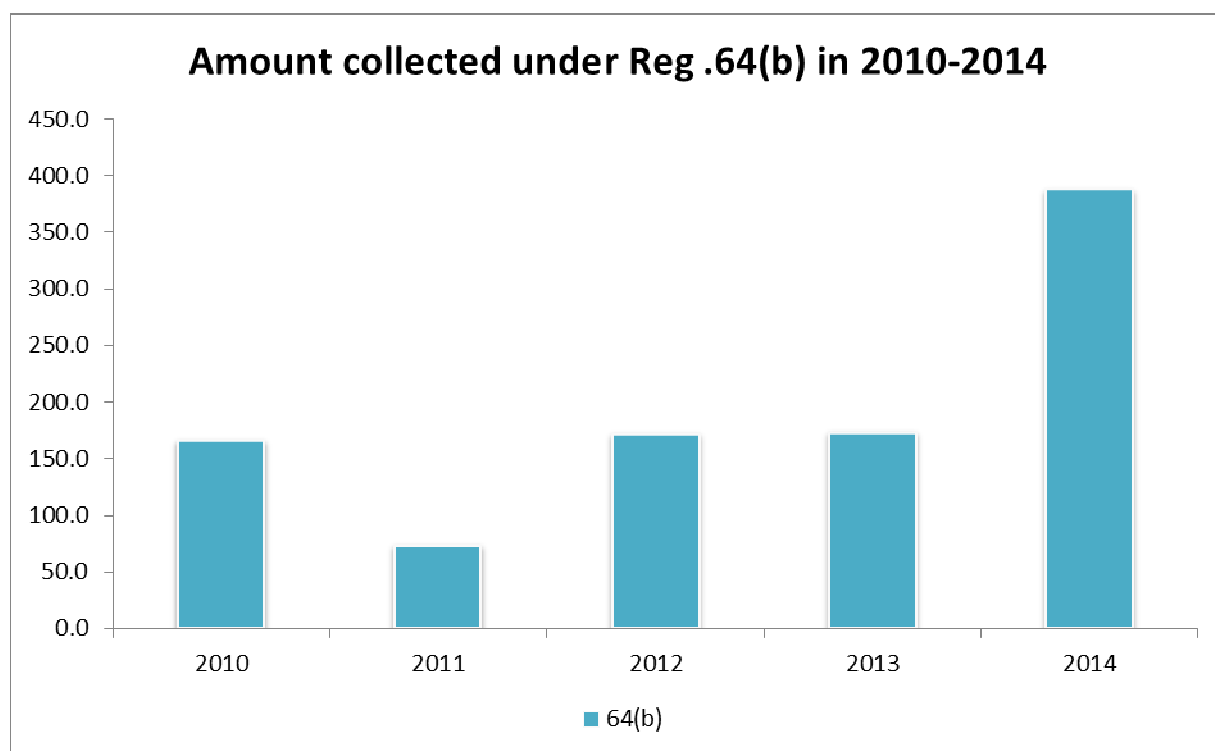
The regulation no. 64(b) of Development Control Regulations, 1991 which gives discretionary powers to the Municipal Commissioner stipulates that *“(b) In specific cases where a clearly demonstrable hardship is caused, the Commissioner may for reasons to be recorded in writing, by special permission permit any of the dimensions prescribed by these Regulations to be modified, except those relating to floor space indices unless otherwise permitted under these Regulations, provided that the relaxation will not affect the health, safety, fire safety, structural safety and public safety of the inhabitants of the building and the neighbourhood.”*

Thus under this regulation the Commissioner can permit dimensions prescribed in the regulation to be modified except relating to FSI. This proviso has been mainly utilised by MCGM for condoning the deficiencies created in the open spaces to be left around the building for the light and ventilation. The DC Regulations stipulate the open spaces/ setbacks to be left around the building for light and ventilation for a FSI of 1.0. The DC Regulations allows this FSI of 1.0 to be exceeded by $(1.0 + 0.70)$ 1.70. Hence as a result of utilisation of this FSI a deficiency in the required open spaces to be left for light and ventilation is created. This deficiency in open spaces is permitted by Commissioner under the provision of the regulation 64(b) of DC Regulation by charging premium as stipulated in the section 22(m) of MR&TP Act 1966.

The premium to be charged for grant of relaxation in open space on account of utilisation of TDR in lieu of Road/ Reservation and FCFSI is 100% of the rate of Stamp Duty Ready Reckoner Rate for that year. This premium is reduced to 10% on account of utilisation of slum TDR and additional 0.33 FSI.

The premium collected on account of this proviso appears to be steady over the past three years. However in the current budget for the year 2014-2015 the budget estimate is Rs.387.4 Crore.

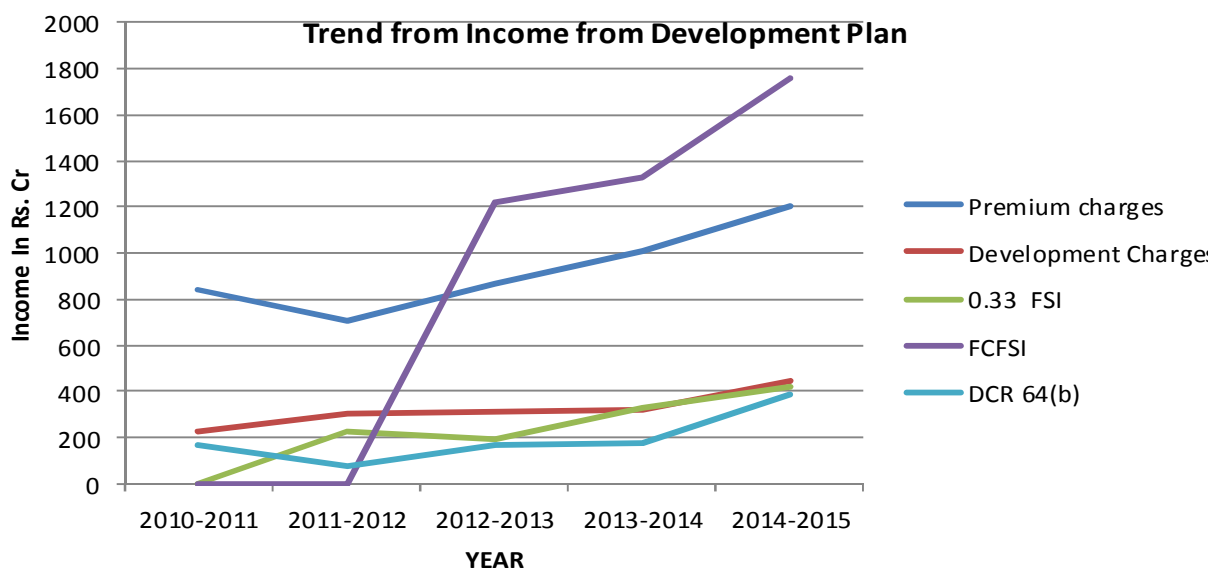
Figure23.8: Amount Collected under Reg. 64(b) in 2010-2014



23.3.7 Trend from Income from Development Plan

The income from the development plan shows an increasing trend on all sources of income. The income from the Development Charges shows a steady increase as shown in the trend Figure shown below. There is a dip in the income under DCR 64(b), Premium Charges for the year 2010 to 2012. This dip in the income can be attributed fall in the approval of new building proposals on account introduction of FCFSI in that period. The income from the FCFSI shows a steep increase in the period 2011 to 2014 as the developers opted for the FCFSI as a tool to increase in built-up areas. The income from the 0.33 FSI shows a steady rise. The steady rise in this income can be attributed to the developers opting for 0.33 FSI instead of TDR.

