PUNE METROPOLIS
Pune Metropolitan Region
Development Authority

Draft Development Plan of
Pune Metropolitan Region
2021-2041

Volume -1

Pune Metropolitan Region Development Authority, Pune.

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VOL
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PUNEMETROPOLIS

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Draft Development Plan of
Pune Metropolitan Region 2021-2041

The Report of Draft Development Plan of Pune Metropolitan Region, prepared and published u/s section 26 of Maharashtra & Regional Town Planning Act, 1966 vide notice dated 2nd August 2021 in Government Gazette, Pune Division, is presented herein.

(Abhiraj Girkar)

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And Metropolitan Planner
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Hon. Shri Ajit Pawar, Dy. Chief Minister and Guardian Minister, Pune

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Hon. Shri Prajakt Tanpure, Minister of State, Urban Development Department

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Hon. Members of Pune Metropolitan Planning Committee and PMRDA

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Abbreviations

AAI - Airport Authority of India
ARAI - Automotive Research Association of India
AQI - Air Quality Index
ARAI - Automotive Research Association of India
ASI - Archeological Survey of India
ATC - Air Traffic Control
BFSI - Banking, Financial Services and Insurance
BMCC - Brihan Maharashtra College of Commerce
CAGR - Cumulative Annual Growth Rate
CBD - Central Business District
CG - Cremation ground
BG - Burial Ground
BOD - Biochemical Oxygen Demand
CB - Cantonment Board
C - College
CC - Community Center
CH - Community Hall
COD - Chemical Oxygen Demand
CMP - Comprehensive Mobilty Plan
CPCB - Central Pollution Control Board
Cr - Crores
CT - Census Town
CTTS - Comprehensive Traffic and Transportation Study
CWPR - Central Water and Power Research
DCPR - Development Control and Promotion Regulation
DES - Directorate of Economics and Statistics
DPR - Detailed Project Report
DTV - District Tourist Visits
ELU - Existing Landuse
ESA - Ecologically Sensitive Area
ETP - Effluent Treatment Plant
FDI - Foreign Direct Investment
FMCG - Fast-moving consumer goods
FS- Fire Station
FSI - Floor Space Index
FSL - Full Supply Level
FTV - Foreign Tourist Visits
G - Garden
GCNP - Ground Control Network Point
GDP - Gross Domestic Product
GEMS - Global Environmental Monitoring System
GIS - Geographical Information System
GI- Galvanized Iron
GSD- Ground Sample Distance
GSDA - Groundwater Directorate of Surveys & Development Agency
GST - Goods and Services Tax
H - Hospital
Ha - Hectare
HEMRL- High Energy Materials Research Laboratory
HFL- High Flood Line
HH- Household
ICD - Inland Container Depot
IGR - Inspector General of Registration

IISER - Indian Institute of Science Education and Research
IT - Information Technology
ITES - Information Technology Enabled Services
ITP- Integrated Township Policy
JNPT - Jawaharlal Nehru Port Trust
LIG - Low Income Group
LIS - Land Information System
LPCD - liter per capita per day
km - Kilometer
MADC - Maharashtra Airport Development Corporation
MDR - Major District Road
MHADA - Maharashtra Housing Area Development Authority
MIDC - Maharashtra Industrial Development Corporation
MINARS - Monitoring of Indian National Aquatic Resource
MIT - Maharashtra Institute of Technology
MJP - Maharashtra Jeevan Pradhikaran
MLD- millions of liter per day
Mm3 - cubic millimetre
MMR - Mumbai Metropolitan Region
MoEFCC - Ministry of Environment Forest and Climate Change
MoU - Memorandum of Understanding
MPCB - Maharashtra Pollution Control Board
MPN- Most probable number
MRTP Act - Maharashtra Regional Town Planning Act
MSETL - Maharashtra State Electricity Transmission Limited
MSL - Mean Sea Level
MSME - Micro, Small and Medium Enterprises
MSRTC - Maharashtra State Road Transport Corporation
MTDC- Maharashtra Tourism Development Corporation
MWRRA - Maharashtra Water Resources Regulatory Authority
NA - Not Available
NAINA - Navi Mumbai Airport Influence Notified Area
NASSCOM - National Association of Software and Service Companies
NCL- National Chemical Laboratory
NDA - National Defense Academy
NH - National Highway
NMT- Non-motorized Transport
NP - Nagar Panchayat
NRW - Non revenue water
NUTP - National Urban Transport Policy
NWMP-National Water Quality Monitoring Program
ODR- Other District Road
PCU - Passenger Car Unit
PHC- Primary Health Centre
PMPML- Pune Mahanagar Parivahan Mahamandal Limited
PPP- Public Private Partnership

PS - Primary School
PWD - Public Works Department
RADPFI - Rural Area Development Plan Formulation and. Implementation
RC - Regional Centre
REIT - Real Estate Investment Trust
RERA - Real Estate (Regulation and Development) Act
R&D- Research and Development
ROB - Road over bridge
ROW - Right of Way
RUB - Road under Bridge
RP - Regional Plan
pH - Pote
ntial of Hydrogen
PG - Playground
SC/ M - Shopping Centre/ multipurpose Market
SEZ- Special Economic Zone
SH- State Highway
SME - Small and Medium Enterprises
SPA - Special Planning Authority
SPC - Sports Complex
SPV - Special Purpose Vehicle
SRA - Slum Rehabilitation Authority
SS - Secondary School
STP - Sewerage Treatment Plant
NIV - National Institute of Virology

PCMC - Pimpri Chinchwad Municipal Corporation
PLU- Proposed Landuse
PMC- Pune Municipal Corporation
PMR- Pune Metropolitan Region
PMRDA - Pune Metropolitan Region Development Authority
RP- Regional Plan
RSPM - Respirable Suspended Particulate Matter
SPA - Special Planning Area
SWM- Solid Waste Management
TDR - Transfer of Development Rights
TEU - twenty-foot equivalent units
TC - Town Centre
TMC - Thousand million cube feet
TPS - Town Planning schemes
ULB - Urban Local Bodies
UNESCO - United Nations Educational Scientific and Cultural Organization
URDPFI - Urban and Regional Development Plans Formulation and Implementation
URGD - Urban Rural Growth Decadal
VR - Village Road
WFPR - Work Force Participation Rate
WTP - Water Treatment Plant
ZP- Zilla Parishad

Executive Summary

1. Background or context

The Pune Metropolitan Region (PMR) is spread over 6,914.26 sq. km. area, comprising of 814 villages and has a total population of 73,21,367 as per Census 2011. It is the largest Metropolitan Region in Maharashtra followed by MMR, NMR and NMA, and third largest in the country in terms of area after Bangalore and Hyderabad. Pune Metropolitan Region Development Authority (PMRDA) is the planning and development authority for the PMR with an outlook towards channelizing growth in a strategic and orderly manner.

PMR is strategically located in India's Golden Quadrilateral. The Region is well connected to major cities and regions like Mumbai and economic activities like JNPT and Dighi ports. PMR has good connectivity with Satara, Bangalore, Ahmednagar and Solapur through a network of National Highways.

The Region is blessed with a salubrious climate, abundant natural resources, rich cultural heritage, automobile manufacturing hub, booming IT sector, a strong institutional base and proximity to India's financial capital- Mumbai. These critical factors provide an impetus for the growth of new businesses and expansion of existing ones. PMRDA has prepared the Draft Development Plan for PMR that is envisioned for 2041 with an intent to promote integrated and inclusive growth and guide the present and future sustainable development of rural areas, towns and cities.

**Area: 6,914.26 sq.km.
Population : 73,21,367
Villages: 814**

2. Planning Area

PMRDA has been appointed as SPA for the area not covered under any local authority and also has been appointed for the 23 villages in Pune Municipal Corporation, as per Maharashtra Regional and Town Planning Act, 1966. Two municipal corporations, seven municipal councils, three cantonment boards, two nagar panchayats have statutory plans either in effect or under process as per the relevant provisions of the MRTP Act, 1966. In addition to these, Maharashtra Industrial Development Corporation (MIDC) is the planning authority for the area under its jurisdiction. Thus, the Planning Area herein refers to 804 villages - including 23 villages under PMC and 10 census towns. Total Planning Area is 6,051.62 sq km. It excludes planning jurisdictions of two municipal corporations, seven municipal councils, three cantonment boards, two nagar panchayats and SPAs - MIDC, MADC within PMR.

Study Area: As such, PMRDA does not have control over development within MIDC and MADC areas. However, considering the existing and future roles of these jurisdictions as drivers of economic growth, these jurisdictions have been included in the planning analysis. Thus, the Study Area refers to the PMRDA planning jurisdiction of 804 villages- including 23 villages under PMC, 10 census towns and jurisdiction of MIDC, MADC, covering 6159.32 sq km of total area. Bifurcation of the PMR area is provided in following figure.

Figure A: Jurisdiction in PMR.

Legend:
- PCNDTA
- Municipal Corporation
- Municipal Council
- Nagar Panchayat
- Cantonment Board
- NDA
- MIDC
- MADC
- SPA
- PMR

3. Development of erstwhile PMR since 1997

The Regional Plan (RP) for PMR was prepared in 1997 for horizon year of 2011 covering the Pune District. The RP has been guiding the growth of PMR since 1997. Its intention was to achieve decongestion of Pune Metropolis (old Pune Municipal Corporation, Pimpri Chinchwad Municipal Corporation limits) and other areas, by developing new peripheral industrial ring towns around Pune City and creating employment opportunities closer to the rural areas, to curb rural- urban migration and congestion of the Metropolis. Assessment of development pattern or growth in PMR in the year 2018 reveals that, the 'decentralised' model of development has not been successful, because of:

◉ Decentralized Ring towns planned with only zoning without public amenities, has resulted into skilled and educated industrial workers preferring to live in PMC and PCMC areas, leading to increase in residential density of the Corporations

◉ Weak work-live relation due to the absence of efficient mass transport system and lack of dedicated freight corridors further multiplied congestion levels in PMC and PCMC areas.

◉ Non-flexibility for accommodating future economic drivers: Future economic drivers such as IT Sector, logistics, etc. or development of tertiary sector was not envisioned. Thus development of IT Sector in Hinjawadi proved to be a major disruptor that changed urban development dynamics of Pune agglomeration

◉ Limitations on technological inputs aiding the planning process such as GIS and similar other softwares

The Figure B shows the present stage urbanizing areas in PMR.

Figure B: Present stage urbanisation in PMR.

4. Understanding the urbanisation potential of PMR

As per Census 2011, around 91% of the Study Area was living in rural areas. However, after carrying out the existing landuse survey for mapping of existing activities in 2017-18 revealed that many rural villages have been subsumed by the urban sprawl. Considering the limitation of census definition, parameters of assessment have been broadened to represent Study Area's actual urban- rural composition. Assessment is based on 13 parameters as given below:

Based on scoring criteria assigned to each parameter, there are 233 villages which are complying with parameter 1,2,3 and at least 3 parameters from 4-8, indicating immediate 'need' and 'opportunity' for a planned urban development respectively. These villages occupy 27% of PMR's land area and accommodates about 63% of its population, based on 2018 estimates.

On the other hand, remaining 581 villages do not represent urbanisation pressure nor substantial demographic growth; accommodate 37% of population (2018) of the Study Area; and sparsely spread over 73% of its land area. Above figures clearly indicate that PMR's urban population share has already surpassed the rural.

Considering this, a need arises to prioritise 'consolidated' development of 233 villages, which are grouped into 18 Growth Centres (DP Planning Areas), by preparing Development Plans as shown in following figure

Figure C: Urbanisation Potential Assessment

Village-wise Data

| Accessibility Roads & Mass Transport | Census 1991, 2001, 2011 | Existing Landuse | Basic Utilities | Basic Amenities | Land Values |

Primary Parameters
1. Census Definition of Urban/ Census Town
2. Proposed/ Approved Regional Projects
3. Zoning within Sanctioned RP Planning Areas
4. Proximity to Major Employment Nodes
5. Accessibility by Road
6. Accessibility by Mass Transport
7. Population Growth Rates
8. Main Male Workforce in Non Agricultural activities

Data Attributed to 814 Village Boundaries

13 Parameters Defining 'Urbanisation Potential'

Secondary Parameters
1. Availability of Water
2. Availability of Secondary Schools
3. Availability of Power
4. Availability of Hospital
5. Availability of College

Scoring
No Scoring: Parameter 1,2,3
Score (1): Comply 4-13
Score (0): Don't comply 4-13

233 Villages : Urbanised/ Urbanisable

581 Villages : Rural

No scoring means village considered as Urban if it satisfies Parameter 1,2,3.

Figure D: Urban Growth Centre Boundaries

However, dependence of rural areas on urban areas need to be reduced, making the rural areas self-reliant while improving the rural living conditions by providing required social facilities. Thus, rural catchments situated beyond 5km distance from the boundary of Urban Growth Centres need to be served by the Rural Growth Centres, which host the required amenities. Rural Growth Centre are identified based on following criteria:

- Strategically located village with access by national/ state level highway;
- Central location of village within rural catchment;
- Presence of some higher order amenities;
- Population higher than the region's average population per village (>2000);
- Administrative centre (headquarter of a circle level as per revenue department)

5. Demographic and Economic Characteristics of PMR:

"In reality, the Study Area is rapidly urbanising, out-pacing the rural population growth rate."
The average decadal growth rate of urban population in the Study Area was 90% between 2001-11. This decadal growth rate is higher than that of PMC (33%) and PCMC (71%) during the same period. PMC's declining population growth rate can be attributed to the increased cost of living, high land prices, sluggish natural growth rate, congestion and declining quality of life. Spin-offs from this trend can be seen as an increase in urban population around its immediate fringes, i.e. urbanising villages of Study Area and PCMC.
The Study Area has excellent potential to urbanise with emphasis on offering the best "Quality of Living" to benefit from present demographic growth trends within the region.

Figure E: Population Growth Rate Trends

"Broad base of young and working-age population."
Age-group wise distribution is studied at District level since Census 2011 data is limited to age group 0 to 6. Age-group pyramid indicates a favourable situation with a broad base of the young and working-age population.

Age Sex Pyramid PMR Planning Area 2017

"Shrinking household size"

Household sizes across various jurisdiction boundaries in PMR are shrinking invariably, between 1991 and 2011. Rate of reduction of household size in case of villages is higher than census towns. The average household size is 4.72, about 58% of households represent household size ranging from 4 to 5, and only 11% of households have a size greater than 5.

Figure F: Sectoral Distribution of Pune District GDP (in Cr.) (2005-14)

Secondary and Tertiary Sectors are key economic drivers of Pune District Economy"

Secondary and tertiary sectors are the main drivers of the district economy, whereas the primary sector (agriculture) offers employment to most of the workforce. Agriculture is the main economic activity within the primary sector, whose GDP contribution has been declining by about 1% every two years.

Contribution of the secondary sector has been consistent at 40% and above. Manufacturing sub-sector shows a positive trend of increasing registered establishments. It can be seen that the share of unregistered manufacturing is decreasing with time. Key sub-sectors within the industrial sector in Pune are automotive, auto ancillary, electronics, food processing and engineering. The tertiary sector has been showing consistent growth from 2009 to 2013, (51-55%), in tandem with urbanisation. Growth is seen in banking and insurance, real estate, trade and hospitality and communication sectors.

Figure G: Major Contributors to GDP Share in Maharashtra 2014

"Tertiary sector growth is driven by IT/ITES, Real Estate, Education, Warehousing and Logistics."

The contribution of the tertiary sector grew over the past two decades in the district. Major sub-sectors in the tertiary sector of Pune are - IT/ITES, banking and finance, trade, hospitality, biotechnology research centres, and communication. The sector is still growing and shows potential for further penetration. The factors that promote services in Pune are the competitive land prices, skilled labour and good connectivity to other major growth centres such as Mumbai. Among services, IT exports are the primary economic activity in Pune.

Promising Banking, Real Estate & Hospitality Sector

Tertiary sector
REAL ESTATE **27%**
BANKING & INSURANCE **22%**
TRADE AND HOSPITALITY **19%**
COMMUN-CATION **9%**
UNREGISTERES MANUFACTURING **11%**

Primary sector
OTHER SERVICES **8%**
AGRI-CULTURE **80%**

Pune District GDP 2013- 14 sectoral split

REGISTERES MANUFACTURING **67%**

Secondary sector

Positive trend of increasing registered establishments

"Pune alone contributes half of the total IT exports of Maharashtra."

Pune is among the top four cities in India in terms of software exports. With its rising IT sector and infrastructure base, it has the potential to reach the likes of Bangalore, to be an IT leader in the country. Pune's share of Maharashtra's IT export stood at 57% by 2014 as per STPI, media sources. Pune's software exports were higher (INR 29,589 crore) compared to Greater Mumbai (INR 21,811 crore). Other cities in Maharashtra such as Nagpur, Nashik, Kolhapur, Aurangabad altogether were under 1%.

"Employment base of the Study Area is Transforming."

As per 2011 Census, PMR holds about 74% of the total employment in the Pune district. Study Area employment by 2011 was 8.3 lakh, in primary, secondary, and tertiary sector was 53%, 29%, 17% of workforce respectively. Agricultural workforce reduced by 4% within a decade (2001-2011). Primary sector (agriculture) offers employment to majority of the workforce.

Figure H: Transforming Employment Scenario of Planning Area (Census 2011)

6. Guiding future development through robust Economic Transition Strategy

The broad direction is to strengthen existing economic sectors; and diversify the economy with emerging sectors arising from hinterland synergies, demand- pull from other regions, and opportunities from sunrise sectors at national / global level, as shown in Figure K. It also represents snapshot of economy of the Study Area based on the economic importance and distribution of projected employment

Figure K: Existing Economic Base and Proposed Catalysts

TOTAL EMPLOYMENT 26.1 LAKHS

Media & Entertainment, Medical, leisure, Religious, Spiritual & Business Tourism	TOURISM	25% PRIMARY SECTOR EMPLOYMENT
Agro-processing, BioTech, Pharmaceutical, Smart Farming, Agro Tourism	AGRICULTURE	
Design, International Universities, Skilling/ Re-skilling	HIGHER EDUCATION & RND	
Logistics & Warehousing, Organized Commerce	COMMERCE & TRADE	32% TERTIARY SECTOR EMPLOYMENT
FinTech & Blockchain	IT, ITES	
Renewable Energy Equipments, Electronics, Defense Manufacturing	ENGINEERING	43% SECONDARY SECTOR EMPLOYMENT
Electric Mobility, AI & Robotics	AUTOMOTIVE INDUSTRIES	

FUTURE PROSPECTS — **EXISITING ECONOMIC SECTORS BY IMPORTANCE** — **FUTURE PROSPECTS**

Figure L: Distribution of Projected Employment

Education & Health **3%**

IT, ITES **11%**

PRIMARY **25%**

COMMERCIAL **18%**

SECONDARY NON MANUFAC-TURING **5%**

JOBS 2041

LOGISTICS **11%**

SECONDARY MANUFACTURING **28%**

Employment Projections

Estimated jobs: 26.1 by 2041 from 12.8 in 2018

Total employment: 26.1 lac with 11.27 for industrial and 8.3 lac for tertiary

About 25% jobs are projected to be in primary sector, 43% in secondary sector, and 32% in tertiary sector

Implementation of above mentioned economic development projects shall be facilitated by identifying unique economic role for each Growth Centre and aligning strategic projects in line with the role, as shown in the following figure:

7. Projections for Study Area

Socioeconomic projections are worked out by village for 814 villages which are under PMRDA jurisdictions. Projections are carried out for population, employment, and household for 2021, 2031 and 2041 and are based on three historic Census data of 1991, 2001 and 2011.

The Study Area is organised into two parts - Urban Growth Centres and Rural Area based on the assessment of urban/rural development potential of 814 villages. 233 villages are identified for urban development (referred to as Urban Growth Centres), and 581 villages are identified for rural development (referred to as Rural Areas). Arithmetic increase method is used for projections of Rural Areas as growth rates of most of the villages are stabilising/declining. For village wise projections of Urban Growth Centres, arithmetic/incremental increase method is used based on the individual village's growth rate. However, just summing up the village-wise populations of urban and rural villages in isolation to project the population of Urban Growth Centres will not be feasible since all the villages are closely linked to each other and not isolated. Thus, for projections of each Urban Growth Centre as a whole, Urban-Rural Growth Differential (URGD) method is used since each Urban Growth Centre contains a mix of interdependent urban and rural villages showing different demographic growth trends.

For such cases, URGD is the most reliable method since its formula takes into consideration the urban and rural growth difference in relation to the total population while projecting. It is also known as the United Nations method. Pune district level projections in RP 1997 are also based on URGD method.

Study Area projections:Total population in 2041 is projected to be 53.7 lakh - 40.74 lakh in Urban Growth Centres and 12.96 lakh in Rural Areas.

Figure M: Population Projections

Projected employment for Study Area stands at 26.1 lakh - comprising 18.4 lakh jobs in Urban Growth Centres and 7.6 lakh jobs in Rural Area. Study Area's projected employment is based on Census data and using the URGD method. It is to be noted that this is employment without a sector-wise breakdown.

Figure N: Employment and Work Participation Ratio

Average household size for Study Area would be 4 by 2041, whereas the same for Urban Area is expected to be 3.9 and 4.4 for Rural Area. Household size is likely to shrink with rising education levels and cost of living. Based on this, estimated housing demand within the Study Area by 2041 would be 13.3 lakh - urban 10.4 lakh and rural 2.9 lakh

Figure O: Household Projections and Household size

8. Developing vision for PMR

Key Strengths of the Study Area are:

- Proximity to Mumbai;
- Established industrial ecosystem and education base with potential for expansion;
- Relatively cheaper land values; and commutable size are the core competencies of the Study Area.
- Key regional development projects like new international airport, ring roads, railway up gradation, is expected to boost PMR's regional economic competitiveness further.
- Relatively safe environment; scenic recreational destinations; and proximity to the culturally vibrant Pune City is also an unique combination that PMR offers, compared with other metropolitan regions.
- Excellent natural setting endowed by the western ghats, which is omnipresent all across the Study Area, truly sets it apart from its peers.

Above mentioned strengths are generally considered as the basic parameters to define liveability of the place. Therefore, the Study Area is already poised to be a liveable region. It shall leverage upon comprehensive planning to increase its attractiveness as a preferred investment and lifestyle destination, and become 'India's most Liveable Region' by 2041. It shall ensure liveability by implementing 5 sectoral development Goals as mentioned in below:

A bold and clear vision is needed to convey an overarching planning intent, along with quantifiable goals and strategies, to precisely guide the downstream development. Five goals - Resilient (Environment), Efficient (Infrastructure), Convenient (Mobility), Prudent (Economy) and Self-sufficient (Housing and Amenities) are fundamental pillars of development of PMR. These five goals will guide strategic actions to implement the proposed vision.

Opportunities :
Strong economic anchors and supporting infrastructure to boost PMR's sustainable development

PMR DEVELOPMENT CONCEPT
Consolidated Development

- Avoid decentralised concept- promote a consolidated development
- Create self sufficient towns that are independent yet complement with PMC & PCMC by providing unique economic role for each town
- Provide for a better lifestyle and increase liveability index by providing sufficient amenities and robust utility infrastructure
- Create a strong linkages through public and private modes of transport connecting these towns
- Sustainable development as envisaged in SDGs
- Promote environmental resilience

Shortcomings of Regional Plan
Decentralisation concept did not work:
Decentralized industries keeping 5km buffer
Ring towns planned with only zoning without public amenities
Population density of Municipal Areas increased
Non-flexibility for accommodating future economic drivers: Future economic drivers such as IT,ITES, logistics, Tourism, etc was not envisioned,
Lack of regional connectivity of public transport

VISION 2041

"INDIA'S MOST LIVABLE HABITAT"

Convenient
Provide Convenient Mobility, Maximum Accessibility

- Develop Regional Linkages
  - Expansion and up-gradation of highways
  - Development of Ring Roads
  - Development of secondary road network
- Develop Transport Hubs
  - Development of multi-modal hubs and transfer stations
  - Promote development along transit corridors along with last-mile connectivity
  - Development of truck terminals
- Promote Public Transport & Increase Its Modal Share
  - Connect employment nodes by mass transit
  - Development of Metro, linking Growth Centres to PMC and PCMC
  - Development of suburban railway, crescent railway and high-speed rail
  - Promote mass transit system/feeder systems within the secondary road

Prudent
Stimulate Prudent Growth

Resilient
Increase Resilience by Reducing Vulnerability & Mitigating Disasters

Efficient
Manage Resources Efficiently

Self-sufficient
Build Self-sufficient Communities

- Town planning schemes for implementing strategic projects
- Public housing at each growth centre
- Provide equitable distribution of open spaces and social amenities
- Promote Work-Live concept and develop compact residential development along transit corridors

- Provide adequate and affordable housing for all
- Guide integrated and equitable neighbourhood development
- Development of compact residential development along major transit corridors

Promote Consolidated Employment Centres
- Consolidate employment nodes for vibrant economic centres
- Promote integrated commercial development at major transit hubs enabling transit services to regional job centres, job creation and investments in transit serviced locations
- Development of tourism nodes

Promote Industrial and Logistics Clusters
- Promote synergies for Industry 4.0 (Next Generation Industry) through expansion of industrial development along with technological advancement
- Consolidate development of logistics clusters along Crescent railway and radial roads
- Provide logistic hubs as urban-rural nexus

Promote Innovation Hubs
- Create a vibrant startups ecosystem
- Add value to existing agro-supply chain through agro-processing/R&D hubs
- Promote biotechnology and pharmaceuticals hubs
- Promote educational hubs focusing on STEM, R&D and skilled development
- Empower Rural Development

Protecting Blue Ribbon
- Protect and conserve all water bodies: streams, rivers, canals, ponds, lakes and reservoirs

Conserving Green Ribbon

Protecting Green Segments
- Reduce vulnerability by demarcating flood lines (blue lines) and safeguarding through green belt
- Demarcate flood lines and augment flood control measures
- Develop avenues conceived as a tree-lined road, with Non Motorised Transport (NMT) provision, linking the Green and Blue features

Preserving Green Canvas

Developing Green Nodes
- Protect and Conserve Western Ghats (eco sensitive zone) and forests
- Controlled development in eco-sensitive zones, establishing contiguity of forest and development of regional parks
- Protect Hilltop & hill slopes
- Develop parks as green lungs within Growth Centres
- Promote plantation of indigenous trees within Catchment areas and along bottom of the hills

- Protect irrigated agriculture lands in command areas

- Promote Carbon Neutral Townships
- Promote renewable energy banks within urban and rural centres

Develop efficient networks for piped water supply and sewage in each Growth Centre
- Develop trunk infrastructre for water supply and sewage network for each Growth Centre

Promote water conservation and recycling
- Promote recycling of wastewater at each Urban Centre
- Recharge groundwater through rainwater harvesting

Promote circular economy through waste management
- Decentralisation of solid waste management sites
- Promote the in-situ solutions to recycling of organic waste
- Mandate industrial waste recycling and effluent treatment

Encourage share of renewable energy within the grid
- Encourage an increase in renewables share
- Facilitate waste to energy concept

9. Proposed Development Model

Proposed structure is a spatial representation of proposed regional sustainability framework, regional economic positioning, and solutions to address issues arising from implementation of RP 1997. Analysis of Regional Plan 1997 reveals that 'decentralised' model of growth has not been successful and the Study Area needs 'consolidated' development. Thus, proposed physical structure aims to:

- Consolidate the existing and future urban development within 5-10 km radius from PMC, PCMC limits and within 5 km along regional transport corridors
- Concentrated urban development in 18 DP Growth Centres; served by regional transportation infrastructure
- Interconnect 18 Growth Centres and to regional nuclei (PMC, PCMC) by mass transit system
- 18 Growth Centres have an independent development plan
- Regional centres to serve urban and rural areas, covering entire Study Area.
- 8 Rural Growth Centres to serve higher order amenities for rural catchment
- Maintain natural character of PMR

Figure P. 9. Proposed Development Model

10. Salient features of the Development Plan

Following projects are proposed under each of the goal to ensure liveability.

Work Hubs:

By 2041, estimated jobs are likely to be increased from 12.8 to 26.1 lacs where 25% jobs are projected in primary sector, 43% in secondary sector (Industries), and 32% in services sector (including Logistics, Commercial, IT & ITES). Estimated land requirements for the Growth Centres as below:

- About 186.6 sqkm of total gross Industrial land would be required to cater to 7.17 lacs of jobs in industries;
- 3.9 sqkm total gross land would be required to accommodate 2.9 lacs jobs in IT sector for the Study Area; 20 sqkm of gross land would be required to accommodate 2.81 lacs of total jobs in Warehousing and Logistics;
- 23.77 sqkm of gross land would be required for commercial purpose which would cater to 5.5 lacs jobs in commercial sector.

Industrial Zone:

Chakan and Talegaon Growth Centre would anchor the future growth of industrial sector with expansion of Chakan Phase V; Talegaon Phase IV-New; and proposed MIDC Industrial Estate at Baur. Electric mobility, AI and Robotics, High tech engineering, Renewable energy equipment, and Defence manufacturing shall be promoted.

Expansion of established industrial clusters at Shikrapur, Pirangut, and Hinjavadi is proposed.

- New industrial clusters are proposed at CSR international Airport to promote airport related industries; at Manjari to promote R&D and manufacturing related to Life Sciences; and at Urali Kanchan to promote agro-processing industries.

New IT Parks / Business Parks are proposed at Wagholi adjacent to Regional Centre; at Talegaon MIDC Phase IV-Old ; and next to proposed CSR international airport.

Live Hubs:

Total 374 sqkm of gross residential land (including ITP/ TPS, sanctioned layouts and new residential area) would be needed to house total 40.74 lacs projected population in Growth Centers. Residential land requirement for each GC is calculated by applying net density to each Growth Centre population, based on the assigned role of each Growth Center.

Residential Zones are proposed as below:

- In order to bring homes closer to the work, comprehensively planned residential zones are proposed at existing and proposed work hubs at Hinjavadi, Chakan, Alandi, Ranjangaon, Shikrapur, Talegaon, Pirangut, Wagholi, Khed Shiwapur, Urali Kanchan, Saswad, and Loni Kalbhor Growth Centres with medium densities (125 p/ha).

- Residential zone with higher densities 250 p/ha is proposed at Khadakwasla Growth Khadakwasla considering the current demand for development and limitations to expansion due to natural constraints.

- Malavali and Nasarapur are proposed with lower densities (100 p/ha) considering their positioning as Tourism hubs.

- Existing residential and RP residential zones are retained in the Growth Centres along with approved Townships, TP Schemes, and sanctioned layouts.

Action	Projects	Description
Promote Employment Centres		
Consolidate employment nodes	4 Regional Centres	115.08 ha Hinjavadi, Chakan, Wagholi and Saswad to serve total region
	Town Centres	86.45 ha serving 14 Growth Centres
Promote Tourism in PMR	5 Tourism Gateways & 3 circuits	Adventure Tourism Centre near Pawana Dam and its circuit, Art & Heritage Centre at near Saswad and its circuit, Spiritual Centre near Alandi and its circuit, Wellness Centre at Uruli Kanchan, Entertainment and Amusement Centre at Malavali Palakhi Sthal on both the Palkhi Marg
Promote Industrial/logistic clusters		
Promote synergies for Industry 4.0, through expansion of industrial development	Industrial Hubs (223.22 sqkm of Industrial area)	Hubs: Talegaon, Chakan, Shikrapur, Ranjangaon, Khed Shivapur and Pirangut MIDC area (98.15 sq km) Newly expanded/ proposed area: 125 sq km
Consolidate development of logistics clusters	19.93 sq km of Logistic zone proposed at key locations	Logistic Hubs located at: Along Crescent Railway & HSR - 4 Along NH -4 Along RR -5
Promote Innovation Hubs		
Promote educational hubs adding to STEM graduates and high-skilled workers	5 Education Hubs, 2 Medical Centres and 1 Sports University	Education Hub: 337.54 ha, Proposed at Pirangut, Alandi, Khadakwasla, Saswad and Nasrapur Medical Centres: Chakan and Wagholi Sports University at Chakan (23.93 ha)
Promote biotechnology and pharmaceuticals hubs	1 Life Sciences Park	Life Science Park at Manajri Kh complementing the current developments
Add value to existing agro - supply chain through agro-processing/R&D hubs	1 Wholesale Markets, APMC & Sub -amrket yard	Wholesale market (20.43 ha) and APMC (39.07 ha)
Empower rural development	8 Rural Empowerment Centre	8 Rural Empowerment Centres at each RGC (8 ha)

Convenient

Action	Projects	Description
Develop Regional Linkages		
Expansion and upgradation of highways	8 NH & SH	Highways are proposed as per the URDPFI road standards and certain State highways upgraded to NH as per information from PWD.
Development of Ring Roads	PMRDA and MSRDC Ring Roads	123.35 km PMRDA Ring Road (65m width) 41.03 km of common stretch: 173.79 km MSRDC Ring Road (110m width)
Development of Secondary Roads	11 secondary roads	11 number of secondary roads are upgraded
Promote Public Transport		
Development of suburban railway, crescent railway and high-speed rail	Suburban Railway, High Speed Rail and Crescent Railway	Pune - Nashik High Speed Rail: 152.19 km crossing Loni Kalbhor, Wagholi, Alandi and Chakan Crescent Railway (for goods and passenger): 89.69 km crossing Uruli Kanchan, Shikrapur, Chakan and Talegaon Quadruplication of passenger railway: Lonavala - Pune - Daund
Development of Metro, linking Growth Centres to PMC and PCMC	10 Metro lines	Out of the total 10 metro lines, 3 are under progress; 7 lines cross Study Area
Develop Transport Hubs		
Promote development along transit corridors	12 Logistic Hubs	12 Logistic Hubs (30.32 sq km) located at: Along Crescent Railway & HSR - 4 Along NH -4 Along RR -5
Development of multi-modal hubs and transfer stations	13 Multi-modal hubs	13 Multi-modal Hubs (48.4 sq km): At junctions of Crescent Railway: 2 At Junction of High Speed Rail: 4 At Junction of Metro: 7 Along NHs:8
Development of truck terminals	9 Truck terminals	11 Truck terminals (37.81 ha)

Action	Projects	Description
Protecting Blue Ribbon		
Protect and conserve all water bodies: streams, rivers, canals, ponds, lakes and reservoirs	368.06 sq km of waterbody	All rivers in the region, including river course, first and second -order streams, major, medium and small irrigation projects are earmarked and protected under the proposed Water Body Zone.
Conserving Green Ribbons		
Reduce vulnerability by demarcating flood lines (blue line) and safeguarding through green belt	88.89 sq km of Green Belt Zone	Green Belt Zone is proposed between a blue line and riverbank, on either side. Activities within this green belt are proposed as per the U-DCPR while dense veg etation cover of the riparian forest is promoted.
Develop avenues conceived as a tree -lined road, with NMT provision, linking the Green and Blue features		Cycle tracks could be developed between the buffers along nalas connecting the Green belt and further to transport hubs. As well as within ROW's of 30 m and above roads
Protecting Green Segments		
Preserve the Western Ghats (eco sensitive zone)	1180.69 sq km of Western Ghat, 824.29 sq km of Forest land	The Western Ghats, a UNESCO World Heritage site, is designated as Ecologically Sensitive Areas (ESA) comprising 145 villages part of PMR. These villages have been included under Ecologically Sensitive Zones I and II.
Protect Hilltop & hill slopes	547.47 sq km	Following criteria is considered while delineating HTHS Zone: slope greater than 1:5 ratio It generally falls within elevation of 700 -850 AMSL
Promote plantation of indigenous trees within Catchment areas and along bottom of the hills	430.17 sq km of Afforestation zone	Afforestation Zone delineation Criteria: Linked with forest land Catchment area Gentle slope at the bottom of hill

Efficient

Action	Projects	Description
Provide efficient water management		
Develop Water supply system	35 sources and 35 water zones	Decentralised system, topographic divisions based on ridges, principles of River Basins, villages within same watershed and availability of water led to planning of 35 zones along: 9 Major irrigation dams, 6 medium dams and 16 MI tanks
Develop water treatment system	26 WTPS	Decentralised and Modular system is adopted along with an integrated approach while planning for the water supply system, to reduce on the capital cost. WTP locations are considered at a higher elevation, accentuating the decentralised water supply system, making each Growth Centre selfsufficient.
Develop efficient systems		
Develop sewerage system	64 STPs 9 ETP	Promote 30% recycling of wastewater at each Urban Centre and are propposed considering gravitational force, locating the STP at the lowest point of the Growth Centres.
Decentralisation of solid waste management sites	36 SWM sites	As per the Municipal Solid Waste Management and Handling 2016 guidelines, sites are located at the distance of a. 100m from river, 200 m from pond b. 200 m from highway c. 10 - 20km from Airports or airbase d. 200m from any settlement/ habitation, public p arks or water supply wells Location based on availability of government land and ideally located within agricultural zones
Encourage share of renewable energy within the grid		

Self Sufficient

Action	Projects	Description
Provide adequate and affordable housing for all		
Town planning schemes for implementing strategic projects	26 TPS covering109 sqkm	Inclusive housing though development of TPS and ITPs
Public housing at each growth centre	59 Public Housing covering 3.02 sqkm	Inclusive housing though development of 42 Public Housing, under the PMAY Program Covering area of 153.42 ha and 18 Public Housing under MHADA covering area of 55.28 ha
Guide integrated and equitable town dev		
Provide equitable distribution of open spaces and social amenities	1437 amenities are proposed	Amenities proposed at Neighbourhood, Town and Regional level Educational facilities- 168 Healthcare facilities- 169 Socio -cultural facilities- 165 Open space & recreational facilities- 619 Residential facilities - 94 Commercial facilities -160 Transport facilites- 62
Promote Development along compact transit		
Promote Work -Live concept and develop compact residential development along transit corridors	Proposed Residential Area: 401.87 sqkm	Residential Zone is proposed considering density of 125 ppl/ha in 15 Growth Centres and 45% topup (15% amenity, 10% open space and 20% roads)

11. Development Control Regulations

Government of Maharashtra, wide Notification no. TPS-1818/CR-236/18/DP&RP/sec 37 & sec 20(4)/UD dated 2nd December 2020, sanctioned Unified Development Control and Promotion Regulations (UDCPR) for the state of Maharashtra and it was published in Government Gazette dated 3rd December 2020.

Therefore from a planning point of view, the following changes are proposed in sanctioned UDCPR. Accordingly sanctioned Unified Development Control and Promotion Regulations (UDCPR-2020), with the following changes, will be applicable for the draft Development Plan of PMR from the date decided by the Government; in the intervening period the Sanctioned Development Control and Promotion Regulations of 2018 for PMRDA shall prevail.

Following key changes are proposed within the U-DCPR. Further details are described in Chapter 19

Regulation in sanctioned UDCPR – Chapter 4 – Land use classification and permissible uses Proposed addition Following sub- regulation no 4.28 shall be added. – Logistic Zone Integrated Logistic park and Logistic park shall be allowed in Logistic zone and shall be governed by the provision mentioned in regulation no 14.11. Subject to following provisions. Sub regulation 14.11.5 shall be changed as follows:	Logistics Park (LP) Logistics Park / Building with a minimum of 10,000 sq.ft. built up area with basic FSI will be designated as Logistics Park (LP). The 80% of the total area of 'Logistic Park' should be used for providing logistic services and up to 20% of the total area will be permitted for support services and common facilities mentioned in Regulation No.14.11.2 (iii and iv). Logistics Parks will be allowed with applicable FSI in these Regulations.
Regulation in sanctioned UDCPR:4.18 – GREEN ZONE – 2 Proposed changes: The said regulation shall be changed as below; 4.18- GREEN ZONE–2 The following users shall be permissible in this zone. All agricultural uses including stables of domestic animals, piggeries, poultry farms, tents, etc.; Garden, forestry, nursery, public/ private parks; playfields, summer camps for recreation of all types; Public/ semi-public sector utility establishments Vehicle Fuel filling Station , subject to conditions mentioned in regulation 4.11(vi); Farmhouses shall be permitted subject to conditions mentioned in regulation 4.11(ix); Any building/use by the Government / Semi-Government with maximum FSI of 0.20 Development of buildings of educational, research, and medical institutions, etc. with FSI of 0.20 Integrated highway/ Wayside amenities with maximum FSI of 0.2 on the gross plot area. Ancillary Service Industries for agro related products with max FSI of 0.20.	Solid waste management, landfill sites, bio-gas plants, power generation from waste. Power generation from non-conventional sources of energy Cemeteries and crematoria and structures incidental thereto; Bus Terminus Tourist homes, Resorts, Hotels, Motels, Health and Wellness Spa, Golf courses, etc.. with platform area up to 10 sq.m. in permanent / semi-permanent structural components. The permissible FSI shall be a maximum of 0.2 on the gross plot area. Development Permissible Adjacent to gaothan:. For the villages in the area of non-planning areas (Areas outside of Urban & Rural Growth Centers), development permissible in the residential zone may be permitted:- a.)Within a belt of 500 meters from the gaothan limits of settlements having a population less than or equal to 5000 as per latest census and; b.)Within the belt of 1500 meter from the Gaothan limits of settlement having a population of more than 5000 as per latest census

Land use category	Area (ha)	Proportion of Total Developed Area (%)	Proportion of Total Area (%)
Residential	401.87	39.4	6.52
Gaothan	23.66	2.3	0.38
Commercial	33.65	3.3	0.55
Industrial	125.07	12.3	2.03
Logistics	19.93	2.0	0.32
Tourism Development	11.65	1.1	0.19
Public and semi public	38.57	3.8	0.63
Public Utility	4.24	0.4	0.07
Traffic & Transportation	223.53	21.9	3.63
MIDC	98.15	9.6	1.59
MADC	9.55	0.9	0.16
SEZ	21.21	2.1	0.34
Defense	8.03	0.8	0.13
Total Developed Area	**1019.11**	**100.00**	**16.55**
Agriculture (G1)	2287.81		37.14
Water bodies	368.06		5.98
Green Belt	88.89		1.44
Green Zone G-2	565.65		9.18
Forest	824.39		13.38
Hilltop Hillslope	547.47		8.89
Recreational	18.79		0.31
Quarry	8.99		0.15
Afforestation	430.17		6.98
Total Non-Developable Area	**5140.21**		**83.45**
Total	**6159.32**		

Chapter 1:
Pune Metropolitan Region

Pune Metropolitan Region Development Authority (PMRDA) is the planning and development authority for the Pune Metropolitan Region (PMR) with an outlook towards channelizing growth in a strategic and orderly manner. The region is gifted with a salubrious climate, abundant natural resources, rich cultural heritage and proximity to India's financial capital- Mumbai. These critical factors provide an impetus for socio-economic growth of the region.

PMR covers the talukas of Pune City, Maval, Mulshi, Haveli entirely while Bhor, Daund, Shirur, Khed, Purandar and Velhe talukas are covered partially. The total area under PMR is 6,914.26 sq km with 73,21,367 population as per 2011 Census figures.

The purpose of the Development Plan is to promote growth and guide the present and future development of towns and cities with a perspective of 20 years. It is an instrument to work out land and infrastructure requirements for various urban and rural uses and allocate land for multiple uses to result in balanced and sustainable distribution of socio-economic activities. This will provide towns/cities with a form and structure within which they can perform all their economic and social functions, efficiently and effectively. The Development Plan has to address issues of growing urbanization, uneven distribution of jobs, increasing commutes, lack of affordable housing, environmental degradation and necessary infrastructure in the region.

1.1 Location and Regional Setting

Figure 1.1: Strategic Location of PMR

Source: MMRDA Map, NMRDA Map, PMRDA Map

PMR is located in Pune district of Maharashtra state between 18°58'N, 73°50'E (north), 18°07'N, 74°01E (south), 18°33'N, 73°10'E (east) and 18°28'N, 74°27' (west).

Pune Metropolitan Region is the largest urban agglomeration in Maharashtra. It is a part of India's Golden Quadri-lateral and is linked through a state-of-the-art expressway with Mumbai (150 km), the state capital and India's commercial capital. It is 140 km and 165 km away from India's largest container port JNPT and Dighi port, while 160 km from Thane-Belapur industrial belt. Mumbai Metropolitan Region bounds PMR on the north-west, Raigad district on the west, Satara district on the south, Ahmednagar district on the east, Junnar and Ambegaon talukas on the north.

The PMR enjoys multiple locational advantages. One of the key advantages has been its close proximity to Mumbai, ports, airports and evolved industrial base. The second advantage is the proximity to hinterland districts, located within 200 km from Pune. These districts are mostly agrarian economies and depend on Pune city for higher order services, strengthening Pune city's position as a service hub.

1.2 Regional Connectivity

Pune Metropolitan Region is the largest metropolitan region in Maharashtra and third-largest region in India in terms of its geographical area after Hyderabad and Bangalore. It is well connected to major cities nationally and internationally through roadways, railways and airways. Despite the availability of perennial river stretches, there is no significant utilization of waterways in the district. Figure 1.2 shows the connectivity within the district.

Road

The major road network consists of an expressway, national highways, state highways and major district roads. PMR is well connected to Mumbai through the state-of-the-art Mumbai-Pune Expressway and National Highway 48. PMR is connected to Nashik via NH-60, Satara/Bangalore via NH-48, Solapur via NH65 and Ahmednagar via NH-753F. It is also well connected to JNPT which is the largest container port of India. PMR also enjoys a direct connection to Dighi port through Pune-Kolad (NH-753F) National Highway.

Railway

Pune Metropolitan Region is well connected to major cities in India through a rail network. The rail network consists of both broad gauge (electrified and non-electrified) double-track as well as single-track lines. The three main railway routes in the region are Mumbai-Pune-Solapur, Pune-Miraj and Daund-Baramati. Pune-Lonavala and Shivaji-nagar-Talegaon routes operate as suburban trains.

Air

An international airport is located at Lohegaon in Pune city and has decent connectivity to major domestic airports and select international destinations. The airport also has a small international air-cargo terminal developed mainly to operate perishable agricultural products. Pune airport runway and ATC facility are shared between Indian Air force base and AAI. This imposes restrictions on operations of civilian flights from the airport. The Government of Maharashtra has embarked on developing a new international Airport in Purandar taluka due to the above limitation of the existing airport, city's growing passenger demand, and lack of such facility within 200km from Pune.

Figure 1.2*: Regional Connectivity*

Source: PWD Department, Maharashtra

1.3 PMR: Jurisdictions, Planning Area and Study Area

Pune Metropolitan Region

Pune Metropolitan Region (PMR) is spread across ten talukas (4 full talukas- Pune City, Haveli, Mawal, Mulshi and 6 part talukas - Khed, Shirur, Purandar, Bhor, Velhe and Daund) of Pune district. The Pune Metropolitan Region's total area is 6914.26 sq. km. and covers about 44% of the district (15,642 sq. km). PMR comprises two municipal corporations viz Pune and Pimpri-Chinchwad, seven municipal councils viz Lonavala, Talegaon-Dabhade, Alandi, Rajgurunagar, Chakan, Shirur and Saswad, three cantonment boards viz Pune, Khadki and Dehu Road, two nagar panchayat viz Vadgaon Maval and Dehu, three SPAs- MIDC, MADC and NDA, ten census towns and 804 villages. Accordingly, the Planning Area of PMR comprises 814 villages (including ten census towns), and its area is 6051.62 sq km.

Table 1.1: *Jurisdictions in Pune Metropolitan Region*

No	Jurisdictions	Area (sq km)	Population (Census 2011)
1	Pune Municipal Corporation (Planning area)	340.45	33,71,626
2	Pimpri Chinchwad Municipal Corporation	177	17,27,692
4	Alandi Municipal Council	2.73	28,645
5	Chakan Municipal Council	17.10	41,113
6	Lonavala Municipal Council	30.47	57,698
7	Rajgurunagar Municipal Council	4.44	25,146
8	Saswad Municipal Council	22.62	31,821
9	Shirur Municipal Council	7.07	37,111
10	Talegaon Dabhade Municipal Council	10.55	56,435
11	Vadgaon Nagar Panchayat	12.99	15,687
12	Dehu Nagar Panchayat	8.5	17475
13	Dehu Road Cantonment	37.41	48,961
14	Kirkee Cantonment	13.74	78,684
15	Pune Cantonment	12.42	71,781
16	National Defence Academy & Defense	57.45	
A	Sub-total (1-16)	**754.94**	56,09,875
17	Special Planning Area - MADC	9.55	
18	Special Planning Area - MIDC	98.15	
B	Sub-total (17 and 18)	107.70	
C	PMR- Planning Area (SPA Area)	6,051.62	
D	PMR- Study Area (B+C)	6159.32	17,11,492
E	PMR- Total Area (A+B+C)	6914.26	73,21,367

Source: Data from respective authority and DP reports

Table 1.2: *Details of Urban Centres in PMR*

	Name of Urban Centre	Area (sq km)	Population (Census 2011)	Type of Authority
1	Pune	340.45	33,71,626 (2018)	Pune Municipal Corporation (Planning area)
2	Pimpri Chinchwad	177	17,27,692	Pimpri Chinchwad Municipal Corporation
3	Alandi	2.73	28,645	Alandi Municipal Council
4	Chakan	17.10	41,113	Chakan Municipal Council
5	Lonavala	30.47	57,698	Lonavala Municipal Council
6	Rajgurunagar	4.44	25,146	Rajgurunagar Municipal Council

7	Saswad	22.62	31,821	Saswad Municipal Council
8	Shirur	7.07	37,111	Shirur Municipal Council
9	Talegaon	10.55	56,435	Talegaon Dabhade Municipal Council
10	Vadgaon	12.99	15,687	Vadgaon Nagar Panchayat
11	Dehu	8.5	17,475	Dehu Nagar Panchayat
12	Dehu Road Cantonment	37.41	48,961	Cantonment Board
13	Kirkee Cantonment	13.74	78,684	Cantonment Board
14	Pune Cantonment	12.42	71,781	Cantonment Board
15	Hinjawadi	7.26	11,459	Census Town
16	Khadkale	4.64	13,435	Census Town
17	Kharabwadi	5.69	9,200	Census Town
18	Koregaon Bhima	12.71	13,116	Census Town
19	Kusgaon Bk	7.12	15,612	Census Town
20	Medankarwadi	5.47	12,576	Census Town
21	Nanekarwadi	4.04	12,654	Census Town
22	Pirangut	9.55	14,174	Census Town
23	Sanaswadi	16.97	13,543	Census Town
24	Wagholi	28.67	33,479	Census Town
	Total	795.62	57,59,123	

Source: *Data from respective authority and DP reports; Census 2011*

Planning Area

As per Maharashtra Regional and Town Planning Act, 1966, certain areas are under the jurisdiction of other administrative bodies, which act as planning authorities in their jurisdiction of Pune Metropolitan Region. Two municipal corporations, seven municipal councils, three cantonment boards, two nagar panchayats have statutory plans either in effect or under process as per the relevant provisions of MRTP Act, 1966. In addition to these, Maharashtra Industrial Development Corporation is planning authority for the area under its jurisdiction.

Thus, Planning Area herein refers to 814 villages (including ten census towns) with an area of 6,051.62 sq km that excludes planning jurisdictions of two municipal corporations, seven municipal councils, three cantonment boards, two nagar panchayats and SPAs - MIDC, MADC within PMR. PMRDA has been appointed SPA for the 23 villages which were handed over PMC. These villages are part of the 814 villages as part of the Planning Area.

Study Area

As such, PMRDA does not have control over development within MIDC and MADC areas. However, considering existing and future roles of these jurisdictions as drivers of economic growth, these jurisdictions have been included in the planning analysis. Thus, Study Area refers to PMRDA jurisdiction of 804 villages, ten census towns and jurisdiction of MIDC, MADC, covering an area of 6,159.32 sq km. Bifurcation of PMR area is provided in Figure 1.3 and Table 1.1.

Figure 1.3: *Jurisdictions in Pune Metropolitan Region*

Source: *Data from respective authority and DP reports; Census 2011*

1.4 Legal Mandate for Development Plan 2021-2041

The Government of Maharashtra vide Government Notification Urban Development Department No. TPS-1899/1191/C.R.80/99/UD- 13 dated 23rd July 1999, under clause (c) of the Article 243-P of the Constitution of India read with clause (c) of section 2 of the Maharashtra Metropolitan Planning Committees (Constitution and Functions) (Continuance of Provisions) Act, 1999, notified a certain area, in and around the city of Pune as "Pune Metropolitan Area (PMR)" to coordinate and supervise the proper, orderly and rapid development of the areas in the Region; execution of plans, projects and schemes for such development; and to provide for matters connected therewith or incidental thereto.

The Government of Maharashtra vide Notification No. TPS−1815/1204/13/CR-87/15/ UD-13, dated 31st March 2015, under section 42A, 42C and 42F of Maharashtra Regional and Town Planning Act, 1966 (hereinafter referred as "the said Act") declared the Pune Metropolitan Area as a Pune Metropolitan Development Area under section 42A of the said act and under section 42C thereof also constituted the Pune Metropolitan Regional Development Authority as the Area Development Authority. Thereafter the Government of Maharashtra vide Notification No. TPS-1815/613/CR-309/15/UD- 13 dated 4th December 2015 and TPS.1815/CR 313/15/UD-13 dated 10th February 2016, inter-alia revised the limits of the Pune Metropolitan Area.

The Governor of Maharashtra had promulgated the Maharashtra Metropolitan Region Development Authority Ordinance, 2016, to provide for the establishment of the authorities for areas declared as Metropolitan Areas and to co-ordinate and supervise the proper, orderly and rapid development of the areas in the Metropolitan Region; execution of plans, projects and schemes for such development; and to provide for matters connected therewith or incidental thereto on 13th June, 2016. Subsequently, the ordinance came into act on 10th January 2017.

The Government of Maharashtra vide Notification No. MPC−2011/CR-215/2011/UD- 30, dated 27th June 2016, declared the formation of Pune Metropolitan Planning Committee as per 74th Amendment of Constitution of India (Annexure-I).

The Government of Maharashtra vide notification No. PMRDA.3316/CR 54/UD- 7, dated 11th July 2016, rescinds the Govt. Notification No. TPS/1204/13/CR-87/15/UD-13 dated 31st March 2015 and established 'Pune Metropolitan Region Development Authority' for Pune Metropolitan Region, under the provisions of Maharashtra Metropolitan Region Development Authority Ordinance, 2016 (Annexure-II).

The Government of Maharashtra vide Notification No. TPS-1817/CR- 173/17/ UD-13 dated 18th January 2018 under subsection (1) of section (40) of the said Act declared Pune Metropolitan area as "Notified Area" and appointed Pune Metropolitan Region Development Authority as a "Special Planning Authority" for the said notified area, from the date of its establishment, i.e. 31st March 2015.

Pune Metropolitan Region Development Authority (PMRDA) intends to prepare the Draft Development Plan for Pune Metropolitan Region (2021-2041) in accordance with the provisions of the said Act. Legal formalities related to the procedure of preparing and sanctioning of the Development Plan as per the said Act are outlined in Table 1.3.

Table 1.3: *Legal framework of procedures for the preparation of the Development Plan*

No	Provisions of MRTP Act, 1966	Date
(A)	Formation of Pune Metropolitan Region (PMR) under the provisions of Maharashtra Metropolitan Planning Committees Act, 1999	23/07/1999
(B)	Formation of Pune Metropolitan Planning Committee by Government	27/06/2016
(C)	Establishment of Pune Metropolitan Region Development Authority (PMRDA) for PMR under the provisions of Maharashtra Metropolitan Region Development Authority Ordinance, 2016	11/07/2016
(D)	Declaration of PMR as Notified Area and appointment of PMRDA as Special Planning Authority u/s 40 of the Act from 31st March 2015	18/01/2018
(E)	Declaration of Intention for Preparation of Draft Development Plan u/s 23 of MRTP Act, 1966	
	(1) Resolution of Metropolitan Planning Committee (MPC)	08/07/2016
	(2) Resolution of PMRDA	28/12/2016
	(3) Publication of Intention in Govt. of Maharashtra Gazette	06/07/2017
(F)	Appointment of Town Planning Officer u/s 24 of MRTP Act,1966	01/03/2018
	Appointment of Town Planning Officer u/s 24 of MRTP Act,1966	13/03/2020
(G)	Preparation of Existing Land Use Map u/s. 25 MRTP Act, 1966	
	(1) Original time limit	05/01/2018
	(2) Extended time limit	05/07/2018
	(3) Existing Land Use Map handed over to Authority	05/07/2018
(H)	Publication of proposed Land Use Plan u/s 26 of the MRTP Act, 1966	
	(1) Original time limit	05/07/2019
	(2) Extended Time period of publication of draft development plan as per the provision of section 26 and 148-A of MR & TP Act	02/10/2021
	(3) Declaration of 23 villages in PMC limit as Notified Area and appointment of PMRDA as SPA u/s 40 of MR & TP Act	14/07/2021
	(4) Formation of Pune Metropolitian Planning Committee	16/07/2021
	(5) Resolution of PMRDA	29/07/2021
	(6) Resolution of Pune Metropolitian Planning Committee (MPC)	29/07/2021
	(7) Publication of Draft Development Plan in Government of Maharashtra Gazetteer	02/08/2021

1.5 Evolution of the Region

PMR is the focus of evolution study wherein the objective is to understand the factors that shaped PMR's physical pattern (initially rural and later suburban) and their relevance in today's context.

Throughout history, the evolution of PMR and growth of Pune city have been closely linked. For example, PMR supported Pune as a trade town in its formative years and up to early industrialisation phase, by serving as the agricultural hinterland of Pune town. Hinterland provided a strong agricultural base to Pune town owing to its fertile river valleys and other climatic factors bestowed upon by the Western Ghats. Based on the understanding of the symbiotic relationship between PMR and Pune city, its evolution can be broadly categorised into the following stages of evolution of Pune as mentioned below:

Stage 1 - Administrative and Trade Center

In the Maval region, Chhatrapati Shivaji Maharaj first established his base and developed the Maratha Empire. Almost all rivers originate from the West. Hence, their watersheds (Khore in Marathi) must have been collectively referred to as Mavals. Each Maval is essentially represented by a river or sometimes by a fort depending on its strategic location and jurisdiction. These Mavals appear in the archives of the Maratha Kingdom where they were recognised as early administrative divisions. Overlay of watersheds of Mavals and revenue divisions reveals the transition of administrative divisions from Mavals-Pargana-Tehsil and finally consolidated into Talukas.

The patronage of Maratha Peshwas resulted in a great expansion of Pune, with the construction of many temples, bridges and Sadashiv, Narayan, Rasta and Nana peths. A lake at Katraj on the city's outskirts and an underground aqueduct to bring water from the lake to Shaniwarwada were developed.

With the advent of the British in 1818, mass infrastructure development started taking place, army cantonment boards were set up, and railway lines from Bombay to Poona (Pune) were laid. In the subsequent years, the rail line was extended down south connecting other parts of the country. Railway infrastructure boosted the economic development of Pune city.

Figure 1.4: Pune: Stage 1- Administrative and Trade Centre

Source: A Note on 12 Mavals of Poona District, School of Oriental and African Studies, University of London, 1978

Stage 2 - Industrial Center

Around the time of India's Independence, sporadic development started taking place in the form of refugee camps away from the city towards today's PCMC. Industrialisation in this area commenced with the establishment of an industrial estate by MIDC in 1960 and Hindustan Antibiotics, transforming small villages of PCMC into a premier industrial hub.

The introduction of foreign direct investments initiated large scale manufacturing, automobile, information and biotechnology industries to set up their bases in Pune. By this phase, Taluka headquarters were emerging as a nascent version of today's growth centres in PMR. Setting up industries in today's Pimpri-Chinchwad MIDC created employment shifts from agricultural to non-agricultural for the workforce employed in PMR villages. It is this policy that drove the fast-paced industrialisation and urbanisation in the region.

Figure 1.5: *Pune: Stage 2 - Industrial Centre (Pune city and Pimpri Chinchwad New Town)*

Source: Revised Development Plan Pimpri- Chinchwad Municipal Corporation 1993, Development Plan- 2021 for newly merged areas in PCMC, Draft Development Plan for Old Pune City 2007-2027

Stage 3 - Industrial Expansio

The formation of Pune Metropolis marks this phase of evolution in 1991 consisting of PMC, PCMC and regional planning efforts to decentralise its urban development. The economic liberalisation policy led to a shortage of developed industrial land. High land prices resulted in the decentralisation of industrial development outside municipal corporations but adjacent to its boundaries sowing the seeds of the city's fringe development. Within a decade, concentric growth along municipal corporation boundaries and ribbon-like growth along major transport corridors was witnessed. The work-travel pattern between both municipal corporations also put pressure on the transport infrastructure.

Figure 1.6: Pune: Stage 3 - Industrial expansion (Pune and Pimpri Chinchwad as twin cities)

Source: Revised Development Plan Pimpri- Chinchwad Municipal Corporation 1993, Development Plan- 2021 for newly merged areas in PCMC, Draft Development Plan for Old Pune City 2007-2027

Stage 4 - Business and Service Center

Regional Plan 1997 adopted a decentralised development model intending to solve problems of Pune Metropolis. It aimed to control urban-rural migration by providing employment (industrial) close to growing rural centres which were referred to as Peripheral Towns. Most of these towns are part of PMR and were conceived as self-sufficient industrial towns. RP 1997 also intended to supply more land to absorb residential growth in fringe areas. Fifty-three villages were identified as urban fringes and were planned as eight sectors. Out of these villages, 18 villages were merged into PCMC and 23 were integrated into PMC between 1997-2001.

In today's context, some of the peripheral towns identified in RP 1997 have already established themselves as major employment hubs such as Chakan and Sanaswadi. However, they have not been self-sufficient due to the lack of resident population. On the other hand, over-densification has taken place in fringe towns such as Wagholi, Manjari, whereas Uruli Kanchan, Loni Kalbhor, Nasrapur remain relatively underdeveloped.

On the contrary, with the opening of the national economy and the rise of the IT industry, Hinjawadi emerged as a major disruptor in economic development that changed the skyline of Pune Metropolis which was not envisaged in the RP 1997. To conclude, economic liberalisation and decentralisation of urban development strategy have shaped the urban pattern of the planning area besides organic growth of local growth centres.

Present Stage

Urbanization in PMR is extensively taking place along five major transport corridors connecting major districts around. Urban growth is also focused mainly around locations closest to PMC and PCMC.

Figure 1.7: Pune: Stage 4 - Business and Service Centre (Pune Metropolis and Suburbs)

Source: Revised Development Plan Pimpri- Chinchwad Municipal Corporation 1993, Development Plan- 2021 for newly merged areas in PCMC, Draft Development Plan for Old Pune City 2007-2027

Figure 1.8: Pune: Present Stage - Pune Urban Agglomeration

1.6 PMR's Assets

PMR is blessed with rich heritage and culture, natural abundance and prosperity in all forms. The glorious city of Pune is heralded as the cultural capital of the state of Maharashtra. PMR's culture emphasizes education, arts and crafts, music, theatre, etc. and can be seen as an example of the blending of culture and heritage with modernity. PMR has been the birthplace of the great poet-saints Tukaram Maharaj and Dhnyaneshwar Maharaj. It claims the honour of being the home of great freedom fighters like Bal Gangadhar Tilak, Gopal Krishna Gokhale, etc. The culture of PMR is well reflected through its cuisine, people, languages, etc. The most common language spoken by the majority of the population is Marathi. Apart from Marathi, Hindi is also one of the languages used commonly.

Following is the list of key assets PMR possesses:
1. **Heritage :** Forts: Sinhgad, Rajmachi, Lohagad, Korigad, Purandar, Visapur, Tung, Tikona, etc
2. **Scenic :** Hill station destinations: Amby valley, Ajibai Devrai, Temghar dam, Vadivali Lake, Dudhiware waterfall, Pawana dam, Walwan dam, etc
3. **Biodiversity :** Western Ghats, Wildlife sanctuaries of Tamhini Ghat & Sudhagad
4. **Educational** : Pune University, NCL, ARAI, IISER, NIV, Defence Institute, NDA, HEMRL, BJ Medical College, Fergusson, BMCC, Gokhale Institute, Agharkar Institute, Symbiosis, CWPR, MIT, Bharati Vidyapeeth
5. **Cultural :** Tukaram Maharaj and Dyaneshwar Maharaj Palakhi, Maha-ganpati & Chintamani Ashvinayak Mandir, Chhatrapati Sambhaji Maharaj Samadhi, Prati-Shirdi, Triveni Ashram, Art of Living, Bhaje caves, Karla caves
6. **Economic** : Hinjawadi IT Park, Chakan Automotive Hub, Ranjangaon MIDC, Kharadi IT Hub

All the Indian festivals like Diwali, Janmashtami, Navaratri, Dussehra, Holi, Rakshabandhan, Christmas, Eid, etc. are celebrated with the same excitement in PMR with no religion, language bars.

Ganpati festival

This is one of the biggest festivals in Pune. People buy Ganesh idols to be kept in their houses as a divine guest for three, five to ten days. The idol is then taken out ceremoniously for the ritual of visarjan and is immersed into the water.

Huge Ganesh idols are worshipped at pandals, also known as Dekhavas for 8 to 10 days organized by Mandals. Various Mandals take out huge processions during the first day and the day of immersion of the idols throughout the city. People from the city and nearby towns and districts come in numbers to witness the festive celebrations.

Pandharpur Wari

Pandharpur wari is an annual pilgrimage where palakhis carrying paduka (footprints) of various saints (mainly Dhnyaneshwar Maharaj from Alandi and Tukaram Maharaj from Dehu) are taken from their respective shrines to Pandharpur. People march on foot from various locations and join the main palkhi from Dehu and Alandi. All the palakis gather in Pandharpur on Ashadhi Ekadashi and take holy dip in the waters of Bhima River and visit Lord Vithoba temple.

Figure 1.9: *Ganapati Festival and Pandharpur wari*

1.7 Review of Past Planning Efforts

Revised Regional Plan for Pune district (RP 1997) was prepared to address development needs for the period of 1991-2011. It came into effect from 1997.

According to the MRTP Act 1966, certain areas within PMR are under the jurisdiction of other administrative bodies that act as planning authorities in their respective jurisdictions. Two municipal corporations, seven municipal councils, three cantonment boards, one nagar panchayat have statutory plans either in effect or under process as per the relevant provisions of MRTP Act 1966. Additionally, MIDC has prepared development plans for its areas such as Chakan, Ranjangaon, Hinjawadi, and Talegoan.

Table 1.4: Past Planning Efforts

#	Agency	Sanctioned Plans and Dates
1	Pune district	Pune Metropolitan Region was established in 1967 for an area of 1605 sq km, and Regional Plan for this area (1970-91) was sanctioned in February 1976. Regional Plan of Pune district (1991-2011) was sanctioned vide Notification No TPS-1895/227/CR-26/95/UD-13 dated November 25, 1997.
2	PMC	State government extended the limits of Pune Municipal Corporation by merging 23 villages in 2008. The Draft Development Plan for these villages was partly sanctioned on September 18, 2008, and the remaining part was sanctioned on May 17, 2008. State government sanctioned the second revision of Development Plan 1987 of old limits of PMC vide Notification TPS 1815/209/C.R. 69/15/D.P. Pune/Sanction /UD-13, dated January 4, 2017.
3	PCMC	State government sanctioned Development Plan for Pimpri-Chinchwad Municipal Corporation on September 18, 1995, for an area of 86 sq km. State government extended the limits of PCMC by merging 18 fringe villages with it. It approved the Development Plan for this extended area (84.51 sq km) on August 18, 2009.
4	Alandi Municipal Council	State government sanctioned revised Development Plan (second revision) on May 15, 2013.
5	Lonavala Municipal Council	State government sanctioned revised Development Plan (second revision) on June 29, 2005.
6	Saswad Municipal Council	State government sanctioned revised Development Plan (first revision) on July 29, 2015.
7	Shirur Municipal Council	State government sanctioned revised Development Plan (second revision) on August 23, 2012.
8	Talegaon Dabhade Municipal Council	State government sanctioned the revised Development Plan (second revision) on May 27, 2013.
9	Chakan Municipal Council	Preparation of the Development Plan is under progress.
10	Rajgurunagar Municipal Council	First Development was prepared and published for objection and suggestions in June 2017.
11	Pune Cantonment Board	Development Plan is in existence.
12	Kirkee Cantonment Board	Development Plan is in existence.
13	Dehu Cantonment Board	Development Plan is in existence.
14	PCNTDA	State government sanctioned the Development Plan of Pimpri Chinchwad New Town Development Authority on December 14, 1995.
15	MIDC	Plans for MIDC areas namely Khed, Ranjangaon, Baur, Talegaon, Chakan and Rajiv Gandhi Infotech Park are sanctioned.

Review of Regional Plan 1997

Regional Plan for Pune district (RP 1997) is a comprehensive document that was prepared to address the region's development needs from 1991 through 2011. It came into effect from 1997. This section presents a review of RP 1997 in four subsections - objectives, planning strategies, salient proposals and analysis.

Objectives

The objectives of Regional Plan 1997 were to promote balanced regional development and optimum utilisation of available resources. It aimed at reducing urbanisation pressure from Pune agglomeration that engulfed PMC, PCMC and villages situated at its fringes, protecting the environment of the Western Ghats, maximum utilisation of irrigation potential for the remaining part of the region.

Figure 1.10: *RP 1997 - Proposed Regional Structure*

RP 1997 Planning Strategies - Pune District

1. It established the broad planning concept and organized the District into subregions for planning purposes.
2. As the PMC area was considered congested, an alternative New Town was proposed at 80-100 km from Pune between Baramati and Kurkumbh industrial areas, with an estimated 5-7 lakh population.
3. At nodal points, peripheral ring towns of 0.50-1.50 lakh population each around existing/proposed industrial areas were proposed.
4. Residential townships were suggested to take care of housing needs at peripheral industrial Ring Towns. These towns were named as Inner Ring Towns (25-30 km away from Pune City) and Outer Ring Towns (50-80km away from Pune City).
5. Distribution of population and public amenities was done based on the proposed settlement hierarchy and optimum travel distance norms. By 2011, the population of PMC was estimated at 21 lakh, PCMC at 12 lakh and Cantonments at 2.65 lakh. PMR population was estimated at 15.7 lakh (8 Fringe village clusters (10.75 lakh), 4 Growth Centers (2.25 lakh) and 79 rural areas (2.7 lakh)).

Figure 1.11: RP 1997 - Proposed Population Distribution

RP 1997 Planning Strategies - PMR

1. Existing land use, settlement patterns and growth rate revealed that pronounced growth occurred at 53 villages around PMC and PCMC limits. These villages were regrouped into eight sectors (referred to as Fringe Areas) along arterial roads/highways based on administrative boundaries and natural features.

2. Potential village clusters were identified as Growth Nodes/Nodal Towns considering the proximity to growing municipal councils (Lonavala, Alandi, Talegaon Dabhade), industrial developments (Chakan, Shikrapur-Talegaon Dhamdhere, Pirangut, Khed Shivapur-Nasarapur) and presence of major institutions (Uruli Kanchan).

3. Zoning and circulation plans were prepared for the PMR, i.e. 8 Fringe Areas (Sector A-H) and 3 Growth Centers (Sector I, J, K). It did not cover the 4th Growth Center at Loni-Kalbhor since it already had a Development Plan. Broad Land Use Plans were prepared for 5 Peripheral Towns (Sector L, M, N-O-R, P, Q). Refer to Figure 1.13 .

4. Residential areas have been worked out considering the gross residential density of 125-150 persons per hectare. However, to increase land availability for residential use and discourage conversion of agricultural lands into residential use, most of the developable lands, except protected areas, have been assigned with residential zoning. Average gross residential density for 18 sectors (A-R) works out to be 100 persons per hectare.

5. Most of the Sectors were envisioned as Industrial Towns/Townships. Estimation of land requirements was based on the following parameters:
   a. The industrial area was estimated based on worker density of 60 workers/hectares for large industries and 75 workers/hectares for SMEs
   b. The ratio of industrial to tertiary sector employment was considered as 1:1.5
   c. The ratio of workers to dependents was assumed 1:2
   d. Employment generated and the land requirement for proposed industrial development was obtained using a, b and c above.
   e. The following assumptions guided the land requirement for residential areas:
      1. It was assumed that 25-35% of workers would commute from existing urban centres, 10%-20% workers would commute from surrounding rural areas to proposed industrial clusters, and there would be 50% natural growth in the existing population.
      2. Residential population estimated based on a to c and e(i) were added together to obtain a total population of a Township.
      3. This population number was divided by gross residential density ranging between 75-125 p/ha to arrive at residential land requirement.

f. The document mentions that although residential areas were worked out in detail, residential zoning was provided on the higher side to avoid shortage of residential zoning, a lesson learnt from the implementation of the 1976 Plan.

Figure 1.12: RP 1997 - Proposed Planning Areas

Salient proposals of RP 1997

1. Protected Zones were the forests, Hilltop Hillslope zone (slope >1:5), an immediate catchment of lakes, defence areas and perennial Bagayat/agricultural lands.
2. Industrial proposals were for small scale and services industries. Industrial Zones proposed by MIDC were incorporated at Talegaon, Bhosari and Talawade. Major industrial clusters (>500 ha) were proposed at Chakan, Koregaon Bhima, Khed Shivapur and Wadgaon. Mid-sized industrial clusters were proposed at Pirangut and Talegaon. Small-sized industrial clusters were proposed in the remaining sectors.
3. Key regional transport proposals were South Easterly and North Easterly bypass (90m wide), railway line along North Easterly bypass, Westerly Expressway (90m wide) from Somatane Phata to Shirwal, the ring road outside corporation limit, quadrupling of Lonavala-Pune railway and upgrading Pune-Daund railway.
4. Two alternatives were considered to facilitate implementation and maintenance in the future: a merger of fringe villages into existing municipal councils or creation of new municipal councils for a group of fringe villages. Ultimately, a combination of both alternatives was suggested wherein six sectors were to be merged with PMC, PCMC and six new municipal councils were to be established.

Table 1.5: RP 1997: Proposed Land Use for Study Area

Land Use Category	Area (sq km)	Percentage (%)
Afforestation	1,064	17.28
Agriculture	4010.32	65.10
Defence	9	0.15
Forest	349	5.67

Green Belt	6	0.10
Industrial-MIDC	58	0.94
Unclassified/Water bodies	300	4.87
Public and Semi-Public	11	0.18
Gaothan	32	0.52
Hill Station	152	2.47
Hilltop Hill Slope	39	0.63
Residential	129	2.09
Total	6159.32	

Figure 1.13: RP 1997: Proposed Land Use Plan for Study Area

Analysis of RP 1997

1. RP 1997 leveraged strategies of 1976 Plan such as conservation of available forests, agricultural and irrigable areas, 'delimiting' urban growth beyond Pune city's fringes through the reservation of extensive green areas, 'afforestation' of dry hills, decentralised industrial development with a ceiling on industrial hectarage within Pune city and ceiling on residential areas in fringe areas.
2. Decentralisation of industrial activity away from Pune city has been achieved by enforcing a Buffer Zone of 5 km around PMC and PCMC.
3. Industrial development has been successfully implemented by MIDC and privately developed industrial clusters as per proposed zoning at Talegaon, Urse, Chakan, Koregaon Bhima-Talegaon Dhamdhere-Shikrapur node, Pirangut, and Hinjawadi. It supported employment generation for corporations, fringe areas and to some extent, rural areas situated within commutable distance.
4. The urbanisation has outpaced the estimated PMR population. RP 1997 projected 2011 PMR population at 51.35 lakh, out of which PMC and PCMC together absorbed about 95% as per 2011 Census. This means the

strategy of controlling the growth of PMC and PCMC through decentralisation was not successfully implemented. It is also evident from the fact that out of 18, only three growth centres managed to attain the estimated population.

5. On the contrary, the growth that took place in the form of uncontrolled urban sprawl is characterized by low densities, triggering unsustainable infrastructure demand and added pressure on natural resources and utilities.

6. The original intention of generating rural employment closer to villages and decongestion of PMC, PCMC could not be achieved due to the following reasons:
   - Decentralised industries were remotely located. Although RP recommended hierarchical development of amenities, it did not materialise, which discouraged residential areas from flourishing despite the provision of residential zoning near industries.
   - Industries employed skilled and educated workers, who preferred to live in PMC, PCMC to avail quality of life and services offered by municipal corporations
   - The density of municipal corporation areas increased through the creation of higher development potential (FSI and TDR) through revisions to DCPR and through territorial expansions that collectively increased the capacity of PMC and PCMC to absorb higher population growth.
   - While control on industrial development in a buffer zone of 5 km around PMC and PCMC was achieved, it also triggered industrial/real estate activity in rural areas, populating irrigated agricultural lands affecting rural employment that led to further rural-urban migration towards corporations and municipal councils.

