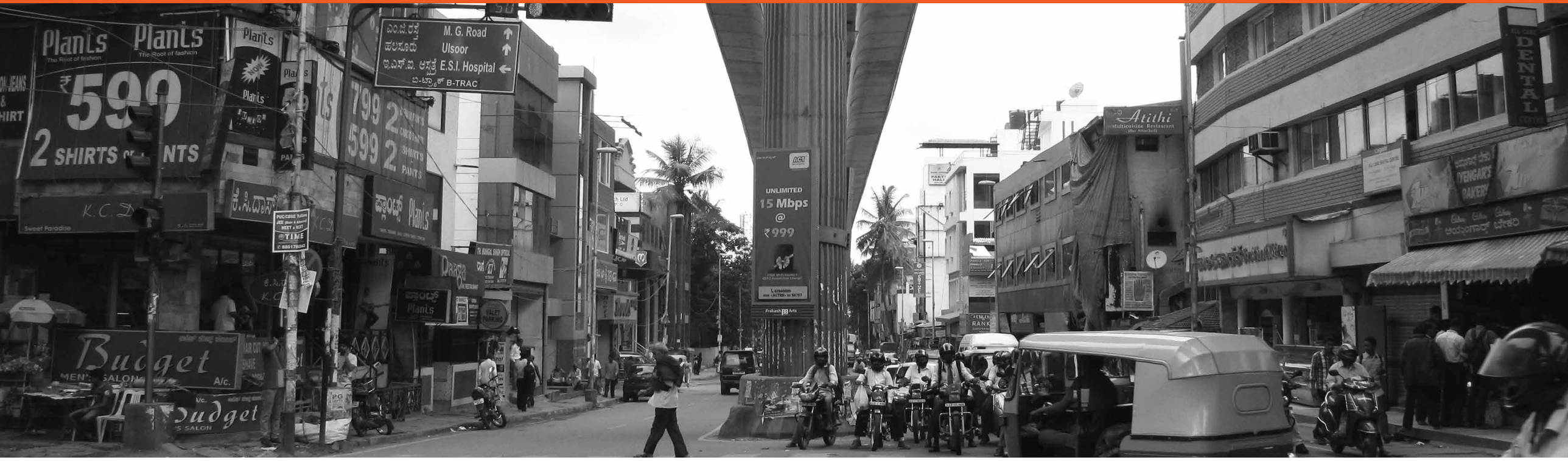
TOWARDS A WALKABLE AND SUSTAINABLE BENGALURU

Development Control Regulations for Indiranagar Metro Station area



EMBARQ India

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Directorate of Urban Land and Transport
Government of Karnataka

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EXECUTIVE SUMMARY

The Metro Rail System was proposed in Bengaluru in 1994, with the incorporation of Bengaluru Metro Rail Corporation Limited), and has had a definite impact on the development of the city ever since. With part of the line being opened to the public in 2011, the influence has grown stronger and more definite patterns of change are emerging. While the most apparent influence has been on land values and the real estate market, the effects are also seen in the changes in land use, density, commercialisation and other development trends in areas around the Metro lines and stations. The Government of Karnataka has responded to these demands of development by introducing a common incentive for areas around all Metro Stations in the form of increased FAR within a radius of 150m from the metro station.

However, the Metro line with a length of 42.3km passes through a variety of localities, each with a different demographic, social and economic structure, urban fabric, street network, land use and buildings. While the introduction of the Metro line itself has affected these areas in different ways, a common regulation cannot address the issues of growth and sustainable mobility in all the areas with such varied characteristics. Hence it is imperative to steer the development in these areas towards a sustainable and user friendly future by understanding the characteristics and issues in each area and introducing regulations that also respond to their specific requirements.

EMBARQ India has been working in collaboration with the Directorate of Urban Land Transport, Karnataka in developing methodologies to design and develop safer streets, public spaces and built environment around the Metro stations in the city.

With pedestrian safety and ease of access as its focus, EMBARQ India developed the Safe Access Proposal for Indiranagar Metro Station in 2011. Following that, this document puts together a framework to build Development Control Regulations (DCRs) for areas around Metro Stations. The aim is to improve the quality of streets and public spaces for pedestrians through regulation of the built environment. The project also aims to cater to the market trends, development potentials and the character and identity unique to these areas through these regulations. The area around the Indiranagar Metro Station has been taken up for demonstration.

Focussing only on Phase 1 of the Namma Metro and the 40 stations along this line, the project has been carried out in two parts. The first part is a cursory study of areas within a 500m radius of the Metro Stations along the length of the line and the different parameters that define their character. It categorizes them into broad typologies based on the combination of these parameters. This helps in identifying Metro Station areas with similar potentials, issues and characteristics. It outlines the predominant issues to be addressed while framing the DCRs for each and locating each of these Station areas within the whole network and the city.

Data for this part has been taken from secondary sources such as the Revised Master Plan – 2015, Detailed Project Report for Namma Metro, Bangalore Mobility Indicators, the Comprehensive Traffic and Transportation Plan, Census of India, satellite images from Google and bangaloreheritage.com. A broad framework for analysis is developed from this study which is applied to the demonstration area.

The second part of the project undertakes a detailed study of the existing characteristics of the demonstration area, its transformation over the years and potential for growth; and accordingly proposes a set of guidelines for the regulation of the built environment. Data has been obtained from primary sources such as ground surveys, public perception interviews and photographic documentation as well as secondary sources such as the RMP 2015.

Two objectives have been achieved with the help of this study:

1. Framing of DCRs for the Indiranagar Metro Station area and
2. Developing a methodology for the Station area Plan that can be applied to other station areas

The proposal is in the form of amendments to the Zoning Regulations of the RMP 2015 that can be implemented in the demonstration area. It also includes recommendations by which these regulations can be integrated into the Master Plan during its revision in 2015. The terms of reference for the application of the methodology to other station areas on Phase 1 have also been provided in this document.

Acronyms	
BBMP	Bruhat Bengaluru Mahanagara Palike
BDA	Bengaluru Development Authority
BESCOM	Bengaluru Electricity Supply Company Limited
BMRCL	Bengaluru Metro Rail Corporation Limited
CBD	Central Business District
CITB	City Improvement Trust Board
CMH	Chinmaya Mission Hospital
CPHEEO	Central Public Health and Environmental Engineering Organization
DCR	Development Control Regulations
DPR	Detailed Project Report
DULT	Directorate of Urban Land Transport
ECS	Equivalent Car Space
ESI	Employees State Insurance
FAR	Floor Area Ratio
HAL	Hindustan Aeronautics Limited
HOPCOMS	Horticultural Producer's Co-Operative Marketing and Processing Society Limited
IISc	Indian Institute of Science
ISRO	Indian Space Research Organization
IT	Information Technology
ITPL	International Tech Park Limited
km	Kilometre
KR Market	Krishna Rajendra Market
KR Puram	Krishna Raja Puram
KTCP	Karnataka Town and Country Planning
LPA	Local Planning Area
m/ mts	Metre
MG Road	Mahatma Gandhi Road
NIMHANS	National Institute of Mental Health and Neuro Sciences
NMT	Non Motorized Transport
pph	people per hectare
RBL	Required Building Line
RMP 2015	Revised Master Plan 2015
RoW	Right of Way
RTO	Regional Transport Office
SPV	Special Purpose Vehicle
sqft	Square feet
sqm/ sqmts	Square metre
TDR	Transfer Development Rights
ToR	Terms of Reference
TTMC	Traffic and Transit Management Centre
UDD	Urban Development Department
ZR	Zonal Regulations

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Quick Connect
Now @
#542, Ohirag Bld, Below Metro Station
CMH Road, Near Mc Donalds
The new
htc one
ON EVERY SMARTPHONE GET UNBEATABLE OFFERS
BLUETOOTH
MUSIC HEADPHONE
2 YEARS WARRENTY
DATACARD
0 % EMI
FREE
T&C Apply
Prakash Arts
Canon
YAMAHA
Petrol

INTRODUCTION

Fig 1.1: Map of India showing location of Bengaluru
Source: Wikipedia

Purple Line: East - West	
R1	Baiyappanahalli
	Swami Vivekananda Road
	Indiranagar
	Halasuru
	Trinity
	Mahatma Gandhi Road
	Cubbon Park
UG2	Vidhana Soudha
	Sir M. Visveshwaraya
	Kempegowda Interchange
	City Railway Station
	Magadi Road
R2	Hosahalli
	Vijayanagar
	Attiguppe
	Deepanjali Nagar
	Mysore Road
R: Reach | UG: Underground	

Table 1.1: Stations along Purple Line
Source: Website of BMRCL

Green Line: East - West	
R3b	Nagasandra
	Dasarahalli
	Jalahalli
R3a	Peenya Industry
	Peenya
	Yeshwanthpur Industry
	Yeshwanthpur
R3	Sandal Soap Factory
	Mahalakshmi
	Rajajinagar
	Kuvempu Road
	Srirampura
	Sampige Road
UG1	Kempegowda Interchange
	Chickpete
	Krishna Rajendra Market
	National College
R4	Lalbagh
	South End Circle
	Jayanagar
	Rashtreeya Vidyalaya Road
R4a	Banashankari
	Jaya Prakash Nagar
	Puttenahalli
R: Reach | UG: Underground	

Table 1.2: Stations along Green Line
Source: Website of BMRCL

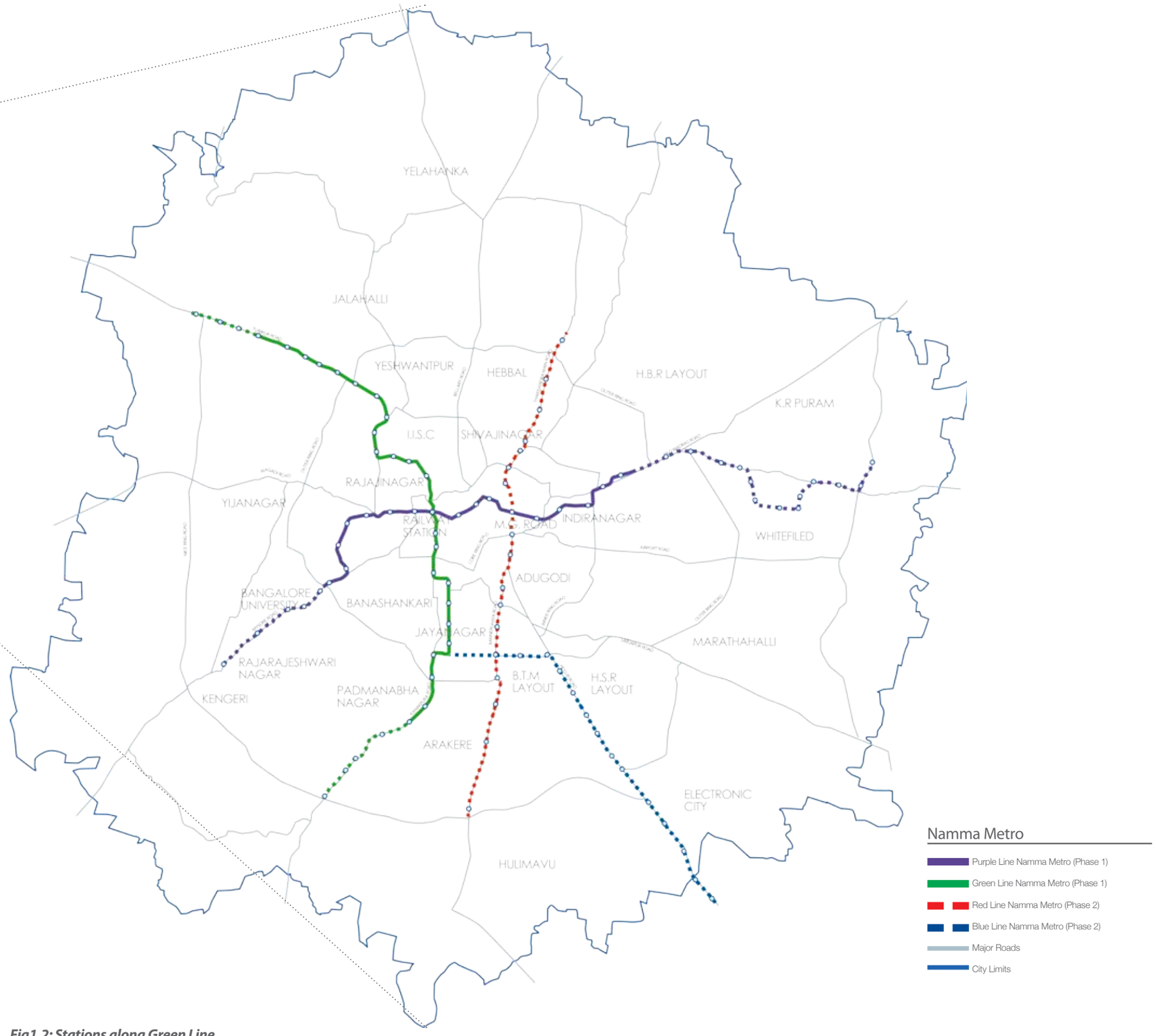

Fig1.2: Stations along Green Line
Source: Website of BMRCL

INTRODUCTION

Bengaluru: Planning Framework

Bengaluru, the capital of Karnataka, is popularly known as the Garden City due to its temperate climate and a relatively high percentage of green cover. It is also called the Silicon Valley of India due to its rapid growth as the IT capital of the country in the past decade. The city's numerous public sector industries, aerospace companies, software firms and defence and telecommunication organisations, as well as the good quality educational and medical institutions make it a preferred destination for employment and education. Due to the increase in migrants, Bengaluru's population has increased by 46.68%in the decade of 2001-2011. There has been considerable increase in the extents of the city as well as the building activities within it, thereby burdening the city's infrastructure and calling for strategic planning and regulatory actions.

