



City Development Plan for Nagpur, 2041

(Final Report)

March 2015

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Capacity Building for Urban Development

City Development Plan for Nagpur City – 2041

Final Report

March 2015

“The Growth Nucleus of Central India”

“... An eco-city that provides adequate, equitable, sustainable access to urban services for all citizens”

“... A city that is safe, livable and promotes growth of its citizens”



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Abbreviations

ACCCRN	Asian Cities Climate Change Resilience Network
ADMC	Additional Deputy municipal Commissioner
ADTP	Assistant Director of Town Planning
ALV	Annual Letting Value
AMASR	Ancient Monuments & Archaeological Site and Remains Act, 1958
ANC	Anti Natal Clinic
APL	Above Poverty line (as defined by NMC)
ARV	Annual Rateable Value
ASI	Archaeological Survey of India
BCRZ	Biodiversity Corridor Regulations Zones'
BFSI	Banking, Financial Services and Insurance
BOD	Biological Oxygen Demand
BOT	Built, Operate, Transfer
BPL	Below Poverty Line
BPT	Balancing Pressure Tank
BRTS	Bus Rapid transportation System
BSUP	Basic Services to Urban Poor
CAA	Constitutional Amendment Act
CAFO	Chief Accounts & Finance Officer
CAGR	Cumulative Average Growth Rate
CAPEX	Capital Expenditure
CASP	Conventional Activated Sludge Plant
CBD	Central Business District
CBO	Citizen Based Organisation
CBR	Crude Birth Rate
CBUD	Capacity Building for Urban Development
CDP	City Development Plan
CDR	Crude Death Rate
CDRI	Climate and Disaster Resilience Index
CDS	Community Development Society
CIP	Capital Investment Plan
CMP	Comprehensive Mobility Plan
CNC	City of Nagpur Corporation (CNC Act, 1947)
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board

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CPHEEO	Central Public Health and Environmental Engineering Organisation
CPWD	Central Public Works Department
CREDAI	Confederation of Real Estate Developer's Association of India
CRIS	CRISIL Risk and Infrastructure Solutions Limited
CSP	City Sanitation Plan
CSR	Central Sewerage Zone
CST	Central Sales Tax
CSZ	Central Sewerage Zone
CZA	Central Zoo Authority
DCB	Demand, Collection, Balance statement
DCR	Development Control Regulation
DDA	Deputy Director of Audit
DEAS	Double Entry Accounting System
DPC	District Planning Committee
DPDC	District Planning & development Committee
DPR	Detail Project Report
DSCR	Debt Service Coverage Ratio
DSR	Debt Service Ratio
DU	Dwelling Unit
EGC	Employment Guarantee Cess
EMP	Environmental Management Plan
EOU	Export Oriented Unit
EPP	Employment Promotion Programme
ESA	Environmentally Sensitive Areas
ESR	Elevated Service Reservoir
EWS	Economically Weaker Section
FGD	Focus Group Discussion
FOB	Foot Over Bridge
FOP	Financial Operating Plan
FSI	Floor Space Index
GAD	General Administration Department
GDP	Gross Domestic Product
GHG	Government of Maharashtra
GIS	Ground Service Reservoir
GOM	Government of Maharashtra
GPS	Global position System
GSDP	Gross State Domestic Product
GSR	Ground Service Reservoir

GWP	Greenhouse Warming Potential
HIGS	Hazard, Infrastructure, Socio-economic and Governance framework
HOD	Head of Department
HPEC	Housing and Urban Development Corporation
IAS	Indian Administrative Service
IDA	International Development Association (World Bank)
IEC	Information Education Campaign
IHSDP	Integrated Housing Scheme Development Programme
IMD	Indian Meteorological Department
INR	Indian Rupees (Currency)
IPCC	Indian Panel of Climate Change
IPTS	Intermediate Public Transport System
IRDP	Integrated Road Development Project
ITC	Input Tax Credit
ITS	Information Technology System
Indo-US FIRE(D)	It a collaboration of Indian and US government for "Financial Institutions Reforms and Expansion" Project-Debt market Component
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
KJSFBY	Kranti Jyoti Savitribai Fuley Beema Yojna
LBT	Local Body Tax
LIG	Lower Income Group
LMIS	Labour Market Information System
LPCD	Liters Per Capita per Day
LPG	Liquefied Petroleum Gas
LSI	Large Scale Industries
MADC	Maharashtra Airport Development Corporation
MBR	Mass Balancing Reservoir
MCED	Maharashtra Centre for Entrepreneurship Development
MCM	Million Cubic Meters
MHADA	Maharashtra Housing and Development Authority
MIDC	Maharashtra Industries Development Corporation
MIHAN	Multi modal International Hub and Airport for Nagpur
MIS	Management Information System
MoUD	Ministry of Urban Development
MLD	Million Liters per Day
MMC Act	Maharashtra Municipal Corporation Act, 2012
MPC	Metropolitan Planning Committee
MPCB	Maharashtra Pollution Control Board
MPN	Most Probable Number (method)

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MRPB	Metropolitan Regional Planning Board
M RTP	Maharashtra Regional & Town Planning Act, 1966
MRTS	Metro Rail Transit System
MSEB	Maharashtra State Electricity Board
MSH	Major State Highway
MSK	Medvedev–Sponheuer–Karnik scale
MSME	Micro, Small and Medium Enterprises
MSRDC	Maharashtra State Road Development Corporation Ltd.
MSRTC	Maharashtra State Road Transport Corporation Ltd.
MSSDS	Maharashtra State Skill Development Society
MSW	Municipal Solid Waste
MTDC	Maharashtra Tourism Development Corporation
NAAQS	National Ambient Air Quality Standards
NAMP	National Air Monitoring Programme
NEERI	National Environmental Engineering Research Institute
NESL	Nagpur Environment Services Limited
NGO	Non-Government Organisation
NIT	Nagpur Improvement Trust
NLCP	national Lake Conservation Plan
NMAM	National Municipal Accounting Manual
NMC	Nagpur Municipal Corporation
NMR	Nagpur Metropolitan Region
NMRE	National Ministry of Renewable Energy
NMT	Non-motorised Transport
NOC	Non-Objection Certificate
NMPL	Nagpur Mahanagar Parivahan Pvt. Limited
NRCP	National River Conservation Plan
NRW	Non-Revenue Water
NSZ	North Sewerage Zone
NTU	Nephelometric Turbidity Units
OCWL	Orange City Water Limited
ODF	Open Defection Free
PAS	Performance Assessment System project
PCU	Passenger Car Unit
PGR	Public Grievance Redressal
PKV	Punjab Krushi Vidhyalaya
PMC	Project Management Consultant
PMU	Project Monitoring Unit

PPM	Parts Per Million
PPP	Public Private Partnership
PRO	Public Relations Officer
PWD	Public Works Department
QPR	Quarterly Progress Report
RAY	Rajiv Awas Yojana
RCC	Reinforced Cement Concrete
RDF	Refuse Derived Fuel
ROB	Rail Over Bridge
RSPM	Respiratory Suspended Particulate Matter
RTO	Regional Transport Office
RUB	Rail Under Bridge
SAMP	State Air Monitoring Programme
SBR	Still Birth Rate
SCADA	Supervisory Control And Data Acquisition
SCZCC	South Central Zone Cultural Centre
SDAD	Swachata Doot Aplya Dari
SEZ	Special Economic zones
SFC	State Finance Commission
SJSRY	Swarna Jyanti Sahari Rojgar Yojna
SLB	Service Level Benchmarking
SLSC	State Level Steering Committee
SMC	State Management Committee
SMILE	Savitri Marketing Institution for Ladies Empowerment
SPM	Suspended Particulate Matter
SPV	Special Purpose Vehicle
SRA	Slum Rehabilitation Authority
SSDC	Sectoral Skill Development Committees
SSZ	South Sewerage Zone
STEP	Skill Training for Employment Promotion amongst Urban Poor
STP	Sewerage Treatment Plants
SWD	Strom Water Drainage
SWM	Solid Waste Management
SWOT	Strength, Weakness, Opportunity, Threat
TDM	Travel Demand Management
TDR	Town and Country Planning Officer
TDS	Total Dissolved Solids
TOD	Transit oriented Development

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TOR	Terms Of Reference
TPD	Tonnes Per Day
UDA	Urban Development Authority
UDD	Urban Development Department
UFW	Unaccounted For Water
UGD	Under Ground Drainage
UHI	Urban heat Island
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
ULB	Urban Local Body
UMTA	Unified Metropolitan transport Authority
URDPFI	Urban and Regional Development Plans Formulation and Implementation
USEP	Urban Self Employment Programme
UWSP	Urban Women Self help Programme
VAT	Value Added Tax
VHS	Vidarbha Heritage Society
VNIL	Nimay Vansh Infraprojects private Ltd.
VNIT	Visvesvaraya National Institute of Technology
VOC	Volatile Organic Compounds
WTP	Water Treatment Plant

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Executive Summary

The City Development Plan (CDP) is the Municipal Corporation's corporate strategy that presents both a vision of a desired future perspective for the city and mission statements on how the Corporation, together with other stakeholders, intends to work towards achieving the vision in the next five years. It should translate the Mission into actions and actions into outcomes. The objective of involvement of the stakeholders and endorsement by the local body and other implementing agencies is to hold them accountable for their mission statements, actions and expected outcomes.

Nagpur CDP was prepared in 2006 under the technical assistance from USAID. All the key officials of various departments were involved in the CDP preparation process. Nagpur Municipal Corporation's (NMC) key officials and Head of Department's (HODs) made presentations of their respective departments and highlighted the existing status and the vision of their departments.

NMC has formed the steering committee to prepare the CDP and coordinate with the consultant. As part of the CDP preparation process, the consultant organised various workshops with the key stakeholders. The officials from NMC and parastatal agencies, public representatives, political leaders, business groups and industry associations, NGOs, and the media representatives attended these workshops.

The workshops aimed at providing insights into the assessment of various sectors carried out by the consultant. Further, the consultant has incorporated the inputs provided by the stakeholders and accordingly finalized the CDP. This section presents an analysis of the first generation CDP with a focus on the service levels at the time of preparation of CDP.

In order to identify broader issues for intervention and areas of assistance pertaining to development of city, City Development Plans (CDPs) which were already available for most of the cities under the JnNURM is required to be revised as per the revised CDP Guidelines (April, 2013) issued by MoUD.

In order to give an impetus to reforms under JnNURM, the Ministry of Urban Development (MoUD) and Ministry of Housing and Urban Poverty Alleviation (MoHUPA) have launched a new project called "**Capacity Building of Urban Development**" (CBUD). The project has been launched with support from The World Bank (WB). The GoI has received the financing from the WB/International Development Association (IDA) towards CBUD project. The broad aim of the CBUD project is to address the major constraints of urban development and specifically focus on the capacity building requirements for successful urban management and poverty reduction across the selected ULBs in India. Under the CBUD project preparation of revised CDP for Nagpur was taken up.

Revise CDP for Nagpur will be prepared for a horizon period of 25 years (2014-2041). Preparation of Revised CDP is based on, revised guideline issued by MoUD further incorporates certain additional aspects; these aspects shall be covered while preparing both the fresh and revised CDP. The aspects to be incorporated are:

- Formation of CDP Committees – Policy and Technical;
- Inclusion of Heritage, Health and Education sector in the CDP;
- Stress on infrastructure management aspects;
- Outcome parameters of projects;
- Revenue enhancement initiative, expenditure management initiatives and asset management initiatives;
- Special emphasis on PPP projects; and
- Transit Oriented Development (TOD).

Apart from the above points, some of the other key areas of importance in the revised guidelines are as follows.

Nagpur derived its name from the Nag River or Nag people and is known since prehistoric times. Nagpur and its surrounding region also find a mention in the Vedic and Mauryan scriptures. Nagpur city's foundation was laid by the Gond King of Deogad, Bakht Buland Shah, in the year 1703. In 1743, it became the capital of Raghoji Rao Bhonsle's kingdom. The Bhonsle period witnessed peace with cultural and economic prosperity.

The city was annexed in 1817 by the British after the defeat of Appasaheb Bhonsle in the Battle of Sitabuldi. Consciousness for planned city development was raised by Sir Patrick Geddes, who visited the city in 1915.

In today's time, Nagpur is seen as one of the rapidly developing central India's metro city¹ and also ranks third in the list of the urban centres in the state of Maharashtra. Nagpur enjoys the privilege of being termed as the richest city, greenest city, city with latent potential, hub of health care industry in the state, tiger capital of the country, etc. It is also considered to be second greenest city in the country due to NMC's great efforts of plantation and city beautification in past.

Nagpur is an important urban centre in the Vidarbha region. Nagpur is the administrative capital of the district and the largest urban centre in the district in terms of population and area. The city is a part of the Nagpur division. The Nagpur Municipal Corporation (NMC) is the only corporation in the district with a jurisdictional area of about 225.08 sq km and is divided into 136 administrative wards.

Nagpur is the capital of Vidarbha and the second capital of the state. Nagpur stands third in terms of the population in the state after Mumbai and Pune. Nagpur city is the third largest urban agglomeration in the state of Maharashtra in terms of population. As per Census 2011, Nagpur accounted for 6% of the total urban population of the state and 76% of the district urban population of Nagpur district. In addition, 52% of the total district population resides within NMC. In the past, Nagpur attracted the migration and floating population from the neighbouring districts of Maharashtra for education, employment, and business. However, the trend has decreased over the last decade.

The City growth is dependent on aspects like physical infrastructure, social infrastructure, economic and employment opportunities, city administration setup, and urban environment. Based on assessment of physical and economical infrastructure within the city and region; some of the major growth drivers identified and having a prominent role in the growth of Nagpur are as follows:

- Presence of 11 MIDCs in and around Nagpur. Butibori MIDC is Asia's largest Industrial zone and industrial suburb for Nagpur
- MIHAN - International Airport and SEZ for healthcare city, processing units, maintenance repair and overhauling of aircraft, information technology park, and manufacturing units
- Presence of historical monuments, buildings with heritage value, natural features, forests and sanctuaries. Potential for tourism and supporting industries to grow.
- Presence of physical/urban infrastructure – 24 x 7 water supply, good roads, railway connectivity to all the states, air connectivity along with ample green cover in the city
- Presence of well-established facilities by government and private sector in education and health sectors

¹ Interpretation from an article published in "The Economist Times" on December 24th, 2008

In spite of this, the city is not growing at the pace of other cities of Maharashtra (Pune and Nashik) due to minimal presence of large scale industries; lack of enabling policies for development of large scale industries. Also, deficiencies in service delivery is hindering the overall economic growth.

Given this scenario, there is need to develop physical and social infrastructure of the city, the industrial corridors and mass transit facilities to connect the residential zones to the employment zones. In light of this through participatory development of CDP for Nagpur the vision has been formulated as **“Growth nucleus of Central India; An eco-city that provides adequate, equitable, sustainable access to urban services for all citizens; A city that is safe, livable and promotes growth of its citizens.”**

The sectors such as water supply, sewerage and sanitation, solid water management, storm water drainage, traffic and transportation, urban poverty and slum improvement, local economic development, urban environment, social infrastructure, and heritage management are covered under the development goals to realize the vision. The development goals have been framed on the basis of priority areas, to achieve the Vision for the city and to meet the desired sector specific service level benchmarks and indicators. Thus the sector specific development goals have been substantiated with detailed action plan.

The project identification has been carried out on the basis of demand-gap analysis. Further, the sector strategies and action plans have been finalised based on discussions with relevant stakeholders. The goals and service outcomes are envisaged to be implemented by 2021 as an immediate priority. The projects identified involve rehabilitation of existing infrastructure systems and augmentation of the capacity to meet the demands of future population.

I. Water supply

The key challenges in the city with respect to water supply services were identified during early 2000 and efforts were made by NMC to address the same through projects taken up under JnNURM. During 2006-2013 period most of the water supply projects were taken up for implementation under JnNURM, which will help NMC to achieve the goal of 24 x 7 water supply in Nagpur. Also, the ongoing project will address the need for changing and augmenting the existing distribution system, augmenting the storage capacity, provision of 100% individual connections and metering of all the connections, reduction in NRW levels, etc. In view of this, it is considered that investment would be required for augmentation of additional source capacity for 2041 demand and construction of treatment plant. Further, there is a requirement for extension of distribution network in Hudkeshwar and Narsala.

II. Sewerage and Sanitation

The key challenges with respect to the sewerage and sanitation sector identified are; lack of 100% coverage of underground drainage system and 100% sewage treatment facilities. The sewage generation forecasted by NMC in their sewerage master plan prepared in 2008 takes into consideration the creation of infrastructure to meet the demand till 2041. The present system of sewerage has been divided into three sewerage zones and accordingly the estimation has been carried out.

Presently, NMC is treating only 22% of the sewage generated in the city. At present, an additional 345 MLD treatment plant is proposed to be implemented by way of two projects by NMC, which will augment the treatment capacity of from 100 MLD to 230 MLD. For the purpose of project identification, the projects proposed in the Master plan have been considered.

III. Solid Waste Management

The key challenges with respect to the Solid Waste Management sector are lack of segregation of waste at source, and absence of transfer stations and scientific landfill facilities. NMC has prepared a city sanitation plan (CSP) in 2012 which identifies the issues and grey areas which are coinciding with CRIS observations. The efficiency of the recovery mechanism is linked to segregation at source.

The projects identified include the Construction of compost plant and waste processing plant; Construction of RDF plant and Bio gas plant; Construction of 63 acres landfill facility for 2041 for Nagpur city.

IV. Storm Water Drainage

The city does not have 100% coverage of pucca open drains. Further, the drains are in a dilapidated state and need immediate rehabilitation. The demand-gap analysis has been estimated on the basis of the following design parameters: drainage network reach as % of road length (min 130%) and size of drains to be designed according to the rainfall data. Accordingly, construction of drainage system in North zone, Central zone and South zone have been identified.

V. Traffic and transportation

The city does not have 100% coverage of concrete/bituminous (CC/BT) surface roads. Pedestrian safety, increasing trends in accident rates and lack of city-exclusive public transportation are the other major concerns.

In order to address these issues, the NIT and NMC have prepared separate Comprehensive Mobility Plans (CMPs) for improving the road and transport infrastructure in Nagpur. These two CMPs formed the basis for the project identification in traffic and transportation sector. Further, the road network projection for 2041 has been made on the basis of the minimum per capita road length required, which is 0.67 meter.

VI. Urban Poor and Access to basic services

The key challenges with respect to housing & basic services for the urban poor relate to the high percentage of dilapidated housing and lack of 100% service coverage in terms of individual toilets and social infrastructure facilities. In order to overcome these issues, the CDP proposes construction of new housing and infrastructure for 2.13 lakh households for 2041 and development of basic services to urban poor.

VII. Social Infrastructure

The key challenges are lack of adequate education infrastructure for pre-primary, primary, and higher secondary education. There is a need for health care infrastructure at both neighbourhood and city level. Socio-cultural infrastructure like community centres are to be developed in identified wards.

In order to improve the social infrastructure in the city, Development of crematoria; Development of Education Infrastructure; Development of Health care infrastructure; Socio cultural infrastructure; Parks & play grounds; Construction of Vasant Rao Narkhedekar Cultural/play theatre; Convention and Exhibition Centre and Construction of modern hygienic fish markets in City have been proposed.

VIII. Urban Environment

NMC had already initiated conservation and rejuvenation of water bodies. Also, detailed project report for conservation and rejuvenation of all the water bodies like lakes and rivers has been prepared. There are 16 water bodies within NMC's limits, which are part of the natural features of the city. Of these, NMC has already taken up rejuvenation of two lakes. For the remaining 14 water bodies, rejuvenation and waterfront development was suggested by the stakeholders and considered even in the master plan for lakes and rivers. To improve the urban environment in the city rejuvenation of lakes and rivers has been proposed in the CDP.

IX. Heritage Development

Nagpur has various heritage structures, which are referred to as "listed heritage structures" as per the general resolution of the Urban Development Department (UDD), GoM in 2003. The conservation and

preservation of these structures was a long-pending issue with the citizens and was needed to be taken up. In order to develop the heritage potential in the city, Digitizing of all the heritage structure and precincts; Documentation of all the heritage structures/Booklet; Development of Nagpur as tourist hub-Phase I and Tourism development in and around Nagpur have been proposed.

X. Tourism Development

Tourism development in Nagpur has been envisaged to elevate the tourism potential of Nagpur so that visitor stay is extended. Further, the tourism development aims to generate local employment and livelihood through tourism. The projects proposed under tourism development are identification of tourist potential sites and development of public amenities in the identified sites in Nagpur.

XI. Urban Governance

Based on the discussion with NMC officials and also efforts made by NMC to implement e-governance projects, the need for augmenting the newly developed system by providing the required hardware and system was suggested. Also, in order to improve the coverage of the services and ensure that citizens get the most of the benefits from the recently implemented E-governance project, need of developing kiosks and facilitation centres were also identified.

XII. Disaster Management

Based on the discussion with NMC officials need to augment the existing fire fighting and emergency response facilities are a required. In order to prevent major catastrophic or any disaster occurrences and to able to respond within time to reduce the damages procurement of better, sophisticated technology has been identified.

NMCs Financial Assessment

Assessment of the municipal fund was carried out for the period starting from FY 2008-09 and ending in FY 2011-12. The revenue account consists of two components: revenue income and revenue expenditure. NMC has revenue surplus in all the five years, with an average of Rs. 16,450 lakhs/year from 2007-08 to 2011-12. Revenue surplus was recorded in all the years by NMC, with maximum in FY 2011-12. From 2007-08 till 2011-12, the total revenue surplus recorded is Rs. 82,248 lakhs.

Contribution of tax revenues in the total revenue income was in the range of 71%-75% of the total revenue income. Contribution of non-tax revenues in the total revenue income was in the range of 19%-22% over the last five analysis years. Contribution of revenue grants in the total revenue income has been in the range of 6%-7% for the analysis years of 2007-08 to 2011-12.

Currently, there are 5.32 lakhs properties in the register of the property tax department, of which 3.70 lakhs are residential properties (89%) and 0.46 lakhs are non-residential properties (11%). On an average, 2.5% growth in properties is observed in the case of Nagpur city.

NMC has established collection centres in all the zones. Once the bill is received by them, the property owner has to pay the same in their zone's collection centre. Property tax current collection efficiency for FY 2011-12 stands at 87% against the current demand and that of arrear efficiency was 52% against the arrears demand.

Revenue expenditure increased from Rs. 33,292 lakhs in 2007-08 to Rs. 49,944 lakhs in 2011-12, registering a CAGR of approximately 11%. From the above shown figure the details of revenue expenditure for the five analysis years. On an average, the growth rate increase in revenue expenditure year-on-year basis for NMC is observed to be around 11%, with maximum growth rate observed in the fiscal year 2009-10, of 21%.

Establishment expenditure accounts for 47% of the total revenue expenditure on an average for the analysis period. In the year 2007-08, establishment expenditure reduced by 4% from 2007-08 till 2011-12; this is attributed to outsourcing of some of the services to private agencies.

Capital income consists of grants received by NMC under various schemes for capital works or loans taken by NMC for various projects. The components of the capital income are grants and loans.

From figure shown on the side, it is clear that the major source of capital income for NMC is grants, and NMC has received capital grants for various works, with major grant revenue from the central and state governments under JNNURM.

Over the analysis period, capital deficit is recorded by NMC for all the FYs, i.e., 2007-08, 2008-09, 2009-10, 2010-11, and 2011-12. Highest deficit was recorded during the year 2010-11 (Rs. 20,131 lakhs) and least deficit was recorded during the year 2007-08 (Rs. 617 lakhs).

Investment Requirements and City Investment Plan

The investment requirement have been identified to implement the sectoral action plans and included in the city investment plan (CIP). CIP is prepared in line with the identified vision for the city through a comprehensive process of gap assessment and through stakeholder consultation. This assessment has also based on identified sector specific strategies, implementation actions, and associated reforms with specific inputs from stakeholders too. The strategies adopted primarily have three dimensions: improving the service delivery by efficiency measures, improving service delivery by creating infrastructure assets: and improving the governance aspects. The total estimated capital investment required for providing efficient services to the present population and future population of the city by the year 2041 is Rs. 34,604 crores. A total of Rs. 27,350 crores are proposed for investment by 2021-22 to cater to infrastructure requirement. The table below presents the summary of sector-wise total investment need and investments.

Sr.No.	Sector	Short Term 2021	Long Term 2021-41	Total investment (Rs. Crores)
		(investment in Rs. Crores)		
1	Water Supply	200	471	671
2	Sewerage & Sanitation	683	683	1,366
3	Urban Roads, Traffic & Transport	21,608	445	22,053
4	Storm Water Drains	1,748	1,944	3,692
5	Solid Waste Management	341	27	368
6	Slum Housing	1,684	3,127	4,811
7	Heritage development	267	267	534
8	Tourism Development	200	1	201
9	Urban Governance/ System Modernisation	80	80	160
10	Social Infrastructure	63	132	194
11	Urban Environment	428	29	457
12	Disaster Management, Fire Fighting and Emergency	47	47	95
Total Investment Estimated		27,350	7,253	34,604

Source: CRIS Analysis

Urban roads, traffic and transportation is a key priority sector in Nagpur city and hence 64% of investment has been identified towards this sector; 14% of the investment has been identified towards slum housing. In order to improve the drainage system in the city about 11% of the investment has been identified towards Storm water drainage system in the city. About In order to improve the sewerage and sanitation system in north, central and south zones in the city about 4% of the investment has been

identified. NMC is already implementing the 24x7 water supply scheme in the city. Hence only 2% of the investment has been identified for laying distribution network in the newly merged areas. The rest of the investment has been identified towards Solid waste management, Heritage and tourism development, social infrastructure, urban environment, disaster management and urban governance.

The following agency would be responsible for implementing the projects identified under this CDP;

- **NMC:** NMC being the urban local body for the city of Nagpur it would be responsible for design, construction, operation, and maintenance of water supply, sewerage system, SWM, SWD, housing and basic services for the urban poor, municipal roads, education facilities, health facilities, parks, and playgrounds, etc. NMC would be the implementing agency for the projects identified in the above mentioned sectors. In the overall investment, NMC has to contribute 73% of total investment identified till 2041. Share of NMC in the overall investment identified for Nagpur city till 2041 is around 58%.
- **NIT:** NIT being a planning authority for the Nagpur city, plays an important role in development of infrastructure in the city. though in comparison to NMC it has limited role in implementation of the projects, but based on the recent plans for traffic and transportation and other social sectors it is assumed that NIT will also be one of the agencies that will take up development projects within the Nagpur city. It would be responsible for implementation of METRO (MRTS), other traffic and transportation projects. Share of NMC in the overall investment identified for Nagpur city till 2041 is around 42%.
- **Maharashtra Tourism Development Corporation (MTDC):** The state department for tourism development is responsible for implantation of the tourism projects identified in the CDP. Share of MTDC in the overall investment for Nagpur has been identified as 0.6%.
- **State Department for Health and Education:** The state department for health and education is responsible for implementation of projects in health and education department. In the overall investment, the share of these departments is about 0.1% and 0.2% respectively.

Department	2041 (Rs. Crs)	Share (%)	2021 (Rs. Crs)	Share (%)
NMC	20,024	57.7%	12,808	46.5%
NIT	14,300	41.5%	14,300	52.6%
MTDC	201	0.6%	201	0.7%
State Department for Education	53	0.2%	21	0.1%
State Department for Health	25	0.1%	20	0.1%
Total investment	34,604	100.0%	27,350	100.0%

Source: CRIS Analysis

NMC Investment capacity and Financial Operating Plan (FoP)

The FOP is generated from the sustainable investment point of view in line with current growth trends against the identified investment. It has been estimated that NMC has to contribute about Rs. 12,808 crores to improve the infrastructure for meeting the current gap and future short-term requirement out of all the different scenarios of sustainable investment capacity.

Overall the investment required for the year 2021-22 is Rs 27,350 crores. However, NMC would be responsible to take-up the projects worth Rs 12,808 crores and the remaining investment to be taken-up by the Parastatals/state government departments. Therefore, the financial operating plan has been prepared for NMC with an estimated investment for Rs 12,808 crores.

The overall investment estimated is Rs. 12,808 crores (on constant prices). However, as per the current prices, the estimated investment would be Rs. 16,443 crores (which includes the cost escalation and physical contingencies on yearly basis for 7 years – FY 2015-16 till FY 2021-22).

- Business as usual scenario: NMC is not in a position to take up any new project - NMC shall take a loan of Rs. 400 crores in order to fulfil the existing the financial commitment towards on-going projects under JnNURM and repayment of outstanding) loan
- Improved investment capacity with grant support: Rs 2,795 crores
- Improved investment capacity with grant plus debt support: Rs 3,289 crores

In order to meet the existing financial commitments and also to take up new projects as identified in the short term investment plan, it is highly recommended that NMC implements various reforms that will improve the investible surplus for NMC. Some of the reforms that will help improve the revenues for NMC and investment capacity for next phase of development (short term – FY 2015-16 till FY 2021-22) are as mentioned below;

- **New tax and revision of base for existing taxes:** NMC should explore or propose the levy of a new tax, which will be as per the applicable act.
- **Property tax:** On an immediate basis, the reforms to be implemented in property tax to improve the coverage and collection efficiency;
- **Water and sewerage:** Water and sewerage tariff structures must be revised immediately
- **SWM charges:** NMC should levy user charges on SWM services – NMC may explore this initiative as part of property tax.
- **Establishment expenditure:** The outsourcing option should be explored in the establishment department as well as in the operation and maintenance of assets. If possible, reduction of staff and optimum resource utilisation through the use of sophisticated technology should be explored
- **O&M new assets:** NMC should ensure that the contractor/private operator appointed will carry out O&M of the assets (WTP, STP and SWM plant) for a period of 5-8 years after completion of the test runs.
- **Capacity-building:** It is very important that NMC should keep on imparting training to the staff on various aspects, from technical to managerial skills.
- **Study tours:** NMC should organise study tours to know the best practices carried out for some of the core services and also to understand the challenges faced by other cities in the implementation of projects and reforms.

1 Project Background

1.1 Context

The need for an overall urban improvement and development to sustain the economic growth momentum post the liberalization era first found its expression in the mandate of Jawaharlal Nehru National Urban Renewal Mission (JnNURM) launched by the Government of India in 2005. The project endeavored to bring about an improvement in urban quality of life and make them as investment destinations. The programme derived its initial rationale from the “National Common Minimum Programme” of the Government of India that laid stress on expansion of physical infrastructure and therefore, comprehensive urban renewal and slum development could be taken up. The second rationale for such a large scale programme was derived from India’s International commitment to achieving the Millennium Development Goals and therefore, the Government of India (GoI) proposed to

- Facilitate investments in the urban sector; and
- Strengthen the existing policies in order to achieve these goals.

In recognition to the above mandate, the JnNURM programme was conceived. The scale of the programme was aimed to be in a mission mode primarily to make the cities realize their full potential and become engines for growth. It is argued that the urban sector contributes to over 50% of the country’s Gross Domestic Product (GDP) and therefore, focused attention is required for urban infrastructure development.

As already mentioned above, the JnNURM is the first flagship national programme for urban development of this nature and size by the Government of India. The programme sought to bring about a change in the way urban development has been perceived. It recognized the importance of two major aspects for urban development in the country including

- The need for urban infrastructure improvement in order to improve quality of life and sustain the local economy as well as to attract more investments; and
- The need for investment for carrying out the urban infrastructure improvements.

In doing the above, the programme brought about the necessary awareness among the Urban Local bodies (ULBs) for planning and implementation of projects, need for systematizing the urban services and their management, the need for involving stakeholders in project planning and raising revenues for the urban areas that can sustain the urban infrastructure. Significant emphasis was given to urban governance reforms and the need to link reforms with investments. Assistance therefore, to the state governments and ULBs was proposed to flow through a reforms linked plan. Introduction of such reforms were considered crucial for developing sustainable infrastructure that would include,

- Efficient management of created physical assets so as to increase self-sustainability; and
- Enhance efficient service delivery.

Both these aspects were to be achieved through the agenda of reforms in the cities.

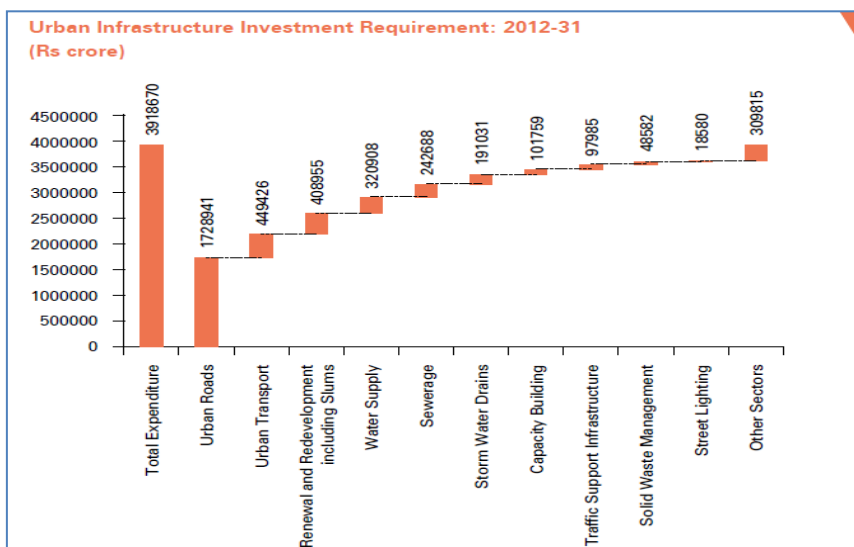
Progress

Over the past nine years, the programme has committed over Rs. 286 billion for 552 projects involving a total investment of over Rs. 620 billion. Some of the **key achievements** of the project include:

- The mission has been successful in catalyzing multi-year investments and reformed development in urban infrastructure;
- There has been visible improvement in the delivery of municipal services in many cities;
- Some cities have prepared development/master plans for the first time. There is also greater awareness in the ULBs for the need to develop systematic plans for improvement in infrastructure. There is also an increase in aspiration levels among communities and there is a demand for better infrastructure and services;
- Several projects especially in transport sector have been taken up within the JnNURM framework that has significantly improved the quality of life in the cities; and
- There has been good progress in implementation of reforms at policy level at state and central level. Most of the states have framed their policies on reforms and started implementing the same. ULBs have started implementing the reforms in the areas of accounting, e-governance, property tax and user charges.

While there has been significant change in the urban sector due to JnNURM, challenges have emerged which will need to be addressed going forward:

- CDP was seen as an investment plan for projects in the immediate term and not as a vision document for the city with very limited cities revising the same;
- While preparing the CDP, consultations with the stakeholders was limited and mostly restricted to the line departments and parastatal agencies;
- The pace of project execution has been found to be slow. Some states have been able to take greater advantage of the programme than others;
- Cities have also not been very successful in leveraging JnNURM funds to raise finances on their own or to attract private or PPP-based investment;
- The ULBs are not in a position to take over all the functions mentioned under 12th schedule of 74th Constitutional Amendment Act (CAA) at present. Most ULBs are also not in a position to take over functions like roads and bridges, water supply sewerage, drainage and urban forestry due to their present incapacity to do so; and
- Institutional strengthening and capacity buildings initiatives are yet to initiate in most of the ULBs. Most of the ULBs are facing capacity related issues such as lack of staff (staff recruitment has not been carried since long).



Source: The High Powered Expert Committee (HPEC) report, 2011

The Planning Commission of Government of India, through a committee has devised a framework for JnNURM Phase-II. This framework has been prepared after studying and analyzing the success and challenges arising from JnNURM and the initiatives taken by other Ministries.

The High Powered Expert Committee (HPEC) report, 2011 further identified about Rs. 39,000 billion of investment in infrastructure in the urban areas of India.

1.2 Revised CDP under CBUD Project

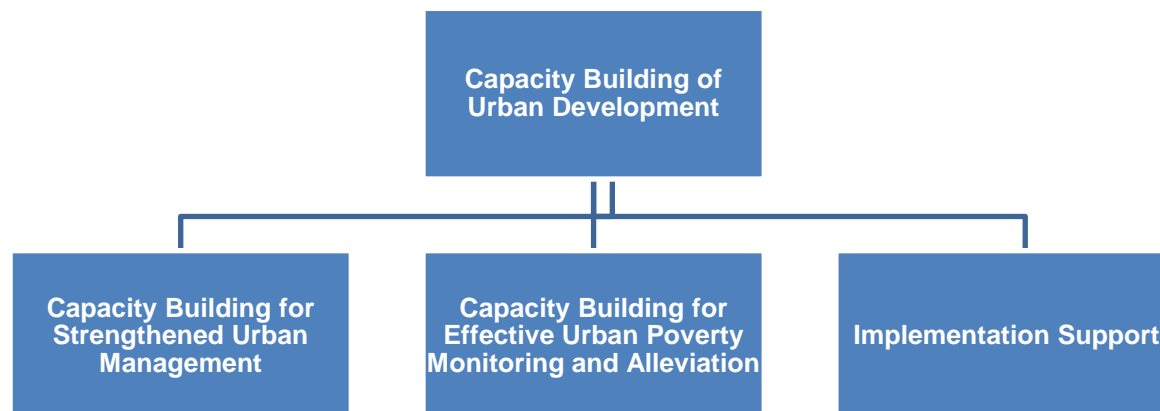
1.2.1 CBUD Programme

In order to give an impetus to reforms under JnNURM, the Ministry of Urban Development (MoUD) and Ministry of Housing and Urban Poverty Alleviation (MoHUPA) have launched a new project called “**Capacity Building of Urban Development**” (CBUD). The project has been launched with support from The World Bank (WB). The GoI has received the financing from the WB/International Development Association (IDA) towards CBUD project. The broad aim of the CBUD project is to address the major constraints of urban development and specifically focus on the capacity building requirements for successful urban management and poverty reduction across the selected ULBs in India.

The project will contribute to GoI’s overarching objective of creating economically productive, efficient, equitable and responsive cities. Achieving this objective, will help sustain high rates of economic growth, accelerate poverty reduction, and improve services, especially to the urban poor.

The project has three components as presented in the figure below.

Figure 1: CBUD project components



- 1. Capacity Building for Strengthened Urban Management:** This component is aligned with the infrastructure and governance sub-mission of JnNURM and will thus support technical assistance across the several urban management topics.
- 2. Capacities Building for Effective Urban Poverty Monitoring and Alleviation:** These capacity building initiatives are aligned with the basic services to the urban poor sub-mission. They reflect the need for building information systems, sharing experiences, and designing strategies on urban poverty alleviation.
- 3. Implementation Support:** This component will support a national Project Management Unit (PMU) for providing overall technical and managerial support during the implementation of the Programme. The PMU will have a critical role in promoting and support the project.

1.2.2 Preparation of Revised CDP under CBUD Programme

In order to identify broader issues for intervention and areas of assistance pertaining to development of city, City Development Plans (CDPs) which were already available for most of the cities under the JnNURM is required to be revised as per the revised CDP Guidelines (April, 2013) issued by MoUD.

The MoUD has identified 30 cities across India under the CBUD project to facilitate the support. The MoUD invited proposals and entrusted CRISIL Risk & Infrastructure Solutions (CRIS) with the responsibility of preparing the City Development Plans.

1.3 Revised CDP Guidelines – Key Areas of Emphasis

The revised guideline issued by MoUD further incorporates certain additional aspects; these aspects shall be covered while preparing both the fresh and revised CDP. The aspects to be incorporated are:

- Formation of CDP Committees – Policy and Technical;
- Inclusion of Heritage, Health and Education sector in the CDP;
- Stress on infrastructure management aspects;
- Outcome parameters of projects;
- Revenue enhancement initiative, expenditure management initiatives and asset management initiatives;
- Special emphasis on PPP projects; and
- Transit Oriented Development (TOD).

Apart from the above points, some of the other key areas of importance in the revised guidelines are as follows.

1.3.1 Vision Led Planning

The revised guidelines specify that unlike the past CDPs the vision for city need to be more detailed. They need to be based on understanding the Strengths, Weaknesses, Opportunities and Threats (SWOT) for the city, the needs and priorities of the people of the city. The people must be encouraged at workshops and consultation sessions to visualize their future of the city, their aspirations and the consequent growth that they anticipate in the city. This vision finally can be translated into respective sectoral visions.

1.3.2 Resource based planning

Every city in India in the context of its regional location has particular strengths in terms of its resource endowments. Such resources need to be assessed and their strengths realized for city development. The approach for plan preparation could be: a) national resource led planning for cities endowed with natural resources like water bodies) OR b) Economy based (for an industrial or trading city), OR c) Tourism based for heritage cities OR d) combination of the above. This helps in settling the city apart from the rest. This approach can be identified based on:

- a) Existing city strengths and its opportunities,
- b) Regional role of city in the context of state development, and
- c) Needs of the city.

1.3.3 Participatory approach

As already mentioned above, the revised CDP guidelines have specified that the CDP be treated as a “living document”. For this periodic revision and updation of the CDP is necessary. Such revisions have to and must be conducted with a participatory planning approach. The CDP outlines that local area plans need to be prepared in consultation with the ward committees to fulfill the expectations of the citizens. Also, the guidelines specify that such an approach is necessary to ensure equity concerns and poverty issues are integrated in the CDP. Consultations also need to be carried out at every stage of the plan preparation and implementation. The citizens must be able to prioritize and choose their needs for infrastructure development.

1.3.4 Equity concerns, poverty and local economy development

Poverty and local economy development go hand in hand. Understanding of the local economy would help in devising appropriate infrastructure development strategies that can help in/be conducive to the growth of local economy and thereby nurture local talent and resources. These need to be given adequate focus in the present CDP exercises and therefore help in not just local economy development but also in regional economy development.

The 12th five year plan has also started a mission for National Urban Poverty Alleviation (NUPAM) for targeting housing and poverty alleviation based on recommendations of the NUPAM identifying the issues of poverty and housing in city and implementation status of programmes such as Rajiv Awas Yojana, Integrated Housing and Slum Development Programme (IHSDP), etc. Integration of these aspects would be crucial in making the CDP relevant to state and central government policies.

1.3.5 Capacity Building in ULB

The ULBs presently face serious human resource shortage for planning, development and urban management activities (including operations and maintenance, monitoring and evaluation, financial management and procurement). This issue has been highlighted by the study on appraisal of JnNURM projects as well. The guidelines have proposed that the CDPs must address this issue as to the gaps in such capacity can be addressed.

Also, it has been suggested in the guidelines that urban reforms need to be done with greater participatory approach. The strategies to arrive at the vision for the city should be linked to the reform agenda. ULBs should be asked to furnish the reforms and propose a time line to achieve the same. Administrative and structural reform should be made mandatory and carried out as soon as possible. Financial thresholds need to be decided and adhered to in terms of the central assistance under JnNURM being given as a soft loan or a grant. This approach would help in designing an appropriate capacity building strategy.

1.3.6 Sectoral Action Plans with Goal Oriented Targets

The revised guideline specifically also lay out the need for preparation of sectoral action plans that have targets that are oriented towards specific goals. Action plans are specifically required for sectors including Local Economic Development Plan, Infrastructure Development Action Plan, Housing and Poverty Alleviation Action Plan, City Mobility Plan (CMP), Heritage Management Plan (Where needed), Financial Management Plan, Institutional and Capacity Building Action Plan and Environment Management Plan (including disaster management). Such sectoral plans would be based on clearly

identified goals. Also, Inter-sectoral as well as intra-sectoral linkages need to be addressed through the CDP.

1.3.7 Monitoring and Evaluation Arrangements

The guideline clearly spells out the need for monitoring and evaluation at regular intervals as to the extent of implementation of the CDP. Also, development of such monitoring arrangements would go a long way in securing community participation who can be involved in the process of monitoring.

1.4 Objective of the assignment

The CDP aims to identify an integrated solution to the challenges facing the city. It recognizes the economic growth strategy as well as the actions that would be required by various agencies to ensure the sustainable development of the city. The CDP is the ULB's strategy that presents the vision of a desired future for the city, and the mission statements on how the ULB, together with other stakeholders, intends to work towards achieving this long-term vision. The City Development Plan incorporates the assessment of city on majorly four levels: Socio Cultural and Economic Environment; Physical Environment; Infrastructure Services and Institutions; Urban Poverty and Heritage.

The primary objective of this assignment is – to revise and update the existing CDP.

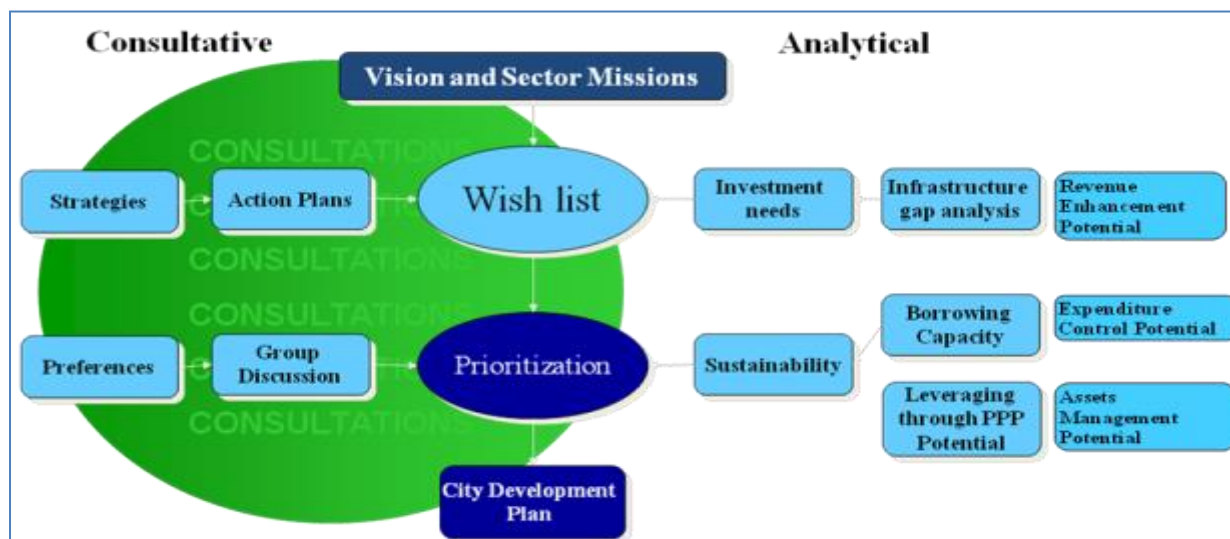
The scope of work in brief shall entail –

- Profiling the present status of the city, giving an in-depth analysis of its demographic, economic, financial, infrastructure, physical, environmental and institutional aspects;
- Based on the above analysis, the consultant shall develop a perspective and a vision for the city, which would be prepared in consultation with its relevant stakeholders. In order to achieve the vision, a formulation strategy for bridging the gap between where the city is at present and where it wishes to reach need to be prepared;
- The CDP should provide for a City Investment Plan (CIP), based on which the concerned ULB will be able to access funds under central/ state government schemes as well as from own and other sources based on priority actions and projects identified in the CDP;
- The document should also provide Financial Operating Plan (FOP) to direct the ULBs for mobilizing various financial resources to implement the identified projects. The inter-sectoral and intra-sectoral issues need to be addressed by the CDP;
- Preparation of the CDP will consist of city development strategies that will emerge out of a structured consultative process. The process will enable elected representatives, key staff of departments of Municipal Corporation/ Municipal Council, para-statal agencies and other institutions, policy makers and the citizens to participate and plan for spatial, social and economic development of the concern cities; and
- The CDP has to adhere to the latest revised toolkit prepared by the MoUD for CDP preparation published on its website www.jnnurm.nic.in in April 2013.

1.5 Approach and Methodology

The approach to the assignment would be based on consultative and analytical assessment of the existing situation. The inputs from stakeholders would be used to prioritize areas of development and to formulate the strategies in order to make the revised CDP an implementable document. The approach of revised CDP preparation is presented in the figure below.

Figure 2: CDP Approach



Source: CRIS Analysis

The revised CDP has been prepared for the period of next 30 years, i.e. 2041. It is a forward-looking consensus program for the city that outlines the path with respect to the following aspects:

Infrastructure Development – Assessment, gap analysis, arriving at investment requirement (short term and long term) and prioritization of various services provided by Municipal Corporation - water supply, sewerage, storm water drainage, roads, traffic & transportation, street-lighting, solid waste management, firefighting, education, health, etc.

Slum Development – Preparation of programme for the development of slum pockets in the city. This includes access to all the basic services as well as housing for urban poor.

Economic Development – The revised CDP focused critically on tapping the existing potential and identifying key economic development opportunities for the city.

Social Development – The revised CDP has taken into account the social development needs of the city such as the need for hospitals, education institutes, and recreational centers.

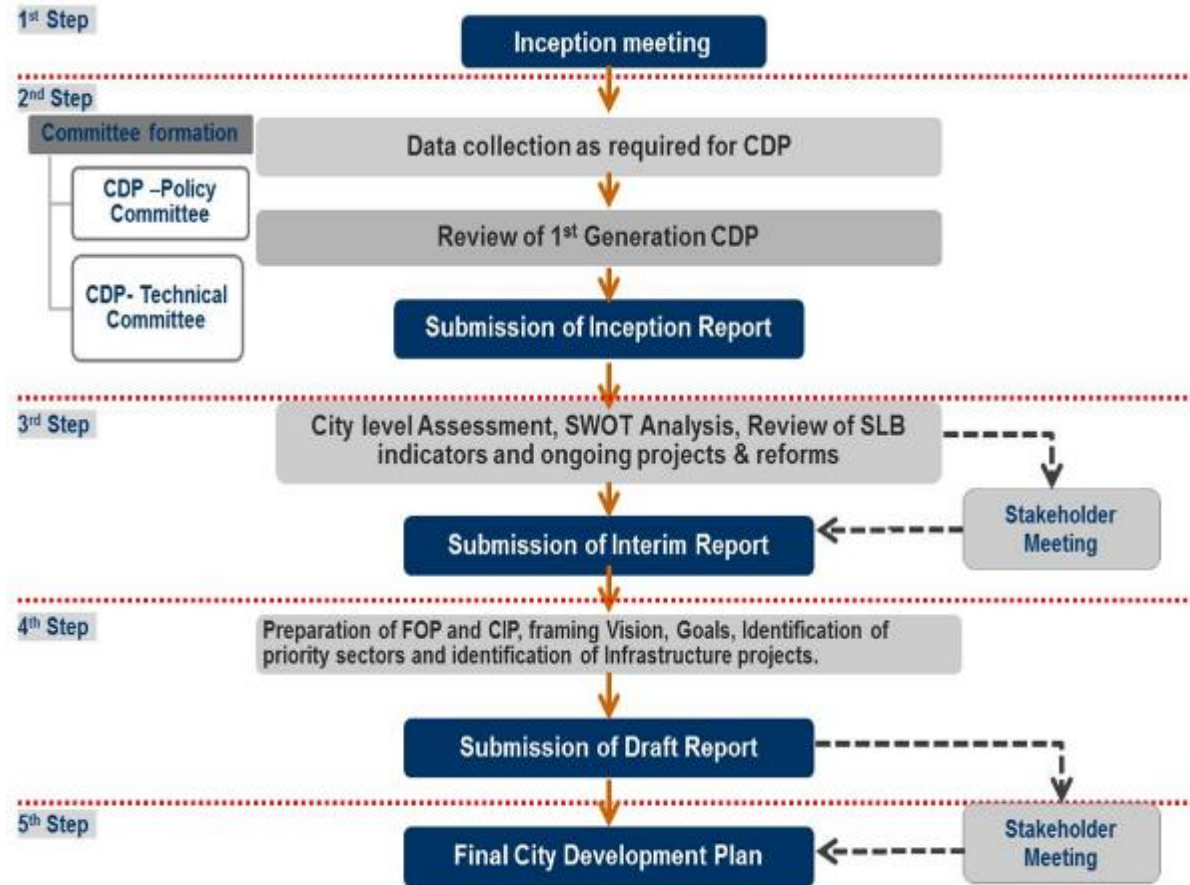
Institutional Development – Assessment of capacity-building required for ULBs to undertake development of city.

Financial sustainability -The revised CDP has assessed the revenue sources, areas of expenditure and current and future investment requirement of the city. Based on this, sustainable investment capacity has been arrived and measures to improve revenues and control expenditures have been suggested.

Reform Assessment Plan –The revised CDP also discussed status of various reforms undertaken by the ULBs to bring about improvements. These reforms are in the areas of accounting, e-Governance, property tax, user charges, building byelaws, etc.

Moreover, the approach is based on the philosophy of developing workable solutions. The methodology for undertaking the work of preparation of revised CDP is presented in the figure below. Broadly five steps in a sequential order have been undertaken in this work.

Figure 3: Revised CDP Preparation Methodology



Source: CRIS Analysis

1.6 Brief on 1st Generation CDP of Nagpur

Nagpur CDP was prepared in 2006 under the technical assistance from USAID. All the key officials of various departments were involved in the CDP preparation process. Nagpur Municipal Corporation’s (NMC) key officials and Head of Department’s (HODs) made presentations of their respective departments and highlighted the existing status and the vision of their departments.

NMC has formed the steering committee to prepare the CDP and coordinate with the consultant. As part of the CDP preparation process, the consultant organised various workshops with the key stakeholders. The officials from NMC and parastatal agencies, public representatives, political leaders, business groups and industry associations, NGOs, and the media representatives attended these workshops.

The workshops aimed at providing insights into the assessment of various sectors carried out by the consultant. Further, the consultant has incorporated the inputs provided by the stakeholders and accordingly finalized the CDP. This section presents an analysis of the first generation CDP with a focus on the service levels at the time of preparation of CDP

Vision formulated

- City Vision “The Growth nucleus of Central India”
- “To be an eco-city that provides adequate, equitable, sustainable access to urban services for all the citizens ...a city that is safe, livable and promotes growth of its citizens”

Following table presents the sector wise vision statement in Nagpur.

Table 1: Sector wise vision statement

Sector	Vision
Water Supply	Water for all and 24 x 7 water supplies along with safe, equity, reliability
Sewerage	100% coverage of sewerage collection and treatment of waste water
Solid Waste management	Clean City and Bin-Free City
Urban Poor	Access to basic services to all urban poor
Education & Health	Eradication of preventive diseases by 2011 and making Nagpur a medical service hub
Urban Environment	Clean and Green City

Projects envisaged under the CDP

The projects were finalized based on stakeholder consultations and were related to water supply, sewerage, storm water drainage, SWM, roads, and basic services to the urban poor. The investment for the projects was estimated at Rs. 5,984 crores.

Housing for the urban poor accounts for 27% of the total investment estimated for the city, followed by MRTS, roads, and water supply projects. The following table presents the sector wise investment plan.

Table 2: Investment envisaged in 1st generation CDP

Sl. No.	Sector	Investment Envisaged (Rs in crores)	Key Components of the Proposed Projects along with capacities
1	Water Supply	590	<ul style="list-style-type: none"> ■ Intake capacity addition by 113 MLD ■ Treatment capacity addition by 113 MLD WTP, pumping machinery and pumping main, feeder mains, and ESRs ■ Strengthening of the distribution system of the existing system, regularizing of unauthorized connections ■ Detection of distribution leaks and reduction of UFW
2	Sewerage	515	<ul style="list-style-type: none"> ■ Implementation of north, central, and west sewerage systems along with the construction of STP and ■ Branch sewer network augmentation
3	SWM	50	<ul style="list-style-type: none"> ■ Land acquisition for treatment facilities ■ Development of a new waste disposal site ■ Development of landfill infrastructure and composting facility at dump site
4	Storm Water Drainage	246	<ul style="list-style-type: none"> ■ Construction of storm water drainage alongside roads ■ River/canals canalization ■ Strengthening existing canals/rivers ■ Rejuvenation of Nag and Pilli rivers
5	Roads/Traffic/	1086	<ul style="list-style-type: none"> ■ Preparation of master plan for city transport

Sl. No.	Sector	Investment Envisaged (Rs in crores)	Key Components of the Proposed Projects along with capacities
	Transportation		<ul style="list-style-type: none"> ■ Outer ring road construction ■ Construction of bridges and flyovers ■ Road widening and improvements and traffic management
6	MRTS and Traffic Management	1550	<ul style="list-style-type: none"> ■ Implementation of public transport system for Nagpur city to ease traffic congestion and city transport conditions ■ Traffic signal improvement ■ Installation of the new signal system
7	Housing for the Urban Poor	1592	<ul style="list-style-type: none"> ■ Onsite infrastructure development for housing needs provision of basic services to the urban poor
8	Environment (Recycling and Reuse of Wastewater)	250	<ul style="list-style-type: none"> ■ Proposal for implementation of wastewater treatment plant on PPP basis for treating wastewater and using it for non-potable use (use in cooling towers of power plants and thermal plants, agricultural activities, small industries, etc.)
9	Others (Social Amenities)	15	<ul style="list-style-type: none"> ■ Projects for medical and health facilities, culture and heritage projects were also proposed.
Total		5894	

Source: City Development Plan, 2006

1.7 Brief Scenario after 1st Generation CDP

NMC has submitted the DPRs for various infrastructure projects such as water supply, roads, and reuse and recycled of wastewater. Against the investment proposed of Rs. 5894 crores in the CDP under JNNURM, total 19 projects worth Rs, 1,518 crores has been sanctioned, which also includes procurement of buses and implementation of e-governance system at NMC.

NMC has completed 10 projects, and the remaining nine are in progress. As on date, NMC has incurred expenditure of Rs. 787 crores on the sanctioned projects. The detail of the project implementation status has been presented in the Annexure.

1.8 Key Process Undertaken for CDP Preparation Process

CRISIL Risk & Infrastructure Solutions Limited (CRIS) has been appointed by Ministry of Urban Development (MoUD) for the Preparation and Revision of City Development Plans for 13 Selected Cities under Package 1 and 17 selected cities under Package 2. A kick-off meeting was organized by MoUD to review the work plan and approach for the assignment. The meeting was chaired by Ms. Nisha Singh IAS, Joint Secretary and Project Director and was attended by senior officials from MoUD, PMU from CBUD and officials from TCPO, CPWD.

CRIS Team made a presentation on the following aspects

- Our Experience in Preparation of CDPs
- Details of Assignment Coverage
- Our Approach - Revised CDP toolkit
- Proposed Teaming

The minutes of the kick off meeting have been provided in **Annexure 22.1.1**.

1.8.1 List of meetings

The list of meeting carried out during the CDP revision process with ULB officials, parastatal agencies, city stakeholders, Technical Advisory Committee and CBUD team have been outlined below.

Table 3: List of meetings during CDP revision process

Sr.No.	Meeting	Date and Venue	Participants
1	Inception meeting	4 th September 2013 at Commissioner chamber, NMC	NMC officials and CRIS team
2	Focussed Group Discussions	21 st to 25 th October 2013 in Nagpur city	City level stakeholders
3	Interim workshop	06 th December 2013 at NMC's Mahal Town hall	NMC officials, representatives from line departmetns, City level stakeholders and media.
4	Focus Group Discussions	4 th and 5 th April 2014 at NMC	NMC officals and city stakeholders
5	Meeting with NMC and NIT n on Draft CDP.	13 th August 2014 at NMC	Officals from NMC, NPNL and CRIS team
6	Meeting of HoDs of NMC for discussion on Revised Draft CDP	21 st October 2014 at the meeting hall, Nagpur Municipal Corporation (NMC), Nagpur.	NMC officials and CRIS team
7	TAC meeting	24 th November 2014 at 313 – B, committee room, Nirman Bhawan, New Delhi	TAC committee members and CRIS team.
8	Final Workshop	17 th March 2015 at Mahal, Town Hall, Nagpur Municipal Corporation	NMC officials, representatives from line departmetns, City level stakeholders and media.

Source: CRIS Analysis

1.8.2 Data collection

Secondary data on various sectors were collected from the respective departments including NMC, ATDP, NIT, SRA and RTO Nagpur etc. Other major documents/reports collected from Nagpur include CDP, Comprehensive Traffic and Transportation Plan, DPRs on water and sewerage sectors, CMP, municipal budgets and actual accounts, Maharashtra Municipal Act,2012 etc. Subsequently, the review of 1st generation CDP has been conducted and the inception report has been submitted to MoUD and NMC on 30th October 2013.

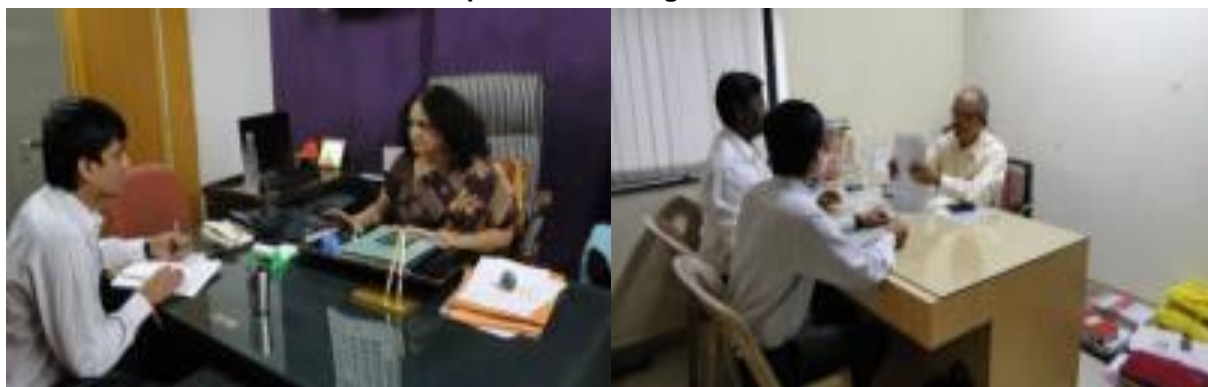
1.8.3 Technical and Policy Committee Formation

In line with Gol's revised tool kit for CDP preparation, NMC has formed both policy and technical committees. The team has been involved in the preparation of the CDP for the city. The details of the committees have been annexure with this report.

1.8.4 Stakeholder's consultation

To ensure a participatory and inclusive development process CRIS team carried out wide range of stakeholder consultations and focus group discussions with the city stakeholders of the city. The exercise involved mapping of the key stakeholders in the city followed by discussions on city level issues.

Discussions with various head of department during 21st to 25th October 2013




1.8.5 Stakeholder workshop

The snapshots of various stakeholder workshops conducted during the revision of CDP for Nagpur have been presented below. The detailed discussion on these workshop has been presented in the City vision, development goals and strategies section.


1. Inception meeting

Stage 1	Inception meeting
Agenda	The objective of the inception meeting was to discuss with the NMC officials on the process for CDP preparation and the role of the ULB and other line departments in the preparation process etc. and also, explain the relevance of formation of policy and technical committees as envisaged in revised CDP Toolkit.
Timing	The inception meeting was organized on 4 th September 2013 at NMC to initiate the commencement of CDP preparation process.
Venue	Commissioner chamber, NMC
Participants	<ul style="list-style-type: none"> ▪ Officials from NMC and ▪ Representative from CRISIL Risk and Infrastructure Solutions Ltd. (CRIS)
Outcomes	<ol style="list-style-type: none"> 1. Awareness among the municipal officials on the Revision of CDP process 2. CRIS team informed during the meeting regarding formation of policy committee and technical committee. 3. Subsequently, the review of 1st generation CDP has been carried out and inception report has been submitted to MoUD and NMC on 30th September 2013.

Stage 1	Inception meeting
Photographs	

Source: CRIS Analysis

2. Interim workshop

Stage 2	Interim workshop
Agenda	To present the status and performance of service delivery mechanism in Nagpur, City SWOT analysis to the stakeholders. And to understand aspirations of the citizen on city development and framing of the vision for Nagpur.
Timing	The workshop was conducted on 06 th December 2013 post the city assessment; stakeholder consultations on city issues and prioritisation of sectors.
Venue	Nagpur Municipal Corporation, Nagpur
Participants	The Municipal Commissioner chaired the workshop and there were 60 participants including the representatives from Parastatals agencies, NGOs and academicians.
Outcomes	Grouping of stakeholders was carried out to discuss sector specific issues. The views and suggestion provided were noted down. Sectoral issues and suggestions were identified; Vision formulation exercise was carried out.
Photographs	

Source: CRIS Analysis

3. Focus Group Discussions

Stage 3	Interim workshop
Agenda	To discuss issues and strategies in the sectors such as urban infrastructure, traffic and transportation, local economic development, urban governance and finance, heritage management and urban environment.
Timing	4 th and 5 th of April 2014 during preparation of Draft CDP
Venue	Nagpur Municipal Corporation, Nagpur
Participants	City level stakeholders, NMC officials and CRIS team.

Stage 3	Interim workshop
Outcomes	Sector specific issues were discussed. The views and suggestion provided by stakeholders were noted down.
Photographs	

Source: CRIS Analysis

4. Meeting of HoDs

The meeting with head of the departments of NMC was organized on 21st October 2014 to discuss the revised draft CDP for Nagpur and further to take the consent on the projects proposed in the revised draft CDP.

- The meeting was chaired by the Additional Municipal Commissioner of NMC and was attended by the head of the departments of concerned departments of NMC.
- The nodal officer for CBUD project at NMC has briefed about the CBUD project. The nodal officer has also briefed about the current status of the revised CDP for Nagpur.
- Further, the team leader from CRISIL has made a presentation on the revised draft CDP and also informed that the comments and suggestions received from NMC were incorporated in the revised draft CDP.

Further, the department/section wise the projects and components were discussed. The details minutes of the meeting have been annexed with this report.

5. Final Workshop

Stage 3	Final Workshop
Agenda	To discuss the proposed projects for the each sector, sector strategies and the financial operating plan for NMC
Timing	17 th March 2015 at Draft CDP stage
Venue	Nagpur Municipal Corporation, Nagpur
Participants	City level stakeholders, NMC officials and CRIS team.
Outcomes	Strategies for the priority projects and reforms for the revenue improvement
Photographs	

Stage 3	Final Workshop

Source: CRIS Analysis

2 Introduction to the City

Nagpur derived its name from the Nag River or Nag people and is known since prehistoric times. Nagpur and its surrounding region also find a mention in the Vedic and Mauryan scriptures. Nagpur city's foundation was laid by the Gond King of Deogad, Bakht Buland Shah, in the year 1703. Chand Sultan, successor to Bakht Buland Shah, constructed a three-mile-long wall around his city by the Nag River. In 1743, it became the capital of Raghoji Rao Bhonsle's kingdom. The Bhonsle period witnessed peace with cultural and economic prosperity. Cottage and handloom industry started developing during this period.

The city was annexed in 1817 by the British after the defeat of Appasaheb Bhonsle in the Battle of Sitabuldi. Consciousness for planned city development was raised by Sir Patrick Geddes, who visited the city in 1915.

The Nagpur Improvement Trust (NIT) was established in 1936 to carry out planned development in the city. The British government made Nagpur the capital of the new state named Central Province in the mid-19th century and it remained till 1956, after which it was part of the state of Maharashtra and became the winter capital of Maharashtra. Thus, Nagpur has enjoyed the status of the administrative centre of Central India during the ancient and medieval eras.

Salient Features of Nagpur

- It's located at the geographical centre of the country.
- It is an important urban area in the Vidarbha region and winter capital of Maharashtra.
- Nagpur is known as city of oranges and the tiger capital of India
- Indian Air Force's maintenance command base, ordnance factory and Staff College are located in Nagpur. Also, Indian Air Force's giant transport planes (IL-76) nicknamed "Gajraj" are based in Nagpur.
- Presence of MIHAN, IT parks and health facilities that serves the region
- The city is famous for the Nagpur Orange and is known as the "Orange City" for being a major trade centre of oranges cultivated in the region.

Figure 4: Transformation of Nagpur during 21st century

Nagpur in 1902



Nagpur in 2013



Picture shows 'Sitabuldi' area, which is a commercial area located at the centre of Nagpur

2.1 Regional setting

Nagpur is seen as one of the rapidly developing central India's metro city² and also ranks third in the list of the urban centres in the state of Maharashtra. Nagpur enjoys the privilege of being termed as the richest city, greenest city, city with latent potential, hub of health care industry in the state, tiger capital of the country, etc. As per R. K. Swamy's BBDO Guide to Urban Markets, 2005, Nagpur is considered to be the 10th richest city in the country.³ It is also second greenest city in the country.

Nagpur has the benefit of being strategically and centrally located in the country. Also it is strategically located at the geometrical centre of international aviation route between south-east Asia-Europe and Northeast Asia-African making it favourable for the development of an international hub for passenger and cargo movement. Based on this, the city is home to the Multi-Modal International passenger and cargo Hub Airport at Nagpur (MIHAN) comprising an international airport, a multiproduct special economic zone IT Park. Nagpur is the only city after the country capital, New Delhi, to be connected to all the states through the railways; it is the focal point or point of convergence of different routes. The city also has good road connectivity with the neighbouring states.

Nagpur has all the ingredients for becoming a competitive city. Nagpur city is considered to have great potential and capabilities to grow and prosper based on the resources available in the region. Nagpur has been the main centre of commerce in the Vidarbha region since early days and is an important trading centre.

Nagpur is the only metropolitan in a radius of 500 km in terms of population, developed social infrastructure and services it offers. This makes Nagpur an important centre not only restricted to regional level, but within a large catchment area, which includes other cities of Maharashtra and cities of surrounding states. This is attributed to the opportunities available for people to carry out business, trade and commerce; to opt for jobs, education, health facilities available in Nagpur. Some of the important aspects which has is attracting people to Nagpur are as listed below.

- Nagpur is emerging as the largest trading centre for goods and services. Sitabuldi Market in central Nagpur is one of the busiest commercial areas of Nagpur. Nagpur is also a hub for food grain market in the Vidarbha region. The city boasts of Asia's biggest food grain market complex. This region also produces the biggest yield of cotton. Itwari and Mahal areas host a large number of small businesses and are very famous for shopping and are crowded, especially during holidays.
- Most of the industries in the district of Nagpur predominantly are engineering, textiles, coal mining, and agriculture based. Engineering industries like fabrication workshops, re-rolling mills, foundries, manufacturing of steel furniture, auto parts, machinery and machinery parts there are in Nagpur. There is sufficient scope for the promotion of ancillary industries based on the existing large/medium scale industries and public sector enterprises.
- Nagpur is the biggest market of teak wood in India. There are three industrial estates (MIDC⁴ area) in Nagpur – Butibori MIDC, Hingna MIDC, and Kalmeshwar MIDC. The Butibori industrial area serves to be one of the major venues where a large number of Nagpur industries have been set up. In fact, the Butibori region is considered to be the largest in entire Asia in terms of area.

² Interpretation from an article published in "The Economist Times" on December 24th, 2008

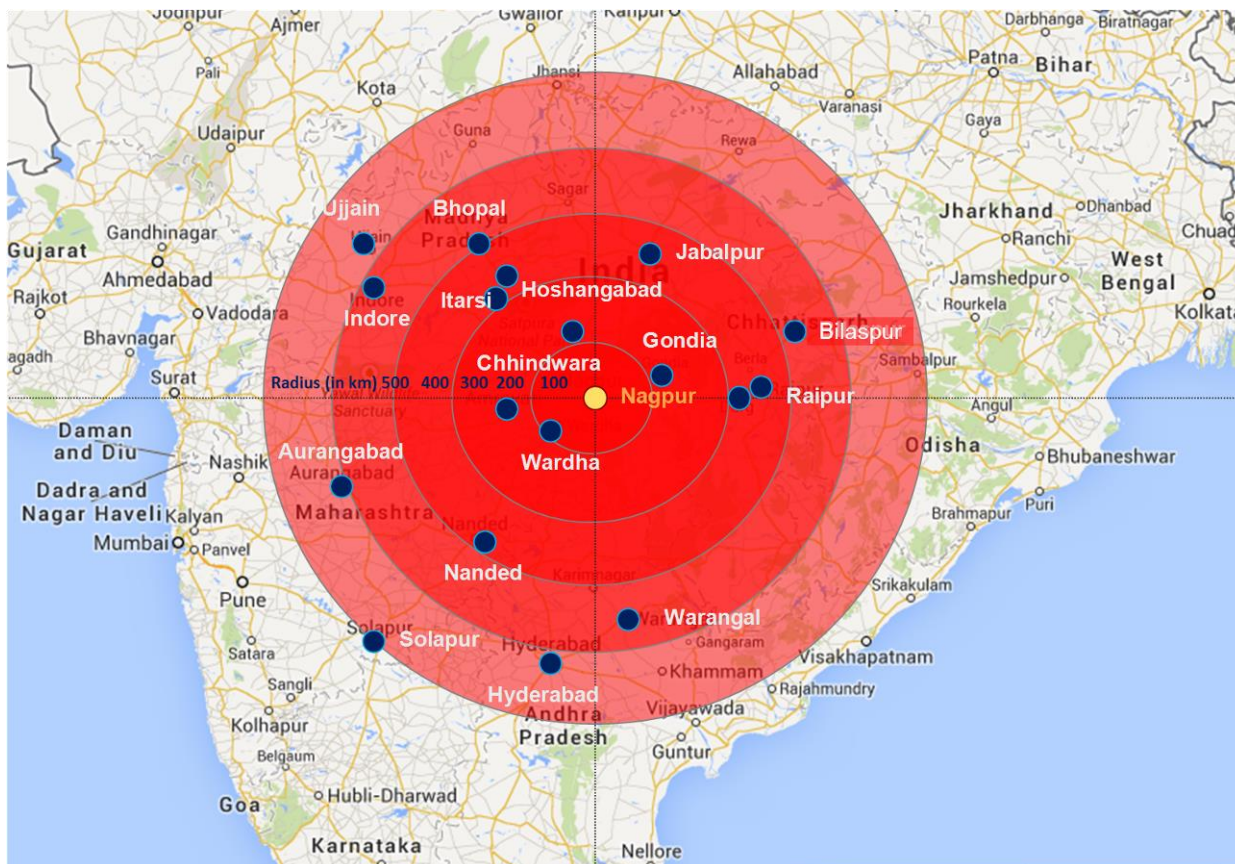
³ Interpretation from an article published in "The Economist Times" on December 24th, 2008. Web link-

http://articles.economictimes.indiatimes.com/2008-12-24/news/27722689_1_nagpur-growth-nucleus-second-greenest-city

⁴ MIDC stands for Maharashtra Industrial Development Corporation estates or zones or areas

- Nagpur has immense potential for development of medical, educational, and industrial sectors among others. The private sector has already identified these spheres and all-round development is being witnessed here today.
- The public sector has also identified Nagpur as a city of international importance. Later, during 2004 composite project called MIHAN was proposed, which will be home for international airport and an SEZ. It is estimated that MIHAN would attract investment around Rs. 5000 crores and will play a crucial role in enhancing the regional economy and Nagpur's competitiveness compared to other cities located within a radius of 600 km.

Figure 5: Nagpur's regional and national setting



Source: CRIS analysis

Orange city – Nagpur

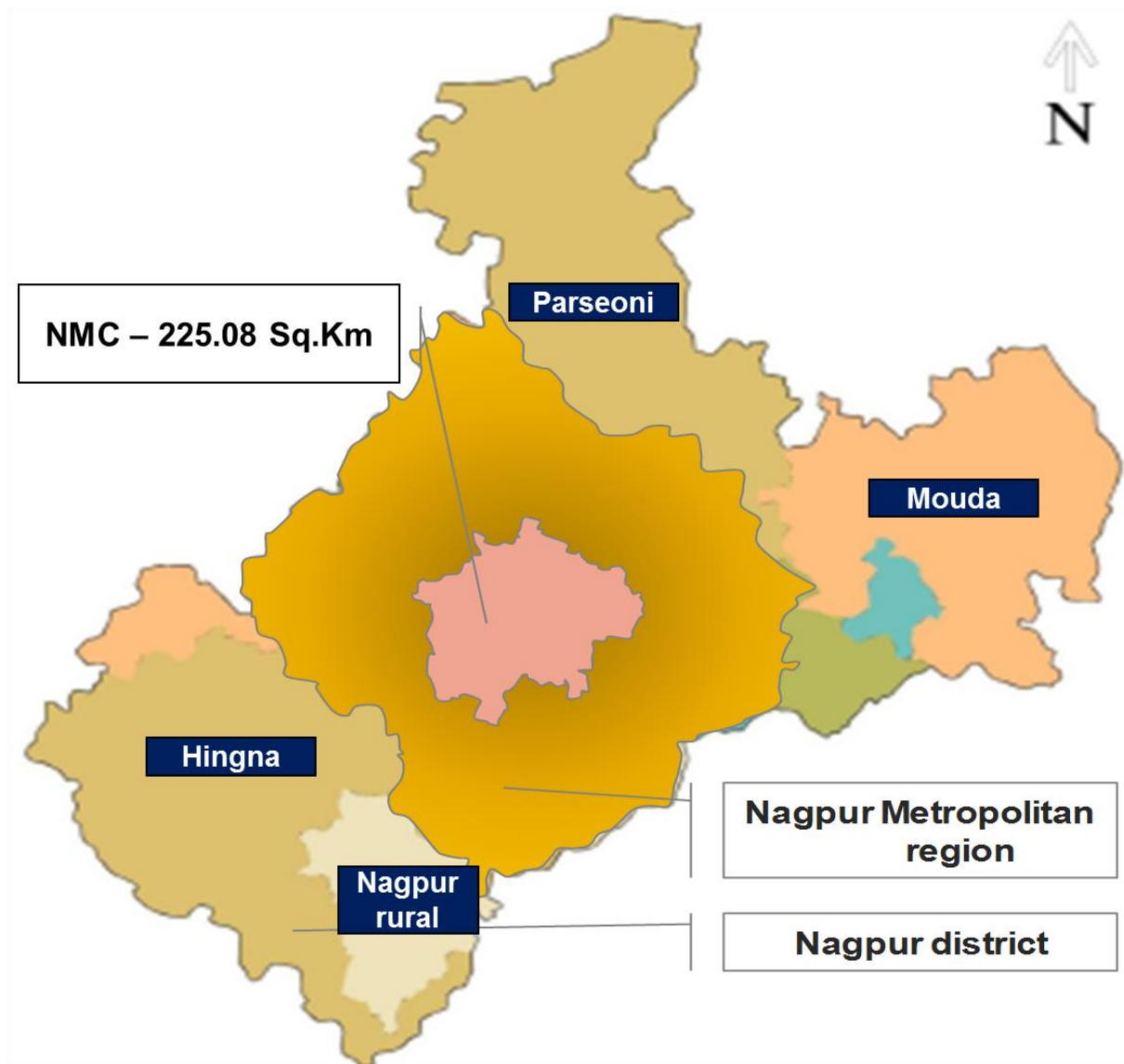
Nagpur is famous for the Nagpur Orange and is known as the "Orange City" for being a major trade centre of oranges cultivated in the region. The Jawaharlal market yard in the city is the major market for Oranges in Nagpur. The yard is run by Agricultural Produce Market Committee of Nagpur. The Shanichara bazaar is the other famous market place for Oranges.

2.2 Administrative boundary

Nagpur is an important urban centre in the Vidarbha region. Nagpur is the administrative capital of the district and the largest urban centre in the district in terms of population and area. The city is a part of the Nagpur division. The Nagpur Municipal Corporation (NMC) is the only corporation in the district with a jurisdictional area of about 225.08 sq km and is divided into 136 administrative wards.

NMC and NIT are the two main authorities and are responsible for provision of services. NMC is the main authority and responsible for carrying out all the obligatory functions as per the applicable act (Maharashtra Municipal Corporation Act, 2012). NIT was the planning authority for Nagpur city till the year 2000. As on date, NIT is a special planning authority for the Nagpur Metropolitan Region and is also responsible for provision of infrastructure and certain services in the periphery of the NMC jurisdiction.

Figure 6: Administrative boundaries - city, region, and district



Source: NMC, town planning department

2.2.1 Location and connectivity

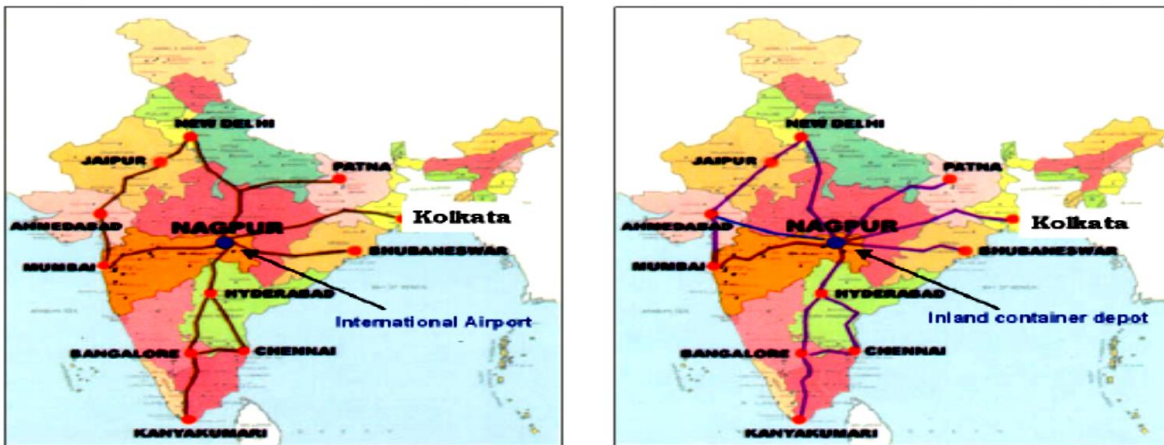
Nagpur is situated in the eastern part of Maharashtra. The city is located between 78°30' to 79°30'E and 20°30' to 21°45'N latitude. Nagpur is situated at an altitude 310.5 m above mean sea level.

Road connectivity

Nagpur city is well connected with all major cities by the road network. All major highways and railways pass through Nagpur. Due to the good connectivity, the city has become a major trade and transportation centre in the region. The following national highways (NH) and state highways (SH) pass through the city.

- NH 7: Connecting Varanasi-Jabalpur-Nagpur-Hyderabad-Bangalore-Kanyakumari
- NH 6: Connecting Hajira, Gujarat-Surat-Dhule-Amravati-Nagpur-Raipur-Sambalpur-Kolkata
- NH 69: Connecting Nagpur-Betul-Obedullaganj near Bhopal
- SH 9: Nagpur-Umred-Nagbhid-Chandrapur
- SH 248, SH 255, and SH 260

Figure 7: Connectivity to and from Nagpur city



Source: Nagpur Traffic and Transportation Plan, 2031

Rail connectivity

In Nagpur, the railway service was started in the year 1867. Nagpur is an important railway junction and a transit for all the trains that connect the four major metropolises Mumbai, Delhi, Chennai, and Kolkata. Within the city, there are small railway stations located at Ajni, Itwari, Kalamna, Kamptee, and Khapri.

As on today, around 160 trains from various destinations pass through the city. Further, 65 trains pass through the city on a daily basis; about 26 trains start or end at Nagpur. Annually, Nagpur railway station caters to about 1.6 lakh passengers.

Figure 8: Images of Nagpur railway station



Air connectivity

Nagpur has an airport located in the MIHAN area, and the domestic airlines connect with major cities such as Mumbai, Delhi, Ahmedabad, Pune, Bengaluru, Hyderabad, Indore, and Kolkata. Nagpur is also connected to international destinations such as Bangkok, Singapore, Doha, Dubai, and Sharjah. In

addition, the proposed MIHAN, which is considered as a cargo as well as passenger hub, will enhance the connectivity with more destinations.

Figure 9: Images showing Nagpur international airport



2.3 Defining the study area

Recently, two census towns namely Hudkeshwar Bk. and Narsala have been merged with the NMC jurisdiction. The jurisdiction of NMC has increased from 217.57 sq km to 225.08 sq km. The CDP has been updated and revised for the expanded jurisdictional boundaries. The population of the study area as per the 2011 census is about 24.48 lakhs. The details of the population and size of the study area are presented in the table below.

Table 4: Population of the study area and size of the area considered for revised CDP, 2041

Jurisdiction details	Population (in lakhs)	Size of the jurisdiction (in sq km)
Nagpur city (NMC jurisdiction)	24.06	217.56
Narsala (Census Town)	0.17	7.52
Hudkeshwar Bk. (Census Town)	0.25	
Total	24.48	225.08

Source: Nagpur Municipal Corporation

2.4 Physical setting

2.4.1 Topography

All major geological formations are observed in this region. Remnants of the eastern edge of the rolling Mahadagarh Hills, which are themselves extension of the more prominent Satpura Ranges, can be seen in the city in the form of Seminary Hills, Starky Point Hill, Ramnagar Hill, and Sitabuldi Hill.

Centre

Geographically, Nagpur city lies at the origin (vertex) of the 'V' shaped Nag River Basin with its vertex at the edge of the Deccan trap plateau and arms spread eastward in the alluvial plain up to the mighty Wainganga River. There is a well-demarcated drainage with a continuous slope from east to west in the central areas of the city. This demarcation is prominently visible in the city, especially at its western edge. Also Nag River and its main tributary and the Pili River originate within Nagpur and are considered to be main rivers in this basin.

West

The areas to the west are interspersed with low elevation and are located into the valleys covered with black cotton soil, mixed with stones. An important bio-geographic system close to the city is the extensive grassland of the Deccan Plateau, extending from Rajasthan to Andhra Pradesh.

Although, Nagpur city and the surrounding region are slightly away from the 'arid zone', the character of the areas in the west of the city can best be described as scrubland and grassland. The major tanks are located at the western edge of the city, on a rim of elevated hills from which two rivers appear to rise and flow eastward.

South

Southward, the area is similar to the west. To the southeast, east, and the northeast the surface is, for the most part, a plain covered with alluvial deposit of the Kanhan and its tributaries.

East

The corridor in which Nagpur city lies roughly coincides with the Satpura and Vindhya ranges and connects the Western Ghats and Aravali Range. The city stands on the eastern edge of the undulating trap, which includes Sitabuldi Fort one of the historical structures in the city.

The eastward slope extends right up to the mighty Wainganga, which is about 80 km away. In the city, especially along the rivers, large amount of greenery and open space exist, which can be used for further eco-development.

2.4.2 Geology (soil)

Knowledge of the soils is very essential for land use planning. The major soil texture in Nagpur is clayey, where the clay content varies from 35% to 75%. In some of the areas, the soil texture ranges from clay loam to sandy clay loam. As most of the soil is clayey, it is productive having very good water holding capacity. The organic matter content in the soil is usually less than 0.75%. The soil pH varies from 8 to 8.5. The problem of soil salinity does not exist in Nagpur.

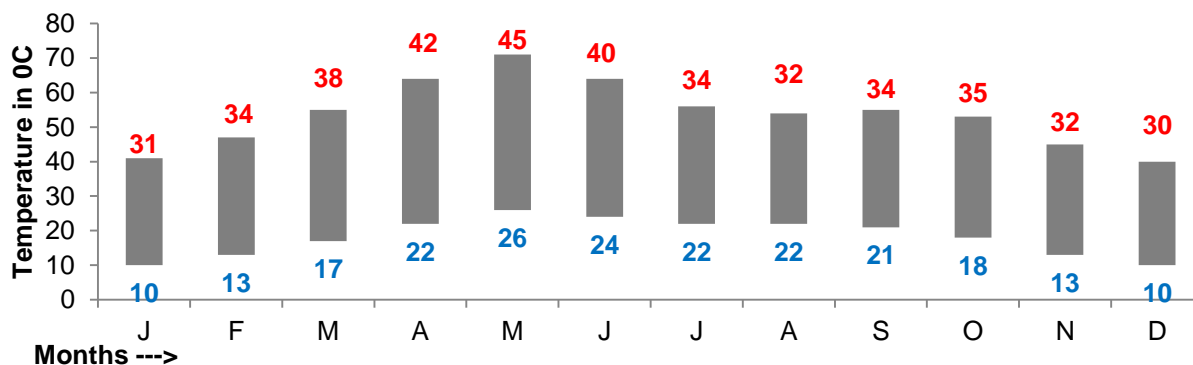
2.4.3 Climate

The climate of Nagpur city is characterized by hot summers and is located in the arid zone. Also, typical seasonal weather pattern is observed in Nagpur with good rainfall in the monsoon season, cold, and dryness with hot summer. The cold season is from December to February and is followed by the hot season from March to May. The southwest monsoon season is from June to September, while the period October-November constitutes the post-monsoon season.

Temperature and humidity

Nagpur is classified as a city with tropical wet and dry climatic conditions. Summers are hot and winters are cold. The average rainfall in a day is about 92 mm. Nagpur gets rainfall during the period of June to September due to the southwest monsoon.

The city experiences extreme hot summers (March to May) with temperatures rising up to 48°C. Extreme summers are experienced during the month of May, and those days are locally referred to as 'Nava Tappa'. During November to February, the temperature drops as low as 10°C to 12°C. The least temperature is recorded during winters in the month of December, around 4°C.

Figure 10: Monthly maximum and minimum temperature at Nagpur

Source: India Meteorological department of inida

Rainfall

In Nagpur, the average annual rainfall is 1161.54 mm. The southwest monsoon usually reaches the city in the second week of June. Around 90% of the total rainfall happens during June to September duration. The highest rainfall is reported in the month of July. The variation in the annual rainfall from year to year is not much.

Wind direction

Winds are generally light to moderate throughout the year, some increase in wind speed is observed during the later months of summer season and the monsoon months. Winds during the monsoon season are from the southwest direction. In January, winds from directions between northwest and northeast are common in the morning hours and changes directions to northeast to southeast during the afternoon hours. While the winds in the morning hours during February and March months are similar to that in January; however, the afternoon winds become variable. In the rest of the summer season, the winds are mostly from southwest to northwest.

2.4.4 Agriculture, mineral, and industry

Nagpur district's major economy is from the agriculture and related activities. Paddy, Jowar, cotton, tur, soyabean, and oranges are some of the crops grown in the district. Apart from this, the district is moderately rich with minerals such as coal, manganese ore, dolomite, limestone, iron ore, clay, copper ore, chromites, tungsten ore, zinc ore, and quartz.

Coal reserves have been found in the North-West belt of the district i.e. from Saoner to Kanhan (Kamptee apart from the high coal found in umrer tahsil).The region is richly endowed with Manganese Ore and the district is well placed in the country as far as production of Manganese ore is concerned. Manganese ore is found particularly in Ramtek and Saoner tahsils.

Good quality limestone is found in Kandri and Deolapar, Mica and Tungsten are also found in the district. The sand from Kanhan River is considered to be of high quality as far as the construction of building is concerned. The mineral base supports the industrial activity in and around Nagpur city. The city has Butibori MIDC, which is Asia's biggest industrial zone, along with 7 other MIDCs.

2.4.5 Water resources

Nagpur city gets raw water from three different surface sources, viz., Gorewada tank, Kanhan River, and Pench canal. The sources have been developed over a period of time. Maximum amount of water is drawn from Pench schemes and Kanhan at present. Pench is a reservoir.

There are several natural water bodies within the city including 12 lakes, 2 rivers, and 5 nallahs. The lakes (Gorewada, Futala, Ambazari, Sonegaon, Sakkardara, Gandhisagar, Lendi Talao, Naik Talao, Dob Talao, Sanjay Nagar Khadan, and Pardi) cover an area of about 3.13 sq km.

The Nag and Pili rivers cut across the city and are 15.73 km and 12.11 km in length, respectively. Besides these, Chamar Nallah, Shakti Nagar Nallah, Hudkeshwar Nallah, Swawalabmi Nagar Nallah, and Sahakar Nagar Nallah also pass through the city.

Apart from this, ground water is another of the source of water, which is used for various purposes like drinking, washing, bathing, etc. The depth of ground water table in the central part of the city is about 1.65-1.95 m, and it can go up to 16 m in the peripheral areas. The Central Groundwater Board (CGB) has estimated that ground water availability in Nagpur can be up to 25 million cubic meters (MCM) per year.

2.4.6 Forest resources

The total area of NMC jurisdiction is about 21756 ha, out of which 7250 ha of land is under green cover. But, as per the proposed land use for 2031, the green cover area has been reduced to 6146 ha from existing 7250 ha. Due to the conversion of agriculture land use into residential and commercial uses, the green cover has reduced significantly in the city.

Around 45 gardens and parks have been as developed by NMC. Around 40 gardens have been developed by NIT in the city. Apart from these gardens, NMC has also developed landscapes at various locations, which is intended to increase the green cover in city. About 2.62 ha of land were developed as part of landscaping.

Due to population growth and increase in the number of vehicles, pollution has been increasing over the years. However, the tree plantation projects have helped safeguard the environment to some extent. NMC has carried out tree plantations and development of gardens and parks to preserve the green cover in the city.

3 Demographic profile of the City

The chapter presents a detailed overview of the demography profile of the city and the overall position with reference to the state and district. It also describes the population growth trends, spatial distribution, and other demographic characteristics of the city. In addition, based on the past trends and potential of the city, the future population has been estimated through various scientific methods.

3.1 Background

Nagpur is the capital of Vidarbha and the second capital of the state. Nagpur stands third in terms of the population in the state after Mumbai and Pune. Maharashtra is located in the western part of the country. It has a long coastline stretching nearly 720 km along the Arabian Sea. As per census 2011, Maharashtra was the second most populous state in India. And the population was about 11.24 crores persons, which have spreaded over an area of 3.08 lakh sq km.

3.2 Population and urbanisation

Urbanization is an indicator of the level of development in the region. Maharashtra has the highest level of urbanization in the country. The section will provide a review of the demographic profile of state, district and city. Further, the trends have been compared with those of the neighbouring cities.

3.2.1 Maharashtra – Trends in urbanisation

Maharashtra is considered to be one of the most urbanized states in India. As per Census 2011, the state's urban population accounts for 45% of the state's total population. In the last decade, Maharashtra has witnessed rapid urbanization, and the population has grown at the rate of 16% as compared to the 1991-2001 decade.

Further, Maharashtra is divided into 35 districts and 353 sub-districts for administrative purpose. Each district has one urban centre/district headquarters, which has emerged as an important centre for trade and commerce activities in the district. The list of cities/urban agglomerations in Maharashtra with more than one lakh population is provided in the annexure.

The state has total 36 cities, of which 14 important cities account for the major share in the state's urban population. Based on the population size, the cities have been categorized into groups, which is as shown below;

- 13 cities with less than 2 lakh population
- 10 cities with population between 2-5 lakhs
- 7 cities with population between 5-10 lakhs

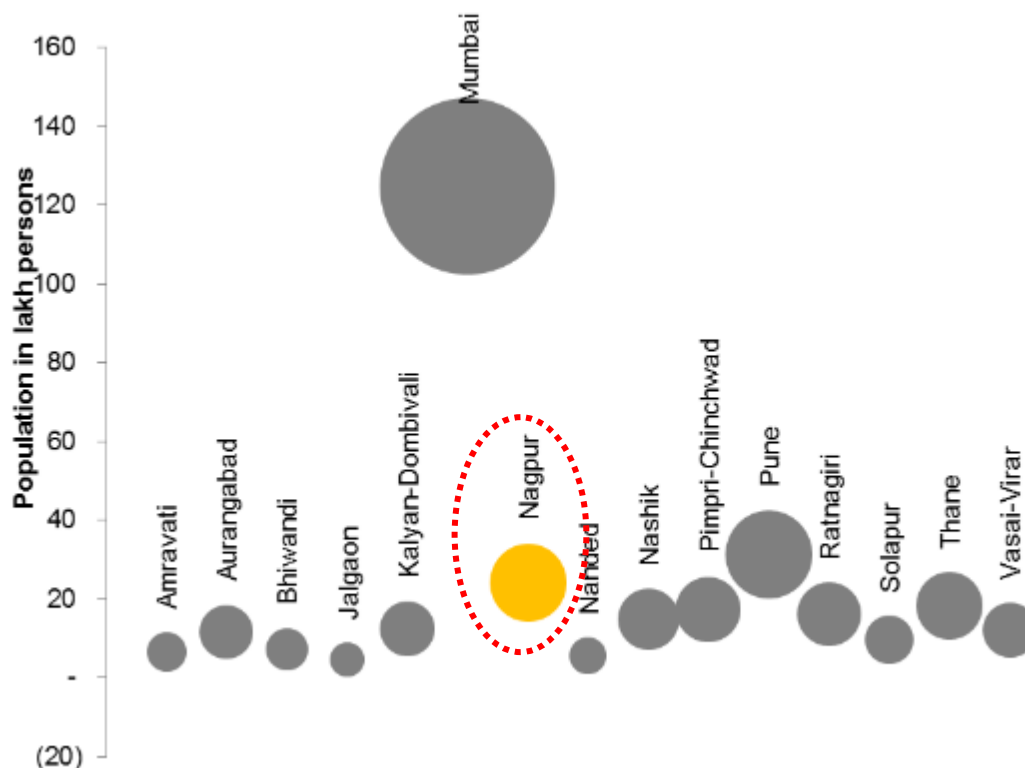
Key facts in 1st generation CDP

- NMC had a population of 20.52 lakhs as per census 2001 and increase in population was at a decadal growth rate of 32%. The city had an average population density of 9,631 persons per sq km spread across an area of 217.56 sq km.
- The sex ratio of Nagpur was 936, which is almost close to the all-India average of 933, however it was better compared to other cities like, Bangalore, Ahmedabad, Chandigarh, Indore, Lucknow, and Surat during 2001.
- During 2001, around 65% of total population was of age less than 25 years, which indicated presence of young crowd in city.

- 6 cities with population above 10 lakhs

Maharashtra has six urban centres with population more than one million and the cities are Mumbai, Pune, Nagpur, Thane, Nashik, Pimpri-Chinchwad, and Aurangabad. Apart of this, other cities such as Amravati, Bhiwandi, Kalyan-Dombivali, Nanded, Solapur, and Vasai-Virar also emerged as important centres in the state. The list of the key urban centres has been presented in the figure below.

Figure 11: Urban centres in Maharashtra



Source: Census of India data and CRIS analysis

The population trends of major cities have been compared. It can be observed from the table below that Thane and Pimpri-Chinchwad have reported a significant growth in the population during 2011 compared to previous 2001 figures. This is due to industrialization and high migration from various states as well within the state. At the same time, Nagpur has reported moderate growth rate during the period 2001-11. The table below presents the population and the growth rate for the major urban centres in Maharashtra.

Table 5: Major cities in Maharashtra

Principle cities	Population in lakhs (2001)	Population in lakhs (2011)	Population growth (%)
Mumbai – UA	99.25	124.78	4
Pune	15.66	31.15	23
Nagpur	16.24	24.48	17
Thane	8.03	18.18	44
Pimpri-Chinchwad	5.17	17.29	71
Nashik	11.52	15.62	37

Source: Census of India data and CRIS analysis

Note: UA – urban Agglomeration

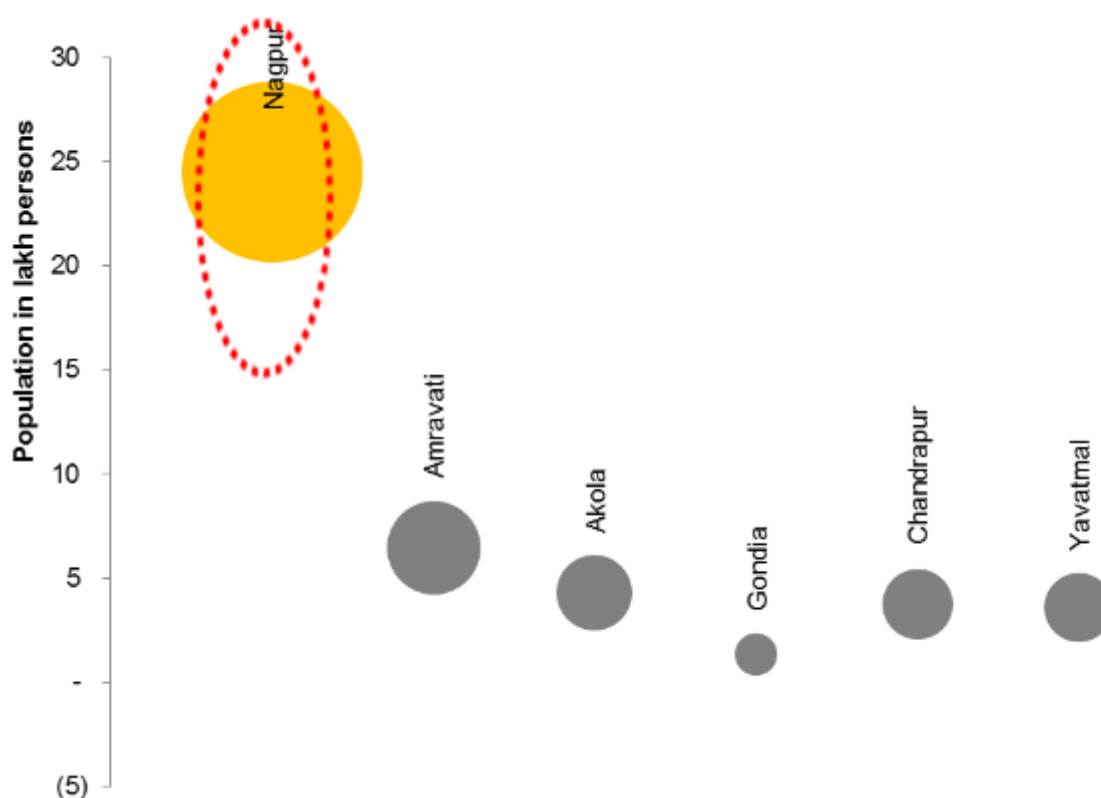
3.2.2 Vidarbha region

Vidarbha is the eastern region of Maharashtra state. The Vidarbha region consists of Nagpur and Amravati division. The region accounts for 32% of the total area of the state. The region accounts for 21% of the total population of the state.

It borders the state of Madhya Pradesh to the north, Chhattisgarh to the east, Andhra Pradesh to the south, and Marathwada and Khandesi regions of Maharashtra to the west. Vidarbha has its own rich cultural and historical background distinct from the rest of Maharashtra.

It can be observed from the following figure that Nagpur is the largest city in the region, followed by Amravati Akola, Chandrapur, Yavatmal, and Gondia. All these urban centres are the district headquarters of their respective districts.

Figure 12: Urban centres in Vidarbha region

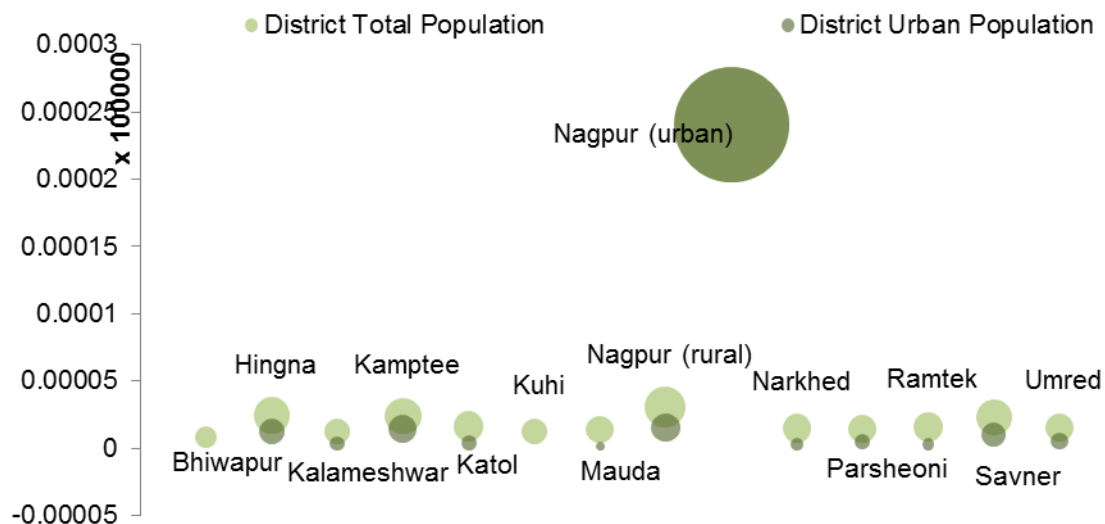


Source: Census of India data and CRIS analysis

3.2.3 Nagpur district

Nagpur district has been sub-divided into 14 sub-districts for administrative purpose. Nagpur Urban is the largest sub-district in terms of population. As per Census 2011, Nagpur district has a population of 46.5 lakhs, out of which 31.7 lakhs (68% of the total district population) are residing in urban centres in the District. In Nagpur district, urban population accounts for 6% of the state urban population. The total district population accounts for 4% of the state total population. Within the district, Nagpur city is the largest city in terms of population.

Figure 13: Level of urbanisation in Nagpur district



Source: Census of India, 2011, and CRIS analysis

3.2.4 Nagpur city

Nagpur city is the third largest urban agglomeration in the state of Maharashtra in terms of population. As per Census 2011, Nagpur accounted for 6% of the total urban population of the state and 76% of the district urban population of Nagpur district. In addition, 52% of the total district population resides within NMC. In the past, Nagpur attracted the migration and floating population from the neighbouring districts of Maharashtra for education, employment, and business. However, the trend has decreased over the last decade.

Table 6: Population trends at various tiers – Total, rural, and urban for 2011

Indicator	Population (2011) (In Lakhs)			% of Urban Population w.r.t. Total Population	NMC comparison – Urban Population- %	NMC comparison – Total Population- %
	Total	Rural	Urban			
Maharashtra	1124	616	508	45%	6%	2%
Nagpur District	47	15	32	68%	76%	52%
NMC	24.48	0.0	24	100%	100%	100%

Source: Census of India, 2011, and CRIS analysis

3.3 Population growth trend

Nagpur’s population has been steadily increasing since 1971. During the decade 1971-81, the population has increased to 12.71 lakhs from 8.66 lakhs and reported a decadal change of 3.51 lakhs and registered a decadal growth of 26%. In the successive decade (1981-91), the city registered decadal change of 4.06 lakh population. This was followed by 4.24 lakh decadal change during the decade 1991-01, reporting a decadal growth of 21%.

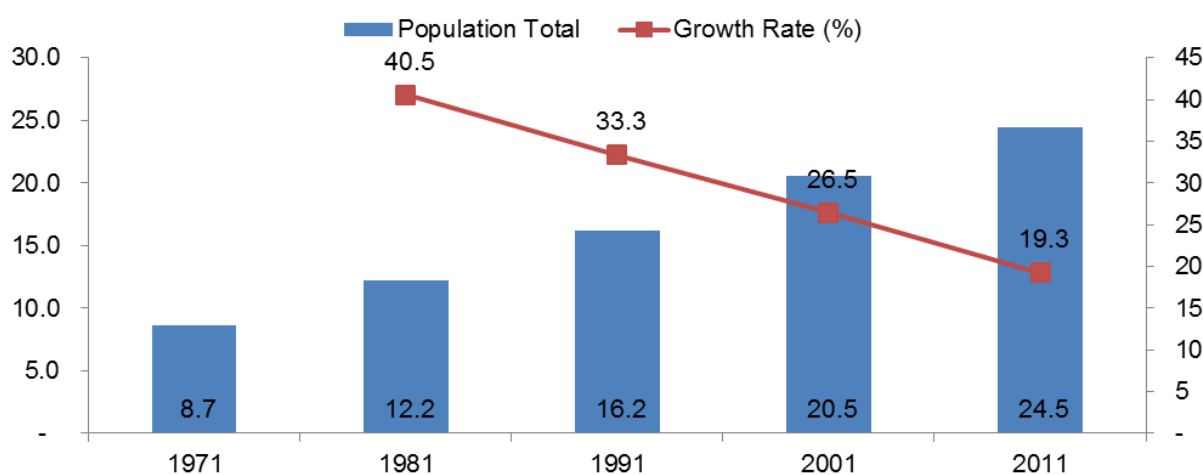
As indicated in the table below, the decade 2001-2011 had registered the lowest decadal change. Discussions revealed that during this decade, NMC has witnessed only the natural growth, and the migration population accounts for only nominal growth.

Table 7: Population trend in Nagpur city

Census year	Population (in lakhs)	Decadal change (in Lakhs)	Growth rate (%)
1971	8.66	-	-
1981	12.17	3.51	40
1991	16.22	4.06	33
2001	20.52	4.29	26
2011	24.47	3.53	19

Source: Census of India, 2011, and CRIS analysis

Overall, the population trends in the city show a declining growth rate over the decades. Increase in the population is attributed to natural growth only. The reason for declining population growth rate is due to limited economic opportunities in the city. Even though Nagpur is a base for various economic activities, is home to the much-planned MIHAN project, and has the potential for the development of IT parks, Nagpur could not tap the advantage of the projects and the economic activities. Hence, in-migration in Nagpur due to jobs or work related reasons was negligible. The city has witnessed less in-migration during the period 2001-2011. This indicates that, perhaps, Nagpur has been unable to provide adequate employment opportunities, which typically propel in-migration.

Figure 14: Population trend in Nagpur city – 1971 till 2011

Source: Census of India, 2011, and CRIS analysis

3.4 Population density

Nagpur city is spread over an area of 225.08 sq km with a population of 24.48 lakhs; the population density is 10,873 persons/sq km, which is high when compared to the density of 9,400 persons/sq km in 2001.

Same trend of increase in the population density during last decade (2001-11) can be seen for district and state too. Nagpur district's population density increased from 411 persons/sq km in 2001 to 470 persons/sq km in 2011. Similarly, state population density increased from 315 persons/sq km to 365 persons/sq km in 2011.

Table 8: Comparison of population density - City, district, and state (2001 and 2011)

Parameter/Year	Population Density (Persons/sq km)		
	NMC	Nagpur District	Maharashtra
2001	9,457	411	315
2011	10,873	470	365

Source: Census of India, 2011, NMC and CRIS analysis

Based on the area of 136 administrative wards and ward level population; the population density was calculated. The population density graph is presented below, which indicates uneven spread of population and non-uniform density. The ward number 66, 67, 52, 53, 55, 56, and 36 has population density more than 60,000 persons per sq km. On the other hand, very sparsely dense wards in the city are 1, 2, 4, 13, 14, 28, 30, 43, 44, 46, 48, 49, 86, 87, 97, 114, 115, 116, and 121.

High-density wards

Ward number 66 and 67 are central part of the city. Areas such Itwari and Mahal come under these wards. These are old and high-density residential areas like chawl settlements. Ward number 52, 53, 55, 56, and 36 are part of the old city with more of chawl settlement, attributed to high population density.

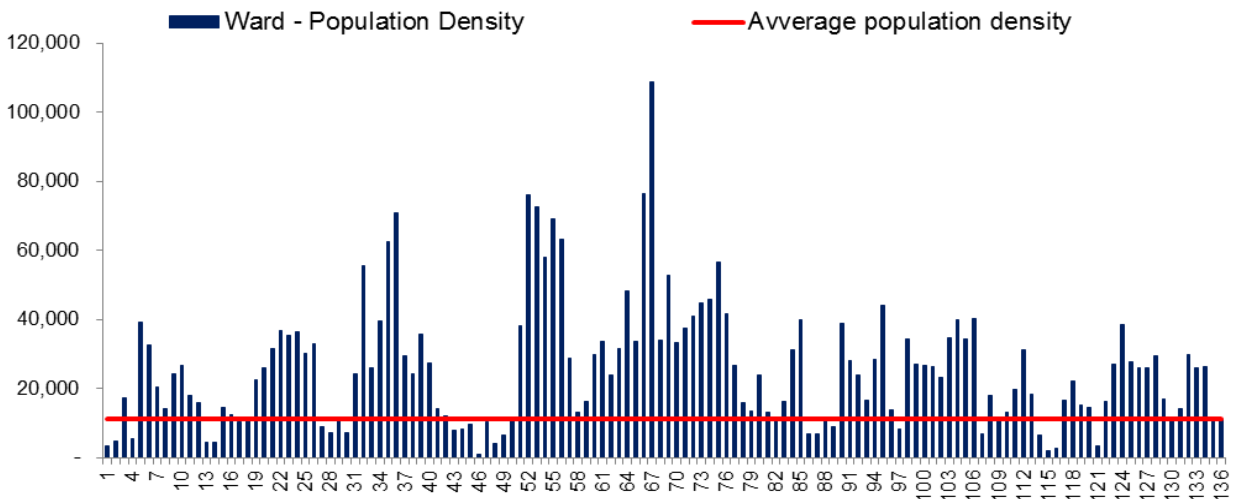
Low-density wards

Ward number 1, 2, 4, 13, and 14 are part of the northern area of the city, such as Vandevi Nagar, Binaki, Kalamna, Ananth Nagar, and Pardi and have witnessed less development as compared to other areas. Ward number 114, 115, 116, and 121 are part of the southern area of the city, such as Pooja layout, airport area, Somalwada, and Khamla. These areas are witnessing real estate development at a pace like never before and this could improve the density in the future.

Ward number 44, 46, 48, and 49 are part of the western area of the city, such as Wadi, Kachimet, Civil Lines, Bharatnagar, and Ambazari. These areas have less density due to some of these areas, which have been developed during British time and also presence of government offices on large land parcels. Ward number 86, 87, and 97 are part of the central area of the city have less density. This is due to presence of low-rise apartments and bungalows.

The newly merged areas have a density of 5562 persons/sq km, which is low compared to the city’s density of 10873 persons/sq km.

Figure 15: Population density of wards of Nagpur, 2011



Source: Census of India, 2011, NMC and CRIS analysis

The population density in most of the wards in the city (about 42%) falls in the range of 20,000 to 40,000 persons per sq km. The population density in around 27% of the wards falls in the range of 10,000 to 20,000 persons per sq km. Only 14% of the wards have population density more than 40,000 persons per sq km.

Table 9: Population density for wards of Nagpur

Population density range (in persons/sq km)	no of wards (in each group)
0 – 2000	1
2000 – 5000	8
5000 – 10000	14
10000 – 20000	37
20000 – 40000	57
>40000	19
Total Wards	136

Source: Census of India, 2011, NMC and CRIS analysis

3.5 Households and household size

As per census 2011, NMC has 5.29 lakh households with a household size of 4.56 which was decreased from 5.01 as per 2001 census. The number of households has increased from 2001 to 2011 and reported a decadal growth rate of 22%. The no of households in Nagpur during 2001 was 4.10 lakhs, which grew to 5.28 lakhs during 2011. There was an addition of 1.18 lakhs households during last decade (2001-11).

As per census 2011, Nagpur district has 10.42 lakh households with an average household size of 4.47. The number of households has increased from 2001 to 2011 and reported a decadal growth rate of 19%. The average household size in 2001 was 4.85, which reduced to 4.47 in 2011.

City's household size is on the higher side compared to that of household size at district level. On the other side, the city's household size is on lower side compared to that of household size at state level. The following table presents details regarding the households and household size in the city, district, and state.

Table 10: Comparison of household size - city, district, and state (2001 and 2011)

Parameter/Year	Household (in lakhs)			Household size (Number)		
	NMC	Nagpur District	Maharashtra	NMC	Nagpur District	Maharashtra
2001	4.10	8.39	195.77	5.01	4.85	4.95
2011	5.28	10.42	244.22	4.56	4.47	4.60

Source: Census of India, 2011, NMC and CRIS analysis

3.6 Literacy rate

As per Census 2011, the literacy rate stands at 92% of the total population; male literates are about 90%, whereas female literacy is about 78% of the female population. It is observed that literacy rate has increased from 2001 to 2011; it is attributed to the increase in the enrolment of students in the schools. The same scenario has continued at the district and state levels, where the literacy rates improved by 5%

and 7%, respectively, in the last decade. Details of literacy rates for Nagpur, district, and state are provided in the table below.

Table 11: Comparison of Literacy rates - city, district and state (2001-2011)

Parameter/Year	Literacy rate (Population with person of age 7 and above) in %		
	NMC	Nagpur District	Maharashtra
Total Population			
2001	84%	84%	77%
2011	92%	88%	82%
Male Population			
2001	90%	90%	86%
2011	94%	92%	88%
Female Population			
2001	78%	77%	67%
2011	89%	85%	76%

Source: Census of India, 2011 and CRIS analysis

3.7 Sex ratio

As per Census 2011, the sex ratio in Nagpur is 963 females per 1000 males, whereas at the district and state level, the ratio is about 932 and 922 respectively. The sex ratio has improved at all the three levels, i.e., Nagpur city, district, and state levels, at the district level; the sex ratio has improved from 932 during 2001 to 951 during 2011. The absolute numbers for sex ratio during 2001 and 2011 for Nagpur city, district, and state level are presented in the table below.

Table 12 : Details of Sex ratio – city, district and state (2001 – 2011)

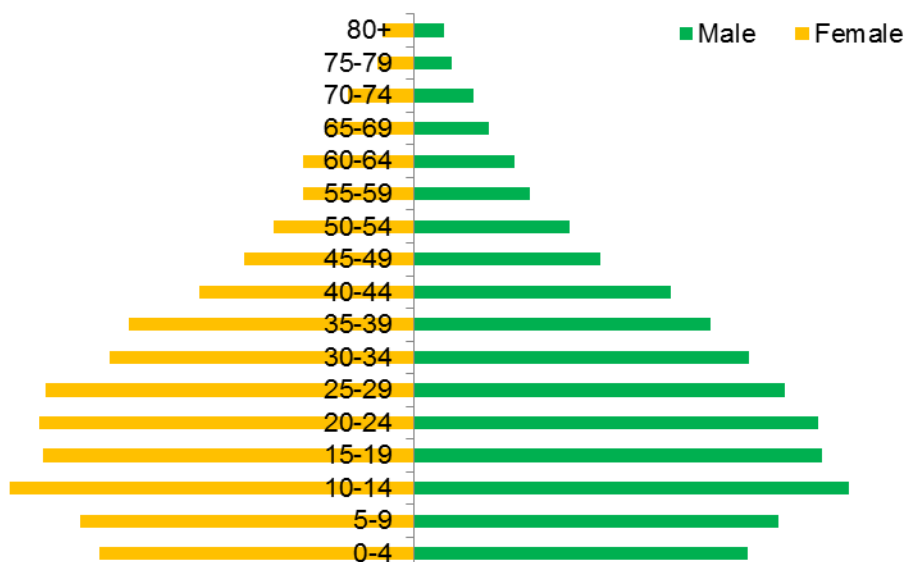
Parameter/Year	Sex ratio		
	NMC	Nagpur District	Maharashtra
2001	936	932	922
2011	963	951	929

Source: Census of India, 2011,

3.7.1 Age-sex pyramid⁵

Based on the age-sex pyramid for Nagpur's population as in 2001 shows that majority of the population is young. The trend was similar to that at the national level where most of the population is young with an average age of 24 years. About 66% of the total population is between 0-35 years, and the largest population group is the age group of 10-25 years. It was a strong indication, which highlighted that Nagpur had a valuable resource like youth crowd that could play an important role in the economic development of the city.