7. The Mumbai-Pune Expressway and Westerly bypass from Somatane Phata to Katraj were implemented out of regional transport proposals. Most of the proposed roads are either not implemented or remain partly implemented due to local constraints and high land prices.

8. Upgrading the railway routes partly took place, but suburban railway frequency to ridership equation has not been economically viable beyond municipal limits. Easterly bypass with broad gauge railway could not be implemented.

9. The proposed international airport at Chakan could not be developed. It has been relocated near Saswad which is under planning stage.

10. IT sector development in Hinjawadi took place beyond the preparation phase of RP 1997. It has been a major disruptor that changed urban development dynamics of Pune agglomeration. IT parks were either developed by MIDC or the private sector that could not ensure adequate residential land around these parks due to their limited mandate and land values. This has resulted in excessively long work-home trips for their workers, adding to the congestion of PMC and PCMC.

Chapter 2:
Physical Features and Environment

This chapter covers an assessment of the region's environmental features, including the topography, geology, climatology, and status of natural resources such as water, forests, agriculture, and the pollution levels observed in the region.

Approximately 38% of the PMR area is currently used for agricultural purposes, and most of the urbanisation is envisaged to add to the urban agglomeration of Pune and Pimpri-Chinchwad cities. Rapid urbanisation has been exerting tremendous pressure on environmental resources in the region. The Planning Area population is estimated to grow almost three times to over 54 lakh by the year 2041. Thus, resources must be equitably allocated amongst entities mandated with regulation and management of resources in the region.

2.1 Topography

Topographically, PMR has the following four major physiographic units:
1. **The Hills and Ghats:** Strip of Sahyadri mountains towards the west is known as 'Ghatmatha' (1,420 m above MSL). This physiographic area has famous tourist places such as Lonavala and Khandala. The altitude of this area ranges between 500 m and 1500 m above MSL.
2. **The Foothills:** Undulating belt of 15-30 km towards the east of 'Ghatmatha' is called 'Mawal'. The central parts of Mawal, Mulshi and Velhe talukas come under this region. The altitude of this region ranges between 100 m to 500 m above MSL.
3. **The Central Plateau:** The plain's remaining belt on the east of 'Mawal' is called 'Desh'. This area covers basins of the river Bhima and its tributaries. The central and western part of Khed taluka, the eastern zone of Velhe, Mulshi, Bhor talukas and western part of Haveli taluka falls in this area.
4. **The Eastern Plains:** The area of Shirur and Daund talukas is mostly plains.

Foothills of the Western Ghats are critical physical features of the region since they hold the majority of surface water resources. Water from these sources is stored in several small and large dams, pouring into irrigation systems and water supply systems. Pune and Pimpri-Chinchwad cities are settled on the central plateau located in the region. This plateau keeps these settlements from flooding in monsoon. Eastern plains are fertile and most productive of agricultural areas in the region. These plains have formed from alluvial deposits of rivers in the Krishna basin. However, these areas are also prone to frequent flooding and inundation.

Elevation and Slope Analysis

The region has an average elevation between 500m to 1400m from mean sea level. Based on the slopes, the Pune Metropolitan Region is divided into four categories.

Table 2.1: Slope Analysis for Study Area

Sr No	Category	Slope gradient	Slope %	Area of PMR (sqkm)	Proportion (%)
1	Very Steep Slope	>1:2.5	More than 40%	46.81	0.76
		Very steep slopes occur in small parts of the Sahyadri Hills range, the ridge areas of Mulshi, Velhe talukas and a small narrow stretch in Bhor and Haveli talukas.			
2	Steep Slope	1:2.5-1:5	Less than 40% and more than 20%	753.28	12.23
		A significant portion of hill ranges in Mulshi, Mawal and Khed talukas have steep slopes.			

3	Moderate Slope	1:5 - 1:10	Less than 20% and more than 10%	784.08	12.73
		Shirur, Khed and Purandar talukas have major stretches of moderately sloping. Small patches are also scattered in Haveli, Daund talukas and Pune city.			
4	Gentle Slope	< 1:10	Less Than 10%	4573.29	74.25
		Gentle sloping is scattered in all talukas of the district. This covers major areas of Daund, Shirur, Haveli talukas and Pune city.			

Source: GIS Data base

Figure 2.1: *Slope Analysis*

Source: GIS Data base

2.2 Geology

Almost all the rocks in PMR are varieties of Deccan trap-basalts. The outpouring of enormous lava spread over vast areas in western and central India led to their formation. The lavas are called 'Plateau basalts' because of their dominantly basaltic composition and as they tend to form flat-topped plateau-like features. Such flows are called 'traps' because of their step-like or terraced appearance. The rock is dark grey to greenish-grey in colour.

The district's basaltic dykes are all upright and do not seem to have caused disturbance or dislocation in basalt strata. Two dykes about 4 feet wide run obliquely across the Indrayani valley, 55 km north-west of Pune, and intersect each other. Small dykes are seen near Pune Cantonment and at the southern slopes of the hills near Bhosari and Dighi. These dykes are to be regarded as feeders for the trap flows and are expected to be present underneath the traps' main mass. In general, they show regularity in direction, thickness and size. The details of rocks and minerals of PMR are represented in Figure 2.2.

Figure 2.2: PMR - Lithography

Source: Geological Survey of India

2.3 Soil Type

Soils in PMR are classified into broad five types based on soil depth, drain, soil characteristics and slope. Table 2.2 and Figure 2.3 show the soil types and their locations in PMR.

Table 2.2: Soil types within Pune district

Type	Soil Type	Locations in PMR
1: Very Deep Soil	Very deep, well-drained, loamy soils on gently sloping narrow valleys with moderate erosion.	Patches are spread in Mulshi, and some parts of Velhe taluka.
2: Deep Soil	Deep, moderately well-drained, strongly calcareous, fine soils on gently sloping plains and valleys with moderate erosion.	Narrow stretches are spread in Khed, Mawal, Mulshi, Velhe, Haveli, Bhor and Purandar talukas along river banks.
3: Slightly Deep Soil	Slightly deep, well-drained, fine, calcareous soils on very gently sloping lands with mesas and buttes with moderate erosion.	Major portions of Purandar, Pune City, Haveli, Daund and Shirur talukas have this soil coverage.
4: Shallow Soil - 1	Shallow well-drained, clayey soils on gently sloping lands with mesas and buttes with moderate erosion and slight stoniness.	Major portion of the region is covered by this type of soil. This includes the major portion of Mawal, Khed, Mulshi, Velhe, Bhor, Purandar Haveli and Daund talukas. Small stretches are spread in Pune City and Shirur talukas.
5: Shallow Soil - 2	Shallow, well-drained, clayey soils on gently sloping land with moderate erosion.	Stretches are spread in Mawal, Shirur, Haveli, Purandar and Daund.

Source: District Environment Atlas for Pune District By MPCB 2006; DIstrict Agricultural Depatment, Pune (www.mpcb.gov.in); NBSS-National Bureau of Soil Survey, Zoning Atlas Division.

Figure 2.3: *PMR - Soil Types*

Source: District Environment Atlas for Pune District By MPCB 2006; DIstrict Agricultural Depatment, Pune (www.mpcb.gov.in); NBSS-National Bureau of Soil Survey, Zoning Atlas Division.

2.4 Climatology

The climate of PMR is studied at Pune district level. Pune district is part of the tropical monsoon land and therefore shows a significant seasonal variation in temperature and rainfall conditions. The climate of the western region of Pune district is cool, whereas the eastern part is hot and dry.

Rainfall

Pune Metropolitan Region has a varied topography and physiography. Likewise, the climate varies drastically ranging from high rainfall areas to the areas having low rainfall. Based on climatic characteristics, PMR is divided into three zones.

Zone-1 (High Rainfall Zone): This zone includes narrow strips extending from north to south along the crest of Sahyadri ranges. It consists of hilly high lying terrains and part of Mawal, Mulshi and Velhe talukas where rainfall is above 1250 mm.

Zone-2 (Medium Rainfall Zone): This zone includes the central part of PMR where rainfall ranges from 1250mm to 700mm. It includes part of Khed, Pune City, Bhor, Haveli and Purandar talukas.

Zone-3 (Low Rainfall Zone): This zone includes talukas with the lowest rainfall intensity. The decline in rainfall amount towards the east is due to the Sahyadrian mountainous zone, which creates a rain shadow region, where rainfall is below 700mm. It includes parts of Shirur, Haveli and Daund talukas.

Figure 2.4: Pune district - Taluka wise rainfall

Source: District Environment Atlas for Pune District By MPCB 2006; https://pune.gov.in/about-pune

The western part of the region adjacent to the west coast is a hilly area with forest cover, due to which the rainfall intensity is very high in this part compared to the eastern parts. Zone wise yearly total Rainfall data during years 1951-2016 is shown in Figure 2.5.

Figure 2.5: Zone wise yearly total rainfall data during the years 1951-2016

Source: Indian Metorological Department, Ministry of Earth Science.

Temperature and Humidity

April and May are the hottest months in the district. The maximum temperature during these months often rises above 36° C. The western and northern regions i.e. Khed, Mawal, Mulshi and Velhe talukas, are cool, whereas the eastern part, i.e. Shirur, Daund talukas, is hot and dry. In the summer months, the relative humidity ranges from a minimum of 20% to a maximum of 67% during the day. During the monsoon period, the relative humidity varies from 68% to 87%. The relative humidity during winter shows maximum daytime variation, ranging from 37% to 88%.

Wind

Twelve-hour observations of wind direction and speed over twelve months reveal that westward winds are observed for over 57% of the times in a year with speeds ranging between 1.5-4.5 m/s. The predominant winds from the west and south-west direction are responsible for the monsoons as they carry moisture-laden clouds from the Arabian sea. Potential for wind energy lies in the western and southern parts of the region. In monsoon, the Western Ghats prevent strong winds from blowing into the region from the west and carrying away moisture. Wind frequency is more during the monsoon season, with the percentage of frequency reaching as high as 73% with not much variation during the daytime.

Figure 2.6: *Wind Rose*

Source: Indian Metorological Department, Ministry of Earth Science

2.5   Hydrology

River Systems of PMR

All rivers in PMR mostly originate from the western part of the Sahyadri Hills and flow through the eastern part of the district.

The Pune Metropolitan Region has three major river systems, namely:
1. The Bhima-Ghod River system in the northern, north-eastern and eastern part
2. Mula-Mutha River system covering the central part
3. Small part of the Nira River system covering the south part

Major rivers originating in the region include Bhima, Bhama, Pavana, Indrayani, Mula, Mutha and Nira, all tributaries of Bhima. These rivers originate in the Sahyadri region on the western side and have minimum travel length. Most of the reservoirs are located on the western side of the region wherein the annual rainfall is both higher and assured. Based on geomorphological settings and drainage patterns, the district is divided into 33 watersheds.

Figure 2.7 shows major rivers passing through PMR, the river basin boundaries and the drainage catchments.

Figure 2.7: *Pune: Rivers and Watersheds*

Source: Central Water and Power Research Station, Pune; Water Resources Department, GoM.

Ponds and Lakes

Based on the ELU database, presently the region has numerous ponds spread across the Study Area. Surface areas of these ponds vary drastically. Further, there are xx lakes (other than irrigation projects) covering xx sq km of area. Majority of these lakes are in Mawal taluka.

For analysis purposes, criteria of funding assistance for rainwater harvesting structure as per Rashtriya Krishi Vikas Yojana is referred (average size of farm pond 20mx20mx3m, community pond 100mx100mx3m). Based on these selection criteria, there are 9,967 existing ponds (≥400 m2) and 240 ponds (≥ 10,000 m2) as per the ELU database.

Ground Water

95% of the area in Pune district is underlain with hard rock (Basalt) formation. The rocks give rise to a complex and extensive low-storage aquifer system where the water level tends to drop rapidly once the water table falls by more than 2 m to 6 m. Additionally, these aquifers also have low permeability which limits their recharge through rainfall. This means water in these aquifers is non-replenishable and will eventually dry out due to continuous usage/drawdown. The overall groundwater development of Pune district is 71.51%. However, within PMR, Purandar taluka is categorised as semi-critical. The rest of the talukas in PMR are classified as safe for further water development.

Irrigation Projects and Dams

In Pune district, the maximum numbers of irrigation projects are in Baramati, Junnar, Khed, Mulshi and Shirur talukas whereas the talukas with the least irrigation projects are Haveli and Velhe. The location of major and medium irrigation projects (completed and under construction), and command areas (completed and under construction) are shown in Figure 2.8 . Table 2.3 consists of the total area covered under each major irrigation project.

Figure 2.8 : Irrigation Command Area

Source: Central Water and Power Research Station, Pune; Water Resources Department, GoM;

Table 2.3: Pune- total area covered under each major irrigation project

No.	Name of Source	Type of Source	River Name	Storage Details of Reservoir			Sanctioned Reservation for use of water
				Live	Dead	Total	Quantity (mm3)
1	Khadakwasla	Major	Mutha	55.91	30	85.91	
2	Temghar	Major	Mutha	105.01	2.95	107.96	
3	Warasgaon/Dasave	Major	Mose	363.13	12.23	375.36	
4	Panshet	Major	Ambi	301.61	9	310.61	
5	Chaskaman	Major	Bhima	214.5	27.19	241.69	26.44
6	Bhama Ashkhed	Major	Bhama	217.13	13.52	230.65	144.11
7	Ghod	Major	Ghod	137.99	31.31	169.3	12.62
8	Pawana Dam	Major	Pawana	240.97	31.15	272.12	285.77
9	Bhatghar	Major	Velvandi	665.57	7.08	672.65	29.73
10	Gunjawane	Major	Gunjawani	104.48	0.21	104.69	0
11	Mulshi Dam	Major	Mula	522.76	13	535.76	0
12	Upper Andhra Lake/ Thokarwadi	Major	Andra	363.7	0	363.7	0
13	Shirwata	Major	Indrayani	212.97	0	212.97	0

Source: Central Water and Power Research Station, Pune; Water Resources Department, GoM;

2.6 Environmental Status

As PMR develops, there would be growth in population, industries and ancillary facilities with potential stress on the environment. The environment is a crucial factor that needs to be considered when framing land uses and built form for this growth. Furthermore, it should be seen that environmental pollution like air and water pollution does not cross the maximum permissible range.

Air Quality

Air quality is an essential component of everyday life. The Central Pollution Control Board (CPCB) has set National Ambient Air Quality standards applicable nationwide. CPCB has been conferred this power by the Air (Prevention and Control of Pollution) Act 1981. Air Quality Index (AQI) is a tool to showcase air quality status. As the AQI increases, an increasingly large percentage of the population is likely to experience adverse health effects. Major air pollution sources are industrial estates and vehicles from traffic within the town along highways and unpaved roads. The air pollution from industrial estates belongs to A1 and A2 categories having potential air pollution impact areas ranging from 7-15 km and 5-7 km respectively. Based on the field survey, the air quality in Pune district is relatively free of pollutants. However, the RSPM level is on the higher side in a few areas of Pune city.

Water Quality

Maharashtra Pollution Control Board (MPCB) is executing the GEMS (Global Environmental Monitoring System) and MINARS (Monitoring of Indian National Aquatic Resources) projects under National Water Quality Monitoring Program (NWMP) funded by CPCB to understand the nature and extent of pollution control required in the state. At present MPCB monitors 48 surface water and 25 groundwater locations in Maharashtra. Monitoring at these stations is done as per the uniform protocol for water quality monitoring prescribed by MoEFCC and CPCB. There are 21 water quality monitoring stations present within Pune Metropolitan Region. Parameters which are observed are PH, BOD, COD, Nitrate and Fecal Coliform. Table 2.4 gives representative data of water qualities of the Indrayani River at major stations.

Table 2.4: Surface Water Quality of Indrayani River, Pune 2016 (MPCB)

Months	pH	Dissolved Oxygen (mg/l)	B.O.D. (mg/l)	C.O.D.(mg/l)	Nitrate (mg/l)	Fecal Coliform (MPN/100 ml)
Standard Parametres	6.5-8.5	Min. 4 mg/l	100	250	Max. 20	Max. 500
January	7.6	6.27	4.8	13.2	2.51	N/A
February	8.2	Nill	10.6	28.4	0.6	N/A
March	8	3.09	4.2	16	N/A	N/A
April	7.8	4.8	5.2	16	0.5	20
May	7	2.6	12.5	40	0.3	20
June	7.7	5.9	3.8	16	0.2	25
July	7.1	5.5	6.2	20	0.6	25
August	N/A	N/A	N/A	N/A	N/A	N/A
September	8.4	6	3.6	12	0.3	N/A
October	7.7	6.1	2.8	8	0.4	N/A
November	N/A	N/A	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A	N/A	N/A

Note: B.O.D. − Biological Oxygen Demand; C.O.D. − Chemical Oxygen Demand; M.P.N. − Most Probable Number
Source: Maharashtra Pollution Control Board (MPCB).

2.7 Environmentally Sensitive Areas

Forest Areas

Pune Metropolitan Region is divided into two forest divisions viz. Pune and Junnar forest division and one forest subdivision at Bhor. About 824.29 sqkm (13%) of PMR is under forest division. Table 2.5 presents a taluka wise summary of the area under forest. Figure 2.9 represents the forest area within PMR.

Table 2.5: PMR - Taluka Wise Forest areas

Sr No	Taluka	Area under Forest (ha)	Proportion to the total forest area (%)
1	Bhor	48.13	6%
2	Daund	42.55	5%
3	Haveli	123.34	15%
4	Khed	87.29	11%
5	Mawal	234.98	29%
6	Mulshi	177.26	22%
7	Purandar	34.56	4%
8	Shirur	32.7	4%
9	Velhe	43.43	5%
10	Total	824.29	100%

Source: Maharashtra Forest Department, GoM, Pune.

Figure 2.9: *PMR-Forest, Western Ghats and Wildlife Sanctuaries*

Source: Maharashtra Forest Department, GoM, Pune.

Western Ghats

The Western Ghats is an important geological landform on the fringe of the west coast of India and extends over a distance of approximately 1,500 kilometre from Tapi River in the north to Kanyakumari in the south with an average elevation of more than 600 metres and traverses through six states namely, Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu. The Western Ghats is a global biodiversity hotspot and a treasure trove of biological diversity. It harbours many endemic species of flowering plants, endemic fishes, amphibians, reptiles, birds, mammals and invertebrates and is also an important centre of evolution of economically crucial domesticated plant species. UNESCO has included certain identified parts of Western Ghats in the UNESCO World Natural Heritage List because the Western Ghats is a Centre of origin of many species and home for rich endemic biodiversity and hence a cradle for biological evolution.

The Ministry of Environment, Forest and Climate Change vide draft notification dated 03/10/2018, in the exercise of the powers under Environment (Protection) Act 1986, has notified the identified area of 56,825 sq km spread across six states as the Western Ghats Ecologically Sensitive Area. Maharashtra has 2,159 villages under Western Ghat admeasuring 55,345 sq km and out of that 17,340 sqkm has been proposed under Environmentally Sensitive Area.

In Pune district, 337 villages with a total area of 2,653 sq km has been proposed under ESA. PMR has 145 villages under the Western Ghats measuring 1,180.6 sq km area (17.5%). These all villages have been included under Ecologically Sensitive Zones I and II.

All 'Red' categories of industries specified by the Central Pollution Control Board or State Pollution Control Board and the expansion of such existing industries shall be forbidden. All new and expansion projects of building and construction with a built-up area of 20,000 square metres and above and all new and expansion townships and area development projects with an area of 50 hectares and above or with a built-up area of 1,50,000 square metres and above shall be prohibited. There shall be no restriction on repair or extension or renovation of existing residential houses in the Eco-sensitive Areas as per prevailing laws and regulations.

Table 2.6: Western Ghats - Taluka Wise Area

Sr No.	Taluka	Number of Villages	Area (Sq Km)
1	Bhor	4	18.283
2	Khed	0	0
3	Daund	0	0
4	Purandar	5	33.835
5	Shirur	0	0
6	Velhe	16	87.6
7	Haveli	4	29.884
8	Mawal	50	414.00
9	Mulshi	66	597.083
Total		145	1,180.6

Source: The Ministry of Environment, Forest and Climate Change (GR).

Wildlife Sanctuaries

Tamhini Ghat Wildlife Sanctuary

Ministry of Environment and Forest, Government of Maharashtra vide notification dated 3 May 2013, under the provision of wildlife (protection) in 1972 declared the limits of Tamhini WIldlife Sanctuary in Pune and Thane District, admeasuring 49.62 sq km. Thereafter Ministry of Environment of Central Government, vide notification dated 10 August 2017 under the provisions of environment (protection) 1987 notified the area to the extent of 100m to 1200 m from the boundary of Tamhini Wildlife sanctuary as the Tamhini Wildlife sanctuary Eco Sensitive Zone over an area of 15.98 sqkm.

Tamhini Ghat is a mountain passage located between Mulshi and Tamhini in Maharashtra, India. Situated on the crest of the Western Ghat mountain ranges, Tamhini Ghat is known for its surroundings comprising scenic waterfalls, lakes and dense woods. A part of the Sahyadri Hills, the Tamhini Ghat was designated as a wildlife sanctuary in May 2013. Situated 70 kilometres from Pune city, the Ghat is home to a rich and diverse selection of flora and fauna, not to mention its scenic beauty which draws tourists and visitors, especially in the monsoons when it is dotted with waterfalls. The sanctuary is home to various species of mammals, birds including Indian endemic bird species, butterflies, reptiles, invertebrates, and rare flora. Among its wildlife is the Kondana Rat, an endangered species, and Maharashtra, the Indian Giant Squirrel, commonly known as Shekaru. Out of 49.62 sqkm, 35.88 sqkm of Tamini Ghat Wild life Sancturay falls within PMR.

Sudhagad Wildlife Sanctuary

Government of Maharashtra vide notification dated 27 August 2014 under the provisions of wildlife protection act 1972 specified the limits of Sudhagad wildlife sanctuary in Raigad and Pune District admeasuring about 76.88 sq km. Sudhagad is a historic hill fort. It lies about 53 kilometres west of Pune city, 26 kilometres south of Lonavala and 11 kilometres east of Pali in Raigad District. The total area of 76.88 sq km was declared as a wildlife sanctuary on 27th August 2014 under Notification no. WLP. 2014 /CR No. 37/ F-1. The Sudhagad wildlife sanctuary falls under Alibag division, Roha Division and Pune Division of forest department. 26.31 sq.km. of Sudhagad wildlife sanctuary area falls within Pune Metropolitan Region. The sanctuary has dense forests i.e. tropical evergreen forest, evergreen forest and wet deciduous forest and it hosts a variety of species, some of which are enlisted below:

1. Trees: Teak, Anjani, Jambhul, Pisa, Varas, Aasana, Ain, Beherda, Parjambhul, Nana, Khair, Katesavar, Bija, Kumbha, Aashta
2. Shrubs: Karavi, Karavand, Dhayati, Rametha, Murudsheng, Phapat, Kuda, Dida
3. Climbers: Ukshi, Piluki, Malkangoni, Khaj koyali, Vatoli, Ombal, Pahadvel, Ghotvel, Kadukaranda, Aambguli, Toran, Kusar, Bedkicha Pala, Kartuli etc.
4. Mammals: Indian leopards, Bhekar, Asian palm civet, Jungle cat
5. Reptiles: Python, Kobra

Figure 2.10: *PMR- Forest Area, Western Ghats and Wildlife Sanctuaries*

Source: Villages under Western Ghats as per Ministry of Environment and Forest, Section 5 of Environment Protection Act, 1986; Wildlife Resource Instutite.

2.8 Disaster Prone Areas

A disaster is an extreme disruption of the functioning of a society that causes widespread human, material or environmental losses that exceed the ability of the affected society to cope with its own resources. However, a more modern and social understanding of disasters views this distinction as artificial since most disasters result from the action or inaction of people and their social and economic structures. It happens by people living in ways that degrade their environment, developing and overpopulating urban centres

Communities and populations settled in areas susceptible to the impact of a raging river or the violent tremors of the earth are placed in high vulnerability situations because of their socio-economic conditions. This is compounded by every aspect of nature being subject to seasonal, annual, and sudden fluctuations and the unpredictability of the timing, frequency, and magnitude of the disasters.

Earthquake Prone Areas

Earthquakes are generally regarded as the most destructive among natural disasters. The state has been subdivided into three earthquake damage risk zones. Most of the Pune district falls into the moderate damage risk zone, Zone III. The south-west area of Bhor and Velhe talukas fall into high damage risk Zone IV. Figure 2.11 shows earthquake zones within the PMR.

Flood prone areas

All talukas in Pune district have few flood-prone villages. Flood lines are currently marked by the State Irrigation Department, which includes 25 years (represented by Blue line in the irrigation drawing) and 100 years (Red line) flood line.

The area marked between the blue line and banks of rivers as a part of a flood mitigation strategy covers 82.02 sq km of area. HFL of major irrigation projects are also marked. Additionally, flood-prone areas along these rivers are shown in Figure 2.11.

Landslide prone areas

PMR is prone to landslides, rock falls, debris flows, especially in Mawal (Malewadi, Boraj, Maau, Mormarwadi), Mulshi (Ghutke) and Bhor (Sonarwadi) Talukas. Figure 2.11 shows the landslide-prone area within PMR.

Figure 2.11: Disaster Prone Areas

Source: District Disaster Management Plan as on March 2020.

Chapter 3:
Existing Land Use

Planning for the future of any region starts with comprehending its present situation and factors driving it. Carrying out land use surveys that inform the creation of the Existing Land Use (ELU) map is a vital part of assimilating such knowledge and understanding of the region. PMRDA has leveraged GIS-based technology to prepare this Development Plan starting from the data collection to analyzing planning needs and formulating solutions. After carrying out exhaustive surveys to capture the prevailing land uses in the region, land use at each land parcel was mapped on the GIS platform to create an interactive inventory of existing spatial and non-spatial data. This exercise led to the creation of the Existing Land Use (ELU) Map that is mandated under Section 25 of the MRTP Act. This process broadly involved five steps: preparation of the base map, geo-referenced land record system, data collection, preparation of Existing Land Use (ELU) map, ELU analysis.

3.1 Preparation of Existing Land Use (ELU) Map

This involved four broad steps, as explained below:
1. Rectification of Aerial imagery
2. Generation of contours using Digital Elevation Model
3. Creation of revenue/land records layer by georeferencing revenue maps
4. Digitization of each building information using high-resolution aerial imagery

Preparation of geo-referenced base maps is the basic requirement for the Existing Land Use (ELU) Map. All revenue records such as village maps, Tippan, Phalani, Akarband, etc. from revenue department were collected. The records were correctly decoded, digitized and brought to a proper scale.

High-resolution aerial imagery was captured for the Study Area. The detailed information about land features, land use, built-up areas, city structure and urban form, physical aspects of the environment, etc. were extracted from the aerial photographs.

A Digital Elevation Model is created for the entire project area to support the generation of ≤10 cm Ground Sample Distance (GSD) orthophotos. 0.5 m contours were generated for the entire PMR, the contour lines of 5 m and 25 m are shown in the ELU Map.

A comprehensive land information system (LIS) was created, including a parcel boundary, ownership records and digitized land record data. Geo-referencing of survey records available with the State Revenue/Land Records department was done for the Study Area.

A cadastral map was prepared by superimposing revenue records with high resolution aerial photogrammetric images with the help of GCNP (Ground Control Network Point) with geo-referencing attributes of each land parcel.

Detailed information about each building within the development plan area of PMRDA and related data from various government authorities has been collected. The information is then presented in a GIS layer with appropriate attributes.

Methodology for Data Collection

Primary Data: Physical Survey done in year 2017 includes maping of social amenities, building uses and extent of natural feature. Interview and photo documnetation were two menthods used to collect infromation. Secondary Data: Sourcing of Data from various government authorities and institutions in 2017. Desktop study includes sourcing data from official websites and research articles. Government Resolutions, notifications and Development Control Regulations form source of major information.

All these steps ultimately culminated into the creation of the Existing Land Use (ELU) map.

3.2 Existing Land Use Analysis

Existing land use analysis here covers 814 villages that fall under the PMR jurisdiction including MIDC and MADC areas. However, it does not cover areas under PMC and PCMC jurisdictions, 7 municipal councils, 2 nagar panchayats, 3 cantonment boards and the NDA. Thus, the total study area analysed in this section is approximately 6,159.32 sq km.

Agriculture activities, forest, slope areas and vacant lands form the major chunk of the land use in PMR currently with urban activities along the major transport corridors and periphery of Pune and Pimpri-Chinchwad cities.

ELU dataset has been analysed using two-level data classification. First, it is classified into 16 broad 'Level 1' classes of land uses that includes categories namely Residential, Mixed, Commercial, Industrial, Public Semi-Public, Public Utility, Agriculture, Recreation, Forest, Slope Area, Government Land, Special Areas, Vacant Land, Mines, Water Body, and Transportation.

ELU dataset further provides sub-classification of each Level 1 Land Use Class which is referred to as Level 2 Land Use Class. Areas of Level 1 and 2 land uses are provided in Table 3.1.

Table 3.1: Existing Land Use classification and area

No	Level 1 LU	Level 1 Area(sqkm)	Level 1 - % of ELU	Level 2 LU	Level 2 Area (sq km)	Level 2 -% of Level 1
1	Residential	80.83	1.31%	Residential	80.82	99.99%
				Temporary structure	0.01	0.01%
2	Mixed	2.4	0.04%	-	-	-
3	Commercial	25.66	0.42%	Godowns	1.53	5.96%
				Hotels & Restaurants	0.79	3.08%
				Markets	0.07	0.27%
				Other Uses	23.27	90.69%
4	Industrial	37.47	0.61%	IT	0.08	0.21%
				Large Scale	4.39	11.72%
				Medium Scale	1.06	2.83%
				Small Scale	31.94	85.24%
5	Public Semi Public	25.49	0.41%	Colleges	0.64	2.51%
				Govt. Offices	0.13	0.51%
				Health Facility	0.31	1.22%
				School	1.27	4.98%
				Other Uses	23.14	90.78%
6	Public Utility	1.87	0.03%	Burial Ground	0.024	1.28%
				Crematorium	0.007	0.37%
				Electric Substation	0.209	11.18%
				Fire Station	0.001	0.05%
				Overhead Tank	0.04	2.14%
				Public Toilets	0.008	0.43%
				WTP/ STP	0.0013	0.07%
				Others	1.579	84.47%

7	Agriculture	2221.81	36.07%	Crop Land	2,245.93	96.31%
				Farm House	8.04	0.35%
				Forest House	3.91	0.17%
				Nursery	0.69	0.03%
				Plantation	64.82	2.79%
				Poultry Farm	3.05	0.13%
				Other	5.42	0.23%
8	Recreation	5.89	0.10%	-	-	-
9	Forest	824.29	13.4%	Government Forest	716.63	99.89%
				Private Forest	0.77	0.11%
10	Slope Area	889.95	14.45%	-	-	-
11	Govt. Land	111.29	1.81%	Gairan	63.64	57.18%
				Others	47.65	42.82%
12	Special Areas	7.35	0.12%	Defense Area	4.66	63.40%
				Heritage	2.46	33.47%
				Other	0.23	3.13%
13	Vacant land	1,447.14	23.50%	Under construction	5.84	0.40%
				Vacant	1441.3	99.60%
14	Mines/Quarries	12.51	0.20%	-	-	-
15	Water bodies	375.14	6.09%	Dam	193.7	51.63%
				Nala	16.51	4.40%
				Overhead tank	0.006	0.00%
				Pond/ Lake	25.31	6.75%
				Revenue Water	93.38	24.89%
				River	43.63	11.63%
				WTP	0.01	0.00%
				Wells	2.59	0.69%
				Other	0.006	0.00%
16	Transportation	90.23	1.47%	As per revenue	28.42	31.50%
				Bus Stand/ Bus depot	0.01	0.01%
				Railway Land	0.32	0.35%
				Roads	61.48	68.14%
	TOTAL ELU	6,159.32				

Actual areas are likely to be higher than the areas mentioned in the table as the land uses are mapped based on the building footprint than the parcels. This is because 'phalani' or subdivision of plots is not mapped in the database. ELU data provides detailed Land Use Classes (Level 1 and Level 2) and corresponding areas.

For key uses (mainly, residential, commercial, industrial) ELU GIS data informs the legal status of development in two categories. Category "Approved" indicates developments sanctioned, "Other" category represents developments which are either not approved or approval records are not available with PMRDA. This information is crucial as several non-approved developments have come up in the Pune Metropolitan Region in the absence of a planning authority until PMRDA was institutionalised.

Residential Land Use - 80.83 sq km

1. Residential Land Use (Level 1) occupies 1.31% of the total ELU area.
2. Residential Land Use is scattered across the PMR whereas distribution becomes denser in the fringes (3 to 5 km) of Municipal Corporations; along Pune-Mumbai and Pune-Ahmednagar corridors. Residential areas have also come up in pockets between NHs and railway lines of Pune-Mumbai and Pune-Daund.
3. Significant residential development is seen along Pune-Mumbai Highway, Pune-Ahmednagar Highway and Pune-Bangalore Highway corridors.
4. Khed Rajgurunagar, Talegaon Dabhade, Shikrapur, Talegaon Dhamdhere, Nasarapur serve as residential areas for nearby industrial estates.
5. Townships are predominantly coming up in the western part of the PMR such as Nanded City, Forest Trails, Energia, Blue Ridge, Belmondo. These townships attract the middle and higher-income working class by providing homes in proximity to work hubs, and all good quality amenities, utilities within their boundaries and security systems. Most of these townships are coming up within 10 km radius from PMC limits.
6. Eastern and southern fringes of PMC are characterised mostly by dense low-rise settlements attracting middle and lower-income groups.

Mixed Land Use - 2.4 sq km

1. Mixed Land Use (Level 1) occupies 0.04% of the total ELU area.
2. Mixed land use is mainly characterised by co-location of commercial and residential use in one structure or land parcel.
3. It is scattered in the fringes, and along Pune-Mumbai and Pune-Ahmednagar corridors.

Commercial Land Use - 25.66 sq km

1. Commercial Land Use (Level 1) occupies 0.42% of the total ELU area.
2. Major commercial clusters are observed in industrial areas such as Hinjawadi, Chakan, Ranjangaon and fringe areas like Wagholi, Chimbali, Vadki, Pirangut. It implies that the major component of commercial use is warehousing/godowns.
3. Warehousing is mainly observed along the Pune- Chakan, Pune Shikrapur, Pune-Mumbai and Pune-Ahmednagar Highways suggesting high freight traffic between Industrial hubs in Pune District and JNPT.
4. Being a tourist destination, the western part of PMR houses commercial uses such as resorts.

Industrial Land Use - 37.47 sq km

1. Industrial Use (Level 1) occupies 0.61% of the total ELU area.
2. Consolidated Industrial clusters are mainly developed in Pirangut, Hinjawadi, Talegaon, Chakan, Sanaswadi, and Ranjangaon. These clusters are either MIDC Estates or RP Industrial zoning.
3. Dispersed small-medium scale Industrial clusters have been developed near Khed Shivapur, Lonikand, Markal, Narhe as per RP Industrial zoning.
4. Various industrial areas in the PMR show different type and character of industries as below:
   a. Pirangut - SMEs of auto components, freezing, equipment (Northstar), milk processing, beverages (Coca-Cola), appliances (Godrej) and chemical industries (Sudarshan, Tata).
   b. Hinjawadi - IT companies (TCS, WIPRO, Cognizant, Mahindra Tech, HCL, Dassault, KPIT, Persistent, Accenture, Capgemini, TCS, Synechron, Hexaware). It also has a small SMEs cluster supporting engineering, paints, tools and components, consumer goods, machine parts (Tata automotive). Hinjawadi Biotech Park includes core biotech firms (Emcure pharmaceuticals, Genova, Centaur, TCG, Avieum Life Sciences) and ITES (Barclays, HDFC).
   c. Talegaon - Characterised by automobile industries (General Motors), automobile parts/accessories (Mahindra, DSK Motowheels, KSPG Automotive) and a floriculture park.
   d. Chakan - Major auto setups (Mahindra, Mercedes, Volkswagen, Bajaj, Bridgestone, Ericsson, SKF, Bosch), and logistics (Indospace Industrial Park).
   e. Sanaswadi - SMEs (John Deere, Essar, Ispat, Kalyani) and forging and auto/machine components industrial units.
   f. Ranjangaon MIDC - Mix of major automotive industries such as Fiat, Jeep and electronics/consumer goods such as LG, Haier, Whirlpool, Apollo, Michelin Tyres, ITC, Tata Steel.
   g. Uruli Kanchan - Mainly agro-processing industries (Jagtap Dairy, Venky's poultry, Rise-n-Shine).
   h. Nasrapur to Shirwal belt - SMEs involved in engineering, electronics, furniture, food processing; and logistics such as warehousing and cold storage.

Public Semi-Public Use - 25.49 sq km

1. Public Semi-Public Use (Level 1) occupies 0.41% of the total ELU area.
2. PSPs are concentrated on the western and eastern fringes along with Pune-Mumbai corridor.
3. Prominent higher education/R&D institutes are located at the following locations in the PMR:
   a. Wagholi (Raisoni Institute), BAIF Campus
   b. Manjari and Loni Kalbhor (MIT University, Vasantdada Patil Sugar Institute, SERUM Institute, Aircraft Engineering Institute)
   c. Pirangut (Symbiosis, Flame, Mahindra United World College, Rani Laxmibai Military School)
   d. Hinjawadi (International Institute of IT, Symbiosis Center for IT, Indira Engineering and Management College, Kirloskar Institute of Advanced Management Studies)
   e. Talegaon (National Institute of Post-Harvest Technology, DY Patil Engineering College, Heritage Residential School, Empress International school)
   f. Malavali (Samundra Institute of Maritime Studies, Sinhgad Institute, VIT, INS Shivaji Naval Training Centre)
   g. Khadakwasla (Public Institutions such as National Water Academy, CRPF Camp, Central Water and Power Research Station, Defence Institute of Advanced Technology)
4. Other notable public facilities in the PMR are Balewadi Sports Complex, Gahunje International Cricket Stadium and Prayag Ashram at Uruli Kanchan.
5. Higher education and R&D Institutes are the major drivers of the economy of PMR, and their demand is higher in the parts of highly accessible and populated areas.

Public Utility - 1.87 sq km

1. Public Utilities (Level 1) occupy about 0.03% of the total ELU area.
2. Public Utilities are concentrated on western and eastern fringes as well as on the Pune-Mumbai corridor.
3. Share of Public Utilities in ELU is marginal. It indicates the need for planning and land reservation for Public utilities, especially for water treatment plants, sewage treatment plants and solid waste management sites.

Agricultural Use - 2221.81 sq km

1. Agricultural Use (Level 1) occupies about 37.79% of the total ELU area.
2. Share of agriculture in ELU shows that the primary character of PMR is agrarian.
3. Crop Land constitutes 96% of the total agricultural land.
4. Agriculture is mostly practised in the eastern part of the PMR supported by flat terrain, coverage of irrigation command area, and fertile basins of major rivers - Bhima and Mula-Mutha. Agriculture as an activity is practised in Maval and Mulshi talukas mainly along the river basins; but is limited due to the hilly terrain in the west.
5. 565.84 sqkm of the agricultural area is observed under command areas of the Irrigation Department.

Recreation - 5.89 sq km

1. Recreation Use (Level 1) occupies about 0.1% of the total ELU area.
2. Recreational open spaces are clustered near residential use and industrial nodes seen at Hinjawadi, Lavale, Chakan, Wagholi, and Malavali, suggesting it is either part of MIDC estate or open spaces provided within mass housing/gated communities.
3. Recreational open spaces are either underprovided or not developed, despite high urbanisation rates, in upcoming urban areas like Khadakwasla, Manjri, Loni Kalbhor, Wagholi, Kesanand, Dehu and Alandi. Marginal percentage of Recreation Land use as per ELU (0.1%) in the PMR indicates the need to provide open spaces through DP and implementation strategy through DCPR.

Forest - 824.29 sq km

1. Forest Use (Level 1) occupies about 11.65% of the total ELU area.
2. Most of the forest lands belong to the government and are mostly located on the hilltops and hill-slopes, whereas on the Eastern part, forests are located mostly along the rivers and water bodies.
3. Private forests are negligible and make up only about 0.1% of the total forest area. Private forests are the forests under privately owned lands but declared as 'forest' by the government.

Hill Top Hill Slope Area - 889.95 sq km

1. Slope Area Use (Level 1) occupies about 14.45% of the total ELU area.
2. Slope Areas are concentrated on the west in the form of Ghat Matha and Mavals.
3. Smaller patches of Slopes are observed in the east along the rivers and major water bodies.
4. There are certain stretches with slopes beyond 40% (based on the contour analysis). Such stretches are

highly sensitive and need to be protected from any form of development.

Government Land - 111.29 sq km

1. Government Land (Level 1) occupies about 1.8% of the total ELU area.
2. Gairans, a cattle grazing land owned by the government, covers about 57% of the total Government Land and is located along the hill slope/hilltop or rivers. Other kinds of Government Lands are distributed evenly across the region.
3. Relatively larger Government Land parcels are dispersed within a radius of 10 km around PMC and PCMC limits. However, some of these lands have limited development potential as they are located on hill slopes or within high flood lines.

Special Areas - 7.35 sq km

1. Special Areas (Level 1) occupy about 0.12% of the total ELU area.
2. Major chunks of Defence Area are located in villages Gorhe Bk (near NDA), Manjari, Ghera Purandar, and Sudumbre whereas INS Shivaji is located at the south of Lonavala Municipal Council.
3. Out of seven heritage areas, two are located across Pavana Lake (Lohagad, Visapur), whereas cave temples at Bedse, Bhaja, Karla are locatied in Mawal taluka.
4. The concentration of heritage areas around Western Ghats; its pristine natural setting; proximity to Lonavala and good accessibility would collectively justify Eco-tourism Activies within the region.

Vacant Land - 1,447.14 sq km

1. Vacant Land (Level 1) occupies about 23.46% of the total ELU area.
2. A high percentage of Vacant Lands is misleading since some part of it also contains unbuilt land within private properties which may not be available for development. In some cases, building setbacks within a land parcel are also represented as Vacant Lands.
3. However, large chunks of vacant lands located along the major transport corridors and the fringes of municipal councils have strategic importance for aligning regional level transportation projects.
4. Vacant land observed within the irrigation command area could be a matter of concern as it might indicate desertification of good agriculture land supported by irrigation systems

Mines/Quarries - 12.51 sq km

1. Mines/Quarries (Level 1) occupy about 0.2% of the total ELU area.
2. Most of the quarries are dealing with raw materials used in construction activity. The quarries represent the tail of slope areas located in proximity to the suburban areas.
3. Quarries are primarily located at Wagholi and Lonikand, followed by north of Dehu, Vadgaon and South of PMC limits.
4. Consolidated area of Wagholi quarry alone is about 6.8 sq km. About 107 stone quarries are dispersed in Wagholi, Bhavadi, Lonikand and Perne, contributing to air pollution.

Transportation - 90.23 sq km

1. Transportation (Level 1) occupies about 1.46% of the total ELU area.
2. The roads and railways' actual area is likely to be higher than shown in ELU, as the transportation layer provides their carriageways and not ROWs (for Roads, Railway Land).
3. Existing road networks in the eastern part of the PMR are denser than that of the western part because of the western region's hilly character.
4. Area of bus stands/depots is about 10 ha of the entire PMR. It implies that the penetration of mass transport within the region is not adequate.

Exisiting Land Use Map

Towards Nashik

Towards Ahmednagar

Towards Mumbai

Towards Daund

Towards Daund

Towards Kolad

Towards Solapur

Towards Miraj

Towards Baramati

Towards Kolhapur

Agriculture	Mixed
Commercial	Public Services
Forest	Public Utility
Govt Land	Recreational
Hill Top Hill Slope	Residential
Water body	Special Areas
Industrial	Transport
	Vacant

0 2.5 5   10   15   20
                                Km

Chapter 4: Housing

Housing is a critical piece of urban service delivery. This chapter explains the housing scenario in Pune Metropolitan Region in terms of existing housing stock and housing trends as a whole in urban and rural areas. It provides an assessment of major residential clusters in the region based on various sources such as Census data, Comprehensive Mobility Plan and the ELU database.

4.1 Growth trends in PMR

The population of PMR has grown at a CAGR of 3.24% from 2001 to 2011. Approximately 78.66% of the population in PMR resides in the urban area, while in comparison, 21.34% of the total PMR population lives in the rural area. From 2001 to 2011, the urban population in PMR grew at a CAGR of 3.52%, while the rural population grew at a CAGR of 2.17% during the same period.

Data in Table 4.1 indicates that the decadal growth Study Area- Urban is highest (91.03%) while that of PMC has been low at 32.82%. However, the growth rate in PCMC is about double for both population and households, indicating saturation in the PMC area and growth in the PCMC area between 2001 and 2011.

Table 4.1: PMR Population

Population (in Lakh)	Census 2001	Census 2011	CAGR	Decadal Growth Rate
PMR - Total	53.24	73.21	3.24%	37.51%
PMR- Urban (including CTs)	40.66	57.47	3.52%	41.34%
PMR- Rural	12.60	15.62	2.17%	23.97%
Study Area - Total	13.38	17.11	2.49%	27.88%
Study Area - Urban	0.78	1.49	6.69%	91.03%
Study Area- Rural	12.60	15.62	2.17%	23.97%
PMC	25.38	33.71	2.88%	32.82%
PCMC	10.12	17.27	5.49%	70.65%

Table 4.2: PMR Households

Households (in Lakh)	Census 2001	Census 2011	CAGR	Decadal Growth Rate
PMR - Total	11.17	16.30	3.85%	45.93%
PMR- Urban (including CTs)	8.73	12.76	3.87%	46.16%
PMR- Rural	2.44	3.53	3.76%	44.67%
Study Area - Total	2.48	3.63	3.88%	46.37%
Study Area- Urban	1.14	2.11	6.35%	85.09%
Study Area- Rural	1.34	1.52	1.27%	13.43%
PMC	5.24	7.34	3.43%	40.08%
PCMC	2.24	4.10	6.23%	83.04%

4.2 Residential development in Planning Area and trends

Table 4.3 showcases taluka wise breakup of residential development in the Planning Area. A total of 8,083 hectares of the Planning Area is under residential development. A drill-down of the residential area for taluka spread reveals that five talukas, namely Haveli, Khed, Mawal, Mulshi and Shirur, have a dominant 89% of the existing residential plinth area in the Planning Area.

Table 4.3*: Taluka wise residential development in hectares and share of each taluka*

Taluka	Residential plinth area (ha)	Share in total residential plinth area (%)
Bhor	250.67	3.10
Daund	439.67	5.44
Haveli	1,917.27	23.72
Khed	987.41	12.22
Mawal	1,865.05	23.07
Mulshi	1,471.88	18.21
Purandar	222.97	2.76
Shirur	844.49	10.45
Velhe	83.96	1.04
Total	8,083.37	100

An ELU assessment for residential clusters shows that in Haveli taluka, the bulk of the residential development is housed in Wagholi, Manjri Bk, Kirkitwadi, Nahre and Koregaon Mul. In Khed taluka, Varale and Mahalunge together contribute significantly to overall residential development in the planning region. In Mawal taluka, Vadgaon, Jhambul and Kune account for most of the residential developments. In Mulshi taluka, Hinjawadi, Bavadhan Bk, Pirangut, Sus, Mahalunge, Bhugaon, Bhukum and Man drive the residential development. The key villages driving growth in Shirur Taluka are Shirur and Shikrapur. These circumscribe the periphery of the PMR urban core and align with transport corridors emanating on the fringes. It is reasonable to expect further radial growth around these clusters.

Figure 4.1: *Village Wise Structure Density*

4.3 Household Characteristics

The housing condition assessment is based on the CTTS Survey, which categorises the households under various categories. 2% of households in PMR were interviewed to capture household and travel characteristics. The samples were distributed among sectors based on the population. Within the 2% sample size, 40% of households were interviewed from PMC, 30% from PCMC and 30% from the rest of PMR. Thus to understand the housing scenario, household characteristics of PMR are represented in this section.

Household Size

Figure 4.2: *CTTS: Household Size*

The average household size in PMR is 3.87, where the smallest is in PCMC (3.73) and the largest in the PMR Planning Area/Study Area (4.16). The household size in PMC is 3.77. At the taluka level, the average household size is the largest in Khed, i.e. 4.29 and smallest in Mawal (3.71). In contrast, among municipal councils, the

largest household size is observed in Rajgurunagar (4.51) and the smallest in Talegaon (3.80).

Household Income

Average household and personal income per month in PMR is observed to be INR 24,806 and INR 17,110, respectively. PMC has the highest household income, i.e. INR 28,793 and personal income, i.e. INR 18,469, followed by PCMC (HI - INR 23,119 and PI - INR 18,360). Men's income, i.e. INR 20,149, is observed to be highest in PMC, whereas women's income, i.e. INR 15,438, is highest in PCMC.

Among the talukas, Haveli has the highest household and personal income of INR 24,889 and INR 15,673. In comparison, Bhor (HI - INR 14,770 and PI - INR 10,561) and Velhe (HI - INR 14,793 and PI − INR 10,430) have the least incomes.

Figure 4.3: CTTS: Income Levels

Household Ownership

The distribution of households by ownership reveals that 71% of families have their own house in PMR. The ownership level in PMR Planning Area is highest with 79%, followed by PCMC with 69%. Among talukas, owner-ship share is highest in Purandar (97%), followed by Velhe (96%), whereas the lowest is in Haveli (68%). Among municipal councils, ownership share is highest in Saswad (96%) and lowest in Chakan (58%).

The share of rental housing is higher in urbanized areas like PCMC, PMC, Alandi, Chakan, and Haveli.

Household Typology

Predominant household typology in PMR is individual houses with 56% of the total dwellings. Within PMC, the share of flats/apartments is almost equal to individual homes. Among the share of kutcha/huts, a higher share is observed in PMC and PCMC than in the PMR Planning/Study Area.

Among talukas, the share is dominated by individual houses, similar to municipal councils. However, the percentage of flats/apartments in municipal councils is on a higher side.

Employed Persons per Household

The average number of employed persons per household in PMR is 1.53. The average male and female employed persons per household are 1.18 and 0.35 respectively. The share of employed persons per household is highest in the PMR Planning/Study Area, i.e. 1.76.

Among talukas, this share is observed to be highest in Shirur, i.e. 2.14, followed by Daund (2.00), whereas it is the lowest in Purandar (1.41). Among municipal councils, the share is highest in Alandi (2.10) and the lowest in Lonavala (1.35).

Figure 4.4: CTTS: Average Number of People Employed per Household

Vehicle Ownership

About 62% of households in PMR own only two-wheelers, whereas about 10% of households own both two-wheelers and cars. The share of households owning no vehicle is about 13% in PMR, whereas the share of households owning only bicycles is 3%. A similar trend has been observed in talukas and municipal councils.

Figure 4.5: CTTS: Distribution of Vehicle Ownership

Travel Expenditure

The average household expenditure on travel in PMR is INR 1,076 per month, which is about 4.52% of the household income. Spending on travel has been observed to be highest in PMC (5.1% of HH income), followed by PCMC (4.38% of HH income).

Among Talukas, the highest monthly expenditure on travel has been observed in Purandar, i.e. INR 1,105, followed by Haveli (INR 987) and Mulshi (INR 919). Among municipal council areas, the highest monthly expenditure on travel is in Shirur, i.e. INR 1,050, followed by Talegaon (INR 994).

Figure 4.6: CTTS: Average Household Expenditure on Travel

In addition to CTTS 2018, Census 2011 data is analyzed to gain insights about household conditions in PMR.

Household Condition

For the purpose of our evaluation, the households are based on the following conditions:
1. House condition- Good, livable, dilapidated
2. Number of dwelling rooms
3. Material of roof
4. Source of drinking water
5. Households with latrine facilities

Data indicates that 72% of the houses are in good condition, 23% are livable and only 5% of the total houses are in dilapidated condition. An assessment of the taluka wise household condition shows that 53% of the total dilapidated homes are present in Haveli taluka.

Figure 4.7: Census 2011: House condition

The households have been categorized as per the number of dwelling rooms, ranging from no exclusive room to 6 and above (Refer Figure 4.8). The average dwelling room per household in the PMR Planning Area is two based on the Census 2011 dataset.

Figure 4.8: *Households categorization based on the number of dwelling rooms*

One of the most basic housing characteristics to understand living conditions at a macro level is the building construction materials used for the house roof. Figure 4.9 indicates that 54% of PMR houses are made with temporary building material such as GI/metal/Asbestos sheet.

Figure 4.9: *Census 2011: Roof Material*

4.4 Housing supply in PMR

Table 4.4 shows the supply of housing units in the Pune Metropolitan Region categorised by provider type.

Table 4.4: *Housing Units Supply Provided by Stakeholders as of 2018*

Stakeholder/scheme	Total	PMC	PCMC	Other ULBs	PMR Planning Area
Government Sector Housing Units	2,48,715	1,99,824	39,493	4,363	5,035
MHADA	8893	2,343	2,187	4,363	-
SRA	2,00,261	1,65,000	35,261		
PMAY	8,310	4,078	4,232		5,035*
BSUP	20,528	20,528			
Total Residential Census Houses	20,71,833	7,31,648	4,08,278	1,82,802	7,42,654

Source: Housing Census, Secondary research, Ministry of Rural Housing, Economic Survey of Maharashtra, MHADA, SRA

Integrated Townships and Town Planning schemes

Integrated Townships: The latest Integrated Township Policy stipulates that a minimum of 40 hectares of contiguous land is required with a minimum of 18 m wide access road to get permission for a township. The policy also stipulates the land requirements for public amenities and services like gardens, playgrounds, schools, economic activities, transportation network, etc. The remaining area can be utilized for residential purposes.

Townships are predominantly coming up in the western part of the Planning Area. Most of them are coming up within 10 km from municipal limits of Pune and Pimpri-Chinchwad. Town Planning Schemes are predominantly located in the eastern part of the Planning Area.

Town Planning Scheme: The preparation and execution of a Town Planning Scheme is based on the Maharashtra Regional and Town Planning Act 1966. Chapter 5 of the MRTP Act details the process of making Town Planning Schemes. The scheme's main purpose is to ensure orderly development, whether it be for implementing Development Plan proposals or any land that is likely to be in the course of development. It helps create new towns-like development or integrated developments through the pooling of land required for public purposes in respect of the plan or for purposes connected with the implementation of such a scheme. As per Section 64 of the MRTP Act, 50% of the land is planned for public purposes such as EWS/affordable housing, roads, open spaces and social infrastructure. The remaining 50% of the land is given back to the original landowners.

Mahalunge-Maan is the first model town planning scheme of PMRDA themed as High-Tech City, which is spread over 250 hectares. The main planning intention was to create a township in an environmentally conscious and tech-savvy way.

The land acquisition for the development of Phase 1 of the Ring Road is currently under progress through various tools such as Town Planning Schemes, TDR, and direct acquisition. Town Planning schemes for Phase 1, at Phursungi and Uruli Devachi are being processed by Pune Municipal Corporation, while the remaining TP schemes at Wadachiwadi, Autade Handewadi, Holkarwadi, and Manjari Khurd are under process through PMRDA. Town Planning Schemes at Vadki and Manjari Khurd are yet to be proposed.

Table 4.5 and Table 4.6 give the details of these TPSs and ITPs as per respective TPS Reports.

Table 4.5: Town Planning Schemes in PMR

No	TP Scheme	Area (ha)	Population (Projected)	Households (Projected)
1	Mahalunge-Maan	250	120,000	30,769
2	Wadachiwadi	134	84,000	21,538
3	Autade Handewadi	94	54,000	13,846
4	Holkarwadi 1	158	103,000	26,410
5	Holkarwadi 2	131	87,500	22,436
6	Manjari Kolwadi	223	145,000	37,179
	Total	991	593,500	152,179

Table 4.6: ITP and Special Township

No	ITP and Special Township	Area (ha)	Population (Projected)	Households (Projected)
1	Riverview (Mahalunge)	44	10,909	2,797
2	Knowledge City & Oxford golf course	331	82,865	21,247
3	Xrbia (Hinjewadi)	123	30,837	7,907
4	Life republic	161	40,329	10,341
5	Forest Trail	78	19,416	4,978
6	Blue Ridge Hinjewadi	44	11,119	2,851
7	Nanded City	261	65,181	16,713
8	Sanjivani Integrated Township- Urse Adhe	103	25,845	6,627
9	Solitaire - Manjari	44	11,006	2,822
10	Riverview city Kadmavakwasti	216	54,094	13,870
11	Kul Ecolech	52	12,899	3,307
12	Sanaswadi	42	10,527	2,699
13	Kaleidoscope - Bhugaon	61	15,318	3,928
14	Nilkanth – Bhugaon	100	24,905	6,386
15	Gulbakshi – Bhugaon	69	17,287	4,433
16	Splendour Country	288	71,985	18,458
17	Total	2,018	504,521	129,364

Figure 4.10: ITP and TPS

Source: GIS Database

Chapter 5:
Traffic and Transportation

This chapter gives an overview of existing regional connectivity and movement of people and goods through three modes of transport - Road, Railway and Air. The chapter also presents a review of key transport proposals in the PMR Planning Area. It summarises analyses carried out to understand key issues and challenges of different transportation systems in place. This exercise is based on the data available with PMRDA and data shared by various government agencies, forming the basis for statistics in this chapter.

5.1 Background

Pune Metropolitan Region is located at a distance of 150 km to the southeast of Mumbai. PMR has been experiencing immense economic growth supported by favourable socio-economic conditions and investment climate. However, the economic sustainability of the region will require more efficient transport systems that will facilitate the movement of people and goods with a reduction in travel time and cost, leading to enhanced competitiveness of the region.

Since its inception in 2015, PMRDA has provided a significant thrust to infrastructure projects in the region with support from the state and central governments. List of such major transportation and urban development projects include Pune Ring Road, Metro/MRTS projects, greenfield airport and town planning schemes along the Pune Ring Road.

PMRDA commissioned Comprehensive Traffic and Transportation Study (CTTS) in 2017 to identify transport infrastructure requirements for the next 30 years in PMR necessary to meet the needs of the current and future population. This study aimed to prepare a long-term transport strategy for the region and identify a pragmatic capital investments program up to 2048 in line with the National Urban Transport Policy (NUTP) 2006. PMRDA appointed L&T Infrastructure Engineering Limited to carry out this study.

5.2 Road Transport

PMR is well connected to major cities by national highways, state highways and railways. Major national highways that pass through Pune include Mumbai-Bangalore (NH-48), Pune-Hyderabad (NH-65), Pune-Nashik (NH-60), Talegaon-Shikrapur (NH-548D) and Pune-Ahmednagar (NH-753F). Major state highways that pass through Pune provide good connectivity with major cities and ports.

- Mumbai–Pune Expressway is India's first six-lane concrete, high speed, access controlled tolled expressway. Operationalised in 2002, it provides a high-speed alternative to NH-48 between Mumbai and Pune while connecting important economic growth centres along its 95 km long alignment.
- NH-48 traverses PMR from northwest to south. This highway connects the region with Mumbai and JNPT port on the northwest within 150 km. Further north, it then connects to Surat and Ahmedabad. Towards the south, NH-48 connects Pune to Satara and Kolhapur in Maharashtra and then further ahead with Bangalore and Chennai. Some of the important economic centres along the NH-48 are Hinjawadi IT Park, Talegaon and Lonavala.
  - o The Rajiv Gandhi InfoTech Park has transformed Hinjawadi into a major IT hub of the country.
  - o Talegaon is a growing urban centre with an adjoining MIDC industrial area.
  - o Lonavala is a prominent tourist spot that attracts a large number of tourists throughout the entire year.
- NH-60 passes through the north of PMR and connects Pune to Nashik. Major economic centres along the highway include Rajgurunagar, Chakan and Bhosari. All three are major industrial hubs developed by MIDC.
- NH-753F traverses PMR from southwest to northeast. On the southwest, it connects Pune to Dighi port. On the north-eastern side, it connects PMR to Ahmednagar and onward to Aurangabad and then to Nagpur.
- NH-65 is a major corridor along the eastern part of PMR connecting Pune to Solapur and onwards to Hyderabad. A bypass is provided for the road from Hadapsar to Katraj and meets NH-48 bypass at Katraj Chowk. Hadapsar is a major economic centre located along the highway. It is an industrial hub and has three

SEZs – Magarpatta, Amanora Park Town and SP InfoCity.

- NH-965 connects Pune to Saswad, where the Chatrapati Sambhaji Raje International Airport is proposed.

To summarise, these highways connect PMR directly with Nashik, Aurangabad, Nagpur, Mumbai, Kolhapur, Solapur, Hyderabad and Bangalore.

Table 5.1*: Distances from Major Towns, Cities and Ports*

No	Town/City/Port	Distance (km)
1	Satara	100
2	Ahmednagar	105
3	JNPT Port	140
4	Mumbai	163
5	Dighi Port	166
6	Nashik	202
7	Kolhapur	233
8	Solapur	243
9	Bangalore	835
10	Delhi	1,417

Source: Google Earth

Figure 5.1*: Regional Connectivity of PMR*

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Road Network

PMR has a dense road network of length 28,572 km comprising national highways, an expressway, state highways, major district roads, other district roads, village roads and internal roads. There are five national highways, one expressway and three major state highways in the region that form a radial network providing access to goods and passengers in and out of the region.

Figure 5.2: Existing Road Map

Source: Public Works Department GoM, Pune; Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

National highways connect the region with other states and cities and provide internal connectivity to municipalities and MIDCs in the region. State highways connect the region with other cities. Major district roads and other district roads provide taluka level connectivity, and the village roads and internal roads connect the villages. The share of these roads in the region is given in Table 5.2.

Table 5.2: Length of Roads

No	Hierarchy of Roads	Length (km)	Percent (%)
1	Expressway	37.48	0.13
2	National Highway	346.16	1.23
3	State Highway	570.67	2.03
4	Major District Road	1,520.25	5.41
5	Other District Road	628.24	2.23
6	Village Road	1,488.82	5.30
7	Internal Road	23,489.78	83.64
8	Total	28,081.40	100

Source: GIS Database

Regional Plan (1997) Roads

PMRDA has taken Regional Plan 1997 as the base for the planning. Much of the development in PMR, as well as building permission sanctions, occurred considering RP proposals. Subsequently, the road network from the RP 1997 has formed the basis for road proposals in this Development Plan.

Although RP 1997 proposed a robust road network to supplement existing roads in PMR, only 60% of these proposed roads have materialised thus far. Many roads were converted into classified roads, and the planning authorities revised some roads from RP 1997 falling in their jurisdictions.

Regional Plan also included Pune Ring Road, which is currently taken on priority by PMRDA. The Regional Plan also proposed alternative routes to highways passing through major towns such as Chakan, Wagholi, Hinjawadi, Shikrapur, Khed Shivapur, Loni Kalbhor and Uruli Kanchan. In addition to these bypasses, the Regional Plan also proposed roads to enhance connectivity between municipal councils and corporations.

Table 5.3: RP 1997 Road Length

Category	Length (km)
Total Length of RP roads in PMR	1,462.18
Total Length of Developed RP roads	901.04
Total Length of RP roads yet to be developed	561.14

Source: GIS Database

Existing Traffic on roads

Pune and Pimpri Chinchwad cities have witnessed a drastic surge in private vehicular traffic over the past three decades. The PMR is also witnessing a similar trend as spillover growth from these two cities is absorbed into PMR. With the development of IT parks and auto industries in peripheries of municipal corporations, to and fro commute from the corporations to these peripheral areas has increased rapidly, resulting in excessive traffic on major arterial corridors, including national highways. Classified traffic volume counts that were conducted as part of the CTTS are presented below.

Traffic volume count survey at outer and inner cordon locations:

Based on the analysis, about 28.64 lakh vehicles (26.59 lakh PCU) travel north-south and 13.71 lakh vehicles (12.70 lakh PCU) travel east-west every day.

1. Outer Cordon
   a. About 3.4 lakh vehicles enter and leave PMR daily.
   b. The highest traffic volume was observed on Satara Road (Khed Shivapur toll plaza), i.e. 56,750 vehicles, followed by Pune-Mumbai Expressway Talegaon toll plaza (46,200 vehicles).
   c. With a share of 39.2%, cars dominated the traffic composition at outer cordons in PMR, followed by two-wheelers (36.1%) and goods vehicles (19.6%).
   d. Peak hour traffic, as a percentage of total daily traffic, stood between 5.6% and 9.9%, with an average of 7.7%.
2. **Inner Cordon**
   a. About 11.28 lakh vehicles enter and leave PMC and PCMC daily.
   b. The highest traffic volume was observed at Shivaji Chowk (Hinjawadi), i.e. 1,69,000 vehicles, followed by Ahmednagar Road (1,57,916 vehicles).
   c. Two-wheelers, with a share of 57.7%, dominated the traffic composition, followed by cars (26.3%) and goods vehicles (9.1%).
   d. Peak hour traffic, as a percentage of the total daily traffic, stood between 6.6% and 9.5% with an average of 7.0%.

Figure 5.3 and Table 5.4 presents the location wise traffic volume.

Figure 5.3*: Outer and Inner Cordon Survey Locations*

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Table 5.4*:Traffic volume count observed at major roads on outer cordon*

No	Road/Location	Vehicles	PCU	Share (%)
1	Khed Shivapur Toll Plaza, Satara Road (L1)	56,750	65,298	16.10%
2	Velhe Bk Village Road (L2)	2,145	1,969	0.49%
3	Saswad Jejuri Road and Indraprastha Road Junction (L3)	25,119	25,643	6.32%
4	Solapur Highway - Patas Toll Plaza (L4)	31,789	41,966	10.35%
5	Khedgaon-Supa Road (L5)	12,000	13,750	3.39%
6	Nirvi-Nhavare Road (L6)	4,609	3,935	0.97%
7	Ahmednagar Road at Shirur (L7)	45,170	52,901	13.04%
8	Near Malthan, Maltan-Awasari Bk Road (L8)	3,743	3,552	0.88%
9	Nashik Highway Near Peth (L9)	32,753	35,922	8.86%
10	Mumbai-Pune Expressway (Lonavala Entry/Exit Toll Plaza) (L10)	9,531	26,062	6.43%
11	Mumbai-Pune Expressway (Talegaon Toll Plaza) (L11)	46,211	61,172	15.08%
12	Mumbai-Pune Highway NH-4 (Near Lonavala) (L12)	23,165	26,493	6.53%
13	Near Loni, Pabal-Loni Road (L13)	4,004	4,213	1.04%
14	Rajgurunagar-Dhamai Road (L14)	2,143	1,815	0.45%

15	Pabal-Pargaon Road (L15)	1,581	1,413	0.35%
16	Chas-Wada Road (L16)	4,583	4,088	1.01%
17	Saswad-Supa Road (L17)	6,516	5,801	1.43%
18	Saswad-Kapurhol Road (L18)	13,965	13,513	3.33%
19	Velhe Bhagud MIDC, Mulshi Road (L19)	3,167	3,549	0.88%
20	Ranjangaon-Takalihaji Road (L20)	4,410	3,853	0.95%
21	Urulikanchan-Jejuri Road (L21)	6,330	6,282	1.55%
22	Alegaon-Kasti Road (L22)	2,729	2,354	0.58%
Total		3,42,413	4,05,542	100

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Table 5.5: Traffic volume count observed at major roads on Inner cordon

No	Road/Location	Vehicles	PCU	Share (%)
1	Moshi Toll Plaza, Nasik Road (L1)	85,455	88,270	7.57
2	Near Sambhaji Chowk, Alandi Road, Alandi (L2)	63,846	58,152	5.66
3	Nagar Road (L3)	157,918	151,713	13.99
4	Kawadipeth Toll Plaza, Solapur Road (L4)	75,077	79,623	6.65
5	Saswad Road (L5)	38,514	39,926	3.41
6	Saswad-Bopdev Road (L6)	38,981	36,008	3.45
7	Sinhgad Road (L7)	68,432	63,629	6.06
8	NDA Academy Road (L8)	84,055	72,303	7.45
9	Near Bhugaon, Mulshi Road (L9)	47,080	42,854	4.17
10	Shivaji Chowk, Hinjawadi (L10)	169,036	155,361	14.97
11	Dehu Road Toll Plaza, Mumbai- Pune Highway (L11)	61,535	65,080	5.45
12	Talwade, Dehu Alandi Road (L12)	92,980	92,133	8.24
13	Katraj-Satara Road (L13)	51,933	50,864	4.60
14	Sus Road (L14)	33,449	30,563	2.96
15	Nande-Balewadi Road (Mahalunge) (L15)	19,425	16,789	1.72
16	Manjari Village, Manjari Road (L16)	21,115	19,814	1.87
17	Lohegaon-Nirgudi Road (L17)	1,751	1,668	0.16
18	Lohegaon-Wagholi Road (L18)	18,217	17,420	1.61
Total		11,28,799	10,82,167	100

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Figure 5.4 shows vehicular traffic on radial roads and the Volume/Capacity ratio for these roads.

Figure 5.4: *Existing Road Volume / Capacity Ratio.*

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Figure 5.5: *CTTS: Movement Pattern in PMR*

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Figure 5.5 shows trip movements in PMR. It can be seen that most trips start and terminate in municipal corporation areas. Thus, to influence the land use and have a uniform distribution of trips, it is essential to have a ring road around Pune and Pimpri Chinchwad cities.

Figure 5.6: CTTS: Private Vehicle flow along major corridors for PMR (2018)

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Figure 5.6 indicates traffic on existing roads. Roads with traffic more than 1,250 PCUs/hour on minor roads and 2,500 PCUs/hour on major roads are selected. The thickness of the line denotes the intensity of traffic. The thicker the line, the heavier is the traffic. It can be inferred that there is heavy radial road dependency for reaching municipal corporation areas.

Road network inventory for PMR was prepared as part of the CTTS. Single lane roads constitute around 57% of the total road length in the Study Area, followed by intermediate lane roads at about 22%. In Study Area, roads without footpath are much more in numbers vis-a-vis roads with a footpath.

Household Surveys

- About 62% of households in the Study Area own a two-wheeler, 10% of households own a car and two-wheeler, about 3% of households own a cycle only and 13% own no vehicles.
- The per capita trip rate in PMR, including walking and cycling, is 1.26 whereas for motorized trips only it is 0.79. The highest average motorized trip rate was observed in PMC, i.e. 0.90, followed by PCMC, i.e. 0.82.
- The mode-wise distribution of trips (including walking and cycling) in PMR is dominated by walking, i.e. 35.1%, followed by two-wheelers (33.2%) and buses (9.9%). The share of trips catered to by cars is at 9.1%.
- Work-based activities dominate the distribution of trips based on purpose in PMR, i.e. 51.3%, followed by educational trips (33.8%). The average per capita trip length in PMR, including walking and cycling, is 5.16 km. In contrast, for motorized only trips, it is 7.80 km. The highest average motorized trip length was observed in the rest of PMR, i.e. 9.43 km.

Issues and Challenges

Based on the analyses conducted as part of the CTTS, key issues and challenges of the existing road transportation systems in PMR are as follows:

- Inadequate carrying capacity of radial growth corridors, national highways and major state highways
- Absence of Ring Roads, bypass roads, alternative roads to radial roads
- Congested up entry/exit points to PMC and PCMC due to non-segregated external traffic
- Low quality of roads in terms of available road widths and pavement condition
- Weak accessibility to the Western Ghats and tourism nodes
- Lack of connectivity to villages
- Absence of implementation strategy for Regional Plan roads beyond municipal corporation limits in PMR

5.3 Rail Transport

PMR is well connected to major cities of the country through an extensive regional rail network. This railway network is under Central Railways jurisdiction, consisting of broad gauge lines both electrified and non-electrified.

The two major railway routes in the region are Mumbai-Pune-Solapur and Pune-Miraj. Daund is a major junction located outside the Study Area, and it is connected with Baramati and Ahmednagar.

Figure 5.7: Existing Railway Network in PMR

Source: Central Railway, Pune Division; Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019

Table 5.6 Contains rail ridership statistics, including suburban passengers.

Suburban railways alone carry 1.1 lakh (2017) passengers every day. The highest ridership was observed on the Pune-Lonavala section, with a total number of 68,899 (2017) passengers boarding and alighting per day on 18 trains. Trains on this route run with a minimum frequency of 30 minutes. Another route with a significant number of passengers is the Pune-Daund line, with eight services per day. The average trip length of passengers on suburban rail stands at 41 km in PMC and 15 km in the PCMC area.

Table 5.6: Characteristics of Existing Railway Lines in PMR

Route	Length (km)	Specification	Annual Ridership (million)	Capacity
Pune-Lonavala	63	Double line	28.6	142
Pune-Daund	64	Double line	NA	107
Pune-Miraj	32	Single line	14.5	118

Source: Central Railway, Pune Division.

Ridership on the Pune-Mumbai route is rising rapidly due to residential and industrial developments along this corridor. All the railway lines are operating beyond their capacity. Lands around railway stations at Yavat, Kedgaon, Kutbav, Kadetan and Malavali are not utilised to their potential. One of the reasons is the absence of robust road connectivity between railway stations and the highway network. The existing Inland Container Depot (ICD) is at Chakan MIDC Phase 2. The facility is spread over 12.5 acres with an annual capacity of 60,000 TEUs. It serves logistic demand between Nashik, Pune and JNPT port. The facility lacks railway connectivity to ensure the economical and sustainable movement of goods.

Key issues and challenges

Based on the analyses conducted as part of the CTTS, key issues and challenges of the existing rail network in PMR are as follows:
- Existing railway lines are being utilised beyond their capacity hampering the suburban rail frequency.
- Bypass Railway line that will connect all three existing railway lines, act as suburban ring railway serving goods transport. Pune Railway Division presented this requirement to PMRDA. PMRDA has incorporated the same in the Comprehensive Mobility Plan 2018.
- Road network connectivity to railway stations, particularly in rural areas of the region, is weak.
- Lower frequency of suburban rail services leading to a dependency on the road-based transport system.
- Linkages with major industrial nodes for passenger and goods movement are inadequate.
- The capacity of the single and non-electric Pune-Miraj railway line is limited.
- Rail connectivity to industrial areas in the Pune region is weak.

5.4 Public Transport and NMT

Public Transport

Public Transport in PMR consists of bus and rail-based nodes of transport for mobility. The city bus service provided by PMPML serves the city centre and suburbs up to 20 km from PMC and PCMC boundaries. MSRTC provides intercity bus services for passengers travelling outside Pune.

Public transport coverage is primarily concentrated in PMC and PCMC jurisdictions. In the rest of PMR, public transport coverage is limited to only national highways and some major roads. Lack of demand for buses due to high dependency on private vehicles, company buses for daily commute to and fro between home and office adds to conjestion. Thus, to improve the public transport coverage in the rest of PMR, the major focus needs to be on developing residential and employment centres around the rail and road-based infrastructure provisions.

Figure 5.8: *Public Transport Coverage in PMR*

Source: Central Railway, Pune Division; Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019; Public Works Department GoM, Pune;

Private and state-run intercity bus services to major cities in the state and neighbouring states currently serve PMR. Maharashtra State Road Transport (MSRTC) operates the state-run bus service with a fleet of over 18,000 buses. These buses run from four bus terminals: Swargate, Shivaji Nagar, Pune Railway Station and Vallabh Nagar. From the latest statistics, an average of 0.3 million passengers travelled on MSRTC services.

PMPML operates the city bus service serving the city centre and suburbs, up to 20 km from PMC and PCMC, with a fleet size of 1,500 operating on 371 routes. This bus service provides public transport connections from PMC and PCMC to the major MIDC centres and municipal councils. The annual ridership for PMPML services has declined from around 420 million passengers in 2013 to about 390 million passengers in 2016. The decreased ridership can be attributed to the shift to private vehicles. Long-distance PMPML bus routes operate at lower than 2-hour frequency due to less ridership.