The administrative body responsible for the civic and infrastructural assets of the city is the Bruhat Bengaluru Mahanagara Palike (BBMP), while the principal planning authority of the city is the Bengaluru Development Authority (BDA). As per the Karnataka Town and Country Planning (KTCP) Act, 1961, BDA is responsible for the preparation of the Comprehensive Development Plan (CDP) for the Local Planning Area (LPA) of Bengaluru and its revision at least once every 10 years. The current revision of the Master Plan serves a plan period ending in the year 2015 and is referred to as the Revised Master Plan 2015 (RMP 2015). As a statutory document, the RMP 2015 identifies growth perspectives, develops land use plans, and specifies Development Control Regulations (DCR) to regulate the city's development.

The Directorate of Urban Land Transport (DULT), under the Urban Development Department (UDD) – Karnataka, is set up with the objective of coordinating planning and implementation of Urban Transport projects and programs in the State.

Bengaluru Metropolitan Area Statistics	
Bengaluru Metropolitan Area	1307 sqkm
Number of Administrative Wards	198
Total Population of Bengaluru	84,99,399
Male population	44,41,248
Female population	40,58,151
Sex ratio	0.914
Average literacy rate	89.56%

Table 1.3: Bengaluru Metropolitan Area Statistics
Source: Census of India, Bengaluru Master Plan 2015 Vol-1: Vision Document

Namma Metro: Phase I and II

To address Bengaluru's growth challenges, several infrastructure projects have been proposed in recent years including the Kempegowda International Airport, Bangalore-Mysore Infrastructure Corridor, High Tech Zone, Peripheral Ring Road and the Commuter Rail System. The Namma Metro or Bengaluru Metro Rail is one such project introduced in 2006-07 in order to ease the severe traffic congestion and to encourage people to shift their mode of travel from private to public transport.
Bengaluru Metro Rail Corporation Limited (BMRCL) is the Special Purpose Vehicle (SPV) created in a joint venture by the Government of Karnataka and Government of India, which is responsible for the implementation of the Namma Metro project .

Design and implementation of the Namma Metro Project has been envisioned in two phases. Phase 1 has a total of 40 stations along a total length of 42.3 kms. It consists of:

- The Green Line (running North- South from Nagasandra to Puttenahalli stations) with 24 stations and
- The Purple Line (running East- West from Byappanahalli to Mysore Road stations) with 17 stations.

The two lines intersect at the Kempegowda Interchange Station.
The two lines are divided into:

- Two underground sections (UG 1 on the Green Line, UG2 on the Purple line) and
- Four reaches on the sections above ground (R1 and R2 on Purple line, R3 and R4 on Green line). (Refer: Tables 1.1 and 1.2)

The Red Line (IIM-B to Nagawara) and Blue Line (RV Road to Bommasandra), proposed as part of Phase 2, intersect with Phase 1 lines at the MG Road and Banashankari stations respectively. Phase 2 also includes extension of the Green and Purple lines to the outskirts of Bengaluru (Kengeri, Whitefield, Anjanapura and BIEC). (Refer: Figure 1.2)
The construction of Namma Metro began in 2007 and a portion of the Purple line from MG Road to Byappanahalli Station became operational in October 2011. While the construction of this phase was expected to be completed by 2014, the State Government approved the preparation of Detailed Project Reports (DPR) for Phase 2 of the project in 2011.

The influence of Namma Metro is already apparent as transformations are beginning to occur in the areas through which it passes, slower in the inner core areas but more rapid along the outer edges. Although a number of other factors such as availability of developable land, permissible land uses, regulations of the master plan and availability of infrastructure influence the transformations, it is expected that the Metro Line will have a significant impact on these neighbourhoods, and also on the ridership across the city.
In addition to this, in 2009, the Urban Development Department announced in a notification serving as an amendment to the Master Plan, an increase in the FAR for all plots within a 150m radius of a Metro Station, irrespective of land use. The intent was to ensure increased density in alignment with the infrastructure investments, so as to increase ridership numbers.

However, such a blanket application of increased FAR may result in rampant, unplanned redevelopment that may negatively impact the area's urban characteristics and environment. Thus, it becomes imperative to guide the development in a manner that continues to support the public transport system and also create a friendlier environment for metro users and residents alike.
In this direction, EMBARQ India undertook the Safe Access Project for Indiranagar Metro Stations in 2011 to demonstrate ways of addressing issues relating to improvement of accessibility to metro stations. The Indiranagar DCR project extends it further to demonstrate ways of optimizing the development around metro stations to leverage the impact of the public transport system and improving the quality of public spaces through effective development control regulations.

Namma Metro timeline	
1994	Bengaluru Metro Rail Corporation Limited (BMRCL) incorporated
2005 March	Karnataka State government's clearance for project
2006 May	Union government's clearance for project; Land acquisition BMRCL
2007 April	Commencement of civil construction for Reach 1
2009 March	UDD Notification of FAR 4 assigned to 150 m around metro stations
2011 October	Reach 1 (and Indiranagar station) inaugurated
2014 February	Reach 3 inaugurated

Table 1.4: Namma Metro Timeline
Source: Website of BMRCL, Wikipedia

Demonstration Area

The following factors were considered while selecting the demonstration area:

- The Metro station must be an intermediate station on the line as it is more representative of a typical situation than a terminal station.
- The area surrounding the Metro station must have a substantial mix of different land uses in order to understand the character and requirements of the different scenarios in the context of the metro rail system.

Keeping in mind the above factors, the Indiranagar Metro Station was selected for the pilot study of the Safe Access Proposal as it was representative of many of the localities of Bengaluru and had already begun to show extensive transformations due to the Metro line. Indiranagar Metro Station is located along Reach 1 of Namma Metro which runs eastward from the Kempegowda Interchange to Byappanahalli station. During the period of this study, only a portion of this line (6.7 km long) with 6 stations has been in operation. This operational stretch starts at MG Road - a high end commercial zone, passes through the old and dense neighbourhood of Halasuru, runs along CMH Road - a commercial corridor in the planned residential area of Indiranagar - and ends at Byappanahalli, close to an inter-city railway station with industrial and institutional uses around it where a substantial number of residential projects are coming up. All stations on this line are elevated with the exception of the terminal Byappanahalli station, which is at grade. Beyond this Phase 2 of the line continues further east connecting the city to KR Puram, Whitefield and Kadugodi Industrial Area.
Located between Halasuru and Swami Vivekananda Metro stations, Indiranagar is a predominantly residential neighbourhood with a high concentration of commercial activities along its main roads. A number of medical and educational institutions are located in close proximity to the station, resulting in a large number of residing and working populations and thus, a high potential for Metro ridership.

Indiranagar Metro Station: Safe Access Project

Intent and Scope

The intent of the Safe Access Project is to show how access to the Metro station may be enhanced for pedestrians and made a priority in an environment that anticipates increased density and rapid urban transformation.

The study area, defined up to a distance of 500 to 750 m from the metro station, was established after studying the built form, activities and transport networks at the city and neighbourhood levels. The project recommendations focussed on identifying and detailing out street design parameters within the study area, while enhancing safe pedestrian access to the Metro.

Methodology

The methodology comprises of the following stages:

- Identification of a Core area (approximately a city block in depth and width) within the selected neighbourhood that houses the transit station;
- Identification of a larger Buffer area (approximately 500 meters from the transit hub) that acts as a feeder to the Core area (a 500 meter radius is an internationally accepted distance for walking and bicycling).
- Identification of 'Urban Components' that affect pedestrian networks in the Core and Buffer areas and identification of linkages between these components. The 'Urban Components' are divided in four main categories: Physical (Land use, Urban Fabric, Mobility Networks and Street Environment), Institutional, Economic and the Intangible (Social and Cultural).
- Data collection for Urban Components in the Core and Buffer area and analysis on how each component affects pedestrian networks in its present context.
- Identification of urban transformation triggers such as access and proximity to the stations, land costs, plot size, land ownership, current Floor Area Ratio (FAR) achieved and the likelihood of change in land use. Analysis of how each 'Urban Component' would be affected by the transformation process and in turn its effect on pedestrian networks and overall accessibility.

Recommendations

The proposals are based on three implementation time frames – immediate implementation, implementation after 5 years, and implementation after 15 years.

The proposals of the Safe Access Project are restricted to interventions in the public realm. But to ensure that the goals of the project are met over a long term, it is equally important for the surrounding built form to participate in the creation of a pedestrian friendly environment on all streets and public spaces. Hence, it is essential to set guidelines for buildings in these zones to encourage a greater contribution of the built form to the public realm.

The safe access project was phase I of the station area plan which addressed challenges of access to metro stations within the realm of urban transformation

Fig1.3: Phase I of Safe Access proposals
Source: EMBARQ India

- No On-road Parking
- 4 - Wheeler Parking
- 2- Wheeler Parking
- Improve Pedestrian Connectivity
- Important Junction
- Pavement Improvement
- Cycle Parking
- Metro
- Drain/ Nala
- 150m Core
- 500m Radius
- Study Area
- Bus stop
- New Location for Bus stop
- Generator

The key recommendations of Phase 1 (immediate implementation) include the following factors: (Refer Figure 1.3)

1. Table top crossing; surface treatment as traffic calming technique; placement of bus stops away from the traffic junction; placement of auto rickshaw pick-up and drop-off points on either sides of the road.
2. Raised crossings; surface treatment as traffic calming technique; placement of bus stops away from traffic junctions.
3. Restricted vehicular access from CMH Road; continuous pavement with bollards to restrict 2-wheeler traffic; shared space on secondary roads for pedestrian movement, parking & vehicular movement; cul-de-sac towards CMH Road for sufficient turning radius.
4. Wider median for shelter while crossing; fixed Right of Way (RoW) width 100ft and a minimum of 7m wide pavements on both sides of the road.

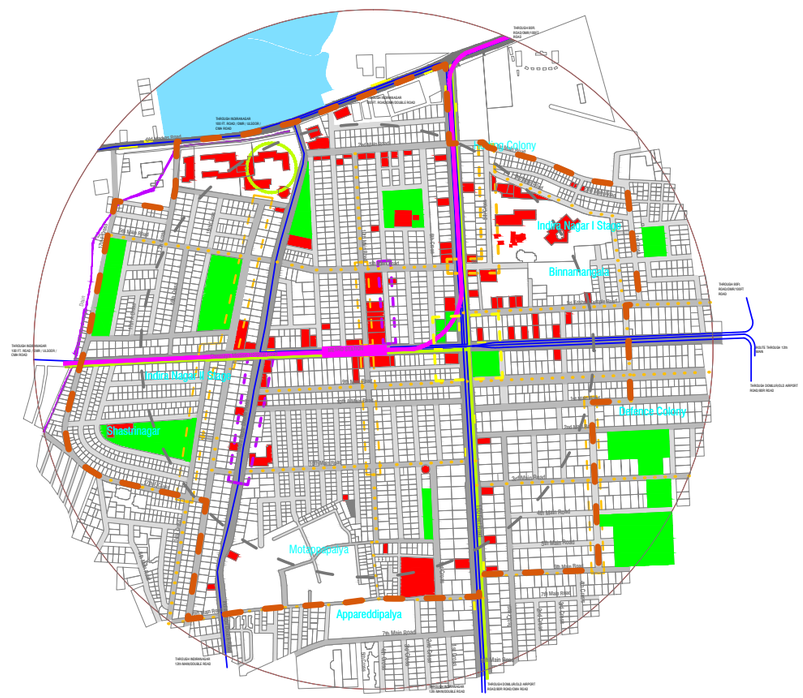

Fig1.4: Phase II of Safe Access proposals
Source: EMBARQ India

- Special Pedestrian Zone
- Pedestrian Priority for Access to Metro Station
- Pedestrian Priority Zones
- Pedestrian and Biking connection between neighborhoods
- Metro Feeder Bus System (Existing Proposla Route)
- Highlight
- Metro
- Drain/ Nala
- 150m Core
- 500m Radius
- Study Area
- Bus stop
- Generators

The key recommendations of Phase 2 of the proposal included:

1. Creation of multilevel parking for Metro rail users at BDA Complex.
2. Maintenance of consistent right of way (RoW) on 100 feet road, provision of biking lanes off pavements, provision of parking in basement or on sides or rear of buildings.
3. Joint development by BMRCL & private property owners to permit free access way for pedestrians at ground level to access CMH Road by raising the properties on stilts. Private property owners to be compensated by BMRCL.