Figure 23.9: Trend from Income from Development Plan



The Budget Expenditure and Accounting Practice

The duties of the Corporation under Section 61 of MMC Act include, inter alia:

- Construction and maintenance of drains, drainage works, public latrines, urinals and similar conveniences;
- Urban forestry, protection of environment and promotion of ecological aspects;
- Construction and maintenance of works and means for water supply for public and private purposes;
- Scavenging and the removal and disposal of refuse and rubbish;
- Establishing and maintaining public hospitals and dispensaries;
- Construction and maintenance of public remarks and slaughter houses;
- The entertainment of a fire-bridge and the protection of life and property in the case of fire;
- Construction maintenance, alteration and improvement of public streets, bridges, culverts, causeways and the like;

- *Lighting, watering and cleansing of public streets;*
- *Maintaining, aiding and suitably accommodating schools for primary education;*
- *The improvement of Greater Mumbai;*
- *Further, in terms of Section 63 the Corporation may also provide for, inter alia:*
- *Slum improvement and up-gradation;*
- *Urban poverty alleviation;*
- *Furtherance of educational objects;*
- *Establishment, aiding or maintaining libraries, museums, art galleries, botanical or zoological collections;*
- *Laying out or the maintenance of public parks, gardens or recreation grounds;*
- *The planning and care of trees on road sides and elsewhere;*
- *Construction, purchase, organization, maintenance, extension and management of tramways, trackless trams, or mechanically propelled transport facilities for the conveyances of the public;*
- *Purchase, maintenance, management and conduct of any undertaking for the supply of electric energy or gas to the public or the subsidizing of any such undertakings;*
- *Any measure, likely to promote public safety, health, convenience or instruction;*

Further, under Section 354-B it is the duty of the Corporation to execute city improvement schemes, street schemes, poor class accommodation schemes, reclamation schemes etc.

The income from the Development Plan has been a major source of the revenue for the MCGM finances. The income under various receipts is allotted a separate budget head so as to have quick information about the earnings under these budget heads. MCGM has adopted the SAP system of accounting across all the departments. This system of accounting dissipates information on the basis of cost heads. The consolidated income from the each budget head therefore can be obtained from the SAP system. However, the disbursement of the budget i.e. its distribution across the various Capital/ Revenue budget heads is not available.

The chapter VI-A of MR&TP Act 1966 stipulates the provisions for the Levy, Assessment and Recovery of the Development Charge. The section 124J stipulates the provision for recovering, accounting and expenditure of the Development Fund. The section 124J is as under:-

"124J. Development Fund: - (1) there shall be established and set apart a separate fund to be called "the Development Fund" and an Authority shall separately show the same in its budget.

(2) All moneys received by the authority as development charge together with interest thereof, if any, under this Chapter shall be credited to the Development Fund.

(3) The moneys credited, from time to time, to the said Fund shall be applied only for the

purposes of providing public amenities in the area and maintenance and improvement of the area under the jurisdiction of the said Authority.

(4) Surplus moneys at the credit of the said Fund, which cannot immediately or at an early date be applied for the purposes aforesaid, shall, from time to time, be deposited by the Authority in the bank.”

The above sections stipulates that the Development Charges that are recovered under section 124B of MR&TP Act are required to be utilised for the purposes of providing public amenities in the area and maintenance and improvement of the area under the jurisdiction of the MCGM.

The regulation 32 of the DC Regulation for the grant of 0.33 FSI stipulates that *“The MCGM shall utilise the premium through Escrow Account for implementation of Development Plan and infrastructure.”* Similarly the note below the regulation 35(4) which grants the FCFSI states that *“The premium amount collected shall be kept in a separate Account to be utilized for infrastructure development.”*

The above provisions of the DC Regulations, 1991 stipulates that the charges recovered for grant of additional 0.33 FSI and FCFSI are to be utilised for the implementation of the Development Plan, infrastructure and for infrastructure development.

The MR&TP Act and the D.C Regulations stipulates that a separate account is required to be created for the recovering of the charges. The MCGM has accordingly created separate cost centres in SAP for each of these incomes. However, the expenditure under these incomes heads is not shown separately in the budget. The contribution from Development Charges from Budget ‘A’ is reflected in the sources for meeting the Capital Expenditure. However, the expenditure for the remaining budget is not reflected in the budget. Both the operating acts i.e. MR&TP Act and DC Regulations provides that the charges recovered under these provisions are required to be utilised for the Development Plan implementation and the infrastructure. These aspects are required to be reflected in the MCGM budget for the effective utilisation of theses incomes. However, the budget documents available in public domain do not provide the data about the deployment of Development Chargers and other Premiums charged. In fact all the Development Plan is classified as revenue income. Consequently its deployment for implementation of DP is not clearly discernible.

On this background the estimated cost of implementation of DP and its financing could be considered as described below.

The Development Plan essentially comprises two components. (a) Proposals for developing the public realm represented by reservations and designations for public purposes and (b) The regulations for controlling development in private realm. The past experience indicates that the regulatory function tends to overshadow the development of public realm. It is therefore proposed to establish an administrative protocol for ensuring implementation of DP.

However, prior to presenting such protocol, it would be appropriate to first establish the financial feasibility of the DP.

23.4. Cost of Implementation of DP

The draft DP has proposed reservation of land for public purposes in following categories:

- i. For roads and road widening
- ii. For recreational open spaces
- iii. For other built amenities and utilities.

Financial cost will have to be incurred in procuring land if compulsorily acquired. Alternatively, land could be procured by way of grant of TDR without any monetary compensation. In addition the draft DP has made a provision of contribution of land toward the pool of land for public purpose. Development of such lands including construction of built amenities on them will have to be financed

The developmental expenditure will have to be thus incurred in case of the following:

- Construction of new roads;
- Widening of existing roads;
- Development of recreational open spaces; and
- Construction of built-up spaces for other amenities on reserved land and land from the pool of land for public purposes.

The total land to be acquired for public purpose to suffice the needs of the projected population of Greater Mumbai by 2034 is 57.65 million sqm. Out of this 47.91 million sqm is proposed as reservations and the remaining 9.74 million sqm is proposed to be met through pool of land for public purposes. The reserved land comprises 7.51 million sqm for amenities, 0.13 million sqm for public utilities, 18.75 million sqm for roads and 21.50 million sqm for open space and cemeteries. This does not include the land under reservation that is already acquired and the land that would be acquired by agencies other than MCGM.

The total amenity built up area to be constructed for public purpose by 2034 is estimated on the assumption that lands reserved for education, municipal offices and municipal housing will be built at 3.5 FSI and all other amenities and utilities shall be built at an FSI of 1. Land from pool of land for public purpose will be built at FSI of 0.2. The total built up area estimated to be constructed for public purposes 20.74 million sqm. This built-up area does not include construction to be carried out by agencies other than MCGM and the civil works required for installations of plant and equipment by MCGM departments.

23.5. Cost of Implementing Development Plan

23.5.1 Components of cost

The cost of procuring land and development listed above is estimated below.

23.5.2 Basis for estimating cost

Cost estimates are carried out in 2013-14 prices. The unit costs for the above cost components are given in Table 23.1 below:

Table 23.1: Components of Cost

Sr.No.	Components	Unit cost
1	Land acquisition	2.5 times the Ready Reckoner Rate (2013)
2	Cost of Road construction	Rs. 9,020 /sqm
3	Cost of Road widening	Rs. 7,150/sqm
4	Cost of building construction	Rs. 21,530/sqm
5	Cost of Open Space Development	Rs. 3,230/sqm

23.5.3 Total estimated cost

The total cost of implementing development plan is estimated based on the above and is summarized below:

Table 23.2: Estimated Cost

Sr.No.	Components	Area in sqm	Estimated Cost Rs. in Crores
1	Acquisition of all reserved lands (100%)	47,910,567	513,997
2	Cost of Road construction	9,526,370	8,593
3	Cost of Road widening	9,224,838	6,596
4	Cost of Building construction	20,742,428	44,658
5	Cost of Open Space and Cemetery Development	21,505,784	6,946
	Total		580,790

23.5.4 Sources of Revenue

MRTP Act provides for levy of Development Charge at the time of granting development permission. The rates prescribed in the Act for residential and institutional use are 0.5% of Ready Reckoner Rate of Land (2013) applied to area of land and 2% of Ready Reckoner Rate of Land (2013) applied to the area of construction. The rates for industrial and commercial use are 1.5 and 2 times respectively. To be on the conservative side, revenue from industrial and commercial use is also estimated at residential rates.

Section 22 (m) of MRTP Act enables the Planning Authority to impose fees, charges and premium for grant of additional FSI. Taking recourse to this provision it is proposed to charge premium for additional FSI. This is proposed to be levied in two bands. FSI in the band Premium A is charged at 70% of Ready Reckoner Rate for Land and FSI in the band Premium B is charged at 100% of the Ready Reckoner Rate for Land.

23.5.5 Estimation of Revenue

It is assumed that the extent of development that would occur by 2034 would fully exhaust the permissible FSI. Based on this assumption the development charge from construction and related land is estimated. Further as a corollary it is also assumed that permissible premium FSI will also be fully used.

