

Draft for Discussion – Nagpur SCP

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1 City Profile

1.1 Quality of Life

1.1.1 Transport

Initiatives-

- ✓ Bus procurement- increased number of buses from 230 to 470 during 2012-2014
- ✓ 66 operational routes and planned additional 174 routes
- ✓ Installed signals at various locations, restricted entry of heavy vehicles in the city during peak hours and different traffic calming measures
- ✓ Work on 38Km metro line is already underway
- ✓ Created an SPV for bus operations

Impacts-

- ✓ Number of road accidents have reduced at a CAGR of 6% during the past three years
- ✓ 3% increase in people riding in public buses
- ✓ Average waiting time has reduced to 15 min, from earlier 25 min
- ✓ Average peak hour speed maintained at 30Km/hr (which is high compared to other cities of comparable size)
- ✓ Number of buses per lakh population increased from 10 to 20
- ✓ Availability of 71% paved footpaths

1.1.2 Water supply

Initiatives-

- ✓ Augmented water supply capacity to 700 MLD and water treatment capacity to 650 MLD
- ✓ Successfully Implemented 24x7 water supply pilot project (11,000 connections)
- ✓ Commenced work on 24x7 WS scale up programme
- ✓ Re-use of 130 MLD waste water on PPP
- ✓ Conducted water audit to assess Non-revenue water

Impacts-

- ✓ Water supply coverage increased from 82% to 85%
- ✓ Non-revenue water (NRW) reduced from 56% to 53%
- ✓ In the pilot area, NRW reduced from 53% to 28%
- ✓ 20,245 connections -7% of city's population receives 24x7 water supply
- ✓ 9000 slum connections i.e. 4% slum population receives water 24x7
- ✓ 28% of water connections are metered
- ✓ Water is supplied at a rate of 261 LPCD, one of the highest in cities of comparable size

1.1.3 Solid waste management

Initiatives –

- ✓ Implemented “ Bin free city” programme (2007 – ongoing)
- ✓ Separate collection system for bio-medical, hotel and market waste
- ✓ 550 TPD waste processing plant has been developed on PPP basis
- ✓ Android based mobile application for registering consumer complaints
- ✓ Plan to construct 4 transfer stations to reduce waste handling and vehicle running cost

Impacts-

- ✓ Increased coverage of door to door collection service from 50% to 80%
- ✓ Reduced number of community bins from 700 to 170
- ✓ Open dumping spots converted to parking space, landscape and other public amenities
- ✓ Increased waste processing capacity from zero to 68% of the total waste generation
- ✓ Average daily transportation cost per ton has reduced from Rs 774 to Rs.656

1.1.4 Safety/security conditions

Initiatives-

- ✓ Opened three dedicated helplines: for women, senior citizens and children
- ✓ Covered five major traffic junctions under CCTV surveillance
- ✓ Initiated GPS-based tracking system for police vehicles
- ✓ Installed signals and signage for safe pedestrian movement
- ✓ Developed traffic based theme park for educating children
- ✓ Installed 93,707 street lights
- ✓ Department of police now receives complaints through social media channel (face book and twitter handle)

Impacts –

- ✓ Crime detection rate has increased to 26% CAGR over the past five years

1.1.5 Energy availability and outages in the city

Initiatives-

- ✓ Adopted franchise model for improved operations
- ✓ Conducted regular maintenance drives
- ✓ Formed vigilance team to identify unauthorised connections
- ✓ Replaced 500 conventional street lights with programmed LED lights
- ✓ Conducted energy audit of municipal assets
- ✓ Prepared a solar city action to reduce the grid based energy demand by at least 10%

Impact-

- ✓ Coverage of electricity connections increased from 93% in 2001 to 97% in 2011

- ✓ Scheduled outages per month reduced from 7.5 hours to 4.2 hours
- ✓ Unscheduled outages also reduced to 37%
- ✓ T&D losses reduced from 32% in 2011 to 17.9%
- ✓ Installation of 500 LED street lights have accrued 68% energy saving
- ✓ Implementation of energy audit recommendations have resulted in saving of 1.8 Kwh energy units
- ✓ Achieved 20% reduction in energy demand from grid in NMCs main building

1.1.6 Housing situation in the city

Initiatives-

- ✓ Introduced Auto DCR software for hassle free building plan approval
- ✓ Conducted door to door survey for increasing property tax demand
- ✓ Rationalised property tax rates to avoid retrospective taxation
- ✓ Developed 1702 dwelling units and work on 1818 dwelling units are under advance stage of completion
- ✓ Prepared housing for all action plan

Impacts-

- ✓ Average time taken for issue of building permission has reduced from 45-60 days to 25 days
- ✓ Coverage of property tax increased from to 88%
- ✓ Property tax collection increased from INR 70.18 crore in 2011-12 to INR 101.7 crore in 2014-15
- ✓ As a result of reassessments, property tax demand in pilot area increased by 102%. Implementation of this at city level will increase the potential property tax demand to INR 547 crore

1.2 Administrative efficiency

1.2.1 Overall attendance of functionaries

- ✓ 2131 NMC employees have been covered under Biometric attendance system and remaining 6000 will be included during 2016-17
- ✓ Employee attendance has been linked to monthly salaries. This has resulted improvement in overall attendance of functionaries. Instances of dummy attendance have also reduced.
- ✓ Internal/ administrative communication has been streamlined through a personal management system application. Employees can access information related to salary, leaves, training and development, disciplinary actions etc.
- ✓ Performance of each department is evaluated based on pre-defined key result areas

1.2.2 Two-way communication between citizens and administration

- ✓ Created online platform for addressing citizen grievances through a web based module. Citizens can now easily track the status of their complaints
- ✓ Developed android based mobile application for grievances
- ✓ More than 1,800 citizens have used web platform in 2015 as against only 305 citizens in 2012

- ✓ Mayor, through his blog, Facebook page, WhatsApp and Twitter handle communicates with nearly 45% citizens to spread awareness on dengue, malaria and other initiatives
- ✓ NMC officials connect with citizens through social media platforms (Facebook, twitter etc.)
- ✓ Online citizen engagement through e-news portal, NMC website, smart city website
- ✓ Citizens provide their feedback, complaints, opinions and suggestions on the official email address of NMC
- ✓ NMC is also implementing SARATHI, a single point call center for providing municipal information.
- ✓ Nagpur District collector office offers one stop services to the public through multiple delivery channels such as physical SETU centers, electronic Kiosks and through the website

1.2.3 Use of e-governance to enable hassle free access to statutory documents

- ✓ Statutory information such as Development Plan, list and contact details of NMC staff, annual budgets, CDP, CMP, CSP and other detail project reports is hosted on NMCs website
- ✓ Till August 2015, 4 lakh birth certificates and 2.12 death certificates have been issued online since 2012
- ✓ 681 statutory licenses for veterinary hospital, waterworks, hospitals, PWD contractors, hawkers and electrical contractors etc. were issued during the same period.
- ✓ NMC has developed various software modules which are hosted on the website. As a result more than 9,000 citizens have accessed different citizen services through web and mobile platform.

1.2.4 Dashboard that integrates analytics and visualisation of data

- ✓ A water supply system dashboard supported by SCADA system is in use since 2014. The dashboard integrates critical information such as pressure, discharge, quality and leakages in the system and sends alerts to respective officials to take corrective action.
- ✓ A dashboard for citizen grievance sends alerts when complaints are not resolved within the stipulated time to higher authority.
- ✓ Dashboard for property tax module tracks key indicators such as zone wise collection and balance property tax.
- ✓ For all 62 e-governance application modules developed, different MIS reports are generated on the dashboard
- ✓ An integrated e-governance dashboard is being prepared and will be ready by the end of June 2016

1.2.5 Availability of basic information relevant to citizens

- ✓ NMCs website hosts key information such as DP, CDP, various study reports, and detail project reports
- ✓ Other information such as tenders, recruitments, building bylaws and budget documents is also made available on the website
- ✓ List and contact details of NMC staff officials is also published on the website

- ✓ Information about civic services, documents required for different applications, procedures involved, etc. is disseminated through citizen charters available at our head office and 10 zonal offices.
- ✓ Relevant information is also disseminated through NMC's e-newsletter, mayor's blog, Facebook page and NMC's Twitter handle

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2 SWOT

Based on extensive citizen engagement, expert opinions and a systematic city assessment, a Strength Weakness Opportunity and Threat (SWOT) metrics for Nagpur was drawn. The analysis, further, forms the basis of the strategic blueprint for the city discussed in the next section.

A] STRENGTHS OF NAGPUR ARE

S1) **Strategically located**- Nagpur is the geographical center of the country. On account of its strategic central location, Nagpur enjoys a seamless road, rail and air connectivity to major urban centers such as Delhi, Mumbai, Pune, Hyderabad, Bangalore and Chennai. Riding on its geographical location and a robust connectivity profile, Nagpur has the potential to become a key logistics hub of central India

S2) **Competence to implement PPP projects successfully**- Nagpur is perhaps the only city in the country with a broad-based PPP implementation competence. The city has implemented PPP projects such as 24*7 water supply, recycling and reuse of 130 MLD wastewater (to commence operation by December 2015), installation of LED street lights in place of conventional street lights, city bus operations and collection and treatment of solid waste management. The city has been able to improve efficiency of these services through effective leveraging of the private sector expertise

S3) **Rich mineral base**- A large reserve of various mineral resources within the Nagpur Metropolitan Region has led to development of mineral based industries. The key minerals found in the region are; coal (23% of state's reserves), manganese (45% of state's reserves), and limestone and iron ore (76% state's reserves). These minerals are raw materials and have led to development of power, cement and steel manufacturing sectors in the region.

S4) **Endowed with water resources and availability of affordable industrial land**- Presence of abundant water resources and affordable industrial land makes Nagpur a compelling case for investment. The presence of perennial rivers such as Pench, Kanhan and Vena endow the Nagpur region with abundant water resources; Vena dam has a capacity of 23.5 million cubic meters and the total line storage capacity is 380 million cubic meters. Additionally, industrial land available in MIHAN, Butibori and other industrial areas can propel industrial growth with industrial land prices being only 10% and 14% of the industrial land prices in Thane and Pune respectively

S5) **Effective delivery of core urban service**- Nagpur has been at the forefront in delivering effective delivery of basic public services. The city today supplies 261 LPCD water to 85% of its population, which is much higher than benchmark of 135 LPCD. 96% of households (including those in slums) are covered with sewerage network and 97% households are connected to the power grid. Nagpur is also one of the cities to have successfully implemented 24x7 water supply pilot project serving 1.75 lakh population. It has been one of few cities to have implemented bin free city programme.

S6) **Development of 38 km metro corridor at the right moment** - Nagpur is the only city in Maharashtra after Mumbai to invest in developing a 38 km metro corridor. The investment comes at an ideal time to address the city's public transit woes. The proposed metro will connect MIHAN area and other commercial

locations such as Sitabuldi, Itwari and Mahal with the residential neighborhoods in the city. This will enable easy mobility of citizens and reduce dependence on private modes of transport

S7) Tiger tourism hot-spots are easily accessible from the city - There are an estimated 243 tigers and 3 Project Tiger within the Vidarbha region. The region also has 4 national parks which attracts tourists in large number (520,000 in 2009). Nagpur is the key access point for reaching these tourist locations which can add to city's economic potential

S8) Established medical and education hub of Central India - With nearly 700 hospitals, the city has a total bed capacity of 9,000. With 3 beds per 1,000 population, Nagpur is a medical hub for the central India region. With 35 engineering colleges, 3 medical colleges and a host of research and professional education institutions, Nagpur has emerged as the education hub of central India. Reputed institutions such as VNIT, NEERI, IIM-Nagpur and Nagpur University are present in the city. With the upcoming IIT and AIIMS, Nagpur will be able to expand on its reputation as an education hub and also facilitate setting up of startups and other entrepreneurial ventures

S9) Experience in set up and management of SPV - The NMC has already set up an SPV in the form of the Nagpur Environment Services Ltd. for implementing the 24*7 water supply project in Nagpur. In addition, the Nagpur Improvement Trust is also akin to an SPV which has been executing urban development projects in the city's periphery. Thus Nagpur has substantial experience in setting up and management of SPVs which is essential for implementation of smart city programme in the city

B] WEAKNESSES of NAGPUR- PRIORITY AREAS

W1) Unplanned and haphazard development- Over the years, there has been an increase in unauthorized layouts and illegal developments that currently make up the eastern (north to south east) periphery of the Nagpur. It is estimated that there are over 2450 unauthorized layouts that have developed in violation of the proposed land-use of the Development Plan of Nagpur. This includes Mauza such as Nara, Nari, Wanjara, Wanjri, Bharatwada, Pardi, Watoda, Tajbagh, Manewada and Somalwada

W2) Inequitable distributions of civic infrastructure services to one third of its population- The 2450 unauthorized layouts are estimated to house ~30% of the city's population. Being illegal, these layouts are unable to access civic services and continue to subsist in squalor. Services such as adequate water supply, sanitation and sewerage, public transport, and street lighting are not available to this section of the society. This has severely affected livability parameters and has offered compromised quality of life to those dwelling in such layouts

W3) Gaps in delivery of core infrastructure- While Nagpur scores well in terms of delivery of core services, there are evident gaps on account of operational inefficiency and aging infrastructure. Although, NMC supplies 260 LPCD water, about 100-115 LPCD reaches consumer end signifying 56% non-revenue water. However, NMC under its 24x7 water supply scale up project is already taking initiatives to curb incessant water loss and bring NRW to below 20% level. Completed pilot project demonstrates the same

W4) Administrative and operational inefficiencies affecting quality of public service delivery- While, NMC has developed more than 60 e-governance modules, reach of these services has been fairly limited. Further, limited convergence and compartmental approach of government departments has also affected

overall service delivery. Although use of IT/smart technology for facility operations is fairly limited at present, NMC has already introduced IT systems such as SCADA system, smart LED street lights on pilot basis. However, it is now necessary to scale up the use of technology to achieve incremental benefits of improved operations.

W4) Limited share of public transport- Currently, public bus transport caters to only 9% of the commuting population. Despite efforts such as route rationalization and procurement of additional buses, the city has had limited success in shifting its commuting population to the public transport system

W5) Limited employment opportunities- Workforce participation of only 34% speaks volumes about the availability of employment opportunities in the city. An estimated 11,000 engineers, ~800 management graduates and ~250 doctors graduate from Nagpur each year; retaining this skilled workforce is a challenge since local employment opportunities are fairly limited

C] OPPORTUNITIES for **ECONOMIC PROSPERITY** and **IMPROVE LIVABILITY**

O1) Roll out of Goods and Services Tax (GST) - Distribution of goods from Nagpur to various parts the country will be cost effective with GST implementation and would result in Nagpur becoming a mother distribution center

O2) Potential to become a multi-modal logistics hub with MIHAN playing a key role- While GST will make Nagpur a cost-effective distribution center, its connectivity via rail, road and air will make it an attractive location for multi-modal logistics activity. The growth of MIHAN will also ensure creation of a diverse economic base propelling all round development in Nagpur

O3) Transit Oriented Development along 38 kms of Metro corridor planned- Two Metro routes of 38 km have been planned across the city. Works for 6 kms are already underway. High density mixed development, through FSI of 4 or more, along the Metro alignment will encourage TOD in areas like Sitabuldi and Jail ward. Shifting the Central Jail will unlock prime real estate which can then be utilized for developing high density retail / medical / entertainment zones. TOD along metro can be further leveraged to develop compact and connected neighborhoods in the city

O4) Untapped potential of government land- A large number of government, industrial and NMC land is available for development. Land along metro corridor (Jail land) and other important locations (Wathoda, Bhandewdi) are being planned for commercial and other amenities' development. Presence of huge government land at strategic location presents opportunity to fund infrastructure demand through land financing

O5) Skill Development Centre planned - Building upon the Make in India and Skill India programs, Nagpur is developing a Skill Development Center to train the youth in some critical skills. With skilled labor being made available locally, it will be a win-win situation for both employers and job seekers

D] THREATS TO STRATEGIZE FOR

T1) 36% population lives in slums; supply of affordable housing limited - Despite attempts to provide extensive affordable housing, 36% of Nagpur still lives in slums. This indicates that the supply of affordable housing has not kept pace with the demand. Efforts under the Slum Rehabilitation Authority (SRA) and Housing for All should doggedly focus on providing good quality of life and affordable housing

T2) Presence of unauthorized layouts in the eastern periphery - A large number of unauthorized layouts exist on the eastern periphery of the city abutting the Bhandara road. The Bhandara road is fast emerging as a warehousing and logistics centers which will attract population due to employment opportunities. Abysmal quality of life in these unauthorized layouts can limit the growth of a logistics hub along the Bhandara road

T3) Over 12.5 lakh private vehicles ply on city roads - Nagpur has over 12.5 lakh private vehicles plying on city roads, suggesting a threefold increase in the last decade. Issues such as parking, noise and air pollution have increased due to this unmitigated increase in vehicles. Lack of a reliable and efficient public transport system is further compounding the problem

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3 Strategic blueprint

In response to the most pressing and relevant challenges of urban planning, urban mobility, Environmental Sustainability and Socio-economic development facing the city, 6 Urban Agendas: Responsive and Accountable Governance, Improved Livability, Sustainable Habitat, Future Proof Infrastructure, Fiscal Prudence and Economic Vitality have been identified. These Urban Agendas are further guided by 15 Strategic Directions that shape Nagpur's growth strategy to make it the most livable city

URBAN AGENDA AND STRATEGIC DIRECTIONS

UA 1 RESPONSIVE AND ACCOUNTABLE GOVERNANCE: With Open, democratic decision-making processes and effective dialogue with people to contribute their ideas, opinions, and energy to the well-being of the city, Nagpur will ready itself to implement its smart city program.

SD 1 Ignite Civic Engagement: Make Nagpur's smart growth processes a more participatory and people centric by igniting citizen connect initiatives, citizen volunteering, Area Sabha, participatory local area planning and participatory budgeting

SD 2 Digital Governance: Create robust OFC connectivity to leverage ICT for improving governance, achieving transparency in processes, assigning accountability and improving overall consumer experience

SD 3 Organizational Excellence: for effective implementation of smart city program Nagpur needs to create a repository of mutli-dimensional expertise and skill sets.

UA 2 IMPROVE LIVIABILITY: Traditional planning practices and poor inter-agency coordination has had negative impact on city's urban form and Livability. Embrace this agenda to revitalize and redevelop city neighbourhoods and make Nagpur the most livable.

SD 4 Transport Led Land Use Planning and Urban Form: Organically link land use and transport using TOD principles to create compact, connected and mixed-use urban form

SD 5 Connect Places and Move People: Make multi-modal mobility options available. Promote non-motorized transport

SD 6 Social Development: Equitable access to resources and opportunities are available to respond to the unique needs of different communities. Social development through equity lens: affordable housing, education, health care and access to skill development

SD 7 Value Neighbourhoods and Communities: Target funding toward existing communities (Old city, Sitabuldi, Mominpura, Mahal etc.) through strategies like Redevelopment to revitalize and create a compact, connected and mixed-use urban form. Create network of attractive public precincts boulevards

UA 3 BUILD FUTURE PROOF INFRASTRUCTURE: Create equitable basic infrastructure systems for all citizens and attain efficiency by leveraging technology and ICT

SD 8 Create Basic Infrastructure for all: Finance creation of basic infrastructure for 24x7 WS, Sewerage system, 24x7 Power, storm water drainage etc.