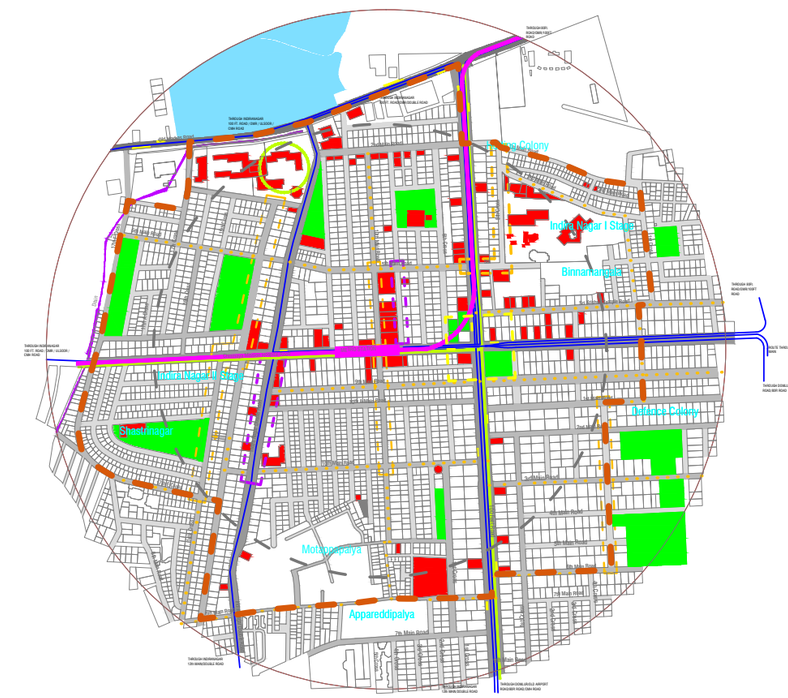

Fig1.5: Phase III of Safe Access proposals
Source: EMBARQ India

- Special Pedestrian Zone
- Pedestrian Priority Zones
- Controlled Land Use Change
- Metro Feeder Bus System (Existing Proposal Route)
- Bollards
- One Way
- Generators
- Metro
- Drain/ Nala
- 150m Core
- 500m Radius
- Study Area

The key recommendations of Phase 3 of the proposal included:

1. Provision of additional parking capacity for commercial users of the entire neighbourhood at the BDA Complex.
2. Allotment of half Right of way of internal streets for pedestrians; Parking space for 2 wheelers only
3. Joint development by BMRCL & Private Property Owners to permit free access way for pedestrians at ground level to access CMH Road by raising the properties on stilts. Private

Property owners to be compensated by BMRCL.

1. Regulation of Parking, treatment of intersections and improvement of pavements.
2. Provision of parking only in basements for all new developments
3. Regulation of Parking, treatment of intersections and improvement of pavements. Reduction of carriageway, provision of wider pavements and street furniture.

Indiranagar Metro Station: Development Control Regulations

Intent

The Intent of this project is to address issues pertaining to the transforming character of the public spaces and built environment around the Metro Station.

Methodology

The detailed methodology adopted for each part of the study is explained in the respective sections. The broad approach to the project is as follows:

1. City Level Analysis
   a. Only Metro Stations along Phase 1 of Namma Metro are considered for analysis. An area of 500m radius around each metro station is demarcated as Station area and a cursory study is undertaken of various characteristics of these Station areas.
   b. Each Station area was assessed based on four parameters to identify its typology: the Level of Connectivity, Predominant Land use, presence of Ecological factors and Heritage Components.
   c. While Level of Connectivity and Predominant Land use help in assessing the development potential, the Ecological and Heritage Components highlight the critical elements or systems present in the Station area that have to be conserved during the planning process.

   This study helps in assessing the scope of development of the demonstration area in comparison to the rest of the city and also identifying the areas of concern that have to be addressed in detail.

2. Station area Analysis
   a. The Indiranagar Station area boundary is rationalized and demarcated based on the constraints on ground.
   b. Data collection is undertaken for the following scenarios to assess the impact of the Metro line on the Station area:
      i. Existing conditions before the inauguration of the Metro (2011)
      ii. Existing conditions after the inauguration of the Metro (2013)
   c. Review of the following statutory documents is undertaken to assess the impact of their regulations on the Station area
      i. Implications of the RMP 2015
      ii. Implications of the UDD Notification of 2009
   d. Primary sources for the study include physical surveys of the built form, pedestrian traffic surveys and interviews with residents and visitors. Secondary sources include statutory documents like the RMP 2015, Census of India and the UDD notification of 2009.
   e. 2D and 3D simulations of the physical characteristics are carried out for the two scenarios considered and mutually compared to identify areas and patterns of growth, transformation and potential for future development.

The analysis is consolidated to identify areas that require preservation, areas with potential for growth and regulations that require modification. These crucial parameters provide the framework on which the DCRs are built.

3. Formulation of the Development Control Regulations:
   a. An Overlay Zone is identified within the Station area where the proposed regulations will be made applicable. The vision and principles guiding the proposals are outlined for areas within this Zone.
   b. Areas identified for intervention through the Station area Analysis are highlighted in the Urban Design Concept plan. The guiding principles are applied to these areas and strategies are accordingly developed to address the issues and requirements of each area.
   c. Development Control Regulations are developed as modifications to the zonal regulations and the UDD recommendation applicable to each of the identified areas. These are in the form of regulations for FAR, Ground Coverage, Setbacks, Parking, Vehicular Access to plot and Building Design guidelines.
   d. 3D simulations of the Station area are generated for 3 scenarios:
      i. Interpretation of existing regulations as per the RMP 2015 (This serves as the reference against which the other two scenarios are compared).
      ii. Implication of regulations as per the UDD notification
      iii. Implication of the proposed Development Control Regulations
   e. Parameters of growth and indicators of quality of pedestrian and built environment are compared for the different scenarios.

4. A list of considerations are prepared to integrate the DCRs with the Master Plan

5. Terms of Reference are drawn up in order to make the methodology employed in this project applicable to other stations in Phase 1.

The DCR project is phase II of the station area plan which addresses issues relating to the development and design of the built environment within the station area.

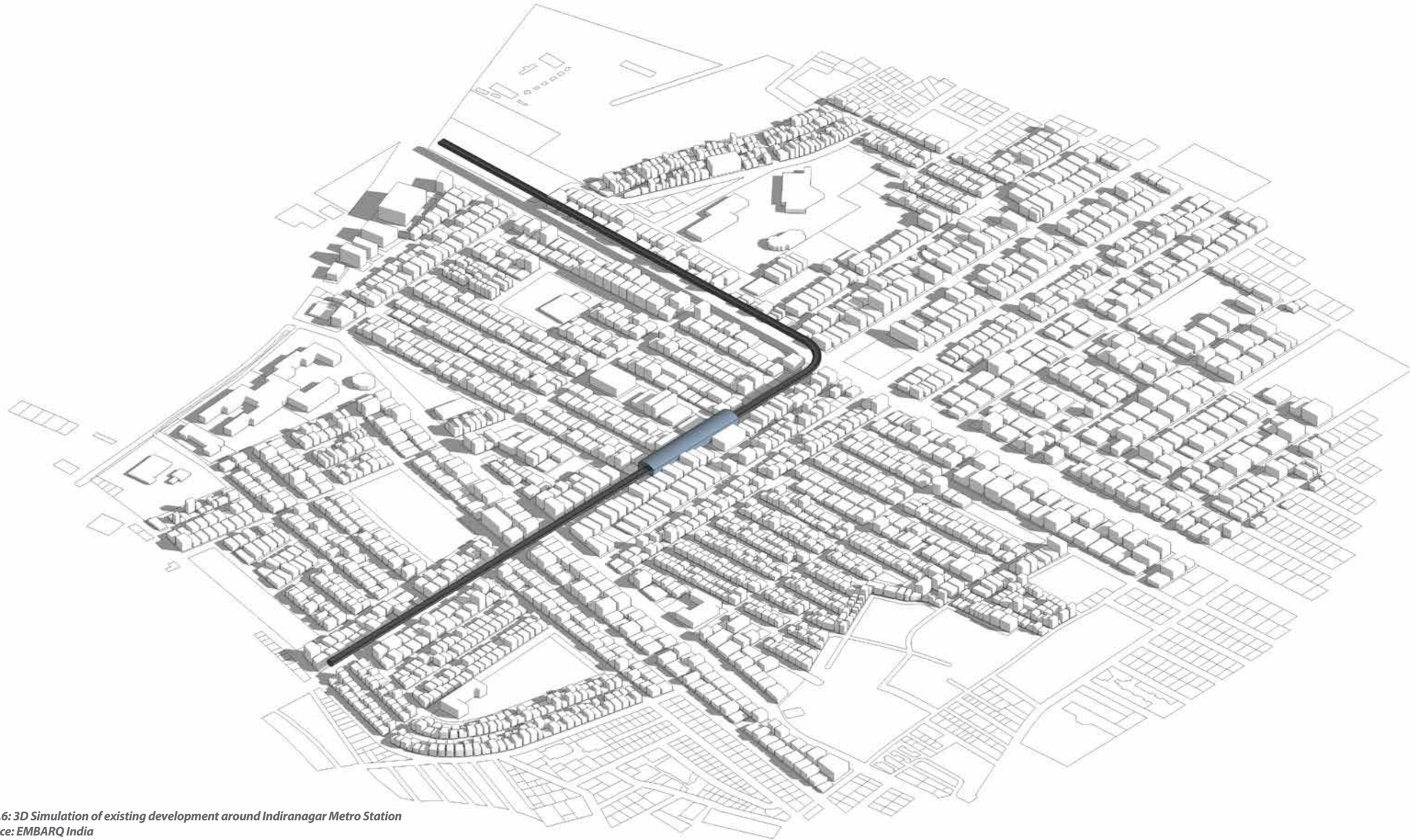

Fig1.6: 3D Simulation of existing development around Indiranagar Metro Station
Source: EMBARQ India


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Prakash Arts

KEY PROPOSALS

Impact of UDD Notification
Key Proposals
Comparative study of proposals

Impact of UDD Notification

The Namma Metro project began in 2007 and was inaugurated in 2011. It has already induced substantial changes in the areas surrounding the stations and is expected to greatly improve the connectivity between different parts of the city.
A notification from the Karnataka Urban Development Department (No.UDD 93 MNJ 2008) was passed in 2009 stating that the maximum permissible FAR is increased to 4.00 for all land uses with the exception of Traffic and Transportation Zone within a distance of 150m from the outer edges of the Metro Station. However, it does not prescribe any change to the other regulations of the RMP 2015.

The current regulations fail to address the issues that accompany the transformations brought on by the introduction of the metro system and the UDD notification itself. Since each of the areas through which the metro line passes differ from the rest in many aspects, they have responded differently to the transformations triggered by these developments. Hence a blanket rule cannot be applied to all areas without assessing their potential and limitations in supporting these new developments.
Indiranagar is characterised by predominantly residential land use and small to medium sized plots.