⁵ Age sex pyramid for 2001 was adopted, as age-sex bifurcation as per age group was not available for 2011.

Figure 16: Age-sex pyramid, 2001

Source: Nagpur's 1st generation City Development Plan, 2006

3.8 Scheduled caste and scheduled tribe population

Out of the total population of 24.47 lakhs in Nagpur, around 10% of the population is scheduled caste (SC) and 8% is scheduled tribe (ST) population. The increase in the SC population during the last decade was about 1.38 lakh persons, and registered a decadal growth rate of 29%. SC population has also increased during the last decade, registering a decadal growth rate of 3%.

Further, the SC and ST population in city is compared with that at district and state level, to understand the share of respective population to that of the total population. As per Census 2011, in Nagpur district, SC population accounts for 19% of total population and ST accounts for 9% of the total district population.

As far as the state is concerned, SC population accounts for 12% of the total population, whereas ST population accounts for 9% of the total state population. The share of SC population in the district is high as compared to the city and state. The table below presents the share of SC and ST population in the city, district, and state.

Table 13: SC and ST population - city, district and state (2001- 2011)

Parameter/Year	Schedule Caste Population (SC) in Lakhs			Schedule Tribe Population (ST) in Lakhs		
	NMC	Nagpur District	Maharashtra	NMC	Nagpur District	Maharashtra
2001	3.43	6.96	98.82	1.82	4.44	85.77
2011	4.75	8.68	132.76	1.85	4.38	105.10

Source: Census of India, 2011

3.9 Key issues and observations

- Overall, Nagpur has a strong presence in Maharashtra and is regional hub as far as urbanisation is concerned, but lack of support and delay in implementation of various projects has affected the competitiveness of the city.
- Nagpur city has a very strong presence and caters as a growth centre for the entire district as well as the neighbouring districts.
- Nagpur has witnessed natural growth in population; however, the growth rate has been declining as compared to the previous decades. The reason for declining population growth rate is due to limited economic opportunities in the city.
- The city has witnessed less in-migration during the period 2001-2011. This indicates that, perhaps, Nagpur has been unable to provide adequate employment opportunities, which typically propel in-migration.
- The population density has increased in 2011 as compared to 2001 and the average household size has reduced in 2011 as compared to 2001.
- The sex ratio is also improved significantly between 2001 and 2011 at all the three levels, i.e., Nagpur city, district, and state levels, at the district level.
- Literacy rate has improved during 2001 and 2011, which indicates that on social indicators front Nagpur is doing well.

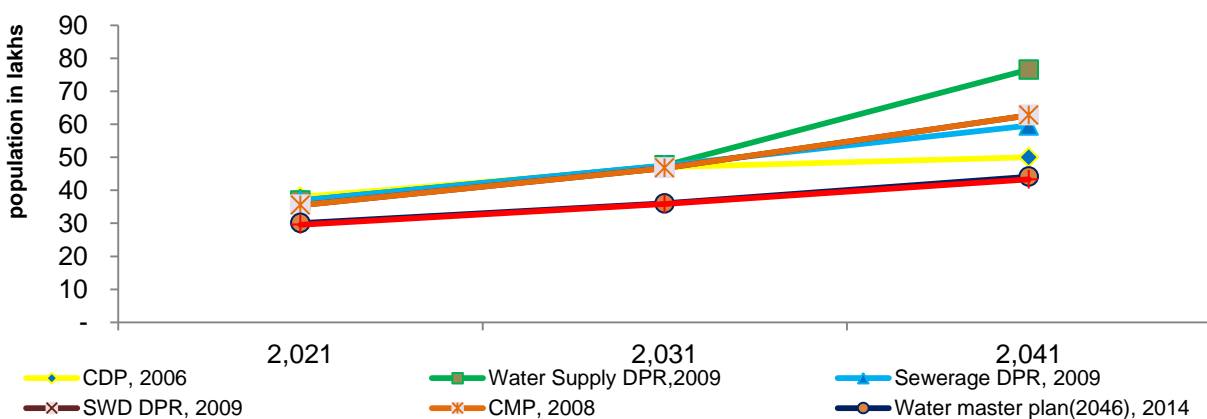
3.10 Population projections

The population projections would play a vital role in the assessment of future needs for the city. The projected population would assist in estimating the demand for water supply, sewerage, solid waste management, and social infrastructure facilities like schools, hospital and parks etc. for the design years. Hence, the population projections have been carried out for the study area for next 30 years using various methods. Following sections describe the methods adopted and present the population projections for the study area.

3.10.1 Methodology adopted for estimation of population

In order to estimate the population for the horizon period of 2041, initially, the population projections estimated in the 1st generation CDP, water supply project, sewerage project, SWD project, and traffic and transportation study (CMP) were reviewed. The review indicates that the projected population in the 1st generation CDP and water supply project are more or less the same. The trends in population projections in various studies have been provided in the figure below.

Figure 17: Population projections under various studies



Source: Detailed progress reports of various sectors prepared for Nagpur

Further, based on the population trends during the past four decades, CRISIL has projected the population for the study area using the following methods:

- 2nd order polynomial
- 3rd order polynomial
- Arithmetic
- Geometric
- Incremental increase; and
- Exponential.

Population projections obtained using various methods are given in the table below.

Table 14: Population projections using various methods

Methods for population projections	2021	2031	2041
2nd order Polynomial	28.21	32.27	36.37
3rd order Polynomial	27.72	29.80	30.28
Arithmetic	28.43	32.38	36.34
Incremental	29.59	35.86	43.28
Exponential	33.09	42.76	55.27
Geometrical	33.52	45.90	62.87

Source: CRIS Analysis

3.10.2 Basic assumptions made for population projection

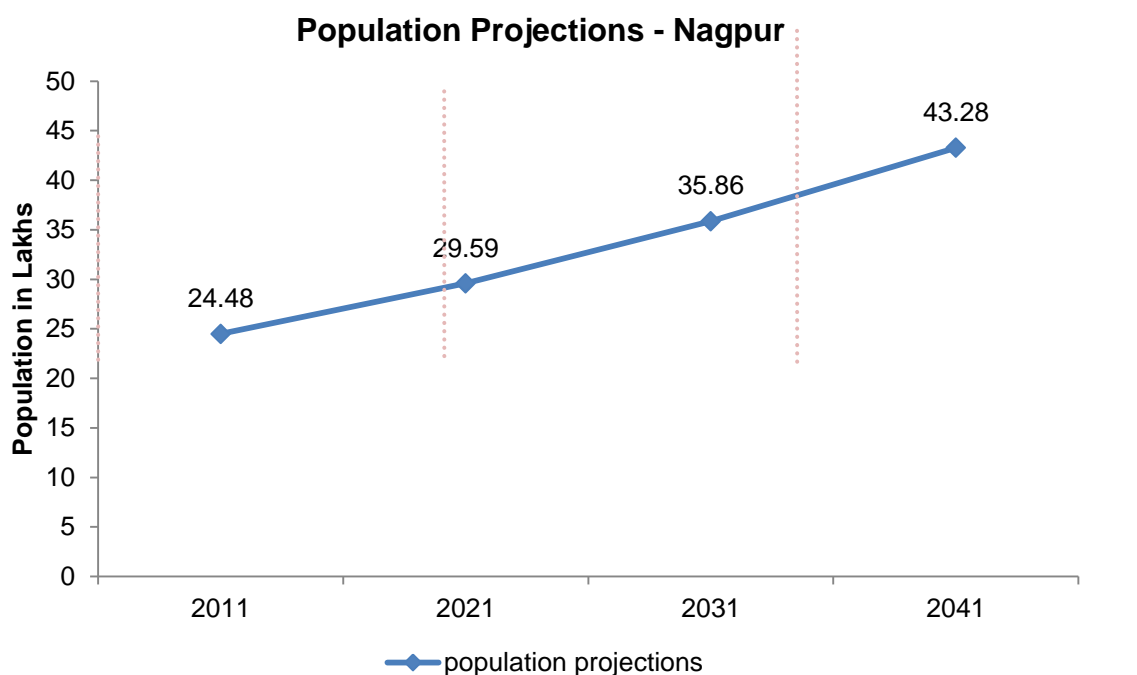
Nagpur has been an important centre of Vidarbha region. Various developments in past had attracted people to Nagpur. Based on the assessment of population in the past few decades; reveals that the growth rate of the population decreased from 41% in 1971-81 to 19% in 2001-11. Further using the decadal growth rate of past decades and linear projection method, the growth rate may reduce in the next three decades to 12% (2031-41). But, there are certain developments within Nagpur which might revive the growth rate and population in Nagpur will increase. By 2041 the population in Nagpur will be 2.5 times more than the population of 2011.

For Nagpur, developments like improving the city infrastructure, MIHAN project, healthcare facility, international airport and cargo hub, and industrial development at Butibori, Hingna, and Kamptee are some of the important factors that will attract investment for economic development and also attract people to Nagpur. Apart from these developments, there are proposals to develop IT parks and power plants in and around Nagpur. But, based on discussion with stakeholders, it was understood that developments like MIHAN and Nagpur METRO region will be exclusive events and it will have no impacts on neither Nagpur city nor NMC for providing basic infrastructure and services. For MIHAN, MADC being the responsible authority, while for Nagpur METRO region, NIT being the responsible authority will be developing all the necessary and required infrastructure and will also provide services to the residents of the respective regions. Thus, the projections that will be considered will be for NMC jurisdiction area or Nagpur city, excluding MIHAN and Nagpur METRO region.

As per review of various projections, it is evidently observed that due to certain developments like mentioned in the paragraph above, improved growth in the population in Nagpur over the next three decades will not be possible and unrealistic. Based on past growth trends and population projections carried out through various methods, assumptions considered, and review of the population projections in various technical studies, the **incremental increase** method seems to give a more realistic output/scenario for future population at Nagpur till the time horizon of 2041. Projection based on the

incremental increase will be considered to carry out the demand and gap analysis for various infrastructure projects.

Figure 18: Population projection for Nagpur till 2041 adopted for revised CDP



Source: CRIS Analysis

3.10.3 Recommended population projection

The projected population under various methods has been compared with the population projections finalized in the 1st generation CDP, water supply project, sewerage project, SWD project, and traffic and transportation study (CMP). Based on the above factors, the population trends during the past four decades and the projected population in various studies and methods, the **Incremental method was found appropriate**. As per the incremental method, the population would increase to 29.59 in 2021; 35.86 lakhs in 2031 and 43.28 lakhs in 2041. The decadal growth rate considered as per this method is about 20.9%, 21.2% and 20.7% for 2021, 2031 and 2041 respectively. The results of the various methods were presented during the 1st city-level stakeholders’ workshop.

Table 13: Projected population in Nagpur

Year	Incremental projection method (population in lakhs)	Estimated growth rate (%)
2021	29.59	20.9
2031	35.86	21.2
2041	43.28	20.7

Source: CRIS Analysis

4 Economic Profile of the Town

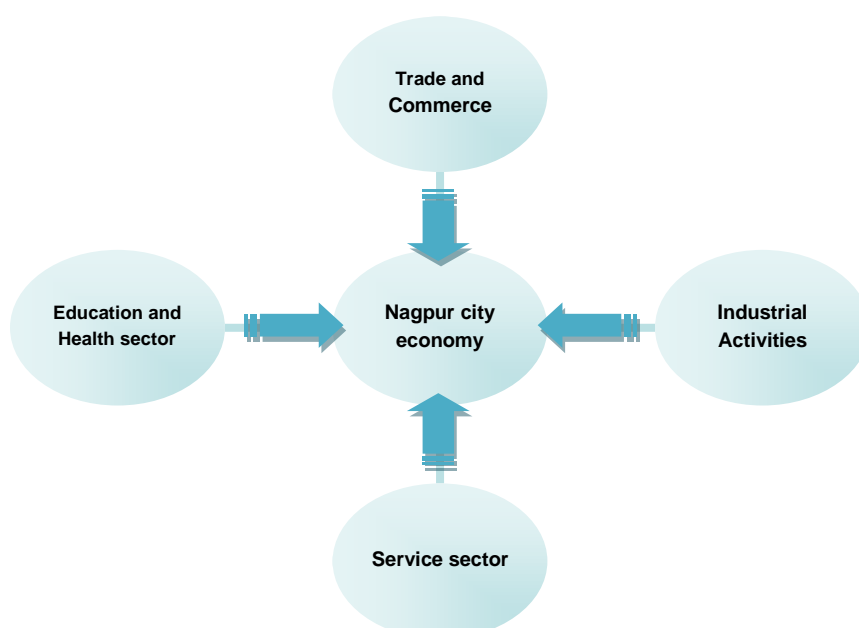
The chapter presents a detailed assessment of the economic profile of Nagpur city, such as key economic drivers of the city, spatial distribution of economic activities, industrial profile, workforce participation rate, worker classification, state-level economic policies which impact the city's economy, key economic indicators with reference to the state and district, and a brief on the informal sector activity in the city. Sector-wise workforce projections have been carried out for future years. Further, the key issues with respect to the economic base have been detailed out at the end of the chapter.

City's dynamics would keep changing it being the economic engine and the important centre for trade and commerce for the district and Vidarbha region. These dynamics would be due to changes taking place within city, which can be attributed to the constant changing environment in the government sector or private sector and also to some extent to the change in the policies that are being framed to support local economic development and generate employment opportunities.

4.1 Background

The pillars for the city's economy are trade and commerce, service sector, industries, health, and education sector. Post-independence, Nagpur, which was part of the central province, was the place where India's first textile mill was established by TATA group, which was formally known as Central India Spinning and Weaving Company Ltd. It was popularly known as Empress Mill and was inaugurated on 1st January 1877. Mill had spinning, weaving, and dyeing factories; and employed 4300 operatives. At recent, there are 10 MIDC areas within the region which was possible due to the state's economic policies promoting industries development. The MIDCs within the region has more than 2100 working units as on 2012-13.

Figure 19: Pillars of Nagpur's economy



Source: Based on the discussions and CRIS analysis

Nagpur has always been an important centre for the central province in the past, and later for Vidarbha region and the Nagpur district. Various wholesale and retail markets in Nagpur have become important part of the city's economy. Various daily and weekly markets in Nagpur also are a part of trade and commerce activities in the city. In case of the services sector, presence of various central and state government agencies in Nagpur has played a role in attracting people to Nagpur.

In the health and education sector also, the remarkable development has taken place. From 1991, private health facilities in Nagpur have grown at a very high rate during last two decades (1991-01 and 2011-11). During 1991-01, increase in private health facilities was 215%, and during 2001-11, it was 65%. Similarly, the growth in the education sector in the city is worth a notice. Both health and education sectors have been able to attract people not only from the region but also from other parts of the neighbouring state.

4.2 Overview of economic situation of the state and the town

4.2.1 Maharashtra

As per the NSDC report, Maharashtra is the one of the highest contributors to the economy of India. Maharashtra's gross state domestic product (GSDP) during FY 2011-12 was around Rs. 11.99 lakh crores. The GSDP of Maharashtra over the financial period 2006-07 to 2011-12 grew at a compounded annual growth rate (CAGR) of 8.1%, which is more than the GDP growth rate of India (7.9% during the same financial period). Maximum contribution to Maharashtra's GSDP is from the Konkan region (38.5%), Nashik region (13%), and Pune region (22%).

Figure 20: Map showing regional share to Maharashtra's GSDP, 2011-12



Source: NSDC's report - District wise skill gap study for the state of Maharashtra (2012-17, 2017-22)

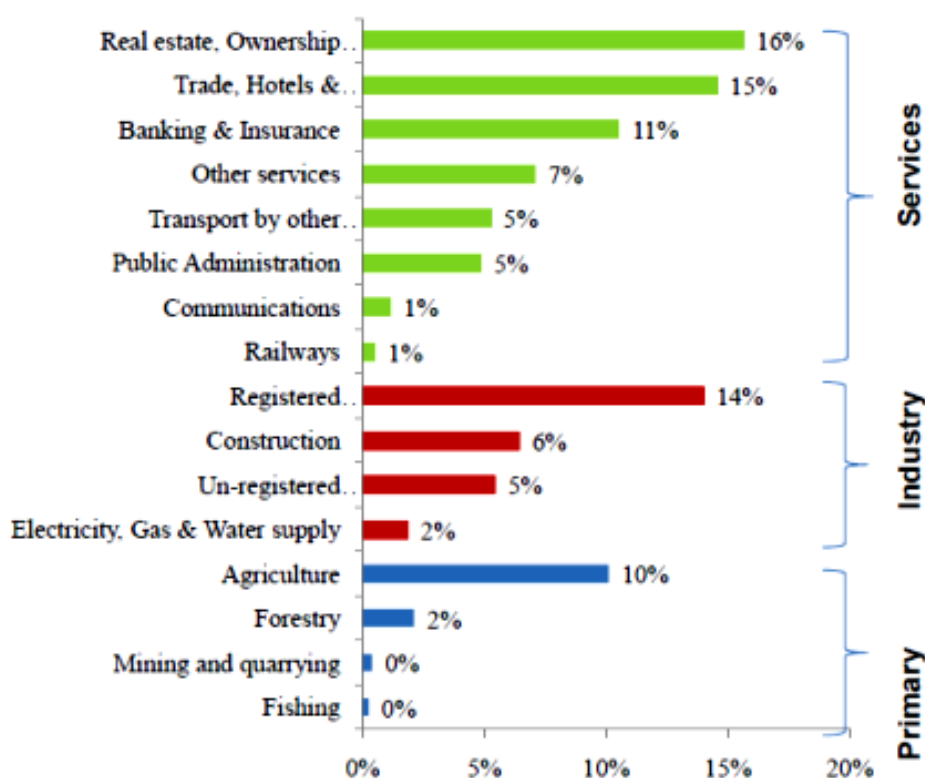
Sectoral contribution

Maharashtra is the most industrialized state in India. The number of large enterprises and MSMEs registered in the state was 4,900 units and 1.12 lakh units, respectively, as on till 2011-12. Further, the concentration of the industries is more in the Pune, Konkan, and Nashik regions.

The services sector is the most prominent sector, contributing maximum to the state economy. Contribution of the primary, secondary and tertiary sectors is 60%, 27%, and 13%, respectively, to the state GSDP. Though the primary sector has the least share in the state GSDP, it provides employment to around 52% of the state workforce.

Detailed composition of the various sub-sectors to the gross state domestic product (GSDP) of the state during 2011-12 is shown in the figure below. The major contribution to the GSDP of state is from the real estate, ownership of dwelling, business, and legal services sector at a secondary level. It is followed by trade, hotels and restaurants (15%), registered manufacturing units (14%), banking and insurance sector (11%), and agriculture (10%).

Figure 21: Composition of sectoral shares to Maharashtra's GSDP, 2011-12



Source: NSDC's report - District wise skill gap study for the state of Maharashtra (2012-17, 2017-22)

Workforce participation

Of the total population in Maharashtra, the workforce population accounted for 44% – around 494 lakh persons. Around 52% of the workforce is engaged in the agriculture sector (primary), and the remaining workforce is engaged in the secondary and tertiary sectors. Of this, 4% of the workforce is immigrants.

4.2.2 State's economic policy

Maharashtra state ranks first in comparison of all the state in terms of GDP at country level. In order to retain its economic development and lead in contribution to the GDP of country, it has developed new

economic policy in 2013. The policy focuses on differential incentives for developed and underdeveloped regions within the state, and this is assumed to promote balanced development across the state. The new industrial policy also, focuses on creating and providing a hassle free environment for investors. Steps to strength necessary industrial infrastructure and to bridge the gap in skill employees within state is also an important component considered in the policy. The policy Vision is “Maharashtra – a globally competitive manufacturing destination that will promote faster, sustainable, inclusive and balance growth”. Objectives framed to achieve the vision are as follows;

- To retain Maharashtra’s leadership position in industrial investment within the country
- To further accelerate investment flow to industrially underdeveloped regions of the state
- To create more employment opportunities

As said earlier, new policy focuses on differential incentives that are for 3 major components like large special economic zones (SEZs); scale industries (LSIs); Micro, Small and Medium enterprises (MSMEs). Key feature or incentives in the new industrial policy 2013 for each of the mentioned components is as provided below;

SEZs

For fast implementation and conversion of the proposed SEZs into the operational ones; following are some of the fiscal incentives proposed in the new industrial policy;

- Timely refund of Value Added Tax (VAT) to the units and the developers
- Exemption from payment of royalty on excavation of minor minerals within the SEZ
- Exemption from Payment of Non Agricultural (NA) tax
- Stamp duty exemption for land acquisition, and
- Provide single interface for payment of multiple taxes like dividend distribution tax, minimum alternate tax

Large Scale Industries

Various incentives are identified that will be provided as per the classification of the LSI based their aggregate amount not exceeding the ceiling as shown in the box adjacent. Incentives for LSIs are as follows;

- **Industrial promotion subsidy** – Every year to areas (other than A and B areas), industrial promotion subsidy will be 60% to 100% minus input tax credit or zero whichever is mire and Central Sales Tax (CST) payable on eligible finished products.
- **Water and energy Audit** – 75% reimbursement of sot of water and energy audit admissible. Assistance of 50% grants, limited to Rs 1 lakh for water audit and Rs 2 lakh for energy audit

Classification of LSI to avail incentives is as follows		
Taluka/Area classification	Monetary ceiling as percentage of admissible Fixed CI	Eligibility period (in years)
A	-	7
B	-	7
C	30	7
D	40	7
D+	50	7
No Industry Districts	70	7
Naxalism Affected Area	80	7

Source: Maharashtra Industrial Policy 2013

- ◆ 50% cost of capital equipment required for undertaking measures to conserve water and energy limited to Rs 5 lakhs each

- **Stamp duty Exemption** – 100% exemption within investment period for acquiring land and for term loan purpose. In A and B areas, stamp duty exemption only to IT and BT units in IT and BT parks
- **Electricity Exemption** - Exemption from payment of electricity duty to eligible new units in C, D, D+, No industry district units and Naxalism affected areas for a tenure equal to the eligibility period
 - ◆ In A and B areas, electricity duty exemption will be offered to 100% Export Oriented Unit (EOU) LSI units and IT/BT units for 7 years
- **Food processing sector** - 10% additional incentive and additional 1 year towards eligibility period

MSMEs

In order to ensure financial sustainability of MSMEs, state government through package schemes of incentives will provide fiscal incentives and support to improve the economic development in the underdeveloped areas of the state. Various incentives that will be provided are as listed below;

- **Industrial promotion subsidy** to areas other than A,B areas, equal to VAT on local sales minus ITC or zero whichever is more plus CST payable plus 20% to 100% of ITC on eligible finished
- **Water and energy Audit** – 75% reimbursement of cost of water and energy audit admissible. Assistance of 50% grants, limited to Rs 1 lakh for water audit and Rs 2 lakh for energy audit
 - ◆ 50% cost of capital equipment required for undertaking measures to conserve water and energy limited to Rs 5 lakhs each

Classification of MSMEs to avail incentives is as follows

Taluka/Area classification	Monetary ceiling as percentage of admissible Fixed CI	Eligibility period (in years)
A	-	7
B	20	7
C	40	7
D	70	10
D+	80	10
No Industry Districts	90	10
Naxalism Affected Area	100	10

Source: Maharashtra Industrial Policy 2013

- **Stamp duty Exemption** – 100% exemption within investment period for acquiring land and for term loan purpose. In A and B areas, stamp duty exemption only to IT and BT units in IT and BT parks
- **Electricity Exemption** - Exemption from payment of electricity duty to eligible new units in C, D, D+, No industry district units and Naxalism affected areas for a tenure equal to the eligibility period
- **Food processing sector** - 10% additional incentive and additional 1 year towards eligibility period
- **Interest Subsidy** – 5% per annum maximum up to the value of electricity consumed and bills paid for that year for areas other than A areas

- **Power tariff Subsidy** – to the extent of Rs 1 per unit consumed to eligible new units located in all the areas (other than A areas) in Vidarbha, Marathwada, North Maharashtra and districts of Raigad, Ratnagiri and Sindhurg in Konkan.

4.2.3 State policy for skill development

Based on the present economic development and need to promote the economic development within the state; definite need for augmenting the strength of workforce and also to focus on enrichment of essential skills to be improve the productivity. The Government of Maharashtra (GoM) has put in place an institutional structure for skill development in the state up to the district level. GoM has set itself up a target of generating 450 lakhs skilled manpower by 2022. It has formed the state management committee (SMC) of skill development initiative for Maharashtra and sectoral skill development committees (SSDC) under the Department of Higher and Technical Education.

Key skill development initiatives taken by the government so far include the following:

- SSDCs have identified **11 high demand trades** in the state: construction; production and manufacturing; textile; automobile; hospitality; healthcare; banking, financial services and insurance (BFSI); retail; pharmaceuticals and chemicals; Information Technology (IT) and IT enabled services; and agro processing.
- **Maharashtra State Skill Development Society (MSSDS)** has been established as a single nodal agency for skill development with the objective of preparation and continuous updating of 'State Skill Gap Assessment Report' and 'State Skill Development Plan'. It is also responsible for empanelling and grading training providers and providing support to district and division level committees and sectoral/territorial skill mission officers in the state for the preparation and effective implementation of 'Annual Action Plans'.
- **Knowledge Management Centre** for skill development has been proposed to be established at Yashada, Pune.
- Directorate of Establishment & Self Employment has set up a dynamic **Labour Market Information System (LMIS)**.

Various skill development programmes are run by many government departments as well. Some of these are as follows:

- **Employment Promotion Programme (EPP):** On-the-job training or other practical training to educated unemployed persons. The programme is run by the Department of Employment & Self-Employment, Maharashtra. EPP is a stipend-based scheme.
- **Apprenticeship Training Programme:** Supply of skilled manpower to the industry through apprenticeship training. The programme is run by the Directorate of Vocational Education & Training, Maharashtra.
- **Entrepreneurial Development & Training Programme:** Motivate and train the educated unemployed youth for self-employment. It is run by the Directorate of Industries, Maharashtra. The programme is run by recognized training institutions such as MITCON Consultancy Services Ltd. and Maharashtra Centre for Entrepreneurship Development (MCED).

4.2.4 Nagpur district

Agriculture

Nagpur district predominantly is an agrarian economy, and the rural economy is inextricably woven with the district economy. The district has a total geographical area of 9,892 sq km, of which 6,440 sq km is cultivable area. The main crops of the district are paddy, Jowar, cotton, tur, and soyabean. The region is also known for fruit production. Nagpur oranges are very famous, and the region produces close to 40,000 tonnes of oranges annually. Mango, chiku, sweet lime, guava, custard apple, jackfruit, pomegranate, tamarind, papaya, and banana are some of the other fruits that the region produces.

Floriculture

The concept of growing different varieties of flowers in the district is ever increasing due to it being seen as a cash crop. The total area under floriculture is 22,742 ha, and several varieties such as rose, shewanti, zendu, nishigandha, gladioli, gaillardia, white lily, goldenrod, daisy, mogra, and ostre are cultivated in Nagpur.

Mineral resources

Nagpur district is moderately rich in minerals. Deposits of coal, manganese ore, dolomite, limestone, iron-ore, clay, copper ore, chromites, tungsten ore, zinc ore, quartz, etc., are found in the district. Coal reserves have been found in the north-west belt of the district, i.e., from Saoner to Kanhan (Kamptee), apart from the high-grade coal found in Umred tehsil. Nagpur district is richly endowed with manganese ore, and the district is well placed in the country as far as production of manganese ore is concerned. Manganese ore is found particularly in Ramtek and Saoner tehsils.

Good quality limestone is found in Kandri and Deolapar. Mica and tungsten are also found in the district. Sand from the Kanhan River bed is considered to be of high quality and is used in the construction of buildings and infrastructure projects.

Fisheries

Out of the total geographical area of the district, 15,037 ha of land is being used for fish farming apart from the 650 km long stretch under river water. During 2005-2006, fish production in the district was around 8310 MT, valued at approximately over Rs. 2,100 lakhs. The Maharashtra government has undertaken various developmental schemes/projects for fish farming.

4.2.5 City economic profile

Nagpur has presence of industries located in the periphery of the city and in region, which are contributing to city's economy and supports the local economic development. Apart from the industries, there is trade and commerce in the city that comprises of retail and wholesale trade both contributing to the city's economy. Some of the industries present in Nagpur are:

- Chemicals
- Cements
- Coal based
- Engineering
- Electrical
- Electronics
- Food Processing
- Paper products
- Wood based
- Pharmaceuticals

- Textile
- Ceramics, etc.

4.2.6 Secondary sector

There are 8 industrial estates of Nagpur, which make the foundation of the economy for the city. These estates are spread over an area of 3,887 ha, with majority of the area located at the Butibori industrial estate. 100% of the land is developed against the earmarked land for MIDCs and it is occupied by 2195 working industrial units.

Table 15: Details of industrial estates in Nagpur region

Sr.No.	Industrial estate/ Growth Centre	Developed area (in ha)	No. of Plots		Units working
			Allotted	Available	
1	Hingana	746	1253	0	1266
2	Butibori	2421	1151	113	722
3	Kalmeshwar	111	164	1	112
4	IT parsodi	12	46	0	26
5	Umred	326	133	84	9
6	Katol	138	82	1	16
7	Saoner	74	71	1	27
8	Narkhed	21	16	0	2
9	Bhiwapur	13	8	38	1
10	Kuhi	16	37	0	2
11	Parseoni	12	38	2	12

Source: Brief industrial profile of Nagpur district report, 2012-13, prepared by MSMEs - Development Institute

4.3 Industries and commercial activities in Nagpur

4.3.1 MIDCs estates and MSMEs

Butibori MIDC

At around 30 km from Nagpur, towards Hyderabad, an industrial estate has been established at Butibori within the area of 2,500 hectares (ha). Currently, 1,757 ha have been developed and approximately 722 units are operational. Also, the industrial estate is close to the airport. If the MIHAN project is completed in the near future, it would support the growth of export-related industries within the MIDC premises. This would further boost the economy of Nagpur city and would create huge employment opportunities within the region.

In addition to the above activities at the MIDC industrial estate, following proposals by MIDC have been prepared in order to boost the economy in the region:

- Information Technology Park in 20 Ha
- Textile Park in 204 Ha
- Apparel Park in 68 Ha
- Weavers' Park in 147 Ha

In Butibori MIDC, around 722 units are operational.

Hingana MIDC

Hingana MIDC estate was developed in 1962 and is located 7 km from Nagpur city. Several engineering industries, electrical-based industries, food-based industries, etc., are located in this Industrial area. The

Maharashtra State Electricity Board (MSEB) has established its two sub-stations in the estate area. Telephone department has already established its telephone facilities within the estate by way of electronic exchange. To facilitate the industrialists and workers, amenities like a post office, banks, a police station, petrol pumps, canteens, and bus services are available in this area. No land is available in this area for further planning. In Hingana MIDC, 1,266 units are operational.

Medium, small, and micro enterprises/industries (MSME)

Nagpur district has a number of small- and medium-scale industries. Most of the small-scale industries in the region are engaged in engineering and agro-based production. Majority of them are fabrication workshops; re-rolling mills; foundries; and manufacturing of steel furniture, auto parts, and machinery and machine parts. These small-scale industries provide employment opportunities and contribute towards the economic development of the region.

As per the MSME report on Nagpur, around 3.5 lakh people are engaged in the MSMEs. Approximately 41% of these workers are employed in the public sector enterprises, while 59% are employed in the private sector.

4.3.2 MIHAN

MIHAN is a state government initiative to support the economic development in and around Nagpur region. MIHAN is a composite project consisting of international airport and an SEZ. The project will be developed over an area of 4354 ha of area and will be developed by Maharashtra Airport Development Company Ltd. (MADC). MADC has following proposal under MIHAN project:

- An international airport, which will act as a cargo hub, and
- A special economic zone (SEZ) with residential zones.

MIHAN comprises an international passenger and a cargo hub airport, a road terminal, a rail terminal, a health city, international schools, an SEZ, and various facilities. The SEZ is located near the airport, and Maharashtra Airport Development Company Ltd. (MADC) is developing the SEZ. The MIHAN project is under implementation and is estimated to cost around Rs. 2,580 crores (as per 2002 rates). MIHAN will be developed over an area of 4,200 ha. 6 companies have started their operations at MIHAN.

MIHAN mainly consists of two components, i.e., an SEZ and an airport. The MIHAN SEZ is proposed to attract various industries like IT, gems and jewellery, pharmaceuticals, processed food, health, garments, electronic goods, and other types of industries.

Economic and social impact

Investment envisaged for the MIHAN project is Rs. 20,000 crores, which will take place over a period of five years, and will generate employment for the local people. Around 1.20 lakh direct jobs and around 2.40 lakh indirect jobs will be generated.

MIHAN has already spurred a real estate boom in Nagpur with property prices increasing by 25% to 40%. The project is expected to add 12 million persons to the city population by means of providing employment. MIHAN will support and help boost the economic growth and development of Vidarbha and specifically Nagpur and gain visibility in the competition for growth with other cities in Maharashtra.

Emphasis has been given to environmental aspects and social aspects for better work space and residential space while planning for the MIHAN project.

Figure 22: Location of MIDC industrial estates



Source: MIDC, Nagpur region

4.3.3 Tertiary sector

Along with formal economic activities there are markets (both formal and informal), which are part of the Nagpur’s economic profile and provide employment to many people. There are various types of markets like retail and wholesale and further it can be classified based on the goods that are sold in these markets. Some markets are held on daily basis, and some markets are held on specific days only. These markets are regularised by NMC and is maintained by the Market department with a dedicated team. This department’s main roles are as follows:

- Construct market places,
- Operate and maintain market places (for some of the market places, department outsources O&M through auctioning)
- Allot stalls or land to vendors
- Collect rent/revenue from vendors, O&M contractors, etc.

The list of various NMC authorised markets held in the city is as given below.

Table 16: List of NMC authorised weekly markets held in Nagpur

Sr.No.	Zone	Weekly Market Name
1.	Laxminagar Zone	----
2.	Dharampeth Zone	Gokulpeth Bazar
3.	Hanumannagar Zone	Somewaripeth Bazar (Budhwari Bazar)
4.	Dhantoli Zone	Netaji Market, Supermarket Sitabuldi, Mahatma Phuley Bazar
5.	Nehrunagar	-----
6.	Gandhibagh	Mahal Bazar
7.	Sataranjipura	Itwari Bazar
8.	Lakadgunj	Kadbi Bazar (ahead of Fire Brigade)
9.	Ashinagar	Kamal Talkies Bazar
10.	Mangalwari	Mangalwari Sadar Bazar

Source- Market Department, NMC

Figure 23: Location of markets in NMC

Source: NMC, market department

As mentioned in the above table, there are weekly markets active in only 8 zones out of 10 zones. In total there are around 4,431 market units developed by NMC in markets. Further, break-up of the 4,431 commercial units is as follows;

- Shops establishment - 2400 numbers
- Benches/platform - 612 number
- Seats - 1419 number

Maximum market units developed in Mahatama phule market located in dhantoli zone (769 shops, 217 platforms and 373 seats), while the minimum commercial units developed is in Hanuman nagar zone's market. During FY 2013-14, market department collected sum of Rs. 5.76 crores through rents, lease fee, etc. from market units.

Table 17: List of NMC authorised daily markets held in Nagpur

Sr.No.	Zone	Daily Market Name
1.	Laxminagar Zone	----
2.	Dharampeth Zone	----
3.	Hanumannagar Zone	Somewaripeth Bazar (Budhwari Bazar)
4.	Dhantoli Zone	Mahatma Phuley Bazar
5.	Nehrunagar	-----
6.	Gandhibagh	----
7.	Sataranjipura	Dahi Bazar, Bangladesh , Itwari Phul Bazar
8.	Lakadgunj	-----
9.	Ashinagar	Kamal Talkies Bazar
10.	Mangalwari	-----

Source- Market Department, NMC

At present, NMC's market department is collecting Rs. 10 per market units in daily markets for providing basic services. Also, this fee is not being collected from all the markets at present. In order to provide uninterrupted services to these market units in future, market department has proposed to collect Rs. 10 from each of the market units from all the daily markets being organised in the city. Post approval of the General body, market department will be able to collect around Rs. 20 lakhs annually from daily markets.

Apart from NMC authorised weekly and daily markets, there are unauthorised markets organised in the city too. At present, as per the records of market department there are around 24 weekly markets and 17 daily markets that are unauthorised. At present, market department is not collecting any fee from these unauthorised markets and proposal of collecting Rs 10 from each market units has been put up to general body. Post approval, market department will be able to collect around Rs. 30 lakhs annually from unauthorised markets.

Apart from this, NMC has shopping complexes, which are located at various locations within city. These commercial complexes are constructed houses commercial spaces and shops that are given on lease. Lease rent is collected from these shops by the tax collection team of the Market department.

Recently, NMC has planned to develop multi-purpose shopping complexes at around six locations in the city. This is to address the demand of commercial space with better infrastructure and state-of-the-art facilities to the citizens. As of now, six locations have been identified by NMC for the construction of commercial complexes through public private partnership (PPP-BOT basis). The total investment required for the development of six commercial complexes is identified to be Rs. 20300 lakhs (as on 2011-12). Detail of these commercial projects is as provided below.

Table 18: List of commercial complexes to be developed on PPP-BOT basis at six locations

Sr.No.	Particular	Details	Area of site	Permissible FSI (sq km)	Approx. Project cost (Rs. lakhs)	Current status of the project
1	Danaganj, Old Bhandara road	Multi utility shops, office chambers, conference hall, etc.	16785	2.50	4,100	Under progress
2	Gokulpeth Market, West High court road	Shopping centre, weekly market, commercial complex	9304	2.50	4,500	Under Progress
3	Panch Paoli Market, Awale square	Shopping mall, daily need market, meeting chambers, Banquet hall,	17244	2.50	5,000	Under Progress

Sr.No.	Particular	Details	Area of site	Permissible FSI (sq km)	Approx. Project cost (Rs. lakhs)	Current status of the project
		multiplex				
4	Jaripatka Bus stop, Main road	Shopping mall, Commercial complex, multiplex	5983	2.50	2,200	Under Progress
5	Water works Office, NMC Sitabuldi	Shopping mall, office chambers	4297	2.50	2,000	Under Progress
6	Netaji Market, Sitabuldi	Shopping mall, daily need market, Office chambers	9393.40	1.25	2,500	Under Progress
Total investment (proposed on PPP-BOT basis)					20,300	

Source- Market Department, NMC

4.4 Street Vending activities

Street vending is an indispensable economic activity in urban India. It is the largest informal sector which caters to the livelihood of the urban poor. Since the era of economic reform in the country, the sector has faced many challenges. Street vendors count for about 2% of the population and provide 'affordable' as well as 'convenient' services to a majority of the urban population.

Report on Conditions of Work and Promotion of Livelihoods in the Unorganized Sector, 2007 of the National Commission for Enterprises in the Unorganized Sector (NCEUS), suggest that the vendors' earnings are very low although they vary from trade to trade and from location to location. The men's average daily income is around Rs. 70 in most cities and women earn considerably less – Rs. 40 per day.

Articles 39 (a) of the Constitution clearly mention that the State shall in particular direct its policy so that - (a) the citizens, men and women equally, have the right to an adequate means of livelihood. To improve the condition of urban street vendors, Government of India made numerous legislative attempts starting from the regulation of hawker trade in Bombay Municipal Corporation in 1980 till The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014.

Status of Street Vending Activities and Hawking zones in Nagpur

In past, street vending and hawking is considered an disturbing element for various reasons, eventhough without such informal activities the citizens with not be able meet with their daily needs and requirements. Also it is a way of livelihood for the poor section of the people in the city. As such informal activities don't have a legal back-up or regularization thorough policy it is difficult to get place in the Governance of any ULB. Similary trends were observed in Nagpur; Nagpur's Development Plan for the period 1986-2011 includes hawking zones which remain, however, unimplemented. In several places over the years, Municipal Commissioners have made promises to the hawkers that they would create hawking zones. Unfortunately, these have mostly remained empty promises. Where space has been given, such as the five feet on one side of the road in Jagnadi Chowk, the hawkers have no security of a formal arrangement. They still endure extortion and eviction. Often, those other zones which were promised are now occupied by parked rickshaws, bikes, and cars.

Nagpur has the oldest hawking zones of the cities under study here. They were notified in the city's Development Plan (DP) in 1986, though the Municipal Corporation has never implemented them. This

disjuncture between planning and implementation might have to do with the fact that the DP was developed by a planning entity separate from the Municipal Corporation. Therefore, the Municipal Corporation didn't make hawking zones a priority and chose not to implement that aspect of the DP.

Figure 24: Street Vending near Markets in Nagpur



Source: Picture 1: <http://forbesindia.com/printcontent/36843>; Picture 2: redscarabtravelandmedia.wordpress.com

As per a survey by Nagpur based NGO and Town Vending Committee (TVC) of NMC, at present in Nagpur there are around 90,000 street vendors or hawkers.⁶ The no of the Street vendors in the city was 23,803 during 2001 and increased to 35,000 street vendors by 2009. There was almost 4 times increase in the number of street vendors during the decade (2001-11). In Nagpur the street vending' zones are very less compared to the existing strength of street vendors.

Based on discussion with members of Hawker's Association in Nagpur, it was understood that hawkers are ready to shift to a designated place by NMC, along with paying of a minimal fee for providing basic services like water supply, solid waste management etc. Also, for making autoirised Hawking zones, locations like municipal schools, ULB land, community places, etc were suggested which are mostly idle and dead space for most of the time in a day. Thus, looking at the importance of the informal activities in the city and need to provide a enabling ebvironment to the street vendors along with focusing on keep the local environment livable and clean, NMC and TVC committee along with market department have proposed 16 new street vendor zones within city. The loction of the proposaed zones are as follows;

- Gokulpeth market
- Near Medical Chowk
- Somewaripeth Bazar (Budhwari Bazar)
- Mahatama Phuley Market (platforms)
- Shukrawari (platforms)
- Panch Paoli near flyover
- Near Maskasath PWD office
- Near Deputy signal
- Mini-Matta nagar
- Bhandewadi (Pardi)
- Dhobighat (Teenhaba)
- Kamall Chowk
- Near Jaripatka bus stand
- Gittikhadan opp. To police station on Katol road
- Mangalwari Market, along the sides of Anjuman engineering college
- DHantoli Flyover (near Kumbhartoli)

⁶ Adopte from a news published on 18th July 2014 article in a newspaper-The Times of India. Source: <http://timesofindia.indiatimes.com/city/nagpur/Nagpur-Municipal-Corporation-wakes-up-to-hawkers-problems-once-again/articleshow/38568987.cms>

4.4.1 Street Vending policy and suggestion for NMC

Of the major attempts made, The National Policy on Urban Street Vendors, 2009⁷ was a comprehensive attempt that promoted spatial, legal and participative means of improving the conditions of the urban street vendors. According to this policy, a 'Street Vendor' is defined as 'a person who offers goods or services for sale to the public in a street without having a permanent built-up structure.' The policy was somewhat similar to its predecessor and got a feeble response from the states, to overcome the shortcomings of this policy a draft bill entitled 'Model Street Vendors (Protection of Livelihood and Regulation of Street Vending) Bill, 2009 was introduced but Governments did not take sufficient legislative action. However, the Bill was critiqued to have ignored many pressing issues. The foremost problem that it overlooked was the issue of natural markets which sprang up in places where consumers found them useful. Further, it ignored the vending rights of those who were already selling on the street, still the policy was somewhat able to recognize certain issues related to the street vendors and has provided certain powers to ULBs to regulate, monitor and promote street vendors in towns / cities.

The policy recognized and explicated the positive role of street vendors in providing essential commodities to people at affordable prices and at convenient places. It also recognized the need for regulation of street vending by way of designated 'Restriction-free Vending', 'Restricted Vending' and 'No Vending' zones based on certain objective principles. Overall the Policy meant to foster a congenial environment for the urban street vendors to carry out their vocation and at the same time ensuring that it does not lead to overcrowding or unsanitary conditions at public spaces and streets.

Specific Norms for the Urban Local Bodies

- Spatial Planning norms - demarcation of vending zones
 - ◆ The demarcation of hawking zones should be city/town specific. The master plans, zonal plans etc. should take into account the natural propensity of the street vendors to locate in certain places at certain times in response to patterns of demand for their goods/services.
 - ◆ City authorities should provide sufficient spaces, designated as 'vendors markets' in layout plans at locations of natural markets and they should permit mobile vending in all areas even outside the designated markets, unless designated as 'no-vending zone' through a participatory process.
 - ◆ Designation of vendors markets / no-vending zones should not be left to the sole discretion of any civic or police authority but must be accomplished by a participatory process by a **Town Vending Committee** (which for large towns / cities may be constituted on the basis of wards) whose membership may be as follows: Municipal Authority, Traffic and Local Police, Public Land Owning Authority, Associations, Representative from associations of Street vendors, representative from lead Nationalized Bank / Commercial Bank.
- **Quantitative norms-** refer to the norms on amount of space and facilities to be provided for vendors' markets by the civic authorities. At the town / city level enough space should be designated for vendors' markets at least to the extent of 2% to 2.5% of the total city population. The facilities that are required to be provided at the vendor markets invariably include: solid

⁷ In 2004, the National Urban Street Vendors Policy (NSVP) was announced. It was the first national level regulatory framework on street vending which was left to the States to adopt and implement. In 2009, the NSVP was revised and a Model Draft Bill on the subject was presented by the Central government. The States and Union Territories were to implement the National Policy for Street Vendors of 2004, taking into account this Model Bill. However, it received a feeble response from the States and soon demands were made for a mandatory central legislation on the subject. (National University of Juridical Sciences, 2012)

waste disposal facility, Public toilets to maintain cleanliness⁸, Aesthetic design of mobile stalls/ push carts, electricity, drinking water facility, protective covers to protect their wares as well as themselves from heat, rain and dust and Storage facilities including cold storage.

- **Regulatory Process:** The policy thrusts on having the system of registration of hawkers and non-discretionary regulation of access to public spaces in accordance with the planning standards and nature of trade/ service. The **Town vending committee⁹ / Ward vending Committee** has the power to register the vendors¹⁰. All vendors in each city should be registered at a nominal fee and the registration should be renewed after every three years. The TVC should issue identity cards to the vendors and it should charge a monthly fee for access to various services. For better system of regulation, there should be direct linkage between the urban local bodies (ULBs) and hawkers for collection of: registration fee, - monthly maintenance charges¹¹, fines, if any, etc. The Town vending Committee / Ward Committee should monitor the hawking activity of a particular ward and the quality of the services provided, take corrective action, if required, report to City level Committee, if required and recommend revaluation / changes in specified norms for hawking.¹²

4.5 Workforce participation

The workforce participation ratio in Nagpur district is 40:60 (working population: non-working population). Further, 71% of workforce was contributed by males and 29% of workforce was contributed by females to the total workforce population observed during 2011. The share of main workers is 35% in the total workforce, 5% is shared by marginal workers, and 60% is non-workers' share.

The details of workforce and non-workforce participation in the case of Nagpur district are shown in the figures below and detailed breakup of the workforce participation is provided in a table annexed with this report.

⁸ In spite of the government's fervent concern regarding public sanitation and safety, a number of public events, bazaars, religious festivals and other activities take place on our streets with the whole-hearted approval of government authorities.

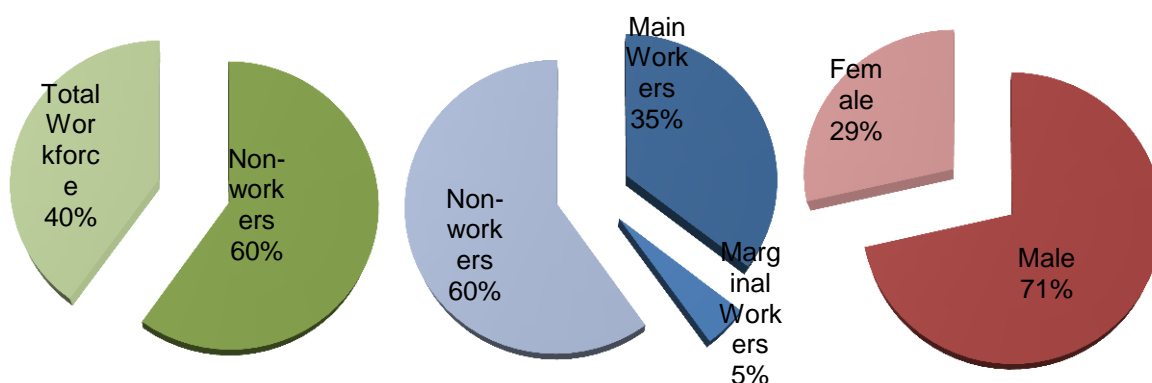
⁹ The committee has no fixed tenure and there is no removal mechanism mentioned.

¹⁰ The National Policy on Urban Street Vendors, 2009. Under Provision 4.5.4 of this Policy, the Municipal Authority is under an obligation to undertake a comprehensive census of the existing vendors in consultation with the Town Vending Committee for the purpose of granting them lease to vend. Hence, we see that here the burden of registration is on the Municipality, which significantly smoothens the exercise of registration and to a large extent simplifies the process for street vendors.

¹¹ Every street vendor is under an obligation to pay periodic maintenance charges for the civic amenities and facilities provided in the vending zone as may be determined by the local authority. Thus, these provisions impose a monetary burden on street vendors.

¹² Concentration of powers in the hands of the municipal authorities that do not have any representation of street vendors.

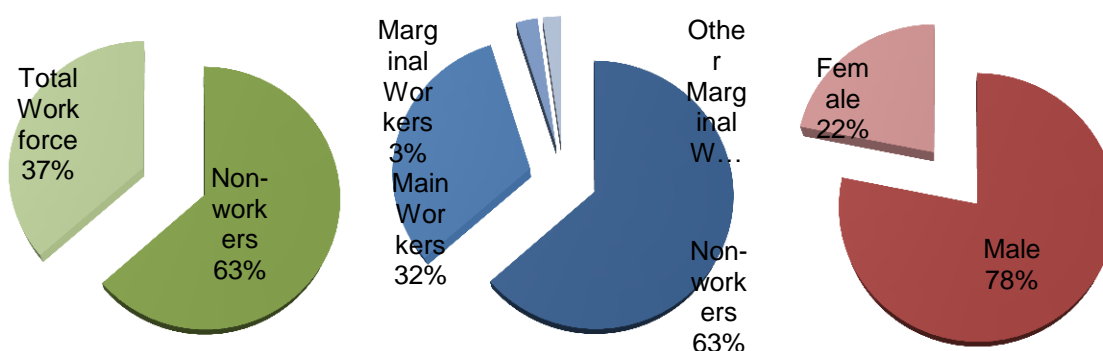
Figure 25: Workforce participation in Nagpur district, 2011



Source: Census of India and CRIS analysis

As per census 2011, the workforce participation ratio in Nagpur city at 37% is lower than that in Nagpur district (45%). The workforce participation rate has increased in 2011 as compared to 2001 (30%). In the case of Nagpur city, male workers contributed around 78% and female workers contributed 22% to the total workforce participation during 2011. The share of main workers is 32% in the total workforce, 3% is shared by the marginal workers, and 2% is the share of other marginal workers. In comparison to district, participation of main workers in Nagpur city is on the lower side. Details of workforce and non-workforce participation in the case of Nagpur city are shown in the figure below and detailed breakup of the workforce participation is provided in a table annexed with this report.

Figure 26: Workforce participation for Nagpur city, 2011



Source: Census of India and CRIS analysis

- The assessment of workforce participation trends shows on an average 70% share of main workers are engaged in each and every category like cultivators and agricultural; household; industrial; and other workers; which indicates stable workforce participation across the sectors of engagement in Nagpur city.
- On an average, 17% share of marginal workers are engaged in each of the category; while 7% marginal workers are engaged into other category of works and 30% of them are engaged as cultivators.

- Majority of the working population engaged is in the secondary or tertiary sector as main workers (93%). Trends in main and marginal worker participation are shown in the figure below.
- On the other hand, 95% of the main workers contribute more to the secondary and tertiary sectors (other workers) and only 2% to the primary sectors (cultivation and agriculture). The same engagement trend is observed in the case of marginal workers (figure shown below).

Figure 27: Trend of main and marginal workers, 2011



Source: Census of India and CRIS analysis

4.6 Growth drivers

City growth is dependent on aspects like physical infrastructure, social infrastructure, economic and employment opportunities, city administration setup, and urban environment. Based on assessment of physical and economical infrastructure within the city and region; some of the major growth drivers identified and having a prominent role in the growth of Nagpur are as follows:

- Presence of 11 MIDCs in and around Nagpur. Butibori MIDC is Asia’s largest Industrial zone and industrial suburb for Nagpur
- MIHAN - International Airport and SEZ for healthcare city, processing units, maintenance repair and overhauling of aircraft, information technology park, and manufacturing units
- Presence of historical monuments, buildings with heritage value, natural features, forests and sanctuaries. Potential for tourism and supporting industries to grow.
- Presence of physical/urban infrastructure – 24 x 7 water supply, good roads, railway connectivity to all the states, air connectivity along with ample green cover in the city
- Presence of well-established facilities by government and private sector in education and health sectors

4.7 Key findings

- Nagpur is not growing at the pace of other cities of Maharashtra (Pune and Nashik)
- Minimal presence of large scale industries
- MIHAN project implementation is behind the planned schedule. Only six companies have their operations at present

- Even though investment has been planned by big giants of various sectors in Nagpur, projects have not taken up so far, thus affecting the economic growth
- Presence of the Central Railway headquarters in Nagpur is not benefiting the city, as railways have no factories in Nagpur
- Lack of political support, huge backlog of development projects and road blocks/hurdles towards implementation of projects to support economic development in the region. These is also due to lack of enabling policies for development of large scale industries.

5 Physical Planning and Growth Management

This chapter presents a detailed assessment of the planning area, spatial growth trends and distribution of population, and critical appraisal of the development plan, master plan, and land use analysis (existing and proposed). The assessment of existing land and proposed land use has been compared with the Urban Development Plans Formulation and Implementation (UDPFI) guidelines. Also, the roles and responsibilities of Urban Local Body (ULB) and Parastatals agencies in urban planning functions have been discussed in the chapter.

5.1 Background

The city has well-established social infrastructure and physical infrastructure makes Nagpur a favourable location for settling. It is also considered as one of the cities for peaceful retirement¹³. The real estate sector has seen a boom in the recent times. The boom can be attributed to the developments taking place in the city, either in the form of physical infrastructure augmentation under various schemes (like JnNURM, BSUP, integrated road development schemes, etc.) or economic developments in and around the city, like that of MIHAN, healthcare city, and IT park.

Nagpur city is spread over an area of 21,756 ha (218 sq km)¹⁴. For Nagpur the planning authority that has the overall responsibility of urban planning and related functions was NIT; which later got transferred to NMC during 2001. Land and urban planning in Nagpur is governed by the Maharashtra Regional and Town Planning Act, 1947 (MRTP Act).

Chronology of planning activities

Urban planning initiatives for Nagpur dates back to 1860s. It started with policy level planning to manage financial policy, expansion and development schemes for some of the areas. Later approach changed to integrated planning, to carry out planning for all the development schemes and industrial areas as a whole region.

Following is the chronology of the planning activities that will provide an insight of the planning efforts made planned development for Nagpur since 19th century;

- 1869- When NMC was established in the year 1869, the population of the city was 82000 with an area of 14.3 sq km
- 1937- The government of Central Province and Berar passed a bill for the establishment of a town development authority
(This was the beginning of NIT whose working is governed by the Board of Trustees.)
- 1946- NIT prepared a master plan for Nagpur
(This plan contains financial policy, development control, and zoning regulations. The master plan also envisaged the development scheme, viz., Civil Station Expansion schemes, Ajni Expansion scheme, Central Avenue schemes, which were ably handled by NIT.)

¹³ Interpretation from an article published in "Business Today" in October 2013. Web link - <http://businesstoday.intoday.in/story/10-indian-cities-quiet-peaceful-life-for-retirement/1/198976.html>

¹⁴ The planning area will increase from 217.56 sq km to 225 sq km due there are merger of 2 census town that took place during 2013.

- 1951- During the said period, need of planning development for new expansion schemes was felt. Two municipalities and the adjoining villages were merged together to form Municipal Corporation. At that time, there were 42 wards with a population of 4.5 lakhs
- 1967- Metropolitan Regional Planning Board (MRPB) was constituted, considering the rapid industrial development in the city viz. Kamthi- Kanhan areas in east, and in Hingana-Ambazari to the west of the city.
- 1976 - The Regional Planning Board submitted interim development plan in the year 1974 and the government sanctioned the same in 1976.
- 1969- NIT declared its intention in the year 1969 to prepare a development plan for Nagpur
- 1970- The Interim Development Plan was prepared under Section 32 of the MRTP Act, published in the year 1970, and submitted for sanctioning in the year 1971
- 1985, '86, '87- NIT sought the expertise of the Deputy Director, Town Planning, Pune; for preparation of revised development plan of Nagpur
- 1988- NIT published the policy plan, highlighting guidelines for framing proposals of the revised development plan
- 2000- The Development Control Regulations for Nagpur came into effect for building plan regulation and control
- 2001- Town Planning department was set up within NMC, and it will be responsible for looking after functions related to urban planning, development of area under NMC jurisdiction and implementation of Development plan

5.2 Constituents of planning area

The Revised Development Plan of Nagpur City 1986-2011 is reviewed in the context of forecast of planning variables. The master plan for 2011-2021/2031 is under preparation. Total area considered for preparation of development plan was 23521 Hectares. It consists of NMC jurisdiction, which admeasures 21756 Hectares and area outside of Nagpur Municipal Corporation (NMC) which is included two census towns admeasuring an area of 1765 Hectares (Digdoh and Wadi). For planning purpose, the entire area of 23521 Hectares is divided into 7 planning units; the details are shown in the table below.

Table 19: Constituents of planning areas and zoning for Nagpur

Planning units/zone	Planning area (in Ha)	NMC area (in Ha)
Central	829	829
North	4349	4349
East	5139	3374
South	2814	2814
South-West	2923	2923
West	3210	3210
North-East	4257	4257
Total area (in Hectares)	23521	21756¹⁵

¹⁵ The revised Development Plan was prepared for earstwhile jurisdiction of NMC which does not include the newly merged Hudkeshwar and Narsala gram panchayats.

Source: Traffic and Transportation Master Plan for 2031, prepared by NMC, 2008

5.2.1 Projected population in the development plan

At present, the development plan under implementation was prepared during 1972-2020. Work of revising the development plan for next phase (2011-21) for Nagpur is yet to be taken up by the Town Planning department of NMC. The population projection as per the Development plan 2011 prepared by NIT has been presented in the table below:

Table 20: Projected population in Development Plan, 2011

Horizon year	Projected population (in lakhs)
2001	21.53
2006	24.15
2011	28.00

Source: Revised Draft Development Plan of Nagpur city, 2011

5.3 Spatial growth trends

In Nagpur, the population and physical growth both are experiencing a declining growth rate. As per observations made by Rupinder Kaur¹⁶ (1981), the physical growth of Nagpur city is declining, and on the other hand, peripheral urban centres are growing faster than the city's growth rate. During 1981-91, the annual growth rate was 2.87%, which declined to 2.33% during 1991-01. There has been a change in the city limits during the last decade 2001-11 due to merging of two census towns (CT) with the NMC jurisdiction. While the peripheral areas started emerging as important centres, Nagpur urban agglomeration was formed during 1991-01 (formation was as per census definition). The annual growth rate for the peripheral urban centre was 6.79%.

Figure 28: Nagpur city and urban agglomeration



Source: Revised Draft Development Plan of Nagpur city, 2011

¹⁶ Paper titled "Spatial Concentration/Diversification: Comparative Analysis of Class I Cities Located within and outside Urban Agglomerations in India (1991-2001)" was written by Rupinder Kaur and the paper was presented in GDN'S conference, 2012.

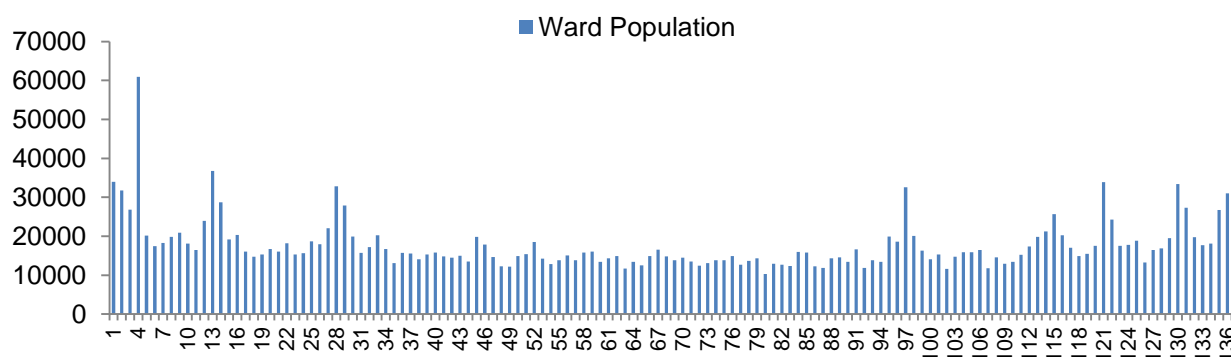
Since the formation of urban agglomeration, Nagpur is witnessing the impacts like urban sprawl of the city due to merging of the peripheral centres and often increases pressure on the infrastructure in the city. Thus, Nagpur will have to face the two way impacts (city to fringe and fringe to city) due urban sprawl and growth of urban centres in the agglomeration.

Growth/development trend within the city is mostly concentrated in the southern zone. The major developments are MIHAN project and real estate projects. Other developments like urban infrastructure and real estate projects are scattered across the city.

5.4 Spatial distribution of population

Spatial distribution of population across the wards is uneven in Nagpur. The pattern observed is distorted pattern and it is largely due to development taking place is not as per the building regulations in many of the areas and based on different socio-economic dynamics across wards. Maximum population is observed to ward no. 4. Ward no. 1, 2, 13, 97, 121, 130, and 136 have more than 30,000 persons residing. Ward no. 80 has the least population (less than equal to 10,000). Spatial spread of population across wards is shown in the figure below. Out of the 136 wards, around 82% of the wards have 0-20,000 persons; 18% of the wards have 20,000-50,000 persons; and only 1% has 5-10 lakh persons.

Figure 29: Spread of population across the wards in Nagpur



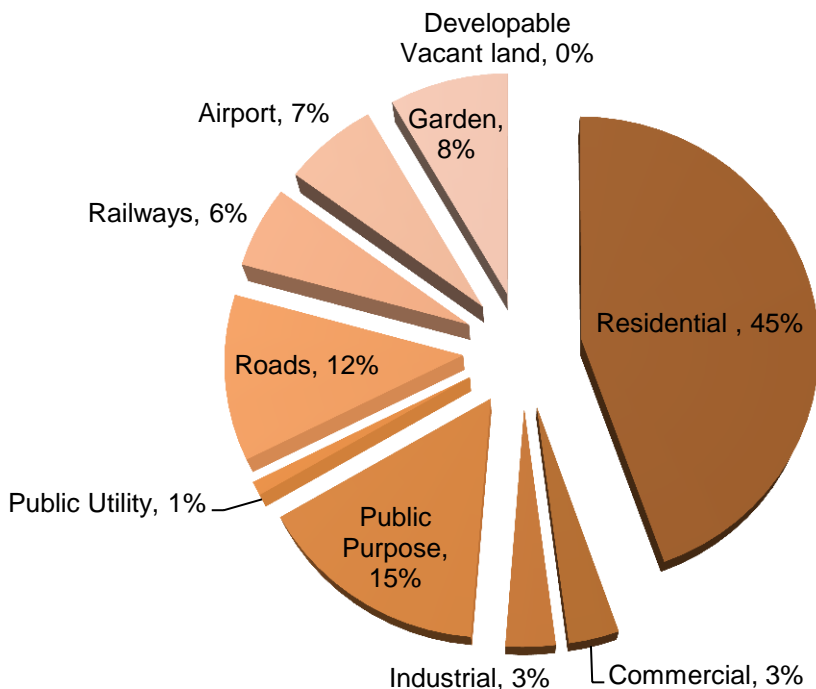
Source: Census of India and CRIS analysis

5.5 Critical appraisal of development plan

5.5.1 Existing land use pattern

At present, Nagpur is spread over an area of 21,756 ha. As per 1984 land use, only 80% of the land was developable, which has increased in 2011 to 100%. Also, 15,033 hectares of area is developed, which is 69% of the total area, and developed area in last three decades (since 1984) has doubled. As per the existing land use, majority of the land portion is developed as residential, 45%; commercial and industrial land use is 6%; land under public use is approximately 41%; and 8% is under parks and gardens. As per the Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines, the existing land use conforms to the norms in case of land under residential use, commercial use and land under public use.

Figure 30: Existing landuse breakup of Nagpur, 2011



Source: Revised Draft Development Plan of Nagpur city, 2011

For land under industrial and recreational use does not conform to the norms. But, land under recreational use is less and is adequately complimented by the large forest cover in the city. Area under water bodies has reduced by almost 50% in comparison to 1984 land use. Breakup of the existing land use is shown in the figure above and landuse in 1984 of Nagpur is provided in the annexure. As discussed earlier in the section, comparison of existing landuse pattern with URDPFI guidelines is shown in the table below;

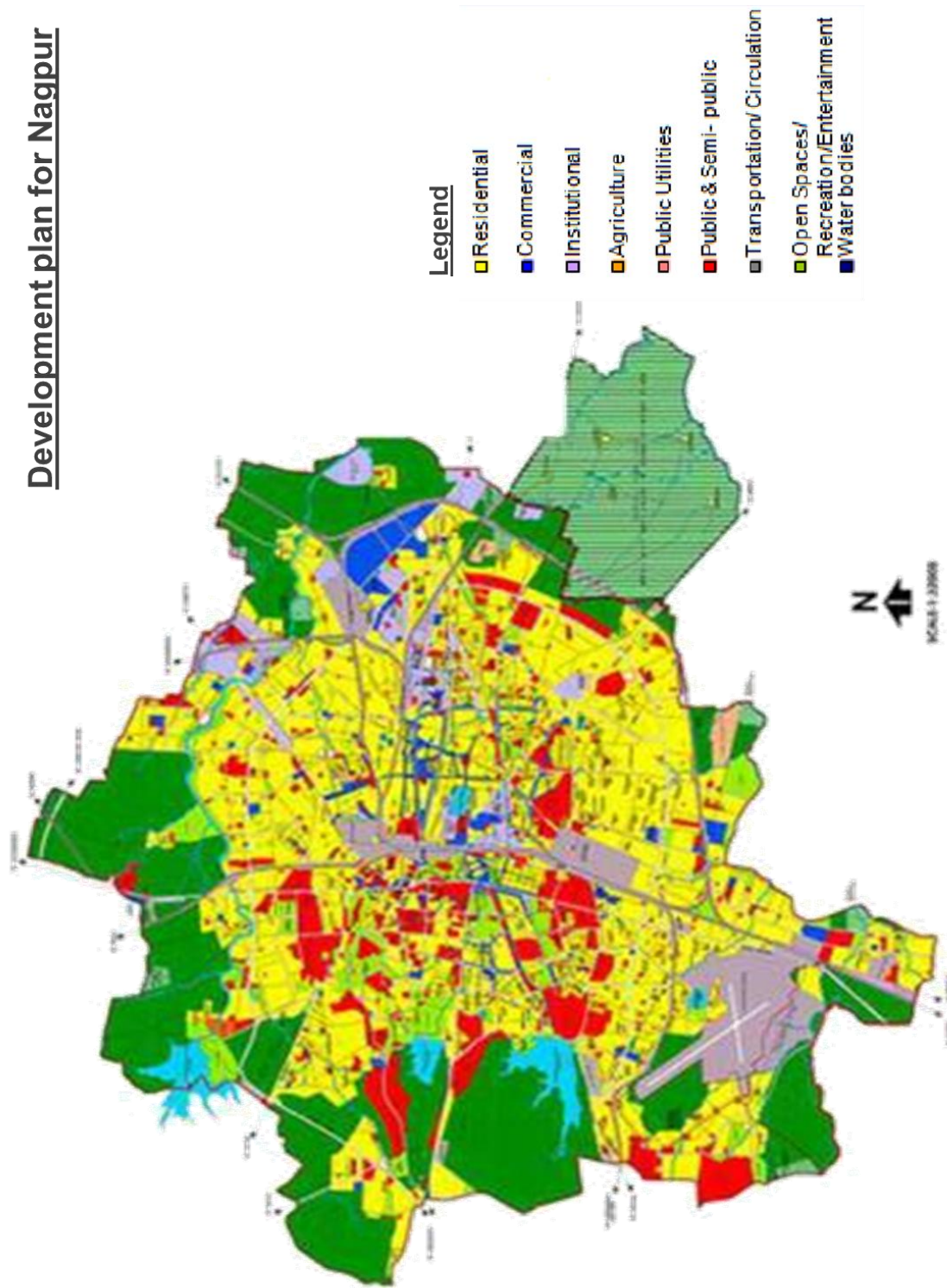
Table 21: Existing land use and comparison with URDPFI guidelines

Category	URDPFI guidelines	Existing (%)	Meets the benchmark
Residential	40-45%	45%	Yes
Commercial	3-4%	3%	Yes
Industrial	8-10%	3%	No
Public & Semi Public	10-12%	15%	Yes
Recreational	18-20%	8%	No
Transportation	12-14%	28%	Yes
Agricultural/Vacant/Forest and water bodies	Balance	0%	No

Source: URDPFI guidelines, 2014

Figure 31: Land use map of Nagpur, 1998-2011

Development plan for Nagpur

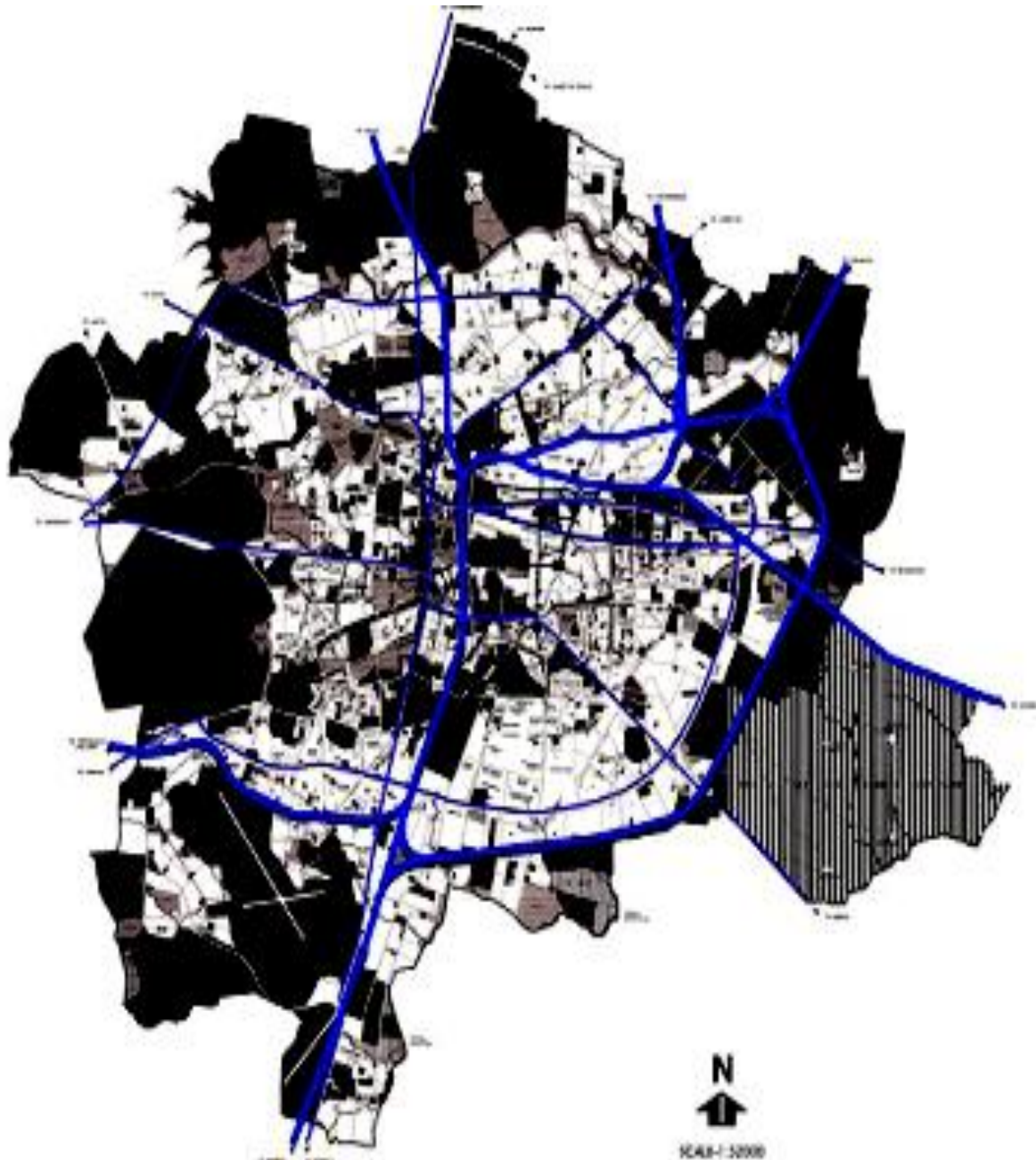


Source: Revised Draft Development Plan of Nagpur city, 2011

5.5.2 Nagpur's built-up footprint

The railway line divides the city into east and west Nagpur. The east represents an old organic settlement, while the west represents the new colonial town. Nagpur's built form consists of historic and heritage structures, which are spread across both east and west Nagpur. The urban footprint represents the developed versus undeveloped land. Mapping of Nagpur's built-up footprint provides details on the (1) built-up space, (2) the open spaces within the city, (3) pattern of development – vertical or horizontal, (4) dispersion of the city's development into the fringe areas, and (4) probable areas for future development. Nagpur's built-up footprint is shown in the below figure.

Figure 32: Nagpur's urban built foot print



Source: Comprehensive Mobility Plan (CMP) for Nagpur, NIT

Nagpur is horizontally expanding, but still the dispersion levels are very low. Also as seen from the map it is clear that in most of the development has taken place in the inner areas and the outer/peripheral areas of the city are less developed comparatively. Also, it is important to highlight that even after city sprawling horizontally, expansion of the city is restricted within the city limits; the open spaces available is less and those available are scattered and are large land parcels. It might be attributed to various reasons like (1) houses with small footprint, (2) presence of 446 slums over 25% of the city area, and (3) 62% of the land falling under the category of undevelopable land, which can be forest, water bodies, agriculture land, land under military forces in Nagpur, etc. The urban form and development in five zones of the city are summarised in the table below.

	<p style="text-align: center;">North Nagpur</p> <p>Police Line Colony is one of the largest sub-urban localities. It adjoins the Police Line apartments behind the Police HQ. Teka Naka-Kamptee is one of the biggest transport zones in central area. Many transporters and commercial vehicle owners reside in this area.</p>	
<p style="text-align: center;">West Nagpur</p> <ul style="list-style-type: none"> ■ Dharampeth, Shivajinagar, Gokulpeth, Gandhinagar, Ambazari Layout, Shankarnagar, Bajajinagar, Laxminagar, Pratapnagar, Khamla, Ramdaspath are residential areas in this region ■ Government offices, Bombay High Court bench and the Vidhan Bhavan are located in civil lines ■ Seminary Hills is home to educational institutes and offices like Air Force, CGO Complex, and TV Tower. ■ Some of the famous parks and open areas are located in this part of the city ■ Sadar is a famous shopping place, close to Railway Station 	<p style="text-align: center;">Central Nagpur</p> <ul style="list-style-type: none"> ■ Mahal is the oldest part of Nagpur, with relatively narrow streets and crowded residential quarters. The famous Bhonsle palace is situated in Mahal. There are many historic temples in Mahal area ■ Mahal is also known for its cloth market and old book market situated on Kelibagh road ■ Sitabuldi houses various commercial shops and the largest wholesale vegetable market in Nagpur. Also located in Sitabuldi is the Sitabuldi Fort ■ Dhantoli is a premium residential area in Nagpur 	<p style="text-align: center;">East Nagpur</p> <ul style="list-style-type: none"> ■ Kalamna is one of the largest wholesale markets for oranges and grains in Asia ■ Mominpura- popularly known as the Chandni chowk of Nagpur. ■ Mayo Hospital and Jama Masjid are parts of Mominpura ■ Itwari is the wholesale business centre of Nagpur. Hardware, cloth, household, wedding saree markets are located in east Nagpur
	<p style="text-align: center;">South Nagpur</p> <p>The Government Medical College and Hospital which is a Govt. managed body concerning public health care is located in South Nagpur</p> <p>Manewada, Besa, Narendra Nagar and Satyam City are suburbs with many new residential projects</p> <p>The multimodal hub of MIHAN is located in South Nagpur along the trunk rail route towards Mumbai</p>	

Source: Adaptation from Comprehensive Mobility Plan (CMP) for Nagpur, NIT

5.5.3 Proposed land use - Nagpur city

The total area considered under the revised development plan being prepared by NMC is 235 sq km. Of this, 217.56 sq km is under NMC jurisdiction, and rest 7.25 sq km is located outside NMC limits. An area

of 17.65 sq km is earmarked for sewerage and drainage disposal schemes. NMC has divided the entire area into 7 planning units for preparing the development plan. Area of newly merged census town is 7.25 sq km which will also be added to the NMC area for future development under revised development plan.

In order to improve the land use and conform to the required norms as per URDPFI guidelines, the Town Planning department has prepared the revised development plan¹⁷ for Nagpur. The following land use has been proposed for 2021 and 2031.

Table 22: Proposed land use for Nagpur city

Sr.No.	Land use	2021			2031		
		Area in Hectares	% of developed area	% of total area	Area in Hectares	% of developed area	% of total area
1	Residential	6,706	44	30	7000	47	32
2	Commercial	501	3	2	700	5	3
3	Industrial	495	3	2	800	5	4
4	Public Purpose	2,312	15	11	2312	15	11
5	Public Utility	149	1	1	150	1	1
6	Roads	1,754	12	8	1800	12	8
7	Railways	873	6	4	900	6	4
8	Airport	993	7	5	1000	7	5
9	Garden	1,251	8	6	1300	9	6
10	Developable Vacant Land	0	0	0	0	0	0
	Total	15,033	100	69	15,962	100	73
11	Agriculture Land	5,774		27	4,846		22
12	Water Bodies & Nallahs	463		2	463		2
13	Non-Developable Land	0		0	0		0
14	Drainage & Sewage Disposal	141		1	141		1
15	Cattle Stable & Dairy Farm	212		1	212		1
16	Compost Depot	131		1	131		1
		6,723		31	5793		27
	Grand Total	21,756		100	21,756		100

Source: NMC, Nagpur, and Nagpur Environment Assessment Report, 2008

5.5.4 Comparison with URDPFI guidelines

Further, it is important to analyse that the proposed land use for Nagpur is in conformity with the norms of land use pattern recommended by URDPFI guidelines. Comparison of proposed land use and recommended by URDPFI guidelines is provided in the table below. From the table it is clear that during

¹⁷ After dedicated town planning Department formed within NMC in 2001, preparation of revised development plan for Nagpur will be the first development plan prepared and implemented by NMC. Till now, the development plans were prepared and implemented by NIT.

21, percentage of land under the residential use will be reduced from 45% to 44% and still within the range recommended by guidelines. Similarly, during 2021-31, percentage of land under public and semi-public use will be reduced and will increase the percentage of land under industrial use. Also, it is important highlight from the proposed land use numbers that, still recreational land use and industries are not been able to meet the recommended percentage.

Table 23: Proposed land use comparison with URDFI guidelines

Category	URDFI guidelines	Proposed Landuse		Meets the benchmark	
		2021	2031	2021	2031
Residential	40-45%	44%	44%	Yes	Yes
Commercial	3-4%	4%	4%	Yes	Yes
Industrial	8-10%	4%	5%	No	No
Public & Semi Public	10-12%	16%	15%	Yes	Yes
Recreational	18-20%	8%	8%	No	No
Transportation	12-14%	12%	11%	Yes	Yes
Railways and Airport	Balance	12%	13%	No	No

Source: Revised Drfat Development plan for Nagpur and URDFI guidelines, 2014

5.5.5 Nagpur Metropolitan Region (NMR) – Proposed land use plan

The State Government of Maharashtra formed Nagpur Metropolitan Region (NMR) in 1999. The metropolitan region includes Nagpur city, Nagpur Gramin (rural), Hingna, Parshivni, Mauda, and Kamptee tehsils and parts of the Savner, Kalmeshwar, Umred, and Kuhu tehsils. The total metropolitan area considered for carrying out planning and preparing the land use plan is 3,780 sq km, excluding the Nagpur city area under NMC jurisdiction. Preparation of the land use plan for NMR will carried out in two phases. In Phase – I, the land use plan for an area of 1,520 sq km has been prepared by NIT. The areas earmarked under Phase – I and II are shown in the figure below.

Figure 33: Map showing different jurisdiction and regions for Nagpur – NMC and NMR



Source: NIT website, www.nitnagpur.org

5.5.6 Building byelaws

As per the MRTP Act, every development or redevelopment of buildings, whether residential, commercial, or industrial, needs approval of building plan from the Town Planning department of NMC. In the Town Planning department, the building plan approval process has been streamlined after the implementation of AutoDCR software. The approval process involves multiple stages:

- Any person intending to carry out any development work has to give a notice by filling up the Performa prescribed by the department.
- It should be accompanied with plans and statement in sufficient copies (four copies). In case of building schemes, the notice should be by copies of clearances from other agencies like fire services.
- The application for building plan approval would be received at the main office at civil lines; then it would move to ADTP for approval.
- The file then moves to Jr. Engineer with approvals from the Town Planner/Deputy Engineer for document verification, site inspection, and technical scrutiny.
- Once the file is scrutinized through AutoDCR, it moves back to ADTP with approvals from Jr. Engineer and Deputy Engineer/Town Planner for sanction.
- The demand letter is issued along with the sanctioned file to issue the building permit.
- At present, it takes 60 days to get a building plan approved, which is same as the time taken for manual approval. However, applications that comply to all the requirements get approval within 30 days.
- Even after AutoDCR developed ensures all the functions for building plan approval starting from scrutiny of plan; generating reports; forwarding to different staff members for further assessment and approval; and escalating matter in case of non-compliance by any of staff member as per the workflow of the module. Still most of the tasks are carried out manually and use of AutoDCR is kept minimal.
- There is lack of IT literacy and awareness regarding benefits of using e-governance modules. This lack of awareness about importance of application developed for day-to-day administration for department, is pushing staff to do work manually.

5.6 Urban planning functions and reforms

NIT was the sole authority looking after all the functions of land and urban planning in the city till 2000. But since 2001, planning and developmental activities are administered by two authorities in Nagpur. Out of the total planning area of 22,508 ha, 15,300 ha is under NMC's Town Planning department and the rest, summing up to 7,208 ha, is under the purview of NIT.

5.6.1 Urban planning functions

1. Implementation of development plan/land use plans

As per the provisions in the MRTP Act, the development plan was prepared during 1984. The development plan preparation took five years and the plan was published in 1989. Subsequently, the plan was submitted to GoM for approval. Based on the scrutiny of the plan, it was revised and submitted again. Finally, after multiple revisions, the development plan came into effect in 2001, which was prepared for a horizon time till 2011.

2. Development Control Regulation, 2000

The building byelaws for the area under NMC were approved by GoM on 24th June 1965. These byelaws were used by NMC up to 1993. The development plan for the city along with the building regulation and

DCR was sanctioned by GoM's general resolution on 3rd June 1976. These building regulation and DCR were in operation till 1990 in areas where the improvement schemes of NIT were implemented.

NIT prepared the revised draft building regulation and DCR and submitted the same to the government for sanction on 11th October 1990. NIT brought the DCR into effect in the same year. In order to avoid serious consequences due to two DCRs prevailing in the city, UDD directed NMC and NIT to resolve the issue and adopt a single DCR for NMC. It was carried out by NMC/NIT under section 154 of the MRTP Act.

GoM itself has prepared the revised DCR for Nagpur city and published it for objections and suggestions in 2000 under section 31 of the MRTP Act. It was sanctioned by the government in 2001.

3. Building plan approval process

As per the MRTP Act, every development or redevelopment of buildings, whether residential, commercial, or industrial, needs approval of building plan from the Town Planning department of NMC. In the Town Planning department, the building plan approval process has been streamlined after the implementation of AutoDCR software. The status of building plan approved during last five years is as shown in the table below. The Town Planning department has received 9786 registered applications for proposed building. At the other hand, the department has approved only 27% of the building plans till 2011-12.

Table 24: Status of building plan application and approved plans, 2007-08 to 2011-12

Year	No. of Applications	Building plans approved	Approved (%)
2007-08	761	642	84
2008-09	1694	173	10
2009-10	2228	531	3
2010-11	2522	1148	46
2011-12	2581	160	6
Total	9786	2654	27

Source: Office of Additional Director of Town Planning, NMC, Nagpur

Additionally 2726 building plans got approval from NIT and 1403 has approved at the zones (10 zones). The percentage of rejection is very high (72%), which is due to non-compliance to the required details. Thus, the compliance standards of NMC seems to be very rigid, but there is need to restructure parameters based on which the building plans which are rejected. Data regarding rejection has not been maintained properly in the Town Planning department.

5.6.2 Urban planning reforms

Major set of reforms were carried out by NMC during the JNNURM implementation phase as part of the programme. Reforms related to the urban planning functions were part of optional reforms, which NMC has implemented. The details of the reforms are as follows:

- **Revision of building byelaws to streamline building approval process** – NMC has streamlined the building approval process and AutoDCR software also has been developed for scrutiny of the building plan. Revision in byelaws has also been carried out. For dissemination of information and providing training to the practicing architects in the city, various workshops sessions have been conducted by NMC.
 - ◆ NMC has also deployed the workflow module for building plan approval, which will generate the scrutiny report on web portal. This will help the architects and registered users to track the status of their file.

- **Revision of building byelaws for rainwater harvesting and water conservation** – NMC has implemented the byelaws. Rainwater harvesting is compulsory for the buildings with plot sizes above 300 sq m. During scrutiny of the plan, in case if rainwater harvesting provision is not shown in the building plan having area more than 300 sq m, the plan is rejected and sent back to the concern architects or registered users.
- **Earmarking land for EWS/LIG housing system** – NMC has agreed to amend the provision as prescribed under the reform and will earmark land while revising the development plan for the next horizon period, which has not started as of now.
 - ◆ As per GoM GR, for the sub-division of the land admeasuring 2000 sq m and more, minimum 20% area shall be provided in the form of 30 to 50 sq m developed plots for the EWS/LIG class.
- **Byelaws for reuse of recycled water** - NMC has prepared the byelaws and submitted to GoM for approval, after approval of the general body of NMC. The approval from GoM is pending and implementation of the byelaws is being delayed. As per draft policy compulsory provision of treatment plant is mandatory for following;
 - ◆ For residential layouts area admeasuring 4000 sq.mt or more in addition to 15% open space
 - ◆ For group housing area admeasuring 200 sq.mt or above or water consumption is 20,000 litres/per day or tenements of 20 or more
 - ◆ For education, industrial commercial government, semi government, hotel, lodging are 1500 sq.mt or more water consumption is 20,000 litres/day, and
 - ◆ For hospital having 40 or more beds.

5.7 Roles and responsibilities of ULB and parastatal

Since 2001, NMC has been looking after all the urban planning functions for the city. Also, NIT has some responsibility in the urban planning functions of the city. Implementation of the development plan as of now is the responsibility of both the agencies. Key roles and responsibilities of NMC and NIT for the urban planning function are summarised in the table below.

Table 25: Roles and responsibilities of ULB and parastatal in urban planning

Agency	Roles and responsibilities
Town Planning Department, NMC	<ul style="list-style-type: none"> ▪ Preparation of development plans ▪ Implementation of development plans ▪ Development of various improvement schemes for Nagpur ▪ Implementation of various plans ▪ To carry out modification or deletion of reservation in the ongoing development plan; which can be for betterment of the city or for city's development. ▪ Building plan approval, building permissions, NOC certificates, sale deeds for developmental activities within NMC jurisdiction ▪ Revision of plans and building regulations from time to time
Nagpur Improvement Trust (NIT)	<ul style="list-style-type: none"> ▪ NIT is the planning authority for 7,208 hectares of area under NMC jurisdiction. Also, it is the planning as well development authority for the declared NMR by GoM. ▪ Development of basic infrastructure in the layouts regularised by NIT. (There are unauthorized layouts in the city, which NIT needs to regularise)

Agency	Roles and responsibilities
	as per workings prescribed in Gunthewari Act. At present, around 5000-10,000 layouts are still not regularised, and some of these are located in NMC jurisdiction.)

Source: *Based on the discussions with the officilas of NMC and NIT*

5.8 Key findings

- Nagpur has traditionally expanded horizontally with low-rise built-up spaces.
- Open space within the built-up spaces is very less, which means there is no space available for future greenfield development within the city, except the peripheral areas.
- Only 8% of the space covered with green vegetation, which can be accessed by citizens for leisure and as a community space and for social purposes.
- No monitoring over the new development of the layouts taking in the city
- The Gunthewari Act allows deletion of the existing reservation in the DP, which conflicts with the provision laid down by the MRTP Act.
- Conflict is powers vested into planning authority by MRTP Act and Gunthewari Act. Reservation of land carried out by planning authority as per MRTP Act, but Gunthewari Act provided powers to planning authority to delete such reservations in the development plan
- Amendment of conservation regulations for heritage sites not carried out in the current DCR
- Violation of DCR and building regulations in the city and absence of monitoring of the building control carried out on regular basis

6 Social Infrastructure

This chapter presents a detailed assessment of the social and cultural environment, which includes health services, education status, and role of various agencies involved in the service provision. The key findings of the analysis indicate the status of Nagpur city in terms of health, education, and recreation service provision. The existing facility has been compared with Urban and Regional Development Plan Formulation Implementation (URDPFI) guidelines to arrive at the gap in the service provision.

6.1 Background

Nagpur is considered to be a hub for health facilities. Due to the availability of better facilities in Nagpur within a radius of 300 km, the city healthcare facilities have a large catchment area. Also, the city has a wide range of educational institutions like universities, science and management colleges, research institutions established by the government and private organisations.

6.2 Health

Nagpur has emerged as a health hub with better facilities and services for the central India. Nagpur has several medical facility centres providing services across service levels and categories. Nagpur has many hospitals and nursing homes. Due to presence of good medical centres in the city and to opt for good medical treatment, many people from surrounding rural areas and other cities of neighbouring states often visit Nagpur. The city has numerous full-service hospitals. These are owned and operated by several agencies including the central government, charity organizations, etc.

Table 26: Existing healthcare and medical facilities in Nagpur

Government facilities	Facilities run by charitable trust	Private facilities
Govt. Medical college	Radha Krishna hospital	Lata Mangeshkar hospital
Govt. Dental college	Nagrik sahakari hospital	BhauSaheb Medical college
Govt. OTPT college	Dalvi hospital	Dabha homeo Medical college
Indira Gandhi Medical college	Janta maternity home	Meditrina Hospital
Daga hospital	Matru sewa Sangh, Sitabuldi	Wockhardt Heart hospital
ESIS	Matru sewa Sangh, Mahal	Orange City hospital
Govt. Ayurvedic college	Mure Memorial hospital	Care Hospital
Govt. Mental hospital	Tirpude hospital	Avanti Heart Institute
Central Railway hospital	Shri. Pakwasa Ayurvedic hospital	Neuron Brain & Spine hospital
Pachpaoli Maternity home	Rastrasanta Tukdoji Maharaj Cancer Hospital	

Source: City Development Plan for Nagpur, 2006

6.2.1 Existing situation

NMC provides health related facilities in the city. The existing government healthcare infrastructure managed by NMC is way less compared to private healthcare infrastructure. There are 29 dispensaries

and 1 mobile dispensary, which are run by the municipal corporation. Also, the city has 1 nursing home, 22 polyclinics, 1 general hospital, and 7 diagnostic centres.

As mentioned earlier, private healthcare infrastructure in the city has outnumbered the public healthcare infrastructure. Overall, there are about 648 nursing homes and dispensaries; 7 Polyclinics with a total of 8989 beds. Out of these hospitals, 84 hospitals have more than 20 beds. It caters to patients coming from villages around the city and even from Madhya Pradesh, Andhra Pradesh, and Chhattisgarh.

A large number of these people come to the city for specialty healthcare. While the population of the city is increasing day by day, the number of beds in government hospitals remains more or less constant. There is an urgent need to expand the bed strength of the hospitals to satisfy the growing demand. Since poor and below-poverty-line patients go to these hospitals, it is extremely important to increase the bed strength of the Government Medical College and Daga Hospital. The list of the existing health facilities in the city is as follows.

Table 27: Existing health facilities in Nagpur

Sr.No.	Health facilities	Number
1	General Hospital	1
2	Specialty Hospital	1
3	Polyclinic	7
4	Nursing home, child welfare, and maternity centre	648
5	Dispensary	
6	Diagnositic centers	69
7	Health posts	11

Source: Health department, NMC, Nagpur

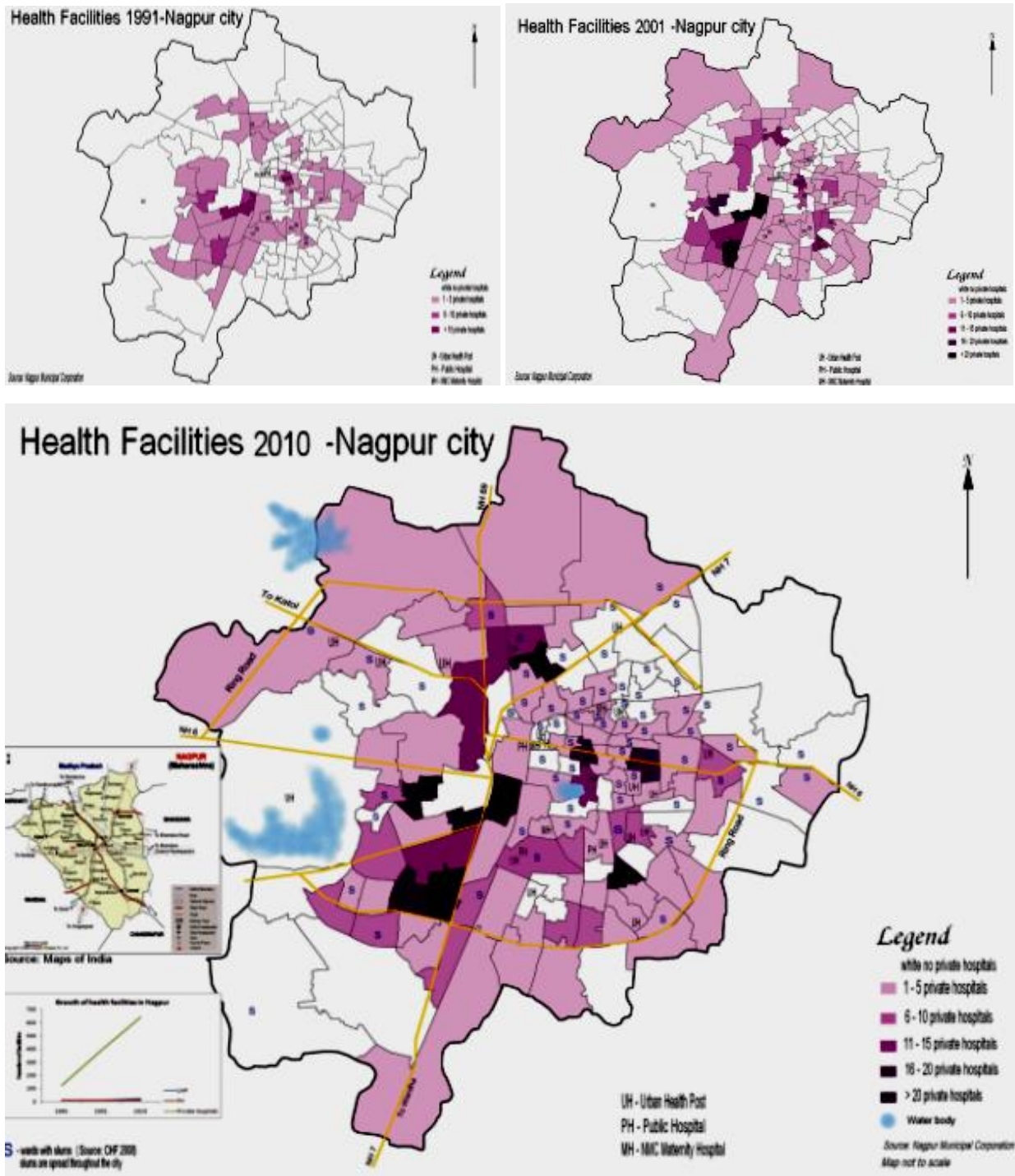
Many fold increase in registered private facilities was observed during two decades. Only 123 registered hospital facilities were there till 1991. During 1991-01, the number of registered hospitals drastically increased from 123 to 388 and it increased at a growth rate of 215%. While, 65% increase was recorded for hospital facilities during 2001-11. Public facilities are outnumbered by private facilities in the city. Also, growth in public facilities, which should have taken place along with the increase in population, has not taken place.

It is observed that the private facilities in the city are concentrated mostly in a few areas spread across the city. Areas like Lendra Park, Ramdaspath, Sitabuldi, Dharampath, and Dhantoli located in the central Nagpur have very dense concentration of hospitals and health facilities. The south-western parts of the city like NEERI and the surrounding areas have a high concentration of hospitals. Sakkadhara area in the south-eastern part and Indora in the northern part of the city are other areas where hospitals have come up. The concentration of hospitals in the city has increased during last two decades are shown in the figure below.

But, another observation is that there are wards in north-east and south-west, where no hospitals have come up, and more than 30% of the wards do not have any private facilities. This spatial trend of health facilities being developed within the city is attributed to the different socio-economic profile observed in the wards or areas.

The city has 11 Health posts run by Government institutions and NGOs. Further, 15 additional Health Posts have been proposed in the city. The list of the existing and proposed Health posts in the city has been presented in the Annexure. Even though the number of health facilities in Nagpur is good, the economically weaker section prefers to opt for public facilities due to non-affordability of private facilities. And at the same time, there is no improvement in the public facilities.

Figure 34: Map showing health facilities in Nagpur during 1991, 2001, and 2010



Source: Report on 'Mapping of urban health facilities in Maharashtra', 2011

6.2.2 Basic public health indicators

Basic health indicators for Nagpur during 2006-2009 are shown in the table below. Increase in the crude death rate is attributed to the increase in registration of anti-natal clinics (ANC) and also due to people come from rural areas to these clinics for treatment and die while undergoing treatment.

Table 28: Health indicators for Nagpur, 2006-2009

Indicators	2006	2007	2008	2009
Crude birth rate (CBR)	21.79	21.1	21.79	22.11
Crude death rate (CDR)	8.04	9.45	8.81	9.53
Infant mortality rate	19.43	NA	17.55	17.49
SBR	5.59	NA	7.36	4.19

Source: Report on 'Mapping of urban health facilities in Maharashtra', 2011

6.2.3 Role of municipal body in the health sector

NMC's Health department is responsible for providing health services and managing health facilities. The Health department is also responsible for managing and implementing various health programmes in the city. The Health department has staff strength of 3,912 including doctors. 29% of the total sanctioned posts are vacant within the department, which might affect the level of services.

Key role and responsibilities of the Health department, NMC towards provision of the health related facilities in the Nagpur are as follows;

- Development of health and medical facilities within the city and managing the operation for various health related services.
- Implementation of various central and state government health programmes that includes development of health facilities and provision of services too. e.i. as part of Central government's mission known as "National Urban Health Mission (NUHM)", NMC is provide support to develop required health related facilities within city. 10 UCHC and 50 UPHC for Nagpur city has been approved under NUHM that will be developed and operated by Health department of NMC.
- To carry out various health camps and health programmes (health programmes of central, state government and programmes of NMC) within city. e.i. women safety programme, mother-child safety programme, sickle cell programme, free of cost dialysis services, physiotherapy services, pathology services, etc.

6.2.4 Comparison with URDPFI norms

Existing healthcare infrastructure in the city has been compared with the URDPFI guidelines to check the current status of healthcare infrastructure and further to identify the gap in the healthcare facilities. As on date facilities like dispensaries, nursing homes, polyclinics, and general hospitals has met the requirement. Moreover, mentioned facilities are on higher side as compared to URDPFI guidelines.

As indicated in the table below, the existing facilities in the city like dispensaries, maternity centres, polyclinics, and hospitals conform to the UDPMI guidelines. Further, as per the guidelines, the city lacks veterinary hospitals and dispensary facilities for pets.

Table 29: Healthcare facilities in Nagpur

Healthcare facility	URDPFI Guidelines	Requirement as per guidelines	No. of hospitals	Met the Benchmark
Dispensary	1 for 15000 population	166	648	Yes
Nursing home, child welfare and maternity centre	45000 to 1 lakh population	41		Yes
Polyclinic	1 for 1 lakh population	25	7	No
Intermediate Hospital	1 for 1 lakh population	109	1	No
Intermediate Hospital	1 for 1 lakh population			

Healthcare facility	URDPFI Guidelines	Requirement as per guidelines	No. of hospitals	Met the Benchmark
Multi-Specialty Hospital	1 for 1 lakh population			
Specialty Hospital	1 for 1 lakh population			
General Hospital	1 for 2.5 lakh population			
Family Welfare Centre	1 for 0.5 lakh population	41	1	
Diagnostic centre	1 for 0.5 lakh population	41	69	Yes
Veterinary Hospital for pets and animals	1 for 5 lakh population	5	0	No
Dispensary for pet animals and birds	1 for 1 lakh population	25	0	No

Source: Health department, NMC, Nagpur and URDPFI Guidelines

6.2.5 Key issues and concern areas – Health facilities

- Nagpur has a wide catchment area with a radius of 300 km due to presence of better health facilities
- Surrounding villages are dependent on public health care facilities in Nagpur and thus the service load on public facilities is more. Even, Urban poor is completely depended on government hospital in the city
- It is extremely important to increase the bed strength of the Government Medical College and Daga Hospital since it is accessed by urban poor
- The condition of health/Medical facilities has deteriorated significantly in the city. Also, the quality of services at the government hospitals being deteriorated
- Public health facilities are not conforming to the URDPFI guidelines. But, considering the private and public both, majority of the health facilities are conforming to the URDPFI guidelines.
- No subsidy programmes for urban poor to avail critical and super specialty services in other private hospitals

6.3 Education

6.3.1 Existing situation

A few decades back, educational facilities were totally in the hands of NMC and Zilla parishad. Recently, increase in private education institutions within the city has been notable due to interest of private organisation in the education sector. Nagpur already boasts of some high quality schools. Students from other countries come to Nagpur to study in these schools. Besides schools, Nagpur has institutions for higher education, like medical and engineering colleges.

The education facilities provided by NMC in Nagpur are completely free of cost. At present, there are around 203 institutional buildings, and more than 36,000 students are enrolled in the municipal schools and colleges operated by NMC. There are 1,572 teachers in NMC. Hired private agencies are providing handholding support to the teachers and in impart education through use of technology. Computer labs at NMC schools are managed by two private agencies (Avron & CBM). Education imparted in NMC schools and colleges is in Marathi, Hindi, and Urdu languages.

Table 30: Details of educational institutions in Nagpur operated by NMC

Particulars	Details
No. of institutions operated by NMC	203 institutions 173 primary schools - till 7 th std 28 high schools - 8 th std to 10 th std 4 junior colleges - 11 th std to 12 th std
No. of students enrolled as on Oct 2013	36,000
No. of teachers	1,572
Student to teacher ratio	22

Source: Education department, NMC, Nagpur

6.3.2 Comparison with URDPFI norms

The existing education facilities have been compared with the URDPFI guidelines to check the current status of public education facilities and further identify the gap in the services. It is observed that the city has adequate facilities in terms of higher education and graduation schools. However, the city lacks sufficient schools at the primary and pre-primary school levels. As per the URDPFI norms, there is a deficit of 993 public schools at the pre-primary level. Further, the city lacks public education facilities like integrated schools with hostel facilities and schools for the physically and mentally challenged. But, in terms of higher education and professional education in Nagpur, private education facilities in Nagpur suffice the deficit in the public education facilities.

Table 31: Existing education facilities' comparison with URDPFI norms

Social infrastructure	UDRFI Guidelines	Actual requirement for 2013	Existing 2013	Met the Benchmark
Pre-primary to secondary education				
Pre-primary, nursery school	1 for 2500 population	993	58	No
Primary school	1 for 5000 population	497	197	No
Senior secondary school	1 for 7500 population	331	24	No
Integrated school (with hostel facility)	1 for 90000 to 1 lakh	28	0	No
School for physically challenged	1 for 45000 population	55	0	No
School for mentally challenged	1 for 10 lakh population	2	0	No
Higher education				
College	1 for 1.25 lakh	43	20	Yes
Technical education	1 for 10 lakh population	18	2	Yes
Professional education				
Engineering college	1 for 10 lakh population	37	2	Yes
Medical college	1 for 10 lakh population	11	2	Yes
Other professional college	1 for 10 lakh population	23	2	Yes
Nursing and paramedical institute	1 for 10 lakh population	0	2	Yes

Source: NMC and URDPFI guidelines

Note: The existing number of schools excludes the private schools. As the details were not available with NMC's education department

6.3.3 Role of municipal body in the education service provision

NMC has a dedicated education department, which is further bifurcated into primary and higher secondary sections. The department is headed by an education officer and has staff strength of 1,925 employees including teachers. NMC plays an important role in the provision of education services as it provides free of cost education to all the students enrolled in public schools. Apart from these, even provision of uniform, books, etc., to poor students is taken care by NMC.

NMC has been making efforts to improve the standard of services of public facilities at par with private facilities. For this, NMC has made provision of computer labs in each of the schools and has hired private agencies to impart computer knowledge. NMC is also planning to provide infrastructure for imparting digital learning through online classes and provision of projectors in each of the schools.

6.3.4 Key issues and concern areas – Education

- Student to teacher ratio is : 22:1
- Some of the institutions are in dilapidated conditions and at present are non-functional. Also, due to high drop out rate of students in the some of the schools located in the posh locality, these schools are no more functional. Thus, Few of the schools are non-functioning due to high drop out rates.
- NMC provides education in three different medium such as Hindi, Urdu and Marathi. Dropout rate has increased in NMC's school due to non-availability of English medium
- Lack of teachers to teach in government schools and lack of qualified english teachers to teach in English subject. Also no training curriculum for teachers has been prepared by NMC.
- Support is required from NGOs to create awareness on importance of education in slums

6.4 Recreational facilities

Recreation is an activity of leisure. The 'need to do something for recreation' is an essential element of human biology and psychology. Recreational activities are often done for enjoyment, amusement, or pleasure and are considered to be 'fun'. There are several recreational facilities in the city for people to spend their leisure time the way they want to. There are various sports ground, parks and gardens, lakes, and rivers in the city.

6.4.1 Sports facilities

Nagpur has various major and minor playgrounds. There are various sport complexes in the city which are used for coaching purposes or for organising sport events. There are two cricket stadiums in Nagpur, one within city and the second one in the outskirts. Yashwant Cricket Stadium is located within city and is now used to organise big cultural events only.

6.4.2 Parks and gardens

NMC develops and maintains open spaces through its Garden department. The functions of the department include maintaining existing gardens, developing new gardens as per the norms and needs of the citizens, and developing and maintaining landscapes/greenery cultivated on road dividers, at intersections, and footpaths. The department performs its duties as per the Maharashtra (Urban Areas)

Preservation of Trees Act, 1975, which covers aspects like plantation of trees, preservation of existing trees, conducting of tree census after every five years, and grant of permission to citizens to cut trees, subject to specific conditions.

At present, around 79 gardens and parks are developed and maintained by NMC. NIT has also developed around 52 gardens and is maintaining them. Apart from these other agencies like forest department and Punjab Rao Krushi Vidhyalaya (PKV) also have developed gardens in the city. There are 135 parks and gardens in Nagpur and these gardens are spreaded over an area of around 351 acres. The summary of existing parks and gardens in Nagpur is provided in table below, while detailed list of gardens in the city is provided in the annexure.

Table 32: Parks and gardens in Nagpur

Sr.No.	Responsible Authorities	No. of parks and gardens	Areas (area in Acres)
1	Garden Department, NMC	79	111
2	Nagpur Improvement Trust (NIT)	52	100
3	Forest Department	1	50
4	Punjab Rao Krushi Vidhyalaya (PKV)	3	75
	Total	135	351

Source: Garden Department, NMC, Nagpur

Also, based on discussions with department official it was understood department has decided to adopt PPP model for development of parks and gardens in Nagpur. At present, on pilot basis development of Ambazari garden has been proposed on BOT-PPP basis. Further there are 14 new gardens that are being development by NMC in the city.

Various greening efforts have been undertaken in Nagpur in the last few years. Replantation of about 700 road-side trees was carried out by NCM against the uprooted trees during the Integrated Road Development Project. NMC and NIT had undertaken a programme to plant one lakh trees during 2002-03 in the NMC area. The programme was taken up with the active participation of schools, social organizations, private institutions, and citizens. The saplings were provided free of cost to all the interested parties. At present, there are in total 21.43 lakhs trees in Nagpur and these are on records of garden department of NMC.

Nagpur had received recognition as the second greenest city in India. But the tempo of tree plantation has not been maintained and greenery has declined substantially. The key issues in the development and maintenance of green spaces and roadside plantations are water scarcity during the summer season, air pollution due to increased vehicular traffic, and lack of civic sense among citizens.

6.4.3 Water bodies

There are several natural water bodies within the city limits including 12 lakes, 2 rivers, and 5 nallahs. The lakes (Gorewada, Futala, Ambazari, Sonegaon, Sakkardara, Gandhisagar, Lendi Talao, Naik Talao, Dob Talao, Pandrabodi, Sanjay Nagar Khadan, and Pardi) cover an area of about 3.13 sq km. The Nag and Pilli rivers cut across the city and are 15.73 km and 12.11 km in length, respectively. Chamar Nallah, Shakti Nagar Nallah, Hudkeshwar Nallah, Swawalabmi Nagar Nallah, and Sahakar Nagar Nallah also flow through the city.

Stakeholder consultations have revealed that some of the lakes have been filled for development purposes. In some cases, slums have expanded into the lake areas. This not only leads to lake degradation but also poses a threat to the slum population. Issues have also been raised regarding the nature of development around the lakes. Intensive activities around the river bodies are also adversely affecting the biodiversity. Clear reservations need to be marked and strictly implemented for the water

bodies. Also, strong steps need to be taken for the rejuvenation of the water bodies. Some beautification and recreational projects have been taken up for Ambazari and Gandhisagar lakes. Similar activities have been proposed for Futala, Sakkardara, and Naik Talao.

6.4.4 Comparison with URDPFI norms

The existing recreation facilities have been compared with the URDPFI guidelines to check the current status of recreation facilities and further identify the gap in the services. As indicated in the table below, there is a deficit of 3,004 ha area under parks in the city. In addition to this shortage, most of the play areas have no standard space as recommended in URDPFI, and the total extent of the area is inadequate too.

Table 33: Comparison of existing parks with URDPFI guidelines

Category of park	No. of parks required	Unit area in Ha	Required area in Ha	Existing area in Ha	Met the Benchmark
Housing area park	1 for 5000 population	0.5	248	142	No
Neighbourhood park	1 for 15000 population	1	166		
Community park	1 for 1 lakh population	5	124		
District park	1 for 5 lakh population	25	124		
Sub-city park	1 for 10 lakh population	100	2,484		
Total			3,146	142	

Source: Garden Department, NMC, and UDRFI guidelines

6.4.5 Key issues and concern areas – Recreation facilities

- Recreation space in the city like parks and gardens and playgrounds is scattered across the city.
- As per the URDPFI norms, there is a huge deficit in the area required under parks and playgrounds. It is observed that the city core is already saturated, and identification of land for recreation in the core city is a challenge.
- In case of lakes and rivers, existing condition of the natural features is not fit for using them as a recreational space. Also, natural features are being encroached by developments, which will make it difficult for the water front development in future.

7 Infrastructure and Services

The chapter presents the status of key urban services such as water supply, sewerage and sanitation, SWM, SWD, and street lighting in NMC jurisdiction. The chapter also elaborates on the key issues in the service delivery mechanism, service level gaps, and the interventions required for filling the gaps and improving service delivery in NMC jurisdiction.

Urban infrastructure services and responsible agency

NMC is responsible for providing core services within Nagpur city such as water supply, sewerage, SWM, SWD, street lighting, service provision in urban poor areas, and construction of affordable houses for urban poor. Maharashtra State Road Development Corporation (MSRDC) and Public works department (PWD) are responsible for the construction, operation, and maintenance of major roads such as state highways within NMC. A snapshot of roles and responsibilities of urban services at Nagpur is provided below.

Table 34: Responsibility matrix for various urban services in Nagpur

Sr.No.	Key Infrastructure Services	Planning and Design	Construction/ Implementation	O&M
1	Water Supply	NMC/Private operator	NMC/Private operator	Private operator
2	Sewerage	NMC	NMC	NMC
3	Storm Water Drains	NMC	NMC	NMC
4	Solid Waste Management	NMC	NMC	NMC
5	Urban Transport – City Bus Service	NMC	NMC/Private operator	NMC/Private operator
6	Street Lighting	NMC	NMC	NMC
7	Preparation of Master Plan/ Development Plan	NIT	NIT/NMC	NIT/NMC
8	Housing for Urban Poor	NMC/SRA	NMC/SRA	NMC/SRA

Source: CRIS Analysis based on discussion with NMC officials

Detailed assessment of each of the services/functions with respect to physical infrastructure, service performance, and observations is presented under immediate sub-sections of the chapter. An assessment is carried out to evaluate the impact of initiatives taken up by NMC under JNNURM.

7.1 Water supply

Water supply provision is taken care by the Water Works department of NMC. Currently, it is being operated by a private operator, M/s Orange City Water Services Ltd., under the public-private partnership mode for a period of 25 years. The following section provides details of the existing water supply system in NMC from source to consumer end. The section also presents the water supply related issues and the status of service levels.

7.1.1 Existing water supply situation

a) Water supply source and storage

Nagpur city, is presently getting water for from two major sources namely Kanhan River (Head work located near village Juni Kamptee) & Pench Dam (through Right Bank Canal with Lifting Point at

Mahadula @ 48.5 Km of canal). Kanhan Water Supply Scheme was commissioned in four phases during the years 1940 to 1970. The first phase capacity in 1940 was 27.3MLD which was augmented to 63.6MLD in 1954. The capacity was further augmented to 86 MLD in 1966 and finally to 109 MLD in 1970. Present supply from this source is @ 109 to 120 Mld. Pench-I, Pench-II & Pench-III Schemes were commissioned in 1982, 1984, and 2003 respectively. Pench-IV scheme is currently under implementation and was expected to be completed by 2011 that has been delayed due to various reasons including land acquisition problems. Existing reservation of water in Pench Project for city 190 MCM³/year (521MLD).Further, department has taken up various projects to achieve 24 x 7 water supply in the Nagpur city.

Table below provides, actual number related to the present annual raw water reservation and withdrawal from various sources.

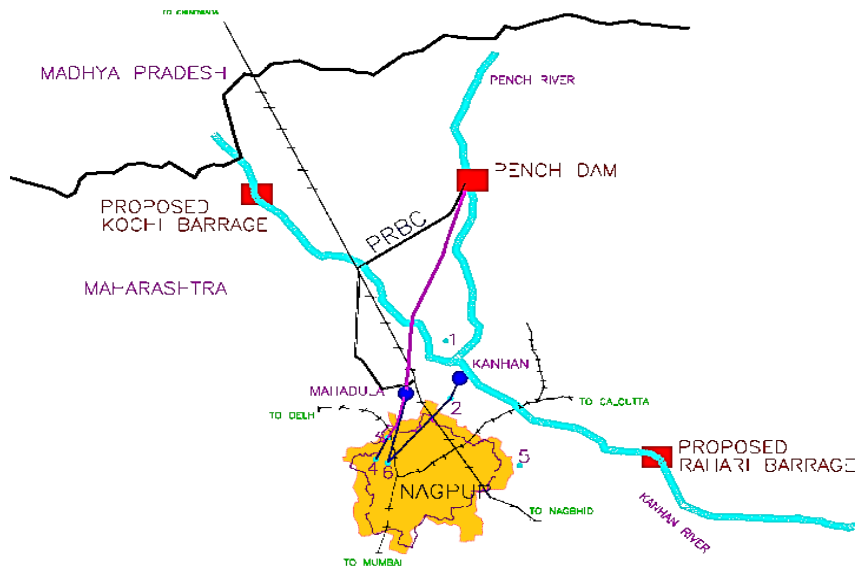
Table 35: Annual water reservation and withdrawal

Source	Annual Reservation		Actual Withdrawal (As per Billing to NMC)	
	MCM ³ /year	MLD	MCM ³ /year	MLD
Kanhan River	66	180	66	180
Pench Project R.B.C. @Mahadula	112 + 78	520	164	448

Source: Water Supply department, NMC

In order to bridge the demand and supply gap in the water supply services, NMC has prepared water supply master plan up to 2031 and even private operator OCWL also has prepared a water supply master plan for NC area till 2046 recently. Various options for augmenting water supply source to meet the future water supply demand have been worked out in the later plan. Feasible options for source augmentation to meet future water supply demand have been discussed in detail in chapter 17 of this report.