Non-Motorized Transport (NMT)

There is limited data on non-motorised transport infrastructure in PMR. Based on CMP and CTTS data, the current share of trips by walking is about 33% with an average trip length of about 0.9 km. It is observed that the NMT infrastructure in PMR is poor, with no footpaths on most roads, encroachments on existing footpaths or used as parking spaces by vehicles. There is also a lack of cycling infrastructure, with the total length of cycle tracks only about 64 km. Consequently, the mode share of cycling is meagre, accounting for only 2.7% of all trips, with an average trip length of 3.28 km.

Key issues and challenges
Based on the analyses conducted as part of the CTTS, key issues and challenges of the existing public transportation systems and NMT in PMR are as follows:
*   Absence of suburban rail-based public transport causing high dependency on road-based transport
*   Limited public transport coverage in PMR, resulting in fewer shares of public transport trips
*   A low frequency of bus services in the region due to less ridership
*   Inadequate NMT facilities and their integration with transport nodes

5.5 Freight Transport

The need for the movement of goods is linked with the land uses spread across the region. PMR is established as an automobile manufacturing hub with industrial and warehouses spread across the region along major transport corridors. These uses demand mobility of raw materials and finished goods in and outside the region. Nashik Road, Nagar Road, Saswad Road, Solapur Road and Mumbai-Pune Expressway are observed to have higher volumes of freight travelling on them than other roads. In terms of percentage share of traffic, the highest share is seen on Nashik Road and Solapur Road due to the rail siding facility near Fursungi. All national highways are identified as major freight corridors for PMR. The movement of heavy vehicles within the municipal limits during the daytime is restricted to avoid their impact on local traffic.

Table 5.7: Goods vehicles on radial roads in PMR

Location	Goods vehicles	Share (%)
Mumbai-Pune Expressway	9,066	8.03%
Saswad-Jejuri Road	3,482	3.08%
Moshi Toll Plaza, Nashik Road	13,810	12.23%
Near Sambhaji Chowk, Alandi Road, Alandi	5,365	4.75%
Nagar Road	10,484	9.28%
Kawadipeth Toll Plaza, Solapur Road	12,851	11.38%
Saswad Road	7,007	6.20%
Saswad-Bopdev Road	2,836	2.51%
Sinhgad Road	3,615	3.20%
NDA Academy Road	2,904	2.57%
Near Bhugaon, Mulshi Road	3,277	2.90%
Shivaji Chowk, Hinjawadi	3,376	2.99%
Dehu Road Toll Plaza, Mumbai-Pune Highway	9,781	8.66%
Talwade, Dehu Alandi Road	12,279	10.87%
Katraj-Satara Road	5,211	4.61%
Sus Road	1,758	1.56%
Nande-Balewadi Road (Mahalunge)	1,068	0.95%
Manjari Village, Manjari Road	2,742	2.43%
Lohegaon-Nirgudi Road	215	0.19%
Lohegaon-Wagholi Road	1,836	1.63%
Total	1,12,963	100

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019;

Figure 5.9: *Desired line diagram showing the Goods vehicle movement in PMR*

Source: Comprehensive Traffic and Transport Study, (CTTS) for PMR, Dec 2019;

Goods movement in PMR is also catered to by the rail systems. Railway sidings are present in various locations of PMR. As rail sidings are restricted along the existing rail lines, a new bypass line will touch other industrial areas like Chakan, Shikrapur on Nashik Road and Nagar Road. The proposed Ring Roads are necessary to provide relief to goods traffic as there is heavy external-to-external truck traffic, as seen in Table 5.7.

Key Issues

Based on the analyses conducted as part of the CTTS, key issues and challenges of the existing freight transportation systems in PMR are as follows:
- Lack of truck terminals in PMR; rail siding and truck parking facilities are located within PMC and PCMC areas.
- Freight vehicles travel through the congested city road network even though their destinations are not within the city. Bypass rail for goods is needed.
- Infrastructure is inadequate to accommodate freight vehicles on radial roads.
- Inadequate cargo parking facilities in industrial areas have led to inefficient carriageway utilisation.

5.6 Air Transport

PMR has an international airport located at Lohegaon within municipal corporation limits. This airport is also an airfield station of the Indian Air Force. The airport accommodates passenger and goods movement of both domestic and international flights. The other international airport in the proximity of PMR is the Mumbai airport, with more robust connectivity to international destinations.

Pune airport has a runway length of 2,539 m that can handle all medium-range and few long-range aircraft. The airport currently handles 8.16 million passengers and 41,566 tonnes of cargo annually. The passengers handled at the airport are growing at an average CAGR of 19% in the past three years. Moreover, the airport shares runway and Air Traffic Control (ATC) facilities with the Air Force base leading to restrictions on operations of civil flights.

Considering all these factors and limitations on expanding the existing airport, to meet the growing demand, the Government of Maharashtra has proposed developing a new greenfield airport in Purandar taluka. It would be approximately 38 km from Pune city. MADC is appointed as the nodal agency and "Special Planning Authority" to develop the new airport.

5.7 Metro Transport

Currently, the Metro rail system is under implementation on three corridors in PMC and PCMC with a total route length of 54 km. The corridors are a combination of both elevated and underground sections.
- Line-1: PCMC to Swargate (16.58 km with 14 stations)
- Line-2 Vanaz to Ramwadi (14.66 km with 16 stations)
- Line-3: Hinjawadi to Shivaji Nagar (23 km with 23 stations)

MahaMetro, an SPV between the Government of India and the Government of Maharashtra, is executing the first two lines. PMRDA is executing the third line under the public-private partnership model and has awarded the project to the consortium of TUTPL and Siemens. The metro corridors are expected to be operational in a phase-wise manner.

Chapter 6:
Social Infrastructure

Social infrastructure covers a range of services and facilities that meet local and strategic needs and contribute towards a good quality of life. It includes health provisions, education, community facilities, recreational and open spaces, sports facilities and emergency facilities. Its availability, extent and sophistication are crucial measures of the overall development and quality of life of any region. Social infrastructure plays a pivotal role in fostering strong and inclusive communities. It provides opportunities to bring different groups of people together, contributing to social integration and the desirability of a place.

6.1 Institutional Setup

The key organisations providing social infrastructure in Pune Metropolitan Region are:

Urban Local Bodies:

Individual municipal corporations,   councils and cantonment boards prepare Development Plans for their respective jurisdictions, which provide a statutory binding to propose and implement social infrastructure facilities as well as operate and maintain those as per the present and future demands of the public realm. Pune Metropolitan Region comprises two municipal corporations, seven municipal councils and three cantonment boards. These Urban Local Bodies have an obligatory duty to establish and maintain education facilities, healthcare facilities, community facilities, open spaces and recreational areas in their respective planning areas.

Zilla Parishad, Pune:

Maharashtra adopted three tiers of the Panchayat Raj System under the Maharashtra Zilla Parishad and Panchayat Samiti Act, 1961. The three-tier Panchayati Raj system included Zilla Parishad at the apex, followed by Panchayat Samiti and Gram Panchayat. Pune Zilla Parishad establishes and maintains primary and secondary educational facilities in the district. Apart from educational facilities, Pune Zilla Parishad also looks after the management of hospitals and other health care facilities in the rural parts of the district.

Gram Panchayat

Gram Panchayat plays an active role in implementing the required social facilities within the premise of a village boundary.

6.2 Educational Facilities

Access to high-quality education, which profoundly affects people's lives, is one of the most powerful ways to break down inequalities and improve social mobility. PMR's literacy rate stands at 81%, slightly lower than that of Pune district (86.2%) and Maharashtra state (82.3 %).

Currently, there are a total of 2,631 education facilities within PMR. Education facilities are categorised as primary, secondary and tertiary. Primary education includes pre-primary or Anganwadi and primary schools. Secondary education facilities include secondary schools /high school and tertiary facilities include colleges and higher education institutes.

Table 6.1: Primary, Secondary and Tertiary Education Facilities - ELU/GIS Database

Taluka		Primary Education Facility	Secondary Education Facility	Tertiary Education Facility	Total Education Facilities
Daund	Numbers	202	30	16	248
	Area (ha)	22.57	7.141	21.77	51.48
Purandar	Numbers	84	13	4	101
	Area (ha)	11.30	6.398	3.52	21.22
Velhe	Numbers	47	10	1	58
	Area (ha)	2.02	0.27	0.10	2.39
Haveli	Numbers	301	105	43	449
	Area (ha)	69.31	71.805	194.88	336.00
Mulshi	Numbers	216	65	41	322
	Area (ha)	42.00	58.324	296.92	397.24
Khed	Numbers	373	79	8	460
	Area (ha)	35.60	14.196	4.79	54.59
Maval	Numbers	382	70	35	487
	Area (ha)	44.59	50.404	137.64	232.64
Bhor	Numbers	83	25	11	119
	Area (ha)	7.29	3.52	28.21	39.02
Shirur	Numbers	302	74	11	387
	Area (ha)	31.04	16.4258	7.00	54.46
Total	Numbers	1,990	471	170	2631
	Area (ha)	265.7	228.5	694.8	1189

Source: GIS Database; Survey Data, ELU Database; Department of School Education and Literacy, Ministry of Education GoM, Schoolgis.nic.in

Table 6.2: Government Schools and Private Schools - ELU/GIS Database

Taluka		Govt. School	Private School	Trust
Daund	Numbers	168	59	
	Area (ha)	18.55	32.85	
Purandar	Numbers	65	16	
	Area (ha)	15.97	4.91	
Velhe	Numbers	41	9	
	Area (ha)	2.01	0.2	
Haveli	Numbers	192	164	4
	Area (ha)	95.92	230.60	1.63

Mulshi	Numbers	163	110	
	Area (ha)	12.68	391.96	
Khed	Numbers	311	95	
	Area (ha)	29.91	24.41	
Maval	Numbers	344	86	1
	Area (ha)	17.02	208.96	6.34
Bhor	Numbers	80	29	
	Area (ha)	7.2	31.87	
Shirur	Numbers	260	84	
	Area (ha)	25.19	30.08	
Total	Numbers	1624	652	5
	Area (ha)	224.45	955.84	7.97

Source: GIS Database; Survey Data, ELU Database; Department of School Education and Literacy, Ministry of Education GoM, Schoolgis.nic.in

PMR is majorly rural in nature, and Zilla Parishad has been active in providing a school in most villages. Out of 2,631 schools, 62% schools are government-run schools while 25% are private schools. Malaval Taluka (487) has the maximum number of schools, followed by Khed (460) and Haveli (449). Mawal, Khed and Shirur Taluka have the maximum number of government schools/ZP Schools, while Haveli and Mulshi have the most private schools. It is also observed that private schools are primarily located along national highways and edging the current urbanisation areas. In contrast, government schools are well spread off into rural areas.

Primary education facility

PMR has 1990 primary schools spread across the region. Currently, one school serves 860 people, better than the desired ratio of one school per 5,000 people (as per RP 1997). However, the average area per school is 0.13 ha, which is less than the standards stated in RP 1997.

Table 6.1 explains the taluka wise distribution of primary schools. It is observed that Maval taluka has the maximum number of primary schools (382), followed by Khed taluka (373). Area-wise, Haveli taluka has the highest average area under schools with 0.23 ha per school. In contrast, other talukas have sizes ranging from 0.04 to 0.19 hectares per school.

Figure 6.1: *Village Wise Availability of Primary Education Facilities - ELU/GIS Database*

Source: GIS Database; Survey Data, ELU Database; Department of School Education and Literacy, Ministry of Education GoM, Schoolgis.nic.in

129 villages are without primary schools, out of which 45 villages lie in the Western Ghats area. The population of some of these villages is also less than 100 people, and thus they share amenities with neighbouring villages.

Secondary education facility

PMR has 471 secondary schools spread across the region. Currently, one school serves 3,634 people, better than the desired ratio of one school per 7,500 people (as per RP 1997). However, the average area per school is 0.48 ha, which is less than the standards stated in RP 1997. The area requirement of these schools is not fulfilled.

Table 6.1 explains the taluka wise distribution of primary schools. It is observed that Haveli taluka has the maximum number of secondary schools (105), followed by Khed taluka (79) and Maval taluka (70).

Out of 557 villages without secondary schools, 126 villages lie in the Western Ghats area. The population of these villages is also less than 100 people, and thus they share amenities with neighbouring villages.

Figure 6.2: *Village Wise Availability of Secondary Schools - ELU/GIS Database*

Source: GIS Database; Survey Data, ELU Database; Department of School Education and Literacy, Ministry of Education GoM, Schoolgis.nic.in

Tertiary Education Facilities

Pune Metropolitan Region has 170 colleges/higher education institutions, with the highest number of establishments in Haveli taluka followed by Mulshi. Table 6.1 gives an overview of available tertiary education facilities in each taluka. Considering the Planning Area population estimated for 2018, there is one tertiary education facility for every 10,067 people.

Table 6.3: *Taluka Wise Availability of Tertiary Education Facilities - Census 2011*

Taluka	Arts and Science College	Engineer- ing College	Medical College	Management Institute	Polytechnic College	Vocational Training Insti- tute/ ITI	Non-Formal Training Centre
Bhor	0	1	0	0	2	0	0
Daund	3	0	0	0	0	2	0
Haveli	14	1	0	0	1	3	0
Khed	1	0	0	0	0	2	0
Mawal	0	0	0	0	0	12	0
Mulshi	1	0	0	0	0	1	0
Purandar	0	0	0	0	0	2	0
Shirur	2	1	0	0	0	6	0
Velhe	0	0	0	0	0	0	0
Total	21	3	0	0	3	28	0

Source: GIS Database; Survey Data, ELU Database; Department of School Education and Literacy, Ministry of Education GoM, Schoolgis.nic.in

Figure 6.3: *Village Wise Availability of Tertiary Education Facilities - Census 2011*

Source: GIS Database; Survey Data, ELU Database; Department of School Education and Literacy, Ministry of Education GoM, Schoolgis.nic.in; Census 2011

It is observed that the majority of tertiary level facilities/ colleges are available edging the dense development areas or the urbanizing areas and along major transport corridors. Area wise, Mulshi taluka has maximum area per facility which is 7.24 ha/facility while Haveli has 4.53ha/facility, followed by mawal with 35 colleges having 3.93 ha/facility.

6.3 Health Care Facilities

Health care facilities have been categorised into health centres, hospitals and veterinary clinics/hospitals. The health centre forms the first tier of the healthcare system, and it serves the neighbourhoods. These health centres are further classified into Primary Health Centres (PHC) developed by Zilla Parishad and private centres.

Hospitals form the second tier of the healthcare system and serve larger masses at the town level. These hospitals are generally located at district headquarters or the major towns. The rural population has to rely on these hospitals for any specialised diagnosis and treatment. Hospitals are classified into maternity care units, government hospitals and private hospitals.

PMR being majorly rural in character, veterinary clinics and hospitals play an essential role. Veterinary hospitals are generally located at district headquarters or major towns and transport intersections. Table 6.4 gives details of the total healthcare units in PMR.

Haveli (82) has the maximum number of health centres, followed by Shirur and Mawal talukas. Mulshi (0.5 ha per facility) tops the average area per health facility after Haveli (0.6 ha per facility).

Table 6.4: Health Care Facilities in PMR - ELU/GIS database

Taluka		Total Health facility	Health Centre			Hospitals		Veterinary
			Primary Health Centre	Private health centre	Maternity	Govt. hospitals	Private hospital	
Daund	Numbers	42	19	15	3	1	5	3
	Area (ha)	5.7	3.3	0.5	0.4	0.7	1.2	0.05
Purandar	Numbers	7	7	0	0	0	0	0
	Area (ha)	0.2	0.2	0.00	0	0	0	0
Velhe	Numbers	8	3	1	0	0	0	3
	Area (ha)	0.3	0.2	0.1	0	0	0	0.03
Haveli	Numbers	82	16	23	0	0	12	3
	Area (ha)	50.4	2.7	1.2	0	0	1.8	0.02
Mulshi	Numbers	49	9	30	1	1	3	2
	Area (ha)	22.8	0.6	19.0	0.25	1.6	1.1	0.01
Khed	Numbers	27	6	47	0	9	4	4
	Area (ha)	4.5	0.2	3.3	0	3.9	2.7	0.10
Maval	Numbers	51	12	28	0	4	5	2
	Area (ha)	7.0	3.2	0.7	0	1.8	1.3	
Bhor	Numbers	14	2	8	0	0	1	1
	Area (ha)	0.7	0.02	0.3	0	0	1.3	0.09
Shirur	Numbers	69	18	48	2	2	2	1
	Area (ha)	1.6	0.3	1.0	0.14	1.4	0.2	0.01
Total	Numbers	349	92	200	6	17	32	19
	Area (ha)	93.1	10.7	26.0	0.8	9.4	9.6	0.3

Source: GIS Database; Survey Data, ELU Database; Pune Zilla Parishad.

Health Centres in PMR

As per the GIS database, PMR has 292 health centres, out of which 31% are PHCs, and 69% are private health centres. The typical character of these private health centres are smaller building footprints or hosted within a few floors of a building, majorly along the national highways. This fact is proven by the average area occupied, which is 0.12 ha per centre.

Shirur (18) has a maximum percentage (19%) of PHCs followed by Haveli (16), while Khed and Shirur have maximum private health centres followed by Haveli.

Figure 6.4*: Village Wise Availability of Primary Health Facilities - ELU/GIS Database*

Source: GIS Database; Survey Data, ELU Database; Pune Zilla Parishad.

While assessing the availability of health centres, it is observed that for every 5861 people one health centre is available. It is imperative to propose and develop new facilities to cater to the present and future PMR population's primary healthcare needs.

Hospitals

PMR has 55 hospitals, out of which 58% are private hospitals,31% are government hospitals, and 11% are maternity hospitals. Nine government hospitals are present in Khed along the Pune-Nashik Highway, while four are present in Maval taluka. In terms of private hospitals, Haveli tops the numbers with 12 hospitals. Maternity and child care centres are few in PMR, with only six clinics spread across three talukas.

Analysing penetration of hospitals in PMR reveals that Purandar and Velhe do not have any hospitals. PMR has one hospital for every 31,118 people. At the same time, each maternity and childcare facility caters to 2,85,248 people, clearly indicating its inadequacy.

Veterinary Hospitals

PMR has 19 veterinary hospitals. Each taluka in PMR has a veterinary hospital except Purandar, as only part of taluka lies in PMR. Khed (4) has the maximum number of veterinary facilities, followed by haveli and Velhe, having three each. Mulshi and Mawal have insufficient numbers with only 2 in the entire taluka, while Shirur (1) has the least number of the available facilities.

Figure 6.5: *Village Wise Availability of Hospitals - ELU/GIS database*

Figure 6.6: *Village Wise Availability of Veterinary facilities - ELU/GIS database*

Source: GIS Database; Survey Data, ELU Database; Pune Zilla Parishad.

6.4 Recreational Areas and Facilities

Pune Metropolitan Region is rich in biodiversity and natural heritage with notable tourism sites such as wildlife sanctuaries, forts, religious or pilgrim destinations and hill stations. Pune city adds to the context of PMR. It has many destinations that attract tourists from the entire district and state. Some of these attractions include Shaniwarwada, Dagdusheth Ganpati, Kasba Ganpati, Pataleshwar Caves, Osho Ashram, Pashan Lake, Katraj Snake Park, and so forth.

Recreational areas and facilities have been categorized as following to have a better understanding of requirements and availability.
1.   Forest and wildlife sanctuaries
2.   Lakes and dams
3.   Heritage
4.   Religious sites
5.   Recreational open spaces

Forest and Wildlife Sanctuaries

PMR has a forest cover of about 824.29 sq km and two wildlife sanctuaries (62.19 sq km) - Tamhini Ghat Wildlife Sanctuary and Sudhagad Wildlife Sanctuary. Tamini Ghat and Sudhagad wildlife sanctuaries are home to a rich and diverse selection of flora and fauna. The sanctuaries are home to different species of mammals and birds, including Indian endemic birds, butterfly species, reptiles species, invertebrates, and rare flora species. Apart from this, Tamhini Ghat and Sudhagad have a very scenic beauty which draws tourists and visitors, especially in the monsoons, when waterfalls dot it.

Lakes and Dams

PMR has many lakes, dams and reservoirs, along with rivers and streams. These water bodies cover 37,514 ha of area, which is about 6.1% of the PMR area. Popular lakes and dams include Pashan lake, Bhushi dam, Mulshi dam, Khadakwasla dam, Varasgaon dam, Panshet dam, Kund mala and Mastani lake. These lakes and dams have tourism development around them and in their proximity.

Heritage

PMR has overall 12 protected monuments of national importance and 12 protected monuments of state importance. The famous protected heritage structures of national importance are Bhaja and Karla caves, Lohgad fort, Pataleshwar cave temple, Shaniwarwada, Visapur fort and Agakhan Palace building. Whereas, Sinhagad, Koirigad, Mahatma Phule Wada, Vishrambaug Wada, Hutatma Rajguru Wada, Grave of Mastani are some of the popular protected heritage sites of state importance. Rajmachi, Tung fort, Tikona fort, Bedse caves, Purandar fort, Malhargad fort and Lal Mahal are other prominent heritage sites in PMR.

Religious Sites

Pune is called the cultural capital of Maharashtra. PMR houses a lot of religious places of different religions. The more prominent sacred places in PMR are Chaturshrungi temple, Alandi temple, Mahaganpati temple in Ranjangaon, Prati Balaji, Prati Shirdi, Parvati Hill temple, Dilawar Khan Masjid and tomb, Kamar Ali Darvesh Dargah at Khed Shivapur, Dagdusheth Ganpati and Dehu-Gatha Mandir.

Recreational Open Spaces

Recreational open spaces include parks, gardens and open spaces. Parks are green landscaped areas that act as the lungs of the city. Parks and gardens provide pollution-free and pedestrian-friendly areas for a varied range of social activities. Open spaces include publicly accessible spaces that can accommodate multiple active recreational uses such as expos, exhibitions, playgrounds, etc. Unlike parks and gardens, open spaces need not be filled with vegetation. At present, 588 ha of land cover is under recreational use as per the ELU database.

Figure 6.7: Recreational Spaces in PMR

Source: GIS Database; Survey Data, ELU Database.

6.5 Fire Services

Fire services play a pivotal role in protecting people from fire hazards, road accidents, building collapse and other unforeseen emergencies. Fire is categorized as a disaster. PMR presently has three fire stations at Nanded City (Nanded Gaon), Marunji and Wagholi.

Table 6.5: Fire Station - ELU/GIS Database

No	Taluka	Fire Station
1	Bhor	0
2	Daund	0
3	Haveli	2
4	Khed	0
5	Mawal	0
6	Mulshi	1
7	Purandar	0
8	Shirur	0
9	Velhe	0
	Total	3

Source: GIS Database; Survey Data, ELU Database; Fire Department, PMRDA.

Figure 6.8: Fire Station with Buffer

Source: GIS Database; Survey Data, ELU Database; Fire Department, PMRDA.

Data in Table 6.5 indicates that Daund, Haveli, Khed and Shirur taluka lack fire services to serve their population adequately. At present, their requirements are being catered by closest urban local bodies with the provision of fire services. Therefore, it is imperative to develop the fire services infrastructure necessary to cater to the demands of the PMR population.

6.6 Cremation Ground and Burial Ground

In PMR, there are a total of 103 Cremation grounds and 306 Burial grounds. Taluka wise distribution of cremation ground and burial ground in PMR is given in Table 6.7. It can be observed that there is no cremation ground in Purandar taluka and no burial ground in Mulshi taluka.

Figure 6.9: *Availability of Crematorium and Burial Ground - ELU/GIS Database*

Source: GIS Database; Survey Data, ELU Database;

Table 6.6 data indicates that PMR lacks in the provision of a burial ground in every taluka. Also, it has an insufficient number of cremation grounds in Daund, Haveli, Purandar, Shirur and Velhe talukas. To cater to present and future population needs, it is required to propose a larger cremation ground or a burial ground for a cluster of villages that would be easily accessible to the population.

Table 6.6: *Requirement of Cremation Ground and Burial Ground for Present Population*

Taluka	Cremation Ground	Burial Ground
Bhor	18	1
Daund	2	24
Haveli	24	6
Khed	70	8
Mawal	128	13
Mulshi	47	0
Purandar	0	4
Shirur	13	45
Velhe	4	2
Total	306	103

Source: GIS Database; Survey Data, ELU Database;

Chapter 7:
Public Utility

Urbanisation, industrial development, population growth and increase in area under irrigation have resulted in increased water demand over the past few decades. Sustainability of the urban water supply is one of the core issues, followed by sanitation, solid waste management and stormwater management. This chapter analyses water supply, wastewater, solid waste and stormwater systems in the region. This analysis aims to understand the current status of infrastructure provision by identifying the supply-demand gap. It would help devise appropriate planning strategies to mitigate the gap and optimise the usage of natural resources for the efficient delivery of infrastructure in the sub-sectors mentioned above.

7.1 Water Supply

PMR falls within the Bhima basin, formed by the Bhima River, which originates in Bhimashankar of Khed taluka. Bhima, Mula, Mutha, Indrayani, Pavana, Bhama, Andra are the major rivers flowing through the region. Dams, reservoirs, weirs, lakes and groundwater cater to the water requirement of the region.

Water for domestic use is supplied to municipal corporations and municipal councils through dams and reservoirs developed by the State Irrigation Department. MIDC areas are provided water through dams built by the State Irrigation Department as well as private dams. Current municipal water supply and distribution systems cover certain rural areas within PMR. For villages not covered under this water supply and distribution system, the residents depend on private wells and water supplied by tankers for their domestic use.

Institutional Framework

Multiple agencies are involved in the process of planning, designing and developing water supply and distribution systems in the region. These agencies are collectively responsible for developing sources, bulk water supply systems and water distribution systems, resource allocation and assessment and monitoring of groundwater sources. The State Irrigation Department is responsible for source development. It develops dams, reservoirs and weirs. Maharashtra Jeevan Pradhikaran (MJP) and Zilla Parishad are responsible for providing water to rural areas by developing regional and individual water supply schemes. The Ground Water Survey and Development Agency monitors groundwater abstraction status and also develops groundwater supply schemes. Municipal corporations and municipal councils are responsible for developing bulk water supply and distribution systems within their jurisdictions. For smaller municipal councils, MJP also assists in planning, designing and implementing water supply networks. MIDC develops its own water source, bulk water supply and distribution systems. For Kirkee, Pune and Dehu cantonment boards, Pune Municipal Corporation is responsible for developing bulk water supply systems. The cantonment boards themselves develop the distribution systems.

Surface Water Sources

Major Basins

Subbasin wise studies were conducted from the northern side to the southern, and analysis is as follows:
1. **Bhima Subbasin**
   It is an uppermost basin in PMR. Bhima River, a left-bank tributary of Krishna River in the Krishna basin, originates in Bhimashankar hill in Khed taluka outside PMR. The entire basin is in Maharashtra and receives rainfall between 500 mm to 750 mm except for a small area upstream of Chaskaman Dam.
2. **Bhama Subbasin**
   Bhama River originates in Sahyadri hills in Rajgurunagar village of Pune district. It is a right-bank tributary of River Bhima and is a small river with an interception of a dam at village Askhed. The dam supplies water to 36 villages within the basin, out of which ten are downstream but in close vicinity. The remaining villages are upstream and within the submergence.
3. **Andhra Subbasin**
   Andra River is a small left-bank tributary of River Indrayani. Andra originates in the village Sawale situated at

Sahyadri hills. Tata Power Company constructed a dam on this river near village Kiwale during the fifties for hydroelectric power generation. This reservoir supplies water to 30 villages, out of which 16 villages lie upstream within the submergence, and 14 villages are downstream.

4. **Indrayani Subbasin**

   Indrayani River is revered as a holy river. Sacred sites of Alandi and Dehu are settled on the left bank of this river in Khed taluka. It is a left-bank tributary of the Bhima River. All medium dam projects on this river, such as Vadivale, Shiravata, Valvan and Lonavala, have comparatively more yield. However, Tata Power Company owns all dams except Vadivale.

5. **Pawana Subbasin**

   Pawana river originates in the Sahyadri ranges on the west side of PMR in Mawal taluka. It is a small basin, and the river confluences with River Mula near Pune city. It is a left-bank tributary of the River Mula.

6. **Mula Subbasin**

   River Mula originates in Sahyadri ranges on the westward of PMR. It flows towards the east and meets River Mutha in Pune city. After that, this merged flow is known as the Mula-Mutha River. Tata Power Company constructed a dam on this river near Mulshi in 1927. Almost all water is diverted to the Konkan region for hydropower generation at Bhira Power House. Thus storage of Mulshi dam is not considered here for domestic supply except for villages situated upstream of the dam. Twenty-five villages in the catchment of Mulshi dam have been availing the domestic water supply from this dam since its opening.

7. **Mutha Subasin**

   It is one of the largest sub-basins in PMR. The Mutha River originates near the village Tamhini (Bk) in Sahyadri ranges located west of PMR. Mosi and Ambi rivers are two tributaries of the Mutha River, and they originate to the south of its origin. Three dams are constructed in the initial reaches of these rivers: The first dam is near village Panshet on the Ambi River. The second dam is near the village of Warasgaon on the Mosi River. The Mutha river is dammed for the third time near the village of Temghar. Panshet dam is currently used as a drinking water source for Pune city. Water released from these three dams is dammed again near the village of Khadakwasla on the Mutha river. All these four dams together form the Khadakwasla Complex group, a lifeline for drinking water of Pune Metropolis.

8. **Nira Subbasin**

   Nira basin is the southernmost basin in PMR. The actual area wise contribution of this basin is minimal. There are four reservoirs in Nira valley, namely Nira Deoghar, Bhatghar, Chapet and Vir.

9. **Karha Subbasin**

   A small part of the Karha basin also falls within PMR. River Karha originates in the hills of Purandar fort. Flowing towards the east side, it merges with River Nira from the left side. River Karha flows seldom, and there is an acute shortage of water in this area. There is no major or medium project constructed in PMR on this river.

Major Reservoirs

Various rivers originating in the Western Ghats, i.e. westerns parts of PMR, flow through PMR boundaries. The region currently has 19 major and medium reservoirs and 16 minor irrigation tanks. This section provides an analysis of various surface water sources in the region.

Table 7.1: Surface Water Sources in PMR - Key Reservoirs

No.	Name of Source	Type of Source	River Name	Storage Details of Reservoir			Sanctioned Reservation for use of water
				Live	Dead	Total	Quantity (mm3)
1	Khadakwasla	Major	Mutha	55.91	30	85.91	
2	Temghar	Major	Mutha	105.01	2.95	107.96	
3	Warasgaon/Dasave	Major	Mose	363.13	12.23	375.36	
4	Panshet	Major	Ambi	301.61	9	310.61	
	Total			825.66	54.18	879.84	424.89
5	Chaskaman	Major	Bhima	214.5	27.19	241.69	26.44

6	Bhama Ashkhed	Major	Bhama	217.13	13.52	230.65	144.11
7	Ghod	Major	Ghod	137.99	31.31	169.3	12.62
8	Pawana Dam	Major	Pawana	240.97	31.15	272.12	285.77
9	Bhatghar	Major	Velvandi	665.57	7.08	672.65	29.73
10	Gunjawane	Major	Gunjawani	104.48	0.21	104.69	0
11	Mulshi Dam	Major	Mula	522.76	13	535.76	0
12	Upper Andhra Lake/ Thokarwadi	Major	Andra	363.7	0	363.7	0
13	Shirwata	Major	Indrayani	212.97	0	212.97	0
14	Vadiwale	Medium	Kundali-Indrayani	30.39	10.48	40.87	8.62
15	Kasarsai	Medium	Pawana	16.06	1.32	17.38	3.91
16	Lower Andra Lake	Medium	Andra	82.75	0.55	83.3	66.3
17	Mulshi Tunnel Project	Medium	Mula	46.61	0	46.61	25.96
18	Nazre	Medium		16.64	5.68	22.32	7.25
19	Valwan	Medium	On Catchment (Sarovar)	72.12	0	72.12	0
20	Adhale	Minor	On Catchment	0.97	0.3	1.27	0
21	Malvandi	Minor	On Catchment (Pawana)	3.28	0.41	3.69	0
22	Jadhavwadi Dam	Minor	Sudha river	11.61	0.51	12.12	1.07
23	Pimploli	Minor	Kaparganga Nala	1.41	0.13	1.54	0
24	Khamboli	Minor	Kaparganga Nala	1.84	0	1.84	0
25	Rihe	Minor	Kaparganga Nala	1.27	0.34	1.61	0
26	Hadshi 1	Minor	Walki river	2.97	0.1	3.07	0
27	Hadshi 2	Minor	Walki river	1.3	0.11	1.41	0
28	Walen	Minor	Walki river	5.07	0.04	5.11	0
29	Uravade	Minor	On Catchment	1.89	0.11	2	0.44
30	Chinchwad	Minor		1.46	0	1.46	0
31	Saltar	Minor	On Catchment	1.3	0	1.3	0
32	Bhongvali	Minor	Nira	3.06	0.16	3.22	0
33	Kadus	Minor	Kumandala	2.26	0.36	2.62	0
34	Wafegaon	Minor	Vel	2.69	0.42	3.11	0.005
35	Tithewadi	Minor	Vel	7.1	0.76	7.86	0
				3819.78	199.42	4019.2	1037.115

Note: *These projects, although outside PMR, are in the vicinity of PMR, should be considered for water planning.

Source: Engineering Department, PMRDA

Figure 7.1*: Surface Water Storage*

Source: Engineering Department, PMRDA; GIS Database

Status of Ground Water

Pune Metropolitan Region falls under the Deccan trap volcanic groundwater province, which proves to be a good aquifer given that the rock is highly weathered. However, the interflow horizons such as red boles tend to become clayey and sometimes reduce the aquifer properties.

Groundwater is a major source of irrigation, accounting for about half of the net irrigated area as of 2011. Irrigation Data 2010-11 indicates that the total area irrigated using groundwater source in the Pune district is 1,45,500 ha. In contrast, area by irrigation accounts for 1,22,400 ha. The net irrigated area by all sources stands at 3,20,000 ha. Further, there were 91,699 dug wells/tube wells in the district for irrigation as of 2010-11. Additionally, groundwater is also an important source of rural water supply.

Lower penetration of piped water supply to many villages has resulted in a high water abstraction in many of these villages. Table 7.2 data represents groundwater development in PMR talukas between 2008-09 and 2011-12. It shows that groundwater development has increased for most talukas. It has reached critical levels in Purandar and Shirur talukas and is approaching a critical stage in Daund and Khed. It shows the need for the conservation of groundwater sources.

Table 7.2*: Stage of Groundwater Development (%) in PMR*

Taluka	2008-09	2011-12
Bhor	40.35	45.84
Daund	81.39	74.6
Haveli	54.9	53.7

Khed	66.3	79.3
Mawal	13.5	19.6
Mulshi	13.04	13.87
Purandar	83.95	92
Shirur	81	89.5
Velhe	6.09	7.9

Source: Report on Dynamic Groundwater Resources of Maharashtra - 2008-09, 2011-12

Status of Piped Water Supply at Village Level

MJP, Zilla Parishad and GSDA have developed regional and individual water supply schemes in the region using surface water and groundwater. Piped water is supplied to district villages through these schemes. Municipal corporations are mandated to provide water supply to villages within 5 km of corporation limits. Currently, PMC and PCMC are providing water supply to these villages through tankers. About 45 regional water supply schemes and 700 individual water supply schemes have been developed in the Pune district to cater to the water requirements of the district. Of the 814 villages, only 428 villages are served through water supply schemes by MJP, ZP or GSDA system. The rest of the villages are served through groundwater abstraction from wells or bore wells.

Key Observations

1. The total water available in the region considering 35 water sources as mentioned in Table 7.1, is 142 TMC.
2. Major and medium irrigation projects has a capacity of 98% of the total storage. Minor projects serve locally.
3. Out of the 142 TMC water storage, 38 TMC (27%) is only sanctioned reserved for use of water.
4. Surface water is used for domestic, industrial and irrigation purposes through dams, reservoirs, weirs and canals.
5. Groundwater is monitored by the Ground Water Development Authority and is abstracted via bore wells and dug wells. For rural areas, groundwater plays a major role in providing domestic and irrigation water.
6. It is observed that currently, total water supplied to ULBs is much higher than the estimated demand and the NRW is also high in the range of 30-48%.
7. Water supplied to the rural area is significantly less compared to its estimated demand. Water deficit in rural areas can be covered with suitable reallocations of current water quantity supplied to urban and rural areas and reduced NRWs at ULBs.
8. At the village level, 428 villages are covered through regional and individual piped water supply schemes.

7.2 Sewerage Systems

Sewerage systems are a core element of physical infrastructure that determines the environmental status of any settlement and requires minute planning, development and management.

As per the 74th amendment to the constitution, Maharashtra Municipal Corporations Act and Maharashtra Municipal Councils Act, municipalities are mandated to collect, remove, treat, and dispose of sewage. The MJP was mandated for wastewater treatment in rural areas. However, no such function is currently carried out by MJP.

Villages within PMR currently have inadequate sanitation facilities. The untreated sewage is discharged into the natural sewer or low lying areas or directly into rivers/water streams. Thus, the river pollution level has breached the threshold levels. Poor sanitation facilities in remote areas are posing serious environmental damages due to the discharge of untreated sewage and open defecation to a certain extent. The peri-urban areas around PMC and PCMC limits are seeing increased housing demand. It is mandatory to obtain pre and post-construction environmental clearances as per the Ministry of Environment and Forest guidelines. Many residential/commercial developments are observed wherein decentralized treatment facilities are developed or under development in surrounding areas.

MIDC is solely responsible for water supply, effluent collection and treatment for their industrial estates at Chakan, Ranjangaon, Kurkumbh, Bhigwan, etc. Simultaneously some industrial areas are not developed in demarcated

industrial areas. However, industries have obtained the approvals for establishment and consent to operate from the Maharashtra Pollution Control Board and other authorities. These industries are responsible for developing the effluent treatment facility and maintaining the outlet parameters. There is no institutional framework set up for monitoring the outlet parameters and the efficiency of the plants.

Existing Situation

Sewerage network and sewage treatment plants currently exist in PMC and PCMC, while there is a negligible sewerage network and no sewage treatment plants in PMR. For villages in the Study Area that are not covered under a sewage network, some sewage is discharged into soak pits/septic tanks. In some areas, the sewage is discharged into water bodies or open spaces without any treatment.

Table 7.3: Status of Waste Water Management at ULB level

Location	Wastewater MLD	Collection System	Per-centage Cover (%)	Treatment Capacity (MLD)	Percent-age Treat-ed (%)	Disposal
PMC	898.4	Piped system	98	527	71	Mula-Mutha river
PCMC	431.2	Piped system	83	333	76	
Alandi MC	2.88	Septic tanks		0	0	
Shirur MC	4.3	Underground Sew., Septic tanks	90	6	100	
Lonavala MC	16	Septic tanks		3.6	30	
Rajguru MC	22.4	Septic tanks	64.75	0	0	
Chakan MC	5.6	Septic tanks	0	0	0	
Talegaon	12.4	Septic tanks	0	0	0	
Saswad MC	3.76	Underground Sew., Septic tanks	100	2	40	

Source: ULB officials, DPRs of proposed projects

Wastewater Quantification

Pune Metropolitan Region includes both urban and rural areas. In rural areas, apart from various townships developed in the region, there is no underground sewerage network and sewage treatment plants in the region. Estimated wastewater generated in the region based on 2011 numbers and piped water supply in the Planning Area is presented in Table 7.4.

Table 7.4: Estimated Wastewater Generation

Taluka	Water Supplied (MLD) (based on 55 LPCD)	Wastewater Generated (80% of Water Sup-plied) (MLD)
Bhor	3.75	3
Daund	9.2	7.36
Haveli	23.34	18.67
Khed	16.18	12.94
Mawal	13.59	10.87

Mulshi	9.37	7.49
Purandar	3.07	2.45
Shirur	14.13	11.30
Velhe	1.47	1.17
Total	94.13	75.3

Source: MWRRA notification, Census 2011

Table 7.5 shows the percentage of households in PMR with individual toilets or have access to individual toilets, which contains flush/pour-flush latrines, pit latrines, and percentage of households without any latrine facilities that are dependent upon public toilets or defecate openly.

According to Census 2011, approximately 68.78% of PMR households have individual toilets, and 31.22% of households depend on either public toilets or defecate openly. Even though public/individual toilets are present in the region, there is a lack of sanitation collection, conveyance and treatment facilities. Primary treatment is in the form of septic tanks that exist in the areas. The sullage in rural areas is drained out into open nalas or open drainage systems, which flows beside residential areas and discharge pollutants into the natural courses. There are some villages in the region where open defecation still persists.

Table 7.5: *Number of Households with Latrine Facility - Census 2011*

Taluka	Piped Sewer System	Septic Tank	Other	Total/Percentage Households with Latrine Facility (%)
Bhor	2.49%	37.44%	41.14%	81.07%
Daund	4.59%	32.86%	11.05%	48.50%
Haveli	57.09%	19.55%	5.46%	82.10%
Khed	6.19%	43.64%	20.87%	70.70%
Mawal	9.44%	43.69%	11.20%	64.33%
Mulshi	11.26%	36.12%	21.75%	69.13%
Purandar	8.12%	22.10%	28.64%	58.86%
Shirur	2.47%	39.39%	20.13%	61.99%
Velhe	2.16%	14.39%	40.41%	56.96%
Total	18.92%	33.82%	16.04%	68.78%

Key Observations

1. Total wastewater generated in the region, considering the estimated existing water supply, is approximately 75.3 MLD.
2. The sullage from soak pits, septic tanks and STPs are disposed of into nearby rivers through nalas and gutters.
3. Currently, no provisions exist for reusing treated water even from STPs for irrigation or industrial purposes.
4. With proper treatment at the ULB level, at least 30% of the wastewater can be reused for irrigation and industrial purposes.
5. The rural areas have soak pits, septic tanks and open drains in place for the collection of wastewater. It is necessary to look into treating the sullage generated through septic tanks and open drains.

7.3 Solid Waste Management

Efficacious solid waste management in PMR is crucial due to the scale and quantum of solid waste generated by the rapidly urbanising region. Current challenges in solid waste management range from collection issues, waste segregation and safe disposal. Poor solid waste management has direct implications on the region's environmental health, with a considerable bearing on the standard of living.

Overview of Solid Waste Management in PMR

Different types of waste generated in PMR include municipal solid waste, bio-medical waste, hazardous waste and e-waste. The central government has published rules for the management of each type of waste, namely:
1.   Municipal Solid Waste Management Rules
2.   Bio-Medical Waste Management Rules
3.   E-Waste Management Rules
4.   Hazardous and other waste Rules

Table 7.6 contains details of different agencies in place for bio-medical waste, e-waste and hazardous waste management in PMR.

Table 7.6: Type of Waste and facilities in PMR

Type of waste	Facilities In the region
Biomedical waste	Bio-medical waste incinerator facility provided by M/s Passco (PMC), M/s MIMER Medical College (Talegaon), M/s Yashwantrao Chavan Memorial hospital (PCMC)
E-Waste	Waste generated is recycled and reused in local markets or sent to MMR
Hazardous waste	All hazardous waste generated is collected, transported and disposed of at the Common Hazardous Waste Treatment Storage and Disposal facility at MEPL, Ranjangaon.

Existing Status of Solid Waste Management - ULB level

As per Municipal Solid Waste Management Rules, municipal corporations and municipal councils are responsible for the collection, transportation, treatment and disposal of municipal waste. These provisions are aligned with the functions of municipal corporations and councils as stipulated under 74th and 73rd amendment to the Constitution and Municipal Corporations and Councils Act. However, there is no authorised agency for managing the waste generated in rural areas.

In urban areas, the waste is generally dumped outside houses or at a common collection site. It is left for municipal authorities to transport it to a common dumping ground. Despite having a door-to-door waste collection system in some areas, garbage dumps are mostly seen in depression or open grounds, creating a severe hazard for health and sanitation. Table 7.7 summarises the status of solid waste management at the ULB level.

Table 7.7: Status of Solid Waste Management - ULB Level (2015)

Location	Waste generated (Ton / Day)	Waste Collected (%)	Waste Treated (%)	Current Treatment Facility	Dumping site	Current proposals
Pune	1,678	100%	51	Composting, Vermicomposting Biomethanation, Waste to Energy plant	Fursungi, Devachi Uruli, Hadapsar, Ramtekadi, Aundh	Waste to energy plant, Waste incinerators, E-waste Recycling centers, New Landfill
Pimpri-Chinchwad	800	91%	94	Composting, Vermicomposting Plastics to Fuel, SLF	Moshi-Treatment and disposal	Waste to Energy, Hotel Waste to Biogas, Sanitary Landfill Site

Alandi	18	83%	NA	No Treatment	Gut No.193	NA
Shirur	11	NA	0	No Treatment	Nagpur-Pune Road Municipal dumping site	Segregation at source, E-waste Management Facilities, Centralized Windrow Composting Facility, MRF
Lonavala	NA	NA	NA	Composting	Warsoli Kachra depot	NA
Rajgurunagar	23	NA	0	No Treatment	Kharabwadi Quarry Landfill	Centralized composting and Material Recovery Facility
Chakan	20	NA	0	No Treatment	Kharabwadi stone fill –Rache alandi road	NA
Talegaon	25	95%	0	No treatment, Partial Material Recovery by Kabadiwalas	221	Segregation at Source, Construction of Sanitary Landfill, Compost Depot
Saswad	12	100%	NA	Composting	Kumbharwalan	NA
Pune CB	30	100%	34	Vermicomposting	Hadapsar	NA
Dehu CB	8	NA	50	Composting	Nigdi	NA
Kirkee CB	32	NA	31	Composting, Vermicompost	Kasarwadi	NA

Source: Consultations with ULBs, MPCB Swachh Bharat Mission Implementation Status report, 2017

Figure 7.2: *Solid Waste Quantity at ULB Level*

Source: Consultation with ULB's, MPCB, Swachh Bharat Mission Implementation Study Report' 2017

Most dumping sites in the region are not lined to protect groundwater from leachate percolating into it. Most of the population disposes of waste in the open space, rivers and water bodies, etc. Figure 7.2. shows locations of landfill sites and dumping sites at ULB level.

Existing Status of Solid Waste Management in Rural Area

PMRDA has published the Draft Development Control Promotion and Regulation Rules (DCPR), Part VIII-Special Provision in certain Buildings. Regulation 34 provides guidelines for the development of buildings and townships in the region. According to these rules, the provisions for solid waste management in the region are as following:
1. All housing complexes, commercial establishments, hostels, hospitals with aggregate built-up area more than 4,000 sqm or more; and all three-star or higher category hotels to have a dedicated solid waste management system to treat 100% wet waste and home-compostable plastic being generated in the building.
2. Wet waste treatment shall be done through organic waste composters/vermicomposting pits or other similar technologies of suitable capacity installed through reputed vendors.
3. The disposal of dry waste, e-waste and hazardous waste shall be carried out through authorized recyclers or any other system specified by the Metropolitan Commissioner.

While the DCPR stipulates waste management rules, there is no agency in place for the collection, transportation, treatment and disposal of waste.

According to the Central Pollution Control Boad Data, the standard waste generated is 0.3-04 kg per capita per day. Considering this norm, the total waste generated in rural areas is 513.39 tons per day. Table 7.8 provides further details on total waste generated in the PMR Planning/Study Area.

Figure 7.3*: Location of Landfills and Dumping Sites*

Table 7.8: Estimated Waste Generation in PMR Study Area

Taluka	Population (2011)	Estimated Waste Generated (Tons) (0.3 kg/ person/day)
Bhor	68,320	20.49
Daund	1,67,351	50.2
Haveli	4,24,428	127.32
Khed	2,94,213	88.26
Mawal	2,47,123	74.13
Mulshi	1,70,366	51.1
Purandar	55,902	16.77
Shirur	2,56,923	77.07
Velhe	26,866	8.05
Total	17,11,492	513.39

Source: Central Pollution Control Board

Key Observations

Presently a number of deficiencies exist in solid waste management systems in PMR:

1. Both urban and rural areas in PMR face several challenges in solid waste management. While at the ULB level, municipal corporations and councils undertake the collection and transportation of waste, there are still gaps in storage facilities, treatment and disposal of waste. In smaller municipal councils, the waste collected is directly dumped at an identified site without any treatment. Most of these municipal councils have prepared DPRs for solid waste management, which proposes developing facilities for the treatment of waste. However, the implementation is still pending. In addition, there is no proposal in place for the development of scientific landfill sites.
2. Due to land shortage, some portion of municipal solid waste is dumped in areas outside municipal jurisdiction.
3. There is a lack of solid waste management systems in rural areas of PMR. The institutional capacity of Gram Panchayats is inadequate to manage a solid waste management system.
4. Some landfill sites are located in environmentally sensitive areas/near watercourses (e.g. Varsoli dumping site located on the north of Indrayani river).
5. No allocated land for waste disposal: There is no land earmarked for solid waste disposal in most of the region, neither as a landfill site nor for disposal through other techniques.
6. Household-generated hazardous waste such as medicines; batteries do not get recycled or addressed.

7.4 Stormwater Management

The carrying capacity of the natural drainage network within the western and eastern zones has been affected due to substantial land-use conversion. For instance, vegetated – vacant, agriculture- non-agriculture, and in some cases to industrial use. Such land-use change results in higher runoffs. In the middle urban zone, runoff is higher, and the natural drainage network is constrained due to encroachments or lack of maintenance. Sometimes flooding has also resulted from inadequate urban drainage infrastructure and bottlenecks (i.e. due to utilities, choking from indiscriminate dumping of solid waste or debris, and construction of illegal structures) of the drainage system. All this makes PMR susceptible to flooding.

7.5 Fire Services

Fire services play a pivotal role in protecting people from fire hazards, road accidents, building collapses and other unforeseen emergencies. Fire is categorized as a disaster. It can spread over a large area in no time and cause great damage to life and property. PMR presently has four fire stations: three operated by PMRDA at Nanded City (Nanded Gaon), Marunji, Wagholi and MIDC owned fire station at Karegaon.

Table 7.9: Fire Station Requirement for Current PMR Population

Taluka	Population (2018E)	Fire Station
Bhor	89,684	0
Daund	205,613	0
Haveli	659,317	2
Khed	407,129	0
Maval	457,956	0
Mulshi	362,355	1
Purandar	73,191	0
Shirur	345,396	1
Velhe	27,971	0
Total	2,628,611	4

Figure 7.4: Provision of Fire Stations in PMR

Source: Fire Department, PMRDA; GIS Database

Chapter 8: Tourism

This chapter provides an overview of the status and scope of tourism developments in PMR. It establishes PMR's standing in terms of its shares of tourist arrivals vis-a-vis the state and Mumbai. Maharashtra Tourism Development Corporation's mandate and policies defining tourism sector growth are discussed. PMR's tourism assets and accommodation scenario is discussed to understand which part of the PMR is more promising for tourism development. The chapter concludes with key issues that need to be addressed through a tourism strategy at the PMR level.

8.1 Background

Oxford of the East, Queen of the Deccan, the cultural capital of Maharashtra are world views of Pune. The region carries these titles gracefully owing to the presence of higher education and R&D institutions, natural beauty endowed by the Western Ghats and river plains, numerous religious, heritage and historical places and year-round cultural events. Tourists visit Pune from all over the world, among which regional and national tourists have a higher share contributing to the growth of Pune's tourism sector.

Right at the onset of devising a tourism strategy, it needs to be understood that while most tourism assets of Pune are located in the PMR, the productivity of the tourism sector is low. Focus on tourism sector analysis is to surface key issues that impede its growth and identify strategies to make it work.

Maharashtra level figures indicate that despite having splendid natural assets, Pune is unable to attract a substantial number of foreign tourists arriving at Mumbai or domestic tourists, who prefer to travel more towards relatively lesser developed places like Aurangabad and Ahmednagar. PMR has a proximity advantage to Mumbai, which can be leveraged by creating a global level tourist destination to attract foreign tourists. Domestic tourist arrivals can be strengthened through stronger branding and creating key tourism getaways by consolidating the known tourist places.

8.2 Key Agencies and Their Roles

Maharashtra Tourism Development Corporation (MTDC)

Maharashtra Tourism Development Corporation (MTDC) has been established under the Companies Act 1956, wholly owned by the Government of Maharashtra, to systematically develop tourism in commercial lines. MTDC is entrusted with functions of all commercial and promotional tourism activities. Since its inception, the agency has been involved in developing and maintaining various tourist locations in Maharashtra and owns and maintains resorts at all key tourist centres across Maharashtra.

Archeological Survey of India (ASI)

Archaeological Survey of India (ASI) is a national statutory agency for heritage. It maintains the register of national monuments, conducts archaeological explorations and excavations. It is entrusted with the maintenance, conservation and preservation of national monuments, archaeological sites and remains.

Pune Municipal Corporation - Heritage Cell

PMC is the statutory urban local agency for heritage in Pune city. PMC coordinates with ASI regarding renovation or redevelopment applications within the prohibited and regulated areas surrounding the listed structures. Heritage sites and structures identified by the Heritage Cell of the city are monitored through heritage regulations prepared by PMC.

8.3 Policy framework

Regional Plan 1997

Regional Plan 1997 planned for tourism activities to cater to increasing demand from tourists for tourism amenities, encourage tourism growth and provide for it on a planned basis to ensure that unplanned sprawls do not disfigure or unregulated activities do not spoil the environment. Understanding the tourist attraction potential and possibility of development on the lines of Lake District in England, strategies were proposed for the development and promotion of tourism facilities mainly along lakes.

The area between 100-500 metre belt from FSL/HFL lines of lakes was considered special tourism development zones for active and passive tourism activities, around lakes in Mawal, Mulshi, Bhor, Velhe, Khed and Haveli talukas. The plan proposed no development within 100m from the edge of the water at HFL, except for the boathouse, jetty, etc. Farmhouses are not permitted within 200 m from HFL of major irrigation projects, and where they are in the vicinity of lakes, they should not be allowed without ensuring that sullage and garbage disposal will not pollute lake waters. However, for the development in the tourism development zone within the 500 m belt around lakes, FSI should be 0.10 with ground floor structures only with height restricted to 5 m. If a project by local residents is in the form of an extension of his existing building, the total FSI allowed, including the existing built-up area, should not exceed 0.15. The maximum area of a plot for tourist resort development should be 2 acres in which ground and first-floor construction with a maximum height of 9m should be permitted.

Afforestation zoning within the 500 m to 1500 m belt around lakes was proposed, with a possibility for low-density development, similar to forest house type development. This low-density development was suggested by the Pune Regional Planning Board, with only ground floor structure may be considered on a plot with a minimum area of 1 ha, instead of 6 ha suggested in draft rules. Another RP proposal was to consider lands falling beyond 200m from boundaries of protected monuments and archaeological features, including forts and temples and extending up to 1.5 km as a Tourism Development Zone. Low-density development was also proposed in all hilly areas with high good forest cover and a belt of lands lying between 500 m to 1500 m from HFLs of major lakes.

Region Plan 1997 recommended the following projects as part of the tourism proposal:
1. Infrastructure development: development of a civic airport, road access to lakes and tourist spots, provision of bus services to tourist spots
2. Projects enhancing tourist attraction: International Industrial Exhibition at Pune, light and sound show at Sinhgad and Parvati, arts and crafts village at Katraj, Regional Park/Wildlife sanctuary near Katraj and Panchgaon Kuran, Riverfront development on banks of Mula-Mutha River, Ropeway projects
3. Religious importance: project for all-round development of Dehu-Alandi, provision for Yatri Niwas and water supply facilities
4. Nature-based tourism: development of bird sanctuary and bird watching facilities along specified lakes, rivers and forest areas
5. Development of viewpoints over hilltops near Lonavala
6. Institutions for imparting training in mountaineering should be promoted at appropriate locations within the Tourism Development Zone
7. Development of Natural History Museum at appropriate locations in Tourism Development Zone, residential zones in Lonavala Wadgaon belt/forest parks developed by the forest department
8. Eco-conservation: increase tree cover, slopes above 30 degrees need to be taken for afforestation, slopes between 15-30 degrees suitable for horticulture, slopes over 10 degrees not suitable for terracing and environmental awareness

Maharashtra Tourism Policy 2016

PMR's tourism proposal is aligned with Maharashtra's Tourism Policy 2016, and the highlights of this policy are presented below.

As per the Maharashtra Tourism Policy 2016, it is expected to generate fresh investments in the tourism sector to the tune of INR 30,000 crore and create 1 million additional jobs in the sector by 2025. It focuses on promoting private investments and accelerating the implementation of projects through public-private partnership models. Maharashtra Tourism Development Corporation, the nodal agency for promoting tourism in the state, is steering Maharashtra's ambitious plans and programs to attract a large number of tourists to the state. MTDC is driven by the Tourism policy 2016.

Out of the 11 high priority projects that MTDC is keen to undertake on PPP/JV mode, none are planned specifically for PMR. The special tourism districts identified under the policy are Sindhudurg, Aurangabad and Nagpur, and it does not include Pune district as a special tourist destination/district. Nonetheless, while proposing the tourism plan for PMR, the tourism themes identified within the policy are required to be abided by. The themes identified in the policy are: sustainable tourism, rural tourism, caravan tourism, MICE, film tourism, theme based tourism, religious tourism, heritage tourism, beach tourism, cruise tourism, culinary tourism (events and festivals), nature tourism, tiger eco-tourism, education tourism (exchange programs and excursions), hill station tourism, adventure tourism, tourism festivals part of Visit Maharashtra 2017, medical tourism.

The policy's implementation plan includes setting up institutional arrangements, single-window clearance for hospitality and live events, investor facilitation cell, PPP transaction advisory cell, promotion and marketing, tourism police and smart ticketing system.

The policy provides fiscal incentives for mega projects based on fixed capital investment and direct employment generated. Fiscal incentives are given to large projects and MSME units too. The incentives are given over the eligibility period, tax exemptions, electricity concession, stamp duty and registration charges exemption, FSI, licenses and clearance. Special incentives are proposed for key strategic interventions.

Pune District Tourism Plan

District tourism plans are formulated based on types of tourism activity and state tourism policy. Pune district's current tourism plan is prepared for a period of twenty years from 2012 to 2032. It identified 59 principal tourism assets in Pune district, out of which half are located within PMR. In 2012, Pune saw a footfall of about 10% (1.5 crore) of total domestic tourists that visited Maharashtra and about 10% (1.7 lakh) of foreign tourists arriving in Mumbai. District plan has assumed an annual CAGR of 9-10% to project tourist arrivals for the next 20 years. Accordingly, the district plan estimated domestic tourists in Pune at 2.35 crore, 3.69 crore, and 9.10 crore in 2017, 2022 and 2032. Foreign tourists are estimated at 2.59 lakh, 3.94 lakh, 9.12 lakh in 2017, 2022 and 2032.

In terms of focus areas of tourism development, three broad tourism themes are identified for domestic tourists: religious, cultural and heritage tourism; leisure and recreational tourism; monsoon tourism.

Similarly, seven broad tourism themes are identified for foreign tourists: eco-tourism; wildlife tourism; cultural tourism; health tourism; heritage tourism; adventure tourism; fairs and festivals. Further, thematic circuits aimed at extending tourist stays are identified and thereby contributing to the local economy: pilgrim circuit; fort and heritage circuit; nature tourism circuit; leisure and adventure tourism circuit; educational tour circuit.

In order to strengthen the circuits, road improvements are proposed that includes: Pabal to Malthan road (37 km); Pirangut to Tamhini Ghat (50 km); Shirur to Ghod dam (28 km); Inamgaon to Ranjangaon (7 km); Paud to Morve village (44 km); Panshet to Sinhagad (40 km); Nasrapur to Baneshwar (10 km); access road to Purandar fort (4 km); Kalewadi to Malhargad (5 km).

Figure 8.1: Existing Tourism Assets in Pune District

Source: Pune District Tourism Plan 2012-2032.

8.4 Existing Tourism Assets

Heritage

Heritage is buildings, artefacts, structures, areas and precincts of historical importance, architectural or cultural significance, and includes natural features within such areas or precincts of environmental significance or scenic beauty such as sacred groves, hills, hillocks, water bodies (and the areas adjoining the same), open areas, wooded areas, etc.

Need for Conservation

Heritage conservation is important for identifying, recording, analyzing and protecting heritage and cultural resources. Conservation of heritage buildings is critical because it provides a sense of identity and continuity in a fast-changing world for future generations.

Heritage conservation is a contemporary activity with far-reaching effects. It can be an element of far-sighted urban and regional planning. It can be the platform for political recognition, a medium for intercultural dialogue, a means of ethical reflection, and the potential basis for local economic development by supporting the tourism industry.

Heritage in PMR

There are 117 monuments protected by the Archeological Survey of India (ASI) in Mumbai Circle as monuments of national importance. Out of 20 monuments in Pune District, 7 monuments have been identified, listed and protected within the PMR (Refer Table 8.1).

Maharashtra State Archeological Department Pune has listed 19 monuments in Pune district out of that 6 are present in PMR. The PMR region has 13 protected monuments as per the information received from ASI and Maharashtra State Archaeological Department. Mawal taluka has the highest number of protected monuments

(5), followed by Khed (3) and Haveli taluka (1). Besides these 3 talukas, no other taluka in PMR has any monuments listed.

Table 8.1: *ASI protected monuments of national importance in PMR*

No	Name	Taluka
1	Lohgad Fort	Khed
2	Visapur Fort	Khed
3	Cave Temple and inscriptions, Bedse	Mawal
4	Cave Temple and inscriptions, Bhaja	Mawal
5	Cave Temple and inscriptions, Karla	Mawal
6	Ancient Dam with lock and sluice gates	Mawal
7	Dilawar Khan's Masjid	Mawal

Source: ASI Department, Pune Sub-Circle

Table 8.2: *Maharashtra State Archeological Department protected monuments in PMR*

No	Name	Taluka	Village	Area (ha)
1	Chhatrapati Sambhaji Maharaj Samadhi	Khed	Vadhu Bk	0.4
2	Sinhagad Fort	Khed	Ghera Sinhagad	26.87
3	Mastani Kabar	Mawal	Pabal	0.09
4	Mahadev Mandir	Mawal	Tulapur	0.76
5	Korigad Fort	Mawal	Ambawane	41.54
6	Sant Santaji Jagnade Maharaj Samadhi	Mawal	Sudumbare	2.18

Source: Maharashtra State Archeological Department, Pune

Natural Assets

PMR has many scenic destinations in both the categories, man-made and natural amongst the magnificent settings Western Ghats. Pawana lake, that is the backwaters formed due to Pawana dam is one of the most visited sites. Temghar dam, Vadivali Lake,Walwan dam are another set of scenic assets. Waterfalls of Kataldhaar, Malawali, Thoseghar, Shivali, Tamhini, Malshej ghat, Dudhiware, Madhe ghat and many such attractions, during the rainy season form part of the natural assets of PMR. Hill stations, Khandala and Lonavala are famous tourist attractions.

8.5 PMR Tourism Statistics

Top destination for domestic tourists

A field survey was conducted for a period of 12 months from July 2014 to June 2015 in all districts of the state by MTDC to gather information related to tourism statistics. Following are the top 15 tourist destinations covered by domestic tourists in PMR (Table 8.3) and PMR Planning Area (Table 8.4).

Table 8.3: Domestic visits and infrastructure status of major tourism destination in PMR

Taluka	Classification	Name	No of do-mestic visits	% share of total domestic visits in PMR	Infrastructure status*
Pune City	Multiple	Pune city	15,35,128	19.1%	NA
Pune City	Heritage, Fort	Shaniwar Wada	8,89,204	11.1%	Good
Mawal	Hill station	Lonavala	7,27,503	9.1%	Good
Mawal	Hill station	Khandala	5,06,962	6.3%	Good
Mawal	Heritage, Fort	Lohagad	4,99,690	6.2%	Good
Shirur	Religious	Ranjangaon	3,32,019	4.1%	Very Good
Haveli	Religious	Dehu	3,17,094	4.0%	Good
Pune City	Heritage, Fort	Chattri	2,69,121	3.4%	Good
Haveli	Waterbody	Khadakwasla dam	2,65,250	3.3%	NA
Pune City	Heritage, Fort	Pataleshwar	2,42,204	3.0%	Good
Purandar	Heritage, Fort	Purandar fort	2,25,247	2.8%	Average
Mawal	Heritage, Fort	Karla caves	2,01,271	2.5%	Average
Haveli	Others	Katraj garden	1,92,893	2.4%	Very Good
Haveli	Religious	Chintamani Temple, Theur	1,49,978	1.9%	Good
Pune city	Heritage, Fort	Aga Khan Palace	1,42,628	1.8%	Very Good

Souce: Pune District Tourism Plan and Report on Tourism Survey for the State of Maharashtra April 2014 to March 2015

Table 8.4: Domestic visits and infrastructure status of major tourism destination in PMR Planning Area

Taluka	Classification	Name	No of do-mestic visits	% share of total domestic visits in Planning Area	Infrastructure status*
Mawal	Heritage, Fort	Lohagad	4,99,690	17.3	Good
Shirur	Religious	Ranjangaon	3,32,019	11.5	Very good
Haveli	Religious	Dehu, samadhi of tukaram	3,17,094	11.0	Good
Haveli	Waterbody	Khadakwasla dam	2,65,250	9.2	NA
Purandar	Heritage, Fort	Purandar fort	2,25,247	7.8	Average
Mawal	Heritage, Fort	Karla caves	2,01,271	7.0	Average
Haveli	Religious	Chintamani temple, Theur	1,49,978	5.2	Good
Haveli	Heritage, Fort	Sinhagad fort	1,39,065	4.8	Good

Mawal	Waterbody	Bhushi dam	1,06,141	3.7	Average
Mawal	Adventure	Hot air balloon Kamshet	1,00,971	3.5	NA
Velhe	Waterbody	Panshet dam	76,207	2.6	Average
Mawal	Heritage, Fort	Rajmachi	75,407	2.6	Average
Mulshi	Waterbody	Mulshi dam	66,148	2.3	Average
Mawal	Heritage, Fort	Tung fort	58,384	2.0	Average
Mawal	Heritage, Fort	Korigad fort	56,812	2.0	Average

Souce: Pune District Tourism Plan and Report on Tourism Survey for the State of Maharashtra April 2014 to March 2015

Top 15 tourist places cover 81% of all visits by domestic tourists. The major tourist attractions are heritage and forts, followed by religious places and hill stations. Pune city taluka attracts the highest number of domestic tourist visits in PMR. Pune city taluka followed by Mawal and Haveli talukas have the most number of tourist places amongst 15 top most tourist spots in PMR.

The top 15 tourist places cover 92.5% of all visits by domestic tourists in the PMR Planning Area. Further, these top 15 tourist places cover 33.3% of all visits by domestic tourists in PMR. The major tourist attractions are heritage and forts, followed by water bodies and religious sites. Mawal taluka attracts the highest number of domestic tourist visits in the PMR Planning Area. Mawal taluka, followed by Haveli taluka has the most tourist places amongst the top 15 tourist spots in the PMR Planning Area.

Also, it can be noticed that there is a strong relationship between tourism spots with infrastructure available at those locations. All the top 15 spots have more or less a good infrastructure system in place which helps them attract a larger tourism base than other places in PMR.

Top foreign tourism destination

Following are the top 15 tourist destinations covered by foreign tourists in PMR (Table 8.5) and PMR Planning Area (Table 8.6).

Table 8.5: Foreign visits and infrastructure status of major tourism destination in PMR

Taluka	Classification	Name	Number offoreign visits	% share of total foreign visits in PMR	Infrastructure status
Mawal	Hill station	Lonavala	65,026	24.5%	Good
Mawal	Hill station	Khandala	47,338	17.8%	Good
Haveli	Waterbody	Khadakwasla dam	40,399	15.2%	NA
Pune City	Heritage, Fort	Chattri	20,372	7.7%	Good
Pune City	Heritage, Fort	Pune City	19,083	7.2%	NA
Haveli	Religious	Dehu	17,178	6.5%	Good
Haveli	Heritage, Fort	Sinhagad fort	12,180	4.6%	Good
Pune City	Heritage, Fort	Kelar museum	10,694	4.0%	Good
Pune City	Heritage, Fort	Aga Khan	9,285	3.5%	Very good
Pune City	Heritage, Fort	Shaniwarwada	7,719	2.9%	Good
Velhe	Waterbody	Panchet dam	4,756	1.8%	Average
Purandar	Heritage, Fort	Purandar fort	2,058	0.8%	Average

Mawal	Heritage, Fort	Karla caves	1,628	0.6%	Average
Pune City	Adventure	Paragliding Hadapsar	1,413	0.5%	NA
Khed	Religious	Alandi	1,227	0.5%	Good

The above top 15 tourist places cover 98.1% of all foreign tourist visits. The major tourist attractions are heritage and forts, followed by religious sites and hill stations.

Lonavala and Khandala attract the highest number of visits by foreigners with a 42.4% share. Pune city taluka has the most number of tourist places amongst 15 topmost tourist spots.

Here also, a strong relationship is noticed between tourism spots and availability of infrastructure. All these top spots have more or less a good infrastructure system in place, which helps them attract a larger tourism base.

Table 8.6: Foreign visits and infrastructure status of major tourism destination in PMR Planning Area

Taluka	Classification	Name	No of Foreign visits	% share of total foreign visits in Planning Area	Infrastructure status
Haveli	Waterbody	Khadakwasla dam	40,399	49.4	NA
Haveli	Religious	Dehu, samadhi of Tukaram maharaj	17,178	21.0	Good
Haveli	Heritage, Fort	Sinhagad fort	12,180	14.9	Good
Velhe	Waterbody	Panshet dam	4,756	5.8	Average
Purandar	Heritage, Fort	Purandar fort	2,058	2.5	Average
Mawal	Heritage, Fort	Karla caves	1,628	2.0	Average
Shirur	Religious	Ranjangaon	1,142	1.4	Very good
Mawal	Heritage, Fort	Bhaja cave	779	1.0	Poor
Mawal	Waterbody	Bhushi dam	643	0.8	Average
Mawal	Adventure	Hot air balloon Kamshet	413	0.5	NA
Mawal	Heritage, Fort	Bedse cave	261	0.3	Average
Haveli	Religious	Chintamani temple, Theur	220	0.3	Good
Mawal	Heritage, Fort	Tung	220	0.3	Avg

Accommodation Scenario in PMR

Accommodation facilities play a vital role in enhancing the tourism base of any area. Based on the ELU database, a total of 3,788 facilities are available for tourists in PMR. Two MTDC resorts are located in Karla and Panshet. Mawal and Mulshi talukas being major tourism hubs have the most number of hotels and restaurants available accounting for 37.22% of total available hotels and restaurants in PMR. Haveli taluka being a centre for educational and commercial importance has 15.65% of total available hotels and restaurants.

Duration of stay

Based on a tourism survey conducted for the State of Maharashtra from April 2014 to March 2015, domestic tourist's average stay duration ranges between 1.1 to 1.18, whereas the same ranges between 1.1 to 1.16 for foreign tourists depending upon the month of travel. Thus both domestic and foreign tourists spend an average 1 or 2 nights in any location in Pune district. The Month of July has the highest duration of stay for domestic tourists. This trend can be explained by the fact that this is a monsoon duration. The month of October and November has the highest stay for foreign tourists. This trend can be explained by the fact that these are the most favourable weather conditions and see the highest foreign tourist inflow.

8.6 Tourism Analysis

PMR has not been able to take advantage of its tourism assets and foreign tourist arrivals from Mumbai. Its key factors are listed below:

- Lack of infrastructure, tourist facilities and maintenance of tourist spots.
- Lack of branding and marketing of tourism products.
- Standalone tourism projects and piecemeal improvements fail to create impactful tourism destination development.
- Existing natural resources such as large lakes, riverfronts, forests, wildlife sanctuary, hill stations remain unexplored for tourism development.

Tourists are mainly hurdled around the already well-known tourist locations, leaving the other less popular but rich in culture and heritage destinations unexplored. This happens firstly because tourists visit the district only for a short duration, secondly, due to a lack of necessary basic infrastructure at these tourist destinations, and thirdly, due to lack of relevant information required to attract the tourists.

Tourism in Pune district has been mainly focused on religious, heritage and monsoon tourism. The upcoming unique themes of tourism like adventure, wine, agro, medical have not been fully explored.

Thus, there is a need to plan for a consolidated tourism activity that focuses on upgrading and strengthening existing tourist sites and travel circuits. It is imperative to identify new potential tourist sites and circuits that can help boost the district's tourism potential and stimulate future growth.

Chapter 9:
Urbanisation Potential Assessment

As per Census 2011 definition, 91% of PMR was residing in rural areas as of 2011. However, the existing land-use survey carried out by PMRDA in 2017-18 revealed that many rural villages have been subsumed by urban sprawl. Considering this, urbanisation potential assessment parameters have been broadened to better represent PMR's actual urban-rural composition.

Assessment of 814 villages was systematically carried out based on 13 parameters. Each village was tested against these parameters using PMRDA's GIS platform. Each parameter has a specific score attributed to it and subsequently 'Urbanisation Potential Assessment Matrix' was developed to provide a snapshot of village-wise performance, for each parameter. These villages are classified into 'Urban Growth Centres' (Urban Areas) and 'Rural Areas' based on the scoring. Such assessment and classification are necessary to categorically address developmental needs of urbanising villages vis-a-vis villages of rural nature. The mapping process and rationale for selecting these parameters, analysis and inferences are explained in the chapter.

9.1 Mapping Process

PMR includes ten talukas out of which four talukas are fully covered whereas six talukas are partly covered in the Study Area. This created limitations in data sourcing since most of the district level government agencies maintain their data at taluka level and village wise break up of data is not readily available with these authorities. To overcome this limitation, village-wise statistical data is collected from various government agencies and then linked to village boundaries using GIS. This mapping process is elaborated below:

Village-wise datasets used for mapping/analysis:
1. ELU database that included, among other things, existing land use information, administrative boundaries and RP 1997 zoning
2. Census data of 2001 and 2011
3. Education and health departments of Zilla Parishad Pune provided the following datasets:
    a. Primary and secondary schools
    b. Primary and secondary health centres
4. Transport related data referred from Comprehensive Mobility Plan, CTTS and ELU
    a. Traffic volumes by transport corridors
5. Mass transport routes and estimated ridership
6. Existing Land Use (building footprint) data and its disposition in each village
    a. Land Use types such as residential, industrial, commercial
7. Village-wise water consumption tabulated in consultation with various government agencies responsible for the supply of water
8. Locations of existing and proposed electric transmission substations
9. Pan PMR level projects and networks obtained from Master Plans of respective government agencies and used for location-specific criteria of analysis
10. Road improvement/new roads:
    a. Development Plan 2021 (PWD)
    b. Outer Ring Road (MSRDC) alignment and cross-section
11. Rail improvement/new rail routes:
    a. DPRs of quadrupling of Lonavala-Pune and tripling of Daund-Pune line
12. Chhatrapati Sambhaji Raje International Airport forecasts for passenger and cargo volumes by 2035 (MADC)
13. Annual Statement Rates (Ready Reckoner) for lands obtained from IGR web portal
14. Population and employment projections for the year 2018 for analysis purpose

Step 1. Data Collection:

Datasets are collected from various authorities, as mentioned earlier.

Step 2. Data Attribution/Linking:

Village wise data sets mentioned earlier are attributed/linked to respective village boundaries, using village codes, on the GIS platform. Village codes provided in the Census data are assigned to individual village boundaries to facilitate GIS processes since more than one villages bear the same name in some cases.

9.15 Urbanisation Potential Assessment

Considering the vastness of PMR, it is imperative to strategically prioritise development planning and investment efforts on certain villages where urban development pressure is already high or anticipated in the near future. Prioritisation needs to be based on specific parameters such as past demographic growth, availability of essential utilities and amenities, accessibility, etc. Therefore, 13 such parameters are identified to facilitate the prioritisation of urbanised and urbanising villages, to form part of a Growth Centre, for which a Development Plan needs to be prepared. Each village is assessed using these parameters, and a cumulative score is enumerated for each village determining its potential. Table 9.1 represents a snapshot of 814 villages and their performance against 13 parameters. These parameters are grouped into Primary and Secondary Parameters, and further details are described below:

Figure 9.1: *Urbanisation Potential Assessment- Process*

No scoring means village considered as Urban if it satisfies Parameter 1,2,3.