Within 150m of the Metro Station, 69% of plots are zoned Residential (Main), 24% (along CMH Road and Double Road) are on the Commercial Axes.
75% of plots are smaller than 360sqm (46% of plots falling in the 40ftx60ft typology), and 17% of plots are in the 360sqm to 1000sqm range.
Independent homes occupy 62% of plots and apartments occupy only1%.
Of the total 4.93km of roads in the 150m zone, 45% are 12m wide, 21% are 15m wide, 23% are the 24m wide Commercial Axes while 4% is the 9m wide NGEF Road. 65% of plots lie adjoining the narrower roads, i.e. 15m or less.
Average pedestrian walkway width is 1.5m around the Metro Station and 40% of these are of poor quality and have low levels of service.

The notification in itself causes a series of issues by not revising regulations other than the FAR limit, thereby greatly limiting the efficacy of this measure. The issues within the Indiranagar Metro Station area include:

1. Incompatibility with smaller plots
   An FAR of 4.00 translates to a building height of at least 5 floors (15m). As per existing regulations, for buildings taller than 11.5m, the setback increases with the addition of every floor. This results either in the decrease of the building footprint to impractical extents or under-utilization of the FAR due to the restricted height the building should be limited to in order to avoid reducing its ground coverage. This issue is faced by 92% of the plots in Indiranagar which are smaller than 1000sqm.

2. Lack of light and ventilation
   While the maximum FAR limit of 4.00 can be achieved by most plots by adding two or more floors and maintaining the existing setbacks, it will create a series of tall structures with very little space between the buildings due to which sufficient natural light and ventilation cannot reach the lower floors. This is applicable to at least 75% of plots that currently have a maximum FAR of 1.75 and setback of approximately 1.4m on all sides.

3. Insufficient pedestrian infrastructure like pavements to support increased densities
   Application of 4.00 FAR to the 150m zone results in a 95% increase in built-up area and an equivalent increase in the number of households and hence number of vehicles. With most roads having width lesser than 15m and the wider roads already being congested with traffic, the increased demand for parking and road space cannot be accommodated on the existing streets.
   A 95% increase in built-up area also translates to a near doubling of the population and pedestrian volumes within the 150m zone. This makes it imperative to address issues pertaining to walkability and easy access around the metro station; including effective design of building facades, creation of more pedestrian-friendly streets and zones and ensuring a safe environment for pedestrians at all times of the day.

4. Area Character
   The constraints placed by the existing regulations on the smaller plots forces them to either amalgamate or forego the additional FAR they are entitled to. Due to the high real estate values in Indiranagar and proximity to the Metro, amalgamation is more likely to take place across the 150m zone, whereby independent homes cannot be maintained on amalgamated plots and will have to give way to either multi-storeyed apartments or commercial stuctures. Since, currently, in this zone 89% of residential plots have independent homes, such a transformation will completely change the scale and function of buildings in the neighbourhood. The increased rate of commercialization taking place in close proximity to the Metro may result in the creation of mono-functional commercial areas that are dead spaces beyond working hours and hence unsafe for pedestrians.

5. Concentration of densities
   The UDD notification concentrates all the development within 150m of the metro station. The proposed incentive will result in a 95% increase in density when the 4.00 FAR is completely achieved. This doubles the load on the infrastructure within this limited area. On the other hand, a number of activity generators that make Indiranagar a city level destination for high-end retail and commercial activities are located beyond the 150m zone but within walking distance of the Metro Station. These areas have high potential for growth but are underutilized due to the limited FAR they are entitled to.

6. Other opportunities in Indiranagar
   Indiranagar is a city level destination for high end commercial and retail activity as well as a much sought after location for residential properties. A study of the real estate market indicates that the property rates in Indiranagar (Rs.17000/sqft of residential land) are one of the highest in the city. This is further expected to rise with the completion of the metro lines which will provide better connectivity to all parts of the city. Hence, the development in this area must be planned to make best use of the Metro system and the supporting incentives while ensuring that a safe and attractive environment is created for the residents, visitors and users of the public transportation systems.

The current project, hence, looks at a larger zone of influence defined by an average walking distance of 500m around the metro station called the Station area and undertakes a study of its potentials and limitations through the following set of parameters:

- **Study of Characteristics of the Station area** in terms of Plot Sizes, Street Networks and Sidewalks, Building Typologies and Distribution of Densities.
- **Study of Transformations in the Station area** in terms of changes in Land Use, Building Heights and Construction Activities.
- **Study of Impact of Zonal Regulations on the Station area** as specified in the Revised Master Plan 2015 as well as the UDD Notification of 2009.
- **Study of Activity Patterns in the Station area** in terms of Formal and Informal Activity Generators and Pedestrian Movement Patterns.
- **Comparison of existing conditions and proposed incentives** in the light of Perception of the residents, workers and visitors to the area and the Carrying Capacity (in terms of pedestrian infrastructure around the metro station)of the Station area.

Based on these studies, the project arrives at the Key Influencing Factors which need to be addressed in order to formulate a comprehensive development strategy for the Station area. The project proposes to achieve this by a new set of DCRs which will supersede the regulations of the Revised Master Plan (2015). The new Development Control Regulations allow a higher number of plots to avail of the incentives of the UDD Notification. The proposal suggests a redistribution of the increased density to a larger area in order to ensure that the full potential of the incentive is not lost and that the benefit of these measures reaches a greater number of people.

The proposal begins by identifying the extents of the Station area Overlay Zone within which the revised regulations shall be applicable. A rationalization of the 150m zone identified by the UDD notification is considered the Core Area while the remaining area within the Overlay Zone is called the Buffer. The key strategies adopted while formulating the Development Control Regulations include:

- Modifications of specific regulations of the RMP 2015 within the Core Zone immediately around the Metro Station to ensure that majority of the plots are capable of utilizing the 4.00 FAR.
- Restricting the increase in built up space within the Core Zone for plots further away from the Metro Station to an achievable limit. Redistributing the remainder of the buildable area in the Buffer through TDR. The Transfer of Development Rights shall be from the Core to the identified nodes in the Buffer area and not within the Core itself.
- Identification of pedestrian priority streets and activity zones in the Buffer, that are capable of receiving the excess buildable area from the Core thereby extending the benefit of the Metro station and the increased FAR to a larger number of people.
- Specifying a maximum limit to amalgamation of plots to ensure the preservation of the character of the neighbourhood.
- Specifying the permissible land uses to pedestrian friendly uses within the Station area Overlay Zone.
- Specifying a minimum percentage of residential use in buildings in mixed use zones instead of allowing purely commercial areas thereby ensuring a safer walking environment for pedestrians round the clock.
- Specifying a maximum parking requirement per plot and including the parking space in the calculation of the FAR to discourage the use of private vehicles.
- Ensuring that all ancillary uses are located at the front and entry level of buildings to maintain an active edge along the street and regulating the design of the entry level of buildings for areas and streets with high pedestrian activity.

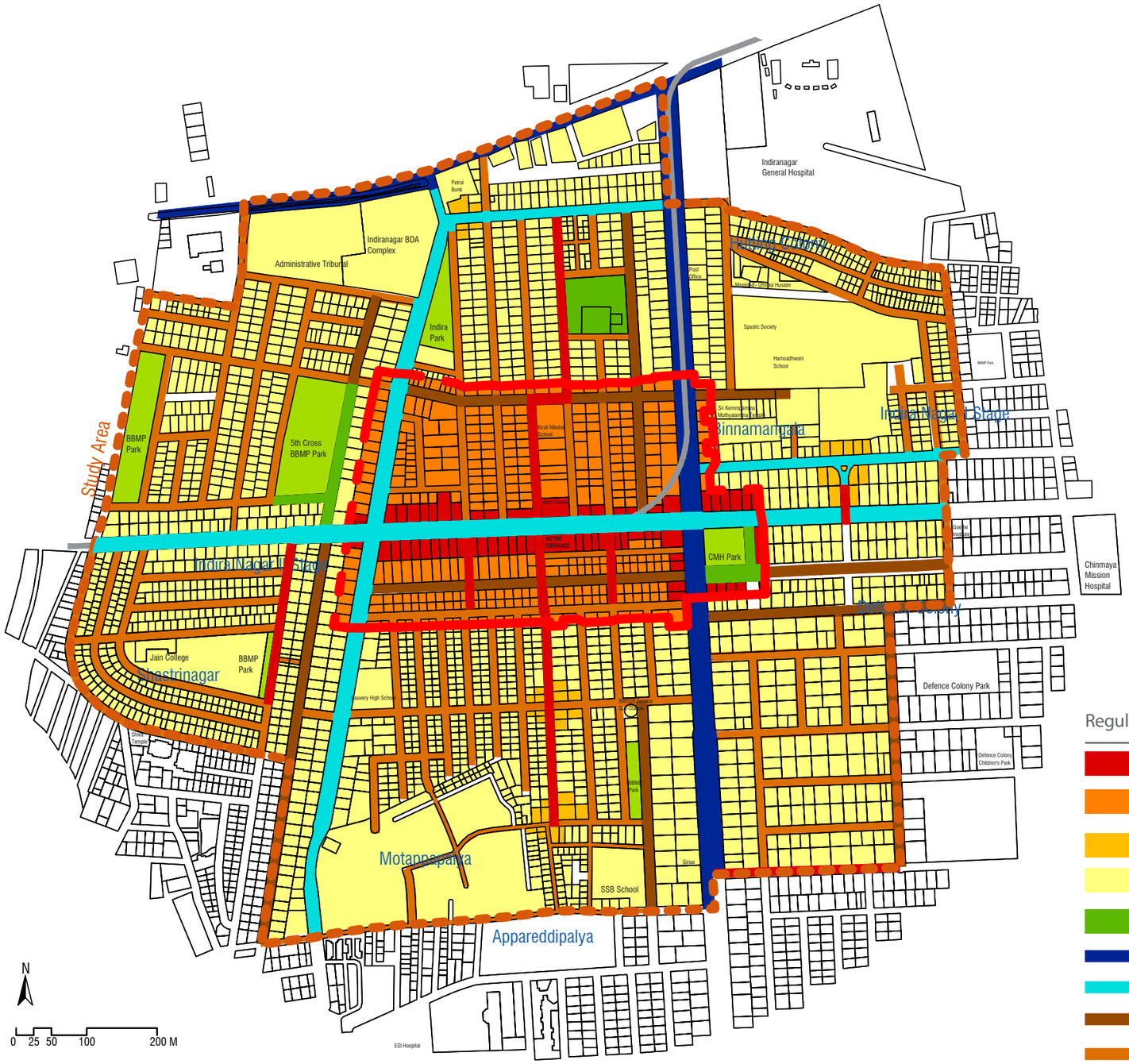

Fig2.1: Proposed Regulating Plan
Source: EMBARQ India

Key Proposals

The proposal identifies the following areas within which the revised regulations/ Development Control Regulations shall be applicable:

1. Core Area
   a. **Compact Development Zone A:** Plots adjoining CMH Road and intersections of CMH Road with Double Road and 100 Feet Road.
      - High Density Development – Maximum permissible FAR of 4.00
      - Minimum residential use in buildings – 40% of built area
      - CMH Road: Vehicular entry is permitted from CMH Road but parking within plots\ cannot be along the street edge.
      - 100 Feet Road: Vehicular entry to site is permitted if the entry driveway width is not greater than 6m.

   b. **Compact Development Zone B:** Remaining plots within the Core Zone
      - TDR source area – Maximum permissible FAR of 3.00
      - Minimum residential use in buildings – 60% of built area
      - Vehicular entry to site is permitted if the entry driveway width is not greater than 3.5m and parking within plots cannot be along the street edge.

   c. **Pedestrian Priority Streets:** Plots adjoining identified streets connecting to the Metro station, bus stops, parks and other public amenities.
      - Vehicular entry to site is permitted if the entry driveway width is not greater than 3.5m and parking within plots cannot be along the street edge.