Table 23.3: Estimated Revenue

Sr. No.	Source	Area in sqm.	Revenue – Rs. Crores
1	Development Charge – Construction	558,743,299	65,274
2	Development Charge - Land	139,914,718	3,951
3	Premium A FSI	74,900,211	301,190
4	Premium B FSI	116,462,402	716,438
	Total		1,086,853

23.6. Scenarios for Development

Above estimates are subject to considerable uncertainties. To arrive at a realistic assessment a range of scenarios is evaluated.

Cost: In case of costs the uncertainty is mainly on account of cost of land acquisition. The Best case would be the one in which entire land would be obtained through TDR without any monetary compensation. The worst case would imply that 90% area for roads and road widening could be obtained through TDR on the adjacent land. Rest of the land would be acquired by paying monetary compensation.

Revenue: The uncertainty of revenue stems from the extent and distribution of development that might occur in various price zones by 2034. The total development permissible under the plan is in excess of demand for floor space estimated for 2034. It is not possible to estimate with any reasonable degree of certainty in respect of geographical distribution of this development. In the optimistic scenario 75% of the maximum permissible floor space would be constructed, and in the pessimistic scenario only 25% of the maximum permissible floor space would be constructed.

Based on the two cases each in Cost and Revenue, four scenarios could be conceived as shown below:

Table 23.4: Scenarios for Development

Scenario	Cost in Crores	Revenue in Crores	Surplus/ Deficit in Crores	Revenue/C ost Ratio
Optimistic	Best (All land obtained through TDR) 65,745	Best (75% redevelopment) 815,140	749,395	12.40
Realistic	Best (All land obtained through TDR) 63,647	Worst (25% redevelopment) 271,713	208,066	4.27
	Worst (Land to be acquired through monetary compensation)* 373,051	Best (75% redevelopment) 815,140	442,088	2.19
Pessimistic	Worst (Land to be acquired through monetary compensation) 370,954	Worst (25% redevelopment) 271,713	- 99,241	0.73

- Assumption: In the worst case scenarios of cost 90% of the road area is obtained by way of TDR and only 10% of road area is acquired through monetary compensation.
- Explanation: The difference in the costs of two best case scenarios is on account of the difference in the area contributed to pool of land and related cost of construction. Similar is the reason for difference in cost of the two worst case scenarios.

In the realistic scenarios, the revenue substantially exceeds the cost of implementing DP. Only in the pessimistic scenario MCGM is likely to face a deficit of about 27%. However it seems unrealistic that virtually no land would be obtained through TDR. Nevertheless MRTP Act by section 124B permits the planning authority to enhance the rates of Development Charge with the prior approval of the Government.

The above analysis is carried out at 2013 prices indicating a broad financial feasibility of the DP. The actual cost would vary with inflation but the revenue being linked to real estate prices would increase at a rate faster than that of general inflation. It should be noted however that the calculations do not account for expenditure outside the development plan. These include, major infrastructure projects like the Coastal Road, investments required for implementing Local Area Plans and costs for rehabilitation of people that are affected by the development projects and amenity provisions like road widening and building. The surplus generated can be used to meet these additional costs. The revenue on account of premium FSI is essentially dependent upon the real estate market, which essentially cyclical. It is therefore not possible to forecast yearly revenues.

23.7. Implementation Protocol

The present practice in MCGM requires the DP Department to prepare DP and then manage development control. The implementation happens through sectoral departments like education, health, roads and gardens. But that is not a result of proactive implementation programme initiated

by the DP Department. Consequently the accounting system does not track expenditure on DP implementation and there is no monitoring of DP implementation.

To overcome this infirmity, following protocol is proposed.

(a) First Five Year Plan of Implementation:

DP Department will prepare a first five year (2014-19) plan of implementation. The plan will be based on the ward wise deficiency analysis following the methodology adopted for planning sector wise radar diagrams. The plan should consist of identification of specific works to be taken up by sectoral departments. This plan should then be referred to line departments for planning their works and proposing annual budget allocation.

(b) Annual Plan

Every year prior to budget formulation, the DP Department may take a stock of land obtained through TDR and built amenities received through AR. Based on this, DP Department may request the sectoral departments to make necessary budgetary provisions both – capital and revenue to use the assets obtained through DR and AR. Where TDR and AR have not yielded adequate results DP Department may request for initiating land acquisition.

(c) Subsequent Five Year and Annual Plans

During the concluding year of the first five year plan DP Department may evaluate the implementation and propose a second five year plan and later follow the same protocol.

Although the DP is prepared for a 20 year period, MRTP Act (section 127) allows for lapsing of reservations after 10 years of sanction of DP if no action is initiated for acquisition of land. In view of this provision, acquisition of reserved land will have to be carefully planned during the first ten years.

Such implementation programmes could then become the basis of monitoring and evaluation outlined in the next chapter.



Chapter 24

Monitoring and Evaluation

24. Monitoring and Evaluation

Development Plans, though prepared for a 20 year long period, typically do not contain provisions for ‘monitoring and evaluation’ as has also been the case with the past two Development Plans of Mumbai. In most cases therefore there is no monitoring of the way in which the context of DP has unfolded as compared to what was estimated in the DP or of the physical growth of the city. In case of MCGM, the financial allocation and budgeting does not expressly show the share of implementation of Development Plan. Consequently, there is no evaluation of DP implementation that could lead to periodic informed revision of DPs though permitted by law. The 20 year revision of DP therefore starts with time consuming ‘existing land use survey’ and assessment of implementation of ‘reservations’. In this DP therefore as envisaged by the TOR we propose a Monitoring and Evaluation system for DP though not mandated by law.

24.1. Three Components of Development Plan

Development Plan comprises four main components that need to be monitored. These are:

- **The Context:** The DP has used long term estimates of economy in terms of NDDP, employment and population as the basis for its proposals. However, economic growth could be cyclical and population growth could be susceptible to migration both in-migration and short distance out-migration. These factors that form the basis of the proposals of DP therefore need to be closely observed.
- **Physical Development:** Physical development in terms of change of land use and new construction is directly controlled by the planning authority through the development control regulations. The data gathered in the process of regulating each development proposal needs to be processed into aggregate information at ward and planning sector that can help monitor the growth with reference to development expected by the DP.
- **Outputs of DP:** DP has proposed development of public purpose infrastructure and amenities. The procurement of land for such public purposes under different measures included in DP needs to be closely monitored as securing land is the key to plan implementation.
- **Resource allocation for DP implementation:** DP has worked out broad cost of implementation of DP and resource mobilization for financing the implementation. Both these aspects need to be closely monitored to evaluate the deployment of various measures to achieve the implementation targets.

The monitoring as indicated above will have to be done annually. However comprehensive evaluation may be carried out every five years. The evaluation in the tenth year could be carried out with a view to formally revise the DP if required. The monitoring of the four aspects listed above is largely linked to measurements of outputs. However the evaluation will have to be of outcomes with reference to the three goals of the DP viz. Competitive Mumbai, Inclusive Mumbai and Sustainable Mumbai. Implementation of DP may be necessary but not sufficient for achieving these goals. The evaluation may over the years include other sectors and their plans to lead to mid-course correction in plan implementation or revision of plan itself.

24.2. Parameters to be Monitored and sources of data

The parameters to be monitored under each of the referred four categories and likely sources of data are presented below. Some of the sources of data are outside MCGM and some efforts may be required in obtaining data from such sources with desired details.

24.2.1 Economy and Demography

Economy of Mumbai is measured by the GDDP and NDDP (Gross District Domestic and Net District Domestic Product respectively) both in current and constant prices. These estimates are a part of the National Accounts compiled by the Director of Economics and Statistics and published annually in Maharashtra Economic Review. This is a good source of data to understand the growth rate of Mumbai with reference to that of Maharashtra and India. However the sectoral composition of DDP is currently not disclosed and therefore growing and declining sectors of economy cannot be identified.

Greater Mumbai is neither a geographically closed labour market nor a closed housing market. Population census provides data of workers by their place of residence. However, Mumbai attracts commuters from outside and also Mumbaikars travel outside for work. The source of data for employment by place of work is rather weak. Economic Survey is a source, but its data for Greater Mumbai is confined to establishment sector and not reliable for trend analysis. MCGM's own data from administering Shops and Establishment Act could be a source for assessing part of the labour market.

Demographic data is available from decennial census. However, reliable methods of annual estimates are yet to be established. Systematic use of housing production, grant of electric meters, issue of ration cards, electoral rolls and birth and death statistics could eventually provide better annual assessment.