Figure 35: Water supply sources for Nagpur city



Source: Prospective Master Plan (2031) for water supply, Nagpur

b) Transmission and treatment facilities

Water is brought to the Gorewada tank from Pench source through a pipeline. While surface water of the Kanhan River is transmitted to Kanhan water works through a pipeline, and water from Gorewada is transmitted to Gorewada tank. Length of the canals for water transmission is about 45 km and that of transmission networks is about 100 km. NMC pays raw water charges to the Irrigation department to draw water from Kanhan and Pench sources. Details of the transmission from three sources to WTPs are provided below.

- **Old Gorewada** – The source has a live capacity of 7.92 mm³ at any point of time. There is a water treatment plant on the downstream side of the source with a treatment capacity of 16 MLD. Further, treated water from the WTP is transmitted to and collected in a pure water sump with a capacity of 18.6 lakh litres, which is then pumped to Seminary Hills GSR and also to Gittikhadan GSR.
- **Kanhan** – The Kanhan scheme was developed in four phases and commissioned in 1940. The initial capacity of the source was 63.6 MLD (1954), which was augmented twice to increase the capacity to 109 MLD (1970). There are two intake wells in the Kanhan River bed and two dry wells on the bank of the river.
- **Pench Source** – NMC has developed the system in three phases.
 - ◆ In Phase–I, 113.5 MLD of raw water was being supplied to the Mahadula pumping station. From this point, water was transmitted to the balancing pressure tank (BPT) of capacity 5.7 lakh litres through a canal. Water is transmitted to the Gorewada balancing tank, and from here, filtered and chlorinated water is pumped to the Seminary Hills GSR of capacity 20.43 lakh litres. Further, Sitabuldi GSR is fed water from the Seminary Hill GSR.
 - ◆ In Phase–II, source augmentation was carried out, where intake sump on right bank canal was constructed. It was commissioned in 1994 and raw water is pumped to the existing Balancing Pressure Tank (BPT) of capacity 5.70 lakhs litres. From this point, raw water is transmitted to Gorewada tank and then to a WTP of capacity 145 MLD. Treated water is pumped to the Seminary Hills GSR and then fed to some ESRs and OHTs in Nagpur city.
 - ◆ In Phase–III, augmentation of the WTPs treatment capacity was carried out. A new WTP with 120 MLD capacity and 14 ESRs with a capacity of 2.27 lakh litres were constructed.

Water supply treatment

Nagpur city gets water from two sources. Water is pumped to the WTPs from sources located on the upstream side and then fed to the respective GSR/ESR connected to the WTPs. Details of the water supplied currently from various sources and WTPs are as follows.

Table 36: Treated water supply from various WTPs

Source	Capacity (MLD)
Kanhan Water Works	240
Pench-I	130
Pench-II	145
Pench-III, Stage-I	120
Old Gorewada	16
Total	651

Source: Water Supply department, NMC

Water treated at Gorewada Pench-I WTP is supplied to the Government House MBR. The WTPs at Gorewada Pench-II and Pench-III supply water to the Seminary Hills MBR. Some water from Pench-II WTP is directly fed to the GSR at Gittikhadan and the ESR at Gayatrinagar and is further supplied to Adhyapak layout, Pande layout, New Laxminagar, and Ramnagar. Water from Old Gorewada is supplied to the GSR at Seminary Hills and to areas located at a higher altitude like Hazari pahad, Surendragarh

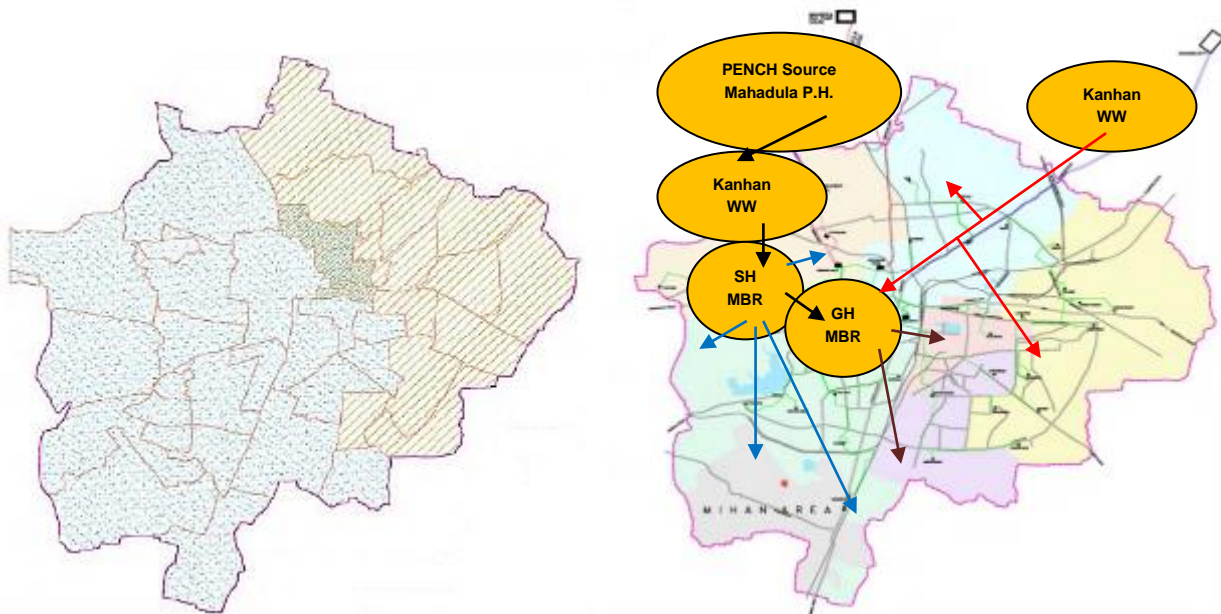
and Dabha. While water supplied from the Kanhan water works is fed directly to 18 ESRs located in different parts of North and East Nagpur.

c) Water distribution system, consumer connections, and metering system and policy

For distribution of water till the consumer end, treated water is supplied to 2 clear water sumps, which further feeds 43 ESRs in 3 water distribution zones. There are 3 ground service reservoirs/sumps for storing clear water at Seminary Hills, Government House, and university area. Majority of the ESRs are fed from the Seminary Hills and Government House GSRs. The Seminary Hills and Government House sumps are master balancing reservoirs (MBR) from which water is fed to the other service reservoirs in the city. A list of ESRs/GSRs/storage infrastructure with their capacity in the city for water supply is provided in the annexure.

Existing water supply system has a well-laid distribution network, which covers 80% of the city areas. The length of the distribution network is around 2,800 km, of which 300 km is made up of feeders and the main network. The remaining 2,500 km of the distribution pipeline forms the tertiary network. Physical losses are estimated to be 40% of water supplied within the distribution network, of which 70% is while providing connection facilities. For administrative purpose, NMC has 3 water supply command areas, which are further bifurcated into 10 sub-zones (same as administrative zones of NMC).

Figure 36: Water supply command areas and distribution system

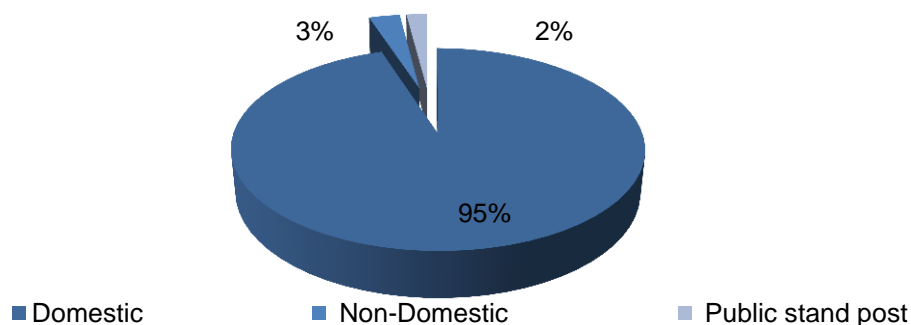


Source: Water supply project DPR prepared by NMC, Nagpur

d) Water supply at consumer end

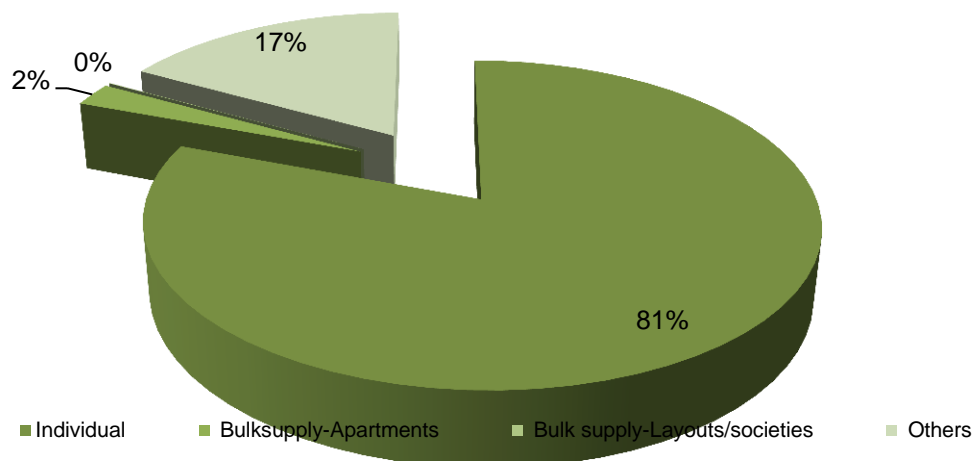
Through the distribution network of 2,050 km, water is supplied to 85% of the households in the city. Water is supplied for six hours a day to citizens having individual and bulk water connections.

Figure 37: Breakup of total water supply connections in Nagpur



There are 4.72 lakh properties and 5.13 lakh households in the city as per department records. Out of total households, 4.38 lakh households (85%) are served with water supply by various means, i.e., piped connections, water supply tankers, and stand posts. Out of 4.38 lakh units, 95% of the connections are domestic connections, 3% are non-domestic connections, and 2% are public stand posts. Breakup of the connections is shown in the above figure.

Figure 38: Category-wise breakup of water supply connections - Residential



Further, in the case of domestic connections, 81% of the connections are individual connections, 2% are for bulk supply of water to apartments, and 17% are categorized into other connections.

The households not connected to the water distribution network are supplied water through NMC’s own water tankers. 52 MLD of water was supplied through tankers during FY 2011-12. Category-wise details of water connections are provided in the figure provided in the side.

e) Water supply connections

Table 37: Category-wise details of total water connections in Nagpur

Year	No. of water connections – metered and non-metered (in lakhs)					
	Domestic		Non-Domestic		Public Stand Posts	
	Metered	Non-metered	Metered	Non-metered	Metered	Non-metered
2008-09	1.61	0.00	0.06	0.00	0.00	0.05
2009-10	1.52	1.32	0.08	0.00	0.00	0.03
2010-11	1.70	1.37	0.09	0.00	0.00	0.03
2011-12	1.77	1.03	0.08	0.01	0.00	0.06

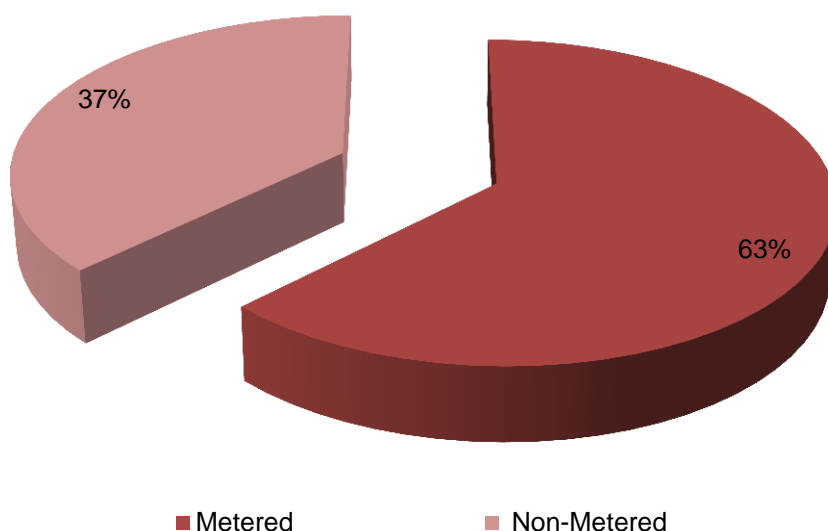
Year	Total Domestic Connections	Total Non-Domestic Connections	Total Public Stand Posts	Total metered connection	Total Non-Metered connection
2008-09	1.61	0.93	0.06	1.67	0.05
2009-10	2.84	2.28	1.40	1.60	1.35
2010-11	3.07	2.35	1.46	1.79	1.40
2011-12	2.80	2.05	1.11	1.84	1.10

Source: Water Works department, NMC, Nagpur, and PAS-SLB checklist for Nagpur, 2012-13

Metering

There are two types of water connections in the city: metered and non-metered connections. 63% of the water connections are metered. Out of the 1.84 lakh metered connections, 96% are domestic connections and 4% are non-domestic connections. 1.2 lakhs connections in the city are not metered.

Figure 39: Break-up of metered and non-metered connections in Nagpur



It was observed that 35% of metered connections are non-functional, and it is important for the meters to be functional to get the accurate reading of actual water consumption. NMC takes the responsibility of replacing or repairing the meters for the consumers, and service of private plumbers is taken for this. Also, even though the extent of metering is 63% in Nagpur, as per the service level indicator, it is only 28% (of the total water connections). This is due to 35% of the water connections which are metered but non-functional. As part of JNNURM reform implementation, NMC is targeting 100% metering of water supply connections.

Water tariff structure

NMC levies a flat water tax and volumetric tariff for non-metered and metered connections, respectively. Water tariff in NMC is revised every year and increased by 5%. Water tariffs were last revised in April 2014. Water tariff for different categories for 2011-12 and 2012-13 is shown in the table below. The detailed tariff structure of water user charges is provided in the annexure.

Table 38: Tariff structure of water user charges for Nagpur in 2012-13

Type of connection	Water consumption slabs (kl/month)		Water charge per month per connection (in Rs./kl)		
	Min slab	Max slab	Min tariff	Max tariff	Avg tariff
For Residential	1-20	above 80	6	17	11
For Institution A	1-20	above 80	14	20	17
For Institution B	1-20	above 80	17	22	19
For Commercial IA	1-20	above 80	28	50	39
For Commercial IB	1-20	above 80	28	83	55
For Commercial 2	1-30	above 100	66	595	331

Source: Water Works department, NMC, Nagpur

In case of metered connections where meter is non-functional, NMC considers the average consumption for the last few months or a flat consumption ratio for billing purpose. During FY 2011-12, 0.11 lakh meters were either replaced or repaired by NMC.

f) Service-level indicators

MoUD has prepared the service-level benchmark (SLB) toolkit for gauging the performance of the basic urban services. It is a useful tool for monitoring performance and taking necessary actions to improve the service delivery. This has been adopted by many government agencies for monitoring purpose and reviewing the performance of the ULBs accessing their programmes. As per the service-level benchmarks prescribed by the government, in consultation with the 13th Finance Commission, every ULB has to report, plan, and achieve SLBs for basic services/functions in its respective city.

Based on the assessment carried out in sub-section 7.1 of this chapter for water supply system at Nagpur, following are the SLBs for the water supply system sector.

Table 39: SLB indicators for water supply sector of Nagpur

Sr.No.	Indicator	Value	MoUD Benchmark
1	Coverage of water supply connections	85%	100%
2	Per capita supply of water	100-110 lpcd	135 lpcd
3	Extent of metering of water connections	28%	100%
4	Extent of non-revenue water	53%	20%
5	Continuity of water supply	6 Hour	24 hours
6	Efficiency in redressal of customer complaints	96%	100%
7	Quality of water supplied	100%	80%
8	Cost recovery in water supply services	117%	100%
9	Efficiency in collection of water supply-related charges	74%	90%

Source: Water Works department, NMC, Nagpur

g) Water account - O&M recovery

As per the concession agreement between NMC/NESL and OCWL, NMC has asked the private operator to collect the user charges in order to improve the collection efficiency. For water supply related cost recovery, as per the PPP agreement, there is a provision for increasing the water tariff by 5% on a yearly basis.

Based on the financial figures from the NMC budgets, O&M cost recovery for the water supply services is calculated. Details of the O&M cost recovery for five years (2007-08 to 2012-13) is shown in the table below. . Though the cost recovery was higher in FY 2011-12, it has been observed from the table that

NMC's establishment expenditure is not there. Also, even though collection efficiency of water user charges during FY 2011-12 was 49%, still NMC is able to manage 100% cost recovery, which is quite good. Review of NMC's budgets, highlights that NMC is transferring some funds to NESL (which is the 100% own subsidiary company of NMC formed for implementation of 24 x 7 water supply project) is not taken into consideration as O&M expenditure. In case of if the fund transferred to NESL is considered than the O&M recovery would be around 66% only (during FY 2011-12).

Table 40: Water supply O&M recovery

Sr.No.	Head of Account	2007-08	2008-09	2009-10	2010-11	2011-12
I	Revenue Income					
1	Water Tax	410	355	432	756	1,410
2	Water bill (Meter)	5,116	5,121	7,139	8,971	7,707
3	Water supply by Tankers	0	350	0	-	-
Total revenue income (A+B)		5,526.68	5,527	5,826	7,572	9,727
II	Revenue Expenditure					
1	Salaries/ Wages & Allowances	732	757	802	850	-
2	Operation & Maintenance	5,594	5,657	4,379	8,651	5,550
Total revenue expenditure (A+B)		6326.53	6,327	6,414	5,181	5,550
O&M Recovery (%)		87%	91%	146%	102%	164%

Source: NMC budget books (2008-09 to 2012-13)

7.1.2 Water supply - Future demand

The water demand has been calculated on the basis of per capita water supply demand (135 LPCD) and the average water supply losses. As indicated in the table below, the water supply losses are assumed to decrease from 53% in 2013 to 20% in 2041. Accordingly, the per capita water supply has been determined as 206 LPCD for 2013, which will reduce by 2041 to 162 LPCD.

Table 41: Estimation of water demand till 2041

Indicator /year	2013	2021	2031	2041
Per capita water supply demand ¹⁸	135	135	135	135
Water losses (%)	53%	45%	30%	20%
Per capita water demand – (LPCD + losses)	207	196	176	162

Source: CRIS Analysis

Per capita estimation of water demand has been forecasted on basis of the population projections finalized in the demography section. Accordingly, the city would require around 656 MLD of clear water by 2021, 806 MLD by 2031, and 1018 MLD by 2041. The detailed gap analysis has been discussed under the sector plans. The water supply demand projection for the design year has been presented in the table below.

Table 42: Water demand for Nagpur till 2041

Year	Water demand (in MLD)
2011	538
2021	656

¹⁸ 135 LPCD water supply is assumed at consumer end. Thus, including the losses treated water that needs to be supplied in system is shown in the last column of same table. Quantity of treated water to be fed into system is varying as the existing quantity is on higher side than required.

Year	Water demand (in MLD)
2031	806
2041	1,018

Source: CRIS analysis

7.1.3 Critical analysis of water supply system post-1st Generation CDP Scenario

NMC was drawing about 480 MLD of water till 2006. Of this, only 10 MLD was being drawn from ground water resources. Rest 470 MLD was drawn from other sources like the Kanhan River, Gorewada tank, and Pench. Water drawn was sufficient to meet the demand during 2004. NMC felt, if no steps are taken, Nagpur would have to face a water deficit of 62 MLD in 2011.

The treatment losses in the system were quite high. The water system input volume is 625 MLD, while the treated water supply volume is only 470 MLD. So 22% of the water was lost by way of treatment losses. Further, the city ranked poorly in terms of transmission and distribution losses. The losses were around 60% in the system.

The 1st generation CDP has envisaged an investment Rs. 59,000 lakhs, against which projects worth Rs. 125,000 lakhs were taken up by JNNURM. Project components identified were system expansion of transmission mains; refurbishment of old distribution network; 24x7 water supply for the whole city; and metering of individual houses and providing bulk metering. Status of 11 projects identified and approved under JNNURM for augmenting the existing infrastructure for Nagpur's water supply services is as follows:

- 7 projects have been completed
- 2 projects having progress >80%
- 2 projects having progress >50% and <80%
- 1 project having progress less than 50%

Impacts of the initiatives taken by NMC under JNNURM to augment the system infrastructure and improve the service levels are identified and presented in the table below.

Table 43: Impact on service levels and indicators post JNNURM

Sr. No.	Sector	Key addition in infrastructure capacity ¹⁹	Indicators impacted	Post CDP and DPR implementation
1	Water Supply	<ul style="list-style-type: none"> ▪ Augmentation of the water supply system ▪ Augmentation of source ▪ Augmentation of transmission network ▪ Augmentation of Water treatment capacity 	<ul style="list-style-type: none"> ▪ Per capita Water supply ▪ Monitoring of the water supply in the system ▪ O&M cost recovery 	<ul style="list-style-type: none"> ▪ NMC is able to supply 24X7 water in one pilot zone ▪ NMC has introduced the volumetric tariff structure, and the tariff has been revised year-on-year basis ▪ NMC has been achieving 100% O&M recovery in water supply services ▪ Energy audit has been completed

¹⁹ Augmentation of distribution network and metering of individual connections are still under implementation as part of rehabilitation plan for 24 x 7 water supply project.

Sr. No.	Sector	Key addition in infrastructure capacity ¹⁹	Indicators impacted	Post CDP and DPR implementation
				<ul style="list-style-type: none"> ▪ NMC has introduced the supervisory control and data acquisition (SCADA) system ▪ NMC has handed over the water supply services to a private operator
Possible improvement in the service levels after completion of ongoing projects are				
		<ul style="list-style-type: none"> ▪ Augmentation of Water treatment capacity ▪ Augmentation of Service reservoirs ▪ 100% metering of all the connections ▪ Monitoring room for the water supply system 	<ul style="list-style-type: none"> ▪ Coverage ▪ Non-Revenue water (NRW) 	<ul style="list-style-type: none"> ▪ Coverage will increase ▪ NMC will be able to supply 24X7 water in the entire city ▪ 100% metering of the connections ▪ Reduction in NRW

Source: CRIS analysis based on the sectoral plan and DPRs

7.1.4 Institutional framework for water supply system

Water works department is responsible for provision of water supply in Nagpur city. Recently the operation and maintenance of all the components of water works has been handed over to private operator Orange City Water Limited (OCWL). For this NMC has formed a 100% subsidiary company called Nagpur Environmental Services Limited (NESL). NESL has entered into tripartite agreement with a private operator for a concession period of 25 years to provide 24 X 7 water supply in the city. The project is being implemented under JNNURM. Under this project, the private operator will have to improve the coverage of connections through compulsory provision of metered connections and replacement of old meters. Also, the private operator will have to regularize the illegal connections through compulsory provision of metered connections and billing of the supply of water, in order to reduce the commercial losses and improve collection efficiency.

7.1.5 Key issues and concerns

- The Water works department is not in a position to quantify the indicators for the water supply as the system is in a transition phase due to the implementation of the 24 x 7 water supply scheme.
- Other projects being implemented are to augment the system; thus, no much improvement on the service level indicators is visible.
- At present the treated water is fed into the distribution system is 247 LPCD, but due to various losses only 100-110 LPCD reaches at consumer end.
- High non-revenue water, however NMC is in position to recover 100% O&M cost recovery.
- Lack of public participation and support in smooth implementation of 24 x 7 project for the whole of city. NMC receives number of complaints on regular basis from citizens, which are due to conversion of existing system into 24 x 7 water supply, as it is under implementation.

7.2 Sewerage and sanitation

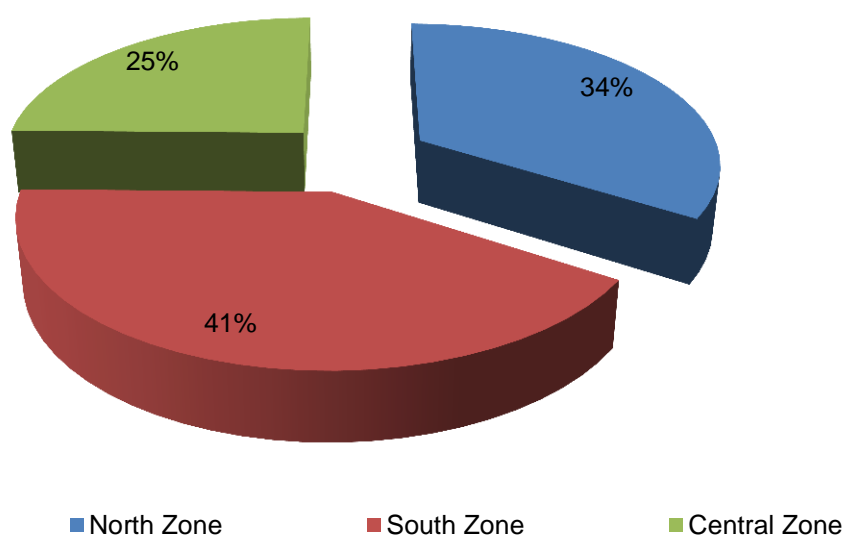
The detailed assessment of the existing sewerage and sanitation system includes existing sewage generation, collection system, treatment, disposal of the waste water, and the existing institutional arrangement. Further, the section highlights the key issues in the sewerage and sanitation sector.

7.2.1 Existing sewerage and sanitation system

- **Sewage generation and collection system**

About 345 MLD of sewage is generated in the city against the water supply of 363 MLD²⁰, which is only 95% of the grey and black water generated and collected in the present sewer network and open drains in the city. As shown in the adjacent figure, sewage generation in the South Zone is 41%, 34% in the North Zone, and 25% in the Central Zone.

Figure 40: Sewage generation zone wise



At present, out of the 4.72 lakh properties in the city, 4.46 lakh properties have individual toilets. Out of the 4.72 lakh properties, 96% are connected to the sewer network, and the rest 4% have an onsite sanitary disposal system.

Sewerage network and coverage

On basis of the sewerage connections provided in the city; the coverage of the sewerage system is 96%. Nagpur city is divided into three sewerage zones, namely, the North Sewerage Zone (NSZ), Central Sewerage Zone (CSZ), and South Sewerage Zone (SSZ). Areas under NIT jurisdiction are also included under the three sewerage zones of NMC. The total length of the sewer lines is about 1,670 km. Only 70% of the city areas are covered by the underground sewer network. 345 MLD of the sewage generated is collected from the sources in the underground sewer network. Only 100 MLD of sewage is collected and transported to the STP developed at Bhandewadi, and the remaining sewage collected in the sewer

²⁰ NMC treats 581 MLD of water, whereas only 382 MLD of water reaches the consumer end.

network is disposed in Gosikhud Dam in untreated condition. Sewage generated in some of the areas in the city has an outfall into open drains and the rivers flowing through the city.

The sewer network has been developed in a piecemeal approach, and 100% city area is not covered under the existing sewerage network. Also there are no trunk sewers to connect the SWD network for collection and transportation of wastewater to the STP for treatment. NMC is planning to augment its sewer network by implementing projects under JNNURM, and projects have been identified under the sewerage master plan prepared by NMC.

Sewerage treatment

Only 20% of the sewage generated is treated at the city's STP. The city currently has one STP with a treatment capacity of 100 MLD, which is located at Bhandewadi. The STP consists of a conventional activated sludge plant (CASP) with sludge digestion tanks, with both sludge drying beds and mechanical sludge dewatering equipment.

NMC has prepared the sewerage master plan and recycle and reuse plan under which it is planning to augment the treatment capacity of the existing STP and develop new STPs in all the sewerage zones.

Sewerage - Operation and maintenance

NMC does not levy sewerage charges or sewerage connection fee. These are recovered as a part of property tax. 12% of the property tax is recovered as sewerage tax. Thus, operation and maintenance is done through the general fund of NMC. NMC is able to manage 100% O&M recovery through sewerage tax itself. Revenue income and expenditure for sewerage and sanitation is provided in the table below. On an average the O&M recovery for sewerage and sanitation services is 168%. Expenditure towards salary payment and O&M is less due to the O&M of the STP is outsourced on service contract. At present, NMC is able to meet 100% O&M recovery for sewerage; but might not be able to meet 100% recovery once NMC starts regular cleaning of sewage network.

Table 44: Sewerage and Sanitation cost recovery

Sr.No.	Head of Account	2007-08	2008-09	2009-10	2010-11	2010-12
I	Revenue Income					
1	Sewerage tax	2,425	2,102	2,602	3,333	2,987
2	sewerage connection fee, other misc income	-	-	-	-	-
Total revenue income (A+B)		2,425	2,425	2,102	2,602	3,333
II	Revenue Expenditure					
1	Salaries/ Wages & Allowances	38	40	45	56	73
2	Operation & Maintenance	286	336	293	341	319
Total revenue expenditure (A+B)		1,063	324	377	339	397
O&M Recovery (%)		228%	748%	558%	769%	839%

Source: NMC budget books (2008-09 to 2012-13)

- **Service-level indicators**

Once the recycle and reuse project is completed and operationalised, recycling for 130 MLD of waste water will take place. Treated waste water will be used for power plants instead on fresh water that is being currently used by MAHAGenco. This will reduce the demand of fresh water within the region, and surplus water can be made available for drinking purpose to other villages or region.

Table 45: Sewerage sector service-level indicators

Sr.No.	Indicator	Value	MoUD Benchmark
1	Coverage of toilets	96%	100%
2	Coverage of wastewater network services	96%	100%

Sr.No.	Indicator	Value	MoUD Benchmark
3	Collection efficiency of wastewater network	29%	100%
4	Adequacy of wastewater treatment capacity	22%	100%
5	Quality of wastewater treatment	100%	100%
6	Extent of reuse and recycling of wastewater	0% ²¹	20%
7	Efficiency in redressal of customer complaints	100%	80%
8	Extent of cost recovery in wastewater management	54%	100%
9	Efficiency in collection of sewerage-related charges	100%	90%

Source: Drainage department, NMC, Nagpur

Present sanitation level

Out of 5.27 lakh households in the city of Nagpur, 5.10 households (96%) are served with an individual latrine facility. A population of 73580 is served through community toilets constructed by NMC. Many of the community toilets are now dilapidated & were constructed long back. A population of 0.36 lakhs persons, which is approximately 7,179 households, has no access to any kind of sanitation facility, though this proportion is as low as 1.5% at city level. This population is resorting to open defecation in open grounds, on roadsides, near nallahs.

Demand and supply gap of household toilets

As Nagpur Municipal Corporation has come up with a policy of providing Individual latrine facility rather than “community or public” facility, it is suggested to construct either Individual latrines or “Sulabh type model”. This will assure long term sustenance and effective “operation and maintenance”. Also, provision of individual toilets is also considered by NMC. Following is the demand and gap of the household level toilets in the city at present;

Table 46: Demand-gap analysis - for Household toilets

Particulars	Numbers
Total Number of HHs	527,634
Number of HHs served with Individual toilets	510,266
Number of HHs have access to community toilets	7,587
Un-served population	35,645
Proposed Individual toilets	4,882
Proposed seats for Sulabh toilets	307
Reconstruction of old public toilets	800
Proposed Number of Urinals	200

Source: City sanitation Plan 2012

7.2.2 Future sewage generation

Estimation of future sewage generation has been calculated with an assumption that 80% of the water supplied will be let out in the sewerage system as waste water. Accordingly, the sewage generation has been projected as 472 MLD for 2021, 647 MLD for 2031, and 752 MLD by 2041. The sewage generation projected for various horizon years has been presented in the table below.

²¹ Extent of recycle and reuse of waste water will be 38% post completion of ongoing project of 130 MLD treatment plant.

Table 47: Sewage generation estimate till 2041

Year	Sewage generation (in MLD)
2021	472
2031	647
2041	752

Source: CRIS analysis based on the sector plan and DPRs

7.2.3 Critical analysis of sewerage system post- 1st generation CDP Scenario

During 2004, only 60% of the city had underground sewers. In rest of the city, sewage was flowing in open drains, which often used to get choked causing unhygienic conditions. As per the citizens' survey, about 35% of respondents feel that drains get choked often, of which, about 42% feel that drains get choked at least once every week. Respondents also felt that NMC never cleans the drains.

About 235 MLD of sewage is generated in the city on an average. It increases to 600 MLD in the peak season. Of the total sewage generated, only 40% flows through the sewers. The rest flows through the city's open drains. Situation gets worse during the monsoon season as sewage and storm water both flow together in the same system.

Post JNNURM scenario

With an intention to meet the service level requirement during 2006 and the future population of 2043, NMC prepared the sewerage master plan. It was prepared taking into consideration the findings from the CDP prepared during 2006. The total investment envisaged for the sewerage and environment sector was in tune of Rs. 39,500 lakhs. Projects identified under CDP were also included in the sewerage master plan. The table below presents highlights of the project components for the sectors and investment needs.

Table 48: Investment needs and projects identified for sewerage and environment sector

Sr. No.	Sector	Investment Envisaged (Rs. lakhs)	Key Components of the Proposed Projects
1	Sewerage	51,500	<ul style="list-style-type: none"> Construction of sewerage network for north, central, and west sewerage zones, along with the construction of STPs and branch sewer network augmentation
2	Environment (Recycling and Reuse of Wastewater)	25,000	<ul style="list-style-type: none"> Proposal for implementation of wastewater treatment plant on PPP basis for treating wastewater and using it for non-potable use. (Non-potable uses like in cooling towers of power plants and thermal plants, agricultural activities, small industries, etc.)
	Total investment envisaged	76,500	11% of the total investment needs envisaged in the CDP (2006)
Projects identified and approved under JNNURM			
1	Recycle and reuse of wastewater ²²		

²² Project of recycle and reuse of wastewater was envisaged in the CDP, and was considered under the environment sector.

Sr. No.	Sector	Investment Envisaged (Rs. lakhs)	Key Components of the Proposed Projects
2	Up-gradation of 100 MLD to 200 MLD		
3	Implementation of north sewerage zone DPR		
4	Implementation of south sewerage zone DPR		
5	Implementation of central sewerage zone DPR		

Source: City Development Plan, 2006, of Nagpur

Apart from projects under JnNURM, recently NMC got other project approved for sewerage sector that will augment the existing sewage collection network. The project cost is estimated to be Rs 49,000 lakhs which will be implemented under the extended phase of JnNURM. Further, apart from JnNURM programmes, NMC on its past experience of implementing project on PPP basis has taken up augmentation of treatment capacity of existing 100 MLD to 200 MLD. The project cost is estimated to be Rs. 20,000 lakhs.

7.2.4 Institutional framework for sewerage and sanitation system

The Sewerage department of NMC is required to oversee the laying of sewer lines and underground drains, and to operate and maintain the entire system, including the operation and maintenance of sewerage treatment plants (STPs). The department is thus responsible for not only laying down the entire system and providing house-to-house connections, but also ensuring proper disposal of the wastewater post-treatment.

7.2.5 Key issues and concerns

- There is no dedicated staff/department for sewerage management at NMC.
- NMC does not have adequate sewerage treatment facilities in the city for treatment. Only 22% of the sewage generated sewage
- Also disposal of the sewage generated in the city is not carried out in a proper way. Presently, the sewage collected is dumped into rivers and finally the sewage has outfall into Gosikhud dam.
- It is also observed that solid waste is dumped in the open channels in the city, leading to blockage of open channels. Dumping of solid waste into rivers is also observed.
- NMC neither collect connection fee nor levy user charges for provision of services. There is sewerage tax levied by NMC is able to recovery 100% cost recovery. Based on the future sewage generation and augmentation of the system, NMC might not be in position to recovery 100% cost recovery from sewerage tax revenues.

7.3 Solid waste management

The detailed assessment of the existing SWM systems includes assessment of existing situation for MSW services carried out by NMC in the city, which includes; collection and transportation, treatment, and disposal of waste. Further, the section highlights the key issues is the SWM sector. Under the CBUD project, the preparation of Detailed Project Report (DPR) for Solid Waste Management for Nagpur city is in progress.

7.3.1 Existing solid waste management system

a) Solid waste generation

Table 49: Composition of MSW collected in the city, Nagpur

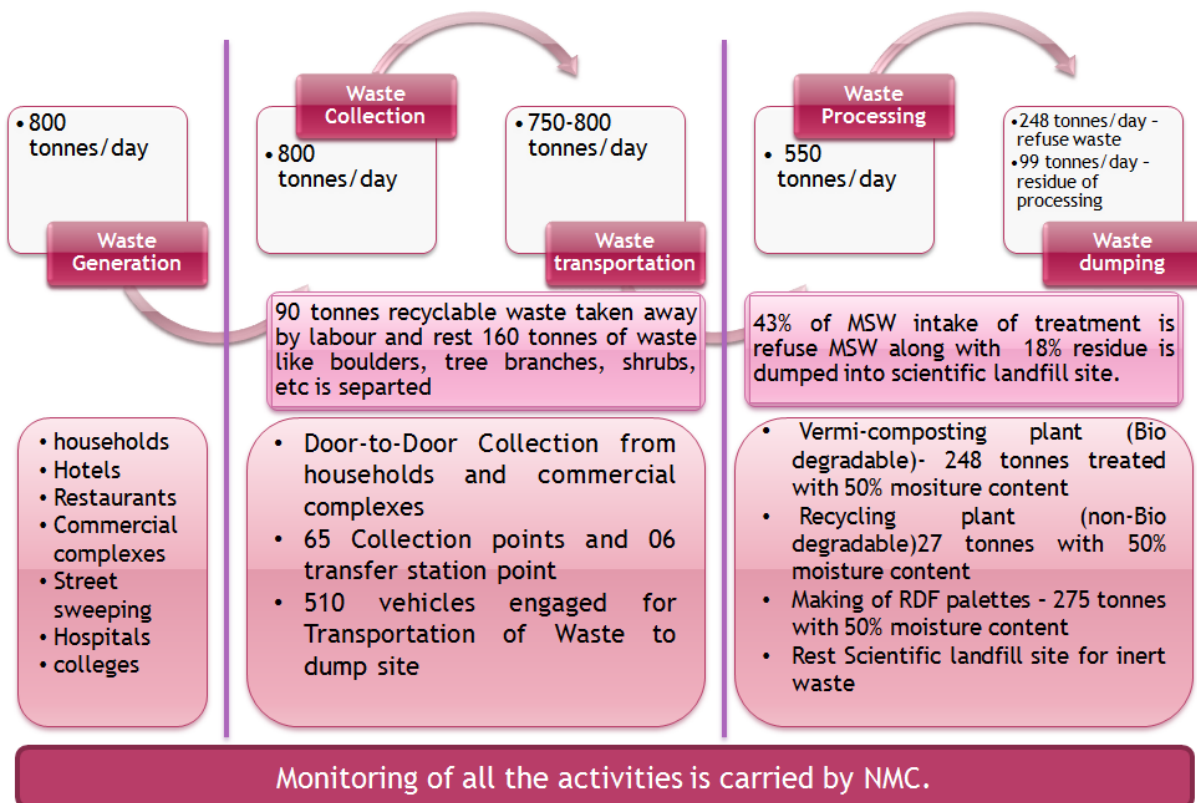
Sr.No.	Waste Type	%age Composition
1	Wet Organic	20% - 30%
2	Dry Organic	20% - 30%
3	Recyclable	3% - 5%
4	Inert	17%
5	Residue – straight way dumping into scientific landfill site	18%

Source: Bhandewadi Treatment plant department, NMC, Nagpur

In order to understand the handling of the Municipal Solid Waste at Nagpur by NMC, preparation of Mass Balance Diagram (MBD) is necessary. MBD for Nagpur is as shown in the figure below. From MBD, it is understood that through various sources around 800 TPD MSW is generated. These 800 TPD is collected through Door-to-Door collection system from residential and commercial properties, community bins, etc. MSW collected is transported to the centralized waste management plant located at Bhandewadi. Around 550 TPD MSW is being treated and post treatment 248 TPD refuse waste along with 99 TPD residue is left over. This refuse is then dumped into the scientific landfill site.

Around 90 tonnes of the MSW is recovered by labours and ragpickers while waste collection and storage is being carried out. And around 160 TPD MSW collected is boulders, tree branches, shrubs, etc. which can be recovered and reuse.

Figure 41: Mass Balance Diagram of Municipal Solid Waste Management at Nagpur



b) Street sweeping

Nagpur city has road network of length 1970 km. All the roads are swept regularly by the sweepers of the Public Health department. As per the practice adopted by the department, every sweeper has to sweep an average 700 m of the designated road length (maximum 900 m and minimum 500 m).

The staff strength of the Public Health department is about 7,500 staff members, of which around 6,000 workers are on temporary basis. Out of the total temporary staff, 5,000 workers are engaged in street sweeping. The beat concept has been introduced for the sweeping of roads. One beat consists of a road length of 500, 700, or 900 m. Every employee has to sweep a fixed road length with a pre-fixed start and end point.

c) Solid waste collection and transportation system

The solid waste collected through road sweeping is taken to the nearest storage and then to the dumping yard. Nagpur city conceptualized the door-to-door collection of municipal solid waste in 2000 in two zones. Seeing the encouraging response in 2002, NMC implemented this door-to-door waste collection scheme in all the 10 zones of Nagpur successfully in association with an NGO. In 2007, NMC thought of making Nagpur a bin-free city by introducing closed body fabricated hydraulic automobile vehicles for waste transportation; these vehicles directly go to the dumping site. This planned approach is integrated with the existing door-to-door waste collection system.

The bin-free project is an ideal model of a PPP project that started with awareness campaigns and by educating people on the importance of segregation and effective disposal of garbage. The basic concept of a bin-free project is to make the city free from bins/reduce the bins to a minimum number; this can only be done by daily primary door-to-door collection of municipal solid waste.

The secondary collection and transfer of waste take place at the intermediate transfer stations before transporting waste to the dumpsites or directly transporting the waste collected through closed body fabricated hydraulic automobile vehicles. In Nagpur city, Kanak Resources Management Ltd. has taken up the task of primary collection of waste with the help of door-to-door collectors by providing scientifically designed rickshaws and handcarts (ghantagadi) in congested localities. The garbage collected is transferred to bigger closed body fabricated hydraulic automobile vehicles, e.g., compactors. These compactors directly take the garbage to the landfill site. In some cases, the small door-to-door collection vehicles are taken to the transfer site, from where this garbage is again shifted to the dumping yard in hook loader containers of 15 cu m capacity.

In Nagpur, the total number of houses covered under the SWM services provided by NMC is about 5 lakhs. Kanak Resources Management Pvt. Ltd. has to cover all types of commercial establishments as per the agreement. There are approximately 66,000 shops, vegetable markets, restaurants, and roadside eateries in the city, which are also covered under SWM service provision by Kanak Resources Pvt. Ltd. The city is divided into 10 administrative zones with 136 electoral wards, and the total area of the city is 217 sq.km.

Segregation

Segregation of waste is mostly done by labourers engaged in house-to-house collection of garbage. Recyclables like plastics, iron, and papers are separated by the labourers, and sold to the rag pickers (kabadiwalas). NMC has authorized contractors to carry out this segregation activity. As the segregation is done before transportation to the dumping site, NMC is saving about Rs. 10 lakh monthly on 60 TPD of garbage. NMC has also established a mechanical segregation plant at Bhandewadi where the remaining segregation is done. All efforts are being made through awareness campaigns for segregation of waste at the source.

Transportation

Waste collected from primary collection points is transferred to bigger vehicles (compactors) for direct transfer to the landfill site. This way smaller vehicle gets enough time to cover more houses under door-to-door collection system. In some cases, to optimize the vehicle's utility and economize the operations, the secondary transfer station is used. In this case, the small door-to-door collection vehicles are taken to the transfer station to discharge the garbage into bigger containers (hook loaders), which will be shifted to the landfill site. For commercial areas, vegetable markets, and shops, 4.5 cubic meter capacity closed containers are used or kept in corners to collect the waste. In order to meet the operational cost recovery for the services carried out by private operators, based on operators demand and feasibility of the services; NMC has agreed and allowed private operator to collect user charges against the waste collection services carried out from non-residential properties.

Table 50: List of vehicles used for solid waste transportation in Nagpur

Types of Vehicle	Quantity	Capacity (in tonnes)	Trips/day
TATA Ace	80	1	3
TATA 407	10	1.5	2
Mahindra Load King	6	1.5	2
TATA 207	5	1.5	2
Compactors	10	14	2
Dumper Placers	13	4.5	5
Hook Loaders	3	18	3
TATA 909	5	5	2
TATA 1210	14	6	2
Tippers	12	10	5
Rickshaws	450	0.03	3
JCB machine	3	-	0
Total	611	63	31

Source: Health department, NMC

d) Processing and disposal system

NMC has allotted the work of treatment, processing, and disposal of municipal solid waste to M/s. Hanjer Biotech Energies Pvt. Ltd., Mumbai, as per the Municipal Solid Waste (Handling & Disposal) Rules, 2000. The tender is on BOT basis for 12 years, and Hanjer Biotech has quoted a rate of Rs. 26 crores. The following constituents shall be derived from the municipal solid waste as per the detailed project report (DPR) of the company:

- Manure - 30%
- Palettes and residual derived fuel (RDF) - 30%
- Bricks and Sand - 17%
- Plastic and other recyclable - 5%
- Rejects/Refuse - 18%

Presently, daily, 550 tonnes of garbage are being processed and residue/refuse post treatment is disposed scientifically. Manure, green coal, bricks, sand, etc., are produced out of the municipal solid waste. The capacity of the plant is about 500 TPD.

e) Biomedical waste

The treatment and disposal work of biomedical waste of Nagpur city has been assigned to a private agency. In addition to in-door hospitals; other medical facilities like dental clinics, dispensaries, blood banks, pathology laboratories, private ayurvedic and homeopathic colleges, etc., have also been covered under this scheme.

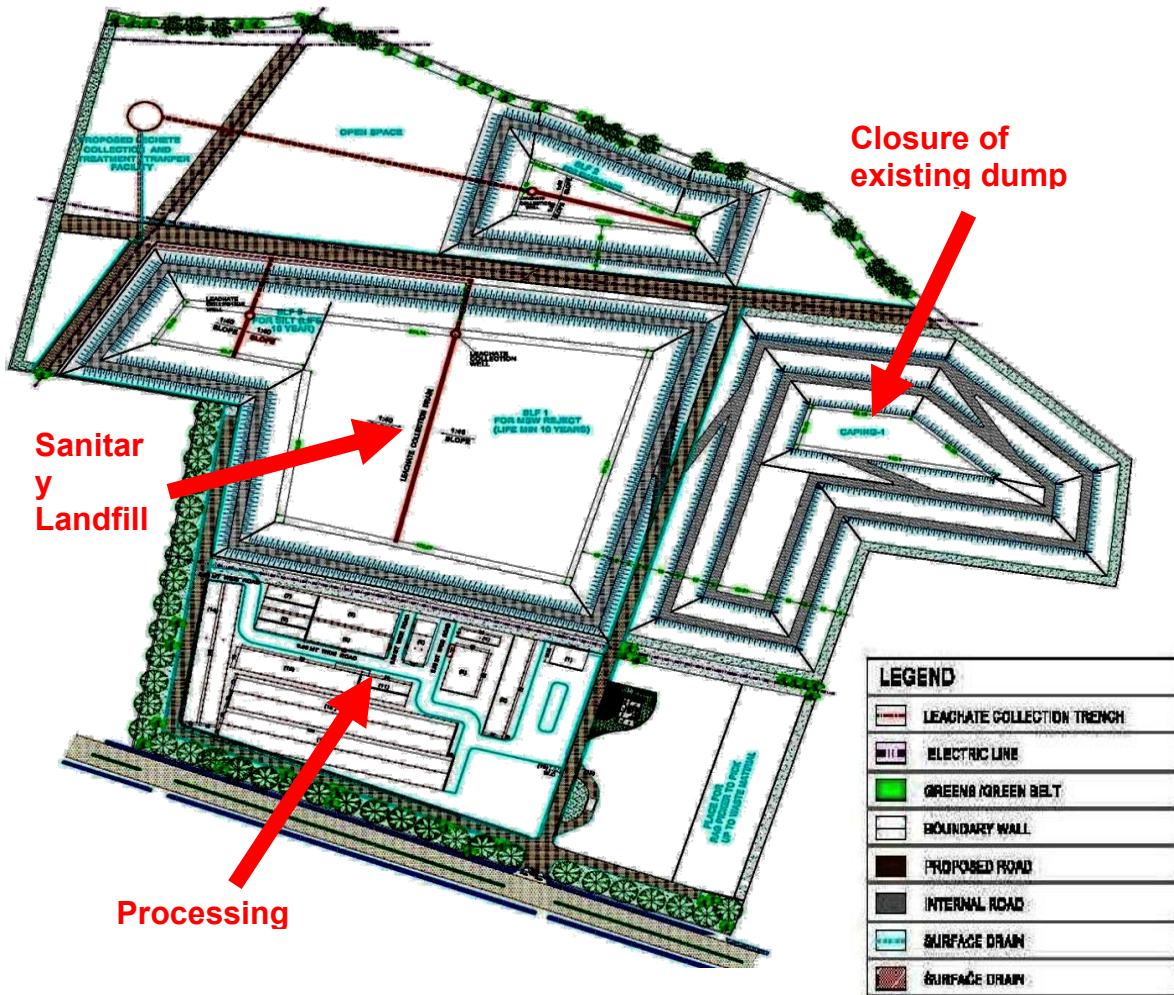
NMC gets Rs. 23.50 lakhs/year as royalty with a 10% increase after every three years. Land admeasuring about 0.25 acre and belonging to NMC has been allotted to a private agency at Bhandewadi, Nagpur. The project has been undertaken on build-own-and-operate basis. The government has sanctioned 30 years' lease for the project. The project started in 2004.

f) Landfill site or dumping site

The Bhandewadi compost depot is reserved for the disposal of municipal solid waste, in the city development plan. The land is about 10 km from the centre of the city and measures 54 acres. The land is fenced with an 8 ft high wall. Concrete roads, streetlights, and provision of basic facilities are also provided in the dumping ground. Presently, 800 tonnes per day of municipal solid waste is transported to the dumping ground.

The construction of scientific landfill site for safe disposal of reject and refuse MSW has been carried out by NMC. There are three landfill sites developed by NMC for disposal of different type of wastes. First landfill site of an area 4 hectares is used for safe disposal of rejected waste or inert waste (that is not possible to be treated). Second landfill site of an area 3.50 hectares is used during emergency cases and the third landfill site of an area 1.40 hectares is used for safe disposal of silt, debris and other waste brought to Bhandewadi. At present, NCM is disposing the reject, inert and refuse MSW scientifically in the newly developed landfill site.

Figure 42: Site map of Bhandewadi dumping yard



Source: SWM Department, NMC, Nagpur

g) SWM - User charges²³

No user charges are levied on residential properties in Nagpur. The private operator collecting waste from non-residential properties collects user charges on monthly basis, and details of the charges are given in the table below. Also, another agency hired for collection, transportation, and treatment of biomedical waste is charging hospitals, clinics, blood banks, etc., on monthly basis. Details of user charges collected against collection of biomedical waste are as follows:

■ Hospital, nursing homes, etc.	-	Rs. 170/- per bed/per month on 60% occupancy
■ Blood banks	-	Rs. 500/- per month
■ Dispensaries	-	Rs. 200/- per month
■ Dental clinics	-	Rs. 500/- per month

²³ This user charges are collected from commercial properties only. The charges are collected by the private operator who undertakes collection and transportation of solid waste in the city.

The above rate is revised every three years in consultation with the Indian Medical Association, Nagpur.

Sr.No.	Category	Tariff charged
1.	Residential Hotels	Rs. 5000 per month
2.	Hotels	Rs. 1000 per month
3.	Medium sized Hotel	Rs. 500 per month
4.	Lawns & halls	Rs. 300 per programme

Source: Health Department, NMC, Nagpur

h) SWM – Operation and maintenance cost recovery

NMC's sources of revenues related to SWM services are not enough to meet 100% O & M recovery. There is a huge gap in the revenue income and revenue expenditure. NMC is not levying any sort of tax or user charges for SWM service provision. Only revenue for NMC is the royalty earned against the land provided to private operator for construction and running treatment plant. Against these revenues, the expenditure is very high due to outsourcing of most of the service components and huge establishment expenditure commitments. The cost recovery for SWM is hardly 1% as seen in the table in case of SWM. But, cost recovery goes high upto to 79% (FY 2011-12) as NMC is cross subsidising revenues from property tax. By doing so, NMC is still not in position of achieving 100% cost recovery and trends of recovery is decreasing on yearly basis due to increase in expenditure and stagnant revenue sources.

Table 51: SWM service cost recovery

Sr.No.	Head of Account	2007-08	2008-09	2009-10	2010-11	2011-12
I	Revenue Income					
1	Categorization of Hotels and fee collection	0	0	31	40	44
2	Royalty from Bio-Medical waste	28	28	31	31	31
Total revenue income (A+B)		28	28	62	71	
II	Revenue Expenditure					
1	Salaries/ Wages & Allowances	4785	5058	5939	7189	8393
2	Operation & Maintenance	739	920	1301	1644	1928
Total revenue expenditure (A+B)		5524	5978	7240	8833	10321
O&M Recovery (%)		1%	0%	1%	1%	0%
III	Cross subsidy of 60% – revenues from property tax	5,513	4,771	6,533	8,158	8,121
O&M Recovery (%)		100%	80%	91%	93%	79%

Source: NMC budget books (2008-09 to 2012-13)

NMC has prepared a subsidy report for SWM services at Nagpur. The report provides recommendation for levying user charges for households and also recommends tariff structure for SWM user charges. In case of levy of user charges, it will generate revenues of Rs. 2,000 lakhs in the first years and gradually will increase to meet 100% O & M cost recovery.

i) Service-level indicators

Table 52: Service-level benchmarks for solid waste management

Sr.No.	Indicator	Value	MoUD Benchmark
1	Household-level coverage of SWM services	95%	100%
2	Efficiency of collection of municipal solid waste	95%	100%
3	Extent of segregation of municipal solid waste	28%	100%
4	Extent of municipal solid waste recovered	9%	80%

Sr.No.	Indicator	Value	MoUD Benchmark
5	Extent of scientific disposal of municipal solid waste	31%	100%
6	Efficiency in redressal of customer complaints	97%	80%
7	Extent of cost recovery in SWM services	75%	100%
8	Efficiency in collection of SWM related user charges	-	90%

Source: Health department, NMC

7.3.2 Future solid waste generation

For the purpose of SWM projection, the waste generated per capita for the year 2011 has been considered as 288 grams. According to projected population and per capita waste generation it has been estimated that 705 TPD waste generation will take place.

The per capita waste generation has been projected at 2.2% till 2021; further projected at 1.9% till 2031 and 1.6% till 2041. Accordingly, the annual solid waste generation has been calculated. Based on the solid waste generation estimates, the infrastructure requirement for primary and secondary collection, transportation, landfill, and treatment capacity has been estimated and the same has been discussed in the sector plans.

Table 53: Estimation of solid waste generation in Nagpur till 2041

Year	Projected population (in lakhs)	Per capita Waste generation (in grams)	Average per day waste generation (TPD)
2013	2,447,494	288	705
2021	3,351,873	293	982
2031	4,590,432	298	1,368
2041	6,286,652	303	1,905

Source: CRIS Analysis

7.3.3 Critical analysis of SWM system: Post- 1st generation CDP scenario

Nagpur generates about 875 MT of waste per day, which is 350-400 grams per capita per day. Under the scheme called 'Swatchata Doot Aplya Dari' (SDAD) (sanitation worker at your doorstep), daily about 75% of the waste is being collected through the door-to-door waste collection system. This is an NGO-based initiative, wherein a contracted NGO worker called Swatchata Doot visits every house, shop, and other commercial establishment. Workers carry out waste collection through ghanta gadis and cycle rickshaws. About 60% of the residential and commercial establishments are covered by this scheme.

Post JNNURM scenario

To improve MSW related services, and to achieve the sector vision of "Clean city and Bin free city", an investment of Rs. 5,000 lakhs was estimated to augment the system during 2006. Broadly projects include development of treatment facilities, landfill site and composting facilities at the dump site.

Table 54: Investment needs and projects identified for SWM sector

Sr.No.	Sector	Investment Envisaged (Rs. lakhs)	Key Components of the Proposed Projects
1	SWM	5,000	<ul style="list-style-type: none"> ■ Land acquisition for treatment facilities ■ Development of a new waste disposal site ■ Development of landfill infrastructure and

Sr.No.	Sector	Investment Envisaged (Rs. lakhs)	Key Components of the Proposed Projects
			composting facility at dump site
	Total investment envisaged	5,000	1% of the total investment needs envisaged in the CDP (2006)

Source: City Development Plan, 2006, of Nagpur

Even though, NMC had envisaged augmentation needs for SWM sector, and was included in the CDP; NMC's none of the projects got approved under JNNURM.

7.3.4 Institutional framework for SWM

The Health department of NMC is responsible for SWM services along with other key health related services like cleaning of drains, O&M of hospitals, birth and death registrations, issue of trade licenses, and food safety concerns. The department is headed by the chief medical officer, who is assisted by the assistant medical officer, sanitary supervisors, sanitary inspectors, and public health staff. Apart from the mentioned functions, there is a sewerage department, which monitors activities at Bhandewadi dumping yard and treatment facilities run operated and managed by private operators.

7.3.5 Key issues and concerns

- There is no segregation of waste at the source.
- There is no awareness among the citizens regarding segregation of waste.
- There are no transfer stations within the city. Hence, the waste is transferred in multiple vehicles. This is leading to higher O&M expenditure on transportation of the waste.
- There are no user charges for the SWM services. Hence, there is no cost recovery on SWM services.

7.4 Storm water drainage (SWD)

The detailed assessment of the existing SWD systems includes existing drainage network, water logging areas, and the existing institutional arrangement. Further, the section highlights the key issues is the SWD.

7.4.1 Existing drainage system

The public works department (PWD) of NMC is responsible for laying storm water drains in the city and overseeing the operation and maintenance of these drains. Storm water drains cover approximately 40% of the city's total area. The total length of these drains is approximately 917 km (as surveyed for preparation of master plan in 2008) and stretch across the three drainage zones of the city.

The existing storm water drainage in the city covers three major storm water-carrying rivers, i.e., the Pilli River, Nag River, and Pora River, which fall outside NMC's boundaries. The Nag River starts from Ambazari Lake's overflow weir at the western end of the city and flows towards the east. The final disposal of storm water from some of the areas in west Nagpur, south Nagpur, central and east Nagpur is

into Nag River through major and minor nallahs. Storm water from the southern part of the city drains into the Pora River. There is pucca closed drains also, which runs along the major road networks of the city.

a) Service-level indicators

Table 55: Service level benchmark for storm water drainage service

Sr.No.	Indicator	Value	MoUD Benchmark
1	Coverage of storm water drainage network	35%	100%
2	Incidence of water logging/flooding	Maximum of 45	0

Source: Health department, NMC

7.4.2 Critical analysis of drainage: Post-1st generation CDP scenario

Only 30-35% of the road network is covered by the storm water drainage system of open drains and closed drains. Flooding takes place in most of the SWD network, due to carrying of both - storm water and sewer together. During monsoon the problem of back flow in the sewer line was rampant. Due to siltation and blockages in the natural drains, river, and nallahs, effective carrying capacity of the natural system has reduced. To improve the SWD service levels in the city, investment needed was around Rs. 24,600 lakhs. Details of the projects and investment envisaged in the CDP are provided in the table below.

Table 56: Investment needs and project identified for SWD sector

Sr.No.	Sector	Investment Envisaged (Rs. crores)	Key Components of the Proposed Projects
1	Storm Water Drainage	246	<ul style="list-style-type: none"> ■ Construction of storm water drainage alongside roads ■ River/canal channelization ■ Strengthening of existing retaining wall of canals/river ■ Rejuvenation of Nag and Pilli rivers
Total investment envisaged		246	4% of the total investment needs envisaged in the CDP (2006)

Source: City Development Plan, 2006, of Nagpur

NMC has also prepared the SWD master plan for Nagpur. The master plan has been prepared taking into account the future demand for SWD network for Nagpur. An investment of around Rs. 2,000 crores is envisaged to provide 100% SWD network in the city. Apart from the projects envisaged in the CDP, other projects were also identified in the master plan for SWD. But, none of the projects of the SWD sector was approved under JNNURM. Due to high capital investment required and existing commitments towards projects under JNNURM, no SWD project was taken up for implementation on the basis of its own municipal funds.

7.4.3 Key issues and concerns

- 100% of the city area is not covered with SWD.
- During regularisation of unauthorized layouts, provision of SWD was not carried by the authority, which is creating financial pressure on NMC as these regularised layouts are handed over to NMC for provision of services.
- Natural topography and gradient are neglected and not considered during the development of layouts.

- Sewage and storm water are carried in the same network, resulting in overflows and water logging during monsoon.

8 Traffic and Transportation system

8.1 Existing road infrastructure

Nagpur has a good road network. Many of the roads have been developed as a part of the integrated road development project (IRDP). IRDP has revolutionized the roads in the city, which now enjoy an excellent status, in terms of both coverage and quality. Vehicle ownership is quite high in Nagpur; about 11.30 lakh vehicles were registered during 2011. The number of vehicles increased in the last decade at a rate of 59%. On an average, about 200-280 vehicles are being added every day. But, supporting infrastructure like parking facilities, NMT facilities and signages are inadequate. Average travel speed is 25 km per hour, which is quite high making road safety a cause of concern.

8.1.1 Regional network

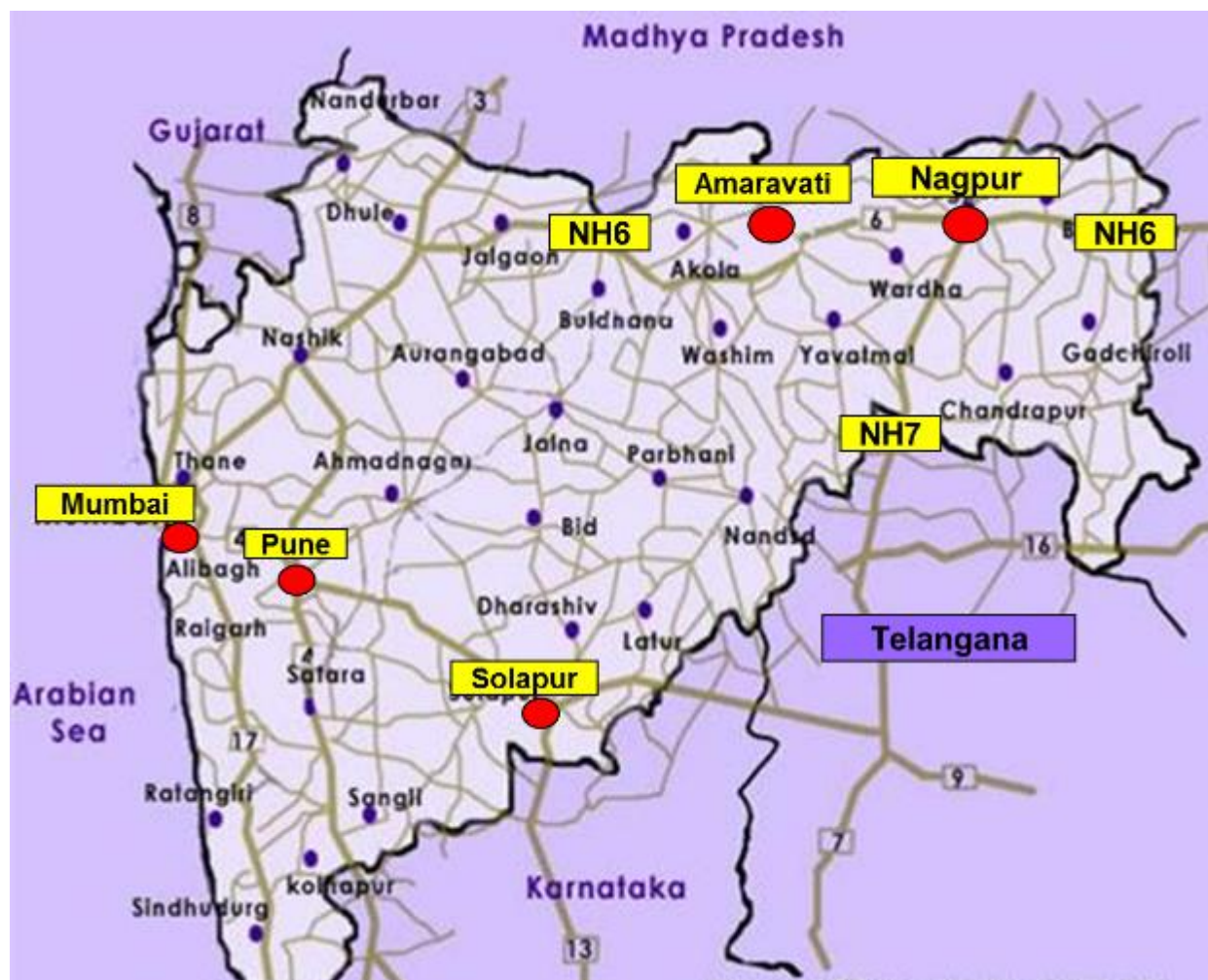
Nagpur city is well connected with all major cities by the road network. All major highways and railways pass through Nagpur. Due to the good connectivity, the city has become a major trade and transportation centre in the region. The following national highways (NH) and state highways (SH) pass through the city.

- NH 7: Connecting Varanasi-Jabalpur-Nagpur-Hyderabad-Bangalore-Kanyakumari
- NH 6: Connecting Hajira, Gujarat-Surat-Dhule-Amravati-Nagpur-Raipur-Sambalpur-Kolkata
- NH 69: Connecting Nagpur-Betul-Obedullaganj near Bhopal
- SH 9: Nagpur-Umred-Nagbhid-Chandrapur
- SH 248, SH 255, and SH 260

Another important aspect in the road hierarchy or network is the development of the road network. The road network developed in the city is shown in the figure below. It can be seen that the roads have been developed in a radial pattern like spikes.

There are 5 full spikes and 1 half spike developed in the network. Apart from the radial spikes, there are two ring roads; one is outer ring road and another one is inner ring. However, both the ring formation is not carried out properly. It seems that the development of roads in the city is not based on a planned approach, which is evident from the ring and radial spike development. The road network developed in the city doesn't have a proper road hierarchy, and there are numbers of missing links in the road network. The figure indicating the Regional network of Nagpur and connectivity to major cities has been presented in the figure below.

Figure 43: Regional connectivity map



Source: <http://images.blogs.hindustantimes.com/indigestion/post/maharashtra.jpg> and CRIS analysis

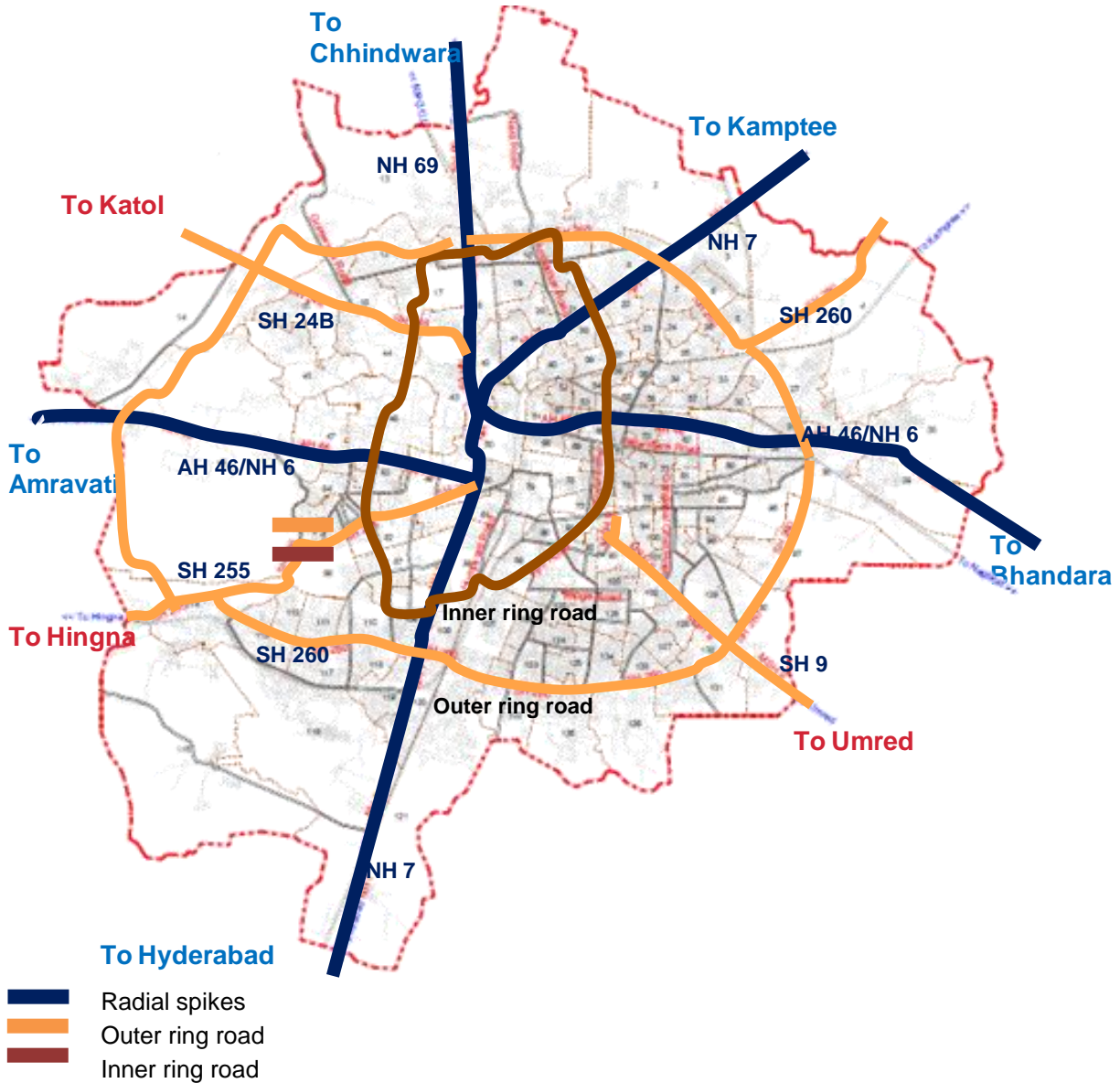
8.1.2 Road hierarchy system

The total length of roads is about 1,907 km; of this 1,150 km of roads are in NMC jurisdiction. The length of arterial roads is around 101 km, sub-arterial roads is about 91 km, and collector roads is about 33 km; the remaining roads are local roads. Details for the roads are provided in the table below.

Table 57: Road hierarchy system

Category of roads in NMC	Length in Kms
Arterial roads	101
Sub arterial roads	91
Collector roads	33
Local roads	925
Total length of roads in NMC jurisdiction	1,150

Figure 44: Road hierarchy of the network in Nagpur



Source: Traffic and Transportation Master Plan for Nagpur, 2008

8.1.3 Road infrastructure and its service levels

Performance or the level of services (LoS) in the case of roads is measured in terms of quality of roads, carriageway, and level of street furniture and accessories. The details of the level of services in the case of road and transport infrastructure in the city are given below:

Carriageway

The classification of road length by carriageway width shows that the maximum of the network is a 4-lane carriageway, followed by single-lane carriageway and intermediate lane. The average width of the carriageway is in the range of 6-14 m, which includes the state and national highways as well. In the case of city roads, the minimum carriageway is 3.5 m and the maximum is about 10.5 m. The majority of the road stretches (62%) have a carriageway of 7 m, whereas 23% of the roads have a carriageway of 3.5 m, and the remaining 13% of the roads have a carriageway of 10.5 m.

Table 58: Details of carriageway width available on both the sides of roads

Category (width – in m)	Left carriageway	Right carriageway
3.5	23%	24%
4	1%	1%
5	1%	1%
7	62%	62%
10.5	13%	12%
Total	100%	100%

Source: Traffic and Transportation Master Plan for Nagpur, 2008

Of the total roads, around 62% are divided and have a median/separator. The remaining 38% roads are undivided and both sides of the carriageway are separated by markings only.

Table 59: Condition of carriageway based on median

Divided / Undivided carriageway	Total
Divided carriageway	62%
Undivided carriageway	38%
Total	100%

Source: Traffic and Transportation Master Plan for Nagpur, 2008

Road surface

90% of the roads in the network have weathered pavements. Around 78% of the roads have bituminous pavements and 1% of the roads are paved with concrete. Based on the master plan, the condition of the pavement observed for 351 indicates that almost 82% of the road stretches have both the shoulders paved. Following table presents the status of paved and unpaved conditions of the surface roads.

Condition of surface	Left Shoulder	Right Shoulder
Paved	83%	82%
Unpaved	17%	18%
Total	100%	100%

Source: Traffic and Transportation Master Plan for Nagpur, 2008

Pedestrian walkway/footpath

Majority of the city roads have footpaths. Around 82% of the roads surveyed have footpath. The width of walkway available on footpaths varies across the road length in the city. Advertisement poles and railings along footpaths discourage pedestrians from using the footpaths. Also, traffic islands are an inconvenience to the pedestrians while crossing the roads. Details of the footpaths and width of the walkways on both the sides of the road are provided in the table below.

Table 60: Details of footpath and available width of walkway

Footpath width (m)	Left Footpath	Right Footpath
1	17%	17%
1.5	33%	34%
2	24%	24%
2.5	6%	6%
3	2%	1%
No footpath	18%	18%
Total	100%	100%

Source: Traffic and Transportation Master Plan for Nagpur, 2008

As discussed in the earlier sections, 82% of the roads have footpaths. But, the footpaths along some of the stretches are encroached by hawkers or too many obstructions such as trees, poles, etc has been observed. Hence, the use of footpath is very limited. In the name of NMT facilities as present in Nagpur footpath is the only Infrastructure that is developed. Even in the master plan, development the infrastructure for NMT/pedestrians is not given a priority.

Drainage/Storm water drainage

About 80% of the road length has drainage facility along the road length on both sides of the RoW. Most of the drainage along the roads has been constructed as part of IRDP programme.

Lighting/illumination of roads

4% of the city roads have streetlights on both the sides of the carriageway. 76% of the roads have lighting on either side of the carriageway, and 20% of the roads don't have illumination. Further, out of 76% of the roads with illumination on one side, 24% have illumination on one side and 52% have illumination at the centre. On an average, the distance between the street lighting poles is 18 m, which is well within the prescribed standards.

Tree plantation

Trees are planted along the main corridors and along the national and state highways. However, for aesthetic purpose limited plantation along some of the arterial roads has been carried out. The forest department is planning to carry out more plantations in and around the city for city beautification.

8.1.4 Important junctions

A junction, when discussed in the context of transport, is a location where traffic can change between different routes, directions, or sometimes modes of travel. The efficiency of the road network is highly dependent on the performance of traffic intersections and bottlenecks. Intersections that have traffic flow more than the design capacity results into higher degree of congestion. Also other issues like time delays, traffic jams, and un-regulated traffic movements will take place. Some of the important intersections in Nagpur are listed below:

- Ajni Chowk
- Manewada Chowk
- LIC Chowk
- Rana Pratap Nagar Chowk
- Chatrapati Chowk
- Lokmat Chowk
- Chhindwara Katol Road
- Vaishnavdevi Chowk
- RBI Chowk
- Gaddi Godam Chowk
- Kadbi Chowk
- Golibar Chowk
- Indora Chowk
- Mental Hospital Chowk

In order to manage the traffic movements and patterns of the traffic at the junctions, it is important to look at the junction geometry. The junctions are classified based on their geometry like 3-arm, 4-arm, rotary, S, U, and Y junctions. Of the total 351 roads surveyed in the master plan, most of the junctions (53%) are 4-arm junctions, followed by 3-arm junctions (30%). Around 8% of the junctions have no proper junction

infrastructure. The rest 9% are rotary, S, U, and Y junctions. Details of the junctions in the city are provided in the table below.

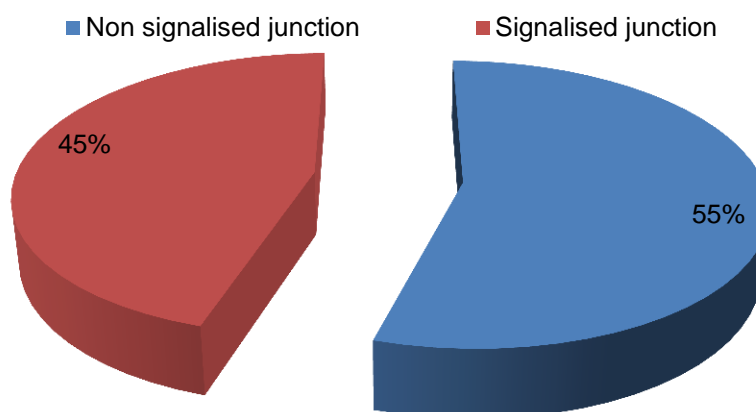
Table 61: Classification of junctions

Junction type	Total (in percentage)
4 arm	53%
3 arm	30%
Rotary junction	2%
S junction	4%
U junction	0%
Y junction	3%
No junction	8%
Total	100%

Source: Traffic and Transportation Master Plan for Nagpur, 2008

From the traffic management point of view, it is important to look at the provision of signals at the junctions for better management of traffic flow in different directions. Of the total 351 junctions, 45% are signalised junctions. Most of the signalised junctions are located along the major corridors and arterial roads are signalised. Also, it is important to highlight that the signal cycle at most of the junctions is 90 s. The present signal cycle for most of the junctions (excluding junctions along the major corridors of west-east and north-south) is on higher side compared to the traffic volumes observed at those junctions.

Figure 45: Bifurcation of junctions based on signaling infrastructure available



Source: Traffic and Transportation Master Plan for Nagpur, 2008

Due to this, the waiting time at these junctions is high, which increases the travel time. Also, it was observed that some of the citizens are breaking traffic rules and not waiting for the complete signal cycle at the junctions. Hence, there is a need for reducing the signal cycle time at some of the junctions in order to better manage the traffic and reduce the waiting time.

From the traffic management point of view, there are various junctions and intersections in the system, like cross roads, roads and railway lines junctions. As discussed in the urban planning section, the city is divided into two parts i.e. West Nagpur and East Nagpur. During the stakeholder discussion, the issue of various grade crossings due to railway line branching into three directions in East Nagpur is increasing the waiting time and ultimately the travel time.

The presence of various railway routes and road-rail intersections is leading to traffic delays. Also, traffic movement interruption is very noticeable at such intersections. Construction of ROBs and RUBs at important intersection is considered in the master plan.

8.1.5 Bridges, flyovers, and interchanges

Bridges and flyovers

Bridges and flyovers are constructed to ensure uninterrupted traffic movement on main arterial roads. 3 flyovers have been constructed in different areas of the city to facilitate uninterrupted traffic movement and to reduce travel time. These flyovers are:

- Near railway station – The flyover was constructed for uninterrupted flow of traffic moving from LIC Chowk or traffic coming from east city and going towards Loha pool.
- Bardi to Mehadi Chowk – Flyover was constructed to provide un-interrupted traffic movement for vehicles going towards airport. There are multiple signalised junctions on the Bardi Mehadi stretches and in order to reduce the travel time flyover is constructed.
- Mehadi Chowk to Munje Chowk - Flyover was constructed to provide uninterrupted traffic movement for vehicles going towards airport or outside city on Wardha road.

Apart from these, the city has 9 bridges, which have been constructed as ROBs or RUBs. These bridges are also meant to reduce the travel time and facilitate uninterrupted travel movement across the railway lines in the city. Out of these 9 bridges, 3 bridges have constructed at Mangalwari, Anand Talkies, and Itwari railway station railway under the JNNURM programme.

Interchange

Interchange in transport terminology means ‘the act of transferring between modes’.²⁴ Interchange facilitates a smooth and coordinated transfer or change of mode. Thus, interchange facilities/hubs are important in urban transport as they act as converging points for various transportation modes and facilitate in forming an integrated network. If transfers between various services can be made easier and quicker, more convenient travel opportunities for passengers/commuters will emerge.

Currently, only a bus-based public transport system is available in Nagpur. Since only one public transport system is available, the infrastructure for interchange is not required. In future, better and efficient interchange will have to be developed since new public transport systems such as metro, BRTS, and monorail are being proposed in Nagpur. The provision of interchange will facilitate the integration of various systems and help manage the services in an efficient and sustainable manner.

Interchange concept is also applicable to the cargo movement. In Nagpur, there are truck terminals and railway terminals. Truck terminals on a daily basis encounter number of trucks halting and cargo movement is taking place. Also, there are proposal of developing an international cargo hub at MIHAN and truck terminals in outskirts of NMC jurisdiction.

8.1.6 Key issues and concerns

Based on the analysis of the existing road infrastructure available in the city, following are the key issues and challenges ahead for the authorities:

²⁴ <http://www.tfl.gov.uk/microsites/interchange/61.aspx>

- The initial reconnaissance survey revealed that roads in the inner city area, central business district (CBDs), and market areas are narrow and not able to handle existing traffic volumes that are more than 1200 PCUs (Passenger Car Equivalent) per lane per hour. This results in congestion and time delays due to traffic jams.
- Encroachment of footpaths by hawkers and shopkeepers, varying width, irregular geometric designs, and no regulated walkways are a disincentive for the pedestrians to use the existing pedestrian infrastructure.
- Lack of non-motorised transport facilities like bike lanes, subways, sky walk, etc., results in mix traffic conditions. Further, it results into mix traffic with varying speed, increase in travel time, reduction in the carriageway for traffic, and accidents.
- In the absence of adequate parking facilities, 76% of the stretches in the network experience on-street parking on both the lanes. Unplanned and unauthorised on-street parking results in the reduction of the effective carriageway for the movement of traffic.
- Lack of road signs/intersection markings is resulting in accidents.
- A constant signal cycle of 90 s is observed at all the junctions in the city. This results in more waiting time, ultimately increasing the travel time. Also, commuters were found to be breaking traffic rules to avoid the waiting time at junctions.
- The carriageway widths of main Arterial roads in Nagpur town are broad, the inner city roads and some of the roads leading to the market areas are narrow. These narrow roads carry large volumes of traffic resulting in congestion.
- Absence of footpaths for pedestrians and unregulated pedestrian crossings and lack of facilities for cycling.
- Unauthorized on street parking on both sides of road in commercial areas and encroachment of roads/foot-paths by hawkers and shopkeepers.

8.2 Existing traffic and transportation system

The traffic and transportation master plan for Nagpur has been prepared by M/s L&T Ramboll during 2008; provide an overview of the existing condition of the traffic and transport sector and analysis the demand and gap in the sector. Primary surveys like road network inventory, classified traffic volume counts, speed and delay study, origin and destination survey, public transport survey, parking survey, terminal area survey, pedestrian survey, IPT survey, etc were carried out. Forecasting of the projects required meeting the demand and bridge the gap for traffic and transport sector till the time horizon of 2031 was carried out.

8.2.1 Traffic volumes

Nagpur is the located at the geographical centre of the country. There are many highways – national and state – passing through the city. In a way, Nagpur can be termed as a converging point for two major highways connecting west with the east through NH6 and north to the south by NH 7 & NH69. These highways are part of the city's road network and form major west-east and north-south corridors catering to the major traffic. Origin-destination (OD) surveys were conducted to analyse the travel pattern within city. Based on the survey results, the average daily PCU count observed on the outer corridors of the city is shown in the table below.

Table 62: Daily vehicle count and PCUs on outer cordons of Nagpur

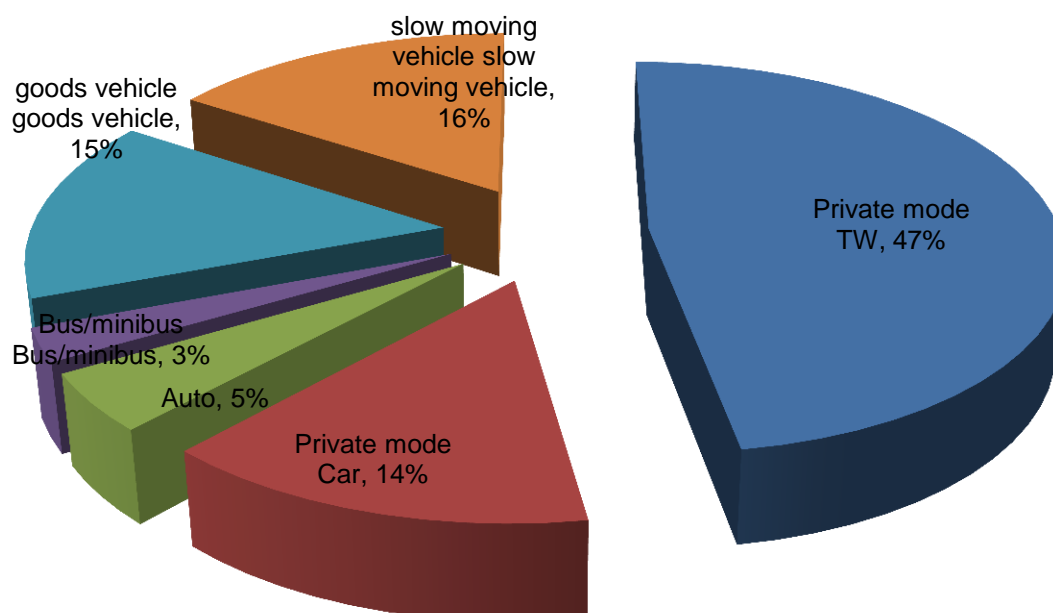
Sr.No.	Name of the Road/Cordon	Vehicle count (in thousands)	PCUs (in thousands)
1	Wardha road (NH-7)	26	34
2	Hingna road	25	23
3	Amravati road (NH-6)	50	53
4	Katol road	14	13
5	Chhindwara road	33	32
6	Kamptee road (NH-7)	24	24
7	Bhandara road (NH-6)	28	36
8	Umred road	18	18
All locations (Total)		218	234

Source: Traffic and Transportation Master Plan for Nagpur, 2008

On daily basis, around 2.18 lakh vehicles movement in and out of the city on the selected cordons as listed in table above. Maximum vehicular movement was observed on Amravati road, Wardha road, and Bhandara road, which accounted for 23%, 15%, and 15% of the total vehicular movements/traffic, respectively.

The traffic observed along the cordons, comprises of vehicles registered in Nagpur and outside vehicles. Later is more due to through traffic from different destinations observed on all the cordons. Whereas, the traffic movements on the state highways is less as compared to the NHs and accounts for 30% of total of the total traffic movements along the cordons.

Figure 46: Composition of traffic observed at outer cordons in Nagpur

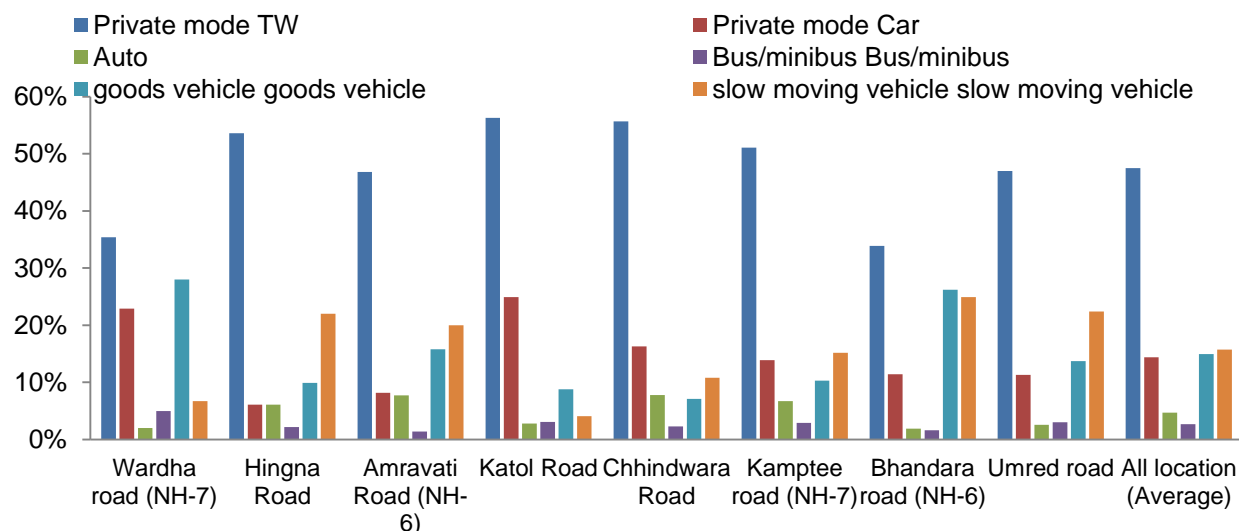


Source: Traffic and Transportation Master Plan for Nagpur, 2008

The analysis of traffic composition on the selected cordons is important to understand the travel pattern and will be useful for future planning purpose. 47% of the vehicles were two-wheelers and 14% were cars, which sum up to 62% of the total vehicles, and most of the traffic comprises of private vehicles. Also, goods vehicles accounted for 15% of the traffic and 16% of the vehicles were slow moving vehicles.

Auto rickshaws and buses accounted for 8% of the vehicular movement on the outer cordons. The traffic movement observed on each of the outer cordons is presented in figure below.

Figure 47: Traffic composition by vehicle type at outer cordons in Nagpur

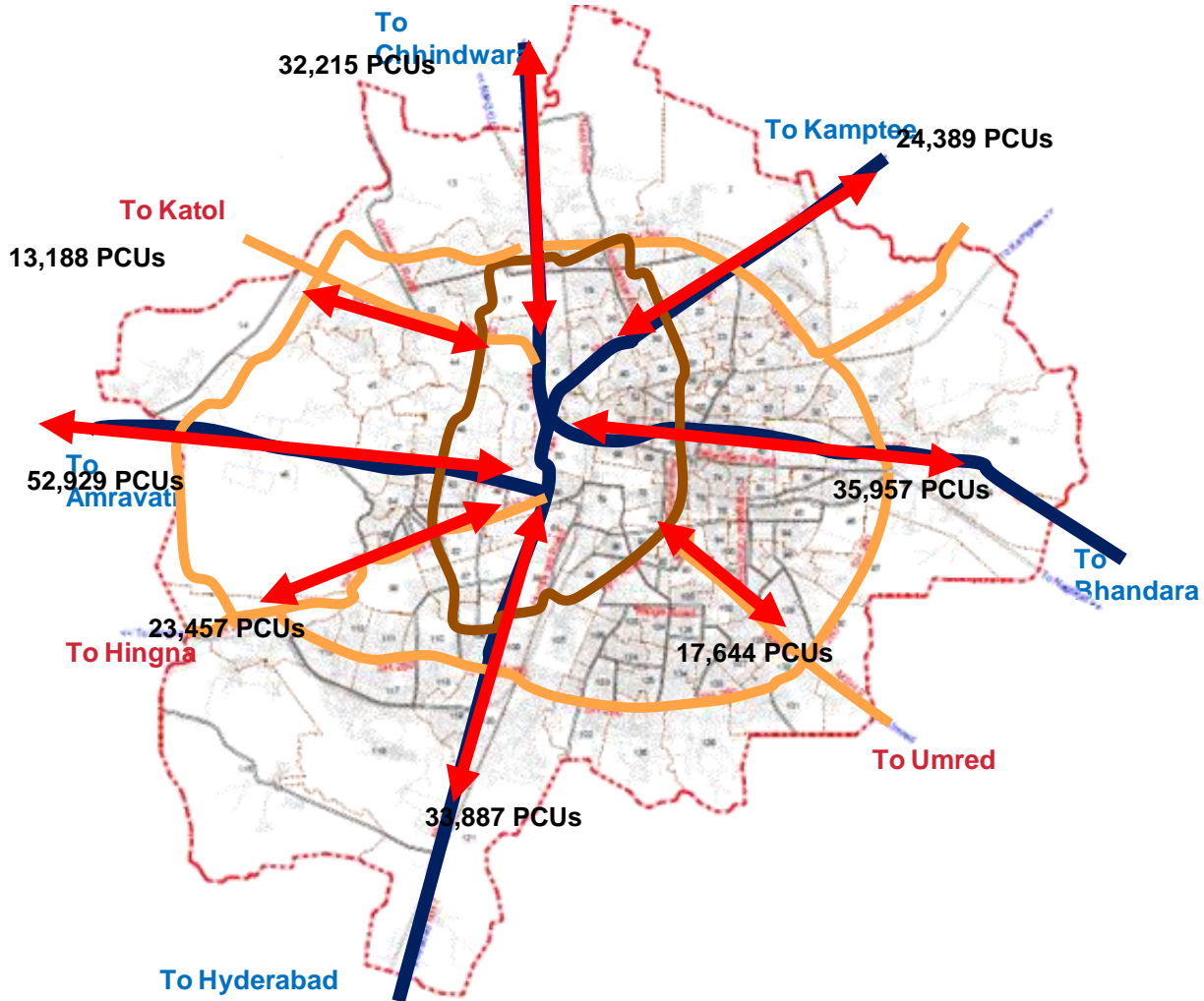


Source: Traffic and Transportation Master Plan for Nagpur, 2008

From the travel pattern on the cordons, it is observed that majority of the trips are going out and coming into the city. Following are the major observations:

- 43% of the trips were internal to external – vehicles moving out of the city.
- 37% of the trips were external to internal – vehicles coming into the city.
- 18% of the trips were external to external – through traffic accessing the city link roads.
- 2% trips were internal to internal – internal movement within the city using the outer cordons.

Figure 48: Traffic movement in all directions in Nagpur



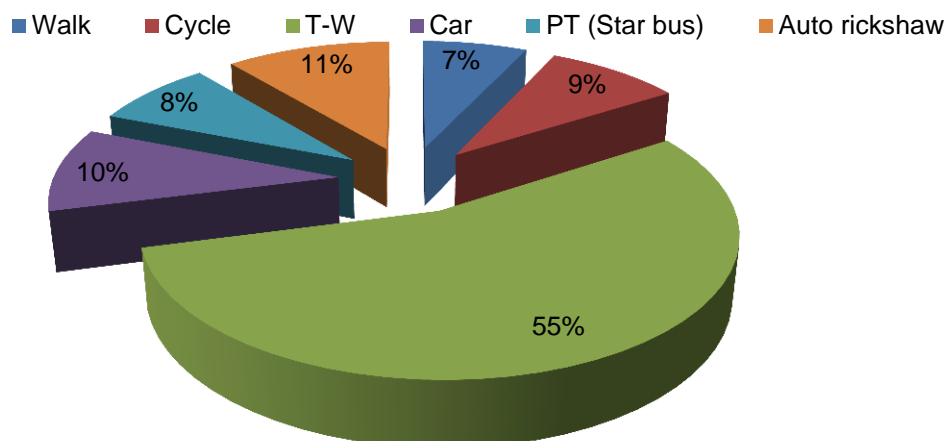
Source: Traffic and Transportation Master Plan for Nagpur, 2008

From the analysis of the traffic movement, the maximum traffic movements are observed in the west-east or the horizontal direction, Amravati and Bhandara road. The traffic movement in terms of PCUs in all the directions in Nagpur is shown in the figure above.

8.2.2 Modes of transport

The details of household and vehicle ownership are some of the important factors in the determination of travel modes. The population, its distribution in an area, and its composition in terms of age, sex, working members, and students constitute as equally important factors, which influencing trip making rates of a household as family size and household income. The number of vehicles available per household would also influence the choice of trip making and mode of travel. Based on all this parameters Origin-Destination (O-D) matrix can be prepared to understand the travel pattern in the city.

Figure 49: Modal Split of trips in Nagpur



Source: Traffic and Transportation Master Plan for Nagpur, 2008

8.2.2.1 Modal split

Based on the survey carried out during 2008, the modal split observed in Nagpur is shown in the above figure. The modal share indicates that the preferred mode is private vehicles (65%), of which two-wheelers account for 55% and cars, 10%. Other modes of travel preferred by the citizens are auto rickshaw (11%); cycle (9%), walking (8%), and public transport (7%).

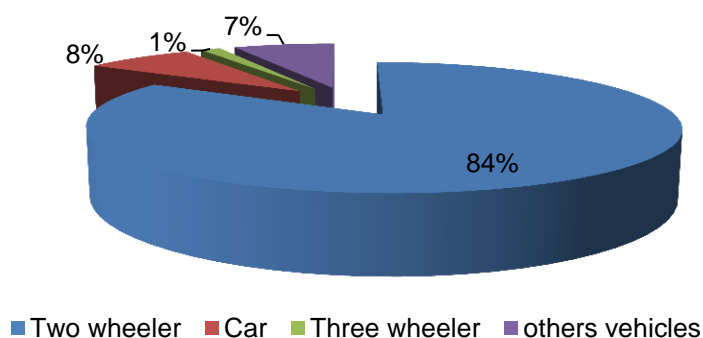
The total share of non-motorised travel modes like walking and cycling is more than share of public transport system, which clearly shows that the preference for using public transport is less. Also, share of public transport dropped to 4% from 6% during 1998. Considering the population and spread of the city, the public transportation system is highly inadequate, which raised a concern of system's efficiency.

8.2.2.2 Modes of transport

Private vehicles

Number of vehicles registered during 2001 was around 4.60 lakhs and during 2011, the number of registered vehicles increased to 11.30 lakhs. There was a 2-fold increase in the number of registered vehicles in the last decade (2001-2011). Of the total vehicles registered, 9.5 lakh are two wheelers (84%), 0.9 lakh are cars (8%), 0.2 lakh are auto rickshaws (1%), and 0.8 lakh are other vehicles including goods vehicles. The number of private vehicles for commuting has increased in Nagpur in the recent years. This is attributed to the poor public transportation services in the city.

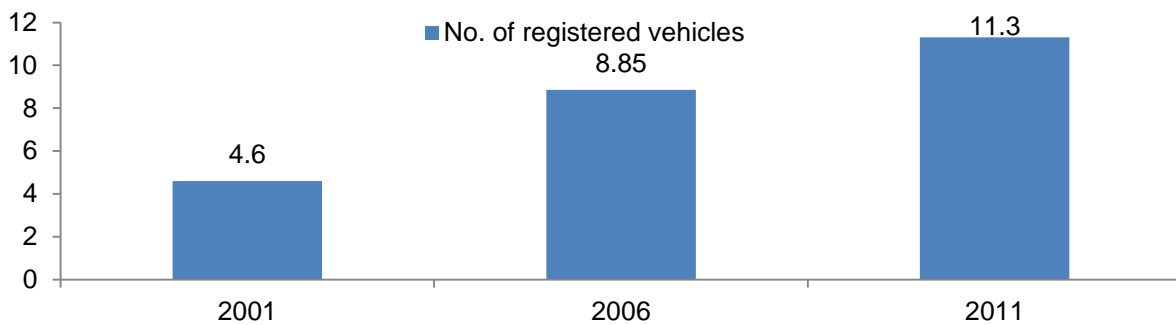
Figure 50: Vehicular composition in Nagpur, 2011



Source: RTO Nagpur

The vehicular composition during 2011 is shown in the figure above. 1% of the vehicles are auto rickshaws, which form the intermediate public transport system (IPTS)/para-transit system in the city. The composition of vehicles during 2006 was also similar to that observed during 2011. From the figure shown above, it can be observed that 2.50 lakh vehicles have been added during 2006-2011, reporting a growth rate of 22%.²⁵ Similarly, the two-wheelers and other vehicles have recorded a high growth rate in the city. The cars have grown at a rate of 31% and reported highest growth rates among all the vehicles. The lowest growth rate was observed in three-wheelers (auto rickshaws) (7%). The past trends show that annually, about 1 lakh vehicles are added to the city's traffic volume. From the figure shown below, it can be seen that vehicle population in Nagpur during 2006 and 2011 along with the growth rate.

Figure 51: Vehicle population during 2006 and 2011 in Nagpur



Source: RTO Nagpur

Public transport

Nagpur has a bus-based public transport system with a fleet size of 470 buses of varying capacities. The public transport system till 2007 was managed and operated by MSRTC in Nagpur. Under JNNURM, funding was made available for procurement of buses in the mission cities. Further, the public transport service function was taken over by NMC from MSRTC, and NMC procured buses under JNNURM for bus-based city transportation. The buses were procured in the year 2010 and handed over to Vansh Nimay Infraprojects Pvt. Ltd. (VNIL) for operating the public transportation in the city. NMC has formed company/SPV named Nagpur Mahanagar Parivahan Pvt. Ltd. (NMPL) for outsourcing O&M of public transport.

Figure 52: Public transport system (Star Bus)



Management of the bus-based public transport service has been outsourced by NMPL to VNIL for 10 years. A fleet of 240 buses procured under JNNURM by NMC and the fleet will be handed over to VNIL for operation, but the ownership of the buses will be with NMPL. There is a revenue sharing model developed by NMC, where both NMPL and VNIL will share the revenues from advertisement and royalty will be paid by VNIL to NMPL against the buses provided by NMPL. Key indicators for the public transport system and services in the city of Nagpur are compiled in the table below.

²⁵ Growth rate is computed for vehicular population data available for 2006 and 2011.

Public transport has a good coverage, in almost all the areas of the city. The present route map of the public transport is provided in the figure below.²⁶ At present, there are around 174 routes, which are operational. The total fleet in operation consists of 254 buses, which means the operational efficiency of the public transport being only 54%. It is a clear indication that the system is not efficient, and more than 40% of the fleet is kept idle. Also, based on the discussion with the officials and reconnaissance survey in the absence of the bus terminal and adequate depots, buses are kept idle on roads.

The planning activities like route planning, fare card, O&M of public transport fleet, etc are to be carried out by VNIL. The route rationalization is carried out by VNIL. NMPL can provide suggestions in terms of rationalization of the fares, in the interest of the citizens.

Para-transit system – Auto rickshaws

Para-transit in Nagpur is unorganised and is operating independently by the auto drivers. Share of para-transit in the modal split is more than that of the public transport. There are 7 to 8 associations formed by auto drivers in absence of a single association it is making difficult for the authorities to manage the para-transit since they don't have common consensus.

Auto rickshaws (para-transit) in Nagpur don't operate in an organised way, and even the fare card fixed by the RTO is not followed. Citizens opting for para-transit services have to bargain every time while travelling. Despite the efforts made by the RTO for fixing the tariff card, the same has not been enforced and auto rickshaw drivers demand more fare every time. The problem persists since long time and authorities not able to resolve it due to multiple associations with different objectives making it difficult to arrive at common consensus.

8.2.3 Existing transportation infrastructure

Bus stands in Nagpur city

Since Nagpur is the district headquarters, presence of wholesale markets, availability of better health facilities and business and job opportunities from nearby places. So this attracts a number of tourists and daily visitors to Nagpur, who reach city by road or rail. There are private and state transport bus services available for intercity travelling to Chhindwara, Raipur, Mumbai, Surat, Hyderabad, etc. In order to facilitate the passenger movement with proper infrastructure, there are several bus terminals developed in the city. The locations of these bus terminals in the city are as follows:

- Ganeshpeth ST Stand
- MP Bus Stand
- Agayaram Devi Chowk
- Baidyanath Chowk
- Geethanjali Talkies near Gandhi Bagh
- Ravi Nagar Chowk

In case of rail transport, Nagpur is a converging point and majority of the trains pass through Nagpur going. There are four railway stations in the city:

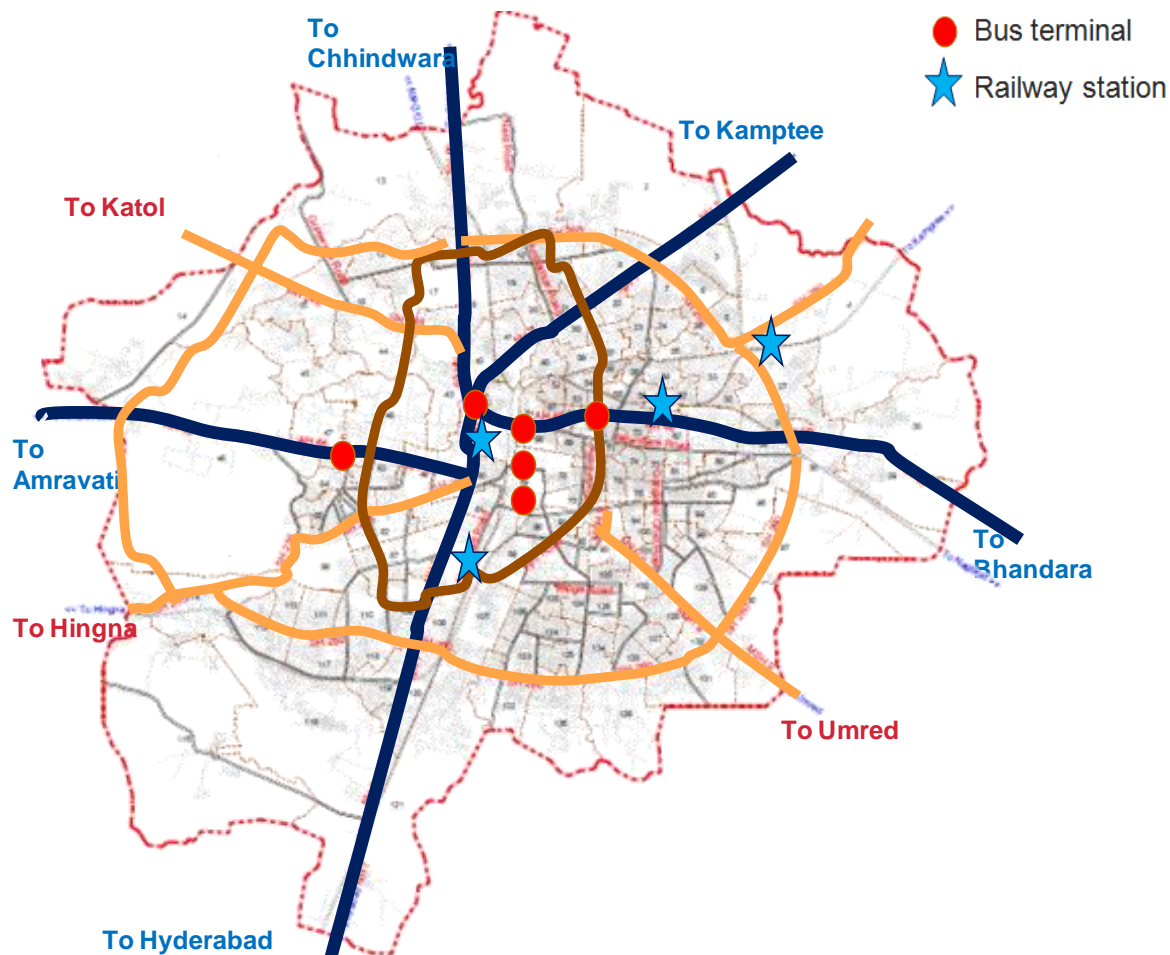
- Nagpur Central Railway Station
- Ajni Railway Station
- Itwari Railway Station

²⁶ Source: *Comprehensive Mobility Plan for Nagpur prepared by NIT in 2013-14*

- Kalamna Railway Station

Locations of bus terminals and railway stations in the city are shown in the map below.

Figure 54: Map showing the locations of bus terminals and railway stations



Source: Traffic and Transportation Master Plan for Nagpur, 2008

8.2.4 Parking facilities

The number of registered vehicles is growing at the rate of 10% to 20% per annum in Nagpur. The increase in two-wheelers/cars has led to an increase in the demand for parking space. The parking of vehicles along the kerbs reduces the effective carriageway, thereby increasing congestion, accidents, time delays, and pollution. As per the ESR report (2011-12), around 65% of the reduction in speed of regular traffic on roads takes place due to kerb/on-street parking.

Street parking is very prominent in Nagpur. It is observed that on 76% of the stretches in the road network, on-street parking happens on either side of the stretch, and this reduces the effective carriageway. This causes hindrance in the regular flow of traffic by reducing the effective carriageway. On-street parking is observed on both the sides of 75% of the roads, while 25% of the roads have no on-street parking.

Table 64: Share of on street parking observed

Road sides	On-street parking observed		Total
	No	Yes	
Left side lane	24%	76%	100%
Right side lane	23%	77%	100%

Source: Traffic and Transportation Master Plan for Nagpur, 2008

There is a need for a comprehensive parking policy for Nagpur, to control and regulate on-street parking, provision of off-street parking facilities, exclusive parking bays in various commercial areas and near market places, levy of parking fee, parking norms along with standards, and demand management measures. Also, incorporation of parking/no parking zones in congested areas and other areas as required. Recently, NMC drafted a parking policy which is under scrutiny, which might help authorities to address the parking issues in the city. Implementation of the policy should be carried out on priority basis to bridge the gap of parking demand along with tapping the potential for revenue generation. The location of the parking facilities have been identified in the Development Plan – 2011.

8.2.5 Truck terminals

A large number of trucks and multi-axle vehicles were parked outside Chungi Naka (Octroi Naka) on all important radial roads including Bhandara Road, Amravati Road, Kamptee Road, Wardha Road. The obvious reason was the restriction of timings to pass through the city area, besides lack of proper truck terminals. The city road network profile itself invites high number of truck movements to pass through NH6, NH69, NH9, SH260 and MSH 9. To reduce the impact of heavy vehicle movement on local traffic, trucks are banned during 7.00 am to 12 noon and 4.00 pm to 9.00pm.

8.2.6 Safety and traffic management measures

Traffic situation

Old city areas have high density with a mix land use. Lot of traffic movement in and out of these areas is observed due to the presence of markets and commercial centres. Also, Nagpur railway station and ST bus stands are located in the core area, which attract more traffic. This is leading to problem of congestion, high levels of pollution, time delays, traffic jams, etc. In core city areas, almost all the streets have turned commercial with high level of encroachments by hawkers. There is complete mix land use, which comprises shops, retail markets, eating establishments, private tutorials, clinics, etc.

Apart of this, based on a reconnaissance survey it was observed that there is heavy vehicle mobility within and around the NMC jurisdiction. Large number of trucks and multi-axle vehicles were parked outside octroi check posts on all important radial roads including Bhandara road, Amravati road, Kamptee road, and Wardha road. The obvious reason was the restriction of heavy vehicles entry timings to city area, besides lack of proper truck terminals.

The city road network faces high number of truck movements to pass through NH-6, NH-69, NH-7, SH-260, and SH-9. This significantly increases the parking demand on all major radial roads outside octroi check posts. Also, the city lacks well-planned truck terminals, which can take care of the huge parking demand during peak hours.

Traffic signal

In some of the junctions, traffic signals are not working and lack of attention from the traffic police hinders the traffic movement. As discussed earlier, signal cycle at all the signalised junctions is same, which is

observed not to have synchronised with the traffic volumes. This is ultimately resulting into more waiting time. For controlling the traffic, there are 159 traffic signals, of which 49 are conventional and 110 are LED signals.

Safety measures

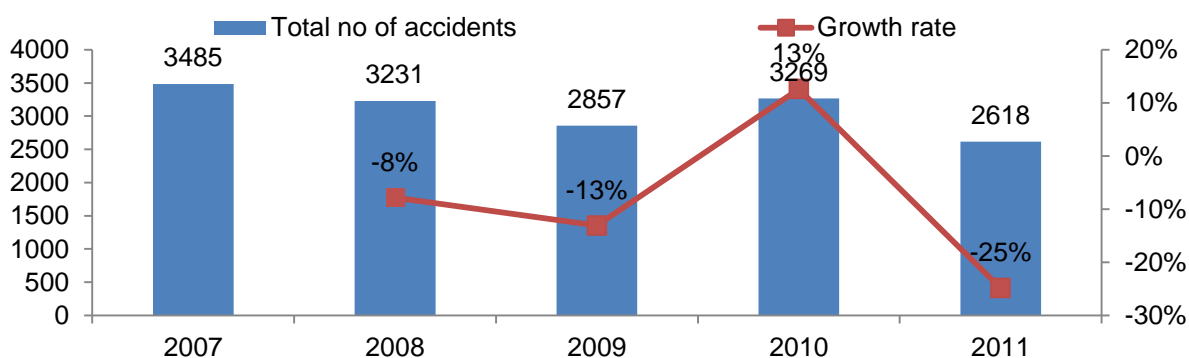
Traffic signals and signages have been installed at majority of the junctions to manage and guide the traffic movement within the city. Apart from this, there is a traffic park in the city, which is meant for educating young children about the importance of following traffic rules and safe driving. The traffic park also provides recreational facilities.

Accidents

Traffic safety is of utmost important that needs to be considered to reduce the number of accidents in the city. NH-6, NH-7, and NH-69 are the major national highways passing through Nagpur. In addition, state highways SH-260 and MSH-9 connect to these national highways and form a radial pattern. Major part of the outer ring road is still under construction. The presence of state and national highway network will naturally invite through traffic in the city. Also, it was observed that due to uncontrolled speeds of the vehicles is the reason for accident taking place on city roads and on flyovers. Most of the two-wheeler accidents are due to over-speeding.

The trend shown in the figure below for the accidents taking place in Nagpur shows a decline in road accidents, except for 2010, where it increased by 12%. The growth rate in total number of accidents during 2008, 2009, and 2011 is negative, which is a positive indicator. 27 accidents per 10,000 vehicles take place in a year in Nagpur.

Figure 55: Total recorded accidents in Nagpur, 2007-2011



Source: Traffic and Transportation Master Plan for Nagpur, 2008

The number of accidents recorded for five years (2007-2011) is presented in the table below. In Nagpur, on an average, around 3092 accident cases are recorded. Annually 1462 accidents, 265 accidents with fatal injuries and 1364 accidents with injury took place in Nagpur during 2007-2011. From During the period 2007 till 2011, the maximum number of total accidents recorded was during 2007 (3485) and least number of accidents recorded during 2011 (2618). The incidents of fatal accidents are on lower side throughout the years (2007-2011) compared to the incidents of accidents where injuries have taken place, which indicates that casualties’ in road accidents is less.

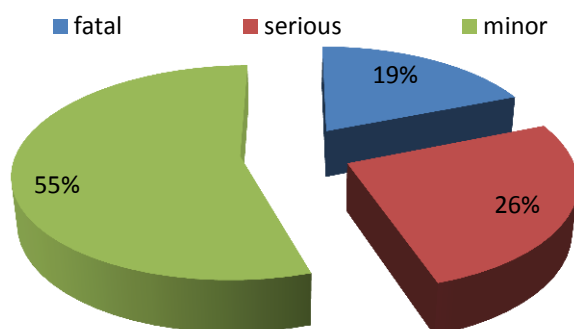
Table 65: Accident data for Nagpur, 2007 till 2011

Type of Accident	2007			2008			2009			2010			2011		
	A	Fa	In	A	Fa	In	A	Fa	In	A	Fa	In	A	Fa	In
Fatal	250	259	80	249	263	94	229	250	50	301	317	80	228	237	45
Serious	378	0	490	341	0	456	330	0	393	375	0	456	367	0	446
Minor	1018	0	1010	913	0	915	824	0	781	872	0	868	637	0	658
Total	1646	259	1580	1503	263	1465	1383	250	1224	1548	317	1404	1232	237	1149

(A - Accidents, Fa - Fatal, In - Injured) Source Traffic and Transportation Master Plan for Nagpur, 2008

It is observed that around 55% of the incidents are minor accidents, 26% are serious, and 19% are fatal accidents where permanent loss of person could have happened. Though the number of accidents is on the lower side compared to the state level figures for accidents, authorities need to introduce traffic calming and traffic control mechanisms.

Figure 56: Accidents and casualties in Nagpur, 2007-2011



Traffic calming measures and TDM measures

As of now, traffic calming measures are not employed in Nagpur to manage and control the traffic movements. In order to cal the traffic conditions in some of the old city areas and areas of heritage importance are required travel demand management (TDM) measures such as banning of motorised vehicles to avoid congestion and calm the traffic.

As of now, only traffic calming measures adopted is to reduce the heavy traffic movement (trucks) onto the city roads. The entry of the trucks in the city is restricted from 7.00 am to 12 noon and 4.00 pm to 9.00 pm.

8.2.7 Issues and key challenges

- On-road and kerb parking practices hindering regular flow of traffic, causing delays, traffic congestions, etc.;
- Lack of proper parking complexes in and around market areas;
- Lack of efficient public transportation system;
- NIT is appointed as nodal agency for implementation of METRO in Nagpur (NMC jurisdiction) and role of NMC is negligible in planning and implementation of METRO project;
- No initiative for formation of Unified Metropolitan Transport Authority (UMTA);
- Central Business District (CBD), market places and commercial areas are congested. Planning for any traffic control and calming measures yet not taken up for these congested areas;

- Implementation master plan prepared by NMC and CMP prepared by NIT are yet to be taken up;
- Infrastructure for street lighting in the city is old and is in dilapidated condition;
- Energy consumption on higher side due use of sodium vapour lamps for street lighting across the city; and
- Authorities have not explored use of TDM measures to calm the chaotic traffic situations in the congested areas in the city.