4. Buffer Area
   a. Activity Nodes: Plots adjoining intersections of major roads or pedestrian connections; in proximity to parks, bus stops or other amenities.
      - TDR receiving area – Maximum permissible FAR of 3.00
      - Minimum residential use in buildings – 60% of built area
      - Vehicular entry to site is permitted if the entry driveway width is not greater than 3.5m

   b. Major Roads: Plots adjoining roads of width 15m or higher.
      - TDR receiving area – Maximum permissible FAR of 3.00
      - Minimum residential use in buildings – 60% of built area
      - Vehicular entry to site is permitted if the entry driveway width is not greater than 3.5m

   c. Pedestrian Priority Streets: Plots adjoining identified streets connecting to the Metro station, bus stops, parks and other public amenities.
      - Vehicular entry to site is permitted if the entry driveway width is not greater than 3.5m

Regulations applicable to all zones:

1. All ancillary uses shall be located along the front of the building and at the entry level.
2. For Commercial use at entry level of building:
   - Set back space shall be used for activities such as outdoor display of goods, kiosks, outdoor seating, landscaping and other informal activities.
   - No boundary walls shall be allowed along the front plot line.
   - Awnings at ground level and balconies on the top floors may be projected into the front setback area.
   - A minimum of 80% of ground level façade shall have windows or openings with transparent, non-reflective materials.
3. For Residential use at entry level of building:
   - In case of residential properties, a boundary wall of a maximum of 1.5 m is permitted. The boundary wall shall be solid up to a height of only 0.45m from ground and the top portion of the wall must allow visual link from the pedestrian walk way to the front of the building.
4. Plots around Parks:
   - Balconies and active uses located at top level of buildings to overlook the park to maintain a visual connection.
   - Park boundary to be demarcated using grills or other materials to facilitate visual link between pedestrians and park activity.
5. Parking shall be included in the total built up area for calculation of FAR. The maximum permissible area allotment for parking shall be specified as per size of plot. No parking along the frontage of buildings within the plot.

Comparative study of UDD notification and EMBARQ India proposal

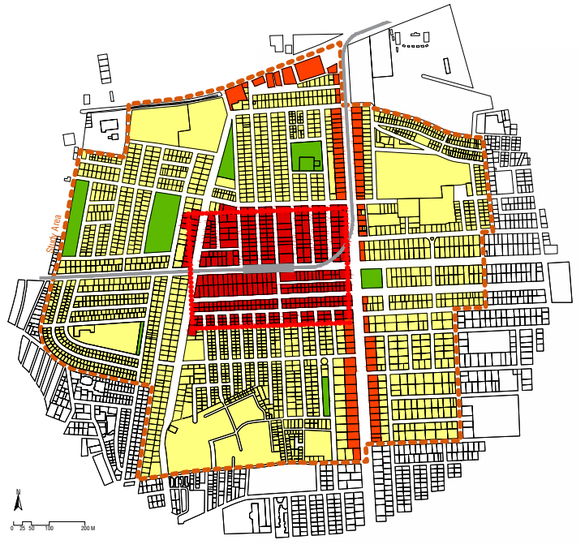

Fig2.2: FAR plan, UDD
Source: EMBARQ India

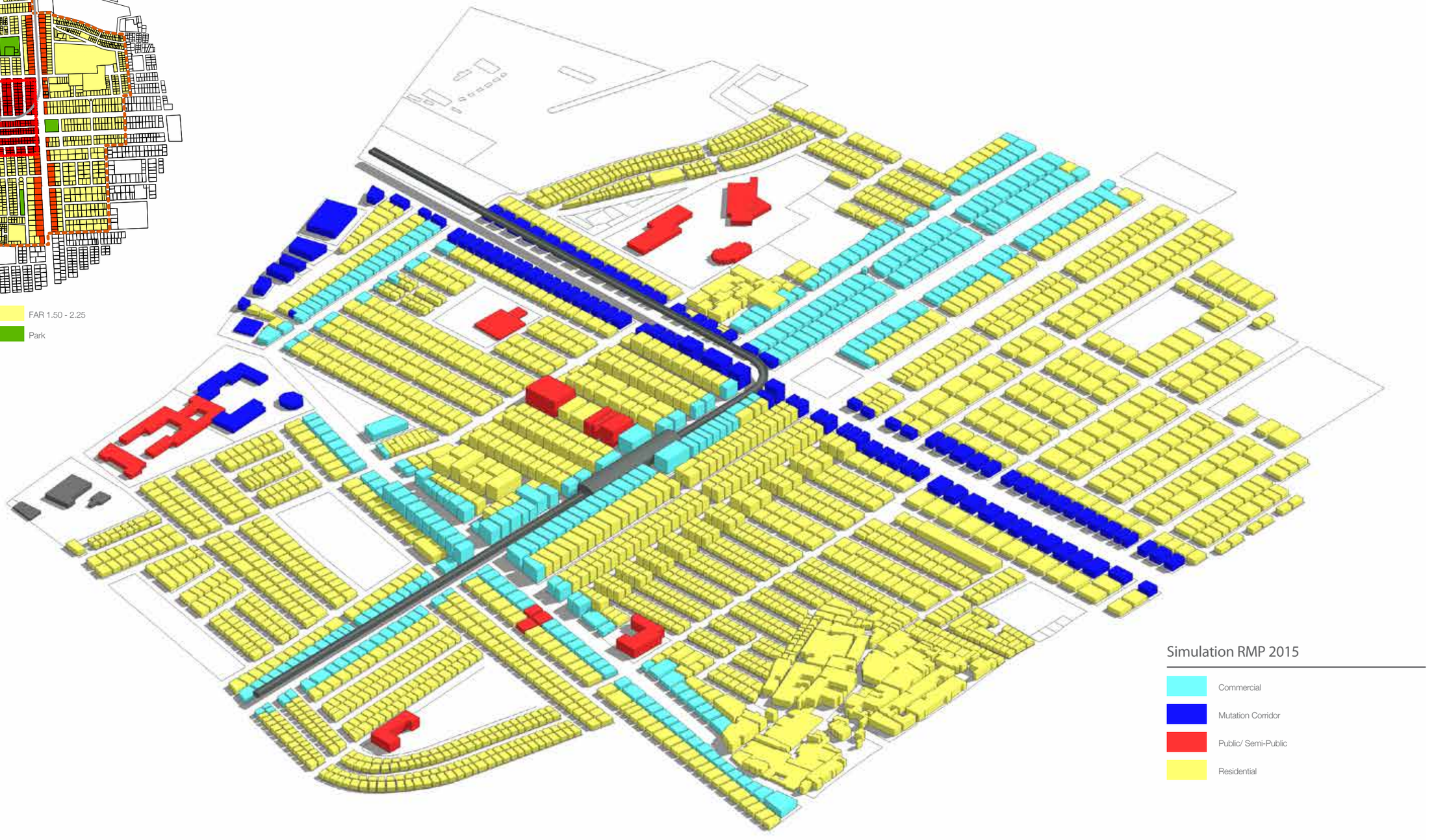

Fig2.3: Simulation of Indiranagar Station area, according FAR proposed by UDD Notification
Source: EMBARQ India

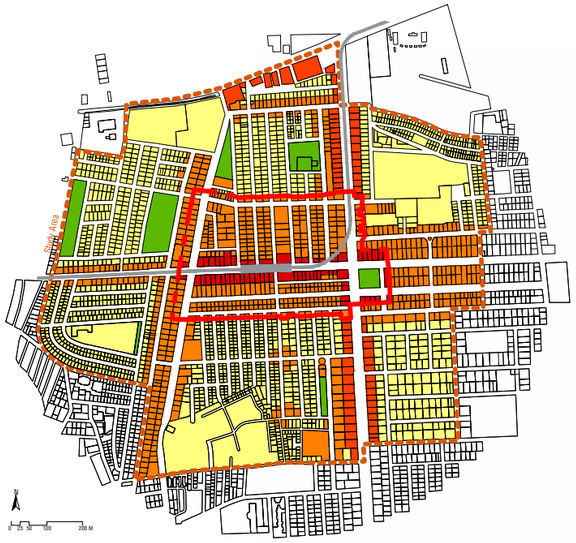

Fig2.4: FAR plan, Proposed
Source: EMBARQ India

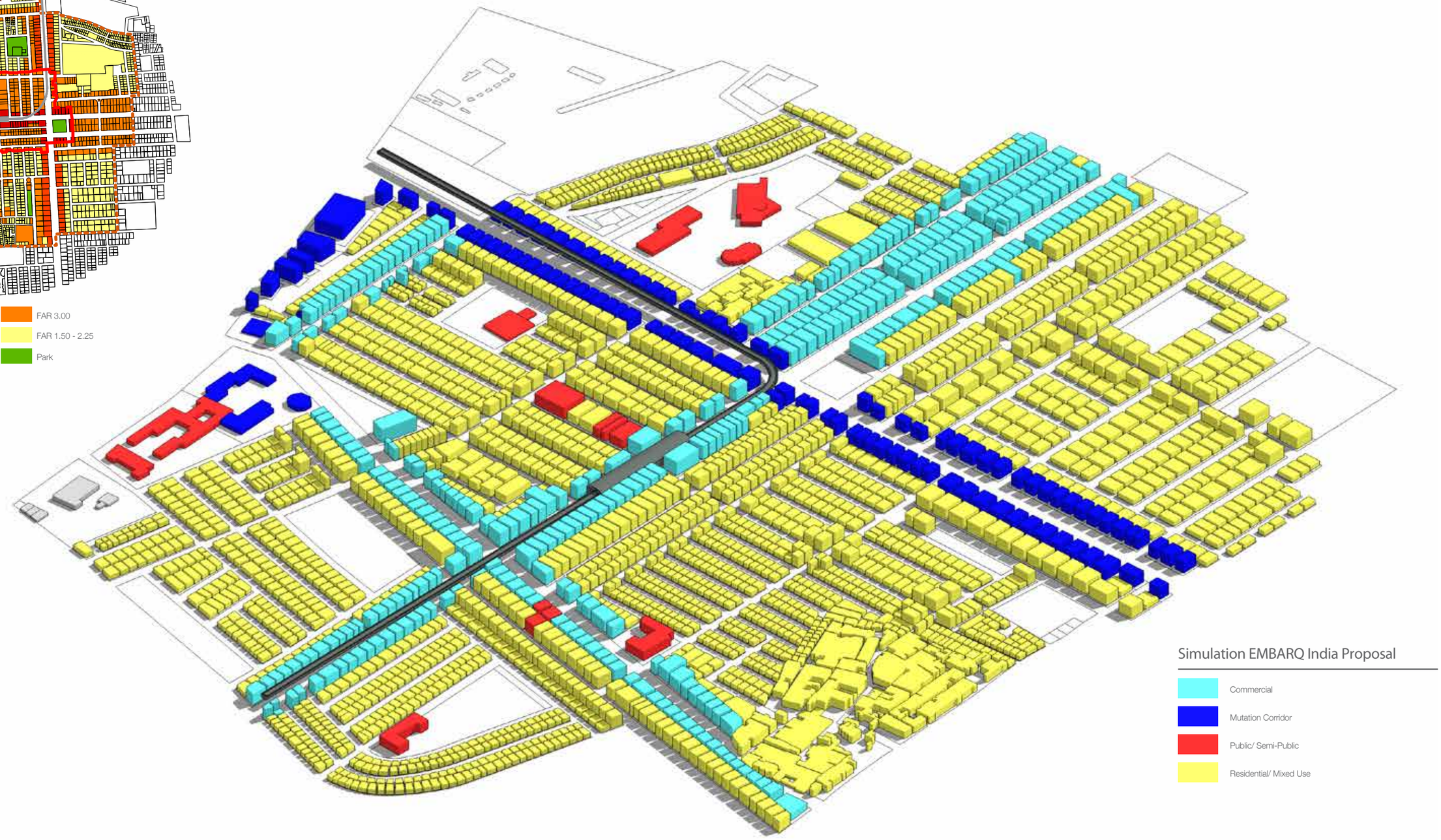

Fig2.5: Simulation of Indiranagar Station area, according to EMBARQ India Proposal
Source: EMBARQ India