Economic growth of Mumbai would depend upon its competitiveness with reference to other Indian and international cities. By now there are established periodic surveys that measure and rank cities along various parameters of competitiveness. Illustratively, surveys of Doing Business carried out by the World Bank rank nations and cities in terms of ease of doing business. Quality of Living surveys by Mercer provide intercity comparisons of quality of living to help MNCs decide compensation policies. Inter city comparison of office rentals by CB Richard Ellis would indicate competitiveness of particular sector. Similarly, National Housing Bank regularly compiles RESIDEX - an index of residential prices for various cities in India.

It would therefore be useful for MCGM to annually compile and report data on the following parameters:

Table 24.1: Economy and Competitiveness

MCGM DEVELOPMENT PLAN MONITORING AND EVALUATION				
ECONOMY AND COMPETITIVENESS				
PARAMETER	REPORTING YEAR	PRECEDEENG THREE YEARS		
NDDP IN CURRENT PRICES (RS IN CRORES)				
GROWTH RATE %				
NDDP IN CONSTANT PRICES (RS IN CRORES)				
GROWTH RATE %				
POPULATION ESTIMATES IN THOUSNAD				
PER CAPITA NDDP @ CURRENT PRICES				
PER CAPITA NDDP @ CONSTANT PRICES				
EMPLOYMENT ESTIMATES				
DOING BUSINESS RANK/OUT OF				
QUALITY OF LIVING INDEX				
OFFICE RENTALS - COMPARISON				
RESIDEX				

24.2.2 Physical Development

Physical development particularly by way of construction of floor space is indicative of growth in the real estate and housing markets. The formal real estate market is governed by the acts of building permission by the MCGM. However the data remains in the individual files and does not get translated into information that can monitor the real estate and housing markets. It would be useful to annually publish summary results as illustrated in tables below. Most of the development in Mumbai is now by way of redevelopment where some of the built-up area / dwelling units are demolished for new construction to take place. The net addition therefore should be of interest.

Following two tables could summarise the physical development of Mumbai.

Table 24.2: Tracking physical development of Mumbai.

SR.NO.	USE	TABLE 1			
		BUILT_UP AREA PERMITTED IN SQ.M. (BASED ON C.C.)			
		CURRENT YEAR	THREE PRECEDING YEARS		
1	RESIDENTIAL				
2	OFFICE				
3	INDUSTRIAL				
4	COMMERCIAL (OTHER THAN OFFICE)				
5	EDUCATIONAL				
6	HEALTHCARE				
7	OTHERS				
8	TOTAL	0	0	0	0
9	BUA PRPOSED TO BE DEMOLISHED				
10	NET ADDITIONAL BUA	0	0	0	0

TABLE 2					
SR.NO.	USE	BUILT-UP AREA CONSTRUCTED IN SQ.M. (BASED ON O.C. GRANTED)			
		CURRENT YEAR	PRECEDING THREE YEARS		
1	RESIDENTIAL				
2	OFFICE				
3	INDUSTRY				
4	COMMERCIAL (OTHER THAN OFFICE)				
5	EDUCATIONAL				
6	HEALTHCARE				
7	OTHERS				
8	TOTAL	0	0	0	0

Similarly, the following two tables could summarise the housing production in the formal sector.

Table 24.3: Tracking Housing Production in the Formal Sector

TABLE 3					
SR.NO.	RESIDENTIAL DWELLING UNITS	No. OF DWELLING UNITS PROPOSED (BASED ON C.C.)			
		CURRENT YEAR	PRECEDING THREE YEARS		
1	1 ROOM				
2	1 BHK				
3	2 BHK				
4	3 BHK & ABOVE				
5	TOTAL	0	0	0	0
6	DWELLING UNITS PRPOSED TO BE DEMOLISHED				
7	NET ADDITION	0	0	0	0

TABLE 4					
SR.NO.	RESIDENTIAL DWELLING UNITS	No. OF DWELLING UNITS PROPOSED (BASED ON O.C.)			
		CURRENT YEAR	PRECEDING THREE YEARS		
1	1 ROOM				
2	1 BHK				
3	2 BHK				
4	3 BHK & ABOVE				
5	TOTAL	0	0	0	0

These tables should be derived from the detailed planning sector and ward-wise tables produced by the zonal Deputy Chief Engineers in charge of building permissions. Since a separate office of Deputy Chief Engineer has been established for development permissions sought by public sector agencies tables for public sector agencies could also be separately created.

Eventually when tracking of building permissions is established on GIS platform it should also be possible to generate similar tables according to price zones as recorded in Ready Reckoner. This may also enable computation of incremental value of real estate.

24.2.3 Implementation of DP

Apart from development control important aspect of implementing DP is to provide land and buildings for social amenities and public utilities and services. It is therefore critical that progress in this respect is closely monitored. Periodic evaluation with reference to trends of housing construction would help decide the priorities for implementation. Twenty year targets of DP need to be divided into four five yearly phases. Evaluation at the end of a phase would help revise the

targets of the succeeding phase. The interventions proposed include procuring land for public purpose, procuring constructed BUA for public purpose and obtaining dwelling units under the provisions of inclusionary housing. Following tables generated every year would help monitoring the outputs of each of these interventions.

Table 24.4: Tracking Procurement of Land

PROCUREMENT LAND						TABLE 1
SR.NO.	USE	MODE	TARGET OF DP SQM	CUMULATIVE PROCUREMENT	TARGET FOR THE REPORTING YEAR	ACHIEVEMENT FOR THE REPORTING YEAR
1	EDUCATIONAL	COMPULSORY ACQUISITION	SUO MOTO			
			ON ACCOUNT OF PURCHASE NOTICE			
			BY GRANT OF TDR			
	SUB TOTAL EDUCATION		THROUGH ACCOMMODATION RESERVATION			
2	HEALTHCARE	COMPULSORY ACQUISITION	SUO MOTO			
			ON ACCOUNT OF PURCHASE NOTICE			
			BY GRANT OF TDR			
	SUB TOTAL HEALTHCARE		THROUGH ACCOMMODATION RESERVATION			
3	RECREATIONAL OPEN SPACE	COMPULSORY ACQUISITION	SUO MOTO			
			ON ACCOUNT OF PURCHASE NOTICE			
			BY GRANT OF TDR			
SUB TOTAL RECREATIONAL OPEN SPACE						
4	ROADS	COMPULSORY ACQUISITION	SUO MOTO			
			ON ACCOUNT OF PURCHASE NOTICE			
			BY GRANT OF TDR			
SUB TOTAL ROADS						
5	OTHERS	COMPULSORY ACQUISITION	SUO MOTO			
			ON ACCOUNT OF PURCHASE NOTICE			
			BY GRANT OF TDR			
	SUB TOTAL OTHERS		THROUGH ACCOMMODATION RESERVATION			
6	AMENITY SPACE	CONTRIBUTED UNDER GDCR				
TOTAL						

Table 24.5: Tracking Outcome of Accommodation Reservation

OUTCOME OF ACCOMMODATION RESERVATION					TABLE 2
SR.NO.	MODE	PURPOSE	TARGETS OF DP- BUA IN SQM	CUMULATIVE TOTAL OF BUA RECEIVED	BUA RECEIVED IN THE REPORTING YEAR
	ACCOMMODATION RESRVATION	HEALTHCARE			
		MARKETS			
		OTHERS			

Table 24.6: Tracking Outcome of Inclusionary Housing

				TABLE 3
OUTCOME OF INCLUSIONARY HOUSING				
SR.NO.	MODE		CUMULATIVE TOTAL RECEIVED	RECEIVED IN THE REPORTING YEAR
1	INCLUSIONARY ZONING	RECEIVED		
		BUA IN SQM		
		DWELLING UNITS		
2		ALLOTTED		
		EWS / LIG HOUSES		
		PAP HOUSES		
		PAP SHOPS/WORKSHOPS		
		TOTAL ALLOTTED -BUA SQM		
		TOTAL ALLOTTED -UNITS		
3		AVAILABLE		
		BUA IN SQM		
		DWELLING UNITS		

24.2.4 Resources for DP Implementation

Development Plan department, because of various charges and premium levied at the time of granting development permission, has emerged as a major revenue earning department. Its revenue now surpasses property tax and is next to octroi. Ironically, however, neither resource allocation nor expenditure on implementation of Development Plan is distinctly seen in MCGM's budget or accounts. The reasons for this are systemic and ingrained in the institutional structure. The main responsibility of the Development Plan department is seen to be to grant development permission according to the DCRs. Its role in implementation of DP was confined to acquisition of land. With the introduction of TDR in DCR 1991, obtaining land for public purpose became a market dependent activity and not a planned effort targeted at achieving DP's goals. Developing land so obtained was naturally seen as the responsibility of respective line departments such as education (for building schools), health (for building hospitals), roads and traffic (for widening or constructing new roads). Decision to take up works and propose budgetary allocation for that became the responsibility of the respective departments. This happened without explicit reference to proposals of DP. The departments thus unintentionally crowded out the requirements of DP. (for example expanding existing school and hospitals vs. building new facilities proposed by the DP). This has also reflected in assets obtained under the Accommodation Reservation lying underutilized.