Table 9.1: Urbanisation Potential Assessment Matrix (Sample)

No	CODE	Revenue_Name	Regional Projects (1)	Census Urban/Rural (2)	RP Buildable Landuses (3)	Proximity to Employment Nodes (4)	Access by Road (5)	Access by Mass Transport (6)	Population Growth Rate 2001-11 (7)	Non Agricultural Workforce (8)	Availability of Sec. Schools (9)	Availability of Colleges (10)	Water Supply (11)	Availability if Electric Sub Station (12)	Availability of Health Facilities (13)	Scores_4 to 8	Scores4 to 13
6	556037	Adhe kh.		R		1	1	0	0	0	0	0	0	0	0	2	-
8	556254	Agalambe		R	RP	1	0	1	0	0	0	1	1	0	0	2	-
10	555937	Ahirvade	RS	R	RP	0	0	0	1	1	0	0	0	0	0	2	-
14	556029	Akurdi	RR	R	RP	1	1	0	0	1	0	0	0	0	0	3	3
15	555852	Alandi	RR	U	RP	1	1	1	1	1	1	0	0	0	1	5	7
20	555877	Ambale		R		1	1	0	1	0	0	0	0	0	0	3	3
21	556136	Ambarwet		R	RP	1	1	1	0	0	0	0	1	0	1	3	4
26	556163	Ambegaon		R		1	0	1	0	0	0	0	1	0	0	2	-
30	556028	Ambi	RR	R	RP	1	1	0	1	0	0	1	0	0	0	3	4
32	555576	Amdabad		R		1	1	0	0	0	1	0	0	0	0	2	-
37	555658	Andhalgaon		R		0	1	0	1	0	0	0	0	0	0	2	-
38	555980	Apati		R		0	0	0	1	1	0	0	0	0	1	2	-
43	556280	Arvi		R		1	0	1	0	0	1	0	0	0	0	2	-
51	555975	Aundhe kh.		R		0	1	0	0	1	1	0	0	0	0	2	-
770	556390	Varwand	RS	R		0	1	1	0	0	1	1	1	0	1	2	-
777	556674	Velu		R	RP	1	1	1	0	0	0	1	0	0	0	3	4
781	556204	Vitthal Nagar		U	RP	1	1	1	1	1	0	0	0	0	0	5	5
783	556150	Vitthalwadi		R		1	0	1	0	0	0	0	0	0	0	2	-
785	556220	Wade Bolhai		R		0	1	1	0	0	1	1	0	0	1	2	-
786	556212	Wadhu Kh.		R	RP	1	0	1	1	0	0	0	0	1	0	3	4
789	556327	Wagholi	RR,TPS,TS	U	RP	1	1	1	1	1	1	1	1	0	1	5	8
792	555630	Wajewadi		R		1	1	1	0	0	0	0	0	0	1	3	4
794	556365	Wakhari		R		0	1	0	1	0	0	0	0	0	0	2	-
796	555837	Waki Kh.		R	RP	1	1	1	1	1	1	1	0	0	1	5	8
798	555946	Waksai		R	RP	0	1	0	1	1	0	1	0	0	1	3	5
806	555822	Warale		R		1	1	0	0	0	0	0	0	0	1	2	-
809	555824	Wasuli		R	RP	1	1	0	0	0	0	0	0	1	0	2	-
812	556353	Yawat Station	RS	R		0	1	1	0	0	0	0	0	1	0	2	-
815	555828	Yevalewadi		R		1	1	1	0	0	0	0	0	0	1	3	4

Primary Parameters

Primary parameters identify villages which can be considered as 'urban' or 'potential urban'.

1. Census Definition of Urban/Census Town

Villages are categorised as 'urban' based on Census definition, i.e. a minimum population of 5,000, at least 75 percent of the male working population engaged in non-agricultural pursuits and a population density of at least 400 persons per sq km.

2. Proposed/Approved Regional Projects

Proposed/approved regional projects such as PMRDA Ring Road, Railway up-gradation, MIDC's future expansion, TP Schemes and Townships are likely to trigger future urbanisation.

Recognising this, villages are categorised as 'potential urban', in case such projects are situated in the village or passing through it.

3.   Zoning within Sanctioned RP Planning Areas

Zoning plans of erstwhile Growth Centres of RP 1997 have been sanctioned, and it has been used as a basis while granting the development permissions. Therefore, a village is deemed 'potential urban' (to be included in Urban Growth Centres), if it was part of RP Planning Areas and zoning such as residential/industrial was proposed over there.

Two hundred ten (210) villages satisfying either of parameters 1, 2, 3 are selected for inclusion in Urban Growth Centres.

Remaining villages are tested against parameter 4-8 as explained further.

4.   Proximity to Major Employment Nodes

Villages situated within 7 km from existing major employment nodes such as MIDC estates, industrial clusters, IT Parks, and road access are considered 'potential urban'. 7 km refers to average trip length for work in PMR, as per CMP study.

5.   Accessibility by road

As per CMP GIS data, most of the villages are accessed by roads with maximum 1 or 2 lanes. A village is considered 'potential urban' if it has better accessibility, i.e. more than two lanes (>7 m).

6.   Accessibility by Mass Transport

Lack of adequate penetration of mass transport is one of the critical problems faced by the Study Area. Therefore accessibility by mass transport (intracity/intercity level) is considered as a positive indicator supporting future urbanisation of such villages.

7.   Population Growth Rates

Growth rates of the majority of the villages in the Study Area are either stabilising or declining. Therefore, a village showing greater than average growth rates of Study Area (>26%) is considered as a positive indicator supporting future urbanisation of such villages.

8.   Main Male Workforce in Non-Agricultural activities

This is considered partly in the Census definition of an urban/census town. However, there is a risk of not recognising a village that represents any of the three criteria. Out of three, non-agricultural primary male workforce employment is a clear indicator of urbanisation. Population density is a variable that depends on the size of the village, and not many villages are >5000 population. Therefore, the primary male workforce in non-agricultural activities is considered a parameter to categorise a village as 'urban'.

A score of 1 for every parameter is assigned to a village if it satisfies parameter 4 to 8. Zero is assigned otherwise. Additional 25 villages, receiving a score of 3 or more, are selected for inclusion in Urban Growth Centres.

235 villages are identified for inclusion in Urban Growth Centres based on primary parameters 1-8.

Secondary Parameters

Secondary parameters minimize the risk of missing out and improve the assigned score for certain villages if most of the primary parameters are not applicable.

9.   Availability of Water

Many villages in the Study Area and some of the urbanised localities within municipal corporations suffer from water scarcity. Village wise projection of population by the year 2018 and per capita consumption rates specified by MWRRA are used to project estimated demand by 2018. It is compared to the village wise allocation of water as obtained from MJP and ZP. Based on this analysis, villages with surplus water allocation, i.e. capacity to absorb future population are identified and categorised as 'potential urban'.

10.   Availability of Secondary Schools

Most of the Study Area villages have adequate primary schools considering village wise schools as per ZP and proposed planning norms. Based on these criteria, only a few villages have adequate secondary schools. For urban households, proximity to a secondary school is considered an essential measure before choosing a particular locality. Therefore, villages with surplus secondary schools would become an added advantage for the

village in attracting a higher migrant population. Therefore, such villages are categorised as 'potential urban'.

11. Availability of Power

Electrical transmission substations are key to connect power grids to the distribution network, and their location coordinates are obtained from MSETCL. Such substations are likely to boost urban development by serving industrial/commercial/residential uses that generate higher electricity demand. Presence of electrical transmission substation could raise urbanisation prospects of villages where it is located. Therefore it is considered as a parameter to categorise a village as 'potential urban'.

12. Availability of Hospital

Proximity to a hospital raises urbanisation prospects of a locality. Therefore, a village with a hospital is considered a parameter to classify it as a 'potential urban.'

13. Availability of College

In the case of Pune, urbanisation of many localities have been either initiated or spurred with higher education institutes. Therefore, it is considered as one of the parameters to categorise villages as 'potential urban'.

Parameters 9 to 13 are applied only to 235 villages that are already identified based on parameter 1, 2, 3 and villages scoring >3 as per parameters 4 to 8. A score of 1 is assigned for each parameter if it satisfies parameter 9-13. Zero is assigned otherwise. As parameters 9-13 are secondary parameters, they are used to identify central/core villages within a group of already identified villages.

It is to be noted that during finalization of Urban Area boundaries, out of 235 villages, certain villages have been excluded to minimize the size of an Urban Growth Centre and certain villages have been included to maintain contiguity. Accordingly, 233 villages have been included in the Growth Centre boundary.

Figure 9.2 represents villages categorised as urban, based on parameter 1 to 3, whereas figure 9.3 denotes villages classified as 'potential urban' based on parameter 4 to 8. Figure 9.4 is a combined output that shows villages complying to parameter 1 to 8.

Figure 9.2*: Urban Villages as per Primary Parameters 1,2,3*

Figure 9.3: Potential Urban Villages as per Primary Parameters 4 - 8

Figure 9.4: Urban and Potential Urban Villages as per Parameters 1-8

9.16 Growth Centre Delineation and Boundaries

Two hundred thirty-three villages were identified for inclusion in Urban Growth Centres based on urbanisation potential assessment. Also, eight villages are identified under Rural Growth Centres, details of which are covered in Chapter 38.

Figure 9.5 represents the proposed boundaries of 18 Growth Centres. Table 9.2 shows villages covered under each Growth Centre.

Figure 9.5: *Urban Growth Centre Boundaries*

Table 9.2: *Villages under Urban Growth Centres*

Sr No	Urban Growth Centre (RP Sectors)	Area (sq km)	Villages Considered Under Growth Center Boundaries (233 /814 Villages)
1	Chakan (Sector M*)	169	Shinde, Jambavade, Induri, Kanhewadi tarf Chakan, Sangurdi, Yelwadi, Sudhavadi, Sudumbare, Wasuli, Savardari, Bhamboli, Varale, Khalumbre, Nighoje, Mahalunge, Ambethan, Biradwadi, Kharabwadi (CT), Nanekarwadi (CT), Moi, Kuruli, Medankarwadi (CT), Kadachiwadi, Chimbali
2	Alandi (Sector I*)	102	Alandi, Bhose, Charholi Kh., Dhanore, Golegaon, Kelgaon, Markal, Nirgudi, Pimpalgaon Tarf Chakan, Rase, Solu, Tulapur, Vadgaon Shinde
3	Wagholi (Sector H*)	110	Awhalwadi, Bhavadi, Kesnand, Loni-kand, Perane, Phulgaon, Taleranwadi, Wadhu Kh., Wagholi, Bakori
4	Loni Kalbhor (Sector G*)	142	Autad Handewadi, Holkarwadi, Kadamvak Wasti, Kolavdi, Loni-kalbhor, Manjari Bk, Manjari Kh., Pisoli, Shevalwadi, Vadachiwadi, Vadki
5	Khadakwasla (Sector E*, F*)	59	Bhilarewadi, Jambhulwadi, Khadakwasale, Kirkitwadi, Kolavadi, Kondhave Dhavade, Kopare, Mangewadi, Nanded, Nandoshi, Narhe, Nimbalkarwadi, Sanas Nagar

6	Pirangut (Sector P*)	110	Ambarwet, Ambegaon, Bavadhan BK, Bhare, Bhugaon, Bhukum, Kasar Amboli, Lavale, Mukhaiwadi, Nande, Pirangut, Sus, Uravade
7	Hinjawadi (Sector B*, C*, D*)	141	Bebad Ohol, Bhegdewadi, Bhoirwadi, Chande, Dattawadi, Dhamne, Gahunje, Ghotavde, Godambewadi, Godumbare, Hinjavadi, Jambe, Mahalunge, Man, Marunji, Materewadi, Mulkhed, Nere, Salumbe, Sangavade, Shirgaon, Chandkhed, Darumbre
8	Talegaon (Sector J*, R*)	205	Kalhat, Pawalewadi, Nigade, Ambale, Umbare Navalakh, Badhalwadi, Mendhewadi, Badhalwadi Jadhavwadi, Nanoli Tarf Chakan, Akurdi, Talegaon Dabhade (R), Varale, Ambi, Sangavi, Jambhul, Paravadi, Nanoli N. m., Nayagaon, Khadkale (CT), Kamshet, Kusgaon Kh., Kanhe, Chikhalse, Ahirvade, Sate, Mohitewadi, Brahman Wadi, Karunj, Brahmanwadi, Baur, Sadavali, Ozarde, Adhe Kh., Urse, Parandwadi, Somatane, Malawadi
9	Malavali (Sector N*0*)	73	Aundhe kh., Aundholi, Bhaje, Boraj, Devale, Devghar, Dongargaon, Karla, Kune N.m., Kusgaon Bk. (CT), Malvali, Mudhavare, Patan, Pathargaon, Pimploli, Sadapur, Taje, Varsoli, Waksai
10	Khed- Rajgurunagar	49	Chandoli, Dhorewadi, Holewadi, Pacharnewadi, Rakshewadi, Sandb- horwadi, Santosh Nagar, Satkarsthal, Shiroli, Takalkarwadi, Vadgaon Tarf Khed, Varachi Bhamburwadi, Waki Kh.
11	Shikrapur (Sector L*)	91	Apti, Koregaon Bhima (CT), Sanaswadi (CT), Shikrapur, Talegaon Dhamdhere, Vadu Bk.
12	Uruli Kanchan (Sector K*)	72	Bhowarapur, Koregaon Mul, Kunjirwadi, Naygaon, Peth, Prayagdham, Sortapwadi, Theur, Uruli Kanchan
13	Saswad	74	Ambodi, Dive, Gurholi, Jadhavwadi, Kalewadi, Kumbharvalan, Pawarwadi, Singapur, Sonori, Udachiwadi, Vanpuri, Zendewadi
14	Khed - Shivapur (Sector Q*)	38	Kasurdi, Khed Shivapur, Ramnagar, Sasewadi, Shindewadi, Shivapur, Shivare, Velu
15	Nasrapur (Sector Q*)	58	Chivhewadi, Devadi, Divale, Hrishchandri, Kamthadi, Kapurhol, Kelavade, Ketkawale, Nasrapur, Naygaon, Umbare, Varve Bk., Varve Kh.
16	Ranjangaon	75	Dhok Sangavi, Karegaon, Nimgaon Mhalungi, Ranjangaon Ganpati, Shirur(Annapur,Saradwadi,Tardobachiwadi,Kardilwadi)
17	Kedgaon	28	Boripardhi, Dapodi, Dhaygudewadi, Dhumalicha Mala, Kedgaon, Kedgaon Station
18	Yawat	42	Yawat, Yawat Station
	Total Urban Growth Centre Area	1638	
	Rural Growth Centre	Area (sqkm)	Villages Considered Under Growth Center Boundaries (8 / 814 Villages)
1	Paud	4	Paud
2	Nhavre	35	Nhavre
3	Pabal	40	Pabal
4	Rahu	33	Rahu
5	Kikavi	3	Kikavi
6	Sangarun	6	Sangarun
7	Kadus	37	Kadus
8	Kale	4	Kale
	Total Rural Growth Centre Area	162	

includes part of RP sectors

Chapter 10: Socioeconomic Analysis - Demographics and Economic Situation Analysis

This chapter and the next chapter cover socioeconomic analysis - analysis of existing socioeconomic conditions and prospects of Pune district and the Study Area. It consists of four parts - (i) existing demographic and economic situation analysis, (ii) regional economic positioning, (iii) economic transition strategy and (iv) projections for populations, households and employment by 2041.

The output of these analyses has guided the formulation of the overall vision for PMR and quantification of gross land quantum for various employment generating uses and residential uses.

This chapter covers the first part - existing demographic and economic situation analysis. The statistical study of demographic indicators helps understand the change in demography and economy of a region. This chapter discusses the spatial distribution of the population residing within the PMR Planning Area analyzed using the ELU database. It elaborates the trend observed in key demographic statistics for the area, population, household size, density, etc. from 1991 to 2011 at PMR Study Area and taluka levels. It will then discuss the economy of Pune district and PMR along with inferences drawn from the economic analysis and end with a summary of key findings.

10.1 Methodology

Land Use Planning for Study Area is based on assessment and projections of three key indicators - population, households and employment.

Projections are carried out for 2018, 2021, 2031 and 2041 for planning purposes. Most of the existing statistical information is available at taluka/district/state level, whereas Study Area is defined with villages (814 villages). This necessitated compilation of indicators mentioned above at the village level in the following manner:

1. Census data (1991, 2001, 2011) provides village wise population, households and employment information. It is used as a base for projecting population, households and employment for 2018, 2021, 2031 and 2041.
2. There is always a risk of linear projections based on only Census data since it does not capture the effects of major socio-economic disruptions that may occur between Census surveys. To avoid this, two more datasets have been referred to, namely- Directorate of Economics and Statistics (DES) data and Household Survey data collected under the Comprehensive Traffic and Transport Study by PMRDA in 2018.
3. District level data from Directorate of Economics and Statistics provides the total number of persons employed by economic sectors and by establishments (Report on Sixth Economic Census Maharashtra State 2013-14).
4. Study Area's employment data (Census 2011) is projected till 2014 and subdivided into above economic sectors based on sector-wise shares depicted in the Sixth Economic Census of Maharashtra 2013-14.
5. Numbers have been ratified using sector-wise employment findings from the CTTS Household Survey.
6. Population projections are carried out for the Study Area and Pune Metropolitan Region separately. Forecasts for the Study Area are based on arithmetic and URGD methods where village wise population, households and employment is projected.
7. Incremental increase method is used to project population for municipal councils, whereas the projections for PMC, PCMC and cantonments are retained as per CTTS.

10.2 Demography: Pune Metropolitan Region (PMR)

Pune Metropolitan Region covers 6,914.26 sq km area, which is 44.20% of Pune district's area. According to Census 2011, the total PMR population is 73,21,367, which is 77.64% of Pune district population. Within PMR, 78.66% of people live in urban areas while the remaining 21.34% population is concentrated in rural areas. Taluka wise summary of settlements under PMR with their population is presented in Table 10.1.

Figure 10.1: Location of settlements in PMR

Source: GIS Database,

Table 10.1: Taluka wise Population Distribution across Pune Metropolitan Region - Census 2011

No	Taluka	Urban Population		Rural Population		Total Population	Percentage of PMR Population
		Settlement	Pop. 2011	Settlement	Pop. 2011	Pop. 2011	
1	Pune city	PMC	33,71,626 (2018)	-	-	35,22,091	48.11
		Canton.-2	1,50,465				
		Total	35,22,091				
2	Haveli	PCMC	17,27,692	Villages:104	3,90,949	22,18,556	30.30
		Canton.-1	48,961				
		Census town-1	33,479				
		Dehu NP	17,475				
		Total	18,27,607				
3	Mawal	Lonavala MC	57,698	Villages:187	2,18,076	3,76,943	5.15
		Talegaon MC	56,435				
		Vadgaon-NP	15,687				
		Census town-2	29,047				
		Total	1,58,867				
4	Mulshi	Census town-2	25,633	Villages:142	1,44,733	1,70,366	2.33
5	Khed	Alandi MC	28,645	Villages:111	2,59,783	3,89,117	5.31
		Rajguru MC	25,146				
		Chakan MC	41,113				
		Census town-3	34,430				
		Total	1,29,334				

6	Shirur	Shirur MC	37,111	Villages:66	2,30,264	2,94,034	4.02
		Census town-2	26,659				
		Total	63,770				
7	Purandar	Saswad MC	31,821	Villages:38	55,902	87,723	1.20
8	Bhor	-	-	Villages:53	68,320	68,320	0.93
9	Velhe	-	-	Villages:52	26,866	26,866	0.37
10	Daund	-	-	Villages: 51	1,67,351	1,67,351	2.29
Total		Municipal Councils	2,77,969				
Total		Nagar Panchayats	33,162				
Total		Cantonments	1,99,426				
Total (Planning Area)		Census Towns:10	1,49,248	Rural Villages: 804	15,62,244	17,11,492	
Grand Total (PMR)	24		57,59,123		15,62,244	73,21,367	100
%			78.66%		21.34%		

Source: Census 1991, 2001, 2011

Table 10.2: *Population of Census Towns - Census 1991, 2001, 2011*

No	Taluka	Census Town	Census 1991	Census 2001	Census 2011
1	Haveli	Wagholi	9,004	17,743	33,479
2	Mawal	Khadkale	6,001	9,804	13,435
3		Kusgaon	4,982	8,567	15,612
4	Mulshi	Hinjawadi	2,971	5,407	11,459
5		Pirangut	3,402	6,040	14,174
6	Khed	Kharabwadi	2,059	4,267	9,200
7		Nanekarwadi	1,623	5,112	12,654
8		Medankarwadi	1,708	4,066	12,576
9	Shirur	Koregaon Bhima	4,533	8,999	13,116
10		Sanaswadi	4,407	8,356	13,543
	Total		40,690	78,361	1,49,248

Source: Census 1991, 2001, 2011

Figure 10.2: *Taluka wise Population Distribution across Pune Metropolitan Region - Census 2011*

As per Census 2011, PMR population is 73.21 lakh. While PMC and PCMC constitute about 46.05 % and 23.59 % of the total population respectively, cantonments and municipal councils constitute only 2.72 % and 3.79 % respectively. The decadal population growth rate from 2001 to 2011 for PMR was 37.46 %.

Table 10.3: Urban-Rural composition in PMR - Census 2011

		Urban		Rural		Total
		Pop. 2011	%	Pop. 2011	%	Pop. 2011
Pune District		57,51,182	60.99%	36,78,226	39.01%	94,29,408
PMR Total Area	PMC	31,24,458	58.54%			
	PCMC	17,27,692	30.00%			
	MC	2,77,969	4.83%			
	NP	33,162	0.58%			
	Canto.	1,99,426	3.46%			
	CT	1,49,248	2.59%			
	Total	55,11,955	78.66%	15,62,244	21.34%	73,21,367

Source: Census 1991, 2001, 2011

Figure 10.3: Urban-Rural composition in PMR - Census 2011

Table 10.4 : *Population Growth Rate Trends*

No	Sector	Population			Growth Rate (%)	
		1991	2001	2011	1991 - 2001	2001 - 2011
1	Pune District	55,32,532	72,32,555	94,29,408	31%	30%
2	PMC - 2011 (Excluding 11 villages- 2,39,483 and Yewalewadi- 7,685)	15,66,651	25,38,473	31,24,458	62%	23%
	PMC - 2018	15,66,651	25,38,473	33,71,626	62%	33%
3	PCMC	5,17,083	10,12,472	17,27,692	32%	71%
4	Cantonments	2,01,017	2,04,359	1,99,426	2%	-2%
5	Municipal Councils and NP	1,62,831	2,32,900	2,99,789	43%	34%
6	Census Towns	40,690	78,361	1,49,248	93%	90%
7	PMR - Planning area (including CT)	10,65,134	13,48,185	17,11,492	27%	27%
8	PMR - Total	37,52,731	53,24,674	73,21,367	42%	37%

Source: Census 1991, 2001, 2011

PMR Study Area population has increased from 13.48 lakh in 2001 to 17.11 lakh in 2011 which is 23.61% of PMR population (73.21 lakh) and 18.33% of Pune district's population (94.29 lakh). Table 10.2 shows taluka wise distribution of Study Area population.

Figure 10.4 : *Population Growth Rate Trends*

Source: Census 1991, 2001, 2011

Table 10.5: Taluka wise population distribution

No.	Talukas	Census 1991	Census 2001	Growth 1991-01 (%)	Census 2011	Growth 2001-11 (%)
1	Haveli	2,25,453	3,05,854	36%	4,24,428	39%
2	Mawal	1,53,742	1,94,234	26%	2,47,123	27%
3	Mulshi	1,13,159	1,32,623	17%	1,70,366	28%
4	Khed (Part)	1,80,164	2,24,526	25%	2,94,213	31%
5	Shirur (Part)	1,50,531	2,01,317	34%	2,56,923	28%
6	Purandar (Part)	49,823	54,382	9%	55,902	3%
7	Bhor (Part)	53,771	61,000	13%	68,320	12%
8	Velhe (Part)	26,970	26,397	-2%	26,866	2%
9	Daund (Part)	1,11,521	1,47,853	33%	1,67,351	13%
10	Total population of Study Area (including census towns)	10,65,134	13,48,185	27%	17,11,492	27%

Source: Census 1991, 2001, 2011

Figure 10.5: Map showing taluka wise total population

Source: GIS Database, Census 1991, 2001, 2011

Figure 10.6: *Village-wise population distribution in PMR Planning Area*

Source: GIS Database, Census 1991, 2001, 2011

Population Growth

PMR Study Area population growth rate is almost constant from 1991 to 2001 and from 2001 to 2011. This was majorly due to the increasing migration rates, decreasing fertility rates and overall urbanization of the area.

Figure 10.7 shows that talukas in the south (Purandar, Bhor and Velhe) show significantly low growth from 1991 to 2011, indicating out-migration. As shown in Table 10.5, Haveli, Mawal, Mulshi, Khed, and Shirur talukas show high population growth from 1991 to 2011. The population of Haveli taluka has increased from 2,25,453 in 1991 to 4,24,428 in 2011, indicating rapid growth of population in the taluka. This population growth in Haveli is majorly due to its proximity to Pune city, leading to spillover development. PMC Population has grown from 25,38,473 in 2001 to 31,24,458 in 2011 at a decadal rate of 33%, and PCMC Population has grown from 10,12,472 in 2001 to 17,27,692 in 2011 at a rate of 71 %. Compared to PMC and PCMC, the PMR Study Area population has grown from 13,48,185 in 2001 to 17,11,492 in 2011 at a decadal rate of 27 %.

Figure 10.7: *Taluka wise population growth in PMR Study area.*

Population Density

PMR Study Area's population density has increased from 219 persons per sq km in 2001 to 278 persons per sq km in 2011. This increase in population density is majorly due to the high urbanization of the metropolitan area. Comparatively, the population density of Pune Metropolitan Region (i.e. including Pune urban) is 1,189 persons per sq km and that of Pune district is 602 persons per sq km indicating that PMR is a relatively less dense area.

Figure 10.8: Trend in the population density of PMR Study Area

As shown in Table 10.6, the population density of Haveli taluka has increased significantly from 276 to 520 persons per sq km between 1991 and 2011 due to spillover development from Pune. This is followed by Khed taluka showing an increase in population density from 206 persons per sq km to 337 persons per sq km from 1991 to 2011 due to spillover of development from Pimpri-Chinchwad. There has been little change in Purandar taluka's population density, with a marginal increase from 171 persons per sq km in 1991 to 192 persons per sq km in 2011. Velhe taluka has shown a decline in density from 118 persons per sq km in 1991 to 117 persons per sq km in 2011 within the PMR. Over the years (from 1991 to 2011), Mulshi and Mawal talukas have shown above-average population growth but below-average population densities. This is majorly due to the talukas' hilly terrain in the south and west of the region.

Table 10.6: Taluka-wise population density

Taluka	Area (sq km)	1991	2001	2011
Haveli	815.63	276	375	520
Maval	1,070.64	144	181	231
Mulshi	1,003.26	113	132	170
Khed (Part)	874.15	206	257	337
Shirur (Part)	1,062.85	142	189	242
Purandar (Part)	290.96	171	187	192
Bhor (Part)	258.14	208	236	265
Velhe (Part)	229.24	118	115	117
Daund (Part)	552.88	202	267	303
PMR-Planning Area	6,157.75	173	219	278

Source: Census 1991, 2001, 2011

Figure 10.9: Gross Density of Study Area

Source: GIS Database, Census 1991, 2001, 2011

Household Size

Household size of the PMR Study Area was 4.72 in 2011. Comparatively, PMR's household size is 4.1, and for Pune district, it is 4.2. The household size of the PMR Study Area has declined from 5.12 in 2001 to 4.72 in 2011.

Primary reasons for decreasing household size is the growing trend of more nuclear families, declining fertility rates, and rising single-person migrations. This trend of the increasing population combined with decreasing household size translates further into increasing housing space demand.

Figure 10.10: Trend in household size in PMR study area

Taluka-wise household size

Haveli (4.60) and Mulshi (4.52) have the smallest household size within the PMR Study Area. Further, it can also be seen that there is a negative growth trend in household size in the region. Haveli and Mulshi talukas have shown a rapidly decreasing rate of household size within the region. This is indicative of the trend of increasing nuclear families in urban areas. Similarly, the rural talukas of Purandar, Bhor, Velhe and Daund have comparatively larger household sizes.

Table 10.7: Taluka wise decreasing growth trend in household size

Talukas	Household Size			
	1991	**2001**	**2011**	**2017 (Estimated)**
Haveli	5.23	5	4.6	4.29
Mawal	5.75	5.37	5.09	4.97
Mulashi	5.35	4.92	4.52	4.27
Khed (Part)	5.82	5.27	4.65	4.36
Shirur(part)	5.6	5.1	4.68	4.74
Purandar(part)	5.65	5.14	4.75	4.7
Bhor(Part)	5.32	4.99	4.71	5
Velhe (Part)	5.06	4.88	4.75	5.01
Daund (Part)	5.37	5.12	4.94	4.51
PMR Planning Area	5.49	5.12	4.72	4.51

Source: Census 1991, 2001, 2011

Literacy Rate

The literacy rate in the PMR Study Area has increased from 59% in 1991 to 81% in 2011. This rate is higher than the literacy rate estimated for Pune district, which is 79%. Further, male literacy in the PMR Planning Area is 80.1%, and female literacy is 70.6%.

Figure 10.11: Literacy Rates (1991-11)

Taluka-wise literacy rates

The literacy rate (2011) of the PMR Planning area is 81%. The average literacy rate for the talukas of Haveli, Mulshi and Shirur was 82%. The average literacy rate for the talukas of Daund, Velhe and Purandar was 78.6 %. Table 10.8 below gives the literacy rates in the overall PMR Planning area.

Table 10.8: Taluka wise Literacy Rates in the PMR Study Area

Taluka	1991	2001	2011
Haveli	65%	75%	83%
Mawal	53%	70%	79%
Mulshi	55%	68%	79%
Khed (Part)	58%	71%	80%
Shirur (Part)	59%	74%	84%
Purandar (Part)	64%	75%	81%
Bhor Part)	64%	78%	84%
Velhe (Part)	52%	66%	78%
Daund (Part)	59%	71%	77%
PMR study Area	59%	72%	81%

Source: Census 1991, 2001, 2011

Sex Ratio

The sex ratio in the PMR Study Area has decreased from 932 in 2001 to 908 in 2011. PMR Study Area's sex ratio is lower than that of PMR and Pune district. This indicates in-migration of male migrants in the region.

Figure 10.12: Sex ratio in PMR Study Area

Taluka-wise sex ratio:

The decreasing trend of sex ratio in the PMR Study Area indicates migration within the region. Within the talukas, Shirur has the lowest sex ratio of 839, indicating high male in-migration. This is followed by Khed and Daund talukas having sex ratio of 851. Hilly talukas on the western region Mawal (918), Purandar (882), Bhor (889) and Velhe (934) have comparatively higher sex ratio, which is an indicator of male out-migration rate.

Table 10.9: Taluka wise sex ratio

Talukas	1991	2001	2011	2017 E
Haveli	927	883	862	851
Maval	956	961	918	880
Mulshi	993	931	881	851
Khed (Part)	961	914	851	799
Shirur (Part)	959	880	839	808
Purandar (Part)	987	854	882	919
Bhor (Part)	961	901	889	876
Velhe (Part)	1,031	932	934	939
Daund (Part)	962	888	851	808
PMR Planning Area	958	907	869	840

Source: Census 1991, 2001, 2011

Age-sex pyramid

The age-sex pyramid has been forecasted for the year 2017 using the cohort survival method. Cohorts of major urban areas, i.e. PMC and PCMC were deducted from the cohorts of the PMR area as a whole to obtain the cohorts only inclusive of municipal councils in PMR and PMR Planning Area. Here, cohorts of municipal councils and PMR Study Area are assumed to be applied for the PMR Study Area and projections for the year 2017 were carried out. The age-sex pyramid for 2017 shows the higher share of 20-35 age group of the population indicating in-migration in the PMR Study Area for work and educational purposes.

Figure 10.13: Graph for age-sex pyramid for PMR Planning Area.

Workforce participation

Workforce Participation Ratio (WFPR) represents a percentage of people actively participating in the workforce vis a vis total number of people eligible to participate in the labour force. As Census 2011 data does not provide age-wise population distribution, the total population is considered for calculations.

The workforce participation rate for PMR is 48.2 % with 8.31 lakh workers, which is more than PMR (41%), Pune district (43%) and Maharashtra (44%). But it is to be noted that the high WFPR in the PMR Planning Area is also contributed by agricultural activities as opposed to the urban areas.

The workers in the PMR Study Area contribute to 26% of PMR workers and 19% of Pune district workers. As shown in Figure 10.14, overall workforce participation in PMR is estimated to have increased from 47.15% to 48.2 % between 2001 and 2011, with no substancial growth.

Figure 10.14: Workforce Participation rate in PMR study area

Taluka-wise Workforce Participation

Further, workforce participation is comparatively high in Purandar (59%), Shirur (51%) and Khed taluka (51%). These high numbers are due to the agrarian nature of these talukas, where more than 50% of the working population is engaged in agriculture and allied activities. Workforce participation is low in Mawal (44%), Mulshi (48%) and Haveli (44%). These talukas are close to the city centre and thus have employment opportunities other than agriculture. It can be clearly seen from the table given below that the talukas having low workforce participation rate have more than 50% of the workers engaged in non-agricultural activities.

Table 10.10: Economic classification of workers in PMR planning area

Taluka	Total Working Population 2011	Agricultural Workers and Cultivators	Non-Agricultural Workers (Household Industries and Other Workers)	Workforce Participation Rate	Percentage of Total Workers	
					Agriculture Workers Percentage	Non-agricultural Workers Percentage
Bhor	34,768	22,825	11,943	50.89%	65.65%	34.35%
Daund	85,832	64,778	21,054	51.29%	75.47%	24.53%
Haveli	184,636	76,346	108,290	43.50%	41.35%	58.65%
Khed	151,547	94,371	57,176	51.51%	62.27%	37.73%
Mawal	108,111	49,047	59,064	43.75%	45.37%	54.63%
Mulshi	81,375	36,452	44,923	47.76%	44.80%	55.20%
Purandar	32,725	26,104	6,621	58.54%	79.77%	20.23%
Shirur	131,939	88,371	43,568	51.35%	66.98%	33.02%
Velhe	13,791	10,272	3,519	51.33%	74.48%	25.52%
Total	824,724	468,566	356,158	48.19%	56.81%	43.19%

Source: Census 1991, 2001, 2011

10.3 Demographics Analysis

This section presents key inferences based on close analyses of the demographic situation of the Study Area to position it in the correct perspective.

"91% of the Study Area is rural as per Census definition."

As per 2011 Census, about 18.15% of the district's population resides in Study Area out of which 91.29% is rural population. Considering the definition of Census Towns (CT), the villages are considered urban if their population is greater than 5,000, main male workforce outside agriculture is >75%, and population density is >400 p/sqkm. Within the Study Area, Bhor, Velhe, Daund, and Purandar are entirely rural as per the above criteria. Mulshi taluka shows the highest urbanisation level (15%), whereas Khed, Mawal, Shirur talukas show urbanisation levels between 9-12%.

However, aerial imagery and existing land use reveal the number of rapidly urbanising villages and applying census definition alone may not reveal the real growth trend in the Study Area.

"In reality, the Study Area is rapidly urbanising, out-pacing the rural population growth rate."

The average decadal growth rate of urban population in the Study Area was 90% between 2001-11. This decadal growth rate is higher than that of PMC (33%) and PCMC (71%) during the same period. PMC's declining population growth rate can be attributed to the increased cost of living, high land prices, sluggish natural growth rate, congestion and declining quality of life. Spin-offs from this trend can be seen as an increase in urban population around its immediate fringes, i.e. urbanising villages of Study Area and PCMC.

The Study Area has excellent potential to urbanise with emphasis on offering the best "Quality of Living" to benefit from present demographic growth trends within the region.

"Favorable Sex Ratio for demographic growth but weaker Literacy Rates for development."

Sex ratio is commonly defined as the number of females per 1,000 males in the population. Within the Study Area, the sex ratio has been declining, which could be attributed to largescale migration of male workforce into the

region post-2001. The Study Area shows a higher number of females compared to urban areas. It has favourable sex ratio in comparison with MMR. Age-group wise distribution is studied at District level since Census 2011 data is limited to age group 0 to 6. Age-group pyramid indicates a favourable situation with a broad base of the young and working-age population.

However, Literacy Rate remains a key concern since it is lowest in the Study Area. CTTS Household Survey reports 91.1% literacy rate with about 25%, 32% and 22% of the population being educated up to 5th, 10th and 12th class respectively. The lack of educational infrastructure, accessibility, and efficiency could be few contributors to lower literacy rates. As most of the working-age group is educated up to 10th-12th Class, vocational training holds immense importance for skilling of youth and re-skilling of elderly workforce. It would also support major employment generators such as SME, which grapples with sourcing local semi-skilled/skilled tertiary workers which is understood from interaction with industry associations.

"Shrinking household size"

Household sizes across various jurisdiction boundaries in PMR are shrinking invariably, between 1991 and 2011. Rate of reduction of household size in case of villages is higher than census towns. The average household size is 4.72, about 58% of households represent household size ranging from 4 to 5, and only 11% of households have a size greater than 5.

Table 10.11: Demographic Indicators of Pune District and Study Area

Census 2011 Data	Total	Urban		Rural	
Pune District					
Population	94,29,408	57,51,182	61%	36,78,226	39%
Decadal Growth Rate	30%				
Child Population (0-6)	11,04,959	6,64,857	60%	4,40,102	40%
Sex Ratio	915	904		932	
Literacy Rate	86%		79%		71%
Work Force	40,48,993	22,20,406	55%	18,28,587	45%
Households	21,51,503	13,71,531	64%	7,79,972	36%
Household Size	4.4	4.2		4.7	
WPR	43%	39%		50%	
Study Area					
Population	17,11,492	1,49,248		15,62,244	
Decadal Growth Rate	27%				
Child Population (0-6)	2,17,065	22,609	10%	194,456	90%
Sex Ratio	945	826		947	
Literacy Rate	71%		75%		
Work Force	8,31,824	61.71	7%	770.11	93%
Households	3,67,048	37,222	10%	3,29,826	90%
Household Size	4.7	4.2		4.8	
WPR	48%		40%		49%

Source: Census 2011

10.4 Economy: Pune Metropolitan Region (PMR)

A comprehensive understanding of a region is often developed through the study of its economic characteristics. This section outlines the economic profile of the PMR in context of the economic profile of the state and Pune district. It also discusses relevant growth trends across various segments of the PMR economy.

Growth of the metropolis

Pune is a diversified metropolitan city with industrial and commercial activities, educational, administrative and defence services. The original old city has been a hub for market centres for agricultural produce in the district as well as distant rural areas. It serves as a wholesale market for the sale of agricultural goods. Pune city has a great historical and administrative background and the most important advantage of being close to India's economic centre - Mumbai. Pune experienced the outgrowth of expansion of industries beyond Mumbai, with many companies choosing to locate their industries in the city. Eventually over a period of time, Pune became an industrial hub catering services to the entire state of Maharashtra, thus establishing linkages to other cities not only in India but also globally.

The industrial development was majorly supported by good connectivity within the region. The Mumbai-Pune expressway gave an impetus to the economy of the region by reducing travel times to Mumbai and JNPT port. The region also enjoys connectivity to MIDCs in the east through SH27 to Ahmednagar/Aurangabad and NH65 to Solapur, towards the south through NH48 to Satara.

The initial industrial development was concentrated in Pimpri Chinchwad Municipal Corporation area (PCMC) only. Development of PCMC as an auto hub centre attributed to active industrial set up of production units. Few of the industries which established themselves between 1962 and 1992 were Kirloskar, Bajaj, TELCO (now Tata Motors), Philips India, etc. -The establishment of MIDCs brought about a major change in the manufacturing sector in the industrial profile of the region. The establishment of Chakan MIDC as a major auto-hub cluster acted as a magnet for investment in the auto-manufacturing sector globally.

The international status of the region has attracted many multinational corporations in choosing Pune for a profitable investment centre. Pune experienced a major change, shifting its base from the manufacturing sector to the IT sector, after the IT revolution and industrialisation after 1990. The city is now an established IT hub in India. This geared up growth in all the directions beyond the city limits. The IT cluster in Hinjawadi towards west and Magarpatta Cyber City in Hadapsar and Kharadi are the key locations that have experienced tremendous growth with respect to population and real estate. Pune is also an emerging pioneer educational hub with well-equipped educational facilities and one of the highest young populations. The development of IT widens the gates for employment opportunities for a number of people from different parts of the country. This, in turn, has led to an increase in demand for real estate and an increase in demand for housing, retail and commercial spaces.

The geographical advantage of Pune is its large flat hinterland with good accessibility. The primate city has now grown well beyond its city limits and will continue to experience this, being a great centre for opportunity. Pune metropolitan region is thus an important social, economic and cultural centre in the state as well as the country.

Regional Income and past trends

To understand the domestic output of the region, district level analysis of the economy has been carried out. Due to the availability of income data at Pune district level, this data has been used to understand the economic output of PMR. The report on the District Domestic Product of Maharashtra 2004-05 to 2013-14 (the base year 2004-05) has been referred for this analysis.

As shown in Figure 10.15, for the year 2013-14, Pune district contributed to 12% of the total state domestic product (Mumbai's contribution was 23% and Thane was 14%). In absolute values, the Pune district's GDP was Rs. 1,03,141 Cr and that of Maharashtra's was Rs. 8,96,767 Cr.

Figure 10.15: *Major contributors to GDP share in Maharashtra 2014*

Figure 10.16: *GDP Growth Trend for Pune and Maharashtra*

Data in Figure 10.16 shows that the annual average growth rate in the domestic product for Pune district as well as Maharashtra was about 9% during 2006-2014. It can be observed that during peak periods, Pune has experienced higher growth rates than Maharashtra. Similarly, during the economic slowdown, Pune was more severely affected compared to the state. Pune district is a major contributor to the state's economic health.

Further observing the sectoral contribution to the GDP as shown in Figure 10.17, the tertiary sector dominates with its share of 55% to the total GDP for Pune district for the year 2014, followed by the secondary sector (40%) and the primary sector (5%).

Figure 10.17: Sector wise GDP share for Pune District 2014

Source: District Domestic Product Report for Maharashtra 2004-05 to 20013-14 (DES, GoM)

In terms of Pune district's sectoral contribution to the State economy, it is observed that the contribution of the secondary sector and tertiary sector has always been significant as against that of the primary sector. For the year 2014, Pune district's secondary sector constituted 15.9% of Maharashtra's secondary sector GDP, and the tertiary sector's contribution was 10.2% of total Maharashtra's tertiary sector GDP.

Figure 10.18 shows the trend within the sectors at 2004-05 base prices from 2004-2014 in Pune. It can be clearly seen that the GDP contribution by the tertiary sector has shown rapid growth over the past decade. The secondary sector has experienced ridden fluctuation within the economic slowdown phase and has contributed significantly, indicating the robustness of the sector. The primary sector's contribution has been the lowest, and it does not show any growth in the past years.

Figure 10.18: GDP growth trend within sectors in Pune District

Source: District Domestic Product Report for Maharashtra 2004-05 to 20013-14 (DES, GoM)

In the last two decades, the Pune Metropolitan Region has emerged to be an important centre for industrial development. With the setting up of various MIDCs, SEZs, townships and incentives with respect to policy initiatives which has created a conducive environment for huge investment in the region. According to the Economic Survey of Maharashtra 2017-18, the Pune division of MIDC contributes to 25% of the total number of units, 38% of the total investment and employs 36% of employees in total Maharashtra. This clearly establishes the importance of Pune region as an important economic centre for investments and generating employment.

Table 10.12: *Industrial units in MIDC with key investments in Maharashtra*

Division	Units (Numbers)	Investments (INR Cr)	Employment (Lakh)
Pune	12,159	66,464	4.77
Mumbai	1,012	19,040	1.39
Konkan (excl Mumbal)	12,821	48,953	4.11
Rest of Maharashtra	21,420	39,317	2.92

Source: Economic Survey Report Maharashtra, 2017-18

Spatial distribution of economic activities

The Pune metropolitan region hosts a variety of secondary and tertiary activities together with primary activities. The spatial distribution of these activities is majorly seen along the transport corridors resulting in ribbon development. The Regional Plan 1995 had identified urban growth centres at Alandi, Talegaon, Uruli Kanchan and Loni Kalbhor and had proposed development around the fringe of PMC and PCMC. These proposals have not been realised completely, however, have shaped the development pattern in the region. Figure 10.19 shows the spatial spread of different industrial clusters in the PMR Planning Area and beyond.

Industrial Clusters in PMR

Industrial clusters are spread across PMR. PMR houses MIDCs at Talegaon, Chakan, Ranjangaon, Kharadi and Hinjawadi. Their strategic location and good connectivity have led to the development of other industries along these corridors. Development of some of these industrial clusters has been seen in Urse along the Mumbai-Pune Expressway, along Talegaon-Chakan road at Mahalunge in Khed, at Shikrapur and Sanaswadi and Koregaon Bhīma along Pune-Ahmednagar corridor, at Uruli Kanchan towards Solapur highway and Sasewadi in Khed Shivapur. It can be noted that the presence of these industries has influenced the employment trend in villages as workers engaged in non-agricultural activities have shown an increase in numbers and concentration along and around these developments.

Figure 10.19: Industrial Clusters in PMR

Existing Economic Geography of the PMR Study Area

The ELU database captures areas under primary activities including agricultural farms, cattle sheds and farmhouses. Secondary activities include industrial zones and special planning areas such as MIDC and SEZ. Tertiary activities cover the area under commercial and mixed-use. Based on the ELU database, the total area under various economic activities in the PMR Study Area is 2,400 sqkm. This is 39% of the entire PMR Study Area. Table 10.13 provides a further breakdown of these numbers.

Table 10.13: Spatial distribution of Land-use under various economic activities as per ELU

Sr. No.	Land Use	Type of Activities captured in ELU	Area in sq. km (as per ELU data)	Area as a % of total area under economic activities	Area as a % of total planning area
1	Agriculture use	Primary Activities Farmhouse, Cattle shed, Animal related Poultry farm	2221.81	97.3%	37.95%
2	Industrial use	Secondary activities Small scale Medium scale Large scale	37.48	1.56%	0.61%
3	Commercial use	Tertiary Activities Markets Godowns/Warehouse Hotels Other use	25.66	1.07%	0.42%

Table 10.13 indicates that around 97% of the land available under different economic activities in the PMR Study

Area is under agricultural use. This is predominantly due to the rural nature of the region and agriculture being a major income source of the villages. The ELU data captures the land-use under various economic activities. The table above shows the distribution of economic activities in talukas. Out of the total PMR Study Area, 37.95% is under primary use, 0.61% under secondary use and 0.42% under tertiary use.

Primary Activities:

The total area under the primary sector (agriculture and allied use) in the PMR Study Area is 2,338 sq km. Figure 10.20 shows that out of the total area under primary use i.e. agriculture, Shirur and Daund talukas constitute 42% of the total area under primary activities, making them major contributors. Purandar, Bhor and Velhe talukas have a lower share of primary agricultural activities, with 5%, 5%, 2% contribution respectively. This is maybe on account of the hilly terrain of the area in these talukas and as only a part of these talukas are included in the PMR Study Area.

Figure 10.20: *Primary activities-land use distribution in PMR study area*

Secondary Activities:

The ELU database captures the secondary activities concerning small, medium and large-scale industries. The total area under secondary activities as industrial use in the PMR Study Area is 37 sq km. Out of the total share of land-use under secondary activities, Khed and Shirur contribute to 50% of the secondary activities in the PMR Study Area. This is majorly due to the presence of Chakan MIDC in Khed taluka and Ranjangaon MIDC in Shirur taluka. The talukas contributing least to the secondary activities are Bhor, Purandar, Velhe and Daund. This may be due to the terrain of the region and lack of connectivity.

Table 10.14: *Secondary activities in PMR Study Area- Land-use distribution and number of units*

Classification	Area (ha)	Number of Units
Micro and Small	3,179.24	21,873
Medium	106.28	780
Large	438.26	2,031
Total	3,723.78	24,684

Tertiary Activities:

The area under commercial use as per the ELU database is around 26 sq km. The tertiary activities include all markets, hotels and restaurants, warehouses etc. There is a dispersed spread of commercial areas in the PMR Study Area where the offices and retail areas are located in and around major city centres. The concentration of area under office spaces is high in Mulshi (31.64%), Haveli (22.96%) and Khed (15.52%) taluka as it is located near Pune city. The same talukas correspond to more than 50% of the total no. of commercial units in the PMR Study Area. Apart from the periphery of Pune city, the commercial use concentration is also high around urban centres. Concentration of retails, hotels, restaurants is high along the Mumbai-Pune expressway and around Lonavala. The concentration of commercial units is low in Bhor (0.38%), Daund (2.67%) and Purandar (2.57%) taluka.

Table 10.15: Commercial units and area

Classification	Area (ha)	Number of Units
Godowns	154	2,862
Hotels	79	3,788
Markets	7	105
Other uses	2,029	18,690
Total	2,269	25,445

10.5 Economic Analysis

This section presents key inferences based on close analyses of the economic composition of the Study Area, Pune district and Maharashtra.

"Maharashtra is a leading destination for investments in India."

With its strong industry and service, Maharashtra is consistently the highest contributor to the Indian economy. Its contribution to the national GDP stands at 14% while the national industrial output share is at 13%. Major economic drivers of Maharashtra are retail, infrastructure, media and tourism, fintech and IT. The service sector dominates the state domestic product contribution (56%) as a result of strong IT/ITES, banking industry presence in Maharashtra. Maharashtra has high FDI inflows, and 4,210 MoUs were executed with major companies during the Magnetic Maharashtra (2018) summit. Key sectors for high investments in Maharashtra include energy, infrastructure, metal and alloys, aircraft, e-vehicles, textiles, renewables, agro-processing, FMCG, logistics, precision manufacturing, real estate and consulting.

"Pune district is the third-largest economic contributor to Maharashtra's economy."

Pune district attracted about 16% of total investments pledged during the Magnetic Maharashtra (2018) summit. Approximately 2,400 entries had details of investment showing the key sectors such as real estate, auto and spare parts, logistics and warehousing, FMCG, precision engineering, pharmaceuticals, and biotech attracted significant investments in Pune.

Pune district ranks second in Maharashtra for the number of establishments and industrial employment. All this reflects in the consistent growth in its GDVA over the years, which grew at a CAGR of 11.5% between 2012 and 2017.

Key factors contributing to Pune district's socioeconomic growth are elaborated in Figure 10.23. It shows that Study Area's economic positioning is primarily defined by industrial infrastructure and an established ecosystem for knowledge-based sectors such as IT, ITES, Biotech and Pharmaceutical. It contributes to approximately 75% of the GDP of the district. The Study Area is Pune district's industrial powerhouse with a home to several industrial parks, IT parks, business parks and emerging technology industries. The district has been undergoing robust economic performance for the past two decades where GDP has been growing steadily around 6-8%.

Figure 10.21: Key Governing Factors for PMR's Socio economic Growth

"Secondary and Tertiary Sectors are key economic drivers of Pune District Economy "

Secondary and tertiary sectors are the main drivers of the district economy, whereas the primary sector (agriculture) offers employment to most of the workforce.

Agriculture is the main economic activity within the primary sector, whose GDP contribution has been declining by about 1% every two years.

Contribution of the secondary sector has been consistent at 40% and above. Manufacturing sub-sector shows a positive trend of increasing registered establishments. It can be seen that the share of unregistered manufacturing is decreasing with time. The secondary sector witnessed maximum growth in 2010-11 after which the sector shrunk due to global recession. It has picked up again post 2014.

The tertiary sector has been showing consistent growth from 2009 to 2013, (51-55%), in tandem with urbanisation. Growth is seen in banking and insurance, real estate, trade and hospitality and communication sectors.

Within the Study Area, growth of the secondary sector (construction in particular) and Tertiary sector has been concentrated at municipal corporations and along its fringes through large scale developments and business parks. Growth of the industrial sector has been pushed beyond the 5km buffer from PMC and PCMC boundaries due to industrial decentralisation policy adopted in RP 1997. These industries and its support ecosystem form the interface between the Study Area and municipal corporations.

Table 10.16: Sectoral Distribution of Pune District GDP and Changing shares (2005-14)

	2004-05	2007-08	2010-11	2013-14	Share of Sub-sector	2004-05	2008-09	2011-12	2013-14
Primary	3,240	3,789	3,615	4,780	Agriculture in Primary sector	84%	84%	80%	80%
	7%	6%	4%	5%					
Secondary	19,026	29,599	37,294	41,873	Registered Manufacturing in Secondary Sector	65%	67%	68%	67%
	41%	43%	44%	41%	Unregistered Manufacturing in Secondary Sector	15%	12%	11%	11%
Tertiary (Service)	23,985	34,731	44,377	56,488	Communication in Tertiary Sector	3%	4%	8%	9%
					Trade and Hospitality in Tertiary Sector	23%	20%	20%	19%
					Banking and Insurance in Tertiary Sector	18%	22%	23%	22%
					Real Estate in Tertiary Sector	26%	29%	26%	27%
	52%	51%	52%	55%	Other Services in Tertiary Sector	10%	8%	8%	8%

Source: District Domestic Product Report for Maharashtra 2004-05 to 20013-14 (DES, GoM)

Figure 10.22: Growth Rate of Sectors in Pune district

Source: District Domestic Product Report for Maharashtra 2004-05 to 20013-14 (DES, GoM)

"Agriculture is the third largest income generator for the District."

The District has a net sown area of 8,63,000 hectares, 55% of total geographical area, and has major crops like sugarcane, jowar, fruits, pulses and vegetables.

The major component of the primary sector in Pune district is agriculture. There are also fisheries and limited forestry activities in the district. Organised Mining and Quarrying is negligible in the district and contributes <5% of the primary sector GDP.

Major crops which are cultivated in the district are Sugarcane, Rice, Jowar and Bajra. Crops and productivity vary

across the talukas. Shirur is a leading taluka in the production of cereals, pulses and Sugarcane. Daund also is a major producer of Sugarcane. Cereals and Sugarcane occupy the maximum area under cultivation among the major crops. Sugarcane, Rice and Bajra are the major crops in terms of production. Sugarcane is the major crop which adds to about 51,56,200 tons of annual production.

"Despite massive public investments in irrigation, agriculture sector output and employment share remain low."

Table 10.17 shows Taluka-wise agriculture potential in terms of cultivated agricultural land, irrigation coverage and output.

Census data shows that the share of agricultural employment has been falling in the district over the past four decades with a reduction in the number of cultivators in the region (reduced from 19% to 15%). The Study Area reflects the same trend as per Census 2011, where cultivators merely increased by 10649, whereas the number of agriculture labourers grew only by 4%.

Table 10.17: Summary- Taluka-wise Agriculture Potential 2016

Taluka	Area	Forest	Under Culti-vation	Suitable for cultivation	Under Irrigation	% of Irrigated & Culti-vated	Area un-der Main crops	Main Crop Output (in Tons)
Shirur	1,55,727	6,019	1,31,248	1,34,091	77,520	59%	140,486	2,458,600
Khed	1,37,354	20,079	1,05,151	1,07,745	21,818	21%	61,977	26,600
Mawal	1,13,135	32,736	68,920	72,473	22,735	33%	18,215	219,800
Mulshi	1,03,931	16,726	44,347	69,529	21,977	50%	24,577	63,800
Haweli	1,33,627	7,864	92,531	1,06,868	19,112	21%	33,998	387,400
Pune City	11,990	235	5	1,480	NA	NA	0	0
Daund	1,28,986	4,904	1,15,469	1,04,746	52,033	45%	84,407	1,937,000
Purandar	1,10,313	2,221	89,100	99,884	25,171	28%	58,769	105,600
Velhe	49,955	10,796	23,881	34,296	2,259	9%	14,738	6,900
Bhor	89,234	12,260	48,124	59,599	10,893	23%	30,407	193,200

Source: District Socio-economic Review 2016 (Agricultural Output in Talukas of Pune district & Area under cultivation of Major Crops have been termed as Main Crops. Areas/ Output clubbed under respective column); Taluka-wise Irrigation data referred from Irrigation Department's Zila Pustika 2015

Figure 10.23: *Taluka-wise Cropping Pattern and Output*

Source: District Socio-economic Review 2016

"Manufacturing sector leads in terms of establishments and employment within the secondary sector."

Key sub-sectors within the industrial sector in Pune are automotive, auto ancillary, electronics, food processing and engineering. Additionally, about 2,872 large industries have been registered as of 2015. The spread of these industries in terms of manufacturing and services is portrayed in Figure 10.24.

Figure 10.24: *Registered industries and employment in Pune District*

Source: District Industrial Centre (DIC)

The manufacturing sector comprises large industries and SMEs. Approximately 44,000 firms were registered in Udyog Aadhaar as of March 2018, and the number reached 80,000 in October 2018.

Table 10.18: *Industrial Estates in PMR*

Location	Distance from Pune city (km)	Major Industries
Chakan	35	Engineering, Auto and Auto Ancillary
Hadapsar	10	Engineering, Food, Auto Ancillary
Hinjawadi	19	Pharmaceuticals, Auto Ancillary
Jejuri	45	Pharmaceuticals, Textiles, Engineering
Kharadi	17	Engineering

Pimpri Chinchwad	17	Engineering, Auto and Auto Ancillary, Pharmaceuticals, Engineering
Pirangut	25	FMCG, Pharmaceuticals, Engineering
Ranjangaon	50	White Goods, FMCG, Auto, Engineering, Electronics
Talegaon	35	Engineering, Auto and ICD
Talegaon Floriculture Park	35	Floriculture, Inland Container Depot
Sanaswadi	25	Steel, Engineering, Auto and Auto Ancillary
Shirwal	60	Engineering, Consumer Durables, Chemicals, Pharmaceuticals
Uruli Kanchan	33	Engineering, Paper, Agriculture
Rajgurunagar	43	Engineering, Confectionary

Source: District Industrial Centre (DIC), 2013 Data (Sixth Economic Census, 42nd Round)

Table 10.19: *Major SMEs in Pune district*

Sector	Number of Enterprises	Number of Employees
Manufacture of fabricated metal products, except machinery and equipment	4,789	46,913
Manufacture of machinery and equipment N.E.C.	3,196	41,630
Other Manufacturing	3,294	37,568
Computer programming, consultancy and related activities	1,276	37,183
Manufacture of food products	3,115	22,592
Information service activities	462	19,831
Manufacture of rubber and plastics product	1,537	18,557
Manufacture of electrical equipments	969	17,027
Employment Activities	396	15,802
Manufacture of motor vehicles, trailers and semi-trailers	898	15,479
Manufacture of basic metals	1,659	12,593
Security and investigation activities	211	11,395
Food and beverages service activities	1,866	11,311
Other professional, scientific and technical activities	1,478	11,126
Manufacture of computer, electronics and optical products	5,74	9,652
Total	25,146	3,28,659

Source: District Industrial Centre (DIC), 2013 Data (Sixth Economic Census, 42nd Round)

Figure 25: Major SME's in Pune District

In terms of economic output, the manufacturing sector's growth occurred due to MIDC developed industrial estates and privately-led complementary industrial clusters. Data on the status of land availability in MIDC estates (Table 10.20) reveals that almost 100% of lands are almost consolidated/committed in terms of absorbing newer industrial tenants.

Table 10.20: Status of MIDC Estates - Study Area

Sr. No.	Name of MIDC Estate	Land area in possession (ha)	Land area allotted (ha)	Vacant land Unalloted (ha)	Land area to be acquired (ha)	Remark
1	Chakan Ph.-I	256			3	
2	Chakan Ph.-II	1,407			29	Vacant land unalloted is not consolidated Undulating land.
3	Chakan Ph.-III	584	2,613	37	4	
4	Chakan Ph.-IV	402			2	
5	Chakan Ph.-V	-	-	-	637	400-485 ha. to be acquired by Dec. 2019

6	Talegaon Ph.-I	578	-	-	-	20 Ha. not available for development
7	Talegaon Ph.-II	271	-	20	-	
8	Talegaon Ph.-III	-	-	-	-	Denotification due to high acquisition cost
9	Talegaon Ph.-IV old	-	-	-	107	Acquisition status to be confirmed by MIDC
9A	Talegaon Ph.-IV new	-	-	-	2,200	Notification status to be confirmed by MIDC
10	Talegaon Ph.-V	-	-	-	162	Acquisition schedule not defined by MIDC
11	Ranjangaon Ph.-I	929	929	36	-	-
12	Ranjangaon Ph.-II	63	63	-	-	-
13	Ranjangaon Ph.-III	-	-	-	283	To be acquired within 2019
14	Hinjawadi Ph.-I	96.42	63.82	-	-	Allotted land is earmarked but not in possession
15	Hinjawadi Ph.-II	236.24	99.78	-	-	
16	Hinjawadi Ph.-III	351.17	144.69	-	-	
17	Hinjawadi Ph.-IV	11.02	-	-	-	
	Total	5,185	3,913	93	3,427	

Source: MIDC- Regional Office, Pune (RO1)

The major growth catalysts in the region are skilled workforce, good connectivity and supporting infrastructure attracting large investments.

The manufacturing sector is on the verge of major transformations as the industry leapfrogs towards embracing Industry 4.0 and IoT to improve their efficiency. It is likely to boost high-tech Innovation, IT and high-tech engineering, which is already established in the Study Area.

"SMEs employ the majority of the industrial workforce in Pune district."

Most industries are located within 60 km from Pune city, which offers most of the skilled workforce for these industries. Table 10.21 depicts the spread of industrial clusters around Pune city and their major industrial activities.

Engineering and auto industries are distributed across all the industrial clusters. As per the District Industrial Profile - Pune (2012), the employment share of large industries and MSMEs was 38% and 62% respectively. The major sectors that employ the greatest number are engineering, IT-related activities and food processing. In terms of the greatest share of enterprises, engineering and food processing lead the manufacturing SME sector of Pune. There is also major auto-ancillary production in Pune.

"Tertiary sector growth is driven by IT/ITES, Real Estate, Education, Warehousing and Logistics."

The contribution of the tertiary sector grew over the past two decades in the district. Major sub-sectors in the tertiary sector of Pune are - IT/ITES, banking and finance, trade, hospitality, biotechnology research centres, and communication. The sector is still growing and shows potential for further penetration. The factors that promote services in Pune are the competitive land prices, skilled labour and good connectivity to other major growth centres such as Mumbai. Figure 10.26 highlights the major sub-sectors within services. Infrastructural developments in the region can enormously enhance the service sector. Among services, IT exports are the primary economic activity in Pune.

***Figure 10.26**: Sub-Sectors within Tertiary Sector and its contribution*

Source: District Domestic Product Report for Maharashtra 2004-05 to 20013-14 (DES, GoM)

"Pune alone contributes half of the total IT exports of Maharashtra."

Pune is among the top four cities in India in terms of software exports. With its rising IT sector and infrastructure base, it has the potential to reach the likes of Bangalore, to be an IT leader in the country. Pune's share of Maharashtra's IT export stood at 57% by 2014 as per STPI, media sources. Pune's software exports were higher (INR 29,589 crore) compared to Greater Mumbai (INR 21,811 crore). Other cities in Maharashtra such as Nagpur, Nashik, Kolhapur, Aurangabad altogether were under 1%.

Pune is a leading IT destination in India with several IT parks, spanning over Business Process Management (BPM), Information Technology Outsourcing (ITO) and Engineering Services Outsourcing (ESO). Pune saw the fastest growth as an IT destination compared to other IT hubs of India such as Bangalore or Hyderabad. According to NASSCOM, Pune's IT sector employs approximately 3-3.4 lakh workforce spread over Business Process Outsourcing (BPO), Knowledge Process Outsourcing (KPO), ITO and ESO.

Pune has the highest share of private IT parks in Maharashtra, leading over Mumbai and Thane. There are about 172 private IT parks in Pune with major ones being in Hinjawadi, Koregaon Park, Yerawada, Viman Nagar, Kharadi, Magarpatta, Phursungi and Talawade. The Rajiv Gandhi Infotech Park (Phase I, II, III and IV) at Hinjawadi, is a dedicated MIDC Park, targeted to consolidate IT activity of Pune and is spread across a total area of about 695 hectares. IT majors operating from here are Tech Mahindra, TCS, RMZ Corporation, Infosys, Wipro, Cognizant, Ascendas, Hexaware Technologies Limited. Out of the total estimated workforce employed in all the IT Parks, Hinjawadi IT Park employs most of them.

However, it is vital to make Pune future-ready for emerging technological innovations such as Artificial Intelligence, Blockchain, and other high IT innovation sectors. Additionally, it is important to evolve a supportive start-up ecosystem in Pune to harness innovation possibilities in technology and other major sectors fully. It is crucial to upgrade the technology sector of Pune through infrastructure development and skilling.

***Figure 10.27**: Software Export Contribution by Tier I cities in India*

Source: NASSCOM

"Township is a unique feature of the PMR Residential Real Estate market."

There are 16 townships spread over 2018 ha in the Study Area with their areas varying from 42- 331 ha. Out of 16, 10 townships are located on the west side and are clustered around Hinjawadi and Pirangut.

Real estate sector includes four sub-sectors - housing, commercial, retail and hospitality. The regulatory framework changes such as GST, RERA and introduction of REITS have ensured remarkable investments in the real estate segment. As these legislations are meant to protect the interests of buyers and developers, it is not only likely to fuel the market demand but also make the sector more efficient and organised. Increased productivity in the sector would lead to additional employment generation.

"Office spaces, retail and warehousing drive PMR's commercial real estate market."

Pune's commercial real estate market traditionally had a greater supply than demand until 2011, since then the office space off-take increased. Because of this oversupply, the market witnessed fewer launches from 2012 to 2015. Supply normalization was observed in 2012. Thereafter demand has picked up, driven by IT firms and banking, financial services, and insurance (BFSI) sector setting up back offices.

The supply for commercial offices (Source: Cushman and Wakefield report) in Pune is little over 55 million sq ft, with vacancy rates between 4% to 10% in the past five years. About 10.8 million sq ft is under construction. It showed high vacancy in the 2010-2012 periods which came down by 2014-2016, but again in 2017 onwards, it saw a slight decrease.

"Pune is an emerging retail hub with the rising purchasing power and a growing middle class population."

Traditionally retail activity was concentrated in central Pune's high streets such as MG Road, Laxmi Road, JM Road and FC Road. Organized retail made its foray into Pune with the developments of malls such as ICC High Street and Pune Central. Pune has emerged as an organized retail destination over the last 5 to 7 years.

The major factors which supported the retail boom in Pune are:
1. A significant proportion of the population within the age group of 20 to 35 years
2. Higher disposable income among the population employed in the IT/ITES sector
3. Predominantly migrant population

The retail development in Pune is also discerning a growth and movement to peripheral areas of the city. In addition to this, there is an increasing presence of international and national brands across High Streets and Malls. The supply for retail in Pune is about 6.26 million square feet, with current vacancy rates of about 30%. About 2.3 million square feet is under construction.

"Warehousing activity in PMR has been driven by the industrial sector."

Warehousing and logistics sector has been growing in PMR, and the Study Area is becoming one of the major logistics hubs in western India. The industrial sector has driven warehousing activity in PMR with the presence of industries such as automobiles, engineering, electronics, logistics, hi-tech, e-commerce and consumer durables.

Chakan, Talegaon, Ranjangaon are the key warehousing micro-markets with an investment-grade inventory. Pune's Grade A supply stands at 6.82 million sq ft. Other markets such as Sanaswadi, Phulgaon, Wagholi and Lonikand primarily comprise Grade B and C stock. Chakan contributes maximum completed supply, followed by Ranjangaon and Talegaon. A loosely organised stretch of warehousing and logistics activity can be seen at Wagholi – Lonikand – Koregaon Bhima and Katraj which cater to the city's captive demand. Combined supply of this stretch is about 4.82 million sq ft where the majority of the supply is Grade B and Grade C. Chakan shows a vacancy of about 15% whereas Ranjangaon shows 32% vacancy.

Table 10.21: Logistics Supply and vacancy in PMR

Key Micro-market	Total Completed Grade A Supply (in mn sft)	Total Absorption Level in Grade A(in mn sft)	Total Completed Grade B Supply (in mn sft)	Total Absorption Level in Grade B(in mn sft)
Chakan	4.8	4.1 (85%)	4.03	3.55 (88%)
Ranjangaon	0.8	0.54 (68%)	1.12	0.83 (74%)
Talegaon	0.36	0.36 (100%)	0.31	0.31 (100%)
Wagholi-Lonikand-Phulgaon	4.77	4.77 (100%)	0.99	0.61 (62%)
Koregaon-Bhima-Sanaswadi	0.40	0.40 (100%)	0.86	0.82 (95%)
Katraj	-	-	0.3	0.3 (100%)

Source: CBRE Research

"About 1.5-1.65 lakh graduates are produced in Pune per annum."

Pune has been Maharashtra's educational capital for decades, with several institutes of national importance and renowned research centres. Pune comes 4th in the country by the number of colleges. Moreover, it has a large number of well-known research centres that elevate its role as educational hub at the national level. These institutes include National Chemical Laboratory, IISER, IITM.

Pune being an educational hub also offers a skilled workforce for several industries. It has an annual output of about 1.5-1.65 lakh graduates spread across diverse sectors. This talent supports the transition of the region to high tech and high innovation sectors. Figure 10.12 shows the spread of total annual talent output of Pune across diverse disciplines. It highlights the advantage of Pune in terms of available skilled workforce and strong share in science, technology and innovation. Science, Technology, Engineering, Mathematics (STEM) graduates account for about 50% of total talent output in Pune.

Table 10.22: Major Higher Education Institutes

Sr. No.	Institutions	Research Publication	Patents (Granted)
1	NCL,Pune	3,232	114
2	Centre for Development of Advanced computing	132	12
3	Centre for Development of Telematics	132	7
4	Centre for Materials for Electronics Technology	2,302	6
5	The Automotive Research Association of India	18	3
6	India institute of Science education and Research	1,234	0
7	Indian institute of Tropical Meteorology, Pune	890	0
8	National Centre for Cell Science	516	0
9	Armed Forces Medical College	496	0
10	Defence Institute of Advanced Technology	381	0
11	Agharkar Research Institute	358	1
12	National Institute of Virology	313	0

13	Armament Research Board - Defence Research and Development Organization (DRDO)	41	1
14	Central Water and Power Research Station	44	1
15	Indian Institute of Science Education and Research	1,234	1
16	Bharati Vidyapith	330	0
17	Poona College of Pharmacy	497	0

Source: Mapping Patents and Research Publications of Higher Education Institutes & National R&D Laboratories of India, 2018

"Employment base of the Study Area is Transforming."

As per 2011 Census, PMR holds about 74% of the total employment in the Pune district. Study Area employment by 2011 was 8.3 lakhwith a total population of 17.3 lakh.

Study of Census 2011 indicates that the primary sector forms the economic base of the Study Area by engaging 57% of the working population in agriculture where 41% are cultivators and 15% are labourers.

The middle section is occupied by the secondary and tertiary sector (indicated as others) occupying about 41% of the workforce. Remaining 3% are occupied in household industries. This aligns with the share of district-level employment in the primary, secondary, and tertiary sectors, engaging 53%, 21%, and 26% of the workforce respectively (DES Data, 2013-14). This also indicates that the cross-section of employment at Study Area level reflects district level sectoral employment shares. Considering this, district-level employment by sub-sectors (Sixth Economic Census 2013-14) has been used as the basis to classify employment in the Study Area by sub-sectors. Variation in decadal growth rates is studied for PMR to understand the overall trend and find its correlation to the urbanisation of the Study Area, which is explained in demographic analysis. Refer to Table 10.9 below.

Based on this Census 2011 data, it is observed that employment of the Study Area shrank by 9% between 2001-11 which is attributed to the drop in agricultural employment (15-20%). On the other hand, employment in others, i.e. secondary and tertiary sectors, grew by 23%. This indicates that the economic base of the Study Area is getting replaced by secondary and tertiary sectors.

Table 10.23: PMR Area Employment Scenario

PMR Employment	1991	2001	Growth 1991-2001 (%)	2011	Growth 2001-2011 (%)
PMC	5,37,014	8,65,150	61	12,99,487	50
PCMC	2,41,790	3,50,260	45	6,76,832	93
Municipal Councils	56,887	77,519	36	1,10,283	42
Cantonments	66,000	72,536	10	80,329	11
Study Area	450,523	629,718	40%	824,724	31%

Table 10.24: Study Area Employment Scenario

Study Area Employment	1991	2001	Growth 1991-2001 (%)	2011	Growth 2001-2011 (%)
Total Employment	450,523	629,718	40%	824,724	31%
Agri. Labourers	52.65%	48.43%	-8%	35.42%	-13%
Cultivators	19.03%	18.13%	-5%	14.93%	-17%
HH Industries	2.24%	2.39%	7%	2.67%	10%
Others	26.08%	31.05%	19%	44.2%	30%

Table 10.25: PMR Study Area Employment by Sectors

No	Employment Projection	2011* Share	2011 Share	2011	2021	2031	2041	2041 Share	CAGR
1	Primary	53%	53%	441,964	707,231	772,780	658,985	25%	1%
2	Secondary (Non-manufacturing)	3%	3%	22,004	40,270	86,433	123,889	5%	5%
3	Automotive	2%		14,353	26,405	37,011	65,898		4%
4	Auto-ancillary	7%		56,083	103,174	128,859	192,424		3%
5	Engineering	4%		36,229	66,649	93,420	158,156		4%
6	Pharma	1%		4,791	8,813	16,258	52,719		6%
7	Biotech	0%		492	904	5,172	34,267		11%
8	Electronics	3%		28,422	52,287	78,096	131,797		4%
9	Food processing	0%		2,654	4,882	19,524	79,078		9%
10	Heavy machinery	0%		3,282	6,037	5,542	7,908		2%
11	Others	1%		5,127	9,432	6,599	2,636		-2%
22	Information and communication (including computer system, consulting and related services)	2%		13,409	26,765	52,478	92,258		5%
23	IT- Other service activities (not classified elsewhere)	7%		55,492	96,048	137,238	197,695		3%
	Secondary (Manufacturing)		27%	220,332	401,397	580,198	1,014,837	39%	4%
12	Sales, Maintenance and Repair	1%		11,444	29,637	50,844	73,806		5%
13	Wholesale trade	1%		10,341	32,600	54,301	79,078		5%
14	Freight and Storage (with postal and courier work)	2%		17,308	40,306	91,519	131,797		5%
15	Retail trade	3%		24,169	54,828	79,316	105,438		4%
16	Restaurants and hotels	2%		17,998	32,078	70,441	79,078		4%
17	Financial and Insurance Work	1%		8,266	14,984	40,441	57,991		5%
18	Real estate work	1%		4,695	8,366	18,375	31,631		5%
19	Arts, Entertainment, Sports and Entertainment (excluding illegal gambling and betting)	0%				10,169	13,180		3%

20	Vocational, scientific and technical work (including advertising, marketing, research, and veterinary work)	6%		46,250	88,910	128,127	158,156		3%
21	Organized administrative and support service activities (travel agency, routine work and session and organized trade exhibitions)	0%			14,818	16,270	21,088		3%
24	Educational	0%		3,206	9,632	24,405	55,355		8%
25	Human health and social work (including residential and non-residential resident center)	0%		3,453	6,770	10,136	31,631		6%
	Tertiary		18%	147,131	332,927	594,344	838,229	32%	5%
	Total Employment	100%	100%	831,430	1,481,825	2,033,755	2,635,939	100%	~

10.6 Summary of Key Findings

1. Pune district is the third-largest economic contributor in Maharashtra's Economy. It has already established itself as a service centre, catering to the catchment of western Maharashtra. Secondary and tertiary sectors are key economic drivers of the Pune district economy.

2. The manufacturing sector leads the district economy in terms of output. However, the agriculture sector generates the majority of employment. Tertiary sector growth is driven by IT, ITeS, real estate, education, Warehousing, and Logistics. The district alone contributed about 57% of Maharashtra's total IT exports. PMR is a growth engine of the district economy.

3. PMC employment growth has declined whereas PCMC jumped by 17% during 2001-2011. This fact aligns with the trend of employment generators shifting outside PMC due to higher land and/or operational costs. There was a substantial rise in the population of PCMC due to relatively cheaper cost of living and proximity to existing industrial clusters in PCMC and major employment generators. Currently, PCMC is also facing a shortage of more affordable land for industrial expansion. In this context, the Study Area has emerged as the manufacturing and IT hub of PMR.