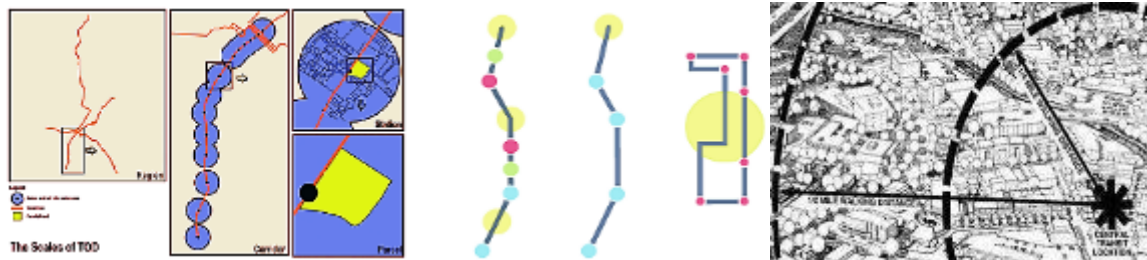
8.3 Transit Oriented Development (TOD) for Nagpur

8.3.1 Concept of TOD

Transit Oriented Development (TOD) is a recent trend in creating vibrant, livable, compact, walk-able communities around or along transit (rail/bus) systems to achieve a higher quality life by reducing car dependency. TOD is defined as a high density, mixed use type of development close to transit services.

TOD is compact, mixed use development near new or existing public transportation infrastructure that provides housing, employment, entertainment and civic functions within walking distance of transit. The pedestrian-oriented design features of TODs encourage residents and workers to drive their cars less and ride public transit more. A 500 m area around the transit station is considered a 5-minute walking distance in the vicinity of transit stations.

Figure 57: Conceptual diagram for TOD



Source: “Transit Corridors and TOD” guidebook; series no TOD 303; by Center for ‘The Transit-Oriented Development (CTOD)’, USA

Successful case of Curitiba - TOD and BRTS

Curitiba possesses a “Master Plan” and, vitally, an agency IPPUC, to monitor, implement, and update the plan. IPPUC is a largely independent institute and thus is less liable to political pressures and changes than a municipality-based department or division. The success of IPPUC (not of course in transport alone but in all urban development sectors) is legendary in Latin America, and the institute presents courses, based on its experience, to a wide range of central and local government agencies from other countries. The key features related to land use and transit in the plan are the following:

- Land use and transport are integrated; the “structural axes” concept of high-intensity development has created corridors with a travel demand that is well suited to be met by transit (high demand, short walk distances to the transit facility, etc.).
- Land within two blocks of the busway has been zoned for mixed commercial/residential uses. Beyond these two blocks, zoned residential densities taper with distance from the busways.
- Most importantly, the zoning prescribed by the structural axes has been realized by a combination of control and incentives. This combination includes various bonuses to develop as planned; incentives to transfer development rights; firm control over large scale development (such as large shopping centers, which are limited to the structural axes); provision of incentives

to developers to increase residential density close to the transit corridors; and development of transit terminals with a wide range of facilities – both public and private sector.

- The busway system has been instrumental in driving land use development and has been used to stimulate development along the structural axes.

Figure 58: Successful TOD implementation at Curitiba



TOD Development in Curitiba



Bus stands and Bus bay






Transit Corridor

Source: Report on “Curitiba, the cradle of Bus Rapid Transit”

8.3.2 Combination of Public Transport and Land use

TOD is an integrated approach to land use and transport planning. The primary goal of transit-oriented development is to shift the auto-centric realm of urban living to a transit-centric realm of urban living.

Moderate- high Density:	A mix of uses:	Compact, high quality, pedestrian-oriented environment:
<p>Distinctively designed high density buildings near station serve as identifying features, and contribute to the quality of the city skyline.</p> 	<p>Horizontal and vertical mix of uses that include office or residential above retail spaces with continuous facades that align to the build-to-line.</p> 	<p>Highly active and clear pedestrian paths are defined by street amenities and transparency of building frontages.</p> 

Urban Centre – City of Denver, Colorado

Density of buildings: 124 - 371 units per net hectare (50 -150 units per net acre)

Height of Buildings: 4 - 30 storey buildings.

Site Coverage: 90% min. - 100% max.

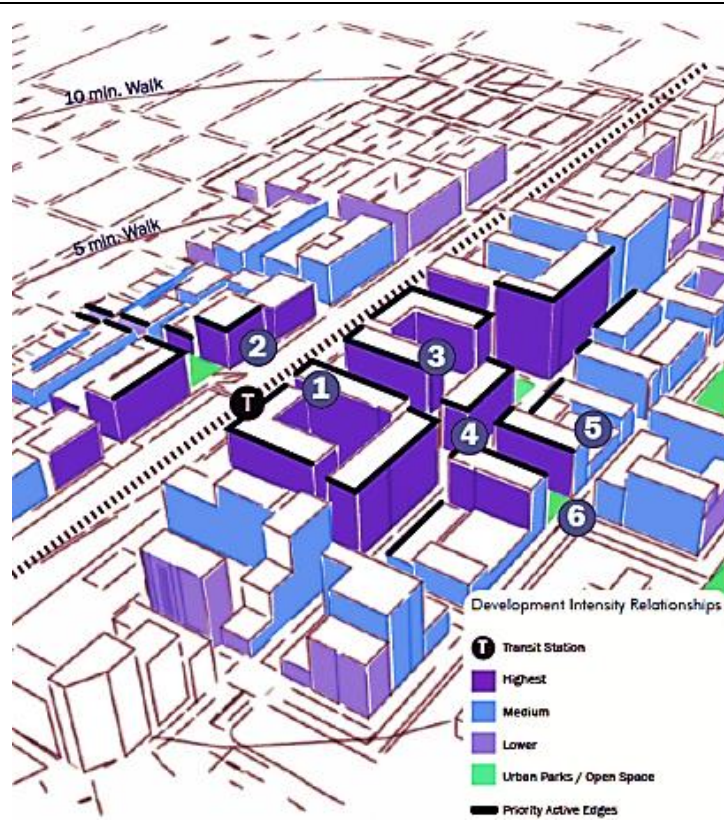
Pedestrian Environment: 5 -7 metres (14 -18 feet) wide sidewalks (typ.), convenient connections, and other amenities.

Land Use Mix

Employment: Office centre, retail, commercial, urban entertainment, and civic/cultural uses.

Residential: Mixed-use, multi-family housing with ground floor retail or office use required. High to Mid-rise residential with minimum ground floor height of 4.8 metres (16').

Transit Frequency: 5- 15 minutes.



Active defined centre:

Taller buildings extend above streetwall (i.e. buildings that frame pedestrian zone), but do not impede the comfortable pedestrian scale it defines.



Innovative parking strategies:

Structured parking integrated into development. Parking ratio minimums based on proximity to station.



Urban parks and open space:

Programmed environments with pedestrian amenities that encourage community interaction and gathering places for large groups.

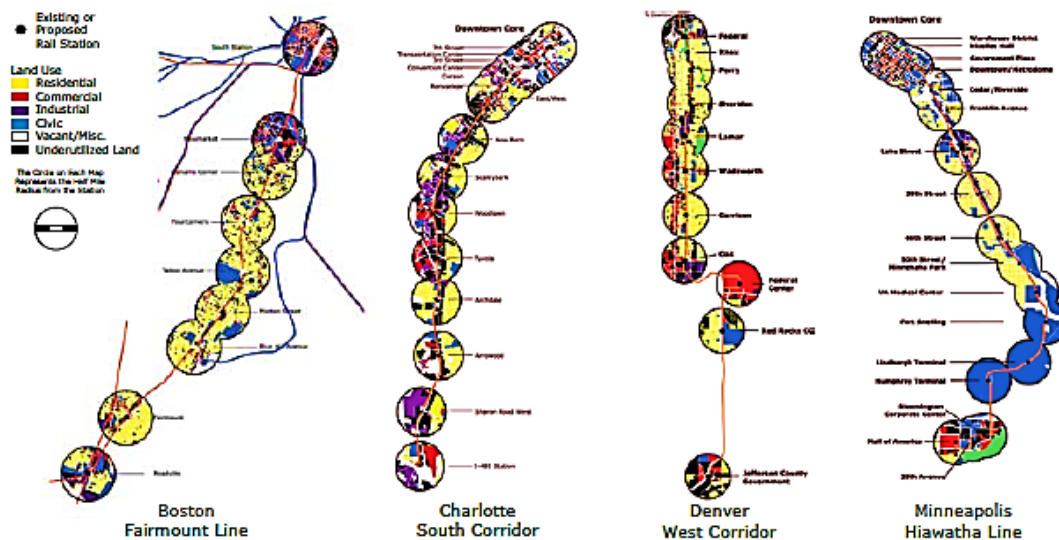


TOD is ideal for high capacity systems such as metro rail, monorail, high speed rail, regional rail systems or high capacity bus based mass transit systems. The systems can be selected depending on the current and future needs, geographical factors, funds availability, etc. Unfortunately, most of the Indian cities Master Plans have not integrated the transport system plans into them.

Guided Growth and development through TOD and Land use – Transport integration

TOD corridor planning helps stakeholders understand how transit can influence the real estate market around stations and deliver the benefits of smart, compact growth, which include reduced traffic congestion and household transportation costs. Transit alone does not create a new market for development, but a strong market at one station can help focus market activity at other stations. Transit corridors that connect activity centers to station areas with significant development opportunities are most likely to see significant new development.

Figure 59: TOD and land use integration along mobility corridor for guided growth



8.3.3 Transit Oriented Development opportunity at Nagpur

Urban mobility solutions cannot be evolved by a single source strategy. The mobility goals for Nagpur Metropolitan Region were addressed through a multipronged strategic approach. Since land use patterns directly influence travel patterns, it is essential to examine desirable land use patterns in the study area from the viewpoint of urban transport development. For instance, commercial and residential area development should be integrated with mass transit development, in pursuit of transit-oriented development, reducing dependence on private vehicles. Hence, CMP prepared for Nagpur recommends integration of land use planning and urban transport planning as one of many strategies.

As a part of this strategy, all important radial roads comprising Amravati Road, Higna Road, Wardha Road, Sadar Road, CA Road, Kamptee Road, Inner Ring Road are recommended as mobility corridors which will maximize throughput of people, focusing on mass transport and non-motorized traffic, rather than personal automobile traffic. In the first phase, 87.2 km of corridors can be developed as mobility corridors up to inner ring road. The corridors can then be extended up to outer ring road as part of the 2nd phase (58.7km).

The urban sprawl in Nagpur has taken place in almost all the directions; however, a greater thrust has been observed in urbanization of the South Western, Southern and South Eastern suburbs of the city. One of the strategies of integrating land use and transport is the consideration of Transit Oriented Development (TOD) strategy. TOD concept can be applied along the major identified mobility corridors that have the potential to carry higher order mass transit systems

Transit Oriented Development (TOD)

By designating certain roads as corridors to maximize passenger throughput, these corridors get priority planning for public transit systems. Mixed use development that is cognizant of the low income users of the transit system, is important. Land use planning can be used to create urban and suburban environments where walking and transit are viable transportation options (Transit Oriented Design/Transit Supportive Design, TOD) by making it easier to go from one transportation mode to another, the connection between community and development is enhanced ensuring that a community is accessible to all. Resilient neighborhoods will provide the needs of daily living, within walking distance (1/2 to 1 km radius). Nagpur has the potential to adopt these principles. The TOD planning process includes:

- **Travel Connections:** This would focus on convenient and direct pedestrian connections, pedestrian scale blocks, interconnected street network including bicycle circulation and parking. Increased density in neighborhood centers would make transit service more effective.
- **Building Scale and Orientation:** Transit-supportive design assumes people are willing to walk a maximum of ½ mile for premium transit and rail service and ¼ mile for other bus services. Building placement is a powerful tool in reinforcing streets as public amenities. Sensitivity to the physical design and location of buildings is important in order for travel connections to be attractive. The quality of “out of vehicle” experiences is influenced by the placement of buildings in relation to the street and other buildings, as well as their height and scale.
- **Public Spaces:** This would include pedestrian-friendly streets including adoption of traffic calming measures, parks and Plazas as community gathering spaces to enable social interaction, quality facilities for transit users (features such as benches, shelters, landscaping and adequate lighting make people feel comfortable while waiting for transit service). Additionally, services such as child care facilities, dry cleaners, postal facilities and health care offices can be included as part of bus transfer centers or rail stations.
- **Parking:** The proper location and size of parking facilities are essential if pathways, buildings and public spaces are to succeed in creating transit-supportive settings. Parking structures/shared parking lots are two ways to reduce the amount of space occupied by parking facilities.

Successful Transit Oriented Development can significantly reduce per capita motor vehicle travel, and reduced travel time. Reduced travel time in turn leads to lower pollution including lower GHG and particle emissions.

■ Residential development around transit centers.	-	10%
■ Commercial development around transit centers.	-	15%
■ Residential development along transit corridor.	-	5%
■ Commercial development along transit corridor.	-	7%
■ Residential mixed-use development around transit centers.	-	15%
■ Commercial mixed-use development around transit centers.	-	20%
■ Residential mixed-use development along transit corridors.	-	7%
■ Commercial mixed-use development along transit corridors.	-	10%

Given the benefits of a transit oriented development, it is very important to assess its impact on land price, area character, and the socio-economic profile of the corridor, so that poor and disadvantaged population does not stand to lose. The equity and inclusive planning process becomes core to this strategy. Two major corridors that have been identified for the introduction of urban rail transit in Nagpur are the corridors along which TOD can be initiated. These corridors include:

- Corridor 1: Kamphthi Road to Wardha Road / Butibori
- Corridor 2: CA Road to HInghna Road

Figure 60: Mobility Corridor for rail based public transportation is proposed

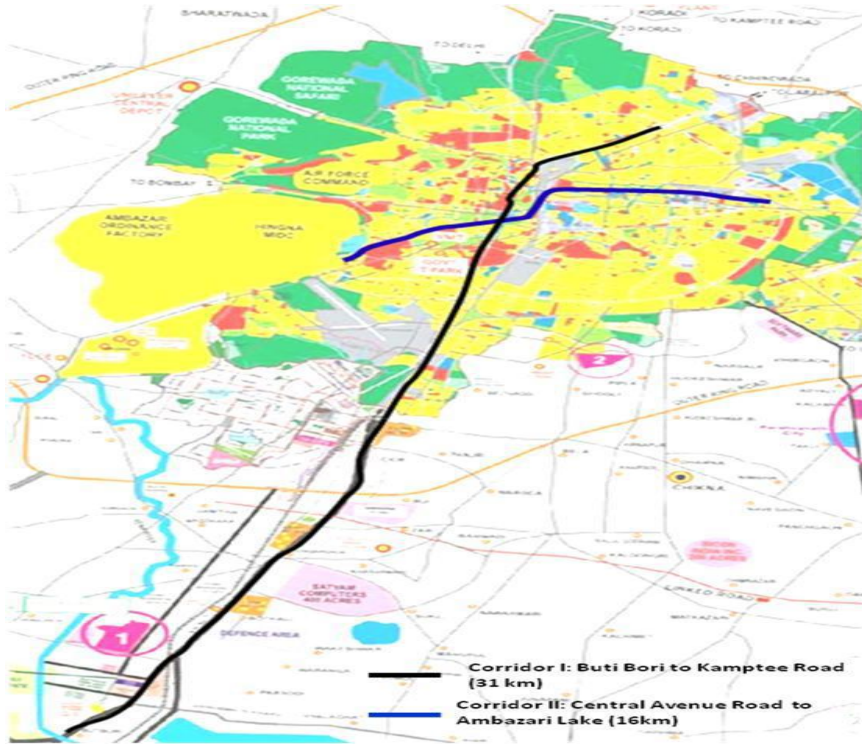


Figure 61: TOD possible along the mobility Corridors in Nagpur



Source: Comprehensive Mobility Plan for Nagpur by NIT

8.4 Review of institutional system and investments

8.4.1 Review of institutional system

Nagpur is administered by NMC, which is a democratically elected civic governing body. NIT is responsible for works like planning related activities and development of the civic infrastructure for new areas in the city outskirts and region. For urban transport system, various agencies like NMC, NIT, Nagpur RTO, Traffic police department play an important role in provision of services.

Activities like planning, development infrastructure, and operation and maintenance of all most of the urban transport infrastructure is carried out by NMC. Since 2009, the operation and maintenance of the public transport in Nagpur has been handed over to the private operator VNIL by NMC.

8.5 Analysis of post 1st generation CDP Scenario

Nagpur's public transportation system was operated and maintained by the Maharashtra state road transport corporation (MSRTC). The public transportation system of the city was highly inadequate, in terms of both capacity and reliability. MSRTC operated city buses, which used to cater to about 6% of the total generated in the city trips till 2009 and later public transport share increased to 8%. Travel demand in the city was primarily catered to by personal modes of transport and auto rickshaws. Overall, Nagpur had a better road infrastructure as compared to that of other cities in India. It was projected that with improvement in the economy of the city, there would be an increase in the vehicle ownership pattern in the city. It might become an issue due to related problems like safety, congestion, pollution, etc. Nagpur authorities need to prepare themselves for combating the issues and problems in traffic and transport sector. Solutions may lie in widening the road network in congested areas, introducing better parking norms and facilities, strictly enforcing encroachment norms, practicing scientific traffic management, and instituting an effective public transportation system.

Post JNNURM scenario

To meet the service level requirements and cater to the demand of current population (during 2006) and the future population till 2031, the projects or interventions identified in 1st generation CDP and projects taken up for implementation during post CDP are list below in the table. Details of the investment identified for urban transport, projects implemented, status of projects, and benefits (if any) are provided below.

Table 66: Investment needs and project identified for public transportation system

Sr. No.	Sector	Investment Envisaged (Rs. lakhs)	Key Components of the Proposed Projects
1	MRTS and Traffic Management	1,55,000	<ul style="list-style-type: none"> ■ Implementation of public transport system for Nagpur city to ease traffic congestion and city transport conditions ■ Traffic signal improvement ■ Installation of the new signal system
	Total investment envisaged	1,55,000	26% of the total investment needs envisaged in CDP (2006)
Projects identified and approved under JNNURM			

Sr. No.	Sector	Investment Envisaged (Rs. lakhs)	Key Components of the Proposed Projects
1			Procurement of 240 buses for bus based city transportation system
2			Cable Street ROB-Santra Market
3			ROB near Maskasath
4			ROB near Itwari Railway station.
5			ROB near Mangalwari
6			RUB at Anand Talkies

Source: Nagpur City Development Plan, 2006

The status of projects in the MRTS and traffic management sector as identified and approved under JNNURM is as follows.

Table 67: Status of public transportation projects taken up and completed under JNNURM

Project/Sector	Approved Cost (Rs. lakhs)	Status of projects (till May 13)	
		Physical	Expenditure (Rs. Lakhs)
Procurement of Buses for Public transportation in the city	6,360	<ul style="list-style-type: none"> Project completed. Buses procured have been handed over to VNIL for operating public transportation in city. (Benefits: A public transport system with a fleet size of 470 buses, which is catering to 1.25 lakhs trips daily in Nagpur) 	3,696
Cable Street ROB-Santra Market	8,628	<ul style="list-style-type: none"> 81% (Benefits: Will ease the traffic movement between east Nagpur and west Nagpur) 	6,672
ROB near Maskasath	253	<ul style="list-style-type: none"> 10% (Benefits: Will ease the traffic movement at the grade level crossing. The benefit will be reduction in the travel time as no more waiting time at grade level crossing) 	62
ROB near Itwari Railway station.	900	<ul style="list-style-type: none"> Project completed (Benefits: Will ease the traffic movement at the grade level crossing. The benefit will be reduction in the travel time as no more waiting time at grade level crossing) 	1,975
ROB near Mangalwari	849	<ul style="list-style-type: none"> Project completed (Benefits: Will ease the traffic movement at the grade level crossing. The benefit will be reduction in the travel time as no more waiting time at grade level crossing) 	2,015
RUB at Anand Talkies	1,828	<ul style="list-style-type: none"> Project completed (Benefits: Will ease the traffic movement at the grade level crossing. The benefit will be reduction in the travel time as no more waiting time at grade level crossing) 	2,682

Source: Monthly Progress Report prepared by NMC for JNNURM projects, May 2013

Urban Transport Reforms²⁷

JnNURM mission cities have been provided support by GoI for procurement of buses under JNNURM during 2009. Also, mission cities have been directed to carry out reforms to improve the service levels and efficiency of the urban transport system. Following are the details of the urban transport reforms (city level) at Nagpur:

Table 68: Urban transport reforms

Reforms	Current Status of Reform (May 2014)
Set up Unified Metropolitan transport Authority (UMTA) – by state government	Not Implemented Government of Maharashtra has not set up UMTA for Nagpur metropolitan region.
Form urban transport fund	Not implemented NMC/NMPL has not formed urban transport fund.
Develop an advertising policy to tap the revenues from advertising on public transport fleet and public utilities	Implemented Advertising policy has been worked out between NMPL and VNIL (private operator) as per of concession agreement. Revenue generated from advertising through public transport system will be shared equally (50:50) amongst the concessioner and concessionee. But, as of now, the revenues from advertising are not been shared by VNIL with NMPL.
Develop a parking policy	Not Implemented Draft parking policy has been formulated. Approval from the general body needs to be taken in order to implement it, which is pending.
Develop intelligent transport system (ITS)	Not Implemented No ITS system has developed by NMPL or VNIL for public transport system monitoring at Nagpur.
Multi-modal integration of modes for developing regional connectivity	Not Implemented
Set up a traffic information management control centre	Not Implemented

Source: Based on the discussion with NMC officials

Apart from the projects taken up under JNNURM during post CDP (1st generation), the authorities have made an effort to augment the urban transport infrastructure. NMC had invited tenders for the installation of traffic signals at junctions and has planned to increase the number of bus shelters from 190 to 290. Also there is a proposal of multi level parking facilities to be developed by NIT. But, development of road infrastructure like missing links, road widening, parking bays and skywalks was not taken up during 2006-2013.

²⁷ Analyzing the benefits of urban transport reforms for urban transport system and services of Nagpur, only city level reforms are reviewed. State level urban transport reforms have not been reviewed.

9 Housing and Urban Poverty

The section provides a detailed over view of the existing housing scenario in the city in terms of present housing stock, quality of housing and housing requirement for future projected population. Also, the housing typology in the inner city, newly developed areas and peripheral zones has been discussed. Based on discussions with officials and stakeholders the future housing growth scenario has been forecasted. The Urban poverty section explains the demographics, social profile and the status of coverage of key infrastructure services in the urban poor area of the city. Also, the status of the projects related to urban poor has been discussed.

9.1 Overall housing scenario in the city

The growth and development that swept the country is showing deep colors in the city of Nagpur as well. Both the public and private entities have joined hands to improve the city and the result is that the city has a well-developed infrastructure and public utility mechanism. Already an industrial hub and commercial city, it took Nagpur very less time to become a new generation city. Nagpur property has emerged like never before and the value of the same has gone up manifold.

Nagpur was never a nondescript city and was always a professional's or businessman's city. The city has a reputation of being a commercial hub and has rapidly caught on the development wagon. In the State of Maharashtra, after Mumbai and Pune, it is the city of Nagpur which is a businessman's choice and the corporate sector too has invested in lump sum in the city.

Based on the population projections and migration due to investment to be taking place at MIHAN in near future will definitely have some demand for housing needs in future. It is difficult to say the exact demand for housing stock required for future; but based on the details from supply side it can be assumed that the demand will be balance by equal or more supply in Nagpur in the future.

Real estate in Nagpur

With bigger metros like Mumbai and Pune fast approaching their saturation point, developers, investors, end-users and IT majors alike are now making a dash for Nagpur with a host of residential, commercial and IT-focused projects in varying stages of development now dotting this once tranquil city. Blessed with good infrastructure, excellent connectivity and a strategic location, the Orange City, as it is popularly known, is now poised for an urban transformation of massive proportions that will change its landscape forever.

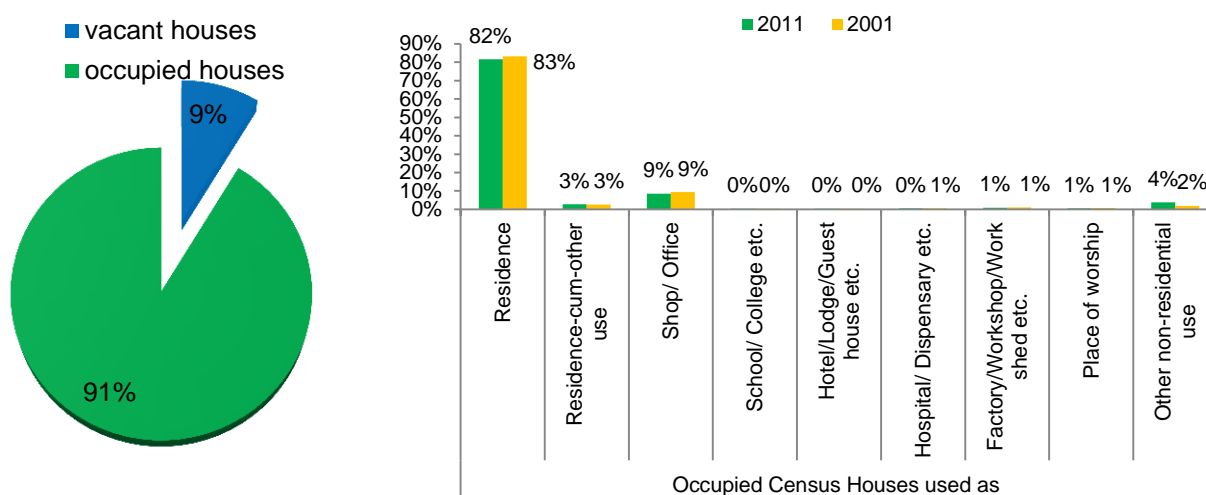
9.1.1 Present availability of housing stock

At present, as per census 2011 figures total census houses in Nagpur is 6.55 lakhs. Out of this, 91% of the houses (5.98 lakhs houses) are occupied and remaining 9% of the houses are vacant houses. The residential houses accounts for 82% of total occupied houses in the city followed by shops/offices with 9%, and 3% of the house have mix-use. The Factory/Workshop/ Work shed are accounts for 1% of total occupied houses and remaining use accounts for 8% of total houses.

In order to find the growth in the number of houses, the current data has been compared with the census 2001. As per this analysis, the total number of houses has increased to 1.72 lakhs. Whereas, number of occupied houses increased by 1.53 lakhs at a decadal growth rate of 26%. The residential use has

decreased from 83% in 2001 to 82% in 2011. While, number of hospitals and other non-residential use houses has increased during the decade by 18% and 62% respectively.

Figure 62: Housing stock comparison in Nagpur, 2001 and 2011



Source: Census 2001 and 2011

The remaining uses have reported a positive growth rate over the review period. As per discussions with stakeholders and NMC officials, the main reason for growth in the number of houses is due demand of housing increased and supply for the housing stocks also increased. Following table provide the number of houses in each category for census 2001 and 2011.

Table 69: Census houses in the Nagpur, 2001 and 2011

Type of House use	2001		2011	
	Total	%	Total	%
Residence	370176	83%	488740	82%
Residence-cum-other use	11449	3%	16569	3%
Shop/ Office	41520	9%	51086	9%
School/ College etc.	1591	0%	1814	0%
Hotel/Lodge/Guest house etc.	1292	0%	1557	0%
Hospital/ Dispensary etc.	2355	1%	2877	0%
Factory/Workshop/Workshed etc.	4754	1%	5346	1%
Place of worship	2898	1%	3430	1%
Other non-residential use	8711	2%	22853	4%
Total	444746	100%	594272	100%

Source: Census 2001 and 2011

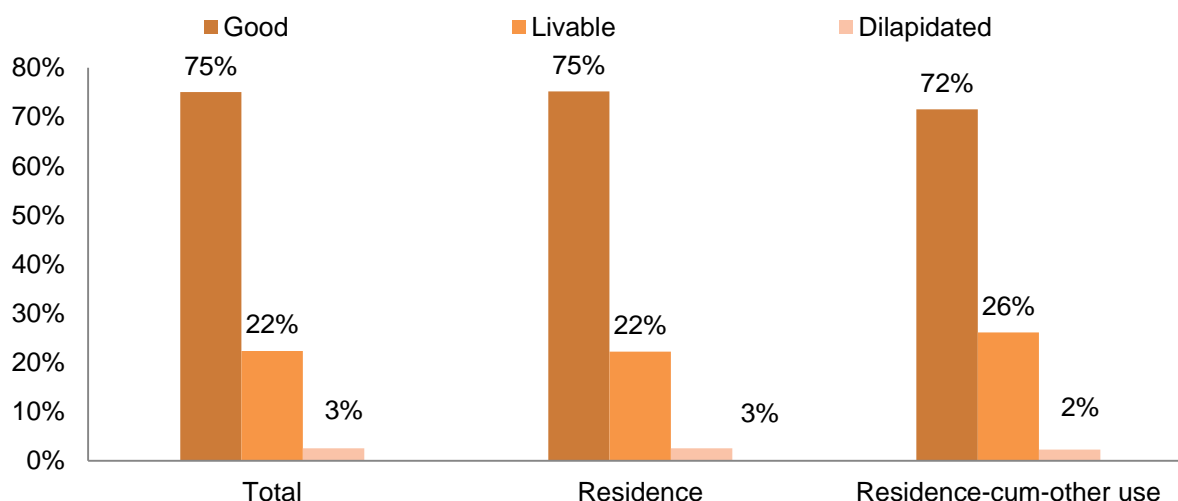
9.1.2 Quality of housing stock

Quality of housing stock in Nagpur is quite good. As per census 2011, most of the census houses are in condition, which is 75% of the total occupied houses in the city. The number of census houses in good condition increased at a decadal growth rate of 36%.

Further, 75% of the residential houses are in good condition, followed by 22% of the houses are in livable condition and 3% are houses are in dilapidated conditions. On the other hand the housing condition of the non-residential and other use is having 72% of the houses in good condition, 26% in livable condition

and 2% in dilapidated condition. The details of the condition of the houses as per type of use of houses are provided in the figure below.

Figure 63: Condition of housing stock in Nagpur as per census 2011



Source: Census of India 2011

In order to analyse the improvement in the housing condition in 2011, figures of 2001, is considered. As indicated in the table below, there has been a net increase of 1.38 lakhs good houses in the last decade indicating a growth rate of 36%. There has been a decrease in the livable houses by 0.08 lakhs in the last decade indicating a growth rate of -8%. Further, there has been a decrease in the number dilapidated houses over the last decade. Overall, it indicates that condition of housing stock in Nagpur is improving, which is clear from the 2011 figure.

Table 70: Quality of housing in the Nagpur, 2001 and 2011

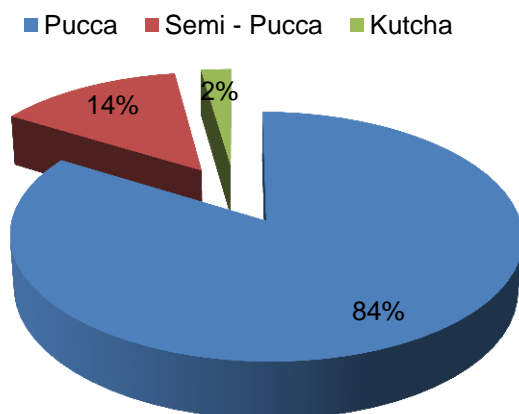
Housing condition	2001		2011		Net increase in a decade	Growth rate
	Total	Share	Total	Share		
Good	241,781	63	380,139	75	138,358	36%
Livable	122,129	32	113,258	22	(8,871)	-8%
Dilapidated	17,585	5	12,956	3	(4,629)	-36%

Source: Census 2001 and 2011

Quality of the housing materials

Based on the building materials used for construction of houses in Nagpur, there are 84% structures/houses which are pucca structures, while 14% are semi pucca and 1% is kutcha structures. These figures are not inclusive of the slum dwelling units. The detail bifurcation of the no of houses as per different building materials used for roof and wall is provided in the figure below.

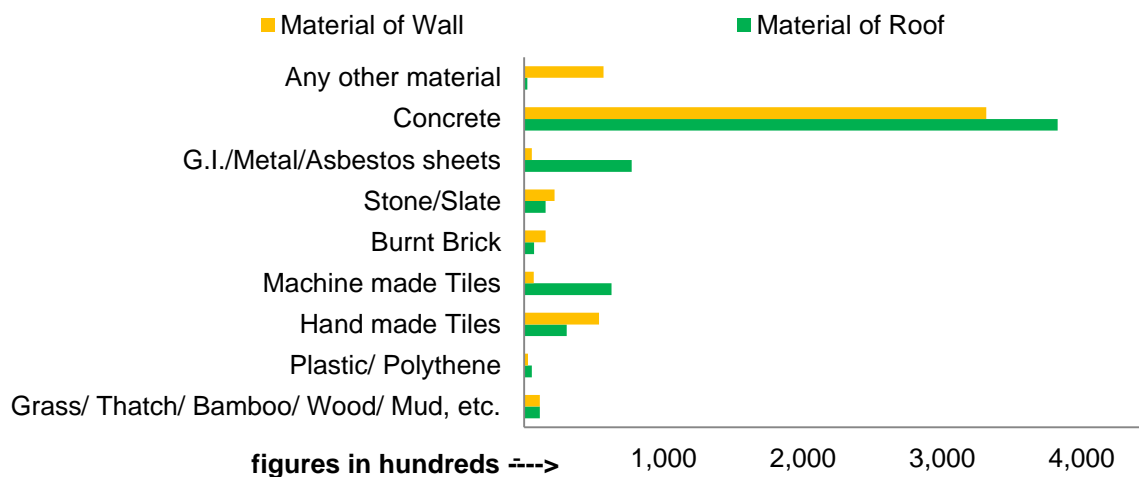
Figure 64: Type of houses in Nagpur



Source: Census of India 2011

Quality of housing stock that is coming up in the city is based on the needs of the buyers who are rich and prosperous citizens of Nagpur. Presently, all the new schemes for housing are developed with provision of basic amenities which is more attractive.

Figure 65: Condition of roof and wall material of the housing stock in Nagpur



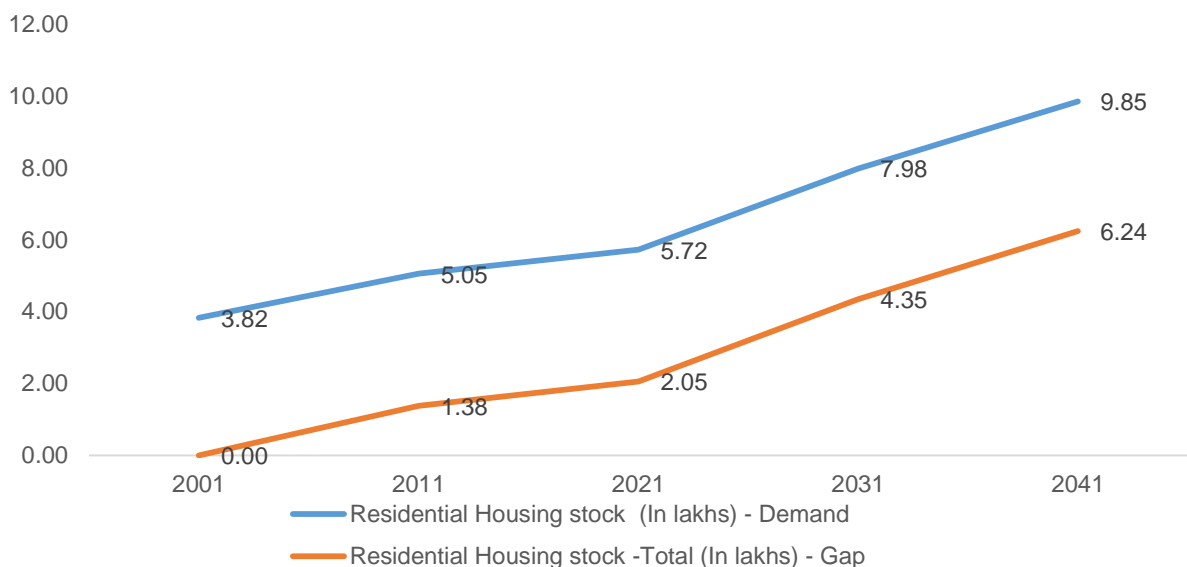
Source: Census of India 2011

9.1.3 Housing requirement as per the future projected population

As per the projected land use for the core city, 47% of the area has been earmarked for the residential use for the year 2031. This indicates that additional 294 ha of area would require for the residential uses.

In order to estimate the housing stock requirement for the next three decades, we have adopted the following assumptions. The assumptions are as follows;

- Population projections as finalized in demography section above
- Household size is considered as 4 over the next three decades
- Residential and mix use would increase by 2% over the next three decades

Figure 66: Housing requirement for the future years


Source: Census of India 2011 and CRIS analysis

Based on the above assumptions, the city will have 10 lakhs houses by end of 2041. It indicates that the city would require additional 6 lakhs houses by end of 2041. In view of the existing percentage of dilapidated houses and existing housing stock, it is estimated that the gap in housing requirement is 6.24 lakhs by 2041. Following table provide the assumptions and housing requirement in the city for the next three decades.

Table 71: Projected housing stock in the city

Year	2001	2011	2021	2031	2041
Population/Projected (in lakhs)	20,52,066	24,47,494	29,58,635	35,85,542	43,28,217
Household size	5.01	4.56	4.50	4.00	4.00
Total Census houses (In lakhs)	4.45	5.94	6.57	8.96	10.82
Residential and mix land use %	86%	85%	87%	89%	91%
Residential Housing stock (In lakhs) - Demand	3.82	5.05	5.72	7.98	9.85
Residential Housing stock (In lakhs) - Gap		1.23	1.90	4.15	6.02
Dilapidated Houses (%)	5.00%	3.00%	2.70%	2.43%	2.19%
Residential Housing stock - Dilapidated Buildings (In lakhs)		0.15	0.15	0.19	0.22
Residential Housing stock - Total (In lakhs) - Gap		1.38	2.05	4.35	6.24

Source: CRIS analysis

9.1.4 Housing in inner city, unplanned areas, urban villages and unauthorized colonies

Major portion of housing supply is concentrated in the newly developed areas which are in the outskirts or near MIHAN project. Apart from this, the supply of housing is spreaded across the city, except the old inner city areas as it is already developed and space for new development is not available.

Apart from conventional housing supply, planning authority in Nagpur which is NIT is making continuous efforts for development of new layouts in the outskirts areas of NMC. NIT is currently preparing a development plan for Metropolitan Region which is spreaded over an area of around 9000 sq km. the present real estate trend based on the regulation is allowing a FSI of 1.2 to 1.8 in the city, which means vertical expansion is not encouraged. Also, plan of introducing TDR is back by the association, builders and architects; but it is getting delayed from the authority's end.

Within NMC jurisdiction, around 5,000 to 10,000 layouts are unauthorized. Authority responsible for regularizing these unauthorized layouts is NIT in Nagpur. The work of regularizing the layouts is being carried out at a very low pace.

9.1.5 Overview of growing housing sector in the Nagpur

At present the housing stock in the city is around 5.40 lakhs and 1.40 lakhs in the slums. The real estate market is facing a slow down due to stagnancy in the demand for the housing requirement presently. But as per the expert it looks that Nagpur has a potential to develop as a commercial city providing a platform for businessmen to run their businesses. At present the slowdown in the economy has only made the prices stable for the real estate or properties. But still there are some areas where it is witnessed that growth in the demand for housing has increased and is between 3 to 6 per cent per quarter. There is no decline in the overall property scene in the city of Nagpur.²⁸

The impact of the ongoing real estate boom at Nagpur is clearly being felt on its property prices, which were under-priced for a long time, now rising gradually to be on par with mini metros with a population of about 35-40 lakhs. The setting up of ambitious projects such as the upcoming Mutli Modal International Hub Airport (MIHAN) has come as a boon for the investor lobby which in turn has invested heavily in all the available land around MIHAN, thereby fueling the price rise further. The developer sentiment about the city is also clearly bullish, given the interest shown by majors like the Hiranandani Group, Raheja Universal and DLF, and the slew of residential and commercial projects being planned here.

The trickle of commercial inquires which rarely surpassed one or two per month in the past has now turned into a flood with at least four conversions per month notwithstanding the rising commercial rental value which has almost doubled in the past two years. The only possible hurdle to the city's bright future could be its desolate power supply scenario²⁹. If not tackled urgently, this could prove to be the proverbial Achilles heel in the future of this Orange City which now stands on the threshold of a major urban transformation.

9.2 Urban Poverty and Slums

The main centre in the Nagpur district in terms of urban settlement is the city of Nagpur and its suburban extension, which now almost reaches up to the industrial nucleus of Kanhan that is 19.312 km (12 miles)

²⁸ <http://www.featherarticles.com/nagpur-real-estate-in-good-health/>

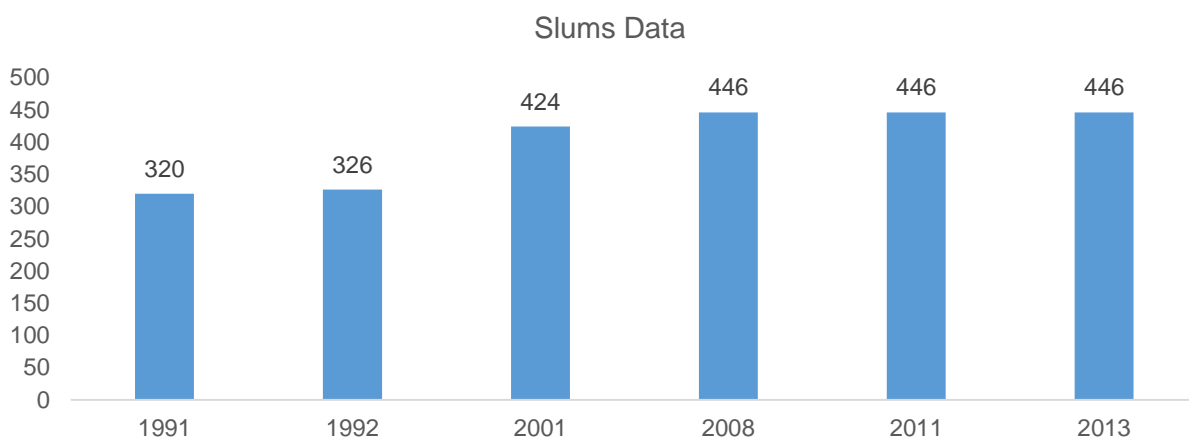
²⁹ http://www.realtyplusmag.com/spotlight_fullstory.asp?spotlight_id=32

east. Originally, a vantage point for defense, Nagpur grew into an urban centre under the Bhonsles of the Maratha confederacy. With the formation of the central provinces under the British regime, the town acquired a new importance as the administrative capital. This growth coincided with the economic development of the surrounding region which is having production of cotton as basic activity. The cotton textile industry made its appearance on account of cotton cultivation, easy communications access to coal deposits, and adequate labour supply. The city derived an industrial base and the mills which attracted the concomitant labour to the city. Slums being economical settlement option for such concomitant labours it became a characteristic feature of the urban landscape of Nagpur.

9.3 Slums in Nagpur

The growth of slums in Nagpur in past few decades has been outrageous. During 1971, the number of slum pockets in Nagpur was around 47, which increased by seven times by 1992 and in 2008 another 50% slums were added in this period, currently (2011) the number of slums is 446. Drastic increase in the number of slums in Nagpur is during the period of 1971-91 (85%) and 1991-2001 (25%). The number of slums in Nagpur during different period is shown in the figure below.

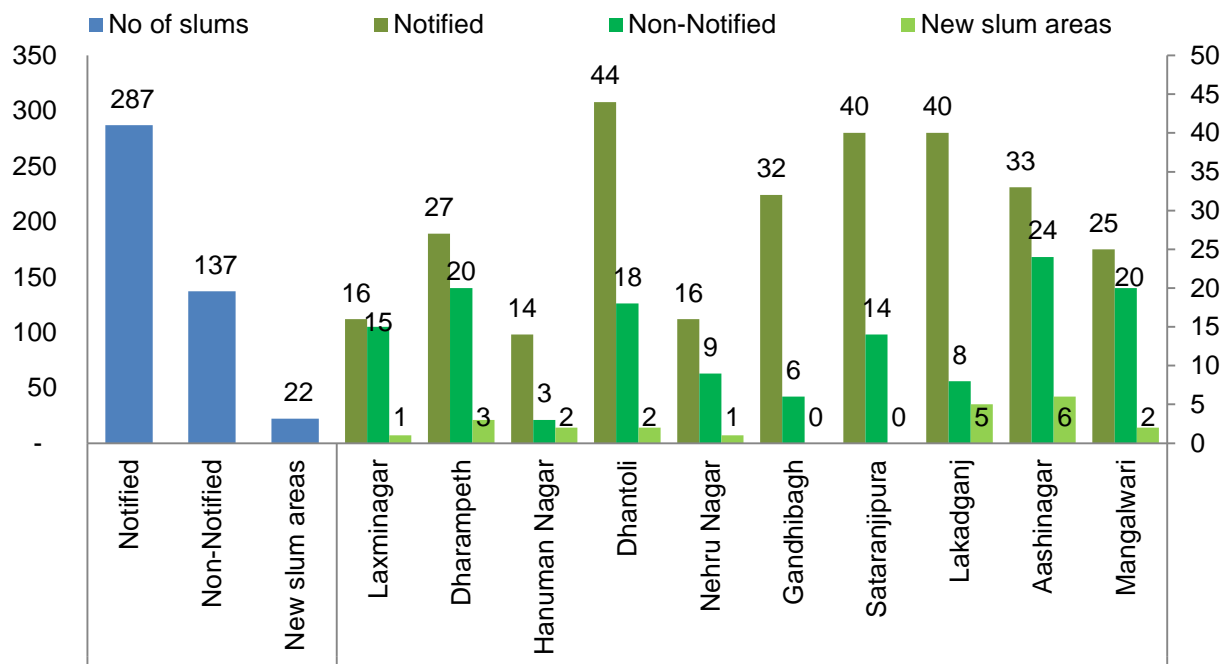
Figure 67: Existing and growth of slums in Nagpur



Source: Slum Department, NMC, Nagpur

After the notice from Government of India in 1985, some of the slums were notified as per the norms laid down by Gol. At present, there are 287 notified slums. Majority of the notified slums are located in the Dhantoli zone (44 slums), following by Sataranjipura and Lakadgunj zones with 40 slums in each zone. Ashinagar and Mangalwari zones have the maximum number of non-notified slums, which is 24 and 25 slums, respectively. Status of the slums in Nagpur city is shown in figure below.

Figure 68: Status of slums in Nagpur as of 2011

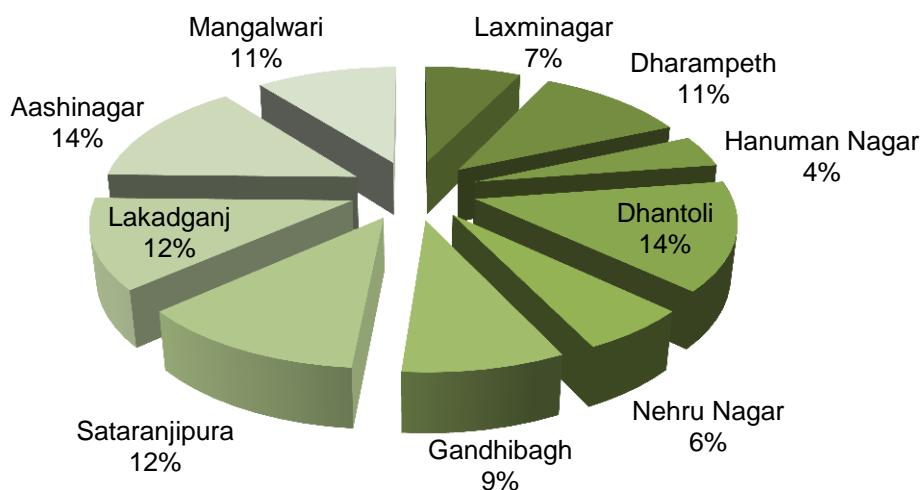


Source: Slum Department, NMC, Nagpur

9.4 Spatial distribution of slums (ward-wise distribution)

Slums are a part of the urbanscape of Nagpur city since a long time. At present, there are 446 slum pockets in the city with a spread of 17 sq km 25% area compared to the total Nagpur city area. Slums in the city are spread across the 10 zones. Ashinagar and Dhantoli zones have the maximum number of slum pockets, 14% each. Hanumannagar zone has the least number of slum pockets, only 4%. Below figure provides the share of slums pockets in each of the zones in the Nagpur city.

Figure 69: Spread of slums in Nagpur



Source: Slum Department, NMC, Nagpur

With the presence of 446 slums, out of which 66% are notified and 30% slums are non-notified. There are some new slums that have come up recently within the city and are 22 in number (4% of the total slums in the city). Majority of the new slums are located in the Ashinagar zone that is 6 slums, whereas the in case of Nehrunagar and Gandhibagh no new slums have developed recently

9.4.1 Demography of urban slums

Slums in Nagpur have a footprint of 17 sq km, which is 10% of the city size. Around 8.5 lakh persons are residing in the slums in Nagpur. The slum pockets have around 1.5 lakh dwelling units³⁰ (DU)/properties with a household size of 5.76 persons/dwelling units. 40% of the DUs are pucca structures, 38% DUs are semi-pucca structures, and 22% DUs are Katcha structures.

Table 72: Demographics of urban slums in Nagpur

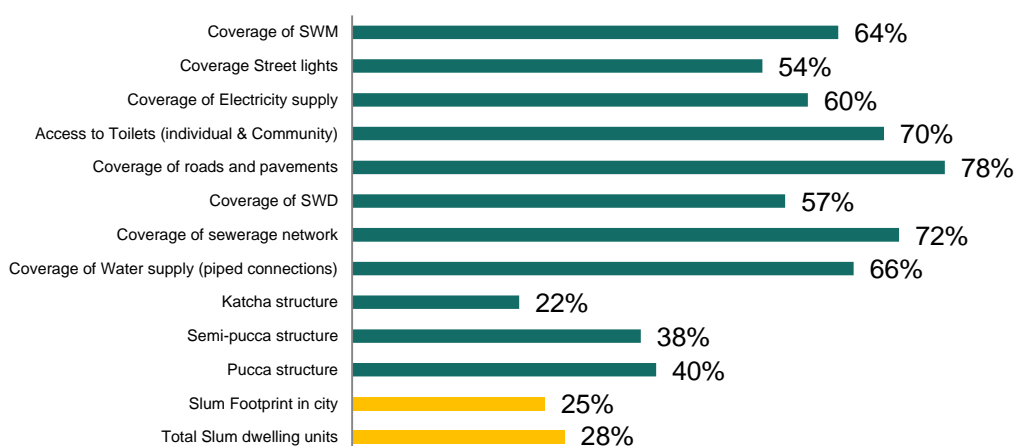
Particular	Units	Indicator value
Total slum dwelling units	Dwelling units	147,716 (28% of the total properties in Nagpur)
Slum footprint in city	sq km	17 (25% of the city area)
Population	Persons	858,963 (36% of the city population)
Sex ratio	Ratio	963 to 1000 males
Child population (below 6 years age)	% of slum population	31%
Average household size	Persons/HHs	5.81
Religion	-	Majority Buddhists (54%)
Literacy rate	%	74%

Source: Slum department, NMC, Nagpur, and Slum atlas report, 2008

9.4.1.1 Available infrastructure for slum communities

Basic services like water supply, sewerage, solid waste management, streetlights, and pavements are provided by NMC. About 50% of the slums have access to all the basic services. Details of the basic services provided in slums are shown in figure provided below.

Figure 70: Indicators of basic services for the urban poor



Source: Slum department, NMC, Nagpur, and Slum atlas report, 2008

³⁰ Dwelling units is the terminology used for housing unit located in slums by MHUPA under BSUP and IHSDP programme.

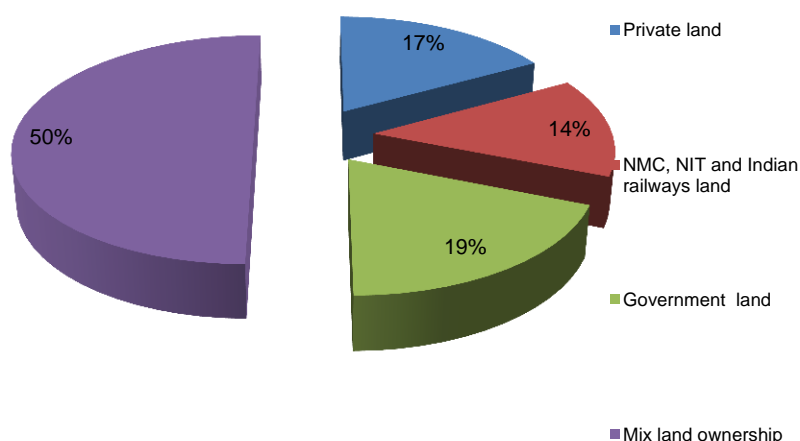
9.4.1.2 Housing Stock (slums)

There are around 1.5 lakhs DUs in slums of Nagpur. Out of 1.50 lakhs houses, around 40% of the DUs are pucca structures, 38% of the DUs are semi pucca structures and 22% are kutcha structures. From the condition of DUs in slums, it is clear that the quality of houses is comparatively better compared to what is normally perceived. Based on the discussions with officials, it is learnt that in order to provide a better DU to urban poor in Nagpur around 1.35 lakhs new DUs needs to be constructed.

9.4.1.3 Land and tenure-ship of slums

Out of the total 446 slums in Nagpur, around 17% of the slums are located on private land, while 14% of the slums are located on land belonging to authorities like NMC, NIT, Revenue Department and Indian Railways. Other 19% of the slums are located in the government owned land. Almost 50% of the slums are located in land having mix ownership.

Figure 71: Location of slums based on type of land



Source: Slum department, NMC, Nagpur, and Slum atlas report, 2008

9.4.1.4 Government Initiatives in slum improvement

Basic Services for Urban Poor (BSUP)

In Nagpur, the scheme under JNNURM is been implemented by SRA Nagpur on behalf of NMC. Under this scheme, 6,246 dwelling units (DU) along with infrastructure and amenities have been proposed and sanctioned in 18 slum communities in Nagpur.

The Nagpur Municipal Commissioner is the Chief Executive Officer of SRA. Under BSUP scheme, 251 dwelling units have been completed and allotted to respective beneficiaries, and work on 2,000 dwelling units is in progress at 10 slum communities.

Initially, the scheme under BSUP was sanctioned for in situ redevelopment in G+2 housing cluster. Slum dwellers in Nagpur have bigger footprint sizes, and almost 70% of the slums in the city has basic infrastructure, due to which there was resistance from slum dwellers, and hence the pace of implementation was slow in initial 3 years of the project timeline. In March 2012, the scheme was revised

based on the interactions with slum dwellers and local elected representatives, and a mixed bag approach was proposed. Now as per the new scheme following are the up gradation in the project models:

- In situ redevelopment in G+2/G+3 housing clusters with complete infrastructure: Under this strategy, SRA has sanctioned 1,206 dwelling units in 7 slum communities. Work on all the 7 projects is in progress, and the work is expected to finish within the mission period.
- In situ construction of new houses on same footprint with infrastructure gap filling: Under this strategy, 3,292 dwelling units in 11 slum communities have been sanctioned, work in 5 slums is in progress, and bid management has been completed for the remaining 6 slums. However, work on 25 DU's under this strategy is initiated in 1 slum community; 15 DU's are completed and allotted. This strategy is very popular among the slum dwellers and elected representatives; however, the process of implementation is slow because the houses have to be constructed on the same footprint, which consumes more time, thereby delaying the implementation.

Rajiv Awas Yojana

Nagpur has been selected as one of the pilot cities under Rajiv Awas Yojana (RAY) - SRA has been appointed as the implementing agency for RAY in Nagpur. The agency has initiated the preparatory process for RAY. The Rajiv Awas Yojana cell has been constituted by SRA as per the guidelines of RAY. Surveys of 130 slums have been already completed and socio-economic surveys as per formats issued by Gol are underway. SRA has completed the initial surveys and mapping for 1 cluster (which consists of 5 slums) and is taken up for implementation on pilot project basis under RAY. The pilot project having a mixed bag of EWS housing, livelihood, and rental housing alternatives has already conceptualized, prepared, and submitted to MHADA and SLSC for their approval. The possibility of involving private players to cross subsidize the schemes, are being worked out by SRA.

Preparation of the Slum-free City Plan of Action (SFCPoA) is at an advanced stage. SRA has prepared the draft plan of action based on the available data on slums, which was for FY 2008-09 has been adopted. SFCPoA will be submitted to Gol by SRA once the plan of action is finalised.

9.5 Critical analysis of housing and urban poverty under 1st Generation CDP Scenario

Nagpur's urban landscape has been marked by the presence of slums from the time of Bhonsle rule and later, its presence kept increasing in terms of footprint and population residing in such areas. The chart below shows that during 1971 only 47 slum pockets were there in the city, which has grown over every decade. Today, the city has 10 times more slum pockets compared to 1971. At present there are 446 slum pockets in the city.

Post JNNURM scenario

With an intention to meet the service level requirement of present (during 2006) and the future population of 2031

Table 73: Proposed projects in 1st generation CDP

Sr. No.	Sector	Investment Envisaged (Rs. In lakhs)	Key Components of the Proposed Projects
1	Housing for Urban Poor	159,200	<ul style="list-style-type: none"> ▪ On-site infrastructure development for housing needs provision of basic services to the Urban Poor.

Sr. No.	Sector	Investment Envisaged (Rs. In lakhs)	Key Components of the Proposed Projects
	Total investment envisaged	159,200	27% of the total investment needs envisaged in the CDP (2006)
Projects identified and approved under JNNURM			
1	BSUP-work for 6246 DUs is divided into various packages.		

Source: City Development Plan, 2006 of Nagpur

Status of projects in MRTS and traffic management sector as identified and approved under JnNURM is as follows;

Table 74: Status of BSUP project approved under JnNURM

Project/Sector	Approved Cost (Rs in lakhs)	Status of projects (till May 13)	
		Physical	Expenditure (Rs. in Lakhs)
BSUP	37,481	<ul style="list-style-type: none"> Out of 6,246 DUs approved under the project, 216 DUs are completed and work is in progress for 1177 DUs. 	-

Source: Monthly Progress Report prepared by NMC for JnNURM projects, May 2013

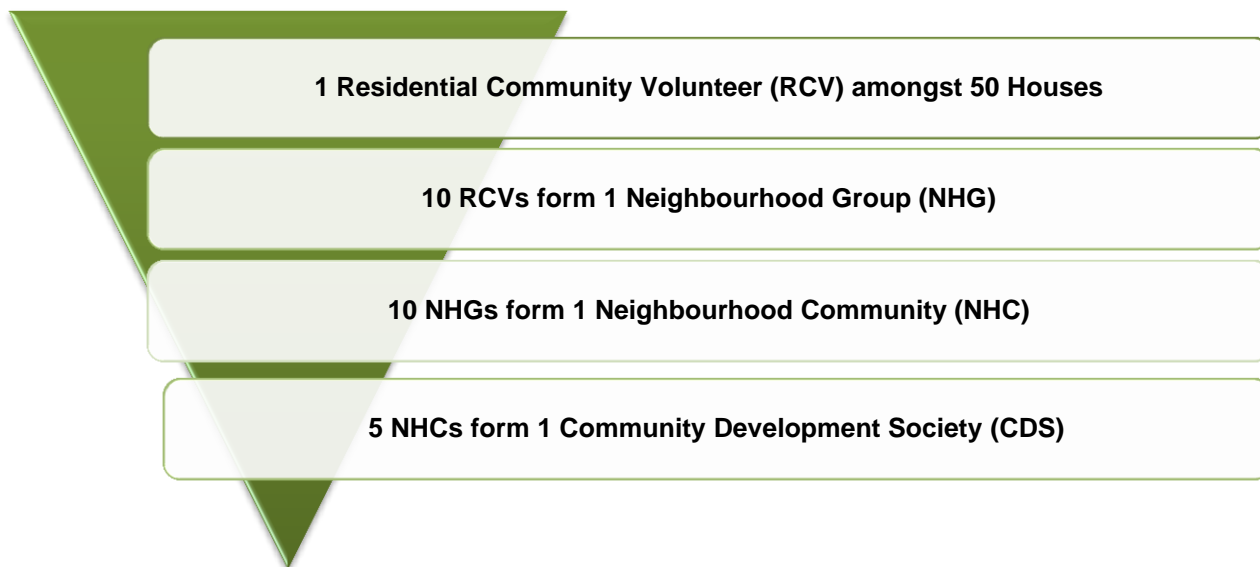
9.6 Social security for the urban poor

For the urban poor located within the NMC jurisdiction, social security and social benefits are provided and administered by the Social Welfare department of NMC. The Social Welfare department is looking after the implementation of welfare programmes of central, state and of its own in Nagpur. Various programmes are being implemented by the department. The programmes implemented by the department mainly focus on two aspects:

- Social welfare – Conducting trainings and providing handholding support to the needy poor, helpless, and divorcee women belonging to APL and BPL families. This helps the urban poor to get social visibility and status in the society.
- Financial support – Financial support is provided under some of the programmes, through loans or subsidy, to the needy.

The department is headed by the Social Development Officer and has a support staff of around 14 members. The department administers and monitors the implementation of the social and economic welfare programmes. For implementation of the programmes on ground, the department has support from NGOs, which are appointed through a tendering process. Also, the department has adopted the social structure as suggested in the Swarnim Jayanti Sahari Rojgar Yojana (SJSRY) programme, to reach out to the BPL families and provide them with the benefits of through community development societies (CDS). 15 CDSs have been formed and registered with NMC, spreading their reach across 10 zones. Volunteers/community organisers are appointed to help in the implementation of SJSRY at the ground level. Support from the volunteers appointed under the social structure is also taken for the implementation of all programmes for the urban poor in Nagpur. The social structure is shown in the following chart.

Figure 72: Social structure adopted for implementation urban poor programmes



For monitoring and planning of the programmes being implemented by the department under the guidance of 10 member special committee, which on regular basis arranges meeting to monitor the progress of the programmes and also decision making takes place. In order to reach out to the large population residing in the slums of the city, NMC takes help from NGOs and other groups that are working towards the social welfare of the urban poor. Some of the important programmes are as follows.

9.6.1 Social welfare programmes

9.6.1.1 Mahila Aave Bal Kalyan Samiti

During 1999, NMC passed a resolution to allow the urban poor women to form and register groups; where women coming together to engage themselves in making of homemade items and selling it during exhibitions and melas. This initiative of NMC was with the intention to make the urban poor women economically independent and provide them social status in the society. Under this programme, every year, NMC organises a mela cum exhibition where the groups formed under Mahila Aave Bal Kalyan Samiti sell their products. Also, other women entrepreneurs, NGOs, and Bachat Gat groups are allowed to exhibit their products during the exhibition. On an average, 200 stalls are put up by NMC every year.

9.6.1.2 Vocational trainings to women belonging to APL group

NMC is providing various vocational training to the women belonging to APL families who has the thrust and awaits the opportunity to develop/establish its own business in coming future. Such trainings are being conducted by two agencies hired by NMC:

- Mitcon Consultancy and Engineering Services Ltd., Nagpur, and
- All India Local Self Government, Nagpur

The duration of trainings is around 2 months. Till date, around 12,000 women have been benefitted under this programme. Under this programme, the women are provided the following trainings:

- Basic Computers,
- Data Type and Printing (D.T.P.),
- Screen Printing,
- Housekeeping,

- Artificial Jewellery Making,
- Hand & Machine Embroidery,
- Ari Jardogi,
- Fashion Designing,
- Making of Soft Toys,
- Leather and Rexine Works,
- Pottery,
- Bakery (Chocolates/Cakes/Biscuits/Cookies), and
- Decoration with Flowers and Bouquet Making

9.6.1.3 Support to the needy, divorcee women by distribution of sewing machines

NMC also has some programmes wherein it has extended support to the needy and divorcee women by distributing sewing machines for making them economically independent. Under this programme, NMC encourages women to participate in self-employment programmes where they will be preparing garments, do stitching works, etc. Total 366 sewing machines have been distributed by NMC in the city to needy and poor women.

9.6.1.4 Kranti Jyoti Savitribai Fuley Beema Yojna

KJSFBY was launched by NMC in 2010-11, the centenary year of Kranti Jyoti Savitribai Fuley. Under this scheme, NMC provides needy and poor women with a life insurance policy. Around 40,000 women have been provided with a life insurance policy thus far, which are foaling in the age group of 10-75 years.

9.6.1.5 Women's Counseling Centre

In order to provide social rights by stopping the atrocities on women and children, NMC has introduced 10 women's counseling centres in all the 10 zones of NMC. These counseling centres are operated by NGOs appointed by NMC through a tendering process. The programme was launched in 2012-13, and these centres are named after late Anusayabai Kale Smruti. There are women councilors along with lawyer are working for protecting the social rights and to stop the atrocity on women and child in the urban poor families in the city.

9.6.1.6 Ladli Laxmi Yojna

NMC launched 'Ladli Laxmi Yojna' during 2012-13, under which every female child born will be insured with a policy of Rs. 1,24,500, which will be provided to the family once she turns 21 years old. For this, NMC pays the full premium (Rs. 2,258) per annum. Till date, 806 female children have been insured under the scheme. This scheme is applicable to female children born in a BPL family.

9.6.1.7 Scheme for physically handicapped persons

Since 1998-99, NMC started a programme to distribute tricycles to the physically handicapped persons irrespective of the economic status in the city. Till date, 322 tricycles have been distributed by NMC.

9.6.2 Economic Welfare Programmes

9.6.2.1 Urban Self Employment Programme (USEP)

Under this programme, urban poor beneficiaries are provided financial assistance to set up a business venture. The beneficiaries are provided assistance in accessing loans from selected nationalised Banks. Also, NMC provides support to the beneficiaries for the preparation of loan proposals. Once the loan is

approved, the initial programme amount of Rs. 2 lakhs is given to start the business against the sanctioned amount of loan. Under this programme, NMC contributes 25% of the sanctioned amount as a subsidy to the beneficiary. An eligibility criterion to avail the benefits of the programme is that the beneficiary should belong to a BPL family. Till date, the programme has benefited 2,572 beneficiaries.

9.6.2.2 Skill Training for Employment Promotion amongst Urban Poor (STEP-UP)

The STEP-UP programme is funded by the SJSRY programme. All the expenditure incurred in imparting training to the women is borne by the central government. Vocational training of 2 to 6 months is provided to the BPL beneficiaries by ITI and VTP institutions, and till date, around 38,200 beneficiaries learning various skills.

9.6.2.3 Urban Women Self-Help Programme (UWSP)

This programme provides assistance to the women of BPL families to form Mahila Bachat Gats to avail the benefit of this programme. Mahila Bachat Gat is group of five women, will be provided assistance of Rs. 2000 per women as a revolving fund for their venture. But, in order to ensure the sustainability of the groups working independently, the programme requirements are:

- The group should run successfully for six months;
- Monthly statements of income and expenditure should be up to date;
- Review and gradation of the group's performance

Once, the group fulfils the above-mentioned requirements, a revolving fund of Rs. 10,000 is released to the group. 4,844 beneficiaries group have benefited from the scheme.

9.6.2.4 Urban Women Self-Help Programme (Loan & Subsidy) (UWSP)

Special incentives are provided to the beneficiaries of this scheme for setting up a business venture. Mahila Bachat Gat (group of five women) who has completed their successful association for six months with NMC under this scheme, are encouraged to set-up a business. They are supported by community organiser in prepare for loan proposals for getting loan from nationalised Bank. Loan of Rs 3 lakhs is provided by the bank and 35% of the sanctioned amount is provided by NMC as a subsidy. There are 233 beneficiaries groups till date who got benefited from the scheme.

9.6.2.5 Savitri Marketing Institution for Ladies Empowerment (SMILE)

NMC with intention of supporting the women to have market access bought business centre called 'SMILE'. Here women can sell the products produced by them based on the vocational trainings they have undergone or women who want to sell their products and lacks market access. The SMILE centre is run by 'Shuruwat Krida Bahuddeshiya Sanstha', an NGO appointed by NMC. The SMILE centre has 36 stalls, and products are sold throughout the year.

9.6.3 Social welfare awareness programme

Apart from programmes by NMC to provide technical and financial support, NMC is also actively involved in social awareness programmes on regular basis. Campaigns are conducted by NMC with support from NGOs to spread the awareness to educate and change the mindset of the urban poor towards certain social practices followed at individual level, atrocity on women and child, and child labour. Some of the awareness programmes carried out by NMC are as follows:

International Women's Day

To support and promote women empowerment within each section of the society, NMC, every year, celebrates International Women's Day on 08th of March. Women councilors and women employees of NMC participate in the celebration.

Female Foeticide

Awareness about female foeticide (Stree Bhrun Hatya) under the Health and Education programme for women and children is created at various locations across the city. Awareness is created through road shows/street plays, and this has helped reduce the incidents of female foeticide. Beneficiaries of this awareness campaign are around 13,500 citizens of Nagpur.

9.6.4 Social programme by NGO, private organisation for Urban poor in Nagpur

The Livable City program is implemented by ESAF with the support from Health Bridge, Canada in three cities of India-Nagpur, Bangalore and Thrissur. The objective of this program is to explore possibilities for increased public spaces and improved pedestrian facilities through research and advocacy with the Municipal Corporations of the respective cities. Our initiatives have led to development of non-functional Municipal parks for children in Nagpur city as a fully renovated functional park. Also an inclusive park for differently abled children is in the making! Survey reports on exploring the possibility of developing Commercial Street once called the shopper's paradise into car free pedestrian friendly zone has been submitted to the Local Government for further action. The pedestrian rights program and Safe Route to School program in Thrissur facilitates the improvement of pedestrian facilities and work for safe healthy school trip for children.

A project of ESAF 'Sparrow-Making city livable for children' is a gift for the community children at Nagpur and increasing community cohesion. The park in Karnal bag which was previously in deserted condition, now whining of children ranging in the park with the initiative of ESAF. Through the summer camp, parents were also participating in the children's activities and remember their own childhood. Every day each parent participated as volunteers according to the scheduled planned for a month. Parents remembered their childhood through Indian games, fun and joy. This was a step towards social change by the efforts of the parents. Children got accompaniment of their parents while playing. Grandparents were also enjoying looking their grandchildren playing with them. Away from Television and cartoon show, children learned so many new things and games, they enjoyed the growing trend 'Summer Camp' without paying any fees.

9.7 Policy, Regulatory and Institutional Framework

9.7.1 NMC

Administration and infrastructure development in slums is governed by the Slum department at NMC. The department's main task is to look after the implementation infrastructure development or maintenance works in slums. Projects/works taken up by the department are based on certain criteria like budget allocation to the department, allocation to zonal offices, demand and need of the work, etc. Works apart from the once taken up by department are take up are based on any of the following considerations;

- Any slum dweller requesting to zonal officers, or zonal head (Asst. Commissioner), slum department (civil lines)

- Any elected representative coming up with proposal of new work or maintenance works for the slums located in their jurisdiction
- Any NMC officer or zonal officer proposes new work or maintenance under any of the programmes of central, state or NMC.
- Slum development/Durbal Ghatak committee can propose the work in any of the slums on demand or need basis.

For work proposed by any of the above criteria, the officer deployed at the zonal office prepares a file of the project or work. Once file is prepared, it is sent to the Executive Engineer (EE). If the estimation for proposed work is around Rs. 50,000, it is cleared by the AC himself with the powers assigned to him. If the estimation of work is more than Rs. 50,000, the file is sent to the Slum department, Main office, after the approval of EE. For such works as per department policy, will be carried out through proper tendering process for selection of contractor.1 EE is assigned to 2 zones as their jurisdiction. Administration and implementation of works in their respective zones will be look after the team of Junior Engineer (JE) available with each EE at zonal office.

9.7.2 Slum Rehabilitation Authority (SRA)

The Slum Rehabilitation Authority (SRA) is the authority responsible for the implementation of housing schemes in Nagpur. SRA is primarily looking after planning and implementation of BSUP projects and Rajiv Awas Yojana (RAY) projects, which is in the pipeline.

9.8 Key issues and concerns

Housing and basic infrastructure provision

- Though 70% of the slums have access to basic services and have basic infrastructures; but these slums are not de-notified.
- Due to non-de-notification of slums the footprint and population share residing in the slums is high, which is not the real case.
- It is estimated that 1.23 lakh housing units are required in city to make it slum free, but so far under BSUP project only 216 dwelling units have been constructed, there is huge investment and effort required towards slum free city.
- Presence of political resistance delaying the implementation of housing projects
- Footprint of the existing DUs in slums is more than that of the new houses constructed under BSUP. So, resistance from Slum dwellers to evacuate their DUs and accept new houses offered to them.
- No effective implementation of housing projects due to presence of multiple agencies in provision of same functions and absence of single authority in the city.
- Coordination issues between agencies. NIT is carrying out development works in slums in the city. Details of works carried out by NIT in the slums are not been shared with NMC. Thus, repetition of works is taking place.
- NMC, NIT, SRA, and MHADA are working for slums in Nagpur. MHADA is now working in slums located in the city outskirts.

Social and Economic welfare

- Lack of Public awareness campaigns about the social and economic programmes being run by NMC and other agencies. Due to this the urban poor are not able to get the benefits of the programmes.
- Department's existing staff strength is not enough to effectively implement and monitor various programmes for social and economic benefits of urban poor in the city.

10 Baseline Environment: Urban Environment and Disaster Management

10.1 Pollution Level in Nagpur

Nagpur stands third in terms of urbanisation and largest cities in the State of Maharashtra. The pace of urban development in the city is faster compared to the initial decades, due to pressure of the urbanisation and developmental activities taking place in various segments in isolation. Urban environmental is an important for any city's development as it provided enabling environment for the growth at each level for all the sectors. It encompasses health and safety aspects for the citizens of the city. From this point of view, it becomes essential to assess the current situation of the urban environment and issues related to it. Urban environment is further bifurcated into city environment and health and safety aspects.

10.1.1 Ambient Air Quality

The Maharashtra Pollution Control Board (MPCB) is the agency monitoring the air quality in all the cities of the state and the implementing agency for the central programme, 'National Air quality Monitoring Programme', for all the selected cities in the state including Nagpur. There are 11 air monitoring stations at various locations in Nagpur, of which 7 stations installed are under NAMP and 4 stations are installed under SAMP. Air quality monitoring carried out in Nagpur is as follows;

- Visvesvaraya National Institute of Technology (VNIT) through 7 stations under NAMP
- MPCB through 4 stations under SAMP

Table 75: Air quality results for Nagpur

Parameters	Annual average value ($\mu\text{g}/\text{m}^3$)				CPCB Standard	SAMP
	2008	2009	2010	2011		
SO ₂	8	6	7	8	50	80
NO ₂	33	31	33	35	40	80
RSPM (PM ₁₀)	114	101	113	108	60	100
SPM	ND	ND	ND	ND	-	-

Source: Nagpur Environment Status Report, 2011-12

Particulate Matter

- The average PM10 concentration varied from 12.01 $\mu\text{g}/\text{m}^3$ to 58.23 $\mu\text{g}/\text{m}^3$. The minimum and maximum values of 24 hourly average PM2.5 concentrations varied in the range of 5.01 $\mu\text{g}/\text{m}^3$ and 39.05 $\mu\text{g}/\text{m}^3$, respectively. The highest concentration was observed at Wadi industrial area, which may be due to windblown dust, unpaved roads, etc.

SO₂&NO_x

- The observed average concentration of SO₂ (covering all stations) varied from 10.5 to 39.0 $\mu\text{g}/\text{m}^3$. The average concentration of NO_x was in the range of 11.23-66.19 $\mu\text{g}/\text{m}^3$. The concentrations of SO₂ and NO_x were observed to be below the stipulated standards of NAAQS. The highest concentration was observed at Wadi industrial area among the locations monitored, which may be credited to largest industrial area at Nagpur city.

Other pollutants traced in the air of samples are:

- ◆ Volatile Organic Compounds (VOC)
- ◆ Heavy Metals in Suspended Particulate Matter
- ◆ Lead
- ◆ Nickel
- ◆ Benzo (a) Pyrene

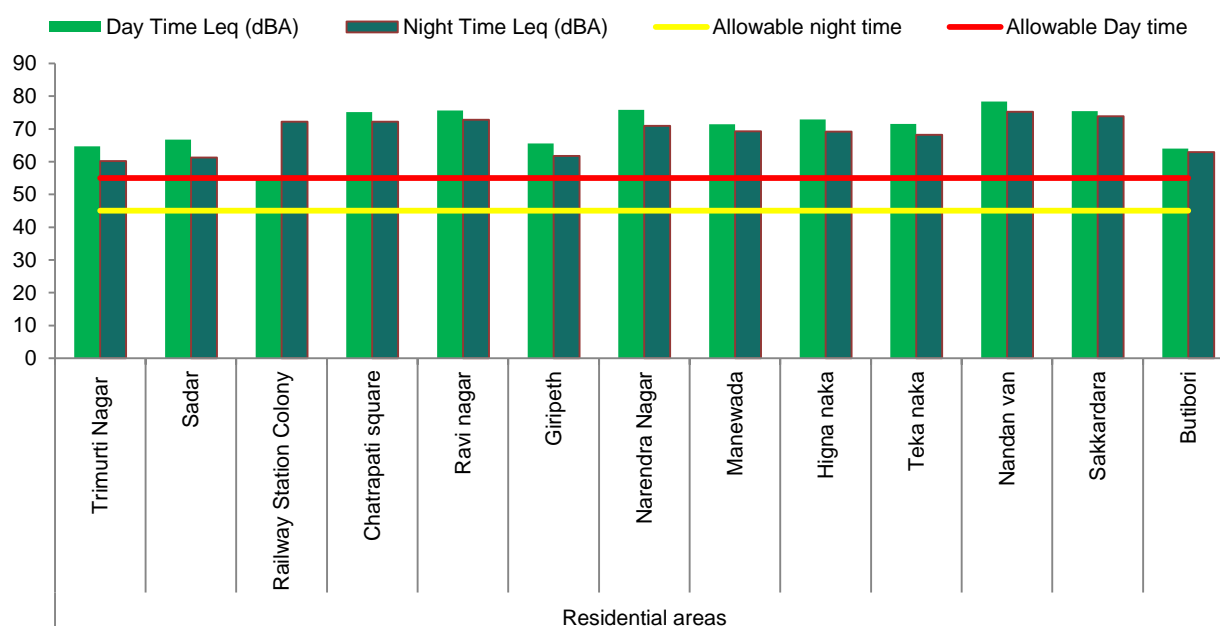
10.1.2 Noise Pollution

Nagpur is becoming increasingly crowded, busy, and noisy. The people living in Nagpur have leading sources of noise as Road Traffic Noise, Air Craft Noise, Noise from railroads, Resident & Community Noise and Construction Noise etc. It is also observed that noise levels at all the zones (silence, residential, and commercial) are increasing and are exceeding the noise level standards.

This can be mainly attributed to the traffic congestion due to the increase in the number of vehicles plying on the road and lack of awareness amongst the common man about the adverse impact of noise pollution. As per the list declared by NMC dated 7/4/2012, silent zones identified are court area, education institution, hospitals, etc spreaded across all the zones in Nagpur. The background noise levels were measured using the Larson 831 Davis instrument. The various noise levels recorded during day and night time at various locations are listed in the annexure.

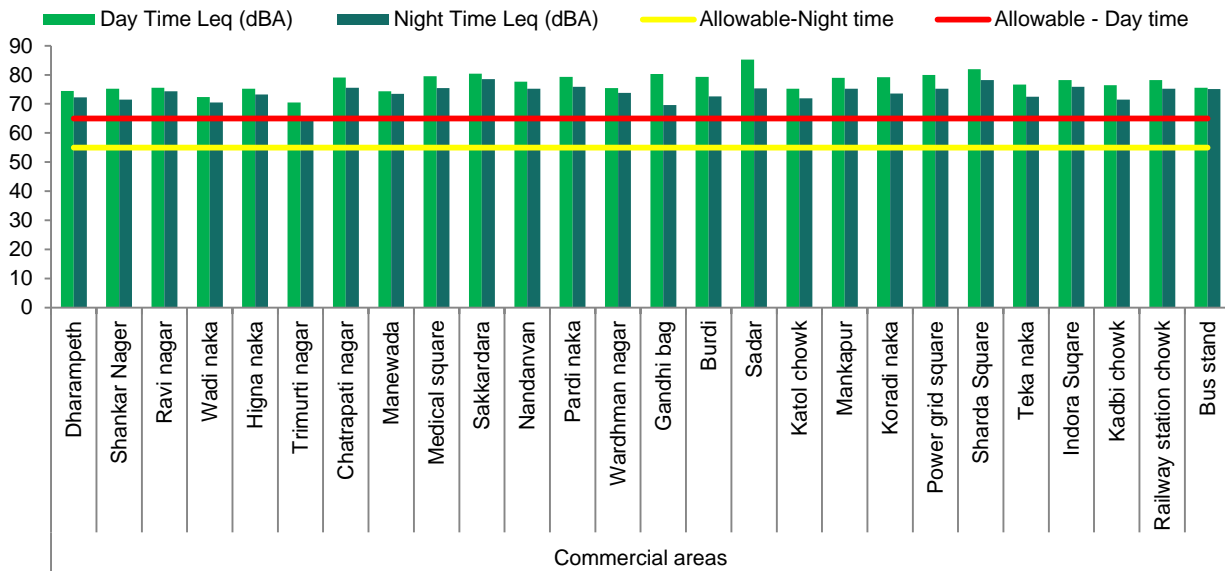
In the residential zone, the noise levels ranged from 54.7 to 78.6 dBA during the day and 53.9 to 75.2 dBA during the night. At the commercial zones, the noise levels range from 70.5 to 85.2 dBA during the day and 65.2 to 78.5 dBA at night. Noise levels were monitored in schools, primary health centres, and hospitals in Nagpur, which are declared as silence zones. The noise levels varied from 59.7 to 79.6 dBA during the day and 56.2 to 70.6 dBA during the night, as shown in the chart below.

Figure 73: Noise levels in residential areas - Nagpur



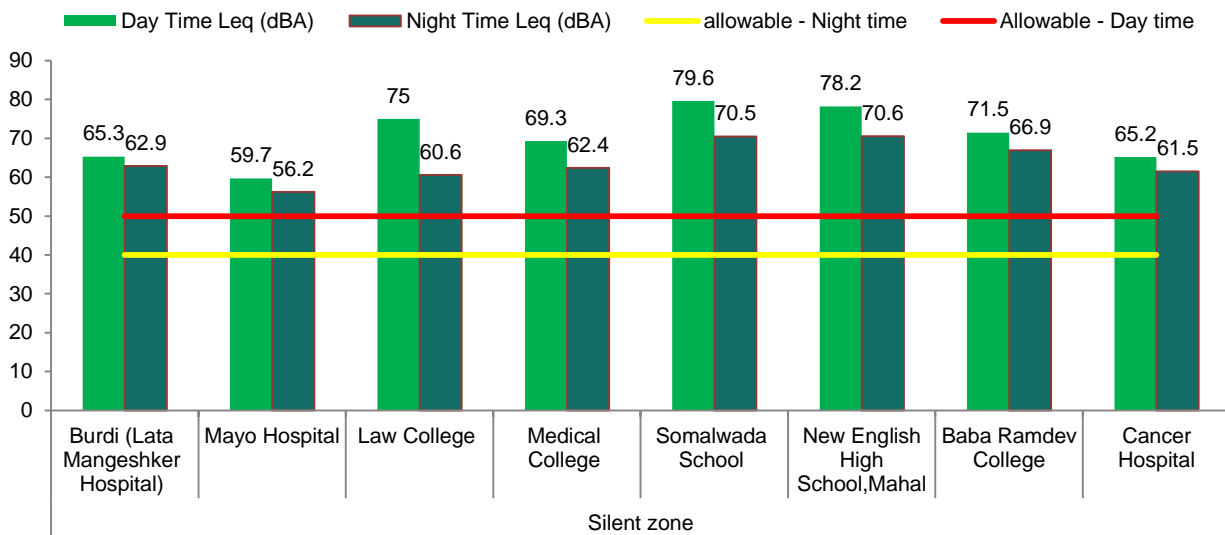
Source: Nagpur Environment Status Report, 2011-12

Figure 74: Noise levels in commercial areas - Nagpur



Source: Nagpur Environment Status Report, 2011-12

Figure 75: Noise levels in silent zones - Nagpur



Source: Nagpur Environment Status Report, 2011-12

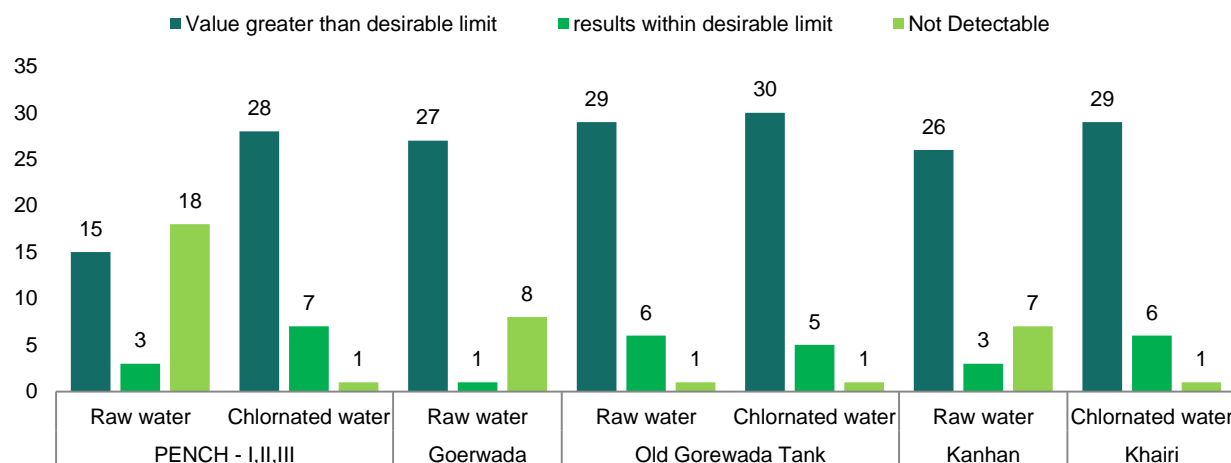
10.1.3 Water

The existing water supply for the Nagpur city is from Gorewada, Kanhan, and Pench schemes - Pench-I, II, and III. The average total supply of water ranges between 600 and 645 MLD. Maximum water supply is from the Pench Project Schemes. Besides this, a very small quantity is drawn from groundwater through bore wells and open wells, which is 9 MLD and 4.63 MLD, respectively. Water quality tests are carried out on a regular basis by NMC. Details of the water quality tests are carried out and provided in the environment status report of 2011-12 are provided as below.

10.1.3.1 Surface water quality

Surface water was collected and monitored for physico-chemical and bacteriological analysis to get trend in water quality in successive years. The overall water quality is indicated by 37 parameters, which gives background information for the water quality. The physico-chemical characteristics and bacteriological analysis results are presented in the annexure.

Figure 76: Quality analysis of samples collected from surface water



Source: Nagpur Environment Status Report, 2011-12

10.1.3.2 Groundwater quality

Considering the scarcity of surface water during the summer season and insufficient supply in the rural areas as well as outskirts of the area, it is very essential to make provision for the exploitation of groundwater on a large scale. The depth of groundwater table is in the range of 1.65-1.95 m in most of the central part of the city and extends up to 16 m in the peripheral areas. It is therefore necessary to tap the groundwater mostly in the northeastern part of the city, which can serve mainly as a supplementary source of water supply as and when required.

With the increased population growth and developmental activities, the demand for water supply will increase tremendously, thereby increasing the need to tap the groundwater source for potable or non-potable usage. Considering this, the groundwater quality was assessed for its suitability for different usages. The physico-chemical characteristics along with the bacteriological analysis results are presented in the annexure. It is observed that the groundwater in most parts of the city is hard and mineral content with respect to dissolved solids, hardness and sulphate is on the higher side. There is no problem as such for nitrate and fluoride. Most of the ground water samples are bacteriologically contaminated and need chlorination before used for drinking purpose.

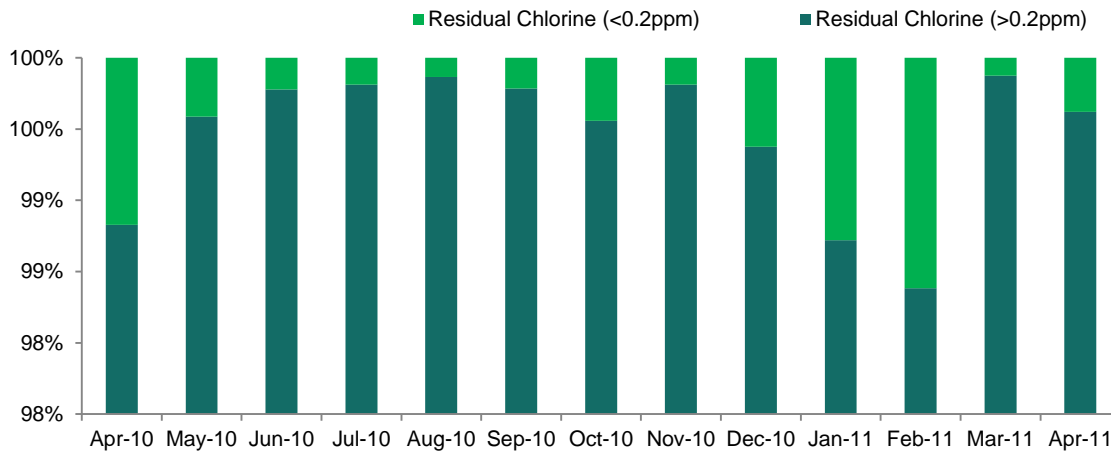
10.1.3.3 Drinking water quality

NMC is supplying drinking water through its distribution system. As a part of health concern, water quality monitoring was carried out at the end of the pipeline. Samples were collected from 17 locations from different parts of the city and analysed for drinking water parameters. The quality of water at the consumer end w.r.t. physico-chemical and bacteriological is given in annexure. It is observed that the drinking water is safe physico-chemically and bacteriologically indicating NMC's awareness and maintenance for the distribution system.

Daily 1000 samples are collected for testing the residual chlorine content. More than 98% of the samples were found to contain more than 0.2 PPM of residual chlorine. The tap water samples were also collected

from different places, zone wise. Total 115 samples were collected from each zone and tested for residual chlorine and total coliform and thermo tolerant species; the results are presented in the table provided in the annexure. Most of the samples showed presence of coliform in tap water. The Bacteriological contamination of tap water was also presented in the table provided in annexure. The bacteriological contamination varied between 8 to 34% of the samples received for the study throughout the year.

Figure 77: Water quality results for the samples collected during 12 months



Source: Water supply Department, NMC

10.2 Water bodies

10.2.1 Existing condition of water bodies

There are 11 no. of lakes situated in and around Nagpur city. The main lakes are Futala, Ambazari, Sonegaon, Shukrawari, Sakkardara, Naik and Lendi Talab. These lakes are being used for domestic, recreational purposes. Provision is made to use some of the lakes for the immersion of idols during festival seasons. So it becomes very essential to know the quality status of these lakes. On the bank of these lakes, some of the slums are located which are using lake water for washing, bathing and domestic activities. NMC has taken steps to protect these lakes for getting polluted due to local activities. Every year samples are being collected from all these lakes to know the quality status of these lakes and accordingly analysed for physico-chemical parameters.

It was observed that these lakes are exerting organic load in the form of BOD and COD due to manmade activities. The mineral contents are found to be high and increased every year with respect to dissolved solids, sulphates, hardness and chloride. Nutrient load in terms of nitrate and phosphate are found to be increased except Ambazari, Futala, Shukrawari and Sakkardara and therefore these are on the verge of eutrophication. The lakes are periodically deteriorating and need attention. The heavy metals in some of the lakes are also found to be exceeded the permissible limits of drinking water. All the lakes situated in the city area are found to be bacteriologically unsafe for drinking point of view. The biological characteristics of some lakes, is found to be affecting the primary and secondary productivity as well as species diversity with enumeration of species.

Efforts by NMC and several social organization yielded results, and is indicated by reduced contamination of ponds and lakes in the region. Awareness about ill effect of idol immersion in water bodies through radio, newspaper, displays played a great role. The nirmaliyas (flowers, garlands, prasad

items), seen floating in the lake were much lesser this year as compared to the previous years, which is an indication of growing awareness among people about Environment protection.

All the lakes and people are requested to immerse the idols in tanks instead of lake 200 tonnes of nirmaliyas was collected from these venues; nearly 3000 idols were immersed in the tanks provided by NMC.

Rivers

There are mainly two drains namely Nag River and Pilli River flowing through the city areas. The other rivers flowing in the NMC are the Pora River and Pili River. The Nag River flows through major part of the city carrying mostly sewage generated from that particular areas. The river Pilli passing mostly through outskirts of city also carries domestic waste generated from the locality besides the river. The rivers jointly meet Kanhan river and ultimately in the Gosikhud reservoir. The list of rivers has been presented below:

1. Pora River
2. Nag River
3. Pili River
4. Phutala River

Over the years, these rivers have been carrying heavy sewage load and converted into wastewater channel. The water quality in the rivers is contaminated due to sewerage and wastewater being let out into the river and its nallahs/rivulets. Looking at these rivers carrying only sewage from the city and storm water in rainy season, the situation of these drains infers the followings:

- Due to discharge of sewage in to the drains, these have converted into a waste channel only with no further assimilation potential
- With uncontrolled discharge of solid and semi-solid waste into these drains, heavy deposits of sludge (mostly organics) at the bottom restricting the flow of the drains.
- The unprotected (embankment) edges of the drains (both sides) creates lot of siltation problem and produce uncertainty to the local habitation residing on the bank of these drains
- The rivers are passing through different sections of land uses and initially are in their natural state. But as soon as they receive wastewater from the city created problems to the nearby habitation due to ingress of domestic wastewater into the groundwater. Situation becomes most critical in the rainy season, when these drains are flooded and water/wastewater enters in to the nearby locality due to unprotected edges of these rivers
- These drains are carrying lot of thrash materials generated from the city along with the domestic wastewater thereby restricting the flow of the river and further worsening the situation. The major township and residential developments have been proposed along the drains which would significantly affect the quality and quantity of the water in the future.

10.3 Gardens, Open Spaces and Urban Forests

The comparative landuse/land-cover study carried out by during the March 2010 & December 2006 indicates that water body decrease by 0.01% in the month of December. Fallow Land and built up are increased by 4.97% and 6.04% respectively. Land with vegetation decreased by 2.38%. The percentage of waste land increased by 5.75%, while the land with shrub decreased by 15.04%. It was observed that the reduction in water bodies could be due to the hot summer and reduction in level as well as dryness of the water resources.

Fallow and waste land seems to be increased due to the removal of vegetation and taken the shape of barren land which is unused and kept for habitation or developmental activities and that is reason the

built-up area is increased during the year 2010. If critically compared related to vegetation cover, it is found to be declining in the outskirts of the city area; however it is increasing in the western side of the city. The eastern side is totally found to be in covered vegetated area where much attention is needed.

10.4 Identification of environmentally sensitive areas

Residential and commercial areas

There can be various environmental sensitive areas based on different type of the environmental concerns, which can have direct impacts on the local environment. From the air pollution point of view, the residents and commercial development along the roads in the city can lead to serious concerns of health issues due to vehicular pollution. Also, the industrial and other heavy commercial activities in the outskirts areas also are sensitive areas where people might face health issues due to pollution from the heavy vehicular movement. The sensitive locations identified where ambient air quality exceeded the stipulated standards pertaining to SPM as stipulated by CPCB are as follows;

- Shankar nagar
- Ajni Square
- Variety Square
- Manewada
- Baidyanath square
- Cotton Market
- Itwari
- Sadar
- Kamal Square
- Gittikhadan
- Mankapur
- CPWD service Centre
- V.S.P.M. B.Ed. College
- Sakkardara Square

The hotspots where ambient air quality exceeded the stipulated standards pertaining to RSPM as stipulated by CPCB are as follows:

- Ajni Square
- Sadar
- Kamal Talkies Square
- CPWD service centre.
- Pratapnagar ring road
- Chatrapati Sq.
- Railway station junction.

Also, the places like religious worship places, schools, colleges, hospitals, institutions, etc are considered as silent zones from the noise pollution point of view. Any high decibel sound in and near such places is disturbing and not permitted. The major source of noise pollution in and near such places can be heavy vehicular movement, which needs to be controlled through appropriate traffic calming measures.

Lakes and Rivers

Apart from this, the rivers and lakes are the most sensitive areas in the city as the water is polluted due to dumping of waste and sewage into it. Also, the temperature of the city being high during summer can reduce the water levels and high rate of water evaporation. The situations of the lakes are highly

influenced by the land uses surrounding the lakes. It is observed, that a significant increase in the development around the lake leads to the deterioration of the lake quality. Thus, no development zones in the areas surrounding lakes and along the sides of rivers needs to be ensured.

Open wells, bore wells and tube wells are constructed in authorized as well as unauthorized layouts and slums, to cater to the local needs as some of the pipe network may not have reached there. Groundwater in an urban area need not be used fully in potable water distribution system as every urban center provides water treatment and distribution system. But ,the from the review of the reading on various parameters in the earlier section of the chapter, it was observed that the that most of the groundwater sources are containing high mineral content with respect to dissolved solids, hardness, chlorides, sulphate, nitrate etc. Moreover bacteriologically groundwater is unsafe because of the nearness of the sewerage system (sewage drainages, especially in slum areas) and contamination of groundwater due to seepages from the open defecated area especially in rainy season.

Eco-sensitive zones and preservation of heritage precincts

One important and step in conserving these Natural precincts is to recognize their importance and impart more and more legal protection to them. In addition to the heritage regulations, declaration and regulations for `Environmentally Sensitive Areas ESA (or zones) under the section 3 (2) (v) of the Environment Protection Act and Rule 5(v) thereof, as also declaration and regulations / guidelines for `Biodiversity Corridor Regulations Zones' (BCRZ on the lines of CRZ) can prove to be a very effective legal tools for this.

Local heritage in Nagpur is also one of the important aspects which need to be considered as environmental sensitive places as due to heavy development activities, heavy traffic movements and air pollution, the structure can be damage. In past some of the heritage structures have been damage due to the mentioned reasons already.

10.5 Environment assessment studies for Nagpur

NMC has started taking environment as a serious sector and given utmost importance. Nagpur is considered to the greenest city in the country and also looking at the rapid urbanisation taking place in the city will pose threat the city environment; for which NMC is making efforts to provide sound and healthy environment to the citizens of Nagpur which is taken care during the formation of strategies in the Environmental Status Reports (ESR). For this NMC on yearly basis is carrying out ESR for Nagpur city. This programme is aimed at helping authority in formulating a sound environmental management plan (EMP). And this is taken up for implementation in next year's agenda.

NMC has been preparing ESRs since 2003. Environmental concerns related to lakes and rivers, water quality and pollution, noise pollution, air pollution, environmental concerns related to sewage and solid waste dumping, etc., are reviewed during the preparation of ESRs. Along with these strategies to overcome the issues in form of workable and implementable EMP is provided.

10.6 Disaster Proneness Assessment of Nagpur

Natural Disasters

Nagpur is the located in the seismic zone II. Based on the environmental status report for State of Maharashtra, earthquake activities is associated with the Deolapar thrust or the sheared and faulted zones of Ramtek and Sakoli basins. Possible earthquake activities can be expected to be of intensity VI

MSK in and near Nagpur region. Apart from earthquake, as the Nagpur is located on a plain terrain, probability of cyclone and tsunami are zero.

Anthropogenic Disasters

Unnatural and manmade disasters such as road accidents, industrial accidents, fires, accidents in quarries and mines, drowning, explosion etc. may occur due to some technical blunders or man-made changes in the environment.

On an average, the road accidents that took place in the past reveal, that it is on an average 1202 accidents take place in the highways in the Nagpur region and 1462 accidents, 265 accidents with fatal injuries and 1364 accidents with injury are taking place on the city roads. Apart from this, there are industries accidents, which can also catastrophic and cause damage to lives and properties. In Nagpur, total 156 accidents have taken place in various types of manufacturing industries.

Natural heavy rains and recent development activities which has damaged the natural drains pattern in the city results in water logging problems and incidents of flooding. Due to such incidents the day-to-day activities of the people residing in affected areas gets hampered. It was observed that many of the areas that are getting affected are low laying area and natural drains pattern. NMC has tried to identify such areas which facing problems of water logging and flooding during monsoon season and is shown in the figure as shown on side.

Apart from these, environmental concerns which can lead to anthropogenic disasters have been covered in the local environment chapter in the same report.

10.7 Key Issues and Concerns

- Water bodies are polluted and contaminated by various ways, leading to difficulty for survival of the flora and fauna and affecting the biodiversity of the city
- As per survey carried out by NMC various reasons for contaminations of lakes are:
 - ◆ Idol immersions during festivals
 - ◆ Throwing of nirmaliyas³¹ and garbage
 - ◆ Outflow of untreated sewerage and storm water into water bodies
 - ◆ Lack of awareness of citizens in not considering water bodies as their cultural treasure.
 - ◆ Lack of willingness by NGOs' to work with NMC or working in isolation for conservation of water bodies. This is leading to ineffective implementation of large scale and work is taken up in bits and pieces.
 - ◆ Level of air pollution observed in some of the busiest areas of the city is not in the permissible limits. Major contribution to the air pollution is from vehicles.
 - ◆ Sample water quality tests are within permissible limits.

³¹ *Nirmaliyas is local term used for temple waste. (Flowers, food, milk, etc.)*

11 Climate Change and Sustainable Development

For centuries, human activities have released large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Majority of greenhouse gases come from burning of fossil fuels like while producing electricity or smoke from transport vehicles. Deforestation, industrial processes, and some agricultural practices also emit gases into the atmosphere. This has led to **climate change**, which refers to any significant change in the condition of climate lasting for an extended period of time.³² In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer. Various evident impacts of the ongoing climate change at broad level are as follows:

- Rise in global average temperature near Earth's surface.
- Change in the monsoon pattern
- Change in the pattern of wind
- Increase in incidents of natural calamities like floods, droughts, earthquake, severe heat waves, and cyclones
- Effect on agriculture yields
- Melting of ice and rise in sea level, etc.

The impacts of the climate change are evident from various disasters events that have taken place and present challenges for the societies and environment. Planning to mitigate the impact of climate change and reduce the emission of greenhouse gases is becoming more important for sustenance of our present societies and to save for future generation. This is possible by adopting sustainable and low carbon emission development measures.

11.1 Climate change and urban cities

Given that half of the world's population started to live in cities by 2007, it is no exaggeration to say that the battle against climate change will be won or lost in our cities. To the extent that cities promote use of cars, urban sprawl is also often associated with climate change. That is, the wider the sprawl, the greater the use of cars and carbon emissions. Energy consumed in lighting of residential and commercial buildings generates nearly a quarter of GHGs globally and transport contributes 13.5%, of which 10% is attributed to road transport. We can safely assume that a sizeable portion of this volume of emissions is generated in cities. According to the Clinton Foundation, large cities are responsible for about 75% of the GHGs released into our atmosphere.

Since cities have a high concentration of population and economic activities, they are vulnerable to climate change. India's cities are characterized by high density of population and housing stock and poor infrastructure, which make them all the more vulnerable to climate change. Given that the most valued infrastructure is usually located in cities, the economic and social costs of climate change will be much higher in cities. For example, cities house valuable communication infrastructure as they do physical infrastructure such as buildings, roads, bridges, and flyovers. Hence, any climate change impacts will cause damage both physical and financial. Climate change impacts the physical assets used within cities

³² Definition of climate change is adopted as described by the United States Environmental Protection Agency (EPA). Web link – ["http://www.epa.gov/climatechange/basics/"](http://www.epa.gov/climatechange/basics/)

for economic production, the costs of raw materials and inputs to economic production, the subsequent costs to businesses, and thus output and competitiveness.

11.2 Carbon footprint and heat island mapping

It is important to understand that all the emitted gases, which get trapped in the atmosphere, are called greenhouse gases (GHG). Carbon dioxide, methane, nitrogen oxide, and halocarbons are termed as GHGs. These GHG emissions stay in the atmosphere and the time of stay of various type of GHG emission also varies. As per the Inter Panel of Climate Change (IPCC), the approximate time of stay of various GHG emissions in the atmosphere is summarised in the table below.

Table 76: Approximate time of GHG emissions (gas) residence in the atmosphere

GHG emission (Gas)	Approximate time of residence in the atmosphere	Global warming potential over 100 years
CO ₂	50-200 years	1
Methane (CH ₄)	12 years	21
Nitrous oxide (N ₂ O)	114 years	289
Halocarbons (others)	1-50,000 years	5-22,800

Source: Intergovernmental Panel on Climate Change, 2007, report

The warming impact of different types of GHGs varies according to the warming power of the gas and the length of time it stays in the atmosphere. As shown in the table above, carbon dioxide has an atmospheric life of 50 to 200 years. So once emitted into the atmosphere, it has a warming effect over a long period of time. Methane, for example, has a life of about 12 years, much shorter than carbon dioxide.

The warming power of each gas varies greatly. For example, methane is a much more powerful GHG than carbon dioxide. Over a 100 year period, a molecule of methane (CH₄) has 21 times the warming effect as a molecule of carbon dioxide (CO₂), even though it stays in the atmosphere for only about 12 years of the 100-year period.

To compare the impact of each gas, the warming potential of each gas is computed over a 100-year period, as shown in Table 1. The greenhouse warming potential (GWP) is computed for each gas based on its warming power and atmospheric lifetime. As a basis of comparison, carbon dioxide is assigned a GWP of one and the GWP of the other gases are computed in relationship to carbon dioxide. For example, relative to carbon dioxide, nitrous oxide has about 300 times the warming effect. The other gases (halocarbons, perfluorocarbons, and sulphur hexafluoride) are also powerful gases.

11.2.1 Concept of carbon footprint and its impact

Carbon foot print is a measure to understand the per capita GHG emission levels for a specific area, which can be a block, city, region, state, country, etc., which also helps to understand its impact on the environment. It also helps in understanding the actual CO₂ emissions emitted by the actions of each individual and based on the carbon footprint, necessary steps should be taken to reduce the carbon footprint to make cities more sustainable.

Socio-economic characteristics play an important role in GHG emissions (primarily consisting of CO₂). Increase in carbon footprint is having a direct and profound impact on the environment, human health, economy, flora and fauna, and ecosystems. Thus, understanding the impacts due to increasing carbon footprint are summarise below.

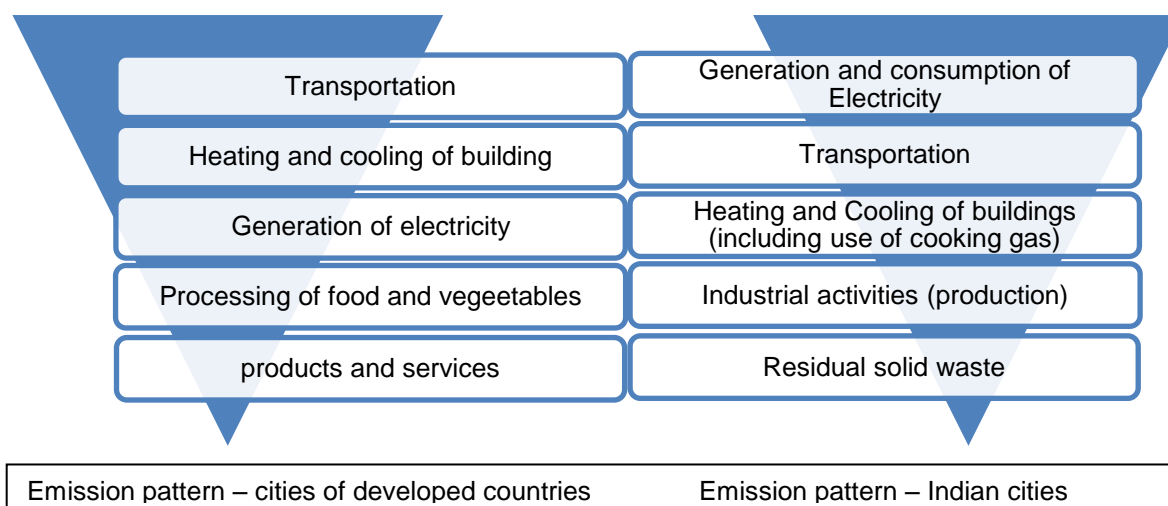
Figure 78: Impacts due to climate change on various sectors

Sector to be affected	Probable affects due to climate change
Impact on Environment	<ul style="list-style-type: none"> ▪ Rising temperatures, shifting precipitation patterns are changing the growing patterns of plants, heat island effects ▪ Sea levels rise due to increase in temperature - warmer water occupies more space than cooler water (applicable for coastal cities) ▪ Increasing solid waste and sewage and dumping of waste without treatment posing a threat.
Impact on human health	<ul style="list-style-type: none"> ▪ Malnutrition caused by the result of climate change on food crops, such as drought that interferes with the growing season ▪ Chances of spread of diarrhoeal disease as access to safe water being compromised ▪ Vector-borne diseases such as malaria due to rising temperature ▪ Respiratory problems as asthma and allergies due to increased air pollution
Impact on Economy	<ul style="list-style-type: none"> ▪ Effect on local economies dependent on land and natural resources like agriculture, fishing industry, coral reefs ▪ Rise in prices of food grains, vegetables, fruits, etc.
Impact on Ecosystem	<ul style="list-style-type: none"> ▪ Erosion of shorelines, destruction of ecosystems, coastal cities and towns could be displaced by rising seas

Source: CRIS adaptation from the article by author Alyssa Morse: “The Importance of Reducing a Carbon Footprint”, issued in 2010

Based on the various literature review; understanding of the emission pattern from various sectors at a city or urban area level in developed countries and Indian context is shown in the figure below.

Figure 79: GHG emission pattern from various sectors in cities of developed countries and India



The pattern shows that majority of the GHG emissions are from the transportation sector, followed by heating and cooling of building, electricity generation and consumption, production of food processing, and services in case of cities in developed countries. But in the case of Indian cities, the trend observed is different. Majority of the GHG emissions are attributed to generation and consumption of electricity by individual citizens of the cities, which is followed by the emissions from the transport sector, heating and cooling of buildings (including use of cooking gas), burning of fuel in industries and residual solid waste.

11.2.2 Nagpur's carbon footprint

A GHG emission is the by-product of smoke from vehicles, heating our homes, using electricity and from other activities in our daily lives. Carbon footprint is the amount of carbon dioxide equivalent of GHG emissions that is emitted through our direct or indirect actions into the atmosphere. The level of GHG emissions in carbon dioxide equivalents is the measure followed to review the level of GHG emissions. Considering carbon dioxide equivalent is due to warming potential of the other gases is more powerful than carbon dioxide, but carbon dioxide emissions dwarf those of the other gases due to its large volume of emissions.

As per ICLEI-South Asia's study during 2007-08, annually around 1.65 million tonne equivalent CO₂ (TeCO₂) is emitted in Nagpur's local environment. It implies that per capita carbon footprint in Nagpur was 0.67 teCO₂/year, which is attributed to various activities taking place in the city. Sectoral emissions, which are due to burning of non-conventional fuels, are listed in the table below. Review of sectoral consumption of fossil fuels reveals use of kerosene and fuel wood is used for various activities linked to residential sector in Nagpur. While, coal is used for generating electricity is attributed to residential, commercial and industrial activities and the consumption of the sector is 47%, 12% and 41% respectively. Whereas, the fossil fuels such as diesel and petrol is attributed to the activities related to the transport sector only for Nagpur.

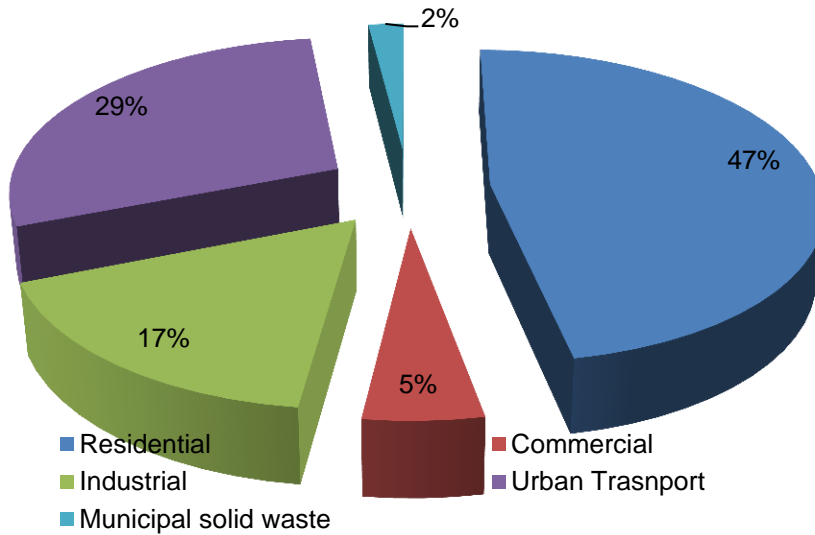
Table 77: Quantum of community fossil fuel consumption in Nagpur, 2007-08

Sector	Fuel type	Unit	Consumption quantity
Residential	Electricity (coal)	million kWh	548
	Liquefied Petroleum Gas (LPG)	MT	109,897
	Fuel Wood	MT	2,400
	Kerosene	kl	38,497
Commercial	Electricity (coal)	million kWh	142
	Liquefied Petroleum Gas (LPG)	MT	2,341
Industrial	Electricity (coal)	million kWh	479
Urban Transportation	<i>Diesel</i>	kl	85,237
	Petrol	kl	86,026
Municipal solid waste	-	TPD	770

Source: Energy and Carbon Emissions Profiles of 54 South Asian Cities, ICLEI-South Asia report 2009

Contribution to the total city level CO₂ based on the annual fossil fuel consumption is shown in the adjacent figure. The majority of the CO₂ emission is attributed to the residential sector (47%), followed by the urban transport sector (29%) and industrial sector (17%). Rest of the CO₂ emission is attributed to the commercial and municipal solid waste, which accounted for 7%. During the current efforts by NMC which are focusing on development of infrastructure assets and improvement of services, which is at its peak will certainly increase the per capita carbon footprint of Nagpur.

Figure 80: Contribution of various sectors to corporation's GHG emissions

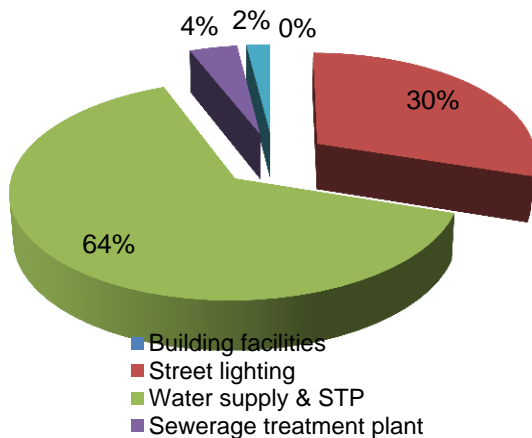


Source: Energy and Carbon Emissions Profiles of 54 South Asian Cities, ICLEI-South Asia report 2009

On other hand carbon footprint of the corporation (civic body) was also calculated and corporation’s fossil fuel consumption was as shown in the table below. Of the corporation’s total fossil fuel consumption, majority, 98% is attributed to electricity consumption and 2% for use of fossil fuels for transport vehicles. Based on the fossil fuel consumption of the corporation (NMC); the level of CO₂ emission during 2007-08 were about 7.8% of the total city emissions. Further, the breakup of corporation level CO₂ emissions is as follows:

- 64% - for O&M of water supply services i.e. WTP and pumping stations
- 30% - for illumination of street lights
- 4% - for O&M of sewerage services, i.e., STP and pumping stations

Figure 81: Contribution of various sectors to corporation's GHG emissions



Source: Energy and Carbon Emissions Profiles of 54 South Asian Cities, ICLEI-South Asia report 2009

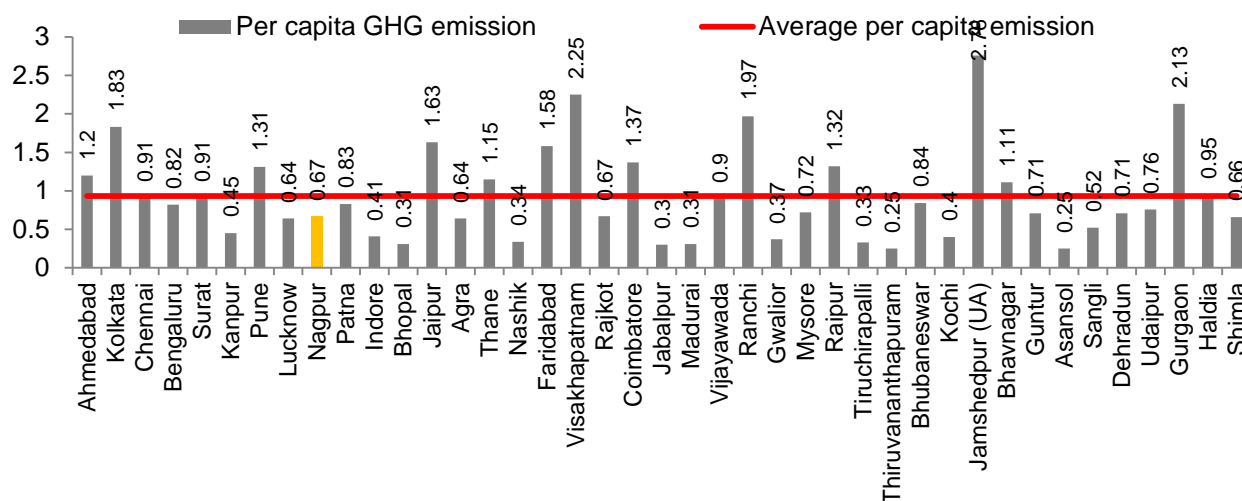
Table 78: Quantum of corporation fossil fuel consumption in Nagpur, 2007-08

Sector	Fuel type	Unit	Consumption quantity
Building facilities	Electricity (coal)	million kWh	0.22
Street lighting	Electricity (coal)	million kWh	33
Water supply & STP	Electricity (coal)	million kWh	75
Transportation	Diesel	kl	59
	Petrol	kl	1,268

Source: Energy and Carbon Emissions Profiles of 54 South Asian Cities, ICLEI-South Asia report 2009

In order to understand where Nagpur stands in terms of GHG emissions compared to other cities in India and pattern of GHG emissions of cities in the developed countries, per capita GHG emissions for 41 Indian cities have been considered from the study carried out by ICLEI-South Asia. The average per capita emissions for the 41 Indian cities is 0.93 T/year. The cities having highest and lowest per capita GHG emissions are Jamshedpur (UA), Jharkhand, and Asansol, West Bengal. Nagpur’s per capita GHG emissions are well below the average. Even out of 17 cities with million plus population, Nagpur ranks 11th in terms of per capita GHG emissions.