Implementation of DP therefore will have to become a specific ongoing activity. As a first step in that direction, five yearly targets for procuring land developing the land for intended public purpose may be worked out. These could then be translated into five yearly resource requirements. (This exercise could become a part of the comprehensive Capital Investment Plan as indicated in Chapter 23). Expenditure could then be tracked as illustrated in table below with necessary modification to budgeting and accounting procedures. Following two tables illustrate the summary of such exercise.

Table 24.7: Tracking Expenditure

EXPENDITURE ON PROCURING LAND					
SR.NO.	USE	TARGET FOR THE CURRENT FIVE YEARS RS. IN LAKHS	CUMULATIVE EXPENDITURE TILL PREVIOUS YEAR	BUDGET PROVISION FOR REPORTING YEAR	EXPENDITURE DURING REPORTING YEAR
1	EDUCATIONAL				
2	HEALTHCARE				
3	RECREATIONAL OPEN SPACE				
4	OTHERS				
5	ROADS				
6	TOTAL				

TABLE 2

EXPENDITURE ON DEVELOPMENT					
SR.NO.	USE	TARGET FOR THE CURRENT FIVE YEARS RS. IN LAKHS	CUMULATIVE EXPENDITURE TILL PREVIOUS YEAR	BUDGET PROVISION FOR REPORTING YEAR	EXPENDITURE DURING REPORTING YEAR
1	EDUCATIONAL				
2	HEALTHCARE				
3	RECREATIONAL OPEN SPACE				
4	OTHERS				
5	ROADS				
6	TOTAL				

24.3 Use of Technology

Given the scale and complexity of development regulation, accounting budgeting in MCGM above monitoring will not be possible without the integrated use of technology. Introduction of GIS to track the physical development will be very high priority. Automation of development permission will be linked to GSI. The GIS will contain the following elements:

- Geo referenced map based on high resolution satellite imagery capturing all physical features in vector format e.g. water courses, roads, railways, building footprints etc.;
- Geo referenced cadastre map correlated with the above map;
- Layers showing the proposals of DP – land use zones, FSI zones, proposed roads, designations and reservations etc.;
- Layers showing zoning and regulations by external agencies such as Civil Aviation, Railways, ASI, MoEF-CRZ etc.

A system of updating the map will also be put in place as developments occur such as roads are widened, gardens developed etc. Development permissions granted and occupation certificates granted will also be linked to updating of the map. Considerable changes might occur outside the formal development control. These will be periodically tracked through high resolution satellite imageries.

The GIS will also have following attribute data which shall be updated as and when new data becomes available.

- Data from population census according wards and census sections (time series);
- Number of voters according to electoral constituencies (time series according to electoral rolls);

- Data according to Traffic Analysis Zones (TAZ) (as compiled for the City Mobility Plan and later similar surveys in future);
- Data of DP implementation in terms of use wise data of land procured for reservations, use wise data of BUA obtained under AR; and
- Incremental BUA for various uses and incremental dwelling units resulting from development permissions for every project or plot. (Macros could be developed to produce planning sector and ward wise totals every year for DP implementation and development according to permissions granted);
- Ready reckoner price data according to zones and sub zones (Time series).

Accounting system in MCGM is already computerized. This may be modified to monitor resource allocation to DP implementation as presented in 3 above.

24.4 Annual Reporting

Annual budget estimates is the prevalent document that provides the salient policy initiatives and proposes resource allocation for various activities. It would be useful to present the main results of the monitoring of the monitoring as represented above as a part of the budget document. MCGM has been compiling an annual Environmental Status Report. It would be useful to prepare and publish similar report on the Status of Development. This could include the detailed geographically disaggregated data from which summary tables as represented above are derived. These could form the basis for participation by the concerned citizens.

Every fifth report will be an evaluation report that will compare the growth trends with those assumed DP, efficacy of DP provisions in terms of obtaining land and buildings for public amenities, resources generated through development charge and premium FSI, expenditure incurred on DP implementation, constraints – physical and financial – in implementation of DP. Based on such evaluation, ameliorative actions to accelerate DP implementation will be proposed or amendments or revision of DP will be proposed.

Annexures

Annexure to Chapter 12: Growth Scenarios

Annexure 12.01: Existing and Projected, Population and Employment Distribution Planning Sectorwise

	Planning Sectors	Area in ha	Existing Population 2011	Projected Population 2034	Existing Employment 2011	Projected Employment 2034
A - WARD	A 1.01	230.05	19,354	16,470	14,238	18,531
	A 1.02	138.59	34,754	29,576	84,026	110,584
	A 1.03	72.05	483	411	74,341	97,116
	A 1.04	9.36	12	10	15,878	21,106
	A 1.05	94.90	800	681	60,454	78,422
	A 1.06	61.07	13,697	11,656	106,740	140,913
	A 1.07	46.01	2,654	2,258	43,097	55,947
	A 1.08	160.32	14,195	12,080	218,282	287,522
	A 1.09	71.66	13,636	11,604	76,497	99,760
	MMRDA	236.95	85,429	72,701		
	Total	1120.95	185,014	157,448	693,555	909,903
B - WARD						
	B 1.01	106.44	109,486	86,616	95,954	125,367
	B 1.02	66.03	17,220	13,623	10,080	12,236
	B 1.03	93.34	584	462	10,597	12,732
	Total	265.82	127,290	100,701	116,630	150,336
C - WARD						
	C 1.01	23.78	5,331	4,590	8,716	10,976
	C 1.02	71.68	81,293	69,986	49,849	66,165
	C 1.03	95.85	79,537	68,475	97,669	130,839
	Total	191.30	166,161	143,051	156,233	207,981
D - WARD						
	D 1.01	315.79	131,413	129,318	64,273	83,009
	D 1.02	60.81	28,437	27,983	21,866	28,530
	D 1.03	121.61	50,646	49,839	57,534	75,322
	D 1.04	331.99	136,370	134,196	46,065	61,282
	Total	830.20	346,866	341,336	189,738	248,143
E - WARD						
	E 1.01	74.93	70,112	61,107	15,615	19,226
	E 1.02	125.01	54,493	47,494	46,302	59,058
	E 1.03	139.48	34,820	30,348	43,720	57,908
	E 1.04	129.99	11,090	9,666	20,325	25,753
	E 1.05	147.82	90,227	78,638	48,594	62,452
	E 1.06	100.02	132,544	115,520	46,263	61,120
	Total	717.25	393,286	342,773	220,819	285,516