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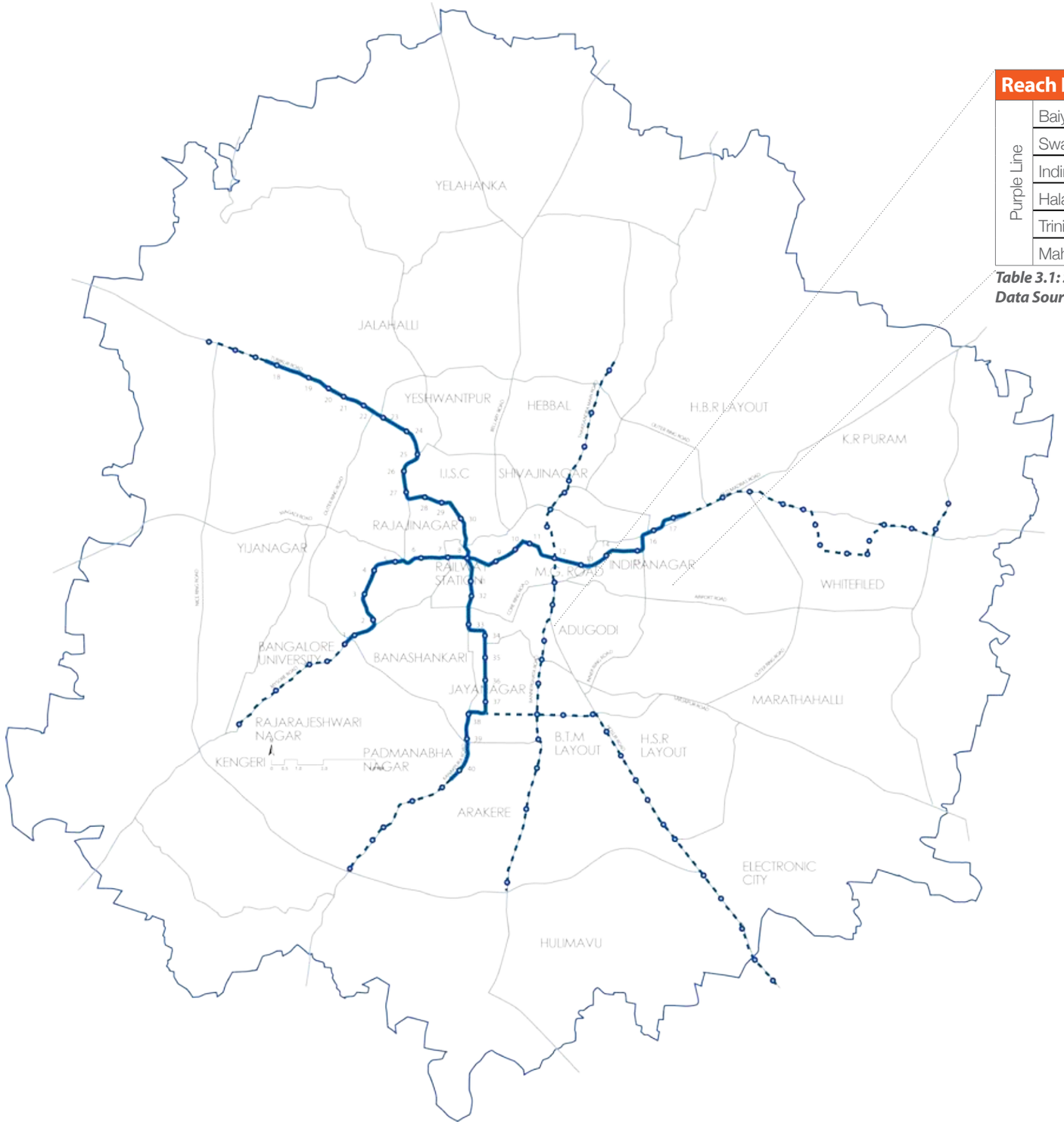
CITY LEVEL ANALYSIS

Reach I	
Purple Line	Baiyappanahalli
	Swami Vivekananda Road
	Indiranagar
	Halasuru
	Trinity
	Mahatma Gandhi Road

Table 3.1: Stations along Reach I
Data Source: Website of BMRCL



01. Mysore Road
02. Deepanjalinagar
03. Attiguppe
04. Vijayanagar
05. Hosahalli
06. Magadi Road
07. City Railway Station
08. Kempegowda
09. Sir M. Visveshwara
10. Vidhan Soudha
11. Cubbon Park
12. MG Road
13. Trinity
14. Halasuru
15. Indiranagar
16. Swami Vivekananda Road
17. Byappanahalli
18. Nagasandra
19. Dasarahalli
20. Peenya Industry
21. Jalahalli
22. Peenya
23. Yeshwanthpur
24. Yeshwanthpur Industry
25. Sandal Soap Factory
26. Mahalakshmi
27. Rajajinagar
28. Kuvempu Road
29. Srirampura
30. Sampige Road
31. Chickpete
32. Krishna Rajendra Market
33. National College
34. Lalbagh
35. Southend Circle
36. Jayanagar
37. Rashtreeya Vidyalaya Road
38. Banashankari
39. JP Nagar
40. Puttenahalli

Metro Phase I and II

- Purple Line Namma Metro (Phase 1)
- Green Line Namma Metro (Phase 1)
- Red Line Namma Metro (Phase 2)
- Blue Line Namma Metro (Phase 2)

Fig 3.1: Map of Bengaluru Metropolitan Area: Showing alignment of Namma Metro and location of Stations
Map generated by EMBARQ India
Data Source: Bangalore Master Plan 2015; Website of BMRC ; www.skyscrapercity.com

EMBARQ India

CITY LEVEL ANALYSIS

Background

The DCR project considers the impact of the Metro stations only along Phase 1 of the Metro line. The line passes through a wide variety of localities and neighbourhoods in Ring 1 (areas within Core Ring Road) and Ring 2 (areas within Outer Ring Road) of the city. Each neighbourhood varies in size and scale and is defined by a number of physical, economic, institutional and socio-cultural factors. Although the nature, complexity and interdependence of these factors vary from one neighbourhood to the next, there are a few parameters common to all areas within the city. The relative potential of the neighbourhoods and the influence of the metro line on them can be compared based on these parameters. This comparison is expressed through a matrix that lists the status of all the parameters in the area around each station thereby defining its character and contextualising it at the city level. The matrix helps to arrive at inferences and focus areas which guide the overall vision and urban design concept for the future development of each station.

Methodology

City Level Analysis

A 500m radius is internationally accepted as a reasonable distance for commuting by walk and bicycle . Hence areas falling within 500m of the Metro Stations are considered as the influence zone for the study and defined as Station area. The city-wide parameters that define the character of the Station area are:

A. Transportation Networks of the city -
   - Impact of different scales of transport networks and hubs within the Station area

B. The Master Plan of the city -
   - Impact of the RMP 2015 in the form of land use and FAR proposed for the Station area and its surroundings

C. Physical Characteristics -
   - Ecological features and natural systems within or in the vicinity of the Station area
   - Traditional built fabric, historical structures and networks within or in the vicinity of the Station area

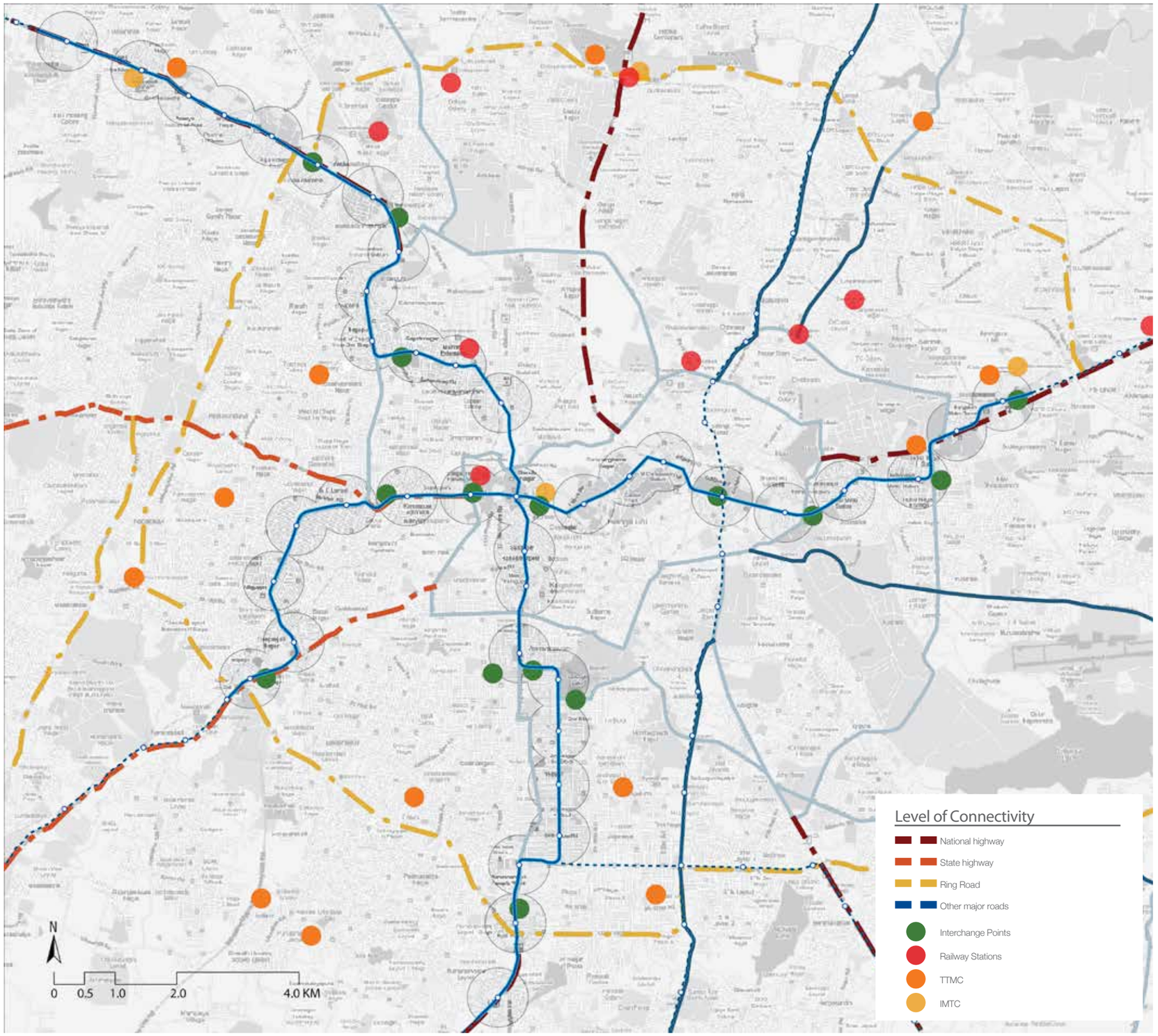
These factors help classify the Station areas into broad typologies (Refer Table 2.2 on page 26) on the basis of:

1. Scale of influence: Regional, City, Sub Centre, Local Centre
2. Predominant Use: Commercial Hub, Employment Centre, Transportation Hub, Mixed Residential Neighbourhood, Purely Residential Neighbourhood, Recreational Hub
3. Presence of Ecological/ Historical features or networks.

The typology classification in this chapter remains indicative as it is based on infrastructure projects and regulations existing or proposed at the time of the study. Changes in the public infrastructure projects and master plan at a later date will have direct impact on the defining parameters and hence the classification will need to be updated accordingly. Moreover, other local level projects and constraints also have substantial impact on the potential and limitations of the station areas. Hence, a detailed study of all the factors needs to be undertaken at the station level to have a comprehensive understanding of each station area.

Further assessment of the development potential of each Station area can be made through the detailed analysis of factors such as

- Street network and plot sizes
- Building typologies and distribution of population
- Construction Activities and Real Estate Trends
- Activity Generators and pedestrian movement patterns
- Comparison of the above factors with the carrying capacity of the infrastructure provided in the Station area



Development Potential Analysis | Level of Connectivity

The Metro Line is part of the larger transportation plan for Bangalore. According to the Comprehensive Traffic and Transportation Plan (CTTP) – 2011, an integrated multi-modal mass transport system has been proposed to cater to the traffic demands of the city up to 2025. The Plan also includes introduction of Integrated Multimodal Transit Centres (IMTCs) cum Intercity Bus Terminals at the intersection of the different networks across the city. This analysis compares the scale of connectivity of the stations to other areas through the presence of road networks and transportation hubs within the Station area. (Refer Fig:3.2)

UG 1 and Reach 3: Eight of the thirteen stations on this line (Nagasandra to Sandal Soap Factory Stations) lie along the NH4 (Tumkur Road) of which of the Peenya, Yeshwanthpur Industry and Sandal Soap Factory Stations are envisioned to have good connectivity at city level due to the IMTCs proposed within their Station areas. Yeshwanthpur Station has Regional Level connectivity due to the railway station within the Station area. The remaining metro stations lie along arterial roads and are connected at Sub-centre or Local Level.