Figure 82: Per capita GHG emission for 41 Indian cities, 2007-08



Source: Energy and Carbon Emissions Profiles of 54 South Asian Cities, ICLEI-South Asia report 2009 and CRIS analysis

11.2.3 Urban heat island analysis for Nagpur

To understand and analyse the UHI effect for Nagpur, Mr. Yashwant Bhaskar Katpatal, Mr. Abhijeet Kute and Mr. Deepty Ranjan Satapathy has carried out a study on Nagpur in 2008 and published an article “Surface- and Air-Temperature Studies in Relation to Land Use/Land Cover of Nagpur Urban Area Using Landsat 5 TM Data” in a ASCE Journal ³³

The salient features of research paper published in ASCE Journal are as follows.

- The green areas and water bodies in the city indicate lower temperatures.
- The most densely populated areas such as Mahal, Itwari, Central Avenue Road, and Buldi fall in high-temperature zones
- The transportation network within the city indicates high temperature zones.
- In addition, the open spaces and barren land/wasteland, in and around Nagpur also show higher temperatures.
- The areas which have dense vegetation shows low temperature.

The research article arrives at the following conclusions:

- The areas with dense vegetation play an important role in regulating temperatures within Nagpur.
- Also, planned growth of vegetation, intermixed with concrete structures, can play a crucial role in controlling the formation of heat islands within the city.
- There is a need to emphasise proper eco-friendly construction in developing areas of the city, to control heat.

11.3 Climate resilience and carbon reduction strategy

A major challenge for cities facing rapid population growth is to maintain environmental sustainability. A review of a literature indicates that some factors that make cities sustainable include the presence of robust urban infrastructure, good governance and legal framework, participatory approaches for multi-stakeholder interactions, and replicability of best practices.

Given the nature of inter-linkages of services within an urban environment and consequently the highly connected nature of risks, policies relating to urban resilience and sustainability essentially need to address multiple sectors and dimensions. This includes, for example, land use planning, energy management, ecosystem services, housing and transport, water supply and sanitation, health services, and waste management, inter alia.

11.3.1 Available policies for climate change and disaster resilience

The national government’s Ministry of Environment and Forests (MoEF) deals with climate change issues within the country. In June 2007, a high-level advisory committee called the ‘Prime Minister’s Council on Climate Change’ was established to coordinate national action for assessment, adaptation, and mitigation. The committee’s mandate is to develop a coordinated response on climate change at the national level, formulate action plans, and monitor the key policy decisions. The Indian government launched the National Action Plan on Climate Change on June 30, 2008. The plan provides a directional shift towards the development of a low-carbon economy through multi-pronged, long-term, and integrated strategies.

³³ *Journal Of Urban Planning And Development* © ASCE / September 2008

Climate change and disaster management policies in India

- National Water Policy, 2012
- Disaster Management Act, 2005
- Energy Act, 2003, and National Electricity Policy, 2005
- Energy Conservation Act, 2001
- Coastal regulation policies
- Jawaharlal Nehru National Urban Renewal Mission (JNNURM), 2006
- Nehru Rozgar Yojana
- MSW Management and Handling Rules, 2000
- National Urban Transport Policy, 2006
- National Housing Policy, 2007
- National Task Force on Urban Perspectives and Policy
- National Action Plan on Climate Change to outline National Missions on key sectors: solar energy, enhanced energy efficiency, etc.

Source: Various climate change and disaster resilience reports

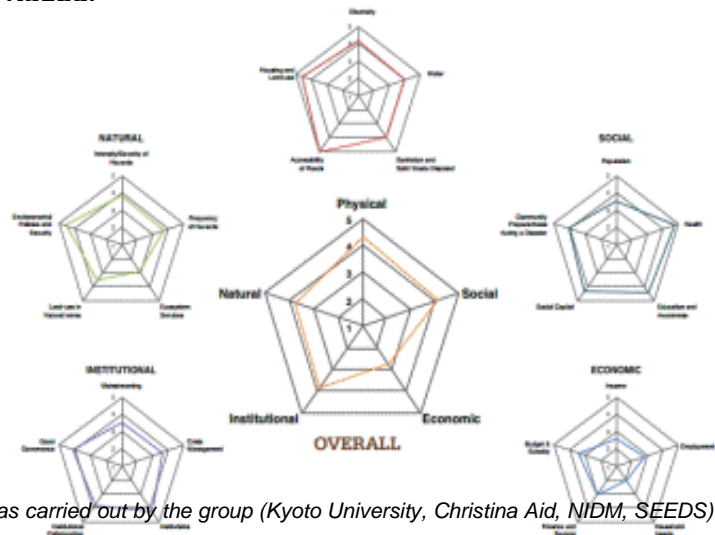
11.3.2 Nagpur’s climate change resilience

Nagpur is characterized by a strong physical resilience in terms of good connectivity of roads, access and availability of electricity, and water. Also the social resilience in terms of health facilities, good social capital and cohesion that can be termed as a strong preparedness for climate related disasters. The authorities are in a good shape and mostly prepared for such events. Economic resilience could be improved by increasing the income through availability of more employment, especially to the youth. Existing environmental policies are expected to protect the natural features and urban environment of the city from the potential harm of the striking hazards and may also improve the current quality of the ecosystem.

Based on the CDRI Framework, Nagpur’s climate and disaster resilience analysed³⁴ is shown below and preparedness as per the framework dimension is as follows.

- **Physical dimension**
 - ◆ Nagpur has good paved roads and good connectivity.
 - ◆ All the citizens have access to the electricity, which is available for the most part of the day. Around 25% of the electricity is kept as back-up for emergency services.
 - ◆ Hygienic conditions are ensured within the city
 - ◆ Better collection system of solid waste in place and only 25% of the waste is treated and recycled.

Figure 83: Climate and disaster resilience index for Nagpur



³⁴ Climate and disaster resilience profiling for Nagpur was carried out by the group (Kyoto University, Christina Aid, NIDM, SEEDS) during 2010.

- ◆ Most buildings are permanent structures, and 50% of the structures adhere to the building code for mitigating hydro-meteorological disasters.
- **Social dimension**
 - ◆ High literacy rate with access to primary and secondary education
 - ◆ Only 17% of the population in the city informal settlers
 - ◆ Disaster awareness programmes/drills organised more than once a year by the ULB
 - ◆ Social capital is good, as more than 40% citizens participate in the social or community group activities.
 - ◆ No significant social cohesion due to inadequate preparedness at household level and reduction in participating as volunteers in the times of disasters
- **Economic dimension**
 - ◆ More than 34% of the population is below poverty line, which is the biggest weak point.
 - ◆ Around 24% derived income is from informal sector
 - ◆ More than 25% of the young people are without a job.
 - ◆ Access and availability of credits to citizens for mitigating disaster impact at their end is good. More than 40% of the houses are insured
 - ◆ The ULB has sufficient funds for climate change and disaster risk reduction measures. About 5% of the budget is allotted for disaster resilience management.
- **Institutional dimension**
 - ◆ Disaster risk reduction measures have been incorporated in plans/policies of the education, transportation, and environment sectors, whereas focus on city level preparedness by ensure appropriate landuse and urban planning plan/policies has reduced.
 - ◆ Focus on implementation of disaster management plan has reduced as it is not an immediate threat.
 - ◆ The ULB is dependent on external support in times of disaster for mitigating the impact post event.
 - ◆ Formal and informal institutions are active during disasters, and the emergency team is trained twice a year and competent.
- **Natural dimension**
 - ◆ Occurrence of natural hazards like floods, heat waves, and droughts is occasional.
 - ◆ Quality of ecosystem in the city is poor and less than 25% of the city is vulnerable to disasters.
 - ◆ Policies to mitigate air pollution, waste management system (reduce, recycle, and reuse), reduction in water losses, etc. are in place.

11.3.2.1 Resilience initiatives in Nagpur city

NMC has taken some resilience initiatives towards protecting the local environment. NMC during the JNNURM phase has carried out lot of planning for various sectors, which in some manner trying to address the environmental concerns. Some of the initiatives have been summarized in the table below.

Sr.No.	Initiatives	Brief details
1	24 x 7 water supply, water audit, and Water monitoring	In Nagpur there water supply is through intermediate system, which has losses (NRW) more than 50% (including theft). Pressure on the potable water demand was increasing with the rise in the population and high NRW.

Sr.No.	Initiatives	Brief details
	cell	Thus, NMC taken up 24 x 7 water supply project which is still under implementation. Post implementation it will address the concern of pressure on potable water demand as NRW will be reduced to 20%. Also, O&M cost will come down. Resulting into cost recovery improvement.
2	Recycle and reuse of wastewater	At present, only 28% of the sewage generated is treated; the rest is discharged into the city rivers leading to Gosikhud dam. Thus, the city's water bodies are being polluted. So, NMC has prepared a recycle and reuse master plan for wastewater. Under this plan, around 275 MLD of treated waste water will be reused for cleaning of vehicles, gardens, industries, etc. Use of 275 MLD of treated water will further reduce the pressure on demand of potable water in the region.
3	Campaign for rejuvenating the Nag river	NMC's initiative to save the Nag river was done through a 15-day campaign. Campaign focused on cleaning of the river (de-silting of some of the important stretches of the river). Already NMC has prepared a rejuvenation plan for all the water bodies and will be implementing it under state and central funded programmes.
4	Rejuvenation of lakes	NMC's master plan for rejuvenation of water bodies also focused on the rejuvenation of the lakes in the city, which are considered as the heritage of the city. The rejuvenation project for two lakes is under the implementation stage. It will ensure ground recharging of the water table, controlling the surface temperature of the areas nearby to the water bodies, and to some extent in preserving bio-diversity.
5	Covering of the old dumping sites along with treatment of the solid waste and recycling of the waste	In order to prevent foul gases from evaporating into the atmosphere and polluting the air, old dumping yard was scientifically closed as per the MSW Rules, 2000. NMC is treating around 25% of the waste on daily basis to recycle and reuse the waste.
7	Use of renewable energy (solar energy)	Nagpur will become a model solar city by 2012 under the scheme ³⁵ . Up to 10% of energy consumption of this city has been targeted to be met through renewable energy to ensure energy efficiency. 50% of the cost will be shared by the ministry where Rs. 50 lakh will be provided for preparation of Master plan, solar city cell and promotional activities. Components that will be using solar energy will be street lights, lights in gardens, traffic lights, hoardings, solar water heaters etc. Energy efficient green buildings also will be promoted on a large scale in the city.

³⁵ <http://pib.nic.in/newsite/erelease.aspx?relid=47599>

Source: CRIS analysis based on various initiatives taken by NMC and review of sectoral plans, and DPRs

11.3.3 Review of various climate resilience frameworks

Through intense literature review for various climate resilience frameworks developed for assessing climate and disaster vulnerability of any city; following are the two climate resilience frameworks, which have been widely accepted and adopted for any climate resilience related studies.

Sr.No.	Framework	Developed by	Dimensions/variables	Brief about framework
1	Climate and Disaster Resilience Index (CDRI)	Kyoto University, Christina Aid, NIDM, SEEDS	<ul style="list-style-type: none"> ■ Physical ■ Social ■ Economic ■ Institutional ■ Natural 	Climate and Disaster Resilience Index (CDRI) is a framework that has 5 dimensions and 125 variables. The CDRI framework is more of a scoring method, which will score the responses based on the predefined values of each of the variables. The framework provides an overview of the existing scenario of the climate and disaster resilience of the city.
2	Hazard, Infrastructure, Socio-economic and Governance (HIGS)	iiied, Rockefeller Foundation, ACCCRN, IRADe	<ul style="list-style-type: none"> ■ Hazard ■ Infrastructure ■ Socio-economic and Governance 	Hazard, Infrastructure, Socio-economic and Governance (HIGS) is a framework developed by consortium of iiied, Rockefeller Foundation, ACCCRN, and IRADe, to assess the climate vulnerability and climate change resilience for cities, and a step towards the planning and enabling adaptation for better mitigation of the impacts. The framework has 4 dimensions and 23 variables.

As of now, no climate resilience framework has been prepared or adopted by NMC for Nagpur. As discussed earlier in the local environment section, NMC has shown concern for the local environment in the city, and annual review studies are carried out. Also, the studies identify areas of concern and recommend steps for mitigating the risk of the damage due to various activities - individually by citizens or by corporation.

12 Cultural Resources, Heritage and Tourism

12.1 Existing Framework for Heritage Zone

12.1.1 Monuments and protected sites in Nagpur

Monuments

As per the Archaeological Survey of India, **ancient monument** means any structure, erection or monument, or any tumulus or place of interment, or any cave, rock-sculpture, inscription or monolith that is of historical, archaeological, or artistic interest and which has been in existence for not less than 100 years and includes:

- Remains of an ancient monument,
- Site of an ancient monument,
- Such portion of land adjoining the site of an ancient monument as may be required for fencing or covering in or otherwise preserving such monument, a
- The means of access to, and convenient inspection of, an ancient monument;

Based on the classification norms, there are around 11 monumental sites in Nagpur. These sites are either religious or historical background. List of the monuments in Nagpur is provided below.

Table 79: List of historic monuments preserved by ASI in Nagpur

Sr.No.	Name of Monuments	Location
1	Remains of an old fort on the hill	Bhiwagarh
2	Fort	Dpnagartal
3	Temple of Mahadev	Ghogra
4	Stone Circle	Junapani
5	Stone Circle	Ghorar
6	Ancient Buddhist remains comprising monastery, stuppas, rock-cut inscriptions, etc.	Mansar & Kahari
7	Stone Circle	Nildho
8	Kalimata's Temple	Ramtek
9	Remains of a very old shrine at the western ride at the end of the Ramtek hill consisting of a portion of porch of a temple and the mutilated image of Trivikram Avatara of Vishnu	Ramtek
10	Tank and Mandapa opposite to the Dattatraya's Temple	Ramtek
11	Stone Circle	Takalghat

Source: Archeological Survey of India website

Protected site

The Archaeological Survey of India (ASI), under the provisions of the AMASR Act, 1958, protects monuments, sites, and remains of national importance by giving a two-month notice for inviting objections, if any in this regard.

There are at present more than 3,650 ancient monuments and archaeological sites and remains of national importance. These monuments belong to different periods, ranging from the prehistoric period to the colonial period, and are located in different geographical settings. They include temples, mosques, tombs, churches, cemeteries, forts, palaces, step-wells, rock-cut caves, and secular architecture as well as ancient mounds and sites, which represent the remains of ancient habitation. Recently, Nagpur circle was established which is looking after excavation activities for ancient sites around the country. There are 21 protected sites in and around Nagpur and list of the sites is provided below.

Table 80: List of protected sites preserved by ASI in Nagpur

Name of Protected Site	
Umred Fort	Shiva Temple
Chandramauli Temple	Shiva Temple
PanchaShikhari Temple	Mahadeva Temple
Datta Temple	Ganesha Temple
Harihara Temple	Vitthala Temple
Chhatri	Ram Ganesh Gadkari Temple
Chhatri	Saraswati Mata Payarikund
Chhatri	Archaeological site
Chhatri	Archaeological site
Jagannath Temple	Bholahudki Temple
Mahadeva Temple	

Source: Archeological Survey of India website

12.2 Heritage conservation initiatives

Based on the directives of Government of Maharashtra, City of Nagpur has identified various structures in the city that are having heritage value associated with it. The structures identified where, architectural buildings, religious places, cultural sites, natural features, etc. those structures identified and submitted to Government of India to include it in the list of Heritage structures for Nagpur were selected based on the following criteria's;

- Value of the architectural, historical or cultural reasons
- The date and/or period and/or design and/or unique use of the building or artifact
- Relevance of the site to social or economic history
- A building or group of buildings and/or areas of a distinct architectural design and/or style, historic period of way of life having sociological interest and/or community value.
- The unique value of a building or architectural features or artifacts' and/or being part of a chain of architectural development that would be broken if it were lost.
- Its value as a part of a group of buildings
- Representing form of technological development
- Vistas of natural/ scenic beauty or interest, including water front areas, distinctive and/or planned lines of sight, street , street line, skyline or topographical.
- Open spaces sometimes integrally planned with their associated areas having a distinctive way of life and for which are and have the potential to be areas of recreation.

Based on these criteria's, 204 structures were identified for inclusion in the “**Listing of heritage structures**” for Nagpur. Government of Maharashtra sanctioned 138 structures sanctioned during 2003 and 17 structures during out of 66 deleted structures where included in the listing during 2004. In total

there are 155 structures in Nagpur city which are listed and needs due attention for conservation and some of the old structure also needs restoration to be carried out.

It is worth noting that Nagpur is the 3rd city have its “**Listing of City Heritage structures**” and heritage regulations in whole of India. Also, Nagpur is the 1st city in India to have Natural features like Seminary hills, lakes and other such features on the “**Listing of City Heritage structures**”. Details of structures included in the “Listing of City Heritage structures” for Nagpur is provided in the Annexure. Brief on some of the iconic, famous, and most visited structures/attractions/places in Nagpur (also included in the “Listing of City Heritage structures” of Nagpur) are provided in the next section.

12.3 Historical Importance of the Nagpur

The history of the Nagpur has a certain background starting from the inscription is a record of grant of a village situated in the visaya (district) of Nagpura-Nandivardhana during time of Rashtrakoot king Krisna III in the Saka Year 862 (940 CE). However, tradition ascribes the founding of Nagpur to Bakht Buland, a prince of the Gond kingdom of Deogarh in the Chhindwara district. In 1743, the Maratha leader Raghoji Bhonsle of Vidarbha established himself at Nagpur, after conquering the territories of Deogarh, Chanda and Chhattisgarh by 1751.

After Raghoji's death in 1755, his son and successor Janoji was forced to acknowledge the effective supremacy of the Maratha Peshwa of Pune in 1769. Regardless, the Nagpur state continued to grow. Janoji's successor Mudhoji I (1788) came in to power in 1785 and bought Mandla and the upper Narmada valley from the Peshwa between 1796 and 1798, after which Raghoji II (1816) acquired Hoshangabad, the larger part of Saugor and Damoh. Under Raghoji II, Nagpur covered what is now the east of Maharashtra, Chhattisgarh, Orissa and parts of Madhya Pradesh and Jharkhand.

Nagpur was a scene of significant political activity during India's freedom struggle. The city hosted two annual sessions of the Indian National Congress and the Non Co-operation Movement was launched in the Nagpur session of 1920. After Indian Independence in 1947, Central Provinces and Berar became a province of India, and in 1950 became the Indian State of Madhya Pradesh, again with Nagpur as its capital. However when the Indian states were reorganized along linguistic lines in 1956, the Nagpur region and Berar were transferred to Bombay State, which in 1960 was split between the states of Maharashtra and Gujarat. The historical events occurred are given chronologically:

- 1861 A.D - Nagpur became capital of Central provinces.
- 1864 A.D - The Municipality of Nagpur was established.
- 1867 A.D - Between Nagpur to Mumbai, a new British train route - 'Great Indian Peninsula (G.I.P) 'railway' was laid down which transformed the future of Nagpur for good. The first train steamed out of the city in 1867 A.D.
- 1891 A.D - On 28th December 1891, the seventh all India Congress Session was organized at Lal bagh locality at Nagpur, in which the famous from Chennai P. Anandacharlu presided.
- 1899 A.D - The great plague strikes and takes a heavy toll in Nagpur.
- 1901 A.D -The foundation of Cotton market was laid. The C. P. Club was also founded.
- 1905 A.D - Indora was founded.
- 1911 A.D - Punjabi line was founded. The English daily 'The Hitvada' was founded.
- 1912 A.D - Foundation Stone of Vidhan Sabha was laid.
- 1920 A.D - 35th all India Congress session was held for the second time at Nagpur for which a new colony Congress nagar was laid down near Dhantoli Park. In this session over 60 thousand Congress representative attended.

- 1923 A.D - Nagpur University was founded. To mark the all India 'Jhanda Satyagrah Andolan' a protest rally was also organized at Nagpur in which Pt. Nehru and Rajrishi Tondon participated.
- 1924 A.D - The foundation of Ramdaspath was laid.
- 1925 A.D - The foundation of Lashkari bagh was laid.
- 1929 A.D - The foundation of new colony was laid.
- 1930 A.D - The foundation of Dhantoli was laid.
- 1934 A.D - Gondwana Club was founded and Hindi 'Navbharat' was launched.
- 1936-1938 A.D - The 'Hindustani Lal Sena' was found.
- 1940 A.D - Netaji Subhash Chandra Bose's 'Forward Block Party' organized it's second all India session at Nagpur.
- 1942 A.D - Nagpur participated in 'Bharat Chodo Andolan' in which Maganlal Bagdi's Lal Sena actively participated. He was imprisoned and the freedom fighter Shankar was hanged.
- 1947 A.D - The country got its freedom from the British yoke and Nagpur also participated in this celebration. All India Radio Station was founded at Nagpur.
- 1950 A.D - Nagpur declared as the capital of Madhya Pradesh.
- 1951 A.D -The Nagpur Municipality was converted to Municipal Corporation. Same year, the foundation of 'Bhartiya Jansangh' was also laid.
- 1956 A.D - On present 'Deekshabhoomi' Ground; Dr B. R. Ambedkar embraced Buddhism along with lakhs of his followers.
- 1957 A.D - On 17th Oct 1957, The 'Nag Vidarbha Andolan Samiti' was formed.
- 1958 A.D - The third all India session of congress party was organized at Abyankar nagar in Nagpur.
- 1960 A.D - Nagpur city and district were transferred to Maharashtra State, as a part of state reorganization. Since the first session of the state legislature was organized at Nagpur, the city was assigned the status of the second capital to Maharashtra.

12.4 Tourism Scenario

12.4.1 Major Tourist spot

Historical sites

Sitabuldi Fort

Sitabuldi Fort is the historical lineage of the place. This fort of Maharashtra was put up as early as in the year 1857, in the pre-independence era.

The person who established the Sitabuldi Fort was British by birth. The year of establishment of this well-reputed fort of Nagpur is the same as the year in which the very crucial battle of Plessey was fought.

From the pre-independent era, the Sitabuldi Fort has been one of the major tourist spots of Nagpur.



For the protection of the fort, a trough has been created around the fort. There is a memorial that is located inside the fort, which is meant to commemorate the dedication of the soldiers who lost their lives during the well-known war between the British and the Marathas.



Zero Mile-Stone of India
At the centre of Nagpur city "Zero Mile stone of India" is located from where the distance of all the cities of India is calculated.



Maharajbagh zoo
The charm of the Maharaja Baug and Zoo of Nagpur lies in the fact that it has a historical lineage, unlike many other places of its kind in India. The Maharaja Baug and Zoo at Nagpur was established a long time back by the rulers who used to belong to the Bhonsle dynasty. There is a fascinating garden, which is called the Maharaja Baug. The name of this garden suggests the historical background of the place. It is converted into a botanical garden housing a zoo, containing some rare species of birds and animals. The zoo comes under the Central Zoo Authority (CZA) of India



Religious sites

Deekshabhoomi

This sculpture is world known for its beautiful design and architect. Deekshabhoomi, the biggest "stuppa" in Asia, is a sacred monument of Buddhism at the place where B. R. Ambedkar converted to Buddhism along with his about 380,000 followers on October 14, 1956. Ambedkar's conversion to Buddhism is still guidance for the masses in India. Deekshabhoomi is situated in Nagpur, Maharashtra, a location regarded as a pilgrimage center of Buddhism in India. Thousands of pilgrims visit Deekshabhoomi every year, especially on Ashok Vijayadashmi and the 14th of October.



Balaji Temple

One of the reasons for the popularity of the Balaji Mandir at Nagpur is the picturesque surrounding of this religious place. It is located at the Seminary Hills, one of the most important places of interest in the city of Nagpur. The soothing natural beauty of the place adds to the tranquility of the temple area.



Adasa

This small village is the site of the ancient Ganesh temple, which houses a statue of the deity, believed to have been self-evolved. It is one of the eight Ashta-Vinayaks in Vidarbha.





Paradsinga


This is the place where Vaidehi Sati Anusuya Mata displayed her charisma and spiritual powers. The temple and dharmashala, amidst beautiful landscaping, is worth a visit.







Man-made sites

<p>Raman Science Centre</p> <p>The centre was developed to promote a scientific attitude, portray the growth of science and technology and their applications in industry and human welfare, and hold science exhibits. The centre is named after famous Nobel Prize winner Indian physicist Chandrasekhara Venkata Raman.</p>	
<p>Dragon Palace Temple</p> <p>Ogawa Society had constructed as International monument Dragon Palace Temple. The Temple had received Internationals and National Awards for its Structural design. More than 50 Lakh people from different parts of India visited Dragon Palace Temple. Many delegates from Japan, Sri Lanka, Thailand, Burma, America, U.K. and other Countries had also visited the International Place Centre. They recognise it as a source of Peace, Friendship and Harmony. Dragon Palace Temple is considered as a landmark of INDO-JAPAN friendship because Madam Noriko Ogawa from Japan had contributed financially to build up this International Temple in Central India. Dragon Palace Temple was inaugurated in the year 1999 at the hands of Rev. Nichiki Kato, Tokyo, Japan. In this Inaugural ceremony, 120 Buddhist monks from Japan were present and also representatives of 14 countries participated in this grand function. A record number of 5 lakhs people witness this inaugural ceremony. This International Dragon Palace Temple is being visited by 17 lakhs people annually.</p>	

Natural features – lakes & Rivers

<p>Seminary Hill</p> <p>The Seminary Hill lies at a distance of 6 km west of the old city. The hillock gets its name from the Seminary of St. Charles which is built at the top of the hillock. The main attraction is the spectacular view of the whole city of Nagpur that it offers. The climb up the hillock is an easy task and can even be attempted by people who do not take part in trekking on a regular basis.</p>	
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<p>Shukrawari Lake</p> <p>It is located near Raman Science Centre. The lake which is said to exist for more than 275 years, was established as a source of water supply by Chand Sultan, the then ruler of Nagpur. He created the water body in the form of streams being diverted to the Nag River, which was connected to the water reservoir and named it as 'Jumma Talab'.</p>	
<p>Futala Lake</p> <p>Futala Lake is one of the lakes in Nagpur in the Indian state of Maharashtra. Built by Bhonsle kings of Nagpur, the lake is known for its colored fountains. In the evenings the place is illuminated with halogen lights. The lake is surrounded on three sides by forest and a landscaped Chowpatty on one side.</p>	
<p>Ambazari Lake</p> <p>Ambazari Lake is situated near the western border of Nagpur. It is one of the 11 lakes in Nagpur. It is the largest and the most beautiful lake in the city. Nag River of Nagpur originates from this lake. The beauty of the lake is complemented by a well-kept garden, which is situated close to the lake. Created in 1958, it covers an area of approximately 20 acres (8.1 ha). The garden is called the Ambazari Garden. There is a musical fountain and a replica of a dinosaur, which are of much interest to the children who visit the place. People can take part in a variety of fun activities like boating and riding in the toy train. One of the most preferred games of the place is the Swinging Columbus Boat.</p>	
<p>Khernakala</p> <p>It is a renowned tourist spot that is home to a beautiful dam, which is positioned at the fringe of the verdant woodlands known as Khapra Range Forest. The ambiance that prevails at Khernakala, Nagpur is so soothing and placid that it will beyond a shadow of a doubt captivate you in a state of trance. The luscious green surroundings which are simply spellbinding blend into the aura created by the healthy environment prevailing there, to give rise to an awesome combination.</p>	

Wildlife tourism

Nagpur boasts of vast forests and tiger sanctuaries within a radius of few hundred kilometers. In fact, Nagpur has been declared as the tiger capital of the country. Some famous national parks surrounding Nagpur are:

- Tadoba
- Pench
- Nagzira
- Melghat
- Kanha
- Bordharan
- Umrer Karhandla

12.4.2 Tourist arrival

The Tadoba tiger reserve is the most popular among tourists with 1 lakh tourist footfalls last year. The number was merely 35,000 in 2003-04. The other reserves, Melghat and Pench, have also witnessed a rise in the number of tourists in the last few years.

Apart from this, every year around 2-5 lakhs people visit Nagpur during different times and festivals like Dhamma chakra Parivartan, Marbat festival, etc. also there is tourist footfall to visit other heritage and cultural places like Dragon temple, Paradsinga, Adasa, Raman science centre, etc. exact figure of the tourist footfall is not available for Nagpur, but there is lot of potential in developing the local heritage and tourism spot in the region to promote the tourist industry.

12.4.3 Existing tourist supported infrastructure

As present, there are few hotels in Nagpur which are 3 star rated hotels with total room strength of 208³⁶. The supporting infrastructure like restaurants, water supply, solid waste management, roads, transportation means, electricity, etc. is good; expect the number of hotels which is very low.

12.4.4 Existing Tourism Development Initiatives

Tourism development opportunities – Nagpur to be tiger hub

Nagpur is seen as tiger capital and government of Maharashtra has proposed a project worth Rs 75 crores to promote tiger tourism in Vidarbha. With three notified tiger reserves in Vidarbha, the department identified a potential for tiger promotion. The project will focus on the rehabilitation of nearly 25 hamlets and villages in Tadoba and Melghat reserves.

With a budgetary allocation of Rs 25 crore by state forest department, GoM and financial assistance of Rs 50 crore from the Gol, state forest department has plans to promote tiger tourism in Vidarbha. The department has put together a plan to double the number of tourists visiting tiger reserves in Vidarbha in the near future.

³⁶ Figures extracted from the report on "Identification of Tourism Circuits across India" prepared by IL&FS for Ministry of Tourism, Government of India during February 2012.

12.4.5 Role of Agencies involve in tourism development

Maharashtra Tourism Development Corporation

Maharashtra Tourism Development Corporation (MTDC) is a body of the Government of Maharashtra responsible for development of tourism in the state. MTDC has, since its inception, been involved in the development and maintenance of the various tourist locations of Maharashtra. MTDC owns and maintains resorts at all key tourist centers and having more resorts is on the plan.

Forest department, Government of Maharashtra

Department is responsible for preserving the natural resources like forest and the living community and integrate the interests of people and nature. Department promotes behaviors that conserve natural resources. Also, it supports and is engaged in applied conservation projects, which promote conservation. Department is committed to managing and operating the forests as a credible, successful, and self-sustaining enterprise with the support of people that are consistent with our mission and vision. Department looks after projects and management of the wildlife tourism in the Nagpur region.

Nagpur Municipal Corporation

NMC is responsible for planning, developing the heritage precincts and promote the local tourism in the city and region. Also, NMC is responsible for providing the basic infrastructure services like water supply, solid waste management, sewerage, electricity, etc.

There are associations in the city which are very active in promoting the local heritage and tourism related activities in city and region. Vidarbha Heritage Society (VHS) and Indian Institutes of Architects, Nagpur chapter are some of the associations very actively contributing their expertise to support and promote the heritage and tourism. Recently, VHS has started organising heritage walk in the city to promote the local heritage and to create awareness about the city's heritage.

12.5 Fairs and Festivals

12.5.1 Religious festivals

Nagpur is a city with a mix of population belonging to all the religions, and all the major festivals are celebrated by the citizens. Religious events are observed in the city throughout the year. Ram Navami is celebrated in Nagpur with shobha yatra with a procession of floats depicting events from the Ramayana. Processions are also held on important festivals of other religions such as Dhamma Chakra Pravartan Din, Vijayadashmi, Eid E Milad, Guru Nanak Jayanti, Mahavir Jayanti, Durga puja, Ganesh Chaturthi, Christmas, and Moharram.

Like the rest of India, Nagpurians celebrate major Hindu festivals like Diwali, Holi, and Dashera with enthusiasm. Celebrations lasting for several days are held on Ganesh Chaturthi and Durga Puja festivals. The city also contains a sizeable Muslim and Christian population who celebrate Eid E Milad and Christmas. Famous places of worship for Muslims include the Jamma Masjid-Mominpura and Bohri Jamatkhana-Itwari. The most famous Dargah of Hazrat Tajoddin Baba at Taj Baug. The St. Francis De Sales Cathedral is located in Sadar as well as the All Saints Cathedral church. There are many south Indian temples in Nagpur, like Sarveshwara Devalayam, where all south Indian festivals are celebrated, like Sitarama Kalyanam, Radha Kalyanam, Dhanurmasa celebration with Andal Kalyanam, Balaji temple in seminary hills where every year Bramhotsavam to lord Balaji and lord Kartikeya is celebrated here. Then there are two Ayyapa temples, one at Ayyapanagar and the other at Harihara Nagar, Raghvendaswami Mutt, Murugananda swami Temple at Mohan Nagar, Nimishamba Devi temple

Subramanyam devastanam at Sitabuldi and may more such south Indian temples are here in Nagpur as there is quite a good populations of south Indians in Nagpur.

12.5.1.1 Celebration of Dasher and Dhamma Chakra Pravartan

Deekshabhoomi, the largest hollow stupa or the largest dome shape monument and an important place of Buddhist movement, is located in Nagpur. Every year on the day of Vijayadashmi, i.e., Dasher, followers of Ambedkar visit Deekshabhoomi. The 14 April which is birth date of Dr. B. R. Ambedkar, is celebrated.

12.5.1.2 Marbat Festival

Marbat Festival held especially in the Nagpur city, is an important festival in this region which is celebrated to protect the city from evil spirits. During the festival, people of Nagpur venerate their God to save them from the evil spirits and they make statues of evil forces. These statues are taken to a vast ground as a procession, from all the areas of the city. They are burnt together on a belief that the city would be free from all types of evils. People purchase and wear new attires and ornaments on that day, and women prepare delicious delicacies and distribute the delicacies to everyone. Various cultural activities such as dance and drama are organized during the festival.

Figure 84: during Marbat Festival



12.5.2 Traditional – handicrafts exhibition haat

The Cultural Centre at Nagpur is the one place where tribal, cultural, and modern art forms of various member states like Maharashtra, Andhra Pradesh, Madhya Pradesh, Karnataka, and Chhattisgarh are preserved, promoted, documented, and disseminates art to the bigger mass. Also, its main objective is to provide a platform to the artists and new talent to display their art, which might be in the form of tribal art, folk dancing, singing, theatre, visual, etc.

Events are planned round the year by SCZCC, Nagpur, which helps keep the cultural values of the region alive amongst the Nagpurians.

Figure 85: SCZCC Cultural Centre in Nagpur



12.6 Key concern - Tourism development

Nagpur is blessed with heritage and cultural treasures in terms of having natural features, heritage sites, religious sites, and regional culture; but the main issue are

- Nagpur doesn't have any heritage conservation plan prepared by any of the authorities
- There are no regulations amended in the Town planning regulation for conservation and preservation of heritage site. There are two main areas/zones in Nagpur having many of the heritage sites/buildings being located in these zones.
- Gandhibagh Zone – this zone of NMC, has more than 115 sites which possesses heritage importance and needs to be preserved

- Civil lines area – It is the area where development has been carried out during British rule and has many old structures of that time which should be preserved.

13 Assessment of Institutions, Systems and Capacities

The detailed assessment has been carried on the functional mapping, transfer of functions as per the 74th CAA, structure of the organisations involved in the delivery of the services, reforms implementation under the JNNURM. The key findings of the analysis indicates key challenges such as multiple agencies involved in delivery of the services, limited role of ULB in delivery of the services and capacity constraints. The section would end with the key issues in the urban governance of the city.

13.1 Urban governance system

Urban governance is a complex setup of agencies with specific set of roles and responsibilities. NMC is the primary agency responsible for urban governance related activities.

Table 81: Key authorities responsible for provision of services in Nagpur

Sr.No.	Agency	Legislation
1	Nagpur Municipal Corporation (NMC)	Maharashtra Municipal Corporation Act, 2012
2	Nagpur Improvement Trust (NIT)	Maharashtra Regional and Town Planning Act, 1947 Gunthewari Act, 2001
3	Slum Rehabilitation Authority (SRA)	Maharashtra Slum Areas (Improvement, Clearance and Redevelopment) Act, 1971
4	Maharashtra Pollution Control Board (MPCB)	Maharashtra Prevention of Water Pollution Act, 1969 Water (P&CP) Act, 1974 Air (P&CP) Act 1981
5	Maharashtra Housing and Area Development Authority (MHADA)	Maharashtra Housing and Area Development Act, 1976
6	Maharashtra State Road Development Corporation Ltd. (MSRDC) ³⁷	Incorporated as a limited company under the Companies Act, 1956, on 2nd August 1996

Source: Based on the discussions with officials of NMC and review of various acts

13.1.1 Nagpur Municipal Corporation (NMC)

NMC is the governing body in the city of Nagpur. Firstly, it was constituted in 1864 as a municipal council with a jurisdiction limit of 15.5 sq km. Later, based on publication of the City of Nagpur Corporation Act, 1948, in the Madhya Pradesh Gazette, the council was promoted to a municipal corporation in 1951. For NMC, the governing legislation was CNC Act, 1948, till 2012. Recently, the State Government of

³⁷ MSRDC is a fully owned company of the State Government of Maharashtra, which facilitates and supports government agencies in dealing with the properties and assets comprising movables and immovables including land, road projects, flyover projects, toll collection rights, and works under construction which vested with the state government and were under the control of the Public Works Department.

Maharashtra has changed the legislations for councils and corporations in the state, which is applicable to Nagpur too. From December 2012, the new legislation for Nagpur is the Maharashtra Municipal Corporation Act, 2012.

NMC is solely responsible for providing the basic services within its jurisdictions. NMC is governed by the MMC Act, 2012. As per the provisions of the act, NMC is providing the various services to the citizens along with other key functions. Along with NMC, a few parastatal agencies are also involved in the provision of the key services within NMC's jurisdiction. The details regarding the parastatal agencies are discussed in the following sub-sections.

Roles and responsibilities of NMC

As per the MMC Act, 2012, and as per transfer of functions to NMC; it is responsible for the planning, implementing, construction, and O&M of the key sectors Like water supply, sewerage, municipal solid waste, storm water drainage, urban transportation, fire fighting, etc. and provides the following services:

- Provides all key services such as water supply, sewerage, sanitation, solid waste management, storm water drainage, roads, street lighting, housing for the poor, health and education, birth and death registrations, parking facilities and basic services to the urban poor people within NMC's limits
- Planning, designing, construction, operation, and maintenance of key services
- Enforcement of various plans and regulating development activities as per the state byelaws as applicable
- Levy and collection of various taxes, charges, and fees as per the applicable municipal corporation act
- Framing of polices and plans for sustainable development in the region
- Disclosure of the status of the services and various activities as per the applicable public disclosure law
- Public transport services
- Fire-fighting service

Administration framework at NMC

The city administration is vested with NMC. The total area within the municipal corporation's limit is 217.56 sq km. The organizational setup of NMC comprises a political wing and an executive wing. The elected wing consists of elected candidates from 72 electoral wards in the city and is headed by the Mayor. The administrative wing comprises various administrative wings, headed by a Municipal Commissioner, who acts upon the decisions of the General Body and manages the day-to-day functioning of the corporation. The organisation structure of NMC is shown below.

Nagpur is divided into 10 zones and each zone has zonal offices with the zonal structure headed by the Assistant Commissioner. The main responsibilities of zonal officials are to collect taxes, user charges, and property tax and resolve grievances related to services provided by NMC. Thus, the zonal offices work as execution agencies in their administrative areas.

Elected Wing

The corporation elects a Mayor who along with a Deputy Mayor heads the organization. The Mayor is responsible to administer the activities that are to be performed by various committees such as the Standing Committee, health and sanitation committee, education committee, water works, public works, public health and market committee.

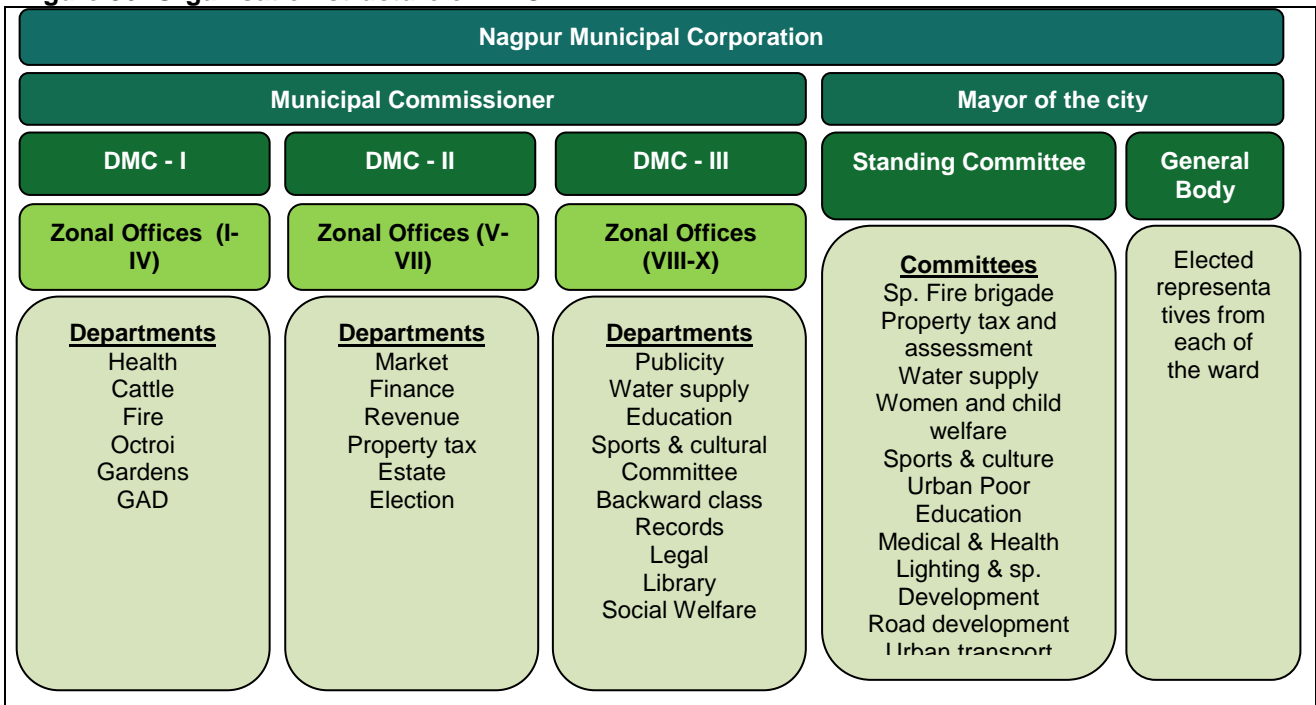
As per the governing act for NMC, the Standing Committee (SC) has been constituted and consists of the Chairman and a 15-member team, who all are elected representatives. Under the Chairman's guidance, the Standing Committee performs following activities:

- Oversees the working of the administrative wing
- Provides approvals and issues work orders
- Conducts the General Body meetings
- Decision making and scrutiny of regulations in best interest of ULB and citizens

The Standing Committee of NMC conducts weekly meetings where the Standing Committee members, Municipal Commissioner, and members of other special committees discuss the topic put forward by the Municipal Commissioner or any other committee. Once the Standing Committee has given its consent, the same is then taken to the GB meeting.

Once in a month, the General Body (GB) meeting is organised and managed by the Municipal Secretary of the ULB, which is chaired by the Mayor along with the Deputy Mayor, Standing Committee Chairman, and Municipal Commissioner. Main purpose of the General Body meeting is to discuss the administrative working of the ULB and to pass resolution for any new work, policy, and regulation or give approval for any matter related to the city development. The General Body of NMC consists of 145 elected representatives who are elected from 72 pravags/electoral wards in Nagpur.

Figure 86: Organisation structure of NMC



Source: GAD, NMC, Nagpur

Administrative Wing

The Municipal Commissioner is the head of the administrative wing, which consists of various departments. Appointed of the Commissioner is carried out by the state government from the IAS cadre. The Municipal Commissioner administered the administrative and execution works performed by the departments of Corporation. The Commissioner, on regular basis, calls for meetings with departments or with all the HODs for discussing the working of the departments. In the administrative hierarchy, most of the powers are vested in the Commissioner of NMC, which he has delegated to other officers at Class I rank like the Additional Commissioner, Deputy Municipal Commissioner, Assistant Commissioner, and

HODs. Delegation of powers has been carried out Based on the charge of the officer and department in which he is posted.

For smooth functioning, NMC's administrative structure is based on the various functions that NMC is supposed to carry out. There are 29 departments in NMC. The General Administrative department (GAD) is responsible for:

- Overall management of the various departmental working and framing working policy
- Assessment of training and capacity buildings needs of the officers and organise trainings, workshops, and seminars
- Dissemination of information etc. and issuing of circulars as per the government resolution to all the departments/offices of NMC
- Coordination with the rest of the departments of NMC for dissemination of information to the public through the PRO section
- Receive citizen grievances and circulate to concern departments
- Maintaining and updation of the service books of employees
- Under the human resource category/establishment section of GAD, it is responsible for following functions;
 - ◆ For framing of establishment policy
 - ◆ For recruitment of staff;
 - ◆ To manage staffing pattern and structuring of department;
 - ◆ To look into promotions of the staff members;
 - ◆ For fixation of pay and wages;
 - ◆ Managing Leave sanction and maintenance of database of service books;
 - ◆ Management of Pension;
 - ◆ To manage the transfer policy
 - ◆ Arrangement of logistics for all the officials and officers of NMC
 - ◆ Supporting department in logistic arrangement during event or festivals
 - ◆ Purchase of materials along with stores inventory management
 - ◆ Supporting and organising Standing Committee and General Body meetings. Also dissemination of information of the meetings to the departments and public as per NMC policy

Functioning of GAD is further segregated into seven sections: Committee Section, Special Desk Office, Public Relation Office, Prosecution Section, Labour Section, Establishment Section, and Record Section. Details of roles and responsibilities of each section of GAD are provided in the annexure. Also, functioning, roles, and responsibilities of various departments of NMC are provided in the annexure.

Human Resource Management at NMC

The establishment section of GAD of NMC is responsible for human resource (HR)-related activities in the corporation. The department is headed by the additional commissioner and he is further assisted by the department staff in various HR related activities. Bill clerks in each department/section are responsible for updating the service books (SB) of the employees, recording leaves, attendances, and promotions, etc., of their departments. By the end of every month, the bill clerks would prepare and send the salary requests to the Accounts department for payment of salaries through e-governance modules. The same process would continue throughout the year.

Staff Strength

There are in all, 28 departments in NMC. Some of the key departments are GAD, Water Works, Sewerage, Social Welfare, Market, Fire-fighting, Accounts, Health, Property tax, Education, and the

Town Planning department. There are in all, 12,532 regular sanctioned posts in NMC, of which 7,910 posts are filled and 3,874 posts are vacant. The department-wise and class-wise staff details have been provided in the annexure.

13.2 Urban reforms /transfer of function (CDP post 1st Generation scenario)

Transfer of functions as per 74th CAA

In order to strengthen the third tier of local self-government, the Government of India (GoI) has amended the Constitution in 1992 to make the ULBs self-sustainable and bring local participation in the planning and development of their respective cities. Under JNNURM, most of the functions and powers have been transferred by the state government to NMC. The 74th CAA has been implemented in Nagpur by the state government. Key important services provided by NMC to citizens under the functions delegated to it, are as follows:

- Regulation of land use and construction of buildings
- Roads and bridges
- Sanitation and SWM
- Public health - sewerage, water supply
- Safeguarding the interests of weaker sections
- Slum improvement/up-gradation
- Urban poverty alleviation
- Provision of urban amenities such as parks and playgrounds
- Promotion of cultural, educational, and aesthetic aspects
- Burial grounds and crematoria
- Cattle pounds
- Registration of births and deaths
- Public conveniences including street lighting, parking lots, etc.
- Regulation of slaughter houses
- Fire services
- Urban forestry
- Urban planning
- Socio-economic planning

All the functions related to urban governance and city administration, along with the responsibilities of providing mandatory and obligatory services in the city of Nagpur, are mainly carried out by NMC. Other agencies like NIT, SRA, and MSRDC also play a role in providing services in Nagpur. The following sections provide a snapshot of the institutional responsibilities, including the roles played by the private sector, for various urban infrastructure services.

Status of transfer of functions as per 74th CAA from state government to NMC is as follows,

Sr.No.	12th Schedule Functions	Status of Transfer and the name of the agency/s responsible
1	Urban planning including town planning	Not Transferred. ADTP, Town Planning Dept.
2	Regulation of land-use and construction of buildings	Transferred. NMC & NIT
3	Planning for economic and social development	Transferred. NMC & NIT

Sr.No.	12th Schedule Functions	Status of Transfer and the name of the agency/s responsible
4	Roads and bridges	Transferred. NMC and MSRDC
5	Water supply- domestic, industrial and commercial	Transferred. NMC
6	Public health, sanitation, conservancy and SWM	Transferred. NMC
7	Fire services	Transferred. NMC
8	Urban forestry, protection of environment and ecology	Transferred. NMC and state forest department
9	Safeguarding the interests of weaker sections of society including the handicapped and mentally retarded	Transferred. NMC
10	Slum improvement and up-gradation	Transferred. NMC and Slum Rehabilitation Authority (SRA)
11	Urban poverty alleviation	Transferred. NMC and SRA
12	Provision of urban amenities and facilities- parks, gardens and playgrounds	Transferred. NMC
13	Promotion of cultural, educational, and aesthetic aspects	Transferred. NMC
14	Burials and burial grounds, cremations, cremation grounds and electric crematoriums	Transferred. NMC
15	Cattle pounds, prevention of cruelty to animals	Transferred. NMC
16	Vital statistics including registration of births and deaths	Transferred. NMC
17	Public amenities including street lighting, parking lots, bus stops and public conveniences	Transferred. NMC
18	Regulation of slaughter houses and tanneries	Transferred. NMC

Source: Rapid baseline assessment report for Nagpur, MoUD

13.2.1 Status of JnNURM Implementation

Citizen's Charter

NMC has worked on improving its basic service provisions to citizens and the same has been provided in the citizens' charter prepared during 2012. Citizen charter for all the basic functions/services provided to citizens has been provided outside all the concern departments and offices of NMC. Details have been provided in form of posters and charts.

NMC has initiated the following initiatives to improve service delivery and strengthen municipal performance in the city:

Grievance Redressal System

NMC has developed a grievance redressal module under e-governance. NMC proposes to deliver citizen-centric integrated services through the NMC services portal. Access is either through online web portal or through manual registration at nearest citizen facilitation centre which have been set up across the city. Also, a new web portal of NMC offers many services online, which will save citizens' time and efforts.

Public Disclosure

NMC is disclosing the information in terms of physical progress and financial progress related to the infrastructure/development works executed by its various departments through its website from time to time. Also, the progress reports related to JNNURM projects have been uploaded on the websites.

13.2.2 City level reforms – mandatory and optional

Nagpur being one of the mission cities under Government of India's programme known as JnNURM. Under this programme, Nagpur as mission cities has to compulsory implementation of certain mandatory and optional city level reforms. These reforms aim to improve the administrative and governance process along, which also targets to revenue improvement measures like property tax, user charges, etc.

Some of the mandatory reforms focus on improving the existing system of budgeting and accounting, property tax, provision of basic services to urban poor. Following table provides status of mandatory reforms.

Table 82: Mandatory Reforms status

Sr.No.	Reforms	Current Status	Status Update
1	e-Governance setup	Implemented	All 61 modules which were proposed as E-Governance project (including 08 E-Governance modules which are part of reforms) have been developed and deployed. All the 29 departments of NMC are using the concern modules developed for the departments.
2	Shift to accrual-based double-entry accounting	Implemented	However both the system are running parallel
3	Property tax (85% coverage)	Achieved	NMC has consistently been achieving the target of 85% coverage in property tax on an average for over the last six years NMC has achieved 87% coverage during 2011-12.
	Property Tax (90% collection efficiency)	Achieved	
4	100% cost recovery (Water supply)	Achieved	The detailed are provided in the main section
	100% cost recovery (Solid waste management)	Not achieved	At present, there is no user charge for SWM services. NMC's Health department had prepared subsidy report for MSW services. Tariff for SWM user charges is proposed based on the subsidy report.
5	Internal earmarking of funds for services to urban poor	Earmarking 25% of total budget towards urban poor	
6	Basic services to urban poor	In progress	

Source: Nagpur's quarterly progress report, May 2013

Some of the optional reforms were focussing on improving the existing process of building plan approval process and byelaws for rain water harvesting, recycle and reuse of wastewater, etc. Following table provides status of mandatory reforms.

Table 83: Optional Reforms status

Sr.No.	Optional Reforms	Status Update
1	Introduction of Property Title Certification System	State government is implementing the modules
2	Revision of building byelaws – Streamlining the approval process	The building bye laws are in place

Sr.No.	Optional Reforms	Status Update
3	Revision of building byelaws - Mandatory rainwater harvesting in all buildings	The building bye laws are in place since 2010
4	Earmarking 25% developed land in all housing projects for EWS/LIG	State government is implementing
5	Simplification of legal and procedural framework for conversion of agricultural land for non-agricultural purpose	The revenue department of sub division would be responsible for NA conversion.
6	Introduction of computerized process of registration of land and property	State government is implementing the modules
7	Byelaws on reuse of recycled water	Yet to initiate this. Proposal with state government
8	Administrative reforms	In progress
9	Structural reforms	In progress
10	Encouraging public-private partnership	Implemented

Source: Nagpur's quarterly progress report, May 2013

Provision of e-governance system to improvise the governance system and also to facilitate some of the services online for citizens, implementation of e-governance was considered as a separate component and project of developing 61 e-governance modules was taken up by NMC. Status of 9 out of 61 modules that are part of the city level reforms is provided in the table below.

Table 84: Status of e-governance modules

Module	Status	Remarks
Property tax	Implemented	Deployed the property tax module and also the payment gateway on NMC website.
Accounting	Implemented	Tally based module is in place for double entry accounting system and the process of integrating it with budget codes, municipal receipts and expenditure has been carried out under E-Governance project. Recently, NMC has prepared the budget as per NMAM budget codes and NMC is planning to integrate the same with the accounts codes.
Water supply and other utilities	Implemented	Water supply module is in place. NMC has prepared the module but as per agreement a private operator is collecting the water user charges. The private operator has informed NMC that they will have their own module/application for water supply which is still pending.
Birth and death registration	Implemented	A computerized system of birth and death is in place. Database for birth and death is digitized and available since 1897.
Citizen's grievance monitoring	Implemented	A dedicated cell for citizen's grievance monitoring is in place and all the departments are provided access to the PGR module. Once Citizen's register their grievances online, it will be directed to the respective official of respective department. As per the timelines decided necessary action has to be taken, else case gets escalated to the senior official.
Personnel management system	Implemented	Module for personnel management system is in place; database for all the employees has been created.
Procurement and monitoring of projects	implemented	Module for procurement and monitoring is under implementation.
E-procurement	Implemented	Module is in place and under implementation.
Project/ward works	Implemented	Module for projects is already under implementation. Projects' status reports and measurement books are prepared and updated in the software itself.
Building Plan	Implemented	A separate module (Auto DCR) is in place for building plan

Module	Status	Remarks
approval		approval. All the approvals are given through this software.
Health programmes		
Licenses	Implemented	A computerized licenses module is in operation.
Solid Waste Management	Implemented	Module is in place and vehicle-tracking is done with the help of the GPS system.

Source: Nagpur's quarterly progress report, May 2013

13.3 Key issues and concerns

- Around 30% of the sanctioned posts are vacant, thus the existing staff members are given multiple charges. This is affecting the service delivery.
- NMC has a transfer policy, under which transfer are taken place within the department on regular basis. However, there is no handholding support and training to the staff on the new role and responsibilities. This is resulting into poor performance of the staff.
- There is no review and appraisal process and discussion with the employee on their performance, which is one of major area of concern.
- There is no defined job card. Hence, there is lack of clarity on roles and responsibilities at the key positions; leading to accountability issues.
- There is no monitoring system to track the status of the key services as against the timelines mentioned in the citizen's charter.
- There is no proper monitoring system to track the status of complaints. Hence, the complaints are not attended to within the prescribed time;
- There is no adequate IT infrastructure and trainings to the staff and hence most of the staff lacks basic computer skills.
- It is also understood that the majority of the staff do not have exposure to the relevant acts, policies, guidelines for administrative works.
- NMC has not carried out training needs assessment; there is no training curriculum and budget for trainings. Also, there are no initiatives for the skill development of the staff. Thus, the teams are updated about new technologies; best practices implemented elsewhere.

14 Financial Assessment

The detailed assessment has been carried on the revenue income, revenue expenditure, capital income and capital expenditure for the past five years. Moreover, detailed review of property tax has been carried since the property tax is one of the key revenues source. Overall, the section provides the performance of revenue and expenditure items and the further it has been compared with benchmarks.

14.1 First generation CDP: Key features of municipal finance

The 1st generation CDP provides financial analysis of NMC for the review period of five years (2000-01 to 2004-05). The status of Revenue account, capital account and collection of taxes is shown in the table below:

Component	Status as with 1 st generation CDP
Revenue Income	<ul style="list-style-type: none"> ■ Income from own sources accounts for 88% of total Revenue Income. ■ Own sources of income has grown at a CAGR of 6.4%. ■ Grants accounts for 12.5% of the revenue income. ■ 16% of the income is accounted for non-tax revenues.
Revenue expenditure	<ul style="list-style-type: none"> ■ The establishment expenditure accounted for 45% of the revenue income and 66% of revenue expenditure in the review period. ■ O&M expenditure accounted for 32% of the Revenue expenditure on an average in the review period.
Revenue surplus/Deficit	<ul style="list-style-type: none"> ■ The overall status of Revenue account indicated a net surplus
Capital income	<ul style="list-style-type: none"> ■ No grants provided to NMC during review period ■ In general, the capital income of NMC comprises loans, grants and contributions. ■ NMC has not availed of any loans in the past two years.
Capital expenditure	<ul style="list-style-type: none"> ■ Most of the capital expenditure has been on water supply, public works and roads. ■ The overall status of the capital account indicated a net deficit.
Octroi Taxes	<ul style="list-style-type: none"> ■ It accounts for 47% of the revenue income and has registered a CAGR of 8.5%.
Property tax collection efficiency	<ul style="list-style-type: none"> ■ Property tax collection efficiency increased from 53% to 52% in the review period. ■ Property tax registered a CAGR of 5.5% during the review period. Revision of the tax rates was not carried out during review period.

Key Issues identified under 1st generation CDP

- Water and sewerage tax were levied on flat rate system.
- There was no user charges/taxes on SWM services
- NMC could not able to recover 100% of cost on water and sewerage services.
- Salary and O&M expenditure accounts for majority of the revenue expenditure
- Establishment expenditure accounts for about 45% of revenue income and 66% of revenue expenditure during FY 2004-05.

14.2 Status of financial indicators

Based on the above assessment of financials of NMC, following are the key indicators showing the financial performance of NMC.

Table 85: Key financial indicators for NMC

Sr.No.	Indicators	Value
1	Own revenues as a proportion of total revenue receipts	94%
2	Per capita own revenues	Rs. 2785
3	Non-tax revenues as a proportion of own revenues	23%
4	Per capita property tax demand	Rs. 399
5	Coverage for property tax net	87%
6	Property tax collection performance	87%
7	Water charges collection performance	49%
8	Operating ratio (revenue expenditure/ revenue receipts)	0.63
9	Per capita O&M expenditure	Rs. 1000
10	Salary as percentage of Revenue Income	30%
11	Salary as percentage of Revenue Expenditure	40%
12	Staff per 1000 population	3.09
13	Debt Servicing Coverage Ratio (≤ 1.50) - (O.S+D.S / D.S)	8.29
14	Debt Service Ratio (Max 25%) - (Debt/Revenue income)	4

Source: Actuals figures for FY 2007-08 till 2011-12 and CRIS analysis

14.3 Existing Municipal Finance

The Chief Accounts and Finance Officer (CA&FO) is the head of the Accounts department. For proper distribution of the accounting works, the department is divided into two sections. One section is headed by the accounts officer, who takes care of matters for the following departments: PWD, Fire department, GAD, library, slum department, town planning, and civil court. The other section is headed by the Asst. Superintendent and is responsible for all the matters of various departments like health education, water works, garden, electrical, lighting, JNNURM, octroi, property tax, assessment, market, and enforcement. For administrative purpose, Nagpur is divided into 10 zones, and each zonal office is headed by an Assistant Commissioner. The zones have the right to approve bills up to Rs. 5 lakhs. After approval from the Asst. Commissioner, it is accepted in NMC.

Budget preparation

All the departments are asked to give an estimate of the revenues and the expenses of their department for the next year. The Accounts department then works upon these estimates so that the total of all the receipts matches the payments. The Commissioner meets the head of the department to discuss the budget. After discussions and changes, the Commissioner approves the figures of each department. These figures are presented to the Standing Committee. The Standing Committee approves the budget after making necessary changes.

As per the old method of budget preparation, the budget book includes capital and revenue heads. These are further divided into revenue income, revenue expenditure, capital income, and capital expenditure. The capital income generally comprises loans, while revenue income includes revenue collected from different sources like octroi, property tax fees, and others. NMC has prepared the budget

as per the National Municipal Accounting Manual for 2013-14. The new budget has been presented by the Standing Committee in May 2013. Budgeting is an annual process at NMC.

Recently, NMC prepared the budget (FY 2013-14) as per the National Municipal Accounting Manual. The new budget has been presented by the Standing Committee to be general body and has been approved. For preparation of budget, prominent involvement of senior officials like CA&FO, senior accounts officer, and budget officer of the accounts department is taking place. The budget is prepared twice a year. The first budget is prepared in March, which is the Commissioner's budget, and is presented and submitted to the Standing Committee for its review, providing recommendations and suggestions along with their expected budget allocation for each budget head. No other staff is involved in the budgeting process, which makes the entire budgeting process vulnerable, as if both the senior level officers retire from the services.

14.4 As-is Assessment of Municipal Financial

In order to review the status of municipal finances, the actual income and expenditure data was collected and further regrouped and recast. Then, an analysis was carried out to understand the revenue account and capital account status and the overall closing balance for the review period. A snapshot of the municipal finances is provided in the table below. Assessment of the municipal fund was carried out for the period starting from FY 2008-09 and ending in FY 2011-12. The following are the key highlights of the financial assessment. The detailed financial statement is provided in the annexure.

Table 86: Financial summary for FY 2007-08 till 2011-12

Items	2007-08	2008-09	2009-10	2010-11	2011-12	CAGR (%)
	Rs. in Lakhs					
Opening Balance	7480	15254	19316	19042	23189	24
Revenue Account						
Income	41700	45884	54090	66217	74577	25.5
Expenditure	33292	36295	39366	41322	49943	14.9
Surplus/ (Deficit)	8407	9589	14724	24894	24633	
Capital Account						
Receipts	12391	9111	8687	14346	14194	13.9
Payments	13008	12393	26245	34478	26449	32.1
Surplus/ (Deficit)	-617	-3281	-17558	-20131	-12254	
Extra Ordinary						
Receipts	2648	4528	5770	3360	3669	44
Expenditure	2665	6773	3210	3976	3202	-11.1
Surplus/(Deficit)	-17	-2245	2559	-616	466	
Closing balance	15254	19316	19042	23189	36034	42.4

Source: Budget books of NMC of FY 2008-09 till 2012-13 and CRIS analysis

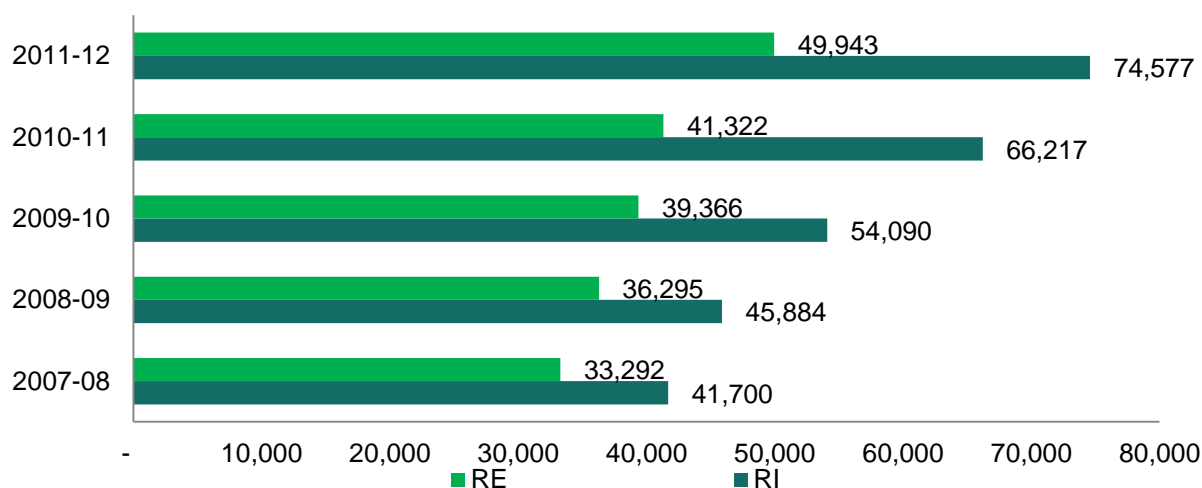
14.5 Revenue account

The revenue account consists of two components: revenue income and revenue expenditure. Revenue income and expenditure are linked to the daily administration related transaction of NMC. Revenue account of NMC over the last five years is shown in figure below. It is seen that NMC has revenue surplus in all the five years, with an average of Rs. 16,450 lakhs/year from 2007-08 to 2011-12.

Also, it is clear that revenue income has increased year-on-year basis from 2007-08 to 2011-12 from Rs. 41,700 lakhs to Rs. 74,577 lakhs. Similarly, revenue expenditure has increased from Rs. 33,292 lakhs to Rs. 49,943 lakhs from 2007-08 to 2011-12.

Revenue surplus was recorded in all the years by NMC, with maximum in FY 2011-12. From 2007-08 till 2011-12, the total revenue surplus recorded is Rs. 82,248 lakhs.

Figure 87: Revenue account of NMC (FY 2007-08 till 2011-12)



Source: CRIS analysis

Each of the revenue account components is described in detail in the same chapter.

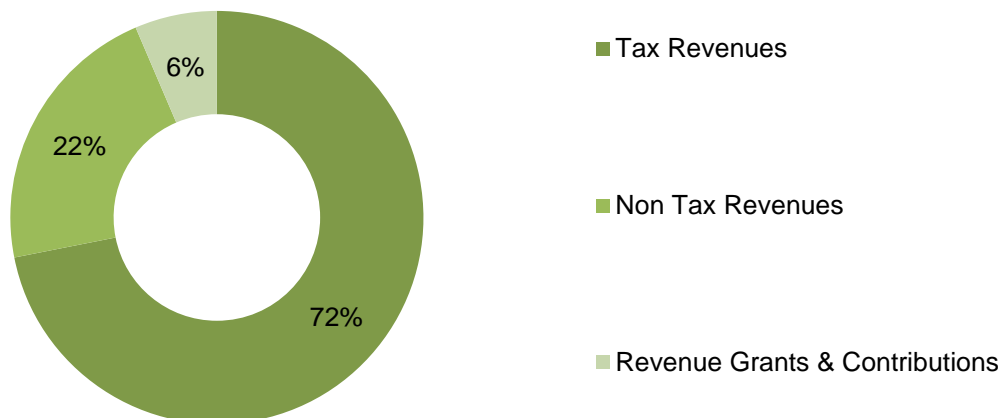
14.5.1 Revenue Income - NMC

Revenue income for NMC consists of own sources of revenue and revenue from grants and contributions. Further, own sources of revenue consist of tax revenues and non-tax revenues.

Analysis of the trend in revenue income for NMC shows an increase in the revenue from different sources. In the fiscal year 2011-12, the revenue income was Rs. 74,577 lakhs, while it was Rs. 41,700 lakhs in the fiscal year 2007-08. The growth in the income is 16% CAGR over the last five fiscal years. Steady growth rate for revenue income over the analysis period from 2007-08 to 2011-12 is not observed, but is increasing 10% in 2008-09 to 13% in 2011-12. During 2009-10 and 2010-11, it is observed to be around 18% and 22%, respectively.

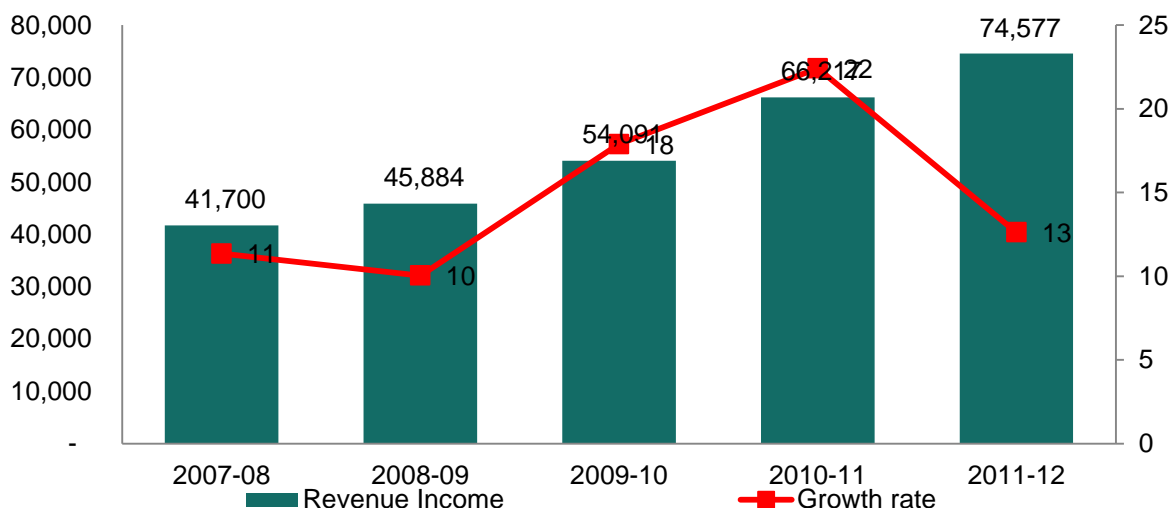
In the year 2011-12, the growth rate in revenue income was maximum 34%. Every year, income from octroi and property tax contribute maximum to the tax revenue and water user charges in the non-tax revenue category, respectively.

Figure 88: Revenue Income-NMC



Revenue income increased in 2008-09 due to town planning feeds and road damage fees apart from regular increase in revenue from property tax and octroi. In 2009-10, income increased due to the development charges and income from other sources; whose growth rate observed is 103% and 52%, respectively. In the year 2010-11, water, fire, and light taxes, revenue from the deposits, income from other sources, and education grants showed maximum growth rate by increase in revenue from Rs. 54,901 lakhs in 2009-10 to Rs. 66,127 lakhs in 2010-11. Revenue income increased in the year 2011-12 by increase in the revenue from town planning fees, advertisement fees and income from. The trend in the total revenue income for the five analysis years is shown in figure below.

Figure 89: Trend in revenue income for NMC



Source: CRIS analysis

- Contributions of different revenue sources like own sources, tax revenue, non-tax revenue, and grants; over the last five years from 2007-08 till 2011-12 is shown in figure below.
- Contribution of tax revenues in the total revenue income was in the range of 71%-75% of the total revenue income.
- Contribution of non-tax revenues in the total revenue income was in the range of 19%-22% over the last five analysis years.

- Contribution of revenue grants in the total revenue income has been in the range of 6%-7% for the analysis years of 2007-08 to 2011-12.

Figure 90: Contribution of different sources for revenue income - NMC



Source: CRIS analysis

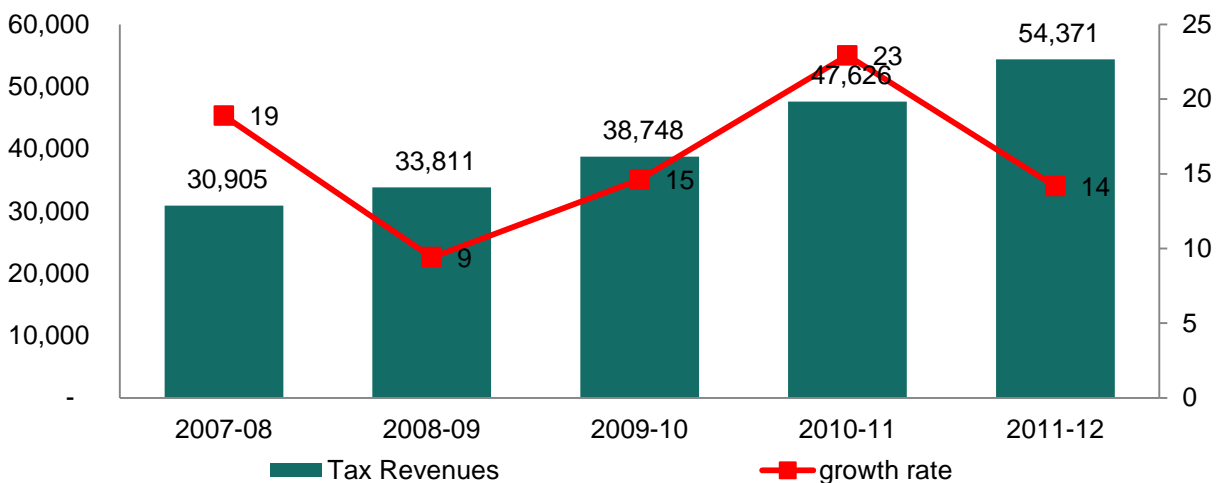
Own source of revenues

Own sources of revenues are divided in two parts: tax revenue and non-tax revenue. Both the components are discussed in the section below.

Tax revenues

On an average, tax revenue has contributed 72% of the total revenue income over the analysis period. From figure shown below, it can be observed that tax revenue has increased from the year 2007-08 with a share of Rs. 30,905 lakhs to Rs. 54,371 lakhs in 2011-12, with a fall in revenue in the fifth year (2011-12) by 9%; it also translates into a CAGR of 15%.

Figure 91: Trends in revenue income over the review period 2007-08 till 2011-12 - NMC

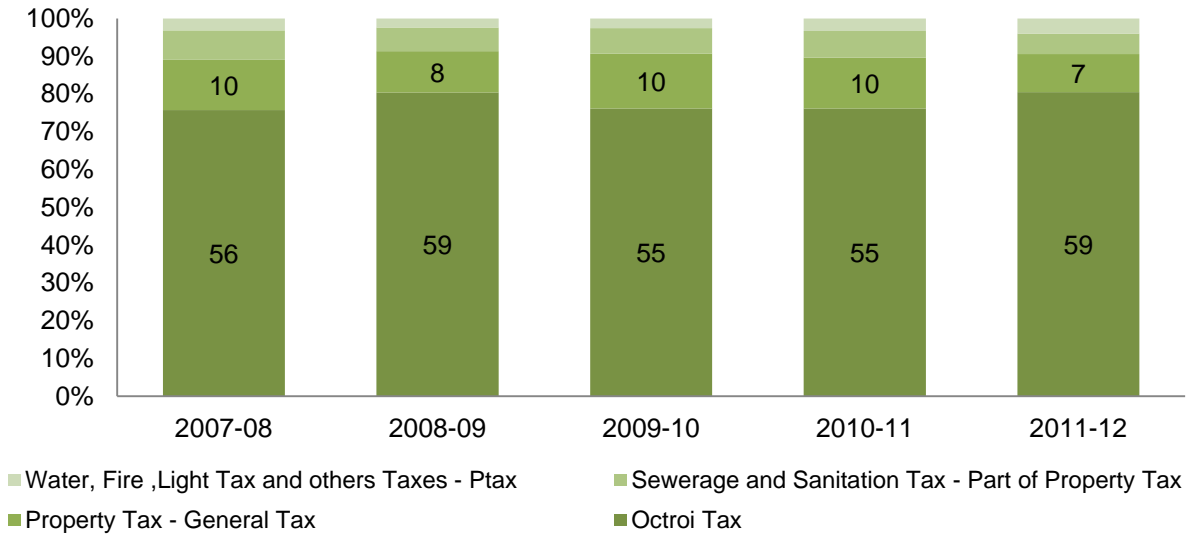


Source: CRIS analysis

On an average, year-on-year, the growth rate has been 12% for the tax revenue. In the year 2007-08, the growth rate of octroi increased by 16% due to the increase in the recovery of taxes, and that of property tax was on downside, -10%, due to non-recovery of the taxes as against the demand. Same trends continued in 2011-12 for octroi and property tax by recording 21% and -15% growth rates, respectively.

During 2009-10 and 2010-11, property tax recorded a positive growth rate, which is 52% and 14%, respectively.

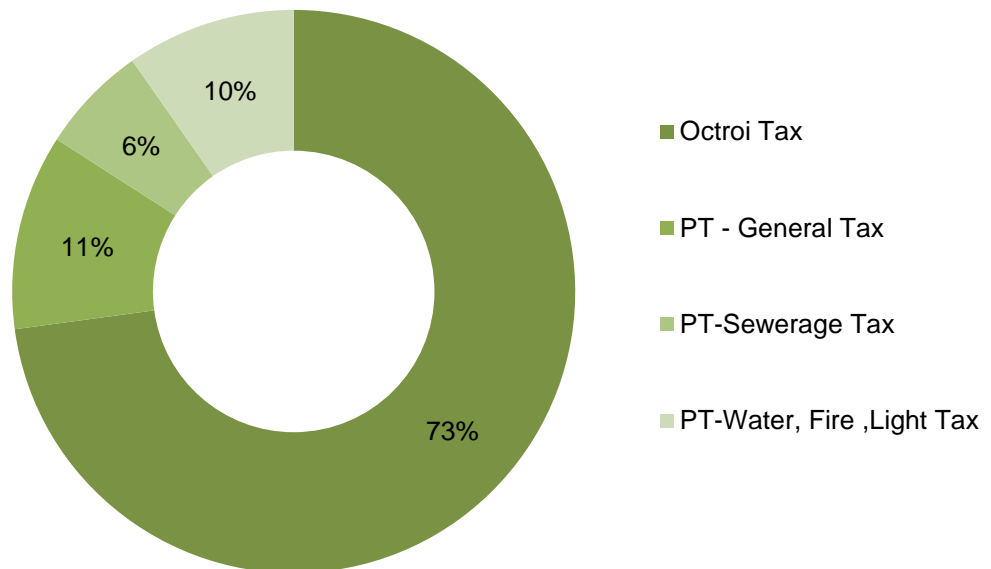
Figure 92: Contribution of tax revenue sources - NMC



Source: CRIS analysis

From the figure below, it is clear that property tax is the major contributor to the tax revenue, with 75%, followed by other taxes cumulatively, by 25%, on an average over the analysis years.

Figure 93: Share of different sources in tax revenue - NMC



Source: CRIS analysis

Property tax system

Property tax is a major contributor to the revenue income and own source of income after octroi tax. Assessment of the property tax system is important to determine the potential that can be tapped in for future. Also, to check the possibilities of revenue enhancement for property tax system at Nagpur.

a. Institutional arrangement

The property tax department has been divided into a tax assessment department and a tax collection department. The assessment department has 259 sanctioned posts, out of which 154 posts have been filled. More than 50% of the sanctioned posts for revenue inspectors and civil engineering assistants are vacant.

- Each revenue inspector (assessing inspector) is assigned 5-6 wards/circles.
- Currently, there are 21 revenue inspectors (out of 72 sanctioned posts) in the tax assessment department which can cover only 105 wards out of 136 wards. As more than 50% of the sanctioned posts for revenue inspectors are vacant, existing inspectors are allotted more than six wards (each revenue inspector is assigned more than 4000 properties).
- Thus, the strength of the staff members in the tax department is less than required, which increases the work load of existing staff members.

The tax department has, in all, 233 sanctioned posts, of which 196 posts have been filled by NMC; this amounts to 84% of the total sanctioned posts in NMC. The remaining 37 posts (16%) are currently vacant. Tax collectors account for 57% of the total sanctioned posts in the department. At the junior inspector position level, 50% of the posts are vacant. Also, NMC needs to fill the tax collector’s post. Currently, 17 tax collector posts are vacant.

b. Assessment of property tax

Section 118 of the Maharashtra Municipal Corporation Act, 2012, empowers NMC to collect property tax from the residents of Nagpur. The tax would be levied on all properties; the properties are classified into residential, non-residential properties and open plots. At present, all the assessable properties are broadly classified into three categories, namely, residential, non-residential, and open plots.

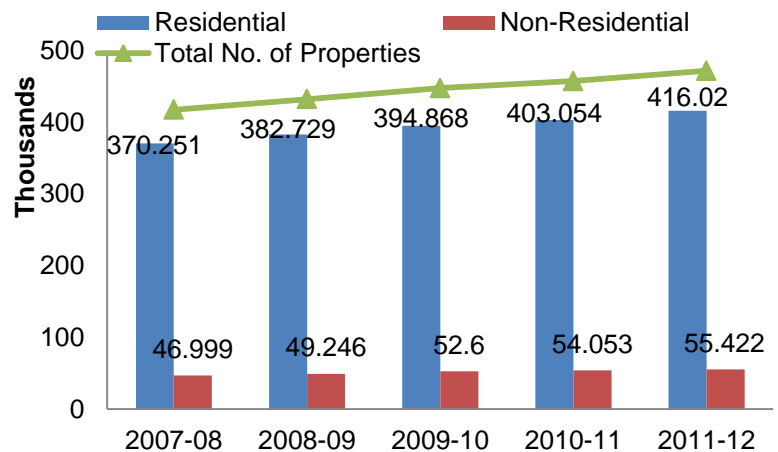
NMC currently follows the annual letting value (ALV) system for the assessment of properties, which is a percentage based system on rental value of the property. Different rates for different category of properties have been adopted based on the Maharashtra Municipal Corporation Act, 2012. (MMC Act) and property tax byelaws prepared by NMC. The rates for the residential and non-residential properties are in the range of 25-31% of the ALV. Property tax and other taxes are calculated based on the ALV within the NMC area. In order to determine the ALV of a property, the following factors are considered:

- Location of the property,
- Nature of construction (Type of construction),
- Age and present condition of the building,
- Level of service,
- Location advantage of the property,
- Prevailing rents for similar buildings in the neighbourhood, and
- Actual rents fixed either by contract or law (Applicable for properties on rents)

c. Coverage of properties

Currently, there are 5.32 lakhs properties in the register of the property tax department, of which 3.70 lakhs are residential properties (89%) and 0.46 lakhs are non-residential properties (11%). On an average, 2.5% growth in properties is observed in the case of Nagpur city. Growth in

Figure 94: Coverage of properties in Nagpur in the last five years



residential and non-residential properties is at 3% and 4%, respectively. Trends in the coverage of properties are been shown in the figure.

On an average, the number of properties increased each year at the rate of 2.4%. But in 2011-12, maximum growth (3.1%) in no. of properties was observed compared to other years. The following table presents the current coverage ratio of properties at NMC over the past five years.

Table 87: Coverage of properties

Year	Total properties (in lakhs)	Assessed properties (In lakhs)	Coverage of property tax (%)	Growth in total properties	Growth in assessed properties
2005-06	4.62	3.94	85%		
2006-07	4.71	4.02	85%	2%	2%
2007-08	4.83	4.17	86%	2%	4%
2008-09	4.94	4.32	87%	2%	4%
2009-10	5.02	4.47	89%	2%	4%
2010-11	5.16	4.57	88%	3%	2%
2011-12	5.32	4.71	88%	3%	3%

Source: Tax department, NMC, Nagpur

d. Billing and collection

NMC has 10 zonal offices, and property owners are required to pay the bills in their respective zonal office collection centres. Currently, demand bill issued is with annual demand and carried out once in a year, instead of issuing two demand bills every year with half yearly demand. The process of issuing of bills and tax collection adopted by NMC is as follows;

- NMC starts the bill preparation process in April and bills are dispatched in September. As per the NMC Act, 2012, NMC has to issue two half-yearly demand bills. NMC has to offer 4% rebate if the bill is paid before May and November.
- But as per current practice, if the property owners pay the tax before May of the current year's demand, a rebate of 4% is offered and 2% rebate if the bill is paid between July and November.
- The last month for payment of property tax is December; if a property owner fails to pay the bill within the grace period (October to December); a penalty of 15% is imposed on the outstanding bill amount. Post January, the tax collector and his team of the respective zone visits the defaulters to remind them of the outstanding/dues.
- NMC starts the recovery drive for arrears in December and the list of defaulters is prepared in January. NMC serves demand notices to the property owners who have failed to pay their taxes. The defaulters are served demand notices, and within 21 days from the date of serving the demand notices, the tax has to be paid at the respective zonal offices. In case the defaulters do not pay tax within the notice period, a warrant is immediately issued.

The schedule of billing, collection, and grace period provided to citizens to pay off their taxes is detailed in the table below.

Table 88: Schedule of billing and collection process

Tasks	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar

Tasks	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Billing preparation												
Bills dispatch												
Grace period												
Rebate period		4%		2%								
Interest on late payment										2% more for every month		
Preparation of defaulters list												
Collection of arrears												

Source: Tax department, NMC, Nagpur

e. Demand, collection, and balance statement

NMC has established collection centres in all the zones. Once the bill is received by them, the property owner has to pay the same in their zone's collection centre. Property tax current collection efficiency for FY 2011-12 stands at 87% against the current demand and that of arrear efficiency was 52% against the arrears demand. Overall, the collection performance for current demand and current arrears for 2011-12 stands at 69%. Arrears demand was more than current demand for Nagpur's property tax system, which clearly highlights concerns regarding the performance of the system. Against the current arrears over the last five years, the recovery of the same is 57% on an average. The demand collection balance statement for the last five financial years is shown in the table below.

Table 89: Demand, collection, and balance for property tax

Items in lakhs	2007-08	2008-09	2009-10	2010-11	2011-12
	Rs. Lakhs				
Current Demand	52,178	5,637	6,907	8,001	8,292
Arrears Demand	6,165	6,751	9,058	10,338	10,799
Total Demand	11,383	12,390	15,965	18,338	19,09
Current Collection	4,394	4,388	5,431	6,388	7,190
Arrears Collection	4,096	3,025	4,981	6,872	5,628
Total Collection	8,491	7,413	10,413	13,262	12,819
Collection Performance (%)					
Current efficiency	84%	78%	79%	80%	87%
Arrears efficiency	66%	45%	55%	66%	52%
Total efficiency	75%	61%	67%	73%	69%

Source: Tax department, NMC, Nagpur

f. Disputed/litigated properties

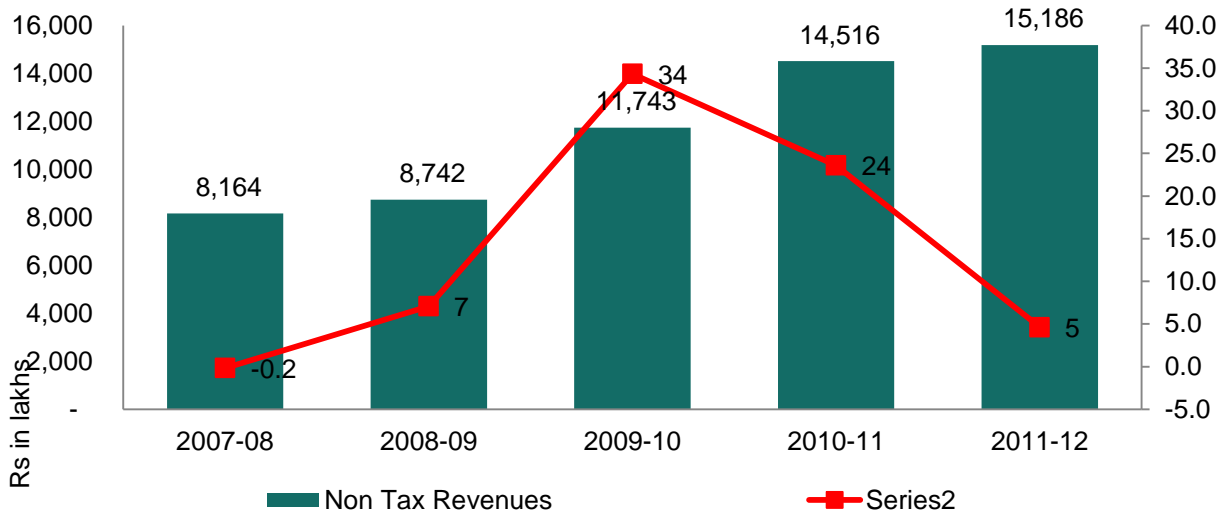
Currently, there are 17% disputed/litigated properties in Nagpur. The current demand of property tax for these disputed/litigated properties in 2011-12 was Rs. 16.82 crores and that of outstanding arrears is Rs. 32.68 crores. Total property tax recovery pending from disputed/litigated properties stood at Rs. 49.51 crores in 2011-12.

Non-tax revenues

On an average, non-tax revenue has contributed 22% to the total revenue income over the analysis years. For NMC, non-tax revenue increased from Rs. 8,164 lakhs in 2007-08 to Rs. 15,186 lakhs in

2011-12, growing at CAGR of 17% in the analysis period, major contribution of 10% on average in non-tax revenue is due water user charges.

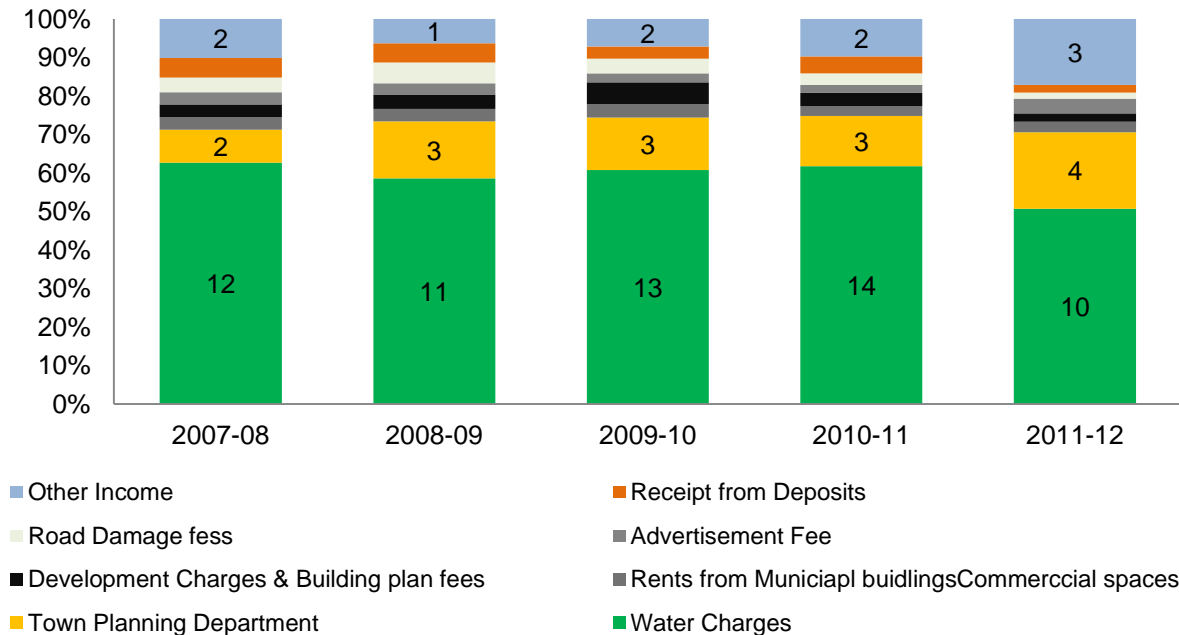
Figure 95: Trend in non-tax revenue growth - NMC



Source: CRIS analysis

In case of NMC, the major contribution is from water user charges, followed by the fees from the Town Planning department, contributing 3%, and income from other sources, 2.5%. Composition of non-tax revenue sources for the analysis period is shown in figure below. The major contributor to the non-tax revenue has been due stamp duty fee on sale of properties in Nagpur.

Figure 96: Composition of non-tax revenue - NMC



Source: CRIS analysis

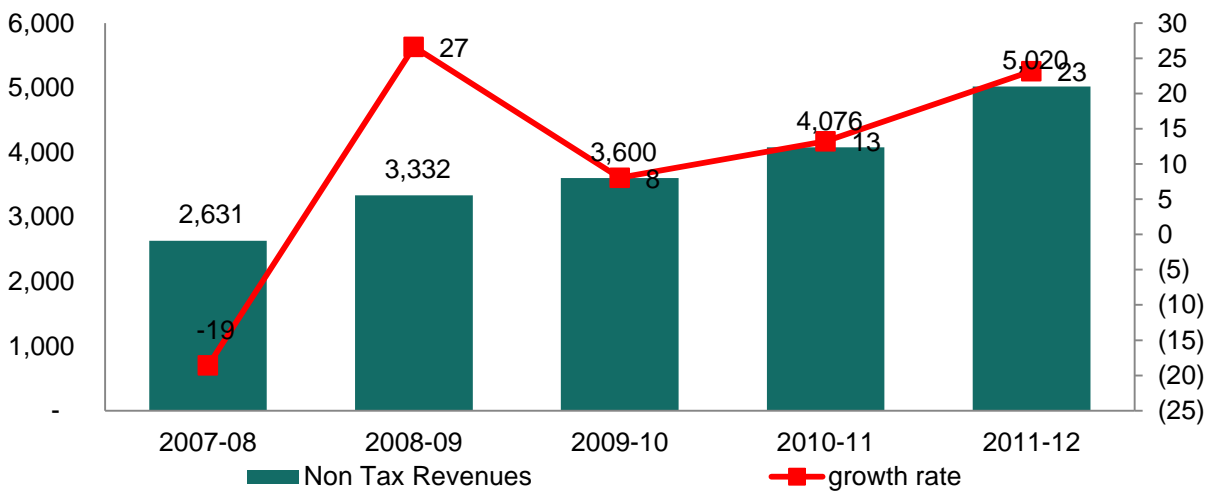
Water supply - User charges and taxes

Expenditure incurred by NMC on provision of water supply in Nagpur is recovered through water tax and water user charges. General water tax is collected as part of property tax. Apart from the general water tax, since FY 2011-12, NMC has introduced water user charges, which are on volumetric basis. The tariff structure of water user charges has been discussed earlier in chapter 7 of the report.

Assigned revenues and grants contributions

For NMC, revenue contribution of grants to the total revenue income is 6% on an average. NMC has received grants of Rs. 2,631 lakhs in 2007-08 and Rs. 5,020 lakhs in the fiscal year 2011-12. Revenue from assigned grants and contribution has increased from year-on-year basis since 2007-08 till 2011-12. The education grant of Rs. 3,197 lakhs during 2008-09 was the reason for increase in the income and sudden rise in the growth rate during 2008-09 by 65%.

Figure 97: Trend in assigned revenues - NMC



Source: CRIS analysis

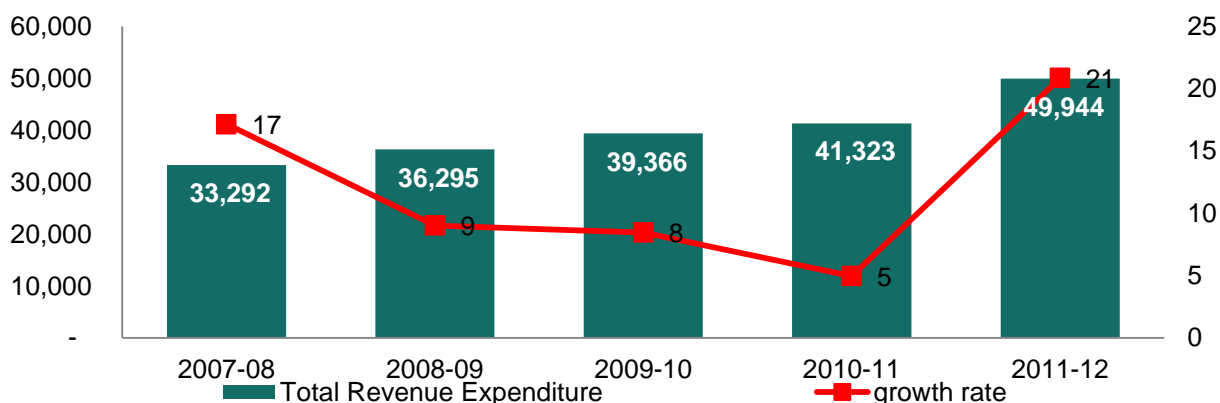
14.5.2 Revenue expenditure

Expenditure incurred by NMC on its day-to-day administrative operations. The key components of revenue expenditure are:

- Salary, Allowances, and Pension;
- O&M;
- Debt Servicing – Interest Payment

The revenue expenditure composition from 2007-08 to 2011-12 is shown in, with each components percentage share. Major share, of 50%, of the revenue expenditure of NMC is incurring for operation & maintenance. Rest 47% share for revenue expenditure is made up by establishment expenditure and 3% of debt servicing-interest payment.

Figure 98: Trend in revenue expenditure - NMC

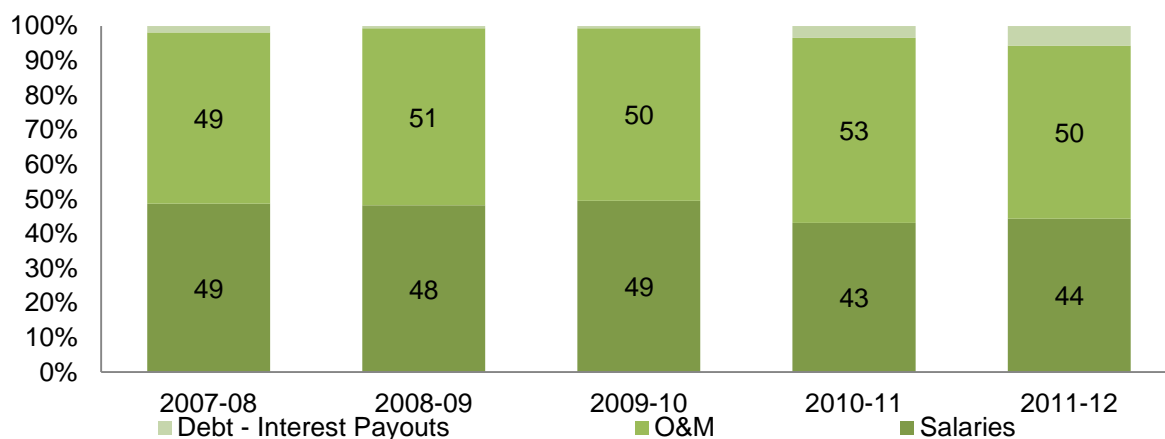


Source: CRIS analysis

Revenue expenditure increased from Rs. 33,292 lakhs in 2007-08 to Rs. 49,944 lakhs in 2011-12, registering a CAGR of approximately 11%. From the above shown figure the details of revenue expenditure for the five analysis years. On an average, the growth rate increase in revenue expenditure year-on-year basis for NMC is observed to be around 11%, with maximum growth rate observed in the fiscal year 2009-10, of 21%.

Contribution for revenue expenditure is shown in figure below. There is being three components, major contribution by salaries & allowances expenses incurred in employee salaries. On an average 3% contribution is from debt servicing, due to NMC taking up loan and bonds for implementation of JNNURM projects.

Figure 99: Contribution of various sources to the revenue expenditure

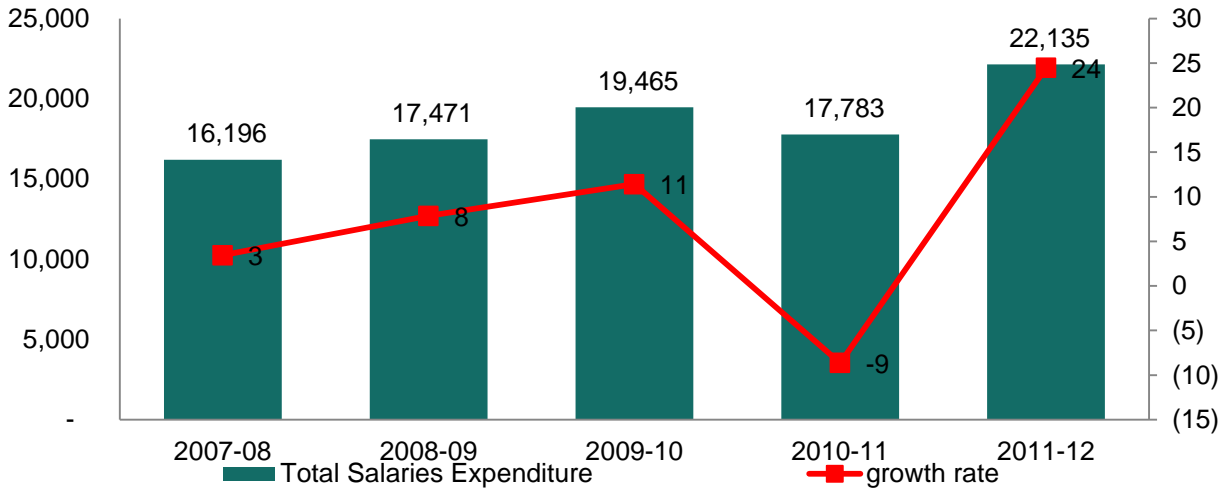


Source: CRIS analysis

Establishment expenditure

Establishment expenditure accounts for 47% of the total revenue expenditure on an average for the analysis period. In the year 2007-08, establishment expenditure reduced by 4% from 2007-08 till 2011-12; this is attributed to outsourcing of some of the services to private agencies. In 2011-12, revenue expenditure increase at a growth rate of 24%, and maximum growth in revenue expenditure was observed in the same year.

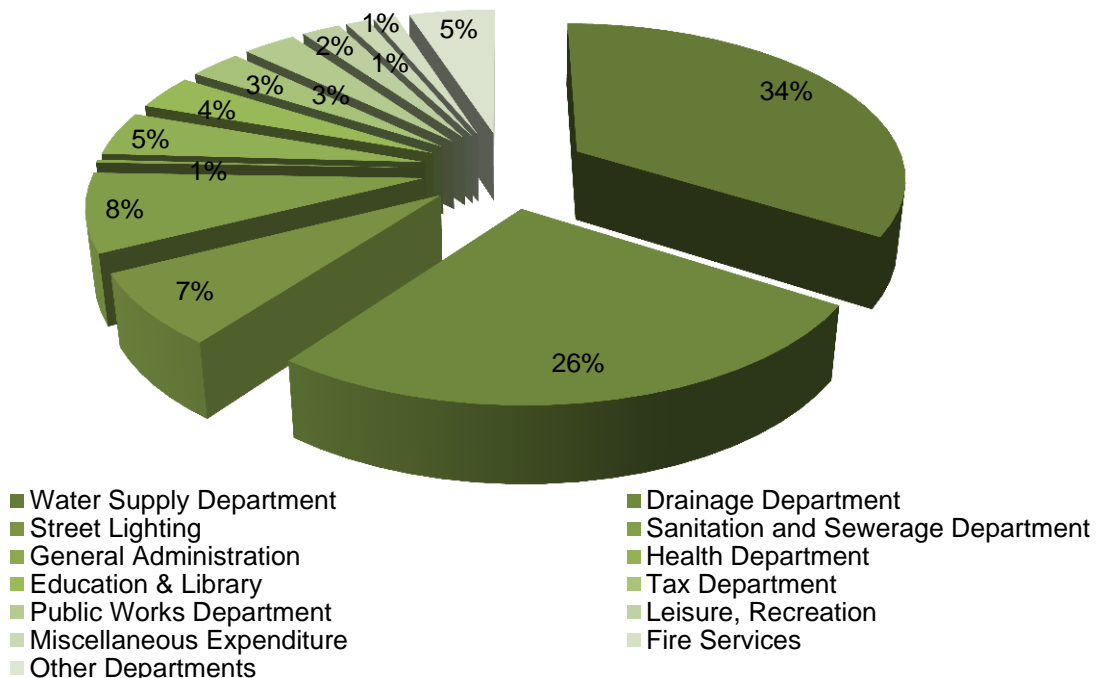
Figure 100: Trend in salary expenditure - NMC



Source: CRIS analysis

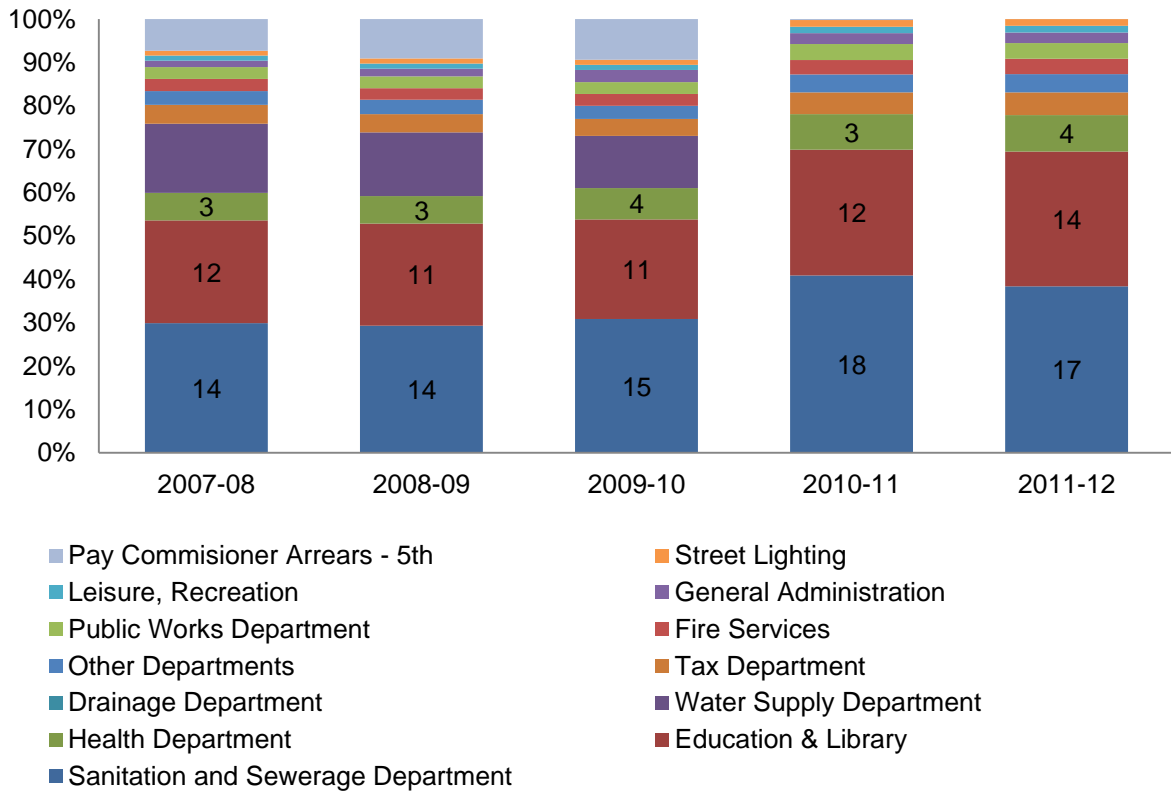
NMC has 29 departments, which accounts for establishment expenditure for paying off the salaries to the employees. Percentage composition of each department's establishment expenditure is shown in figure below. Salary expenses of the Sewerage & Sanitation department account for the major share of 34%, followed by 26% share of the Education & Library department. The remaining 40% is accounted by all other departments.

Figure 101: Share of various departments towards establishment expenditure



Source: CRIS analysis

Figure 102: Contribution of various departments to salary expenditure - NMC

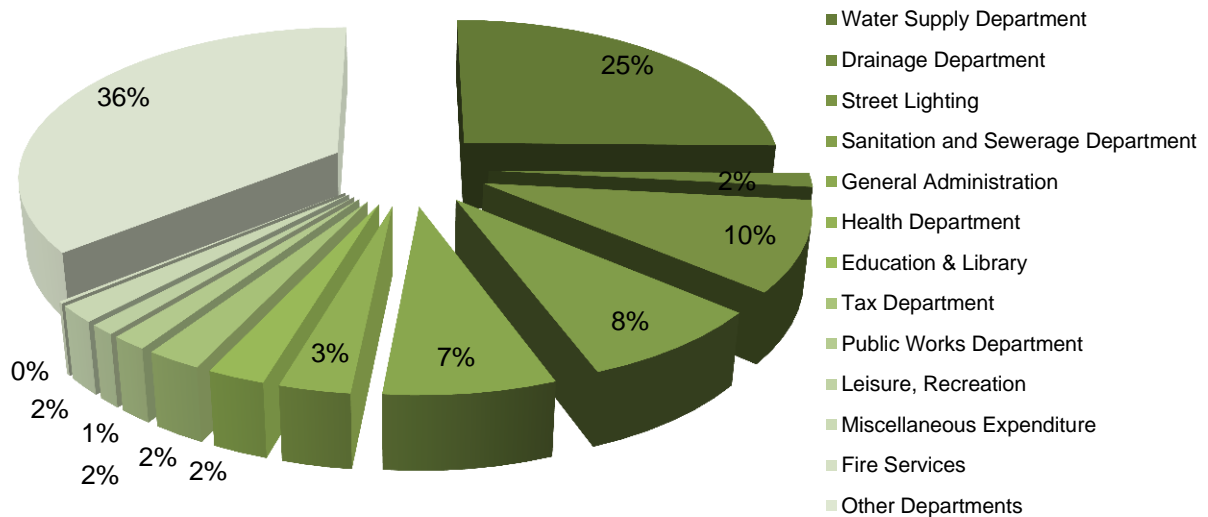


Source: CRIS analysis

Operation and Maintenance

The operation and maintenance expenditure incurred by different departments of NMC is shown in figure below. Major share of 25% in O&M expenses has been incurred by the Water Supply department. The second major share of 10% is by the Lighting department. Other departments like the Sewerage department and GAD contributed 8% and 7%, respectively, towards the total O&M expenses of NMC.

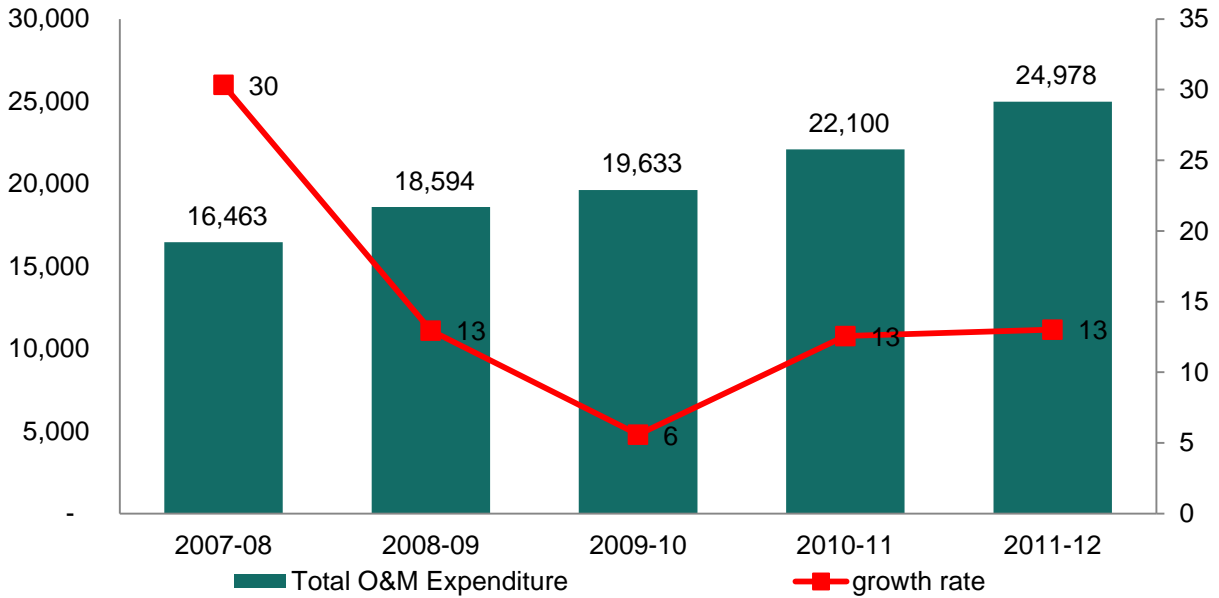
Figure 103: Contribution of various departments in O&M expenditure - NMC



Source: CRIS analysis

Expenditure incurred by NMC in the analysis period of 2007-08 till 2011-12 is shown in the figure below. On an average, the O&M expenditure has shown a CAGR of 11%. Maximum increase in the O&M expenditure is seen in the year 2008-09 with 13% growth rate. On an average, the growth rate year-on-year basis is observed to be 11%.

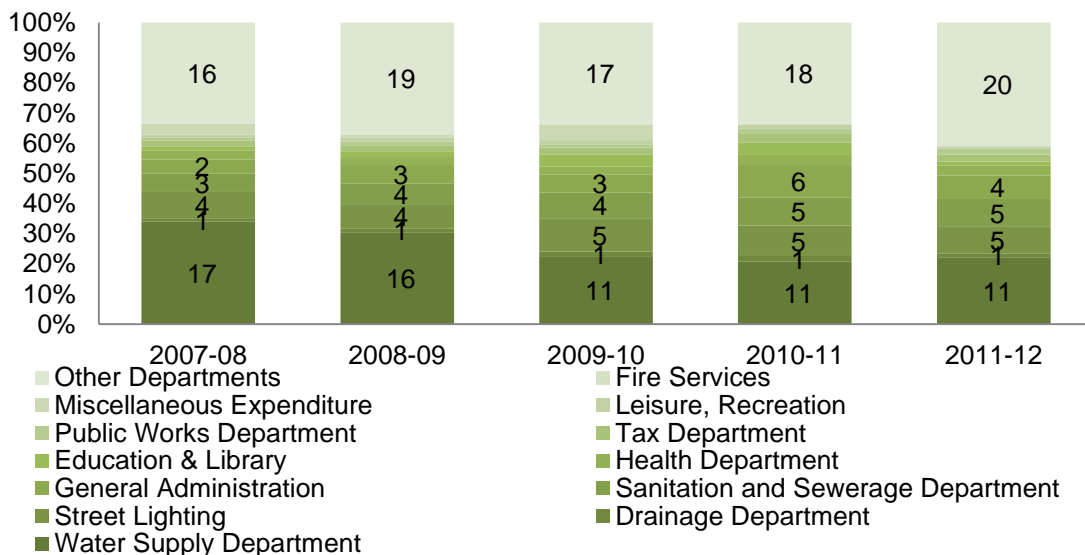
Figure 104: Trends for Operation and Maintenance - NMC



Source: CRIS analysis

Contribution of each component accounted for revenue expenditure is shown in the chart shown below. It is observed that each component of O&M has shown varying levels of growth rates from 2007-80 till 2011-12.