4. Prima facie, the Study Area appears to be rural with an urbanisation level of just 9%. However, decadal growth rates indicate that the rural population is gradually declining (decadal growth of 24%) and urban has been exponentially growing (decadal growth of 85%). The overall decadal growth rate of the Study Area is moderate (28%).

5. The Study Area employment is undergoing an economic transition where the agricultural workforce (53% of total employment) reduced by 15-20% within a decade whereas secondary and tertiary sector employment grew by 15% between 2001- 2011.

6. Demographic growth potentials of the Study Area are high with a favourable Female/Male ratio. However, literacy rates are relatively low compared to municipal corporation areas. According to CTTS household survey 2018 in the Study Area, only 15% of the workforce has been pursuing professional courses, about 56% of the workforce is educated up to 10th class, and 22% are educated up to 12th class within the Study Area. Upgrading skills is the first challenge.

7. Study Area's household size shrank from 5.1 to 4.2 (urban) and 5.5 to 4.8 (rural) between 1991-2011, indicating out-migration. WFPR in the Study Area (48%) is higher compared with Corporations (39%). However, it may not necessarily be an indicator of high productivity as most of the rural workforce is employed in the agriculture sector whose GDP contribution is below 5% compared to employment that it creates.

8. Household income levels are low in the Study Area compared to the PMR. Average household income in the Study Area is INR 17,600. Over 70% of households earn less than INR 20,000 per month. About 59% of

households earn less than INR 20,000, and about 24% earn INR. 20-50,000.

9. As per MHADA's classification of income groups, 59% of households fall under the EWS category and 24% under LIG category. Increasing income levels and affordability of 83% of households is the second major challenge.

10. The third key challenge is to address shrinking employment in the agriculture sector and productivity; and relatively slow growth in the industrial sector (global phenomena). It needs a robust regional economic positioning to identify complimentary new economic sectors for initiating the economic diversification process.

Figure 10.28: Regional Economic Competitiveness of PMR

- Pune District Contributes to approx. 11% of the state's share in employment; 76% of the workforce being literate, highest in the state

- Approx. 300,000 direct jobs generated by IT sector; 31,000 more skilled jobs to be created in Education Sector by 2041

- Mumbai, the financial capital of the country acts as a regional HQ for manufacturing MNCs present in Pune; can also be considered Gateway to Pune through sea (JNPT)

- Upcoming Airport at Navi Mumbai and Navi Mumbai SEZ touted to compliment Industrial story of Pune; shall also enhance viability of logistics sector along the belt

- Strong Connectivity with Mumbai and JNPT through Mumbai-Pune Expressway

- **Hyperloop** and upcoming **Airport at Purandar** expected to enhance accessibility and Imageability of Pune from a Logistics and Tourism angle

- Ring Roads and Regional Rail Network to further facilitate multi-modal connectivity of Pune to

Young Workforce (48% workers in age group of 15-40 years)

Smart Cities (Pune being at the pole position in terms of Liveability along with PCMC)

Regional Economic Influence of Mumbai & MMR

Advantage PMR

Established Educational & Research Base

Ace regional Infrastructure (Hyperloop, Purandar Airport and MSRDC Ring Road)

Firm IT, Industrial and Logistics Base (IT/ITeS, FinTech, Automobiles, Engineering and Electronics)

- Pune (City) ranked number 1 on 'Ease of Living' Index 2018, issued by MoHUA, GoI and ranks 8th in India in terms of Cost of Living Index, ahead of Mumbai

- Pune and Pimpri-Chinchwad being planned to emerge as regional centres of excellence for Trade, Technology, Education and Liveability

- As many as 16 major private and public sector universities and 811 colleges (affiliated with Pune University)

- 85+ registered Biotech and Pharmaceutical R&D labs present in Pune, second after Mumbai

- One of the only 12 cities to have a dedicated Biotech Park in the country, 1st in Maharashtra

- Pune accounts for ~10% of Software exports from Tier I cities of India, highest in State (Mumbai 8%) accounting to ~4.4 Bn USD with approx. 135 Units functional in Pune

- Auto industry, already a leader in India, to generate ~70,000 new jobs by 2041, ~68% jobs generated from **SMEs**

Chapter 11: Regional Economic Positioning and Socio-economic Projections

The first half of this chapter covers socio-economic projections, and the second half will discuss the regional economic positioning, including economic transition strategy.

Regional economic positioning systematically assesses existing economic drivers and anticipates future drivers. While doing so, it factors in their growth/decline trends into socio-economic projections. This is necessary so that projections do not merely reflect historical trends as recorded in Census data. It lays the foundations of the economic development plan for the Study Area and guides policy formation to boost the region's economic competitiveness.

11.1 Socio-economic Projections

Socio-economic projections are worked out village wise for 814 villages within PMRDA jurisdiction. Projections are carried out for population, resident workforce/working population and household for 2021, 2031 and 2041 and are based on three historical Census datasets of 1991, 2001 and 2011.

Projections for PMR

Projections are carried out in two parts. Population projections for PMC, PCMC and Cantonments are taken from the CTTS and kept constant. While projecting populations for municipal councils, Planning Areas and Rural Areas, four established methods of population projections such as arithmetic increase, geometric increase, incremental increase and graphical curve method were tested.

Out of these four methods, projections through the geometrical increase method were outliers; as the geometrical increase method projections were more than 10 lakh vis-à-vis projections using the remaining three methods. Thus, they were discarded. Similarly, the projection using the graphical curve method was not adopted as the accuracy is dependent on the skill and experience of the person dragging the curve, which is subjective.

Ultimately, arithmetic increase and incremental increase methods were chosen for detailed village level projections of the study area due to their relevance, as explained below.

Projections for Study Area

The Study Area is organised into two parts - Urban Growth Centres and Rural Area based on the assessment of the urban/rural development potential of 814 villages. Two hundred and thirty-three villages are identified for urban development (referred to as Urban Growth Centres), and 581 villages are identified for rural development (referred to as Rural Areas). Detailed village-wise population projections are carried out for Urban Growth Centres and Rural Areas separately.

The arithmetic increase method is used for projections of Rural Areas as the growth rates of most of the villages are stabilising/declining.

For village wise projections of Urban Growth Centres, the arithmetic or incremental increase method is used based on the individual village's growth rate. However, just summing up the village-wise populations of urban and rural villages in isolation to project the population of Urban Growth Centres will not be feasible since all the villages are closely linked to each other and not isolated. Thus, for projections of each Urban Growth Centre as a whole, Urban-Rural Growth Differential (URGD) method is used since each Urban Growth Centre contains a mix of interdependent urban and rural villages showing different demographic growth trends.

URGD is the most reliable method for such cases since its formula considers the urban and rural growth difference in relation to the total population while projecting. It is also known as the United Nations method. Pune district level projections in RP 1997 are also based on the URGD method. Urban-Rural Growth Differential rate in the URGD

formula is computed by taking the difference between average urban population growth rate and average rural population growth rate. The remaining methodology of the projection exercise is shown in Figure 11.1.

Figure 11.1: Methodology for Study Area Population Projections

Projections for Rural Areas i.e. 581 Villages

For Rural Areas, the arithmetic increase method is used, where the average increase in population is assumed to be constant from decade to decade. The average increase per decade is found out from the previously available census data (1991, 2001, 2011). This number is multiplied by the number of decades for which the population is to be worked out and is then added to the present population to get the future population after 'n' decades.

$$Pn = P + n * d$$

Where Pn is the future population after n decades, P is the present population, n is the number of decades and d is the average increase per decade.

The total population of 581 villages represents the total Rural Area population for a particular decade.

Projections for Villages under Urban Growth Centres

Evolution of the Study Area shows that its urbanisation level would determine the population growth of Urban Growth Centres, and it would be dependent on the difference between urban and rural growth rates.

'Urban-Rural Growth Differential' means the difference between the population growth rate of urban and rural areas. It is observed that the difference is maintained for an indefinite future period without leading to absurd results by using the URGD Method. This is irrespective of the current urbanisation level, total population growth rate, or whether the rural population is increasing or diminishing.

First, villages are classified under rural and urban character based on the parameters satisfied by them as explained in the assessment of urban/rural development potential of 814 villages in Chapter 9. Urban villages are selected based on parameters 1 to 8.

Then, the population for each of the 233 villages is projected, and the total natural population is worked out.

For village-wise population projections, villages are classified into two categories based on their growth rates from 2001 to 2011. The incremental increase method is used for villages with growth rates more than the average growth rate of 233 villages in Urban Growth Centres. In contrast, the arithmetic increase method is used for villages with growth rates below average. First, the average increase per decade is found out in the incremental increase method, and then the average percentage increase per decade is worked out. The future population is worked out from the following equation:

$$Pn = P + n * d + (n*(n+1)/2)*t))$$

Where Pn is the future population after n decades, P is the present population, n is number of decades, d is average increase per decade, t is average incremental increase per decade.

Then, inputs such as urban population, rural population, total population, urban growth rate, and rural growth rate of each village in Urban Growth Centres are inserted in the URGD method formula. Refer to the formula shown in Figure 11.1. The existing urban population will be multiplied with a factor of urban-rural growth differential. The factor considers average urban-rural growth difference for the past three decades, existing rural and total population and future total population projected using arithmetic/incremental increase method. This calculation procedure is adopted for all eighteen Urban Growth Centres.

Urban Population in URGD

Urban Population in URGD method has been calculated by adding the population of villages categorized as Urban within the DP planning Area. About 104 villages have been categorized as Urban in URGD method. The process of selecting Urban villages is represented through the maps (Fig.11.2 to Fig.11.7) and explained though four steps in the following table (Table 11.1).

Table 11.1: Categorizing Urban Villages in URGD

No	Category of Villages	No. of Villages	Remark
1	Census Towns	29	Villages are selected as Urban if they fulfil all the three Census parameters of Population >5,000, Density >400 pph, and Main male working population in non agriculture >75%
2	Villages with High Density and high workforce in Non Agricultural Acitivites	21	Further, some more villages qualify as Urban if they fulfil both the following parameters since they indiate that they are already urbanised: 1. Villages having Population Density greater than 400 pph (as per the census definition) 2. Villages having Main Male Working population engaged in non agricultural employment higher than 75%
3	Villages with good connectivity and high density considered as Urban	47	Additionally, villages are shortlisted as Urban if they fulfil both the following parameters they can become an Urban Nucleus within each DP PA in future and attract rural migrants: 1. Villages along National and State Highways, Expressway, proposed Ring Road and with Railway stations 2. Villages having Population Density greater than 400 pph (as per the census definition)
4	Villages Additionally considered as Urban as per Planning Intent	10	Villages are added to Urban Category based on the Planning Intent such as: 1. Villages with proximity to proposed Airport: Vanpuri, Sonori, Dive 2. Villages with presence of Proposed ITP/ TPS: Urse, Manjari Kh. 3. Village with excellent connectivity (Proximity to Highway, Expressway, Ring Road and Railway): Shirgaon 4. Villages with existing IT Cluster: Man, Bhoirwadi 5. Village fully built up: Kune N. M. 6. Village with urbanisation potential due to high Population and Density: Rakshewadi

5	Villages omitted	-5	From above selected villages, 5 villages are omitted, inspite of meeting above criteria, due to constraints. Such villages are Kolwadi, Chivhewadi, Holewadi, Kedgaon, and Sandbhorwadi
6	Total 'Urban' Villages in URGD	102	Devghar, Bhaje, Kune N.m., Indori, Kanhe, Malvali, Bebad Ohol, Gahunje, Karla, Patan, Varsoli, Waksai, Varale, Urse, Parandwadi, Somatane, Shirgaon, Sangavade, Brahman Wadi, Mohitewadi, Dongargaon, Khadkale (CT), Sudumbare, Kusgaon Bk. (CT), Talegaon Dabhade (R), Bhoirwadi, Man, Mahalunge, Bavadhan BK, Kasar Amboli, Sus, Bhugaon, Marunji, Hinjavadi, Pirangut, Dive, Sonori, Vanpuri, Pawarwadi, Alandi, Charholi Kh., Kelgaon, Khalumbare, Moi, Chimbali, Mahalunge, Shiroli, Waki Kh., Yevalewadi, Kuruli, Medankarwadi, Kadachiwadi, Rase, Nanekarwadi, Kharabwadi, Rakshewadi, Chandoli, Satkarsthal, Yawat, Kedgaon Station, Boripardhi, Awhalwadi, Manjari Kh., Autad Handewadi, Khed Shivapur, Loni- kand, Koregaon Mul, Kadamvak Wasti, Kunjirwadi, Kopare, Dehu, Holkarwadi, Kirkitwadi, Kondhave Dhavade, Perane, Uruli Kanchan, Sortapwadi, Manjari Bk, Pisoli, Loni-kalbhor, Vitthal Nagar, Nimbalkarwadi, Ramnagar, Vadgaon Shinde, Wagholi, Khadakwasale, Nanded, Malinagar, Mangewadi, Jambhulwadi, Narhe, Kelavade, Kamthadi, Shindewadi, Velu, Kapurhol, Nasrapur, Karegaon, Shikrapur, Ranjangaon Ganpati, Koregaon Bhima (CT), Sanaswadi (CT)

Figure 11.2: Villages fulfilling all three Census parameters (Census Towns) considered as Urban

Figure 11.3: Villages with High Density and High Main Male Workforce in Non-agriculture considered as Urban

Figure 11.4: Villages with good Connectivity and Population Density greater than 400 pph considered as Urban

Figure 11.5: Villages additionally considered as Urban as per Planning Intent

Figure 11.6: Villages Removed from Urban category *Figure 11.7*: Urban villages in URGD
due to constraints

Projections for Projects

1. The population of various projects in the Study Area such as Townships, Town Planning Schemes and Sanctioned Layouts are calculated based on the following:
2. PMRDA has approved 16 townships over 2,018 hectares - 15 townships in Urban Growth Centres and 1 in Rural Area. The population of each township is estimated based on the gross residential density of 250 PPH.
3. Populations of six notified Town Planning Schemes (TPS) are considered as per their respective TPS reports.
4. The Study Area has about 3,592 hectares of sanctioned layouts, out of which 2,527 hectares are in Urban Growth Centres and 867 hectares in Rural Areas. The population of sanctioned layouts is calculated by considering the gross residential density of 250 PPH.
5. Promoting greenfield development at Saswad Growth Centre is a planning strategy, considering the proposed Chhatrapati Sambhaji Raje International Airport. Since this Growth Centre does not have an adequate existing population, the projections can not reach a sufficient population required to justify amenities and other public developments. Hence, Saswad Growth Centre's population is induced by proposing a consolidated residential development of 225 hectares and a gross density of 250 PPH applied to 50% of the area.

To estimate employment and households of the projects in Urban Growth Centres, Workforce Participation Ratio and Household size are projected for 2021 using the incremental increase method. The incremental increase method is used since the projects are majorly present in the villages that show higher than average growth rates. By this method, WFPR comes out to be 48.6%, and household size works out to be 4. These numbers are used to calculate employment and households for the 'Projects' population for years 2021, 2031 and 2041.

Total Study Area Population

The total Study Area population is worked out by adding individual populations of Urban Growth Centres, Rural Areas, Townships, TP Schemes and sanctioned layouts.

Employment and households are estimated using the Census 1991, 2001 and 2011 datasets and methodology as explained above.

Population, employment and household projections for each Growth Centre are provided in Table 11.6, 11.7 and 11.8.

Table 11.2: Summary of Projections for Study Area

Key Projections	2011	2018	2021	2031	2041
UGC Population	953,579	1,667,369	1,989,629	2,977,366	4,074,098
UGC Employment	417,287	744,827	893,163	1,343,285	1,842,331
UGC Households	210,669	398,287	483,764	745,478	1,040,985
UGC Household Size	4.5	4.2	4.1	4	3.9
UGC Workforce Participation Rates	43.80%	44.70%	44.90%	45.10%	45.20%
RA Population	757,913	961,242	1,048,383	1,172,550	1,296,718
RA Employment	407,437	527,263	577,770	673,299	767,981
RA Household	152,340	204,451	226,785	259,654	292,523
RA Household Size	5	4.7	4.6	4.5	4.4
RA Workforce Participation Rates	53.80%	54.90%	55.10%	57.40%	59.20%
Total Population	1,711,492	2,628,611	3,038,012	4,149,916	5,370,815
Total Employment	824,724	1,272,090	1,470,933	2,016,584	2,610,311
Total Households	363,009	602,739	710,549	1,005,132	1,333,507
Household Size	4.7	4.4	4.3	4.1	4
Workforce Participation Rates	48.19%	48.39%	48.42%	48.59%	48.60%

Note: UGC - Urban Growth Centres; RA - Rural Areas. Numbers for 2011 are based on Census 2011 data.

11.2 Regional Economic Positioning

The truncated pyramid represents the PMR economy. The base constitutes four sectors indicating high productivity. The top two sectors denote weak productivity with untapped potential, and the middle sector - research and education demonstrates its strategic importance by serving a skilled workforce for all the sectors. Refer to Figure 11.8.

Figure 11.8: Existing Economic Base and Proposed Catalysts

Although Pune's key strengths are manufacturing (automobile and engineering), IT/ITES, education and research and emerging biotech, pharma industry, other cities have already established their stronghold at the national level. For example, automobile manufacturing has been a stronghold of Chennai. Bangalore supersedes Pune in terms of IT exports, the number of higher education institutes and innovation quotient (patents filed), and biotech sector output. Hyderabad is India's Pharma hub. Moving forward, prospects for higher Quality of Life (QOL), relatively lower cost of living, and the availability of economic opportunities would be the key differentiator for PMR to sustain its economic competitiveness. Figure 11.9 highlights the regional economic competitiveness of PMR.

Figure 11.9: Regional Economic Competitiveness of PMR

Strategic regional infrastructure development projects and external development initiatives are likely to improve PMR's attractiveness for investments. For example, international airports at Navi Mumbai and Saswad, railway infrastructure up-gradation, Dighi port development, Development Plans for NAINA and MSRDC (71 villages) and PMR level development initiatives such as MIDC planned land consolidation, 2 Ring Roads and Metro proposals are likely to be growth drivers for the Study Area.

PMR is witnessing a spur in investments into auto, engineering, IT/ITESand FMCG (Fast Moving Consumer Goods). While these sectors are foreseen as future employment growth drivers, emerging trends are also assessed to understand prospects for these sectors. It is identified based on market intelligence, understanding emerging global trends, considering government policies and capturing stakeholder aspirations.

Potential Economic Drivers

Proposed economic sectors for the Study Area are organised into three categories as below based on the aspects discussed above:

Hinterland Sectors: Synergies from District Catchment

- Automotive (Production and R&D)
- High-tech Engineering
- Information Technology, IT Enabled Services
- Logistics and Warehousing (FMCG, Agriculture Manufacturing and Retail Industry)
- Education, Research and Skill Development
- Smart Agriculture (High-value Agriculture, Agri-mechanisation, Traceability of Agriculture and Food)
- Tourism (Leisure, Agro, Heritage, Adventure Tourism)
- Wellness Tourism (Hospitals, Wellness Centres, Yoga and Spiritual Tourism, Alternative Medicines)

Demand Pull Sectors: Synergies from Competing Regions

- Electronics (for Industries, Government, Services Sector and Agriculture)
- Life Sciences (Biotech, Pharmaceuticals, Medical Devices etc.)
- Banking, Financial Services and Insurance (BFSI)
- Agro and Food Processing
- Design (Animation and Gaming)
- Healthcare
- Media and Entertainment

Sunrise Sectors : Synergies from Global and India Growth

- Innovation and High-tech Industries (Industry 4.0)
- Defense Equipment Manufacturing
- Renewable Energy (Biofuels, Methanol, Hydrogen fuel cells, Clean Energy related component manufacturing/ assembly)
- Electric Mobility
- IoT, AI and Robotics
- Blockchain and Fin-tech

Table 11.3: *Assessment of Future Potential of Existing Growth Drivers of PMR*

Existing Growth Drivers- PMR	Prospects and Potential	Emerging Trends
Automotive Sector	• Strong existing infrastructure and investment • Potential for an export oriented as well as domestic market focused production	• Smart Manufacturing- Value chain digitisation & use of real-time data, intelligent technology enhancing communication, productivit
Auto-ancillary	• An evolved sector in PMR • Goes hand in hand with the automotive sector development	• Robotic technologies - impact reaching into logistics and supply chain organizations. Becoming increasingly important for SMEs t adopt as these technologies take center stage
Engineering	• Strong employment prospects • Needs skilling and human resource development for fully utilising technological advancements in the sector	• Additive Manufacturing (3D printing)- customized three-dimensional parts from digital designs
IT/ ITES	• Stronghold of the region • Potential to evolve into high innovation IT sectors like AI and Big Data	• Network/Cybersecurity- IT audit and penetration test is becoming norm. • Internet of Things- IOT having a major impact on smart manufacturing
Banking & Insurance	• Growing regional economy fueling banking and insurance penetration • Potential for innovations in FinTech and IT enabled services like Blockchain	• Blockchain Technology saving time and cost of processing trade transactions
Education & Research	• Stronghold of Pune • Huge potential to drive start-ups, innovation, technical skilling and R&D	• Foreign Universities with local campuses • Digital education, Virtual Campus • Newer concepts like Superlabs
Supply Chain Logistics	• Emerging in Pune with industrial base & e-commerce penetration; • Huge potential to support all sectors, especially FMCG, Agro-processing	• Business-to-Business-to-business (B2B) and business-to-consumer (B2C) internet businesses have evolved from basic communications channels to complete end-to-end mediums

Economic Transition Strategy

Historical trends in GDP and employment growth indicate that economy of PMR is in a transition phase, where the primary sector is likely to face a decline in output with a scarcity of workforce, the secondary sector growth rate is likely to slow down, and the services sector would witness significant growth as the Study Area urbanises, over the next two decades. Economic transition strategy essentially addresses this phase by recommending sectors that would play the role of sustainer, enabler or driver of this economic transition to diversify the economy.

Sustainers

Findings from the demographic and economic analysis point out three main challenges for the Study Area: upgrading skills of the workforce, increasing income levels and raising affordability, addressing the shrinking employment base of the agriculture sector.

These challenges are linked to the livelihood source of 53% of the Study Area workforce, i.e. the agriculture sector, that has been grappling with the lowest productivity (GDP contribution below 5%). Therefore, the economic transition should begin from the agriculture sector. Improving the productivity of the agriculture sector through 'value addition' and leveraging the services sector to bridge the gap between production and processing would kick start the economic transition.

The burgeoning service sector (commercial and logistics), which is already absorbing most of the unskilled and semi-skilled workforce of the Study Area, can seamlessly connect the farm and consumer/agro and food processing industry.

Adopting technology for mechanised farming, weather and market predictability, traceability, agricultural research can be the means of improving productivity. Therefore, sectors such as smart agriculture, agricultural biotechnology and FMCG (agro and food processing, supply chain logistics) are seen as employment 'sustainers' that would retain the jobs dependent on agriculture. The sectors shall be promoted on the agriculturally productive east side and near the proposed airport, which is seen as a gateway to agrarian districts of western Maharashtra.

Enablers

Tourism, construction and education sectors can 'enable' the transition from primary sector employment in the short term. The tourism sector is already established as a source of employment for the rural workforce. Consolidation of this sector is needed by promoting Tourism Getaways, i.e. aggregation of tourism developments representing particular themes. Leisure, Wellness and Adventure tourism in the Western Ghats, Religious/Spiritual tourism on the north side, Heritage tourism on the south/southwest and agro-tourism on the east side of PMR should be incentivised.

Committed public investments in regional infrastructure and downstream real estate development could trigger substantial jobs in the construction sector. Vocational training of the local workforce and skilling centres should be set up on priority by engaging large industries and SMEs.

Drivers

Manufacturing, IT and the commercial sector are likely to continue as the 'drivers' of the economy. As industry majors are already transforming their operations to embrace Industry 4.0, IoT and digitisation for higher productivity, it would require its ancillaries (SMEs) to organise themselves to remain relevant.

SMEs are the largest employment generator and are likely to create substantial new jobs in industrial ancillaries, IT/ITES, e-commerce and supply chain logistics.

Ecosystem requirements of these newer versions of industries will have to be planned proactively by establishing newer IT parks, business parks, logistics clusters and industrial clusters. These could be set up in the north, east and south of the Study Area for balanced regional growth.

Although electronics, life sciences, design (animation and gaming), media and entertainment, defence manufacturing, renewable energy, blockchain and fin-tech are not seen as drivers of the PMR economy, these need to be encouraged to diversify the economy.

Employment Projections

Data Sourcing Limitation

- Most of the statistical information is available at the taluka/district/state level, whereas the Study Area/ Planning Area is defined with villages (814 Villages). This necessitated the compilation of data at the village level from the Census 1991, 2001 and 2011.
- Census data does not provide employment by each sector. Therefore, the district level report on the Sixth Economic Census Maharashtra State 2013-14 is used to fill this gap.

Derivation of Employment Split by Sector, 2011

As per Census 2011, total employment of the Planning Area was 8.25 lakh. (Refer to Table 11.4)

Table 11.4: *Employment Scenario of Planning Area Census 1991, 2001, 2011*

Employment as per Census Data	1991		2001		2011		CAGR (2001-1991)	CAGR (2011-2001)
Total employment	450,523	100.00%	629,718	100%	824,724	100%	3.4%	2.7%
Total Primary Sector	333,027	73.9%	434,191	68.9%	438,399	53.2%	2.7%	0.1%
Agri. Labourers	237,200	52.6%	304,972	48.4%	292,092	35.4%	2.5%	-0.4%
Cultivators	85,735	19.0%	114,168	18.1%	124,533	15.1%	2.9%	0.9%
HH Industries	10,092	2.2%	15,050	2.4%	21,773	2.6%	4.1%	3.8%
Others (Secondary & Tertiary Sector)	117,496	26.1%	195,527	31.0%	386,325	46.8%	5.2%	7.0%

As of 2011, primary sector employment was 53% (agricultural laborious, cultivators, and household industries). Census data classifies the rest of the employment as 'Others' which was 47%. 'Others' represents combined secondary and tertiary sector employment.

Census figures show downward trends in the primary sector share in rural employment from 74% in 1991 to 69% in 2001 and 53% in 2011. By 2011, its GDP contribution was about 4%. Total primary sector employment CAGR between 1991-2001 was 2.7% whereas it was 0.1% between 2001-2011. This aligns with the observed trend of

shrinking agricultural employment due to the low productivity of the sector and also the rural exodus.

Census 1991, 2001, 2011 figures indicate that the combined share of secondary and tertiary sectors increased from 26% in 1991 to 31% in 2001 and 47% in 2011. Combined secondary and tertiary sector employment CAGR between 1991-2001 was 5.2% whereas it was 7% between 2001-2011. This is in tandem with spillover of the secondary sector (non-manufacturing) activities (construction material production and mining) and tertiary sector activities (logistics, commercial, tourism support, education, health etc.) into the rural areas. This is mainly due to large land uptakes in rural areas and the higher cost of operations in urban areas.

In order to understand the break up of the secondary and tertiary sector by 2011, the 'Others' category of employment is subdivided using the sectoral shares depicted in the Sixth Economic Census of Maharashtra 2013-14.

The resultant split is regrouped into the secondary and tertiary sector. Thus, the sectoral employment breakdown of 2011 is derived for the primary sector (53%), secondary sector (29%) and tertiary sector (18%) for the Planning Area. (Refer to Table 11.4).

Employment Projection by Sector: 2011-2041

The URGD method is used to project Planning Area employment by 2041 (along with population and households). The Planning Area would have 26.1 lakh total employment as per the same.

While keeping an ultimate target as 26.1 lakh, the previously mentioned derived sectoral split of 2011 is analysed and projected till 2041 by using the Linear Regression method.

However, as per the Linear Regression method, the share of certain sectors was observed to be constantly decreasing while the same for certain sectors was continually increasing. For example, agriculture's share would follow the trend and reduce to a single-digit share till 2041. On the other hand, sporadic expansion of IT companies in the late 1990s and early 2000s contributed to an exponential increase in the combined share of the secondary and tertiary sector, which almost doubled between 1991-2011.

Using only these growth rates would have resulted in skewed projections. Therefore, during the regression analysis, both sectoral shares and CAGR are used as variables to project the sectoral employment till 2031, and 2031 figures are tweaked to align with envisaged growth as per planning intent to derive 2041 employment.

The methodology used to project sector-wise employment projections is as follows (Refer to Table 11.4):

Primary Sector

Considering historic data from 1991 to 2011, the share of the primary sector, with respect to overall employment, dropped from 74% to 53%, and CAGR declined from 3% to 0.1% over the

past three decades. 2041 employment is projected considering a CAGR of 1% to ensure that projected employment does not shrink below the 2011 figures of primary sector employment.

This implies retaining rural jobs by improving the productivity of the sector as per the proposed economic transition strategy. The resultant share of the primary sector would reach 25% of total employment by 2041.

Table 11.5: Employment Projections

No	Employment Projection	2011* Share	2011 Share	2011	2021	2031	2041	2041 Share	CAGR
1	**Primary**		**53.16%**	**438,399**	**702,033**	**766,255**	**652,578**	**25.00%**	**1.4%**
2	**Secondary (Non-man-ufacturing)**		**2.65%**	**21,826**	**39,974**	**85,704**	**122,685**	**4.70%**	**6.1%**
3	Automotive	1.73%		14,237	26,211	36,698	65,258		5.4%
4	Auto-ancillary	6.75%		55,631	102,416	127,771	190,553		4.3%
5	Engineering	4.36%		35,937	66,160	92,632	156,619		5.2%
6	Pharma	0.58%		4,752	8,749	16,121	52,206		8.6%
7	Biotech	0.06%		488	898	5,129	33,934		15.8%
8	Electronics	3.42%		28,193	51,902	77,437	130,516		5.4%
9	Food processing	0.32%		2,632	4,846	19,359	78,309		12.4%
10	Heavy machinery	0.39%		3,255	5,993	5,496	7,831		3.1%
11	Others	0.62%		5,085	9,362	6,543	2,610		-2.3%
12	Information and communication (including computer system, consulting and related services)	1.61%		13,300	26,569	52,035	91,361		6.9%
13	IT- Other service activities (not classified elsewhere)	6.67%		55,044	95,343	136,079	195,773		4.5%
	Secondary (Manufac-turing + IT)		**26.5%**	**218,555**	**398,447**	**575,299**	**1,004,970**	**38.50%**	**5.4%**
14	Sales, Maintenance and Repair	1.38%		11,352	29,419	50,415	73,089		6.6%
15	Wholesale trade	1.24%		10,257	32,361	53,843	78,309		7.3%
16	Freight and Storage (with postal and courier work)	2.08%		17,168	40,009	90,746	130,516		7.3%
17	Retail trade	3.91%		23,974	54,425	78,647	104,412		5.2%
18	Restaurants and hotels	2.16%		17,853	31,842	69,846	78,309		5.2%
19	Financial and Insurance Work	0.99%		8,200	14,874	40,099	57,427		6.9%
20	Real estate work	0.56%		4,657	8,305	18,220	31,324		6.8%
21	Arts, Entertainment, Sports and Entertainment (excluding illegal gambling and betting)	0%				10,083	13,052		2.9%
22	Vocational, scientific and technical work (including advertising, marketing, research, and veterinary work)	5.56%		45,877	88,256	127,045	156,619		4.3%

#	Description								
23	Organized administrative and support service activities (travel agency, routine work and session and organized trade exhibitions)	0%			14,709	16,133	20,882		2.9%
24	Educational	0.39%		3,180	9,561	24,199	54,817		10.3%
25	Human health and social work (including residential and non-residential resident center)	0.42%		3,425	6,720	10,050	31,324		7.9%
	Tertiary		17.70%	145,944	330,480	589,326	830,079	31.80%	6.2%
	Total Employment	100%	100%	824,724	1,470,933	2,016,584	2,610,311	100%	~

Secondary Sector - Non-manufacturing

With increased urbanisation, non-manufacturing activities such as mining, construction and utilities sub-sectors are likely to expand. 2041 employment is projected to catch up to a CAGR of 5% by 2041. It is defined to ensure that the secondary (non-manufacturing) sector's employment growth rate remains in tandem with the population growth rate.

Secondary Sector - Manufacturing

With an established strong foothold into the region and the anticipated 4th industrial revolution, the industrial sector's share is envisaged to grow from 27% to 39%. As shown in Table 11.4, sub-sectors such as automotive, auto ancillaries, engineering, and electronics are projected to grow at a CAGR of 3-4% each, in alignment with the past trend and continue to be major employment generators. Sub-sectors such as pharma, food processing and biotech are not strongholds of the region but need to be promoted to drive the economic transition. Therefore, an aggressive CAGR of 6%, 9%, and 11% respectively, is targeted to push growth into these sub-sectors.

Secondary Sector - IT

As per NASSCOM data, IT sector employment in the Pune division was 4.5 lakh in 2018. As per the 'Socio-Economic Survey of Pune City' by Karve Institute in 2008-09, IT sector employment in the Pune division was 2.25 lakh (1999), mainly concentrated in and around Hinjawadi.

CBRE's real estate database suggests that at PMR level, the built-up area under IT was 34.1 million square feet before 2014, and it grew to 42.2 million square feet by 2018 (Q4). Vacancy in stock was 7% by 2018. Assuming 100 square feet of built-up area per IT worker, the PMR IT workforce works out to be 4.2 lacs, close to the NASSCOM data.

Based on these two sources, it can be observed that Pune Division's IT sector employment grew from 2.25 lakh to about 4.5 lakh by 2018 at a CAGR of about 3.7%.

PMR level direct IT employment is projected to increase at a CAGR of 3% (assuming marginal growth scenario) from 4.2 lakh to about 7.1 lakh by 2041.

Assuming that the Study Area would take up a 40% share from PMR, the IT sector's new employment is estimated to be 2.9 lakh by 2041.

IT sector employment is validated by projecting employment of the Study Area, using Census 2011 data and classifying it into economic sub-sectors using sub-sector-wise employment data provided in the 6th Economic Census of Maharashtra (2012-13). Projected employment for 2041 based on this data also comes out to be 2.9 lakh.

Tertiary Sector

Services sector (vocational, technical, scientific, marketing, advertisement, research etc.) represents a major share of the tertiary sector and is anticipated to maintain a 2011 share of 6% of overall employment. Logistics, sales-maintenance-repair, wholesale trade, restaurants and hotel, retail trade, finance, and insurance show high growth due to rapid urbanisation and change in urban lifestyle. Therefore, these sectors are projected to grow at a CAGR of 4-5%. Although human health and education have a small share at present, these sectors are envisaged to diversify the economy. Therefore, an aggressive CAGR of 6% and 8% respectively, is targeted to push the growth of these sub-sectors.

Thus, out of the projected 26.1 lakh employment in 2041 for the Planning Area, the primary sector share is 25%, secondary sector (non-manufacturing) share is 5%, secondary sector (manufacturing) share is 28%, secondary sector (IT) share is 11%, and the tertiary sector share is 32%. (Refer to Table 11.5)

Figure 11.10 shows the envisaged economic transition and projected employment by 2041.

Figure 11.10: Economic Transition and Projected Employment 2041

Proposed Employment Distribution

While projecting the Planning Area employment, using the URGD method, 2041 employment of urban (Development Plan Growth Centres) and rural areas is also projected. As per the same, urban and rural areas would generate 18.4 lakh and 7.7 lakh employment, respectively. Distribution of this employment is carried out based on the following rationale:

Rural Area (NPA)

Primary sector employment was largely generated from rural areas (about 70%) considering Census 1991 and 2001 data. Agriculture is the most dominating sub-sector within the primary sector. Out of total agricultural land, the rural area holds about 83% of the land, which is either under agriculture/command area/land with potential for agriculture. Therefore, 83% (about 5.4 lakh) of projected primary sector employment would be located in rural

areas. In terms of projected rural employment, it represents a 71% share.

Secondary sector (non-manufacturing) is proposed to be located entirely within the rural area since it is a land-intensive sector and not compatible in terms of land values of an urban area. This translates to about 16% of rural employment (about 1.2 lakh) in the secondary (non-manufacturing) sector.

Secondary sector (manufacturing) activities are not to be dispersed in the rural areas since industrial nodes thrive on 'cluster or network effect' which is already established at industrial clusters in urban areas.

The tertiary sector would absorb the balance 13% of rural employment (about 1.03 lakh), to service the needs of the rural population and other sectors proposed for rural areas such as tourism, primary and non-manufacturing sectors.

Urban Area (Urban Growth Centres)

Large chunks of irrigated agricultural lands are also present in urban areas, employing the workforce, which is likely to continue agriculture practice in future. This is also necessary to provide a certain degree of resilience in food production to support urban consumer needs. Considering this, the remaining 17% of primary sector employment (about 1.1 lakh) is anticipated in urban areas.

The secondary sector (non-manufacturing) is not compatible in terms of land values of urban areas. Moreover, its operations and logistics pose environmental challenges and traffic congestion to the densely populated urban areas. Therefore, employment under this sector is not considered for the urban area.

Secondary sector (manufacturing) activities are to be consolidated in the urban areas since industrial nodes thrive on 'cluster or network effect', which is already established at industrial clusters in urban areas. Therefore, urban areas would absorb 100% of the secondary sector (manufacturing + IT) employment (7.2+2.9=10.1 lakh).

The tertiary sector would absorb the remaining employment (7.3 lakh) to service the needs of the urban population and other sectors proposed for the urban area.

Table 11.6: *Employment Distribution - 2041*

Sector	Total employment	Overall Sectoral Share		Employment Split		Employment Share (%)	
		Rural	Urban	Rural	Urban	Rural	Urban
Primary Sector	652,578	83%	17%	541,640	110,938	71%	6%
Secondary - Non Manufacturing	122,685	100%	0%	122,685	0	16%	0%
Secondary - Manufacturing	717,836	0%	100%	0	717,836	0%	39%
IT/ITES	287,134	0%	100%	0	287,134	0%	16%
Total Secondary	1,127,655	11%	89%	122,685	1,004,970	16%	55%
Commercial	462,025	19%	81%	87,367	374,658	11%	20%
Logistics	281,914	0%	100%	0	281,914	0%	15%
Education & Health	86,140	19%	81%	16,289	69,851	2%	4%
Total Tertiary	830,079	12%	88%	103,656	726,423	13%	39%
Overall	2,610,312	29%	71%	767,981	1,842,331	100%	100%

11.3 Summary

Table 11.2 represents a summary of socioeconomic projections for the Study Area. It is elaborated as below:
1. The Study Area's total population in 2041 is projected to be 53.70 lakh - 40.74 lakh in Urban Growth Centres and 12.96 lakh in Rural Areas. Refer Table 11.7 for Population for each Growth Centre and Rural Area.

Table 11.7: Breakup of Population Projections for Urban Growth Centres and Rural Areas.

No	PLANNING AREA	TOT_P (1991)	TOT_P (2001)	TOT_P (2011)	Total_P (2018)	Total_P (2021)	Total_P (2031)	Total_P (2041)
1	Chakan	38,433	57,873	104,372	168,715	199,876	278,563	381,153
2	Alandi	21,748	30,220	39,510	61,589	71,276	82,713	95,641
3	Wagholi	26,611	41,704	71,341	170,206	214,747	264,855	329,431
4	Loni Kalbhor	61,571	80,189	112,358	163,229	186,793	504,376	833,710
5	Khadakwasla	18,791	42,138	77,258	123,049	143,041	209,127	277,662
6	Pirangut	29,320	37,493	61,111	162,852	208,189	325,594	454,553
7	Hinjawadi	29,622	42,398	62,509	121,464	147,688	287,771	434,241
8	Talegaon	35,265	47,641	77,603	163,551	202,877	266,655	347,040
9	Malavali	21,036	28,539	40,351	88,173	109,289	126,130	147,109
10	Khed-Rajgurunagar	16,614	21,324	31,251	45,520	52,042	64,260	79,186
11	Shikrapur	30,344	46,292	68,504	97,924	111,243	142,263	178,019
12	Uruli Kanchan	45,449	54,659	66,971	87,029	95,693	106,088	116,936
13	Saswad	14,853	16,932	17,373	20,465	21,790	51,215	80,641
14	Khed-Shivapur	13,699	17,334	20,034	25,066	27,222	30,411	33,599
15	Nasrapur	15,306	17,479	19,605	30,869	35,696	38,037	40,378
16	Ranjangaon	15,346	22,854	40,381	77,957	95,270	123,358	159,504
17	Yawat	11,626	15,106	18,038	24,060	26,640	29,626	32,611
18	Kedgaon	13,183	19,812	25,009	35,652	40,257	46,323	52,684
	Total Urban Growth Centres	458,817	639,987	953,579	1,667,369	1,989,629	2,977,366	4,074,098
	Total Rural Areas	600,316	698,394	757,913	961,242	1,048,383	1,172,550	1,296,718
	Total Study Area	1,059,133	1,338,381	1,711,492	2,628,611	3,038,012	4,149,916	5,370,815

2. The projected working population for Study Area in 2041 stands at 26.1 lakh - comprising 18.4 lakh jobs in Urban Growth Centres and 7.7 lakh jobs in Rural Area. Study Area's employment is projected based on Census data and using the URGD method. It is to be noted that this is projected resident workforce/employment without a sector-wise breakdown, and not total employment generated in a particular Growth Centre. The projected employment generation per Growth Centre is provided in Chapter 12.

Table 11.8: *Breakup of Resident Workforce Projections*

No	Employment	1991	2001	2011	2018	2021	2031	2041
1	Chakan	19,117	27,339	48,209	77,888	92,353	129,195	177,670
2	Alandi	10,326	14,855	18,446	28,600	32,944	37,446	42,677
3	Wagholi	10,916	17,459	29,723	73,979	93,707	113,398	138,712
4	Loni Kalbhor	16,962	18,745	46,714	74,277	87,089	238,507	396,750
5	Khadakwasla	5,309	4,204	31,038	59,547	72,748	113,312	160,423
6	Pirangut	9,145	13,595	27,016	77,502	99,898	154,639	214,442
7	Hinjawadi	12,586	20,588	29,579	56,558	68,369	130,751	194,807
8	Talegaon	18,746	23,036	32,441	67,095	82,564	103,491	128,527
9	Malavali	7,534	11,612	14,429	34,873	43,699	47,513	51,755
10	Khed-Rajgurunagar	7,819	11,057	15,371	21,934	24,861	29,942	35,783
11	Shikrapur	13,682	21,160	31,076	43,036	49,342	62,762	77,760
12	Uruli Kanchan	20,388	25,295	29,105	38,683	42,805	47,359	52,032
13	Saswad	7,279	9,510	10,321	12,325	13,184	27,653	42,122
14	Khed-Shivapur	5,818	8,626	9,169	12,007	13,223	14,643	16,063
15	Nasrapur	7,447	8,968	9,352	14,582	16,826	17,994	19,180
16	Ranjangaon	3,122	7,930	15,404	23,668	27,619	37,161	50,045
17	Yawat	5,047	6,887	8,470	11,417	12,680	14,257	15,835
18	Kedgaon	5,014	8,030	11,424	16,853	19,251	23,263	27,748
	Total Urban Area	186,257	258,896	417,287	744,827	893,163	1,343,285	1,842,331
	Total Rural Area	264,266	370,822	407,437	527,263	577,770	673,299	767,981
	Total Study Area	450,523	629,718	824,724	1,272,090	1,470,933	2,016,584	2,610,311

3. Average household size for Study Area would be 4 by 2041, whereas the same for Urban Area is expected to be 3.9 and 4.4 for Rural Area. Household size is likely to shrink with rising education levels and cost of living. Based on this, estimated housing demand within the Study Area by 2041 would be 13.34 lakh - urban 10.4lakh and rural 3 lakh.

Table 11.9: *Breakup of Household Projections*

No	Households	1991	2001	2011	2018	2021	2031	2041
1	Chakan	6,524	11,549	24,890	42,946	51,829	75,882	107,568
2	Alandi	3,834	5,810	8,178	13,710	16,137	18,950	22,135
3	Wagholi	4,840	8,378	15,866	40,638	51,811	64,519	80,936
4	Loni Kalbhor	11,894	9,498	24,694	38,359	44,653	124,113	206,494
5	Khadakwasla	3,805	1,859	17,921	34,869	42,796	66,710	95,045
6	Pirangut	5,533	5,754	14,378	42,844	55,879	91,253	132,197
7	Hinjawadi	5,139	8,348	13,897	29,175	35,994	71,776	109,369
8	Talegaon	7,892	10,953	16,084	34,316	42,425	53,403	66,353
9	Malavali	3,892	5,576	7,776	18,989	23,863	26,511	29,609
10	Khed-Rajgurunagar	2,858	4,143	6,743	10,474	12,181	15,447	19,431
11	Shikrapur	5,715	9,691	15,789	23,564	27,127	36,072	46,560
12	Uruli Kanchan	9,015	11,260	14,486	19,616	21,840	24,569	27,463
13	Saswad	2,797	3,341	3,693	4,531	4,890	12,340	19,790
14	Khed-Shivapur	2,686	3,487	4,254	5,521	6,063	6,873	7,682
15	Nasrapur	2,839	3,522	4,235	7,212	8,506	9,456	10,523
16	Ranjangaon	2,519	4,303	8,952	18,704	23,234	31,041	41,191
17	Yawat	2,294	3,068	3,808	5,281	5,913	6,617	7,322
18	Kedgaon	2,399	3,804	5,025	7,539	8,624	9,948	11,316
	Total Urban Area	86,475	114,344	210,669	398,287	483,764	745,478	1,040,985
	Total Rural Area	107,055	134,052	152,340	204,451	226,785	259,654	292,523
	Total Study Area	193,530	248,396	363,009	602,739	710,549	1,005,132	1,333,507

4. From 2018, Study Area Population is likely to grow at 3.2% per annum, with a healthy growth rate of 4.0% for Urban Areas and stable growth rate of 1.3% per annum for Rural Areas.

11.4 PMR Level Projections

Table 11.10 summarises PMR population projections, including PMC, PCMC, cantonments, municipal councils and Study Area.

Table 11.10: PMR Population Projections 2018-2041

Jurisdiction	1991	2001	2011	2018	2021	2031	2041
PMC	1,566,651	2,538,473	3,371,626	3,713,999	3,906,145	4,769,213	5,494,169
PCMC	766,874	1,012,472	1,727,692	2,273,525	2,520,698	3,314,495	4,211,940
Cantonments	201,017	204,359	199,426	205,751	204,074	206,419	207,798
Municipal Councils and NPs	153,055	232,900	293,656	345,449	368,298	447,280	530,64
Study Area - Urban	458,817	639,987	953,579	1,667,369	1,989,629	2,977,366	4,074,098
Study Area - Rural	600,316	698,394	757,913	961,242	1,048,383	11,72,550	12,96,718
Total Study Area	10,59,133	13,38,381	17,11,492	26,28,611	30,38,012	41,49,916	53,70,815
Total PMR	37,46,730	53,26,585	73,03,892	91,67,336	1,00,37,226	1,30,99,665	1,53,37,787

Chapter 12:
Vision Framework

This chapter covers the Vision Framework for PMR. It consists of the vision, goals and strategies to guide the development of the Pune Metropolitan Region over the next 20 years. Five goals form the fundamental pillars of the proposed vision. The objective behind the formulation of the vision framework is to inform the downstream planning process and execution.

By 2041, the Study Area is envisaged to become India's most livable habitat through setting up and realisation of five goals: Convenient (Mobility), Prudent (Economy), Resilient (Environment), Efficient (Infrastructure) and Self-sufficient (Housing and Amenities). The vision is synchronised with PMRDA's mission to make PMR a premium international investment destination - ultra-modern and futuristic.

12.1 Background

A bold and clear vision is needed to convey an overarching planning intent along with quantifiable goals and strategies to precisely guide the downstream development. Five goals - Resilient (Environment), Efficient (Infrastructure), Convenient (Mobility), Prudent (Economy) and Self-sufficient (Housing and Amenities) are fundamental pillars of the development of PMR. These five goals will guide strategic actions to implement the proposed vision.

The proposed vision for the Study Area takes into consideration its world-view and core competencies.

The World-view

'Queen of the Deccan' is a world view of Pune, primarily attributed to its green setting. A substantial part of the Study Area is covered by the Western Ghats that creates this setting. Its green setting shall underpin PMR's vision.

Core Competencies

Proximity to Mumbai, robust industrial ecosystem and education base with potential for expansion, relatively cheaper land values and commutable size are core competencies of PMR. Key regional development projects such as new international airport, ring roads, railway up-gradation, and metros are expected to boost PMR's regional economic competitiveness further.

Relatively safe environment, scenic recreational destinations and culturally vibrant Pune city is also a unique combination that PMR offers compared to other metropolitan regions. Excellent natural setting endowed by the Western Ghats, which is omnipresent all across the PMR, truly sets it apart from its peers.

12.2 Proposed Vision

Vision 2041 "INDIA'S MOST LIVABLE HABITAT"

Globally, the assets mentioned above are considered as basic parameters to define the livability of a place. Considering the increasing stress on urban livability, the Study Area shall proactively harness these assets to become India's most Livable Metropolitan Habitat (Metropolitan Region). It shall ensure livability by implementing five Goals as illustrated subsequently in this chapter.

Convenient
Provide Convenient Mobility, Maximum Accessibility

Develop Regional Linkages
- Expansion and up-gradation of highways
- Development of Ring Roads
- Development of secondary road network

Develop Transport Hubs
- Development of multi-modal hubs and transfer stations
- Promote development along transit corridors along with last-mile connectivity
- Development of truck terminals

Promote Public Transport & Increase Its Modal Share
- Connect employment nodes by mass transit
- Development of Metro, linking Growth Centres to PMC and PCMC
- Development of suburban railway, crescent railway and high-speed rail
- Promote mass transit system/feeder systems within the secondary road

"INDIA'S MOST LIVABLE HABITAT"
VISION 2041

Prudent
Stimulate Prudent Growth

Resilient
Increase Resilience by Reducing Vulnerability & Mitigating Disasters

Efficient
Manage Resources Efficiently

Self-sufficient
Build Self-sufficient Communities

- Town planning schemes for implementing strategic projects
- Public housing at each growth centre
- Provide equitable distribution of open spaces and social amenities
- Promote Work-Live concept and develop compact residential development along transit corridors

- Provide adequate and affordable housing for all
- Guide integrated and equitable neighbourhood development
- Development of compact residential development along major transit corridors

Promote Consolidated Employment Centres
- Consolidate employment nodes for vibrant economic centres
- Promote integrated commercial development at major transit hubs enabling transit services to regional job centres, job creation and investments in transit serviced locations
- Development of tourism nodes

Promote Industrial and Logistics Clusters
- Promote synergies for Industry 4.0 (Next Generation Industry) through expansion of industrial development along with technological advancement
- Consolidate development of logistics clusters along Crescent railway and radial roads
- Provide logistic hubs as urban-rural nexus

Promote Innovation Hubs
- Create a vibrant startups ecosystem
- Add value to existing agro-supply chain through agro-processing/R&D hubs
- Promote biotechnology and pharmaceuticals hubs
- Promote educational hubs focusing on STEM, R&D and skilled development
- Empower Rural Development

Protecting Blue Ribbon
- Protect and conserve all water bodies: streams, rivers, canals, ponds, lakes and reservoirs

Conserving Green Ribbon
Protecting Green Segments
- Reduce vulnerability by demarcating flood lines (blue lines) and safeguarding through green belt
- Demarcate flood lines and augment flood control measures
- Develop avenues conceived as a tree-lined road, with Non Motorised Transport (NMT) provision, linking the Green and Blue features

Preserving Green Canvas
- Protect and Conserve Western Ghats (eco sensitive zone) and forests
- Controlled development in eco-sensitive zones, establishing contiguity of forest and development of regional parks
- Protect Hilltop & hill slopes
- Develop parks as green lungs within Growth Centres
- Promote plantation of indigenous trees within Catchment areas and along bottom of the hills

Developing Green Nodes
- Protect irrigated agriculture lands in command areas

- Promote Carbon Neutral Townships
- Promote renewable energy banks within urban and rural centres

Develop efficient networks for piped water supply and sewage in each Growth Centre
- Develop trunk infrastructre for water supply and sewage network for each Growth Centre

Promote water conservation and recycling
- Promote recycling of wastewater at each Urban Centre
- Recharge groundwater through rainwater harvesting

Promote circular economy through waste management
- Decentralisation of solid waste management sites
- Promote the in-situ solutions to recycling of organic waste
- Mandate industrial waste recycling and effluent treatment

Encourage share of renewable energy within the grid
- Encourage an increase in renewables share
- Facilitate waste to energy concept

Goals, Objectives and Actions

Goal 1 - Convenient: Provide Convenient Mobility, Maximum Accessibility

The convenient goal aims to facilitate complete ease of access to transit facilities, thereby inducing people to use public transportation over the private mode of transport and prefer to walk. In order to achieve the 'Convenient' goal, the following strategies and actions are proposed:

Objective	Actions
Develop Regional Linkages	Action 1: Expansion and up-gradation of highways
	Action 2: Development of Ring Roads
	Action 3: Development of secondary road network
Develop Transport Hubs	Action 4: Development of multi-modal hubs and transfer stations
	Action 5: Promote development along transit corridors along with last-mile connectivity
	Action 6: Development of truck terminals
Promote Public Transport and Increase Its Modal Share	Action 7: Connect employment nodes by mass transit
	Action 8: Development of Metro, linking Growth Centres to PMC and PCMC
	Action 9: Development of suburban railway, crescent railway and high-speed rail
	Action 10: Promote mass transit system/feeder systems within the secondary road

Goal 2 - Prudent: Stimlate Prudent Growth

The prudent goal aims at delivering a stimulus to the economy and employment through following strategies and actions:

Objectives	Actions
Promote Consolidated Employment Centres	Action 1: Consolidate employment nodes for vibrant economic centres
	Action 2: Promote integrated commercial development at major transit hubs enabling transit services to regional job centres, job creation and investments in transit serviced locations
	Action 3: Development of tourism nodes
Promote Industrial and Logistics Clusters	Action 4: Promote synergies for Industry 4.0 (Next Generation Industry) through expansion of industrial development along with technological advancement
	Action 5: Consolidate development of logistics clusters along Crescent railway and radial roads
	Action 6: Provide logistic hubs as urban-rural nexus
Promote Innovation Hubs	Action 7: Create a vibrant startups ecosystem
	Action 8: Add value to existing agro-supply chain through agro-processing/R&D hubs
	Action 9: Promote biotechnology and pharmaceuticals hubs
	Action 10: Promote educational hubs focusing on STEM, R&D and skilled development
	Action 11: Empower Rural Development

Goal 3 - Resilient: Increase Resilience by Reducing Vulnerability and Mitigating Disasters

The resilient goal aims to mitigate disasters through appropriate measures, which would help reduce the vulnerability of PMR to both natural and human-made disasters. In order to achieve the 'Resilient' goal, the following strategies and actions are proposed:

Objectives	Actions
Protecting Blue Ribbon	Action 1: Protect and conserve all water bodies: streams, rivers, canals, ponds, lakes and reservoirs
Conserving Green Ribbon	Action 2: Reduce vulnerability by demarcating flood lines (blue lines) and safeguarding through green belt
	Action 3: Demarcate flood lines and augment flood control measures
	Action 4: Develop avenues conceived as a tree-lined road, with Non Motorised Transport (NMT) provision, linking the Green and Blue features
Protecting Green Segments	Action 5: Protect and Conserve Western Ghats (eco sensitive zone) and forests
	Action 6: Controlled development in eco-sensitive zones, establishing contiguity of forest and development of regional parks
	Action 7: Protect Hilltop & hill slopes
	Action 8: Develop parks as green lungs within Growth Centres
	Action 9: Promote plantation of indigenous trees within Catchment areas and along bottom of the hills
Preserving Green Canvas	Action 10: Protect irrigated agriculture lands in command areas
Developing Green Nodes	Action 11: Promote Carbon Neutral Townships
	Action 12: Promote renewable energy banks within urban and rural centres

Goal 4 - Efficient: Manage Resources Efficiently

The efficient goal aims to ensure availability and sustainable water and sanitation management through improved physical infrastructure and balanced distribution of natural resources. In order to achieve the 'Efficient' goal, the following strategies and actions are proposed:

Objectives	Actions
Develop efficient systems for water supply and sewage in each Growth Centre	Action 1: Develop trunk infrastructre for water supply and sewage network for each Growth Centre
Promote water conservation and recycling	Action 2: Promote recycling of wastewater at each Urban Centre
	Action 3: Recharge groundwater through rainwater harvesting
Promote circular economy through waste management	Action 4: Decentralisation of solid waste management sites
	Action 5: Promote the in-situ solutions to recycling of organic waste
	Action 6: Mandate industrial waste recycling and effluent treatment
Encourage share of renewable energy within the grid	Action 7: Encourage an increase in renewables share
	Action 8: Facilitate waste to energy concept

Goal 5 - Self-sufficient: Build Self-sufficient Communities

The self-sufficient goal aims at inclusive and equitable distribution of amenities, ensuring healthy lives and promoting well-being for all. In order to achieve the 'Self Sufficient' goal, the following strategies and actions are proposed:

Objectives	Actions
Provide adequate and affordable housing for all	Action 1: Town planning schemes for implementing strategic projects
	Action 2: Public housing at each growth centre
Guide integrated and equitable neighbourhood development	Action 3: Provide equitable distribution of open spaces and social amenities
Development of compact residential development along major transit corridors	Action 4: Promote Work-Live concept and develop compact residential development along transit corridors

In summary, the vision and its implementation strategy are detailed in the above structure incorporating 45 actions. The livability of the region would largely depend on the successful implementation of the strategies stated above and corresponding representative actions.

12.3 Structure: Translating Goals into Physical Planning Strategies

Proposed zoning ensures that the sectoral development goals are clearly conveyed through it. For brevity, proposed sectoral goals and their corresponding physical planning strategies are mentioned in Table 12.1.

Table 12.1: Goals and Physical Planning Strategies

Goal	Development Sector Addressed	Physical Planning Strategies
Convenient	Roads and Mass Transport	Movement Lattice
Prudent	Employment and Housing	Work- Live Hubs
Resilient	Reducing Vulnerability and Mitigating Disasters	Green-Blue Connectors
Efficient	Infrastructure and Utilities	Decentralised Resource Management
Self- sufficient	Public Facilities	Walkable Neighbourhoods

Subsequent sections elaborate on each of the goals, strategies and translation of sectoral development goals into appropriate zoning plans.

Movement Lattice Concept

In order to provide maximum accessibility and flexibility for the use of public transport and ease of movement, a grid network is proposed. Thus the concept 'Movement Lattice' is proposed to develop a robust network of roads and mass transit.
1. 'Convenient' goal would be addressed by developing a strong road network so that all the developable areas would be conveniently accessible
2. It would also provide alternative routes to congested areas, thus inducing smoother traffic flows
3. Reduce the average time spent commuting to work
4. Intermodal integrations that are creating transport nodes within the lattice
5. It implies a lattice (a grid) formed by the existing/proposed roads following maximum spacing of 300 m - 500 m. This would ensure that road density in a Growth Center would increase (> 1km/sqkm) to make it accessible and improve its carrying capacity
6. Movement lattice concept also includes a web of mass transit corridors running across Growth Centers to encourage >50% of the residents to use mass transport for their daily commute

Work-Live Hub Concept

The Work-Live concept is a physical planning strategy required to facilitate the realisation of the 'Prudent' goal. It aims to reduce the distance between work locations and homes. The concept implies living closer to the workplace. Consolidated urban development would be based on the Work-Live concept.
- Planning intent here is to:
- Avoid daily commute/external trips to reduce congestion
- Save commuting time to reinvest in recreation
- Foster local employment

In the next 20 years, the promotion of new work hubs, their integration with the city through ring and radial mass transport corridors and allocating sufficient residential areas around it along with public amenities shall be the top priority.

Following are the key planning strategies as part of the Work-Live Hub:
1. Plan each urban node with 'Work Hubs', i.e. employment-generating zones that would be complementary to the envisaged economic role for an urban area located at a strategic location with the highest accessibility
2. Promoting 'Live Hubs', i.e. compact residential development within a distance of 5 km from Work Hubs
3. Employ at least 30% of the resident workforce within an urban node
4. Connect remaining 70% of resident workforce to other urban nodes utilising a mass transport system based on the hub-and-spoke network model, i.e. develop a mass transport interchange within each Growth Centre to serve its residents and connect such interchange with each other and with municipal corporations through mass transport corridors
5. Promote compact residential developments along the mass transport routes/interchanges

Green Blue Connectors

Within the concept of Green-Blue-Connectors, 'Green' refers to protecting forests, slopes, river biodiversity corridors, wilderness areas, 'Blue' refers to the protection of water bodies and 'Connector' refers to proposed avenues and streams/canals. The goal also aims to make these features accessible for passive recreation to cover the existing deficit of recreational spaces. It is translated into the plan by employing the Green Blue Connector strategy. It implies a more sustainable living for PMR. The milestones and targets of a roadmap for PMR to achieve carbon neutrality will further enable the implementation of the 'Resilient' goal.

Protecting the 'blue', i.e. rivers and water bodies, 'green', i.e. hills and forests and green canvas, which is agriculture and ecologically sensitive areas, will help PMR transit to a low-carbon green economy and contribute to sustainability and resilience.

As per the roadmap for Carbon-Neutral PMR, the milestones and targets are divided into two main parts: Carbon sequestration and Emission reduction. Carbon Sequestration or increase in carbon sinks can be achieved through mainly protecting and enhancing green cover, ecological restoration, storing carbon dioxide and reducing emission gaps using technology, as explained in the strategies and actions of the Resilient goal.

Emission reduction deals with formulating alternatives to systems that emit carbon dioxide. This can be achieved through increasing the renewable energy capacity of PMR, promoting NMT corridors and electric mobility, use of renewable energy in utility infrastructure, integration of energy-efficient guidelines for buildings and modular green townships designed for low carbon footprint and smart sustainability.

Decentralised Resource Management

Achieving an 'Efficient' goal would mean successful management of natural resources and implementation of proposed physical infrastructure network and utility sites. Attaining cost-effectiveness for efficient water supply, electricity supply and collection of sewerage, stormwater, and solid waste through decentralised systems of treatment plants and waste management sites is the concept of decentralised resource management. It also promotes recycling and reuse of waste.

Smart Cities Mission's framework prescribes a set of guidelines to transform the city or planning area into a smart area. Since decentralised resource management focuses on the utility framework and governance, smart systems related to these topics are proposed as key strategies.

Following are the key physical strategies:
1. Hub and spoke system for utility development
2. Promoting systems using smart metering, renewable energy and SCADA systems
3. Decentralisation of treatment plants
4. Clustering of villages for solid waste management
5. Common utility corridors within urban areas
6. Water-Energy nexus (promoting the use of renewables for pumps and other electronic devices, adopting energy efficiency measures)
7. Recommending the use of data repository centre, monitoring mechanism and digital citizen engagement platforms

Walkable Neighbourhood

The 'Self-sufficient' goal is set to increase the livability index of PMR. The Walkable Neighbourhood concept entails providing essential services such as education, health, sports and recreation within the neighbourhood so that residents can have easy access to them on foot.

Key physical strategies:
1. Propose amenities within 500 m distance
2. Delineate amenities based on URDPFI standards/ planning norms
3. Provide amenities adjacent to mass transit corridors
4. Consider the implementation strategies of amenities while proposing them
5. Provide opportunities for well planned Town Planning Schemes

12.4 Proposed Development Framework

The proposed framework outlines the development model of PMR aimed at consolidated development mostly around PMC and PCMC limits. The proposed framework aims to:
1. Consolidate existing and future urban development within 5-10 km from PMC and PCMC limits and within a 5km belt along regional transport corridors.
2. Organise villages into Urban and Rural areas for their specific development needs. By 2041, the urban population is estimated to be 40.74 lakh and rural to be 12.96 lakh.
3. Interconnect 18 Urban Growth Centres with each other and regional nuclei (PMC, PCMC) through mass transit system:
   a. Urbanisation would be concentrated at 18 Growth Centres, which would be served by regional transportation infrastructure such as:
      i. Five national highways as well as Pune-Mumbai Expressway
      ii. Two Ring Roads (PMRDA and MSRDC)
      iii. Seven radial Mass Rapid Transit Systems
      iv. Three upgraded suburban railway lines, namely Lonavla-Pune, Daund-Pune and Miraj-Pune
   b. One proposed Crescent Railway line (freight line) connecting the Miraj line to the Lonavala line via Uruli Kanchan, Sanaswadi, Chakan and Ambi for cargo movement to decongest the rail network within PMC, PCMC limits and serve industrial estate located along the crescent railway route.
   c. Out of 18 Growth Centres, eight are located within 5-10 km from the present municipal corporation limits and would accommodate 31.5 lakh people by 2041. The proposed PMRDA Ring Road would mainly serve it.
   d. Six Growth Centres located along the Mumbai-Pune-Daund railway corridor would be promoted on Transit Oriented Development principles and would accommodate 15.3 lakh people.
   e. 8 Growth Centres are located along the proposed MSRDC Ring Road, out of which four would also be served by the proposed Crescent Railway. Crescent Railway line is a revised alignment of the CMP 2018 proposal. About 18.25 lakh population is estimated within these Growth Centres by 2041.
   f. All the villages located in the rural area would be connected to the Growth Centres by at least village roads.
4. The vitality of these Growth Centres would be ensured by proposed employment generators (Work Hubs) located in each Growth Centre. An economic role for each Growth Centre is assigned as part of regional economic positioning. It is quantified by using projected employment and sector-specific worker densities.
5. Leverage 18 Growth Centres to serve higher-order amenities for the rural catchment, situated within 5 km travel distance

a. Each Growth Centre would provide higher-level amenities such as higher education/college, commercial/market, hospital, entertainment for the rural population situated within 5 km travel distance from its boundary.

6. Leverage eight Rural Growth Centres to provide higher-order amenities for the rural catchment, serving the villages which are not within 5 km radius from Urban Growth Centres

    a. Eight Rural Growth Centres would support the same higher level amenities for the rural population situated beyond 5 km travel distance from any Growth Centre.

    b. Commercial and health amenities proposed at Rural Growth Centres would also create some tertiary sector employment opportunities to support the rural population.

7. Natural resources such as water bodies and forest have been designated as protected areas. On the other hand, the rest of the protected areas, such as agricultural and hilltop hillslope zones, would be closely integrated within rural areas.

8. Agricultural and allied activities and tourism-based employment to be promoted in rural areas.

Figure 12.1: Consolidated Development Model

Assigning Economic Role for each Growth Centre

Each Growth Centre represents a distinct development opportunity based on its location, natural resources, economic opportunities and sociodemographic mix.

Successful implementation of the vision would occur when each Growth Centre would play a complementary role. Therefore, complimentary 'Economic Roles' are assigned to the Growth Centres, and 'Strategic Projects' are identified as 'catalysts' to attract investments with a clear economic priority for each Growth Centre. Land quantum is distributed into each Planning Area based on the assigned role. Refer to Figure 12.2 for assigned economic roles.

Table 12.2 explains the rationale for assigning an economic role for each Growth Centre.

Following criteria have been used for assigning an economic role for each Growth Centre:
1. Compatibility with existing economic activity (industries, higher education, R&D institutions, tourism assets, high-value agriculture etc.)
2. Land availability of potentially developable land
3. Location advantage with respect to existing/proposed strategic regional projects (existing/proposed highways/expressways/railway lines/mass transport routes/international airport)

Figure 12.2 *: Proposed Economic Roles for Growth Centres*

Table 12.2: Rationale for Proposed Economic Roles

DP Planning Area	Position-ing	Focus Economic Sub-sectors	Strategic Projects	Rationale for Project Identification
1 Chakan	Automo-bile Hub & Regional Centre	Automotive-Electric Mobility; AI & Robotics; High Tech Engg. & Electronics	Proposed MIDC Chakan Phase 5	Planned land consolidation by MIDC, Pune. Economic Sub-sectors supported by existing Industrial Ecosystem & presence of R&D Institutions like ARAI.
		Offices & Retail, Finance, Fintech & Blockchain	Regional Center and Exposition Centre	Fill the gap of CBD in the North of Pune Agglomeration (5-10 lakh population). Complement business requirements of Industrial Hub. High demand for commercial development is likely to be generated by the proposed extension to Metro (Hinjawadi-Chakan). Govt land availability.
2 Alandi	Riverfront Pilgrimage & Industri-al Hub	Spiritual Tourism	Pilgrimage Center at Alandi	Designated open space for Annual Pilgrimage Events (Palkhi) or equivalent purpose with support infrastructure.
			Spiritual Center at Tulapur	Tourism Strategy to revitalise places of Historical Importance & strategic site of river confluence (Triveni Sangam).
			Indrayani North Riverfront Development at Alandi	Flood control mechanism which is complementary to ongoing riverfront development by PCMC.
		Industrial Hub	MSME Cluster Markal (expansion)	Presence of existing RP Industrial Cluster. Increased potential due to direct connectivity to Aurangabad-JNPT Industrial Corridor, and Proposed PMRDA & MSRDC Ring Road
3 Wagholi	Regional Centre & IT Hub	IT, ITES	Infotech Park at Wagholi	Natural expansion for the IT Sector at Kharadi, Magarpatta with available land (Wagholi TP Scheme/ reclamation of Quarry Sites). Potential to integrate Sub-regional Center with Infotech Park & affordable housing as Integrated Township.
		Offices & Retail, Finance, Fintech & Blockchain	Regional Center	Fill the gap of CBD in the East of Pune Agglomeration (5-10 lacs population). Complement business requirements of proposed IT Hub. High demand for commercial development is likely to be generated by the proposed extension to Metro (Ramwadi-Wagholi).
		R&D, Higher Education	University Town at Wagholi/ Kesnand	New Compact Urban University (National/ International level) proposed on Govt land. Feasibility for University Town by networking existing Private Universities situated around through Urban Design Intervention.
		Logistics & Warehousing	Logistics & Warehousing Cluster at Lonikand-Wadhu-Phulgaon	Consolidated cluster development leveraging upon high existing demand along Lonikand-Alandi Road

4	Loni Kalbhor	Life Sciences & Smart Agriculture Hub	Biotechnology, Pharma, Healthcare Devices etc.	Life Sciences Park Manjri	Life Sciences Park (Integrated Pharma, Medical equipment manufacturing, Biotech Park) to leverage its proximity to Proposed CSR International Airport. Presence of renowned Serum Institute catalyst for biotech/pharma ecosystem to flourish.
			R&D, Higher Education	University Town	Requirement for expansion by Savitribai Phule Pune University New Campus).
			Smart Farming	Smart Agro Cluster (greenhouse)	Promoting existing trends around Manjari & leveraging support from Vasantdada Sugar Institute (VSI) for Smart Farming Pilot Project.
5	Khadak-wasla	Commuter Town	Real Estate-Residential & Commercial	Integrated Townships (low density)	Promoting Planned Development through TP Scheme to balance over densification and protecting the natural heritage of Southern PMR.
6	Pirangut	Knowl-edge Hub	Higher Education, R&D, Design	Private / International Universities, Design Incubation Center	Integrated Township Project with core function as National/ International level University/ R&D Institution by leveraging current trend of Township development/ presence of Institutions like FLAME, SYMBIOSIS International University. Land availability to absorb future institutions of similar nature. Envisaged Integrated Design Campus involving higher studies focused on Management Studies etc.).
			Ancillary Industry - Automobile, Engineering, Electronics	MSME Cluster Pirangut (expansion)	Presence of existing Industrial Cluster. Increased potential due to direct connectivity to proposed Port at Dighi & upgradation of Paud-Mulshi Road as National Highway.
7	Hinjawadi	Regional Centre & IT Hub	Offices & Retail, Finance, Fintech & Blockchain	Regional Center	Fill the gap of CBD in the West of Pune Agglomeration (5-10 lacs population). Complement business requirements of IT Hub. High demand for commercial development likely to be generated by the proposed extension to Metro (Phase III).
			IT, ITES, AI & Robotics	High Tech City - Mahalunge Man, and Exposition Centre	TP Scheme under Implementation by PMRDA.
8	Talegaon	Industry 4.0 Hub	Renewable Energy; AI & Robotics, IOT, High Tech Engg. & Electronics	Proposed MIDC Talegaon Phase 4, 5 (outside Planning Area)	Planned land consolidation of 2200 ha by MIDC, Pune. Economic Sub-sectors envisaged considering rising digitisation trend in Industries and revival/ deeper penetration of IT sector in future.
			Defence Equipment Manufacturing	Proposed MIDC & SME Cluster Baur	Ongoing land consolidation at Baur by MIDC, Pune and considering Govt. focus to boost Defence related production and R&D for captive military institutions in Pune. Direct accessibility to JNPT with Mumbai-Pune Expressway.
			IT, ITES	Infotech Park at Wagholi	Planned 107 ha land consolidation by MIDC, Pune under Talegaon Phase IV (old). Planning intent to decentralise IT, ITES Hubs in four directions of Pune Agglomeration..

9	Malavali	Wellness Tourism & Education Hub	Tourism & Hospitality (Medical, Leisure)	Theme Park & Resorts Cluster	Excellent Weather, proximity to established tourist destinations and amusement park, direct access to proposed Navi Mumbai International Airport by Mumbai-Pune expressway, trained human resource, and land availability.
			Media & Entertainment	Film Production Studios & Theme Park in the Green Belt along the River	Above advantages; and presence of film and entertainment industry drivers through their luxury homes.
			Higher Education	Private Universities, International Education Institutions, Specialised Training Centers	Presence of existing higher education/ specialised training institutions such as Sinhgad Institute, Samudra Institute of Marine Studies etc. Land availability to absorb future institutions of similar nature.
			Warehousing & Logistics	Logistics Park	Excellent connectivity to JNPT and Industrial estates in Pune by railway, expressway. Quadrupling of railway and Navi Mumbai International Airport to boost logistic development potential. Proposed Multicommodity logistics cluster by private sector within Malavali Planning Area.
10	Khed Rajgurun-agar	Commuter Town	Real Estate- Residential	Public Amenities & Infrastructure	Land availability and extension of Khed Rajguru Nagar / Chakan Municipal Council services is possible to develop comprehensively planned Residential Townships/ Housing Schemes to support industrial workers of Chakan and ongoing Private Industrial Cluster (Khed SEZ).
11	Shikrapur	Logistic & Industrial Hub	Warehousing & Logistics	Logistics Park Sanaswadi	High demand for logistics further enhanced by the proposed Crescent Railway line and railway station under this plan. Govt land availability for railway station/logistics hub.
			Ancillary Industry - Automobile, Engineering, Electronics	MSME Cluster Sanaswadi (expansion) and Exposition Centre	RP Zoning, potential for extension of existing Industrial Cluster, and enhanced location potential created by Crescent Railway proposal..
12	Uruli Kanchan	Agro Processing Hub	Agro and Food Processing	Agro and Food Processing Cluster	Presence of similar industries; direct access to raw material produced at agrarian districts like Shirur, Daund, Baramati, Satara etc. as well as surrounding talukas by NH/SH and railway; proximity to proposed CSR International Airport by proposed MSRDC Ring Road for future export.
			Tourism & Hospitality	Agro-Tourism Destination (integrated with High Value Agriculture)	Extensive irrigation network and cultivated land; existing trend of agro-tourism. Proximity to established spiritual tourism destination (Prayag Dham) with consistent footfall; proximity to future airport.
			High Value Agriculture	Horticulture/ Floriculture/ Sericulture etc.	Above advantages with upcoming projects of Rental/Contract Farming in the nearby Talukas.