UA 4 SUSTAINABLE HABITAT: Create an ecosystem that is clean, green and uses minimal external resources to fuel its growth. Make Nagpur a carbon neutral society through initiatives: green building systems, energy efficiency, non-conventional energy and efficient waste management

SD 9: Swachh Nagpur: Focus on efficient liquid and solid waste management to create neat and clean public places

SD 10: Carbon Neutral Society: Facilitate Green Buildings, Energy Efficiency, Non-Conventional Energy, Rain Water Harvesting, use of hybrid fuel buses and maxi cabs to minimize carbon footprint

UA 5 FISCAL PRUDENCE: Ability to mobilize internal resources, cost control measures, monetization of assets, efficient revenue management and innovative financing will be necessary for implementation of Smart City Proposal and replication to the entire city

SD 11: Proactive Financial Management: Outcome linked budget, Check on cost and time overruns, well-planned operational finances and reduced sundry expenses work on the principle of “a rupee SAVED is a rupee EARNED”

SD 12: Adopt Innovative financing: Augment internal resources through, capturing land value of municipal assets, PPP, borrowing from multilaterals, capital market, incremental FSI and TDR instruments to finance not only regular capital expenditure but also for proposed smart city initiatives

UA 6: ECONOMIC VITALITY: Leverage existing strengths and build on future potential to create a vibrant economy that provides equitable employment opportunity

SD 13 Leverage existing base: Use education, health and heritage to create employment avenues to local youth

SD 14 Build on Future Opportunity: Leverage geographical location, robust connectivity and rollout of GST to build a logistics hub at Nagpur. Use MIHAN as a catalyst for future economic development

4 City Vision and Goals

Shaped by citizen responses, inputs from domain experts, and guidance from public representatives, the vision for India's Heart Nagpur is to be:

- A well-planned city with compact, mixed-use and connected neighbourhoods and promote multiple green mobility choices
- A Sustainable Habitat that is clean, green and eco-friendly and aims to become a carbon neutral community
- A safe and most Livable city that creates beautiful public places and offers affordable: Housing, Mobility, Education and Healthcare options
- A city with future proof and climate resilient infrastructure
- A Digitally Governed society that connects governments, businesses, people and spaces seamlessly to co-create an accountable and responsive governance ecosystem
- A prosperous economy that provides equitable employment opportunities

As a result of city assessment, SWOT and citizen engagement six key principles have been identified that will drive Nagpur's Smart city growth agenda: Well-planned city, Safety and Livability, future proof infrastructure, sustainable habitat, Digital Governance, and Economic Prosperity. Closely knit, these six principles shape city's Vision

Well-planned city to: address issues of informal and unauthorised layouts mushrooming on the city's periphery; unequal access to open and public spaces; create compact neighbourhoods around metro stations on TOD principles; promote walking and biking and other green urban mobility options

Sustainable Habitat relates to: addressing urban sanitation and waste management issues, use of energy efficiency technology to reduce carbon foot print: LED street lighting waste-to-energy, solar roof top water heating systems; rainwater harvesting system. Citizens have also strongly voiced for a Clean and Green Nagpur during the citizen engagement.

Safety and Livability are related to: creation of a safety environment for children, women, senior citizens, pedestrians and ensuring equitable access to open spaces, affordable housing, education, healthcare and affordable urban mobility options;

Future proof infrastructure is to address: issue of poor access to core infrastructure services in peripheral neighbourhoods

Digital governance relates to: improved monitoring of utility operations; improved service delivery; transparent governance; and convenient G2C services; improved administrative efficiency

Prosperous economy relates to: leveraging city's pool of talent, research institutes (VNIT, NEERI), healthcare facilities, tiger and heritage tourism and locational potential, MIHAN, multi-skill development, rollout of GST to create broad employment base for citizens

The vision builds on the key strengths of Nagpur and also succinctly captures the key challenges that the city aims to overcome in the next decade. Thus, the vision gains immense importance as it perfectly blends

the strengths of the city and also subsumes the challenges aiming to convert them into strengths. The key aspirations emerging from the vision are:

SD 1: Ignite Civic Engagement

Goal 1: Make community engagement a priority agenda- We will make citizens a partner and involve them in decision making for better service delivery.

Goal 2: Institutionalize Participatory Budgeting and Local area planning by 2017: To make citizens interested, informed, empowered and involved in their communities, we will institutionalize participatory budgeting and local area planning.

Goal 3: Promote and support engagement of citizens at all levels through LEAD Volunteer Initiative.

SD 2: Digital Governance

Goal 4: Leverage digital and internet technology to connect with citizens and ensure their participation in city planning

Goal 5: Create city-wide ICT backbone by 2017 - The entire city will be covered under the Nagpur City Community Network. 400 km of optical fiber network will be laid in Nagpur by 2020. The backbone will be used by NMC for its services while agencies and service providers can add layers of services and create G2C, G2G, B2C, B2G, B2B platforms.

Goal 6: e-Governance and m-Governance by 2018 - Nagpur will integrate its services on the e-Governance and m-Governance platforms to improve service delivery and citizen interface.

Goal 7: Increase the penetration of government services-Nagpur will roll out 65 citizen facilitation centers with convergence of services of government departments like district collector, police department, state transport etc. A single point helpline on the lines of 911 will be developed by 2019

Goal 8: Develop a digital platform that allows integration of multiple subsystems of citizen services- A Unified Operation Command and Control Center (UOCCC) that integrates utility services, 10 other citizen services to be established by 2019

SD 3: Organizational Excellence

Goal 9: Establish a research institute to address internal capacity issues by 2019: In collaboration with VNIT, NEERI and IIM Nagpur, establish a network of experts to create a knowledge resource pool that will help in build capacity on various domains of urban sector

SD 4 Transport Led Land Use Planning and Urban Form

Goal 10: Promote compact, mixed-use developments - using TOD instrument along Metro routes, a compact, high density mixed-use development will be encouraged. We will redevelop at least one 50 acre area by 2025 to create high density, mixed-use facilities.

Goal 11: **Utilize state/NMC owned lands for strategic developments** - publicly owned lands would be put to use for strategic purposes of introducing focused developments which would enhance the city's image. Vegetable, fruits, fish and mutton markets would be developed using state/NMC owned lands. NMC will champion a 50 acre greenfield development based on principles of compact, mixed-use habitat

Goal 12: **Become a truly inclusive community by 2025** - 75% of the unauthorized layouts in the city will be regularized and developed, all slums would be upgraded and the livability of these areas would be enhanced through provision of smart core and social infrastructure

SD 5: Connect Places and Move People

Goal 13: **Create multiple and affordable modes of urban mobility:** 38 km metro network and efficient bus based public transport system will aim at increasing the trip share to 40% from current level of 10% by 2025

Goal 14: **Be a walker's paradise-** Adopt contemporary street design principles that support, pedestrians, children, senior citizens are disable friendly. Redesign roads and streets based on TenderSURE project

Goal 15: **Ensure Last mile connectivity** – establish a demo zone covering 100 Km of dedicated bicycle tracks and 5 public bicycle sharing kiosks by 2020 to enhance last mile connectivity. This will be replicated and scaled-up to the entire city by 2030

SD 6 Social Development

Goal 16: **Promote neighborhoods that offer affordable housing choices** for citizens: device financial instruments to incentivize creation of affordable housing

Goal 17: **Promote neighbourhoods that offer affordable education and healthcare facilities:** Build up on city's health infrastructure, we will provide affordable primary, secondary, and multispecialty healthcare facilities to citizens

Goal 18: **Promote Skill Development for social equity:**

SD 7 Value Neighbourhoods and Communities

Goal 19: **Create attractive and beautiful realm of public places:** Through planting 50,000 trees, landscaping of public areas, creation of iconic parks and garden, revitalizing Ambazari and Futala lake, Nag and Pili river front, public art installation, city graffiti wall, fountains etc. attractive public places will be created

Goal 20: **10 new Inclusive open spaces by 2025** - Nagpur will develop 1 theme based garden in each of the 10 zones; this open space will be inclusive and accessible for differently-abled, old-age citizens, children and the young

SD 8 Create Basic Infrastructure for all

Goal 21: **24*7 water supply to the entire city by 2019** - Scale-up of the 24*7 water supply project will ensure that every single household in the city has access to safe and reliable water supply services

Goal 22: **Reduce the NRW to 30% by 2019** - Systematically overhauling the transmission and distribution infrastructure and layering them with SCADA systems will ensure reduction of NRW

Goal 23: **Create utility ducts across the city by 2025** - Utility ducts not only reduce recurring costs and are low maintenance, but also secure the utilities against hazards. At least 50% of roads will have utility ducts by 2025.

Goal 24: **Extensive use of SCADA system and efficiency and quality sensors** - Services such as water supply and sewerage would be monitored closely at all times to actively address issues as well as reduce maintenance

Goal 25: **Ensure 10% reduction in conventional energy demand by solar energy by 2021**: Initiatives such as neighbourhood level bio-methanization plants; installation of solar roof top water heating systems; smart LED street lights will ensure reduction in consumption of conventional energy

SD 9: Swachh Nagpur

Goal 26: **Make Nagpur Swachh by 2019** - Nagpur will implement 100% DTD segregation of waste; increase the municipal solid waste processing capacity to 800 MTD and achieve 100% scientific disposal by 2019; Increase wastewater collection and treatment capacity to 100% by 2019.

Goal 27: **Make Nagpur Open Defecation Free by 2016** - Nagpur will eliminate open defecation by providing individual toilets for every household under the Swachh Bharat Mission

SD 10: Carbon Neutral Society: Green buildings

Goal 28: **10% increase in tree cover by 2025** - Nagpur will create greener precincts by enhancing green cover

Goal 29: **LED streetlights to replace conventional fixtures by 2020** - Replacing conventional streetlights with interactive LEDs to generate 70% energy savings

SD 11: Proactive Financial Management

Goal 30: Improve processes for municipal planning and budgeting:

SD 12 Adopt Innovative financing

Goal 31: **Leverage municipal land assets for monetizing infrastructure project**

Goal 32: Access bond markets: raise municipal bonds after credit rating and finance smart city investments

Goal 33: **Make PPP as a preferred project financing model for big ticket infrastructure projects**: Further building on NMC's capacity to implement PPP projects in WS , WW, we will develop LED street lighting, NAG river front development, waste-to-energy initiatives on PPP

SD 13 Leverage on existing base

Goal 34: **Increase hospital bed capacity to 12,000 by 2021** - Leverage existing healthcare infrastructure to develop a health-hub that provides specialty and super-specialty services

Goal 35: **Create a skilled workforce over the next 10 years** - Leveraging existing educational base and Skill India program, establish Skill Development Center to impart essential skills to the workforce. Match skill demand-supply gaps to foster economic growth

Goal 36: Leverage tiger tourism, and heritage in the region to emerge as regional economic hub.

SD 12 Build on Future Opportunity

Goal 36: Increase State GDP contribution to 7% by 2025 - Aggressively promote Nagpur as an affordable and sustainable investment destination to attract high value adding industries and services (information technology). Leverage Make in India and Make in Maharashtra to promote industrial growth by providing support infrastructure. Agro-processing industries and logistics and warehousing would be further encouraged; Leverage on impending GST and established MIHAN infrastructure to grow as a logistic hub of central India.

Goal 37: Increase the work force participation rate to 50% - create ample employment opportunities to propel workforce participation and encourage women to become economically active.

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5 Citizen Engagement

5.1 Extent of citizens involved in shaping Vision and Goals

A unique and unprecedented citizen engagement initiative, focused on reaching out to every household in Nagpur for developing the Vision and Goals for Nagpur to become smart city, was undertaken. Government machinery, citizen volunteers, NGOs and media professionals participated in the campaign that reached out to ~ 50% of the households in the city (2,35,194 respondents). The inclusive engagement strategy counted in 30% women respondents, 24% self-employed, 19% service and 18% housewives. A significant chunk of senior citizens also participated in the process.

Apart from face-to-face engagement, a host of other events and activities were undertaken to maximise citizen engagement:

Face-to-face:

- ✓ Events- focused group discussions- 362 domain experts, **idea challenge presentation- xxx**
- ✓ Sensitization workshops- Visioning workshop- 2000 NMC officials; 100 navaratri mandal volunteers
- ✓ Ward committee meetings-
- ✓ Engagement through media channels- 50 opinions from eminent citizens and businesses; engagement through Sakal newspaper- 150 participants

Virtual interaction and engagement:

- ✓ Nagpur smart city website - **xxxx visits; Online participation for visioning**
- ✓ Nagpur smart city Facebook and Twitter handles - with 25,276 likes and **xxx comments**; Reach: **xxx**
- ✓ **Mass emails-**
- ✓ **Mass SMS/WatsApp messages**
- ✓ Talks and speeches by commissioner- More than 2000 students from VNIT, Rasoni college, Shantiniketan participated during the discussions
- ✓ Elected representatives- 80 councilors; 3 MLAs, Guardian Minister and the Chief Minister

Please refer Annexure 3.3 for details and snapshots of the process.

5.2 Engagement strategy to get best results from citizens

A three-pronged strategy; "popularize - co-create - crystallize", ensured unprecedented and intensive citizen and stakeholder participation at each stage.

- ✓ Popularize - Smart City program was popularized through media campaigns, discussions in citizen forums, a Smart Nagpur portal (www.smartcitynagpur.com), use of dedicated Facebook page and a Twitter handle, radio jingles and advertisements, talks and speeches by commissioner at various public forums and a Smart City Idea Challenge competition.

- ✓ Co-Create - Intensive door-to-door engagement of citizens and stakeholders facilitated articulating the vision and goals for making India's Heart, Nagpur Smart. Meticulously designed short and simple citizen survey form helped us understand key areas of improvement and priorities from citizen's perspectives.
- ✓ Crystallize – Meaningful engagement with domain experts, architects and urban planners, private service providers, media groups, and focused engagements with citizens across the 20 locations in the city allowed crystallizing the pan-city and area-based interventions. Consent for area based interventions was generated through stationary kiosks and soliciting feedback from citizens of the area
- ✓ Other dimensions of our strategy, keeping in mind the 100 day tight schedule, focused on creating a dedicated team for public outreach, promotions and citizen engagement. A war room with staff specialized in mass communication, analytics and communication design was floated. Collaboration with media (print, audio, TV and social), education and research institutes and private sector firms resulted in maximum citizen outreach within a tight deadline.

5.3 Different means of citizen engagement adopted

To stimulate our outreach strategy following four tools were put to use:

- ✓ **Digital platform to popularize, visualize and ideate-** A smart city website (<http://www.smartcitynagpur.com>), email account, smart city Facebook page and a Twitter handle, WhatsApp, SMS, etc. was created for soliciting ideas, opinions and aspirations.
- ✓ **Media platforms for visibility, branding and popularize -** Both print (dailies) and electronic media (FM radio and television news) were leveraged to increase visibility through press conferences, media events, radio and TV advertisements. Interviews of councilors, commissioners and other important stakeholders were flashed regularly
- ✓ **In-person direct engagement**
 - Interactive sessions in colleges and institutes, seminars and summits, ward-level meetings of elected representatives and citizens
 - Women participation through women networks such as Tanishka, interactions by the Municipal Commissioner at various public forums
 - FGDs with panels of experts, eminent citizens of Nagpur, business representatives, urban planners, architects, engineers, solution providers, citizen driven knowledge forums etc.
- ✓ **Crowd-sourcing –**
 - 2000 NMC officials campaigned door-to-door to solicit vision and challenges from 2.35 lakh citizens
 - 150 Navratri mandals hosted booths for information and form-filling. For vision-specific citizen engagement (Clean Nagpur), vans with hoardings, survey forms and campaigners (NMC officials and college students) visited 20 key locations across the city
 - Idea challenge and essay writing competition

5.4 Extent of coverage of citizen engagement in different media and channels

- ✓ Face-to-face engagement:
 - Door-to-door survey- inputs from 2.35 lakh households representing ~9.5 lakh citizen on city vision and priority areas
 - Meetings and public discussion forums- 15 sector specific FGDs, over 25 public meetings by commissioner, 10 sensitization lectures in colleges by NMC staff
- ✓ Media channel:
 - Citizen engagement through 15 local and national media houses, 4 radio channels and local cable operators
 - 4 press conferences specifically for various stages of citizen engagement
 - Daily press release sent to over 150 media persons
 - 53 news articles in vernacular dailies and 13 newspaper articles in English dailies. Dedicated campaign by TOI (8 FGDs and news articles) and Sakal (24 FGDs and news articles) to identify citizen perspective on smart city
 - Dedicated campaigns including on-ground events and stakeholder consultations by local media (Lokmat, Sakal) and TOI
 - WhatsApp group for continuous updates to Radio Jockeys
 - Radio & Cable TV: regular coverage by Sam TV, ABP Majha, TV 9 and local TV network, dedicated programs, regular mentions, audio/video bytes of key politicians and personalities.
- ✓ Online channel:
 - Use of MyGov.in portal to engage citizens via essay competition and discussions
 - YouTube channel- 5 short video bites by Mayor, Deputy Mayor, party leader, standing committee chairman and municipal Commissioner- with 7 subscriptions and more than 150 views
 - 'Smart City Nagpur' Facebook page and web-portal: Likes: 25,185; • Reach: 66,566; • Portal unique users: 7,779; • Portal page views: 4,332

5.5 Incorporation of citizen inputs in overall vision

- ✓ Nearly 2.35 lakh households representing ~9.5 lakhs citizens have been directly engaged in co-creating the vision for smart Nagpur. Two word clouds were created; one for the city vision and the second for listing priority areas:
 - 41% citizens desired a clean Nagpur
 - 30% want Nagpur to be green and safe
- ✓ In terms of priorities;
 - 46% citizens want access to recreation and open spaces
 - 40% citizens want more job opportunities
- ✓ Further, bulk of the ideas shared by citizens during the idea challenge competition also focused on city cleanliness and safety.

The vision built on seven key elements completely reverberate citizens' aspirations. Key words sourced through word-cloud such as Clean, Green, Safe, and Prosperous form an integral part of the vision. Further, citizens' desire to have well-planned neighbourhood that have equitable access to amenities, recreation and entertainment and public transport have also guided the city vision.

Please refer [Annexure 3.3](#) for details and snapshots of the process.

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Area-Based Proposal

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6 Summarize your idea for an area-based development (100 words)

Nagpur's area-based proposal envisions retrofitting of 951 acres of selected local area (Pardi- Bharatwada-Punapur). With an envisaged outlay of INR 876 crore spread over the next five years, the proposal aspires to significantly improve the liveability and quality of life and also resolve land-use conflict with the Development Plan. Beheld as a cornerstone initiative, the project will reflect Nagpur's uniqueness by planning neighbourhoods that are;

- ✓ Sustainable- urban planning, utilities and urban environment (climate resilient)
- ✓ Walkable, dense, compact and mixed use habitat that is well-connected with open and recreational spaces through pedestrian boulevards,
- ✓ Inclusive, safe and prosperous

Through systematic TP schemes and smart infrastructure services, the proposed retrofit will positively impact liveability of ~65,000 inhabitants. Once completed, this model neighbourhood can be REPLICATED across the city's eastern periphery to provide better quality of life to ~0.8 million people (1/3 of the city's population) making Nagpur more liveable and sustainable.

7 Approach and Methodology for ABD

A three pronged approach; Shortlist, Select and Finalize was adopted for identifying a suitable neighbourhood for area-based intervention.

1) SHORTLIST-

Selection of a zone for demonstrating smart area-based initiative for Nagpur was a multidimensional and complex process. For selection of an area for physical intervention, we started shortlisting city neighbourhoods/areas that qualified area-based solution criteria notified in the smart city guidelines. To make the process more rational and scientific, a systematic analytical framework was developed and a carefully constructed process that combined results of analytical assessment and extensive citizen engagement was adopted.