	Planning Sectors	Area in ha	Existing Population 2011	Projected Population 2034	Existing Employment 2011	Projected Employment 2034
F/N - WARD	F/N1.01	283.91	99,303	84,943	56,395	72,336
	F/N1.02	138.96	58,548	50,082	25,235	31,621
	F/N1.03	140.44	65,184	55,758	15,017	17,949
	F/N1.04	108.92	78,854	67,451	10,253	11,851
	F/N1.05	37.44	9,239	7,903	1,905	2,424
	F/N1.06	180.23	163,067	139,487	20,714	27,334
	F/N1.07	190.07	34,791	29,760	7,824	10,242
	MMRDA (Wadala)	120.70	20,049	17,150		
	Total	1200.68	529,034	452,534	137,343	173,755
F/S - WARD	F/S 1.01	128.35	47,449	47,263	48,629	65,163
	F/S 1.02	54.90	36,542	36,398	22,517	29,599
	F/S 1.03	142.60	90,526	90,170	39,703	52,146
	F/S 1.04	420.03	40,943	40,782	11,774	12,685
	F/S 1.05	92.79	69,931	69,656	19,556	25,921
	F/S 1.06	126.62	75,579	75,282	37,259	46,929
	Total	965.30	360,972	359,550	179,437	232,442
G/N - WARD	G/N 1.01	210.46	154,611	152,226	78,973	103,477
	G/N 1.02	231.43	195,085	192,076	133,212	174,759
	G/N 1.03	94.48	10,569	10,406	28,600	35,814
	G/N 1.04	9.77	8,449	8,319	3,502	6,289
	G/N 1.05	18.16	7,436	7,321	5,931	7,410
	G/N 1.06	10.00	1,495	1,472	1,771	0
	BKC	80.37	3,901	3,841		
	Dharavi	221.75	217,493	214,139		
	Total	876.41	599,039	589,799	251,988	327,749
G/S - WARD	G/S 1.01	249.54	142,043	121,473	115,433	153,313
	G/S 1.02	133.59	57,589	49,249	40,917	54,461
	G/S 1.03	298.29	83,454	71,368	49,468	63,019
	G/S 1.04	121.02	32,924	28,156	32,094	41,852
	G/S 1.05	77.30	48,905	41,823	48,791	64,594
	G/S 1.06	49.50	12,834	10,975	21,365	27,903
	Total	929.24	377,749	323,045	308,067	405,142
H/E - WARD	H/E 2.01	188.38	140,164	149,882	67,197	85,534
	H/E 2.02	25.19	13,320	14,243	4,704	5,844
	H/E 2.03	108.23	79,308	84,807	34,127	40,285
	H/E 2.04	93.71	2,520	2,694	23,893	23,588
	H/E 2.05	289.11	203,233	217,324	105,625	119,951

	Planning Sectors	Area in ha	Existing Population 2011	Projected Population 2034	Existing Employment 2011	Projected Employment 2034
	Dharavi	8.65	-	-		
	MMRDA - BKC	428.05	59,654	63,790		
	AIRPORT	148.01	65,246	69,770		
	Total	1289.31	563,445	602,511	235,546	275,202
H/W - WARD	H/W 2.01	136.36	44,086	38,894	19,536	25,366
	H/W 2.02	167.28	61,021	53,835	30,468	40,042
	H/W 2.03	54.70	28,399	25,055	9,537	12,455
	H/W 2.04	98.26	30,481	26,892	14,397	17,928
	H/W 2.05	192.12	55,706	49,146	42,179	52,873
	H/W 2.06	63.43	15,294	13,493	20,833	25,306
	H/W 2.07	67.38	31,718	27,983	7,532	9,603
	MMRDA - BKC 2	85.49	34,669	30,587		
	Total	865.03	301,375	265,884	144,482	183,573
K/E - WARD	K/E 2.01	230.01	119,877	130,448	64,447	82,236
	K/E 2.02	188.05	87,934	95,689	79,627	100,013
	K/E 2.03	301.33	99,296	108,052	65,651	80,747
	K/E 2.04	58.66	13,844	15,064	23,216	29,898
	K/E 2.05	161.92	17,363	18,894	22,479	28,237
	K/E 2.06	451.54	247,348	269,160	62,133	79,677
	K/E 2.07	274.99	139,684	152,003	119,416	154,114
	K/E 2.08	10.12	72	78	6,875	6,259
	AIRPORT	583.03	78,356	85,265		
	MIDC - SEEPZ	140.22	20,113	21,886		
	Total	2399.87	823,885	896,539	443,844	561,181
K/W - WARD	K/W 2.01	578.32	234,698	271,854	100,830	127,882
	K/W 2.02	243.94	85,338	98,848	73,730	94,124
	K/W 2.03	515.24	127,983	148,245	39,811	49,173
	K/W 2.04	251.89	2,300	2,664	14,449	14,784
	K/W 2.05	236.05	99,989	115,819	17,131	19,030
	K/W 2.06	62.01	31,576	36,575	3,549	3,601
	K/W 2.07	366.79	150,697	174,554	39,169	49,078
	K/W 2.08	125.95	436	504	4,779	6,282
	K/W 2.09	7.40	-	-		
	MMRDA - ODC	54.48	15,672	18,153		
	Total	2442.07	748,688	867,217	293,447	363,953

	Planning Sectors	Area in ha	Existing Population 2011	Projected Population 2034	Existing Employment 2011	Projected Employment 2034
L - WARD	L 3.01	84.96	42,801	53,735	12,354	14,719
	L 3.02	338.40	147,981	185,784	16,356	19,669
	L 3.03	77.01	5,308	6,665	7,512	8,770
	L 3.04	246.14	223,961	281,175	46,820	61,808
	L 3.05	23.93	10,618	13,330	5,550	7,345
	L 3.06	196.16	118,300	148,521	46,002	60,348
	L 3.07	127.54	101,590	127,543	57,223	75,487
	L 3.08	339.63	180,809	226,999	59,207	71,372
	Dharavi	3.97	220	276		
	Airport	118.32	70,637	88,682		
	Total	1556.07	902,225	1,132,709	251,024	319,517
M/E - WARD	M/E 3.01	2472.51	451,799	598,117	82,768	105,948
	M/E 3.02	161.21	80,188	106,157	15,497	19,371
	M/E 3.03	160.03	80,644	106,761	30,763	40,278
	M/E 3.04	594.82	195,089	258,270	71,363	93,873
	Total	3388.56	807,720	1,069,305	200,391	259,469
M/W - WARD	M/W 3.01	988.69	32,699	34,800	28,674	34,636
	M/W 3.02	508.21	251,228	267,371	89,433	115,922
	M/W 3.03	148.57	81,110	86,322	26,780	33,376
	M/W 3.04	94.89	46,856	49,866	28,196	34,809
	Total	1740.36	411,893	438,360	173,082	218,743
N - WARD	N 3.01	387.65	315,094	343,949	64,088	82,009
	N 3.02	172.07	59,816	65,294	40,162	50,631
	N 3.03	97.84	9,497	10,367	14,670	17,790
	N 3.04	177.64	17,266	18,847	29,103	37,040
	N 3.05	292.80	123,454	134,759	50,632	65,359
	N 3.06	1406.62	97,727	106,677	34,747	44,035
	Total	2534.62	622,853	679,893	233,401	296,863
P/N - WARD	P/N 2.01	1754.41	113,387	145,824	35,928	42,661
	P/N 2.02	637.21	214,851	276,312	18,954	18,444
	P/N 2.03	113.67	24,519	31,533	17,189	20,375
	P/N 2.04	313.24	145,798	187,506	109,056	136,281
	P/N 2.05	220.01	97,168	124,965	61,912	78,651
	P/N 2.06	602.31	331,022	425,716	51,771	68,144
	P/N 2.07	4.75	186	239	433	558
	Recreation & Tourism Development Zone	566.48	14,435	18,565		

	Planning Sectors	Area in ha	Existing Population 2011	Projected Population 2034	Existing Employment 2011	Projected Employment 2034
	National Park	459.59	-	-		
	Total	4671.67	941,366	1,210,660	295,244	365,115
P/S - WARD	P/S 2.01	311.53	1,484	1,717	10,330	10,542
	P/S 2.02	291.07	112,414	130,095	117,080	146,502
	P/S 2.03	124.73	58,243	67,404	20,741	23,740
	P/S 2.04	150.73	34,268	39,658	23,037	28,835
	P/S 2.05	323.64	91,429	105,810	58,797	75,406
	P/S 2.06	101.12	32,376	37,468	9,880	12,838
	P/S 2.07	1170.55	125,762	145,544	73,516	94,120
	ODC	50.96	7,532	8,716		
	National Park	4.51	-	-		
	Total	2528.83	463,507	536,413	313,382	391,983
R/N - WARD	R/N 2.01	409.40	45,038	52,122	7,861	3,650
	R/N 2.02	284.27	126,050	145,877	20,585	19,246
	R/N 2.03	295.38	117,738	136,258	43,321	51,826
	R/N 2.04	211.74	142,269	164,647	19,192	18,549
	National Park	217.10	272	315		
	Total	1417.88	431,368	655,223	90,959	93,271
R/C - WARD	R/C 2.01	580.60	9,847	10,594	17,437	15,736
	R/C 2.02	225.07	83,560	89,901	13,986	14,924
	R/C 2.03	209.10	72,546	78,051	17,341	16,055
	R/C 2.04	159.05	78,940	84,930	13,658	15,767
	R/C 2.05	301.07	135,297	145,564	82,868	99,949
	R/C 2.06	140.11	64,094	68,958	63,790	75,241
	R/C 2.07	117.04	24,559	26,422	11,876	13,910
	R/C 2.08	202.63	93,119	100,185	23,100	28,378
	Recreation & Tourism Development Zone	1440.51	201	217		
	National Park	1427.62	-	-		
	Total	4802.80	562,162	604,821	244,057	279,960
R/S - WARD	R/S 2.01	147.23	10,614	14,394	17,664	22,356
	R/S 2.02	48.37	26,271	35,626	4,698	5,830
	R/S 2.03	45.12	540	732	4,633	5,664
	R/S 2.04	141.90	124,628	169,005	8,037	9,197
	R/S 2.05	302.95	146,644	198,862	98,550	119,827
	R/S 2.06	259.22	107,188	145,356	57,158	70,320
	R/S 2.07	474.40	275,344	373,390	74,218	96,950