13	Saswad	Aerotropolis and Regional Centre	Warehousing & Logistics (FMCG); Agro & Food Processing Industry; Business Tourism	Logistics Park; Agro and Food Processing Cluster; Business Park	Govt. proposal of CSR International Airport on the lines Aeroprolis. Proposed projects are important constituents of the Aerotropolis ecosystem. Projects to be pursued by MADC.
			Real Estate-Residential	Residential Townships/ TP Schemes	To cater for the resident workforce required during development of the airport and for operations of Aerotropolis in future.
14	Khed-Shivapur	Ancillary Industrial Hub	Ancillary Industry - Automobile, Engineering, Electronics	MSME Cluster Shindewadi (expansion)	Potential for extension of existing Industrial Cluster with land reserved by RP Zoning; existing accessibility to NH and Mumbai-Pune Express-way, and enhanced location potential created by MSRDC Ring Road and Airport.
15	Nasrapur	Heritage Tourism & Education Hub	Tourism & Hospitality	Hill Town-Heritage & Leisure Tourism	Proximity to proposed airport; existing trend of well planned low density residential enclaves and amusement parks; lack of MICE support facilities for corporations operative in Shirval MIDC estate; Potential to become a hub for tourists visiting salient forts of Maratha Empire with adventure tourism potential.
			Higher Education	Private Universities, International Education Institutions, Skilling Center	Considering the present trend of city institutions setting up campuses at the outskirts and advent of new national/ international universities at fringes of the city to avail cheaper lands and conducive environment for learning.
16	Ranjanga-on	Integrated Industrial Town	Real Estate-Residential	Residential Townships/ TP Scheme	High employment generation at Ranjangaon MIDC but a deficit of comprehensively planned residential developments for the workers. Govt. land availability next to MIDC.
			SMEs - Electronics	SME Extension of MIDC cluster (Ranjangaon)	High demand for the electronics industry anticipated with future urbanisation and digitisation of the economy. Potential for consolidation of 283 ha of land at Ranjangaon MIDC Phase III.
17	Yavat	Commuter Town	Real Estate-Residential	Residential Townships/ TP Scheme	Leverage upon proposed upgraded capacity of Pune- Daund railway to open up residential development potential along the railway corridor.
			Infrastructure Development	Integrated Railway Station Development	Maximise commercial potential of railway land by developing Town Center at railway station with park and ride facilities to improve railway ridership and cross-subsidize railway station development.
18	Kedgaon	Commuter Town	Real Estate-Residential	Residential Townships/ TP Scheme	Leverage upon proposed upgraded capacity of Pune- Daund railway to open up residential development potential along the railway corridor and encourage existing trends of rising ridership & population growth.
			Infrastructure Development	Integrated Railway Station Development	Maximise commercial potential of railway land by developing Town Center at railway station with park and ride facilities to improve railway ridership and cross-subsidize railway station development.

12.5 Quantification of Land Requirement for Growth Centres and Distribution of Estimated Land into Growth Centres

Land requirement calculations for Industrial, Logistics, IT, Commercial and Residential zones for each Growth Centre are elaborated in this section.

Industrial Zone

The Industrial Zone consists of industries and IT sectors. Industrial employment and, in turn, the land requirement for each Growth Centre is calculated by applying the split share of the total industrial employment in the overall Study Area. The split share was applied based on the intended economic role, and the Work-Live hubs concept explained earlier in this chapter.

Land requirements are worked out by considering total employment in the overall Planning Area in the industrial, logistics and IT sector by 2041. General industrial and IT Zone are together shown as 'Industrial Zone' in the proposed zoning. Land Takes are worked out separately for each sector since the land requirement parameters for these two sectors are different. Land requirements and employment for the total Industrial Zone are given in Table 12.3.

General Industrial Zone

Land requirement for the General Industrial zone is estimated based on a worker density of 50 workers/hectare. For 7.2 lakh industrial jobs in 2041, the total net industrial land of 143.6 sq km would be required. Further, 30% add-on is considered to account for amenities (5%), open spaces (10%) and roads (15%). Accordingly, the total gross area of 186.6 sq km is required under the General Industrial zone accommodating existing, proposed and designated RP Industrial zones.

General Industrial Zone Distribution:

Industrial Zone comprises extension to existing clusters and new clusters to be set up at certain locations. Projected gross Industrial land requirement of 186.6 sqkm has been distributed using the 'split share' technique.
1. Chakan and Talegaon Growth Centres would anchor the future growth of the industrial sector in the Study Area, allocating each 30% of total industrial land within them, respectively, considering the existing and proposed MIDC Industrial areas.
2. 10% share of industrial land is allocated at hitherto unrealised MIDC development at Hinjawadi.
3. Expansion of established SME clusters at Shikrapur and Khed Shivapur would also be triggered by allocating 5% and 2.5% respectively of total industrial land.
4. 1.25% share is allocated at Loni Kalbhor for the proposed Industrial Park and 5% at Pirangut to strengthen the existing SME cluster.
5. The remaining share of estimated industrial land is equally distributed at Ranjangaon, Uruli Kanchan, Nasrapur and Alandi to strengthen the existing MIDC and RP industrial areas in these Growth Centres.

Industrial- IT Zone

IT sector's new employment in Study Area is estimated to be 2.9 lakh by 2041.

2.9 sq km of the net land area is identified for the IT sector, considering ten sqm BUP per person. Further, 30% add-on is considered to account for amenities (5%), open spaces (10%) and roads (15%). Accordingly, the total gross area of 3.7 sq km is required to accommodate the projected 2.9 lakh IT employment by 2041 in the Study Area.

Industrial - IT Zone Distribution:

1. IT zone is envisaged in the north, east and south in addition to the existing IT hub in the West (Hinjawadi), which would be served by PMRDA Ring Road/MSRDC Ring road.
2. The planning intention is to distribute the thriving IT sector developments in four directions to avoid congestion faced by Hinjawadi due to over-concentration.
3. Out of the estimated gross land requirement of 3.7 sq km, 50% of projected land for the IT/ITES sector has been allocated at Wagholi as a counter magnet for development on the west. 20% of the estimated requirement is allocated at Hinjawadi considering the existing and unimplemented development. The remaining 30% is distributed equally (15% each) in the north at Talegaon MIDC and south at Saswad near the proposed CSR airport.

Logistics Zone

Logistics sector land requirements have been worked out by considering 55 sqm built-up area requirement per person. About 15.5 sq km of net land is estimated to accommodate the total employment of 2.81 lakh by 2041. Further, 30% add-on is considered to account for amenities (5%), open spaces (10%) and roads (15%). Accordingly, the total gross land requirement comes out to be 20.2 sq km.

Logistics Zone Distribution:

The logistics sector would be a key driver within the tertiary sector as urbanisation and industrialisation continue to grow in future. The planning intent is to develop organised logistic parks at intersections of Ring Roads with a highway/expressway and key locations along the proposed Crescent Railway instead of standalone logistics developments. Out of total gross land requirement of 20.2 sq km:

1. Shikrapur and Chakan are allocated 20% share each since they are envisaged to be Logistics and Industrial Hubs and for completing the industrial value chain for proposed industrial parks/ MIDC and
2. 5% share is allocated at Wagholi to complement the Aurangabad-JNPT Industrial Corridor.
3. 10% share is assigned at Khed-Rajgurunagar considering its strategic location on Pune-Nashik Highway and proximity to Chakan industrial hub.
4. Alandi and Kedgaon are assigned 5% share due to their proximity to industrial hubs (Chakan and Kurkumbh) and their strong regional connectivity.
5. 5% share is assigned at Nasrapur, which is located along the major transport corridors.
6. The remaining share has been distributed at Talegaon, Khed-Shivapur and Uruli Kanchan, considering their location vis-a-vis the proposed PMRDA and MSRDC Ring Roads and at Saswad considering the proposed CSR International Airport.

Commercial Zone

Total tertiary sector employment (excluding logistics) is projected to be about 5.48 lakh by 2041, out of which about 4.62 is in commercial, while 0.86 lakh is in the education and health sector. Tertiary sector employment (excluding logistics) is distributed within 18 DP PAs in proportion to the projected population of each DP PA.

Commercial land requirements have been worked out based on the URDPFI standard of 0.6 ha per 1,000 population. Most of the existing commercial use comprises warehousing/godowns, which is classified under Logistics Zone. About 17.95 sq km of net land is estimated to accommodate the total population of 29.91 lakh by 2041. This population excludes the population of ITP and TPS since both would have their own commercial zone provisions. Further, 30% add-on is considered to account for roads (15%), open space (10%) and amenities (5%). Accordingly, gross land requirement for the Commercial Zone is estimated to be 23.77 sq km.

Commercial Zone Distribution:

1. The total commercial land requirement of 23.77 sq km is divided into two components in each of the Growth Centres: consolidated development in the form of Regional Centres (RC) and Town Centres (TC) and general commercial exclusive of RC/TC.
2. The area requirements for RC and TC are proposed as per the Planning Norms described in Chapter 16.
3. The remaining general commercial land requirement (exclusive of RC/TC) has been distributed throughout the region based on the population of each Growth Centre. Neighbourhood centres (spread over 18 Growth Centres) will be part of the general commercial land requirement.
4. The proposed Commercial Zone would cater to about 4.6 lakh employment in the 18 Growth Centres, whereas the Public Semi-Public Zone employment is about 87,000. Land Requirements for Commercial Zone are given in Table 12.5.

Residential Zone

The residential land requirement by 2041 is estimated for the proposed 18 Growth Centres. Residential land requirement is inclusive of the area under Gaothans/Wadis.

By 2041, the Rural Area population is estimated to be 12.96 lakh, whereas Urban Area (18 Growth Centres) population is estimated to be 40.74 lakh. Residential land required for the rural population would be supplied by allowing Gaothan extension and zoning proposed in 8 Rural Growth Centres.

For the calculation of land requirement in Urban Growth Centres, Residential Zone is divided into two components: ITP/TPS area with 10.8 lakh population (since the gross area for ITP/TPS population is already established and to be retained), and the new residential area required for 29.9 lakh population.

The total gross residential area under ITP and TPS is ten sq km.

For the remaining population of 29.9 lakh (excluding ITP and TPS population), the residential land requirement for each GC is calculated by applying net density to each Growth Centre population, based on the assigned role of each GC. The estimated total net residential land required for the 29.9 lakh population works out to be 266 sq km. Further, 40% add-on is considered to accommodate amenities (15%), roads (20%) and open spaces (10%). Accordingly, the total gross land requirement for the projected population of 29.9 lakh is estimated to be 347sq km, out of which 36 sq km is under sanctioned layouts.

Total gross land under residential zone including ITP/TPS, sanctioned layouts and new residential area is 373.9 sq km.

Residential Zone Distribution:

The total gross residential area under ITP and TPS is ten sq km. Gross area under sanctioned layouts and proposed residential developments is 347 sq km, which is worked out based on applying net densities to each Growth Centre (exclusive of ITP and TPS population) as mentioned below:

1. Khadakwasla GC is assigned the highest population density of 250 PPH because of the limited availability of developable land, as 60% of the GC area is under constraints.
2. Population density of 100 PPH has been assigned to Malavali and Nasrapur Growth Centres, considering their positioning as Tourism GCs.
3. 125 PPH standard population density is assigned to the remaining Growth Centres- Chakan, Alandi, Wagholi, Loni Kalbhor, Pirangut, Hinjavadi, Talegaon, Shikrapur, Saswad, Urali Kanchan, Khed Shivapur and Ranjangaon, Khed-Rajgurunagar, Yawat and Kedgaon

Table 12.3: Industrial, Logistics and IT Zone Land Requirement

	Growth Centre	General Industrial Zone			Logistics Zone			IT Zone			Total Industrial	
		Pro-posed Share	Employ-ment 2041	Gross Area Re-quired (sq km)	Pro-posed Share	Employ-ment 2041	Gross Area Re-quired (sq km)	Pro-posed Share	Employ-ment 2041	Gross Area Re-quired (sq km)	Total In-dustrial, Logistics, & IT Em-ployment 2041	Total Gross Area Re-quired-Indus-trial, Logis-tics, IT (sqkm)
1	Chakan	30%	2.15	56.0	20%	56,383	4.0	-	-	-	271,734	60.0
2	Alandi	2.5%	0.17	4.7	5%	14,096	1.0	-	-	-	32,042	5.7
3	Wagholi	1.25%	8,973	2.3	5%	14,096	1.0	50%	143,567	1.9	166,636	5.2
4	Loni Kalbhor	1.25%	8,973	2.3	2.5%	7,048	0.5	-	-	-	16,021	2.8
5	Khadakwas-la		-	-		-	-	-	-	-	-	-
6	Pirangut	5%	35,892	9.3		-	-	-	-	-	35,892	9.3
7	Hinjavadi	10%	71,784	18.7	2.5%	7,048	0.5	20%	57,427	0.7	136,258	19.9
8	Talegaon	30%	215,351	56.0	5%	14,096	1.0	15%	43,070	0.6	272,517	57.6
9	Malavali		-	-		-	-	-	-	-	-	-
10	Khed Rajgurun-agar		-	-	10%	28,191	2.0	-	-	-	28,191	2.0
11	Shikrapur	5%	35,892	9.3	20%	56,383	4.0	-	-	-	92,275	13.4
12	Urali Kanchan	1.25%	8,973	2.3	5%	14,096	1.0	-	-	-	23,069	3.3
13	Saswad	1.25%	8,973	2.3	5%	14,096	1.0	15%	43,070	0.6	66,139	3.9
14	Khed Shiwapur	2.5%	17,946	4.7	10%	28,191	2.0	-	-	-	46,137	6.7
15	Nasrapur		-	-	5%	14,096	1.0	-	-	-	14,096	1.0
16	Ranjangaon	10%	71,784	18.7		-	-	-	-	-	71,784	18.7
17	Yawat		-	-		-	-	-	-	-	-	-
18	Kedgaon		-	-	5%	14,096	1.0	-	-	-	14,096	1.0
	TOTAL	100%	717,836	186.6	100%	281,914	20.2	100%	287,134	3.7	1,286,884	210.5

Table 12.4: Residential Land Requirement

	Growth Centre	Residential Zone					
		Total Population 2041	Population 2041 Excluding ITP, TPS	Net Density for Pop Excluding ITP, TPS (pph)	Net Area Required- Excluding ITP/ TPS (sqkm)	Total Net Resi Zone Required (sqkm)	Gross Area required Excluding ITP*/ TPS (sqkm)
1	Chakan	381,153	381,153	125	30.5	30.5	44.2
2	Alandi	95,641	95,641	125	7.7	7.7	11.1
3	Wagholi	329,431	329,431	125	26.4	26.4	38.2
4	Loni Kalbhor	833,710	295,110	125	23.6	33.6	34.2
5	Khadakwasla	277,662	212,481	250	8.5	11.1	12.3
6	Pirangut	454,553	294,763	125	23.6	30.0	34.2
7	Hinjavadi	434,241	208,151	125	16.7	23.4	24.1
8	Talegaon	347,040	321,195	125	25.7	26.7	37.3
9	Malavali	147,109	147,109	100	14.7	14.7	21.3
10	Khed-Rajgurunagar	79,186	79,186	125	6.3	6.3	9.2
11	Shikrapur	178,019	167,491	125	13.4	13.8	19.4
12	Urali Kanchan	116,936	116,936	125	9.4	9.4	13.6
13	Saswad	80,641	80,641	125	6.5	6.5	9.4
14	Khed-Shiwapur	33,599	33,599	125	2.7	2.7	3.9
15	Nasrapur	40,378	40,378	100	4.0	4.0	5.9
16	Ranjangaon	159,504	159,504	125	12.8	12.8	18.5
17	Yawat	32,611	32,611	125	2.6	2.6	3.8
18	Kedgaon	52,684	52,684	125	4.2	4.2	6.1
	TOTAL	4,074,098	3,048,064	129	239	266	347

*- The boundries of ITP schemes whose master plans are approved and are inforce, are marked as overlay while zone under it is maintained as per the proposals of RP 1997 at the time of its sanction.

Table 12.5: *Commercial Zone Land Requirement*

	Growth Centre	Area under ITP, TPS (sqkm)	Total Gross Area Required (sqkm)	Commercial + Education Zone		Percentage of Population (Share of employment)	Employment in Commercial and Education Sector	Total Net Commercial Zone Required (sq km)	Total Gross Commercial Area Required (sq km)
				Total Population 2041	Population 2041 Excluding ITP, TPS				
1	Chakan	-	44.2	381,153	381,153	9%	51,787	2.29	2.97
2	Alandi	-	11.1	95,641	95,641	2%	12,995	0.57	0.75
3	Wagholi	-	38.2	329,431	329,431	8%	44,760	1.98	2.57
4	Loni Kalbhor	10.0	44.2	833,710	295,110	20%	113,276	1.77	2.30
5	Khadak-wasla	2.6	14.9	277,662	212,481	7%	37,726	1.27	1.66
6	Pirangut	6.4	40.6	454,553	294,763	11%	61,760	1.77	2.30
7	Hinjavadi	6.7	30.9	434,241	208,151	11%	59,000	1.25	1.62
8	Talegaon	1.0	38.3	347,040	321,195	9%	47,152	1.93	2.51
9	Malavali	-	21.3	147,109	147,109	4%	19,988	0.88	1.15
10	Khed-Rajgurunagar	-	9.2	79,186	79,186	2%	10,759	0.48	0.62
11	Shikrapur	0.4	19.9	178,019	167,491	4%	24,187	1.00	1.31
12	Urali Kanchan	-	13.6	116,936	116,936	3%	15,888	0.70	0.91
13	Saswad	-	9.4	80,641	80,641	2%	10,957	0.48	0.63
14	Khed-Shiwapur	-	3.9	33,599	33,599	1%	4,565	0.20	0.26
15	Nasrapur	-	5.9	40,378	40,378	1%	5,486	0.24	0.31
16	Ranjangaon	-	18.5	159,504	159,504	4%	21,672	0.96	1.24
17	Yawat	-	3.8	32,611	32,611	1%	4,431	0.20	0.25
18	Kedgaon	-	6.1	52,684	52,684	1%	7,158	0.32	0.41
	TOTAL	27.2	373.9	4,074,098	3,048,064	100%	553,547	18	24

12.6 Proposed Planning Strategies

Planning Hierarchy for Urban Growth Centres

Planning Hierarchy is essential to conceive and plan for the developmental needs of urban and rural areas. As explained before, Study Area is broadly organised into urban and rural areas. The proposed urban hierarchy addresses 18 Growth Centres. Each Growth Centre is conceived as a Town, and it is further subdivided into Neighbourhoods/Sectors as elaborated below:

Region

The total PMR represents the Region, which hosts PMC & PCMC corporations, Municipal Councils, Nagar Panchayats, Cantonment, Defense areas, special planning authority areas such as MIDC & MADC together with 18 Urban Growth Centres and 8 Rural Growth Centres.

At present, the villages of the Study Area depend on existing central business/commercial districts centres of PMC and PCMC, but it adds to their congestion. Anticipating the projected growth, the Region would require a dedicated business/commercial district as Regional Centre to serve the higher-order commercial needs of its population. It would be developed as decentralized Peripheral Business Districts (PBD). It would comprise regional level amenities and services. Regional centres would serve urban and rural areas, covering the entire Region.

Town

Each Growth Centre is conceptualised as a "Town". A Town would be a self-sufficient Planning Unit providing local service/amenity needs for its residents and generating a certain percentage of local employment. It would be interdependent on other towns within the PMR for a higher level of services/ amenities and employment. Principal town level amenities would be integrated at Town Centre serving 100,000-200,000 resident population. Desired service radius of a Town Centre would be a maximum of 5 km. However, it would also serve rural areas located within a 5 km radius.

Neighbourhood

A typical Town would be composed of 8-12 Neighborhoods (Urban Blocks). A Garden and Playground would form the Neighborhood nucleus to foster a healthy lifestyle and a strong sense of community. A commercial node planned as neighbourhood centre within each of the neighbourhoods would serve for daily requirements and convenient stores catering to 10,000 -15,000 resident population. It would be located in such a way that multiple Neighborhoods would share the same. Desired service radius of a Neighborhood Centre would be a maximum of 1 km.

Neighbourhood level amenities would be planned in an integrated manner at the Neighborhood Centre

Planning Strategies for 18 Urban Growth Centres

The Structure, delineation of the Growth Centres and Proposed Framework have provided a broad concept and spatial development skeleton for PMR and, thus, the foundation for the Development Plan. Based on these guidelines detailing within each Growth Centre will be done. Following are the planning strategies to be followed for each of these 18 urban Growth Centres:

1. Each Growth Centre will have an exclusive Development Plan: Each Growth Centre is unique in its setting and potential. Therefore each area should be planned to address existing issues, land requirements, gaps within social infrastructure, past proposals and environmental concerns of the place.
2. These Growth Centres should be guided by the 'Structure' described above to propose sustainable development and achieve the stated vision.
3. Zones are delineated as per the economic role following the land quantification described in Table 12.5.
4. The proposed planning structure in this chapter and area-based solutions from CTTS 2018 should be captured and further detailed in each growth centre, integrating with the proposed land use.
5. A balanced distribution of social amenity demands should be ensured based on the projected population of each Growth Centre. The proposed planning standards will guide the planning and delineation of amenities within each Growth Centre.
6. Arrangements for water and sewerage infrastructure for each Growth Centre should be proposed under the integrated water supply and sewerage plan. This integrated plan is expected to cater to the entire Planning Area and projected population of the year 2041. Allocation and delineation of water supply and sewerage systems should be based on this plan.

7. Abundant green spaces proposed for a livable habitat: As per the Resilient goal, environmentally sensitive areas should be protected and, in certain cases, promoted. This structure should guide the allocation and delineation of green spaces within the Development Plan of each Growth Centre.

Rural Growth Centres

Vision for PMR proposes rural growth centres as amenity hubs as well as a catalyst for rural employment generation that would create new tertiary sector jobs triggered by operations and maintenance of the proposed amenities for the local rural workforce.

Planning hierarchy for Rural Growth Centre

A key lesson learnt from the present urban sprawl that engulfs the Growth Centres proposed in the 1997 Regional Plan is that spatial planning for rural development is equally important. To facilitate the planning of the rural areas, rural settlements are organised into a hierarchy of two tiers as below, and planning norms are proposed for each tier.
1. Rural Growth Centre
2. Village

Rural Growth Centre

Rural Growth Centre would be a scaled-down version of a Town Centre and would cater for higher-level amenities for the rural areas.
1. The catchment population shall be at least 40,000 as per RP 1997.
2. Expected travel distance norms from villages to their Rural Growth Centre had been defined as 8-10 km by RP1997. These norms are maintained for relatively flatter rural areas. However, travel distance would be >10 km for the villages located in the western ghats considering sparsely populated villages and larger travel distances imposed by physical constraints such as large water bodies/topography.

Village

1. Grampanchayat should do village level planning.
2. Village would be catering to its own needs, which are required to be located within walkable distance.
3. Each village is anticipated to be self-sufficient.

Planning Strategies for 8 Rural Growth Centres

1. Each Growth Centre will have an exclusive Development Plan: Each Growth Centre is unique in its setting and potential. Therefore each area should be planned to address existing issues, land requirements, gaps within social infrastructure, and environmental concerns of the place.
2. The Rural Growth Centres should be guided by the Movement Lattice, Walkable neighbourhood and Green Blue Connectors concept.
3. Residential zones should be worked out by considering the 2041 population of the village designated as the centre and an additional 10% migrant population of its rural catchment, the net population density of 75 PPH and 45% top-up to accommodate local roads, amenities and open space. As residential zones are proposed for all Rural Growth Centres, provision of Gaothan extension shall not be applicable to them.
4. A new grid of roads of 500m x 5000m should be proposed covering the proposed urbanisable area.
5. A balanced distribution of social amenity demands should be ensured based on the projected population of catchment served by each Growth Centre. The proposed planning standards will guide the planning and delineation of amenities within each Growth Centre.
6. Arrangements for water and sewerage infrastructure for each Growth Centre should be proposed under the integrated water supply and sewerage plan.

Chapter 13:
Convenient: Traffic and Transportation Proposals

PMR currently faces challenges in transportation such as the absence of ring roads, bypass roads to national highways, alternatives roads to radial roads, choked entry/exits to PMC and PCMC, existing railway lines functioning at overcapacity and limited public transport coverage in PMR.

PMRDA took the initiative to prepare the Comprehensive Mobility Plan (CMP) for 2,172 sq km urbanised parts of PMR and Comprehensive Traffic and Transportation Surveys (CTTS) for the entire PMR. Both these plans form the basis for the proposed traffic and transportation plan in this Development Plan.

The transport sector is one of the major contributors to greenhouse emissions, thus contributing to climate change. Further, in various surveys and citizen feedback taken by multiple agencies such as PMC and PSCDCL, transport has emerged as significant stress for Pune. Therefore, it is necessary to evaluate the transport provisions through resilience, low-carbon and smart city lenses.

13.1 Convenient: Objectives and the Actions

The Convenient Goal under the Vision Framework covers transportation related objectives. These objectives stipulate the development of robust transport infrastructure, convenient accessibility and ease of intermodal exchange. Further, it proposes the following specific actions to ensure these objectives can be materialised through the planning process:

Table 13.1: Convenient Mobility and its Actions

Objective	Actions
Develop Regional Linkages	Action 1: Expansion and up-gradation of highways
	Action 2: Development of Ring Roads
	Action 3: Development of secondary road network
Develop Transport Hubs	Action 4: Development of multi-modal hubs
	Action 5: Promote development along transit corridors along with last-mile connectivity
	Action 6: Development of truck terminals
Promote Public Transport and Increase Its Modal Share	Action 7: Connect employment nodes by mass transit
	Action 8: Development of Metro, linking Growth Centres to PMC and PCMC
	Action 9: Development of suburban railway, crescent railway and high-speed rail
	Action 10: Promote mass transit system/feeder systems within the secondary road

13.2 Key provisions of Proposed Transportation Plan

Key Strategies	Key provisions proposed in the DP
Interconnectivity	Interconnectivity with the regional network, municipal corporations and councils, industrial areas, TP schemes and integrated townships is considered.
Continuity	Connectivity between adjoining urban growth centres as well as between urban and rural planning areas is considered for effective traffic dispersal.
Pragmatic approach	Proposed roads took cognisance of contours, forests, water bodies, defence lands, railway buffers, approved building plans, and major existing structures.
Dense urban grid and hierarchy	An urban grid of 500m x 500m is considered for the road network. Hierarchy in the road network is proposed categorising roads into primary, secondary, collector and local level roads.
Multimodal corridors	PMRDA Ring Road will act as multimodal corridor.
Public transport	7 Metro corridors identified in the CMP form the key projects.
Non Motorised Transport	Non-Motorised Transport (NMT) width is considered in road widths for last-mile connectivity from neighbourhoods to arterial roads.
Accessibility	Accessibility to major development zones, all proposed amenities and major transit points such as Metro, bus terminals, railway stations is provided.
Intermodal Integration	Intermodal integration at intersecting locations between Rail and Roads is proposed to encourage modal shift to rail-based public transport and public transport terminals in urban growth centres.
Logistics planning	Logistic hubs/Truck terminals are proposed along the Ring Roads and highways at strategic locations.
Optimised road widths	Optimised road widths considering the current and projected population and traffic forecast.

13.3 Growth Direction in Core Urban Areas

The ongoing development in core urban areas in PMR is primarily along:

1. Pune-Ahmednagar Highway (NH-753F) towards Wagholi, Ranjangaon, Shikrapur
2. Pune- Kolad Road (NH-753F) towards Bavdhan, Pirangut, Mulshi
3. Mumbai- Bangalore Highway (NH-4) towards Hinjawadi, Mahalunge, Gahunje, Talegaon, Dehu, Khed Shivapur, Nasrapur
4. Pune-Nashik Highway (NH-60) towards Moshi, Chakan
5. Pune-Solapur Highway (NH-65) towards Loni Kalbhor, Uruli Kanchan, Kedgaon

Major future developments that will have an immense impact on the growth direction are:

1. IT and auto hubs located in the west, northwest and north of PMR
2. IT, BPO and manufacturing in the northeast of PMR
3. The international airport in the south and southeast of PMR

The developments along the Mumbai-Pune Expressway will trigger expansion towards the south and south-west directions, but due to prevailing topographical conditions, i.e. hills, the growth will be restricted. The future growth direction of the urbanised area in PMR is presented in Figure 13.1.

Figure 13.1: *Future Growth Direction of Urbanised Area of PMR*

13.4 Development of Transport Network - Process

The planning process is complicated due to the existing prevailing conditions, the involvement of various authorities, the fallout of the Regional Plan proposals, and honouring the building permissions thereof. The following actions provide a guide for the preparation of the transportation plan of PMR.

Existing Road Network as a Base Network

PWD district roads master plan 2001-2021 is generally followed. Classified roads such as national highways (NH), state highway (SH), major district roads (MDR), other district roads (ODR), village roads (VR) are duly considered while proposing the transport network. Further, roads developed by government authorities, roads part of Regional Plan, roads within MIDC industrial areas, private internal roads are also considered. All these roads included in the ELU database form the basis of the proposed road network planning.

Connectivity with Adjoining Development Plans

Connectivity with an existing and proposed road network of development plans/master plans of PMC, PCMC, seven municipal councils, three cantonments, MIDC layouts/industrial layouts, PMRDA TP schemes, integrated townships, approved building permissions have been considered.

Approved Projects by various authorities and PMRDA Approved Layouts

Proposals from government authorities such as NHAI, PWD, MSRDC, railways, PMRDA, MIDC, MADC etc. have been considered in the proposed transportation plan. However, these authorities reserve the right to change their respective alignments in consultation with concerned stakeholders at a later stage.

Proposed road network within layouts and ITPS is considered along with its continuity with the surrounding iwhile proposing the transport network.

Demands from Citizens, Public Representatives, Government Bodies

PMRDA has received several applications from residents, elected representatives and government agencies regarding their requirements of amendments in roads passing through or aligning certain properties. These have been studied and considered in relation to CTTS study as well as Development Plan planning intent and incorporated accordingly. PMRDA has also received letters from government authorities regarding the incorporation of their transport amenity requirements.

Physical Features Considered While Planning

While planning for the proposed transport network, due cognisance was given to the physical features such as forests, water bodies and their buffers, hilltop hill slopes and green zones around rivers. Contours and levels played an essential role in the profiling of road alignments. Constrained sites such as defence, military and special planning areas were bypassed. Roads were designed following the terrain, plot boundaries and integrating with the proposed land use. Bypass roads have been proposed around Goathans and congested areas to avoid congestion.

RP Proposals and their Criteria

In general, Regional Plan 1997 road alignments, hierarchy and ROWs are adhered to. However, after analysing existing information based on high-resolution imagery, 0.5 m contour data and existing land use, certain amendments were required to the road network proposed in Regional Plan 1997.
Following criteria were utilized while considering RP roads:
1. An alternative road is proposed if the RP road alignment is passing through a settlement that is fully built-up, but in a case where alignment is important, then the old alignment is retained as per RP even if it is incompatible with structures; also, an additional alternative road is further provided.
2. Existing (i.e. already developed) road alignment is considered when the RP road is aligned in close proximity to this existing road.
3. Roads proposed by other planning authorities which are differing from RP alignment are considered.
4. An alternative route is proposed to the RP roads, which pass through restricted areas like forests and geographical constraints like hills, water bodies etc.
5. Roads in approved layouts, which either adjoin RP roads or where an RP road passes through the structures, are followed.
6. Revised ROW is proposed for RP roads passing through existing settlements such that the proposed road is implementable.
7. Unimplemented RP roads passing through greenfield areas that do not cater to any existing settlement or which are not in line with proposed transportation strategies are realigned/downgraded to suit the planning intent.

13.5 Movement Lattice: Low Carbon Mobility Plan

Low Carbon Mobility Plan (LCMP) provides a long-term vision for sustainable mobility for people and movement of goods in cities. The LCMP advocates an integrated approach, e.g. looking at land use and transport planning, social inclusion and the integration of safety, environment and CO2 mitigation.

CTTS covering the entire PMR recommends compact development along transport corridors, promotes low carbon mobility actions such as strengthening the public transportation system through suburban rail network, metro rail network and BRTS routes etc., optimised road widths considering the current and projected population and forecasted traffic.

Developing Non-Motorised Transport (NMT) within the proposed road network, within the 18 Growth Centres and 500 m radius around industrial and institutional campuses, helps address problems related to high consumption of non-renewable energies, thus addressing air pollution and GHG emission production. Furthermore, it promotes health and traffic safety, reduces traffic congestion and provides equal mobility options for all income brackets.

The central and state governments are promoting low carbon buses (CNG, LPG, Hybrid, Biofuels, Electric). Recommendations regarding vehicle charging infrastructure, last-mile connectivity at metro stations and bus stops are also proposed.
Thus Lattices such as Road Lattice, Urban Mass Transport Lattice, NMT Lattice and the nodes of Lattices such as multimodal hubs and terminals together form Low Carbon Mobility Plan of PMR addressing the goal of Convenient mobility.

Road Grid

PMR has about 8,823 km of road network in which PMC, PCMC together have a road network of 2,171 km (25% of PMR road network). The length of regional roads (Expressway, NHs, SHs, MDRs) is about 2,500 km. About 79% of the road network is either a single or intermediate lane configuration, and the remaining 21% of the road network is a two-lane configuration or more. The share of four-lane/six-lane configuration is around 9%. In terms of availability of RoW (based on road inventory), 46% of the road have an RoW of less than 7 m, 27% of the road have an RoW of 7 m to 10 m, 10% of the road have an RoW of 10 m to 20 m, 7% of road have an RoW of 20 m to 40 m, and only 1% of the road length has RoW of more than 40 m. The road density in PMC, PCMC and the rest of PMR is 4.55 km per sq km, 4.77 km per sq km and 0.95 km per sq km respectively. The road density in municipal councils is observed to be high at 6.22 km per sq km.

By considering constraints of the road network, the following strategy has been framed:
1. Major radial roads are vital to the region's economy, providing access to both raw material producers and finished goods suppliers across the nation. There is a need to make major primary roads as access-controlled roads (as per NHAI 6-lane standards).
2. Ensure hierarchical road development, i.e. development of ring, radial and grid pattern of PMR road network at the regional and local level with hierarchy. The primary road network shall be complemented with a secondary road network.
3. Develop road infrastructure to cater to not only private vehicles but also pedestrians, cyclists and public transport. Road cross-sections should have provision for trees, shrubs and landscaping. Develop New Urban Street Design Guidelines for designing roads in urban areas.
4. Develop missing links and grade separators/interchanges at critical locations.
5. Develop ROBs/RUBs across railway lines for improving safety and reducing delays.
6. Improve road connectivity to major employment nodes from PMC and PCMC.
7. Develop road linkages to tourist locations.
8. Develop bypasses to towns falling along the radial roads.
9. Develop access roads to PMRDA Ring Road, MSRDC Ring Road etc., to improve the effectiveness of major transport connectivity projects.
10. Optimise available capacity of roads through improved street designs, access control, vehicle actuated signals and traffic management using ITS and enforcement. Further, modes that use the least space and have higher capacity, i.e. rail and public transport, shall be encouraged.
11. Develop guidelines and model cross-sections/designs through the Engineering Department for road development within the region that should generally be followed. Among other things, such cross-sections/designs should include provisions for utility ducts for various utilities such as water, power, telecommunication. PMRDA will facilitate the development of these services in exchange for rental/license fees.
12. Carry out junction improvements on primary/secondary road networks.

In line with the strategies mentioned above, the following segments further explain road grid of PMR:
* The Proposed Road Hierarchy
* Proposed Road Design and Grid
* Proposed Road Development Plan

Proposed Road Hierarchy

The proposed road classification in urban areas includes the expressway (187 km), national highways (215 km), primary arterials (270 km), secondary arterials (331 km) and collector roads.

Each growth centre can be accessed using a national highway, a ring road or a rail route. Figure 13.2 illustrates transport strategies such as road hierarchy, junction spacing and recommended zones along transport corridors for each situation. It governs the road hierarchy in Growth Centres. Model 1 represents transport planning principles for Growth Centres that are 'bisected' by a national highway/railway/expressway. Model 2 indicates the same for Growth Centres 'sandwiched' between railway and highway. Model 3 explains the same for Growth Centres 'bypassed' by a highway.

Figure 13.2: *Schematic Road Hierarchy Models*

The basis of classification is whether the road is to be used primarily for movement or access. So, all the expressways, highways, primary and secondary arterials restrict the direct access to plots, street vending facilities and on-street parking on these roads to maintain smooth traffic flow.

Proposed road hierarchy is elaborated in Table 13.2

Table 13.2: *Proposed Road Hierarchies*

Type of Road	URDPFI recommended Road Width in Meter	Proposed DP Road Width in Meter
Primary	50-80	60/75/90/110
Secondary	30-50	30/36/45
Collector	15-30	15/18/24
Local	15<	12

Road Design and Grid

Forming a grid network is considered for proper dispersal and distribution of traffic. An overall grid network for the entire PMR region connecting all major development nodes is proposed. A denser grid of around 500m x 500m or 300m x 300m in urban residential neighbourhoods is provided, whereas a grid of approximately 800m x 1500m is provided in greenfield and rural areas as per the site context and overall planning intent. The roW is decided based on CTTS traffic projections as well as GoMs express RP directives.

Following guidelines have been considered while designing the hierarchical grid network:
1. A hierarchical grid is proposed considering the traffic flow characteristic, access control criteria, connections with other hierarchy of roads, junction type and junction spacing.
2. Primary Road: These include expressways and highways which have uninterrupted flow except at interchanges. All Growth centres have a highway passing through them. Grade junctions for primary roads need to be spaced between 2.5 km to 5 km, and they form connections with secondary roads. Since most national highways pass through urban areas, a 12 m service road is considered along all national highways,

where secondary and tertiary roads could connect.

3. Secondary Road: These roads are proposed to form a grid of 1.5 km to 3 km. Junctions for secondary roads are at a distance of 1.5 km to 2.5 km, and they form connections with collector roads.
4. Collector Road: Proposed collector roads form a grid of 0.3 km to 0.8km. Collector roads form connections to local roads.
5. Secondary roads to have Non-Motorised facilities as part of ROW.
6. All villages have been provided with at least one access road. All tourist places have been provided with road connectivity.

Proposed Road Development Plan

The proposed road development plan is shown in Figure 13.3. It comprises ring roads, radial roads, secondary roads (supporting both radial and ring roads), missing links and prioritised undeveloped Regional Plan 1997 roads.

Ring Roads

Over the years, Pune has grown in concentric rings. While the radial roads have been well developed, ring roads could not be developed due to several constraints. MSRDC and PMRDA are in the process of developing ring roads in the region.

PMRDA Ring Road

The Ring Road is proposed to be 123.35 km in length with 65 m ROW containing a six-lane main carriageway along with provisions for mass transit systems. This Ring Road aims to bypass the city and connect all the growth nodes in the periphery of PMC and PCMC. Implementing the Ring Road will help alleviate the traffic in the core city by bypassing traffic from city roads. Simultaneously, it is crucial to implement Ring Road as an access-controlled freeway to achieve faster movement of passengers and goods.
A stretch of 41.03 km from Urse to Solu is common between the PMRDA Ring Road and MSRDC Ring Road.

MSRDC Ring Road

The MSRDC ring road (173.79 km) has been proposed to facilitate faster movement of regional traffic connecting PMR roads of national importance. The Ring Road starts at Solu, passes through Lonikand, Uruli Kanchan, Dive and Urse, as shown in Figure 13.3. This ring road will have faster connectivity to JNPT and Dighi ports from highways in the region.

Radial and Secondary Roads

In addition to ring roads, there is a need to widen existing radial roads and support them with a parallel secondary road network to ease traffic on radial roads. The proposed radial roads development proposals are presented in Table 13.3.

Table 13.3: *Proposed Radial Road Development in PMR*

No	Proposal	Length (km)	Exist. Lane Configure	Prop. Lane Configure
1	Mumbai Expressway (PMRDA Ring Road to PMRDA Boundary)	40	6	8
2	Mumbai Highway (NH 48) (Ring Road to PMRDA Boundary)	36	4	6
3	Nasik Highway (NH 60) (Ring Road to PMRDA Boundary)	29	4	6
4	Nagar Highway (NH 753F) (Ring Road to PMRDA Boundary)	58	4	8
5	Solapur Road (NH 65) (Ring Road to PMRDA boundary)	48	4	8
6	Satara Road (NH 48) (Ring Road to PMRDA boundary)	34	6	8
7	Mulshi Road (NH 753F) (Ring road to PMRDA boundary)	68	2	4
8	Wadki to Saswad (NH 965) (Proposed Airport)	30	2	6

Moreover, there is a need to develop an alternative secondary road network to divert some of the local traffic. Lateral connecting secondary roads are proposed to improve connectivity among radial roads, and the same is presented in Table 13.4.

Table 13.4: *Proposed Missing-link Road Development in PMR*

No	Proposal	Length (km)	Exist. Lane Configure	Prop. Lane Configure
1	Peth-Shirur Road	56.5	1	2
2	Rajgurunagar-Pabal Road	22.1	2	2
3	Shikrapur-Maltan Road	18.2	1.2	2
4	Shirur-Kedgaon Road	44.5	2	4
5	Kondhapuri-Yavat Road	34.0	1.2	2
6	Nirvi-Shikrapur Road	37.3	1.2	2
7	Road connecting Pargaon and PMRDA Ring Road	51.3	1.2	2
8	Road connecting PMRDA Ring Road and Uruli Kanchan	13.6	1.2	3
9	Kapurhol-Saswad Road	20.5	2	2
10	Saswad Bypass	5.5	Greenfield	3
11	RP Road from Hinjawadi to Pirangut	12.4	1.2	3

Along with regional roads, it is essential to develop alternative routes to radial national highways. Bypass roads to towns such as Chakan, Alandi, Wagholi, Shikrapur, Loni Kalbhor, Uruli Kanchan, Pirangut, Hinjawadi, Talegaon are proposed. Multiple connecting links to PMC, PCMC and urban growth centres are proposed. The proposed grid network helps in effective traffic dispersal and reduces radial road dependency.

Figure 13.3: *Proposed Road Network and Hierarchy*

Urban Mass Transport Grid

Currently, public transport demand is catered by city bus service, BRTS (both operated by PMPML) and suburban railway (operated by central railways). The bus system carries around 10.5 lakh passengers per day, whereas Suburban rail carries around 1.1 lakh passengers per day. The current share of public transport trips in PMR is 17% only. The share of public transport trips in PMC and PCMC is 16% and 19%, respectively. The share of public transport is very low considering the area and population.

Urban Mass Transport Strategy

• Develop and expand Bus services, BRTS, Metro and LRT and connect all the systems through seamless multi-modal infrastructure facilities with an emphasis on last-mile connectivity. Last-mile connectivity is a weak link in urban transport which needs particular focus and attention.
• Develop multi-modal integration of facilities.
• Improve public transport coverage in rural areas. The rest of PMR shall be connected with PMC and PCMC using a robust public transport system. The PMR public transport network shall be developed in Hub and Spoke fashion.

The proposed mass transport grid is based on the Hub and Spoke model. It entails identifying mass transport interchanges within Growth centres located on fringes of municipal corporations as mass transport hubs and connecting them with proposed/existing key transport hubs in municipal corporations. This grid includes the existing suburban railway (upgrading), proposed crescent railway and proposed Metro network (Lines 1, 2, 3 and their extensions within Growth Centers). A shuttle bus service is recommended to connect transport hubs located on these corridors to their service areas as part of last-mile connectivity.

Figure 13.4: Hub and Spoke System for Public Transport

Following sections further explain Urban Mass Transport Grid of PMR:
• Mass Rapid Transit System
• Railway Development

Mass Rapid Transit System Development Plan

Based on demand (PHPDT), the appropriate system, i.e. Metro, Light Metro, Suburban and BRTS, is recommended. These tentative alignments are altered to fit in proposed land uses in Growth Centres based on their detailed planning.

The MRT/BRT routes proposed are in concurrence with allocated residential and employment-generating land uses along these corridors. MRTS routes are proposed such that they connect public transport stations and allied amenities like parking, bus terminals, truck terminals and promote intermodal integration. The proposed higher-order public transport system is presented in Table 13.5

Figure 13.5: Public Transport Network in PMR

Table 13.5: Future Metro/LRT Routes in PMR

No	Proposal	Length (km)	Jurisdictions Covered	Remarks
1	Line 1: Nigdi - PCMC to Swargate - Katraj	31.21	PCMC, PMC	Swargate to PCMC stretch of 16.58 km is under construction
2	Line 2: Chandni Chowk - Vanaz to Ramwadi - Wagholi	21.07	PMC, PMR	Vanaz to Ramwadi stretch of 14.66 km is under construction
3	Line 3: Hinjawadi to Shivaji Nagar	23.00	PMR, PMC, PCMC	Under construction in PPP
4	Line 4: Shivaji Nagar to Hadapsar	11.56	PMC	
4a	Line 4 Ext: Hadapsar to Loni Kalboor	9.37	PMR	
5	Line 5: Hinjawadi (Wakad) to Chakan via Nashik Phata	20.58	PCMC, PMR	
6	Line 6: Sinhgad Road to Pune Cantonment	8.76	PMC	Light Metro
7	Line 7: Warje to Swargate	11.05	PMC	Light Metro

8	Line 8: Chandni Chowk to Hinjawadi	19.53	PMR, PMC	Light Metro
9	Line 9: Hinjawadi (Wakad) to Wagholi	32.43	PMC, PCMC, PMR	
10	Line 10: Hadapsar to Saswad Airport	23.25	PMC, PMR	High-speed Airport Metro
11	Line 2 Ext: Wagholi to Shikrapur	20.61	PMR	
12	Line 5 Ext: Chakan to Rajgurunagar	11.59	PMR	

Railway Development

After reviewing various ongoing and proposed railway projects in PMR, few new proposals such as bypass railway lines are proposed. This proposed alignment of bypass rail or 'Crescent railway' is essentially a bypass to PMC and PCMC to reduce congestion at existing railway stations situated within their limits and fast track the movement of goods on Pune-Daund and Pune-Miraj lines. It would serve as a boon for industrial clusters located at Talegaon, Chakan, Koregaon Bhima, Sanaswadi and areas of Uruli Kanchan. The station locations are proposed at Talegaon, Chakan, Shikrapur and Uruli Kanchan.

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Upgradation of existing railway networks of Pune-Daund, Pune-Lonavala and Pune-Miraj lines is being undertaken by the railway authority, which would serve as suburban rail services. The proposed railway network takes cognisance of the Pune-Nashik high-speed railway alignment shared by MRIDL.

High Speed Rail

Railways are space efficient and environmentally sustainable mode of transport. In order to develop and promote rail based systems for bringing desired modal shift from private vehicles to Rail and to provide faster and improved regional rail connectivity with Nashik (212 km), High Speed Rail is proposed.

The Pune-Nashik High Speed Rail passes through PMR with stations at Pune station, Manjari Bk, Lonikand, Alandi, Chakan, Rajgurunagar. It starts at Pune Station upto Nashik. However total length form Manjari Bk, till Khed Rajgurunagar covers a length of 152.19 km. From Pune station until Manjari Bk station, the High Speed Rail follows the existing track of Pune-Daund railway corridor. The alignment and station locations provide opportunity for exchange of modes between PMRDA Ring Road, MSRDC Ring Road, Crescent Railway, Hadapsar- Loni Kalbhor Metro, Wagholi- Shikrapur Metro, Hinjawadi- Chakan Metro and national highways such as NH-753F, NH-548D and NH 60.

Figure 13.6: Proposed Railway Network

The details of the railway development proposals are presented in Table 13.6.

Table 13.6: Proposed Railway Lines

No	Proposal	Length (km)	Remark
1	Talegaon to Uruli Kanchan (Crescent Railway Line Phase I)	89.6	To operate as a suburban service as well.
2	Jejuri (Pune-Satara Line) to Proposed CSR International Airport	15	
3	Pune- Lonavala Quadrupling **	65	
4	Pune- Nasik** (High Speed Rail)	266	
5	Pune-Lonavala	65	Increased frequency for suburban service
6	Pune-Daund	75	Suburban rail service

Note: **Proposed by Indian Railways but implementation is yet to commence due to financial/institutional issues except for Pune-Miraj line which is fully funded by Indian Railways.

Non Motorised Transport (NMT)

Non-motorised transport (NMT) has gained popularity over conventional modes of motorised transportation. The advantages of NMT are that it emits zero emissions, provides better first and last-mile connectivity, and requires less space than private transport. Furthermore, NMT is also commonly known as active mobility due to walking and cycling's health benefits. Currently, there are limited NMT facilities and infrastructure in PMR. Thus, it is crucial to safeguard the necessary land and corridors to implement a safe and sustainable NMT network. To facilitate detailed planning activity and to ensure NMT is integrated as an essential planning consideration in land-use/amenity disposition, the following general guidelines are proposed:

NMT Strategies

- The proposed NMT plan's primary strategy is to provide a continuous and seamless network between the origin and destination. To achieve this, the network shall be connected to amenities, retail and major public transport stops.
- Secondary arterials in each growth centre are proposed as Avenues with wider footpaths for walking and cycling, connecting all the greens and blues, thus creating a scenic route.
- Minimum width of 1.8 m for footpath and 2 m for bicycle path shall be ensured on the road cross-sections.
- Integration of NMT infrastructure at intersections is crucial for the safe movement of pedestrians and cyclists infrastructure such as bicycle lanes, bicycle parking, park and ride facilities that increase bicycle movement efficiency in urban areas.
- For bus stops in residential areas, 400 m has traditionally been regarded as a cut-off point and 200 m in Town Centres/Sub-regional Centres. As for railway stations or main transport terminals, walk up to 800 m.

Figure 13.7 shows a desirable walking radius by general type of amenity/points of origin/destination of human movements.

Figure 13.7: NMT Strategy

Fig.7.12   NMT requirements at Public Facilities

Road Cross Sections

Utility Duct/ Corridor

Utility corridor concept is recommended so as to avoid building of connections at later stages which disturbs the road carriageways and to allow for proper planning of manholes and other connections. As part of good practices, utility ducts could be proposed under the carriage way and specific intervals are maintained for connections that would ensure quick connectivity and increase the efficiency of the treatment.

Utility duct/ corridor could host all types of ducting, conduits such as water pipes, telecommunication fibres, electricity conduits, etc, could be accommodated and managed efficiently. SCADA systems within these ducts will enable a much easier way of management from the centralised command centre.

Utility corridors shall be developed within the cross sections for primary and secondary arterial by PMRDA. The utility corridor service would be given to concern stakeholders, as part of the revenue scheme for the Authority.

Secondary roads or Avenue roads have provisions for footpaths and bicycle corridors. Collector roads have provisions for footpaths too. Since these hierarchies connect town level and neighbourhood level amenities, a contiguous network of NMT corridors is formed. Multimodal hubs are located along secondary roads, thus providing a seamless NMT connection from transit hubs to neighbourhoods.

Nodes of Lattices

The nodes are multimodal hubs, transfer stations, truck terminals and logistic terminals.
Following segments further explain PMR Nodes of Lattices:
1. Multimodal Hubs
2. Freight and Logistic Hubs

Multi-Modal Hubs and Transfer Stations

Multi-modal integration involves integrated public transit network planning, seamless transfer from one mode to another and passenger amenities.Multimodal integration involves integrated public transit network planning, seamless transfer from one mode to another and passenger amenities. Various locations to develop multimodal hubs are identified to facilitate the ease of major transfers among different modes of transport. All these locations act as transfer facilities from at least one public transit mode to another. The proposed multimodal hubs in PMR are presented in Table 13.7

Commercial activities could be part of the multimodal hub enabling investments in transit services. The multimodal hub could host a metro concourse/station, rail station, bus terminal, parking spaces, electric charging stations, bike share points, drop-off/ pick-up points for public and private vehicles, along with convenience stores and local commercial needs.

Multimodal Hub Strategy:

Multimodal integration is an essential feature of any public transportation system and vital for the evolution of the least cost and viable public transport system. Multimodal integration is required to be achieved at various levels:

- Physical integration implies ease of transferring from one transport mode to another by minimising the walking distance and keeping horizontal or vertical displacement to a minimum.
- Fare integration implies introducing common ticketing for accessing several public transport modes such as PMPML, BRT, Rail, Metro, LRT etc.
- Information integration comprises provisions for adequate customer information about availability, routes and schedules of public transport services.
- Develop multimodal hubs and multimodal transfer stations; multimodal integration facilities shall be planned for all the mass transit stations to improve the seamless transfer from one mode to another. Park and ride facilities, drop-off and pick–up facilities shall be created at mass transit stations. The roads connecting mass transit stations shall have a wider footpath.

Table 13.7: Proposed Multi-Modal Hubs and Transfer Stations

Sr No	Growth Centre	Location of Multimodal Hub	Along Transit corridor or junction	Area
1	Chakan	Kuruli	MSRDC Ring Road	2.07
2	Chakan	Khalumbre	NH 548D and MSRDC ring road	1.45
3	Alandi	Solu	MSRDC and PMRDA Ring Road	5.51
4	Wagholi	Wagholi	Pune-Ahmednagar (NH 753F) and 2 Metro lines	9.08
5	Wagholi	Lonikand	MSRDC Ring Road, High Speed Rail	4.02
6	Loni Kalbhor	Manjari Bk	Pune Nashik High Speed Rail & Pune-Daund Existing Railway	5.02
7	Khadakwasla	Bhilarewadi	PMRDA Ring Road	1.60
8	Pirangut	Bhugaon	PMRDA Ring Road	1.24
9	Talegaon	Khadkale (CT)	Crescent Railway & Old Mumbai-Pune Expressway	1.62
10	Talegaon	Adhe kh.	Expressway	2.68
11	Khed-Rajgurunagar	Waki kh.	Pune-Nashik Road (NH 60) and High Speed Rail	2.37
12	Shikrapur	Wadhu bk.	Pune-Ahmednagar (NH 753F) and Crescent Railway	9.65
13	Saswad	Dive	MSRDC Ring Road	2.09

Freight and logistic Hubs

The new economic sectors such as logistics and warehousing, agro-processing proposed in PMR require a robust freight and logistics network. In order to cater to these, the transportation plan proposes truck terminals and logistic hubs at interchanges of two more transport systems. This will help to avoid congestion within PMC and PCMC. Bypass rail proposal is effective for good transport, further connecting the freight to the proposed international airport. Strategic logistic hubs are proposed to support cargo facilities.

Truck Terminals

Trucks carrying goods within the city affect overall city mobility. In order to avoid the movement of truck traffic during peak hours in the city and to facilitate loading and unloading activities, truck terminals are proposed at various locations on major arterial roads in PMR.

Logistics Hubs

A logistic hub facilitates domestic and foreign trade by providing services including handling, warehousing, cold-storage, multi-modal transport facilities, container freight stations etc. for efficient, cost-effective and value-added total logistics services such as cargo-aggregation/disaggregation, distribution and intermodal transfers. In a logistic hub, all the activities related to supply chains are carried out commercially by various operators.

Logistic hubs at various locations near bypass railway lines are proposed to facilitate multi-modal connectivity for the logistic operations, and the same is presented in Table 13.8.

Table 13.8: Proposed Logistics Hubs and Truck Terminals in PMR

No	Growth Centre	Logistic Hub			Truck Terminal		
		Location	Transit Corridor	Area	Location	Transit Corridor	Area
1	Chakan	Bhamboli,Ambethan & Moi	MDR17,MDR20 & MSRDC Ring Road	1381.66	Bhamboli	Crescent Railway, 75m MIDC road	2.54
2	Alandi	Dhanore	MSRDC Ring road	214.17	Solu	MSRDC & PMRDA Ring road	3.17
3	Wagholi	Lonikand	NH 753F & MSRDC Ring Road	72.45	Lonikand	NH 753F & MSRDC Ring Road	5.67
4	Loni-Kalbhor	Vadaki	PMRDA Ring road & SH120	85.65	Vadaki	SH120	2.77
5	Khadakwasla	-	-		Mangewadi	NH 48	3.09
6	Pirangut	Kasaramboli	MSRDC Ring Road & NH753F	86.53	Kasaramboli	SH130	1.04
7	Talegaon	Parandwadi,Ambi & Badhalwadi	MSRDC Ring Road, Crescent Railway	147.82	Parandwadi & Urse	MSRDC Ring Road & Expressway	5.74
8	Malavali	Malavali	Expressway and	50.59	-		
9	Shikrapur	Wadhu bk & SanaswadiÂ	Crescent Railway, NH 753F	397.35			
10	Urali Kanchan	Prayagdham & Koregaon Mul	MSRDC Ring Road	42.64	Prayagdham	MSRDC Ring Road	3.67
11	Saswad	Kumbharwalan	SH119	132.29			
12	Khed-Shivapur	Khed-Shivapur, Kasurdi	NH 48	381.47	Kasurdi	MDR36 & NH48	1.20
13	Ranjangaon				Ranjangaon Ganapati	NH 753F	4.81
14	Kedgaon	Kedgaon	NH65	39.39	Kedgaon	NH65	4.12

Figure 13.8: Proposed Multimodal Hubs, Truck Terminals and Logistic Hubs in PMR

13.6 Recommendations

Some of the actions under the proposed Low Carbon Mobility plan do not fall under the purview of the statutory process of Development Plan. Nonetheless, these measures must be taken in current times and are considered critical for future development. Considering this, the following 'Recommendations' are proposed to complete the loop in achieving a sustainable mobility vision.

1.   Physical infrastructure for low carbon emission services

Charging Stations: The central and state governments are promoting low carbon buses (CNG, LPG, Hybrid, Biofuels, Electric). PMRDA could incorporate conducive physical infrastructure through provisioning for separate lanes for buses through BRTS corridors, vehicle charging infrastructure, last-mile connectivity at metro stations and bus stops etc. Feasibility studies for charging stations at all transport reservations, multimodal hubs could be carried out later to access locations dedicated to public transport.

Energy-efficient Streetlights: Energy-efficient lighting will reduce energy demand by a fraction of current levels (between 10–50%). Developments are underway to phase out incandescent light bulbs. The initial transition involves the switch to CFLs. Technologies in the near future include LEDs, light-sensitive switches and further improvements in solid-state lighting.

2.   Air Quality Management

PMRDA could bring under its fold the urban policy design of public transit-oriented urban mobility, smart parking, intelligent traffic management and integrated multi-modal transport, prioritising non-motorised transport, digitalisation of public services, and waste management e.g. reduction of C&D (construction and demolition) waste, all of which are good practices for better air quality.

To bring into effect healthy air quality to the citizens, PMRDA needs to propose Clean Air Action Plans mandated

by the National Clean Air Programme of the Indian government.

These are also actions that need to be emulated in the entire PMR. It will also need to strengthen the Air Quality Monitoring Program by providing locations for monitoring stations for measuring Ambient Air Quality and continuous emission monitoring system (CEMS).

3. Smart systems

The effective way of managing the transport infrastructure and traffic is through the use of smart technology. Since various agencies are involved in managing transportation within PMR, some of the recommendations may not be directly related to PMRDA. Still, these are included considering holistic planning and management.

Key recommendations for the creation of smart infrastructure are set up public transport ITMS- Intelligent Traffic Monitoring System for public Bus System which shall include:

1. GPS, real-time tracking, health monitoring in buses
2. Smart bus stops with a passenger information system.
3. Mobile apps for real-time tracking of buses and schedules and integrating it with other modes such as metro and auto, including GPS based traffic analysis.
4. Private bus aggregator to complement public buses.
5. Develop Adaptive Traffic Management System across signals with pedestrian safety buttons, solar panel and UPS backup, an emergency response system.
6. Smart Card- one card for multi-modes.
7. Intelligent road asset management - Road asset management is based on an analysis of road data related to inventory, condition, traffic, unit costs, and road deterioration models. The data is entered into a Road Asset Management System (RAMS) that allows the data to be analysed and optimal budget levels and allocations to be determined. A RAMS generally involves a computerised road asset management system, encompassing data collection, data management (database), and data analysis.
8. Air pollution monitoring stations.

Traffic and Transportation Proposals in PMR

Kadus

10 Khed

Pabal

16 Ranjangaon

Towards Nashik

Towards Ahmednagar

Towards Mumbai

09 Malavali

09 Malavali

08 Talegaon

01 Chakan

Kale

02 Iandi-Dehu

11 Shikrapur

Nhavara

Towards Daund

03 Wagholi

07 Hinjewadi

Rahu

Paud

06 Pirangut

04 Loni Kalbhor

12 Urali Kanchan

17 Yavat

18 Kedgaon

Towards Daund

Sangarun

05 Khadakwasla

05 Khadakwasla

13 Saswad

Towards Kolad

14 Khed Shiwapur

Towards Miraj

Towards Solapur

15 Nasrapur

Towards Baramati

Kikavi

Towards Kolhapur

Legend	
● MMH	
● TT	
● Logistic Hub	
⊶ PMR Metro	
— Exist, Primary Arterial	
— Exist, Secondary Arterial	
— Proposed, Expressway	
--- Proposed, Primary Arterial	
--- Proposed, Secondary Arterial	
Growth Centre	

0 2.5 5 10 15 20
Km

Chapter 14 Prudent:Economic Hubs and Tourism Proposals

Pune has experienced rapid growth of industrial and commercial activities since 1960. This has led to the over-concentration of employment activities within the municipal corporation limits and the spilling over of these activities in an unplanned manner along the fringe areas of municipal corporations and councils. The result is the strain on infrastructure, leading to the deterioration of quality of life. Thus decentralisation of the economic activities and planned economic hubs is the key requirement of the metropolitan region.

PMR also has the advantage of having year-round pleasant weather, good quality of life, a strong education base, two proposed international Airports in the vicinity and proximity to international tourism destinations in Mumbai. PMR is bestowed with excellent natural settings and diverse tourism opportunities in the form of nature, heritage, history and culture, the flair of all that is yet not captured.

Prudent goal promotes balanced distribution of economic activities across PMR, a multinucleated approach and the Work-Live concept, implying living closer to the workplace, making PMR the most liveable habitat in India. This chapter also proposes the strategies to boost the tourism potential of the Planning Area and place it on the world tourism map.

14.1 Prudent: Objectives and Actions

The economic development and tourism objectives are covered under the Prudent goal of the Vision Framework. These objectives promote an integrated approach to fostering all-round economic growth and developing commercial nodes that provide employment. The prudent goal aims at delivering a stimulus to the economy and employment through the following strategies and actions, materialising into the planning process:

Table 14.1: Objectives and Actions

Objectives	Actions
Promote Consolidated Employment Centres	Action 1: Consolidate employment nodes for vibrant economic centres
	Action 2: Promote integrated commercial development at major transit hubs enabling transit services to regional job centres, job creation and investments in transit serviced locations
	Action 3: Development of tourism nodes
Promote Industrial and Logistics Clusters	Action 4: Promote synergies for Industry 4.0 (Next Generation Industry) through expansion of industrial development along with technological advancement
	Action 5: Consolidate development of logistics clusters along Crescent railway and radial roads
	Action 6: Provide logistic hubs as urban-rural nexus
Promote Innovation Hubs	Action 7: Create a vibrant startups ecosystem
	Action 8: Add value to existing agro-supply chain through agro-processing/R&D hubs
	Action 9: Promote biotechnology and pharmaceuticals hubs
	Action 10: Promote educational hubs focusing on STEM, R&D and skilled development
	Action 11: Empower Rural Development

Work Live Hubs

The Work-Live concept is a physical planning strategy aimed to reduce the distance between work locations and homes. The concept implies living closer to the workplace. Planning of consolidated urban development and public amenities along the radial mass transport corridors would be based on the Work-Live concept. This includes planning of the 'Work Hubs', i.e. employment-generating nodes, complementing the envisaged economic role for an Urban Growth Centre, located at a strategic location with the highest accessibility.

Diverse 'Work Hubs' are proposed in the Development Plan for PMR, promoting an integrated approach to regulating overall economic growth. These include public amenities such as Regional and Town Centres, consolidated transport hubs integrated with commercial activities such as logistics and multimodal hubs and fostering innovation through the development of education and business hubs. Rural Empowerment Centres are the reservations proposed within the Rural Growth Centres as the urban-rural nexus, encouraging rural development. Five tourism gateways are proposed as reservations, which are evenly distributed across, covering the entire Region, that provide employment while conserving and preserving the ecology and heritage areas.

14.2 Proposed Economic Hubs

Following are the various Economic Hubs of PMR:

Regional Centres

Out of the 18 Urban Growth Centres, three Growth Centres are envisioned as Regional Centres, which also are the current thriving hubs of PMR, on the lines of Work-Live Hub. These three Regional centres, namely Chakan, Wagholi and Hinjawadi, are proposed to arrest further concentration of commercial activities within the Corporations and thus aid in decongesting them.

Regional Centre would be a multi-activity driven centre. The key uses would include commercial, social facilities, government offices and transport facilities. Residential and mixed-use developments are important for the 24/7 use of the spaces, making them a safer environment. Parks and recreation would be part of the centre too. Regional centres are along/around major transit corridors and integrated with commercial development. They are well served with public transport and road infrastructure as it is an employment hub and ease of movement for employees is important. It also hosts government offices; thus, easy accessibility to the public is essential again. Being well served and strategically located, theseRegional Centres provide a good opportunity to host strategic projects such as business parks, cultural and performance centres, sports hubs and convention centres. Below is a list of programs and land (area) composition that could guide the development of the three Regional Centres of PMR covering an area between 40 to 80 ha with a mix of around 8-10 activities.

Breakup of activities is proposed below:
1. Government offices: 10%
2. Institutional (Social infrastructure- health care, sports centre, community centre, cultural centre, education centres, etc): 25%
3. Office spaces and hotel: 25%
4. Integrated transport interchange: 5-7%
5. Residential developments: 15%
6. Parks and open spaces: 10%
7. Roads and NMT routes: 8-10%
8. Additional: Strategic projects, business parks, plazas, hawker markets, etc.

These three Regional centres would not only be the thriving employment hubs of PMR but would set the right futuristic image of PMR, leading to a world-class metropolitan. The Hubs promote mixed-use development with access to public transport and are connected by major arterial roads. A detailed urban design and form will need to be planned for these centres. The iconic strategic projects would be the crown of each of the Regional Centre. Each of the three Regional Centres will be unique in character through variation in programs based on the need and context of the area it serves.

Wagholi Regional Centre (Lonikand 33.23 ha)

It is located at the junction of Pune-Ahmednagar Highway (NH 753F), Pune-Nashik High-Speed Rail, Ramwadi-Wagholi-Shikrapur Metro line, and in proximity to Pune Airport. All this, including proximity to corporation limits, positions Wagholi Growth Centre to develop into the eastern IT Hub of PMR.

Wagholi being a majorly residential town, with thriving IT development and logistic activities at Kharadi and Lonikand, this Regional Centre could host strategic projects such as convention centre/exhibition centre and arena, along with business hotels, innovation centres and SoHo (Small office Home office) type spaces. These developments could promote the envisioned retail, finance, fintech and blockchain activities for this Centre. Institutional complexes such as a regional public library, multipurpose community hall, specialty healthcare facilities, auditorium and cultural centres along with government offices could form the core of this Regional Centre. Additionally, spaces for recreational activities such as parks, NMT corridors, plazas aligned by residential development could be part of the Centre.

Chakan Regional Centre (Sadumbare 17.82 ha and Mhalunge 33.22 ha)

Chakan Growth Centre is positioned as the Automobile Hub and encompasses industrial and MIDC activities. The Regional Centre proposed at the centre of the Chakan GC is envisaged to fill the gap of CBD in the north of Pune Agglomeration, complementing the business requirements of Chakan Industrial Hub. High demand for commercial development is likely to be generated by the proposed Hinjawadi- Chakan Metro Line.

This Regional Centre could host strategic projects such as large exposition centres and business park-like developments which could promote finance, fintech and blockchain type similar activities. Institutional complexes such as vocational/ skill development institute, R&D centres, science parks, specialty healthcare facilities along with government offices could form the core of this Regional Centre. Additionally, spaces for recreational activities such as parks, NMT corridors, plazas aligned by residential development could be part of the Centre.

Hinjawadi Regional Centre (Hinjawadi 18.84 ha)

Hinjawadi is currently the IT destination of PMR. The Regional Centre is envisaged to fill the gap of CBD in the west of Pune Agglomeration, complementing the business requirements of IT Hub and High-Tech City Town Planning Scheme. High demand for commercial development is likely to be generated by the under-construction Hinjawadi-Shivajinagar Metro Line.

Led by Phase 1, 2 and 3 MIDC development of IT park, this Centre could host business and innovation hubs promoting IT, ITES, AI and robotics related activities along with either an exposition centre or convention centre catering to the western side of PMR. Institutional complexes such as training and vocational centres, incubation centres, specialty healthcare and socio-cultural centre facilities along with government offices could form the core of this Regional Centre. Additionally, spaces for recreational activities such as parks, NMT corridors, plazas aligned by residential development could be part of the Centre.

Saswad Regional Centre (Dive 11.97 ha)

Saswad Growth Centre is positioned as the Aetropolise because of its proximity to the new International Airport. This GC forms a strong southern economic hub of PMR and thus a Regional Centre is proposed to serve not only southern PMR but also parts of southern Pune District.

This Regional Centre could host strategic projects such as convention centre and business park-like developments which could promote finance, fintech and blockchain type similar activities and a state-of-art logistic hub. Institutional complexes such as vocational/ skill development institute, tourist information centre, international institutes of higher education, specialty healthcare facilities along with government offices could form the core of this Regional Centre. Additionally, spaces for recreational activities such as parks, NMT corridors, plazas aligned by residential development could be part of the Centre.

Town Centres

Town Centre would be a commercial node integrated with social facilities serving a resident population of 100,000-200,000. The town centre's size varies between 5-15 ha depending on the projected population size of the corresponding Growth Centre.

The activities could include commercial complex hosting offices, business hotels, retails and financial services. It could host transport facilities, depending upon its location. Government offices and social amenities required for Growth Centres could be the main features of the Town Centre. Parks and other recreational spaces could be part of the Centre.

Some of the Town centres are proposed on the concept of Transit-Oriented Development. The Town centre at Alandi is located at Solu villages, adjacent to the MSRDC & PMRDA Ring road junction, while the Loni Kalbhor TC is located along the NH 65 and metro adjacent to MMH. The TC at Khed Shivapur and Nasrapur are centrally

located within the GC along NH-48 and MSRDC Ring Road. The Khadakwasla TC is proposed along PMRDA Ring Road. Pirangut TC is located along NH-753F while Talegaon TC is proposed along PMRDA/MSRDC Ring Road adjacent to Crescent Railway. Khed Rajgurunagar TC is proposed along the Crescent Railway. Similarly, Shikrapur TC is located adjacent to Crescent Railway station and metro depot complementing the commercial and institutional requirements of the GC. Uruli Kanchan TC is proposed over government land along SH-117 adjacent to Crescent Railway station and proposed logistic hub. The Town Centre of Ranjangaon GC is centrally located along NH-753F at Karegaon. Malavali TC is proposed at Boraj village along the Lonavala-Pune existing railway.

Logistic Hubs

Logistic hubs would facilitate domestic and foreign trade by providing services such as handling, warehousing, cold-storage, multi-modal transport facilities, container freight stations etc., for efficient, cost-effective and value-added total logistics services like cargo-aggregation/ disaggregation, distribution and intermodal transfers. In a logistic hub, all the activities related to supply chains are carried out on a commercial basis by various operators.

Consolidated development of logistic activities at various locations such as along the Crescent railway line, existing railway, national highways, metro and CSR International Airport are proposed to facilitate the multi-modal connectivity for the logistic operations. These Hubs are proposed to be integrated with the commercial activities, promoting synergies for Industry 4.0, adding to technological advancement within the industrial sector.

Table 14.2: Logistic Hubs in PMR

No.	Growth Centre	Logistic Hub		
		Location	Transit Corridor	Area
1	Chakan	Bhamboli, Ambethan and Moi	MDR-17,MDR-20 & MSRDC Ring Road	474
2	Alandi	Dhanore	MSRDC Ring road	145.32
3	Wagholi	Lonikand	NH-753F & MSRDC Ring Road, Wagholi- Shikrapur Metro	169.46
4	Loni-Kalbhor	Vadaki	PMRDA Ring road & NH-956	87.30
5	Pirangut	Kasaramboli	MSRDC Ring Road & N-753F	94
6	Talegaon	Parandwadi, Ambi and Badhalwadi	MSRDC Ring Road, Crescent Railway	190
7	Khed-Rajgurunagar	Waki kh.	NH-60	76
8	Shikrapur	Wadhu bk and Sanaswadi	NH-753F, Crescent Railway, Wagholi-Shikrapur Metro	404.21
9	Urali Kanchan	Prayagdham and Koregaon Mul	Crescent Railway, MSRDC Ring Road	55.06
10	Khed-Shivapur	Shivapur	NH 48	140.13
11	Saswad	Kunbharwalan	SH119	132.18
12	Kedgaon	Kedgaon	NH65	42.21

Wholesale Market (Solu 20.43 ha)

Pune City centre hosts many wholesale markets with types ranging from textile, timber, automobile, electronics, metal, chemicals, paper, tiles, pharmaceuticals, flowers and vegetables. With lack of space availability for further expansion, congestion, logistic issues and hampering of business due to disasters such as pandemic and other natural issues, it is proposed that the majority of the businesses be relocated.

Good connectivity, available infrastructure and proximity to existing urban settlement are the main criteria for site selection. Considering these prerequisites, the land requirements and the availability of government owned

parcels, 43.69 Ha of Wholesale market is proposed within Alandi Growth Centre at Solu villages, at the juncture of both the Ring Roads. The Chakan- Alandi- Wagholi Metro provides good connectivity to this Market.

Life Sciences Park - (Manjari Kh. 149.29 ha)

Prevailing biopharma activities in Manjari Kh (east of PMC) with the presence of a strong pharmaceutical ecosystem, renowned organisations such as Serum Institute of India, robust institutional base provides a good opportunity for development of a Life Sciences Park in this region.

As part of the proposed Town Planning Scheme at Manjari Kh, a 149.29 ha of industrial zone is reserved along Ring Road which could provide a good platform for activities related to Life Sciences Park or the biotechnology/ pharmaceutical activities. The existing ecosystem and a good connectivity via Pune Nashik High Speed Rail, PMRDA Ring Road and direct connectivity to Pune Solapur Road (NH 65), Hadapsar - Loni Kalbhor Metro, provides a good setting for development of the Science Corridor.

Education Hubs

Pune has been known as an educational hub of the country. The Development Plan aims to enhance human capital employment opportunities by creating a sustainable education ecosystem of talent, skills, and entrepreneurs.

In order to create a thriving educational landscape of the region, a set-up for good universities, research centres with a variety of themes and spectrums needs to be promoted. PMR's education hubs aspire to provide a platform for knowledge production and innovation, converting the young population into valuable human capital, adding to STEM graduates and high-skilled workers. The education hubs will create a backbone for the proposed envisioned economic activities such as AI, Robotics, automation, Industrial 4.0, IT/ITES, fintech and blockchain, etc., promoting innovation and creativity-led entrepreneurship opportunities.

Five education hubs are proposed, Pirangut being the main hub on the west along with Khadakwasla, Alandi on the east and Saswad, Nasrapur in the south.

Pirangut Education Hub (Bhukum 35.98 ha)

Pirangut has an existing ecosystem for education and allied activities. It is adjacent to Hinjawadi Growth centre, and provides a good resource, talent pool for IT and ITES industries. Scenically located at Lavale, it is an extension of the existing campuses such as Symbiosis International University, FLAME University and many others. Knowledge Hub is the assigned economic role of Pirangut Growth centre, and the proposed education hub would serve the western region of PMR. It is in proximity to the Western Ghats, which would also help support the ecotourism activities in PMR.

Alandi Education Hub (Tulapur 102.54 ha)

RP 1997 had proposed 'Vidyanagari' as part of the Alandi Sector, promoting the university town concept. Alandi is not only a pilgrimage hub, but also home to many institutions such as MIT Arts, Commerce & Science College, MAEER's MIT Saint Dnyaneshwar B.Ed College and traditional dharamshalas.

Alandi Education Hub, would be the eastern knowledge hub to provide a variety of talent from diverse fields ranging from engineering to philosophy to neighbouring economic centres, such as Automobile Hub, IT & ITES Centre and Life Sciences Park. Alandi Growth Centre is well connected, served with both PMRDA & MSRDC Ring Roads, Pune Nashik High Speed Rail and Hinjewadi- Markal- Wagholi Metro. It will thus prove to be a most strategically located education hub.

Saswad and Nasrapur Education Hub (Dive 35.88 ha and Kelawade 39.58)

The new international airport at Saswad is envisaged to be a major logistic node boosting the Agro-processing and FMCG sector within PMR. The Growth Centre is positioned as Aetropolise, promoting a modern lifestyle. The Education hub proposed is an important constituent of the Aerotropolis ecosystem. It could have the state of the art infrastracture inviting international universities for business, hospitality, tourism and logistic related studies.