Figure 105: Contribution of various departments towards Operation and Maintenance - NMC



Source: CRIS analysis

14.6 Capital account

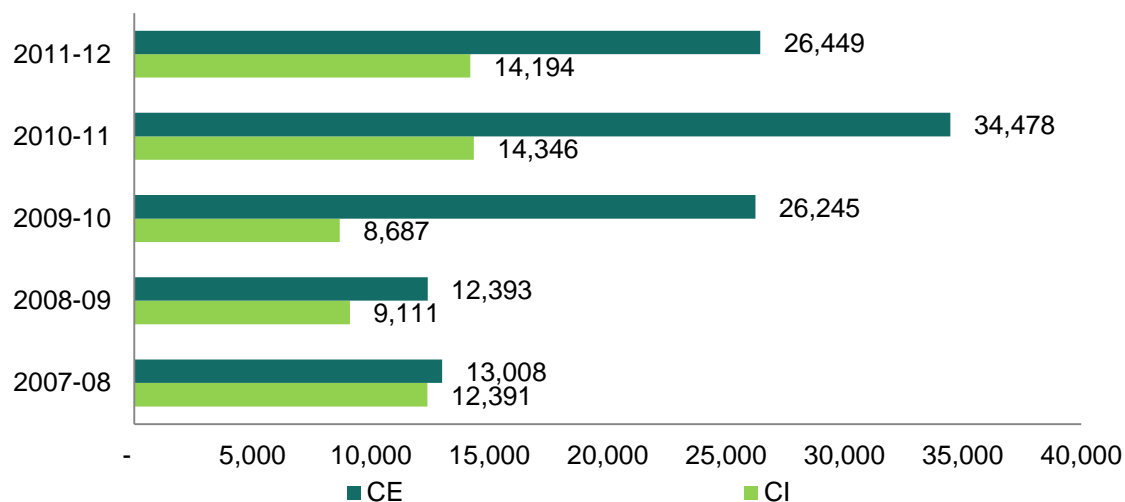
Capital account consists of the following two components:

- Capital Income
- Capital Expenditure

Capital income and expenditure of NMC from 2007-08 till 2011-12 are shown in figure below

. Over the analysis period, capital deficit is recorded by NMC for all the FYs, i.e., 2007-08, 2008-09, 2009-10, 2010-11, and 2011-12. Highest deficit was recorded during the year 2010-11 (Rs. 20,131 lakhs) and least deficit was recorded during the year 2007-08 (Rs. 617 lakhs).

Figure 106: Capital account - NMC

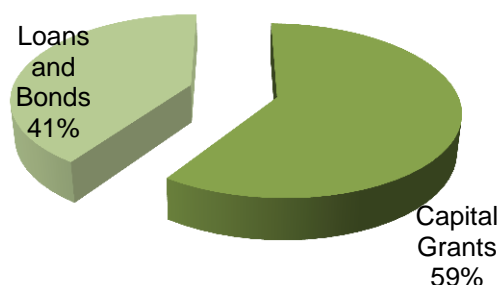


Source: CRIS analysis

14.6.1 Capital income

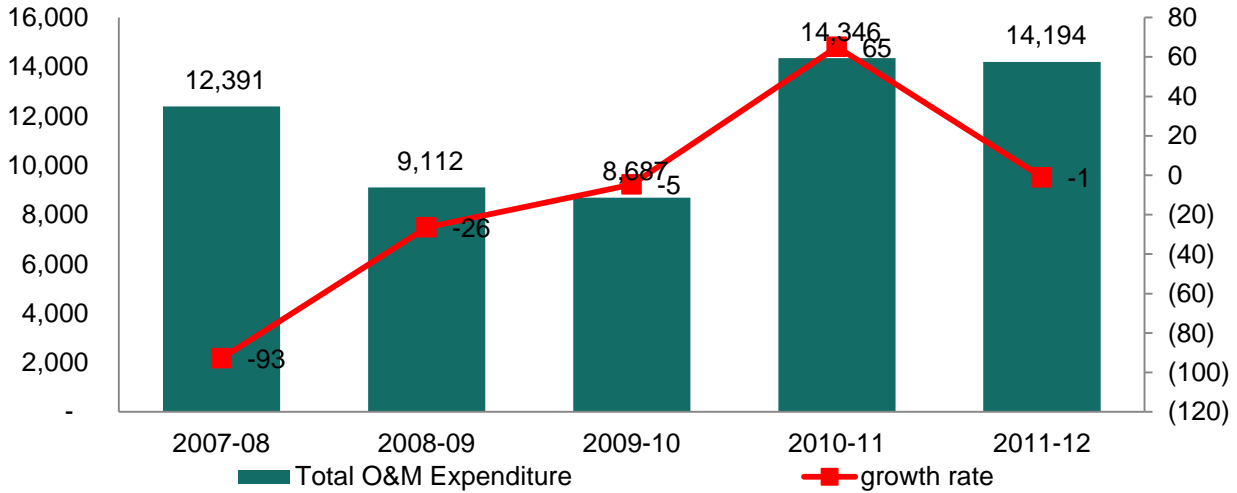
Capital income consists of grants received by NMC under various schemes for capital works or loans taken by NMC for various projects. The components of the capital income are grants and loans. From figure shown on the side, it is clear that the major source of capital income for NMC is grants, and NMC has received capital grants for various works, with major grant revenue from the central and state governments under JNNURM

Figure 107: Share of sources in capital income - NMC



Source: CRIS analysis

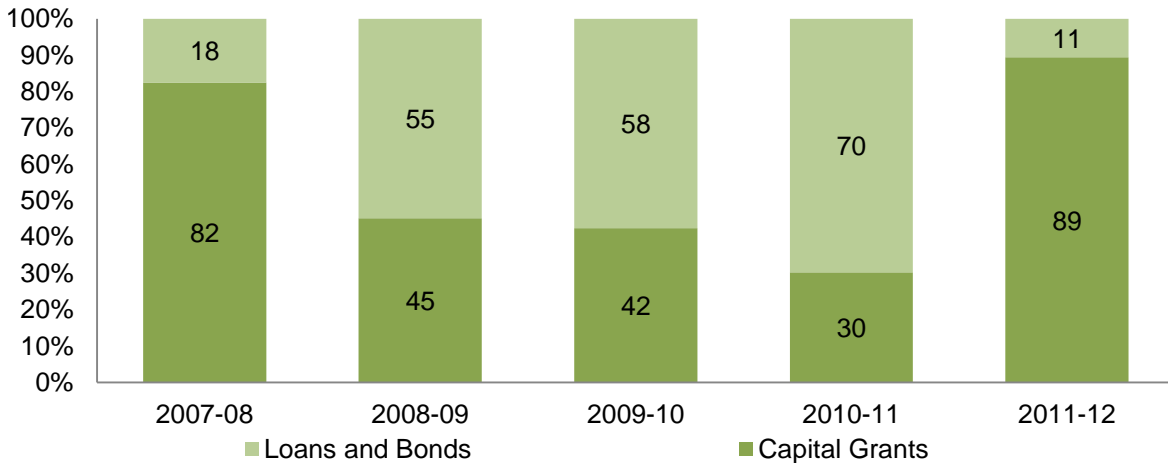
Figure 108: Trend in capital income - NMC



Source: CRIS analysis

Capital income has shown varying levels of growth rate over the analysis period from 2007-08 till 2011-12 (figure shown above). Composition of each source of income contributing to capital income over the analysis period is shown in figure below.

Figure 109: Contribution of various sources towards capital income - NMC



Source: CRIS analysis

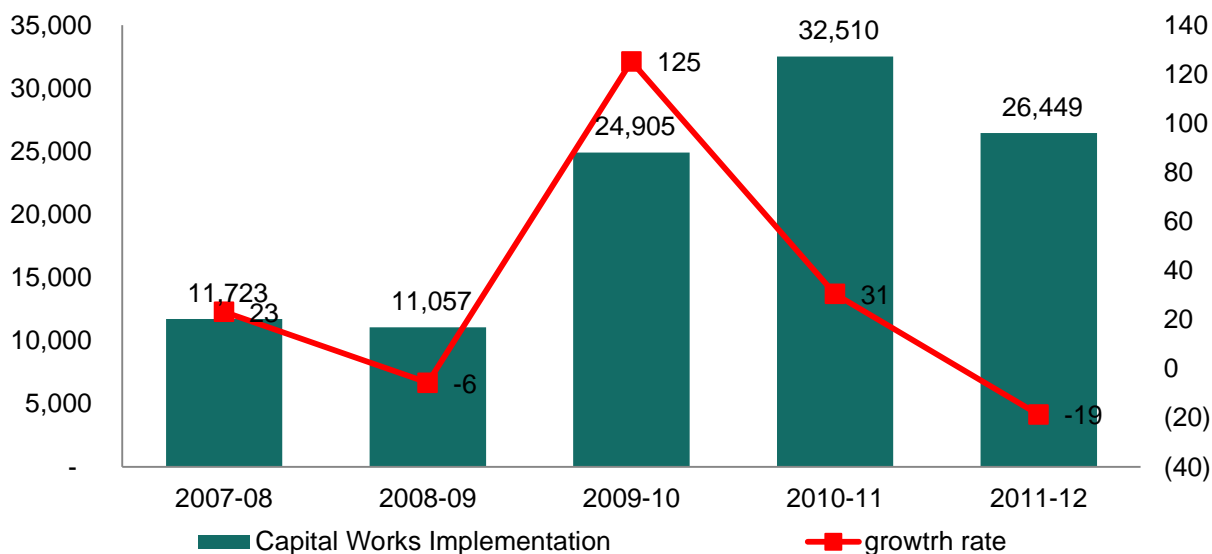
From 2007-08 till 2011-12, NMC has received total grants of Rs. 35,061 lakhs from different sources. It is seen that from 2007-08 onwards, grants received by NMC increased due to major portion of grants were from state and central governments under JNNURM. Other grants like DPDC grants, special development grants, and other grants also were received by NMC from various sources. On an average, 50% of the share in capital grants was of JNNURM grant-in-aid from central and state governments.

14.6.2 Capital expenditure

Capital expenditure consists of capital expenses incurred by NMC for carrying out various regular capital works and other capital works under own, state, and central schemes. Capital expenditure has increased from Rs. 15,467 lakhs in 2007-08 to Rs. 30,988 lakhs in 2011-12. Capital expenditure increased by two

fold in 2011-12 compared to 2007-08, but there is no steady increment in the capital expenditure observed and is varying over the analysis period.

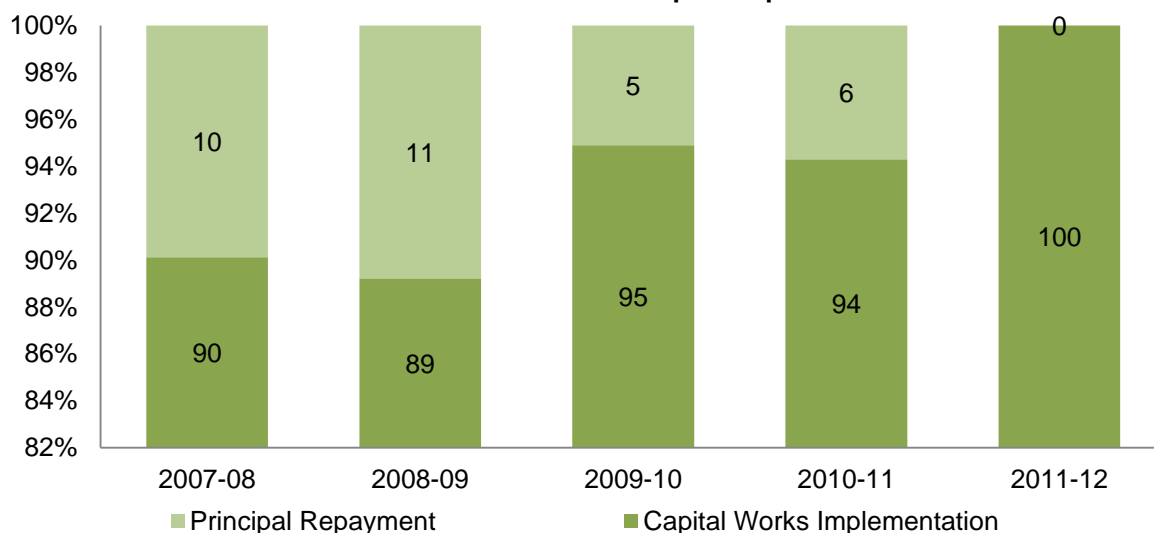
Figure 110: Trend in capital expenditure - NMC



Source: CRIS analysis

From figure, it is observed that expenditure on capital works form the major share of capital expenditure for NMC. Share of expenditure on capital works on an average is 94% of the total capital expenditure. Contribution of expenditure for capital works and principal repayment during the five years is shown in figure below.

Figure 111: Contribution of different sources towards capital expenditure - NMC

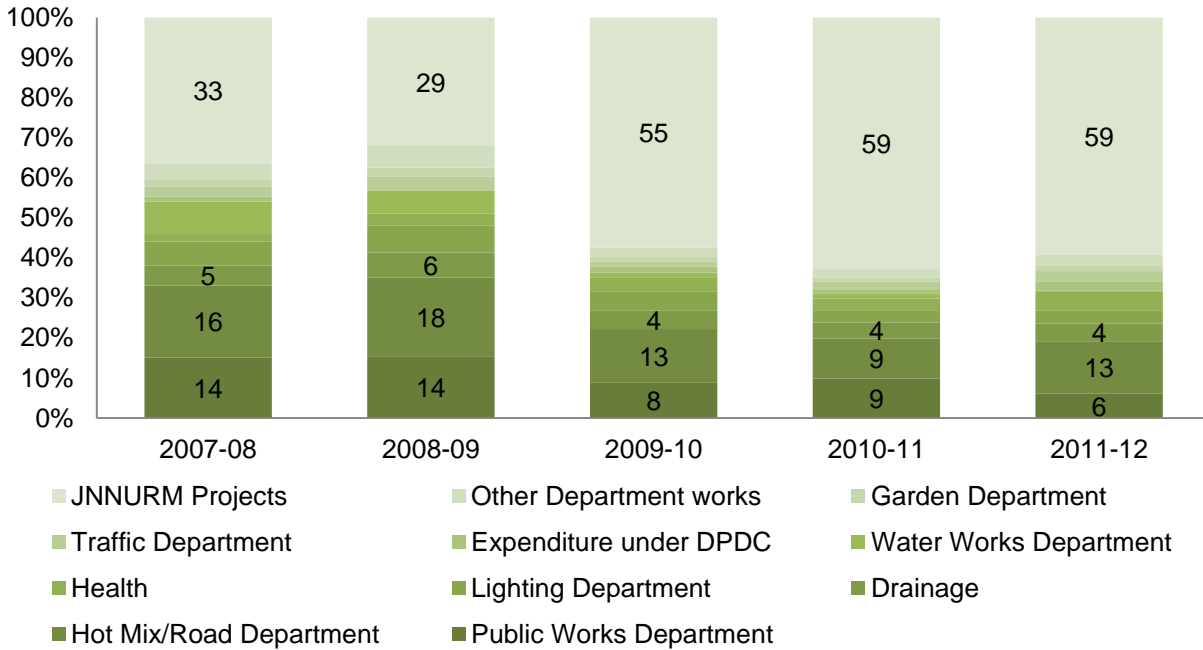


Source: CRIS analysis

Major share of capital expenditure incurred by NMC on various works proposed under the JNNURM scheme, and other capital works being implemented under various schemes of state and central governments and its own developmental projects too. Expenditure incurred on JNNURM projects accounted for 46% of the total capital expenditure. Roads and hot mix plant related capital works accounted for 14% of the total capital expenditure. Another major share in expenditure is on works by PWD, accounting for 10%. The remaining 30% of capital expenditure accounted for water supply, street

lighting, sewerage works, conservancy/SWM works, gardens and parks, slum development, and town planning works. Contribution of each component over the analysis period is shown in figure below.

Figure 112: Contribution of various departments towards capital expenditure - NMC



Source: CRIS analysis

14.7 Key Issues and Concerns

- Octroi abolished and LBT introduced in Nagpur
 - ◆ Associations, trade organisations, local vendors have opposed and this has affected the revenue income for NMC
- Lack of robust property tax system, leading to long pending arrears from defaulters
- No user charges on SWM and sewerage
- Recovery of taxes and user charges on the lower side compared to the benchmarks
- Scope for expenditure management

15 SWOT analysis

Growth drivers for Nagpur has been discuss in the Economic profile chapter earlier in this report and key growth drivers for Nagpur are as follows;

- Presence of 11 MIDCs in and around Nagpur. Asia's biggest Industrial zone and industrial suburb for Nagpur
- Presence of MIHAN - International Airport and SEZ
- Presence of historical monuments, buildings with heritage value, natural features, forests and sanctuaries.
- Presence of physical/Urban infrastructure – 24 x 7 water supply, good roads, railway connectivity to all the states, air connectivity along with ample green cover in the city
- Presence of well-established infrastructure by government and private sector in education and health sectors

15.1 Competitive position of Nagpur

Based on the review of the understanding from various consultations carried out with NMC officials, parastatal agencies, organisations, institutions, experts, and other stakeholders; following is the competitiveness of Nagpur.

Table 90: Competitiveness of Nagpur city

Parameter	Scale	Remarks
Efficiency in Governance	Medium	<ul style="list-style-type: none"> ▪ Presence of multiple agencies for single function like Urban planning, provision of housing for Urban poor, City public transportation, etc. ▪ Lack of coordination between various agencies for integrated planning and effective implementation development in the city.
Competitive economic growth	High	<ul style="list-style-type: none"> ▪ Presence of MIDCs, MIHAN, Local markets, etc ▪ Availability of Skilled workers ▪ Availability of cheap semi-skilled labour ▪ Good connectivity with the neighbouring state via roads and railways
Social cohesion & prosperity	High	<ul style="list-style-type: none"> ▪ Presence of High quality education institutions in all class- primary, secondary, higher educations ▪ Presence of better quality services in health and medical sector.
Sustainable environment	High	<ul style="list-style-type: none"> ▪ Efforts by NMC for reducing wastage of water by implementation of 24 x 7 water supply ▪ Efforts for use of treated waste water <ul style="list-style-type: none"> ◆ Recycle and reuse plan ◆ Recycle and reuse of waste water project (construction of 100 MLD plant by MAHAGenco for using treated water for cooling of towers at thermal power plants)

Parameter	Scale	Remarks
		<ul style="list-style-type: none"> ◆ Sell of treated waste water to other industries, for this augmenting the treatment capacity of 100 MLD treatment plant to 200 MLD. ◆ Rejuvenation of lakes and rivers being implemented by NMC ■ Scientific closure of existing dump site at Bhandewadi. Construction of Scientific landfill site at Bhandewadi. <ul style="list-style-type: none"> ◆ 450 TPD treated at Bhandewadi treatment plant ■ To control air pollution from vehicles movements, tree plantation carried out by NMC and other agencies in the city. ■ Annually Environmental status reports being prepared by NMC and actions are taken based on the recommendations provided in it.
Efficient Infrastructure	Medium	<ul style="list-style-type: none"> ■ Physical infrastructure for water supply, roads, street lighting, SWM, education and health is in place to meet the current and future demand. ■ But, augmentation of physical infrastructure for sewerage, SWD, public transportation,
Skilled & motivated workforce	Medium	<ul style="list-style-type: none"> ■ Availability of Skilled workers ■ Availability of cheap semi-skilled labour ■ Small scale training centres available in the city, where trainings for various skill sets are imparted. ■ Proposal by Reliance industries to develop training centre to impart training to workforce available in Nagpur.
Protected Heritage	Medium	<ul style="list-style-type: none"> ■ Presence of ASI to preserve Monuments and protected sites. ■ List of Historical and Architectural Buildings for Nagpur and heritage conservation regulation is available ■ Presence of Heritage conservation committee ■ NMC has developed Heritage conservation Fund ■ But, lack of incorporation of conversation of heritage in Nagpur's Building Byelaws and monitoring of encroachments near the heritage structures.

Source: Based on the discussions with officials of NMC and other stakeholders

15.2 SWOT Analysis

The SWOT analysis gives a cursory snapshot of existing potentials that favour growth in the city. Further, issues curbing the city development are discussed. The ranking of importance in a scale of High to medium has been developed through interactions with stakeholders and officials. In case of opportunities and threats, the possibility of occurrence has also been identified.

Nagpur being the most urbanized city in the region and has rich mineral source, well connected to all major cities in India through road, rail and air networks. Further, excellent medical and educational facilities are available in the city. However, the city is landlocked and has inadequate city infrastructure and amenities. The analysis of strengths and weakness in the city has been presented in the table below.

Table 91: Strength and weakness in the city

Strengths	Importance
Centrally located in India – large catchment spread in all directions	High
Rich mineral resource base	High
Well connected to all major cities in India through road, rail and air networks	High
Excellent medical and educational facilities available in the city	High
Clean and green image of the city	High
Weakness	Importance
Landlocked city industries needing sea transport are not feasible	Medium
Has a low profile and image	High
Inadequate city infrastructure and amenities	Medium
Lack of employment opportunities for the large educated young population	Medium

Source: CRIS Analysis

The potential opportunities are that the city has low cost high skill labour is available for development of services and knowledge based industries. Also, there is enough space available in the city to develop IT parks, health city. However, the delays in the implementation of MIHAN project may decelerate the expected economic growth. The opportunities and threats in the city have been presented in the table below.

Table 92: Opportunities and threats in the city

Opportunities	Possibility of occurrence	Impact on city
Low-cost high-skill labour is available for development of services and knowledge based industries	Medium	High
Location allows for development of a distribution hub	High	High
Enough space available in the city to develop IT parks, health city	High	High
Threats	Importance	
Delay in implementation of MIHAN project may decelerate the expected economic growth	High	High
Deteriorating power situation may discourage rapid economic development	High	High

Source: Based on the discussions and CRIS Analysis

15.3 SWOT

Based on the review of the current city level assessment, growth drivers for Nagpur, Competitiveness of Nagpur and discussions with various stakeholders at Nagpur; following are the Strength, Weakness, Opportunities, and Threat (SWOT) for the future development.

Table 93: SWOT Analysis for Nagpur city

Strength	Weakness
<ul style="list-style-type: none"> ▪ Centrally located in India – large catchment spread in all directions. ▪ Rich mineral resource base. ▪ Well connected to all major cities in India through road, rail and air networks. ▪ Excellent medical and educational facilities available in the city. ▪ Clean and green image of the city. 	<ul style="list-style-type: none"> ▪ Landlocked city industries needing sea transport are not feasible. ▪ Has a low profile and image. ▪ Inadequate city infrastructure and amenities. ▪ Lack of employment opportunities for the large educated young population.
Opportunities	Threat
<ul style="list-style-type: none"> ▪ Low-cost high-skill labour is available for development of services and knowledge based industries. ▪ Location allows for development of a distribution hub. ▪ Enough space available in the city to develop IT parks, health city. 	<ul style="list-style-type: none"> ▪ Delay in implementation of MIHAN project may decelerate the expected economic growth. ▪ Deteriorating power situation may discourage rapid economic development.

16 City Vision, Development Goals and Strategies

16.1 Stakeholder Consultation

A city development plan is a vision document of a city, in which the vision, objectives and strategies for development of a city and various sectors are set out. These are formulated by the citizens and stakeholders of the city themselves. Thus, in CDP preparation, stakeholders play an important role. Their views about the city’s development and sectoral performance are of utmost importance. CRIS carried out rounds of stakeholder consultations in Nagpur to solicit views and concerns of the stakeholders and to understand their priorities and suggestions on possible projects and the need for reforms for various sectors.

16.1.1 One-to-one discussions with stakeholders

The team has conducted stakeholder consultations with government department officials of various parastatal agencies and business and trade organisations like the Chamber of Commerce, and CREDAI. Further, views of academicians and city-level CBOs and NGOs have been gathered. Even discussions have been conducted in identified slums.

Figure 113: One-to-one stakeholder discussions at Nagpur



List of stakeholders

Nagpur Municipal Corporation

Table 94: List of consultations with NMC officials

Sr.No..	Stakeholder
1	Shri. Shyam Wardhane, Municipal Commissioner
2	Mr. Urade, JnNURM Coordinator
3	Mr. M.Israil, Deputy Engineer, PPC
4	Mr. Hastak, Executive Engineer, Water supply Dept.
5	Mr. Shyam Chauhan, Health officer
6	Shri. Hemant Pawar, Additional Commissioner

16.2 Stakeholder workshop at interim stage

The CRIS team carried out stakeholder consultations in the city of Nagpur from 21st to 25th October 2013. Consultation was a one-to-one discussion to understand the perspective of stakeholders on current developments in the city and the performance of different sectors. Reasons for the current situation and probable strategies to overcome the hurdles/road blocks were also asked during the consultation.

Based on the data collected from various agencies in the city and discussions with the stakeholders, a presentation was made by the CRIS team during the 1st city-level workshop arranged for the stakeholders. Also, a workshop was conducted with the objective to refine the findings from the previous consultation and define a vision for city development and sectoral strategies.

A workshop was conducted on 6th of December 2013 at the Mahal office, Gandhibagh and stakeholders were invited by NMC. Based on the views of the stakeholders voiced during the workshop, a presentation was shared with the stakeholders and also it was made available online for all the citizens. An online form was further made available on NMC’s website “www.nmcnagpur.gov.in” to share views on city development and define their vision for the city.

Figure 114: Welcome speech by Hon’ble Mayor and Commissioner of Nagpur



Figure 115: Presentation by CRIS Team on city level assessment



Figure 116: Stakeholder discussions during the workshop



Press release articles

NMC ensured sufficient outreach for the stakeholder workshop through personal invitation, reminder calls and messages. The stakeholders have expressed positive opinion about the communication strategies adopted by the ULB.

Briefings and highlights of the workshop was covered by some of the local newspaper agencies and press release articles for the same, which as shown below.

Figure 117: Media coverage for stakeholder workshop



16.3 Focus group discussions (FGD)

In order to carry out sectoral demand and gap assessment precisely, stakeholders of diverse backgrounds were identified by NMC and invited for focus group discussions (FGD). Stakeholders came from different backgrounds like CDP committee members, NMC departmental officials, officials of para-

statal agencies, experts from private organisations, NGO representatives, academicians from institutions, independent sector experts, and members of different associations. This would ensure diversity of views and suggestions, which would lead to the framing of sectoral strategies and goals for Nagpur’s future development.

FGDs were conducted on 4th and 5th of April 2014 at the NMC committee hall at NMC civil lines’ office. Stakeholders identified by NMC for all the four FGD groups, as shown in the table below, were invited and the views of the stakeholders were taken. During the FGDs, CRIS began by making a presentation, which gave an insight into sectoral performance and key observations. This was followed by FGD discussions and individually all the invited stakeholders shared their views through suggestion forms provided to them. A sample of the suggestion form used during FGD discussions is provided in the annexure.

Schedules for Focus Group Discussions		
Date	Moring Session	Evening Session
	(10:30 am to 12:30 pm)	(3:00 pm to 5:00 pm)
Day 1	Urban Infrastructure Services	Planning & Urban Poor
4th April 2014 (Friday)	Water Supply, Sewerage, SWM, Street lighting, Roads, Traffic and Transportation, Storm water drainage	Urban Planning, Land use and growth management, Demography, Urban Poverty and slums, Social Infrastructure
Day 2	Municipal Finance & local Economy	Heritage and Urban Environment
5th April 2014 (Saturday)	Urban Governance, Municipal Finance, Local Economic Development	Heritage conservation, Cultural and tourism promotion and development, Urban Environment, Sustainable Development, Natural Resources and conversation

Figure 118: Photos of the focus group discussions at Nagpur during April 2014



Press release articles

NMC ensured sufficient outreach for the stakeholder workshops through personal invitations, reminder calls and messages. The stakeholders have expressed positive opinions about the communication strategies adopted by the ULB.

Briefings and highlights of the workshop were covered by some of the local newspaper agencies and press release articles, which are shown below.



16.4 Sector analysis and Strategies formulation

Sectoral issues and strategies shared by stakeholders for preparation of the revised CDP of Nagpur during the workshop are as follows.

16.4.1 Sector issues identified in workshops

Table 95: Key issues identified for various sectors

Sectors	Key Issues identified by stakeholders
<p>City Development</p>	<ul style="list-style-type: none"> ■ Development projects envisaged in the CDP are not reflected in the master plan of the city. ■ Integration of various plans and systematic approach along with integration is lacking. ■ Urban planning and preparation of development plan is restricted to NMC jurisdiction, which is not appropriate. This is due to urban sprawl and development taking place on the peripheral areas of the city which will thrust pressure on city's core services in future. ■ Land acquisition is a painful and lengthy process. ■ There is deviation from landuse planned; the implementation of the master plan and other plans is not in accordance with the envisaged implementation timelines and phasing. ■ Tremendous pressure for implementation of development projects on the administrative wing is resulting in the adoption of shortcuts for implementation of the same. Reservation of land used for development projects does not get amended in the development plan and post implementation of project procedure for amending the changed landuse is lengthy and might attract legal issues.
<p>Economic Development</p>	<ul style="list-style-type: none"> ■ Nagpur is not growing at the same brisk pace as other cities of Maharashtra (Pune and Nashik). ■ There is a lack of large industries. ■ The MIHAN project implementation is not happening at the pace envisaged. ■ Even though investment was planned by big giants of various sectors in Nagpur, projects have not been taken up so far which affects economic growth. ■ Presence of Central Railway Headquarters in Nagpur is not benefiting the city, as no railway factories are available in Nagpur. ■ Political support to remove the road blocks/hurdles to the city's economic development is lacking. This is also due to the lack of

Sectors	Key Issues identified by stakeholders
	<p>enabling policies for the development of large-scale industries.</p> <ul style="list-style-type: none"> ■ In 2005, the city was beautiful and infrastructure development took place on a big scale. But since then, the pace of maintenance of that infrastructure and the development of new infrastructure has reduced. ■ Nagpur holds cultural and heritage importance too; development in these sectors has also not been taken up. ■ Local taxes imposed by local authorities are too high.
Land use/ Master Plan	<ul style="list-style-type: none"> ■ The Gunthewari Act is used to delete reservation in the DP. ■ DP got approved in 2001 by GoM and the same year the Gunthewari Act was brought into effect by GoM. ■ Conflict in powers vested with planning authority can carry out reservation of land as per MRTP Act, at same time Gunthewari Act provides powers to planning authority to delete such reservations in the DP.
Water Supply	<ul style="list-style-type: none"> ■ Department is not in position to quantify the indicators for the water supply system as the system is in transition phase due to the implementation of the 24x7 water supply scheme. ■ Other projects being implemented are intended to augment the system; thus there has not been much improvement on the service-level indicators. ■ Lack of public participation and support in implementation of 24 x 7 project
Storm Water Drainage	<ul style="list-style-type: none"> ■ 100% of the city area is not covered with SWD. ■ During authorization of layout; provision of basic infrastructure needs to be carried out by NIT. But provision of SWD was not carried in past. This has created pressure on NMC to develop infrastructure of SWD ■ Natural topography and gradient is neglected and not considered during the development of layouts. ■ Sewage and storm water are carried by the same network, resulting in overflows and water-logging during monsoons.
Roads/ Traffic & Transportation and street lighting	<ul style="list-style-type: none"> ■ Parking is an issue; there is a lack of proper parking complexes. ■ Lack of an efficient public transportation system ■ NMC has no role or no involvement in MRTS planning and implementation. NIT is appointed as the nodal agency for implementation of MRTS in Nagpur. ■ UMTA not formed ■ CBD and market places and commercial areas are congested. No calming measures have been taken up for these congested areas or even planned. ■ CMP has been prepared by NMC and NIT. Implementation of both the plans has yet to be taken up. CMP prepared by NIT has no involvement of NMC in it. ■ System is old and in dilapidated condition. ■ Energy consumption is on the higher side due to the use of sodium vapour lamps for street lighting and other lights across the city.
Urban Poor/ Urban Poverty	<ul style="list-style-type: none"> ■ The urban poor are not aware of programmes for their social and economic benefits. ■ No support by various NGOs working separately for the urban poor; so NMC officials' visits to slums to motivate the urban poor to

Sectors	Key Issues identified by stakeholders
	<p>participate in programmes do not get full support.</p> <ul style="list-style-type: none"> ■ Lack of staff strength. Social structure adopted for SJSRY is as per SJSRY guidelines and for implementation of schemes, department is not having enough strength. Department lacks zonal structure and staff. ■ Various below poverty line (BPL) lists adopted by various NMC departments and also by regional and state level agencies in nagpur ■ Department does not have staff with social science background, which results in lack of accountability and understanding of the ground problems and ability to provide solutions. ■ Department does not have a mechanism and also not enough staff for monitoring the social infrastructure developed by NMC. ■ There is no public participation in implementation of programmes for urban poor. Also, CBO participation is minimal in implementation of programmes. ■ Approach of government agencies is target based implementation of the programme, irrespective of needs and demand and minimal reach out to urban poor is observed. Approach of NGOs owrking for urban poor is completely opposite So it is difficult for NMC to do effective implementation of programmes and have to involve NGOs in the implementation of programmes. <p>Housing for Urban Poor</p> <ul style="list-style-type: none"> ■ Quantum of construction new houses is high. ■ 70% of the slums having access to basic services needs to be de-notified, in absence of such effort the need of proviing better housing in theb city to achieve slum-free city will be estimated as high as 1.23 lakhs units.
Social Infrastructure	<p>Education</p> <ul style="list-style-type: none"> ■ Most of the institutional buildings are rented. ■ Some of the institutions are in dilapidated conditions and non-functional. this is due to some of the buildings are located in posh localities where dropout rate of students is high. ■ Education medium is Hindi, Urdu or Marathi; in the absence of English medium institutions, number of students has reduced. ■ No training curriculum for teachers <p>Health</p> <ul style="list-style-type: none"> ■ Nagpur has a wide catchment area with a radius of 300 km due to presence of better health facilities ■ Surrounding villages are dependent on public health care facilities in Nagpur and thus the service load on public facilities is more. Even, Urban poor is completely depended on government hospital in the city ■ It is extremely important to increase the bed strength of the Government Medical College and Daga Hospital since it is accessed by urban poor ■ The condition of health/Medical facilities has deteriorated significantly in the city. Also, the quality of services at the government hospitals being deteriorated ■ Public health facilities are not conforming with the URDPFI guidelines. But, considering the private and public both, majority of the health facilities are conforming to the URDPFI guidelines ■ No subsidy programmes for urban poor to avail critical and super

Sectors	Key Issues identified by stakeholders
	specialty services in other private hospitals
Municipal Finances	<ul style="list-style-type: none"> ■ Loss of revenue faced by NMC due to abolishment of Octroi ■ Revenue collection for local body tax (LBT) less due to agitation by the local traders and associations ■ Collection efficiency on lower side with regard to water user charges ■ No revenue enhancement studies or strategies adopted by NMC ■ O&M cost recovery for SWM very less due to the high cost of privatization of the services and absence of user charges
Governance and Institutional set-up	<ul style="list-style-type: none"> ■ Around 30% of the sanctioned posts are vacant; so the existing staff members are given multiple charges. This is affecting service delivery. ■ NMC has a transfer policy, under which transfers take place within the department on a regular basis. However, no handholding support and training to the staff on new roles and responsibilities is provided. This is resulting in poor performance of the staff. ■ There is no review and appraisal process and discussion with the employee on their performance, which is one major area of concern. ■ No job card is defined. Hence, there is a lack of clarity on roles and responsibilities relating to the key positions, and this leads to accountability issues. ■ There is no monitoring system to track the status of the key services as against the timelines mentioned in the citizen's charter. ■ There is no proper monitoring system to track the status of complaints. Hence, the complaints are not attended to within the prescribed time. ■ There is no adequate IT infrastructure and training for the staff; hence, most of the staff lacks basic computer skills. ■ It is also understood that the majority of the staff do not have exposure to the relevant acts, policies, and guidelines for administrative works. ■ NMC has not carried out training needs assessment; there is no training curriculum and budget for trainings. Also, there are no initiatives for skill development of the staff. Thus, the teams are not updated about new technologies and best practices implemented elsewhere.
Environment	<ul style="list-style-type: none"> ■ Water bodies are polluted and contaminated in various ways. ■ Difficult for survival of the submerged flora and fauna. Thus affecting the biodiversity of the city ■ As per survey carried out by NMC, the various reasons for contaminations of lakes are: <ul style="list-style-type: none"> ◆ Idol immersions during festivals ◆ Throwing of nirmaliyas and garbage ◆ Outflow of sewerage and storm water into water bodies – untreated ◆ Lack of awareness – citizens of Nagpur do not consider water bodies as their cultural treasure. ◆ Lack of NGOs' willingness to work with NMC; as they work independently for conservation of water bodies. This is leading to ineffective implementation and conflict of interest to some extent.

Sectors	Key Issues identified by stakeholders
	<ul style="list-style-type: none"> ■ As per survey carried out by NMC, the various reasons for contaminations of river bodies are: <ul style="list-style-type: none"> ◆ Encroachment on banks of water body ◆ Garbage throwing in the water body ◆ Natural percolation of water is affected due to continuous paving of walkway/pavements along the banks of the river. ◆ No monitoring of the development taking place along the river side; no open space available along the river banks ◆ Town planning department has not taken care of river development in the development plan of Nagpur.

16.4.2 Stakeholder suggestions

Table 96: Key strategies identified for various sectors

Sectors	Stakeholder suggestions
City Development	<ul style="list-style-type: none"> ■ Improving the preparation of development plan/Master plan for Nagpur ■ Integration of various plans and systematic approach towards implementation of these plans. Investment estimation should be aligned with the integrated development approach.
Economic Development	<ul style="list-style-type: none"> ■ City will grow with the development of industries in and around Nagpur. ■ Local taxes should be rationalised. ■ Policy adopted for LBT is too cumbersome, needs to be revised to ease out the burden for trade and commerce sector in Nagpur. LBT should be merged with VAT.
Land use/ Master Plan	<ul style="list-style-type: none"> ■ Revision of MRTP Act and making it strong and robust for fast planning and implementation of the DP
Water Supply	<ul style="list-style-type: none"> ■ Monitoring of the system
Storm Water Drainage (SWD)	<ul style="list-style-type: none"> ■ Investment envisaged in master plan prepared during 2009 was around Rs.3000 crores for providing 100% SWD in the city ■ It also includes provision of flood protection walls and channelization of nallahs.
Roads/ Traffic & Transportation and street lighting	<ul style="list-style-type: none"> ■ Provision of parking lots and complexes ■ Provision and managing of public transportation system ■ Phase wise implementation of CMP as short-term and long-term plans proposed in CMP ■ Proposals by NMC needs to be implemented are: <ul style="list-style-type: none"> ◆ Increasing the number of bus shelters ◆ Developing terminal and depots for public transportation ◆ Procuring more buses for augmenting public transportation's fleet strength ■ Project for replacement of HSV bulbs with LED lights for 26,000 street lights on NMC poles.

Sectors	Stakeholder suggestions
	<ul style="list-style-type: none"> ■ Also, Nagpur has been selected by NMRE as a model city for the solar city project. Project aims at reducing the dependency on conventional energy sources and use of solar energy. Project is divided into 3 parts. ■ 80% funding support is envisaged from the Central Government and the remaining amount of Rs.9.5 crores will be managed by Nagpur city. ■ Master plan of Rs.1500 crores has been prepared. Through this NMC will reduce the load on conventional energy consumption by 10%
Urban Poor/ Urban Poverty	<ul style="list-style-type: none"> ■ Raise public awareness through awareness and IEC campaigns ■ Support of NGO should be taken for effective implementation of projects and programmes in slums ■ Improving staff strength ■ Implement a strong mechanism for monitoring of the programmes and social infrastructure developed by NMC ■ Develop employment centers in the city for BPL and APL families or develop small house-based industries <p>Housing for Urban Poor</p> <ul style="list-style-type: none"> ■ Implementation of BSUP project ■ Implementation of RAY scheme in Nagpur
Social Infrastructure	<p>Education</p> <ul style="list-style-type: none"> ■ Provide trainings to teachers. Also, trainings should be provided in the English language. ■ Evaluation mechanism to be developed for teachers. Hiring services of private institution/agency to conduct evaluation of teachers on a regular basis ■ All the inspectors should be given tablets or smart phones which will be connected to the central server. This mechanism will help them during their random supervision visits, to send information to the central server and other officials. (System has already been adopted for jilla parishad schools). ■ Department is looking forward to develop E-learning classes in all their institutions. Distance learning through projections (Rs.4.50 crores for project if implemented in one go or Rs.6.50 crores if implemented in phases will be required) ■ E-learning project will be taken up in two high schools on pilot basis.
Environment	<ul style="list-style-type: none"> ■ Raise public awareness through awareness and IEC campaigns ■ Support of NGO should be taken for effective implementation of projects and programmes for conservation and rejuvenation of water bodies ■ Pay immediate attention to lakes and rivers and implement conservation projects ■ Take care of quality of water in water bodies ■ Improve water quality by treating water bodies ■ Promote afforestation around the lakes and rivers for improving bio-diversity ■ Implement riverfront development projects (worth Rs.126 crores)

16.5 Vision Statement

The vision for the city has been adopted from the 1st-generation CDP of Nagpur which was prepared in 2006 after extensive discussions with a large number of stakeholders. It was adopted keeping in mind the long-term requirements till 2041. It is also worth a note that no noticeable change has taken place in Nagpur in terms of socio-economic development and the projects implemented under JnNURM-I have yet to show improvements and results in the current service level indicators for the urban infrastructure services.

Even in terms of infrastructure development, only in two sectors, serious efforts were made to augment the water supply system and improve the traffic and transportation system. In order to achieve the vision defined in the 2006 CDP which focussed on providing a good quality of life to the citizens of Nagpur, still a lot needs to be achieved. And also, investment carried out during 2006-12 amounted to only 26% of the total identified investment.

Based on the past efforts of NMC and improvement interventions required in other sectors like sewerage, urban transport, SWD, SWM, and social infrastructure, and to ensure a good quality of life, the following city vision has been adopted for Nagpur's next phase of development till 2041.

“The Growth Nucleus of Central India”

“... An eco-city that provides adequate, equitable, sustainable access to urban services for all citizens”

“... A city that is safe, livable and promotes growth of its citizens”

In line with above mentioned city vision, sector vision and goals were also identified in the 1st-generation CDP for most of the sectors, and most of it were not taken up during 2006-12. Thus same sector vision has been considered for the purpose of developing projects, estimating the investment and formulating the strategies for various sectors till the horizon year 2041. Sector vision of core sectors are as mentioned as under:

Water Supply

“Water for all and 24 x 7 water supplies along with safe, equity, reliability”

Solid Waste management

“Clean City and Bin-Free City”

Urban Environment

“Clean and Green City”

Sewerage

“100% coverage of sewerage collection and treatment of waste water”

Health

“Eradication of preventive diseases by 2011 and making Nagpur a medical service hub”

Education

“Provision of better education through use of new technology and well trained teachers”

Urban Poor

“Access to basic services to all urban poor”

16.6 Stakeholder workshop at draft stage

CRIS team conducted the final workshop on revision of CDP for Nagpur – 2041 at Town hal, Mahal, Nagpur on 17th March 2015. The CRIS team made a presentation on city level assessment of, sector wise demand gap analysis, projects identified and capital investment plan for Nagpur. Moreover, CRIS team discussed on the financial sustainability of NMC to take-up the projects on various scenarios.

Further, CRIS team has requested the stakeholder to provide their inputs/ suggestion on the proposed projects for the city. The key discussion points have been presented below.

Meeting Agenda	Draft CDP presentation to stakeholders in Nagpur.
Place/Location	Town Hall, Mahal, Nagpur Hubli
Date of the Meeting	17 th March 2015 at 10.30 a.m
Participants	<ul style="list-style-type: none"> • The list of participants has been annexed. Representatives from CRIS Risk and Infrastructure Solutions Ltd (CRIS). <ol style="list-style-type: none"> 1. Dr. Ravikant Joshi 2. Mr. Brijgopal Ladda 3. Mr.Ramesh Turaka
<p>The objective of the stakeholder meeting was to present the draft CDP including the major proposal and strategies and to take the comments, suggestions on various proposals included in the CDP process in Nagpur under CBUD programme of MoUD, Gol.</p> <p>Key presentation points are as follows:</p> <ul style="list-style-type: none"> ▪ At the outset, CBUD team at NMC has welcomed the participants to the final workshop. The nodal officer has briefed about the relevance and objective of this workshop. ▪ The commissioner of NMC has delivered the introduction speech and emphasis on the importance of the CDP. Further, the commissioner has informed the agenda of the today's meeting ▪ The mayor of NMC has delivered the key note on the development activities taken up NMC for Nagpur city ▪ The representatives from CRISIL team elaborated about the activities carried out in Nagpur as part of the CDP preparation and also briefed about the approach and methodology adopted for preparation of CDP. ▪ CRISIL made a presentation on the key findings of the draft CDP. Also, the CRISIL briefed the suggestions provided by the Technical Advisory Committee (TAC) on the draft CDP. ▪ CRIS team explained about the gaps in each sector with respect to the projected population for 2041 for Nagpur. The team has also elaborated on the Vision for the city, goals set to achieve the vision and projects proposed. ▪ CRIS team also explained the financial sustainability scenarios for NMC to implement the proposed projects under CDP. <p>The key suggestion of the stakeholder are as follows</p> <ul style="list-style-type: none"> ▪ The CDP should ensure and balance the growth between region and local level. The CDP should also emphasis on the urban design and the distribution of the population across the city and also ensure on the focal points for development of the city by 2041. ▪ The growth of the city should be development oriented and provide the employment opportunities to the youth of the city. The focus should be on the economic development of the region. Moreover, the city should be developed as education hub for the region. ▪ The climate change related aspects for Nagpur has to be considered in the final CDP. In addition to this, NMC should also focus on the collection, recycle of e-waste, which is generated within the city. ▪ NMC should give priority and needs to take-up the steps towards preservation of ground water in the city. Also, the rain water harvesting bye-laws has to be implemented effectively in order recharge the ground water as the ground water levels in the city are decreasing on regular basis. ▪ NMC should focus on the energy conservation and emphasis on the solar based energy system in the city. ▪ In order to improve the revenue of NMC, NMC should focus on the land based fiscal tools and improve the own source of revenues accordingly. In addition to that, NMC should carry out a study on the financial management and revenue improvement for increasing the revenue base. ▪ NMC should also explore external borrowings such as municipal bonds and loans for meeting the investment envisaged in the city. NMC should explore the revenue generation from the assets created by NMC over the years. The financial strategies to be incorporated in the CDP to improve the financial position of NMC. 	

- To improve the revenues, NMC should arrest the water leakages and improve the revenue from water, and also the property tax assessment should be completed for all the properties in the city. NMC should also explore to levy the property tax on the de-notified slums in the city.
- NMC should de-notify the slums and provide the Phatas to the slum dwellers. NMC should also allocate the adequate budget provision for the same.
- There should be a coordination between the state and NMC for implementation of the projects
- NMC needs to give priority for the beautification of Nag River.
- NMC should establish a quality control cell at NMC for effective implementation of the infrastructure projects in the city.
- The Hawkers committee should be formed in the city and the provide the mini markets should for the hawkers in the city.
- NIT and NMC should ensure that the agriculture utilization of the land as per the development plan.

The meeting ended with a vote of thanks by the Commissioner. Further, the commissioner has requested the stakeholders to refer the revised draft CDP, which is available on NMC's website and then send suggestions if any to the CBUD team of NMC and the consultant's e-mail ids.

Figure 119: Participatns in the final workshop



Figure 120: Introduction speech by the commissioner



Figure 121: Key notes by mayor of NMC



Figure 122: Presentation by CRIS Team



Figure 123: Media coverage

Project Report Identifies Five Priority Areas For City

STRONG OBSERVATIONS IN CITY DEVP PLAN

SEWERAGE & SANITATION

- Only 40% of city has underground network.
- The municipal corporation has prepared sewerage master plan and water reuse plan
- Currently, untreated water flows into Nag River, contaminating water bodies

STORM WATER DRAINS

- Development of storm water drainage system neglected at the time of planning of basic infrastructure while authorization of layouts
- Length of roads is 2,620 km. Storm water drains are 917 km or 35% of the road network

TRAFFIC & TRANSPORTATION

- Fleet maintenance not on regular basis
- Support infrastructure like bus shelters, terminals, workshop, depot, etc. required
- Lack of technical expertise within authorities

MUNICIPAL FINANCE

- Traders' organizations have opposed local body tax and this has affected NMC revenue
- Lack of robust property tax system is leading to long pending arrears from defaulters
- No user charges on solid waste management

Sectors	SI	LI	TI
Water supply	290	471	671
Sewerage, sanitation	683	663	1,366
Roads, traffic, transport	21,690	445	22,053
Storm water drains	1,748	1944	3,692
Solid waste mgmt.	341	77	368
Slum housing	1,684	3127	4,811
Heritage development	267	267	534
Tourism development	200	1	201
Urban governance	80	80	160
Social infra	63	132	194
Urban environ	428	29	457
Disaster mgmt.	47	47	95
Total	27,358	7,753	34,684

INVESTMENT ACROSS SECTORS

SEWERAGE & SANITATION: 345 MLD of sewage, or about 50% of city's daily water supply, generated every day. City has only one sewage treatment plant at Bhandewadi with installed capacity of 100 MLD. Rest of the sewage is disposed of untreated.

STORM WATER DRAINS: Development of storm water drainage system neglected at the time of planning of basic infrastructure while authorization of layouts. Length of roads is 2,620 km. Storm water drains are 917 km or 35% of the road network.

TRAFFIC & TRANSPORTATION: Fleet maintenance not on regular basis. Support infrastructure like bus shelters, terminals, workshop, depot, etc. required. Lack of technical expertise within authorities.

MUNICIPAL FINANCE: Traders' organizations have opposed local body tax and this has affected NMC revenue. Lack of robust property tax system is leading to long pending arrears from defaulters. No user charges on solid waste management.

Citizens want sensible devp plan, strict implementation

Your suggestions

INDIAN INSTITUTE OF HUMAN RIGHTS

POST GRADUATE PROGRAMME IN HUMAN RIGHTS

नगर

पुराना कटौल माकड़ चौक पर खुदाई के बाद मार्ग को दुरुस्त नहीं किया गया. इससे चौक पर गिट्टी और मिट्टी खिखरी पड़ी है. यहां छादसों का खतरा बढ़ा हुआ है.

लोकमत समाचार
अपना नागपुर
नागपुर, बुधवार, 18 नवंबर 2015

'स्मार्ट सिटी' में हर किसी का रखें ख्याल

सीडीपी पर कार्यशाला : वर्ष 2041 को ध्यान में रखकर हो रहा तैयार

नागपुर | 17 नवंबर (संवाद)

नागपुर में नागपुर स्मार्ट सिटी के तौर पर पहचाना जायेगी. शहर विकास योजना (सीडीपी) भी इसी ही ध्यान में रखकर तैयार की जा रही है. वर्ष 2041 में शहर की आबादी 44 लाख से अधिक होने के अंदाज है. इसलिए समावेशिक, समान व प्रगतिशील विकास योजना तैयार की जानी चाहिए. सीडीपी को लेकर मंगलवार को महानगर विधान सभा में विकास प्रारूप पर कार्यशाला का आयोजन किया गया. कार्यशाला का उद्घाटन महापौर प्रवीण दत्ते ने किया.

कार्यशाला में विविध सरकारी विभागों के अधिकारी, जर्नलिस्ट, वरिष्ठ कर्मचारी, प्राध्यापक, अभियंता, छात्रों सहित सदन आदि के प्रतिनिधियों ने हिस्सा लिया. उन्मुखियों ने भवन में हुई नवतियों को न देखते हुए नागपुर को ध्यान में रखते हुए व्यापारिक सुविधाओं के साथ ही रोजगारोपमुख, शैक्षणिक क्षेत्र सहित अन्य क्षेत्रों का भी ख्याल रखने पर जोर दिया. शहर के विकास में अधिकारीक लोग अपना योगदान दें, इसके लिए उनके विचारों को अवसर मिलेगा.

कार्यशाला के दौरान स्थानीय समिति अध्यक्ष रामेश शिंगारे, सहायक नगर विकास अधिकारी, विरोधी नेता विकास ठाकरे, आयुक्त श्याम हडदीकर, आर्थिक अधिकारी प्रकाश उर्डे, पार्षद प्रमोद गुड्डे, क्रिस्टल कंपनी के सलाहकार रविचंद्र जोशी, कर निदेशक शशिकांत हस्तक प्रमुख रूप से

भाग्यवत टाऊनशिप ने सिटी डेवलपमेंट एजेंडा पर अद्युजित कार्यशाला में लोगों को बुद्धिपूर्वक प्रतीक दत्ते के साथ में श्रावण हडदीकर, वरिष्ठ कर्मचारी व अन्य

34604 करोड़ की रूपरेखा

विकास योजना को वर्ष 2041 को ध्यान में रखकर तैयार किया गया है. शहर के विकास को ध्यान में रखकर तैयार किया गया है. शहर के विकास को ध्यान में रखकर तैयार किया गया है. शहर के विकास को ध्यान में रखकर तैयार किया गया है.

पैनी सूची विविध विभागों की हिस्सेदारी

विभाग	वर्ष 2041	वर्ष 2021	वर्ष 2011	
मनरा	20024	57.7	12608	46.5
नगरी	14300	41.5	14300	52.6
नगरी	201	0.6	201	0.7
नगरी	53	0.2	21	0.1
नगरी	25	0.1	20	0.3
नगरी	34604	100	27350	100

नोट: पैनी सूची के साथ ही विकास की गतिमान है. सीडीपी को वर्ष 2041 के विकास को ध्यान में रखकर तैयार किया गया है. शहर के विकास को ध्यान में रखकर तैयार किया गया है. शहर के विकास को ध्यान में रखकर तैयार किया गया है.

इस तरह विभाग आधार पर खर्च होगी राशि

विभाग	वर्ष 2021	वर्ष 2021-41	कुल निवेश
नगरी	200	471	671
नगरी	683	1366	2049
नगरी	21608	445	22053
नगरी	1748	1944	3692
नगरी	341	27	368
नगरी	1684	3127	4811
नगरी	267	876	1143
नगरी	200	01	201
नगरी	80	132	212
नगरी	63	29	92
नगरी	428	139	567
नगरी	47	47	94
नगरी	27350	7253	34604

नोट: राशि कटौत रूप में.

क भास्कर **दैनिक भास्कर** नागपुर • बुधवार, 18 नवंबर 2015 **महानगर**

सब कुछ बने, पर शहर रहने लायक बने

कार्यशाला में नगरसेवक, जानकार और नागरिकों ने रखी राय ■ वर्ष- 2041 के अनुसार सीडीपी होगा तैयार

शहर विकास प्रारूप को दिशा देने का काम शुरू

महानगर विधान सभा | नागपुर

वर्ष 2021 से 2041 की प्रस्तावित जनसंख्या को आधार मानकर शहर विकास प्रारूप (सीडीपी) बनाने की दिशा में काम शुरू हो गया है। मंगलवार को महानगर विधान सभा में मंगलवार को कार्यशाला हुई। कार्यशाला में नगरसेवक, विविध क्षेत्र के जानकार, युवा, महिला और नागरिकों ने शहर विकास को लेकर अपनी राय रखी। किसी ने एजुकेशन हब बनाने की दिशा में काम करने की राय दी तो किसी ने हेल्थ हब पर जोर दिया। हर वर्ग से अलग-अलग राय सामने आई। अधिकारिक सभी ने लोगों को रहने योग्य शहर बनाने पर जोर दिया।

स्वतंत्र सत्र आयोजित हो

कार्यशाला उद्घाटन करते हुए महापौर प्रवीण दत्ते ने कहा कि सीडीपी तैयार करते समय भूतकाल की पुनरावृत्ति न हो, इसका ध्यान रखा जाए। प्रत्येक शहर की विकास की परिभाषा अलग है। विकास प्रारूप तैयार करते समय शहर के सर्वसामान्य का विचार कर, शहर सबको रहने योग्य हो, इस तरह का बनाए। सिर्फ व्यापारिक सुविधाओं सामने न

रख, शहर रोजगारोपमुख करने की दृष्टि से शिथिल क्षेत्र (एजुकेशन हब) विकसित हो, इसके लिए नई पीढ़ी की सुचनाओं का आदान-प्रदान करने स्वतंत्र सत्र आयोजित किया जाए। सभी मुद्रित, इलेक्ट्रॉनिक माध्यम व सोशल मीडिया की सुचनाओं को भी शामिल किया जाए। शहर विकास प्रारूप तैयार करते समय आवश्यक सभी सुविधा उपलब्ध कराकर युवाओं को नौकरी के लिए पुणे-मुंबई न जाना पड़े, इसका भी ध्यान रखें।

उद्देश्य मात्र विकास

क्रिसल के सलाहकार डॉ. रविचंद्र जोशी ने प्रेजेंटेशन दिया। उन्होंने कहा कि सीडीपी में शहर की पर्यावरण पूरक, रहने योग्य व नागरी सेवा उपलब्ध कराना वाला सुनिश्चित व रहने योग्य शहर के रूप में विकसित करने का उद्देश्य रखा गया है। वर्ष 2021 से 2041 तक प्रस्तावित जनसंख्या को सामने रखकर जलापूर्ति, घनकचरा व्यवस्थापन, बरसाती नालियाँ, सड़क व परिवहन, गरीबों को बुनियादी सुविधा, सामाजिक साधन, पूर्व प्राथमिक, प्राथमिक व इंच, स्वास्थ्य सेवा, आर्थिक व्यवस्थापन आदि मुद्दों पर जानकारी दी। शहर में निवेश बढ़ाने चाहिए। इसके लिए साधन संग्रहीत का विकास होना जरूरी है। इसके लिए सभी मान्यवरों के सुझाव इसमें शामिल किए जाएंगे। डॉ. रविचंद्र जोशी ने बताया कि सीडीपी व डीपी में मूलभूत फंडें हैं। शहर विकास प्रारूप के लिए 15 साल में आवश्यकता अनुसार सुधार किया जा सकता है। कार्यक्रम की प्रस्तावना सोबीपूडी नोडल अधिकारी शशिकांत हस्तक ने रखी।

क्रि नव्यन में जलदवाजी

अनुपम श्याम, विकास अधिकारी, शहर विकास प्रारूप को ध्यान में रखकर तैयार किया गया है. शहर के विकास को ध्यान में रखकर तैयार किया गया है. शहर के विकास को ध्यान में रखकर तैयार किया गया है.

Stakeholders slam NMC for flawed city devt plan

■ CDP seeks Rs 34,604 crore for all-round development

■ Special Correspondent

NAGPUR Municipal Corporation (NMC) failed to satisfy stakeholders over new city development plan (CDP) prepared by M/s. CRISIL Risk Infrastructure Solutions Limited during a meeting held on Tuesday. The stakeholders were angry over proposed plan of large sum of investment of Rs 34,604 crore by the year 2041 in various sectors. They alleged that local body has failed to resolve old burning problems of the city and citizens are already reeling under heavy tax loads.

NMC has organised a power point presentation of CDP Mayor Pravin Daske inaugurated the workshop while Municipal Commissioner Shrawan Hardikar, Standing Committee Chairman Ramesh Singare, Ruling Party leader Dayashankar Tiwari, leader of opposition Vikas Thakre, Superintendent Engineers Prakash Usde and Shashikant Hastak were present on the date.

CRISIL Advisor Dr. Bhanukant Kohli in his presentation gave information regarding future need and proposed investment in the city with the help of Central and State Government in coming years. He said, the city will require an investment of Rs 34,604 crore by 2041. The authorities will have to give more emphasis on water, sewerage, solid waste management, lakes, transportation and road sectors. He said that during last four decades, the population growth of the city was in negative direction. This suggests city failed to generate new jobs and attract more investment in the city. He said, the



Mayor Pravin Daske addressing a workshop of City Development Plan organised by NMC. Municipal Commissioner Shrawan Hardikar, Ruling Party leader Dayashankar Tiwari, Leader of Opposition Vikas Thakre, Standing Committee Chief Ramesh Singare, Superintendent Engineer Shashikant Hastak look on.

authorities will have to make financial planning for next five years for the development of the city. The major investment will be in Metro Rail, Urban Transport and strengthening of roads. The city will require more junctions, flyovers, railway over bridge, foot over bridge, and pedestrian subway. The authorities will have to give more thrust on social infrastructure, urban environment and urban governance.

Mayor Daske while addressing the gathering said, the administration should avoid mistakes while implementing the CDP. He should emphasise on more sustainable and livable city and it will be developed as education hub in coming years. The city should have all basic infrastructure and capacity to

attract more investment and industries. Municipal Commissioner Shrawan Hardikar said, the process of urbanisation is unending. Orange city has advantage of growth due to its strategic location and natural facilities. Senior corporators Sanli Agrawal, Praful Gadgilkar, Ashim Khan, Banda Bant, Kamal Ansari, Deepak Patel, former Deputy Mayor Jaijumbi Patel, Gautam Patel, Murlidhar Menharam, Abha Pande, Vidya Kanherkar, Harshada Sable, Meena Tikke, Sheetal Ghate, Samirra Jadhav, Lata Ghate, Brij Gopal Laddha, Rajesh Tikke, DCP (Traffic) Bharat Jangade, Tejinder Singh Bhatnagar, Prakash Usde, Prashant Surode of CREDA, Akshay Kanwal, DBM of SECI Nagpur division K.R. Nagare, Superintendent Engineer of MIDC, I.I. Shah, Deputy Director of GSDA, V.V. Dani of Fisheries and Animal Science University, Kamlesh Shah of Nagpur Chambers, Sanjay Kopolkar of ITPL, Dinesh Bhatia of DRA, Sujit Rodge of ITI, Rajesh

It was not possible to repeat this exercise. Veena Khanolkar, social worker, raised the issue of Bhundevali dumping yard and spreading of various diseases due to unscientific dumping of the garbage. VTA President J.P. Sharma said, the local body has failed to provide clean and uninterrupted water supply over last several years. The 24x7 water supply scheme has miserably failed. Prof. Hule said, development and planning departments should be created in NMC for better planning and development. Ilceman Bhave, an architect, alleged that the CDP has been prepared to obtain more and more funds from the Central Government without considering the fact whether the city would require these schemes or not. He said, the local body will require efficient officers and staff to implement these schemes. Prof. Adane of VNTI, said, finances would be the biggest challenge before the local body.

Long term perspective missing

CENTRAL Ground Water Board (CGWB) Director D. Subba Rao and Superintending Hydrologist Dr. Prabhakar Kanwar have pointed out that CDP failed to emphasise on use of ground water over the long period. The issue of rainwater harvesting, and recycling of water is missing from the presentation. The CDP missed to give importance to augmentation of ground water by rainwater harvesting and artificial recharge of ground water. The maps are missing from presentation.

Noted Architect Paramjit Singh Ahuja, President of Architect Association, was very disappointed with overall approach of the local body over preparation of CDP. He said that during preparation of last CDP in 2006, then Commissioner had involved various non-governmental organisations (NGOs) in the areas of their interest sector wise to give suggestions.

The stakeholders present in the meeting were only reacting on CDP and no constructive suggestions would emerge from such a futile exercise. However, his suggestion was rejected by the Commissioner saying that the process of involvement of NGOs in different sector was already completed and now,

Orange City's facelift to cost Rs 34,604 crore



Vehicular traffic moving in a systematic manner at beautified Medical College Square. (Pic: Satish Raut)

- Nagpur to become more liveable city with all-round improvement in physical infrastructure
- Stakeholders to discuss CIP and draft development plan today

■ Special Correspondent

NAGPUR Municipal Corporation (NMC) will require a fresh investment of whopping Rs 34,604 crore for development of the Orange City up to year 2041 to make the city a desired destination for residence, education, hospitality, IT sector, health care sector and even industries. The local body will require the amount in two phases for a facelift to the Second Capital of Maharashtra and make it more liveable and bring it at par with best in the world.



M/s CRISIL Risk Infrastructure Solutions Limited has submitted a revised draft of city investment plan (CIP) to NMC recently. The local body

NMC to take loan of Rs 400 crore

CRISIL has prepared a financial operating plan for NMC with an estimated investment for Rs 12,808 crore. However, as per the current prices, the estimated investment would be Rs 16,443 crore (including escalation costs).

The report says, NMC is not in a position to take up any new project. Therefore, it shall take a loan of Rs 400 crore to fulfill the existing financial commitments towards on-going projects under JNNURM and repayment of outstanding loan. The local body should improve investment capacity with grant support of Rs 2,795 crore, the report suggested.

(Contd on page 2)

16.7 Development goals

The city vision and milestones have been translated to development goals with specific strategies. The sectors covered under development goals are water supply, sewerage & sanitation, SWD, SWM, traffic and transportation, urban poverty, local economy, urban environment and social infrastructure.

The development goals have been framed on the basis of current priority needs in various sectors and sector vision to adhere to sector-specific service-level benchmarks and indicators.

Table 97: Sector-wise developmental goals

Sector	Vision	Development goals	Action points for NMC
Water supply	“Water for all and 24 x 7 supply”	<ul style="list-style-type: none"> Provide 24 X 7 water supply with adhering to quality standards as prescribed by CPHEEO Recovery of 100% O&M cost Achieving 90% collection efficiency for water user charges and water tax Minimize energy consumption for operation of water supply 	<ul style="list-style-type: none"> Augment source to meet the water supply demand for estimated population of 62 lakhs by 2041 Increase the coverage by providing individual water connections to all including the urban poor and newly merged Census towns (Hudkeshwar Budrak and Narsala) Augment the distribution network to ensure safe and continuous water supply Installations of flow meters, bulk meters in transmission and

Sector	Vision	Development goals	Action points for NMC
			distribution network, and meters at consumer end <ul style="list-style-type: none"> ▪ Conduct water quality checks and energy audits on a regular basis ▪ Reduce potable water demand by use of non-potable water through treating of waste water generated in city ▪ Implement and monitor rainwater harvesting bye-laws
Sewerage and Sanitation	Open Defecation Free (ODF) city and 100% coverage in sewage collection and treatment	<ul style="list-style-type: none"> ▪ 100% households with access to toilets ▪ Development of de-centralised sewerage collection, treatment & disposal system for three sewerage zones ▪ 100% collection and treatment of sewage ▪ Maximum use of treated waste water ▪ Maximize the cost recovery and collection efficiency 	<ul style="list-style-type: none"> ▪ Provision of UGD network in the three sewerage zones. ▪ 100% coverage of the households through individual connections ▪ Construction of adequate STPs to treat the waste water generated in the city. (Centralised for three zones and 16 small STPs) ▪ Solid and liquid waste separation to ensure 100% treatment of the sewage, maximisation of the efficiency of the system and selling reusable or recyclable solid waste as by-products ▪ Implementation of bye-laws for recycle and reuse of waste water ▪ 100% treatment of waste water and promote reuse of treated waste water in the nearby industries ▪ Explore opportunities for PPP and potential of revenue generation from sale of by-products (solid waste and treated waste water)
Storm water drainage	Strengthening and rejuvenation of natural drainage system	<ul style="list-style-type: none"> ▪ Rejuvenate the existing natural basins in the city ▪ Regular maintenance of the existing drainage network to improve the carrying capacity of the system ▪ Minimise the load on treatment of waste water collected in the SWD network 	<ul style="list-style-type: none"> ▪ Construct SWD network ▪ Regularly clean the existing system along with de-silting and construction of retaining wall for the open nullahs ▪ Revive natural basins like lakes and rivers ▪ Design roads and SWD ensuring adequate slope for proper surface water run-off ▪ Explore the possibility of developing a SWD network without a base slab to ensure recharge of ground water level

Sector	Vision	Development goals	Action points for NMC
			and reduce the load on treatment of waste water
Solid waste management	Clean city, bin-free city	<ul style="list-style-type: none"> ▪ 100% door-to-door collection ▪ No bins and 100% waste transportation to the disposal site in segregated manner ▪ Handling and disposal mechanism to be in compliance with CPHEEO standards ▪ Maximum treatment of the waste on daily basis and reduction in the pollution due to solid waste in the city 	<ul style="list-style-type: none"> ▪ Augment the existing system to maximise door-to-door collection ▪ Promote segregation of waste (dry and liquid waste) at source ▪ Explore the latest and sophisticated technologies for handling waste and treatment ▪ Conduct sensitization and awareness campaigns for citizens. ▪ Improve collection efficiency of municipal solid waste management user charges ▪ Explore opportunities of PPP and potential of selling by-products post treatment of solid waste
Urban roads, Traffic & transportation	Safe and efficient traffic management	<ul style="list-style-type: none"> ▪ Improve the coverage of public transport and promote use of public transport ▪ Integration of land use and transport sectors through transit-oriented development, promotion of mixed land use, and defused CBDs in Nagpur ▪ Implement necessary travel demand management (TDM) strategies to achieve sustainability 	<ul style="list-style-type: none"> ▪ Develop necessary infrastructure for improving the coverage and services of public transport ▪ Augment and maintain public transport fleet ▪ Regularise and organise the IPTS system in the city along with fare rationalisation ▪ Adopt transit-oriented development (TOD) along the major transit corridors and METRO routes to ensure integration of land use and transport ▪ Implement travel demand management (TDM) measures like one-way, non-parking zone, and no-vehicle zones in the old city area and commercial areas, walkways, bicycle lanes, pedestrian facilities, etc. ▪ Augment the existing road network by developing missing links ▪ Provide for traffic management infrastructure and street furniture along all the arterial and sub-arterial roads ▪ To provide necessary parking bays – on-street and development of parking complexes at various commercial areas in the city

Sector	Vision	Development goals	Action points for NMC
Urban poverty	Slum-free city	<ul style="list-style-type: none"> ▪ Improved access to physical and social infrastructure for the urban poor ▪ Developing a mechanism to ensure social and land tenure rights to all the urban poor along with the necessary economic welfare programmes ▪ De-notification of slums with basic infrastructure 	<ul style="list-style-type: none"> ▪ Affordable and better quality housing for urban poor ▪ 100% coverage of basic urban services in all the slums. Provision of individual water supply connections, flush toilets, sewerage connections and door-to-door collection of waste ▪ Development of pucca streets and provision of street lights in the slums ▪ Development of facilitation centres in all the slums to maximise outreach and awareness regarding all the government programmes for urban poor ▪ Provision of subsidy cards to the urban poor to access private services for better education, health facilities and other services ▪ Development of training centres for imparting vocational and skill development training to help the urban poor in gaining self-employment ▪ Development of commercial space/haat centre (permanent market with temporary stalls of the craftsmen) to provide the urban poor with a platform to sell their goods and products
Urban environment	To make all the lakes and rivers in the city pollution free and preserve the flora, fauna and avifauna of the region	<ul style="list-style-type: none"> ▪ Developing a robust monitoring and database management system ▪ Develop green spaces and belt ▪ Rejuvenating the lakes and rivers and protecting the bio-diversity 	<ul style="list-style-type: none"> ▪ NMC should develop a robust monitoring and database management system related to ground water extraction, air pollution, noise pollution and water pollution in the city. ▪ Develop and maintain green spaces in the city. ▪ Rejuvenate the rivers in the city and explore water front development possibilities. ▪ Rejuvenate the lakes and make it a place for recreational use by the citizens ▪ Conduct classical morning raga sessions in the parks and gardens in the city
Culture and Heritage	Nagpur to be developed as a tiger hub To promote	<ul style="list-style-type: none"> ▪ Promotion of local and regional tourism ▪ Preservation and conservation of heritage 	<ul style="list-style-type: none"> ▪ To promote local and regional tourism to attract more tourists ▪ To support tourism industry in the city

Sector	Vision	Development goals	Action points for NMC
	Nagpur as a cultural hub in Vidarbha and central India	precincts	<ul style="list-style-type: none">▪ Implement the heritage regulations in the city▪ Develop heritage and culture-related documentation, coffee table books, and digitize all the heritage structures and precincts in the city▪ Develop space for permanent exhibition of the heritage items, and also a library on heritage

17 Sector Plan, Strategies and Investment Plan

The sector plans have been prepared on the basis of SWOT analysis and sector assessments. A technical assessment has been carried out to understand the demand-gap analysis of the current service delivery mechanism. The identified projects have been prioritized based on consultations with the concerned officials, city-level stakeholders and master plans, DPR and other plans already prepared by NMC for various sectors, realizing the need for augmenting the infrastructure to meet the demand-supply gap.

The project identification in sectors like heritage, local economy, and social infrastructure has been done on the basis of consultation. The projects derived are aimed at ensuring the optimal and efficient utilization of existing infrastructure systems and augmentation of the capacity to meet the demands of the future population. The projects were identified for the projected population for a horizon, for all the sectors. So for all the projects identified in the revised CDP, the design year is 2041 and will be able to meet the sectoral demand for 2041.

The total investment for development in Nagpur has been classified into two categories based on the time horizon – short and long term. The period 2016-2022 has been identified as short-term horizon. It is targeted that for the current population and the incremental addition, 50% service delivery should be achieved by 2021. Hence, goals and service outcomes have been planned for the period of next seven years. (2016 -2022). In order to achieve these goals, an action plan has been formulated under each identified sector. The time horizon for the goals and the action plans for water supply, sewerage & sanitation, SWD, SWM, traffic & transportation, urban poverty, urban environment, and heritage have been discussed in the following section.

Capital Investment Plan (CIP)

In line with the vision formulated for the city, the City Investment Plan (CIP) has been prepared through a comprehensive process of assessment of gaps and stakeholder consultation. This assessment has also led to the identification of sector-specific strategies, implementation actions and associated reforms which were formulated based on specific inputs from stakeholders.

The strategies adopted primarily have three dimensions – improving the service delivery by efficiency measures, improving service delivery by creating infrastructure assets and improving governance aspects. This section summarizes the capital investments required for creating infrastructure assets and various strategic interventions required for the implementation of such projects.

CIP is needed for:

- Mapping of infrastructure needs to meet the current gap and future demand based on city population,
- Scheduling of investments of ongoing projects, and
- Assigning of priorities within the constraints of available financial resources.

The City Investment Plan is the multi-year scheduling of identified and prioritized infrastructure investments. The scheduling or phasing of the plan is based on:

- Stakeholders' perceived needs
- Availability of fiscal resources (for new investments and O & M)

The phasing of the identified projects and investments is based on the following principles:

- Priority needs with developed areas receiving priority over future development areas
- Inter and intra-service linkages, viz. water supply investments shall be complemented by corresponding sewerage/ sanitation improvements
- Size and duration of the requirements, including preparation and implementation period
- Project-linked revenue implications, such as installing house connections where supply and distribution capacities have been increased

- Technical capacity for construction and to carry out O & M management of new assets
- Choice of specific improvements to be carried out for a period of four to five years.

17.1 Institutionalizing CIP

The City Investment Plan (CIP) is an important element of and is significant in terms of the city's management process and sustainability with regard to the delivery of basic services. The CIP also provides a framework for the annual budget cycle for the future 6-10 year period. The CIP identifies the roles and responsibilities of various stakeholders in the implementation of identified projects. The CIP involves the identification of public capital facilities to cater to the demand of the city populace for short and long term infrastructure needs.

The project identification has been done through a demand-gap analysis of the services and other projects identified during stakeholder consultations. Further project prioritisation and strategising of the investments/ phasing of investment is based on the strategies listed out under each service sector, as identified through stakeholder consultations.

The projects derived are aimed at ensuring the optimal and efficient utilisation of existing infrastructure systems and enhancing the capacity of the systems/ services to cater to the demands of future population additions. In addition to the developmental projects those addressing the core service sectors, certain other projects listed as part of the CIP has been drawn in consultation with the stakeholders' viz. Urban governance, Heritage conservation, rejuvenation of lakes and rivers, etc.

The CIP and the forecasted future needs for the provision of capital facilities under each identified sector is provided in next section. These assets will help to make equitable services for the current population as well as accommodate the expected increase in population.

In sectors where long-term planning is required (for example, source development for water supply, sewerage, Metro and BRTS system etc.), a 25-year planning horizon is considered. Assets created in such sectors consider the projected population in this horizon. These infrastructure assets would not only guarantee services to their citizens, but also signal a proactive commitment to potential investors considering the region.

17.2 Water Supply Sector Plan

As discussed in the assessment of the water supply sector, the key challenges in the city with respect to water supply services were identified during early 2000 and efforts were made by NMC to address the same through projects taken up under JnNURM. During 2006-2013 period most of the water supply projects were taken up for implementation under JnNURM, which will help NMC to achieve the goal of 24 x 7 water supply in Nagpur. Also, the ongoing project will address the need for changing and augmenting the existing distribution system, augmenting the storage capacity, provision of 100% individual connections and metering of all the connections, reduction in NRW levels, etc.

In view of this, it is considered that additional investment would be required for augmentation of additional source capacity for 2041 demand and construction of treatment plant. Further, there is a requirement for extension of distribution network in Hudkeshwar and Narsala.

In view of this, Water supply demand projections and gap till the design year 2041 has been carried out and presented in the table below. The identified project proposals are envisaged to be completed within the revised CDP time-frame (2041). However, in order to overcome the current deficit and meet the requirement for water supply service delivery for the year 2021, the following short-term goals have been formulated and these have to be achieved in a specific time-frame.

Table 98: Water Supply sector - sector plan and strategies

Water Supply Sector plan and strategies							
Sector goals	<ul style="list-style-type: none"> Provide 24 X 7 water supply with adhering to quality standards as prescribed by CPHEEO Recovery of 100% O&M cost Achieving 90% collection efficiency for water user charges and water tax Minimize energy consumption for operation of water supply 						
Design parameters	<ul style="list-style-type: none"> Base year as 2014 and design year as 2041 Demand estimation based on the projected population for NMC and other villages merged with NMC Daily water supply demand (150 LPCD) calculated on the basis of daily per capita water supply norm (135 LPCD +20% Un accounted for Water) Quality of water as per CPHEEO standards 100% treatment capacity 33% of water supplied as storage capacity Distribution network coverage – 80% of road network Cost recovery through user charges (100% O&M expenses) 						
Demand gap assessment	Component	2013	Current gap	2021 (Short term)		2041 (long term)	
				Demand	Gap	Demand	Gap
	Water supply source (in MLD)	644	0	656	12	1132	488
	Water treatment capacity	624	0	656	32	1132	508
Desired outcomes		2013	2017	2019	2021	Remarks	
	Network coverage to households	85%	100%	100%	100%	-	
	Per capita supply (LPCD)	110	135	135	135	-	
	24x7 water supply	0%	50%	70%	100%	-	
	Quality of water	100%	100%	100%	100%	-	
	Non-Revenue Water	53%	30%	20%	20%	-	
	Consumer metering	28%	70%	90%	100%	-	
Cost recovery	117%	100%	100%	100%	-		
Action Plans	Activities						
Increase the household level coverage	<ul style="list-style-type: none"> Increase water supply coverage through provision of individual service connections. Metering of water supply connections Provide water supply to newly developed/developing areas and uncovered areas. 						
Water supply transmission, distribution, storage infrastructure	<ul style="list-style-type: none"> Install bulk flow meters in the transmission network Augmentation of the distribution network to Hudkeshwar and Narsala. Laying of new distribution network should be in accordance with the future requirement of providing 24 x 7 water supply Provision of adequate storage infrastructure and interlinking of the storage infrastructure to provide uninterrupted water supply even in case of emergency 						
Water Supply System Rehabilitation Plan	<ul style="list-style-type: none"> This focuses on partial or complete refurbishing of the existing water distribution pipeline. The old, defunct, and inadequate piping system needs to be replaced by a proper distribution network. 						
Comprehensive Water Supply Plan	<ul style="list-style-type: none"> This focuses on source augmentation, adequate storage, and distribution network and treatment facilities for future requirement Energy and water audit to be carried out as part of comprehensive water supply plan 						
Operation and Maintenance Plan	<ul style="list-style-type: none"> This focuses on development of the asset inventory. Conducting workshops on water supply and other services to educate the citizens. 						

Water Supply Sector plan and strategies			
	<ul style="list-style-type: none"> ■ Preparation of training calendar to impart training to all the staff members throughout the year on O&M of assets ■ Trainings for expenditure control and reduction of O&M cost on key services. ■ Focus on reduction of UFW and NRW. ■ Use of energy efficient technology 		
Unit Rates	Component	Unit	Unit Cost (Rs in Lakhs)
	Water supply source development	MLD	125
	Construction of WTP	MLD	35
(NOTE: unit rates are adopted from the Master Plan (2046) prepared for Nagpur in 2014)			

17.2.1 Capital Investment Plan

Based on the sector assessment the gaps identified in the sector are considered and needs to be taken up during the next phase of development (2014-2041). As discussed earlier most of the components required has been already taken up under various projects implemented during 2006-2013 under JnNURM that will cater to the water supply demand of future population till 2041. But, the only gap identified will be to augment source for raw water supply, water treatment plant and water supply distribution system in Hudkeshwar and Narsala. As shown in the demand gap section for water supply by 2041, there will be a shortfall of 488 MLD.

During discussions with stakeholders and NMC officials, it was understood that there are various options for meeting the future water supply demand. Future demand of water supply can be either met by augmenting the existing sources at Kanhan and Gosikhud dam or by constructing a dam at Uni-Khappa as a new source. But, construction of a new dam will be very capital-intensive and augmenting the existing available sources will suffice to meet the future demand of water supply for the Nagpur region. Thus, the investment for the sector is based on the assumption that NMC will augment the existing available sources for water supply.

Table 99: Water supply sector – capital investment plan

Component		Project description	Estimated cost in Rs. crores
A	Augmentation of water supply source	1. Construction of additional 5 MLD Water treatment Plant on Gosikhud dam.	366
B	Augmentation of treatment capacity of raw water	2. Construction of 508 MLD treatment plant by 2041.	105
C	Distribution network	3. Laying of distribution network in Hudkeshwar and Narsala.	200
The total investment envisaged for the water supply sector (2041)			671
Short-term investment envisaged (2021)			200

Source: CRIS analysis

17.2.2 Project details

The water supply components have been divided into various activities for implementation purpose. Based on CIP as summarised in the above section key projects and project details for water supply sector is presented in the below table.

Table 100: Water supply sector - project details

Component		Project description
A	Augmentation of water supply source	<ul style="list-style-type: none"> ■ NMC should take up augmentation of the existing

Component		Project description
		available sources of water like Kanhan and the Gosikhud dam. In the case of Kanhan, the city is receiving raw water from Kanhan river and raw water mains are already in place. While for Gosikhud, a dam is already in place and laying of raw water mains needs to be carried out.
B	Augmentation of treatment capacity of raw water	<ul style="list-style-type: none"> There will be need to augment the capacity of existing WTP's or construct a new WTP post 2031. The gap in treatment capacity by 2031 will be around 202 MLD and 508 MLD by 2041, to meet with the demand of supply of treated water in the city.
C	Distribution network	<ul style="list-style-type: none"> Laying of distribution network in Hudkeshwar and Narsala has been envisaged to be developed. The new network could be integrated with the existing network.

Projects in pipeline

In the case of water supply, Nagpur has already taken up 11 projects during the 1st phase of JnNURM. Out of 11 projects, 10 projects have been completed so far and 24 x 7 rehabilitation plan for the water supply project is still in the implementation stage and expected to be completed by 2015. Post completion of 24 x 7 water supply project, improvement in the service levels is expected. The expense of the on-going 24 x 7 rehabilitation plan for water supply will be borne by OCWL; and there is no financial commitment towards the project's capital investment for NMC/NESL.

Apart from these, the need for supplying water to the newly merged census towns by NMC/NESL has been taken into consideration while carrying out a demand gap assessment. Also, provision for new house connections along with fitting of meters in these CTs will be taken care of by OCWL as part of their responsibility under the concession agreement.

17.2.3 Phasing of investment

NC has been implementing various projects under JnNURM for augmenting water supply system and rehabilitation of existing system for 24 x 7 water supply in the city; but still there are some components whose capacity will exhaust by 2021 to cater to the demand of future population. Thus, there is no requirement of any water supply projects to be implemented on immediate basis in the short term. Details of short term investment are presented in the table below.

Table 101: Water Supply sector – phasing investment

Sector/Component	Implementing Agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
		(Rs. In Crores)						
A	NMC	0	0	0	0	0	0	0
B		0	0	0	0	0	0	0

	Implementing	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
	raw water							
C	Distribution network	20	40	40	40	40	20	0
Total (in Rs. crores)		200	20	40	40	40	20	0

Source: CRIS analysis

17.2.4 Possibility of PPP

In the past, NMC has implemented water supply projects on PPP basis. It has experience; though the overall experience of implementing the projects on PPP basis can be further enhance current level services.

To improve the existing experience of implementing projects related to water supply on PPP basis and to ensure maximum gains to all. Following are key suggestion for NMC implementing projects on PPP basis;

- Explore the possibility of a revenue-sharing model and ensure implementation of the same.
- Introduce penalty clause to ensure performance.
- Introduce a clause for NMC to intervene in the decision-making process for better outcome of the project.
- Auditing of the finances statements on annual basis from third party.
- Also, incorporate clauses in the concession agreement linking them to the performance of the private operator.

17.3 Sewerage and Sanitation sector plan

As discussed in the sectoral assessment, the key challenges with respect to the sewerage and sanitation sector identified are; lack of 100% coverage of underground drainage system and 100% sewage treatment facilities. The sewage generation forecasted by NMC in their sewerage master plan prepared in 2008 takes into consideration the creation of infrastructure to meet the demand till 2041. The present system of sewerage has been divided into three sewerage zones and accordingly the estimation has been carried out.

Presently, NMC is treating only 22% of the sewage generated in the city. At present, an additional 345 MLD treatment plant is proposed to be implemented by way of two projects by NMC, which will augment the treatment capacity of from 100 MLD to 230 MLD. To meet the future demand for treating the waste water, the STP requirement worked out is shown in the table below.

Likewise, the coverage of the existing sewage collection network is very low and augmenting the UGD network to provide 100% coverage was also envisaged in the master plan. It is estimated that there is a need for augmenting the existing UGD network in all the three zones to achieve 100% collection of sewage; the details are shown in the table below.

As discussed, in order to overcome the current deficit and meet the requirement for the sewerage sector for 2041, the following goals have been formulated to be achieved in a specific time-frame.

Table 102: Sewerage - sector plan and strategies

Sewerage and Sanitation Sector	
Sector goals	<ul style="list-style-type: none"> ▪ Developing underground drainage network and 100% coverage ▪ To form sewerage zones considering the topography of the town ▪ Construction of adequate public toilet blocks in town by 2035 ▪ Minimise the environmental pollution by 100% treatment of waste water

Sewerage and Sanitation Sector							
Design parameters	<ul style="list-style-type: none"> ■ Base year as 2014 and design year as 2041 ■ Sewage generation – 80% of water supply for all the years till 2041 ■ Sewerage treatment capacity – 100% of sewage generation ■ Sewerage pumping systems – as per the system design and topography of the city ■ Sewer network would cover 100% of road network in the city ■ Household level coverage – Sewerage connections as percentage of water supply connections (80%) ■ Public toilets as per the requirement in the slums and public areas. ■ Closing of all the individual septic tanks post provision of underground sewerage collection system and sewerage connections. 						
Demand gap assessment	Component	2013	Current gap	2021 (Short term)		2041 (long term)	
				Demand	Gap	Demand	Gap
	UGD network (km)	1670	1747	3417	1747	3417	1747
	Sewerage Treatment Plant (MLD)	100	245	472	372	752	652
Desired outcomes		2013	2017	2019	2021	Remarks	
	Households covered with UGD	29%	50%	60%	70%	-	
	Treatment capacity	22%	50%	60%	70%	-	
	Reuse and recycling of wastewater	0%	60%	80%	0%	-	
	Cost recovery on sewerage services	54%	30%	40%	55%		
	Sewerage user charges-collection efficiency	100%	100%	100%	100%		
Action Plans	Activities						
Sewer network, Sewerage treatment and Safe disposal	<ul style="list-style-type: none"> ■ Provision of UGD network for 100% collection of sewage generated and safe transportation to the treatment plant ■ 100% coverage of the households through individual connections ■ Construction of de-centralised STP and de-centralised sanitation system newly merged villages ■ To make effort to for separation of solid and liquid waste to ensure 100% treatment of the sewage, maximisation of the efficiency of the system and selling reusable or recyclable waste by-products ■ Implementation of bye-laws for recycle and reuse of waste water and promote reuse of treated waste water in the nearby industries ■ Phasing out the onsite sewage disposal systems ■ Strategies to arrest practice of ODF and use of community toilets 						
Institutional strengthening and capacity building	<ul style="list-style-type: none"> ■ Workshops for best practices and new technologies available along with low cost sanitation practices across the country ■ Conduct the workshops on sewerage sector to educate the citizens ■ Prepare the training calendar and provide trainings to all the staff members throughout the year on O&M of assets ■ Awareness campaigns for arresting ODF practices with slum dwellers 						
Operation and maintenance plan	<ul style="list-style-type: none"> ■ Focus on development of the asset inventory. ■ Trainings for expenditure control and reduction of O&M cost on key services. ■ Focus on 100% coverage and maximum efficiency of the treatment plants to treat maximum quantum of sewage. ■ To explore the market for use of recycled waste water to generate revenue ■ Use of energy efficient technology ■ Regular energy auditing of the treatment plant ■ To target improve collection efficiency and cost recovery 						
Reforms	<ul style="list-style-type: none"> ■ 100% O&M cost recovery 						

Sewerage and Sanitation Sector			
	<ul style="list-style-type: none"> ■ 100% treatment of waste water ■ Introduce bye-laws for re-use of waste water for new constructions ■ Ensure minimum 85% collection efficiency ■ Create separate accounting system for sewerage system 		
Note	<ul style="list-style-type: none"> ■ Identification and earmarking land through creating land bank for fast-track implementation of projects ■ Identification of areas of open defecation and areas with poor sanitation ■ Awareness campaigns to ensure educating the citizens and getting their support in effective implementation of projects and delivery of better services ■ GIS mapping of the utilities and creation of database for future planning and better management of the services ■ Guidelines and manual for regular maintenance of the sewerage utilities ■ Undertake road works after sewerage pipelines are laid. 		
Unit Rates	Component	Unit	Unit Cost (Rs in Lakhs)
	Sulabh Complexes	Building (8 seats and 10 urinals)	13
	Construction of community toilets	No (1 seat)	0.4
	Construction of individual toilets	No (1 seat)	0.4
	Construction of shared toilets	Km	27
	Laying of sewer network	MLD	141
	Construction of sewerage treatment plant		
(NOTE: unit rates are adopted from the revised Sewerage Master Plan, 2014)			

17.3.1 Capital Investment Plan

Developments in the sewerage sectors were based on piecemeal approach; the existing sewage collection network and treatment plants are not able to cater to the requirements in the city. The existing facility covers less than 70% of the city area, which also includes open nullahs. Further, existing treatment capacity for the sewage is only 28%. The capital investment required for the sewerage sector's improvement in the city is presented below.

Table 103: Sewerage & Sanitation - Projects identified

Component		Project description	Investment estimated in Rs. crores
A	Improvement of Sanitation infrastructure in the city	<ol style="list-style-type: none"> 1. Construction of Individual and shared toilets for for slum-dwellers, community toilets, and public toilets in the city. 2. Laying of UGD for North sewerage zone. 	50.3
B	Development of sewerage system for North zone	<ol style="list-style-type: none"> 1. Construction of 886 kms of UGD network in the North zone for 2041. 2. Construction of 3 STPs by 2041 in the North zone. 	491.0
C	Development of sewerage system for Central zone	<ol style="list-style-type: none"> 1. Construction of 427 kms of UGD network in the North zone for 2041. 2. Construction of 1 STP by 2041 in the North zone. 	441.3
D	Development of sewerage system for South zone	<ol style="list-style-type: none"> 1. Construction of 434 kms of UGD network in the North zone for 2041. 2. Construction of 2 STPs by 2041 in the North zone. 	383.5

Component	Project description	Investment estimated in Rs. crores
Total investment required till 2041		1366.0
Short-term investment for design year 2021		683.0

Source: CRIS analysis

17.3.2 Project details

Based on CIP as summarised in the above section key projects and project details in sewerage sector have been presented in the below table.

Table 104: Sewerage & Sanitation - projects identified

Component	Project description
A	<p>Improvement of Sanitation infrastructure in the city</p> <ul style="list-style-type: none"> Investment has been identified for the development of individual toilets for slum-dwellers, community toilets, and public toilets Also, the investment is identified for providing individual sewer connections to all the houses from toilets to the sewerage network
B	<p>Development of sewerage system for North zone</p> <ul style="list-style-type: none"> It is estimated that about a network of 886 km shall be required by 2041. The network length comprises branch sewers/house sewers Requirement of 3 STPs by 2041 for the zone has been identified, which is in line with the sewage generation estimated The investment in the laying of the collection network and STP also includes the cost of land acquisition and other infrastructure necessary like pumping stations
C	<p>Development of sewerage system for Central zone</p> <ul style="list-style-type: none"> It is estimated that about a network of 427 km shall be required by 2041. The network length comprises branch sewers/house sewers Requirement of 1 STP by 2041 for the zone has been identified, which is in line with the sewage generation estimated The investment in the laying of the collection network and STP also includes the cost of land acquisition and other infrastructure necessary like pumping stations
D	<p>Development of sewerage system for South zone</p> <ul style="list-style-type: none"> It is estimated that about a network of 434 km shall be required by 2041. The network length comprises branch sewers /house sewers Requirement of 2 STPs by 2041 for the zone has been identified, which is line with the sewage generation estimated The investment in the laying of the collection network and STP also includes the cost of land acquisition and other infrastructure necessary like pumping stations

Projects in pipeline

A project for recycle and reuse of waste water is being implemented by NMC on PPP basis. The project is expected to be completed by 2014. Another project to augment the treatment capacity of the existing STP from 100 MLD to 200 MLD has been awarded and soon its implementation will start. The project is expected to be completed within two years. In the case of both the projects, NMC has no financial commitment as execution of the projects is on PPP basis. Instead, both the projects will fetch royalty revenues for NMC.

Also, NMC took up a project to set up a sewerage system for the north sewerage zone. The project was approved by the state and central government and NMC will implement the project under JnNURM extended phase. The project cost is Rs. 490 crores, which will ensure that components like STP and laying of collection network of 886 km will be covered.

17.3.3 Phasing of investment

The phasing of investment has been carried out for short term horizon (2021). The sewerage project components have been divided into various components and timelines have been proposed for implementation purpose. The phasing of investment and implementing agency for sewerage and sanitation sector for 2021 has been presented in the table below.

Table 105: Sewerage & Sanitation - phasing of investment

Sector/Component		Nodal agency	2014-	2015-	2016-	2017-	2018-	2019-	2020-
			15	16	17	18	19	20	21
(Rs. In Crores)									
A	Construction of Individual and shared toilets for slum-dwellers, community toilets, and public toilets in the city	NMC	2.5	5.0	5.0	5.0	5.0	2.5	0.0
B1	Laying underground sewer network for north sewerage zone		24.6	49.1	49.1	49.1	49.1	24.6	0.0
B2	Construction of decentralised Sewerage Treatment Plant for north sewerage zone		22.1	44.1	44.1	44.1	44.1	22.1	0.0
C1	Laying underground sewer network for central sewerage zone		19.2	38.3	38.3	38.3	38.3	19.2	0.0
C2	Construction of decentralised Sewerage Treatment Plant for central sewerage zone								
D1	Laying underground sewer network for south sewerage zone								
D2	Construction of decentralised Sewerage Treatment Plant for south sewerage zone								

Sector/Component	Nodal agency	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total (in Rs. Crores)	683.0	68.3	136.6	136.6	136.6	136.6	68.3	0.0

Source: CRIS analysis

17.3.4 Possibility of PPP

In the past, NMC has implemented sewerage projects on PPP basis. It has experience, though the overall experience of implementing the projects on PPP basis is not good.

To improve the existing experience of implementing projects related to STPs on PPP basis and to ensure maximum gains to all. Following are key suggestion for NMC implementing projects on PPP basis;

- Explore the possibility of a revenue-sharing model.
- Introduce penalty clause to ensure performance.
- Introduce a clause for NMC to intervene in the decision-making process for better outcome of the project.
- Also, incorporate clauses in the concession agreement linking them to the performance of the private operator.

17.4 Solid Waste Management sector plan

As discussed under sectoral assessment, the key challenges with respect to the Solid Waste Management sector are lack of segregation of waste at source, and absence of transfer stations and scientific landfill facilities. NMC has prepared a city sanitation plan (CSP) in 2012 which identifies the issues and grey areas which are coinciding with CRIS observations. The efficiency of the recovery mechanism is linked to segregation at source.

As discussed, with a view to overcome the current deficit and meet the requirement for MSW service delivery for the year 2041, the following goals have been formulated to be achieved in a specific time-frame.

Table 106: Solid Waste Management - sector plan and strategies

Solid Waste Management Sector and strategies							
Sector goals	<ul style="list-style-type: none"> • 100% door-to-door collection • No bins and 100% waste transportation to the disposal site in segregated manner • Handling and disposal mechanism to be in compliance with CPHEEO standards • Maximum treatment of the waste on daily basis and reduction in the pollution due to solid waste in the city • To recycle, reuse and reduce the load on local environment 						
Design parameters	<ul style="list-style-type: none"> • All the households should be covered with the door-to-door waste collection system. • Segregation of waste at source – (ensure 100% of waste would be segregated at the source) • Optimum fleet utilization (No. of trips/ vehicle/ day - average minimum of 2) • Desired SWM treatment capacity – 60% of generated waste • Desired landfill site– 40% of the waste generated 						
Demand gap assessment	Component	2013	Current gap	2021 (Short term)		2041 (long term)	
				Demand	Gap	Demand	Gap
	Primary collection and transportation	611	-	644	33	1270	659

Solid Waste Management Sector and strategies							
	fleet						
	MSW treatment plant (capacity – TPD)	600	150	982	382	1905	1305
	Landfill (in acres)	38	7.5	33	33	64	64
Desired outcomes		2013	2017	2019	2021	Remarks	
	Door-to-door waste collection	95%	100%	100%	100%	-	
	Segregation at source	28%	50%	60%	70%	-	
	Mechanised waste handling	80%	90%	100%	100%	-	
	Waste treatment capacity	0%	75%	80%	100%	-	
	Scientific waste disposal	0%	80%	100%	100%	-	
	Cost recovery of O&M	1%	50%	70%	90%	-	
Action Plans	Activities						
Door-to-door waste collection	<ul style="list-style-type: none"> Door-to-door waste collection should be implemented across Nagpur. The taskforce should be appointed for the effective implementation of the programme and further to achieve the desired goals. 						
Source segregation and collection of MSW	<ul style="list-style-type: none"> The segregation of biodegradable and non-biodegradable wastes should be done at the source level. This segregation of waste would improve the recovery from waste collected since the calorific value of the dry waste is not affected. 						
Composting of organic waste	<ul style="list-style-type: none"> Segregated organic waste should be used for making compost. New technology and treatment plant should be in line with the waste generated in the city. 						
Scientific landfill	<ul style="list-style-type: none"> A regional landfill site with closure mechanism for inorganic wastes is to be developed in accordance with the CPHEEO norms. 						
IEC & capacity building	<ul style="list-style-type: none"> For effective solid waste management in the city, regular awareness campaigns have to be conducted in the city and it is recommended to adopt 4R strategy (reduces, reuse, recycle, and recover). Effective implementation of outreach mechanisms to improve door-to-door collection and segregation at source. Alterations and improvements in the structure of departments dealing with sanitation, i.e. Health department and PWD. The number of staff should be proportional to the population. Define the roles and responsibilities of technical and non-technical staff Training and capacity building exercises to technical staff 						
Unit rates	Component			Unit		Unit Cost (Rs in Lakhs)	
	Auto-tipper(modified with platform to segregate waste)			Nos		5	
	Construction of transfer station			Nos		100	
	Construction of treatment plant			per Tonne		88	
	Landfill site			per acre		20	
(NOTE: unit rates are adopted from the CSP, 2011-12)							

³⁸ NMC is developing the scientific landfill site, but dumping of refused waste into landfill site is not practiced as of now.

17.4.1 Capital Investment Plan

The door-to-door collection coverage is about 95% and waste recovery is hardly 9%. Further, the segregation of waste at source is only 28%, which is understood to be due to the absence of robust monitoring and strict actions against non-performance of the private operator. There is no scientific disposal mechanism for landfill; refuse waste is dumped into the dumping yard. Based on demand gap analysis and future waste generation till 2041, the investment estimated for SWM sector is as shown below.

Table 107: Solid waste management – Capital Investment Plan

Component		Project description	Investment estimated in Rs. crores
A	Construction of MSW treatment facility	1. Construction of compost plant and waste processing plant 2. Constrctuion of RDF plant and Bio gas plant.	15.7
B	Development of scientific landfill facility	1. Constrctuion of 63 acres landfill facility for 2041 for Nagpur city.	339.7
C	Procurement of MSW transportation and waste handling machineries	1. NMC will require augmenting the existing fleet size to achieve 100% coverage and transportation of waste in future. 2. Also, the existing fleet will be need replacement as their after completion of vehicle's life cycle.	12.8
Total investment required for 2041			368.1
Short term investment required for 2021			341.0

Source: CRIS analysis

17.4.2 Project details

Based on CIP as summarised in the above section key projects and project details in SWM sector is presented in the below table.

Table 108: Solid waste management - Projects identified

Component	Project description
A. Construction of MSW treatment facility	<ul style="list-style-type: none"> ■ Investment envisaged towards development of compost plant, waste processing plant, RDF plant & Bio gas plant based on the existing waste composition observed
B. Development of scientific landfill facility	<ul style="list-style-type: none"> ■ The area required for scientific landfill has been projected in view of accumulated waste and future waste generation. ■ It is assumed that on development of treatment facility about 70% of waste would be sent for landfill. ■ Accordingly, the investment has been envisaged for development of landfill of 63 acres with required infrastructure
C. Procurement of MSW transportation and waste handling machineries	<ul style="list-style-type: none"> ■ NMC will require augmenting the existing fleet size to achieve 100% coverage and transportation of waste in future. ■ Also, the existing fleet will be need replacement as their after completion of vehicle's life cycle

17.4.3 Phasing of investment

The SWM project components have been divided into various components for implementation purpose. Further, the timeliness and implementing agency have been proposed for each component, and the same have been presented in the table below.

Table 109: Solid Waste Management - phasing of investment

Sector/Component		Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
			(Rs. In Crores)						
A	Construction of MSW treatment facility	NMC	0	0	0	0	0	0	0
B	Development of scientific landfill facility		0	0	0	0	102	102	136
C	Procurement of MSW transportation and waste handling machineries		0	0	0	0	0	0	1
Total		341.0	0	0	0	0	102.5	102.5	137.0

Source: CRIS analysis

17.4.4 Possible of PPP

To improve the existing experience of implementing projects related to SWM on PPP basis and to ensure maximum gains to all. Following are key suggestion for NMC implementing projects on PPP basis;

- NMC to should explore the possibility of revenue sharing model
- Penalty clause to ensure performance
- clause for NMC to intervene the decision making process for better outcome of the project
- Also, incorporation of clauses in the concession agreement which are linked to the performance of the private operator.

Based on past experience and discussions with NMC officials, NMC's role in the PPP projects especially in SWM sector is merely limited to monitoring. There are some recommendations for NMC to enhance the level of services;

- On daily basis NMC should monitor the SWM activities that are outsourced. Keep check of the records of waste collected, transported and treated.
- NMC should form a dedicated team of 4 team members that will monitor the SWM fleet movement and waste handling within the city on daily basis.
- NMC should have robust vigilance system and impose penalty in case of non-adherence to the stipulated standards for all private operators.

17.5 Storm Water Drainage Sector Plan

As discussed in the assessment of the storm water drainage sector, the city does not have 100% coverage of pucca open drains. Further, the drains are in a dilapidated state and need immediate rehabilitation. The demand-gap analysis has been estimated on the basis of the following design parameters: drainage network reach as % of road length (min 130%) and size of drains to be designed according to the rainfall data.

As discussed, with a view to overcome the current deficit and meet the requirement for the storm water drainage facility in NMC for 2041, the following goals have been formulated to be achieved in specific time-frame.

Table 110: Storm Water Drainage - sector plan and strategies

Storm Water Drainage sector plan and strategies							
Sector goals	<ul style="list-style-type: none"> Rejuvenate the existing natural basins in the city Regular maintenance of the existing drainage network to improve the carrying capacity of the system Minimise the load on treatment of waste water collected in the SWD network Minimize the water logging areas and flooding incidence in the city 						
Design parameters	<ul style="list-style-type: none"> 100% coverage of SWD network and linkage to major drainage channels in the city. Storm water drains as percentage of road length is considered as 130%. SWD to be laid on both the sides along the major roads (except local and internal roads). Size of drains to be designed according to the rainfall and runoff. 						
Demand gap assessment	Component	2013	Current gap	2021 (Short term)		2041 (long term)	
				Demand	Gap	Demand	Gap
	Storm water drainage network coverage	851	3567	4418	3567	4418	3567
Desired outcomes		2013	2017	2019	2021	Remarks	
	Storm water drainage network coverage	49%	40%	50%	60%	-	
	Rehabilitation of existing primary nallahs and primary drains		40%	60%	60%		
Action Plans	Activities						
Storm water drainage rehabilitation plan	<ul style="list-style-type: none"> Assessment of percentage of pucca open drains within NMC limits Identification of water logging areas, contour survey of areas Linkage of major drainage channels and natural basin and de-silting of basin pre-monsoon on regular basis. 						
Rehabilitation and strengthening of nallahs	<ul style="list-style-type: none"> Unregulated constructions and siltation along these channels hamper the drainage system during the monsoon. 						
Up-gradation of roadside storm water drains	<ul style="list-style-type: none"> Upgrade and extend the road side surface drains across the city. 						
Reforms/ strategies	<ul style="list-style-type: none"> Prepare a GIS mapping of the utilities, water logging area, and low lying areas in the town Creation of database of rainfall and inventory of the assets To ensure the drains along the roads and drainage channels are accessible for regular maintenance while designing phase itself. Contingency planning on annual basis to reduce the damage due to water logging and flooding during the month of monsoon 						
Unit Rates	Component			Unit		Unit Cost (Rs in Lakhs)	
	Construction of pucca open drain			km		102	
<i>(NOTE: unit rates are adopted from the revised SWD Master Plan, 2009. Rates have been escalated to current prices.)</i>							

17.5.1 Capital Investment Plan

As per the sector assessment, the city has open nallahs, drains along the roads and drainage channels which carry storm water. Apart from the development of the pucca surface drainage system, rehabilitation of natural water courses has been identified for improvement of the overall drainage system

in the city. The projects identified and the component-wise capital investments are presented in the table below.

Table 111: Projects identified – Storm water drainage

Project	Sub project	Estimated cost in Rs. crores
A. Construction of Storm water drainage system in North zone	1. Construction of 888 kms drainage network for 2041. 2. Widening and deepening of 75 kms of major drainage channels.	1,431
B. Construction of Storm water drainage system in central zone	1. Construction of 863 kms drainage network for 2041. 2. Widening and deepening of 49 kms of major drainage channels.	890
C. Construction of Storm water drainage system in south zone	1. Construction of 863 kms drainage network for 2041. 2. Widening and deepening of 49 kms of major drainage channels.	1,370
Total investment required for 2041		3,692
Short term investment required for 2021		2,407

Source: CRIS analysis

17.5.2 Project details

Based on CIP as summarised in the above section; key projects and project details in storm water drainage is presented in the below table.

Table 112: Storm Water Drainage - projects identified

Project	Description of project
A. Construction of Storm water drainage system in North zone	<ul style="list-style-type: none"> ■ The investment for providing storm water for north zone includes the following components: <ul style="list-style-type: none"> ◆ Land acquisition for laying of SWD pipelines ◆ Laying pipelines of length 888 km along road sides in the zone ◆ Widening and deepening along with construction of RCC wall for 75 km of major and minor drainage channels ◆ Rehabilitation and relocation of settlements to ensure proper alignment of the SWD pipelines
B. Construction of Storm water drainage system in central zone	<ul style="list-style-type: none"> ■ The investment for providing storm water for central zone is including the following components <ul style="list-style-type: none"> ◆ Land acquisition for laying of SWD pipelines ◆ Laying pipelines of length 863 km along road sides in the zone ◆ Widening and deepening along with construction of RCC wall for 49 km of major and minor drainage channels ◆ Rehabilitation and relocation of settlements to ensure proper alignment of the SWD pipelines
C. Construction of Storm water drainage system in south zone	<ul style="list-style-type: none"> ■ The investment for providing storm water for south zone is including the following components <ul style="list-style-type: none"> ◆ Land acquisition for laying of SWD pipelines ◆ Laying pipelines of length 1137 km along road sides in the zone ◆ Widening and deepening along with construction of RCC wall for 60 km of major and minor drainage channels ◆ Rehabilitation and relocation of settlements to ensure proper alignment of the SWD pipelines

17.5.3 Phasing of investment

The storm water drainage project components have been divided into various components for implementation purpose. Further, the timeliness and implementing agency have been proposed for each component, and the same have been presented in the table below.

Table 113: Storm Water Drainage - phasing of investment

Project		Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
			(Rs. In crores)						
A	Construction of Storm water drainage system in North zone	NMC	98.2	98.2	98.2	49.1	0.0	0.0	0.0
B	Construction of Storm water drainage system in central zone		178.1	178.1	89.1	0.0	0.0	0.0	0.0
C	Construction of Storm water drainage system in south zone		274.1	274.1	274.1	137.0	0.0	0.0	0.0
Total (in Rs. crores)		1748.3	550.4	550.4	461.4	186.1	0	0	0

Source: CRIS analysis

17.6 Urban Roads, Traffic and Transportation Sector Plan

As discussed in the sectoral assessment for urban roads, traffic & transportation, the city does not have 100% coverage of concrete/bituminous (CC/BT) surface roads. Pedestrian safety, increasing trends in accident rates and lack of city-exclusive public transportation are the other major concerns.

In order to address these issues, the NIT and NMC have prepared separate Comprehensive Mobility Plans (CMPs) for improving the road and transport infrastructure in Nagpur. These two CMPs formed the basis for the project identification in traffic and transportation sector. Further, the road network projection for 2041 has been made on the basis of the minimum per capita road length required, which is 0.67 meter. The sector plan for traffic and transportation has been presented in the table below.

Table 114: Urban roads, Traffic and Transportation - sector plan and strategies

Urban Roads and Traffic and Transportation sector plan and strategies							
Sector goals	<ul style="list-style-type: none"> ■ Improve the coverage of public transport and promote use of public transport ■ Integration of land use and transport sectors through transit-oriented development, promotion of mixed land use, and defused CBDs in Nagpur ■ Implement necessary travel demand management (TDM) strategies to achieve sustainability ■ To provide necessary infrastructure for NMT mode and promote use of NMT ■ Improve parking facilities across the city 						
Design parameters	<ul style="list-style-type: none"> ■ As per Development Plan, 14% of land use to be under roads. ■ Road condition - % municipal roads surfaced (100% - CC/ BT surfacing) ■ Streetlight spacing – 18 meters ■ Road network – Degree of connectivity in terms of per capita road length (minimum 1.0 meter) ■ Development of non-motorised facilities and sustainable public transportation system 						
Demand gap assessment	Component	2013	Current gap	2021 (Short term)		2041 (long term)	
				Demand	Gap	Demand	Gap
Demand-gap assessment for urban roads, traffic and transport section is adopted from Comprehensive Mobility Plan prepared by NIT/NMC.							
Desired		2013	2017	2019	2021	Remarks	

Urban Roads and Traffic and Transportation sector plan and strategies						
outcomes	% of surfaced roads	85%	100%	100%	100%	
	Reduction in travel time	-	20%	30%	50%	
	Transport safety	-	60%	80%	100%	
Action Plans	Activities					
Comprehensive mobility plan (CMP)	<ul style="list-style-type: none"> The dedicated cell/department for effective implementation of CMP in consultations with various departments concerned in the city Need to create a dedicated fund under the UMTA and ensure regular allocation of the funds for urban transport system. Setting up of separate unit for operating BRTS 					
Transit oriented development (TOD)	<ul style="list-style-type: none"> Development of new transit-oriented development to decongest the existing city by providing access to public transport, and encouraging transit ridership TOD can be achieved by changing the land use plans and amend the building bye laws by giving higher FAR/FSI around the transit areas 					
Development of Traffic and Transport Infrastructure	<ul style="list-style-type: none"> Widening and upgrading the arterial, sub arterial and collector roads Development of skywalks/subways, pathways, cycle tracks Development of freight management hub/truck terminals at nodes on the periphery of the city To develop of interchange hub/multi modal hub for smooth, convenient interchange of modes and to promote integration of various modes of public transport To develop supporting infrastructure like Flyovers, bridges, foot-over bridges, subway, etc. To develop of sustainable public transport system like BRTS and LRTS and integration of the various system. Also, to use of existing bus based public transport system as feeder system. Encouraging use of non-motorised transport mode and to support it developing cycle tracks, pedestrian crossings, walkways in the city. 					
Reforms/ strategies	<ul style="list-style-type: none"> To promote levying of fines and penalty along with robust vigilance system to ensure law and order. To implement parking policy To use Traffic Calming Measures (TCM) and Travel Demand Management (TDM) for efficient management of traffic within the cities and between the cities. Develop monitoring (ITS) and vigilance system to ensure sustainable system and enforcement of law and order. Regularisation of hawking zones and drafting of parking policy 					
Unit Rates	Component	Unit	Unit Cost (Rs in Lakhs)			
	<i>The unit cost for all the components has been taken from CMPs prepared for Nagpur (2008) and Nagpur Metro (2013) region by NMC and NIT respectively.</i>					

17.6.1 Capital Investment Plan

Based on the demand gap analysis, investment required for 2041 has been projected. The project proposals identified and the block estimates are presented in the table below.

Table 115: Projects identified – Traffic & transportation

Sr. No.	Project	Estimated cost in Rs. crores
A. Traffic management and supporting infrastructure		
1	Junction Improvements and Road marking and signages	0.45
2	Repair and Maintenance of existing roads	81.00
3	Road Widening/ Improvement Proposals	102.90
4	Road Links Improvements /Traffic Management	0.43

Sr. No.	Project	Estimated cost in Rs. crores
5	Missing links	50.70
6	Concrete Pavement for city roads in Nagpur	66.68
7	Flyovers (Four Lane on both side)	23.40
8	Rail Over Bridge (ROB)	12.64
9	Rail Under Bridge (RUB)	5.10
10	Bridges on River/ Nallah	0.48
11	Foot Over Bridge (FOB)	3.38
12	Pedestrian Zones, Pedestrian Infrastructure, Removal of Encroachments / hawker Management / dismantling illegal development along mobility corridor	11.00
13	Pedestrian Subways	8.00
B. Public Transportation system and supporting infrastructure		
1	Fleet augmentation	541.03
2	Bus Shelters	10.00
3	Bus Depots and Workshop	60.00
4	ITS (Control room / Passenger Information System and Traffic Information System)	30.00
5	Bike Sharing Plan & Bicycle lanes	7.14
6	Transport hub and TTMC hub cum bus stations	45.25
7	Truck terminals (Frieght management Hub)	37.50
8	Development of Parking spaces along the transit corridors	25.00
9	METRO Rail Transit System(MRTS)	14,300.00
10	Bus Rapid Transit System (BRTS)	134.60
11	Mono rail	2,500.00
12	Parking facility at 72 sites	2,880.00
13	Busstands at 17 locations by NMC	102.00
C. Projects identified in CMP prepared by NMC/NIT		
1	Road widening and development proposals	193.50
2	Development of missing links	50.70
3	Proposals for grade seperators/Fly overs	314.00
4	Rail Under Bridge (RUB) proposal	100.00
5	Rail Over Bridge (RoB) proposal	177.76
6	Proposal of bridges on river	28.80
7	Goods transport improvement proposals	150.00
Total investment required for Urban roads, traffic & transportation infrastructure till 2041		22,053.42
Investment required for 2021		21,608.17
<i>Note: * - Only NMC share has been considered. It is assumed that other parastatal agencies like NIT, MSRDC, PWD-GoM, NHAI, etc. will also take up projects for Nagpur based on discussions with Key NMC officials and other stakeholders.</i>		

Source: CRIS analysis

17.6.2 Project details

Based on CIP as summarised in the above section; key projects and project details in traffic and transportation is presented in the below table.