A] THE PHAE 1 of SHORTLISTING- ANALYTICAL process

We began our analysis by studying the urban morphology, spatial growth and growth pattern, density and livability parameters that existed in the city. Land-use cover analysis of the city between 1998 and 2011 suggests a sprawl towards the east and south-east of the city and a 15.47% increase in built-up area. (Refer Annexure 3.4 maps)

- Three distinct neighbourhood typologies were observed as a result of the above analysis:
 - The dense city core with heritage precincts,
 - The administrative and planned residential neighborhoods, and
 - An urban fringe dotted by unauthorized layouts. (Refer grain structure mapping in Annexure 3.4)

Subsequently, a mapping process, with an objective of developing a quality of life index for the entire city, was initiated. The city was divided into smallest planning units known as prabhag. These units were mapped against; a) availability and access to core infrastructure and b) access to entertainment, recreational and social amenities (Refer annexure 3.5- Quality of life matrix). These two parameters were ranked on a scale of 1 to 5, where 1 being very poor and 5 being very good. Outcome of the process was in the form of a composite map that indicated quality of life in the smallest planning unit (Refer 'status of core infrastructure and quality of life' map in Annexure 3.5).

Clearly, entire eastern peripheral arc, covering approximately one fourth of the city's total area, reflected the very poor status of core infrastructure and other livability aspects. Interestingly, these grey areas exactly coincide with the illegal/unauthorised layouts that have cropped up in the past. Neighbourhoods spanning from Nara in the North to Somalwada in the South were the most vulnerable habitats in the city.

While, neighbourhoods in the eastern periphery were the most vulnerable, livability in the traditional city areas such as Sitabuldi, Mominpura and Mahal was poignant on account of limited access to; a) open and green spaces, b) walkability, and c) reliable public transport.

B] Phase 2 of SHORTLISTING- Citizen Engagement

CITIZEN ENGAGEMENT

In parallel, during the first round of citizen engagement, citizens were asked to diagnose key issues in their neighborhoods affecting their livability. Physical surveys were conducted to understand the existing infrastructure availability and quality of life (Refer Annexure 3.5 for survey form). Based on the inputs from 2.35 lakh citizens, key concerns affecting the livability were recognized. Interestingly, vulnerable areas identified through citizen engagement exactly overlapped with those identified through the analytical process. More than 70% of the residents of Pardi-Bharatwada-Punapur etc. expressed dissatisfaction with civic services in their areas. (Please refer map in Annexure 3.5).

As a result of analytical and citizen engagement process, following areas were shortlisted for area-based intervention:

- Redevelopment and TOD- Sitabuldi, Jail ward and Zero Mile precinct, Mahal, Mominpura, and Rambaug slum
- Greenfield development- Chinchbhavan (was the only area with contiguous 500 acre land parcel) and
- Retrofitting- Pardi, Bharatwada, Punapur, Dighori, Manewada, Nara/Nari & Somalwada

2) SELECT- Post shortlisting of 13 areas, a framework of eight objective criteria was developed for final selection of area. These criteria were deliberated and finalised in consultation with elected representatives, urban planners and other relevant stakeholders:

- a. Existing QUALITY of LIFE and LIVABILITY condition
- b. Visible and high IMPACT- high potential number of beneficiaries
- c. High REPLICABILITY and SCALABILITY
- d. Ease of IMPLEMENTATION- availability of land and right of way
- e. FINANCIALLY-SELF SUSTAINABLE
- f. INCLUSIVENESS
- g. Potential to create a DENSE, COMPACT and MIXED USE neighbourhood
- h. Potential to LEVERAGE existing/proposed INVESTMENT

Analytical assessment against above 8 criteria and inputs from sector experts and urban planners resulted in selection of 951 acre area in PARDI-BHARATWADA-PUNAPUR for retrofit. A strategic decision was taken to cover the entire eastern peripheral arc for area-based retrofit initiative, though in three different phases.

3) FINALIZE-

Citizens also collaborated in final selection of the area. Inputs were solicited through a fair and objective set of questions that were circulated, in the form of a handout, both online as well as offline. More than xxx citizens participated in the process (Refer Annexure 3.5 for results of round 2 of citizen engagement). Through road shows, public meetings and focused group discussions, support of xxxxx residents of PARDI-BHARATWADA-PUNAPUR area was garnered.

Likewise, 30 private players and technology solution providers such as Persistent Pvt. Ltd., CII, Airtel and local enterprises were involved in the process through the stakeholder consultations and have offered wide array of suggestions and solutions that can be applied to the area-based interventions.

Also, Nagpur smart city council, a group of 362 people, comprising domain experts, urban planners, NGOs, and private partners offered their inputs to make the entire process of area-based selection and planning more transparent, comprehensive and successful.

The members of the Confederation of Indian Industry (CII), who were also a part of the stakeholder consultations, indicated that the private sector was inclined to invest in the eastern and southern parts of the city due to the Multi-modal International Hub Airport, Nagpur (MIHAN) project (based in south Nagpur) and good regional connectivity. This further corroborated the selection of area in the eastern part of the city.

Lastly, outcome of shortlisting process, analytical assessment and citizen engagement were presented to elected representatives; 130 councilors, 3 MLAs, 1 Guardian Minister, 1 Member of Parliament and the Chief Minister of Maharashtra (who happens to one of important stakeholders of Nagpur) who facilitated the selection process and upheld the interventions proposed in the area-based initiative. The General Body of NMC approved the proposal of retrofit initiative in 951 acre PARDI-BHARATWADA-PUNAPUR area with a majority.

Through a fairly democratic and scientific elimination process, 951 acre area in Pardi-Bharatwad-Punapur (PBP) was a rational choice made by Nagpur. PBP indeed is the right choice Nagpur has made strategic reasons;

- The selected area has a high impact potential; improving livability of almost 65,000 population
- Proposed metro has a starting point near Pardi will facilitate easy and affordable movement of economically excluded society
- Strategic location close to warehousing and logistic hub
- Availability of 200 acre land for monetization. Through systematic TP schemes, this 200 acre vacant land can be developed into compact, mixed use zone
- There is a potential for a skill development center that aligns with the National Skill Development Mission. Several private players have already expressed their interest to develop a skill center on PPP basis
- Retrofit initiative will promise a more socially inclusive and environmentally sustainable habitat
- 3.5 km long Nag river front can be utilized to create an iconic recreational place for the city. A DPR for Nag river front development has already been prepared.

8 Key Components of the ABD initiative

With the objective of making PBP an exemplary area-based initiative, following key components have been built-in. Successful replication of such initiative will make Nagpur a truly livable city.

CREATING SUYOJIT PBP initiative- This initiative will resolve the core issue of land use conflict of ~7000 houses through a unique and inclusive Town Planning scheme instrument. This instrument will enable a well-planned high density and mixed use PBP neighbourhood thus making it more livable.

1. RESILIENT INFRASTRUCTURE FOR PBP- to make PBP a neighbourhood that matches world class quality of life resilient infrastructure projects such as: a) PROJECT H2O- 24x7 WS including (140 km distribution network, SCADA system and 7000 smart meters), b) 140 km WW network and SWD, c) 140 km concrete roads with utility ducting
2. CONNECTED PBP- to promote efficient mobility: a) 30 e-buses to shuttle in the project area and feed into proposed metro station at Pardi, b) 140 Km pedestrian and bicycle trails with tree canopies, c) 10 interactive smart bus stops and d) 5 bicycle sharing kiosk
3. Project SWACHA PBP- a) establish 10 state of the art e-toilet facilities, b) develop 10 MTD biomethanation project, c) establish one bring back center for waste recycling, d) smart waste collection through GIS and RFID tagging system
4. PROJECT GREEN LIGHT – To ensure sustainable power supply: a) 4000 roof top solar water heaters will be distributed, and b) smart grid project (with smart meters and SCADA system) are proposed
5. EVERGREEN PBP- for clean, sustainable and carbon neutral environment initiatives such as: a) rooftop harvesting on 4000 new residential units, b) 8 MLD packaged STP, c) 7000 rooftop solar water heating systems, d) 50 acre green space and urban forestry project, and e) planting 10000 trees have been proposed
6. NIRMAL NAG initiative- a 3.5 km stretch of Nag river will be developed as a world class river front with acres of open and green spaces, attractive promenades inter connected with pedestrian trails and bicycle routes
7. PROJECT HOME SWEET HOME- as part of the project, 4000 affordable housing stock will be created and will be dovetailed with Housing For All mission and other MHADA housing programmes
8. PROJECT ABHAY (Safety)- To make PBP more safe for residents, business, and women, following subcomponents were identified: a) 9400 smart LED street lights, b) A smart police outpost under CCTNS programme, c) Smart police complaint kiosk and d) 10 CCTV cameras at important locations
9. PROJECT KAUSHAL PBP- 10 acre multi-skill center campus with incubation infrastructure and handholding support
10. SHIKSHIT and NIRAMAY PBP PROJECT- Develop one 500 bed multispecialty hospital with special focus on affordable oncology treatment. Also develop one affordable international standard primary and secondary school with a capacity to accommodate 500 students

9 SMART Urban form

Smart PBP neighbourhood initiative, through a TPS instrument, combines five coherent urban forms to create a more vibrant and livable city.

1. Urban CONNECTIVITY, ACCESSIBILITY and MOBILITY

- Create a comprehensive 140 km street network with revamped street design that indulge diverse activities (designated street vending, dedicated pedestrian and bicycle lanes, bus stops and other civic amenities) through CONNECTED PBP initiative
- To prioritize mobility of citizens over vehicles, CONNECTED PBP initiative focuses on green transport (30 e-buses enabling citizen movement within and outside the neighbourhood). 5 smart and interactive bus stops will also be developed as part of the CONNECTED PBP initiative
- The proposed area is within the 500m radius of the metro station on the north-south corridor. Non-motorized transport connecting the metro station to Pardi has been proposed in the form of maxi cabs (electric cabs) which are already in use in the city.

2. Urban WALKABILITY

- A network of more than 140 km well-designed pedestrian boulevards that connect key community places, parks, riverfronts and markets will promote walkability
- Similarly, redesigning of 10 junctions and introduction of 10 bicycle sharing schemes will further promote walking and NMT

3. ATTRACTIVE and GREEN PUBLIC REALMS

- PBP neighbourhood will improve its public realms through 5 parks and gardens covering 50 acre area (EVERGREEN PBP initiative)
- Also, a world class, 3.5 Km Nag riverfront project will further add to the list of open and green community spaces in the city (PROJECT NIRMAL NAG)
- Additionally, public spaces will be activated through public art installations, street landscaping, graffiti walls, water fountains at square, cleaning street rubbish etc.

4. DENSE and COMPACT Neighbourhood-

- Through a systematic TPS a 200 acre land available in PBP will be utilized for creating a dense and compact neighbourhood. Implementation of projects such as HOME SWEET HOME and PROJECT KAUSHAL shall ensure a compact
- Regulatory use of higher FSI/TDR and enabling DC rules will facilitate land pooling and thus enable market driven densification in PBP area.

5. MIXED LAND USE

- Regulatory enforcement of at least 30% mixed use in PBP area as per new DC rules developed under proposed TPS
- Implementation of ; project HOME SWEET HOME, Project KAUSHAL, Project SHIKSHIT and NIRAMAY PBP and development of commercial , retail and market place in the 200 acre land parcel available in the PBP area will ensure a mixed-use, self-contained, tightly clustered and walkable neighbourhood

10 Convergence Agenda

# No	Mission/Programme /Scheme/Project	How to achieve convergence
1	<p>(i) Integrated Power Development Scheme (IPDS), Ministry of Power</p> <p>(ii) India Smart Grid Forum (IGF)</p> <p>Project for convergence</p> <p>(iii) Project Green Light (4000 roof top solar slighting and 7000 smart LED street lights) @ INR 44.90 Crore</p>	<p>(i) To improve operational efficiency and T&D losses, MSEDCL has agreed to undertake ducting of more than 400 km HT/LT electric cables in the project area under the IPDS project. (add project cost INR xxx crore)</p> <p>(ii) Under the MSEDCLS smart city project, smart grid with SCADA system and 15000 smart meters will also be installed in PBP area</p> <p>(ii) MSEDCL has in-principal agreed to contribute 25% (i.e. INR 33 crore) of the INR 125 crore underground utility ducting project (refer Annexure xxxx MSEDCL letter)</p>
2	<p>(i) Swachh Bharat Mission (SBM), MoUD</p> <p>Project for convergence</p> <p>(ii) Swachh PBP project- 10 e-toilets, 10MTD bio-methanation plant, smart waste bins, bring back center and GPS/RFID tagged d-t-d waste collection system. Project cost @ INR 7.0 Crore</p>	<p>(i) SBM's objective of 100% d-t-d collection and scientific disposal of waste will be achieved through SWACHH PBP initiative which includes smart garbage collection system linked with GPS and RFID technology</p> <p>(ii) Nagpur Smart City SPV will assist in designing and rollout of SWACHH PBP project</p>
3	<p>(i) Atal Mission for Rejuvenation and Urban Transformation (AMRUT), MoUD</p> <p>Project for convergence-</p> <p>(ii) Project Resilient infrastructure for PBP, includes: project H2O 24x7 WS (SCADA system, 1500 smart meters), 140 km sewerage system with 10 MLD advanced STP, 140 km SWD system @ INR 158.83 Crore</p>	<p>(i) Convergence to achieve objective of universal coverage of WS and WW services will be achieved through PROJECT RESILIENT INFRASTRUCTURE</p> <p>(ii) INR 88.48 Crore will be dovetailed through AMRUT for implementing 24x7 smart WS for PBP area of the proposed INR 158.83 Crore project</p>

4	<p>(i) Pradhan Mantri Awas Yojana (PMAY), Ministry of Housing and Urban Poverty Alleviation</p> <p>Project for convergence</p> <p>(ii) Construction of 4000 EWS and affordable housing stock under home sweet home project @ a cost of INR 560 Crore on PPP mode</p>	<p>i) The project HOME SWEET HOME will be taken up on PPP basis. As per the scheme guideline INR 40 Crore will be converged (1 lakh per house)</p> <p>ii) Beneficiaries will be provided with subsidized loan @ 6.5% via credit link subsidy scheme</p>
5	<p>i) Solar City Project</p> <p>Project for convergence</p> <p>ii) Distribution of 15000 roof top solar water heaters @ INR 22.5 Crore</p>	<p>i) It is proposed to converge 10% of the project cost i.e. INR 2.25 Crore from Solar City Programme</p> <p>ii) Another 15% (i.e. INR 3.38 Crore) will be dovetailed under Maharashtra States new Off-Grid Solar Energy Policy</p> <p>iii) Balance INR 16.88 will be invested by beneficiaries who will install the roof top solar water heaters</p>
6	<p>i) Digital India and Maharashtra Crime and Criminal Tracking Network and Systems(CCTNS)</p> <p>Project for Convergence</p> <p>ii) Project ABHAY: 9400 LED street lighting (on PPP), 10 CCTV cameras, smart police kiosk and outpost @ INR 22.93 Crore</p>	<p>i) A kiosk for lodging complaints and a smart police outpost proposed in Pardi and 10 CCTV cameras would be funded under the CCTNS project @ INR 0.30 Crore</p> <p>ii) Safety through installation of smart LED street lighting system will be funded through PPP mechanism @ INR 22.5 Crore</p>
7	<p>(i) Skill India, Ministry of Skill Development and Entrepreneurship</p> <p>ii) Projects for convergence</p> <p>Project KAUSHAL PBP @ INR 15 Crore</p>	<p>i) A multi skill development center on a 10 acre campus will be developed under PPP mode.</p> <p>ii) Convergence with Skill India programme will be achieved through alignment of project objectives of imparting employment through skill development to socially excluded section</p>
8	<p>i) FAME Scheme (Faster Adoption and Manufacturing of Electric Vehicles), Department of Heavy Industry, Gol</p>	<p>i) Funding of INR 21 Crore can be funded through FAME Scheme of Department of Heavy Industry, Gol for procurement of 30 hybrid buses.</p>

	<p>Projects for convergences</p> <p>ii) PROJECT CONNECTED PBP: 30 hybrid buses for improved public transport connectivity in the project area @ INR 21 Crore</p>	
9	<p>i) NRCP (National River Conservation Plan)</p>	<p>i) Of the total INR 2550 Crore Nag river front development project, 3.0 Km stretch falling in PBP area will be financed under NRCP programme @ 50% of INR 150 Crore</p>

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11 Convergence Implementation

- SWACHH BHARAT MISSION (SBM)

It is proposed to finance construction of 10 e-toilets under SBM. SWACHH PBP project will be designed and rolled out by Nagpur Smart City SPV. PBP area shall serve as a demonstration project for implementing household level segregation of municipal waste. A sizeable investment in soft component is entailed. Funding for IEC program for implementing zero garbage PBP project shall be dovetailed through the SBM. (Refer Annexure xxxx)

- INTEGRATED POWER DEVELOPMENT SCHEME (IPDS)

MSEDCL has already prepared and submitted two Detailed Project Reports (DPRs) for city-wide utility ducting and provision of a smart grid. The same has been submitted to the State Government for approval. MSEDCL has agreed to implement the two components; underground ducting and smart grid (including SCADA system and smart metering) in the PBP area. In addition, MSEDCL has also agreed to share 25% of the cost of constructing utility ducts. (Refer Annexure xxxx)

- ATAL MISSION FOR REJUVENATION AND URBAN TRANSFORMATION (AMRUT)

A water supply project worth INR 223 crores has been approved under the SAAP for current FY. Components of PROJECT H2O (140 km water network, 15000 smart water meters, SCADA system, 2 OHTs and a real-time water quality monitoring system) will be financed @ INR 88.48 Crore Under AMRUT. The existing water company-Orange City Water Ltd.(OCWL) shall execute the project and Nagpur smart city SPV shall be responsible for monitoring. (Refer Annexure xxxx)

- SOLAR CITY PROGRAMME

Nagpur is the first model solar city in the country. Already 1,815 solar water heaters have been installed in the city through subsidies provided under the scheme. This scheme would be implemented in the PBP area, and will be dovetailed with the National Solar City Programme and State governments Off-grid Solar Energy Policy 2016. A total of 15,000 solar water heaters will distributed through Nagpur Smart City SPV. (Refer Annexure xxxx)

- CCTNS Project

Under CCTNS project, digitalization of police stations has already commenced. An agreement has been signed between NMC and the Police Commissioner to partner with the Nagpur smart city SPV that will be set up for the creation of a smart police outpost and a Complaint kiosk in the Pardi area. The DPR for this is under preparation and all necessary Smart City program requirements are currently being dovetailed in the DPR. (Refer Annexure xxxx)

- SAFE CITY PROJECT

Nagpur Municipal Corporation is undertaking a safe city project with funding from the Department of Information Technology. The financial resource of Rs. 103 crores proposed for setting up of a Unified Operations Command and Control Center (UOCCC) converging the functions of NMC, Police

department, RTO and health departments will be dovetailed through this project. DPR preparation is already underway and implementation will also commence shortly (Refer Annexure 3.14) Project design and implementation will be observed by the Nagpur Smart City SPV.

- National River Conservation Project

Nag river rejuvenation and beautification plan is being prepared by NMC. A 3.0 km part of the 17.68 km-River falls in the Pardi-Bharatwada-Punapur area; the stretch will be partly funded under the retrofitting proposal for Pardi. The estimated cost of riverfront development in the selected area is Rs. 150 Crores. 50% of the estimated Rs. 150 Crores would be funded under the retrofitting proposal and the remainder will be funded under the National River Conservation Plan under the auspices of the Ministry of Environment and Forests. A concept plan for the riverfront development has already been prepared and the DPR preparation will commence shortly. (Refer Annexure xxxx)

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12 Essential Features Achievement Plan

The proposal has identified xxxx projects to achieve all the essential features identified in the mission guidelines.