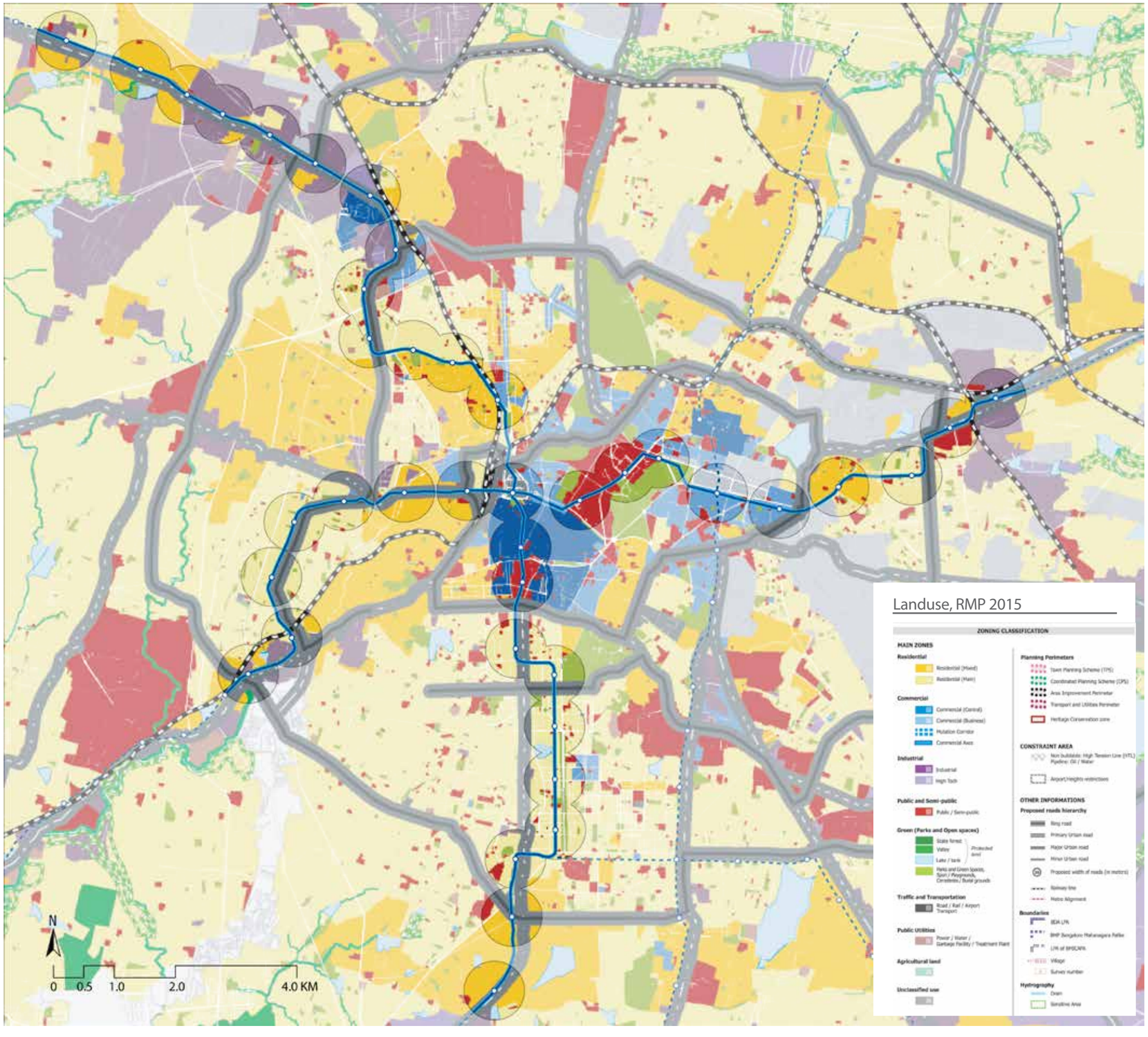
UG 1 and Reach 4: The Chickpete and KR Market Metro Stations lying within the Central Business District (CBD) are connected at the Regional level due to the KR Market bus terminal within their Station areas. All the other stations either have the NH209 (Kanakpura Road) passing through their Station areas or are located along it, such as the Banashankari, JP Nagar and Puttenahalli Stations. Hence they have Sub-centre or City level connectivity depending on the presence of the proposed IMTCs within their Station area.

UG 2 and Reach 1: Five of the nine metro stations on this line are located on the NH4 (Old Madras Road), the exceptions being the Sir M Vishveshwaraiah, Vidhana Soudha, Cubbon Park Metro Stations within the CBD and the Indiranagar Metro Station on CMH Road. The Byappanahalli Station area is located at the intersection of the railway station with the NH4, thus giving it a Regional level connectivity. Although the Indiranagar Station area does not lie along the highway, the proposed BMTC TTMC within the Station area gives it a City level connectivity. Similarly, the Trinity and MG Road Stations are located at the intersection with the BRT and perpendicular Metro line respectively. Stations within the CBD are connected at the Local level.

UG 2 and Reach 2: Two of the seven Stations on this line, the City Railway Station and Magadi Road Metro Station, lie on SH 17E (Magadi Road) while the Mysore Road Terminal station lies on SH 17 (Mysore Road). The City Railway station, Hosahalli and Mysore Road Station areas are proposed to have IMTCs and hence will have City level connectivity. The remaining station areas on this line either have the highway pass through them or a BMTC TTMC located within them, thus giving them Sub-centre level connectivity.
The Kempegowda Station lies at the intersection of almost all the major transportation networks of the city, i.e., the Railway line, the intersection of the Green and Purple Metro Lines and also contains the largest Inter-city and Intra-city Bus Terminals of the city. This makes this Station area well connected at the Regional Scale.

Although in today's context, the Indiranagar station area does not have a major transport network or hub passing through it, it has the potential to be connected at the city level in the future.

Fig 3.2: Employment/ Activity Generators in the Bengaluru Metropolitan Area
Map generated by EMBARQ India
Data Source: Bangalore Master Plan 2015, Website of BMRC, Google Maps



Development Potential Analysis | Proposed Land Use

Since the Master Plan is a statutory document that proposes land uses and regulations for the different areas based on the existing conditions and the overall vision for the city, it gives a fairly accurate indication of ground conditions as well as the scope for growth in the current plan period. (Refer Fig: 3.3)

UG 1 and Reach 3: Majority of the Station areas on this line have industrial land use with a small percentage of mixed residential land use. Areas closer to the centre, such as Mahalakshmi, Rajajinagar, Kuvempu Road, Srirampura and Sampige Road stations, also continue to have a high percentage of mixed residential land use in addition to completely residential areas. While commercial axes and mutation corridors lie along most of the main roads, substantial amount of completely commercial land use is found only in Yeshwantpur, Sandal Soap factory and Mahalakshmi Station areas.

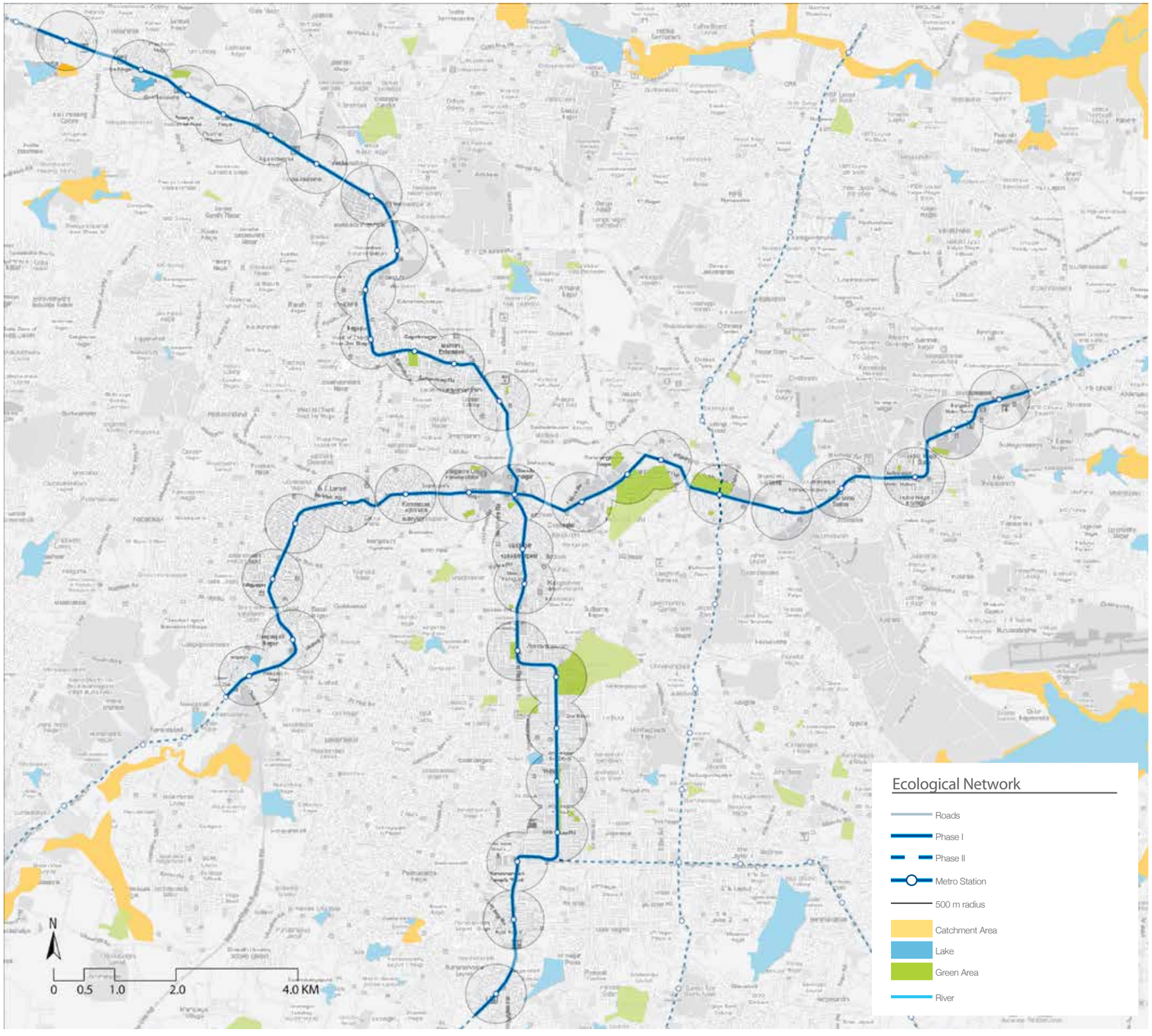
UG 1 and Reach 4: Chickpete and KR Market stations, lying within the Inner Core, form part of the CBD of Bengaluru and hence have completely commercial land use. Additionally, the KR Market station is surrounded by public land use due to the concentration of medical institutions such as Vani Vilas Hospital, Minto Eye Hospital, Victoria Hospital and KIMS. While Residential Main is the primary land use around the line from National College to Banashankari, they also contain minor commercial streets and centres which cater to the areas around them. Towards the end of the line, the areas pass through old villages which have mostly mixed residential land use.

UG 2 and Reach 1: This line contains the widest variety of areas beginning with the highly commercial MG Road, Trinity and Halasuru station areas, to the industrial area around Byappanahalli station. Vidhana Soudha and Cubbon Park stations are located in the administrative centre of the city and hence have almost entirely public land use. Indiranagar is the only station area on this line with predominantly Residential Main land use while Halasuru has Residential Mixed use.

UG 2 and Reach 2: All stations along this line have completely residential or mixed residential land use except for the Kempegowda Interchange and City Railway station where most of the land has been given up to transportation as it contains the transport hub of the city and serves as a transportation centre at the Regional scale. The railway line passes through Mysore Road and Deepanjalinagar station areas.

The land use zoning for Indiranagar manages to preserve the scale and character of the neighbourhood to a large extent by proposing residential land use for the entire area and concentrating the commercial activities along the commercial axes and mutation corridors.

Fig 3.3: Landuse distribution as per Bengaluru Master Plan 2015
Map generated by EMBARQ India
Data Source: Bangalore Master Plan 2015, Website of BMRC



Development Potential Analysis | Ecological Network

Seven stations on the Purple line and six station areas on the Green line have natural ecological features and systems passing through them or in close proximity. In all cases, the metro station is located above grade except for the Vidhana Soudha station, where it passes underground. While the lakes and parks can be developed as attractive destinations in the area, presence of networks such as valleys and sensitive areas around the natural features act as constraints to large scale development. It is crucial to recognise these features and include them in the planning process to avoid conflict, promote resilience and capitalize on their potential. (Refer Fig: 3.4)

UG 1 and Reach 3: The Kuvempu Road and Srirampuram Stations in Malleshwaram area include large parks such as Mariappanapalya Park, Navrang Park and also the Harishchandra Ghat Cemetry. The Dasarahalli station area includes the Dasarahalli tank while Rajajinagar, Kuvempu Road and Srirampura have tributaries of the Vrishabhavati River passing through the station areas.

UG 1 and Reach 4: Since most of Bengaluru's old planned residential areas lie along this line, every station area includes a small patch of green or neighbourhood parks. But 40% of the Lalbagh Station area is taken up by the Botanical Garden and lake while the Puttenahalli Lake falls just beyond the 500m radius around the station in Puttenahalli, thus placing two areas in highly ecologically sensitive zones.