Table 116: Projects identified – Traffic & transportation

Component	Description of project
A. Traffic management and supporting infrastructure	
1. Junction Improvements	<ul style="list-style-type: none"> Projects for improving the existing geometry of 10 identified junctions which will ease the traffic movement in various directions at the junctions
2. Repairs and maintenance of roads	<ul style="list-style-type: none"> The project involves identification of road stretches for repair and regular maintenance of these stretches.
3. Road marking and signages	<ul style="list-style-type: none"> 21 junctions have been identified for improving the existing level of road markings for better guiding the traffic movement
4. Road Links Improvements /Traffic Management	<ul style="list-style-type: none"> Traffic management and road link improvement have been identified for 6 junctions
5. Missing links and construction of concrete roads	<ul style="list-style-type: none"> There are missing links in the road networks in the city, which will be developed for providing last mile connectivity and connect the roads within the road network at 6 locations NMC has proposal of making concrete roads within city at multiple locations.
6. Flyovers	<ul style="list-style-type: none"> 7 locations in the road network is identified for constructing flyovers to ease the traffic movement
7. Rail Over Bridge (ROB)	<ul style="list-style-type: none"> 10 locations in the road network is identified for constructing ROB to ease the traffic movement at the grade level railway crossing and eliminate the waiting time
8. Rail Under Bridge (RUB)	<ul style="list-style-type: none"> 3 locations in the road network is identified for constructing RUB to ease the traffic movement at the railway junctions and eliminate the waiting time
9. Bridges on River/ Nallah	<ul style="list-style-type: none"> 5 location for construction of new bridges over the rivers in the city have been identified
10. Foot Over Bridge (FOB)	<ul style="list-style-type: none"> 9 locations in the city have been identified for constructing FOB to facilitate the pedestrian movement
11. Road Widening/ Improvement Proposals	<ul style="list-style-type: none"> There are stretches identified for widen the existing carriage way to accommodate more traffic
12. Pedestrian Zones, Pedestrian Infrastructure	<ul style="list-style-type: none"> Multiple location within the city for making pedestrian zones to encourage non-motorised transit has been proposed.
13. Pedestrian Subways	<ul style="list-style-type: none"> To facilitate pedestrian movement in the city, construction of 4 subways have been proposed
B. Public Transportation system and supporting infrastructure	
1. Augmentation of public transportation system	<ul style="list-style-type: none"> Augmenting the existing bus fleet and infrastructure required for public transport system is proposed (for both intercity and intracity)
2. Bus Shelters	<ul style="list-style-type: none"> Bus shelters at identified locations have been proposed as per the comprehensive mobility plan.
3. Bus Depots and Workshop	<ul style="list-style-type: none"> For the purpose of maintenance of bus fleet, bus depots and workshops have been proposed.
4. ITS (Control room / Passenger	<ul style="list-style-type: none"> Number of TTMC hub at intersection of each public mobility corridor within the city core area has been proposed and it will act as a transport

Component	Description of project
Information System and Traffic Information System)	hub. It will become a transfer station for all PT modes in addition to parking facility and NMT main docking station.
5. Bike Sharing Plan & Bicycle lanes	<ul style="list-style-type: none"> Majority of the mobility corridors are recommended for dedicated cycle tracks on both side of the roads.
6. Transport hub and TTMC hub cum bus stations	<ul style="list-style-type: none"> Due to heavy movement of goods traffic in the peripheral areas, 4 new goods terminals have been proposed.
7. Truck terminals (Frieght management Hub)	<ul style="list-style-type: none"> At five location on the periphery of the city truck terminals/freight management hub are proposed.
8. Development of Parking spaces along the transit corridors	<ul style="list-style-type: none"> To meet the demand of parking at public places and along the roads in commercial areas and to decongest the roads development of parking at multiple locations has been proposed. For this available public spaces like gardens can be considered for underground parking so as to serve dual purpose
9. METRO Rail Transit System(MRTS)	<ul style="list-style-type: none"> Need for implementation of Mass transit system is identified to facilitate more and faster movement of passengers NMC is suppose to investment 5% towards the METRO project implemented by NIT in Nagpur At grade MRTS of 12 km proposed also proposed Commuter rail system from Nagpur to Butibori of 20 km length
10. Bus Rapid Transit System (BRTS)	<ul style="list-style-type: none"> Need of BRTS and LRTS for Nagpur was envisaged in the CMP. Even, Commuter rail projects between Nagpur and Butibori Industrial Estate has also proposed.
11. Mono rail	<ul style="list-style-type: none"> The project involves development of monorail in identified corridor as per feasibility studies.
12. Parking facility at 72 sites	<ul style="list-style-type: none"> The project involves development of on street and off street parking facilities at feasible locations.
13. Busstands at 17 locations by NMC	The NMC has identified the need for developing bus stands at 17 locatoins within the city limits.
C. Proeject identified in CMP prepared by NMC	
1. Road widening and development proposals	<ul style="list-style-type: none"> The NMC has identified 10 stretches for road widening and development proposals.
2. Development of missing links	<ul style="list-style-type: none"> 10 stretches for development of missing links have been identified by NMC.
3. Proposals for grade seperators/Fly overs	<ul style="list-style-type: none"> Proposals for grade seperators and fly overs at 9 locations have been identified.
4. Rail Under Bridge (RUB) proposal	<ul style="list-style-type: none"> Rail under bridge has been proposed at four lcoations which are Kamptee naka, Gurudwara, Noga factory and Loha pool.
5. Rail Over Bridge (RoB) proposal	<ul style="list-style-type: none"> RoBs have been proposed at eight identified locations.
6. Proposal of bridges on river	<ul style="list-style-type: none"> 8 locations have been identified for construction of bridges.
7. Goods transport improvement proposals	<ul style="list-style-type: none"> Goods transport improvement proposals have been proposed at Pardi naka, Wadi naka and Khapri naka.

17.6.3 Phasing of investment

The traffic and transportation project components have been divided into various components for implementation purpose. Further, the timeliness and implementing agency have been proposed for each component, and the same have been presented in the table below.

Table 117: Urban roads, Traffic and Transportation - phasing of investment (in Rs. crores)

Project	Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
		(Rs. In Crores)						
A. Traffic management and supporting infrastructure								
1. Junction Improvements and Road marking and signages	NMC	0.04	0.09	0.09	0.09	0.09	0.04	0.00
2. Repair and Maintenance of existing roads		8.10	16.20	16.20	16.20	16.20	8.10	0.00
3. Road Widening/Improvement Proposals		10.29	20.58	20.58	20.58	20.58	10.29	0.00
4. Road Links Improvements /Traffic Management		0.04	0.09	0.09	0.09	0.09	0.04	0.00
5. Missing links		5.07	10.14	10.14	10.14	10.14	5.07	0.00
6. Concrete Pavement for city roads in Nagpur	NMC/ PWD, GoM/ NHAI/ MSDRC	6.67	13.34	13.34	13.34	13.34	6.67	0.00
7. Flyovers (Four Lane on both side)		2.34	4.68	4.68	4.68	4.68	2.34	0.00
8. Rail Over Bridge (ROB)		1.26	2.53	2.53	2.53	2.53	1.26	0.00
9. Rail Under Bridge (RUB)		0.51	1.02	1.02	1.02	1.02	0.51	0.00
10. Bridges on River/ Nallah		0.05	0.10	0.10	0.10	0.10	0.05	0.00
11. Foot Over Bridge (FOB)		0.34	0.68	0.68	0.68	0.68	0.34	0.00
12. Pedestrian Zones, Pedestrian Infrastructure, Removal of Encroachments /hawker Management / dismantling illegal development along mobility corridor	NMC/NIT	1.10	2.20	2.20	2.20	2.20	1.10	0.00
13. Pedestrian Subways		0.80	1.60	1.60	1.60	1.60	0.80	0.00
B. Public transportation system								
1. Fleet augmentation	NMPL/ VNIL	27.05	54.10	54.10	54.10	54.10	27.05	0.00
2. Bus Shelters		0.50	1.00	1.00	1.00	1.00	0.50	0.00

Project	Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
3. Bus Depots and Workshop	NMPL/ VNIL	3.00	6.00	6.00	6.00	6.00	3.00	0.00
4. ITS (Control room / Passenger Information System and Traffic Information System)	NMPL/NMC	1.50	3.00	3.00	3.00	3.00	1.50	0.00
5. Bike Sharing Plan & Bicycle lanes	NMC/NIT	0.36	0.71	0.71	0.71	0.71	0.36	0.00
6. Transport hub and TTMC hub cum bus stations	NMC/ NIT	2.26	4.53	4.53	4.53	4.53	2.26	0.00
7. Truck terminals (Freight management Hub)		1.88	3.75	3.75	3.75	3.75	1.88	0.00
8. Development of Parking spaces along the transit corridors		1.25	2.50	2.50	2.50	2.50	1.25	0.00
9. METRO Rail Transit System(MRTS)	NMC/ NIT/ / GoM & GoI	1,430.00	2,860.00	2,860.00	2,860.00	2,860.00	1,430.00	0.00
10. Bus Rapid Transit System (BRTS)		6.73	13.46	13.46	13.46	13.46	6.73	0.00
11. Light Rail Transit System (LRTS)		250.00	500.00	500.00	500.00	500.00	250.00	0.00
12. Parking facility at 72 sites	NMC	288.00	288.00	576.00	864.00	576.00	288.00	0.00
13. Busstands at 17 locations by NMC		10.20	10.20	20.40	30.60	20.40	10.20	0.00
Projects identified inCMP prepared by NMC								
1. Road widening and development proposals	NMC	19.35	19.35	38.70	58.05	38.70	19.35	0.00
2. Development of missing links		5.07	5.07	10.14	15.21	10.14	5.07	0.00
3. Proposals for grade separators/Fly overs		31.40	31.40	62.80	94.20	62.80	31.40	0.00
4. Rail Under Bridge (RUB) proposal		10.00	10.00	20.00	30.00	20.00	10.00	0.00
5. Rail Over Bridge (RoB) proposal		17.78	17.78	35.55	53.33	35.55	17.78	0.00
6. Proposal of bridges on river		2.88	2.88	5.76	8.64	5.76	2.88	0.00
7. Goods transport improvement proposals		15.00	15.00	30.00	45.00	30.00	15.00	0.00
Total	21,608.2	2,160.	3,922.	4,321.	4,721.	4,321.	2,160.	0.0

Project	Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
		8	0	6	3	6	8	

Source: CRIS analysis

17.6.4 Possibility of PPP

In urban transport sector, projects related to transportation systems can be developed on the public-private partnership mode. Various projects that can be implemented through PPP are;

- **BRTS, LRTS – NMC** can outsource the whole function of provision of public transport for the city of Nagpur to private operator for a certain period (7 -10 years). Under PPP, following can be the scenario;
 - ◆ NMC might ask private operator to procure the whole or part fleet required
 - ◆ Private operator should design and develop bus shelters in the city along the routes proposed or suggested by NMC
 - ◆ Authority responsible for routes finalisation for public transportation system will be NMC, and private operator can also suggest change or deletion. Also, NMC will be having the authority to finalise the fare card based on socio-economic factors for the project
 - ◆ Revenue sharing model should be worked out between NMC and the private operator
- **Development of Interchange hub, freight management complexes, bus terminals, etc. – Design**, construction, and maintenance of buildings like interchange hub, freight management complexes and bus terminals is feasible on PPP basis.
 - ◆ NMC can provide municipal land on lease to private operator for construction and maintenance of such buildings.
 - ◆ Private operator might have to bear all the cost related to the project and towards O&M too. Operator would be given a concession period of 10 to 15 years.
 - ◆ Revenue sharing model should be worked out between NMC and the private operator
- **Development of Flyovers, subways, FoBs - Design**, construction, and maintenance of flyovers, subways, FOBs is feasible on PPP basis.
 - ◆ NMC can provide municipal land on lease to private operator for construction and maintenance of flyovers, subways, FOBs.
 - ◆ Private operator might have to bear all the cost related to the project and towards O&M too. Operator would be given a concession period of 20 to 30 years. For recovery of the capital cost and O&M cost of the infrastructure NMC should levy entry tax/toll tax at entry points of the city.³⁹
 - ◆ Revenue sharing model should be worked out between NMC and the private operator.
- **Development of parking bays, complexes – Design**, construction, and maintenance of parking bays or complexes is feasible on PPP basis.
 - ◆ NMC can provide municipal land on lease to private operator for construction and maintenance of parking bays or complexes.

³⁹ Example of Mumbai flyovers - flyovers are constructed and managed by private operator through collection of tolls. NMC can levy toll or user fee on the heavy traffic entering the city or parking of trucks in the goods terminal and same revenue to be used by the private operator for managing the infrastructure. Review of the model adopted by MSRDC should be carried out.

- ◆ Private operator might have to bear all the cost related to the project and towards O&M too. Operator would be given a concession period of 15 to 20 years.
- ◆ Revenue sharing model should be worked out between NMC and the private operator.

Another possibility is that NMC constructs' parking bays or complexes within the city and lease out the space to private operator on service contracts for a period of 3 to 5 years.

The above model is indicative. NMC would require appointing a transaction advisor to undertake detailed feasibility and preparation of bid documents (request for qualification – RFQ, request for proposal – RFP) and bid process management leading to award of contract to private developer.

17.7 Housing for Urban Poor Sector Plan

The key challenges with respect to housing & basic services for the urban poor relate to the high percentage of dilapidated housing and lack of 100% service coverage in terms of individual toilets and social infrastructure facilities. The following are the design parameters considered to improve service delivery in the urban slums.

The improvements in service delivery are envisaged to be completed within the design year 2041. However, in order to overcome the current deficit and meet the requirement for basic services in urban slums for the year 2041, the following short-term goals have been formulated to be achieved in a specific time-frame.

Table 118: Housing and Urban poverty - capital investment plan

Basic Services for Urban Poor sector plan and strategies	
Sector goals	<ul style="list-style-type: none"> ■ Improved access to physical and social infrastructure for the urban poor ■ Developing a mechanism to ensure social and land tenure rights to all the urban poor along with the necessary economic welfare programmes ■ De-notification of slums with basic infrastructure
Design parameters	<ul style="list-style-type: none"> ■ New housing provision for the dwelling units/households located in non-notified slums ■ Sewerage - Individual house service connections to all the slum households ■ Sanitation – Community toilets in the short run and individual toilets in the long run ■ Solid waste management – Coverage of all slum households under door-to-door collection and awareness campaigns on source segregation ■ Paved roads and street lights along with a community centre for all the slums
Action Plans	Activities
Categorization of slums	<ul style="list-style-type: none"> ■ The slums in new areas are to be surveyed to understand the status of infrastructure and finalise the list of beneficiaries
Integrated development of slums	<ul style="list-style-type: none"> ■ Slum networking strategies to be adopted to improve the services in the slums. ■ This would help in building the low cost service in the slums (especially in water supply, sewerage, and SWM sector).
Rehabilitation of slums	<ul style="list-style-type: none"> ■ Pucca housing with infrastructure facilities to be developed in feasible locations.
Construction of housing	<ul style="list-style-type: none"> ■ The slums in low lying areas and along the natural drains could be proposed for relocation. ■ A suitable financing strategy could be developed to minimize the burden on the beneficiaries. ■ The beneficiaries could be provided access to banks for availing the long-term housing loans.
Access to health and education	<ul style="list-style-type: none"> ■ The health action plan should control the prevalent diseases and reduce the infant mortality rate. ■ Access to emergency medical services should be provided to the BPL population. ■ The education action plan should involve renovation of existing municipal schools and regular awareness campaigns to limit the dropout rates.
Livelihood	<ul style="list-style-type: none"> ■ Activity centres to be established for skill development programmes

Basic Services for Urban Poor sector plan and strategies			
restoration			
Planning, Reforms and Institutional Strengthening	<ul style="list-style-type: none"> ■ Capacity building for the staff of the department ■ De-notification of the slums having access to the basic services. Detailed survey to assess the existing level of services provided in each of slum to be carried out ■ Creation of database for each of slum with details of population, households, socio-economic background, access to the various services like water, sewerage, SWM, etc. 		
Unit Rates	Component	Unit	Unit Cost (Rs in Lakhs)
	provision of better housing for urban poor	Per dwelling unit	2.95
	provision of basic infrastructure and social amenities in the slums	Per swelling unit	2.25
(NOTE: Rates have been adopted from RAY project report prepared by SRA, Nagpur during 2014)			

17.7.1 Capital Investment Plan

Nagpur's slum footprint is 25% of the city areas, and there are 1.47 lakh slum-dwelling units. Out of total 446 slums, 64% of the slums are notified; for the purpose of the demand gap analysis and for estimating the investment required; the assumption taken is that only dwelling units from non-notified slums are considered for provision of the new and better houses.

Based on the design criteria presented in the sector plan, the projects have been identified for 2041 design year. The new housing requirement has been calculated on the basis of the existing number of kutchra houses in the identified slums and merged villages.

Table 119: Housing for Urban Poor – capital investment plan

Project	Sub project	Estimated cost in Rs. crores
A. Constructuion of affordable housing	1. Constrction of new housing and infrastructure for 2.13 lakh households for 2041.	4,044
B. Infrastructure Development	2. Development of basic services to urban poor.	767
Total investment envisaged for provision of Housing & basic services in slums (2041)		4,811
Investment envisaged for 2021		1,684

Source: CRIS analysis

17.7.2 Project Details

Based on CIP as summarised in the above section; key projects and project details in basic services to urban poor is presented in the below table.

Table 120: Housing for Urban Poor – projects identified

Project	Description of the project
A. Constructuion of affordable housing	<ul style="list-style-type: none"> ■ New housing & infrastructure requirement for 2.13 lakh households has been estimated for provision of better and affordable housing by 2041. ■ It is recommended that in slums where relocation is possible in-situ up gradation may be taken up.
B. Infrastructure Development	<ul style="list-style-type: none"> ■ As per the requirement of providing basic infrastructure and services to urban poor, the estimated investment required for all the slums to achieve vision that is "Slum Free Nagpur"

17.7.3 Phasing of investment

The key projects and project details in basic services to urban poor is presented in the below table.

Table 121: Housing and Urban poverty - phasing of investment (in Rs. crores)

Project/Sub project	Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
A. Constructuion of affordable housing								
1. Provision of basic infrastructure and social amenities in the slums - De-notification of existing slums	NMC	12.5	12.5	12.5	12.5	12.5	12.5	12.5
2. Provision of better housing for urban poor-Tenureship to existing slum Dweller		147.7	147.7	147.7	147.7	147.7	147.7	147.7
3. Provision of basic infrastructure and social amenities in the slums - Tenureship to existing slum Dweller		18.0	18.0	18.0	18.0	18.0	18.0	18.0
B. Infrastructure Development								
1. Provision of better housing for urban poor-relocation of existing slum Dweller	NMC	54.5	54.5	54.5	54.5	54.5	54.5	54.5
2. Provision of basic infrastructure and social amenities in the slums - relocation of existing slum Dweller		7.8	7.8	7.8	7.8	7.8	7.8	7.8
Total (in Rs. crores)	1,683.5	240.5	240.5	240.5	240.5	240.5	240.5	240.5

Source: CRIS analysis

17.7.4 Possibility of PPP

In case of provision of housing and access to basic services for urban poor, following is the possibility for the local authorities like NMC, SRA, NIT, MHDA to achieve the vision of "Slum Free City".

- **Development of affordable and better houses and social infrastructure - SRA/NMC** has already explored the PPP option for implementation of BSUP in Nagpur. There are slum dwellers that need to be relocated and provision of houses to these slum dwellers is carried out on PPP basis. Same model can be replicated for RAY and other projects that will be taken up in the future in Nagpur.
 - ◆ The option to involve private builder/developers is proposed by Nagpur Municipal Corporation (NMC) under the market driven PPP model so that the project remains profitable for builders and developers.

- ◆ Transfer of Development Rights (TDR) methods of development controls could be used as an incentive to make the scheme work.

GoM’s PPP model for SLUM REHABILITATION and REDEVELOPMENT widely practice in Mumbai

Government of Maharashtra has brought an amendment to the Maharashtra Regional and Town Planning Act 56 and introduced a nodal agency Slum Rehabilitation Authority (SRA). SRA brought forth a Slum Rehabilitation Programme that analyzes and reviews existing positions of slum areas in the city. The Slum Rehabilitation Authority (SRA), in India enables property developers to rehabilitate slum-dwellers in-situ and compensates the landowner and developer by awarding them with the Transferable Development Rights (TDR).

Benefits of Slum Rehabilitation:

- High-rise building design using optimal ground footprint
- SRA model is a financially sustainable model, which requires no government funding and gives new homes to slum dwellers free of cost.
- An increased number of low-income housing options emerge from SR.
- It allows for better roads, drainage, and other civic amenities
- Positive impacts on the social well-being along with safety are unarguably positively affected.
- It is a permanent and lifelong beneficial asset that is created in the long run.
- It leads to the slum dwellers’ Social upliftment and improved living conditions.
- This in turn leads to improved Quality of Life.

17.8 Heritage Development Plan

Nagpur has various heritage structures, which are referred to as “listed heritage structures” as per the general resolution of the Urban Development Department (UDD), GoM in 2003. The conservation and preservation of these structures was a long-pending issue with the citizens and was needed to be taken up. The sector plan for the conservation and preservation of heritage structures in Nagpur is as shown below.

Table 122: Heritage Conservation - sector plan and strategies

Heritage Conservation sector plan and strategies	
Design parameters	<ul style="list-style-type: none"> ▪ Preservation and conservation of heritage precincts
Action Plans	<ul style="list-style-type: none"> ▪ Implement the heritage regulations in the city ▪ Develop heritage and culture-related documentation, coffee table books, and digitize all the heritage structures and precincts in the city ▪ Develop space for permanent exhibition of the heritage items, and also a library on heritage

17.8.1 Capital Investment Plan

Based on the above key requirements identified for culture and heritage and stakeholder suggestions, the capital investment plan has been prepared and presented in the below table.

Table 123: Heritage conservation – capital investment plan

Project	Estimated cost in Rs. crores
A. Conservation and preservation of Heritage structures	526.5
B. Digitizing of all the heritage structure and precincts	5.0
C. Documentation of all the heritage structures/Booklet	2.0
Total investment for Heritage conservation (2041)	533.5
Investment envisaged for 2021	266.8

17.8.2 Project Details

Based on CIP as summarised in the above section; key projects and project details in heritage sector is presented in the below table.

Table 124: Heritage conservation - projects identified

Project	Description of project
A. Conservation and preservation of Heritage structures	<ul style="list-style-type: none"> ■ Conservation work of the heritage precincts identified within the city ■ Development of heritage infrastructure and exhibiting of the heritage sites for local and outsiders visits ■ Preparation of information and publicity documents for creating awareness and branding of the heritage structures at national level ■ Organising cultural festivals and music festivals
B. Digitizing of all the heritage structure and precincts	<ul style="list-style-type: none"> ■ Under this projects, NMC will ensure proper mapping of the all the heritage structures and creation of heritage cell, which will have a library for storing of the documents and office for heritage committee
C. Documentation of all the heritage structures/Booklet	<ul style="list-style-type: none"> ■ Under this projects, NMC will ensure proper documentation of the heritage and cultural precincts in the city along with all the necessary information of related to heritage structure

17.8.3 Phasing of investment

The heritage sector development components have been divided into various components for implementation purpose. Further, the timeliness been proposed for each component, and the same have been presented in the table below.

Table 125: Heritage Conversation - phasing of investment

Project	Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
		(Rs. In Crores)						
A. Conservation and preservation of Heritage structures	NMC	26.3	26.3	26.3	26.3	52.7	52.7	52.7
B. Digitizing of all the heritage structure and precincts		0.0	0.8	0.8	1.0	0.0	0.0	0.0
C. Documentation of all the heritage structures/Booklet		0.5	0.5	0.0	0.0	0.0	0.0	0.0
Total (in Rs. crores)	266.8	26.8	27.6	27.1	27.3	52.7	52.7	52.7

Source: CRIS analysis

17.9 Tourism Development

The tourism hub development strategies include development of tourist amenities and infrastructure along Beach road, development of hospitality industry. These projects could be taken up by state tourism development.

Table 126: Tourism Development sector strategy

Tourism Sector	
Sector goals	<ul style="list-style-type: none"> To elevate the tourism potential of Nagpur so that visitor stay is extended. Generate local employment and livelihood through tourism
Action Plans	<ul style="list-style-type: none"> Creation of tourism information kiosks at transit points and provision of amenities at identified tourist locations.

17.9.1 Capital Investment Plan

Based on the above key requirements in the tourism sector, the capital investment plan is presented in the below table.

Table 127: Tourism Development sector – Project detail

Sr. No	Project	Estimated cost in Rs. Crores
A	Feasibility report for tourist hub- Phase I	1.5
B	Tourism development in and around Nagpur	200.0
Investment required for 2041		201.5
Investment required for 2021		200.7

17.9.2 Project Details

Based on CIP; key projects and project details in tourism sector is presented in the below table.

Table 128: Tourism development - projects identified

Component	Description of project
A. Feasibility report for tourist hub-Phase I	<ul style="list-style-type: none"> NMC has envisaged making Nagpur as the tourist hub for which the project has been planned for implementation in phased manner. This project will focus on making Nagpur as a tourism hub for tiger sanctuaries, regional heritage, etc.
B. Tourism development in and around Nagpur	<ul style="list-style-type: none"> The project involves identification of tourist potential sites and development of public amenities in the identified sites.

17.9.3 Phasing summary

The tourism sector project components have been divided into various components for implementation purpose. Further, the timeliness been proposed for each component, and the same have been presented in the table below.

Table 129: Tourism Development - phasing of investment

Sector/Component	Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
		(Rs. In Crores)						
A. Feasibility report for tourist hub-Phase I	Maharashtra Tourism Development	0.7	0.0	0.0	0.0	0.0	0.0	0.0
B. Tourism development in		20.0	20.0	40.0	40.0	40.0	20.0	20.0

Sector/Component	Implementing Agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
and around Nagpur	Implementing Corporation (MTDC)							
Total (in Rs. crores)		200.7	20.7	20.0	40.0	40.0	40.0	20.0

Source: CRIS analysis

17.10 Urban Environment

The lakes and rivers form a major segment of urban environment in Nagpur. As discussed in the sector assessment, NMC had already initiated conservation and rejuvenation of water bodies. Also, detailed project report for conservation and rejuvenation of all the water bodies like lakes and rivers has been prepared.

Rejuvenation of water bodies

There are 16 water bodies within NMC's limits, which are part of the natural features of the city. Of these, NMC has already taken up rejuvenation of two lakes. For the remaining 14 water bodies, rejuvenation and waterfront development was suggested by the stakeholders and considered even in the master plan for lakes and rivers.

17.10.1 Capital Investment Plan

The lakes and rivers in the city are in bad shape. The water quality is affected due to throwing of garbage, outflow of sewage into rivers, unauthorised development along the streams, etc. The lakes and rivers form an important part of the ecosystem of the city. Also, some of the lakes and rivers have been listed as heritage precincts too. Thus, rejuvenation of the lakes and rivers is essential and the investment estimated is as shown in the table below.

Table 130: Urban Environment - Capital Investment Plan

Project	Estimated cost in Rs. crores
A. Rejuvenation of lakes in Nagpur city	57.2
B. Rejuvenation of Rivers in Nagpur city	
1. Rejuvenation NAG River and water front development	
2. Rejuvenation PHUTALA tributary and water front development	
3. Rejuvenation Pilli River and water front development	
4. Rejuvenation of Pora river and water front development.	399.7
Total investment for Rejuvenation of Lakes and Rivers (2041)	456.9
Investment envisaged for 2021	428.5

17.10.2 Project Details

Based on CIP as summarised in the above section; key projects and project details for rejuvenation of lakes and rivers is presented in the below table.

Table 131: Rejuvenation of Lakes and Rivers - Projects identified

Project	Description of project
A	Rejuvenation of lakes
	<ul style="list-style-type: none"> ▪ 10 lakes in the city have been considered for rejuvenation purpose ▪ Also, under the project other components like beautification,

Project		Description of project
		walkways, construction of RC embankment walls, abatement of non-point source of pollution, cleaning of water, construction of low cost sanitation, and lake front development
B1	Rejuvenation NAG River and water front development	<ul style="list-style-type: none"> Awareness and IEC campaigns 3 rivers and one tributary have been considered for rejuvenation purpose
B2	Rejuvenation PHUTALA tributary and water front development	<ul style="list-style-type: none"> Also, under the project other components like beautification, walkways, construction of RCC embankment walls, abatement of non-point source of pollution, cleaning of water, construction of low cost sanitation, and river front development
B3	Rejuvenation Pilli River and water front development	<ul style="list-style-type: none"> Awareness and IEC campaigns
B4	Rejuvenation Pora River and water front development	

17.10.3 Phasing of investment

Project components for rejuvenation of lakes have been divided into various components for implementation purpose. Further, the timeliness been proposed for each component, and the same have been presented in the table below.

Table 132: Rejuvenation of Lakes and Rivers - phasing of Investment

Project/Sub project		Implementing agency	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
		(Rs. In crores)							
A	Rejuvenation of lakes	NMC	5.7	5.7	5.7	5.7	5.7	0.0	0.0
B1	Rejuvenation NAG River and water front development		13.7	13.7	27.5	27.5	27.5	13.7	13.7
B2	Rejuvenation PHUTALA tributary and water front development		2.1	2.1	4.2	4.2	4.2	2.1	2.1
B3	Rejuvenation Pilli River and water front development		16.5	16.5	33.0	33.0	33.0	16.5	16.5
B4	Rejuvenation Pora River and water front development		7.7	7.7	15.3	15.3	15.3	7.7	7.7
Total (in Rs. crores)		428.5	45.7	45.7	85.7	85.7	85.7	40.0	40.0

Source: CRIS analysis

17.10.4 Possibility of PPP

- NMC can explore the option of rejuvenation of natural features by inviting private corporates to adopt lakes and rivers under their framework of corporate social responsibility (CSR)
 - For attracting and to motivate private corporate to participate NMC can organise annual awards for the best private corporate on basis of their efforts towards maintaining the water body.

17.11 Social infrastructure

As discussed in the assessment chapter, the key challenges are lack of adequate education infrastructure for pre-primary, primary, and higher secondary education. There is a need for health care infrastructure at both neighbourhood and city level. Socio-cultural infrastructure like community centres are to be developed in identified wards.

Table 133: Sector plan for social infrastructure

Social Infrastructure						
Design parameters	<ul style="list-style-type: none"> Schools, hospitals, socio cultural and parks and playground requirements assessed as per URDPFI guidelines 					
Component	Existing	2021		2041		
		Demand	Gap	Demand	Gap	
Demand gap assessment for education infrastructure	Pre-primary, nursery school	58	1129	1071	1455	1397
	Primary school	197	564	367	727	530
	Senior secondary school	24	376	352	485	461
	Integrated school (with hostel facility)	0	31	31	40	40
	School for physically challenged	0	63	63	81	81
	School for mentally challenged	0	3	3	4	4
Component	Existing	2021		2041		
		Demand	Gap	Demand	Gap	
Demand gap assessment for healthcare infrastructure	Dispensary	68	188	120	242	174
	Nursing home, child welfare and maternity centre	757	47	0	61	0
	Polyclinic	3022	28	0	36	0
	Intermediate Hospital (Category B)	642	124	0	160	0
	Intermediate Hospital (Category A)					
	Multi-Specialty Hospital (NBC)					
	Specialty Hospital (NBC)					
	General Hospital (NBC)					
	Family Welfare Centre		47	47	61	61
	Diagnostic centre	69	47	0	61	0
Demand gap assessment for healthcare infrastructure for animal protection	Veterinary Hospital for pets and animals	0	6	6	7	7
	Dispensary for pet animals and birds	0	28	28	36	36
Demand gap	Component	Existing	2021		2041	

Social Infrastructure						
assessment for Socio cultural infrastructure	ng	Demand	Gap	Demand	Gap	
Anganwadi - Housing area/cluster	280	564	284	727	447	
Community hall, mangal karyayala, barat ghar/ library	15	188	173	242	227	
Music, dance and drama centre	0	28	28	36	36	
Meditation and spiritual Centre	0	28	28	36	36	
Recreational Club	3	28	25	36	33	
Old age home	2	6	4	7	5	
Action Plans	<ul style="list-style-type: none"> • Identification of areas for development of new schools and hospitals. • Development of schools with hostel facilities and schools for specially abled children. • Development of ward level community centers and Anganwadi. • Development of night shelters, old age home in the city limits. • Mapping of health care facilities in the city. • Development of night shelters, old age home in the city limits. • Mapping of health care facilities in the city • Construction of protection cells for stray animals in the city. 					
Strategies for protection of stray animals	<ul style="list-style-type: none"> • In order to avoid indiscriminate killing of the stray animals and spread of diseases, it is suggested that NMC should take up construction of animal protection cells to provide veterinary services for stray animals. 					
Unit Rates	Component		Unit		Unit Cost (Rs in Lakhs)	
	Pre primary, nursery school		LS		4	
	Primary school		LS		6	
	Senior secondary school		LS		10	
	Integrated school (with hostel facility)		LS		12	
	School for physically challenged		LS		9	
	School for mentally challenged		LS		8	
	Intermediate Hospital (Category B)		LS		100	
	Intermediate Hospital (Category A)		LS		250	
	Multi-Specialty Hospital (NBC)		LS		600	
	Specialty Hospital (NBC)		LS		900	
	General Hospital (NBC)		LS		1300	
	Family Welfare Centre		LS		65	
	Diagnostic center		LS		75	
	Veterinary Hospital for pets and animals		LS		30	
	Dispensary for pet animals and birds		LS		30	
	Anganwadi - Housing area/cluster		LS		5	
	Community halls		LS		8	
Music, dance and drama center		LS		8		
Meditation and spiritual Centre		LS		8		
Recreational Club		LS		8		
Old age home		LS		10		

17.11.1 Capital Investment Plan

The capital investment plan for social infrastructure estimated on the basis of the demand gap analysis has been presented in the table below.

Table 134: Social infrastructure - capital investment plan

Component		Estimated cost in Rs. crores
A	Development of crematoria ⁴⁰	4.9
B	Development of Education Infrastructure	52.6
C	Development of Health care infrastructure	25.2
D	Socio cultural infrastructure	23.5
E	Parks & play grounds	10.0
F	Construction of Vasant Rao Narkhedekar Cultural/play theatre	0.5
G	Convention and Exhibition Centre	75.0
H	Construction of modern hygienic Fish markets in City	2.8
Total investment (2041)		194.4
Investment envisaged for 2021		62.7
<i>(Note: * - total investment estimated for convention centre is rs. 150 crores, and also it is considered that GoM will extend its support by providing 50% fundng support)</i>		

17.11.2 Project Details

Based on CIP as summarised in the above section; key projects and project details for social infrastructure sector is presented in the below table.

Table 135: Social infrastructure - project details

Project	Project Details
A	Development of crematoria <ul style="list-style-type: none"> NMC has identified need of a developing a crematoria within the city.
B	Development of Education Infrastructure <ul style="list-style-type: none"> Renovation of existing dilapidated schools and construction of new schools in the city as per demand for schools against the increasing population till 2041.
C	Development of Health care infrastructure <ul style="list-style-type: none"> Development of urban health centres, intermediate hospitals, and one super speciality hospital within the NMC limits as per demand for health facilities against the increasing population till 2041.
D	Socio cultural infrastructure <ul style="list-style-type: none"> Construction of ward level community centres, meditation and spiritual centres, libraries as per the URDPFI guidelines as per demand for socio-cultural infrastructure against the increasing population till 2041.
E	Parks & play grounds <ul style="list-style-type: none"> Up gradation of existing parks and development of new parks at neighbourhood, community and city level as per the URDPFI guidelines as per demand for parks and gardens against the increasing population till 2041.
F	Construction of Vasant Rao Narkhedekar Cultural/play theatre <ul style="list-style-type: none"> NMC has identified that city needs another cultural/play theatre or a community hall. Thus, the project has been considered for implementation as per of this CDP.
G	Convention and Exhibition Centre <ul style="list-style-type: none"> Nagpur being the largest urban centre with latent economic potential in the whole of Vidarbha region and having new opportunities for the business sector due to presence of MIHAN, it is essential to have a

⁴⁰ Needs of crematoria in the city was identified in the City Sanitation Plan, 2012 prepared by NMC. investment considered is on as-is basis from CSP document with cost escalation for 2 years.

Project		Project Details
		state of art Convention and Exhibition Centre that will facilitate various Expos and conventions in the city itself.
H	Construction of modern hygienic Fish markets in City	<ul style="list-style-type: none"> NMC has identified need of a fish market that would provide a hygienic environment and platform for the vendor to carry out their business.

17.11.3 Phasing of investment

The social infrastructure project components have been divided into various components for implementation purpose. Further, the timeliness been proposed for each component, and the same have been presented in the table below.

Table 136: Social Infrastructure - phasing of investment

Project		Implementing Agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
(Rs. In crores)									
A	Development of crematoria	NMC	4.9	0.0	0.0	0.0	0.0	0.0	0.0
B	Development of schools	State Government Department	5.3	5.3	5.3	5.3	0.0	0.0	0.0
C	Development of hospital and health facilities		5.0	5.0	5.0	2.5	2.5	0.0	0.0
D	Development of socio-cultural infrastructure	NMC	0.0	0.0	0.0	2.3	2.3	2.3	2.3
E	Development of parks and gardens	NMC	0.0	0.0	0.0	1.0	1.0	1.0	1.0
F	Construction of Vasant Rao Narkhedekar Cultural/play theatre	NMC	0.0	0.1	0.2	0.1	0.0	0.0	0.0
G	Convention and Exhibition Centre	NMC	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H	Construction of modern hygienic Fish markets in City	NMC	0.0	0.8	1.1	0.8	0.0	0.0	0.0
Total (in Rs. crores)			62.7	15.2	11.3	11.6	12.1	5.9	3.3

Source: CRIS analysis

17.12 Urban Governance

Under Urban Governance sector, the need for augmenting the newly developed system by providing the required hardware and system was suggested by NMC officials. Also, in order to improve the coverage of the services and ensure that citizens get the most of the benefits from the recently implemented E-governance project, need of developing kiosks and facilitation centres was also identified.

17.12.1 Capital Investment Plan

Based on the suggestions provided by NMC officials, strengthening the existing E – Governance system, capacity building and strengthening of NMC administrative system have been identified. The Capital Investment Plan has been presented in the table below.

Table 137: Urban Governance – capital investment plan

Project		Estimated cost in Rs. crores
A	Strengthening existing E-Governance system	45.0
B	Capacity building	102.9
C	Strengthening of the NMC administrative system	12.5
Total investment (2041)		160.4
Investment envisaged for 2021		80.2

Source: CRIS analysis

17.12.2 Project Details

Based on CIP as summarised in the above section; key projects and project details for urban governance is presented in the below table

Table 138: Urban Governance – project details

Component	Project Details	
A	Strengthening existing E-Governance system	<ul style="list-style-type: none"> ■ Property tax survey and mapping etc ■ Centralised data center ■ Wifi city ■ Capacity building and trainings ■ E-governance project O&M ■ Capacity building of NSIL ■ Water supply – IEC
B	Capacity building	<ul style="list-style-type: none"> ■ Various capacity building needs and requirement like indoor and outdoor trainings, exposure visits, technical studies, etc. has been identified ■ Capacity building requirement for NMC and needed investment has been considered for next 30 years.
C	Strengthening of the NMC administrative system	<ul style="list-style-type: none"> ■ Various projects for strengthening administrative system of NCM has been identified by NMC

17.12.3 Phasing of investment

Urban Governance project components have been divided into various components for implementation purpose. Further, the timeliness been proposed for each component, and the same have been presented in the table below.

Table 139: Urban Governance - phasing of investment

Project	Implementing agency	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
		(Rs. In crores)						
A	NMC	11.3	6.8	4.5	0.0	0.0	0.0	0.0
B		0.0	15.4	15.4	20.6	0.0	0.0	0.0
C		0.0	1.9	1.9	2.5	0.0	0.0	0.0

Project	Implementing	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
system								
Total (in Rs. crores)	80.3	11.3	24.1	21.8	23.1	0.0	0.0	0.0

Source: CRIS analysis

17.13 Disaster Management, Fire Fighting and Emergency

Based on the discussion with NMC officials, the need to augment the existing fire fighting and emergency response facilities has been identified as a priority project. In order to prevent major catastrophic or any disaster occurrences by way of responding within time to reduce the damages.

17.13.1 Capital Investment Plan

Based on the suggestion and requirement to augment the existing facilities and system, investment estimated for the fire fighting department of NMC is Rs. 95 crores till 2041.

Table 140: Disaster Management, Fire Fighting and Emergency – capital investment plan

Project	Estimated cost in Rs. crores
A. Augmentation of Fire fighting Department and emergency response team	0.5
B. Disaster and rescue training and facility centre	1.0
C. Procurement of Fire Fighting and Rescue vehicles	90.5
D. Various development work within city for mitigating disaster	2.8
Total investment (2041)	94.7
Investment envisaged for 2021	47.2

17.13.2 Project Details

Based on CIP as summarised in the above section; key projects and project details for disaster management sector for Nagpur till 2041 is presented below.

Table 141: Disaster Management, Fire Fighting and Emergency – project details

Project	Project details
A. Augmentation of Fire fighting Department and emergency response team	<ul style="list-style-type: none"> ▪ Preparation of Revised Disaster Management Plan for the city of Nagpur.
B. Disaster and rescue training and facility centre	<ul style="list-style-type: none"> ▪ Construction of state of the art Disaster and rescue training and facility centre to reduce the damage and mitigate the any disasters (natural or man-made).
C. Procurement of Fire Fighting and Rescue vehicles	<ul style="list-style-type: none"> ▪ Strengthening of the existing disaster combat fleet with new technology and high end fire tenders <ul style="list-style-type: none"> ◆ small fire tenders ◆ Vehicles- Jeep ◆ Fire fighting vehicles ◆ fire fighting suits ◆ tools and equipments for emergency and rescue mission ◆ Fire fighting vehicle with 42 mt turn table ladder ◆ Fire fighting vehicle with 32 mt hydraulics platform
D. Various development work	<ul style="list-style-type: none"> ▪ Various development work within city for (structural and

Project	Project details
within city for mitigating disaster	non-structural measures) for mitigating and reducing the risk to lives and properties from any of the disaster (natural or man-made).

17.13.3 Phasing of investment

Project identified for Disaster Management, Fire Fighting and Emergency sector have been divided into various components for implementation purpose. Further, the timeliness been proposed for each component, and the same have been presented in the table below.

Table 142: Urban Governance - phasing of investment

Project		Implementing agency	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
		(Rs. In crores)							
A	Augmentation of Fire fighting Department and emergency response team	NMC	0.2	0.0	0.0	0.0	0.0	0.0	0.0
B	Disaster and rescue training and facility centre		0.1	0.1	0.1	0.1	0.1	0.1	0.1
C	Procurement of Fire Fighting and Rescue vehicles		4.5	4.5	9.1	9.1	9.1	4.5	4.5
D	Various development work within city for mitigating disaster		0.1	0.1	0.3	0.3	0.3	0.1	0.1
Total (in Rs. crores)		47.2	4.9	4.7	9.4	9.4	9.4	4.7	4.7

Source: CRIS analysis

17.14 Summary of Capital Investment

The total estimated capital investment required for providing efficient services to the present population and future population of the city by the year 2041 is Rs. 34,604 crores. A total of Rs. 27,350 crores are proposed for investment by 2020-21 to cater to infrastructure requirement. The table below presents the summary of sector-wise total investment need.

Table 143: Summary of capital investment

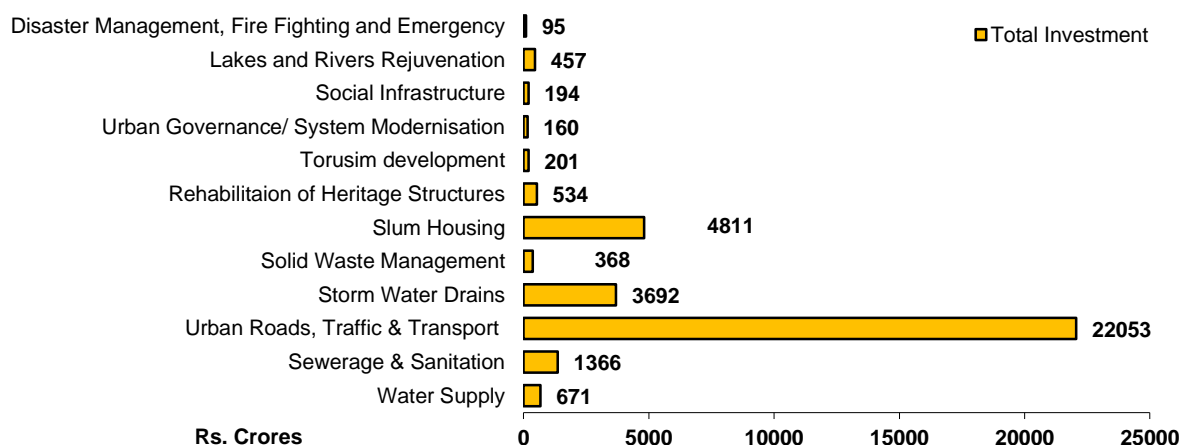
Sr.No.	Sector	Short Term 2021	Long Term 2021-41	Total investment (Rs. Crores)
		(investment in Rs. Crores)		
1	Water Supply	200	471	671
2	Sewerage & Sanitation	683	683	1,366
3	Urban Roads, Traffic & Transport	21,608	445	22,053
4	Storm Water Drains	1,748	1,944	3,692
5	Solid Waste Management	341	27	368
6	Slum Housing	1,684	3,127	4,811
7	Heritage development	267	267	534
8	Tourism Development	200	1	201
9	Urban Governance/ System Modernisation	80	80	160
10	Social Infrastructure	63	132	194
11	Urban Environment	428	29	457

Sr.No.	Sector	Short Term 2021	Long Term 2021-41	Total investment (Rs. Crores)
		(investment in Rs. Crores)		
12	Disaster Management, Fire Fighting and Emergency	47	47	95
Total Investment Estimated		27,350	7,253	34,604

Source: CRIS analysis

Urban roads, traffic and transportation is a key priority sector in Nagpur city and hence 64% of investment has been identified towards this sector; 14% of the investment has been identified towards slum housing. In order to improve the drainage system in the city about 11% of the investment has been identified towards Storm water drainage system in the city. About In order to improve the sewerage and sanitation system in north, central and south zones in the city about 4% of the investment has been identified. NMC is already implementing the 24x7 water supply scheme in the city. Hence only 2% of the investment has been identified for laying distribution network in the newly merged areas. The rest of the investment has been identified towards Solid waste management, Heritage and tourism development, social infrastructure, urban environment, disaster management and urban governance.

Figure 124: Capital investment for 2041 (figures in Rs. crores)



Source: CRIS analysis

17.15 Summary of Investment Phasing

The phasing of projects for 2021 has been made in consultation with NMC officials. While doing the phasing, the timeline for the preparation of detailed project reports and necessary approvals has been considered and accordingly the phasing has been carried out. The detailed phasing of investment is presented in the table below. The project prioritization and detailed project phasing has been discussed in the table below.

Table 144 - Phasing of investment (figures in Rs. Crores)

Sector/ Component	Short term Investment by ULB (in crores)	201 5-16	201 6-17	201 7-18	201 8-19	201 9-20	202 0-21	202 1-22
Water Supply	200.0	20.0	40.0	40.0	40.0	40.0	20.0	0.0
Sewerage & Sanitation	683.0	68.3	136.6	136.6	136.6	136.6	68.3	0.0
Solid Waste Management	341.0	0.0	0.0	0.0	0.0	102.0	102.0	137.0
Storm Water Drainage	1,748.3	550.4	550.4	461.4	186.1	0.0	0.0	0.0
Urban roads, Traffic and Transportation	21,608.2	2,160.8	3,922.0	4,321.6	4,721.3	4,321.6	2,160.8	0.0
Housing and Urban poverty	1,683.8	240.5	240.5	240.5	240.5	240.5	240.5	240.5
Heritage Development	266.8	26.8	27.6	27.1	27.3	52.7	52.7	52.7
Tourism Development	200.7	20.7	20.0	40.0	40.0	40.0	20.0	20.0
Urban Environment	428.3	45.7	45.7	85.7	85.7	85.7	40.0	40.0
Social Infrastructure	62.7	15.2	11.3	11.6	12.1	5.9	3.3	3.3
Urban Governance	80.2	11.3	24.1	21.8	23.1	0.0	0.0	0.0
Disaster Management, Fire Fighting and Emergency	47.4	4.9	4.7	9.4	9.4	9.4	4.7	4.7
Total investment phasing for 2021	27350.4	316 4.6	502 2.9	539 5.7	552 2.1	503 4.4	271 2.3	498. 2

Source: CRIS analysis and financial modelling

17.16 Composition of investment

The following agency would be responsible for implementing the projects identified under this CDP;

- NMC:** NMC being the urban local authority for the city of Nagpur it would be responsible for design, construction, operation, and maintenance of water supply, sewerage system, SWM, SWD, housing and basic services for the urban poor, municipal roads, education facilities, health facilities, parks, and playgrounds, etc. NMC would be the implementing agency for the projects identified in the above mentioned sectors. In the overall investment, NMC has to contribute 73% of total investment identified till 2041. Share of NMC in the overall investment identified for Nagpur city till 2041 is around 58%.
- NIT:** NIT being a planning authority for the Nagpur city, plays an important role in development of infrastructure in the city. though in comparison to NMC it has limited role in implementation of the projects, but based on the recent plans for traffic and transportation and other social sectors it is assumed that NIT will also be one of the agencies that will take up development projects within the Nagpur city. It would be responsible for implementation of METRO (MRTS), other traffic and transportation projects. Share of NMC in the overall investment identified for Nagpur city till 2041 is around 42%.
- Maharashtra Tourism Development Corporation (MTDC):** The state department for tourism development is responsible for implementation of the tourism projects identified in the CDP. Share of MTDC in the overall investment for Nagpur has been identified as 0.6%.
- State Department for Health and Education:** The state department for health and education is responsible for implementation of projects in health and education department. In the overall investment, the share of these departments is about 0.1% and 0.2% respectively.

Table 145: Agency wise investment

Department	2041 (Rs. Crs)	Share (%)	2021 (Rs. Crs)	Share (%)
NMC	20,024	57.7%	12,808	46.5%
NIT	14,300	41.5%	14,300	52.6%
MTDC	201	0.6%	201	0.7%
State Department for Education	53	0.2%	21	0.1%
State Department for Health	25	0.1%	20	0.1%
Total investment	34,604	100.0%	27,350	100.0%

Source: CRIS Analysis

17.17 Priority Projects

Table 146: Priority of projects identified for various sectors

Priority	Sector	Projects
1 st	Traffic and Transportation	<ul style="list-style-type: none"> Augmenting the existing road network, improving the geometric designs of the junctions, provision of infrastructure to facilitate the pedestrian movement, and augmenting the existing infrastructure of public transport system
2 nd	Storm Water Drains	<ul style="list-style-type: none"> Laying of SWD pipelines along the roads on both the sides in north, central and south sewerage zones Improving the minor and major drainage channels
3 rd	Sewerage	<ul style="list-style-type: none"> Construction of STPs and laying of sewage collection networks in the north, central and south sewerage zones
4 th	Slum development	<ul style="list-style-type: none"> New housing development for non-notified slums, provision of basic and social infrastructure under RAY
5 th	Solid waste management	<ul style="list-style-type: none"> Augmentation of fleet and compaction capacity. Development of landfill site with scientific closure mechanism.
6 th	Social infrastructure	<ul style="list-style-type: none"> Augmenting the existing social infrastructure like education and health Construction of convention centre
7 th	Water Supply	<ul style="list-style-type: none"> Water supply system components serving the merged villages. Augmenting the additional raw water supply source for Nagpur by 2041 Augmentation of additional water treatment capacity by 2041
8 th	Rejuvenation of lakes and Rivers	<ul style="list-style-type: none"> Rejuvenation of lakes and rivers, water front development and construction of embankment for water bodies
9 th	Urban Governance	<ul style="list-style-type: none"> Providing system hardwares and machines; kiosks in the city; and facilitation centres
10 th	Disaster Management, Fire Fighting and Emergency	<ul style="list-style-type: none"> Augmentation of existing Emergency and fire fighting system procurement of new technology vehicle to handle emergency and rescue operations. And construction of structures to prevent disasters

18 Financial operating plan

The Financial Operating Plan (FOP) has been prepared for a period of ten years (from F.Y. 2014-15 to F.Y. 2025-26), based on the analysis of the financial data for five years between F.Y. 2007-08 and F.Y. 2011-12.⁴¹

Objectives of the Plan:

- To understand the composition and trends from past financial years
- Link financial data with service delivery indicators for performance measures
- Generate a long-term financial plan for Nagpur Municipal Corporation
- Identify and suggest measures that would lead to better financial control
- Ensure better allocation of resources available for capital expenditure, for prioritized projects
- Assess and suggest measures to bridge the resource gap in achieving the relevant service delivery standards

The investment capacity of NMC is assessed through a Financial Operating Plan (FOP), which gives a multi-year forecast of finances for a medium term of ten years. In line with the phasing of identified investment, the FOP has been generated for the same period for NMC. The salient features of the FOP are that all outstanding dues, including debt and non-debt liabilities if any, are taken into account.

The accounts data of NMC between the years 2007-08 and 2011-12 are used as the basis for determining past trends in revenue income and revenue expenditure and arriving at appropriate growth rate assumptions for each of the income and expense heads. After forecasting the revenue account, the capital investments proposed under the CIP are loaded on to FOP. The FOP is generated to assess the investment-sustaining capacity of NMC.

The project funding structure comprises grants under the JnNURM programme (accounting for 70 percent of the funding, which is based on the JnNURM programme benefits NMC got during 2006-2012), internal resources, and loans. The level of investment that NMC can sustain is determined by studying the overall surpluses/ year-on-year opening balance and Debt Service Coverage Ratio (DSCR). If the DSCR (amount of surplus available to pay interest and to repay principal that is due) falls below 1.25 (i.e., less than 25% cushion), then the investments are reduced gradually till the DSCR exceeds 1.25 in all the years in the forecast period. The main items of income and expenditure, classified into the revenue account and the capital account, are projected in the FOP under the following categories.

Categories of FOP Projections

- Revenue Account Receipts:
 - ◆ Taxes, Non-Tax Sources, and
 - ◆ Grants, Contribution and Subsidies
- Revenue Account Expenditure:
 - ◆ Establishment
 - ◆ Operation and Maintenance
 - ◆ Debt Servicing- Existing and New Loans
 - ◆ Phasing of non-debt liabilities, and

⁴¹ FY 2012-13 is not considered as NMC has changed the accounting structure of their budget from FY 2014-15 onwards. So the actuals of FY 2012-13 provided in the budget books are compiled and detailed bifurcation of the account heads are not there.

- ◆ Additional O&M
 - a. Capital Income
 - b. Capital Expenditure

18.1 Financial Plan for the City

ULB: NMC is solely responsible for the provision of basic services such as water supply, sewerage, solid waste management, storm water drainage, roads and basic services for the urban poor within its jurisdiction. Therefore, NMC accounts have been reviewed and further the accounts have been forecasted to prepare the financial plan for the city and assess NMC's capacity for implementation of capital projects as identified in the earlier section.

Accordingly, the annual accounts of NMC for the period between the financial years 2007-08 and 2011-12 are used to determine past trends for both revenue and expenditure items and to arrive at appropriate growth assumptions for each of the income and expense items. After forecasting the revenue account, the financial indicators have been used for forecasting CIP and FOP. The FOP is generated to assess the investment sustaining capacity of NMC

Parastatals: NIT is one of the para-statal agencies involved in the provision of basic services within the NMC jurisdiction and in the Nagpur metropolitan region. The scope of NIT is restricted to the creation of infrastructure assets for basic urban services; later the assets are handed over to NMC for operation and maintenance. But, based on NMC's past experience, in case the project's implementation is taken up under the Central Government's mission programme, then all the funding will be routed through NMC and NMC will be the lead authority for project implementation, as it was observed during the JnNURM phase. Hence, the financials of para-statals are not included in the City Financial Plan (CFP).

18.2 Methodology

For the preparation of FoP for NMC, we have adopted the following methodology as provided in the revised CDP toolkit. The stage-wise methodology and the key references have been presented in the table below.

Table 147: Methodology for City Financial Plan for Nagpur

Task	Step	Key Stages	Description	Remarks
Task1	Step 1	Defining Objectives	The key objectives have been defined for following key areas. <ul style="list-style-type: none"> ■ Revenue enhancement initiatives ■ Expenditure management initiatives ■ Asset management initiatives ■ Financial Management initiatives Further, it has been discussed in detailed in the subsequent sections.	The sub sections 20.9 to 20.12 has provided the details
Task2	Step 2	Data Collection	<ul style="list-style-type: none"> ■ The annual accounts, balance sheets, debt schedules, DCB statements for water and sewerage have been collected from NMC for the past five years. ■ The recasting and trend analysis has been carried and the findings have been presented in the financial assessment chapter above. 	Chapter 14 has detailed out the recasting and trend analysis.
	Step3	Business-As-Usual scenario --- CFP Version I	<ul style="list-style-type: none"> ■ As a first step in preparation of FoP for the city, we have prepared the Business-As-Usual scenario and 	The sub section 20.6 has provided the

Task	Step	Key Stages	Description	Remarks
			provided the overall capacity of NMC to take-up the infrastructure projects. <ul style="list-style-type: none"> The scenario has been discussed in the section FOP scenario considered 	details.
	Step 4	Analysis / Interpretation of the results	<ul style="list-style-type: none"> Post finalization of Business-As-Usual scenario, we have carried out the analysis on the revenue and expenditure to check the performance of key items. The same has been presented in the annexure. 	
Task3	Task5	Identification of areas of improvement / reforms	<ul style="list-style-type: none"> We have identified the property tax and water charges are the key revenue source where the reforms can be explored to improve the coverage and collection efficiency and the same has been detailed out in the Revenue enhancement initiatives 	The sub sections 20.7 and 20.9 have provided the details.
	Step6	Select / priorities areas of improvement / reforms	<ul style="list-style-type: none"> Under the revenue enhancement initiatives, we have identified the key reforms to be implemented in the property tax and user charges. 	The sub section 20.9 has provided the details.
Task4	Step7	Finalizing basic assumptions for resource mobilization forecast	<ul style="list-style-type: none"> Key assumptions for the income and expenditure side have been presented in the key assumptions section. 	The sub section 20.4.1 has provided the details.
	Step8	Ascertain investible surplus for ULB / Parastatals / Development authority	<ul style="list-style-type: none"> Ascertain investible surplus for NMC has been discussed in the investible surplus section. 	The sub section 20.5 has provided the details.
Task5	Step9	Ascertain combined investible surplus CFP Version II	<ul style="list-style-type: none"> Not Applicable 	Not Applicable
	Step10	Component-wise allocation of combined investible surplus	<ul style="list-style-type: none"> Not Applicable 	Not Applicable
Task6	Step11	Listing of Project Proposals – linkage to CDP	<ul style="list-style-type: none"> The priority project as identified in the CIP section has been linked with the FOP. Further, NMC investment capacity has been tested on various scenarios. 	Chapter 19 has detailed out the CIP for NMC.
	Step12	Priorities Project Investments	<ul style="list-style-type: none"> The priority project investment has been finalized in the CIP section further it has been linked with the financial model for the city. 	
Task7	Step13	Preparation of draft CFP --- CFP Version III &	<ul style="list-style-type: none"> The current chapter has detailed out the overall financial plan for the city 	Chapter 20 has detailed out the CIP for NMC.

Task	Step	Key Stages	Description	Remarks
		Financial Plan report (prioritized project investment loaded on combined investible surplus)	under various scenarios.	
Task8	Step14	Ascertain source and amount of funding, external borrowing, debt servicing mechanism, etc.	<ul style="list-style-type: none"> Under the Improved investment capacity with grant plus debt support, we have tested the capacity of NMC to go for debt and external borrowing. 	The sub section 20.8 has provided the details.
Task9	Step15	CFP Appraisal and Public Verification	<ul style="list-style-type: none"> We had presented the findings to the stakeholder during the final city level workshop and accordingly taken the suggestions on the overall financial plan for the city. 	The sections have been discussed under Section 17 and 20.
Task10	Step16	Finalization of CFP report	<ul style="list-style-type: none"> Post completion of final city level workshop, we had discussed with NMC officials and finalized the financial plan for the city 	
Task10	Step17	Annual revision of CFP (linkage to annual capital investment and improvements achieved)	<ul style="list-style-type: none"> We had suggested this step Monitoring and review framework. 	

Source: Revised CDP tollkit 2013

18.3 Financing strategies for CIP

The project funding structure comprises grants under the NURM (New Urban Renewal Mission) framework⁴² (accounting for 70% of the funding as per JNNURM structure has been assumed); internal surplus and debt are considered to meet the balance fund requirement. The level of investment that NMC can sustain is determined by studying the overall surpluses/year-to-year opening balance and debt-service coverage ratio (DSCR).

If DSCR (amount of surplus available to pay interest and to repay principal that is due) falls below 1.25 (i.e., less than 25% cushion), then the investments are reduced gradually till DSCR exceeds 1.25 in all the years in the forecast period. The main items of income and expenditure, classified into the revenue account and the capital account, are projected in the FOP under the following categories. Categories of FOP Projections are as follows.

Revenue Account Receipts

- Taxes, Non-Tax sources, and
- Grants, contribution, and subsidies

⁴² Based on the past trends, it is assumed the funding structure would remain same as it was in the JNNURM 1; the revised funding structure is yet to be announced by the ministry.

Revenue Account Expenditure

- Establishment
- Operation and Maintenance
- Debt servicing - Existing and new loans
- Phasing of Non-debt Liabilities, and
- Additional O&M for new assets created

Capital Income

- New Urban Renewal Mission capital grants
- Regular State or central grants
- Debt

Capital Expenditure

In determining a long-term financial strategy, NMC should plan to raise resources and fund for CIP through:

- Grants and grant-in-aid available under various programmes
- New Urban Renewal Mission (as percent of investment proposed for funding from 2013-14 for urban infrastructure sectors and other projects - 50 percent central government grants and 20 percent state government grants)
- Available internal resources and improving upon the same through:
 - ◆ Revision of area-based property taxation at certain levels by NMC
 - ◆ Revision of water charges on year-on-year basis
 - ◆ Improvement of the collection performance of taxes and charges against both current and arrears' demand.
 - ◆ Market borrowings – loans
 - ◆ Public-Private Partnerships for asset creation, service delivery, and O&M of the assets

18.4 Financial projections

Current revenue sources are projected under built-in growth assumptions for income and expenditure items, to assess the impact of each such revenue enhancement measure being suggested. The projections also aim at estimating the surplus that will be available for servicing new debt. Part of the surplus, after meeting the additional O&M expenses on newly created assets and infrastructure, is translated into debt size and project size (grant component plus debt component) based on certain assumptions regarding interest rate, repayment method and loan-grant mix.

A spreadsheet of FOP from model has been customized to depict the financial position of NMC. The investment-sustaining capacity of NMC is assessed based on the FOP assumptions. The model was used to calculate future surpluses under various scenarios involving combinations of internal revenue improvement, state support, financing terms, etc.

The standard assumptions under which the projections are carried out and certain expenditure control and revenue augmentation measures proposed in line with the mandatory and optional reforms under the JnNURM programme are presented below.

18.4.1 Investment sustenance capacity

Given the existing financial position of NMC, the revenue and capital accounts of NMC are projected against the growth scenario and assumptions presented above. The FOP is generated from the sustainable investment point of view in line with current growth trends against the identified investment. It

has been estimated that NMC has to contribute about Rs. 12,808 crores⁴³ to improve the infrastructure for meeting the current gap and future short-term requirement out of all the different scenarios of sustainable investment capacity.

18.4.2 Key Assumptions

Table 148: Key Financial Assumption for FOP projections

Head	Assumptions
Guiding Factor for Assessing the Sustaining Capacity	
Surplus	Positive surplus - year on year basis
DSCR	More than 1.25 (ideal)
Project Financing – for admissible Components under NURM⁴⁴	
Project costing	Project cost are based on the detailed cost estimates carried out in the various sector's master plan, DPR, technical documents, etc. Also, the cost escalation year-on-year basis for the cost estimates which are carried out in the past have been considered.
New/Additional O&M (for the proposed capital works in this CDP)	Water supply : 1% of capital cost Sewerage : 8% of capital cost Roads : 10% of capital cost Drains : 8% of capital cost Solid waste management : 10% of capital cost Others : 1% of capital cost
For projects approved under JnNURM	
Grant from Gol	50% of sanctioned cost
Grant from GoM	20% of sanctioned cost
For projects approved under National Lakes Conservation Programme (NLCP)	
Grant from Gol	70% of sanctioned cost
Grant from GoM	30% of sanctioned cost (10% contribution from NMC to ensure public participation)
For projects approved under National River Conservation Plan (NRCP)	
Grant from Gol	70% of sanctioned cost
Grant from GoM	30% of sanctioned cost (10% contribution from NMC to ensure public participation)
For slum and Housing projects to be approved under Rajiv Awas Yojana (RAY)	
Grant from Gol	50% of sanctioned cost (for Housing and Infrastructure development)
Grant from GoM	25% of sanctioned cost (for Housing and Infrastructure development)
	Remaining 25% will be shared between NMC and beneficiaries. NMC – 25% for provision of Infrastructure Beneficiaries – 25% for construction of houses
If Loan for balance funding	
Regular CAPEX	Projection of regular capital expenditure with a base growth rate of 2%. Growth rate of 2% is due to most of the CAPEX projects are implemented under JnNURM or other programmes and same trend is assumed during the next phase of development (short term)

⁴³ Overall the investment required for the year 2021-22 is Rs 27,186 crores. However, NMC would be responsible to take-up the projects worth Rs 12,644 crores and the remaining investment to be taken-up by the Parastatals/state government departments. Therefore, the financial operating plan has been prepared for NMC with an estimated investment for Rs 12,644 crores.

⁴⁴ New Urban Renewal Mission

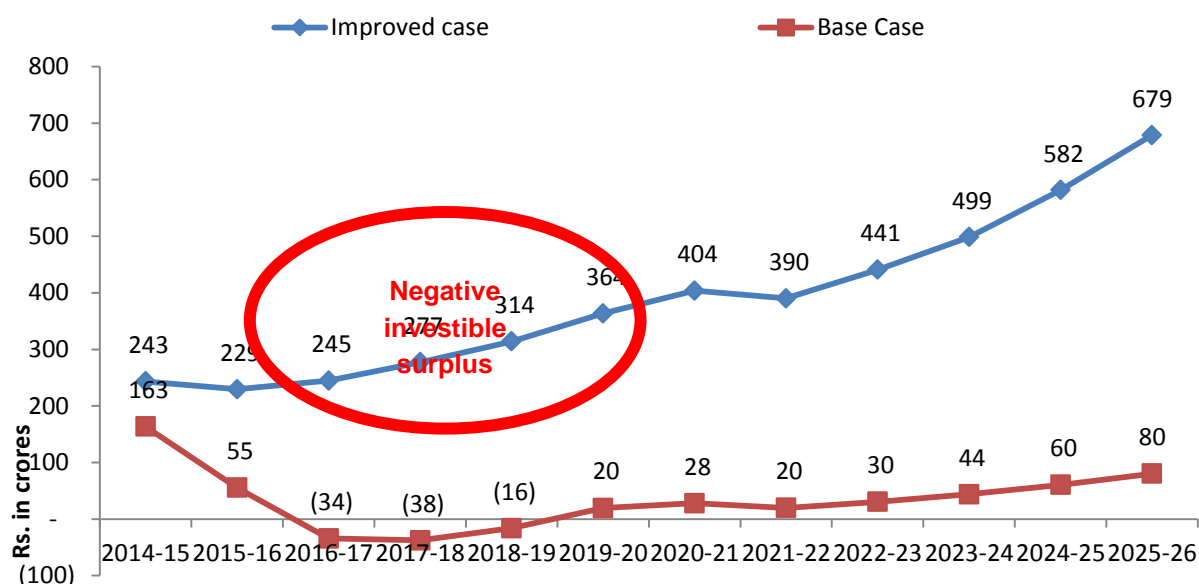
Head	Assumptions
Old Outstanding loans if any	NMC has taken three loans which are for total amount of Rs. 310 crores. The outstanding loan as on 31st March 2014 is Rs. 266 crores. The repayment schedule for these outstanding loan is considered for next seven years till FY 2020-21
Revenue Expenditure	
Growth in Expenditure	Regular growth rate of 8% to 10% considered for all the revenue expenditure heads for projections.
Pay Commission Revision	7th Pay Commission revision from 2016 – 2022 (As on date the salaries are being paid by NMC on the basis of 6 th pay commission)
Assumption for assessment of NMC's sustainability	
Income Items	
Growth in revenue income	Actual average growth with a minimum 8% and maximum of 10% (based on last five years trend) In case of Improved case, the growth rate considered is 12%
Property Tax	
Annual growth in Assessment	1.75% per annum in base case and 2% in improved case
Revision of Tax	15% increase in the ARV every five years starting from FY 2015-16
Collection Performance	85% Improvement on yearly basis considered from FY 2013-14 to FY 2025-26 from 70% to 85% for current collection 85% (Improvement on yearly basis considered from FY 2013-14 to FY 2025-26 from 46% to 74% for arrears collection)
New Taxes (considered as improved case)	In order to achieve financial sustainability, improve the city's infrastructure, and improving civic administration. The new taxes which are possible to be levied has been identified based on the applicable act.
Increasing the tax base of existing taxes (considered as improved case)	In order to achieve financial sustainability, improve the city's infrastructure, and improving civic administration. Increase/revision of tax base which are possible has been identified based on the applicable act.
Income Items- Water Supply	
Individual Water Connections	To achieve 100% individual water connections provision in all the properties in Nagpur
Water Tariff revision	5% annual hike in water user charges
Next Revisions	Annual revision as per current practice of NMC
Collection Performance	85% by FY 2025-26 (Improvement in current collection on yearly basis by 5% considered from FY 2013-14 to FY 2025-26) 80% by FY 2025-26 (Improvement in arrears collection on yearly basis by 5% considered from FY 2013-14 to FY 2025-26)
Income Items- Sewerage	
Sewerage Connections	To achieve 100% coverage by providing sewerage connections
Sewerage Tax	12% of the ALV value for property value.
Collection Performance	85% by FY 2025-26 (Improvement in current collection on yearly basis by 5% considered from FY 2013-14 to FY 2025-26) 80% by FY 2025-26 (Improvement in arrears collection on yearly basis by 5% considered from FY 2013-14 to FY 2025-26)

18.5 Investible surplus

Based on the various assumptions, the investible surplus⁴⁵ has been estimated for the city on the base and improved case scenarios. As per the base case scenario, NMC’s investible surplus for most of the years was seen negative based on the forecasted financials during FY 2014-15 till FY 2025-26. The major reason for negative or no capacity to take up new investment in base case is due to existing financial commitments towards JnNURM projects and loan repayment.

The investible surplus in base case is on an average Rs 10 crores only. At the same time, in the improved case scenario, on an average, NMC will have investible surplus of Rs. 236 crores. The investible surplus in the base and improved case scenarios are as shown in the figure below.

Figure 125: Investible surplus during 2014-2024



Source: CRIS analysis

The spreadsheets of the FoP are presented in the Annexure. The following are the results drawn with respect to investment capacity of NMC. Various possible scenarios for NMC towards sustainable investment for short-term investment have been generated. Also two predetermined cases built, which are Base case and improved case are explained as below:

- **Base investment capacity** – This scenario is built on the past trends as the case is.
- **Improved investment capacity** – This scenario is built on the presumption that NMC is going to undertake reforms leading to its improved financial sustenance capacity. The reforms are especially in the areas of property tax and water charges.

⁴⁵ The investible surplus = “(Revenue (own sources of income) income + capital (own sources of income) - Revenue expenditure”. And, excluding the revenue and capital grants received for specific purpose

18.6 Business-as-usual scenario

Business-as-usual scenario: This scenario is built on past trends, based on as-is case. In this scenario, it is assumed that NMC shall do business as usual and endeavour to implement the capital projects. This scenario will indicate the overall capacity of NMC to take up projects on business-as-usual basis.

Property Tax

Widening/ improving the coverage of the property tax and maximise the number of properties under property tax net
Widen the tax base and change in revision of property tax policy
100% computerization of all the records and database
Introduction of online assessment and payment gateway
Introduction of robust monitoring and dispute resolution mechanism
Restructuring of the administrative system of department

- Based on the investible surplus available, NMC is not in position to take up any new projects identified for short term (2015-16 till 2021-22). NMC has huge financial commitment towards implementation of projects under JnNURM which include the recently taken up projects under the projects envisaged in the extended phase of JnNURM.
- NMC has to contribute around Rs. 1,149 crores for the JNNURM project implementation and repay the outstanding loan of Rs 171 crores, during 3-5 year period.
- In order to implement the on-going projects under JNNURM; NMC could drop some of the existing projects (which is not possible as it will then go in the backlog projects) or have to take up a loan of Rs. 400 crores to implement projects and to repay the outstanding loan on a regular basis.
- It is recommended that NMC should take Rs 50 Crs per year over the next 7 years to complete the on-going projects.
- At the same time, NMC has to curtail the regular capital expenditure substantially over the next 5-7 years.
- The income and expenditure growth would follow past trends. The regular capital expenditure would grow at 2% on a year-on-year basis.
- Under this scenario, NMC should not plan for new projects and priority should be given to the on-going projects.

Table 149: FoP – Business as usual scenario

Financial Year ----->	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	
	Figures in Rs. Lakhs			Projections														
Summary	Actuals			Projections														
Opening Balance	20,412	19,813	24,333	27,042	24,138	-5,151	-3,763	-5,618	-10,329	-13,627	-11,800	-8,618	-3,897	-3,259	-544	4,647	12,736	
1 Revenue Income	54,049	66,030	74,603	68,557	74,643	81,801	89,381	94,162	1,01,522	1,09,395	1,17,675	1,26,697	1,36,875	1,48,180	1,60,628	1,74,304	1,89,316	
2 Revenue Expenditure	37,814	45,050	57,376	53,636	57,653	65,466	76,171	81,578	87,431	93,770	1,00,637	1,08,081	1,22,327	1,31,567	1,41,578	1,52,430	1,64,199	
a Surplus/Deficit- Revenue Account	16,235	20,981	17,227	14,920	16,990	16,335	13,210	12,584	14,091	15,625	17,038	18,616	14,548	16,613	19,050	21,874	25,117	
b Operating Ratio	0.70	0.68	0.77	0.78	0.77	0.80	0.85	0.87	0.86	0.86	0.86	0.85	0.89	0.89	0.88	0.87	0.87	
c Debt Servicing Ratio	0.5%	2.2%	3.9%	0.0%	0.0%	4.2%	3.9%	3.7%	3.4%	3.2%	2.9%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	
3 Capital Income	8,687	20,849	14,194	11,765	15,913	32,468	32,653	10,807	11,032	2,721	2,993	3,292	3,621	3,982	4,380	4,817	5,298	
4 Capital Expenditure	28,128	36,139	29,179	29,589	62,192	47,414	47,719	28,103	28,420	16,519	16,849	17,186	17,530	17,881	18,238	18,603	18,973	
d Surplus/Deficit- Capital Account	-19,441	-15,290	-14,985	-17,824	-46,279	-14,946	-15,066	-17,295	-17,388	-13,798	-13,856	-13,894	-13,910	-13,899	-13,859	-13,786	-13,677	
e Overall Surplus/Deficit- Municipal Account	-646	5,075	2,709	-2,904	-29,289	1,388	-1,856	-4,711	-3,297	1,827	3,182	4,721	638	2,714	5,192	8,088	11,440	
f Closing Balance	19,767	24,888	27,042	24,138	-5,151	-3,763	-5,618	-10,329	-13,627	-11,800	-8,618	-3,897	-3,259	-544	4,647	12,736	24,175	
		Investible surplus			12,636	16,905	12,158	9,348	10,867	9,604	5,813	4,454	5,155	5,803	6,242	6,749	1,505	2,276
Opening Balance	20,412	19,813	24,333	27,042	24,138	-5,151	-3,763	-5,618	-10,329	-13,627	-11,800	-8,618	-3,897	-3,259	-544	4,647	12,736	

Source: CRIS analysis

18.7 Improved case scenario with grant support – Reforms Implementation

NMC will implement mandatory and optional reforms which will improve the overall governance of NMC resulting in better growth rate for all the revenue sources. The growth rate considered for the improved case is 10% to 12% and 8% for revenue expenditure.

Key considerations is as follows

1. NMC shall implement the on-going projects under JNNURM
2. NMC will repay the existing loan as per the repayments schedules
3. In this scenario, it is assumed that NMC shall receive capital grants from the state and Central governments under various programmes.
4. It is assumed that NMC shall take-up the revenue reforms in the areas of property tax, water charges, sewerage charges and introduce the SWM charges
5. Based on above, NMC can do sustainable investment of Rs. 2,795 crores.

- Levy of new taxes like water benefit tax, sewerage benefit tax
- Widening of existing tax base of property tax
- Improved growth rate of all the revenue streams assumed to be between 10% to 15%, due to various reforms and implementation of various suggested strategies within NMC like administrative restructuring of system
- Online payment facilities for payment of all taxes, user charges and rents, etc
- robust collection system, penalties to defaulters
- Tax rebate to the loyal tax payers

Table 150: Improved case scenario with grant

Financial Year ---->	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
	Actuals			Projections													
	Figures in Rs. Lakhs																
Summary																	
Opening Balance	20,412	19,813	24,333	27,042	30,588	14,393	22,274	22,356	15,057	6,637	5,935	14,881	29,671	49,626	74,632	1,05,437	1,44,621
1 Revenue Income	54,049	66,030	74,603	74,978	81,960	91,491	1,00,861	1,07,813	1,16,952	1,27,028	1,38,874	1,50,377	1,63,297	1,77,647	1,93,479	2,12,688	2,34,207
2 Revenue Expenditure	37,814	45,050	57,376	53,636	57,653	65,466	79,229	88,642	97,043	1,05,646	1,13,189	1,18,921	1,30,154	1,39,623	1,49,882	1,61,002	1,73,059
a Surplus/Deficit- Revenue Account	16,235	20,981	17,227	21,342	24,308	26,026	21,632	19,171	19,909	21,383	25,685	31,457	33,143	38,023	43,597	51,687	61,148
b Operating Ratio	0.70	0.68	0.77	0.72	0.70	0.72	0.79	0.82	0.83	0.83	0.82	0.79	0.80	0.79	0.77	0.76	0.74
c Debt Servicing Ratio	0.5%	2.2%	3.9%	0.0%	0.0%	3.8%	4.1%	4.5%	4.8%	5.0%	5.0%	5.1%	3.0%	2.8%	2.6%	2.3%	2.1%
3 Capital Income	8,687	20,849	14,194	11,794	21,690	60,103	67,591	52,873	57,451	44,589	32,004	13,502	4,342	4,863	5,447	6,100	6,832
4 Capital Expenditure	28,128	36,139	29,179	29,589	62,192	78,247	89,141	79,343	85,779	66,674	48,743	30,169	17,530	17,881	18,238	18,603	18,975
d Surplus/Deficit- Capital Account	-19,441	-15,290	-14,985	-17,796	-40,502	-18,144	-21,550	-26,470	-28,328	-22,085	-16,739	-16,666	-13,188	-13,018	-12,792	-12,503	-12,143
e Overall Surplus/Deficit- Municipal Account	-646	5,075	2,709	3,546	-16,193	7,881	81	-7,299	-8,419	-702	8,946	14,790	19,955	25,006	30,805	39,184	49,005
f Closing Balance	19,767	24,888	27,042	30,588	14,393	22,274	22,356	15,057	6,637	5,935	14,881	29,671	49,626	74,632	1,05,437	1,44,621	1,93,626
	Investible surplus																
Opening Balance	12,636	16,903	12,158	15,663	17,948	18,903	13,654	10,236	9,902	10,175	13,132	17,398	17,397	20,388	23,845	29,564	36,371
Opening Balance	20,412	19,813	24,333	27,042	30,588	14,393	22,274	22,356	15,057	6,637	5,935	14,881	29,671	49,626	74,632	1,05,437	1,44,621

Source: CRIS analysis

18.8 Improved case scenario – Grant and Debt

Based on the financial analysis, the option of funding for projects' by accessing market borrowings was also analysed. In this scenario (improved case), along with grants and debt component, it is observed that NMC can do sustainable investment of Rs. 3,289 crores.

Key considerations is as follows

1. NMC shall implement the on-going projects under JNNURM
2. NMC will repay the existing loan as per the repayments schedules
3. In this scenario, it is assumed that NMC shall receive capital grants from the state and Central governments under various programmes.
4. It is assumed that NMC shall take-up the revenue reforms in the areas of property tax, water charges, sewerage charges and introduce the SWM charges
5. NMC has capacity to take-up Rs 652 Crs as loan from the external borrowing/markets
6. Based on above, NMC can do sustainable investment of Rs. 3,289 crores.

Table 151: FoP – Improved case scenario with grant and debt

Financial Year ---->	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
	Actuals			Projections													
	Figures in Rs. Lakhs																
Summary																	
Opening Balance	20,412	19,813	24,333	27,042	30,588	14,393	23,423	24,221	16,801	7,428	4,340	9,524	19,808	35,320	55,843	82,122	1,16,733
1 Revenue Income	54,049	66,030	74,603	74,978	81,960	91,491	1,00,861	1,07,813	1,16,952	1,27,028	1,38,874	1,50,377	1,63,297	1,77,647	1,93,479	2,12,688	2,34,207
2 Revenue Expenditure	37,814	45,050	57,376	53,636	57,653	65,908	80,693	91,428	1,00,986	1,10,568	1,18,550	1,24,019	1,34,597	1,44,106	1,54,408	1,65,575	1,77,684
a Surplus/Deficit- Revenue Account	16,235	20,981	17,227	21,342	24,308	25,583	20,168	16,385	15,966	16,461	20,324	26,358	28,701	33,541	39,071	47,113	56,523
b Operating Ratio	0.70	0.68	0.77	0.72	0.70	0.72	0.80	0.85	0.86	0.87	0.85	0.82	0.82	0.81	0.80	0.78	0.76
c Debt Servicing Ratio	0.5%	2.2%	3.9%	0.0%	0.0%	4.3%	5.2%	6.2%	7.0%	7.6%	7.8%	7.7%	5.4%	5.0%	4.6%	4.2%	3.8%
3 Capital Income	8,687	20,849	14,194	11,794	21,690	67,135	77,080	64,581	70,562	55,976	39,232	16,385	4,342	4,863	5,447	6,100	6,832
4 Capital Expenditure	28,128	36,139	29,179	29,589	62,192	83,689	96,451	88,386	95,901	75,525	54,372	32,460	17,530	17,881	18,238	18,603	18,975
d Surplus/Deficit- Capital Account	-19,441	-15,290	-14,985	-17,796	-40,502	-16,553	-19,370	-23,805	-25,339	-19,549	-15,139	-16,074	-13,188	-13,018	-12,792	-12,503	-12,143
e Overall Surplus/Deficit- Municipal Account	-646	5,075	2,709	3,546	-16,195	9,030	798	-7,420	-9,373	-3,088	5,184	10,284	15,513	20,523	26,279	34,610	44,380
f Closing Balance	19,767	24,888	27,042	30,588	14,393	23,423	24,221	16,801	7,428	4,340	9,524	19,808	35,320	55,843	82,122	1,16,733	1,61,113
	Investible surplus																
Opening Balance	20,412	19,813	24,333	27,042	30,588	14,393	23,423	24,221	16,801	7,428	4,340	9,524	19,808	35,320	55,843	82,122	1,16,733

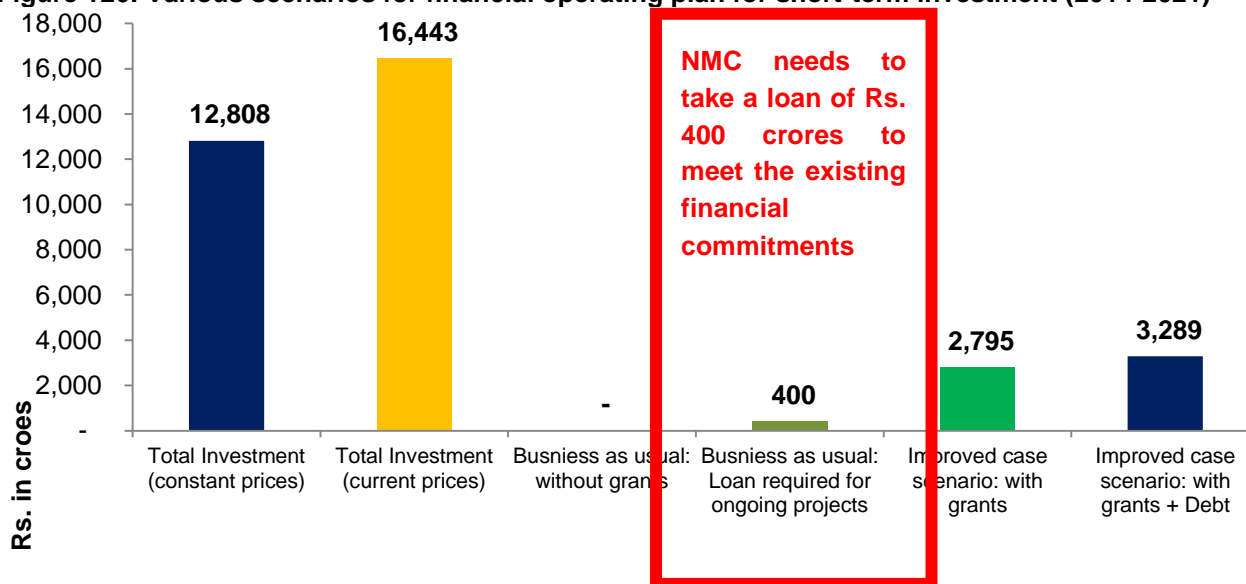
Source: CRIS analysis

18.8.1 Key Summary

Further, the results of the above scenarios have been presented in the figure below. The overall investment estimated is Rs. 12,808 crores (on constant prices). However, as per the current prices, the estimated investment would be Rs. 16,443 crores (which includes the cost escalation and physical contingencies on yearly basis for 7 years – FY 2015-16 till FY 2021-22).

- Business as usual scenario: NMC is not in a position to take up any new project - NMC is have to take a loan of Rs. 400 crores in order to fulfil the existing the financial commitment towards on-going projects under JnNURM and repayment of outstanding) loan
- Improved investment capacity without grant support: Rs. 375 crores
- Improved investment capacity with grant support: Rs 2,795 crores
- Improved investment capacity with grant plus debt support: Rs 3,289 crores

Figure 126: Various scenarios for financial operating plan for short-term investment (2014-2021)



Source: CRIS analysis

18.9 Revenue enhancement initiatives

Table 152: Revenue enhancement measures for various sectors

Area	Existing revenues (Rs. in crores)	Task	Estimated Revenue potential (Rs. in crores)
Property tax (including Sewerage tax and Water tax)	Rs 110 crores (2011-12)	<ul style="list-style-type: none"> Improving coverage of the properties and updating the assessment register. Improving the Collection efficiency through awareness campaigns towards use of online payment gateway for paying of property tax. Separate cell for appellate to deal with defaulters and resolving the long pending arrears due to litigation cases. 	Rs 182 crores (2025-26) And Rs. 45 crores revenues from new taxes (as suggested)
Water charges	Rs 76 crores (2011-12)	<ul style="list-style-type: none"> Existing coverage of functional metered connection is only 28%. About 30-35% of the meters are non-functional. 100% metering of all the water connections should be carried out. Strong support to the OCWL (PPP operator) to achieve maximum collection efficiency and incase of non-compliance of the same levy of penalty on OCWL as per concession agreement should be carried out. Also, to create awareness campaigns towards use of online payment gateway for payment of charges online. 	Rs 330 crores (2025-26)
SWM (New proposed)	-	<ul style="list-style-type: none"> NMC should introduce SWM user charges. Awareness campaigns amongst the citizens towards supporting the levy of user charges and to meet the cost of services for better service provision needed. 	Rs 27 crores (2025-26)
Development Charges	Rs 3.31 crores (2012-13)	<ul style="list-style-type: none"> Improving the Building approval and sanctioning process. Also, to regularize unauthorised layouts and levy a development charges on the same. 	Rs 147 crores (2025-26)

18.10 Expenditure management initiatives

Over the review period, the revenue and capital expenditure of NMC have been increased. In order to reduce the revenue and capital expenditure at NMC, the following key initiatives are to be taken up by NMC.

Reduction in establishment expenditure

- Outsourcing of certain functions: NMC should explore outsourcing of some functions in order to reduce the establishment expenditure.

- Moreover, NMC can outsource the clerical posts such as data entry operators and clerks to reduce the establishment cost.

Reduction in capital expenditure

- Therefore, NMC has to curtail its regular capital expenditure from NMC's own source of revenues.
- NMC should explore for grants, grant-in-aid from Central/state government or tie up with other local para-statal agencies in order to take-up the infrastructure projects.
- It is recommended that the PPP option should be explored further for projects in the social sector and other sectors.

18.11 Asset management initiatives

The establishment of linkages between asset creation and asset management should be through a series of reforms that will ensure project sustainability. Also, ensuring adequate funds to meet the deficiencies in urban infrastructural services is recommended.

In order to maintain the assets over the project's life-cycle, NMC should allocate a certain percentage of funds for the operation and maintenance of the project components. For instance, as regards the water supply project, the O&M cost would be 5% of the project cost and this would be on a recurring basis.

Depreciation account/fund

NMC should ideally try to maintain the depreciation account in order to replace the existing asset with a new asset post its life-cycle.

Key steps to be taken by NMC for better management of assets

- NMC should focus on department wise budget preparation for O&M cost for newly created assets, and provide the best practice to reduce the O&M cost on sewerage and solid waste management
- Carry out water and energy audit to reduce the O&M cost and water leakages (NRW)
- Study the existing status of the assets of key sectors, prepare a tangible action plan for the maintenance of assets, and provide the replacement list for the assets
- Conduct workshops/trainings for the staff on management of O&M and best practices across the states
- Organize study tours for the staff and elected representatives for effective implementation of reforms, for full O&M recovery
- Latest techniques and technology to be adopted for management (inventory, maintenance cycle, replacement time, etc.) of municipal assets
- Conduct trainings in the area of asset management, new techniques for operation and maintenance of assets

18.12 Financial management initiatives

In order to implement the identified projects over the project cycle, NMC has to take up financial management initiatives for smooth implementation of the projects. The key initiatives are as follows:

- First and foremost, the accounts department of NMC should maintain a separate account for all projects. Financial transactions such as deposits, grants and release of payments should be carried out through the project account.
- Carry out all the above-mentioned functions through e-governance modules developed by NMC.
- Transfer a part of the revenue surplus (own source of revenues) to the project account to implement the project. A record of such transactions should be maintained.
- Internal audit of the project accounts should be carried out on a quarterly basis. External audit has to be carried out on an annual basis.

18.13 Projects on PPP basis

NMC may explore the PPP route in the case of the following projects. The details of each component have been provided in the table below.

Table 153: Projects on PPP basis

Sector	Development	Possible PPP interventions	Key Aspects
Sewerage	Construction, operation, and maintenance of STPs	Construction and O&M of STPs and selling of treated sewerage water to potential users	<ul style="list-style-type: none"> ▪ NMC shall handover the land for construction of STPs ▪ O&M of STPs has to be carried out by private operator as per the contract period ▪ The operator would be responsible for the O&M of STPs and further selling of the treated sewerage water to potential users ▪ The revenue sharing between NMC and the private operator can be explored, like royalty on land and revenue sharing from sale of treated waste water.
Solid Waste Management	Improve the waste collection and transportation recovery & scientific landfill	BOT basis	<ul style="list-style-type: none"> ▪ NMC shall procure the vehicles and handover the same to the private operator. Or appoint a private operator who will buy the vehicles ▪ The operator would be responsible for collection and transportation of the waste ▪ NMC may allocate the land to develop the SWM treatment plant. The assets would be created and maintained by the operator ▪ Further, the private operator may sell the manure and pallets and further generate revenues ▪ The revenue sharing between NMC and the private operator can be explored, like royalty on land and revenue sharing from sell of recycle materials
Traffic and transport	Multilevel car parking complex on PPP basis and O&M contracts	Land to be provided on lease basis	<ul style="list-style-type: none"> ▪ The feasibility to be improved by introducing a mixed use – shops & offices ▪ Handing over the O&M function to the contractor for the infrastructure like flyovers, ROB, RUBs, FOBs.⁴⁶ ▪ Installation and O&M of the street

⁴⁶ Example of Mumbai flyovers - flyovers are constructed and managed by private operator through collection of tolls. NMC can levy toll or user fee on the heavy traffic entering the city or parking of trucks in the goods terminal and same revenue to be used by the private operator for managing the infrastructure. Review of the model adopted by MSRDC should be carried out.

Sector	Development	Possible PPP interventions	Key Aspects
			lights ⁴⁷
Housing for Urban poor	Construction of houses for urban poor	Construction of houses for urban poor	<ul style="list-style-type: none"> NMC has already explored the option of PPP based implementation of BSUP project Same way implementation of projects for developing houses under the RAY should be explored
Rehabilitation of Heritage Structures	Cultural events organising Heritage walk	Cultural and events organising	<ul style="list-style-type: none"> Exploring the possibilities of involving private organisations and corporates to host cultural events To manage heritage walks in the city and exhibitions
Social Infrastructure	Asset creation and maintenance of the assets and service contract for provision of services	Construction, operation, and maintenance of schools, hospitals, gardens, parks, convention centre	<ul style="list-style-type: none"> NMC shall handover the land for construction of infrastructure or existing infrastructure Service contract for provision of services like education, health and medical facilities, etc. The revenue sharing between NMC and the private operator can be explored, like royalty on land and sharing of revenues generated from provision of services

18.14 Land resource leveraging

NMC should focus on preparing an inventory of available land in the city, to explore land-based financing offers for implementing the infrastructure projects. The following steps are recommended to NMC;

- NMC should initiate an inventory of land parcels available in the city. Further, NMC should create a database of the same and a land bank
- NMC should crosscheck the proposed land use as per the development plan. If required, NMC needs to initiate land use revision in the records
- NMC may explore available land parcels that can be used for development of affordable housing projects, parking projects, real estate projects and convention centers. Even these projects can be implemented on PPP basis

18.15 Key Conclusions

Given the importance of Nagpur in the region, it is very important to improve the infrastructure facilities to attract investment and industries in the city and further to boost the economic development in the region. Overall, NMC requires around Rs. 12,808 crores to improve the core services in the city.

However, in a business-as-usual scenario, NMC is not in a position to take up new projects. While in case of improved case scenario if NMC take-up the fiscal reforms then NMC can do sustainable

⁴⁷ NMC has already developed a concession agreement for implementation of a project under that replacement of existing sodium vapour bulbs with LED lamps will be carried out for energy efficiency.

investment of Rs. 2,795 crores. Further, in improved case, if NMC gets grants support along with funds from markets, it can do sustainable investment of Rs. 3,289 crores.

Based on the financial analysis and the existing financial commitments, following are key observations and suggestions to take-up projects at NMC;

- It is observed that NMC cannot investment for any of the new projects in base case scenario. This is largely due to the fact that, NMC's existing financial commitment of Rs. 1,149 crores towards on-going projects under JNNURM. In addition to that, the repayment of outstanding loan of Rs. 310 crores over the next 7 years. These commitments will have huge impact on the financial (as forecasted) of NMC over the next 7 years.
- It is recommended that, on priority basis NMC needs to take up various fiscal and administrative reforms which will ensure improved financial in future as per the financial assessment, in case if reforms are not taken up immediately or delay; then it will be difficult situation for NMC to meet the existing commitments and to investment in new projects.

Therefore, NMC should target to achieve the improved investment capacity (Rs. 2,795 crores) with grant support from the state and Central Government. The following key steps need to be taken by NMC to achieve the improved case scenario investment.

1. To meet the existing financial commitments

NMC will not be in position to take up new projects during short term phase. Even to maintain positive financials and implemented on-going projects along with repayment of outstanding loan, NMC will have to take up new loan of Rs 400 crores.

2. To maintain stable revenue income and take-up new projects in near future

In order to meet the existing financial commitments and also to take up new projects as identified in the short term investment plan, it is highly recommended that NMC implements various reforms that will improve the investible surplus for NMC. Some of the reforms that will help improve the revenues for NMC and investment capacity for next phase of development (short term – FY 2015-16 till FY 2021-22) are as mentioned below;

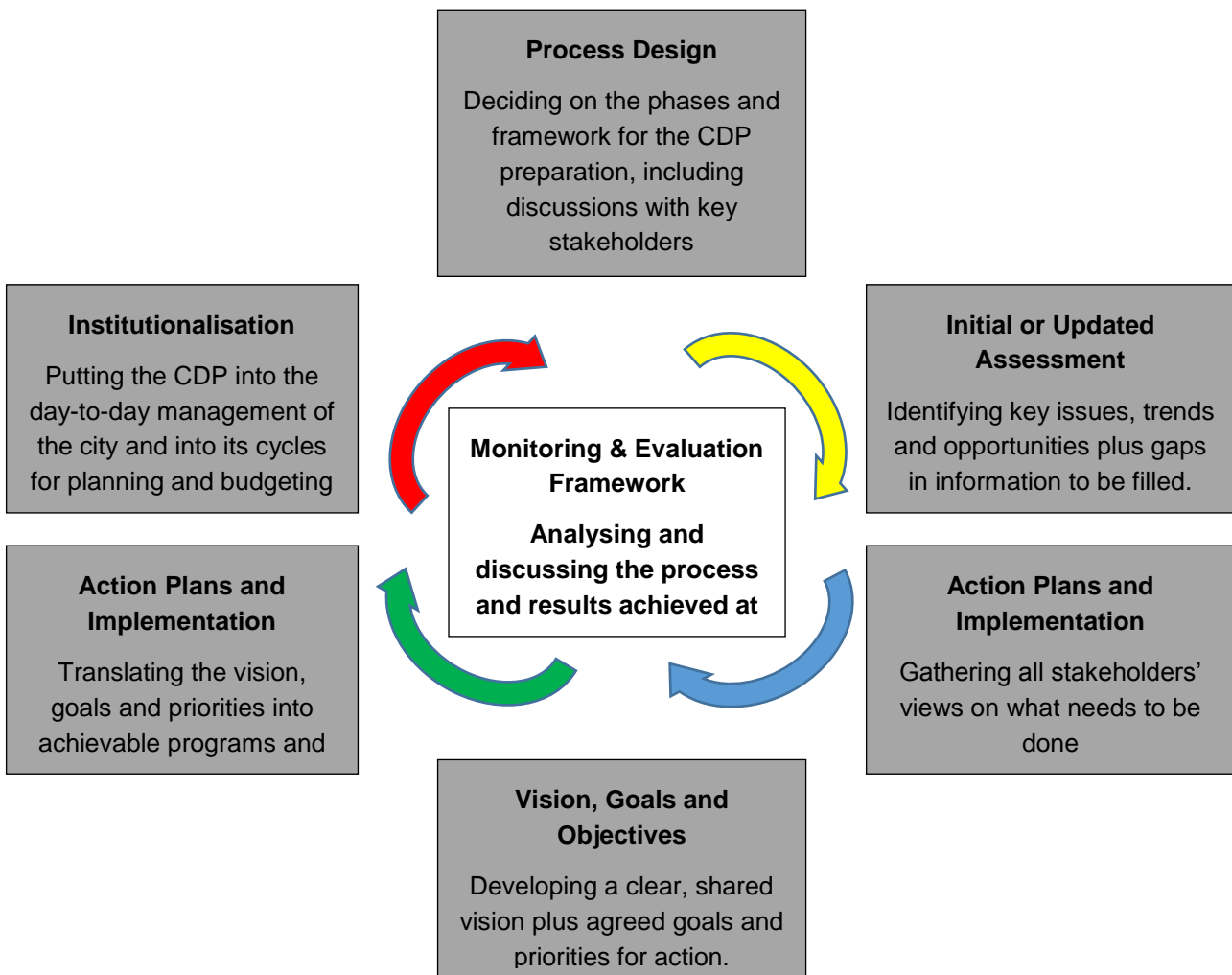
- **New tax and revision of base for existing taxes:** NMC should explore or propose the levy of a new tax, which will be as per the applicable act.
- **Property tax:** On an immediate basis, the reforms to be implemented in property tax to improve the coverage and collection efficiency;
- **Water and sewerage:** Water and sewerage tariff structures must be revised immediately
- **SWM charges:** NMC should levy user charges on SWM services – NMC may explore this initiative as part of property tax.
- **Establishment expenditure:** The outsourcing option should be explored in the establishment department as well as in the operation and maintenance of assets. If possible, reduction of staff and optimum resource utilisation through the use of sophisticated technology should be explored
- **O&M new assets:** NMC should ensure that the contractor/private operator appointed will carry out O&M of the assets (WTP, STP and SWM plant) for a period of 5-8 years after completion of the test runs.
- **Capacity-building:** It is very important that NMC should keep on imparting training to the staff on various aspects, from technical to managerial skills.
- **Study tours:** NMC should organise study tours to know the best practices carried out for some of the core services and also to understand the challenges faced by other cities in the implementation of projects and reforms.

19 Review and Monitoring framework

The monitoring and evaluation (M&E) framework has been designed to help cities integrate M&E into their city development plan (CDP) from the initial phases. M&E is important to enable cities determine whether their CDP is achieving its vision and goals and realising its intended outcomes or not. It is a tool that shall enable cities to monitor the progress on the plan at regular intervals.

The information generated by M&E can be used to provide information and support for the implementation of CDP. It shall help in strengthening the downstream project implementation, undertaking programme and investment activities, and devising strategies for future planning initiatives. A basic principle of the CDP approach is that the way in which the CDP is developed and the development issues that it addresses, are determined by each city and community to meet their own needs. There is no 'one size fits all' approach to designing and implementation of CDP.

The framework mentioned below clearly lays down the broad principles that need to be fine-tuned based on the city specific needs and inputs from various officials at the city level to develop for each city.



19.1 Framework for Review and monitoring

In the context of the ever changing landscape of the developments in the city, the impacts on the growth of the city will have wide ramifications if it is not factored into the City Development Planning process in a dynamic manner. The CDP should have a fixed time frame for its implementation, and shall be followed by a review to study and analyse the impact of the implementation of the plan, in order to make mid-term course corrections, wherever necessary. A monitoring mechanism should also be established for measuring the identifiable indicators provided in the CDP for each sector and there after implementation of CDP can be measured.

The table below gives a framework for updating and reviewing CDPs; this needs to be followed as per the revised tool kit.

Table 154: Framework for Monitoring and Evaluation of various components in the CDP

Sr.No.	Framework for Updating and Reviewing City Development Plan (CDP) to make it a living document							
	Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1	Reviewing CDP Document	√					√	
2	Community and Stakeholder Consultation	√	√	√	√	√	√	√
3	Data Update and Mapping the City	√				√		
4	Capacity Building	√	√	√	√	√		
5	Planning Building Regulations Reforms	√				√		
6	Property Tax Reforms	√	√	√	√	√	√	
7	Institutional Reforms	√	√	√	√	√		
8	Financial Reforms	√	√	√	√	√		
9	Sectoral/Ward Development Plans	√				√		
10	Review of Project Priorities	√		√		√		
11	Financial Operating Plan	√				√		
12	Capital Investment Plan	√				√		

Source: Revised City Development Plan toolkit

19.1.1 Timeline and Periodicity of review

To make CDP as a living document, it is essential to understand that the city landscape, growth source as well as direction keep changing with time. Hence, the CDP should have a fixed time frame for its implementation, and shall be followed by a review to study and analyse the impacts of the implementation in order to make mid-course corrections, wherever necessary. The monitoring mechanism should be on the activities based on the identified indicators in each sectors in the CDP. Some of the identified activities that could be monitored are given below.

19.2 Reviewing of the CDP Document

The foremost thing that comes up is the reviewing of the CDP document. As the city's conditions may change after few years, the CDP needs to be reviewed and evaluated after a particular time before a new development plan is proposed. It is necessary to identify the sectors that are growing and sectors that are lagging, to achieve the vision framed for the city. The CDP is prepared for a long term vision for 30 years and the investment plan is prepared for a time frame for 7 years. Thus it mandatory that review of the City Development Plan is taken up after every five years.

A monitoring mechanism should also be established for measuring the identifiable indicators provided in the CDP for each sector and there after implementation of CDP can be measured.

The table below gives a framework for updating and reviewing CDPs; this needs to be followed as per the revised tool kit.

Table 155: Framework for Monitoring and Evaluation of various components in the CDP

Sr.No.	Framework for Updating and Reviewing City Development Plan (CDP) to make it a living document							
	Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1	Reviewing CDP Document	√					√	
2	Community and Stakeholder Consultation	√	√	√	√	√	√	√
3	Data Update and Mapping the City	√				√		
4	Capacity Building	√	√	√	√	√		
5	Planning Building Regulations Reforms	√				√		
6	Property Tax Reforms	√	√	√	√	√	√	
7	Institutional Reforms	√	√	√	√	√		
8	Financial Reforms	√	√	√	√	√		
9	Sectoral/Ward Development Plans	√				√		
10	Review of Project Priorities	√		√		√		
11	Financial Operating Plan	√				√		
12	Capital Investment Plan	√				√		

Source: Revised City Development Plan toolkit

19.2.1 Timeline and Periodicity of review

To make CDP as a living document, it is essential to understand that the city landscape, growth source as well as direction keep changing with time. Hence, the CDP should have a fixed time frame for its implementation, and shall be followed by a review to study and analyse the impacts of the implementation in order to make mid-course corrections, wherever necessary. The monitoring mechanism should be on the activities based on the identified indicators in each sectors in the CDP. Some of the identified activities that could be monitored are given below.

19.3 Reviewing of the CDP Document

The foremost thing that comes up is the reviewing of the CDP document. As the city's conditions may change after few years, the CDP needs to be reviewed and evaluated after a particular time before a new development plan is proposed. It is necessary to identify the sectors that are growing and sectors that are lagging, to achieve the vision framed for the city. The CDP is prepared for a long term vision for 30 years and the investment plan is prepared for a time frame for 7 years. Thus it mandatory that review of the City Development Plan is taken up after every five years.

19.3.1 Engaging with Community and Stakeholders' Consultation

CDP focuses on the holistic development and betterment of the city as looked upon by various communities and stakeholders. Therefore, it is very important to keep consulting with them about the process of the work to be undertaken to achieve the framed vision for the city. This could be done by conducting a meeting every alternate year, i.e., once in every two years. The feedback should be incorporated and the shared with citizens through a common platform like website etc.

19.3.2 Data Update and Mapping of the City

In case of any major changes in the city limits/boundaries, a complete data updation exercise should be carried out for effective implementation. Therefore, data updates and mapping of the city become very essential. This should always be done before the preparation of the CDP.

19.3.3 Capacity Building

Capacity building initiatives should focus on understanding the areas where in capacity needs to be built in terms of project implementation, reform implementation etc. The regular assessment of the needs can ensure better capacity building measures to be adopted by city.

19.4 Review and Monitoring of Reforms and Project Implementation

The CDP Technical and Policy Committee should be involved in the monitoring and evaluation of the CDP across various components.

19.4.1 Assessment of Reforms and Project Implementation

- Regular assessment of reform and project implementation is necessary for the city to achieve its vision.
- Reforms should be framed for all the institution responsible for the development process of any city. These reforms are very important for all the institution to work in a synchronized manner for the development of the city. **Hence, they must be monitored every year.**

19.4.2 Financial Reforms

- Finance being a most important part for any ULB of the city. The funds are to be utilized according to the kind of development approach adopted to achieve the city vision. **Therefore, financial reforms must be monitored and evaluated on yearly basis.**

19.4.3 Property Tax Reforms

- All the properties abiding under the ULB should be carefully mapped and marked, as it is an important source of revenue for a city. Hence it should be prepared before the implementation of the CDP and monitored at frequent intervals.

19.4.4 Sector /Ward Development Plans

Vision of the city could only be implemented at a macro level only if there is prominent change at the micro level like at the ward level or the sectoral block level planning. To make a CDP document comprehensive in approach, the M&E of these micro level plans should be evaluated at the very beginning and impact should be reviewed in the very first year.

19.4.5 Review of the Project Priorities

The project prioritized in the CDP to achieve the vision may have to undergo changes in their priority order once the implementation of the CDP starts. The reason may be due to any practical issues that arise during project implementation or any other complication. Hence, it is very important to monitor and evaluate the projects that are underway and projects that need to be taken up for the development of the city. The updating process should be regular, but M&E should be done every alternate year.

19.5 Monitoring of Financial Operating Plan and Capital Investment Plan

A capital investment plan (CIP) provides a detailed understanding of anticipated investments into tangible capital assets. The assets include basic facilities, services, and installations needed for the functioning of the community, such as bridges, roads, water, and wastewater systems. This helps the ULBs to formalize their priority setting and decision making process. Therefore, the M&E of CIP should be done on regular basis every year.

A financial operating plan (FOP) outlines the revenues and expenses over a period of time. An FOP uses past performances, incomes, and expenses to forecast what to expect in the following years. It then incorporates the past and recent trends into the planning so as to most accurately forecast what is to come. Therefore, for city development plan in a proper way, it is necessary to monitor and evaluate the FOP regularly every year.

Bibliography

Acts, Policies, and Guidelines

- Maharashtra Municipal Corporation Act, 2012
- Draft policy of NMC; Recycle and Reuse of treated waste water
- Draft policy of NMC; Rain water harvesting
- Draft policy of NMC; Parking Policy
- MIDC, Government of Maharashtra (2013); 'Industrial Policy of Maharashtra, 2013'
- Guidelines – Urban and Regional Development Plan Formulation and Implementation, 2013

Reports, Articles, Publications, News

- NMC, CRISIL, and USAID; 2006; City Development Plan for Nagpur
- NMC (2009); 'City Mobility Plan prepared for respective ULBs
- NMC (2012); 'City Sanitation Plan for Nagpur'
- NMC (2006); Detailed Project Report – '24x7 Water supply Project'
- NMC (2006); Detailed Project Report – 'Augmentation To Nagpur City Water Supply Scheme, PENCH – IV (part I, II, III, and IV)'
- NMC (2006); Detailed Project Report – 'Water Audit, Leak Detection & Leak Reduction for Nagpur Municipal Corporation Nagpur'
- NMC (2008); 'Sewerage Master Plan and DPRs for three Sewerage zones'
- NMC (2006); 'Preparation of Master Plan/Perspective Plan for Drainage System and Rejuvenation of Lakes and Rivers Of Nagpur City for the year 2041' (Three DPRs for each of the zones)
- NMC (2012); Pre-Feasibility Report – 'Providing Sewage Effluent Treatment for Reuse by Potential Customers in Nagpur'
- NMC (2012); Detailed Project Report – 'Rejuvenation of Nag River and its Tributaries in Nagpur City'
- NMC(2013); JNNURM Quarterly Progress Report
- Municipal budget for FY 2009-10, 2010-11, 2011-12, 2012-13, 2013-14
- NMC (2000); Development Control Regulations
- NMC (July 2008); 'Preparation of Master Plan/Perspective Plan for Transportation System of Nagpur City For The Year 2031'
- Nagpur Improvement Trust (December 2013); 'Comprehensive Mobility Plan for Nagpur'
- Department of health and family welfare, Maharashtra (2013), 'Nagpur District Health Action Plan 2013-14'
- Ministry of health and family welfare, Government of India (2005), 'Health and Living Conditions in Eight Indian Cities'
- National Skill Development Corporation (2013), 'District wise skill gap study for the state of Maharashtra (2012-17, 2017-22)'
- Ministry of Urban Development, Government of India (2011); *HPEC report, recommendation on O&M expenditure*, (<http://jnnurm.nic.in>)
- Kirti D. Bhonsle, July - September 2010, A study of urbanization in Nagpur district, ITPI Journal - 3, 88 - 95,
- Sanyogita R. Verma, P.R. Chaudhari, R.K. Singh and S.R. Wate; *studies on the Ecology and Trophic status of an urban lake at Nagpur city, India*, NEERI (<http://www.rasayanjournal.com>)

- Srinivas Chary, *24 X 7 Water Supply Project for Nagpur City*, Administrative Staff College of India.
- National River Conservation Directorate, Ministry of Environment and Forests (May 2008); 'Guidelines for National Lake Conservation Plan'
- National River Conservation Directorate, Ministry of Environment and Forests (December 2010); 'Guidelines for National River Conservation Plan'
- Ministry of MSME, Government of India (2012-13); 'Brief Industrial Profile, Nagpur'
- Ministry of MSME, Government of India (2009-10); 'District Industrial Potential Survey Report of Nagpur District'
- Sally Merrill and Ajay Suri; (December 2007); 'Low Income Shelter Finance in Slum Upgrading'; The Urban Institute-Centre for International Development and Governance, USAID
- Central Pollution Control Board, Government of India (April 2008); 'STATUS OF GROUNDWATER QUALITY IN INDIA, Part-II'
- Maharashtra Pollution Control Board (December 2008); 'Report On Ambient Noise Level Monitoring Of Metro Cities'
- Maharashtra Pollution Control Board (December 2009); 'Report On Ambient Noise Level Monitoring Of Metro Cities'
- Maharashtra Pollution Control Board (December 2012); 'Report On Ambient Noise Level Monitoring Of Metro Cities'
- Mrs. Soma Sharma, Dr. Anant Deshmukh; 'A Study Of Micro Finance Facilities and Analyzing the awareness level of People about Micro Finance in Nagpur City'; International Journal of Social Science & Interdisciplinary Research, ISSN 2277 3630, IJSSIR, Vol. 2 (3), MARCH (2013), (indianresearchjournals.com)
- Mr. Yashwant Bhaskar Katpatal, Mr. Abhijeet Kute, and Mr. Deepty Ranjan Satapathy, 2008, "Surface- and Air-Temperature Studies in Relation to Land Use/Land Cover of Nagpur Urban Area Using Landsat 5 TM Data
- Ms. Anandi Dantas; 2009; 'Mapping of Urban Health Facilities in Maharashtra'; Centre of Enquiry Into Health and Allied Themes
- NMC and CHF (2008); 'Slum of Atlas for Nagpur'
- Indira Gandhi Institute of Development Research and Maharashtra Pollution Control Board; 'State of Environment Report: Maharashtra'
- YUVA (May 2009); 'Implementing the National Policy on Urban Street Vendors A State-by-State Status Report'

Presentations and Other Data


- Census of India data for year 1991, 2001, and 2011
- NMC's Presentation; 2013; 'Sustainable Solid waste management in India (glimpse of SWM at Nagpur)'
- NMC's Presentation; 2013; 'Sewage Generation, Treatment & Present Status-Nagpur'
- NMC's Presentation; 'Urban Transport scenario in Nagpur city'

Annexures

Formation of committees

NAGPUR MUNICIPAL CORPORATION

SHYAM WARDHANE
I.A.S.
Commissioner



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No. :- _____ Date : 15 / 10 / 2013

To,
Shailendra Vikram Singh
Director, NURM -III
Ministry of Urban Development, Government of India,
Nirman Bhavan, New Delhi.

Subject: Revision of City Development Plan for Nagpur regarding formation of committees.

Reference: MoUD letter No. – K.13014/22/2012-N-IV, dated 6th Aug. 2013

Dear Sir,

At the outset, we would like to thank you for selecting our ULB under the CBUD project. We are in receipt of above mentioned letter regarding revision of City Development Plan (CDP) for our city. Subsequent to the letter, the consultant CRISIL Risk & Infrastructure Solutions Limited has visited our ULB during 04th September 2013 and conducted the inception meeting on revised CDP for our city.

The consultant has informed in the meeting that we have to form two committees as per the revised CDP guideline issued by MoUD to initiate the CDP process. In this regards, we please to inform you that we have formed the following committees at our ULB to start the revised CDP process.

Policy Committee:

List of Members as per Revised CDP Guidelines	Name of the officials
1. Chairman (Mayor of City)	Shri. Anil Sole
2. Vice- Chairman (Deputy Mayor)	Smt. Jaitun bee Ashfaque Patel
3. Municipal Commissioner	Shri. Shyam Wardhane
4. Head of the Urban Development Improvement Trust.	Shri. Pravin Darade
5. Head of the Urban Utilities. (e.g. Water Supply & Sewerage Board).	Secy. SRA, SE (NMC), SE (NIT)
6. Members from the MPC and DPC.	Shri. Sandip Joshi (Ward Councilor)
7. Head of all Technical Committees.	SE (NMC)

8. Any other member the Committee you may wish to co-opt.	NGOs in the relevant field
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Technical Committee:

List of Members as per Revised CDP Guidelines	Name of the officials
Land Use and Infrastructure	DDTP, ADTP (NMC), City Engineer (NMC), Traffic Engineer, Town Planner, ADTP (NIT)
Municipal Institutional strengthening	Dy. MC (I), ADy. MC (I, II), SE (NMC), AC (GAD), Mpl. Secy.
Environment, Sustainable Development & Disaster Mitigation	SE (NMC), CFO, Shri. Mohd. Israil, (Dy.Engr.) Garden Supt.
Social & Livelihoods and Local Economic Development	PD (Slum), SWO (NMC), HO (Sanitation)
Heritage, Conservation, Culture & Tourism Development	SE (NMC), SE (NIT), ADTP (MS Heritage Comm.), Sport Officer (NMC), MTDC.
Water supply, Sewerage and SWM	SE(NMC), Director (NESL), HO (S), EE (WW), Shri. D. D. Jambulkar (Dy.Engr.).