EF 01: ASSURED ELECTRICITY SUPPLY WITH AT LEAST 10% OF THE SMART CITY'S ENERGY REQUIREMENT COMING FROM SOLAR

Projects under GREEN LIGHT Initiative

1. Project UNDERGROUND DUCTING of electricity cables under IPDS: To reduce T&D losses and power theft, MSEDCL has initiated underground ducting of electricity HT/LT cables. In this regard, a detail project report @ INR xxxx has already been submitted for approval. Further, MSEDCL has agreed to shift ~140 km electric cables underground in the PBP area and also share 25% cost of the utility ducting project that will be taken up under smart city programme.
2. SOLAR CITY PROGRAMME- Nagpur is the first model solar city in the country. Distribution of 1,815 solar water heaters has resulted in saving of 2.72 MU annually. Current and future electricity demand in the PBP area stand at 24 MU and 31 MU respectively. A Solar city master plan prepared has identified distribution of rooftop solar water heater systems as the most viable strategy to achieve a target of 10% reduction in conventional energy consumption. An initial survey identified ~4000 potential residential properties in the PBP area that can be covered under the rooftop SWH system distribution scheme. Even if 2000 properties install the SWH system, an estimated saving of 3 MU can be achieved annually. This translates to 10% saving in conventional energy consumption. Installation of Solar panels on institutional and public buildings in PBP area will further reduce demand of 0.3 MU from conventional energy.
3. Installation of 7000 LED street lights- As a measure to reduce conventional energy use, NMC has completed a pilot project of replacing 500 conventional high mast lamps with 150 Watt H.P.S.V. / Metal halide LED lights. The pilot project has demonstrated energy saving to the tune of 68%. Installation of 7000 smart LED street lights will accrue additional energy saving of 1.78 MU annually.
4. Commissioning of Bio-Methenization plant- As part of the SWACHH PBP project, a 5 MT bio-methenization plant has been deliberated. The WTE facility is likely to generate 0.2 million electricity units annually using segregated wet waste that will be generated in the neighbourhood.

Implementation of above projects under GREEN LIGHT initiative is likely to accrue 5 million electricity units from non-conventional energy sources there by reducing the carbon-footprint of proposed smart city initiatives.

EF 02 ADEQUATE WATER SUPPLY INCLUDING WASTE WATER RECYCLING-

Projects under RESILIENT INFRASTRUCTURE umbrella

1. PROJECT H2O- The project aims to supply 24x7 WS in the PBP area by; laying additional 140 km WS distribution network, constructing 2 OHTs with 30 lakh liter capacity, installation of

- SCADA system, fixing 15000 smart consumer meters, real-time water quality monitoring system and a dashboard. The project will ensure round the clock WS to 65000 residents (100% HHs) at a rate of 150 liters per capita per day. SCADA system and smart meters will assist plugging leakages efficiently.
2. Integrated SEWERAGE SYSTEM for PBP- Project covering: 140 km sewerage network, 10 MLD packaged sewage treatment plant with UASB technology, 10 pumping stations and a sensor based SCADA system for real-time monitoring will enable 100% collection and treatment of sewage generated in the PBP area. A portion of treated wastewater will be reused for gardening of 5 parks through a 20 km dual piping network. Additionally, balance treated wastewater will be reused under the NMC-MAHAGENCO 130 MLD agreement. The project which was rolled out on PPP has already been completed.
 3. STORM WATER MANAGEMENT and RAIN WATER HARVESTING- To ensure rain/storm water is disposed of in a controlled and sustainable manner, sustainable urban drainage system is proposed in the form of closed storm water drains. Financial input required for this feature is INR 42 Crore. A network of 140 km road side drains will be developed to collect rainwater. The collected rainwater will be used to recharge ground water through 10 recharge wells in the vicinity. Further, one of the parks will be developed as rainwater harvesting park that will aid recharge of ground water. Modifications are being proposed in the NMC bye-laws which will create incentives under the RWH scheme. Effective enforcement of the scheme will ensure a saving of 2.27 MLD water.

EF 03: SANITATION INCLUDING SOLID WASTE MANAGEMENT

Projects under SWACHH PBP initiative

1. SMART GARBAGE Management system: The project includes: a) 10 smart community bins, b) 15000 household bins with RFID tags, c) GPS and RFID tagged primary collection vehicles, d) a BRING BACK CENTER for collection of recyclables, f) mechanized road sweeping machines, g) a modern mechanized transfer station and g) neighbourhood level bio-methanization plant.
2. PROJECT ZERO GARBAGE: Segregation of waste into wet and dry is the key component of the project. Specially designed (with two compartments) primary collection vehicles will ensure 100% door-to-door collection of segregated waste. The proposed waste-to-energy plant has a potential to generate 120 cubic meters of methane gas per day equivalent to 50 Kg per day of commercial LPG (2.5 commercial LPG cylinders of 19 kg capacity). With a systematic public outreach strategy, supporting collection and processing infrastructure, PBP will be developed as a zero garbage neighbourhood. Participation of waste pickers in door-to-door collection will make the project inclusive and thus script its success.
3. E-toilets: The project provides 5 public conveniences at critical public locations at a cost of INR 2.5 Crore .Each e-toilet complex will house 5 seats for men, 5 for women, 1 for children and 1 for differently abled citizens. Facilities for bathing and washing of cloths will also be housed here. Being a model public convenience, these complexes will have rooftop rainwater harvesting and solar panels. A PPP based O&M model involving local community is being structured to ensure top class service at these facilities.

EF 04: SMART METERING

Projects under GREEN LIGHT and RESILIENT INFRASTRUCTURE initiative include

1. SMART ELECTRICITY METERING: As part of the IPDS project undertaken by MSEDCL, we will be installing 15000, residential smart meters and 1000 commercial meters connected with the SCADA system. A dashboard with data analytics facility will help in improving the efficiency of the power distribution system
2. SMART WATER METERS: As part of the project H2O, 15,000 smart water meters for residential connections and 1000 for commercial and institutional connections will be installed. Also, 5 bulk meters along transmission and distribution mains will be used to demarcate water DMA. Smart meters coupled with SCADA system and increasing block tariff structure will help reduce wastage and ultimately save water.

EF 05: ROBUST IT CONNECTIVITY AND DIGITALIZATION

Following projects have been proposed to achieve the above essential smart feature

1. DIGITAL PBP initiative: To operationalise citywide IT governance, we have proposed to lay more than xxxx km of fiber optics network covering the PBP area under the digital PBP initiative. A total of 75 wi-fi spots across the city and 5 in PBP area will be placed to intensify the internet penetration and digital literacy in the city. To further facilitate penetration of governments digital services, citizen facilitation kiosk that integrates G2G, G2B, and G2C services of all government departments. High speed network and broadband connectivity will facilitate smooth data transfer for all G2G and G2C services :
 - a. Accessing NMC services and making payments;
 - b. Accessing government websites;
 - c. Accessing passenger information system;
2. Central Command and Control Center: This Pan-city solution aims at setting up a centralized control room to converge various digital initiatives (smart signaling, smart garbage fleet management, smart public bus fleet tracking system, smart parking etc.) of different departments. The Control center, coupled with CCTV cameras and video analytics, will enable real-time information based decision making and therefore is likely to improve the service delivery

EF 06: PEDESTRIAN FRIENDLY PATHWAYS

Projects under the CONNECTED PBP initiative that promote walking include:

1. PROJECT TenderSURE-Tender SURE is a multi-crore project that aims to revitalize 50 KM important streets and roads in the PBP area to international standards and create vibrant public realm @ INR 50 Crore. The design of Tender SURE roads prioritises the comfort and safety of pedestrians and cyclists, as well as recognises the needs of street vendors and hawkers. TenderSURE also combines street landscape and hardscape aesthetics with practical considerations of user behavioral change. Roads under this project will display functional amenities like trash cans, attractive and smart bus shelters, innovative public conveniences, and

non-functional amenities such as public art installation, street graffiti etc. On-Street Parking will typically come in the form of parallel and angled parking spaces. Planting more than 10,000 trees along TenderSURE streets will offer a comfortable walking experience, especially during dry season. The street design will reflect Transit Linkages, such as bus shelters, transit stops, and bicycle racks, to supplement walking. Paving Patterns, such as stamped concrete, inlaid brick disable friendly ramps, tactile cues and other unique features; have also been considered to help delineate pedestrian travel areas and direct traffic. (Refer **annexure xxx** for typical road design)

2. PROJECT OPEN STREET- under this initiative a proposed 30.0 m wide, 3 km long greenfield road along the Nag riverfront promenade will be developed as no vehicle zone. This will serve as a prototype for development of another 5 km pedestrian only road network in the busy Pardi and Bhartwada market areas. OPEN STREET initiative entails an investment of INR 10 Crore for developing 10 km pedestrian only streets overlooking the NAG riverfront. Mixed-land use, integration of informal activities and convenient pathways will make these streets a happening and vibrant place in the city.

EF: 07 ENCOURAGEMENTS TO NON-MOTORISED TRANSPORT

Projects to achieve the above essential feature

1. TenderSURE- As part of the TenderSure project, a continuous and dedicated bicycle network of 50 km will be developed. Apart from vehicle parking space, the road design takes into consideration the parking requirement of cyclists. This network will connect cyclists with small neighbourhoods and key commercial and public destinations across PBP. Planting more than 10,000 trees along these tracks will ensure a comfortable ride.
2. SHARE a BIKE- A pilot project that connects Nag riverfront promenades with residential and mixed-use areas through a bicycle sharing project has been proposed. 5 fully automated bike stations that allows bikers to check bicycles easily in or out of bike-share stations located at across PBP area, will be developed on PPP basis (**refer Annexure XXXX**). Average distance of 500m between stations will be maintained for user comfort. Initially, 1000 bikes fitted with GPS and RFID tags will be operated to gauge response. The project also includes ICT components such as wireless tracking system and radio-frequency identification devices (RFIDs), to locate where a bicycle is picked up and returned, identify the user, monitor station occupancy rate, and SHARE A BIKE mobile app to provide real-time user information. An appropriate pricing structure that incentivizes bike trips will be devised.
3. E-rickshaws- In addition to walking and cycling,

EF 08: INTELLIGENT TRAFFIC MANAGEMENT

Projects

1. Smart Traffic Management- Smart signaling is a part of the second pan-city initiative on intelligent transport management that will be taken up in the second phase of implementation. The project connects 10 priority traffic signals in the PBP area with the central command and control center through a network of sensors and CCTV cameras. Some of the salient features of the project will include: e-challan system, digital screens to display information on availability of parking spots,

road blocks, traffic diversion etc. Based on video analytic inputs, the system will be able to create green corridors for swift movement of ambulance. A dense network of CCTV in PBP area will enable police in efficient incident management

EF 09: NON-VEHICLE STREETS/ZONES

Projects:

1. Under the project OPEN STREET INITIATIVE 3 km stretch along NAG riverfront will be declared as no vehicle zone. Also another 5 km stretch along Pardi and Bharatwada market area will be developed as no vehicle zone.

EF 10: SMART PARKING

Project

1. Provision of a multilevel car parking at Pardi, Bhartwada and Punapur area to accommodate 500 four-wheelers has been proposed.
2. Under the central command and control center project, through a sensor system, and digital display boards at various key junctions will show information on availability and location of parking spot in the PBP area. Also a separate smart parking application for the entire city will be developed to notify available parking places in the vicinity.

EF 11: ENERGY EFFICIENT STREET LIGHTING

Projects

1. Under the GREEN LIGHT initiative, we are going to install 7000 LED streetlights: 250W HPSV to be replaced with 150W LED and 150W HPSV with 80W LED streetlights covering the entire PBP area. The pilot project implemented in the Civil Lines area (non- PBP area) has established energy saving to the tune of 68%. Installation of 7000 smart LED street lights will accrue additional energy saving of 1.78 MU annually. This project will be taken up on PPP basis and NMC will not have to spend a single rupee on replacing LED lights. Private Player will install necessary infrastructure and operate it for a period of 13 years (typically). The private player in return gets a percentage of energy units saved.

EF 12: INNOVATIVE USE OF OPEN SPACES

Projects

1. PROJECT ATTRACTIVE PUBLIC REALM: as part of this initiative, public space will be made more attractive through installation of public art, graffiti walls, planting 10,000 trees along pedestrian and cycle tracks
2. EVER GREEN PROJECT- under this project, 5 public parks covering an area of 50 acre will be developed. Each park will be developed based on different themes. For instance, one of the parks will be developed as a 20 acre rainwater harvesting public place. Another park 30 acre park will be developed as children and Traffic Park to promote traffic awareness among young citizens.
3. NIRMAL NAG- another 30 acre of open green spaces overlooking Nag river front promenade will be developed. Two sides of the water front will be connected through 3 pedestrian and Cycle

Bridge. A mix of commercial, hotel, and entertainment space along the 3 km riverfront will make the entire complex a stunning urban space

4. Public markets with a built-up area of 3000 sq.m will be developed on PPP basis. The market complex will include vegetable & fruit market, a flower market, fish and mutton market.

EF 13: VISIBLE IMPROVEMENTS IN THE AREA

Projects that will exhibit visible improvement include:

1. TenderSURE- is a signature project that is aimed at improving public realms using contemporary urban design. Underground ducting of all the utilities is a significant aspect that will result in visibly attractive public precincts. Dedicated space for vendors and informal activities along the 50 km TenderSURE roads will further add to the appeal of the area.
2. Landscaping along the 140 km street network and planting 10,000 trees along pedestrian and bicycle pathways will also result in visible improvement.
3. A network of 140 km of sewerage collection lines, and a packaged STP will reduce the instances of sewage overflowing on the streets. Initiative under SWACHH PBP such as BRING BACK centers, DTD collection, regular street sweeping, segregation of waste and installation of bio-methanation plant will create a clean neighbourhood that is visibly appealing.
4. NIRMAL NAG: 3.0 Km Clean and beautiful river promenade will also help in achieving the essential feature of visibly improved areas.

EF 14: SAFETY OF CITIZENS ESPECIALLY CHILDREN, WOMEN AND ELDERLY

Project-

1. Surveillance through a network of CCTV and central command and control center: 25 high resolution CCTV cameras will enable monitoring of notorious areas and facilitate swift action against untoward incidents
2. A Smart Police Kiosk: PBP area will have a smart police outpost and kiosk for registering complaints.
3. Safety of Senior citizens initiative: Under this initiative, police will create a panic alert systems installed in approximately 1000 households with senior citizens.
4. Safe walking initiative: is aimed at improving safety of pedestrians and bikers through carefully designed pedestrian pathways and bicycle tracks, at grade crossings, pedestrian signals and 10 busy junctions
5. SURAKSHA APP- a women safety app will be developed. The app will be connected to the central command and control centers. Nearest police station will be alerted in case of any incident and a quick response will be provided
6. Disaster management plan: Standard operating procedures along with a clear institutional arrangement are being prepared for responding to any public safety incident. Warning dissemination system through speakers and digital display boards installed at important locations will also be created

EF 15: AT LEAST 80% OF BUILDINGS SHOULD ENERGY EFFICIENT AND GREEN BUILDINGS

1. Green Building Initiative: Essential feature of green buildings will be achieved through interventions proposed under HOME SWEET HOME project. Under this project, 4000 affordable and EWS housing units will be developed on PPP basis. Special incentives in terms of rebate in property tax, development charges, additional floor area etc. will be included in the new development control regulations to promote green buildings in the PBP area

EF: 16 ADDITIONAL SMART FEATURES

- SARATHI- A dedicated web based 24x7 helpline center aimed to provide single point for accessing information on citizen services of different government departments. Citizens can register complaints through phone, sms and through SARATHI app.
- PROJECT KAUSHAL PBP: To create avenues for employment through skill development, a multi skill development center will be developed.
- SMART CFC KIOSKS: A smart citizen facility center and a kiosk will be installed in the PBP area for citizens and businesses to access G2B, B2C and G2C services conveniently.
- PRESSUER TILE FOOTPATH: Installation of pressure tiles along 5 km pedestrian foot path, that convert kinetic energy generated by walking into electricity. (Refer Annexure xxx for pressure tile project)
- RESOLVING LANDUSE CONFLICT through TPS: The proposed area of 951 acres will be developed through a Town Planning (TP) scheme prescribed under the Maharashtra Regional and Town Planning Act, 1966 (MRTP Act). The twin objectives of using the TP scheme mechanism are to (a) resolve land-use conflict by converting the current No Development Zone to mixed-use land pocket and (b) explore creation of a land-bank which can not only help recover investments but can also help introduction of mixed-use developments. The proposed area will be handed over to the NMC by the Nagpur Improvement Trust (NIT). A consultant will be appointed for the preparation of the TP scheme. The NMC will declare its intention to prepare a TP scheme in the Pardi area and in parallel will initiate a change of land-use process under Section 37 of the MRTP Act. The TP Scheme process would allow systematic introduction mixed-use development pockets which provide for various types of residential and commercial land-uses in varying ratios. Planning through TP scheme will ensure formal land records for all the 15,000 households in the area and regularization of the 7000 unauthorized properties. Using the TP scheme mechanism, the SPV can create land bank for itself and monetize it over time to raise resources.

13 Success factors of the proposed ABD

The area-based development proposal of retrofitting in the PBP area is an unprecedented endeavor. There are various challenges that will manifest during the actual execution of the proposed intervention. However, the critical factors that will overcome any challenges and will act as success pivots have been outlined below:

1. Consensus and residents' contribution - since a significant number of the layouts in the area are unauthorized, consensus building will be critical to ensure that the proposed intervention succeeds. Consensus building in case of Pardi will be achieved through a door to door campaign which will outline the key proposals, their benefits and commitments to be provided by the citizens. The residents will also be fully apprised of the monetary contribution that they will have to make for (a) regularization and (b) smart infrastructure provisioning. The use of TP scheme mechanism is in itself a mitigation measure against an event where consensus is not total.

2. Use of statutory instruments - the TP scheme mechanism as prescribed in the MRTP Act will be utilized for retrofitting the area. The use of the TP scheme mechanism solves two critical purposes i.e. (i) resolves the land-use conflict through the statutory route and (ii) resolves regularization issue. The use of a statutory instrument also ensures that the uncertainties around consensus are firmly addressed and that there is no legal impediment even in future that can scuttle the process of retrofitting.

3. Creation of land-bank and its monetization - while the regularization fees and betterment charges will aid cost recovery, the creation of a land bank and its subsequent monetization will ensure that the intervention is not only self-financing, but can generate surplus revenues which can then be utilized to implement interventions in other areas as an extended Smart City program. The use of TP scheme will ensure that an adequate land-bank is created with the authority which can be monetized over time to (a) aid economic growth and (b) create a corpus for replication of the retrofitting model in other areas.

Use of the TP scheme mechanism will ensure that the any concerns with respect to consensus are easily tackled and that the authority remains empowered to intervene with fully statutory backing.

If the monetization of land bank is delayed, the building of a corpus for replication may be impacted. It is proposed that the SPV will retain Cash Reserves of Rs. 100 crores at all times; these Cash Reserves will become a fall-back measure for the purposes of (a) securing debt through bonds or loans and (b) making upfront investments in case some of the financial assumptions do not materialize or are delayed.

Thus, the proposed model of retrofitting is a well-thought out and fool-proof implementation and financing plan which will ensure that execution is not impacted adversely at any point.

14 Measurable Impact of ABD proposal

14.1 Governance Impact

- **IMPROVED INTER DEPARTMENTAL COORDINATION:** The area-based proposal has brought together various institutions to align their plans for ensuring smooth execution of the proposal. Institutional collaboration between the Nagpur Municipal Corporation, Nagpur Improvement Trust, Police Department, MSEDCL, PWD and BSNL has already been formalized with each institution making specific commitments to ensure success of the execution of the proposal (please refer Annexure 4, sr. no. 4,5,6). This collaboration will ensure that decision-making is quick and mutual and will result in implementation and service delivery being streamlined and becoming more efficient.
- **FASTER and EFFICIENT CITIZEN SERVICE DELIVERY:** Setting up of smart CFCs, Kiosks, dedicated helpline and a citizen service app will help in faster citizen service delivery. Installation of CCTV cameras integrated with central command and control center shall help in proactive operations, incident management and evidence based decision making
- **EFFICIENT SERVICE DELIVERY:** RFID and GPS tagged collection vehicles coupled with video analytics, and smart bin system will improve operational efficiency and offer real-time information for better resource management
- **FISCAL PRUDENCE-** use of ICT in delivering citizen service will help in optimizing operations and thus reducing operational cost. For instance, use of SCADA system combined with a network of sensors will enable us in early detection of leakages there by saving water.