Nasrapur Growth Centre located adjacent to Mumbai Bangalore Road (NH 48) is situated amongst famous heritage destinations of PMR. An education hub is proposed catering to the tourism and hospitality industry. The scenic background of the hub is a strategic location for campus-like setting inviting the number of institutions.

Khadakwasla Education Hub (Khadakwasale 28.48Ha)

Khadakwasla provides another opportunity for development of an education hub because of the proposed high density, proximity to Defense areas and proximity to PMC. It is well connected by Shivajinagar- Nanded City Metro and PMRDA Ring Road.

Khadakwasla Growth Centre is adjoining Khed Shivapur and Narhe. These two are thriving hubs of r ancillary industries. Thus an education hub is proposed catering to the engineering and technology industry. The scenic background of the hub is a strategic location for campus-like setting inviting the number of institutions.

Sports University Chakan (Indori 23.93 ha)

Sports and fitness are important aspects of a healthy lifestyle. As required by the State Sports department, an international sports university is proposed to prepare a talented young force that would in turn help transform Maharashtra and India into a 'sports superpower'. Shri Shivchhatrapati Sports Complex at Balewadi is the first international sports university in Maharashtra. Of the four cardinal locations for education hubs, Sports University at Chakan forms the northern Education Hub of PMR.

Medical Hubs

Medical hubs are proposed at east at Wagholi and in the north at Chakan, as a cluster of Hospital, medical college and research centers. Both these Growth Centres are main residential nodes serving almost 18% of the urban population as well as Regional Centres. They are well connected by Ring Roads, Crescent Railway and High Speed Rail, providing good regional connectivity. Thus these hubs would serve the region at large.

Rural Empowerment Centres

Rural empowerment centers are proposed to provide support systems required for agriculture such as training centers for new agro-technologies, vocational training for skill development and digital facilities enabling smart agriculture practices. Total eight Centres are proposed in each of the Rural Growth Centres.

The rural empowerment centre could host activities such as multipurpose community hall, administrative offices/ government offices, digital centre /vocation centre and micro-finance bank. These centres could also provide for energy banks, a prototype model for generation of energy using renewable energy, which could further be replicated within rural areas.

Figure14.1: Economic Hubs

14.3 Proposed Tourism Gateways

Need for a consolidated development

Despite all the proposals and policies, the tourism sector had not been able to catch the pace. PMR has not been able to take advantage of its tourism assets and foreign tourist arrivals in Mumbai. Apart from the lack of required infrastructure, accessibility and branding for tourism development, part of the problem lies in the fact that there is no holistic strategy that would support an attractive and competitive tourism destination development.

Various Plans and Policies such as Maharashtra Tourism Policy 2016, 'Tourism Development Plan for Pune District' by MTDC, 'Dehu-Alandi Pilgrimage Centre Projects' by Collector Office, 'RP 1997 Tourism Policy' etc. have proposed tourism strategies that focus on circuit development, destination development, policy level guidelines and theming of tourist destinations. The consolidated strategy that would combine destination, circuit and theming is needed to create an attractive tourism plan for PMR.

Expected Tourist Arrivals

Pune District Tourism Plan estimates that by the year 2032, the number of domestic tourists visiting the district will be 9.1 crores, whereas the foreign tourists will be 9.1 lakh. As per the Tourism Plan, about 50% of the district's tourism attractions are located in PMR. Thus, PMR shall be able to attract at least 50% of the tourists visiting Pune district (4.6 crore domestic and 4.6 lakh foreign tourists). There are about 83 tourist sites in PMR, out of which 57 sites (about 70%) fall in the Planning Area. Considering the same, the Planning Area is estimated to attract about 3.2 crore of domestic tourists and 3.2 lakh of foreign tourists.

Hubs and Spokes of PMR's Tourism

The tourism strategy for PMR is established by proposing five tourism 'Getaways' and three tourism 'Circuits' based on specific tourism 'Themes' depending on the inherent potentials of these Getaways and further strengthened by proposing 'Anchors' and 'Strategic Projects'. The Gateways act as the Hubs, and the Circuits act as the Spokes connecting the gateways.

While proposing the tourism strategy for the Planning Area, cognisance of various strategies proposed in the previous tourism plans such as Tourism Development Plan for Pune District, Maharashtra Tourism Policy 2016, RP 1997 Tourism Policy are considered.

Besides these gateways, other regional projects or strategic projects such as regional parks, biodiversity parks, convention centres, stadiums, sports university, cultural centres and regional centres/business centres also become the hot spots of tourist activities.

The Hubs: 5 Gateways of PMR

The theming of gateways is essential to facilitate the focused efforts as well as streamline the investments into the tourist destination development. The tourism themes are based on various factors such as existing tourism assets, natural resources, untapped potential and strategic location of the concerned node. Five Getaways and their themes are mentioned below:

1. Adventure Getaway/Mulshi Gateway - Focus on biodiversity and wildlife tourism and circuits around mountains, forests, lakes and dams near Mulshi
2. Heritage Getaway/Nasrapur Gateway - Focus on heritage tourism and connecting forts near Nasrapur
3. Wellness Getaway/Uruli Kanchan Gateway - Focus on naturopathy and agro-tourism and religious circuits near Uruli Kanchan
4. Spiritual Getaway/Alandi gateway- Focus on spiritual tourism along the Indrayani river belt from Dehu to Tulapur/Vadhu
5. Leisure Getaway/Malavali Gateway - Focus on entertainment and leisure tourism near Malavali

Figure14.2 illustrates these five Tourism Getaways.

Figure 14.2: Five Tourism Getaways

'Anchors' and 'Strategic Projects'

Each Getaway is proposed to be strengthened by an anchor - a large scale strategic project - to develop an attractive tourism destination. Creating such anchors under each theme is necessary so as to create an image and branding for the Getaway. Effective branding will be an important tool in attracting investments as well as foreign tourists. It is necessary to propose impactful destinations in the Planning Area and effective marketing of them for investments and increased tourist inflow. Strategic Projects in the five Tourism Getaways are described in this section.

Monsoon and Adventure Gateway

The Western Ghats area is the most picturesque site within PMR and has tremendous tourism potential, which is yet not captured. A significant part of the Mulshi region is occupied by the Western Ghats, characterised by rich wildlife and biodiversity. The presence of Tamhini wildlife sanctuary, numerous lakes and forests offer an excellent natural setting and eco-tourism opportunities. Its natural, rich and bio-diverse landscape offered by the western ghats and the abundance of rainfall received along with it during the monsoon season makes it a prime destination for monsoon and leisure tourism. It becomes a haven for adventure enthusiasts and nature lovers to go trekking, camping, hiking in the wilderness, exploring biodiversity, bird watching, wildlife photography and ecological awareness creations. The major existing tourism attractions in this area are Tamhini Wildlife Sanctuary, Sudhagad wildlife Sanctuary, Tata talav, Varasgaon dam, Panshet Dam,Temghar Dam, other dams and lakes, Ajivali Devrai and forts of Koraigad, Tailabaila fort, Ghangad fort.

The lakes offer an excellent medium for lakefront and nature tourism, where outdoor recreational and leisure activities could be developed all-around, with lakes being the prime focus. Aamby Valley and Lavasa lake towns in the Western Ghats are two prime examples.

All the tourist getaways in Mulshi are easily accessible from Pune city (25 km) on motorcycles, private vehicles within an average time of 45-60 minutes.

Strategic Project: Adventure Tourism Centre

A site for Adventure Tourism Centre is reserved within the scenic setting of Tata Talav over 25 Ha land in village Pimpri, taluka Mulshi on the eastern side of Sudhagad Wildlife Sanctuary. Its proximity to Sudhagad Wildlife sanctuary and Tamhini Wildlife sanctuary, Konkan belt and Lonavala make it a perfect attraction point for international adventure tourists. Another site is proposed at Male over 3 ha of land and at Paud RGC of 0.98 ha, providing excellent connectivity via Kolad- Pune Road (NH 753F)

In line with the National Tourism Policy, the Adventure Tourism Centre aims at providing employment to local youth who would cater to the needs of adventure tourists and conduct regular adventure tourism events in and around Western ghats. This, in turn, will help reverse the negative growth trend within the Western Ghats region. Moreover, the locals know the area better and would suffice to be the best guides for eco/adventure tourism. A well-trained youth will be able to mark the area as a global adventure landmark. This centre is the gateway to the eco-circuit, connecting the wildlife, nature trails, trekking and biking routes.

The centre could serve as the base point for paragliding, bungee jumping, hot air balloons and passive water sports like kayaking and canoeing. It would be a destination for 3-10 days, depending on the training sessions and the package of activities. With its auditorium and event place facilities, the institute would provide for corporate sessions and their outdoor events. The resort would be one of the best locations for family gatherings, capturing the scenic beauty of the Ghats. The campus would be a model development for renewable energy with solar panels and electric vehicles around the campus. The centre will manage the safety, degree of risk exposure, and experience of eco-tourism.

To create a safer adventure tourism environment with adequate infrastructure and inculcate a spirit of adventure amongst the people, the following activities are proposed within the 25 ha reserved site at Pimpri:

Adventure Tourism Centre

1. Basepoint for: Trekking and nature trails, Paragliding, Rock climbing, Waterfall rappelling, Bungee jumping, Mountain Biking and Cycling, Hot Air balloons, Kayaking, Canoeing, etc
2. Training areas
3. Nature Interpretation Centre and Museum
4. Auditorium and event place
5. Camping Site
6. Star-gazing telescope and observatory
7. Recreational activities within campus: Bird watching, Paint-ball, Zip lining, Archery
8. Medicare facility
9. Accomodation facilities such as hostels, Resorts, Hotels
10. Equipment storage
11. Restaurants
12. Waterfront park and recreational areas

Heritage Gateway

Nasrapur, located on the southern tip of PMR, is surrounded by many forts and religious attractions such as temples, dargahs. Panoramic splendid views of the Jadhavgad, Torana, Varjgad, Rohida, Rajgad, Purandar and Malhargad forts can be enjoyed in the backdrop along with its rich and natural setting from all around in this getaway.

Nasrapur is easily accessible from the densely developed residential suburbs of Pune city by public transport and Mumbai-Bengaluru National Highway. Due to this ease of accessibility, the trend of weekend vacation homes has been emerging in the vicinity. This trend is supported by low land prices and the idea of being in a natural setting within a short time from dense residential areas. The proposed development of an international airport at Saswad and MSRDC Ring Road will further enhance this trend of low-density vacation homes. These proposals would also make Nasrapur further accessible from the dense urban settlements. In this situation, Nasrapur, with its pristine sites located at the foothills of the forts, would offer a break from the busy urban lifestyle and become an ideal natural destination for weekend retreats/vacation homes.

Strategic Project: Art and Heritage Centre

The Art and Heritage Centre is proposed in proximity to Nasrapur Growth Centre, roughly 40 km from Pune station, a 90-minute journey to the destination. Three strategic projects are possible under this Gateway: Heritage Village including Festive Square, Tourist Centre and Virtual Reality Museum. 20 Ha land in village Chambali, taluka Purandar adjacent to Saswad Growth center (Aerotropolis) is proposed for the Centre. The Heritage Getaway is also the starting point for the PMR Heritage circuit. Another, 3 tourist centers are proposed near this getaway, 0.2 Ha land near Baneshwer temple at village Nasrapur, 1.71 Ha land at village Devadi in Nasarapur growth center and 1.74 Ha land at village Zendewadi in Saswad growth center.

Art and Heritage Village will provide a unique experience into the valley along with spaces for art exhibitions, spaces for artists, workshops and outdoor learning and experimenting areas. The Virtual Reality Museum would cover the history of Pune, Maratha Empire and Maval. It will also have augmented reality/virtual reality centres, a small movie theatre, a library and Indology/anthropology research centre. This Centre could be a family destination along with other cultural activities. The Tourist Centre is proposed to be an information centre for guidance on forts and surrounding activities. The centre will manage the safety, degree of risk exposure, maintenance of facilities at the tourist destination such as the forts, and monitor the Heritage Circuit experience.

The Festive Square will be a prime destination for art and literature events such as Art Biennales, Literature Festival, Music Concerts and Culinary Festival. Miniature fort exhibits and sculpture parks along with lights and sounds could be another attraction of the centre.

The following activities could be part of the 20 ha Art and Heritage Centre:
1. Art and Heritage Village
2. Miniature forts and sculpture park including an open-air theatre for light and sound show
3. Virtual Reality Museum
4. Festive Square and art spaces
5. Tourist centre
6. Camping facilities
7. Logistic facilities to forts around

Wellness Gateway

There is a unique culture of practising Ayurveda and yoga in the state and also within PMR. Ayurvedic centres, yoga centres, destination spas and wellness centres are classified as Medical Tourism Units under the Maharashtra Tourism Policy 2016. Every year there are millions of medical tourists arriving in India. PMR aims to capture this opportunity of providing state-of-the-art Wellness facilities, a complete package of Ayurvedic and naturopathy treatments amidst serene locations.

Uruli Kanchan Getaway is located on the well-irrigated and highly fertile belt along Mula-Mutha River. This has given rise to several large scale agro tourism-focused projects in the vicinity, which have been flourishing. The major tourist attractions popular in and around this getaway are Nisargopachar (Naturopathy) Ashram, spiritual Prayagdham Ashram, Jejuri Temple and Theur (one of the Vinayak temples on the Ashta Vinayak pilgrimage circuit), Bhuleshwar Temple, Ranjan Khalge, Morachi Chincholi.

Strategic Project: Wellness Centre

The Uruli Kanchan Getaway is located on the fringes of Pune city and can be easily accessed from Pune-Solapur National Highway. In order to capitalise on the existing naturopathy practices (as part of AYUSH initiatives) and the horticulture/organic agricultural practices, a Wellness Centre of 10 ha is proposed at Theur village as part of the proposed amenities. Based along the Mula-Mutha River, this centre could help promote a healthier way of life along with natural treatments for modern-day diseases. Agro Park and Health and Wellness Park are proposed within the centre.

Health and Wellness Park could host Retreat and Wellness resorts, Naturopathy centres, Ayurvedic treatment centres and institutes. It can provide a complete package to medical tourists and patients consisting of suitable treatment packages along with a variety of stay facilities. Research activities through medicine herb garden and laboratory could be developed to promote AYUSH initiatives.

Following activities are the possible within the centre:
Wellness Centre
1. Naturopathy clinic
2. Accommodation facility: 50-80 bed general ward, luxury rooms and cottages
3. Ayurvedic treatment, massage and acupuncture centre
4. Wellness and spa centre
5. Yoga and gym area
6. Training area
7. Medicinal herb garden and research laboratory
8. Recreational area and garden

Spiritual Gateway

Alandi is a pilgrimage hub, a hub of culture and spiritualism. It offers great potential to explore tourism avenues around religious spaces. The main pilgrimage centre in Alandi is Sant Dnyaneshwar Maharaj Samadhi and Temple complex. The 800-year-old tradition of Wari sohala and the pilgrimage/yatra brings millions of pilgrims (Warkaris) to the city. There are two annual pilgrimage routes (yatra) with Palkhis, one organized from Alandi and another from Dehu to Pandharpur. Many Warkari devotees join it. Most of the visitors come to Alandi to worship or spread spiritual awareness, for which numerous events and festivals are organized like the annual fair on Kartiki Pournima.

Also, Pune is home to many spiritual centres like Osho Ashram, Ram Krishna Math, Art of Living Ashram, Chinmaya Vibhooti, Vipassana Centre, Prayag Dham, Ramamani Iyengar Yoga Institute and many more. Many foreign tourists are drawn to Pune for spiritual activities.

Alandi is situated in proximity to several other religious and spiritual destinations like Ashta Vinayak, Bhimashankar, Dehu (Sant Tukaram Maharaj Samadhi) and Tulapur (Sambhaji Maharaj Smarak), which could be visited in succession when visiting Sant Dnyaneshwar Samadhi Complex at Alandi. Extension to the Chatrapati Sambhaji Maharaj Smarak is proposed over 2.42 Ha land.

Strategic Project: Spiritual Centre

Considering the above aspects, a Spiritual Centre with multipurpose hall amidst a park-like setting is proposed at Apti along Bhima River. This centre is proposed as part of an amenity reservation, required to hold a wide range of spiritual activities around the year. The Spiritual Circuit will begin from this Spiritual Gateway. Additional Spiritual Centre is proposed over 5.22 Ha land at village Dhanore,Taluka Khed, for supporting pilgrimage activities at Alandi.

This Spiritual Centre is envisaged to provide a holistic experience that includes meditation and yoga halls, and accommodation facilities. The spiritual centre's key programs could include a meditation centre, convention centre and library/research area. Study areas/classrooms, library and research centre could provide for study and contemplation upon the scriptures. A community kitchen along with a dining hall could be proposed. Meditation Park is proposed to create a spiritual experience through nature, being part of nature.

Several international conferences are held on spirituality, such as International Conference on Spirituality and Psychology, Spiritual Leadership Conferences Asia, Global Festival of Spiritual Sciences, and national conferences such as International Festival of Spiritual India, National Medico-Spiritual Conference and many more. A small convention centre could be proposed to understand the requirement of spiritual discourses.

Following activities are possible within the Spiritual Centre:
1. Meditation hall
2. Yoga hall
3. Study areas
4. Library and research area
5. Community kitchen and dining hall
6. Garden and open space area
7. Office and administrative area
8. Spiritual museum
9. Yatri Niwas
10. Convention centre
11. Meditation park
12. Tourist Centre

Entertainment and Amusement Gateway

Malavali is a major hill station between Mumbai and Pune. Malavali attracts a large number of tourists because of its excellent natural setting and climate. It is located in proximity to other highly commercialized tourist destinations such as Lonavala, Kamshet and Khandala. It is a popular destination for monsoon and recreational tourism, attracting adventure enthusiasts. The existing attractions in proximity are Bhaja, Bedse and Karla caves, Visapur fort,Tung Fort, Tikona Fort, Lohgad, Tungarli lake, Pawana lake, Valvan dam, Shiravat dam, Vadiwale dam, Andhra dam and lake amusement parks, adventure parks, various hill points - lion's point and duke's nose etc.

Malavali is easily accessible through trains, public transport and private vehicles. It is a major railway stop between the Mumbai-Pune railway line. It is located 139 km from Mumbai (2.5 hours) and 55 km from Pune city (1.5 hours). With upcoming transport proposals between Mumbai-Pune like the quadrupling of the Pune-Lonavala rail route, Malavali hill station could be accessed in a shorter time from both the cities.

Strategic Projects: Entertainment and Amusement Centre

The centre is proposed to be over 45.5 Ha land along Pawana river adjacent to Pawana lake at village Kale, taluka Mawal. With better infrastructure and state of the art filmmaking studios made available in proximity to Mumbai, another subordinate film city could be developed here. This is where Malavali becomes an ideal location to set up a Film Media and Entertainment Park as it offers several development advantages like relatively low land prices, anticipated good connectivity with Mumbai in the near future and a salubrious climate with a natural setting that would boost creativity, becoming an ideal location to set up the film/television production, supporting animation and emerging VFX business. Additionally, tourist entertainment centres are proposed at Jadhavwadi (52.8 Ha), Kune NM (2.79 Ha) and Mudhavare (4.58 Ha)

The Entertainment and Amusement Centre includes Film, Media and Entertainment Park over 45.5 ha land. Following activities are possible within the within the centre:
1. Film, Media and Entertainment Park
   a. Film City
   b. Studios and production infrastructure
   c. Media centre/broadcasting centre
   d. Gaming and VFX Park
2. Hollywood/ Bollywood Theme-based park
3. Games and Amusement Park
4. Lakefront Resort
5. Waterfront Promenade lined by F&B
6. Service Villas and Apartments

The Spokes - 3 Circuit of PMR

Three circuits - Eco Circuit, Heritage Circuit and Spiritual Circuit - are proposed as part of the proposed tourism plan for PMR, each providing a unique experience.

Eco Circuit

The proposed eco-circuit could be part of the state eco-circuit grid by connecting 13 forts, Tamhini Wildlife Sanctuary, temples and eco-sensitive villages. The circuit provides an adventurous experience to travellers by crossing the ridges of Sahyadri Mountain ranges, its valleys, scenic views of the backwaters of 11 dams and treks of 13 forts. Homestay facilities, eco-huts, eco-friendly dormitories could be promoted within eco-sensitive villages.
The Eco circuit begins at the Adventure Gateway, and the eco-circuit route is marked in Figure 14.2. The detailed eco-circuit and location points could be finalised after preparing a detailed report in consultation with MTDC and Maharashtra Eco-Tourism Board.

Heritage Circuit

The Heritage Circuit covers forts and important religious places PMR. The Tourist Centre at Heritage Retreat Gateway will be the commencing point of the circuit. The Heritage Circuit is marked in Figure 14.3.

Spiritual Circuit

The Spiritual Circuit is planned to augment the spiritual experience by visiting various ashrams, religious places and understanding their philosophies. The Spiritual Centre will be the starting point for the circuit. Recreational facilities such as wellness centres and meditation centres could also be incorporated within the circuit.

Figure 14.3: Proposed Tourism Plan

Chapter 15: Proposals - Ecology and Environment

Ecological features of the region offer an opportunity to function as carbon sinks and upsurge the region's resilience towards environmental challenges and impacts such as water shortage, deforestation, soil erosion, pollution of water and carbon emission. The natural resources such as streams, low lying areas, groundwater, hilltop hill slope, forest, and the eco-sensitive regions in PMR are under pressure due to rapid urbanization. This chapter covers various strategies and mitigation measures envisioned to optimize the existing resources and create an integrated Green and Blue lattice over the locale.

15.1 Resilient: Objectives and the Actions

Ecological and environmental objectives fall under the Resilient Goal of the Vision Framework. These objectives state the protection and preservation of environmental features in PMR. Following actions are proposed in the Vision Framework to materialise these objectives into planning:

Table 15.1: Objectives and actions

Objectives	Actions
Protecting Blue Ribbon	Action 1: Protect and conserve all water bodies: streams, rivers, canals, ponds, lakes and reservoirs
Conserving Green Ribbon	Action 2: Reduce vulnerability by demarcating flood lines (blue lines) and safeguarding through green belt
	Action 3: Demarcate flood lines and augment flood control measures
	Action 4: Develop avenues conceived as a tree-lined road, with Non Motorised Transport (NMT) provision, linking the Green and Blue features
Protecting Green Segments	Action 5: Protect and Conserve Western Ghats (eco sensitive zone) and forests
	Action 6: Controlled development in eco-sensitive zones, establishing contiguity of forest and development of regional parks
	Action 7: Protect Hilltop & hill slopes
	Action 8: Develop parks as green lungs within Growth Centres
	Action 9: Promote plantation of indigenous trees within Catchment areas and along bottom of the hills
Preserving Green Canvas	Action 10: Protect irrigated agriculture lands in command areas
Developing Green Nodes	Action 11: Promote Carbon Neutral Townships
	Action 12: Promote renewable energy banks within urban and rural centres

Increasing Resilience

PMR is exposed to various hazards owing to its geophysical setting. The Western Ghats have been experiencing many landslide events while the eastern region has been experiencing droughts. Some parts of the central area have been experiencing floods, and some other areas have been experiencing forest fires. A detailed hazard analysis was carried out to understand the extent and intensity of these hazards across PMR. Each of these hazards is explained in this chapter, along with various strategies and mitigation measures envisioned to optimise the existing resource and make an integrated resilient plan over the locale.

The Sendai Framework of Disaster Risk Reduction (DRR) 2015-30 emphasises disaster risk management and defines seven global targets with disaster risk reduction an expected outcome. The expected goal is to reduce disaster risk substantially and losses in lives, livelihoods and health in economic, physical, social, cultural and environmental assets of a person, business, communicates and countries. It focuses on the prevention of new risks, reduction in existing risks and strengthening resilience. One of the seven global targets is to substantially reduce disaster damage to critical infrastructure and disruption of basic services, such as health and education facilities, and developing their resilience by 2030.

Mainstreaming disaster management in Development Plans is key to ensure sustainable development envisaged by Sendai Framework. This has been considered in conceptualisation and preparation of the Development Plan through different planning strategies and tools.

15.2 Protecting Blue Ribbon: Water Conservation and Management

Rivers and primary and secondary order streams/nalas form a contiguous network. These water bodies will be protected as it will help conserve the water systems, creating a Blue Ribbon. Following are the actions taken to build this Blue Ribbon:

Protecting the Water Flow

In order to protect the water flow, protecting the entire order of the water system is necessary. Thus following actions are taken for water conservation and management:

Rivers, Streams and Nalas:
Hierarchy of nalas/natural streams is established based on their relation with respect to rivers. As per Strahler stream order, when two first-order streams come together, they form a second-order stream. When two second-order streams come together, they form a third-order stream. PMR has 10 major rivers, which in turn have thousands of first and second-order streams that supply it with water. Most of these streams are on hill slopes of the Western Ghats and spread over the eastern plains of PMR.

It is imperative to preserve the first and second-order streams. Many of them would already have stream vegetation along their banks. Those that are barren can be used for plantation. Plant growth along the streams is relatively faster since soil moisture can be higher. If the streams are removed for any reason, high rainfall will lead to sheet flows resulting in damage to downhill settlements.

Thus all rivers in the region, including river course, first and second-order streams, are earmarked and protected under the proposed Water Body Zone. Similarly, dumping any form of waste and the discharge of wastewater into nalas shall be prohibited.

Canals

PMR has five major canals supplying water to the eastern region. These canals are protected under the proposed Water Body Zone.

Protecting Water Bodies

Protection of water bodies is essential for water conservation as well as for recharging of aquifers. It will also help with water supply to rural areas and rainwater harvesting. Thus following actions are considered for water conservation and management:

Irrigation Projects

Based on information from the state irrigation department, irrigation projects are classified as major, medium and small. PMR has seven major dams and three medium dams/reservoirs. The total surface water capacity available in the region, based on large and medium projects, is about 140 TMC, and for small projects, it is about 4 TMC.

Thus major, medium and small irrigation projects have been classified accordingly and are protected under the Water Body Zone.

Strategies

1. Ensure implementation of regulations by Water Resources Department, GoM regarding clear distances from high flood lines while carrying out any land development around dams and foothill areas as notified.
2. Dumping any form of solid waste and discharge of wastewater into the reservoirs shall be prohibited.

Ponds and Lakes

Existing ponds and lakes are considered under the Water Body Zone for protection, helping maximise rainwater harvesting capacity within the Study Area. Broad estimates indicate that 1.3 TMC rainwater could be harvested, leveraging existing ponds and lakes that cover a total surface area of 1,908 ha.

Strategies:

1. Reinstate and protect all the water bodies shown in revenue records as well as Existing Land Use Map.
2. Ensure no construction shall be allowed within 100 m from high flood lines of natural lakes following the U-DCPR.
3. The building control line from banks of ponds and lakes shall be as mentioned in UDCPR.
4. Belt between a pond/lake bank and the building control line to be developed as a soft landscape, devoid of any temporary/permanent structure.
1. Prohibit dumping of any form of waste and discharge of wastewater into ponds and lakes shall be prohibited.

Wells

As per GSDA regulations, all the wells are recommended to be protected without refilling and kept free of encroachment. In case of development, mandatory open space shall be kept around a well with necessary human safety provisions.

Strategies:

1. Prohibit the encroachment on wells.
2. No cesspool shall be used or made within 100 feet of any well as per U-DCPR.
3. Ensure the unhindered flow of rainwater into wells for effective groundwater recharge
4. Ensure that mandatory open space shall be kept around the well in case of developed areas with necessary standard provisions for human safety.

Reducing vulnerability and mitigating disasters: Drought

Drought is a creeping disaster. Its onset is difficult to demarcate, and so is its end. Delay in the arrival of monsoon, failure of monsoon, irregular and scanty rainfall during Kharif, falling of groundwater level, drying of wells and reservoirs and deficit in paddy plantation indicate the onset of drought. Generally, it is non-structural and, therefore, difficult to quantify on an immediate basis. Its spatial extent like that of floods denotes its severity.

The fall in groundwater level, less food production, less fodder for animals, migration of labourers, and water crisis determine its long-term impact. Its impacts like those of floods are cumulative and its continuance over a period or season magnifies the impact manifold.

Drought, unlike other hazards, does not cause any structural damages. The typical effects include loss of crop, livestock, timber, fishery production, food shortage, dehydration, loss of life, increased poverty etc. In fact, the impacts of drought are generally categorized as economic, environmental and social.

Strategies and actions adopted in the Development Plan

All primary and secondary streams are protected, maintaining the water ecology. All water bodies, ponds, percolation tanks and reservoirs are protected, increasing groundwater recharge. Rainwater harvesting is promoted in urban areas as per DCPR. Irrigated agriculture lands are protected through the G2 zone in command areas, as explained below Green Canvas of PMR. Site for agro market produce is reserved, providing for storage of food grains.

Figure 15.1: Blue Ribbons

15.3 Conserving Green Ribbon: Water Ecology Conservation and Management

Green belts along river banks and green spaces between the building line and banks of primary and secondary order streams/nalas form a contiguous network. Since the Green belt is protected, it will help maintain the water ecology creating a Green Ribbon network. The streams and vegetation for the longitudinal corridors connect ridges of these mountains and hills to the water area, helping the wildlife. Following are the actions taken to create this Green Ribbon:

Flood lines

PMR is blessed with 10 major rivers flowing through it. Most of these rivers originate in Sahyadri mountain ranges and form a part of the upper Bhima basin, an integral part of the Krishna Basin - an important river in peninsular India. There is a great potential for creating carbon sinks along river banks and reducing bank erosion in extreme rainfall events (high intensity, high frequency, short duration).

Large portions of river banks are currently private farmlands. Many portions of the banks have a low vegetative cover. Bank vegetation is known as 'riparian forests'. The root mass of these forests binds the soil on banks during flood situations. Furthermore, the riparian forests help the hyporheic zone.

Over time, as constructions come up along the river banks, there will be a loss of more riparian vegetation. Loss of vegetative cover will make the river banks fragile. They can collapse in high rainfall events. The impact of this is an increased vulnerability of people in the vicinity of rivers to floods.

Green Belt Zone is proposed between a blue line and riverbank, on either side. Within this green belt, mandatory vegetation cover, the riparian forest is proposed. Also, entire vegetation from river banks up to Blue Line are mandated to be conserved, thus increasing the tree cover. No construction shall be allowed between a blue line and a riverbank.
88.89 sq km is demarcated as Green Belt in the Development Plan.

Strategies for Rivers:

1. Demarcate High Flood Lines (25-year HFL and 100-year HFL both) along all major river/ streams
2. Restrict new development by designating a 25-year HFLs zone.
3. Develop the segments of Green Belt within the urban areas as Waterfront Park from the riverbank on either side, while the rest of Green Belt is conserved naturally.
4. Mandatory strengthening of flood protection infrastructure for already permitted developments.

Buffers

The building control line for nalas/streams shall be 6 m respectively, measured from the bank of a nala/stream. A belt between a Nala bank and building control line shall be kept as an open space devoid of any permanent/ temporary structure.

Strategies:

1. Cycle tracks may be proposed in this open space following the provision in U-DCPR.
2. Prohibit major shifts trm of waste and discharge of wastewater into nalas.

Wildlife Corridors/Belt Zone

The western part of PMR, comprising mountain ridges and hill slopes of the Sahyadri mountains, has high species diversity and high endemism. There is a movement of many faunas from here to areas of water and food.

Passages for the movement of wildlife are recommended to be reserved. The streams and nalas marked have good vegetation cover. These longitudinal paths are relatively far from settlements, connecting the ridges to the water areas. Transport overhead bridges are recommended to be constructed at intersections, not disturbing these green ribbons.

Development within this zone is prohibited, and soft scapes, vegetation should be promoted where the owner/ developer bears the responsibility of maintaining the terrain, hydrology, flora and fauna of the proposed corridor.

Reducing vulnerability and mitigating disasters: Floods

Floods are temporary inundations of land with water caused by rains, overflowing of rivers, discharges released from large reservoirs, cyclones, tsunami, melting of glaciers and sea tides. It may come gradually and take hours and days together to recede or may even happen suddenly due to heavy rains, breaches in embankments, failure of dams, cloud bursts, storm surge etc. Except for flash floods, there is usually a reasonable warning period.

Floods damage houses/human settlements/crops/infrastructure, endanger human and cattle lives, fragment families, destroy wealth, jeopardize livelihood bases and cause migration. It literally wipes out the socio-economic development achieved so far in the region and drives it to rewrite everything and begin from the beginning: response, relief, restoration, rehabilitation. reconstruction and redevelopment are needed on a very large scale.

PMR being land-locked, floods are caused by either overflowing of rivers due to excessive rains in its catchment or excessive discharge released from reservoirs. The floods cause either breach in embankments or excessive erosions. As chance would have it, out of the four causes and consequences of floods—excessive rains, excessive discharge, excessive erosion, siltation and breach in embankments—only the last two can be controlled and managed. The others are beyond the control of the administration.

Floods affect most of the talukas within Pune district. As per HRVA assessment 40 villages are likely to be affected by a flood once in 25 years, whereas 35 villages are flood-prone once in 100 years.

Mula, Mutha, Pawana, Indrayani and Bhima rivers are flood-prone and likely to cause flooding in Haveli taluka. Other talukas prone to frequent floods are Shirur, Daund, and Haveli (Bhima River), Pune city and Mulshi (Mutha River), Khed and Maval (Indrayani River), Ambegaon/Shirur (Ghod River) and Purandhar (Nira River).

Strategies and actions adopted in the Development Plan

All primary and secondary streams are protected, allowing smooth flow of stormwater into main rivers, in case of excessive rains and discharge. All water bodies, ponds and reservoirs are protected. Flood lines are demarcated, and lands between blue lines and river banks are protected through Green Belt Zone. This, in turn, will reduce the risk of floods affecting settlements.

Figure 15.2: Green Ribbon

15.4 Protecting Green Segments: Ecology Conservation and Management

Conserving forests, wildlife sanctuaries, regional parks, wilderness patches and town parks within urban areas form the Green Segments. Following are the actions taken for conserving the ecology by creating and protecting these segments:

Forest

Due to deforestation over slope areas, soil erosion and siltation within dams is increasing. There is a loss of forest and wildlife due to uncontrolled tourism activities and real estate developments.

Forestlands under the purview of the forest department are designated as Forest Zone. The land area showcasing dense vegetation within private lands is marked as Private Forest. Similarly, there are several 'sacred groves' or 'Devrai' in this region. They are age-old forests and gene-banks of biodiversity. The forest area comprises about 824.29 Sq km, which is 13.4% of study area.

Strategies:

1. Ensure 100% preservation of forest lands and where degraded forests are observed, afforestation program is recommended.
2. Prohibit diversion of forest land for non-forest purposes from critical and ecologically fragile wildlife habitat.
3. Promote efforts to increase the forest cover and conserve existing forests, including 'sacred groves/Devrai' forests as per National conservation Strategy And Policy statement On Environment and development, National Forest Policy, Indian Forests Act and National Environmental Policy by Ministry of Environment and Forest, GOI.
4. It is recommended to open up forests within Growth Centres for passive recreation to help ensure the availability of 'Green Lungs' for liveability.

Wildlife Sanctuary

Tamhini Wildlife Sanctuary and Sudhagad Wildlife Sanctuary are located on the western side of Mulshi and Velhe talukas. The forest in Tamhini is rich with birdlife, insects, and the endemic Indian Giant Squirrel. Sudhagad, also

a historic hill fort, has dense forests, viz; tropical evergreen forest, and wet deciduous forest. The total area of a wildlife sanctuary in PMR is about 6220.10 ha (1% of the total PMR area).

All activities in the Tamhini Wildlife Sanctuary are being governed by the provisions of the Wildlife (Protection) Act, 1972 (Act 53 of 1972 and rules framed thereunder) (MOEF, Aug 10, 2017).

Strategies:

1. Ensure controlled development in designated eco-sensitive areas
2. Ensure no encroachments and illegal activities from within forest lands and protected areas
3. Promote, protect and conserve wildlife sanctuaries as per Wildlife Conservation Strategy, 2002

Wilderness Areas/Biodiversity Parks

Government lands situated on slope areas within Growth Centres are proposed as Wilderness Areas or Biodiversity Parks. These wilderness zones are wild plantations. The area is under 'benign neglect', and the forest is allowed to regenerate at its own pace. The total area proposed under this reservation is 4.05 sqkm, where only afforestation and parks related activities will be allowed.

Regional Parks

Regional Parks are proposed along hills or rivers, considering the availability of government-owned lands within Growth Centres. These Parks are theme-based and are also proposed to be tourist attractions in the region. The total area proposed under the Regional Park Reservation is 135.84 ha, where only afforestation, park and eco-tourism related activities will be allowed. Regional parks are proposed to be developed on a specific theme such as Botanical garden, Ridge Park, Wetland ecology park, Waterfront Park, Bird Park, Woodland Park Cultural Creative Park, Science Park etc. The Regional Parks proposed to be larger on a scale ranging from 20 ha to 60 ha as compared to neighbourhood gardens and town parks. These parks are proposed at Wagholi GC (Perane), Uruli Kanchan GC (Theur) and at Alandi (Rase).

Town Parks

As per the proposed planning norms, a 3-5 ha park is reserved in Growth Centres, covering a total area of 153.48 ha. These also form the Green Segments of PMR facilitating the Resilient Goal. These parks are well-manicured 'Urban' parks serving the Growth Centre. 31 Town Parks could also be developed on certain themes such as Waterfront Park, Creative Science Park, Sculpture Park, Rock Garden, Zen Garden, etc.

Hilltop hill-slope

Hilltop hillslopes area is about 547.47 sq km, i.e. 14% of the PMR area and mainly observed on the western side of the region. This zone is designated based on RP 1997 provisions (i.e. slope >1:5) and delineates using GIS analysis of slope, contours, elevation details and high-resolution imagery. Slopes > 1:2.5 are considered non-suitable for development, while 1:5 -1:2.5 slope and Hilltops are considered areas with limited development potential.

Development within this zone is generally prohibited. Certain very low density uses such as agro-tourism, eco-tourism as well as permitted uses specified in Unified DCPR, may be allowed provided that the owner/developer bears the responsibility of maintaining terrain, hydrology, flora and fauna of the proposed development site in original condition, during the development period and post-occupancy.

Strategies:

1. Prohibit development in slopes >40%
2. Ensure the controlled development of lands having slopes >20% to <40% as per provisions of U-DCR
3. Ensure the maintenance of dense plantation on slopes <1:5 in contiguity to Hill Top Hill Slope zone

Afforestation Zone

Barren lands which are gradually sloping until the foot of the hill, which also act as recharge zones considered afforestation zones. Also, the land surrounding lakes, reservoirs and dams are proposed to have limited activities through the proposed afforestation zone. 430.17 sq km land is proposed as afforestation zone.

Strategies:

1. Establish contiguity of forests by classifying steep slopes >20% into Afforestation Zone
2. Avoid contamination of water within the reservoirs/ dams by limiting activities within its surroundings
3. Ensure the controlled development on gradually sloping lands as per provisions of U-DCR
4. Ensure the maintenance of dense plantation within the proposed are

Ecological Sensitive Areas

The Western Ghats/Sahyadri mountain ranges are designated ecological hotspots. They harbour endemic biodiversity and rich species composition. The Western Ghats, a UNESCO World Heritage site, is designated as Ecologically Sensitive Areas (ESA) comprising 145 villages part of PMR (Refer to Chapter 2). These villages have been included under Ecologically Sensitive Zones I and II.

The total area under Ecologically Sensitive Area/Western Ghats is 1180.69 sq km creating a band on the western edge. Development in this region is governed in accordance with guidelines for 'Ecologically sensitive Areas', delineated by the High Level Working Group (MoEF, GoI, 2013).

Strategies:

1. A no-tolerance policy is recommended with respect to intervention and environmentally damaging activities such as mining and other polluting industries. (subject to a high level of scrutiny and assessment before clearance within the Environmentally Sensitive Area).
2. A balanced approach is recommended towards environmental protection for ESA by strictly limiting environmentally damaging activities but also creating an enabling process by introducing activities such as Ecotourism and other environmentally sound developments to benefit the locals and the economy.
3. Promote development of Ecotourism, Nature tourism and Adventure tourism

The conservation, protection and restoration of forests, wildlife sanctuaries and the Western Ghats is a mandate of the following authorities:
1. Ministry of Environment and Forests, GOI
2. State Forest Department, GOM

Water Recharge Zones

PMR's topography consisting of basalt rocks gives rise to a low-storage aquifer system. Thus, it becomes more critical to address the means to replenish these aquifers. Critical areas are recommended to be marked in the future based on the discharge and recharge location from the Pune region/PMR aquifer map.

Strategies:

1. 'Ground Water Recharge Priority Map' needs to be prepared, and a process for development requirements needs to be prepared in future.
2. Prohibit water polluting activities in high infiltration zones with high groundwater potential and groundwater recharge areas, such as lineaments and fault/fracture zones.
3. Ensure the monitoring of groundwater quantity and especially quality regularly by observing wells in unsaturated and saturated zones of the aquifer to detect the influence of land uses and activities at the surface.
4. Ensure increase in groundwater recharge by involving relevant authorities in Watershed Development Initiatives as per the Integrated State Water Plan guidelines issued by the Water Resources Department of the state government.

Reducing vulnerability and mitigating disasters: Landslides

PMR is prone to landslides, rock falls, debris flows, especially in Mawal taluka villages (Malewadi, Boraj, Maau, Mormaarwadi), Bhor taluka (Sonarwadi) and Mulshi taluka (Ghutke).

Since the Malin landslide event (of Ambegaon taluka), which occurred on 30 July 2014 and claimed 151 lives, the susceptibility of moderate slopes and their dynamic interaction with the rainfall came to light. As per the GSI, the village and its surrounding areas are not on the highest slopes in the western ghats.

Strategies and actions adopted in the Development Plan

Majority of landslide-prone areas fall under Hilltop Hill slope zone. These hilltops and hill slopes are protected through controlled development and stringent controls for slopes over >20%. Majority of forest lands fall over mountain crests and steep slopes. The Forest department protects the forest lands.

Afforestation activities are promoted along hills where the slope is less than 20% and along the base of hills, safeguarding erosion and thus mitigating landslides.

Figure 15.3 represents the Green-Blue segments

Figure 15.3: Green-Blue Segments

15.5 Preserving Green Canvas: Protecting Command Areas and Water Catchment Areas

Urban expansion results in socioeconomic transformations with relevant impacts for peri-urban soils, leading to environmental concerns about land degradation and increased desertification risk in ecologically fragile areas. The transformation also impacts agricultural use of land leading to zone conversions. Thus irrigation command areas and water catchment areas of major irrigation projects/dams in the region are proposed to be protected, while 60% of PMR is proposed under the agriculture zone, forming the Green canvas of PMR. Following are the actions taken for protecting the Green canvas:

Protection of Water Catchment Areas

PMR has several major and minor irrigation projects (dams) in the Western Ghats area. These areas were once dense forest because of high rainfall. As the vegetative cover on hill slopes of the dam catchments reduces, a high amount of rainfall in the Western Ghats will hasten soil erosion. This will reduce vegetative growth and regeneration, increase siltation in the dams and reduce the carbon sinking capacity of the area.

The steep slopes are protected through the Hill Top Hill Slope zone. The gently sloping lands of the hills until the foot of the hills, are preserved through the afforestation zone to maintain the vegetative cover, with limited activities as mentioned in U-DCPR. As the land surrounding lakes, reservoirs and dams are proposed to have limited activities through the proposed afforestation zone, water catchment areas of the more significant number of the major irrigation projects are well addressed.

Strategies:

1. Follow the strategies mentioned in HTHS and Afforestation zone
2. Promote integrated watershed development and management works from ridge to valley and establish water balance as per the recommendations in the Integrated State Water Plan of Water Resources Department, Government of Maharashtra.
3. Formulate guidelines for any new development in the water catchment areas, to aid efforts in areas of water

conservation, topsoil conservation, augmentation of groundwater recharge, etc.

4. Introduce and promote sustainable land management and other conservation measures to enable recovery of areas that have ceased to be water catchments.

Agriculture Protection and Management

The objective behind delineating the agriculture zone is to protect agricultural lands where possible and sustain jobs in the agriculture sector. Rural empowerment centres would foster farmer-processor tie-ups and promote startups deploying IoT (Internet-of-Things) and other emerging technologies to improve 'farm-to-fork' supply chain to offer better prices for agricultural produce.

Agriculture Zone G-1:

All existing agriculture and vacant lands situated beyond the Protected Agriculture Zones (G-2) are generally designated under this zone. The total area under this zone admeasures 2287.81sq km.

Green Zone G-2:

All existing agriculture and vacant lands situated in irrigation command areas outside the Growth Centres or the urbanisable area are identified and designated under this zone. The total area under this zone amounts to 565.56 sqkm.

Zone conversion of this zone situated in the irrigation command area is not allowed except for agro-tourism activities that do not impact predominant use of the land, i.e. farming.

Strategies:

1. Arrest depletion of Irrigated agricultural lands - 'Agricultural land under Command Area' for real estate and other development activities
2. Ensure integrated watershed development and management works as per the recommendations in the Integrated State Water Plan by the Water Resources Department of the state government to avoid soil erosion and topsoil conservation.

Reducing vulnerability and mitigating disasters: Earthquake

Earthquakes are generally regarded as the most destructive among natural disasters. According to the IS 1893 Part I 2002, Maharashtra state has been divided into three earthquake damage risk zones. Most of PMR falls into the moderate damage risk zone - zone III. However, the south-west area of Bhor and Velhe talukas fall into high damage risk zone IV.

Pune lies in the seismically active zone of Koyna region, which is about 100 km south of the city. It has recently been upgraded to lie in the zone IV, the second most dangerous seismic zone in India. Historically Pune has experienced some moderate-intensity and many low-intensity earthquakes. Although earthquakes were not known to have originated in Pune itself, an earthquake of a very slight intensity took place in Pune that had its epicentre in Dehu, about 13 km from the main city. Seismologists were unable to explain the occurrence of this earthquake. Fault lines scattered throughout the district make the region a minor earthquake prone area.

Strategies and actions adopted in the Development Plan

The seismic zone IV is observed in Nasrapur Growth Centre and surrounding rural areas. As part of the mitigation strategy, Nasrapur GC is planned to be a low-density town with maximum agriculture zone coverage. The southern tip is protected under the Hilltop Hill slope zone, where development is controlled, reducing the risk to dwellers.

In case of an earthquake as a hazard, no prevention measures are available. However, mitigation measures for earthquake impact reduction need to be considered. They consist of structural and non-structural measures.

Figure 15.4: *Green Canvas*

15.6 Green Nodes: Promoting Carbon Neutrality

The milestones and targets, as per the roadmap recommending actions related to carbon neutrality for PMR, are divided into two main parts:

1. Carbon sequestration: mainly protecting and enhancing green cover to store carbon dioxide and reducing emission gap using technology
2. Emission reduction: reducing current greenhouse gas emission levels in PMR

The strategies and actions mentioned in Blue Ribbon, Green Ribbon, Green Segments and Green Canvas help achieve carbon sequestration. Reduction in emission through the promotion of renewable energies is covered under transport and utility strategies.

However, to promote emission reduction through residential development designed for low carbon footprint and smart sustainability, Carbon Neutral Townships are proposed.

Carbon Neutral Townships

PMRDA intends to adopt elements of carbon neutrality and energy efficiency in its approach towards planning and development of PMR. The Carbon Neutral Township concept caters to a vital urban mix of residential buildings and offices, shops, restaurants and public facilities promoting a Green City. The concept proposes to offer its residents a maximum of quality and minimum resources consumption through:

1. Compact Development
2. Mixed-use, including habitation, offices, shops, restaurants and social facilities
3. Minimised embedded energy
4. Zero Carbon operation
5. Excellent mobility (Train, Bus, local streets, highway access, bike trails, pedestrian mall)

A model town development of 1 sq km, a carbon neutral neighbourhood for over 10,000 inhabitants is being considered as a proof of concept. 19/0/2019, MOU was signed between Government of Maharashtra and 2000 Watt Smart City Association (2000WSCA), Switzerland. The objectives of tre MOU are as below:

1. Enhancement of capacities of PMRDA and GoM in sustainable development planning

2. Master development of the new 2000-Watt-Smart-City Townships
3. To develop a sustainable carbon neutral development regulatory framework

Energy Banks

PMR is proposed to have almost 60% of rural area, which is mainly agrarian in character. Promoting the concept of the circular economy, the concept is to reuse the waste that is generated within PMR into energy as an alternative to conventional energy. This will, in turn, help in an effective reduction in carbon emission, as massive amounts of carbon dioxide are released by burning of dry leaves. Instead, if this fodder is collected and made into biofuel, it will benefit the rural economy and make the rural communities self-sufficient. This could be very well done through a PPP model.

Energy Banks are proposed as part of the Rural Empowerment Centre at each of the Rural growth centres serving the rural villages. Biogas plants could be installed in each of these centres where through faecal sludge treatment plants biomass could be supplied to these biogas plants along with agriculture fodder and byproducts of agriculture processes. Solar panels could be installed in these centres, promoting another method of renewable energy.

Renewable Energy Parks are proposed on government owned lands on higher elevations/ hilly terrain for use of various technologies for producing renewable energy and supply of power into the electricity grid. The ideal technology to be used for power generation from renewable energy resources like solar parks or wind farms, feasibility and the applicability of the proposed technology needs to be first studied.

These Energy banks form the Green Nodes of PMR addressing the Resilient Goal.

15.7 Recommendations

Some actions do not come under the purview of the statutory process of Development Plan. Nevertheless, these measures are required to be taken in the current time and are considered critical for future development. Some of these recommendations to make PMR Carbon Neutral are covered in this section.

Emission Reductions

1. **Hybrid RE Stations and PV:** There are existing as well as proposed high-speed transit corridors in PMR such as Ring Roads and Pune-Mumbai expressway. There is a high potential for emissions reduction by installing Renewable Energy (RE) provisions on the median.
   Recommendation: Hybrid RE stations with Photo Voltaic (PV) + Vertical Axis Wind Turbine (VAWT) could be proposed along these high-speed transit corridors. The RE generated here should be used in Electric Vehicle (EV) recharge stations.
2. **Neighbourhood Amenities Area in PMR:** Land provisions exist in the Development Plan for government institutions, primary and secondary schools, general hospitals, maternity homes, shopping malls, community centres and parking spaces   .
   Recommendation: The rooftops can be demarcated for rooftop distributed hybrid RE plants. They can be fitted with PV and VAWTs. This RE can be used for neighbourhood street lighting.

Carbon sequestration

1. **Quarries within PMR:** Nearly 0.02% area of PMR comprises defunct quarries. These quarries have an impervious base and a good capacity to hold rainwater.
   Recommendation: Convert these quarries into wetlands biodiversity parks. Wetlands are shallow water bodies, where sunlight reaches most parts of the waterbody and bestows it with a high vegetative growth like phytoplanktons, reeds, floating and rooted vegetation. The aquatic vegetative cover can harbour good aquatic life like zooplanktons, crustaceans, molluscs and fish. A wetland ecosystem is efficient and productive with a high capacity to store carbon. Such wetlands attract migratory birds and can be tourist spots in the city.
2. **Neighbourhood Amenities Area in PMR:** Land provisions exist in the Development Plan for government institutions, primary and secondary schools, general hospitals, maternity homes, shopping malls, community centres and parking spaces.
   Recommendation: The plantation can be mandated in some portion of each of these common amenities. This will increase the carbon sink within PMR, without encroaching into development land.

Ecological Improvement

1. **Environment/Ecology Cell for PMR:** The PMR comprises several biogeographic zones with significant rare and endangered species. Their presence endows the land with unique ecosystem services which are vital for the health and well being of humans and non-human beings living in this land.

2. **Recommendation:** An ecological cell for PMR is recommended as part of the administrative setup. The role of the cell would be to protect, conserve and improve ecosystems and ecosystem services within PMR. This is critical in our fight against climate change.

3. **Waste Segregation and Composting of Organic Waste:** The dominant vegetation in the PMR region is the deciduous trees. They give rise to a phenomenal amount of leaf litter during the winter season.

4. **Recommendations:** Composting pits with leaf shredding facility could be provided in villages, which would avoid burning of the leaves, reducing carbon emission. This will help in the faster decomposition of the leaves to nutrient-rich compost. This compost can be used in agricultural activities.

5. **Reed Bed Filtration at the entrance of lakes, ponds and water bodies**. In many water bodies within the PMR, water enters in the form of a stream. It brings with it the sewage collected on its way, and subsequently, the sewage load in the static water body (lake/pond) increases.

6. **Recommendations:** Reed bed filtration system (biological- no energy inputs) are recommended to be planted in these water bodies.   Streams supplying water to lakes and ponds can be identified, and reed bed filtration systems (biological – no energy inputs) can be planted on them. The reed bed filtration system acts as a biological and physical filter. This will improve the water quality entering the lakes.

7. **Sustainable Agriculture Belt:** Runoff of fertilizers and pesticides into the river due to agricultural activities within the river basin, are one of the key components responsible for water pollution.

8. **Recommendations:** It is recommended to promote sustainable agricultural practices in rural areas within 500m from the riven banks on either side of the river. This will not only help in arresting water pollution but help in maintaining the water ecology.

9. **Protection of Water Catchment Areas:** PMR has several major and minor irrigation projects (dams) in the Western Ghats area. This was once a dense forest because of high rainfall. As the vegetative cover on hill slopes of the dam catchments reduces, high rainfall in the Western Ghats will hasten soil erosion. This will reduce vegetative growth and regeneration, increase siltation in the dams and reduce carbon sinking capacity of the area.

10. **Recommendation:** Promote integrated watershed development and management works from ridge to valley and establish water balance as per the recommendations in the Integrated State Water Plan of Water Resources Department, Government of Maharashtra. Formulate guidelines for any new development in the water catchment areas, to aid efforts in areas of water conservation, topsoil conservation, augmentation of groundwater recharge, etc. Introduce and promote sustainable land management and other conservation measures to enable recovery of areas that have ceased to be water catchments.

Chapter 16: Proposed Utility

With the proposed regional positioning and population projections, rapid urbanisation would take place in PMR in the next 20 years. A robust and efficient system for utilities management needs to be in place. This chapter covers the strategies to address the challenges the region faces in water supply and distribution, sanitation and waste management.

16.1 Efficient: Objectives and Actions

Utility infrastructure objectives are captured under the Efficient goal of the Vision Framework. These objectives provide for effective management of natural resources. Following actions are proposed in the Vision Framework to materialise these objectives into planning:

Table 16.1: Efficient Goal and its Actions

Objectives	Actions
Develop efficient systems for water supply and sewage in each Growth Centre	Action 1: Develop trunk infrastructre for water supply and sewage network for each Growth Centre
Promote water conservation and recycling	Action 2: Promote recycling of wastewater at each Urban Centre
	Action 3: Recharge groundwater through rainwater harvesting
Promote circular economy through waste management	Action 4: Decentralisation of solid waste management sites
	Action 5: Promote the in-situ solutions to recycling of organic waste
	Action 6: Mandate industrial waste recycling and effluent treatment
Encourage share of renewable energy within the grid	Action 7: Encourage an increase in renewables share
	Action 8: Facilitate waste to energy concept

16.2 Water Management

This section covers the approach and methodology to ensure efficient and equitable water distribution across PMR through demand assessment, provision of land reservation for physical infrastructure and water conservation strategies. PMR water demand assessment is carried out considering the recommended rate of water supply and population projections. The details of the water management are provided below.

Water Demand

The 18 Urban Growth Centres comprise 233 villages while the 8 Rural Growth Centres comprise 8 villages. The total projected population of the Growth Centres is 40.74 lakh and that of the rural villages is 13 lakh. Demand for the said population is worked out based on MWRRA guidelines. Accordingly, the rate of water supply for urban and rural areas varies. The rate of water supply adopted for Growth Centres is 90 LCPD while that of rural is 55 LPCD.

However, as per the same guidelines, 30% of recycled water (27 LPCD) is considered while calculating the total water demand. The recycled water could be used for non-drinking uses such as agriculture, gardening, car washing, etc. After reducing the demand by considering recycled water, the fresh water requirement works out to be 62 LPCD. Nonetheless, 15% losses are added to the fresh water requirement which sums up to 72.45 LPCD for the Growth Centre villages. After adding the 30% recycled water to the fresh water requirement, the total rate of

water supply works out to be 90 LPCD. In case of rural villages, although the rate of water supply is 55 LPCD as per the MWRRA guidelines, 15% losses are factored in, resulting in a total of 63.25 LCPD for rural villages.

Following is the total water demand for PMR based on 72.45 LCPD for Growth Centre villages and 63.25 LCPD for rural villages

Table 16.1: Water Demand

	Villages	**Population**	**Rate of Water Supply**	**Water Demand (mm3)**
Growth Centre	241	4094823	72.45 LCPD	108.35
Rural Villages	573	1335311	63.25 LCPD	30.82
Total	814	5430134		139.17 (4.9TMC)

Water Sources:

Reservoirs in PMR are classified into major, medium and minor categories using the guidelines provided by the State Water Resource Department. These reservoirs are the key source for different water needs such as drinking water, domestic use, agriculture and industrial use. While devising water supply strategies for PMR, it has been noted that certain water sources have limitations of use due to prior commitments. However, the sources identified are available within PMR and its immediate surroundings to provide an efficient and cost effective system. Similarly, although Chaskaman dam, Bhatghar dam, Nira-Deodhar and Ghod Dam are situated outside PMR, they are considered as water sources for PMR. Currently, 35 sources have been identified serving the 814 villages.

The data regarding sanctioned water and availability of water from the live storage of each dam is collected from various divisions of WRD by the appointed consultant, and water supply planning is done accordingly. Water availability data is dynamic in nature, as many entities depend on the same sources of water. In order to carry out a well informed water supply plan, the data is collected and captured until 31st May 2021.

Water supply Strategies:

1. Decentralised system is adopted for assigning villages to the source along with an integrated approach while planning for the water supply system, to reduce on the capital cost.
2. Topography is the prime criteria, where villages are divided based on ridges.
3. Utilisation of gravitational force for flow of water is key to identifying villages, reducing the requirement of pumping and thus providing for energy saving.
4. The principles of River Basins viz. Sub-basins like Mutha sub basin, Mula sub basin, Pawana sub basin, Indrayani sub basin, Andra sub basin, Bhama sub basin and so on are considered while planning, then following the revenue boundaries. It is rational, logical & technically viable to follow this concept simply because any natural water course follows the basin rules.
5. Villages within watersheds for that particular source are identified and water demand is fulfilled accordingly.
6. In most of the cases, water supply to Growth Centres is provided from major and medium size projects based on availability and proximity.
7. Only local villages within the immediate vicinity of the M.I. tanks are considered as dependent for that particular M. I. Tank.
8. Temghar, Khadakwasla, Vadiwale and Varasgaon are the four dams whose water allocation is already planned for, thus these dams are excluded from the list of water sources. However, the villages edging the submergence line are considered depending on these dams.
9. Detailed planning & design of the bulk transmission lines will be done at the stage of detailed DPR.
10. Equitable and incremental water demand: The equitable water distribution philosophy shall be adopted which will overcome the issue of water scarcity. The rate of water supply shall be in incremental basis based on the financial viability and recovery strategies
11. Renewable energy for pumping and other electric requirements to be promoted
12. It is also desirable to promote recycling of at least 30% of Wastewater and reuse facilities so that the irrigation and the non-domestic water demand can be fulfilled from the recycle source.
13. Implement the SCADA system for ease in operation and maintenance of the water supply, conveyance and treatment system.

Water Supply Plan

Water Zones:

Based on above strategies, 35 sources which include major, medium dams and M. I. Tanks are proposed as part of the Water Supply Plan. Thus, 35 such zones are planned surrounding each source, indicating the number of villages- urban and rural, depending on that particular source. Figure 16.1 and Table 16.2 lists the source and the dependent villages. Also, increase in urbanisation would lead to reducing land under agricultural activities. Additionally, by using advanced technology for use of water in agricultural usage, would help in mitigating irrigation water demand.

As per the proposed Water Supply Plan, Bhatghar, Chaskaman and Mulshi Tunnel reservoirs will supply 48% of the water demand of PMR. Ghod Dam (98 villages) followed by Bhatghar (75 villages), Chaskaman (76 villages), Pawana Dam (63 villages) and Bhama Asked (56 villages) serve 45% of PMR.

Figure 16.1: Water Supply Plan- Zones

Table 16.3: Water Supply Plan- Zones

Name of Source / Zone	Type of Source	No. of Villages covered	Storage Details	Sanctioned Reservation	Year (2031)		Year (2041)		No. of Villages of Growth Centre	
			Total	Quantity (mm3)	Population	Annual Water Demand (mm3)	Population	Annual Water Demand (mm3)	UGC	RGC
Khadakwasla	Major	44	85.91		271628	6.91	370469	9.39		
Temghar	Major	15	107.96		7919	0.18	8149	0.19		
Warasgaon/ Dasave	Major	21	375.36		32947	0.76	33211	0.77		
Panshet	Major	26	310.61		9886	0.23	10269	0.24		
Total			879.84	424.89					10	1
Chaskaman	Major	76	241.69	26.44	679143	17.47	880932	22.77	26	
Bhama Ashkhed	Major	56	230.65	144.11	327936	8.43	414761	10.71	26	
Ghod	Major	98	169.3	12.62	520655	12.82	605380	14.96	11	2
Pawana Dam	Major	63	272.12	285.77	187087	4.68	217229	5.47	20	1
Bhatghar	Major	75	672.65	29.73	614647	16.03	907649	23.77	44	
Gunjawane	Major	44	104.69	0	44184	1.02	47357	1.09		
Mulshi Dam	Major	46	535.76	0	49436	1.16	50817	1.2		1
Upper Andhra Lake/ Thokarwadi	Major	19	363.7	0	24357	0.56	25575	0.59		
Shirwata	Major	3	212.97	0	1532	0.04	1639	0.04		
Vadiwale	Medium	49	40.87	8.62	220307	5.76	273589	7.17	24	
Kasarsai	Medium	10	17.38	3.91	59690	1.53	96163	2.49	4	
Lower Andra Lake	Medium	25	83.3	66.3	111533	2.77	146893	3.65	13	
Mulshi Tunnel Project	Medium	22	46.61	25.96	506238	13.39	744238	19.68	22	
Nazre	Medium	18	22.32	7.25	138884	3.56	153379	3.93	9	
Valwan	Medium	15	72.12	0	101294	2.63	119059	3.1	6	
Adhale	Minor	6	1.27	0	26674	0.69	28459	0.73	3	
Malvandi	Minor	4	3.69	0	6389	0.15	6848	0.16		
Jadhavwadi Dam	Minor	13	12.12	1.07	97733	2.58	131016	3.46	13	
Pimploli	Minor	3	1.54	0	2063	0.05	2040	0.05		
Khamboli	Minor	3	1.84	0	3294	0.08	3294	0.08		
Rihe	Minor	2	1.61	0	3224	0.07	3432	0.08		
Hadshi 1	Minor	1	3.07	0	10574	0.24	10643	0.25		
Hadshi 2	Minor	2	1.41	0	1762	0.04	1775	0.04		
Walen	Minor	14	5.11	0	23390	0.54	24202	0.56		
Uravade	Minor	4	2	0.44	12772	0.33	12700	0.33	2	
Chinchwad	Minor	3	1.46	0	1864	0.04	1864	0.04		
Saltar	Minor	3	1.3	0	1360	0.03	1391	0.03		
Bhongvali	Minor	15	3.22	0	29018	0.68	31366	0.73		1
Kadus	Minor	5	2.62	0	20631	0.52	21707	0.55		1
Wafegaon	Minor	8	3.11	0.005	13927	0.32	14841	0.34		
Tithewadi	Minor	5	7.86	0	26377	0.64	27802	0.67		1
Total		814	4019.2	1037.115	4190355	106.93	5430138	139.31	233	8

Water Treatment Plants:

As discussed earlier, reservoirs are considered as the primary source of drinking water. PMR is divided into 35 zones considering river basins in the region. Water treatment plant (WTP) locations are considered near the source but at a higher elevation and also within each of the Growth Centre, accentuating the decentralised water supply system, making each Growth Centre self-sufficient. Availability of water in these reservoirs have led to varying numbers of villages in different zones. The design parameters for water supply system components are based on the CPHEEO manual reference guidelines. Area allocation for each WTP is done based on URDPFI guidelines. Elevated Storage Reservoir (ESR) or Ground Storage Reservoir could be proposed during the detailed project report stage based on gravitational force and water demand.

26 WTPs are proposed in Growth Centres, each with an area ranging from 0.2 to 1 ha, while 8 are proposed within Rural Growth Centre. Further details are available in Table 16.3. Figure 16.2 shows the location of WTPs, reservoirs and zones as part of the Water Supply Plan.

Figure 16.2: Water Supply Plan- WTP locations

Modular and efficient systems

PMRDA is adopting modular (i.e. scaling up capacity as and when required) approach for setting up of WTPs so as to reduce upfront capital investment, avoid underutilisation of facility and to provide flexibility in terms of scaling up the capacity in future.
Feasibility of using the existing water supply system would be checked and proposals for augmentation to the same would be prepared during the DPR stage for long term sustainability. Further, the system components of each WTP will be designed considering minimisation of operation and maintenance and efficient working in the remote areas, case to case and demand basis.

Non- Revenue Water (NRW): The NRW comprises physical losses and financial losses in the water supply system. The proposed plan intends to promote use of automation systems like SCADA for bulk supply along with smart water metering and laying of closed pipe conduits, in order to reduce the rate of NRW to 15% level. In the initial year the baseline of NRW could be established through water audits and sample surveys. Then the annual targets could be set to achieve the benchmark of 15% NRW.

Water Conservation Strategy:

Balancing reservoirs: Quarry areas hold the opportunity for developing some of the non-functional quarries into water reservoirs. Due to the quarrying activity for extracting stones and other construction materials, natural water containers are formed. These containers are lined by impermeable surface, providing a good opportunity for developing them as balancing reservoirs. These cases would be implemented, after detailed study of its feasibility, within existing quarries in Chakan, Alandi and Wagholi Growth Centres, by lifting water from the Indrayani River and refilling these reservoirs. Some of these reservoirs are at higher elevation, water could be drawn through gravitational force.

Augmentation of existing sources: The existing M.I. tanks are based on the FRL received from the State Water Resources Department. Periodic desilting of the tank would be required. However, in case the water requirement increases, water holding capacity of certain M.I tanks, after detailed study, could be increased by raising the height of Waist Weir Bar. In order to provide for the raise in height, provision is made by proposing green belt skirting the M.I. tanks.

Developing barrages: Certain rivers like Bhima, where excess water is available, barrages could be developed across certain cross-sections of the river. This would aid in arresting and utilising the excess water as an alternative water source. It could only be done in concurrence with the State Water Resources Department, also by aligning with the Interstate Water Distribute Tribunals.

Preservation of Shivkalin lakes: PMR has a rich heritage and certain lakes are part of it. Few 'Shivkalin' lakes are observed in PMR, specially in Daund Taluka. It is proposed that these lakes could be re-utilised and maintained further by lifting water from near-by water sources and filling these lakes. These would act as additional water sources for the local villages surrounding the lakes.

Rainwater harvesting: As per U-DCPR, rainwater harvesting is promoted with incentives for newer developments. However, rainwater harvesting could also be taken up by individual Grampanchayat, creating a local water source for the village, making it self sufficient. This could be readily done in the Western Ghat villages, where rainfall is heavy and high water-run off. These percolation tanks could be proposed within the proposed afforestation zone at foothills.

Catchment Treatment Plan/ Increase in Ground-water: Ground water table within PMR is depleting rapidly. In order to increase the percolation of rainwater and augment the ground-water table, Catchment Treatment Plan (CTP) could be proposed. It involves certain majors such as creating bunds across nalas, trenching, constriction of Gabion walls, dense plantation of indigenous trees along slope, reducing the downhill water force, could be proposed. Deepening and widening of streams, construction of earthen stop dams and digging of farm ponds are few other steps which could be further taken up.

Storm-water Management Plan: The urbanised areas in PMR are facing serious issues of stormwater and surface runoff management due to diversion of the natural runoff pattern, encroachment on the natural streams, and inefficient surface runoff management. The issue of flooding in some parts of the rural areas is observed in the region on the southern and northern side. The effective runoff management, defining the correct runoff intensity and runoff management with rain water harvesting mechanism could overcome the present situation. It is thus recommended that a Storm Water Management Plan could be prepared considering effective guidelines of CPHEEO, GIS analysis and Sewer GEMS.

16.3 Sewerage Management Plan

The villages within the PMR region have poor sanitation facilities. The untreated sewage is discharged into the natural sewer or low lying areas or directly into the river. The river pollution level is higher and is beyond the desirable limits. The peri-urban villages along the PMC, PCMC are having increasing housing demand. The sanitation system needs to be improved and user friendly. Also, the PMR area is very widely spread, thus for cost efficiency, the urban areas shall be planned with the de-centralised sewerage system and some parts with prevalence of septic tanks, mostly rural areas. To make PMR more Resilient, it is also desirable to promote the recycle and reuse facility so that the irrigation and the non-domestic water demand can be fulfilled from the recycle source. The sewerage management plan is designed based on the CPHEEO guidelines as well as SWACH Bharat Mission guidelines.

Sewerage Generation

Due to the implication of the Water Policy and the MWRRA notification, the recommended rate of water supply in the PMR region is considered as 90 LPCD for urban villages and 55 LPCD for rural villages. The same rate of water supply is adopted for further design purposes. So wastewater generation is worked out considering 80% the supply plus 15% infiltration as per CPHEEO guidelines.

Table 16.4: Sewerage generation

	Villages	Population	Rate of Water Supply	Water supply (mm3)	Sewerage generation considering 80% the supply +15% infiltration
Urban Villages	241	4094823	72.45 LCPD	108.35	99.7
Rural Villages	573	1335311	63.25 LCPD	30.82	28.3
Total	814	5430134		139.17 (4.9TMC)	128

Sewage Management Strategies:

1. Promote decentralized treatment mechanisms in order to reduce the capital cost.
2. Plan the sewerage system by considering gravitational force, locating the STP at the lowest point of the Growth Centres.
3. Clustered approach in rural areas: Villages having population higher than 5000 people to be provided with STP with surrounding villages depending on the facility, promoting a clustered approach.
4. Provide an efficient recycling system and infrastructure in the light of reducing the amount of potable water usage.
5. Preliminary treatment facility (Septic tanks) to be proposed for the villages having population less than 5000 people, for cost efficiency.
6. To implement the SCADA system for ease in operation and maintenance of the sewerage collection, conveyance and treatment system.
7. Monitoring of management systems and ease of maintenance.

Proposed Sewerage Management Plan

1. The aspects considered while planning of the STP locations are:
2. Terrain and topography of the growth centres, with STP being located at the lowest point of the Growth Centre, avoiding pumping of the sludge.
3. Natural water courses crossing the Growth Centre
4. Population based approach for distributing STPs, not straining the capacity of the STP.

Sewage treatment facilities:

Growth Centre: Each of the Growth centres is provided with multiple STPs, based on population distribution and topography. 64 STPs are proposed in GCs with number of STPs for each growth centre ranging from 0.5 to 1 ha. Maximum STPs are located in Loni Kalbhor Growth Centre with respect to the population (8.33 lakh) followed by Hinjewadi and Talegaon Growth Centre having a population of 4.34 and 3.47 lakh respectivly. Majority of the STPs are proposed along rivers and nalas of second order streams. Details of STP locations are provided in table 16.5.

Effluent Treatment Plant

Most of the industries are located within the MIDC jurisdiction. However, new industrial zones are proposed outside of the MIDC. Treatment of industrial effluent is critical as it may lead to hazardous conditions and affect the environment. Effluent treatment plants are proposed adjoining the newly opened up industrial areas. ETP sites are proposed at Chakan, Talegaon, Pirangut, Khed Shivapur, Ranjangaon and Uruli Kanchan.

Figure 16.3: Sewerage Management Plan- STP & ETP locations

Reuse/Recycle of Sewage

As per the MWRRA guidelines, 30% of the total water demand needs to be fulfilled by recycled water. Promoting this further, the Water Supply Plan as well as the Sewerage Management Plan intends to recycle at least 30% of the domestic waste-water within the Growth Centres and reuse it for non-human consumption such as toilet flushing, gardening, horticulture and agriculture. Use of recycled water for irrigation purposes will ease the burden on the irrigation authority to produce additional water for the same purposes, resulting in increased gross yield. This could have a positive social as well as environmental impact.

Further, potential for reuse of recycled water for industries as their process water through ETPs could be explored. Recycling of waste water is factored in at both the systems STP and C-STPs.

16.4 Solid Waste Management

Solid Waste Management is one of the most important services that authority has to provide. With the urbanization of PMR, it is imperative to optimize this civic expenditure. Solid waste disposal and management should be planned for the long term and at least controlled tipping should be adapted in the disposal of the solid waste.

Solid Waste generation

The per capita waste generation is assumed at 300 gm/day. The details of waste generation is given below:

Table 16.4: Solid waste generation

Planning Areas	Solid waste generation, 2041, MT
PMR Planning Areas (Urban)	1591
PMR Planning Areas (Rural)	321
Total	6986

Proposed Solid Waste Management Plan:

Based on the population projections for the PMR by 2041, the current provisions are inadequate to cater the future projected solid waste generation. The total solid waste generation in the future is going to increase and accordingly, there will be a need to develop appropriate systems for collection, transportation and disposal of solid waste in an environmentally friendly manner either through properly designed solid waste management sites or through other treatment methods. With projected population for urban villages being 40.74 lakh, decentralised solid waste management sites are crucial for a healthy lifestyle.

Solid Waste Management Strategies:

1. Decentralised system to be adopted for Growth Centres
2. Three tiered system to be proposed
    a. door-to-door collection in the Urban area through use of 'ghanta gadi'
    b. Collection of neighbourhood waste at Transfer stations and segregation of waste
    c. Transferring the waste to Solid waste management sites and promoting 50% recycling of inorganic waste.
3. Location of these sites to be identified based on 'low/ moderate prioritisation for artificial recharge of ground water' as defined by GSDA. However, detailed studies of ground water level shall be carried out before finalising the locations of the SWM sites
4. As per the Municipal Solid Waste Management and Handling 2016 guidelines, site to be located at the distance of
    a. 100m from river, 200 m from pond
    b. 200 m from highway
    c. 10- 20km from Airports or airbase
    d. 200m from any settlement/ habitation, public parks or water supply wells
5. Location based on availability of government land
6. Located Ideally located within agricultural zones

Solid Waste Management Sites:

Understanding the three tiered system of solid waste management, only Solid Waste Management sites are proposed within Growth Centres. However, it is proposed that Transfer stations shall be developed at village level or grampanchayat level and to be built-operated by the local body. Total 36 number of sites are proposed with 1-2 sites in each of the Growth Centre. Table 16.5 details our locations of SWM sites, proposed for 2031.

Transfer station (also as recycling centre)

Transfer stations could be planned within a village or neighbourhood. Waste generated from the immediate surrounding could be collected, segregated and stored in this collection point before sending for solid waste management sites. Each Transfer station would be equipped with a transferring facility, sorting facility, recycling facility and either biomass or composting facility, depending on the waste characteristics. Waste would be collected from the customers by door-door basis and delivered to the station to be sorted. Only non-recyclable and non-recoverable materials could be transported to the SWM sites for final disposal. The recycling of waste is highly recommended as it reduces load on solid waste management sites and environmental impact.

Figure 16.4: Solid Waste Management Plan- SWM locations

Reduction in amount of waste generated

In order to reduce the amount of waste generated and reduce load on the waste management sites, it is required that recycling/recovering/ composting of waste needs to be addressed. To achieve this, following programs are proposed for the PMR:

1. Educate the public on 3Rs (Reduce, Reuse and Recycle) concept and strategies in schools and workplaces
2. Provide at least one recycling bin at every community centers and residential clusters in the Urban areas;
3. Add UDCR clause of residential areas having area more than 4000 sqm to develop solid
4. Develop door-to-door recyclable collection in the Urban area in order to make it convenient for the resident to participate in recycling program and eliminate the need to build many recycling drop off facility in the City;
5. Formalise the existing waste pickers under a Community based Organisation to keep track of the recycling rate;
6. Develop a centralised resource recovery center/ transfer station that will site a recycling center, biomass and composting plant to streamline the waste sorting process;
7. Provide incentives for industries to recycle their waste.