	Planning Sectors	Area in ha	Existing Population 2011	Projected Population 2034	Existing Employment 2011	Projected Employment 2034
	National Park	412.12	-	-		
	Total	1831.31	691,229	937,364	264,958	330,143
S - WARD	S 3.01	582.78	42,932	50,088	43,030	48,253
	S 3.02	168.38	41,755	48,715	8,519	10,836
	S 3.03	241.30	77,032	89,871	15,845	19,572
	S 3.04	464.04	303,258	353,803	52,593	66,846
	S 3.05	246.48	60,961	71,121	32,652	41,258
	S 3.06	41.22	3,993	4,659	5,569	6,078
	S 3.07	208.68	110,900	129,383	43,805	56,429
	S 3.08	404.44	102,952	120,111	44,039	56,342
	S 3.09	592.68	-	-	29,028	36,553
	National Park	25.22	-	-		
	Total	2975.23	743,783	867,751	275,079	342,169
T - WARD	T 3.01	273.80	104,933	115,186	14,953	18,394
	T 3.02	370.79	143,772	157,819	40,759	52,880
	T 3.03	288.91	73,176	80,326	33,114	42,845
	T 3.04	614.30	15,977	17,538	11,749	16,103
	T 3.05	2.76	-	-	83	0
	T 3.06	0.07	-	-	2	0
	T 3.07	33.30	-	-	856	0
	Tulsi Lake	115.44	-	-		
	Vihar Lake	497.03	-	-		
	National Park	2091.13	3,604	3,956		
	Total	4287.53	341,463	374,825	101,517	130,222
	Greater Mumbai	45828.32	12,442,373	13,949,712	5,814,225	7,352,330

Annexure to Chapter 18: Land For Public Purpose

Annexure 18.01: Wardwise Proposed Open Space Provision in DP 2034

Ward	Population 2011	Population 2034	Demand for 2034	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Provision	Proposed Per Capita Provision	Unmet Demand Gap
A	185,014	157,448	31.49	145.42	5.59	151.01	7.86	9.59	(119.52)
B	127,290	100,701	20.14	2.05	1.36	3.41	0.16	0.34	16.73
C	166,161	143,051	28.61	11.71	0.22	11.93	0.70	0.83	16.68
D	346,866	341,336	68.27	87.48	28.93	116.41	2.52	3.41	(48.15)
E	393,286	342,773	68.55	44.47	3.38	47.86	1.13	1.40	20.70
F/N	529,034	452,534	90.51	54.97	43.26	98.23	1.04	2.17	(7.73)
F/S	360,972	359,550	71.91	34.22	7.53	41.74	0.95	1.16	30.17
G/N	599,039	589,799	117.96	41.74	12.11	53.85	0.70	0.91	64.11
G/S	377,749	323,045	64.61	125.71	22.79	148.49	3.33	4.60	(83.89)
H/E	563,445	602,511	120.50	58.74	13.12	71.86	1.04	1.19	48.64
H/W	301,375	265,884	53.18	45.21	17.42	62.62	1.50	2.36	(9.45)
K/E	823,885	896,539	179.31	68.61	101.34	169.95	0.83	1.90	9.35
K/W	748,688	867,217	173.44	138.28	75.71	213.99	1.85	2.47	(40.55)
L	902,225	1,132,709	226.54	36.83	61.22	98.05	0.41	0.87	128.49
M/E	807,720	1,069,305	213.86	40.12	134.28	174.40	0.50	1.63	39.46
M/W	411,893	438,360	87.67	96.50	59.11	155.61	2.34	3.55	(67.94)
N	622,853	679,893	135.98	55.53	75.98	131.52	0.89	1.93	4.46
P/N	941,366	1,210,660	242.13	94.69	212.23	306.92	1.01	2.54	(64.78)
P/S	463,507	536,413	107.28	57.48	655.17	712.65	1.24	13.29	(605.37)
R/C	562,162	604,821	120.96	84.85	105.91	190.77	1.51	3.15	(69.80)
R/N	431,368	655,223	131.04	29.51	60.20	89.71	0.68	1.37	41.34
R/S	691,229	937,364	187.47	74.62	52.61	127.22	1.08	1.36	60.25

Draft Development Plan - 2034

GREATER MUMBAI

Ward	Population 2011	Population 2034	Demand for 2034	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Provision	Proposed Per Capita Provision	Unmet Demand Gap
S	743,783	867,751	173.55	81.23	187.30	268.53	1.09	3.09	(94.98)
T	341,463	374,825	74.96	46.08	272.23	318.31	1.35	8.49	(243.34)
Total	12,442,373	13,949,712	2,789.94	1,556.06	2,208.99	3,765.04	1.25	2.70	(975.10)

Note: All areas in hectare;

*P/S includes open space provision for 2034, in Aarey Colony.

Annexure 18.02: Wardwise Proposed Education Amenities Provision in DP 2034

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
A	185,014	157,448	14.17	8.74	-	8.74	0.55	0.55	5.44
B	127,290	100,701	9.06	3.23	-	3.23	0.32	0.32	5.83
C	166,161	143,051	12.87	2.65	-	2.65	0.19	0.19	10.22
D	346,866	341,336	30.72	12.79	0.46	13.25	0.37	0.39	17.47
E	393,286	342,773	30.85	14.08	0.59	14.68	0.41	0.43	16.17
F/N	529,034	452,534	40.73	17.38	1.43	18.81	0.38	0.42	21.92
F/S	360,972	359,550	32.36	8.93	0.81	9.74	0.25	0.27	22.62
G/N	599,039	589,799	53.08	10.57	4.18	14.75	0.18	0.25	38.33
G/S	377,749	323,045	29.07	5.57	1.56	7.13	0.17	0.22	21.94
H/E	563,445	602,511	54.23	9.68	1.17	10.85	0.16	0.18	43.37
H/W	301,375	265,884	23.93	15.32	0.10	15.42	0.58	0.58	8.51
K/E	823,885	896,539	80.69	25.23	4.83	30.06	0.28	0.34	50.63
K/W	748,688	867,217	78.05	34.58	7.37	41.94	0.40	0.48	36.11
L	902,225	1,132,709	101.94	14.84	7.96	22.80	0.13	0.20	79.14
M/E	807,720	1,069,305	96.24	13.93	7.61	21.54	0.13	0.20	74.69
M/W	411,893	438,360	39.45	11.36	7.02	18.38	0.26	0.42	21.07
N	622,853	679,893	61.19	16.14	4.14	20.29	0.24	0.30	40.90
P/N	941,366	1,210,660	108.96	17.09	20.22	37.31	0.14	0.31	71.65
P/S	463,507	536,413	48.28	13.94	87.32	101.26	0.26	1.89	(52.99)
R/C	562,162	604,821	54.43	14.54	17.30	31.84	0.24	0.53	22.59
R/N	431,368	655,223	58.97	7.76	10.70	18.46	0.12	0.28	40.51
R/S	691,229	937,364	84.36	13.17	12.09	25.26	0.14	0.27	59.10
S	743,783	867,751	78.10	15.02	9.39	24.41	0.17	0.28	53.69
T	341,463	374,825	33.73	13.74	7.37	21.11	0.37	0.56	12.62

Draft Development Plan - 2034**GREATER MUMBAI**

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
Total	12,442,373	13,949,712	1,255.47	320.30	213.63	533.92	0.23	0.38	721.55

Note: All areas in hectare

*Total demand for Education amenities includes Schools with DP 2034 per capita benchmark of 0.09 sqm.