14.2 Spatial Impact

- **AREA DENSIFIED:** Mixed-use high density development planned on a 200 acre land parcel in the PBP area is aimed at developing a compact neighborhood. Construction of 4000 affordable housing units, along with commercial, office and retail spaces will increase the population density to 150-200 pph from the current 25-75 pph.
- **CREATE OPEN SPACES:** Through systematic TPS, 5 public parks covering an area of 50 acres will be developed. More than 10,000 trees will be planted along the 140 km street network. As a result, open areas in the PBP area will increase from existing 3% to 15% conforming to international standards
- **SHAPE ATTRACTIVE PUBLIC REALM:** Signature projects such as TenderSURE, NAG riverfront development, installation of public arts, graffiti walls, public fountains, landscaping of public places, development of 5 public parks, and underground ducting of utilities will help in creating attractive public realm.
- **LANDUSE CONFLICT RESOLVED:** Around 7000 households are currently unauthorized and have been developed in the No Development Zone. With the change in land-use under the TP Scheme mechanism the lands encompassing these 7000 HH would be converted to residential use and help in streamlining the urban growth

- **INCREASED NMT TRIPS:** Development of 140km dedicated pedestrian and bicycle network, battery operated maxi cabs, bike sharing scheme and mixed-use compact neighbourhood development will promote walking and NMT thereby resulting in increase in NMT trips to 25% by 2025 and 35% by 2030

14.3 Economic Impact

- **INCREASE IN PROPERTY VALUE:** World class infrastructure, attractive street design, exemplary connectivity and eye-catching public spaces is likely to increase property value in the PBP area
- **INCREASE IN ECONOMIC ACTIVITIES:** Creation of xxxxx million sqft of commercial, retail, office and residential space will increase economic activities
- **INCREASE IN PROPERTY TAX REVENUE:** Since the property value in the PBP areas are likely to increase, there will be increase of INR xxxxx in the property tax collection
- **INCREASE IN EMPLOYMENT:** Creation of a multi-skill center, and real-estate activities (commercial, retail and residential) will stimulate job creation and improve employability
- **INCREASE IN OUTPUT:** 24x7 WS, zero waste society, cleaner precincts, efficient public transit

14.4 Social Impact

- Improved public health and cleaner neighborhood as a result of improved access to core services, sanitation including municipal waste services
- Enhanced Livelihood as a result of multi-skill development center, investment in realestate, riverfront development and open spaces, and promotion of informal activities through dedicated hawking zones and informal markets
- The plans for retrofitting the proposed area will empower citizens to design their own area through a participatory approach. The planning would have a profound impact on shaping more socially integrated neighborhoods.
- Well-designed street-scape with access to public spaces, revitalized public infrastructure, and walkable neighborhoods will improve integration and inclusion. Provision of cycle tracks and electric cabs for transit will lead to healthy living and CO2 emissions reduction. The provision of more public spaces and social infrastructure facilities will enhance the livability of the area and would also promote social harmony.
- 10 bicycle sharing kiosks, 50 kms of dedicated cycle track and around 50 acres of green and open spaces including riverfront development would enable creation of a more socially integrated habitat and would also lead to people living a healthy and happy life.
- Access to 4000 affordable and EWS housing units, a 500 bed multi-speciality hospital, a primary school and a skill development center will result in socially inclusive development

14.5 Sustainability including environmental Impact

- For revitalization of a sense of community, 50 acres of land will be developed as green space and plant growth zones for recreational experience, which would also yield environmental benefits such as resource efficiency and green growth.

- Installation of 2000 solar water heaters would result in reduction of 3240 MT per year of CO2 emission.
- Auto dimming smart LED street lights would be installed to conserve energy usage and light up areas only in case of movement of people. This would allow energy saving up to 68% and would lead to reduction of CO2 emissions by 1422 MT per year.
- 5 km of mass movement areas would be fitted with Pressure Tiles that convert pressure into electricity. This energy would be used for street lights and lighting of public spaces which reduces conventional energy requirement thereby reducing environmental impact.
- Implementation of SWACHH PBP initiative will reduce waste generation
- 140 Km sewerage system and a 10 MLD packaged STP will help in reducing Nag river pollution. Reuse of treated wastewater for non-domestic use within PBP area will reduce fresh water demand
- Implementation of 24x7 smart water supply system in the PBP area will maintain NRW levels below 20% mark there by conserving precious water resource
- Use of 500 maxi-cabs for ferrying citizens within the neighbourhood and to transit points will also reduce carbon emission and would result in a clean and sustainable environment
- Increase in pedestrian trips to 30% by 2030 will also improve air and noise quality in the PBP area

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Pan-City Proposal

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15 Summary of Pan-city proposal

The proposed pan-city solution for Nagpur has two facets. First part consists, a customized ICT-based smart garbage solution to streamline city's garbage management. GPS-based tracking of collection fleet, RFID tagged household bins, sensor based smart trash bins and a video analytics dashboard for information-based decision making, faster response time and improved situational awareness, will help Nagpur in optimized resource utilization and enable efficient service delivery.

The second part of the pan-city initiative entails a Nagpur City Community Network (NCCN, dark cable optical fiber and necessary backbone infrastructure), and a Unified Operations Command and Control Center (UOCCC) to operationalize ICT-based solutions. UOCCC will serve as a platform for an array of sub-systems: Intelligent Parking, Smart Traffic Signaling, Common Mobility Card, Emergency Response Service, Safety Surveillance and NMC's Utility Operations including the proposed smart garbage management pan-city initiative.

The proposed pan-city initiative, along with the connectivity infrastructure, a UOCCC and GPS/Rfid based fleet tracking system will oblige financial resources worth INR 217.26 Crore.

Simultaneously, leveraging on the backbone connectivity infrastructure and UOCCC, Nagpur will operationalize iSafe city initiative under the state governments Safe City initiative at a cost of INR 90.63 Crore.

16 Components of the pan-city initiative

The proposed pan-city project for Nagpur has two extensive components. First, a smart garbage management system and second, a combination of Nagpur CCN/ backbone infrastructure and a UOCCC to operationalize IT-based smart solutions.

The Smart Garbage Solution (SGS) proposes seven ICT subsystems for an integrated garbage management and four non-ICT components to address other aspects of the value chain. Each subsystem will be designed to address a specific business process. Individual subsystems will be interconnected through a software suite to present an integrated solid waste management solution. SGS uses a mix of technologies such as a global positioning system (GPS) and radio frequency identification (RFID) to create an interactive framework in which the services will be monitored. The SEVEN key components of the solution include:

A] ICT components

- 1) **RFID TAGGED household bins:** With a unique ID number associated to a waste bin, municipal authorities will be able to efficiently monitor the status of waste pickup at each household based on the information transmitted by the RFID reader.
- 2) **GPS-BASED FLEET TRACKING:** A GPS based tracking device mounted on the garbage truck will collect real-time location information transferred through a GPRS network to a UOCCC. Municipal authorities will be able to view current location of each truck and thereby can optimize fleet management.
- 3) **WASTE BIN TRACKING SYSTEM:** Weight sensors and RFID tags mounted on community bins will enable municipal authorities to monitor bin status. Concerned municipal authority will be alerted to attend any overflowing bins through the UOCC
- 4) **ROUTE PLANNING SYSTEM:** Using a GIS mapping system, will help in optimizing waste collection routes
- 5) **TRACKING OF STREET SWEEPERS:** With a GPS-enabled mobile handle device, street sweeping in the city will be monitored
- 6) **CITIZEN FEEDBACK SYSTEM:** Citizen Feedback on the waste pickup will be requested on daily basis using SMS and android based applications. Citizen will be also able to register their grievances
- 7) **UOCCC:** The smart garbage solution will be operationalized through creation of backbone connectivity infrastructure and a Unified Operations Command and Control Center. The UOCCC platform will provide visual analytics that will quickly turn complex data sets into high-value, actionable and innovative business opportunities. UOCCC will also enable Nagpur optimize operational performance, reduce processing costs, enhance revenue streams and provide the base for educational community outreach programs

Simultaneously, following non-ICT solutions will also be implemented by Nagpur to improve the entire value chain:

1. **SEGGREGATION OF WASTE:** We acknowledge that household level segregation is the backbone of the entire initiative and therefore preparatory work in this direction has already commenced

2. 8 TRANSFER STATION: To minimize waste handling and optimize use of collection fleet, Nagpur will develop 8 mechanized transfer stations at cost of INR 40 Crore will be developed simultaneously to facilitate smooth execution of the pan-city proposal
3. NEIGHBOURHOOD WTE PLANTS: We will develop 80 small neighbourhood level, bio-methanization plants on PPP basis to process segregated wet waste. Also, BRING BACK initiative will formalize recycling of dry sorted waste and provide economic opportunities to socially excluded section of the society (waste pickers)
4. AUGMETATION WASTE PROCESSING : Nagpur will create 500 TPD capacity of waste processing capacity at city level

Please refer [Annexure 3.8 and 3.9](#).

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17 Approach and Methodology for selecting pan-city proposal

Similar to ABD, Nagpur's pan-city proposal was also prepared by following identical three stage process:

1) SHORTLIST, 2) SELECT and 3) FINALIZE

1) STAGE 1: SHORTLIST

First stage in the process involved shortlisting of potential citizen services that would improve existing service delivery and improve liveability with minimum investment in creating physical infrastructure. The central idea behind the process was to "do more with less".

This was enabled through a service level benchmarking exercise, review of key documents (CDP, CSP, CMP, ESR, etc.) gap analysis and discussions with key stakeholders. Based on this analytical framework following services were identified: Mobility and Transport, Water Supply, Garbage Management, e-Governance, Citizen Safety, Open and Green Spaces, and health and education

After shortlisting of citizen service improvement areas, problem statements for each of the eight shortlisted areas were defined. Possible lists of ICT-enabled solutions to address specific issues were also compiled.

2) STAGE 2: SELECTION

This stage was split into two: Analytical and Consultative-

- a) ANALYTICAL: Discussions with city administration, Nagpur Smart City Advisory Council, technology providers, urban planners, and domain experts resulted in evolution of a five point objective criteria for selection:
 1. Preparedness in terms of availability of physical infrastructure
 2. Urgency improvement
 3. Ease of implementation
 4. Potential with convergence with other projects/programmes
 5. Inclusiveness of the smart solution

DISCUSSIONS WITH URBAN PLANNER and SECTOR EXPERTS: Post, identification of objective criteria, a ranking matrix was prepared for the shortlisted 8 areas. Urban planners, domain experts, service providers and technology partners rated these areas against five objective criteria on a scale of 1 to 5, 5 being highest. Outcome of this exercise resulted in selection of Garbage Management service.

b) CONSULTATIVE

- a. CITIZEN ENGAGEMENT: Similarly, shortlisted seven areas were presented to 2.35 lakh citizens for soliciting their priority. A physical engagement exercise, considering the digital divide, was undertaken using a one pager questionnaire. In terms of priority, Safety and garbage management were the top two areas.

Based on the consultative and analytical process garbage management and safety were the two top pan-city solutions. Since Nagpur has already initiated work on Safe City programme by Government of Maharashtra, it was decided to develop a smart ICT solution for Safety under the same project. A smart

garbage management pan-city solution along with a Unified Operations Command and Control Centre (UOCCC) was shortlisted for finalization.

STAGE 3: FINALIZE

Post shortlisting of UOCCC based smart garbage management as Nagpur's pan-city solution, a detail planning exercise to finalize the solution was undertaken. The process involved:

1. RESEARCH: An extensive research on existing system gaps, type of technology solutions available in the market, and replicability and adaptability of best practices (national and international).

Following observations were made at the end of research exercise:

- a. A great deal of physical infrastructure to facilitate smart garbage system is available
 - b. While the core city area enjoys good SWM service, peripheral area covering city's 1/3rd population identify garbage collection as the key issue
 - c. Mechanism to monitor street sweeping and DTD collection activity is absent
 - d. 33% citizens indicated that garbage from their locality is not collected on daily basis
 - e. Waste segregation at household level is absent
 - f. Absence of operational planning
 - g. Various technology options such as GPS, GPRS and RFID are available for packaging an integrated smart garbage management solution for Nagpur
2. CONFABULATE: Based on the above observations, discussions with solution providers, urban planners and public representatives were undertaken
 - a. SOLUTION PROVIDERS:
 - Dialogue with technology providers such as IBM, Persistent Solutions, Trinity Solutions, Ernst and Young, and Airtel were held to understand different intelligent garbage management solutions that can be applied in case of Nagpur.
 - Case studies of other cities which had implemented similar solutions for monitoring of garbage systems were deliberated. Suggestions included: focus on improving operational efficiency, better resource planning, cost effectiveness, monitoring of waste pickup and street sweeping activities etc. should be addressed through the proposed SGS.
 - Technology partners suggested a smart garbage management solution that uses a combination of RFID, GPS and GPS technologies; these, coupled with video analytics, would enable effective operation and resource planning.
 - Continuous engagement with suppliers such as IBM, PERSISTENT and AIRTEL helped to develop initial solutions as well as detailed costing.
 - b. URBAN PLANNERS and DOMAIN EXPERTS: A two day workshop, attended by a group of 25 urban planners and domain experts (from NGOs, VNIT, FICCI) was organized to brainstorm on identifying and prioritizing issues and developing primary solution architecture.
 - c. VIEWS OF PUBLIC REPRESENTATIVES: Outcome of analytical assessment and citizen engagement process were presented to elected representatives. A smart garbage management solution to improve service delivery, especially in non-covered areas, was

tailored. Majority of them agreed that poor garbage collection service in peripheral areas, littering of waste on roads, open urination and spitting was an issue that needs to be taken on priority. Elected representatives suggested that citizen engagement in is vital and therefore citizen feedback system should be inbuilt in the proposed SGS

3. COLLABORATE: Further, a core group of 25 individuals consisting technology providers (IBM, PERSISTENT, AIRTEL, TRINITY SOLUTIONS) and domain experts from IT industry were called for preliminary designing and packaging of the entire pan-city solution. Further, primary system architecture for the UOCCC was also deliberated. Based on these inputs, an integrated smart garbage solution suite for Nagpur was designed.
4. FINALIZE: The pan-city solution was shared with citizens through different platforms. The entire process of selection, objective criteria, and the solution design was presented to the General Body of Nagpur Municipal Corporation which approved the proposal with a thumping majority.

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18 Demand Assessment

Pan-city solution of Smart Garbage Management operationalized through UOCCC will help Nagpur address following specific issues:

GOVERNANCE

- 1) **ABSENCE OF MONITORING MECHANISM:** With the objective of improving efficiency, NMC entered into a service level agreement with a private municipal waste collection operator in 2010. While services in the core city improved, service levels in informal settlements and 1/3rd of city's population residing at the periphery were still inadequate in terms of reliability, frequency and coverage. A part of responsibility can be accounted towards NMCs inability to effectively monitor operator's performance and adherence to service agreements.

Although Nagpur has successfully reduced number of community bins from 1100 in 2010 to merely 170 at present, problem of overflowing trash bins still persists, especially in congested areas.

While a conservancy staff of 7,000 is responsible for daily sweeping of 1,970 km city streets, at present their work is monitored manually. As a result, NMC officials do not have real-time information on the extent of roads swept on daily basis. Repeated reporting of un-swept roads has become common. Additionally, absence of monitoring mechanism for disposal of waste and open urination by citizens in public areas has created unsanitary conditions in many parts of the city.

Therefore addressing capacity constraints of NMC to monitor operator performance and governance of garbage related services is essential to achieve Goal 12 of the strategic plan **"To Make Nagpur Swachh by 2019"**

UOCCC led SGS provides a unified view of multiple subsystems. It will enable us to monitor services and operations to facilitate insightful decision-making (number of HH covered, length of street network covered). Using data and video analytics, it will also provide effective event response management and coordination, from operational to critical events.

- 2) **ABSENCE OF CRITICAL DATA FOR DECISION MAKING:** Current data management systems in practice are static and no real-time operation information is available for informed decision making. No integrated analytical dashboard that integrates real-time information is available. System of alerts is also missing. This results in inefficient operational planning, duplication of efforts, wasteful use of resources and poor service levels. For instance, NMCs health inspector does not have real-time information on the, location of the collection fleet so that there is a quick response to urgent cases, number of households covered with DTD collection to monitor whether the operator is adhering to agreed service levels, area-wise KM of road length swept, location of overflowing bins, area-wise location of collection fleet etc. and therefore decisions are based on impromptu information.

Through a network of sensors, RFID tags, and GPS system, UOCCC will create a common platform to integrate real-time information related to various subsystems and modules. For instance status of waste collection, road sweeping, location of collection fleet, status of secondary bins etc. will

be displayed on the integrated dashboard which will help NMC administration in taking informed decision and reduce wasteful expenditure; thereby helping Nagpur in achieving its Goal 12 of Strategic Plan.

- 3) **CITIZEN PARTICIPATION:** Good governance requires the cooperation of the people. For garbage collections to be efficient, citizens need to know their daily responsibilities, the routines, the pick-up timings, the standard procedures, and locational factors. In the existing system, citizens are oblivious and uncertain of the pickup timings. No advance notifications are sent to citizens in case of service downtime. This increases instance of open disposal of garbage in public areas. To make Nagpur a zero waste society, collaboration in the form of waste segregate at household level is fundamental.

To address this, an elaborate system of public engagement will be called for, with a focus on critical issues, such as waste segregation, collection, storage, and delivery to the refuse dumps. UOCCC will act as the center for dissemination of real-time instructions (segregation of waste) and notifications (change in pickup time, service down time etc.), to citizens regarding garbage management through SMS, WhatsApp and phone calls to registered citizens. Another unique citizen collaboration initiative will be rolled out through UOCCC. Random mobile numbers from the UOCCC database will be randomly picked up for soliciting feedback on waste pickup. A SMS asking “whether garbage was collected today” will be sent to these numbers. Citizens in return need to respond with yes or no. This will serve twin purposes; firstly engage with citizens, and secondly, monitor operator service performance. Further this will also help in achieving Goal 17 of Strategic Plan.

SERVICE DELIVERY

- 1) **INEFFICIENT SYSTEM:** inefficient and unreliable (some parts of the city) business process, frequent breakdown of collection fleet, absence of effective monitoring collection and street sweeping system and no real-time information dashboard for informed decision making has had negative impact on the overall service delivery of municipal garbage collection system. Further absence of quick response mechanism to address citizen complaints creates a negative impression

Using a combination of sub-systems; Smart Trash Bin System (STBS), Smart Fleet Tracking System (SFTS), Smart Street Sweeping System (SSSS), Integrated Asset Management System (IAMS) and Smart Monitoring and Controlling Hut (SMCH) operated through UOCCC, operational efficiency of the existing system will be improved:

- **Smart Trash Bin System:** With a system of sensors and RFID devices, whenever a trash bin will be filled up to the specified load and level, the sensors will get activated and generate a signal that will be transmitted to UOCCC which will send alerts to the concerned fleet driver about the location of the trash bin.
- **Smart Fleet Tracking System and Smart Route Planning System:** Collection vehicles mounted with cameras and RFID device will be tracked through inbuilt GPS device. Real-time location of each collection vehicle can be monitored on the dashboard at UOCCC. Using a GIS base map, the software solution will prepare an optimized waste collection

route for each vehicle. This will optimize collection time, fuel consumption and address citizen concerns efficiently without delay.