Table 16.5: Details out location of WTP, STP and SWM sites

Growth Centre	Population 2031	No.of Propsed WTP Site	No.of Proposed STP Site	No.of Proposed SWM Site
Chakan	278563	1	5	2
Alandi	82713	1	5	3
Wagholi	264855	1	5	2
Loni Kalbhor	232504	2	10	5

Khadakwasla	209127	3	4	3
Pirangut	245699	1	4	2
Hinjawadi	174726	2	6	5
Talegaon	253732	2	6	0
Malavali	126130	2	3	4
Khed Rajgurunagar	64260	1	2	2
Shikrapur	142263	1	2	1
Uruli Kanchan	106088	2	1	1
Saswad	51215	1	2	2
Ranjangaon	30411	1	2	1
Yawat	38037	2	2	1
Kedgaon	123358	2	2	1
Total	29626	1	3	1
	46323	0	0	0
	2499630	26	64	36

16.5 Fire Brigade Stations

Fire stations are proposed as per the requiremennt from the Fire Department of PMRDA. Each Growth Centre is provided with fire station. A total of 24 fire brigade stations are proposed.

16.6 Recommendations

The Proposed Utilities Management Plan covers aspects required to make the plan efficient and resilient. However, some actions do not come under the purview of the statutory process of the Development Plan. Nevertheless, in current time these measures are required to be taken and are considered critical for future development. Under such pretext, following 'Recommendations' are proposed in order to make the Plan smarter and more resilient.

Energy-efficient water and wastewater management system

There are a number of equipment that use energy in water and wastewater management systems. However, water and wastewater pumps account for the maximum usage of energy. Therefore, energy-efficient pumps need to be considered here as a representative of energy-efficient equipment. An energy-efficient pumps are defined as pumps that have BEE rating ≥ 3stars. Setting up solar systems at utilities so that at least 40% of the plant electricity consumption could be met. Also, biogas generation from sewage and sludge which could be further used to generate additional electricity. E.g. cities like Pune, Chennai, Surat are generating biogas at STPs and converting it into electricity.

Considering environment sustainability, reduce carbon load on environment and reduce load on the solid waste management site, PMRDA intends could take up following actions:

Intelligent Solid Waste Management: Various treatments and processing options including Waste to energy plants with different technologies such as incineration, gasification, biomethanation and pyrolysis could be explored.

Construction & Demolition waste management: Recycled Aggregates (RA) and Recycled Concrete Aggregates (RCA) derived from Construction and Demolition (C&D) waste need to be utilised. PMRDA could identify the C&D Waste Management facilities as per C&D Waste Management Rules, 2016. The Authority could seek detailed plans or undertakings from large generators of construction and demolition waste and sanction the waste management plan. Large generators of C&D waste shall have environment management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C & D Waste. PMRDA could further procure and utilize 10-20% materials made from construction and demolition waste in municipal and Government contracts.

Promote circular economy: The SWM sites could help in processing of wet waste through composting, the byproduct of which can be used as manure. Processed inorganic waste could help provide raw material for other products such as fly-ash, etc. PMRDA along with local bodies could run campaigns, awareness drives etc.

Hazardous waste: The hazardous waste could be disposed of at captive treatment facilities installed by the individual waste generators or at Common Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs).

Biomedical Waste: The hospitals are required to put in place the mechanisms for effective disposal either directly or through common biomedical waste treatment and disposal facilities. The hospitals servicing 1000 patients or more per month are required to obtain authorisation and segregate biomedical waste into 10 categories, pack five colour backs for disposal. Mixing of hazardous materials results in contamination and makes the entire waste hazardous. Hence there is a necessity to segregate and treat. Improper disposal increases risk of infection; encourages recycling of prohibited disposables and disposed drugs; and develops resistant microorganisms. PMRDA could provide land for setting up a common bio-medical waste treatment and disposal facility.

Solid Waste Management Unit or Cell: PMRDA could establish a Solid Waste Management Unit or Cell within PMRDA to plan, manage and monitor all above activities and initiatives.

Chapter 17: Self Sufficient: Housing and Amenities Proposal

Housing is a critical piece of urban service delivery. The Planning Area comprises primarily areas classified as rural and adjoining peripheral areas of urban local bodies. However, the projected population growth rate of 3.1% per annum will lead to rapid urbanisation, posing development pressure in peripheral regions of urban local bodies. The Development Plan aims at providing inclusive development by evaluating the housing provisions through affordability, resilience, low carbon and smart city lenses.

17.1 Self-sufficient: Objectives and Actions

Under the Vision framework, housing objectives are proposed under the Self-sufficient goal. These objectives promote an integrated approach to regulate residential growth, arrest sprawl like development, seize degradation of the environment and help in providing adequate infrastructure for a better liveable habitat. Following actions are proposed in the Vision Framework in order to materialise these objectives into the planning process.

Table 17.1: Objectives and Actions

Objectives	Actions
Provide adequate and affordable housing for all	Action 1: Town planning schemes for implementing strategic projects
	Action 2: Public housing at each growth centre
Guide integrated and equitable neighbourhood development	Action 3: Provide equitable distribution of open spaces and social amenities
Develop compact residential development along major transit corridors	Action 4: Promote Work-Live concept and develop compact residential development along transit corridors

Walkable Neighbourhoods

The Live Hubs promote the integration of various sectors such as mobility planning, economic development, ecosystem conservation, utility infrastructure development and recreational sector into land-use planning, given the desire to enhance resilience and low carbon approach in the urban framework. Housing is one of its critical components and must comprehensively address the needs of all the segments of the social structure. Compact and inclusive development is the key to such development.

17.2 Existing Housing Situation

Understanding the existing housing trends and situations is necessary to analyse gaps and propose housing strategies to address those gaps. It is clear that most of the Planning Area is currently rural, but the economic transition will lead to urbanisation within the Planning Area. Following sections cover the details of the existing population and household as well as its growing trends.

Summary of Existing Population and Household

The PMR Study Area population increased from 13.4 lakh in 2001 to 17.1 lakh in 2011. It was estimated to be 26.3 lakh in 2018 and amounts to 28.6% of the total PMR population (91.67 lakh). Population density of the Planning Area has increased from 217 persons per sq km in 2001 to an estimated density of 329 persons per sq km in 2018.

As per the 2011 Census, the total household in the Study Area was 366,954 units. This is estimated at 608,009

household units by 2018 by considering the population of sanctioned ITP schemes, TPS and layouts. The Household size of the PMR Study Area is estimated to be 4.4 in 2018, a reduction from 5.12 in 2001. The existing number of households in 2018 for Growth Centres is 3,98,287 while for the rural area it is 2,04,451.

Existing Housing Situation

Residential Land Use occupies 80.83 sq km as per ELU data. It is scattered across the Study Area, whereas distribution becomes denser in the fringes (3 to 5 km) of municipal corporations and along the Pune-Mumbai and Pune-Ahmednagar Corridors.

Based on the building permissions data it is observed that five talukas namely Haveli, Khed, Mawal, Mulshi and Shirur has a dominant 98% share of the total built-up area under sanctioned residential layouts with Haveli covering 52% of the built-up area followed by Mulshi with 28% built-up.

Approved Residential layouts in PMRDA are predominantly located along the Pune-Mumbai and Pune-Ahmednagar transit corridors. They are also seen in pockets between the national highway and railway lines of Pune-Mumbai and Pune-Daund. Khed Rajgurunagar, Talegaon Dabhade, Shikrapur, Talegaon Dhamdhere, Nasarapur serve as residential areas for nearby industrial estates.

Other planned Residential areas in PMR are Integrated Townships and Town Planning Schemes. Townships are predominantly coming up in the western part of the Planning Area, most of them coming up within 10 km radius from municipal limits of Pune and Pimpri Chinchwad. Town Planning Schemes are predominantly located in the eastern part of the Planning Area. Table 17.2 and Table 17.3 give the details of these TPSs and ITPs as per respective TPS Reports.

Table 17.2: Town Planning Schemes

Sr. No.	TP Scheme	PMRDA Notified Area (ha)	Population PMRDA	Household	GC
1	Mahalunge Man TPS	250	120,000	30,769	Hinjawadi
2	WadachiWadi TPS	134	84,000	21,538	Loni Kalbhor
3	Autade Handewadi TPS	94	54,000	13,846	Loni Kalbhor
4	Holkarwadi TPS 04	158	103,000	26,410	Loni Kalbhor
5	Holkarwadi TPS 05	131	87,500	22,436	Loni Kalbhor
6	Manjari Kolwadi TPS	223	145,000	37,179	Loni Kalbhor
7	Wagholi TPS	-	-		Wagholi
		991	593,500	152,179	

Table 17.3: ITPs and Special Townships

Sr. No.	ITP & ST	GIS Area (ha)	Population Projected	Household	GC
1	River View (Mahalunge)	44	10,909	2,797	Hinjawadi
2	Knowledge City & Oxford Golf course	331	82,865	21,247	Pirangut
3	XRBIA Hinjawadi	123	30,837	7,907	Hinjawadi
4	Life Republic	161	40,329	10,341	Hinjawadi
5	Forest Trail	78	19,416	4,978	Pirangut
6	Blue Ridge Hinjawadi	44	11,119	2,851	Hinjawadi
7	Nanded City	261	65,181	16,713	Khadakwasla

8	Sanjivani Integrated township- Urse & Adhe	103	25,845	6,627	Talegaon
9	Solitaire - Manjari	44	11,006	2,822	Loni Kalbhor
10	Riverview City- Kadamvakwasti	216	54,094	13,870	Loni Kalbhor
11	Kul Ecoloch	52	12,899	3,307	Hinjawadi
12	Sanaswadi	42	10,527	2,699	Shikrapur
13	Kaleidoscope- Bhugaon	61	15,318	3,928	Pirangut
14	Nilkanth- Bhugaon	100	24,905	6,386	Pirangut
15	Gulbakshi- Bhugaon	69	17,287	4,433	Pirangut
16	Splendour Country	288	71,985	18,458	RA
		2,018	504,521	129,364	

The income classification for the PMR Study Area as established under the CTT study is shown in Table 17.4. It is used as the basis for income-based classification of households such as EWS, LIG, MIG and HIG. These income groups are based on monthly income as defined under the MHADA guidelines and are shown in Table 17.4.

Table 17.4: Income Classification as per CTT Study

No	Monthly Income	% Share of PMR Study Area	Income Grouping as Per MHADA
1	2,000 - 5,000	1%	
2	5,001 - 7,500	3.5%	
3	7,501-10,000	9.5%	55% EWS
4	10,001-15,000	20.1%	
5	15,001-20,000	21.1%	
6	20,001-30,000	20.6%	
7	30,001-40,000	10.3%	38% LIG
8	40,001-50,000	6.6%	
9	50,000 - 1 lakh	6.0%	6% MIG
10	Greater than 1 lakh	0.7%	1% HIG

Accordingly, distribution of households by income groups in the Planning Area as of 2017 includes 56% EWS, 38% LIG, 6% MIG and 1% HIG households.

17.3 Housing Demand

The Study Area's total population in 2041 is projected to be 53.71 lakh, with 40.74 lakh being urban (Growth Centres) and 12.97 lakh being rural. Average Household Size for the Study Area would be four by 2041, whereas the same for urban areas is expected to be 3.9 and 4.4 for the rural area. Household size is estimated to shrink with rising education levels, reducing household level affordability and increasing living costs. Based on the URGD method, estimated minimum housing demand within the Study Area by 2041 would be 13.34 lakh homes (urban 10.41 lakh, rural 2.93 lakh) including existing ones.

The projected housing requirement for rural areas is 292,523 ie. 22% of the requirement of the total households. Residential land required for the rural population would be supplied by allowing Gaothan expansion from Gaothan boundary. However, an integrated strategy needs to be in place for a total of 10.41 lakh homes. Table 11.7 gives

the breakup of the distribution of households in Growth Centres.

Out of the 10.41 lakh households in Growth Centres, almost 12 % of the households, i.e. 129,364 households, are provided through Integrated Townships, and details are mentioned in Table 11.3. Six town planning schemes are proposed in PMR amounting to 152,179 homes, i.e. 14% of the projected demand for 2041.

17.4 Inclusive Housing Strategy

The housing strategy proposes to ensure housing supply to be met through inclusiveness via development concepts of walkable neighbourhoods with equal distribution of amenities, low-cost housing and ensuring newer developments such as TPS and ITPs for quality and well-integrated development. It aims to reduce housing vacancy and create a vibrant, sustainable and inclusive rental housing market through land reservations and PPP models. This will enable PMRDA to shift its role from a provider to a facilitator for affordable housing.

The income classification as per MHADA guideline is assumed as a day-to-day scenario. The income groups analysis shows that the PMR (Urban) has a considerable portion of EWS and LIG households (approximately 94%). The share is further assumed to be similarly consolidated towards the affordable housing segment. However, MIG and HIG housing share is also expected to increase, considering the planning initiatives planned for the region till 2041 and beyond. The shares assumed for the income segments in the future (till 2041) are shown in Table 11.6. The same has been assumed based on the study of other similarly positioned urban metropolitan areas in India such as Nagpur, Mumbai Metropolitan Region, Bangalore Metropolitan Region.

Table 17.5: Household Split as per Income Groups

Sr No	Income Group	2018 (Exist-ing)	2021		2031		2041	
1	EWS	55%	390,802	55%	502,566	50%	546,738	41%
2	LIG	38%	270,009	38%	402,053	40%	560,073	42%
3	MIG	6%	42,633	6%	80,411	8%	160,021	12%
4	HIG	1%	7,105	1%	20,103	2%	66,675	5%
5	Total	100%	710,549	100%	1,005,132	100%	1,333,507	100%

Proposed Housing distribution

The housing distribution estimates are achieved through residential zones, land reservations for public housing and Town Planning Schemes.

Proposed Residential Zone and its distribution: Work-Live Hubs

Live-Work is an urban planning strategy that focuses on bringing the workplace closer to residential areas, reducing commuting time to work. The average trip lengths between the workplace and home need to be reduced to achieve the goal of "Convenience." To achieve this, employment opportunities need to be created within the Growth Centres for at least 30% of resident workers. Remaining 70% resident workforce is connected to other urban nodes utilizing a mass transport system based on the hub-and-spoke network model, i.e. develop a mass transport interchange within each Growth Centre to serve its residents and connect such interchange with each other and with municipal corporations through mass transport corridors.

The Growth Centres around municipal corporations (PMC and PCMC) form the Work-Live Hubs. The bulk of the proposed residential area is located in Loni Kalbhor, Pirangut, Chakan, Hinjawadi, Khadakwasla and Wagholi Growth Centres, in proximity to employment nodes.

The residential land requirement by 2041 is estimated for the proposed 18 Growth Centres that would require a total of 10.49 lakh houses including existing ones. Out of this requirement, ITPs and TPSs cover 2.81 lakh houses. For the remaining 7.86 lakh houses, total residential area of 374.67 sqkm has been proposed in all 18 Growth Centres by considering residential density of 125 ppl/ha and 45% top-up (15% amenity, 10% open space and 20% roads). Total proposed gross land under residential zones including ITP/TPS, approved layouts and new residential

area is 401.87 sqkm. The boundries of ITP schemes whose master plans are approved and are inforce, are marked as overlay while zone under it is maintained as per the proposals of RP 1997 at the time of its sanction.
Figure 17.1 explains the housing requirements and corresponding residential land distribution within the Growth Centre.

Figure 17.1: Household Distribution and Residential Zone Proposed

Table 17.6: Proposed Housing Requirement and Residential Zone Distribution

Growth Centres	Existing Household (2018)	Total Projected House-holds (2041)	Total Proposed Residential Zone (sq km)	% Share of R Zone
Chakan	42,946	107,568	43.66	11.7
Alandi	13,710	22,135	12.5	3.3
Wagholi	40,638	80,936	40.05	10.7
Loni Kalbhor	38,359	206,494	41.8	11.2
Khadakwasla	34,869	95,045	10.84	2.9
Pirangut	42,844	132,197	34.15	9.1
Hinjawadi	29,175	109,369	33	8.8
Talegaon	34,316	66,353	41.75	11.2
Malawali	18,989	29,609	18.94	5.1
Khed Rajgurunagar	10,474	19,431	10.75	2.9
Shikrapur	23,564	46,560	19.63	5.3

Uruli Kanchan	19,616	27,463	15.29	4.1
Saswad	4,531	19,790	10.53	2.8
Khed-Shivapur	5,521	7,682	4.76	1.3
Nasrapur	7,212	10,523	7.22	1.9
Ranjangaon	18,704	41,191	17.4	4.7
Yawat	5,281	7,322	3.96	1.1
Kedgaon	7,539	11,316	7.03	1.9
Total	398,287	1,040,985	373.26	100
Rural Areas		2,98,759	28.61	
Total PMR		13,48,379	401.87	

Affordable Housing

It is projected that urban-rural migration will be key in population growth. Thus, by 2041 the demand for affordable housing will increase. EWS household estimation for 2041 is 41%, and that of LIG is 42%. With the positive economic transition, affordable households would still need to be provided.

Under the Pradhan Mantri Awas Yojana (Urban) Programme launched by the Ministry of Housing and Urban Affairs (MoHUA) following programme verticals are proposed:
1. "In Situ" slum redevelopment
2. Affordable housing through a credit-linked subsidy scheme (CLSS)
1. Affordable Housing in Partnership with Public and Private sectors (AHP)
1. Subsidy for beneficiary-led individual house construction/enhancement (BLC)

60 Public Housing Reservations are proposed. 153.42 ha (42 nos.) land is reserved for public housing for PMAY schemes while 55.28 ha (18 nos.) land is proposed for MHADA housing. Assuming an average FSI of 2.5, a total of 1.32 lakh households could be achieved to have affordable housing.

Besides this, the integrated townships also provide sufficient space for the construction of small tenements for EWS and LIG categories referred to as 'Social Housing Component', with 15% FSI of the basic residential FSI. Out of this component, 25% FSI is utilised exclusively to construct EWS tenements and the remaining 75 % FSI may be used for LIG tenements.Out of the total tenements constructed as Social Housing component, one third (1/3rd) tenements shall be kept for Rental Housing tenements which will be disposed on Rent only by the project Proponents (UDCPR 2020). Thus, Integrated Townships are also inclusive and cater to the need for the low-income groups, which are a major share in projected housing demand. To the extent of 10% land would be available for EWS housing through Town Planning Schemes.

Town Planning Schemes

26 Town Planning Schemes are proposed in Urban Growth Centre for the newly opened up residential areas, which accounts for 109.32 sqkm land in addition to the existing six town planning schemes. PMRDA envisages implementing the Development Plan proposals by enabling the provision of Town Planning Schemes and also to achieve the proposed economic role of each of the growth centres. Strategic projects such as Life Sciences Park, Crescent Railway and Station, Multimodal hub and Metro & Metro Depot, Logistic Hub, Town Centre, Education Hub, etc and other neighbourhood level amenities are to be implemented using the Town Planning Schemes. However, Authority has to quickly initiate the process for declaration of intention to undertake the TP Schemes under the MR & TP Act of 1966.

Figure 17.2: Proposed Town Planning Schemes and Public Housing

17.5 Social Amenities

For an integrated and self-sufficient neighbourhood development, equitable distribution of open spaces and social amenities is necessary, increasing the livability index of the Growth Centres. To do that, amenities are proposed within 500 m distance, leveraging the concept of Walkable Neighbourhoods. The concept entails providing basic infrastructure and services for education, health, sports, and recreation within the neighbourhood to have easy access to them by foot. Following social amenity hierarchies and planning norms are proposed for an organised development.

Planning Hierarchy

Planning hierarchy is essential to organise and plan the infrastructure needs of an area, enabling a balanced distribution of facilities. Proposed urban hierarchy addresses 18 Growth Centres. Each Growth Centre is conceived as a Town, and it is further subdivided into Neighbourhoods as elaborated below:

Region

The total PMR represents the Region, which hosts PMC & PCMC corporations, Municipal Councils, Nagar Panchayats, Cantonment, Defense areas, special planning authority areas such as MIDC & MADC together with 18 Urban Growth Centres and 8 Rural Growth Centres. It would comprise regional level amenities and services. Regional centres would serve urban and rural areas, covering the entire Region.

Town

Each Growth Centre is conceptualised as a "Town". A Town would be a self-sufficient Planning Unit providing local service/amenity needs for its residents and generating a certain percentage of local employment. It would be interdependent on other towns within the PMR for a higher level of services/ amenities and employment. Principal town level amenities would be integrated at Town Centre serving 100,000-200,000 resident population.

Neighbourhood

A typical Town would be composed of 8-12 Neighborhoods (Urban Blocks). A Garden and Playground would form the Neighborhood nucleus to foster a healthy lifestyle and a strong sense of community. Neighbourhood level amenities would be planned in an integrated manner.

Proposed Planning Norms

The planning norm essentially stipulates amenity provision standards and is based on the proposed planning hierarchy and the vision for livability. They also focus on land optimization and recommend harnessing the private sector's potential to implement amenities. To achieve this, the planning authority shall be empowered with the flexibility to relocate the planned amenity reservation within the same Growth Centre. The proposed planning norms are based on comparative analysis of Maharashtra Planning Standards, and URDPFI guidelines. Planning standards adopted in Master Plans of Delhi, NAINA, and Singapore New Town planning guidelines were also referred to. Comparative analysis of above and planning norms for providing public facilities at Rural Areas are provided in the appendix.

Urban Planning Norms

Table 17.7: *Proposed Planning Norms for Urban Growth Centres: Neighbourhood level*

No	Amenities		PMRDA Norms	Remarks
1	Education	Primary School I - V	Primary School : 1/500 students 1/5000 population Area- 0.4 ha including playground.	All government schools are considered. Regarding private schools, primary schools of 0.05 Ha. area or more are considered as utilizable amenity. All existing sites(government) of PS and SS to be strengthen wherever possible. 50% reservations of primary schools and secondary schools are considered to be developed through ITP,TPS, amenities of building permission and through private institutions. Remaining requirements are proposed. For additional required number of secondary schools, combined primary cum secondary schools are proposed. For remaining number of primary schools, independent primary schools are proposed. In the case of calculating areas for existing or proposed primary-secondary combined schools, 1/3rd of the total plot area is considered for primary school while 2/3rd area is considered for secondary schools. In the case of campus where college exists alongside primary and secondary school, the area split is 40% for college, 40% for secondary and 20% for primary school. Influence zone of 500m for Primary school and 1000m for secondary school is considered for their planning and distribution. And accordingly, where spatial gaps are observed, additional amenities are proposed.
		Senior Secondary VI - XII	Secondary school: 1/1000 students 1/10000 population Area-1 Ha. / site (0.6 ha for play ground and 0.4 ha for building)	
2	Health care	Primary Health care centre	Health Centre: 1PHC / 15,000 population Area = 0.08 - 0.12 Ha	50% of the total reservations are considered to be developed through ITP,TPS, amenities of building permission and through private institutions, while remaining requirements are newly proposed
3	Socio-culture	Community Hall	Community Hall : 1 /15,000 population Area = 0.2 ha/ site	Influence zone of 500m to 1000m is considered for planning and distribution of these amenities. All existing sites (government) of HC to be strengthen wherever possible.

No	Amenities		PMRDA Norms	Remarks
4	Open Spaces	Garden	Neighborhood Garden : 1/15000 population Area- 1 Ha	100% reservations to be delineated. Gardens and Play-grounds are proposed at a distance of 500 m for easy accessibility on principles of walkable neighbourhood.
		Play ground	Play Ground: 1/15,000 population Area- 1.5Ha	
5	Commercial	Local & convenience shopping	Shopping Centre/ Market: 1/15,000 population Area- 0.3- 0.45 Ha	50% of the total required reservations to be proposed and implemented by PMRDA, considering remaining 50% will be develop in future through ITP,TPS and amenities of building permission.

Table 17.7: *Proposed Planning Norms for Urban Growth Centres: Town level*

No	Amenities		PMRDA Norms	Remarks
1	Education	College	College :1000 − 1500 students, 1/1.25 lakh population, Area- 5 Ha	
2	Healthcare	Intermediate Hospital	Hospital : 1/100,000 population Cat B = Area =1 Ha., 80 beds Cat A = Area- 3.70 Ha, 200 beds	As per availability of Govt. land
3	Socio-culture	Community Centre	Socio Welfare/ Cultural centre: 1/ 1 lac; Area- 0.6 - 1Ha	
4	Open Spaces	Town Park	Town park: 1 / 1 lakh, Area = 3- 5 Ha.	
		Sports centre	Sports Complex: 1 / 1 lakh, Area- 3- 5 Ha.	
5	Commercial	Multipurpose Market	Town Centre could include: Commercial (Retail, Restaurant, Office / Banking spaces, Business Hotels), Town Square, Informal Market, Gov. Office, Transport Interchange	Area of Town centre is to be proposed as given in concept for respective planning area.
6	Civic	Fire station	As per requirement of Fire department of PMRDA. 1 Fire station / Planning Area = 0.4 Ha.	
		Burial ground	Burial ground1 site/ 5 lakh, area = 4 Ha.	Area to be calculated as per population in respective GC. Extension should be given to existing amenity.
		Cremation ground	Cremation ground1 site/ 5 lakh, area = 2.5 Ha	
		Dumping Ground	Solid Waste Management Site: 1 site per PA / 5 Ha .	Proposed site should be on Leeward side , accessible by road and away from ground water discharge zone. Preferably Government land should be allocated and location should be at remote place from developable zone.

7	Infrastruc-ture Manage-ment	Sewerage treatment plant	80% of water supply may be expected to reach the sewers Land area requirement is as per URDPFI i.e. For activated Sludge Process (ASP)-0.15 Ha/MLD	
		Water works (Water treatment Plant, tanks & pipes)	Water requirement of PMR is 72 lpcd as per Report 'Integrated Master Plan Of Water Supply, Sewerage, Storm Water and Solid Waste Manage-ment in the PMR'. It is distributed to each Growth center. Land area requirement is as per URDPFI i.e. 5MLD- 0.10 Ha 10MLD- 0.19Ha 50MLD- 0.93 Ha 100MLD- 1.87Ha 200MLD-3.73Ha 500MLD-9.34Ha	
		Effluent Treatment Plant	As per land availability	
8	Govern-ment Purpose		As per Government land availability	

Table 17.7: *Proposed Planning Norms for Urban Growth Centres: Regional level*

No	Amenities		PMRDA Norms	Remarks
1	Education	Professional college	Professional college :1/10 lakh population ; Area- 4 - 6Ha	As per requirement of any educational authority.
2	Health Care	General Hospital	General Hospital and research centre with medical college: 1/10 lakh population; Area- 6-15 Ha.	
		Veterinary Hospital	Veterinary Hospital : 1/ 5.00 lakh Area- 0.20 Ha	
3	Socio-culture	Town hall	Socio-cultural centre/ Exhibition cum fair ground-1/ 10 lakh. Area-15 Ha	
4	Open Spaces	Park	Regional park- 1 / 5-10 lakh, Area = 6-10 Ha.	As per availability of government land, green belt.
		Sport centre	Stadium - 1 / 10 lakh; Area- 10 -20 Ha.	
5	Commercial	Wholesale Market	As per requirement	
		Business District Centre	Regional Centre	

Rural Planning Norms

Table 17.8: Proposed Planning Norms for Rural Growth Centres; Neighbourhood Level

Purpose of Public Amenities				Planning Standards Adopted	
Category	Sr. No	Amenities	Label	Requirement	Remarks
Education	1	Primary School I - V	PS	1/5000 ppl, 0.4 -0.6 ha	As per RADPFI guidelines
	2	Secondary VI - XII	SS	1/15000, 1 ha	As per RADPFI guidelines
Healthcare	3	Primary Health Centre	PHC	1/5000 , 0.05 ha	As per RADPFI guidelines of Dispensary
Socio-culture	5	Community Hall	CH	1/5000, 0.05 ha	As per RADPFI guidelines
Commercial	7	Market	M	1/15000 ppl, 0.3-0.45 ha	As per RADPFI guidelines
Open Spaces	8	Play ground	PG	Per 5000, 1 ha	As per RADPFI guidelines

Table 17.8: Proposed Planning Norms for Rural Growth Centres; Community Level

Category		Ammenities	Label	Requirement	Remarks
Education	1	College	C	1/1.25 lakh ppl, 5 ha, 1000-1500 students	As per URDPFI guidelines
Healthcare	2	Hospital/Rural Hospital & Maternity & Nursing Home	H	1/ 1 lakh ppl, 1 ha	As per URDPFI guidelines
	3	Veterinary Hospital	VH	1/ 5lakh 0.2 ha	As per URDPFI guidelines
Socio-cultural	4	Cultural centre	CC	1/ 1lakh, 0.6-1 ha	As per URDPFI guidelines
Open Space & Recreation	5	Town Park	TP	1/ 1 lakh, 1ha	As per URDPFI guidelines
	6	Sports complex	SPC	1/ 1 lakh, 3-5 ha	As per URDPFI guidelines
Civic	7	Burial ground	BG	1/ 5 lakh, 4 ha	As per URDPFI guidelines
	8	Cremation ground	CG	1/ 5 lakh, 2.5 ha	As per URDPFI guidelines
	9	Fire Station	FS	1/ 2 lakh or 10km radius, 0.4 -0.6 ha	As per URDPFI guidelines
Infrastructure Management	10	Sewerage treatment plant	STP		As per requirement
	11	Water works (Water treatment Plant, tanks & pipes)	WTP		As per requirement

	12	Rural Empowerment Centre	REC		REC could host: Vocational Training Centre/ Digital Centre, Local Shopping Centre, Micro Finance Bank, Energy Centre (Mini Solar Park, Bio-gas plant & Incinerator), Government offices- Revenue Sajja Office, Sub Regional Office of PMRDA, Grampanchayat office, Multipurpose Hall
Commercial	13	Agri Produce Sub-Marketyard	APM	3-5 ha	
Transport	14	Bus Terminal /Bus Depot	BS	1 ha	

Details of amenity distribution are explained in each of the Growth Centre chapters. Following is the summary of amenity distribution in PMR.

Table 17.9: Summary of Proposed Amenities

Growth Centre	Educational Facilities	Health Facilities	Socio Cultural Facilities	Open Space Facilities	Residential Facilities	Commercial Facilities	Transport Facilities
Chakan	16	16	18	62	10	19	6
Alandi	5	7	7	27	8	7	3
Wagholi	12	10	19	56	7	15	7
Loni Kalbhor	10	16	12	57	7	12	9
Khadakwasla	7	9	8	33	4	5	2
Pirangut	23	22	18	71	10	14	3
Hinjawadi	10	20	15	52	12	16	4
Talegaon	35	17	15	54	7	13	4
Malavali	11	7	7	35	2	9	2
Khed-Rajgurunagar	5	6	6	20	4	4	2
Shikrapur	3	7	9	29	3	10	3
Uruli Kanchan	5	9	5	22	3	9	4
Saswad	10	5	6	17	3	8	1

Khed-Shivapur	5	4	4	17	4	3	3
Nasrapur	9	5	4	22	2	6	3
Ranjangaon	1	4	8	29	4	8	3
Yawat	0	2	1	7	0	0	1
Kedgaon	1	3	3	9	4	2	2
Total Amenities	168	169	165	619	94	160	62

Figure 17.3: Regional and Town level Amenities Distribution

17.6 Disaster Mitigation through development of Infrastructure and Amenities

Reducing vulnerability and mitigating disasters: Fire

Fires are the accidents which occur most frequently. It has various causes that require a range of interventions, methods and techniques required to adapt to the conditions and needs of each incident. The fire risk can arise either from industrial processes, accidents in storage godowns or closely built timber-framed buildings.

There has been no major industrial fire in PMR. However, minor industrial fires and domestic fires as well as cases of electrocution have been occurring. Fire and emergency services of PMR are already equipped with the latest equipment and skilled human resources. Notwithstanding that, fires have been taking a regular toll of life and property in Pune. The city police and fire brigade attend to these incidents.

Strategies and actions adopted in the Development Plan

Fire stations are proposed along national or state highways in each Growth Centre. They are further connected with secondary and collector roads, helping in faster services to the development within Growth Centres. Besides, the concept of compact/consolidated development will further aid in serving the area swiftly and efficiently.

A trauma care hospital with multi-purpose ground beside it is proposed in the Development Plan. It will act as a service point for air-ambulance reservations proposed on every national highway within the PMR, at every 10km distance. All this will further enhance the delivery of services in case of any fire hazard.

Reducing vulnerability and mitigating disasters: Epidemics and Pandemics

An epidemic is the rapid spread of infectious disease to a large number of people within a short period of time, usually two weeks or less. An epidemic can be a consequence of other disasters like storms, floods, droughts, etc. With the current situation of people suffering from Covid-19 pandemic, these measures are more critical.

Strategies and actions adopted in the Development Plan

Each neighbourhood is served with a health centre within a walkable radius, which could be turned into epidemic treatment centres during the course of epidemic/pandemic. Also, each neighbourhood has a playground where relief camps could be set up. These amenities provide ease of accessibility as they are within a walkable radius of 500m and sufficiently serve the neighbourhoods, reducing crowding, which is critical during an epidemic or pandemic.

A trauma care hospital with multi-purpose ground beside it is proposed in the Development Plan. It will act as a service point for air-ambulance reservations proposed on every national highway within the PMR, at every 10km distance. These two facilities will further enhance the delivery of services in case of an epidemic.
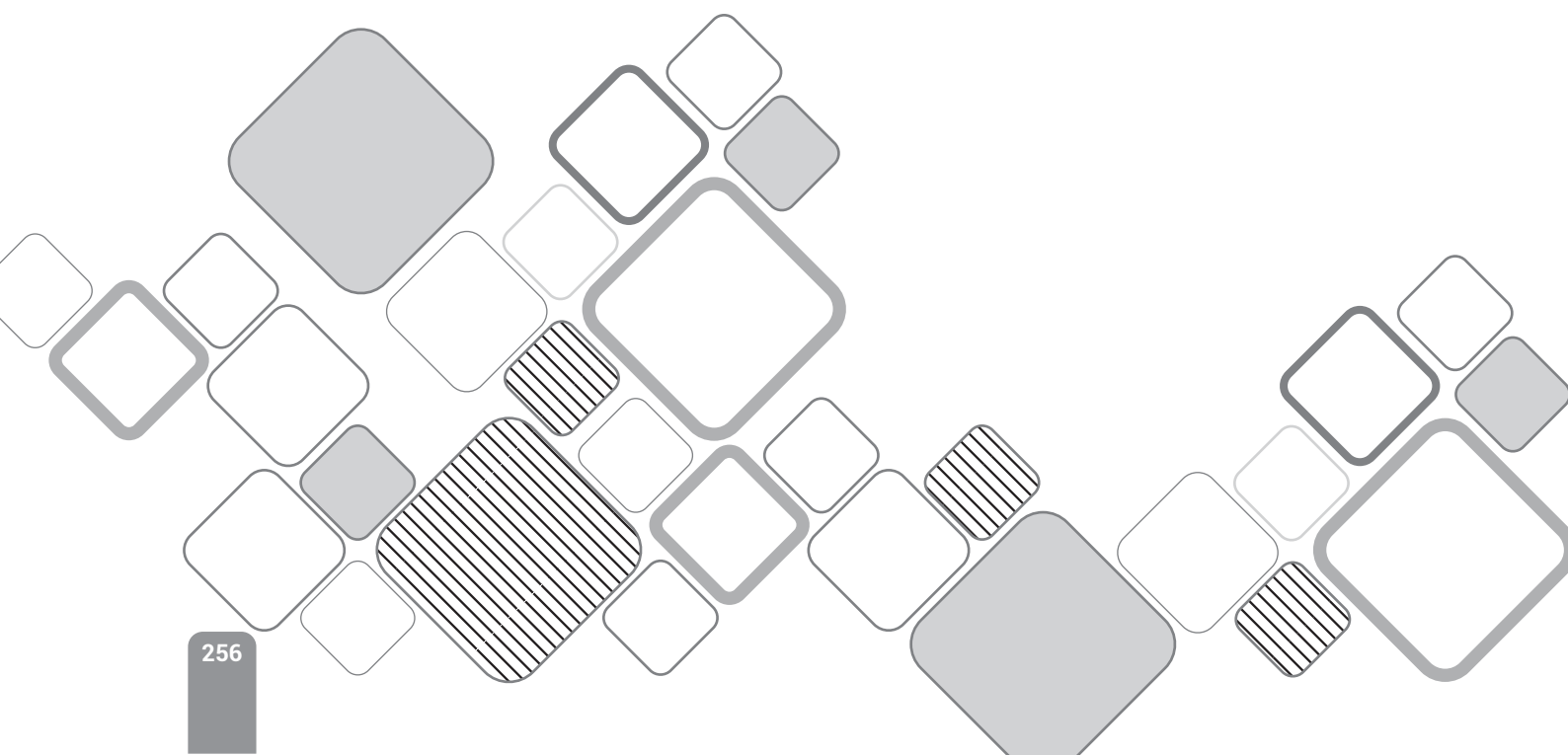
Chapter 18:
Proposed Land Use Plan

The Vision Framework explained in chapter 12 guides the development of PMR. These strategies and actions are detailed in chapters 12 to 17 such as:

1. Resilient: Ecology and environment protection
2. Efficient: Utility and infrastructure planning
3. Convenient: Transportation planning
4. Self sufficient: Housing and amenities distribution
5. Prudent: economic development, density and employment distribution

These strategies have also guided the delineation of proposed zones marked in the Proposed Land Use Plan, serving as the overarching framework to promote and guide organised development in each Growth Centre and Rural Areas.

This chapter covers the land use planning strategy. It elucidates each Land Use Zone with its objectives and definition and parameters used to delineate the zone. The permissible activities/users, development parameters and prohibitive activities within each zone shall be as mentioned in the U-DCPR 2020.

18.1 Residential Zone
Objectives of this zone are as follows:

- Safeguard adequate land to house existing and projected population of PMR Growth Centres
- Promote redevelopment of already urbanised areas through density redistribution and channelise growth by maximising residential land supply at emerging Growth Centers
- Earmark adequate residential land near employment generators to foster Live-Work relationship
- Residential Zones are marked based on proposed densities for each growth centres, and the corresponding land quantum explained is in chapter 12

Total proposed residential zone is 401.87 sq km.

18.2 Commercial Zone
Objectives of this zone are as follows:

- Create a Commercial Zone to acknowledge growing market demand
- Promote organised commercial developments at designated locations commensurate with proposed density distribution, transport and infrastructure provisions
- Promote vibrant, compact, pedestrian-friendly and characteristically distinct commercial developments integrated with other amenities and mass transport facility
- This zone subsumes existing approved commercial developments
- Commercial Zone is distributed based on employment distribution strategy, and the corresponding land quantification explained is in chapter 12

Total proposed commercial zone is 33.65sq km.

18.3 Industrial Zone
Objectives of this zone are as follows:

- Promote industrial development within 10 km distance from municipal corporations, to bring employment closer to homes and to reduce work-related trips for residents
- Co-locate large industries, MSMEs and logistics clusters along expressway/national highways to strengthen the industrial ecosystem and to reduce unwarranted pressure from residential areas

- Recognise the market trend and location advantages to designate thematic economic zones catalysing a particular industry segment/industrial ecosystem to become economically "Prudent" region
- Raise PMR's standing, in terms of "ease of doing business" by facilitating setting up of new businesses/ industries/start-ups
- To position PMR as a premium international investment destination
- Industrial Zone delineation reflects existing industrial developments as well as expansion areas. New locations are identified either considering MIDC expansion plans or in compliance with RP zoning. It consists of both large industries and SMEs. This zone is strategically located close to primary arterials for easy access for heavy vehicles.
- The IT parks zone is also considered under the Industrial Zone. It caters to activities predominantly related to IT/ITES and related businesses. This zone is envisaged as an integrated development that provides an entire ecosystem related to the IT/ITES sector covering Grade A Built-To-Suit (BTS) offices, data centres, banks, R&D spaces, co-working spaces, hotels and restaurants, fitness and entertainment-related spaces. Some of these spaces also contribute to corporate offices and other businesses. Therefore it is also referred to as Business Park. This Business Park Zone is provided at 3 locations within the Planning Area - Wagholi, Talegaon and Saswad Growth Centres - where iconic and integrated mixed-use development is anticipated.
- Industrial Zone is distributed based on the employment distribution strategy, and the corresponding land quantification explained is in chapter 12

Total proposed industrial zone is 125.07 sq km and industrial zone including MIDC area is 223.22 sq km.

18.4 Logistics Zone
Objectives of this zone are as follows:

- Promote organised, consolidated warehousing and logistic development along the Crescent railway and national highways
- Promote warehousing and other ancillary activities within the zone
- Create an ecosystem supporting adjacent industrial activities, as well as supporting the assigned economic role
- Promote clustering of logistics activities with world-class infrastructure facilities suited to flexible uses and space demands of modern technology and knowledge-based activities
- Promote synergies for Industry 4.0 adding to technological advancement within the industrial sector
- Logistic Zone will add value to existing agro-supply chain and ease of distribution, help in FMCG movement
- This zone caters to activities predominantly related to transport, logistics, goods distribution and storage for regional, national and international transit. Generally, these developments consist of warehouses, loading and unloading bays, open storage facilities and supporting ancillary services, APMC Yards and Wholesale Markets with efficient internal vehicular circulation and external multi-modal transport links.
- It is proposed along national highways and its intersections with Ring Roads, to segregate regional logistics
- Logistic Zone is distributed based on the employment distribution strategy, and corresponding land quantification is explained in chapter 12.

Total proposed logistic zone is 19.93 sq km.

18.5 Public Semi-Public Zone
Objectives of this zone are as follows:

- Provide adequate amenities for existing and projected population to ensure a high quality of living in PMR
- Attract new residential development near employment generators such as MIDC and proposed industrial areas
- Amenities are proposed based on planning norms described in chapter 17.

Total proposed public semi public zone is 38.57 sq km.

18.6 Public Utility Zone (U)
Objectives of this zone are as follows:

- Provide adequate utilities for the existing and projected population to ensure good health and well-being of residents and the natural environment in PMR

- Attract new residential development near employment generators such as MIDC and proposed Industrial areas and commercial zones to promote Live-Work concept by allocating Public Utility Zones such as water distribution centres, sewage treatment plants, solid waste management sites, electrical substations etc.
- Ensure timely and coordinated implementation of Public Utilities by reserving land in the Development Plan itself
- Utility zone includes public utility sites required for water supply, sanitation, sewage and solid waste management and electricity supply.

Total proposed public utility zone is 4.24 sq km.

18.7 Tourism Development Zone
Objectives of this zone are as follows:

- Promote consolidated tourism development with high development potential
- Unleash untapped tourism development potential of the Planning Area such as eco-tourism in the Western Ghats and agro-tourism in the eastern areas through sustainable tourism development
- Boost the local economy and arrest negative growth of rural areas
- Ensure accessibility and infrastructure penetration into rural areas to improve the quality of life through tourism development
- Tourism Zone aims to diversify venues near established tourist attractions or create new ones to extend tourist stay, thereby boosting the tourism sector development
- Tourism Zones are earmarked at strategic locations based on tourism planning strategy

Total proposed tourism development zone is 11.65 sq km.

18.8 Traffic and Transportation Zone
Objectives of this zone are as follows:

- Ensure efficient connectivity across PMR with a high level of safety and reserve adequate land for regional level transportation sites
- Ensure implementability of roads, mass transport corridors by considering existing conditions and defining RoWs for roads (instead of building lines)
- This zone includes all proposed and existing roads by PMRDA, PWD, MSRDC, consisting of all three hierarchies- primary, secondary and tertiary roads. It also includes existing and proposed mass transport corridors and terminals/depots, transportation sites such as transport interchanges located at national highways/ ring roads/ expressways and railway stations.
- Provision for public parking has been kept at specific locations

Total proposed traffic and transportation zone is 223.53 sq km.

18.9 Defense Zone
Objectives of this zone are as follows:

- Earmark sensitive uses such as defence so that they are reserved for their purpose and development around is controlled
- Land under defence and military has defined jurisdiction and development regulations that do not come under the purview of PMRDA are classified as Defence Zone

Total defence zone in Study Area is 8.03 sq km.

18.10 Agriculture Zone G-1
Objectives of this zone are as follows:

- Preserve the natural character of PMR Planning Area
- Sustain jobs in the agriculture sector by improving overall output through the promotion of smart agriculture practices
- Foster farmer-processor tie-ups by incentivizing agro-processing industries to ensure mutual commitment
- Promote ongoing trend of linking farmers with startups who are deploying IoT (Internet of Things) and other

state-of-the-art technologies to improve the "farm-to-fork" supply chain, to offer better prices for agricultural produce

- All existing agriculture as well as vacant lands marked in ELU database but situated outside irrigation command areas or within growth centres, and the remaining areas where urban development is not anticipated have been classified under this zone.
- Already permitted but not implemented zone conversions until the date of declaration of PMR DP intent, shall be deemed as Agriculture Zone
- It is recommended to prepare Water Management Plan for entire PMR with a focus on identifying an action plan for implementation of rainwater harvesting projects particularly in lands situated outside irrigation command area

Total proposed agriculture zone (G1) is 2287.81 sq km.

18.11 Green Zone G-2
Objectives of this zone are as follows:

- Protect agriculture activity in the irrigation command area
- Conserve all the notified natural features and environmentally sensitive areas which are under urbanisation pressure
- Enhance its biodiversity without suppressing its economic potential
- All existing agriculture and vacant lands situated in irrigation command areas are identified and designated under this zone.
- Restricted development will be allowed in this zone, such as agriculture related and other activities permissible per DC regulations. Also, zone conversion activity shall not be permitted in this zone.

Total proposed green zone (G2) is 565.65 sq km.

18.12 Green Belt Zone
Objectives of this zone are as follows:

- From a river bank until blueline, the Green Belt is proposed on either side of the river
- Park and other uses mentioned in U-DCPR shall be allowed within this zone

Total proposed green belt zone is 88.89 sq km.

18.13 Afforestation Zone
Objectives of this zone are as follows:

- Promote natural growth of vegetation and forest cover
- Arrest soil erosion and rain-water runoff
- Create contiguous land of dense vegetation aiding the biodiversity growth
- Encourage plantation at barren lands and prevent encroachment of government lands
- This zone is located on lands with a slope less than 1:5 and located in continuity to the Hill Top Hill Slope Zone and land surrounding the lakes and reservoirs.

Total proposed afforestation zone is 430.17 sq km.

18.14 Hill Top Hill Slope Zone
Objectives of this zone are as follows:

- "Hill Top Hill Slope Zone" is designated based on provisions of RP1997 (slope >1:5) and it is marked based on the ELU database and GIS driven slope analysis.
- Specific very low density uses such as agro-tourism, eco-tourism and permitted uses specified in the Unified DCPR may be allowed provided that the owner/developer bears the responsibility of maintaining terrain, hydrology, flora and fauna of the proposed development site in original condition, during the development period and post-occupancy.

Total proposed HTHS zone is 547.47 sq km.

18.15 Forest Zone

Objectives of this zone are as follows:

- Forest Zone covers forest lands as marked as per data from Forest Department
- This zone has restricted land uses permitted as per Unified DCPR.
- Private Forest is marked as an overlay for forest lands falling on private lands.

Total forest zone is 824.39 sq km.

18.16 Quarry Zone

Objectives of this zone are as follows:

- Quarry Zone is defined and designated at existing mining sites situated within PMR
- Land under permitted quarries (as per data from Mining department) and the land between the two quarries is marked as quarry zone
- Majority of quarry zone is observed in Wagholi and Chakan Growth Centres

Total quarry zone is 8.99 sq km.

18.17 Recreational Zone

Objectives of this zone are as follows:

- Ensure adequate green space per capita for residents, to meaningfully raise their quality of living and promote a healthy lifestyle
- Deploy parks to enhance the green image of PMR further

Total proposed recreation zone is 18.79 sq km.

18.18 Water Body Zone

Objectives of this zone are as follows:

- Major, medium and small irrigation projects: Water bodies captured from the ELU database have been reclassified using the state irrigation department's standard classification, as published in Pune "Zila Pustika 2015".
- Rivers are mapped as per the ELU database, revenue and aerial imagery and verified against the 'Zilla Pustika 2015'
- Primary, secondary, tertiary nalas: Hierarchy of nalas/natural streams is established based on their relation with respect to a river. A stream is classified as primary nala if it directly connects to a river. Secondary and tertiary nala is classified based on its direct connectivity to a primary and secondary nala, respectively.
- Belt between a bank of nala and the building control line shall be kept as open space devoid of any permanent/ temporary structure, as per U-DCR. Realignment of the river and primary nalas shall be prohibited.
- Ponds and lakes: Remaining water bodies captured from the ELU database have been classified under this zone.

Total water body zone is 368.08 sq km.

18.19 Goathan

It is a densely developed settlement showing urban/peri-urban character and is captured using the revenue database. Within the Growth Centre, Gaothan Expansion is proposed as follows:

1. 500m gaothan expansion for villages having population greater than 2500 people
2. 200m gaothan expansion for villages having population less than 2500 people
3. 200m gaothan expansion for villages having population greater than 2500 people but development zones are proposed within the village

For the villages situated outside Growth Centres, Gaothan Extension is maintained as per the U-DCPR.

Total gaothan area is 23.66 sq km.

18.20 Congested Area

Congested Areas are densely developed settlements showing urban/ peri-urban character and most of such settlements have grown naturally beyond Gaothan limit due to urbanisation pressure. These Areas are captured based on GIS analysis as follows:

1. A cluster of buildings with margins between buildings less than 4.5m
2. A cluster of buildings with access road less than 4.5m

Congested Areas are shown as overlays and follow the guidelines as per U-DCPR

Table 18.1: Proposed Zones Area Statement

Land use category	Area (ha)	Proportion of Total Developed Area (%)	Proportion of Total Area (%)
Residential	401.87	39.4	6.52
Gaothan	23.66	2.3	0.38
Commercial	33.65	3.3	0.55
Industrial	125.07	12.3	2.03
Logistics	19.93	2.0	0.32
Tourism Development	11.65	1.1	0.19
Public and semi public	38.57	3.8	0.63
Public Utility	4.24	0.4	0.07
Traffic & Transportation	223.53	21.9	3.63
MIDC	98.15	9.6	1.59
MADC	9.55	0.9	0.16
SEZ	21.21	2.1	0.34
Defense	8.03	0.8	0.13
Total Developed Area	**1019.11**	**100.00**	**16.55**
Agriculture (G1)	2287.81		37.14
Water bodies	368.06		5.98
Green Belt	88.89		1.44
Green Zone G-2	565.65		9.18
Forest	824.39		13.38
Hilltop Hillslope	547.47		8.89
Recreational	18.79		0.31
Quarry	8.99		0.15
Afforestation	430.17		6.98
Total Non-Developable Area	**5140.21**		**83.45**
Total	**6159.32**		

Proposed Land Use Map

Towards Mumbai

Towards Ahmednagar

Towards Daund

Towards Daund

Towards Solar

Towards Miraj

Towards Baramati

Towards Kolhapur

Towards Kolad

Towards Ahmednagar

| 0 | 2.75 | 5.5 | 11 | 16.5 | 22 |

Legend

- TOD Boundary
- Private Forest Overlay
- SPA Boundary
- Congested Area
- Wildlife Santuary Boundary
- Hill Station
- Proposed Town Planning Scheme Boundary
- Blue Line
- Existing Railway Line
- Proposed Crescent Railway
- PMR Metro Line
- Pune Nashik Semi High Speed Rail
- Approved ITP Transport Reservation
- Approved ITP Residential Reservation
- Approved ITP Recreational Reservation
- Approved ITP PU Reservation
- Approved ITP PSP Reservation
- Approved ITP Commercial Reservation
- Approved ITP Residential Reservation
- Defence Zone
- Afforestation Zone
- Agriculture Zone G-1
- Green Zone G-2
- Commercial Zone
- Existing Commercial Reservation
- Existing PSP Reservation

- Existing Railway Buffer
- Existing Recreational Reservation
- Existing Residential Reservation
- Existing Transport Reservation
- Existing Utility Reservation
- Forest Zone
- Gaothan
- Green Belt Zone
- Hill Top-Hill Slope Zone
- SEZ
- MIDC
- Quarry Zone
- Industrial Zone
- Logistic Zone
- Proposed Commercial Reservation
- Proposed PSP Reservation
- Proposed Recreational Reservation
- Proposed Residential Reservation
- Proposed Transport Reservation
- Proposed Utility Reservation
- Public Semi-Public Zone
- Public Utility Zone
- Residential Zone
- Tourism Development Zone
- Traffic & Transportation Zone
- Water Body

Chapter 19:
Development Control Regulations

Government of Maharashtra, wide Notification no. TPS-1818/CR-236/18/DP&RP/sec 37 & sec 20(4)/UD dated 2nd December 2020, sanctioned Unified Development Control and Promotion Regulations (UDCPR) for the state of Maharashtra and it was published in Government Gazette dated 3rd December 2020.

Pune Metropolitan Region is the largest urban agglomeration in Maharashtra and third in the country. The total area under PMR is 6914.27 sq. km, totaling 814 villages with 73,21,367 population as per 2011 census figures. By considering the vastness of the area and its diversified nature, 18 urban growth centres and 8 rural growth centres with micro-planning are proposed in the draft development plan and the remaining area is a non-planning area.

Therefore from a planning point of view, the following changes are proposed in sanctioned UDCPR. Accordingly sanctioned Unified Development Control and Promotion Regulations (UDCPR-2020), with the following changes, will be applicable for the draft Development Plan of PMR from the date decided by the Government; in the intervening period the Sanctioned Development Control and Promotion Regulations of 2018 for PMRDA shall prevail.

19.1 Proposed changes in sanctioned (UDCPR-2020), to be applicable for Draft Development Plan of PMR.

Regulation in sanctioned UDCPR – 1.5 – savings

Proposed change
The second provision in regulation 1.5 shall be changed as below
Provided that, the words "Action Taken" in this regulation shall also include the issuance of letter for payment of development and other charges issued after approval of proposal in principle and tentative approval granted for land sub-division.

Regulation in sanctioned UDCPR – 3.1.3 construction within Blue and Red Flood line.

Proposed addition / changes
Regulation No. 3.1.3 (i) (a) shall be changed as below -
The Red Flood Line and Blue Flood Line shall be considered as per the plan prepared by the Irrigation Department. The area between the river bank and blue flood line (Flood line near the river bank) shall be prohibited zone for any construction except parking, open vegetable market, garden, lawns, open space,play ground, cremation and burial ground, sewage treatment plant, water/ gas /drainage pipe lines, public toilet or like uses provided the land is feasible for such utilization.

Regulation in sanctioned UDCPR:3.1 Requirement of site -

Proposed additions/changes
Following new Regulation No. 3.1.14 shall be added.

3.1.14 – Restrictions in the vicinity of Giant Meter wave Radio Telescope (GMRT)
The industrial development within a zone of 30 km radius around the GMRT observatory shall be regulated and may be permitted with prior NOC from GMRT authorities.

Regulation in sanctioned UDCPR – 3.5 - Provision for Amenity Space

Amenity Space areas in Regulation No. 3.5.1 shall be changed as below.

Area of Land	Minimum Amenity Space to be provided	
	Planning Area (Urban & Rural Growth Centre)	Non - Planning Area (Outside of Urban & Rural Growth Centre)
upto 4000 sq.m.	Nil	Nil
more than 4000 sq.m.	Nil	10%
20000 sq.m. or more	5% of the total area.	10%

Regulation in sanctioned UDCPR:4.11 – Agricultural Zone -

Proposed addition/changes

a. Regulations 4.11 (xii), shall be changed as below:
   (xii) IT/ITES parks / units shall be permissible with basic FSI 0.20 without premium and upto 1.00 FSI after payment of premium at the rate of 20% of Annual Statement of Rates, Subject to Regulation No. 7.8.
b. Following new sub Regulation No. (xxxxiii) shall be as below:
   (xxxxiii) Development Permissible Adjacent to gaothan.
   For the villages in the area of non-planning areas (Areas outside of Urban & Rural Growth Centers), development permissible in the residential zone may be permitted:-
   i. Within a belt of 500 meters from the gaothan limits of settlements having a population less than or equal to 5000 as per latest census and;
   ii. Within the belt of 1500 meter from the Gaothan limits of settlement having a population of more than 5000 as per latest census.
   iii. In the case of village settlements in the Western Ghat hilly area (eco-sensitive zone), such distance shall be 200 m. Only.

Provided that such development shall be permitted only on payment of premium of the total area of land. Such premium shall be calculated considering 15% rate of the said land as prescribed in the Annual Statement of Rates of the year granting such developments. This rate of premium shall be subject to orders of the Government from time to time.

Provided further that where more than 50 percent of area of the Survey Number/Gut Number is covered within the above peripheral distance, the remaining whole of such Survey Number/Gut Number within same ownership shall be considered for development on payment of premium as above.

Provided further that the criteria of "distance from gaothan" shall also be applicable to the lands from the nearest gaothan of any village.

Provided further that this provision shall not bar development permission for the uses, otherwise permissible, in agricultural zone as per UDCPR within specified distance from gaothan mentioned in this regulation.

Provided also that this regulation shall also be applicable to all declared / Notified Gaothan under MLRC whether shown on Development Plan or not.

Regulation in sanctioned UDCPR :4.12 – Green Belt Zone / River Protection Belt -

Proposed change

Sub regulation (b) of Regulation No. 4.12 shall be changed as below -
4.12 (b) Green belt zone / River protection Belt–If the land under green belt zone, excepting open space therein, if any, is required by Authority for the public purposes mentioned above, the owner shall hand over the possession of such land for the development and maintenance of public purposes. Thereafter, such land shall remain open and accessible to general public for recreational activities. Provided that FSI of such land under Green Belt zone shall be permissible on the remaining land of the owner, only after handling over such land to Pune Metropolitan Region Development Authority free of cost and free from encumbrances.

Regulation in sanctioned UDCPR:4.18 – GREEN ZONE – 2

Proposed changes

The said regulation shall be changed as below;
4.18- GREEN ZONE–2

The following users shall be permissible in this zone.
I.   All agricultural uses including stables of domestic animals, piggeries, poultry farms accessory building, tents, etc.;
II.   Garden, forestry, nursery, public parks, private parks; playfields, summer camps for recreation of all types;
III. Public/ semi-public sector utility establishments such as electric sub-stations, receiving stations, switchyards, over-head line corridors, radio and television stations, receiving stations, main stations for public gas distribution, sewage treatment, and disposal works, waterworks along with residential quarters for essential staff required for such works;
IV.   Vehicle Fuel filling Station including LPG/ CNG / Ethanol / Public Charging Stations for Electric Vehicles, subject to conditions mentioned in regulation 4.11(vi);
V.   Farmhouses shall be permitted subject to conditions mentioned in regulation 4.11(ix);
VI.   Any building/use by the Government / Semi-Government or Government Controlled bodies and village resettlement or resettlement of project affected person with maximum FSI of 0.20
VII. Development of buildings of educational, research, and medical institutions, community development, human resources development, rural upliftment, yoga ashram, mediation centres, vipashyana centres, Spiritual Centres, goshalas, Panjarpol, Old Age homes, and Rehabilitation Centres along with allied activities, Planetarium / Astronomical / Astrophysical facilities/projects with FSI of 0.20 on the gross plot area.
VIII. Integrated highway/ Wayside amenities such as motels, way-side restaurants, fuel pumps, service stations, restroom and canteen for employees working on-site and truck drivers, service godowns, factory outlets, highway malls, hypermarket along with public conveniences like toilets, trauma centre, medicine shop, bank ATMs and like activities with maximum FSI of 0.2 on the gross plot area.
IX.   Ancillary Service Industries- Ancillary service industries for agro related products like flowers, fruits, vegetables, poultry products, marine products, related collection centres, auction halls, godowns, grading services and packing units, knowledge parks, cold storages, utility services (like banking, insurance, post office services), etc. on the land owned by individuals/organizations with max FSI of 0.20 on the gross plot area.
X.   Solid waste management, landfill sites, bio-gas plants, power generation from waste.
XI.   Power generation from non-conventional sources of energy. Area covered under solar panels shall not be counted in FSI.
XII. Fish Farming.
XIII. Cemeteries and crematoria and structures incidental thereto.
XIV. Bus Terminus
XV.   Construction of any communication route, road, railway, airstrips, ropeways, ports, electric lines, etc.
XVI. Tourist homes, Resorts, Hotels, Motels, Health and Wellness Spa, Golf courses, Art and Craft villages, Exhibition cum Convention Centre, Camping-Caravanning and tent facilities, Adventure Tourism Project, Eco-Tourism Project, Agricultural Tourism Project, Medical Tourism Project, Boutique wineries, Guesthouses, and Bed and Breakfast scheme approved by MTDC / DoT, etc., with Rooms / Suites, support areas for reception, kitchen, utility services, etc., along with ancillary structures like covered parking, watchman's quarter, guard cabin, landscape elements, and if required, one observation tower per tourist resort up to the height of 15m. with platform area up to 10 sq.m. in permanent / semi-permanent structural components. The permissible FSI shall be a maximum of 0.2 on the gross plot area.
XVII. Development Permissible Adjacent to gaothan.
     For the villages in the area of non-planning areas (Areas outside of Urban & Rural Growth Centers), development permissible in the residential zone may be permitted:-
     i.   Within a belt of 500 meters from the gaothan limits of settlements having a population less than or equal to 5000 as per latest census and;
     ii. Within the belt of 1500 meter from the Gaothan limits of settlement having a population of more than 5000 as per latest census.
          Provided that such development shall be permitted only on payment of premium of the total area of land. Such premium shall be calculated considering 15% rate of the said land as prescribed in the Annual Statement of Rates of the year granting such developments. This rate of premium shall be subject to orders of the Government from time to time.

Provided further that where more than 50 percent of area of the Survey Number/Gut Number is covered within the above peripheral distance, the remaining whole of such Survey Number/Gut Number within same ownership shall be considered for development on payment of premium as above.

Provided further that the criteria of "distance from gaothan" shall also be applicable to the lands from the nearest gaothan of any village.

Provided further that this provision shall not bar development permission for the uses, otherwise permissible, in agricultural zone as per UDCPR within specified distance from gaothan mentioned in this regulation.

Provided also that this regulation shall also be applicable to all declared / Notified Gaothan under MLRC whether shown on Development Plan or not.

Regulation in sanctioned UDCPR; 4.16 Afforestation Zone

Proposed additions / changes

a) Sub Regulation No. 4.16 (iv) shall be changed as below –
(iv) uses mentioned in Regulation No. 4.11 (xvi, xxxii, xxxiii, xxxiv) permissible in Agriculture Zone with FSI of 0.2, 0.2, 0.10, 0.15 respectively.

b) The following Sub Regulation No. 4.16 (vi) shall be added.
i. For the villages in the area of non-planning areas (Areas outside of Urban & Rural Growth Centres), development permissible in the residential zone may be permitted:-
Within a belt of 200 meters from the Gaothan limits of settlements.
Provided that such development shall be permitted only on payment of premium of the total area of land. Such premium shall be calculated considering 15% rate of the said land as prescribed in the Annual Statement of Rates of the year granting such developments. This rate of premium shall be subject to orders of the Government from time to time.
Provided further that the criteria of "distance from gaothan" shall also be applicable to the lands from the nearest gaothan of any village.
Provided also that this regulation shall also be applicable to all declared / Notified Gaothan under MLRC whether shown on Development Plan or not.

Regulation in sanctioned UDCPR:4.19–Forest Zone -

Proposed additions/changes

The following regulation shall be added.
a) Where any land in the forest zone in situated outside the designated forest, with due confirmation of the forest department, the development of such land shall confirm to the regulations applicable to the adjacent zone; if abutting more than one zones, the provisions of the zone with the lowest development potential shall apply. If the plot is entirely surrounded by forest, the provisions of Green zone 2 shall apply.

b) Lands situated within Private Forest overlays:
Where any land proposed under Private Forest overlays is situated outside the private forest regime or reverted back to the owner under the provisions of the Private Forest Act, with due confirmation of the forest department, the development of such land shall confirm to the regulations applicable to the zone under it.

Regulation in sanctioned UDCPR – 4.22 – Public Utility Zone

Proposed Change

The regulation shall be changed as below
4.22 – Public Utility zone

The following users shall be permissible in this zone.
Water treatment plant, water reservoirs, pumping station, water storage tank, sewage / influent treatment plant, waste recycling plant, electric substation, cemeteries, burial ground and cremation grounds, slaughter house, solid waste landfill/ management site, fire station, post, telegram and communication office, telephone exchange, cattle pond, dairy farm, public urinals including all public utilities. mobile towers, internet facility related installation including all public utilities alongwith all administrative office set up reputed for there utilities.

Regulations in sanctioned UDCPR: 4.27 – Uses permissible in Development Plan
Reservations

Proposed additions/changes

In regulation 4.27 (5) following sub – regulations shall be added.

Y)	College	Higher education facilities and other professional colleges alongwith ancillary construction such as staff quarters, hostels, laboratory, library, canteen, admin building, auditorium, play ground, indoor games building.
z)	Industrial Research & Training Centre	Technical education and research(incubation center, innovation center) facilities alongwith ancillary construction such as staff quarters, hostels, laboratory, library, canteen, admin building, auditorium, play ground, indoor games building, training halls, workshops.
aa)	Educational Complex	All types of educational activities from primary to higher education and vocational/ professional education along with ancillary construction as staff quarters, hostels, laboratory, library, canteen, admin building, auditorium, play ground, indoor games building, laboratories.
bb)	Study & Research Centre	Education facility related to research and study alongwith ancillary construction such as staff quarters, hostels, laboratory, library, canteen, admin building, auditorium, play ground, indoor games building, any special building/facility required for respective research.
cc)	Sport University	All types of sports educational and other educational activities including indoor and outdoor games arenas, stadium, store, along with ancillary construction as staff quarters, hostels, library, canteen, admin building, parking
dd)	University	All types of higher educational and research activities along with ancillary construction such as staff quarters, hostels, laboratory, library, canteen, admin building, auditorium, play ground, indoor games building, canteen and staff quarters etc.
ee)	Health Centre	Primary medical facility along with ancillary construction such as chemist shop, cafeteria , ATM, PCO, cyber café of not more than 20 sq.mt,
ff)	Trauma Care Centre	Respective uses with their lower / ancillary uses and any sort of medical facilities along with ancillary construction such as staff quarters, chemist shop, restaurant, Helipad, ATM, PCO, cyber café of not more than 20 sq.m., etc. and sleeping accommodation for guests in case of bigger hospitals of built up area not less than 2000sq.m may be permitted.
gg)	Veterinary Hospital	All kinds animal patient's diagnosis and treatment facilities such as hospital, laboratories, X-ray facility, Sonography, Operation theater, cattel shed, space of khoda for restraining of large animal, staff quarters, administrative office etc.
hh)	Medical College & Hospital	Education facilities of medical colleges & Hospital alongwith ancillary construction such as staff quarters, hostels, laboratory, library, canteen, admin building, auditorium, play ground, indoor games building etc
ii)	Community Hall	Community Hall, welfare centre, gymnasium, badminton hall, art gallery, museum, public conveniences, cafeteria, gardens, exhibition centre, and like combination of uses.
jj)	Cultural Centre	Drama theater, marriage hall , art gallery, exhibition hall, performing arts activities, small restaurant to the extent of 20 sqm, allied users such as guest rooms, yoga centre.
kk)	Social Welfare Centre	Community hall, student hostels, working women's hostel, orphanage, old age home, hospice along with ancillary construction such as staff quarters, dormitories, PHC, admin building, watchman cabin, auditorium etc.
ll)	Socio-Cultural Centre	All users includes in Cultural Center and Social Welfare Center.
mm)	Spiritual Centre	All types of spiritual activities includes religious structure, Yoga center, Spiritual training halls/meditation place, residential facility/ bhakta nivas, admin building, canteen, multipurpose ground, Library and research area, Community kitchen and dining hall ,Study areas, Garden and open space area, Office and administrative area, parking, garden, Spiritual museum, Convention centre , Meditation park.
nn)	Government Purpose	Any Public purpose related with functioning of Government as may be decided by Government.
oo)	Authority Purpose	Any public purpose related with functioning of Pune Metropolitan Region Development Authority as may be decided by the Authority.

pp)	Town Park/ Regional Park	Uses permissible i) Horticultural uses. ii) Forestry and Nursery. iii) Park. iv) Historical museum only on the lands owned by the Govt./ Authority subject to maximum floor space area not exceeding 4% of the total plot with ground floor structure without stilts. v) Public Streets having width not exceeding 9.0 m. alignment and the cross section of the street shall be finalised by the Authority without cutting the hill area. vi) Cafeteria, ATM, Public Convenience, Watchman Cabin subject to total extent of 50 Sq.m.
qq)	Business Centre	Government Offices, Office spaces, health care facility, hotels, restaurants, convention center, canteen, IT & ITEC services.
rr)	Regional Centre / Town Centre	A consolidated campus including Government offices, Institutional (Social infrastructure-health care, sports centre, community centre, cultural centre, education centres.), Integrated transport interchange, Residential developments/ staff quarters: Parks and open spaces, Roads and NMT routes, business parks, office spaces, banks, hotels & restaurants, IT & ITES, Convention centre, plazas, hawker markets, etc.
ss)	Rural Empower-ment Centre	Vocational Training Centre/ Digital Centre ,Local Shopping Centre, Micro Finance Bank , Energy Centre (Mini Solar Park, Bio-gas plant & Incinerator),Energy Centre (Mini Solar Park, Bio-gas plant & Incinerator),Government offices- Revenue Sajja Office, Sub Regional Office of PMRDA, Grampanchayat office
tt)	Multi Modal Hub	Reservation provides for seamless interchange between various modes of public transport such as metro, bus, railway, high speed rail, bus, etc. In addition to this respec-tive purpose, other ancillary uses of commercial (eg. market, shopping, offices, etc) and social (community hall, library, etc) purposes may be integrated within the building on above floors. Where there is/ are any existing building/s accommodating owners/ occupants in such reservation, they may be accommodated by the Planning Authority on above floors of any proposed building on the reservation, subject to their willingness.

Regulation in sanctioned UDCPR – Chapter 4 – Land use classification and permissible uses

Proposed addition

Following sub- regulation no 4.28 shall be added.
– Logistic Zone

Integrated Logistic park and Logistic park shall be allowed in Logistic zone and shall be governed by the provision mentioned in regulation no 14.11.

Subject to following provisions.
Sub regulation 14.11.5 shall be changed as follows:

Logistics Park (LP)
Logistics Park / Building with a minimum of 10,000 sq.ft. built up area with basic FSI will be designated as Logistics Park (LP). The 80% of the total area of 'Logistic Park' should be used for providing logistic services and up to 20% of the total area will be permitted for support services and common facilities mentioned in Regulation No.14.11.2 (iii and iv). Logistics Parks will be allowed with applicable FSI in these Regulations. Directorate of Industries will be the registering agency for all logistic parks. The procedure adopted for registration would be in line with that adopted under the IT/ITES Policy 2015. The developer of Logistics Park will have to develop the infrastructure and create and maintain the facilities. Such facilities can be hired/leased/rented or put to own use by the Developer.

Regulation in sanctioned UDCPR – 7.2 –Entitlement of FSI for Road widening or construction of New Roads / Surrender of Reserved land.

Proposed change
Following sentences in the regulations shall be changed as mentioned below-

Thereafter the road shall be transferred in the city survey records/ revenue records in the name of authority before issuance of occupancy certificate.

Regulation in sanctioned UDPCR: 10- City Specific Regulations

Proposed additions/changes -10.16

Following Regulations shall be added in Regulation No. 10

10.16 - Pune Metropolitan Region Development Authority. The Regulation No. 10.16.1 & 10.16.2 shall be applicable to Pune Metropolitan Region Development Authority area.

a) 10.16.1 -Regulations for Development of Tourist Resorts / Holiday Homes / Township in Hill Stations Type Areas under Hill Station Policy. The developments under the Hill Station Policy shall be governed by the Special Regulations as sanctioned by Government vide notification No.TPS-1893/1231/C.R.123/96/UD-13, dated 26/11/1996, and its amendments by the Government from time to time.

b) 10.16.2 - Regulations for planning areas of Malavali Growth Centre and villages – Pangloli, Karandoli, Dahiwali, Kurvande, Vehergaon of Maval Taluka, shall be as per the following Regulations.
No plots in these zones shall be less than 500 sq.m. provided that smaller plots in these zones admeasuring not less than 300 sq.m. existing before the date of publication of Regional Plan shall be recognized for the purpose of granting development permissions, provided further that plots directly abutting on Mumbai-Pune road shall not admeasure less than 1000 sq.m. Development in such 1000 sq.m. plot, shall be governed by development control rules in Lonavala Development Plan, applicable to 10 are zone. Built-up areas, number of storeys, tenements, marginal open spaces and room sizes, the maximum built-up areas, the maximum number of storeys, the maximum number of tenements, the minimum marginal open spaces, and the minimum room sizes permissible in these zones shall be as indicated in the statement mentioned below. As regards, rules for layout plots and group housing schemes and buildings of various users other than residential including industrial, other items of building construction, such as balcony, sanitation, height, ventilation and parking, etc. and all other such regulations which are not explicitly covered above shall be governed by development control regulations for these items incorporated in Development Plan of Lonavala as amended from time to time and subject to these regulations.

Sr. No.	Plot Size group	Max. built up area	Max. no of storeys	Max. no of tene-ments	Min. marginal open space			Min. Habitable room sizes	Min. sizes for kitchen	Min sizes for shops & other rooms for commercial use
					Road side m	Side m	Rear m			
1	Bet. 300 sq.mt and less than 500 sq.mt	25%	Ground plus one floor only	2	3m	2.5m	3m	9.0 sq.m m with no side less than 3m	7.5 sq.m m with no side less than 2.5 m	15 sq.m m with no side less than 3m
	500 sq.mt and above	25%	Ground plus one upper	4	4.5m	3m	4.5m			

1)A ground floor on stilts or columns without enclosing walls (except retaining walls, where such floor is constructed by cutting the sloping ground) intended to be used as parking space shall not be counted as ground floor.

2) In case of classified roads, the minimum marginal open spaces to be observed from roads, shall be as prescribed above or as prescribed by Government from time to time under the ribbon development rules, whichever is more.

Regulation in sanctioned UDCPR – chapter 14 – Special Schemes

Proposed addition

Following sub-regulation no 14.14 shall be added

14.14 – Commercial development over Metro Station Building proposed on any existing or proposed Development Plans Roads.
a) Admissibility – The width of existing or proposed Development Plan / Regional Plan Road shall be 24.0 Meter and more.
b) Permissibility – The users mentioned under Business and Mercantile (commercial) buildings shall be permissible.
c) Area – The footprint of commercial premises shall not be more than floor area of metro station building.
d) FSI – The permissible Floor Space Indices for commercial premises including commercial development in station building shall be 4.00. For FSI calculation, the net plot area of the road, over which the Metro Station is elevated, shall be equivalent to the floor area of Metro Station building.On account of constraints such as height restriction, etc.; if the full permissible FSI cannot be used on the same site, TDR as decided by the commissioner shall be allowed for unconsumed FSI. The utilisation of this TDR shall be as per TDR regulation.
e) Parking – The parking shall be provided as per the provisions of Chapter 8. It can be provided within the radius of 500 mt. From Metro station.
f) Height – The Height of building is allowed to the extent that is required to consume the maximum building potential, subject to other restrictions as per these regulations and prior approval of Chief Fire Officer.
g) Marginal Distances – The Commissioner shall decide required marginal distances from the edge of the road, by considering adjoining present development, access to premises and fire fighting/evacuation majors.

Regulation in sanctioned UDCPR: 14.1 – INTEGRATED TOWNSHIP PROJECT (ITP) For Development Plan Area.

Proposed additions / changes

Following Regulation No. 14.1.1.20 shall be added –
14.1.1.20 – The Integrated Township Project or Special Township Project, declared under the provisions of Section 18 and 44 of MR & TP Act. and are in force, are designated as "Integrated Township Project or Special Township Project". Such lands shall be continued to be developed under the provisions of said Regulations.

Regulation in sanctioned UDCPR - 14.9 – Development of Tourism & Hospitality

Services under Community Nature Conservancy around wild life sanctuaries and Natural parks proposed change.

Following Sentences in the sub regulation no 14.9.2 shall be changed as mentioned below:

The users permissible in Agriculture land / No Development zone / Afforestation zone/ shall be as follows.