Annexure 18.03: Wardwise Proposed Medical Amenities Provision in DP 2034

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
A	185,014	157,448	6.06	23.27	0.29	23.56	1.478	1.50	(17.50)
B	127,290	100,701	3.88	0.44	0.58	1.03	0.044	0.10	2.85
C	166,161	143,051	5.51	0.41	0.03	0.44	0.029	0.03	5.07
D	346,866	341,336	13.14	10.02	0.49	10.51	0.293	0.31	2.63
E	393,286	342,773	13.20	39.06	-	39.06	1.140	1.14	(25.86)
F/N	529,034	452,534	17.42	13.35	5.59	18.94	0.295	0.42	(1.52)
F/S	360,972	359,550	13.84	30.87	-	30.87	0.859	0.86	(17.03)
G/N	599,039	589,799	22.71	3.43	2.31	5.74	0.058	0.10	16.96
G/S	377,749	323,045	12.44	9.63	0.37	10.00	0.298	0.31	2.44
H/E	563,445	602,511	23.20	3.20	3.31	6.51	0.053	0.11	16.69
H/W	301,375	265,884	10.24	6.35	0.82	7.18	0.239	0.27	3.06
K/E	823,885	896,539	34.52	14.53	11.42	25.95	0.162	0.29	8.56
K/W	748,688	867,217	33.39	18.15	7.43	25.58	0.209	0.29	7.81
L	902,225	1,132,709	43.61	2.81	8.14	10.94	0.025	0.10	32.67
M/E	807,720	1,069,305	41.17	4.97	8.83	13.81	0.047	0.13	27.36
M/W	411,893	438,360	16.88	2.85	5.25	8.10	0.065	0.18	8.78
N	622,853	679,893	26.18	8.12	3.82	11.94	0.119	0.18	14.24
P/N	941,366	1,210,660	46.61	7.34	12.26	19.61	0.061	0.16	27.00
P/S	463,507	536,413	20.65	5.52	6.13	11.65	0.103	0.22	9.00
R/C	562,162	604,821	23.29	4.43	8.63	13.06	0.073	0.22	10.23
R/N	431,368	655,223	25.23	5.23	9.09	14.32	0.080	0.22	10.91
R/S	691,229	937,364	36.09	9.82	13.37	23.19	0.105	0.25	12.90

Draft Development Plan - 2034**GREATER MUMBAI**

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
S	743,783	867,751	33.41	8.47	17.07	25.53	0.098	0.29	7.87
T	341,463	374,825	14.43	11.37	9.31	20.68	0.303	0.55	(6.25)
Total	12,442,373	13,949,712	537.06	243.65	134.52	378.18	0.175	0.27	158.89

Note: All areas in hectare

*Total demand for Medical amenities includes Hospitals, Maternity Hospitals and Dispensary together with DP 2034 per capita benchmark of 0.385 sqm.

Annexure 18.04: Wardwise Proposed Social Amenities (Cemetery) Provision in DP 2034

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
A	185,014	157,448	0.47	-	-	-	-	-	0.47
B	127,290	100,701	0.30	1.81	-	1.81	0.18	0.18	(1.51)
C	166,161	143,051	0.43	5.36	-	5.36	0.37	0.37	(4.93)
D	346,866	341,336	1.02	23.02	-	23.02	0.67	0.67	(22.00)
E	393,286	342,773	1.03	11.54	-	11.54	0.34	0.34	(10.51)
F/N	529,034	452,534	1.36	6.31	0.60	6.91	0.14	0.15	(5.55)
F/S	360,972	359,550	1.08	9.66	-	9.66	0.27	0.27	(8.58)
G/N	599,039	589,799	1.77	6.40	-	6.40	0.11	0.11	(4.63)
G/S	377,749	323,045	0.97	9.25	-	9.25	0.29	0.29	(8.28)
H/E	563,445	602,511	1.81	1.75	-	1.75	0.03	0.03	0.06
H/W	301,375	265,884	0.80	4.10	-	4.10	0.15	0.15	(3.30)
K/E	823,885	896,539	2.69	3.08	0.35	3.43	0.03	0.04	(0.74)
K/W	748,688	867,217	2.60	10.04	1.32	11.36	0.12	0.13	(8.76)
L	902,225	1,132,709	3.40	5.89	5.72	11.61	0.05	0.10	(8.21)
M/E	807,720	1,069,305	3.21	5.67	3.46	9.14	0.05	0.09	(5.93)
M/W	411,893	438,360	1.32	2.06	0.72	2.78	0.05	0.06	(1.46)
N	622,853	679,893	2.04	1.71	2.39	4.10	0.03	0.06	(2.06)
P/N	941,366	1,210,660	3.63	4.29	5.92	10.20	0.04	0.08	(6.57)
P/S	463,507	536,413	1.61	3.72	1.08	4.81	0.07	0.09	(3.20)
R/C	562,162	604,821	1.81	2.97	4.28	7.25	0.05	0.12	(5.44)
R/N	431,368	655,223	1.97	1.33	3.35	4.67	0.02	0.07	(2.71)
R/S	691,229	937,364	2.81	2.56	1.96	4.52	0.03	0.05	(1.71)

Draft Development Plan - 2034**GREATER MUMBAI**

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
S	743,783	867,751	2.60	1.70	3.82	5.52	0.02	0.06	(2.92)
T	341,463	374,825	1.12	4.49	1.23	5.73	0.12	0.15	(4.60)
Total	12,442,373	13,949,712	41.85	128.71	36.19	164.90	0.09	0.12	(123.05)

Note: All areas in hectare

*The DP 2034 per capita benchmark for Cemetery is 0.03 sqm.

Annexure 18.04: Wardwise Proposed Social Amenities (Local Market) Provision in DP 2034

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
A	185,014	157,448	0.94	0.52	-	0.52	0.03	0.03	0.43
B	127,290	100,701	0.60	0.33	0.39	0.72	0.07	0.07	(0.11)
C	166,161	143,051	0.86	3.90	-	3.90	0.27	0.27	(3.04)
D	346,866	341,336	2.05	1.50	1.05	2.55	0.07	0.07	(0.50)
E	393,286	342,773	2.06	1.70	0.63	2.33	0.07	0.07	(0.27)
F/N	529,034	452,534	2.72	1.92	2.01	3.93	0.09	0.09	(1.22)
F/S	360,972	359,550	2.16	2.33	0.17	2.50	0.07	0.07	(0.34)
G/N	599,039	589,799	3.54	3.43	0.54	3.96	0.07	0.07	(0.42)
G/S	377,749	323,045	1.94	0.65	0.28	0.93	0.03	0.03	1.01
H/E	563,445	602,511	3.62	1.89	0.78	2.67	0.04	0.04	0.94
H/W	301,375	265,884	1.60	2.21	0.45	2.66	0.10	0.10	(1.07)
K/E	823,885	896,539	5.38	4.24	0.74	4.98	0.06	0.06	0.40
K/W	748,688	867,217	5.20	4.47	2.05	6.52	0.08	0.08	(1.32)
L	902,225	1,132,709	6.80	1.84	1.19	3.03	0.03	0.03	3.77
M/E	807,720	1,069,305	6.42	0.17	2.41	2.58	0.02	0.02	3.84
M/W	411,893	438,360	2.63	0.61	2.14	2.75	0.06	0.06	(0.12)
N	622,853	679,893	4.08	0.96	0.68	1.64	0.02	0.02	2.43
P/N	941,366	1,210,660	7.26	2.01	4.70	6.71	0.06	0.06	0.56
P/S	463,507	536,413	3.22	1.54	1.69	3.23	0.06	0.06	(0.02)
R/C	562,162	604,821	3.63	3.75	3.24	6.99	0.12	0.12	(3.36)
R/N	431,368	655,223	3.93	2.22	1.90	4.12	0.06	0.06	(0.19)
R/S	691,229	937,364	5.62	2.17	3.18	5.35	0.06	0.06	0.27
S	743,783	867,751	5.21	1.24	2.53	3.77	0.04	0.04	1.44
T	341,463	374,825	2.25	2.27	1.11	3.39	0.09	0.09	(1.14)

Draft Development Plan - 2034**GREATER MUMBAI**

Ward	Population 2011	Population 2034	Demand for 2034*	DP 2034 Designation (A)	DP 2034 Reservation (B)	Total Provision (A+B)	Existing Per Capita Land Area	Proposed Per Capita Land Area	Unmet Demand Gap
Total	12,442,373	13,949,712	83.70	47.85	33.88	81.72	0.06	0.06	1.97

Note: All areas in hectare

*The DP 2034 per capita benchmark for Local Market is 0.06 sqm.

DRAFT DEVELOPMENT PLAN - 2034 GREATER MUMBAI

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