- Smart UOCCC: will process and analyze data received from GPS, RFID, sensor devices and CCTV cameras, and create an executive dashboard to depict overall status of garbage collection operations in the city. Facilities at the control center will include: a) situational awareness and reporting, b) resource and critical asset management, c) assessing and displaying KPIs. D) Real-time monitoring report

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19 Inclusion

- **UNIVERSAL ACCESS:** Efficient monitoring of waste collection fleet will ensure 100% coverage of door-to-door collection service including slum and peripheral areas which have been usually neglected
- **ROUTE PLANNING:** Area wise, DTD waste pickup timetable will be prepared and disseminated to citizens. This will help citizens, especially, housewives, since they will be aware of the waste pickup timings. Citizens will also be able to track location of the pickup truck and plan their activities accordingly, which is not possible in the current system.
- **CITIZEN FEEDBACK MECHANISM:** A built in SMS based feedback mechanism has been proposed to ensure participation in the process
- **BRING BACK CENTERS:** More than 100 bring back centers will be established as part of the project to formalize and regulate wastes recycling. This will bring in waste pickers in the mainstream waste recycling business
- **VIDEO SURVEILLANCE:** RFID tagging of trash bins and video surveillance will help in curbing instance of open urination, and instances of overflowing bins thereby making neighbourhoods clean

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20 Risk Mitigation

Risk	Likelihood	Impact	Mitigation
Resistance to use the proposed IT solution by NMC's staff	High	If the NMC staff shows resistance to use the software and other subcomponents, the entire project may get affected. Effective monitoring of private operators will not be possible	NMC intends to effectively manage the change in the process through a strategic change management program. The highlights of this program are: <ul style="list-style-type: none"> • Selection of an effective change management agent • Building a core team of enthusiasts • Engaging with the core team • Involving stakeholders (labor unions, private contractors, other NMC staff) • Providing adequate training to the core team
Refusal by citizens for RFID tagging of household bins	Medium	NMC will not be able to determine whether the private contractor has collected waste from each household in the city	To tackle this, NMC has already planned an alternate solution. Mitigation plan involves Citizens in monitoring garbage pickup. Citizens will be sent SMS asking whether the garbage in their locality has been picked up or not. Their response; yes or no will be registered in the central command room to monitor the collection performance.
Availability of uninterrupted IT	Low	24x7 availability of network will be	A 24x7 backup arrangement for assured

Risk	Likelihood	Impact	Mitigation
infrastructure and connectivity		necessary for effective monitoring. Poor connectivity will have marginal impact on the success of the project.	network connectivity will ensure minimum downtime of the software solution.

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21 Frugal Innovation

UNIFIED OPERATIONS COMMAND AND CONTROL CENTER (UOCCC): Nagpur's Unified Operations Command and Control Center takes cue from Rio's Intelligent Operation Center which was developed to prevent any disaster from happening again after the floods and landslide of 2010. Rio's experience suggest that IOC is not only for disaster response, but also brings more than 30 municipal and state departments plus private utility and transportation companies under one single platform. The operations center is the first such facility in the world that integrates all of the functions of a city in a single digital command-and-control system. Nagpur's UOCCC provides a separate control room for citizen safety and incident management. Individual sub-systems (urban mobility, urban utilities, and other citizen services) will have their dedicated control room with analytic dashboard.

INNOVATION:

NAGPUR CITY COMMUNITY NETWORK: An important component of the pan-city solution entails development of optical fiber network to layer citizen services. With enough traction, the NCCN can become a revenue generator for NMC; G2G, G2B, G2C, B2B, B2G, B2C services can be layered on the NCCN. Telecom, cable TV, DTH operators can also layer their services on the NCCN.

INNOVATION: The frugal innovation is in using the pan-city intervention to create a potentially revenue generating ICT asset which will not only be necessary for the proposed SWM suite, but will enable creation of various layers of services benefiting the citizens at large.

SMART GARBAGE SYSTEM: International case studies on smart garbage system revealed that ICT applications are limited to smart bins only. Cities such as Barcelona, Amsterdam, Hamburg, and Oulu have successfully implemented smart trash can projects. Smart trash cans located across these cities are fixed with sensors and wireless communication links that remotely send alerts to waste pickup vans when they are full. Some Canadian cities such as Ontario and Copenhagen have successfully implemented the tracking of waste collection vehicles through GPS as well for better operational efficiency.

INNOVATION:

- **RFID TAGGIG OF HOUSEHOLD BINS:** Contemporary ICT based garbage management systems have limited use of RFID for community bins only. Nagpur's SGS solution advances one step ahead and mounts RFID tags to HH bins. RFID tagged on household bins will ensure monitoring of, first, segregation of waste at door step and second, and status of waste pickup by collection vans. Each HH bin will be tagged with a unique consumer ID.
- **GPS HANDLED DEVICES FOR STREET SWEEPERS:** For effective monitoring of street sweeping activities, each conservancy staff will mount a GPS tracking device while on duty. Coupled with this the staff has to click a photography before and after street sweeping. The photograph will be geo-tagged and will be automatically sent to UOCCC through GPRS connectivity.
- **GEO-TAGGED PHOTGRAPH OF TRASH BINs TO REDUCE MANIPULATION:** Along with the RFID and GPS devices, collection trucks will also be mounted with high resolution cameras for clicking pictures before and after clearance of bin. The photograph taken will be geo-tagged which minimizes chances of manipulation

- **CTIZEN ENGAGEMENT THROUGH SMS:** Another innovative initiative of our pan-city proposal includes monitoring through citizen collaboration. Under this initiative, system generated SMS asking citizens “whether waste collection van has pick-up waste in the locality?” Citizens have to respond saying yes or no. SMS service will be toll free for citizens. This initiative serves two purposes, first, ensures citizen collaboration, second, helps monitor operator performance.

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22 Convergence Agenda

S.No	Missions/Programmes/Schemes/Projects	How to achieve convergence
1	<p>i) Digital India</p> <p>Projects for convergence:</p> <p>i) Nagpur UOCCC</p> <p>ii) Nagpur City Community Network (NCCN) and</p> <p>iii) Smart Garbage System</p>	<p>i) Convergence of the goals of this initiative with the national goals has been ensured. The proposed pan-city solution will enable NMC to improve governance and digitally empower citizens to participate in effective monitoring of garbage collection services.</p>
2	<p>i) AMRUT: Smart metering and SCADA system for accurate measurement of water balance in the system</p>	<p>i) Installation of smart meters in a phased manner and rollout of SCADA system under AMRUT and ongoing 24x7 scale up project will enable UOCCC to monitor urban water supply in Nagpur efficiently</p>
3	<p>i) Swachh Bharat Mission (SBM):</p> <p>Projects for convergence</p> <p>i) UOCCC and</p> <p>ii) Smart Garbage System</p>	<p>i) GPS-based tracking of Nagpur's waste collection fleet will enable the city administration to rev up the city's overall cleanliness through effective monitoring of operations. This will help achieve the national mission objective of "modern and scientific municipal waste management" under the Swachh Bharat Mission.</p>
4	<p>i) Safe City project</p> <p>Project for convergence:</p> <p>i) Unified Operations Command and Control Center for Nagpur</p> <p>ii) Nagpur City Community Network and</p> <p>iii) RFID, GIS based Smart Garbage System</p>	<p>i) Nagpur's UOCCC will initially have two sub systems plugged in: SGS and Safe city Surveillance. Remaining sub-systems will be layered in simultaneously in subsequent phases</p> <p>ii) As part of safe city project, funded by Government of Maharashtra, INR 90.63 Crore will be dovetailed for creation of hard and soft infrastructure that will enable smooth operation of UOCCC. Components include: 2000 CCTV cameras, Public address equipment, software systems and Analytics and Command and control center infrastructure</p>

S.No	Missions/Programmes/Schemes/Projects	How to achieve convergence
5	<p>i) Crime and Criminal Tracking Network and Systems (CCTNS) project of Maharashtra Police, Government of Maharashtra,</p> <p>Project for Convergence:</p> <p>i) Unified Operations Command and Control Center (UOCCC) for Nagpur.</p>	<p>i) 27 Police station in Nagpur City will be covered under the CCTNS project. Pilot project of Lakadganj Police station will be implemented @ INR 145 Crore</p> <p>ii) Easy recording, retrieval, analysis and sharing of the pile of Information will play a very vital role in improving outcomes in the areas of Crime Investigation and Criminals Detection. Creation and Maintenance of database on Crime and Criminal records through UOCCC will bring in a sea change both in Crime & Criminals handling and related operations, as well as administrative processes.</p>

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23 Convergence Implementation

- 1) DIGITLA INDIA: Creation of 400 Km Nagpur City Community network and fiber optics will be leveraged to layer various citizen services on digital platform. UOCCC will ensure an optimum interplay and interoperability within various services and departments. This initiative will improve governance and digitally empower citizens to participate in effective monitoring of urban systems
- 2) AMRUT: Convergence through hard infrastructure will be ensured through AMRUT. A DPR for 24x7 WS in remaining part of the city is under preparation. SCADA system and smart metering are two key components of the project. Nagpur Smart City SPV will be the nodal agency for roll out and monitoring of the project.
- 3) SWACHH BHARAT MISSION (SBM): A smart garbage system loaded with network of sensors, GPS and RFID devices and operated through a unified operations command and control center will enable NMC administration in effective monitoring of Service levels and thereby ensure operational efficiency. This will help Nagpur in achieving the national mission objective of “modern and scientific municipal waste management” under SBM.
- 4) SAFE CITY PROJECT: As part of Government of Maharashtra’s Safe City Project, enabling infrastructure: 2000 CCTV cameras, Public address equipment, software systems and Analytics and Command and control center infrastructure will be created @ INR 90.63 Crore. Core Infrastructure of city community and optical fiber network of 400 Km will be created @ INR 103 Crore under the SCM. UOCCC will act as the central nerve for operationalizing the city surveillance sub-system.
- 5) CRIME AND CRIMINAL TRACKING NETWORK AND SYSTEMS (CCTNS) project: Crime and Criminal Records in 27 police stations of Nagpur will be connected under the project. A pilot project of INR 145 Crore to develop Lakadganj police station has already been approved. Creation and Maintenance of database on Crime and Criminal records through UOCCC will bring in a sea change both in Crime & Criminals handling and related operations, as well as administrative processes.

24 Success Factors

Two key components of Nagpur's Pan-city proposal: City Community Network and UOCC will facilitate effortless integration of other city-subsystems. Modular system Architecture for UOCC will ensure minimize chaos. The three success factors are:

1. **CITIZENS AT THE CENTER:** Active citizen engagement through UOCC's smart garbage solution will act as a catalyst in monitoring of city services thereby ensuring improved service delivery. The proposal ensures continuous engagement (day-to-day basis) in the form of citizen feedback SMS will safeguard project sustainability.
2. **IMPROVED SERVICE DELIVERY:** BY providing a unified view of city sub-systems and an executive dashboard will allow efficient monitoring of services and operations to facilitate insightful decision-making. Improved operations and informed decision making will surely impact final service delivery, government's response time will be reduced considerably and citizen participation will make the process more engaging.
3. **EQUIPPED WITH ACTION PLAN:** To make Smart Garbage System a success, we have prepared an action plan that will ensure success of the project. A modern collection process focusing of source segregation of waste, neighbourhood level bio-methanization plant and bring back centers for recycling of waste, increasing waste processing capacity to 500 MTD and a scientific landfill. An unprecedented citizen engagement drive through UOCC and other mediums is planned to ensure citizens are aware of the system improvements by NMC and in return, expectations from them.

25 Benefits Derived

Benefits for CITIZENS

YEAR 1- a) Zero instance of garbage overflowing from bins; b) Improved and assured garbage collection services, c) Reduced instances of garbage piled up at kerbside, d) 100% road sweep

- All 170 community bins will be mounted with RFID and infra weight sensor devices
- Garbage collection vehicles will be fitted with GPS, RFID readers and camera devices
- Location tracking wearing device will be given to each street sweeper to monitor street sweeping activities

YEAR 3- a) coordinated response to crisis; b) improved communication capability with citizens (city will be able to marshal its resources within hours, instead of days and weeks to warn the public and provide targeted rescue assistance to help save lives), c) Early detection and CCTV surveillance will improve citizen safety

- A Unified Operations Command and Control Center with more than 6 city sub-systems (CCTV Surveillance, water, waste water, power, urban mobility, Crime and Criminal Tracking Network system, and integrated disaster response unit will be developed
- More than 2000 CCTV cameras across the city covering more than 200 Sq. Km area will be installed and integrated with the UOCCC

Benefits to City administration

YEAR 5- a) Nagpur will be achieve citizen aspiration of Clean city will be achieved through constant efforts in managing city's waste smartly

- Accurate assessment of coverage of door to door collection services by private operator in the city
- Real-time status of street sweeping. Instances of garbage disposed at curbside will reduce
- Reduction in fuel cost per tonnage of waste transported

26 Measurable Impact

26.1 Governance Impact

- Improved interagency coordination on account of a UOCCC (activities of health and PWD will be coordinated)
- Increased accountability: Standard Operating Procedures fix responsibility of actions at each level. This will increase account of actions
- Real-time situational awareness and executive dashboard to depict overall status of the city's operation will enable Nagpur to monitor its services and operations more efficiently resulting in considerable improvement in service levels
- UOCCC city surveillance will enable officials to communicate instantly and synchronize efforts
- Present coverage of door-to-door collection service will shoot up from 80% to 100% in the next one year
- Live performance management of conservancy staff
- Improved productivity per employee
- The number of complaints related to garbage pickup will reduce considerably.
- Fuel cost per tonnage of waste transported will reduce.
- Instances of garbage disposed at curbside will decrease

26.2 Impact on Public Services

- Garbage pickup schedule is optimized: Citizens will know the timing of their garbage pickup making waste collection more reliable.
- Citizens can also register their complaints through mobile application and through UOCCC.
- Response time for addressing grievances will be halved
- GPS-based tracking of street sweepers will improve the attendance of the functionaries and in turn, the overall performance of the street sweeping system in the city
- Sensor based bin tracking system will ensure the no bins will be overflowing with garbage thereby making public places clean and hygienic

Implementation Plan

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27 Implementation Plan

#	Activity/Component	Indicator	Baseline	Target	Resources	Date of Completion
Area-Based Proposal						
1	<p>ACTIVATE PLAN</p> <p>1.1 Ignite Civic Engagement</p> <p>1.2 LEAD volunteer Program</p> <p>1.3 My Area Sabha Initiative</p> <p>1.4 My Neighbourhood My Plan (Rollout of TPS)</p> <p>1.5 Project Urban Knowledge Center</p>	<p>AP 1: No of Citizens engaged per year</p> <p>AP 2: No of Volunteers registered under LEAD Volunteer program per year</p> <p>AP 3 No of My Area Sabha Meetings</p> <p>AP 4: No of Projects suggested by citizens</p>	<p>AP 1: 4000 Number of Citizens Engaged</p> <p>AP 2 : Not applicable</p> <p>AP 3 : Not applicable</p> <p>AP 4 : Not applicable</p> <p>AP 5 : Not applicable</p>	<p>AP 1: 15,000 Citizens per year</p> <p>AP 2 : Register 2000 citizen volunteers per year</p> <p>AP 5: Develop one urban knowledge center</p>	<p>1 Financial Resource- INR 12 Crore</p> <p>2 Human Resource-</p> <p>2.1 Internal team of 3 communication experts</p> <p>2.2 TPS consultant</p> <p>2.3 Partnership with VNIT to develop a Urban Knowledge center for building internal capacity</p>	<p>1. Activities 1.1, 1.2,1.3 will start immediately after commencement of project and will become part of normal proceedings</p> <p>2. Activity 1.4 will start immediately after approval of SCP and will continue for 9 months</p> <p>3. Activity 1.5 will be fully operational from Second year</p>
2	<p>PROJECT RESILIENT INFRA SUB PLAN</p> <p>2.1 PROJECT H20-24x7 water supply</p> <p>2.2 PROJECT INTEGRATED SEWERAGE and STORM WATER DRAINAGE SYSTEM</p>	<p>RI 1: Coverage of WS</p> <p>RI 2: Continuity of WS</p> <p>RI 3: Per capital supply (LPCD)</p>	<p>RI 1: 21% HH coverage</p> <p>RI 2: 1 hour daily (WS mostly through Tankers)</p> <p>RI 3: 50 LPCD</p>	<p>RI : 100% HH covered</p> <p>RI 2: 24 hours WS</p> <p>RI 3: 150 LPCD</p> <p>RI 4: 100% HH Covered</p>	<p>1. Financial resource- INR 158 Crore</p> <p>2. Human Resource-</p> <p>2.1. 10 Citizen Volunteers- for ignite citizen engagement initiative</p>	<p>1. Activities 2.1 to 2.7 will start simultaneously and will be operational by end of Year 3</p>

#	Activity/Component	Indicator	Baseline	Target	Resources	Date of Completion
	2.4 Duel piping system 2.5 Underground electrical ducting 2.6 City Community OFC Network 2.7 Piped gas project	RI 4: Coverage of WW network RI 5 Adequacy of WW treatment capacity RI 6 extent of recycled wastewater RI 7: KM length of electrical wire shifted to utility ducts RI 8 KM of OFC network created	RI 4: 20% HH covered RI 5: 0% RI 6: 0% RI 7: 0% RI 8:	RI 5: 100 % (8 MLD packed STP) RI : 100% (15 km duel piping system) RI 7: 100% (140 Km)	2.2 1 Project management consultant and project contractor per project. 1 Third party audit consultant 2.3 1 Infrastructure Expert and 4 Infrastructure Engineer as part of Nagpur Smart city SPV	
3	LIVABILITY AGENDA PLAN A] Urban Mobility-sub plan 3.1 Project TenderSURE for revitalization of urban streets in PBP 3.2 PADESTRIAN FIRST initiative 3.3 MOVE PEOPLE initiative: E-Buses 3.4 Interactive Bus Stop project 3.5 Project SHARE A BIKE 3.6 Project OPEN STREET	UM 1: Ratio of PBP streets revitalized and non-revitalized UM 2: Ratio of uninterrupted pedestrian ROW and total street network available UM 3: Modal Share of NMT trips UM 4: No of Hybrid buses per lakh population UM 5: Average network speed UM 6: Ratio of dedicated	UM 1: 0 % UM 2: 10% UM 3: 25% UM 4: 0 hybrid buses per lakh population UM 5: 27 Km/hr UM 6: 0% UM 7: 9.6	UM 1: 100% UM 2: 100% UM 3: 50% of total trips in PBP UM 4: 40 hybrid buses per lakh population UM 5: 100% UM 7: 0 fatal road accidents	1 Financial Resources- for Mobility Agenda: INR 424 Crore 2 Land for creation of mobility infrastructure (will be facilitated through a TPS instrument) 3. Human Resource- a) 1Project management consultant for Activities 3.1, 3.2, 3.4, 3.8, and 3.9. b) Suppliers for activity 3.3, 3.5 and 3.7 c) Transaction advisors for PPP:	1. Activity 3.1,to 3.7 will commence after 9 months of activity finish of Activity 1.4 and will be operational at the end of YEAR 3 2. Activity-3.9 will commence 3 months after finish of activity 1.4 and will be operation at the end of YEAR 2