Yours sincerely

Municipal Commissioner,
 Nagpur Municipal Corporation

Details of merged villages with NMC



Source: Additional Director of Town Planning, NMC, Nagpur

List of City/Urban Agglomerations in Maharashtra

Sr.No.	City/Urban Agglomeration(UA)	Census 2001	Census 2011	Population growth (%)
1	Mumbai UA	164.30	184.14	12
2	Pune	37.60	50.49	34
3	Nagpur	21.29	24.97	17
4	Nashik	11.52	15.62	36
5	Vasai-Virar (Mumbai Metro Region)	1.74	12.21	600
6	Aurangabad	8.92	11.89	33
7	Solapur	8.72	9.51	9
8	Bhiwandi (Mumbai Metro Region)	6.21	7.37	19
9	Amravati	5.49	6.46	18
10	Malegaon	4.09	5.76	41
11	Kolhapur	5.05	5.61	11
12	Nanded	4.30	5.50	28
13	Sangli	4.47	5.13	15
14	Jalgaon	3.68	4.60	25
15	Akola	4.00	4.27	7
16	Latur	2.99	3.82	28
17	Ahmednagar	3.47	3.79	9
18	Dhule	3.41	3.76	10
19	Ichalkaranji	2.85	3.25	14
20	Chandrapur	2.89	3.21	11
21	Parbhani	2.59	3.07	18
22	Jalna	2.35	2.85	21
23	Bhusawal	1.87	2.04	9
24	Panvel	1.04	1.80	73
25	Satara	1.08	1.49	38
26	Beed	1.38	1.46	6
27	Yavatmal	1.39	1.38	-1
28	Kamthi (adjoining Nagpur)	1.36	1.36	0
29	Gondiya	1.20	1.32	10
30	Barshi	1.04	1.18	13
31	Achalpur	1.07	1.12	5
32	Osmanabad	...	1.12	-
33	Nandurbar	...	1.11	-
34	Wardha	1.11	1.05	-5
35	Udgir	...	1.04	-
36	Hinganghat	...	1.00	-

Details of Population and Level of urbanisation

Sr.No.	Sub-District (Tehsils)	Census of India 2011 (in lakhs)		Growth rate (Decade: 2001 - 2011)	
		No of HHs	Population	No of HHs	Population
1	Bhiwapur	0.20	0.82	6%	-2%
2	Hingna	0.59	2.42	42%	31%
3	Kalameshwar	0.29	1.22	15%	7%
4	Kamptee	0.50	2.39	27%	14%
5	Katol	0.38	1.64	13%	5%
6	Kuhi	0.29	1.24	5%	-2%
7	Mauda	0.32	1.40	9%	3%
8	Nagpur (rural)	0.71	3.02	60%	52%
9	Nagpur (urban)	5.28	24.06	12%	12%
10	Narkhed	0.34	1.48	0.76%	0.72%
11	Parsheoni	0.31	1.43	0.73%	0.70%
12	Ramtek	0.35	1.59	0.81%	0.78%
13	Savner	0.51	2.29	1%	1%
14	Umred	0.36	1.54	1%	0.75%

Source: Census of India, 2011 and CRIS analysis

Details of Urbanisation in sub-districts of Nagpur district

Sr.No.	Sub-District (Tehsils)	Census of India 2011 -Total Population (in lakhs)	Census of India 2011 - Urban Population (in lakhs)	Percentage Urban Population
1	Bhiwapur	0.82	0	0%
2	Hingna	2.42	1.21	50%
3	Kalameshwar	1.22	0.37	30%
4	Kamptee	2.39	1.43	60%
5	Katol	1.64	0.43	26%
6	Kuhi	1.24	0	0%
7	Mauda	1.4	0.15	11%
8	Nagpur (rural)	3.02	1.54	51%
9	Nagpur (urban)	24.06	24.05	100%
10	Narkhed	1.48	0.3	20%
11	Parsheoni	1.43	0.47	33%
12	Ramtek	1.59	0.28	18%
13	Savner	2.29	1.02	45%
14	Umred	1.54	0.54	35%

Source: Census of India, 2011 and CRIS analysis

Economic Development

Workforce participation in Nagpur district and Nagpur city, 2011

Sr.No.	Type of workers	Total	Male	Female
1	Main Workers			
a	Cultivators among Main Workers	1.88	1.30	0.58
b	Agricultural Labourers among Main Workers	3.38	1.81	1.56
c	Household Industry Workers among Main Workers	0.43	30,492	0.13
d	Other Workers among Main Workers	10.83	8.81	2.02
	Total of Main Workers	16.54	12.24	4.30
2	Marginal Workers			
a	Cultivators among Marginal Workers	0.17	0.07	0.10
b	Agricultural Labourers among Marginal Workers	0.85	0.32	0.53
c	Household Industry Workers among Marginal Workers	0.08	0.03	0.04
d	Other Workers	1.01	0.66	0.35
	Total Marginal Workers	2.13	1.10	1.03
	Total Workforce participation	18.68	1,334,211	5.34
4	Non-workers	27.85	10.50	17.34

(Source: Census of India Data for 2011)(Note: all the figures are in lakhs)

Work force participation in Nagpur city

Sr.No.	Type of workers	Total	Male	Female
1	Main Workers			
a	Cultivators among Main Workers	0.03	0.02	0.006
b	Agricultural Labourers among Main Workers	0.05	0.04	1,519
c	Household Industry Workers among Main Workers	0.26	0.18	0.08
d	Other Workers among Main Workers	7.43	5.95	1.48
	Total of Main Workers	7.79	6.20	1.58
2	Marginal Workers			
a	Cultivators among Marginal Workers	0.014	0.007	0.07
b	Agricultural Labourers among Marginal Workers	0.01	0.006	0.005
c	Household Industry Workers among Marginal Workers	4490	0.01	0.02
d	Other Workers	0.57	0.35	0.21
	Total Marginal Workers	0.64	0.39	0.25
	Total Workforce participation	8.43	6.59	1.84
4	Non-workers	15.61	5.65	9.95

(Source: Census of India Data for 2011) (Note: all the figures are in lakhs)

Physical Environment

Land use of Nagpur -1984 and 2011

Proposed Land use for Nagpur city

Sr.No.	Land use	1984			2011		
		Area in Hect	% of developed area	% of total area	Area in Hect	% of developed area	% of total area
1	Residential	3500	42%	16%	6706	45%	31%
2	Commercial	185	2%	1%	501	3%	2%
3	Industrial	225	3%	1%	495	3%	2%
4	Public Purpose	2000	24%	9%	2312	15%	11%
5	Public Utility	100	1%	0%	149	1%	1%
6	Roads	555	7%	3%	1754	12%	8%
7	Railways	440	5%	2%	873	6%	4%
8	Airport	525	6%	2%	993	7%	5%
9	Garden	150	2%	1%	1251	8%	6%
10	Developable Vacant land	660	8%	3%	0	0%	0%
	Sub total	8340	100%	38%	15033	100%	69%
11	Agriculture Land	8225		38%	5774		27%
12	Water Bodies & nallahs	836		4%	463		2%
13	Non-Developable land	4355		20%	0		0%
14	Drainage & Sewage Disposal	0		0%	141		1%
15	Cattle stable & dairy farm	0		0%	212		1%
16	Compost depot	0		0%	131		1%
	Sub total	13416		62%	6723		31%
	total	21756		100%	21756		100%

Source: NMC, Nagpur & Nagpur Environment Assessment Report, 2008

Social Infrastructure

List of existing Health posts

a. Governemnt Health Posts

Sr. No.	Name & Address of HP Centres	Medical Officer
1	Govt. Medical College & Hospital Health Post Centre, Nagpur	
2	Indira Gandhi Medical College & Hospital Health Post Centre, Nagpur.	
3	Daga Memorial Hospital Health Post Centre, Nagpur	Mrs. M.R.Gahewar (PHN)
4	Govt. Ayurvedic College & Hospital Health Post Centre, Nagpur	Dr. Zavar
5	E.S.I.S. Hospital Health Post Centre, Nagpur	Dr. Mrs. Bhosle

b. NGO Health posts

Sr. No.	Name & Address of HP Centres	Medical Officer
1	Matru Sewa Sangh Sitabuldi Health Post Centre, Nagpur	Dr. Seema Deshmukh / Mrs. Manwar Sister
2	Matru Sewa Sangh Mahal Health Post Centre, Nagpur	Dr. Shraddha Thakur
3	Dalvi Hospital Health Post Centre, Nagpur	Mr. Masurkar
4	Janta Maternity Home & Hospital Health Post Centre, Nagpur	Mr. Deepak
5	Nagrik Sahkari Rugnalaya, Health Post Centre, North Ambazari Road, Nagpur.	Dr. Mrs. Anjali Dakhole
6	Nagpur Homeopathy College & Hospital, Health Post Centre, Nagpur.	

Proposed Health Posts in Nagpur city

Sr. No.	Name & Address of HP Centres	Lady Medical Officer
1	Zingabai Takli Health Post Centre, Koradi Road, Nagpur.	Dr. Snehal Pandao Dr. Yawalkar (Ad.cha.)
2	Kundanlal Gupta Nagar Health Post Centre, C/o, Hiwarkar, Near Buddha Vihar, Kundanlal Gupta Nagar, Nagpur.	Dr. Megha N. Jaitwar
3	Somalwada Health Post Centre, Rahul Nagar, Samaj Bhawan, Near Buddha Vihar, Somalwada, Nagpur.	Dr. Bakul Pande
4	Jaitala Health Post Centre, NMC Library, Near Jaitala Bus - Stop, Jaitala, Nagpur.	Dr. Manjusha Sonawane
5	Baba Taj Bag Health Post Centre, NMC Sanskrutik Bhavan, Nagpur.	Dr. Vivekanad Mathapati
6	New Bagadganj Health Post Centre, Badminton Hall, Satranjipura, Near MLA - Shri. Krishnaji Khopde's House, Nagpur.	Dr. Vasundhara Bhojar
7	Dighori Health Post Centre, C/o, Bhusari Kirana Shop, Near Nawnath I.T.I., Umrer Road, Dighori, Nagpur - 440034.	Dr. Mathapati
8	Mominpura Health Post Centre, Near Corporation School, Mominpura, Nagpur - 440018.	Dr. Mrs. Arefa Ali
9	Azad Nagar Health Post Centre, Urdu Upper Primary School, Farooq Nagar, Teka, Nagpur.	Dr. Heena Qureshi Dr. Zarariya (Ad.cha.)
10	Garib Nawaz Nagar Health Post Centre, Nagpur.	Dr. preeti Zarariya
11	Bhaldarpura Health Post Centre	Dr. Samina Anjum
12	Shende Nagar Health Post Centre, Nagpur	Dr. Minaxi Mane

Parks and gardens in Nagpur

List of gardens developed by NMC

Sr.No.	Name of the garden	Ward No.	Area in acres
1.	Ambazari Garden	46	15
2.	Ambazari Dahan Ghat, Garden	86	0.4
3.	Abhyankarnagar Garden	86	1.12
4.	Shankar Nagar Trikon Park Garden	82	0.2
5.	Shivajinagar Garden	82	4
6.	Shankarnagar Garden	82	2.3
7.	Major Surendra Dev Park (Dhantoli Park)	88	4.97
8.	Major Anand Khare Park (Lendra Park)	81	4.17
9.	Dagadi Park Garden (Ramdaspath)	81	2.19
10.	Kachipura Garden	82	1.4
11.	Congressnagar Garden	88	0.92
12.	Kasturba Library Sadar Garden	43	0.4
13.	Civil Office Garden	48	1.4
14.	Rajbhavan Garden	43	5.4
15.	Advocate Sakharam Pant Meshram Garden (Mangalwari)	42	3.2
16.	Jaripatka Garden	19	0.4
17.	Bal Bhavan Garden	78	2.3
18.	Bhauji Pagey Garden	78	0.25
19.	Bhapkar Park Garden	78	1.4
20.	Mokshdham Dahan Ghat Garden	78	0.8
21.	Chhoti Dhantoli Garden	81	0.5
22.	Ramainagar Garden	8	0.38
23.	Mahatma Gandhi Garden, Hanumannagar	92	2.9
24.	Ramabai Ambedkar Garden Chandan Nagar	92	1.33
25.	Reshimbagh Garden	93	1.2
26.	Nehrunagar Garden	101	0.91
27.	Chitanvispura Garden	76	1.85
28.	Nawabpura Garden	74	0.2
29.	Rahatekarwadi Garden	77	0.5
30.	Mahal Office Garden	70	0.2
31.	Gangabai Dahan Ghat Garden	75	0.4
32.	Dr. Baba Saheb Ambdekar Garden	54	1.6
33.	Lal Bahadur Shastri Garden	54	1.4
34.	Gandhibag Garden	65	5.5
35.	Ram Manohar Lohiya Garden.	62	0.46
36.	Barbate Garden, Lakadganj Garden	62	0.8
37.	Bharat Mata Garden	58	3
38.	Vashnavdevi Garden	59	0.5
39.	Naik Talab Garden	35	1.25
40.	Shantinagar Garden	57	1.7
41.	Shantinagar Housing Board Colony Garden	33	1.75
42.	Shastri Layout Garden	112	1.25
43.	Trishatabdi Gaden	100	2.5
44.	Maharana Pratap Garden	63	0.1
45.	Kernal Bag Garden	77	0.1

Source: Garden Department, NMC

List of Major and Minor Gardens Developed by NIT

Sr.No.	Major/ Minor Garden	Area(Acre)
1	Rajiv Gandhi Udyan, Trimurti nagar	8

Ministry of Urban Development

Sr.No.	Major/ Minor Garden	Area(Acre)
2	Maharma Phule Udyan, Suyognagar	8.5
3	Sant. Dyaneshwar Sanjiwan Samadhi Udyan, Dattatraynagar	9
4	Swatantrya Swarn Jayanti Udyan Deshpande Layout	3.5
5	Dayanand Park, Jaripatka	7
6	Lata Mangeshkar Udyan, Vaishali nagar	6.5
7	Dr. Babasaheb Ambedkar Udyan , Sakkardara	8
8	Sant Tukaram Udyan, Sakkardara	6
9	Udhay nagar	0.5
10	Kabir nagar	0.75
11	Hiwari nagar	1.5
12	Ashirwad nagar	1
13	New Subhedar Layout	1.7
14	Mahal nagar	1
15	Binaki - HUDCO	1.75
16	Sandal nagar	1
17	Kukreja nagar	0.4
18	SariPeth	0.5
19	Lashkaribagh	1
20	Laghuwetan Colony	1.25
21	Raghuji nagar	1
22	Bhagwan nagar	1.25
23	Banerjee Layout	2
24	Gurudwara, Ashok nagar	1.25
25	Kukde Lay-out	1.25
26	Shankar nagar	0.5
27	Adivasi Lay-out	1
28	Telecom nagar	1.57
29	Tapowan	0.45
30	Panchadeep	0.5
31	Urvella Society	0.4
32	Sahakar nagar	1.58
33	P.M.G.Ravindra nagar	0.5
34	Chhatrapati nagar	1.75
35	Laxmi nagar	0.2
36	Ambazari Basti Precinct	0.4
37	Ujjwal nagar	0.4
38	Deekshabhoomi	2
39	Hill Top Layout	0.25
40	Hill Top Layout	1.2
41	Friends Colony	1.75
42	Ramkrishna nagar	2
43	Gajanan Prasad, Wadi.	1.25
44	Shiv nagar	0.4
45	Sadbhawana nagar	1
46	Bezonbagh	0.2

Sr.No.	Major/ Minor Garden	Area(Acre)
47	Angulimal nagar	1.25
48	Shastri nagar	0.5
Total area under gardens		96.65

Water Quality Tests – Surface Water

Water quality test results for PENCH - Raw water

Sr.N o.	Test Parameters	Unit	Desirable value	Results	
				Mar '12	Jun '12
1	pH value	-	6.5-8.5	7.9	8.1
2	Turbidity	NTU	5	<1	<1
3	Apparent Colour	Hazen units	5	1	1
4	Odour	-	Unobjectable	Unobjectable	
5	Taste	-	Agreeable	Agreeable	
6	Total Dissolved Solids (TDS)	Mg/lit	500	201	224
7	Fluoride as F	Mg/lit	1	0.14	0.1
8	Chlorides as Cl	Mg/lit	250	12	16
9	Total Alkalinity (as CaCO ₃)	Mg/lit	200	142	156
10	Total hardness (CaCO ₃)	Mg/lit	300	-	-
11	Calcium (Ca)	Mg/lit	75	48	62
12	Magnesium as (Mg)	Mg/lit	30	18	22
13	Sulphate as (SO ₄)	Mg/lit	200	10	18
14	Nitrates as (NO ₃)	Mg/lit	45	0.82	0.76
15	Total Iron (as Fe)	Mg/lit	0.3	-	-
16	Cyanide	Mg/lit	0.05	-	-
17	Copper as (Cu)	Mg/lit	0.05	0.01	0.01
18	Manganese as (Mn)	Mg/lit	0.1	0.08	0.02
19	Mercury as (Hg)	Mg/lit	0.001	-	-
20	Cadmium as (Cd)	Mg/lit	0.01	-	-
21	Selenium as (Se)	Mg/lit	0.01	-	-
22	Arsenic as (As)	Mg/lit	0.05	-	-
23	Lead as (Pb)	Mg/lit	0.05	-	-
24	Zinc as (Zn)	Mg/lit	5	0.04	0.02
25	Chromium as (Cr+6)	Mg/lit	0.05	-	-
26	Aluminum as (Al)	Mg/lit	0.03	0.01	0.01
27	Boron as (B)	Mg/lit	1	-	-
28	Mineral Oil	Mg/lit	0.01	-	-
29	Anionic Detergents	PPM	0.2	-	-
30	Phenolic Compounds	PPM	0.001	-	-
31	Polynuclear aromatic compound as PAH	ppb	-	-	-
32	Pesticides	Mg/lit	Absent	-	-
33	Residual chlorine	Mg/lit	0.2	<0.2	<0.2
34	Total Coliform	MPN/100 ml	Absent	-	-

Sr.No.	Test Parameters	Unit	Desirable value	Results	
				Mar '12	Jun '12
35	Thermo Tolerant	per 100 ml	-	-	-
36	Electrical Conductivity at 25OC	µs/cm lit	-	-	-
	Dissolved Oxygen			7.4	7.2

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Physico-Chemical Analysis test results for chlorinated water of PENCH I, II, III

Sr.No.	Test Parameters	Unit	Desirable value	January '12		
				PENCH I	PENCH II	PENCH III
1	pH value	-	6.5-8.5	8.22	8.13	8.1
2	Turbidity	NTU	5	1.9	1.7	2
3	Apparent Colour	Hazen units	5	3	4	7
4	Odour	-	Unobjectable	Unobjectable		
5	Taste	-	Agreeable	-	-	-
6	Total Dissolved Solids (TDS)	Mg/lit	500	280	290	286
7	Fluoride as F	Mg/lit	1	0.26	0.242	0.238
8	Chlorides as Cl	Mg/lit	250	17.6	16.6	14.7
9	Total Alkalinity (as CaCO ₃)	Mg/lit	200	112.5	112.5	115
10	Total hardness (CaCO ₃)	Mg/lit	300	115.2	115.2	113.3
11	Calcium (Ca)	Mg/lit	75	36.1	39.9	33.02
12	Magnesium as (Mg)	Mg/lit	30	6.1	3.7	7.5
13	Sulphate as (SO ₄)	Mg/lit	200	5.8	5.1	5.1
14	Nitrates as (NO ₃)	Mg/lit	45	<2	<2	<2
15	Total Iron (as Fe)	Mg/lit	0.3	0.22	0.14	0.21
16	Cyanide	Mg/lit	0.05	<0.005	<0.005	<0.005
17	Copper as (Cu)	Mg/lit	0.05	<0.03	<0.03	<0.03
18	Manganese as (Mn)	Mg/lit	0.1	<0.05	<0.05	<0.05
19	Mercury as (Hg)	Mg/lit	0.001	<0.0005	<0.0005	<0.0005
20	Cadmium as (Cd)	Mg/lit	0.01	<0.001	<0.001	<0.001
21	Selenium as (Se)	Mg/lit	0.01	<0.001	<0.001	<0.001
22	Arsenic as (As)	Mg/lit	0.05	<0.01	<0.01	<0.01
23	Lead as (Pb)	Mg/lit	0.05	<0.001	<0.001	<0.001
24	Zinc as (Zn)	Mg/lit	5	<0.1	<0.1	<0.1
25	Chromium as (Cr+6)	Mg/lit	0.05	<0.03	<0.03	<0.03
26	Aluminum as (Al)	Mg/lit	0.03	0.07	0.045	0.7
27	Boron as (B)	Mg/lit	1	<0.1	<0.1	<0.1
28	Mineral Oil	Mg/lit	0.01	<0.001	<0.001	<0.001
29	Anionic Detergents	PPM	0.2	<0.001	<0.001	<0.001
30	Phenolic Compounds	PPM	0.001	<0.001	<0.001	<0.001
31	Polynuclear aromatic	ppb	-	<0.03	<0.03	<0.03

Sr.No.	Test Parameters	Unit	Desirable value	January '12		
				PENCH I	PENCH II	PENCH III
	compound as PAH					
32	Pesticides	Mg/lit	Absent	<0.03	<0.03	<0.03
33	Residual chlorine	Mg/lit	0.2	1.5	0.5	1.5
34	Total Coliform	MPN/100 ml	Absent	9	<1	6
35	Thermo Tolerant	per 100 ml	-	Present	Absent	Present
36	Electrical Conductivity at 25OC	µs/cm lit	-	491.4	492.8	493.3

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Water quality test results for Gorewada - Raw water

Sr.No.	Test Parameters	Unit	Desirable value	Results	
				Jan '12	Jun '12
1	pH value	-	6.5-8.5	8.38	8.2
2	Turbidity	NTU	5	1.5	3
3	Apparent Colour	Hazen units	5	3	5
4	Odour	-	unobjectable	unobjectable	
5	Taste	-	Agreeable	Agreeable	
6	Total Dissolved Solids (TDS)	Mg/lit	500	288	292
7	Fluoride as F	Mg/lit	1	0.195	0.27
8	Chlorides as Cl	Mg/lit	250	-	-
9	Total Alkalinity (as CaCO ₃)	Mg/lit	200	125	138
10	Total hardness (CaCO ₃)	Mg/lit	300	119.04	-
11	Calcium (Ca)	Mg/lit	75	31.5	48
12	Magnesium as (Mg)	Mg/lit	30	9.8	12
13	Sulphate as (SO ₄)	Mg/lit	200	6.9	12
14	Nitrates as (NO ₃)	Mg/lit	45	<2	4.8
15	Total Iron (as Fe)	Mg/lit	0.3	-	-
16	Cyanide	Mg/lit	0.05	-	-
17	Copper as (Cu)	Mg/lit	0.05	0.01	0.01
18	Manganese as (Mn)	Mg/lit	0.1	0.08	0.02
19	Mercury as (Hg)	Mg/lit	0.001	<0.0005	-
20	Cadmium as (Cd)	Mg/lit	0.01	<0.001	-
21	Selenium as (Se)	Mg/lit	0.01	<0.001	-
22	Arsenic as (As)	Mg/lit	0.05	<0.01	-
23	Lead as (Pb)	Mg/lit	0.05	<0.001	-
24	Zinc as (Zn)	Mg/lit	5	<0.1	0.01
25	Chromium as (Cr+6)	Mg/lit	0.05	<0.03	-
26	Aluminum as (Al)	Mg/lit	0.03	<0.005	-
27	Boron as (B)	Mg/lit	1	<0.1	-
28	Mineral Oil	Mg/lit	0.01	<0.001	-
29	Anionic Detergents	PPM	0.2	-	-

Sr.No.	Test Parameters	Unit	Desirable value	Results	
				Jan '12	Jun '12
30	Phenolic Compounds	PPM	0.001	<0.001	-
31	Polynuclear aromatic compound as PAH	ppb	-	<0.03	-
32	Pesticides	Mg/lit	Absent	-	-
33	Residual chlorine	Mg/lit	0.2	<0.1	<0.1
34	Total Coliform	MPN/100 ml	Absent	-	-
35	Thermo Tolerant	per 100 ml	-	-	-
36	Electrical Conductivity at 25OC	µs/cm lit	-	-	-
37	Dissolved Oxygen			-	7.1

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Water quality test results for Kanhan - Raw water

Sr.No.	Test Parameters	Unit	Desirable value	Results	
				Jan '12	Jun '12
1	pH value	-	6.5-8.5	8.14	8.1
2	Turbidity	NTU	5	0.9	3.4
3	Apparent Colour	Hazen units	5	-	2
4	Odour	-	unobjectable	unobjectable	
5	Taste	-	Agreeable	Agreeable	
6	Total Dissolved Solids (TDS)	Mg/lit	500	474	338
7	Fluoride as F	Mg/lit	1	0.448	0.4
8	Chlorides as Cl	Mg/lit	250	-	-
9	Total Alkalinity (as CaCO ₃)	Mg/lit	200	190	182
10	Total hardness (CaCO ₃)	Mg/lit	300	168.9	-
11	Calcium (Ca)	Mg/lit	75	48.4	52
12	Magnesium as (Mg)	Mg/lit	30	11.7	28
13	Sulphate as (SO ₄)	Mg/lit	200	12.7	24
14	Nitrates as (NO ₃)	Mg/lit	45	2.1	8.4
15	Total Iron (as Fe)	Mg/lit	0.3	-	-
16	Cyanide	Mg/lit	0.05	-	-
17	Copper as (Cu)	Mg/lit	0.05	<0.03	-
18	Manganese as (Mn)	Mg/lit	0.1	11.7	-
19	Mercury as (Hg)	Mg/lit	0.001	<0.0005	-
20	Cadmium as (Cd)	Mg/lit	0.01	<0.001	-
21	Selenium as (Se)	Mg/lit	0.01	<0.001	-
22	Arsenic as (As)	Mg/lit	0.05	<0.01	-
23	Lead as (Pb)	Mg/lit	0.05	<0.001	-
24	Zinc as (Zn)	Mg/lit	5	<0.01	-
25	Chromium as (Cr+6)	Mg/lit	0.05	<0.03	-
26	Aluminum as (Al)	Mg/lit	0.03	0.005	-
27	Boron as (B)	Mg/lit	1	<0.1	-

Sr.No.	Test Parameters	Unit	Desirable value	Results	
				Jan '12	Jun '12
28	Mineral Oil	Mg/lit	0.01	<0.001	-
29	Anionic Detergents	PPM	0.2	-	-
30	Phenolic Compounds	PPM	0.001	<0.001	-
31	Polynuclear aromatic compound as PAH	ppb	-	<0.003	-
32	Pesticides	Mg/lit	Absent	<0.03	-
33	Residual chlorine	Mg/lit	0.2	-	-
34	Total Coliform	MPN/100 ml	Absent	>16	>16
35	Thermo Tolerant	per 100 ml	-	-	-
36	Electrical Conductivity at 25OC	µs/cm lit	-	-	-
37	Dissolved Oxygen			8.1	7.2

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Physico-Chemical Analysis test results for raw water of Old Gorewada Tank

Sr.No.	Test Parameters	Unit	Desirable value	January '12
				Raw water
1	pH value	-	6.5-8.5	8.31
2	Turbidity	NTU	5	1.7
3	Apparent Colour	Hazen units	5	4
4	Odour	-	unobjectable	unobjectable
5	Taste	-	Agreeable	-
6	Total Dissolved Solids (TDS)	Mg/lit	500	272
7	Fluoride as F	Mg/lit	1	0.195
8	Chlorides as Cl	Mg/lit	250	11.7
9	Total Alkalinity (as CaCO ₃)	Mg/lit	200	115
10	Total hardness (CaCO ₃)	Mg/lit	300	119.04
11	Calcium (Ca)	Mg/lit	75	30.7
12	Magnesium as (Mg)	Mg/lit	30	10.3
13	Sulphate as (SO ₄)	Mg/lit	200	8.9
14	Nitrates as (NO ₃)	Mg/lit	45	<2
15	Total Iron (as Fe)	Mg/lit	0.3	0.36
16	Cyanide	Mg/lit	0.05	<0.005
17	Copper as (Cu)	Mg/lit	0.05	<0.03
18	Manganese as (Mn)	Mg/lit	0.1	<0.05
19	Mercury as (Hg)	Mg/lit	0.001	<0.0005
20	Cadmium as (Cd)	Mg/lit	0.01	<0.001
21	Selenium as (Se)	Mg/lit	0.01	<0.001
22	Arsenic as (As)	Mg/lit	0.05	<0.01
23	Lead as (Pb)	Mg/lit	0.05	<0.001
24	Zinc as (Zn)	Mg/lit	5	<0.1
25	Chromium as (Cr+6)	Mg/lit	0.05	<0.03
26	Aluminum as (Al)	Mg/lit	0.03	0.022
27	Boron as (B)	Mg/lit	1	<0.1

Sr.No.	Test Parameters	Unit	Desirable value	January '12
				Raw water
28	Mineral Oil	Mg/lit	0.01	<0.001
29	Anionic Detergents	PPM	0.2	<0.001
30	Phenolic Compounds	PPM	0.001	<0.001
31	Polynuclear aromatic compound as PAH	ppb	-	<0.03
32	Pesticides	Mg/lit	Absent	<0.03
33	Residual chlorine	Mg/lit	0.2	<0.1
34	Total Coliform	MPN/100 ml	Absent	<16
35	Thermo Tolerant	per 100 ml	-	Present
36	Electrical Conductivity at 25OC	µs/cm lit	-	477.6

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Physico-chemical Analysis test results for chlorinated water of Old Gorewada Tank

Sr. No.	Test Parameters	Unit	Desirable value	January '12
				Chlorinated water
1	pH value	-	6.5-8.5	8.11
2	Turbidity	NTU	5	1.7
3	Apparent Colour	Hazen units	5	4
4	Odour	-	unobjectable	unobjectable
5	Taste	-	Agreeable	-
6	Total Dissolved Solids (TDS)	Mg/lit	500	262
7	Fluoride as F	Mg/lit	1	0.204
8	Chlorides as Cl	Mg/lit	250	13.7
9	Total Alkalinity (as CaCO ₃)	Mg/lit	200	110
10	Total hardness (CaCO ₃)	Mg/lit	300	115.2
11	Calcium (Ca)	Mg/lit	75	33.02
12	Magnesium as (Mg)	Mg/lit	30	7.9
13	Sulphate as (SO ₄)	Mg/lit	200	6.9
14	Nitrates as (NO ₃)	Mg/lit	45	2
15	Total Iron (as Fe)	Mg/lit	0.3	0.19
16	Cyanide	Mg/lit	0.05	<0.005
17	Copper as (Cu)	Mg/lit	0.05	<0.03
18	Manganese as (Mn)	Mg/lit	0.1	<0.05
19	Mercury as (Hg)	Mg/lit	0.001	<0.0005
20	Cadmium as (Cd)	Mg/lit	0.01	<0.001
21	Selenium as (Se)	Mg/lit	0.01	<0.001
22	Arsenic as (As)	Mg/lit	0.05	<0.01
23	Lead as (Pb)	Mg/lit	0.05	<0.001
24	Zinc as (Zn)	Mg/lit	5	<0.1
25	Chromium as (Cr+6)	Mg/lit	0.05	<0.3
26	Aluminum as (Al)	Mg/lit	0.03	0.03
27	Boron as (B)	Mg/lit	1	<0.1

Sr. No.	Test Parameters	Unit	Desirable value	January '12
				Chlorinated water
28	Mineral Oil	Mg/lit	0.01	<0.001
29	Anionic Detergents	PPM	0.2	<0.001
30	Phenolic Compounds	PPM	0.001	<0.001
31	Polynuclear aromatic compound as PAH	ppb	-	<0.03
32	Pesticides	Mg/lit	Absent	<0.03
33	Residual chlorine	Mg/lit	0.2	1
34	Total Coliform	MPN/100 ml	Absent	9
35	Thermo Tolerant	per 100 ml	-	Present
36	Electrical Conductivity at 25OC	µs/cm lit	-	459.8

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Physico-Chemical Analysis test results for chlorinated water of Khairi Dam

Sr. No.	Test Parameters	Unit	Desirable value	January '12
				Khairi Dam
1	pH value	-	6.5-8.5	8.07
2	Turbidity	NTU	5	1.6
3	Apparent Colour	Hazen units	5	3
4	Odour	-	unobjectable	unobjectable
5	Taste	-	Agreeable	-
6	Total Dissolved Solids (TDS)	Mg/lit	500	274
7	Fluoride as F	Mg/lit	1	0.148
8	Chlorides as Cl	Mg/lit	250	14.7
9	Total Alkalinity (as CaCO ₃)	Mg/lit	200	115
10	Total hardness (CaCO ₃)	Mg/lit	300	117.1
11	Calcium (Ca)	Mg/lit	75	34.6
12	Magnesium as (Mg)	Mg/lit	30	7.5
13	Sulphate as (SO ₄)	Mg/lit	200	6.9
14	Nitrates as (NO ₃)	Mg/lit	45	<2
15	Total Iron (as Fe)	Mg/lit	0.3	0.098
16	Cyanide	Mg/lit	0.05	<0.005
17	Copper as (Cu)	Mg/lit	0.05	<0.03
18	Manganese as (Mn)	Mg/lit	0.1	<0.05
19	Mercury as (Hg)	Mg/lit	0.001	<0.0005
20	Cadmium as (Cd)	Mg/lit	0.01	<0.001
21	Selenium as (Se)	Mg/lit	0.01	<0.001
22	Arsenic as (As)	Mg/lit	0.05	<0.01
23	Lead as (Pb)	Mg/lit	0.05	<0.001
24	Zinc as (Zn)	Mg/lit	5	<0.1
25	Chromium as (Cr+6)	Mg/lit	0.05	<0.03
26	Aluminum as (Al)	Mg/lit	0.03	<0.005
27	Boron as (B)	Mg/lit	1	<0.01

28	Mineral Oil	Mg/lit	0.01	<0.001
29	Anionic Detergents	PPM	0.2	<0.001
30	Phenolic Compounds	PPM	0.001	<0.001
31	Polynuclear aromatic compound as PAH	ppb	-	<0.03
32	Pesticides	Mg/lit	Absent	<0.03
33	Residual chlorine	Mg/lit	0.2	<0.1
34	Total Coliform	MPN/100 ml	Absent	>16
35	Thermo Tolerant	per 100 ml	-	Present
36	Electrical Conductivity at 25OC	µs/cm lit	-	474.5

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Noise levels at various locations in Nagpur

Noise levels at various locations in Nagpur city

Type of sampling	Sampling Locations	Day Time (dBA)	allowable (dBA)	Night Time (dBA)	allowable (dBA)
Residential areas	Trimurti Nagar	64.7	55	60.2	45
	Sadar	66.7	55	61.3	45
	Railway Station Colony	54.7	55	72.2	45
	Chatrapati square	75.1	55	72.2	45
	Ravi nagar	75.6	55	72.8	45
	Giripeth	65.6	55	61.8	45
	Narendra Nagar	75.8	55	70.9	45
	Manewada	71.4	55	69.3	45
	Higna naka	72.9	55	69.2	45
	Teka naka	71.5	55	68.2	45
	Nandanvan	78.4	55	75.2	45
	Sakkardara	75.4	55	73.9	45
	Butibori	64	55	62.9	45
Commercial areas	Dharampeth	74.4	65	72.3	55
	Shankarnagar	75.2	65	71.5	55
	Ravi nagar	75.6	65	74.3	55
	Wadi naka	72.4	65	70.5	55
	Higna naka	75.2	65	73.2	55
	Trimurti nagar	70.5	65	65.2	55
	Chatrapati nagar	79.1	65	75.6	55
	Manewada	74.3	65	73.5	55
	Medical square	79.5	65	75.4	55
	Sakkardara	80.4	65	78.5	55
	Nandanvan	77.6	65	75.2	55
	Pardi naka	79.3	65	75.9	55
	Wardhman nagar	75.4	65	73.8	55
	Gandhi bag	80.3	65	69.6	55
	Bardi	79.3	65	72.6	55
Sadar	85.2	65	75.3	55	

Type of sampling	Sampling Locations	Day Time (dBA)	allowable (dBA)	Night Time (dBA)	allowable (dBA)
	Katol chowk	75.2	65	71.9	55
	Mankapur	79	65	75.2	55
	Koradi naka	79.2	65	73.6	55
	Power grid square	79.9	65	75.2	55
	Sharda Square	81.9	65	78.2	55
	Teka naka	76.6	65	72.5	55
	Indora Square	78.2	65	75.9	55
	Kadbi chowk	76.4	65	71.5	55
	Railway station chowk	78.2	65	75.2	55
	Bus stand	75.5	65	75.1	55
Silent zone	Bardi (Lata Mangeshker Hospital)	65.3	50	62.9	40
	Mayo Hospital	59.7	50	56.2	40
	Law College	75	50	60.6	40
	Medical College	69.3	50	62.4	40
	Somalwada School	79.6	50	70.5	40
	New English High School, Mahal	78.2	50	70.6	40
	Baba Ramdev College	71.5	50	66.9	40
	Cancer Hospital	65.2	50	61.5	40

Source: Environmental Status report for Nagpur, 2011-12. Prepared by NMC

Details of the JnNURM projects

Sr.No.	(Amount in Rs. Lakhs)	Approved cost	Total ACA Commitment (Central Share)	As per MoF Release Order - ACA Released till date	Utilisation as per Mar'14 QPR	Physical progress (%)
1	Road Over Bridges (ROBs)	8,628	4,314	3,883	6,673	Completed
2	Expansion and upgradation of water supply distribution network in Nagpur city	3,395	1,697	1,528	3,263	Completed
3	Energy Audit Projects for Water Supply	2,504	1,252	1,127	2,901	Completed
4	Water Sector (Leak Detection)	279	139	125	275	Completed
5	Water Audit Projects	2,500	1,250	1,125	3,233	Completed
6	Lifting water from Pench Reservoir and conveying upto Mahadulla by mortar lined MS pipeline in lieu of canal	14,464	7,232	6,509	19,079	Completed
7	Recycle and Reuse of Waste Water	13,011	6,506	4,229	8,351	54%
8	Kanhan Augmentation Scheme	8,217	4,109	3,698	8,333	Completed
9	Water Supply Pench IV (Part 2)	6,196	3,098	2,014	5,202	73%
10	Water Supply Pench IV (Part 3)	8,059	4,030	3,627	7,079	83%
11	Water Supply Pench IV (Part 4)	10,461	5,230	4,707	12,672	Completed
12	Construction of Road under Bridge near Anand Talkies	1,829	914	823	2,877	Completed
13	Construction of Road over Bridge at Maskasath	253	127	32	62	11%
14	Construction of Road Over Bridge at Itwari	901	450	405	2,076	76%
15	Construction of RoB at Mangalwari in replacement of level-crossing No.297/A (A-class) between Km.1041/3-5 on Amla-Nagpur Section	849	425	382	2,015	Completed
16	Rehabilitation Plan to implement 24X7 water supply project for Nagpur city under PPP framework	38786	19,393	7,757	10,628	33%
17	Water Supply system for NIT area (Phase - II) Tertiary distribution network in 46 clusters	21806	10,903	3,705	7,863	41%

Source: Monthly Progress Report prepared by NMC for JnNURM projects, August 2014

List of ESR/GSR/MBR for water supply in the Nagpur

Sr.No.	Name of the servicer Reservoir (MBRs/ESRs/GSRs)	Nos.	Capacity (Million Liters)
1	Semi Hill. Old GSR	1	4.54
2	Governor House GSR	3	22.74
3	Ramnagar	1	0.91
4	Wanjarinagar (old)	1	2.27
5	Laxminagar (old)	1	2.27
6	Seminary Hills M.B.R	2	20.43
7	Gittikhadan GSR	1	5.94
8	Sitabuldi Fort GSR	2	22.74
9	Laxminagar (New)	1	2.27
10	Wanjarinagar (New)	1	2.27
11	Minimatanagar	1	2.27
12	Sakkardara	2	4.54
13	Lakadganj	2	4.54
14	Jariptka	1	2.27
15	Binaki	1	2.27
16	Ramnagar ESR	1	2.27
17	Khamla (Pande Layout)	1	2.27
18	Jaripatka (Nari)	1	2.27
19	OnkarNagar	1	2.27
20	Nandanvan	1	2.27
21	Subhas nagar	1	2.27
22	Takali seem	1	2.27
23	Nara	1	2.27
24	Mahal nagar	1	2.27
25	Wanjari	1	2.27
26	Dhaba	1	2.27
27	Dhantoli	1	2.27
28	Reshimbag	1	2.27
29	Boripura	1	2.27
30	Gayatrinagar	1	2.27
31	Chinchbhuvan	1	2.27
32	Killa Mahal	1	2.27
33	Bezonbagh	1	2.27
34	Kalamna	1	2.27
35	Bharatwada	1	2.27
36	Dighori	1	2.27
37	Wadi Tekdi	1	0.85
Total		43	150.79

(Source: Detailed Project Report for NAG 014 project, NMC, Nagpur)

Water user charges- Tariff Details

Current water user charges tariff details are as provided below for all the categories.

Residential

KL/Month	Rate per KL/ INR 2012-13
1-20	5.5
21-30	8.8
31-80	12.1
Above 80	16.5

Institutional A-(Private small dairy, religious places, hostels and computer training)

KL/Month	Rate per KL/ INR 2012-13
1-20	14.3
21-80	16.5
Above 80	19.8

Institutional B- (Hospitals, schools and colleges, private schools and colleges, banks, private offices, government hospitals, government aided research institutes, railway office, railway workshop, railway station, airport, bus stands)

KL/Month	Rate per KL/ INR 2012-13
1-20	16.5
21-80	18.7
Above 80	22.1

Commercial 1 A- (Private hospitals, marriage functions halls, lawns, b and c class lodges, hotels and restaurants)

KL/Month	Rate per KL/ INR 2012-13
1-20	27.6
21-80	38.6
Above 80	49.6

Commercial 1 B-(Petrol pumps, swimming pools, clubs, Class A hotels, Vehicle servicing centre, Government milk schemes, big private dairy and ice cream factory, trade and amusements, exhibitions halls)

KL/Month	Rate per KL/ INR 2012-13
1-20	27.6
21-80	55.1
Above 80	82.7

Commercial 2- (Oil factories, mineral water plants, beverage industry, fruit juice plant, Water Park and factories)

KL/Month	Rate per KL/ INR 2012-13
1-30	66.2
31-100	198.5
Above 100	595.4

Source: Water Works Department, NMC, Nagpur

Status of the BSUP project Implementation at Nagpur

Details of BSUP projects Implementation - old projects

Sr. No.	Name of Project	Sanctioned Units	Approved project Cost	DU's Completed	Work In Progress	Balance Dwelling Unit
	Project 01					
1	Sanjay Nagar	308		0	10	298
2	Zingabai Takli	148		45	103	0
	Total	456	1525.00	45	113	298
	Project 02					
3	Jat Tarodi - 2	279	1242.23	33	12	234
	Project 03					
4	Indira nagar (Nr martin nagar)	366		0	150	166
5	Indiramatanagar	317		15	100	202
6	Borkar Nagar, Basod Mahalla	174		0	0	174
7	Wanjra (North Along Road)	160		48	160	0
	Total	1017	5688.00	63	410	542
	Project 04					
8	Savitribai Fuley Nagar	530		0	25	505
9	Adivasi Gondtoli	100		0	100	0
	Total	630	3744.00	0	125	505
	Project 05					
10	Behind Anand Kaushalayan nagar	185		0	0	185
11	Gopal Nagar (East of Dipty Signal)	180		21	18	141
	Total	365	2685.00	21	18	326
	Project 06					
12	Panch Zopada	219	1061.06	54	0	165
A	Total	2966	15945.29	216	623	2190
	Project 07					
13	New Pandhrabodi	360	1978.64	Tender process completed	25	335
	Project 08					
14	Sewadal Nagar	430				
15	Sanjay Gandhi Nagar	240				
16	Saraswati Nagar	180				
	Total	850	5078.97	Tender process completed : SRA committee Approval Awaited		850
	Project 09					
17	Lumbini Nagar	226		Tender process completed: SRA committee Approval Awaited		
18	Bezonbagh	150		Tender process completed: SRA committee Approval Awaited		
	Total	376	2806.47			376
B	Total	1586	9864.08	0	25	1561

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- Sr. No.	Name of Project	Sanctioned Units	Approved project Cost	DU's Completed	Work In Progress	Balance Dwelling Unit
19	PPP - BSUP Projects	1694	11672.00	0	544	1150
C	Total	1694	11672.00	0	544	1150
	Total A+B+C	6246		216	1177	4853

Source: Slum rehabilitation authority,

Staff strength of various departments of NMC

Sr.No.	Department Name	Sanctioned Post	Working staff	Vacant Post
1	General Admin Dept.	62	42	20
2	Standing Committee	33	33	0
3	Library Dept.	141	69	72
4	Fire Fighting Dept.	411	273	138
5	Central Auditing Dept.	68	48	20
6	Octroi Dept.	495	343	152
7	tax department	233	196	37
8	Assessment tax Dept.	259	154	105
9	Market Dept.	83	56	27
10	Enforcement dept.	51	29	22
11	Cattle pound Dept.	34	16	18
12	Estate Dept.	29	22	7
13	PWD	336	205	131
14	Slum Dept.	63	55	8
15	Social welfare Dept.	18	15	3
16	lighting Dept.	316	142	174
17	Garden Dept.	273	152	121
18	City Development Dept.	69	54	15
19	Hot Mix Plant	41	23	18
20	Work Charge department	6	5	1
21	Transport Dept.	53	13	40
22	Town Planning Dept.	39	35	4
23	Workshop dept.	68	38	30
24	Education	3,001	1,925	1,076
25	Water works dept.	748	-	-
26	Sewerage dept./STP	50	22	28
27	Health dept.	5,499	3,912	1,587
28	Sewerage dept./Underground drains	53	33	20
	Total	12,532	7,910	3,874

Source: Establishment Department, NMC, Nagpur

Roles and responsibilities of key departments of NMC

Service/ sector	NMCs' responsibility	Other government agencies related to the sector
Water supply	<p>Purchase of water from the Water resources Department, its treatment and distribution.</p> <p>Preparation of water supply schemes</p> <p>Fixing tariffs and its implementation after approval from General Body and Government of Maharashtra</p> <p>Water supply through bore-wells</p> <p>Transportation of water through tankers in select areas</p> <p>Metering, billing and bill collections</p> <p>Monitoring water quality</p>	<p>Maharashtra Pollution Control Board (MPCB) sets the standards for water quality.</p>
Sewerage	<p>Collection, transportation and treatment of sewage</p> <p>Re-use of waste water (under development)</p>	<p>MPCB sets the standards for sewage treatment.</p> <p>NIT provides the facility to the citizens in the seven layouts under its jurisdiction.</p>
Storm water drainage	<p>Collection and transportation of storm water through drainage system and natural drains.</p>	<p>NIT provides the facility to the citizens in the seven layouts under its jurisdiction.</p>
Solid waste management	<p>Door-to-Door collection of solid waste</p> <p>Collection of waste from community bins</p> <p>Transportation of solid waste to disposal site and its treatment.</p> <p>Developing proper disposal methods like waste-to-energy projects, landfill site etc.</p>	<p>MPCB sets the standards for solid waste management</p>
Slum improvement	<p>Implementing programmes for the urban poor/slum improvement schemes.</p>	
Land use planning	<p>Preparing development plan</p> <p>Implementing building control and regulations</p> <p>Demolition of illegal structures</p>	<p>Building and Construction Department, GoM is planning and construction all the public building in the city.</p> <p>NIT is the planning authority for seven layouts</p> <p>Maharashtra Housing and Area Development Authority (MHADA) construct and maintain housing projects in the region.</p> <p>Heritage Committee identifies heritage structures and defines building norms and rules for such structures and neighboring development.</p>

Service/ sector	NMCs' responsibility	Other government agencies related to the sector
Roads and bridges	Preparation of master plans for road development Development of arterial roads and their linkages to the city areas Maintenance of existing roads, including patch work	NIT provides the facility to the citizens in the seven layouts under its jurisdiction. Public Works Department (PWD) develops and maintains national highways national highways, state highways, district roads and outer ring roads. Maharashtra state Road Development Corporation (MSRDC) works in the area of road widening and strengthening of roads and flyovers. For these projects it prepares the plans, estimates and implements the projects.
Traffic management	Intersection development and beautification Providing signage and traffic control systems	Regional Transport Office (RTO) keeps vigil on the vehicles on the road. It checks the authenticity of the vehicle and registers them, issues the licenses and issues permits. Traffic police controls the traffic enforcing traffic rules and penalizing law breakers.
Street lightning	Providing street lights at all the identified points/roads in the city Operation and maintenance of street lights	
Parks and gardens	Developing parks and gardens for the citizens Maintenance of public parks and open spaces	NIT provides the facility to the citizens in the seven layouts under its jurisdiction. Forest department maintains selected gardens, zoos & forest nursery (Located on seminary hills) PKV has developed and maintains selected gardens, zoos, and botanical gardens and amusements facilities therein.
Health	Executing immunization programs Providing primary health care services	Public Health Department plans and finances the immunization schemes
Education	Providing primary and secondary education facilities to the urban poor	Nagpur University provides higher education facilities.
Markets	Developing and maintaining markets Construction of shopping malls	NIT provides the facility to the citizens in the seven layouts under its jurisdiction.
Fire	Attending emergency fire calls	

Financial Statement of NMC – FY 2007-08 till 2011-12

NMC		Actuals Figures (In Rs. lakhs)				
FY Ending >>		2007-08	2008-09	2009-10	2010-11	2011-12
Opening Balance		75	153	193	190	232
Revenue Account						
Revenue Income						
I	Own Sources					
I A	Tax Revenues					
	1 Octroi Tax	234	272	295	363	437
	2 Property Tax - General Tax	41	37	56	64	55
	3 Sewerage and Sanitation Tax - Part of Property Tax	24	21	26	33	30
	4 Water, Fire ,Light Tax and others Taxes - Property tax	10	8	10	16	22
	Sub-Total Tax Revenue	309	338	387	476	544
I B	Non Tax Revenues					
	1 Water Charges	51	51	71	90	77
	2 Town Planning Department	7	13	16	19	30
	3 Rents from Municipal buildings/Commercial spaces	3	3	4	4	4
	4 Development Charges & Building plan fees	3	3	7	5	3
	5 Advertisement Fee	3	3	3	3	6
	6 Road Damage fess	3	5	5	4	2
	7 Receipt from Deposits	4	4	4	6	3
	8 Other Income	8	6	8	14	26
	Sub-Total Non Tax Revenue	82	87	117	145	152
	Total Revenue Income - Own Sources (IA + IB)	391	426	505	621	696
II	Revenue Grants & Contributions					
	1 Education Grant	19	32	23	39	46
	2 Road Grants	5	-	9	-	2
	4 Non Agricultural Cess and Land Revenue Grant	1	-	0	-	-
	5 SJSRY	1	-	-	-	0
	6 Entertainment Tax grant	1	-	0	-	-
	3 Grants for Medicines	0	1	3	1	0
	7 Other Grants	0	0	0	1	1
	Total Revenue Grants & Contributions	26	33	36	41	50
	Grand Total Revenue Income (I + II)	417	459	541	662	746
Revenue Expenditure						

Ministry of Urban Development

NMC		Actuals Figures (In Rs. lakhs)				
FY Ending >>		2007-08	2008-09	2009-10	2010-11	2011-12
Salaries Expenditure						
1	Sanitation and Sewerage Department	48	51	60	72	85
2	Education & Library	38	41	45	51	69
3	Health Department	10	11	14	14	18
4	Water Supply Department	26	26	23	-	-
5	Drainage Department	0	1	1	1	1
8	Tax Department	7	7	7	9	12
9	Other Departments	5	6	6	7	9
7	Fire Services	5	5	5	6	8
5	Public Works Department	4	5	5	6	8
6	General Administration	2	3	5	5	5
1 1	Leisure, Recreation	2	2	2	3	3
1 0	Street Lighting	2	2	2	3	3
1 2	Pay Commissioner Arrears - 5th	12	16	18	0	0
	Total Salaries Expenditure	162	175	195	178	221
Operation and Maintenance						
1	Water Supply Department	56	57	44	46	55
2	Drainage Department	2	2	4	4	3
2	Street Lighting	14	15	22	23	23
3	Sanitation and Sewerage Department	10	13	17	20	23
4	General Administration	8	11	12	24	20
5	Health Department	5	5	5	8	8
6	Education & Library	2	3	8	9	3
7	Tax Department	3	4	5	6	6
8	Public Works Department	1	3	2	4	5
9	Leisure, Recreation	2	2	3	3	2
1 0	Miscellaneous Expenditure	6	2	10	0	0
1 1	Fire Services	0	0	1	0	0
1 2	Other Departments	55	69	66	74	102
	Total O&M Expenditure	165	186	196	221	250
Debt - Interest Payouts						
1	Debt servicing - Interest payment all loans	6	2	3	14	28
	Total Revenue Expenditure	333	363	394	413	499


NMC		Actuals Figures (In Rs. lakhs)				
FY Ending >>		2007-08	2008-09	2009-10	2010-11	2011-12
	Operating Surplus	84	96	147	249	246
Capita Account						
Capital Receipts						
I	Capital Grants					
1	JNNURM	96	35	29	29	116
2	DPDC Grant	6	4	5	8	11
3	Other grants	0	0	0	0	-
4	Sp. Grants for city development	-	2	2	6	-
	Sub Total Capital Grants	102	41	37	43	127
II	Loans and Bonds					
1	Bank of Maharashtra II	-	50	50	100	15
2	Municipal Bonds	22	-	-	-	-
	Total Loans and Bonds	22	50	50	100	15
	Total Capital Income (I+II)	124	91	87	143	142
Capital Expenditure						
Capital Works Implementation						
1	Public Works Department	18	17	22	32	16
2	Hot Mix/Road Department	21	22	33	33	34
3	Drainage	6	7	11	13	12
4	Lighting Department	7	8	12	10	9
5	Health	2	3	8	10	12
6	Water Works Department	9	6	3	4	1
7	Expenditure under DPDC	1	0	4	3	6
8	Traffic Department	3	4	3	7	7
9	Garden Department	2	2	3	3	4
10	Other Department works	5	6	6	8	7
11	JNNURM Projects	43	35	143	203	156
	Total Capital Expenditure	117	111	249	325	264
Principal Repayment						
1	Government. loan	-	-	-	-	-
2	HUDCO Loan	-	0	-	8	-
3	Municipal Bonds	-	-	-	-	-
4	Repayment of PENCH-III loan	12	12	12	11	-
5	Repayment of Personal loan (Debt Loan)	1	1	2	1	-
	Principal Repayment	13	13	13	20	-
	Total Capital Expenditure	130	124	262	345	264

Ministry of Urban Development

NMC			Actuals Figures (In Rs. lakhs)				
FY Ending >>			2007-08	2008-09	2009-10	2010-11	2011-12
		Capital Account Status	(6)	(33)	(176)	(201)	(123)
Extraordinary Account							
Total EO Income							
	1	Education Cess	12	10	13	19	17
	2	EGC Tax	1	1	1	3	2
	3	Extraordinary Income	13	34	44	12	17
0	0	Sub-Total	26	45	58	34	37
Total EO Expenditure							
	1	Other Deposit refunds (EO)	-	-	-	-	-
	2	Education cess repayment to Government.	10	5	3	13	6
	3	Extraordinary Expenditure	15	62	29	26	25
	4	EGC Repayment	1	1	0	2	1
		Sub-Total	27	68	32	40	32
		Status Extra Ordinary Account	(0)	(22)	26	(6)	5
		Closing Balance	153	193	190	232	360

Source: NMC budget books of 2008-09 till 2012-13


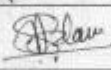
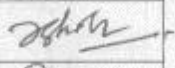
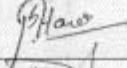

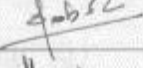

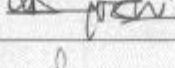


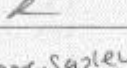
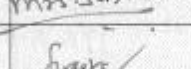
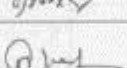
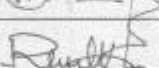
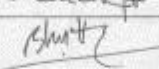

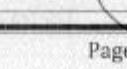
Attendance sheet of 1st city level workshop



Revised City Development Plan –Nagpur Municipal Corporation

Name of the ULB: Nagpur Municipal Corporation
 Date: 06th December 2013
 Time:
 Venue:


Workshop 1- Interim Stage

Sr. No.	Name of the officials	Name of the organization	Contact number	Signature
1	Ar. SANJAY KOPULWAR	INSTITUTE OF TOWN PLANNERS, INDIA	9822237827	
2	Prof. V. S. ADANE	ARCH. & PLNG VNIT, NAGPUR	9890725367	
3	Prof. RAJASHREE KOTHARKAR	HEAD, DEPT. OF ARCH & PLNG, VNIT, NAGPUR	9822719413	
4	Suneeta Aloni	Asstt. Director Town planning M. I. T.	9823323670	
5	Hemant Nausty	Ret. A.P.T.P.	9360942708	
6	bilip Bharade	Raghokw Construction pvt	982222387	
7	VIVEK PATHAK	CREDAI PATHAK PROPERTIES CREDAI, NAGPUR METRO	957323950	
8	SATISH JOSHI	CEO, CREDAI NAGPUR METRO	99224 08877	
9	S.S.Hutale	EE (NMC)	98230, 98620	
10	Mohd. Israil	DYE CUMCS	9823163502	
11	F.S. Wkey	MANEET SUPPL	9820642881	
12	Mrs. Shalini Saxeena	Aishwaryee Bhanuteshiya Saxeena	937142868 9766659618	
13	Mrs. Sudha Gaitkar	Social welfare Nagpur Corporation	9823128265	
14	Mrs. Namda Kotharkar	Gulmohar Human Welfare Organization Secretary	9325047208	
15	Rajendra Kulkarni	Credai Nagpur Metro	9822223280	
16	Rajesh Chitkar	DYE (NMC)	9823313057	
17	G.M. Rathod	Ac. I	9823128275	

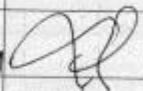


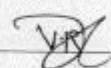


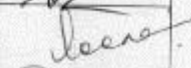

Capacity Building for Urban Development Page 1

Revised City Development Plan - Nagpur Municipal Corporation

Sr. No.	Name of the officials	Name of the organization	Contact number	Signature
18	Raju Bhingade	NMC	9823059357	[Signature]
19	Satish Desai	NMC	9823022712	[Signature]
20	Mahesh Moroney	NMC	9823330932	[Signature]
21	Subhash Jaideo	NMC	9823128268	[Signature]
22	Prakash L. warade	NMC	9823330931	[Signature]
23	R.D. Jadhao	NMC	9823128267	[Signature]
24	Rashmi Sinha	ICLEI SOUTH ASIA	9960023246	[Signature]
25	R.S. Karad	NMC	9823330930	[Signature]
26	Praveen P. Dethve	N.M.C.	9923666677	[Signature]
27	VIJAY HUMANE	NMC	9673009102	[Signature]
28	Ar. P.B. Yelne	I.I.A.	9422806260	[Signature]
29	Ar. A.A. Khoolwe	I.I.A.	9960685854	[Signature]
30	S.S. Gaikwad	City Engineer NMC	9823059358	[Signature]
31	PRADHEEP JADUD	NAGPUR CHAMBER OF COMMERCE	9422806160	[Signature]
32	KAMLESH P. SHAH	- II -	9545554326	[Signature]
33	PRAVIN M. PATEL	- II -	9823096779	[Signature]
34	D. G. Jamgade	Exe. Engrg. (PWD)	9923596010	[Signature]
35	Dr. Mahend Ganvir	NMC	9823063952	[Signature]
36	Madan Gadge	NMC	9545589937	[Signature]
37				



Revised City Development Plan – Nagpur Municipal Corporation

Sr. No.	Name of the officials	Name of the organization	Contact number	Signature
38	Dr Ashok Urkude	N.M.C.	9823074729	
39	D. D. Jambhulkar	NMC	9823177215	
40	D. B. Chaudhari	Bhartiya Shiksha Sanstha	9226373424	
41	Mrs Veena Khanolkar	Vasundhara Educational & Welfare Assn. Nagpur	9822232041	
42				
43	P. U. Fallke	N.M.C.	1880316570	
44	D. V. Khandari	N.M.C.	8275408026	
45	Mrs. Leena Budhe	Center for Sustainable Development (NGO)	9372391202	
46	P. D. KHARWENYIS.	NMC	9764442405	
47				
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Sample suggestion form used during FGDs



Revised CDP for Nagpur

Focus Group Discussions – Group 1 - “Urban Infrastructure Services”

Name of the Stakeholder:
Name of the organization:
Designation:

A S Rao
CPWD

Contact Number: 9422264375
Email id:

Sector- Water Supply			
Key Issues	Key suggestions	Projects if any	Resources mobilization plan if any
<p>Sanering Hill in nagpur @ require only municipal water as ground water is not feasible bejan hill.</p>	<p>Arrage separate water supply system for Area where Ground water is not feasible like Sanering Hill in Nagpur.</p>	<p>Pumpup & groundwater reservoir on Hill for supply to houses.</p>	<p>—</p>



Revised CDP for Nagpur

Focus Group Discussions – Group 1 - “Urban Infrastructure Services”

Name of the stakeholder:
Name of the organization:
Designation:

A S Rao
CPWD
SE CPWD

Contact Number: 9422264375
Email id:

Sector- Sewerage and Sanitation			
Key Issues	Key suggestions	Projects if any	Resources mobilization plan if any
<p>STP to be enlarged in Colonies/groups of houses.</p>	<p>Local STP to be enlarged at each & every colony so that small load shall be reduced and water can be used for Horticulture purposes.</p>	<p>Develop individual plants of different capacities to be installed in colonies by zoning.</p>	



Revised CDP for Nagpur

Focus Group Discussions – Group 1 - “Urban Infrastructure Services”

Name of the stakeholder: CPWD
 Name of the organization:
 Designation: A S Rao SE

Contact Number: 9422264375
 Email id:

Sector- Solid Water management			
Key Issues	Key suggestions	Projects if any	Resources mobilization plan if any
Non collection of solid waste from houses in Central Co. & IT colony, Shaniwar Hills	Door to Door collection to be implemented	PPP mode collection & disposal by charging from individual house	



Revised CDP for Nagpur

Focus Group Discussions – Group 1 - “Urban Infrastructure Services”

Name of the stakeholder: A S Rao
 Name of the organization: CPWD
 Designation: SE

Contact Number: 9422264375
 Email id:

Sector- Storm water drainage			
Key Issues	Key suggestions	Projects if any	Resources mobilization plan if any
Rain Water Harvesting to be implemented in Colonies/ Groups & houses.	RWH to be imposed to each & every household/ colony so that Ground water recharge be improved.	Small scale projects to be introduced so that individual households/groups of houses can be implemented.	—



Revised CDP for Nagpur

Focus Group Discussions – Group 1 - “Urban Infrastructure Services”

Name of the stakeholder: *AS Res*
 Name of the organization: *CPWD*
 Designation: *SE*

Contact Number: *9422264375*
 Email id:

Sector- Roads, Traffic and Transportation			
Key Issues	Key suggestions	Projects if any	Resources mobilization plan if any
<i>Introduce Bicycle paths along major roads.</i>	<i>Introduce cycle paths in each & every major roads for encourage pollution-free transport</i>	<i>Helps cycle & maintain of tracks.</i>	

Minutes of meeting with HoDs of NMC on Revised draft CDP for Nagpur

Meeting Agenda	Discussion on Revised draft CDP for Nagpur
Place/ Location/ Date/ Time	The meeting hall, Nagpur Municipal Corporation (NMC), Nagpur 21 th October 2014, at 12.00 P. M
Participants	<p>Nagpur Municipal Corporation (NMC)</p> <ol style="list-style-type: none"> 1. Shri. Hemat Kumar Pawar, Additional Municipal Commissioner 2. Shri. Rizwan Siddiqui, Deputy Municipal Commissioner 3. Shri. Sanjay Kakade, Deputy Municipal Commissioner 4. Shri. Promod Bhusari, Addl. Dy. Municipal Commissioner 5. Shri. M.N Gadage, C.A. And F.O. 6. Dr. Milind Ganvir, Dy. Director Of Health services 7. Shri. S.S Hastak, Tax Assessor, Nodal Officer CBUD 8. Shri. S.S. Gaikwad, City Engineer 9. Shri Shyam Chavan, Executive Engineer(Pench Project) 10. Shri.Ajijur Rehmaan, Executive Engineer, water works 11. Shri.Mohd. Israel, Dy.Engineer, Lakes and Rivers 12. Shri. Mahesh Gupta, Town planning 13. Shri. C. S. Zade, Town Planner 14. Shri. Dipendra P. Lokhande, Education Officer 15. Miss.Sudha Iraskar, Social Welfare Officer 16. Dr. Savita Meshram, Health Officer(M) 17. Shri. Saleem Iquba Asst. Engg 18. Shri. Nareshchandra Shrikhande, Garden Superintend 19. Shri Deshpande, CBUD team at NMC <p>The list of the participants are enclosed with this minutes of the meeting</p> <p>CRISIL Risk and Infrastructure Solutions Limited:</p> <ol style="list-style-type: none"> 1. Mr.Brijgopal Ladda, Director 2. Mr. Ramesh Turaka, Manager
Discussion points	<p>The meeting with head of the departments of NMC was organized on 21st October 2014 to discuss the revised draft CDP for Nagpur and further to take the consent on the projects proposed in the revised draft CDP.</p> <ul style="list-style-type: none"> ■ The meeting was chaired by the Additional Municipal Commissioner of NMC and was attended by the head of the departments of concerned departments of NMC. ■ The nodal officer for CBUD project at NMC has briefed about the CBUD project. The nodal officer has also briefed about the current status of the revised CDP for Nagpur. ■ Further, the team leader from CRISIL has made a presentation on the revised draft CDP and also informed that the comments and suggestions received from NMC were incorporated in the revised draft CDP. ■ Further, the department/section wise the projects and components were discussed. The section wise key discussion points are as follows; <p>1. Traffic and Transportation section</p>

	<ul style="list-style-type: none"> ■ The city engineer has suggested to include 52 projects in the CDP; which are not included in the CMP prepared by the NIT. The estimated project cost is about Rs 850 Crs. ■ The DPR for the monorail is in progress for a length of 50 KMs. It was suggested to include the mono rail project in the CDP. However, the project cost for the mono rail is not available; hence, it was suggested to estimate the block cost and include the same in the CDP. ■ With respect to parking, the town planning department has informed that there are about 73 sites reserved in the DP for off street parking facility. It was suggested to include all these 73 parking sites and further to explore off-street/MLCP/Mechanized parking. The block cost should be estimated as per the rates considered as in other CDPs. ■ There are about 17 sites reserved for the bus stands/depots in the DP. It was suggested to include all these sites in CDP. <p>2. Water supply section:</p> <ul style="list-style-type: none"> ■ The water supply distribution network to be proposed in the newly merged areas (Hudkeshwar Bk. and Narsala). Accordingly, the block project cost to be included in the CDP. ■ The Executive Engineer of water supply (O&M) has asked CRISIL to correct few factual information provide in the CDP about ongoing projects to be corrected in the water supply assessment section in the revised draft CDP. ■ It was suggested to the check financial sustainability of NMC taking into account that NMC will not receive the committed 70% of the project grant from Gol and GoM for ongoing JNNURM projects. <p>3. Sewerage Section:</p> <ul style="list-style-type: none"> ■ In the sewerage north zone, the project cost for the sewerage network has to be corrected as Rs 491 Crs. <p>4. Tourism section:</p> <ul style="list-style-type: none"> ■ The deputy engineer for lakes and rivers department has informed that the MTDC has appointed the consultant to prepare the DPR on tourism development in Nagpur. It was suggested to contact the consultant to take the project cost accordingly to include in the CDP. <p>5. Following department officials have agreed to the components/projects proposed in the revised draft CDP for Nagpur under their respective sections;</p> <ol style="list-style-type: none"> a) Health department b) Accounts department - Urban finance section c) SWM section d) Storm water drains e) Gardens/Parks f) Lakes and Rivers g) Education section h) Firefighting i) Urban governance section j) Street lighting
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Projects in CMP by NMC/NIT

Road Widening and Development Proposals

Sr.No	Name of Road	Unit	Length in Km	Cost per Km	Amount in Rs. lakhs
1	Old Bhandara Road, Mayo Hospital Chowk to Juni Motor Stand Chowk	Km	3.0	100	300
2	Road in front of Itwari Railway Station	Km	0.5	100	50
3	Inner Circular Corridor (Four Lane to Six Lane)	Km	19.0	100	1900
4	North-South Corridor (Four Lane to Six Lane)	Km	10.0	100	1000
5	All Radial Roads (Except Katoj Road) (Four Lane to Six Lane)	Km	94.0	100	9400
6	Inner Ring Road (Four Lane to Six Lane)	Km	45.0	100	4500
7	Wardha Road to Jaitala Road up to Hingana Road	Km	8.0	100	800
8	Wardha Road via Manishnagar Railway Crossing up to Beltarodi Road	Km	4.0	100	400
9	Parallal Road to Railway line from Narendranagar RoB to Khapari RoB	Km	5.0	100	500
10	Manishnagar T-Point to Beltarodi via Reliance Fresh	Km	2.0	100	500
	Total				19350

Development of Missing Links

Sr.No	Name of Missing Link	Unit	Length in Km.	Unit Cost (in lakhs)	Total Cost (in lakhs)
1	Four Lane (Ridge Road to Ajani Road)	Km	0.5	300	150
2	Four Lane (Narendra Nagar Ring Road to Suyog Nagar T Point)	Km	0.5	300	150
4	Four Lane (NH-7 to Mangalwari level crossing, Sadar)	Km	0.5	300	150
5	Road connecting from Inner ring road - Babulkheda-Chinchbhavan	Km	7	300	2100
6	Old Morris College - Rabindaranath Tagore Marg (via Science College)	Km	0.7	300	210
7	Road connecting from Ring road to Middle ring road	Km	1.2	300	360
8	Road connecting from Kamptee road to Nari road	Km	2.5	300	750
9	Road connecting from Kamptee road to Guru Nanak College road	Km	0.4	300	120
10	Road connecting from Wardha road to North of Central jail	Km	1.8	300	540
11	Road from Nari Village to Proposed outer ring road	Km	1.8	300	540
	Sub Total				5070

Proposals for Grade Separators/Fly Overs

Sr.No.	Location	Unit	Length	Unit Cost in Rs.lakhs	Amount in Rs.Lakhs
1	N.I.T. Square to Chhavani	Rm	1400	6	8550
2	Telephone Exchange Chowk	Rm	300	6	2100
3	Agrasen Chowk- GanjaKhet Chowk	Rm	1000	6	6300
4	Automotive Square	Rm	300	6	2100
5	Ashok Chowk	Rm	300	6	2100
6	Manewada Ring Road Junction	Rm	300	6	2100
7	Shankar Nagar Square	Rm	300	6	2100
8	All major Ring road Junctions(10 Junctions)	Rm	300	6	1800
9	Bhandara Road at Near Pardi Village	Rm	1140		6350
Sub Total					31400

Rail Under Bridge (RUB) proposals

Sr.No.	Location	Unit	No	Unit Cost in Rs.lakhs	Amount in Rs.Lakhs
1	Four Lane RUB near Kamptee Naka	Nos	1	2500	2500
2	Four Lane RUB near Gurudwara, NH-7	Nos	1	2500	2500
3	Four Lane- RUB near Noga Factory, Kadabi Chowk to Mominpura Road	Nos	1	2500	2500
4	Loha Pool	Nos	1	2500	2500
Sub Total					10000

Rail Over Bridge (ROB) Proposals

Sr.No.	Location	Unit	Length	Unit Cost in Rs.lakhs	Amount in Rs.Lakhs
1	Four Lane- Kawalapeth Level Crossing	Rm	225	6	1650
2	Two Lane to Four Lane- ROB near Panchpaoli	Rm	1140	2.5	3150
3	Two Lane to Four Lane- ROB near Jaripataka Water Tank	Rm	225	2.5	863
4	Widening of RoB at Ajani to 6 lane	Rm	100	50	5000
5	Four Lane- Mangalwari Level Crossing	Rm	225	6	1650
6	Two Lane to Four Lane- ROB near Noga Factory, Kadabi Chowk to Mominpura Road	Rm	225	2.5	863
7	Four Lane- Manish Nagar Level Crossing	Rm	225	6	4600
8	Four lane- Deshpande lay out, Ring Road	Rm	225	6	1650
	Total				17776

Proposal of Bridges on the River

Sr.No.	Location	Unit	Length	Unit Cost in Rs.lakhs	Amount in Rs.Lakhs
1	Improvement of Bridge on Nag River near Needose Hotel, Dhantoli	Rm	70	6	420
2	Improvement of Bridge on Nag River near Old Shukkrwari	Rm	70	6	420
3	Improvement of Bridge on Hattinalah near Gangabai Ghat	Rm	70	6	420
4	Improvement of Bridge on Pioli River near Transport Plaza, Kamptee Road	Rm	40	6	240
5	Improvement of Bridge on Pioli River near Mankapur	Rm	60	6	360
6	Bridge on Pioli River ,Near Nara Ghat	Rm	50	6	300
6	4 Bridges on Inner Ring Road	Rm	120	6	720
7	Bridge on Middle ring road near KDK college	Rm	70	6	420
	Total				2880

Goods Transport Improvement Proposals

Sr.No.	Location	Unit	No	Unit Cost in Rs.lakhs	Amount in Rs.Lakhs
1	Pardi Naka, Bhandara Road	Nos	1	5000	5000
3	Wadi Naka, Amaravati Road	Nos	1	5000	5000
4	Khapri Naka, Wardha Road	Nos	1	5000	5000
	Total		3		15000

Abstract

Sr.No	Sector	No/Km	Estimated Cost in Rs. Lakhs
1	Road Widening and Development Proposals	190.50 Kms	19350
2	Development of Missing Links	16.90	5070
3	Proposals for Grade Separators/Fly Overs	9 Nos	31400
4	Rail Under Bridge (RUB) proposals	4 Nos	10000
5	Rail Over Bridge (ROB) Proposals	8	17776
6	Proposal of Bridges on the River	7	2880
7	Goods Transport Improvement Proposals	3 Nos.	15000
		Total	85476 Lakhs

Final Workshop- Attendance sheet

City Development Plan –Nagpur- Final Workshop



Name of the ULB: Nagpur Municipal Corporation

Date: 17th March 2015

Time: 10.30 AM

Venue: Town hall, Mahal, NMC

Final Workshop- Draft CDP Stage




















Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
1	Baksha Borhkar	GREEN VIGIL	8087617165	<i>[Signature]</i>
2	Surbhi Jaiswal	FOUNDATION	"	<i>[Signature]</i>
3	Mehul Kesurkar	"	"	<i>[Signature]</i>
4	Nazma Khan	"	"	<i>[Signature]</i>
5	Sheetal Choudhary	"	"	<i>[Signature]</i> 17/03/15
6	R.G. Boddke	MIDC-Nagpur	9422202816	<i>[Signature]</i>
7	Prathamesh Jiloka	G.H.R.C. Nagpur	9175323007	<i>[Signature]</i>
8	Sanket Amle	"	9503616723	<i>[Signature]</i>
9	S ^{ED} Uma Zolub <i>[Signature]</i>	"	9422258022	<i>[Signature]</i>
10	CHANDRAKANT PATEL	G.H.R.C.E. Nagpur	9279976441	<i>[Signature]</i>
11	K.R.NAGDURE	SE, MIDC	8108719149	<i>[Signature]</i> 17/3
12	Mahesh Nimje	G.H.R.C. Nagpur	9595077062	<i>[Signature]</i>
13	श्यामल फर्नांडिस	एमआय अर्गनायझर विकास विभाग	9420253667	<i>[Signature]</i>
14	P.D. Khordensis.	APRO, NMC	9764442405	<i>[Signature]</i>
15	श्री. अशोकजी 1645 निवा		9272809889	<i>[Signature]</i>
16	Rahul Shukla	G.H.R.C. Nagpur	8239178608	<i>[Signature]</i>
17	Parag Dhotre	G.H.R.C.E. Nagpur	8087756526	<i>[Signature]</i>

City Development Plan - Nagpur - Final Workshop























Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
18	Dr. Anirudh Salunkhe	Sarathi	9422504172	AKV
19	Anon Vazirani	SARATHI	9422504134	AKV
20	N.V. Sahasrabudhe	II	2537172	AKV
21	Mahendra Borekar	Shriyogeshwar & Sons Bhamra Sanstha	9325898966	AKV
22	Shriyam A. Deshpande	-	7709360503	AKV
23	Abhijeet S. Khore	Rajkarni	8308394883	AKV
24	Bhargopal Ladda	CRISIL	9966177835	AKV
25	D. SUBBARAO	CGWB		AKV
26	DR. P. K. JAIN	CGWB		AKV
27	RAHUL SHENDE	CAWB		AKV
28	S. A. Matey	Garden Dept. NMC	9923196811	AKV
29	Mrs. ABHA BILU PANDE		9960695628	AKV
30	Dr. J. J. J. J.		0712255115	AKV
31	V. V. Pawar	police		AKV
32	V. V. Rane	MAFSU, Nagp.		AKV
33	A. S. Randive	MAFSU Nag		AKV
34	A. W. Bhasale	Dr. Sagar MUKJ-C.		AKV
35	Kamlesh. P. Shah.	Nagpur Chamber of Commerce	9541554326	AKV
36	Abhishek S. V. K.	NMC	9049361996	AKV
37	R. S. Kumbhar	NMC	98231 01123	AKV

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Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
38	Dr. Z.Z. Sahu	G.Z.O.A.	9423346106	
39	DR. V.S. ADANE	UNIT Nagpur	9890725367	
40	Adv. D.S. Buche	Bar/Comm	9890017051	
41	Dr. H. S. Patil	Assoc	9422452092	
42	P. B. Bhojey	N.M.C.	9823078447	
43	Dr. V. Chakradar	Architect	989060140	
44	Profulla Goudale	Councillor	9822228997	
45	Alok KANSAL	DRM/Secy/NGP	9730070000	
46	Prof. S.J. Mujumdar	UMTC	9823457367	
47	Smit Gopinath	SE NIT	9823043289	
48	Jayant Deshmukh	UMTC	9700081207	
49	Alitin Guchone	ZM O.C.W.	9096086448	
50	Rajendra Rath		9422102250	
51	R.S. Bhat	Dy. E. T-P	9823098621	
52	K.A. Rathod	C.R.D.	9823172164	
53	Vishwanath Guptha	Architect/Arch	9823272846	
54	C.S. Gurusule	C.E.A.	9923365016	
55	Madhav Wazale	Eng.	9822921912	
56	Dilip Bisen	Eng.		
57	Lalitk Sontakhe	LT		

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Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
58	A.D. Pathwar	NMC	9829650661	
59	S. S. Sengupta	ADP	9922555555	
60	S. B. Renge	ADP NMC	9521267452	
61	Dr. Mihir Jauri	ITD	9823063952	
62	At Ravi Sonbhuwre	Ravi Sonbhuwre Architects	9822578331	
63	Abhay Dair	Developer	9820737914	
64	Ram Munje	Assistant	9422113793	
65	S. S. Rathod	ADP NMC	8600352063	
66	Ar. SANJAY KOPULWAR	URBAN PLANNER ITP, Secretary	9822237827	
67	Dr. S. S. Dange	ITP	7373107869	
68	S. S. Dange	Tulsi Bay Nagpur	9822925905	
69	V. S. Dange		7713881525	
70	Mrs. Purni Shastri	NMC	9890652557	
71	Dr. S. S. Dange		8965972330	
72	Vijay M. Kulkarni	N.M.C.	9923388355	
73	Vijay. Meughni	Kalebastra	9860250244	
74	Rajesh Kulkarni	Sahyadhi	9975640590	
75	Dr. M. P. Kulkarni	Sustainable Infrastructure Society	9822236428	
76	Vijay Lade	N.M.C.	9765550214	
77	Shayyadul Mulla	AFMA	9764570331	

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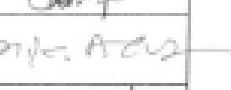
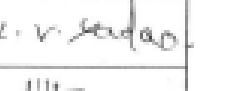



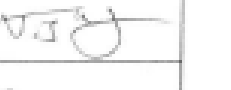


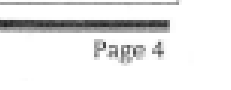



Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
58	P. L. Warale	NMC		[Signature]
59	A. Y. Naitam	NMC		[Signature]
60	G. M. Kulkarni			[Signature]
61	A. G. Muley	NMC		[Signature]
62	Prashant Sankar	President CREDAI Nagpur Metro		[Signature]
63	AR. AMIT SHIRPUREKAR	ASIA & TRANSPLANNING	9865491295	[Signature]
64	V. P. Buty	SHRIKA DEV NAGP		[Signature]
65	HEMANT BHAVE	ARCHITECT & CITY PLANNER	M) 9123685983 D) 0712-2247101	[Signature]
66	Santosh Wankar	Corporator		[Signature]
67	Ajay Lokhande	Fire Department		[Signature]
68	Anand Raut			[Signature]
69	P. S. Rajeev	Ward No 11		[Signature]
70	Shayad Bahadur	- Social	9657253062	[Signature]
71	Dilip	- " "	0712-2775881	[Signature]
72	M. S. PRAJAPATI	Social	9845732879	[Signature]
73	D. M. Umrekar	Market	9923694689	[Signature]
74	Pr. Pr. Pr.	Owner -	9423101442	[Signature]
75	C. W. Khume	Amranga Dev.	9422120579	[Signature]
76	R. S. Gharpure	Corporator	9923823568	[Signature]
77	R. C. Raut	NMC	9827095953	[Signature]

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Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
58	Sanjay Shingri	IIA	9822200900	Sanjay
59	Deepak Patel	25A	9823012827	Deepak
60	Dr. Kshiti Shirkhedkar	IIA	9860916146	Kshiti
61	Mahesh Gundak	NMC	9823167153	Mahesh
62	R.V. MULAY	NMC	9923395688	R.V. Mulay
63	Keena Khavorkar	Yashwantrao	9822232041	Keena
64		Edu. & welfare Assn. Nagpur		
65	Vijay Dargan	Nidhya Const	9891125524	Vijay
66	Tsharat Keshavn	Bhumi Const.	9321616100	Tsharat
67	Pashant. S. Holay	L. I. T. RIM, Npt Univ.	9550791487	Pashant
68	Sahana Santha		8007376312	Sahana
69	Deepak V. Paraske		9960183143	Deepak
70	Devendra Kibargi		986099892	Devendra
71	Shyama Santha			Shyama
72	S. A. Gawde	FIRBRIGAD	9970828605	S. A. Gawde
73	R. S. Karad	AC - 2		R. S. Karad
74	AR. SUJIT RODGE	IIA/ITPI Nag	9822577990	Ar. Sujit Rodge
75	AR. AKSHAY GURMUE	- N. A. -	9657766571	Ar. Akshay Gurmue
76	E. B. Jasekar		9371459641	E. B. Jasekar
77	A. B. Mogarkar	N.M.C. DY. E (G)	9823022710	A. B. Mogarkar

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Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
58	A. N. Borhate DE (CP)	NMC	98252 13098	
59	Leena Budde	Centre for Sustainable Dev NGO, Nagp	9372391202	
60	A. S. Kulkarni	T. P. NMC	9923286678	
61	S. D. Wayate	T. P. NMC	9899371200	
62	S. K. Chandragade	Mahagenco. (Consultants)	8408829904	
63	P. S. Kulkarni	Mahagenco (Consultants)	8408829906	
64	R. G. Gurnubhy	NMC		
65	A. P. Dharmachalkari	Dist. Industries Center	9860739733	
66	Prashant C.	Times of India	9850017804	
67	T. S. Renu	VTA	9860163599	
68	श्री. अश्विनी शिंदे	गणतंत्रिय	937170145	
69	श्री. वसंत विनाय शिंदे	गणतंत्रिय	9373984330	
70	VINAY K Kulkarni		9422574098	
71	GURRAMANANDHAKRISHNA		9822571062	
72	D. M. Madhoo	Palashikya	2724420	
73	Ms. Shweta Dandekar	JE Town Planning Deptt	9276961002	
74	श्री. राजेश शिंदे	गणतंत्रिय	9422808326	
75	Sou. Kanta Kulkarni	N. M. C.	9011952530	
76	Dr. Jyoti G. Kulkarni	N. M. C.	9837766330	
77	M. H. Talewar	NMC	9823063938	

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80	Vinay D. Dagle	N.M.C.	9823023260	Bear
81	Subhash B. Lade	N.M.C	9923164877	BSC
82	Dhansaj D. Dabekar	N.M.C	8446830483	DD
83	Kalpana Faldake	N.M.C	9423107375	KF
84	Swapnil Pokulwar	G.H.R.C.E	9422439793	SPokulwar
85	Pradya P. Gaurle	G.H.R.C.E	9765353900	Pradya
86	Kritika Rajput	G.H.R.C.E NAGP	7745010242	KR
87	Mrs. Smita	N.M.C C.B.U.D	9823163900	MS
88	Ramesh Gurata	CRSIL	9957555182	Ramesh
89	Dr. P. K. Jain	C.G.W.B.	9860349145	P.K.
90	Pranav Jadhav	N.M.C.	9923190870	PJ
91	Meena Tekke	N.M.C	9371952623	Meena
92	Harshada M. Dabke	N.M.C.	9881292002	Harshada
93	S. B. Jaiswal	N.M.C.	9823172905	SBJ
94	Nilesh Bhosale	G.H.R.C.E	9414036088	NB
95	Pratik P. Misra	G.H.R.C.E	08103399789	Pratik
96	Mangal Nakhate	S.B.S.S.N	9579825310	Mangal
97	Saijy Ray	O.C.W	9766008809	SR
98	Vijay Mandlik	O.C.W	8000993763	VJ

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Sr.No	Name of the stakeholder	Name of the organization	Contact number	Signature
99	Omkar Chahande	OCU	922589174	
100	Ar. Rajesh Jaiswal	Architect	9826018259	
101	A.M. Gohatre	MSTRTC	9822567752	
102	R.D. Grotale	MSTRTC	9822691644	
103	Rajendra Khawate	Credai	937209200	
104	Ar. Dilip Phadke	Credai	9823518289	
105	Jethanand	Credai	9873110727	
106	Dr. Pakhmode	GSDA	9822732365	
107	J.Y. Shekhar	CPWD	9850976020	
108	S.J. Chavhan	NMC	9823092716	
109	R.V. Wank	NMC	912312698	
110	J.P. Sharma	VTA	9823024338	
111	Mrs. Shalini Sarkar	Aishwarya Bali. Consultant	9371412868	
112	Ashish Kondhe	Ashish CONSTRUCTION	982229002	
113	डा. अ. अ. शर्मा	NMC	9851209930	
114	S.K. Zedger	NMC	9765290621	
115	P.V. Holay	NMC	992332390	
116	P.H. Nehane	NMC	9823527785	
117	A.K. Joze	NMC	9923065271	

- | | | | | |
|-----|-----------------------|-----------|------------|--------|
| 78) | Str. So J. Nikose | EE MSRDC | 9922811429 | |
| 79) | smt DD Kale | AFI | 9822630267 | Dkale |
| 80) | shri P.P. Sawade | AE | | |
| 81) | Shri. Umesh Meshram | - JMD | 8797879301 | Pans |
| 82) | Shri. G.B.S. Muthyala | - BMD | 9595058335 | UB |
| 83) | Srinath Perath | maha maha | 9800845472 | G.B.S. |
| 84) | G. T. Wasnik | SIS - 7 | 993406478 | JMD |
| 85) | M. D. Ghodoshankar | | 9761490413 | AF |
| 86) | L. U. Patil | | 9890708011 | Mh |
| 87) | Dr. Santa Meshram | | 9420248056 | P.P. |
| | | | 950550821 | Su |

- | | | | | |
|----|---------------------------|------------|------------|-----------------|
| 76 | Sou. Savita Manoj Sangale | Corporator | | <u>Dhanyale</u> |
| 79 | D.D. Jambhulkar | N.M.C | | |
| 80 | Suresh Kumbhar | | 9823062751 | Kumbhar |
| 81 | Gaule & Patil | | 9881575966 | Patil |
| 82 | Dr. R.K. Kulkarni | | 9372305239 | |
| 83 | अखिलेश नरेंद्र | | 9373117122 | Kulkarni |
| 84 | Jai Kumbhar | | 9822223090 | |
| 85 | Y.T. Ramteke | | 9822932481 | RT |
| 86 | M.D. Kumbhar | | 9123009992 | Kumbhar |
| 87 | D.V. Lalchande | | 9764627299 | KL |

Suggestions by the stakeholders

रजि. 148 / 2001 F - 17862 NGP
VIDARBHA HAWKER'S WELFARE (UNION) ASSOCIATION

रजि. 148 / 2001 F - 17862 NGP
VIDARBHA HAWKER'S WELFARE (UNION) ASSOCIATION

विदर्भ हॉकर्स वेलफेयर (यूनियन) असोसिएशन

Ref. 9 प्रमुख कार्यालय :- २२ माला, आटोमोटीव्स बिल्डिंग, सोमवारी बाज़ार रोड,
 आनंद टाकीज़ के सामने, सिताबर्डी, नागपूर-४४० ०१२.
 ☎ : 0712-2551118, M. 7588746524, 8055365214, 9766968963

Ref. No. -- 2 -- Date: _____

का पुराने किताब मार्केट है। बाजू में सब्जी मार्केट हैं। वहा मिनी मार्केट बनाया जा सकता है। पाचपावली उडान पुलिया के निचे बनाया मार्केट को सौंदर्यीकरण करके अच्छा बनाना चाहिये। उसी तरह कमाल टॉकीज़ के सामने शनिचरा बाजार में 10 हजार लोग घंघा कर सकते है। वहाँ डिज़ी मार्केट बनाना चाहिये। चंभारनाला 10 नंबर पुलियां से लेकर टेका की रजा मस्जिद तक नाले पर आधा स्लॉब डालकर 10 से 15 हजार हॉकर्स वहाँ बैठ सकते है। उसी तरह गड्डगोदाम में गोल मार्केट है। उसका विकास करके वहाँ मिनी मार्केट बन सकता है। मंगलवारी बाजार में आधा हिस्से में खाली जगह पर 5/6 मजली मिनी शॉप बन सकता है। खामला में डिपी. प्लेन में डिफेन्स की ओर जानेवाली रेल लाईन हट जाने से खाली जगह पर मिनीशॉप बन सकता है। त्रिमुर्तीनगर में मटन मार्केट के वास्ते नाले पर आधा स्लॉब डालकर मिनी मार्केट बन सकता है। रवी नगर चौक पर नालेपर आधी स्लॉब डालकर हॉकर्स बैठ सकते है। गिट्टी खदान में म.न.पा. के स्कूल के सामने स्कुल बंद होने के बाद हॉकर्स को बैठ सकते है। जरीपटका और नारी के लिये एन.आय.टी. ने दी गई बाजार की जगह पर मिनी शॉप बन सकता है। जरीपटका पुलिस स्टेशन के सामने नारा घाट के सामने म.न.पा. की जगह पर हॉकर्स बैठ सकते है। वैशाली घाट के बाजू में धोबी घाट है, वहाँ हॉकर्स झोन उपलब्ध है। हॉकर्स से अमानत रक्कम लेकर वहाँ मिनी शॉप बांध सकते है। इतवारी में नंगा पुतले के पास म.न.पा. की कोई जगह नहीं है। पुलिस क्वार्टर तहसील पुलिस स्टेशन के पास पी.डब्ल्यू.डी. की जगा लेकर वहाँ हॉकर्स को बैठ सकते है। बर्डी मेन रोड के हॉकर्स के लिये पुराने किताब के बाजार में छोटे छोटे शॉप बांध सकते है। मॉरिस कॉलेज होस्टेल के पास पुरानी सडक खाली पडी है वहाँ मिनी शॉप बन सकता है। हनुमाननगर में विमा दवाखाने के पास बुधवार बाजार में मिनी शॉप बन सकता है। उसी तरह मिनी माता नगर मनपा का मैदान पडा है कलमना बाजार के सामने कुछ जगह उपलब्ध है। दही बाजार उडान पुल के नीचे अंडर ग्राउंड मार्केट बन सकता है। झांसी रानी चौक, मातृसेवा संघ के सामने हॉकर्स को बैठाया जा सकता है। 4 फुट के फुटपाथ पर दोन फुट लोगों के चलने के वास्ते जगह दीजिये और 2 फुट में हॉकर्स बैठाये। कम लागत की दुकान बनाने पर हॉकर्स लोग अमानत रक्कम देने को तैयार है जो जगह दशाई गई है वो जगह हॉकर्स को देने का विचार करें।

धन्यवाद, सहयोग तथा उत्तर की अपेक्षा.

विनीत
 (मदन थुल)
 अध्यक्ष
 विदर्भ हॉकर्स वेलफेअर असोसिएशन (विदर्भ प्रदेश)

Summary of Proposed Projects

Sector/ Component	Sub projects	Investment by ULB (Rs. Lakhs)
Water Supply		67,127
1	Source Augmentation	36,627
2	WTP	10,500
3	Water supply system in newly merged areas of NMC	20,000
Sewerage & Sanitation		68,302
1	Toilets/Sanitation	2,516
2	North Sewerage Zone	24,550
3	Central Sewerage Zone	22,063
4	South Sewerage Zone	19,174
Urban Roads, Traffic & Transport		2,160,817
Traffic management and supporting infrastructure		
1	Junction Improvements and Road marking and signages	45
2	Repair and Maintenance of existing roads	8,100
3	Road Widening/ Improvement Proposals	10,290
4	Road Links Improvements /Traffic Management	43
5	Missing links	5,070
6	Concrete Pavement for city roads in Nagpur	6,668
7	Flyovers (Four Lane on both side)	2,340
8	Rail Over Bridge (ROB)	1,264
9	Rail Under Bridge (RUB)	510
10	Bridges on River/ Nallah	48
11	Foot Over Bridge (FOB)	338
12	Pedestrian Zones, Pedestrian Infrastructure, Removal of Encroachments / hawker Management / dismantling illegal development along mobility corridor	1,100
13	Pedestrian Subways	800
Public Transportation system and supporting infrastructure		
14	Fleet augmentation	27,051
15	Bus Shelters	500
16	Bus Depots and Workshop	3,000
17	ITS (Control room / Passenger Information System and Traffic Information System)	1,500
18	Bike Sharing Plan & Bicycle lanes	357
19	Transport hub and TTMC hub cum bus stations	2,263
20	Truck terminals (Frieght management Hub)	1,875
21	Development of Parking spaces along the transit corridors	1,250
22	METRO Rail Transit System(MRTS)	1,430,000
23	Bus Rapid Transit System (BRTS)	6,730
24	Monorail	250,000
25	Commuter Rail from city to Butibori	
26	Parking facility at 72 sites	288,000
27	Busstands at 17 locations by NMC	10,200
28	Road widening and development proposals	19,350
29		

Sector/ Component	Sub projects	Investment by ULB (Rs. Lakhs)
30	Development of missing links	5,070
31	Proposals for grade separators/Fly overs	31,400
32	Rail Under Bridge (RUB) proposal	10,000
33	Rail Over Bridge (RoB) proposal	17,776
34	Proposal of bridges on river	2,880
35	Goods transport improvement proposals	15,000
Storm Water Drains		275,205
1	North Zone	49,100
2	Central Zone	89,059
3	South Zone	137,046
Street Lights		0
	Master plan	0
Solid Waste Management		36,814
1	Landfill site	1,568
2	SWM treatment plant	33,969
3	Procurement of New Vehicles	1,276
Slum Housing		481,090
1	Housing - Typology 2 - de-notifocation	0
2	Infrastructure - Typology 2 - de-notifocation	25,051
3	Housing - Typology 3 - tenureship	295,333
4	Infrastructure - Typology 3 - tenureship	36,014
5	Housing - Typology 4 - Relocation	109,023
6	Infrastructure - Typology 4 - Relocation	15,668
Rehabilitaion of Heritage Structures		53,354
1	Conservation and preservation of Heritage structures	26,327
2	Digitizing of all the heritage structure and precincts	250
3	Documentation of all the heritage structures/Booklet	100
Tourism Development		20,073
4	Development of Nagpur as tourist hub- Phase I	73
5	Tourism development in and around Nagpur	20000
Urban Governance/ System Modernisation		8,022
1	Strengthening existing E-Governance system	2,250
2	Capaicty building	5,147
3	Strengthening of the NMC administrative system	626
Social Infrastructure		19,442
1	crematoria	486
2	Schools	5,263
3	Hospital	2,518
4	Social and cultural Infrastructure	2,348
5	Reviving the gardens and parks	1,000
6	Construction of Vasant Rao Narkhedekar Cultural/play threatre	47

Sector/ Component	Sub projects	Investment by ULB (Rs. Lakhs)
7	Convention and Exhibition Centre	7,500
8	Construction of modern hygienic Fish markets in City	280
Lakes and Rivers Rejuvenation		45690
1	10 lakes - rejuvenation	5725
2	Nag River	13729
3	Phutula Tributary	2106
4	Pili River	16478
5	Pora River	7654
Disaster Management, Fire Fighting and Emergency		4737
1	Preparation of Revised Disaster Management Plan	23
2	Disaster and resuce training and facility centre	50
3	Procument of Fire Fighting and Resuce vehicles	4526
4	Various development work within city for mitigating disaster	138

Minutes of the meeting – Technical Advisory Committee

Discussion on Draft CDP for Nagpur

Date	24 th November, 2014
Place	Nirman Bhavan, MoUD, Delhi
Agenda of meeting	Discussion on draft CDP for Nagpur with Technical Advisory Committee (TAC)

Discussion points for Nagpur

Chapter	Discussion points
Project Background	<ul style="list-style-type: none"> • The figure 3 to be updated for all the CDPs • Table 2 to be updated with the latest progress of the projects • Section 1.8.1 to be written as formation of committees and the photos to be enlarged • Section 1.8.2 to be revised as composition of stakeholders
Introduction to city	<ul style="list-style-type: none"> • Need to provide a brief about the oranges in the introduction chapter • Figure 5: Check the spellings • Figure 6: Area of the jurisdiction has to be mentioned in the maps • Section 2.4.4 to be expanded further • Need to discuss on the santra markets in the city
Demography	<ul style="list-style-type: none"> • Need to discuss on the decline in the population growth rate of the city • Decadal growth rates to be provided for the projected population. • In the population projections, need to give explanation regarding the method considered for the population projections • The key issues to be improved further
Economic profile of the town	<ul style="list-style-type: none"> • Need to decrease the font size in the figure 11 • Provide the regional map of MIDC • Provide the map of markets, small scale industries and CBD areas and zone in the Nagpur. Also, need to propose the projects related to redevelopment of the existing markets • Table 14 to be renamed and to mention about the district • Table 17 to be updated • The description of economic activities should be categorised under primary, secondary and tertiary sectors. • Section 4.5- the figures to be updated • Remove section 4.6 • Remove Section 4.8 • Key observations to be linked with the discussions with the stakeholders • Key issues to be elaborated further
Physical planning and growth management	<ul style="list-style-type: none"> • Section 5.3 to be updated with population projections and the year as 1972-2020 • Figure 15 and 16 to be presented in A4 along with the legend • Table 20 to be updated and provide the figures with decimals • Section 5.6.5 to be updated and provide the information about the NMR • The key findings of the section to be elaborated.
Social environment	<ul style="list-style-type: none"> • Table 24 and has to be revised as per the hierarchy of the hospital • Table 27 to be updated and update as health care facilities • Table 29 to be updated and provide the gaps in the each area and include the date related private schools etc • Including the recreation facilities section

Chapter	Discussion points
Infrastructure and services	<ul style="list-style-type: none"> The water supply section should be update as per the data provided by NMC- water supply department In SWM section, the DPR for SWM is being considered in the CBUD project – to be mentioned in the report.
Urban roads, traffic and transportation system	<ul style="list-style-type: none"> Need to talk on the regional network of Nagpur Need to provide a table on the hierarchy of the roads in the city Need to present the state level road network map with connectivity to Nagpur etc; and remove the word Asian in the map Figure 26 to be enlarged Existing transport facilities to be discussed as a) Bus stands/ terminals b) Truck terminals C) Warehousing Key issues to be enhanced further The section on parking to be revised and also provide the location of the parking facilities Table 64 : name of the table has to be updated Traffic issues to be discussed
Housing and urban poverty	<ul style="list-style-type: none"> The graph 34 to be revised and provide the analysis for the last two years Table 69 and 70 : the heading has to be revised Need to mention a para NIT, SRA and MHADA The projects and strategies to be prepared for stray animals
Urban Environment	<ul style="list-style-type: none"> Graph 39, 40, and 41 : the source to be provided Listing of the rivers to be presented Figure 34 to be enlarged Key issues and concerned to be elaborated further Need to mention on the lakes and also discussing on the lettering in the lakes and rivers side Disaster mapping, sensitivity mapping to be collected presented –for Itwari, Sitabuldi and Mahal office
Cultural resource, Heritage and tourism	<ul style="list-style-type: none"> The sequence of the sub section to be changes; it should in following sequence 12.2, 12.3 and 12. 1 The tourism data to be collected and analysed further Need to provide the missing figures
SWOT analysis	<ul style="list-style-type: none"> The stakeholder consultations to be presented in a sequence Revise the section as per the Guntur Modal Table 87 to be improved further
City Vision and Development goals	<ul style="list-style-type: none"> The vision should be discussed in the final workshop and accordingly the section to be updated in the final CDP Figure 51 to be revised
Stakeholder consultations	<ul style="list-style-type: none"> In table 76, need to replace rank with priority area Section 16, the photograph to be enlarged The stakeholder grouping to be done The projects should be proposed in line with the stakeholders suggestions on the economic activity of the city Table 79 the heading to be changed as development goals and action to be taken
Sector plans	<ul style="list-style-type: none"> The projects in water supply to be divided into components In sewerage project, the component name has to be revised Table 117: names of the junctions to be annexure to the report

Other general comments

1. Remove the table numbers in the annexure

Action Taken Report

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
Primary observations on the Interim CDP		
The title of CDP to indicated along with horizon of the development plan viz., CDP for Nagpur City _ 2041		
As stated “The First generation CDP for Nagpur was prepared in 2006, with an aggregate investment requirement of Rs. 5894 Crore”. Of which 19 projects of Rs. 1518 Crore was approved for funding by the Gol. Hence the Revised CDP may identify and list the bottlenecks faced during the 1st CDP and information may be used to prepare strategies in the current Revised CDP (horizon 2041) to plan, finalize and draw-up projects for each sector of development.		<ul style="list-style-type: none"> ■ Horizon period considered for Nagpur’s revised City Development Plan (CDP) has been indicated on cover page. The suggested title of the CDP has also been incorporated.
Consultant may clarify the concepts of “work –Force” and “workforce Participation ratio” with respect to the demographic assessment of workers and population.		<ul style="list-style-type: none"> ■ As suggested, the list of bottlenecks for projects that were not taken up for implementation as identified in 1st CDP have been discussed in section on “Brief scenario post 1st generation CDP”. Also, some of the bottlenecks in implementation of the identified projects under 1st generation CDP for each of the sector have been discussed in relevant sections in the report.
Maps submitted in Greyscale don’t reflect the actually intended location/network, and some of them are not placed with proper legends of items inbuilt.		
Mostly maps of the report are not place appropriately along the relevant sections/chapters. This may be corrected and maps maybe placed appropriately.		
Demographic Projections of population and sectoral service population have found to be in contradiction at different section of the report. Also the plan horizon of some sectoral plans is not convergent on the same Time-horizon. These maybe synchronized.		<ul style="list-style-type: none"> ■ Terminologies like “Work-force” and “Workforce participation ratio”, both were used and representing workforce participation in Nagpur. In order to avoid confusion word “Work-force” has been omitted in the Draft report.
Reporting of workshops for CDP preparation involves 3-stages of conducting workshops. This may please be reported as per revised CDP preparation toolkit, 2013.		<ul style="list-style-type: none"> ■ In case of greyscale maps, one set of colour copy and two copies of black and white were submitted. ■ Inconsistency in the population projection in Demography and various sectoral has been corrected and synchronised in the Draft CDP. ■ Two stages of workshops/stakeholder consultations (Inception and Interim) were carried out for preparation of revised CDP for Nagpur and the details are is provided in Chapter 15 - “Stakeholder participation”. Reporting of the workshops is as per the revised toolkit

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
		<p>2013. The third and last stakeholder workshop shall be conducted post submission of the Draft CDP report. In addition to these workshops consultants have also conducted individual key stakeholder meetings and focus group discussion on specific sector, which are discussed in the report.</p>
Project background		
<ul style="list-style-type: none"> ■ IPC and CTGs are constituted to direct and refine the outcomes of the consultation towards better prepared CDPs. The details of the consultant’s meeting with the CPC and CTGs to facilitate preparation may also be reported. 		<ul style="list-style-type: none"> ■ Focus group discussions (FGDs) were carried out at Nagpur, which was headed by the CDP Policy committee and Technical committee members. The details of the FGDs is provided in the stakeholder consultation section.
Physical Settings		
<ul style="list-style-type: none"> ■ The regional setting has been appropriately discussed however, report on passenger load on the rail links and average daily domestic & international arrivals & departures may be mentioned ■ Section 2.5 may also include groundwater table, topography and Terrain, Elevation, Gradient and Natural drainage, Faults & Seismic zones 	<ul style="list-style-type: none"> ■ The chapter could have summarised the SWOT for the Regional setting and its attributes 	<ul style="list-style-type: none"> ■ The details regarding the passenger load on the rail links and annual load on the airport at Nagpur is provided in the section 2.2.1 of chapter 2. ■ The details on groundwater table, topography and Terrain, Elevation, Gradient and Natural drainage, Faults & Seismic zones has been provided in the section 2.5 of the report and also at the relevant sections of the draft CDP report.
Demographic Profile		
<ul style="list-style-type: none"> ■ Trend shown at Table 5 indicate that the population growth is stabilizing gradually however, CDP has not projected population for the city till the planning horizon. ■ Item 4 of key Findings may not be a correct interpretation for the stabilizing population. 	<ul style="list-style-type: none"> ■ It is expected that an appropriate projection is done and included in this section. ■ Population density maps may be included here. 	<ul style="list-style-type: none"> ■ Population projections for Nagpur have been revised and accordingly the trends are changing. Thus as per the revised Projections, increase in population is expected due potential employment opportunities that will be created due to MIHAN. ■ The population projections have been made after due consultation with NMC

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
		<p>officials. Further, these projections are in line with the projections made in various DPRs and technical studies carried out for Nagpur the same were verified using various methods.</p> <ul style="list-style-type: none"> As suggested, the map showing ward wise population density has been provided in the Chapter 2.
Social & Cultural Environment		
<ul style="list-style-type: none"> Facilities of health, Education and Recreation need to be analysed w.r.t. the URDPFI Guidelines for adequacy and qualitative aspects of the inventory could have been tabulated for prioritized programmers/project Floating population during the festivals and necessity of additional services for them may be estimated with quality measures. 	<ul style="list-style-type: none"> Social Environment – should report the different social and religious organization Culture Environment should report different art and culture establishments. Heritage is an integral part of culture environment, but it is desirable that a separate chapter be included in CDP for HRMP. 	<ul style="list-style-type: none"> As suggested, the prevailing status of health, education and recreation infrastructure has been compared with the URDPFI guidelines and the findings have been discussed in the sections 6.2.4, 6.3.2 and 6.4.3. Separate section on Culture and Heritage has been made, which is presented in chapter 12.
Economic Base		
<ul style="list-style-type: none"> This section only mention the 4 primary sectors of agriculture, Floriculture Mineral resources and fisheries A broad analyst should include employments in primary secondary and Tertiary sector with their respective contributions to the economy Briefly mention the MIDC and MSME: <ul style="list-style-type: none"> The current employment in MIDCs and the potential employment generation at the plan horizon may be stated. Stated that about 1.2 Lakh direct and 2.4 Lakh indirect job potential of the MIHAN project, expected to add 1.2 Crore population. Worth of current transaction in the daily and weekly markets 	<ul style="list-style-type: none"> Along with the expected population addition and potential employment generation, it is desired that the location of the planning zones for MIHAN be shown in a city Map and added in the CDP Broad estimate of workforce based population projection at horizon maybe done for estimates of employment opportunities necessary. This should have been a separated chapter. 	<ul style="list-style-type: none"> The future employment pattern in the city has been discussed in the section 4.6 (workers projections) The Informal sector in the city has been discussed in the section 4.3.2 (Informal commercial activity) The information on exiting industries, employment has been discussed in chapter 4. As per the TOC provided the overall SWOT analysis has been discussed in the chapter 4. As suggested, the separate chapter on economy has been provided in the Draft CDP.

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
<p>handling capacity and infrastructure needs for up gradation be stated Table 11: May please add the “unit “ of area in column 4 and remove “sq.km” of area in column 5.</p> <ul style="list-style-type: none"> ◆ Please refer item 4 primary observation at page 2 		
Land Use		
<ul style="list-style-type: none"> ■ Proposed land use at 2021 and 2031 have been indicated, it is however desired that these may be compared w.r.t the URDPF Guidelines, 2014 and devise methods to rationalize with the projected requirements. ■ The planning horizon being 2041, proposals in this CDP should be projected to 2041. 	<ul style="list-style-type: none"> ■ Existing and Proposed landuse maps should replace the city base map as placed in the section. 	<ul style="list-style-type: none"> ■ Comparison of proposed landuse for 2021 and 2031 with URDPFI guidelines has been provided in the Draft CDP. ■ Proposals for development at Nagpur as identified in the Draft CDP are based on the projections carried out till 2041. ■ Along with existing and proposed landuse maps, copy of base map is also provided in the report.
Baseline environment		
<ul style="list-style-type: none"> ■ CDP has excellently presented deteriorating Air, water & noise quality in environmental status reports (ESR) of the municipality EMP. ■ However the detailed assessments should have lead to inferences for working strategies of the environmental management plan (EMP) for the Revised CDP. 	<ul style="list-style-type: none"> ■ The chapter should also have included Urban Green Spaces as a Baseline for urban environment assessment. 	<ul style="list-style-type: none"> ■ Urban Green Spaces as a baseline for urban environment assessment is provided in the Chapter 10 on Local environment in draft CDP.
Cultural Resources & Heritage		
<ul style="list-style-type: none"> ■ CDP has listed heritage monuments and sites along with national parks in Nagpur ■ It is desirable to have location maps and zone maps for the national parks and identify factors that directly or indirectly pose threats to them and strategise mitigation 	<ul style="list-style-type: none"> ■ Intangible Heritage resources like traditional folk arts and handicrafts also needs attention for sustenance and may also be included. ■ Temporary resources/services needed during the fairs and festivals could also be addressed. 	<ul style="list-style-type: none"> ■ As data for intangible heiritage resources is not readily available and its not a core function of the ULB. In the absence of data for suggested intangible heritage, the review of the same is difficult. ■ Proposal of creation of database for heritage in Nagpur is envisaged. This

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
measures.		<p>will ensure that even intangible heritage if any will be covered. Details are provided in the Chapter 18.</p> <ul style="list-style-type: none"> Private organisations and groups manage various fairs and festivals within Nagpur. While provision of basic services like water supply, mobile toilet blocks, collection of waste is taken care by NMC during major festivals and fair; otherwise, it is managed from private service providers available within city.
Infrastructure Services		
Water supply		
<ul style="list-style-type: none"> NIMC has a water supply master plan 2031 and is implemented in PPP for 30 years has abundant natural surface resources but is marked with a heavy 53% NRW. Total projected water demand till 2041 may be worked out based on projected population and floating population and plan for phased augmentation to meet the demand. 	<ul style="list-style-type: none"> CDP to identify the causes of high loss of treated water and limit the NRW to 15% or lower. 	<ul style="list-style-type: none"> Causes of high losses and NRW in water supply are discussed in the chapter 7 under section 7.1. Also, strategies are proposed to reduce the NRW levels from 53% to 20%, the same are discussed in the chapter 18 under section 18.1. Total water demand till 2041 has been worked out based on projected population and details have been provided in the chapter 7 under section 7.1.2. Based on our discussions with officials, and review of water supply DPR, it was assumed that there is no significant floating population in Nagpur.
Sewerage & Sanitation		
<ul style="list-style-type: none"> NMC has prepared sewage master plan for 2043 the horizon maybe synchronised with the CDP horizon of 2041 and estimate be made @ 80% of treated water supply. The strategy for treatment capacity augmentation maybe worked out based on zonal STP capacities or decentralised waste water treatments plants. 		<ul style="list-style-type: none"> NMC's sewage master plan for 2043 the horizon is synchronised with the CDP horizon of 2041. Based on the projected population and future sewage generation estimated till 2041, strategy for treatment capacity augmentation has been worked out based for three sewerage zones.

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
Solid Waste Management		
<ul style="list-style-type: none"> ■ 750 TDP waste delivered at compost plant, operating on PPP-BOT for 12 years Total projected solid waste till 2041 based on projected population and floating population may be worked a out and plan for phased augmentation of treatment inventory, condition repair/replacement needs & cost estimates till horizon (2041) may also be included. ■ CDP needs to recommend decentralized waste water treatment and solid waste management with an objective of zero discharge and zero waste. 	<ul style="list-style-type: none"> ■ TNA for capacity building in NMC personnel to take over operation of treatment plant by the next 12 month also be placed in CDP. ■ Proposal of rationalised user charges and other efforts to meet the SLB benchmarks of MoUD be also included. 	<ul style="list-style-type: none"> ■ Proposal to rationalised the user charges and strategies to meet the SLB benchmarks of MoUD are included in the chapter 18 under section 18.3.2. ■ TNA requirement for NMC staff members is recommended in the Draft CDP and details have been provided in the relevant sections.
Urban Roads, Traffic & Transportation		
<ul style="list-style-type: none"> ■ CDP to assess and assign minimum standards of lux for specific use zones during dark hours appropriate illumination and lighting devices for public spaces as per table 34. ■ The CMP may be revised with horizon 2041 or workout all additional vehicles as per growth trend (with NMT) till 2041 and estimate need of new roads other traffic infrastructure needs. ■ It is desirable to find the current modal split and identify factors influencing the split. The results may be used to make strategies to encourage and incentivise public Transport. ■ Estimated demand till horizon of 2041 be worked out and phased plan be prepared after approval of Gol and GoM. 	<ul style="list-style-type: none"> ■ Parking needs may also be estimated and prioritization of 'paid parking' facilities in parking demand zones be proposed. 	<ul style="list-style-type: none"> ■ Based on the vehicular projections in the CMP of Nagpur till 2041, the projects have been identified. Same projects have been taken up in revised the CDP after discussing with NMC and NIT officials. ■ Existing modal split is provided in the chapter 8 under section 8.2 (8.2.2). ■ Also, phase wise implementation of the CMP is considered and accordingly CIP for short term and long term has been provided in chapter 19 under section 19.2.1 and 19.6. ■ Detailed section on parking facilities in Nagpur has been provided in section 8.2.4.
Housing		
<ul style="list-style-type: none"> ■ NA 	<ul style="list-style-type: none"> ■ Table 42 is erroneous as per the sector reported and may be removed. 	<ul style="list-style-type: none"> ■ The suggestion in this section has been incorporated.

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
Urban Poverty		
<ul style="list-style-type: none"> CDP is to estimate the social representation of the poor as per figure 34 pyramid for CDS and initiate assessment and quantification of technical and financial assistance for welfare and awareness programmes. 	<ul style="list-style-type: none"> This section may be merged with section 8.9 to make an overall plan for the urban poor. 	<ul style="list-style-type: none"> As suggested the section has been merged with the Housing section to provide an overall plan for urban poor in Nagpur. .
Institutions, Systems And Capacities		
<ul style="list-style-type: none"> NMC handles 17 functions out of 18 in the 12th schedule. Training assessments needs (TNA) for the ULB personnel may be worked out in the short-term and long term to undertake all functions by 2041. 		<ul style="list-style-type: none"> Undertaking Training needs assessment study has been recommended for NMC.
Financial Assessment		
<ul style="list-style-type: none"> Table 48 shows strong financial position of the municipality However, a robust property tax mechanism has to be evolved in the CDP (maybe with GIS support) to avoid pending arrears and tax defaults. 	<ul style="list-style-type: none"> Rational user charges maybe proposed for SWM and sewerage with efficient recovery systems. 	<ul style="list-style-type: none"> Rational user charges proposed for SWM. As per the MMC Act provisions, water and sewerage benefit taxes along with other taxes are proposed.
Stakeholders Participation		
<ul style="list-style-type: none"> Report of stakeholders consultation is not properly organised and reported. This may be reported in proper formats with broad recommendations of each stakeholders group. 	<ul style="list-style-type: none"> CTGs to refine and arrive at priority rankings and formulate actions points. This may be further be ratified by the CPC. 	<ul style="list-style-type: none"> Focus group discussions (FGDs) were carried out at Nagpur, which was headed by the CDP Policy committee and Technical committee members. The details of the FGDs is provided in the stakeholder consultation section. The project prioritisation shall be discussed in third workshop
SWOT		
<ul style="list-style-type: none"> SWOT analysis is well presented in the format. Some other aspects of analysis need to be included in the format for e.g. informal sector, development and PPP. 		<ul style="list-style-type: none"> The suggestion has been incorporated and analysed and the same mentioned in the section 15.1.
Vision formulation, development goals & strategies		

TCPO Appraisal Comments	Appraisal Remarks	Action Taken by CRISIL
<ul style="list-style-type: none"> ■ This chapter is well presented in the requisite format as per toolkit. However, sectoral issues should lead to sectoral vision and further evolve the city vision. 	<ul style="list-style-type: none"> ■ May be re-worked according to revised toolkit (page 28-29) 	<ul style="list-style-type: none"> ■ As suggested, the chapter has been re-worked as per the revised toolkit for preparation of CDP, 2013.
Annexures		
<ul style="list-style-type: none"> ■ Annexure and pertaining referenced information has been well presented. ■ Meetings of the CDP consultant with the CPC and CTGs in process of formulation of rankings, recommendations and city vision may be represented with time and stage of preparation of interim CDP. 	<ul style="list-style-type: none"> ■ Focus group discussions (FGDs) were carried out at Nagpur, which was headed by the CDP Policy committee and Technical committee members. The details of the FGDs is provided in the stakeholder consultation section. 	

Data gaps in CDP

Sl. No	Section	Data gaps as per revised toolkit	Remarks	Criticality of information
1	Physical setting	Geology	The information on geology is not available	Low relevance
2	Economic profile of the town	contribution of primary, secondary and tertiary sectors to the GDP	The information on is not available at city level.	Low relevance
3	Cultural resources	Data on intangible heritage	Intangible heritage is not core function of ULB and does not hold much significance in Nagpur city.	Medium relevance.
		Tourism data	The the feasibility report for tourism in the Nagpur region is in progress and hence the tourism data is currently not available for Nagpur city	Medium relevance
4	Infrastructure services	Water supply		
		Identification of water sheds	The delineation of watershed is not available	Medium relevance
		Hydrological data	The information on hydrological data is not available. Hence the analysis of hydrological data has not been carried out.	Medium relevance in CDP. The information is required in preparation of DPRs.

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