#	Activity/Component	Indicator	Baseline	Target	Resources	Date of Completion
	3.7 Project E-rickshaw 3.8 Junction Improvement project 3.9 MLCP at Pardi, Bhartwada and Punapur	bicycle track length to total street length in PBP UM 7: Road Fatalities per lakh population			Activity 3.4, 3.5, & 3.9 d) O&M Contract @ 1 for: activity 3.3, 3.5, and 3.7 f) City Volunteers @ 100 per activity: 3.1, 3.5, 3.6 and 3.7	
4	LIVABILITY AGENDA PLAN B] Social Development sub plan 4.1 Project HOME SWEET HOME affordable housing, night shelters, rental housing and Hostels for working women) 4.2 Project SHIKSHIT and NIRAMAY PBP (Primary school and multispecialty hospital) 4.3 Project KAUSHAL PBP (Skill development center) 4.4 Project ABHAY (CCTV, police kiosk and street lighting) 4.5 Senior citizen safety initiative 4.6 SURAKSHA APP	SD 1: Number of beneficiaries covered under, affordable housing, night shelter, rental housing and working women hostel SD 2: Multispecialty hospital beds per lakh population SD 3 Number of Schools in PBP SD 4: Number of Youth enrolled in Skill development center SD 5 : No of CCTV cameras installed in PBP area SD 6: No of Senior citizens	SD 1: 0 affordable hoses constructed SD 2: 0 multispecialty hospital beds available in PBP area SD 3: 1 schools with 200 student intake capacity SD 4: 0. No Skill development center SD 5: 0 CCTV cameras installed SD 6: No senior citizen connected	SD 1: 3500 affordable housing units, 100 units night shelter, 100 units women hostel, 300 rental housing units SD 2: 500 bed Multi-specialty hospital beds SD 3: 2 Schools with 700 student capacity SD 4: 1 multi-skill development center with 1000 student capacity SD 5: 10 CCTV cameras at key areas SD 6: 100% senior citizens in PBP area will be connected through senior	1. Financial resources- INR 625 Crore 2. Land resource: 200 acre land for affordable housing 3. Human resource: a) Project management consultant @ 1 for activity: 4.1, 4.2, and 4.3 b) Project contractor/developer @ 1 per activity for: 4.1, 4.2, 4.3, 4.4, 4.5 and 4.6 c) Project concessionaire/ Operator @ 1 per activity for: 4.1, 4.3, and 4.4 d) 5 NGO resources and 100 citizen volunteers for activity: 4.1, 4.4, 4.5 and 4.6	1. Activity 4.1 to 4.4 will start after completion of activity 1.4. 2. Activity 4.5 and 4.6 will start immediately after approval of SCP project 4.1 will be operational at the end of YEAR 5 3 Project 4.2, 4.3, and 4.4 will be operational at the end of YEAR 3 Project 4.5 and 4.6 will be operational at end of YEAR 1

#	Activity/Component	Indicator	Baseline	Target	Resources	Date of Completion
	4.7 Public markets	connected to Senior citizen safety initiative		citizen safety initiative		
5	LIVABILITY AGENDA PLAN C] Value Neighbourhoods Initiative 5.1 Project ATTRACTIVE PUBLIC REALMS a) Public art, fountain, street furniture installations b) landscaping of junctions c) Graffiti wall d) Planting 10,000 trees in PBP area 5.2 Project EVER GREEN PBP a) 5 theme based public parks covering 30 acre 5.3 Project NIRMAL NAG (3.0 km riverfront development)	VN 1: Share of open and green space as percentage of total land use VN 2: No of Public art installations in PBP VN 3: KM length of graffiti wall VN 4: No of trees per capita VN 5: KM of riverfront development	VN 1: 3% open and green spaces in PBP VN 2: 0 art installations VN 3: 0 km Length of Graffiti walls VN 4: 9 trees per capita VN 5: No riverfront development	VN 1: 15% green and open space cover VN 2: Public art installations at 10 major junctions VN 3: 30 Km graffiti wall VN 4: 15 trees per capita VN 5: 3.0 Km NAG Riverfront Development	1. Financial resource: @ INR 315 Crore 2. 50 acre land resource for creation of public parks 3. Human resource a) PPP project concessionaire for: Activity 5.2 and 5.3 b) 1 Contractor for: Activity 5.1 c) 1 Landscape expert and a Civil engineer from Nagpur Smart city SPV d) Independent Engineer- 1	1. Activity 5.1 will commence after completion of activity 1.4 2. Activity 5.1 will be complete and ready to use at the end of YEAR 1.5 3. Activity 5.2 will be complete by end of YEAR 2 4. Activity 5.3 will be complete at the end of YEAR 5
6	SUSTAINABLE HABITAT AGENDA SUB PLAN	SH 1: Coverage of DTD service	SH 1: 20% HH covered with DTD collection	SH 1: 100% HH covered SH 2: 7000 LED street lights installed	1. Financial resource: @ INR 30 Crore 2 Land for WTE plant, Bring Back	1. Activity 6.1, 6.2 will commence immediately after approval of SCP and will

#	Activity/Component	Indicator	Baseline	Target	Resources	Date of Completion
	<p>6.1) Project ZERO GARBAGE SOCIETY</p> <p>a) Transfer station</p> <p>b) GPS/RFID tagged collection fleet</p> <p>c) BRING BACK centers (recycle sheds)</p> <p>d) Smart trash bins</p> <p>6.2) E-toilets</p> <p>6.3) Project GREEN LIGHT</p> <p>a) LED Street lights</p> <p>b) Solar Roof Top Heaters</p> <p>c) Electricity from 5 MTD Bio-methanization plant</p> <p>6.4) Rainwater Harvesting project</p>	<p>SH 2: No of Energy saving street lights</p> <p>SH 3: Extent of waste recycled</p> <p>SH 4: Extent of properties with RSH</p> <p>SH 5: Extent of properties with RWH system installed</p> <p>SH 6: No of public toilet seats</p>	<p>SH 2: 0 LED street lights installed</p> <p>SH 3: 0% waste is recycled</p> <p>SH 4: 0% properties</p> <p>SH 5: 0% properties</p> <p>SH 6 : 20 seats</p>	<p>SH 3 : 25% waste will be recycled</p> <p>SH 4: 15% properties</p> <p>SH 5: 15% properties</p> <p>SH 6: 120 e-toilet</p>	<p>centers, E-toilets, and transfer station</p> <p>3. Human Resource</p> <p>a) 1 system integrator for developing SGS</p> <p>b) 1 Supplier each for e-toilets, solar roof top water heater</p> <p>c) PPP concessionaire for LED street lights and Bio-methanization plant</p> <p>d) 1 Environmental expert and sustainability expert from SPV for project monitoring</p> <p>e) 5 NGO resource supported by 50 Citizen Volunteers to engage with citizens for ZERO GARBAGE SOCIETY project</p>	<p>operational by end of YEAR 2</p> <p>2. Activity 6.3 components a, b and activity 6.4 will be operational by end of YEAR 3</p>
7	<p>DIGITAL GOVERNANCE SUB PLAN:</p> <p>7.1 Unified Operations Command and Control Center (UOCCC) project</p> <p>7.2 Wi-Fi spots</p>	<p>DG 1: Percentage of Citizens a citizens using digital services</p> <p>DG 2: Extent of smart water metering</p> <p>DG 3: Extent of NRW</p>	<p>DG 1: 0%</p> <p>DG 2: 0% metering</p> <p>DG 3: 53%</p> <p>DG 4: 0% smart power metes</p> <p>DG 5: 24% T&D losses</p>	<p>DG 1: 100%</p> <p>DG 2: 100% metering</p> <p>DG 3: < 20%</p> <p>DG 4: 100% smart meters</p> <p>DG 5: < 10% T&D losses</p>	<p>1. Financial resource- INR 99 Crore</p> <p>2. Land resource: Land for UOCCC CFC, and smart police kiosk</p> <p>3. Human resource</p> <p>a) system integrator for UOCCC sub system</p>	<p>1. Activities 7.1, 7.2, 7.3, 7.4 and 7.5 will be operational by end of YEAR 3</p> <p>2. Activities 7.6, 7.7 and 7.8 will be operationalized at the end of YEAR 3</p>

#	Activity/Component	Indicator	Baseline	Target	Resources	Date of Completion
	7.3 Smart Water Metering and SCADA system 7.4 SCADA system for integrated sewerage system 7.5 smart energy grid and meters 7.6 Smart Garbage (SGS) 7.7 ORANGE CITY Kiosk Centers 7.8 Smart Police Kiosks	DG 4 Extent of smart power meters DG 5 : Extent of T&D losses			b) Independent engineer-1 c) Smart meter supplier-1 d) Telecom service provider-1	
PAN-CITY SOLUTION						
1	NAGPUR CITY COMMUNITY NETWORK PROJECT 1.1 Dark Cable and OFC network 1.2 Data center/Cloud infrastructure 1.3 Disaster recovery center 1.4 Network operation center	NCCN 1: Coverage of OFC	NCCN 1: 0 km	NCCN: 140 Km	1. Financial resource- INR 75.0 Crore 2. Land resource- land for Data center and network operation center 3. Human resource requirement a) Project management consultant- 1; b) suppliers-1; c) Independent Engineer-1;	1. Activity 1.1, 1.2, 1.3 and 1.4 will be operational by end of YEAR 1
2	UNIFIED OPERATIONS COMMAND AND CONTROL CENTER (UOCCC)	UOCCC 1: Data integration up time	UOCCC1: Not applicable UOCCC2: Not applicable	UOCCC 1: >98% UOCCC 2: >99%	1. Financial resource- INR 80.8 Crore	UOCCC will be completed and operational at the end of YEAR 3

#	Activity/Component	Indicator	Baseline	Target	Resources	Date of Completion
	2.1 UOCCC building 2.2 Video walls- 2 2.3 work stations-25 2.4 IP telephony 2.5 Conference facilities 2.6 citizen service operations center	UOCCC 2: Communication uptime			2. Physical building for UOCCC and set up infrastructure, 3. Operation staff- 25	
3	SMART GARBAGE SYSTEM 3.1 Smart Trash Bins 3.2 GPS, RFID and video cameras for mounting of collection fleet 3.3 RFID readers 3.4 Route optimization module 3.5 VTS units 3.6 Handheld Device with inbuilt RFID Scanner, Camera and GPS 3.7 Software and mobile application	SGS 1: DTD coverage SGS 2: KM of road length swept SGS 3: Percentage reduction in Fuel consumption per vehicle SGS 4: Instance of garbage bins overflowing	SGS 1: 65% households are covered through door to door collection SGS 2: On an average 300 km of the total 1970 km road length SGS 3: Not available SGS 4: Not available	SGS 1: 100% HH SGS 2: 100% road length SGS 3: At least 20% reduction in fuel cost SGS 4: No overflowing bins	1. Financial resource- INR 23.26 Crore 2. Human resource a) software system integrator with UOCCC- 1 b) Supplier enterprise -1 c) control room operator integrated with UOCCC 3. Physical resource- RFID, GPS, VTS, Handled devices, cameras sensor instruments	1. Activity 3.1 to 3.7 will be ready and operational by end of YEAR 1

28 Scenarios

We have identified 60 projects covering different urban agendas to implement Nagpur's SCP. These projects will be operationalized through a Project Organization Matrix i.e. Nagpur Smart City SPV. To honor the constraints on convergence, overlaps, scope, quality, time and cost, these projects have been aggregated into following Implementation Packages:

- Package 1: Activate groundwork and TPS
- Package 2: Resilient and Smart Infrastructure
- Package 3: Livability Module 1- Urban mobility
- Package 4: Livability Module 2- Social Development
- Package 5: Livability Module 3- Value Neighbourhood
- Package 6: Sustainable habitat
- Package 7: Nagpur City Community Network
- Package 8: Unified Operations Command and Control Center systems (UOCCC)
- Package 9: Individual projects
- Package 10: Utility operation and maintenance module

Project sequencing, identification of resources and critical activities, and procurement program has been illustrated in the CPM-PERT chart. **(Please refer Annexure xxxx)**

While the selection process for second round of SCPs continues, Nagpur would have already prepared a detail execution plan for implementation of quick win projects that will yield immediate results. SPV would have been formulated and detail project reports, feasibility studies, and ground work for executing a town planning scheme would have reached advanced stage of completion.

Scenario 1: At the end of YEAR ONE (Short Term)

- SPV in place
- Detail local area plan ready through town planning instrument
- Feasibility, ground surveys, and detail project reports for all project packages be ready
- Smart garbage system be ready and rolled into operations in PBP area
- Senior citizen safety initiative and project SURAKSHA be ready
- ODF PBP
- Initiate procurement for all packages

Scenario 2: At the end of YEAR THREE (Medium-Term)

- Complete project TenderSURE, utility ducts laid, OFC, gas distribution WS, WW, SWD network laid
- Complete project Resilient Infrastructure- 24x7 WS, uninterrupted power supply, integrated WW
- Improved sub-system coordination and operational planning through UOCCC
- PBP has attractive public realms, walkers and bikers heaven through CONNECTED PBP, OPEN STREET, SHARE A BIKE initiatives.
- UOCCC led SGS results better monitoring of garbage system and improved efficiency

- PBP a sustainable habitat; RWH stems, RSWH systems, LED street lighting, e-toilets
- Livability of PBP improves; Value Neighbourhoods and social development initiatives complete

Scenario 3: At the end of YEAR FIVE (Long-Term)

- Inter-agency improved coordination, improved sub-system monitoring and incident management , integration of more than 30 citizen sub-systems with UOCCC
- PBP socially more inclusive :Project HOME SWEET HOME create affordable housing stock of 3500 DUs
- Iconic public place created- Nag riverfront
- Skill development center, retail and office space create avenues for employment
- Social development, green mobility, resilient infrastructure, and sustainable habitat make PBP most livable neighborhood model ready for replication in other parts of Nagpur

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29 SPV

The Nagpur Smart City SPV will be a limited company incorporated under the Companies Act, 2013. The Government of Maharashtra (GoM) and the Nagpur Municipal Corporation (NMC) will together hold 50:50 stakes in the SPV. Over time, private sector or financial institutions may be invited to pick-up equity stake in the SPV; however, at all times, GoM and NMC will continue to hold majority stake with equal holding.

A 13 member Board of Directors will preside over the SPV and shall provide the growth directions and shape the corporate governance agenda of the SPV. The proposed composition of the Board of Directors is as follows:

- 1) Chairman - Commissioner, Nagpur Municipal Corporation
- 2) 1 Nominee of the Chairman
- 3) 4 Nominees of the Mayor/GB
- 4) 4 Nominees of the Govt. of Maharashtra including Commissioner of Police and Chairman, Nagpur Improvement Trust.
- 5) 1 Nominee of the Ministry of Urban Development, Government of India
- 6) 2 Independent Directors from the data bank of Ministry of Corporate Affairs

The organization structure of the SPV will be dynamic, lean and efficient, allowing implementation of projects under the Smart City scheme in a timely, efficient and accountable manner. The SPV will be flexible and will adapt easily to evolving requirements. Please refer Sr. No. 9 and 10 in Annexure 4.

The SPV will have 3 Verticals which will provide both front-end and back-end capabilities for efficient execution of projects and will also enable replication and scale-up. Leadership will be provided by a CEO who will be an experienced leader in executing projects across sectors. The overall organization structure of the SPV will be as follows:

A) Senior management

- i) Chief Executive Officer (CEO) supported by
- ii) President-Operations
- iii) President- Corporate Affairs
- iv) President-Information Technology

B) Planning and project implementation

- i) Head - Planning,
- ii) Head - Water Supply, Sewerage & Storm Water Drainage
- iii) Head - Roads/Transport
- iv) Head - Electricity

v) Head - Solid Waste Management.

C) Corporate

i) Head - Human Resource,

ii) Head - Information Technology

iii) Chief Manager - Finance and Accounts

The SPV will also leverage private sector expertise as may be necessary.

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30 Convergence

#	Activity/Component	Department/Agency/Organization	Role/Responsibility
1	Activate groundwork and TPS	(i) Nagpur Improvement Trust (NIT) (ii) Town Planning Department, GoM (iii) Nagpur Municipal Corporation	(i) NIT to handover planning rights to NMC (ii) Town Planning Department, GoM to notify and sanction the TPS (iii) NMC to coordinate and facilitate the process
2	Smart GRID	(i) Maharashtra State Electricity Distribution Company Limited (MSEDCL) (ii) Public Works Department	i) MSEDCL will contribute to the capital cost of utility ducts' construction, in lieu of the fees presently charged to MSEDCL by NMC for cutting and filling of roads, for underground cabling. ii) MSEDCL will lay out its power cables in these utility ducts, in the selected area on a priority basis. iii) Coordination of project implementation with SPV iv) convergence of IPDS funds
3	Water- 24x7 WS, smart metering, SCADA, integrated WW systems with SCADA	(i) Nagpur water supply company- Orange Water City Ltd (OCWL) (ii) Nagpur Municipal Corporation	i) Expand Nagpur 24x7 WS project in PBP area on priority ii) Convergence of AMRUT funds iii) Technical support for procurement
4	Zero Garbage initiative- Segregation of waste, WTE Plant, Smart garbage collection system	i) Nagpur Municipal Corporation ii) NGOs iii) Citizen Volunteers iv) Maharashtra State Electricity Distribution Company Ltd (MSEDCL)	i) Institutional arrangement with SPV for execution of smart waste initiatives in PBP ii) Citizen engagement drive through city volunteers and NGOS for HH segregation of waste iii) convergence of SBM funds iv) PPP agreements to supply surplus power into the grid from 5 MT WTE plant

#	Activity/Component	Department/Agency/Organization	Role/Responsibility
5	Transit: TenderSURE project- intelligent management, smart bus stops, including transit smart bus stops,	i) National highway Authority of India (NHAI) ii) Vansha Nimay Ltd (VNL) Nagpur bus operator iii) Nagpur Municipal Corporation iv) Traffic Police, Nagpur	i) VNL to enter into contractual agreement to implement smart bus stops in PBP area ii) NHAI to handover portion of Bhandara road for implementing TenderSURE initiative iii) Coordinate with traffic police for traffic diversions and traffic management during project execution
6	Digital Governance Initiative: UOCC and CCTN; command and control center building; control center office infrastructure; backbone OFC infrastructure, Safe City initiative, city surveillance ; Orange city kiosk	i) Nagpur Police ii) Nagpur Municipal Corporation iii) Department of IT, GOM iv) Software Technology Park of India (STPI)	i) identify areas for fixing of CCTV cameras ii) enter into MoU for integrating services and city surveillance through UOCC ii) Convergence of funds from Safe City program and Digital India program
7	Solar City Initiative: Nagpur has been selected for the first model Solar City project	i) Maharashtra Energy Development Agency (MEDA) ii) Nagpur Municipal Corporation iii) National Solar City Program	i) Dovetailing of funds from MEDA and national solar city program ii) Convergence of schemes related to rooftop solar water heater system
8	Project KUSHAL PBP- multi-skill development center with a capacity to impart training certificates to 3000 participants annually along with incubation facility	i) Maharashtra Skill Development Mission ii) Nagpur Municipal Corporation	i) Maharashtra Skill development Mission to support in convergence under Skill India programmes like Pradhan Mantri Kaushal Vikas Yojana

31 PPP

#	Activity/Component	Company/Corp. /Org.	Role / responsibility (basic TOR)
1	<p>Activate groundwork and TPS activities and Detail project reports/feasibility studies for resilient infrastructure package</p>	<p>SPV shall appoint an Urban Planning and design consulting firm with specific experience of implementing Town Planning Schemes</p> <p>The SPV shall also appoint Detail engineering firms for preparing detail feasibility studies for core infrastructure and urban mobility initiatives</p>	<p>TOR for TPS consultant</p> <ul style="list-style-type: none"> i) Prepare a base map of the project area ii) Tabulate ownership information and original plots iii) Prepare concept plan for the area iv) Estimate infrastructure requirement (water, sewerage, solid waste, storm water, street lighting, etc.) v) Estimate land area deduction, development charges and infrastructure costs <p>TOR for DPR</p> <ul style="list-style-type: none"> i) Draw up detailed designs of infrastructure, including utility ducts, in adherence to CPHEEO and IRC's design guidelines ii) Estimate detailed project cost iii) Design streets based on urban street design guidelines iv) Prepare detailed engineering drawings v) Provide project management support

#	Activity/Component	Company/Corp. /Org.	Role / responsibility (basic TOR)
2	UOCCC system integrator and operator- an integrated center to facilitate multi-agency coordination, for incident management, utility operations, and other services including the proposed pan-city solution of Smart Garbage System	For a unique project, that will be developed on PPP basis, an operator to design, integrate and maintain the UOCC facility will be appointed on a performance based contract	<ul style="list-style-type: none"> i) Design, supply, install, test, commission and go-live ii) develop standard operating procedures for each sub-system (SOP) iii) Operate UOCCC as per the O&M manuals iv) coordinate with connected agencies for integration of their modules and sub-systems into UOCCC v) Create a plug and play eco-system for other initiatives like ITMS, city surveillance, disaster management, parking, education, health etc.
3	Provision and operation and maintenance of Smart Water Supply- 24x7 WS	NMC has already entered into an agreement with a concessionaire - Orange City Water Supply Company Ltd. Smart city SPV will enter into a contractual agreement for expanding city scale up of 24x7 project to the selected PBP area on priority.	<ul style="list-style-type: none"> i) Design the network requirement ii) Lay new network in the project area iii) Develop an elevated service reservoir iv) Install SCADA system for monitoring of water system including leakages v) Install bulk flow meters and smart meters vi) Operate and maintain the entire water supply system
4	Resilient infrastructure- sewerage network, utility ducts, storm water drain, NMT Infrastructure and TenderSURE project	A private infrastructure contractor will be appointed for creation of resilient infrastructure on turnkey basis	<p>TOR FOR TenderSURE project</p> <ul style="list-style-type: none"> • Design urban streets as per relevant guidelines. The

#	Activity/Component	Company/Corp. /Org.	Role / responsibility (basic TOR)
			<p>street design should be disabled-friendly.</p> <ul style="list-style-type: none"> • Develop integrated non-motorized transport facilities using special materials. • Construct underground utility ducts to accommodate water, sewer, storm water, electric cable, gas pipes, optical fiber cables, etc. • The contractor should coordinate with other contractors to ensure timely completion of utility services <p>TOR for Sewerage SWD infrastructure</p> <p>Lay down a new sewer network</p> <ul style="list-style-type: none"> • Install the SCADA system and control room • Install sensors on the manholes • Install 8 mld packaged STP with tertiary treatment facility • Install a primary network for distribution of tertiary-treated waste water
5	Installation of smart neighborhoods level 5MTD waste to energy plant as part of Sustainable Habitat urban agenda	The project will be developed on PPP. A royalty sharing, concession agreement of 15 years will be entered into	<ul style="list-style-type: none"> • Design a bio-methanation plant of 5 MTD capacity • Generate electricity • Develop necessary infrastructure for

#	Activity/Component	Company/Corp. /Org.	Role / responsibility (basic TOR)
			<p>distribution of excess energy into grid</p> <ul style="list-style-type: none"> • Operate and maintain the waste-to-energy plant
6	<p>Development of smart parking</p> <p>e-buses and e-rickshaws (maxi-cabs)</p>	<p>Smart parking at 3 locations in PBP area will be developed on PPP. A concession agreement will be entered into with a developer on a 15 year lease period</p> <p>A software development firm will also be appointed for developing and integrating smart parking management system with the UOCCC</p> <p>E-buses and Maxi-cab projects will be implemented on PPP basis</p>	<ul style="list-style-type: none"> • Design, build, own and operate a multilevel car and two-wheeler parking unit of more than 200 vehicle capacity on PPP basis. • Collect user charges <p>TOR for E-buses and E-Rickshaws</p> <p>E-buses and Maxi-cabs suppliers: Provide 30 e-Buses/100 e-rickshaws, setup charging infrastructure and provide 5 years maintenance support</p> <p>E-bus and E-rickshaw operators (PPP): Operate on a revenue-sharing PPP model, via SLAs for on-time service and good maintenance</p>
7	<p>Installation of CCTV cameras to increase safety</p>	<p>Vendor</p>	<ul style="list-style-type: none"> • Supply and install necessary number of CCTV cameras and operate them • Provide necessary infrastructure (hardware and software) to enable functional monitoring through the central control room

#	Activity/Component	Company/Corp. /Org.	Role / responsibility (basic TOR)
8	Installation of solar based LED street lighting to reduce dark spots	Building further on the pilot project, the SPV will enter into a concession agreement for installation of LED street lights. Concessionaire will finance all the LED street lights from the 68% saving in electricity	<ul style="list-style-type: none"> • Design, supply, install, and operate smart LED fixtures with twin dimmable sensors
9	Pan city solution on smart garbage management for effective monitoring of garbage collection in the city	Vendor	<ul style="list-style-type: none"> • Design and develop software solutions for GPS tracking of collection fleet, RFID tagging of waste bins, GPS hand-held devices for monitoring of street sweeping activities, etc. • Develop an android application for customer grievance • Develop a command and control center sub-system and integrate it with the UOCC architecture

Financial Plan

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32 Itemized Cost

The estimated project cost of the Smart City Proposal (SCP) is Rs. 1093 Crores. Of this, Rs. 876 Crores is estimated for the area-based intervention in Pardi and Rs. 217 Crores for the pan-city intervention. The various components and relevant costs of retrofitting in the Pardi area are:

1. Core Infrastructure Facilities:

a) Utility Ducting - Rs. 125 Crores; b) Roads & Beautification of Footpaths - Rs. 284 Crores; c) Water Supply - Rs. 88 Crores; d) Sewerage - Rs. 70 Crores; e) Storm Water Drains - Rs. 42 Crores; f) LED Street Lighting - Rs. 22 Crores; g) Solid Waste Management -Rs. 7.00 Crores; Buried Utility Diagnostic Van and Wifi Hubs- Rs. 1 Crores.

2. Social Infrastructure Facilities:

a) Schools, Public Health Centers, Parks & Playgrounds-Rs. 10 Crores; b) Smart Parking, Bus Stands and Bicycle Sharing Stands-Rs. 18 Crores; c) Smart Police Outpost, CCTV and CFC - Rs. 0.78 Crores; d) Fruits, Vegetables, Fish & Mutton Market - Rs. 2 Crores; e) Solar Heaters, Pressure tiles to generate power (5kms) - Rs. 38 Crores; f) Skill Development Centre - Rs. 15 Crores; g) Field/SPV Office - Rs. 2.00 Crores; h) River Front Development-Rs. 150 Crores.

The components and relevant costs for the pan-city project ICT in solid waste management intervention are:

a) RFID Tags on Bins - Rs. 18 Crores, b) RFID Tags on collection vehicles - Rs. 0.03 Crores; c) RFID Scanner - Rs. 0.04 Crores; d) VTS unit - Rs. 0.17 Crores; e) Hand-held Device with inbuilt RFID Scanner, Camera and GPS - Rs. 0.03 Crores; f) Infrastructure, Software & Mobile application - Rs. 5.00 Crores and g) Backbone Infra, IT Control & Command Centre & Networking - Rs. 173 Crores; h) CCTV and other equipment - Rs. 21 Crores.

Please refer Annexure 3.13 - Abstract of Financial Plan

33 Resource Plan

A financial operating plan (FOP) has been prepared for the proposed SPV that assures self-sustainability, better investing capacity, assured revenue sources to meet estimated expenditure, and possibility to leverage own funds to generate additional revenue. Reliance on a variety of funding sources also mitigates risks.

A) Grants – Rs. 988 crores is assumed from the Smart Cities program after adjusting GoI and GoM's Administrative & Operational Expenses (A&O). It is assumed that GoM would retain 1% of the allowable 5% A&O Expenses.

B) Regularization and Betterment charges – Regularization fee would be charged for regularization of unauthorized layouts/households as prescribed under the Gunthewari Act. Additionally, betterment charges can be levied for the provision of smart core and social infrastructure services under the Town Planning Scheme (TP Scheme) mechanism. This will generate a revenue of Rs. 119 crores from the Pardi area alone. Approximately Rs. 131 Crores is likely to be generated from the phase 2 and 3 (replication and scale-up). These levies would be collected over a period of 3 years in 6 half-yearly installments to facilitate compliance.

C) Land monetization – The SPV will create a land-bank through the implementation of TP Scheme mechanism. Around 50% of the appropriated land will be available for monetization. Rs. 107 Crores is expected to be generated from land monetization in the Pardi area. Approximately, Rs. 682 Crores is likely to be generated phase 2 and 3 (replication and scale-up).

D) Convergence with other Central/State schemes – Convergence has been planned with schemes such as the Solar City (Rs. 11 Crores), Atal Mission for Rejuvenation and Urban Transformation (AMRUT, Rs. 88 Crores), Swachh Bharat Mission (SBM), National River Conservation Plan (NRCP, Rs. 75 Crores), Integrated Power Development Scheme (IPDS), Safe City (Govt. of Maharashtra scheme, Rs. 91 Crores).

E) Cash Reserves - Rs. 100 Crores will be retained as cash reserves to be utilized for either i) funding unforeseen expenses or ii) providing comfort to lenders (creditworthiness).

F) Private sector participation – NMC will install energy-saving LED street lights in the Pardi area on a PPP basis. The PPP operator will be paid from the savings generated due to reduced energy bills. It is estimated that the private operator will contribute Rs. 12 crores or 38% of the total cost of installing the street lights.

G) Sale of Premium FSI - It is expected that premium FSI of 1 will be consumed for 10% of the undeveloped land reserved for monetization. The premium FSI is expected to generate Rs. 4 Crores in the Pardi area. Rs. 66 Crores is expected to be generated from sale of premium FSI during the phase 2 and 3 i.e. replication and scale-up.

Please refer Annexure 3.14 - Assumptions and working of SPV cash-flows.

Action plan for NMC's resource improvement:

In a business-as-usual scenario (BAU), NMC will have an average annual deficit of Rs. 162 crores between FY 2015-16 and FY 2019-20 since the most buoyant revenue source, Local Body Tax, has now been abolished; State is compensating this loss of revenue at a constant rate of 8% increase per annum.

Two scenarios have been developed for resource improvement - A) Improving operational efficiency and B) improving the tax rates as well as optimizing user charge including introduction new taxes and charges. The resource improvement on both accounts has been captured separately; a composite scenario of both scenarios taken together has also been developed.

A) Improving Operational Efficiency of existing revenue sources from FY 2015-16

- i) Property tax – gradually improving the coverage of property tax from 85% to 100% and by increasing arrear collection efficiency from 64% to 90% and current collection efficiency from 78% to 95%, NMC will be able to generate an additional average annual income of approximately Rs. 72 Crores.
- ii) Advertisement tax - increasing coverage to 100% of shop banners with display space of more than 20 sq. ft., NMC can generate an additional average annual income of approximately Rs. 21 Crores.
- iii) Water charges – increasing arrears collection efficiency from 50% to 90% and current collection efficiency from 50% to 95%, NMC can generate additional average annual income of Rs. 119 Crores.

The above mentioned operational efficiency improvements would generate an annual average additional income of Rs. 211 Crores which can wipe out the deficit of Rs. 162 Crores.

B) Improving the tax rates and optimizing user charges starting from FY 2016-17

- i) Property tax - revising the base rate by 30% once every five years, NMC will be able to generate an additional average annual income of Rs. 52 Crores;
- ii) Tax rate revisions - increasing General Tax by 2% and increasing sewerage benefit tax, water benefit tax, and street tax by 1%, NMC will be able to generate an additional average annual income of Rs. 44 Crores;
- iii) Levy of Tree Conservation Tax - levying a tree conservation tax at 1% of the annual letting value (ALV), the NMC can generate an additional average annual income of Rs. 9 Crores;
- iv) Advertisement tax - revising the base rates by 30% once every three years, NMC can generate additional average annual income of Rs. 3 Crores;
- v) Levy of SWM charges - introducing SWM user charges to the tune of Rs. 30 per household per month, the NMC can generate an additional average annual income of Rs. 21 crores.

The above mentioned taxation and user charge augmentation measures would generate an annual average additional income of Rs. 129 Crores.

Please refer Annexure 3.16 - NMC cash-flows and proposed interventions.

By improving operational efficiency, NMC can easily absorb the Smart City financial commitments, including incremental O&M. In addition, if NMC manages to implement tax and user charge augmentation measures, NMC would generate an average annual surplus of over Rs. 150 Crores.

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34 Costs

The key assumptions with respect to the lifetime cost estimated for the interventions planned under the Smart City program in Nagpur:

- i) The O&M cost for pan-city intervention has been assumed at 20% of the capital expenditure.
- ii) The O&M cost for area based development has been assumed at 3% excluding water supply and utility ducts. Water supply O&M will be undertaken by the Orange City Water Limited (OCWL) who is implementing the 24*7 water supply project in Nagpur. Utility ducts typically require only periodic maintenance; this cost has been absorbed in the overall O&M assumptions.
- iii) O&M costs have been assumed to escalate at 6% per annum in line with inflation rate.
- iv) O&M costs for surveillance apparatus (CCTV, video analytics etc.) has not been accounted as part of the Smart City SPV expenditure; these O&M costs would be absorbed by the Home Department, Government of Maharashtra under the Safe City program.
- v) The lifetime costs indicated in this section are for a 10 year period.

The overall lifetime costs for area-based development and pan-city solution have been indicated below:

A) Lifetime Costs for area-based development

For an estimated capital cost of Rs. 876 Crores, the 10 year O&M costs are Rs. 153 Crores. Thus the lifetime cost of the area-based development is Rs. 1029 Crores.

B) Lifetime costs for pan-city solution

For an estimated capital cost of Rs. 217 Crores, the 10 year O&M costs are Rs. 464 Crores. Since the capital costs for CCTVs, Video Analytics etc. are being funded under the Safe City program by Govt. of Maharashtra, the O&M burden on the Smart City SPV will be only Rs. 270 Crores. Thus the lifetime cost for pan-city solution is Rs. 681 Crores.

C) Establishment cost of the Smart City SPV

The establishment cost of the Smart City SPV is estimated to be Rs. 7 Crores which includes staff salaries, office expenses and consumables.

The lifetime costs for a capital expenditure of Rs. 1029 Crores is estimated to be Rs. 617 Crores (average O&M of Rs. 62 Crores per annum) including the lifetime cost of both area-based development and pan-city solution.

Please refer Annexure 3.14 - Assumptions and working of SPV cash-flows and 3.15 - Detailed SPV cash-flow.

35 Revenue and Payback

The revenue income sources of the SPV are expected to be:

1) Rents for use of utility ducts - the rents for utility ducts are assumed to be levied at the rate of Rs. 25 per running meter. The rents would escalate by 10% every 5 years. 8 service providers are assumed to be using the utility ducts which will generate an income of Rs. 150 per running meter. The total income estimated for a 10 year period is Rs. 20 Crores.

2) Rents for usage of IT backbone by various agencies - the rents for usage of IT backbone are assume to be levied at the rate of 12% of the capital expenditure. The rents would escalated by 6% per annum. The total income estimated for a 10 year period is Rs. 142 Crores.

3) Interest on Reserves and Surplus - interest on reserves and surplus is estimated to accrue at 7% per annum. The total income estimated from interest on reserves and surplus is Rs. 124 Crores

Against a total lifetime cost of Rs. 617 Crores, the total revenue income is expected to be Rs. 286 Crores; the SPV will witness a deficit of Rs. 331 Crores. Of the lifetime cost of Rs. 617 Crores, Rs. 423 Crores is the cost of O&M of services that are typically provided by NMC. As NMC is collecting taxes and various other user charges, the O&M component needs to be financed by NMC. Once the NMC transfers Rs. 423 Crores, the SPV will witness a total surplus of Rs. 92 Crores indicating that the proposal is a self-sustaining schema.

Loans would be required once the Smart City proposal is replicated and scaled up to other areas in the city.

36 Recovery of O&M

Under the proposed operations structure of the SPV, the O&M of all assets developed as part of the area-based proposal would be transferred to the NMC after 5 years since the taxes as well as user charges which typically cover the O&M costs, will be appropriated by the NMC. This taxes and user charges would include incremental and regular property tax, general tax, sewerage benefit tax, water tax, water charge, SWM user charge, advertisement tax and any other levies as may be applicable.

However, the pan-city solution, including SWM suite and ICT backbone, O&M would be undertaken by the SPV. The O&M costs will be recovered from:

1. Utility Ducts - The O&M of utility duct will be periodic only and the costs will be minimal. The rents generated for use of utility ducts by other agencies (for instance, BSNL, CGD, Telecom operators, DTH operators etc.) would be available to the SPV.
2. Rental income for ICT backbone (NCCN) - 60% of the O&M cost will be recovered from various agencies that plug into the ICT backbone. This would include agencies such as Police, RTO, various Government departments and any other service providers that plug into the backbone.
3. Contribution by NMC towards ICT backbone - NMC will utilize the ICT backbone for various purposes such as e-Governance operations, ITMS, GPS based monitoring, Kiosks, surveillance, City Wi-Fi, Smart Lighting, Open City Card etc. Therefore, it is expected that NMC would fund 40% of the O&M cost for the ICT backbone.
4. Interest on Cash Reserves and Surplus - It is expected that interest accruing on cash reserves and surpluses will be utilized to cover establishment costs and any outstanding O&M expenses.

With items 1 and 4, the SPV cash-flow is expected to be in surplus.

Please refer Annexure 3.14 - Assumptions and working of SPV cash-flows and 3.15 - Detailed SPV cash-flow.

37 Financial Timelines

Item	Description	Amount
Smart City Grant - GoI	2015-16 to 2019-20	INR. 490 Crores
Smart City Grant - GoM	2016-17 to 2019-20	INR. 248 Crores
Smart City Grant - NMC	2016-17 to 2019-20	INR. 250 Crores
Solar City AMRUT SBM GoM (Safe City) NRCP MSEDCL (utility ducts)	2016-17 to 2019-20 - Applicable to all items	INR 303 Crores
Regularization & Betterment Fees	2016-17 to 2018-19	INR. 119 Crores
Land Monetization	2018-19 to 2022-23	INR. 289 Crores
Sale of Premium FSI	2019-20 to 2023-24	INR. 23 Crores
Contribution by Residents for Solar Heaters	2017-18 to 2018-19	INR. 11 Crores
Contribution by PPP Operator	2016-17 to 2018-19	INR 48 Crores
THE TIMELINES AND THE DETAILED CASH-FLOWS ARE PLACED AT ANNEXURE 3.15 - DETAILED SPV CASH-FLOW.		

38 Fallback Plan

The estimated project cost of the Smart City Proposal (SCP) is Rs. 1093 Crores. Of this, Rs. 876 Crores is estimated for the area-based intervention of retrofitting in Pardi, Bharatwada and Punapur and Rs. 217 Crores is estimated for the pan-city intervention of solid waste management and creation of IT backbone. The replication and scale-up of these proposals is estimated to cost Rs. 1034 Crores for Phase 2 (retrofitting in Nara+pan-city) and Rs. 1224 for Phase 3 (retrofitting in Manewada+pan-city). Thus the overall Smart City investment program is estimated to be Rs. 3351 Crores.

The Phase 1, i.e. retrofitting in Pardi and SWM suite+IT backbone infrastructure, is expected to be financially Self-Sustaining. In fact, the surplus generated during Phase 1 of implementation will be utilized to finance Phase 2 of the program. Phase 3 shall be financed partly from surplus generated during Phase 2 and partly from borrowings of approximately Rs. 475 Crores.

The cash flow assumptions are quite conservative and the realization of each revenue item is spread over a period of 5 years which will residents to plan financial commitments easily. Additionally, the land bank will be opened up in a strategic manner to capitalize the real estate appreciation fully. Below are a few observations on why the revenue assumptions will hold good:

- a) The proposed regularization and betterment fees are accepted and statutorily prescribed rates. Residents will be allowed to pay the same over a 3 year period.
- b) Land monetization is assumed at current market rates; Smart City intervention impact on land prices has not been factored.
- c) Capital contribution for utility duct and duct rents are confirmed by partner agencies and their consent for the same is on record.

The following is a contingency or fall-back plan:

- a) The Phase 1 costs will be fully met with the SCP grants and does not require any additional monies.
- b) The Phase 2 is assumed to commence from FY 2020-21 using the Phase 1 surplus; even if only 50% of the revenues are realized, the SPV can borrow funds and easily tide over short term requirements if any.
- c) The Phase 3 of the project is proposed to commence from FY 2023-24 with approximately 40% of the costs coming from debt financing; in case no revenues are realized as expected, the SPV can rely on NMC to fund the project since it is expected that will full scale revenue reforms' implementation, the NMC's cash flow should have stabilized.