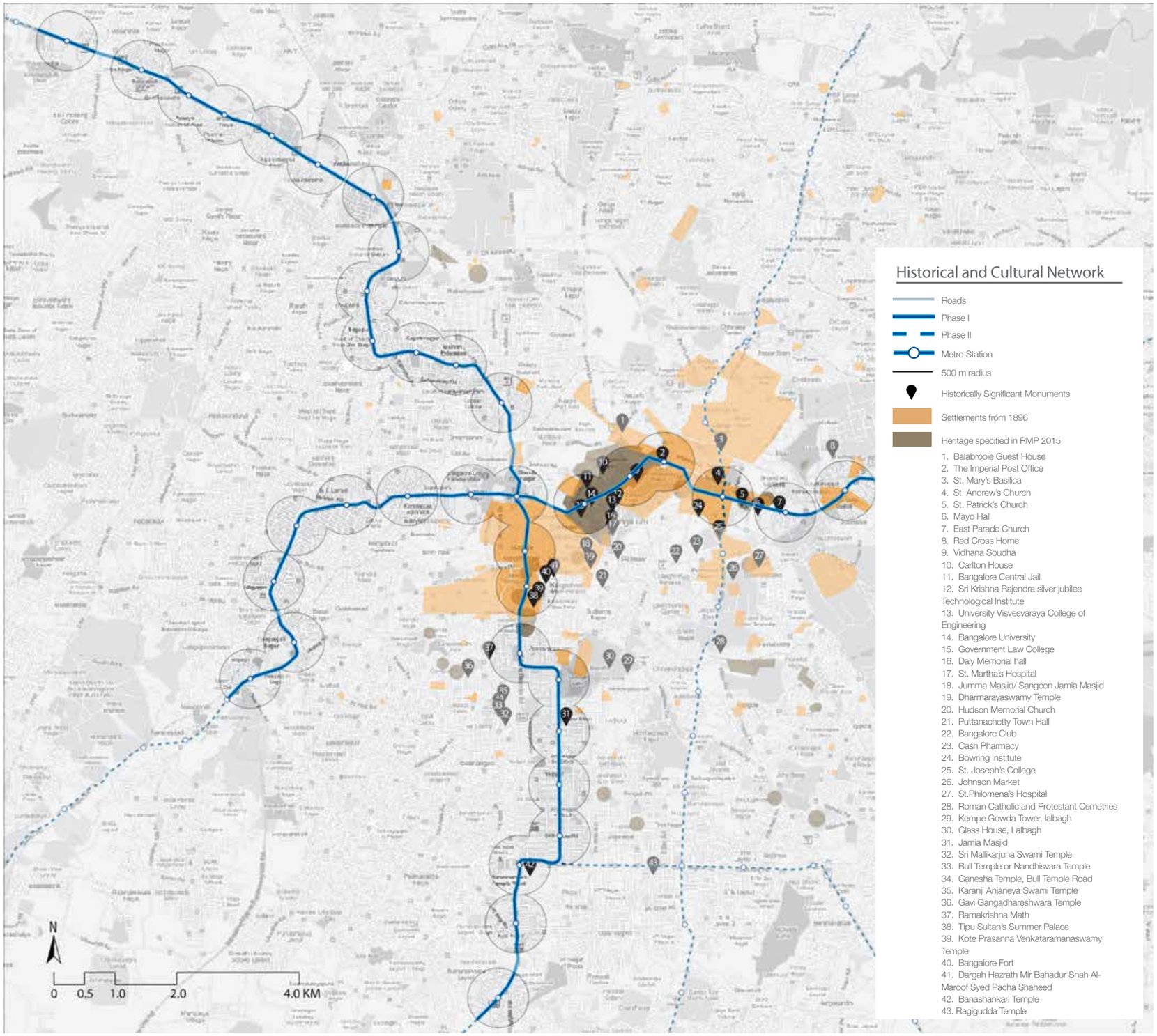
UG 2 and Reach 1: A considerable percentage of the Cubbon Park and Vidhana Soudha station areas are occupied by the Cubbon Park itself, while the Halasuru station area lies in close proximity to the Ulsoor Lake. Hence these zones form part of the larger ecological network of the city and have to identify and protect the sensitive areas. In addition to this, Parade Grounds in the MG Road station area and the Ulsoor Lake are part of the large lung spaces in the city that have to be preserved.

UG 2 and Reach 2: This line cuts across the Vrishabhavati River at Mysore Road, Deepanjalinagar and Magadi Road station areas. Although the river is no more in its original state, due to the heavy pollution from the industries at the outskirts of the city, it has become a health hazard for all the areas through which it passes. In such cases, issues of the ecological system assume the top most priority while formulating the development control regulations for these Station areas.

Most of the lakes and green spaces in the city face imminent danger of contamination, encroachments and loss of connection to the larger network due to uncontrolled and illegal developments in the surrounding areas. Identifying these zones as part of the DCRs and including their protection as part of the regulations can begin to control the extent of damage and help revive the original ecosystem of the city.

The Indiranagar station area does not have any major ecological feature in the vicinity or passing through it. Nevertheless, the various parks and old trees lining the streets are part of the identity of this area.

Fig 3.4: Ecological Network and Natural Features
Map generated by EMBARQ India
Data Source: Bangalore Master Plan 2015, Website of BMRC, Google Maps



Development Potential Analysis | Historical and Cultural Network

Many parts of Bengaluru close to the centre still retain the character of the original settlement. The oldest part of Bengaluru lies within the Core Ring Road. This area is not only densely populated with a number of historically valuable buildings, but also has a dense traditional urban fabric. This makes these zones architecturally, archaeologically and culturally important. Hence, the RMP 2015 identifies such buildings and neighbourhoods in each planning district as 'Heritage Conservation Zones'. These factors play a major role in giving very distinct characters to each of the neighbourhoods through which the Metro line passes. (Refer Fig: 3.5)

UG 1 and Reach 3: Although none of the station areas contain the 'Heritage Conservation Zones' or important monuments, many of them pass through old neighbourhoods like Srirampuram and Malleshwaram which have a very distinct character and identity that sets them apart from the rest of the city.

UG 1 and Reach 4: Since this line begins at the heart of the city, it passes through the old fort area of Bengaluru. The Old Dungeon and Fort Gates, and Tipu Sultan's palace, monuments under the protection of the ASI, are located near the Chickpete and KR Market stations. The RMP 2015 also recognises a few structures in these areas under the 'Heritage Conservation Zones'.

UG 2 and Reach 1: This line contains the highest number of valuable buildings and precincts that have defined the identity of the city for many years. The British administrative and military centres of Parade Grounds, Brigade Road, Queen's Road and Infantry Road lie along this stretch and include a number of important buildings such as Bangalore Central Jail, Daly Memorial Hall, St. Martha's Hospital, Bengaluru High Court, Vidhana Soudha, the British Library and public open spaces such as the Cubbon Park and Parade Grounds. These areas fall within the Sir M Vishweshwaraya, Vidhana Soudha, Cubbon Park, MG Road and Trinity station areas.

UG 2 and Reach 2: This line does not contain 'Heritage Conservation Zones' or important monuments, but passes through villages that have been absorbed into the city in recent years. These lie mostly along Mysore Road where the earlier inhabitants and their descendants still continue to live.

Apart from these, a number of old religious structures such as the Jamia Masjid, St. Mary's Basilica, St Patrick's Church, the Kote Ventakaramanaswamy Temple, the Ramakrishna Math and the Banashankari Temple fall within the station areas of the Metro stations on both lines.

Parts of Indiranagar station area have old settlements that have been absorbed into the surrounding development over the years. But these areas have today lost the original character and retain no historical value.

Fig 3.5: Monuments and Historical Areas
Map generated by EMBARQ India
Data Source: Bangalore Master Plan 2015, Website of BMRC ; Heritage Conservation Areas: RMP 2015 ; Monuments: bangaloreheritage.in, ; Historic Settlements: Map of Bangalore, 1896

Station Typologies

	Station Names [b]	Scale of Connectivity (Refer Page 24)	Predominant Land Use [a] (Refer Page 25)	Ecological Factors [c] (Refer Page 26)	Cultural Factors [d] (Refer Page 27)
01	Baiyappanahalli	Regional	Industrial		
02	Swami Vivekananda Road	Sub Centre	Public/ Semi Public		
03	Indiranagar	City	Residential		Traditional Fabric
04	Halasuru	Sub Centre	Mixed Use	Natural Feature + Eco System	Traditional Fabric + Religious Structure
05	Trinity	Sub Centre	Commercial	Natural Feature	Historical Structure
06	Mahatma Gandhi Road	Sub Centre	Commercial		Historical Structure
07	Cubbon Park	Local Centre	Public/ Semi Public + Green Space	Natural Feature	Traditional Fabric + Historical Structure
08	Vidhana Soudha	Local Centre	Public/ Semi Public	Natural Feature	Traditional Fabric + Historical Structure
09	Sir M. Visveshwaraya	Local Centre	Public/ Semi Public	Natural Feature	Traditional Fabric + Historical Structure
10	Kempegowda Interchange	Regional	Transportation		Traditional Fabric
11	City Railway Station	Regional	Transportation		
12	Magadi Road	Sub Centre	Mixed Use	Eco System	
13	Hosahalli	City	Residential		
14	Vijayanagar	Sub Centre	Residential		
15	Attiguppe	Sub Centre	Residential		
16	Deepanjali Nagar	Sub Centre	Mixed Residential	Natural Feature	
17	Mysore Road	City	Industrial	Natural Feature	
01	Nagasandra	Sub Centre	Industrial		
02	Dasarahalli	Sub Centre	Mixed Use	Natural Feature	
03	Jalahalli	Sub Centre	Industrial		
04	Peenya Industry	Sub Centre	Industrial		
05	Peenya	City	Industrial		
06	Yeshwanthpur Industry	City	Industrial		
07	Yeshwanthpur	Regional	Commercial		
08	Sandal Soap Factory	City	Industrial		
09	Mahalakshmi	Local Centre	Residential		
10	Rajajinagar	Sub Centre	Residential	Eco System	
11	Kuvempu Road	Local Centre	Residential	Eco System	
12	Srirampura	Local Centre	Residential		Traditional Fabric
13	Sampige Road	Local Centre	Mixed Use		
14	Kempegowda Interchange	Regional	Transportation		
15	Chickpete	Regional	Commercial		Traditional Fabric + Historical Structure
16	Krishna Rajendra Market	Regional	Commercial		Traditional Fabric + Historical Structure
17	National College	Sub Centre	Residential		Historical Structure
18	Lalbagh	City	Residential + Green Space	Natural Feature	
19	South End Circle	Sub Centre	Residential		Historical Structure
20	Jayanagar	City	Residential		
21	Rashtreeya Vidyalaya Road	Sub Centre	Residential		
22	Banashankari	City	Residential		Traditional Fabric + Religious Structure
23	Jaya Prakash Nagar	City	Mixed Use		
24	Puttenhalli	Sub Centre	Mixed Use	Natural Feature	

Table 3.2: Station Level Typologies

Generated by EMBARQ India

Data Sources:
a) Bangalore Master Plan 2015
b) Website of BMRCL
c) Google Maps
d) bangaloreheritage.in, Map of Bangalore, 1896










Indiranagar is a city level residential metro station. The focus of the DCRs must be to respond to the requirements of the residential population while regulating and capitalizing on the commercial activities. The traditional settlements must conserved or be treated differently, if necessary depending on the present day condition of the settlements.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STATION LEVEL ANALYSIS

Fig 4.1: Key: Map of Indiranagar Metro Station area

Map generated by EMBARQ India
Source for Photographs: EMBARQ India

Image 4.11

Image 4.12

Image 4.13

Image 4.14

Image 4.15

Image 4.16

Image 4.17

Image 4.18

Image 4.19

STATION LEVEL ANALYSIS

Background

The Indiranagar Metro Station area is selected for the demonstration project. It is a predominantly residential neighbourhood in the eastern part of the city located about 4 kms to the east of MG Road.

The history of Indiranagar dates back to 1954 when the City Improvement Trust Board of Bengaluru (CITB) laid out the neighbourhood and allocated nearly 40% of the land for economically weaker sections. Towards the early 1960's Defence Colony was set up as a neighbourhood exclusively for people from the armed services. This neighbourhood still retains its exclusivity as one of the better planned and maintained part of the precinct. Indiranagar on the whole is an area with steep real estate prices especially along the two booming commercial roads - 100 feet road and CMH Road.

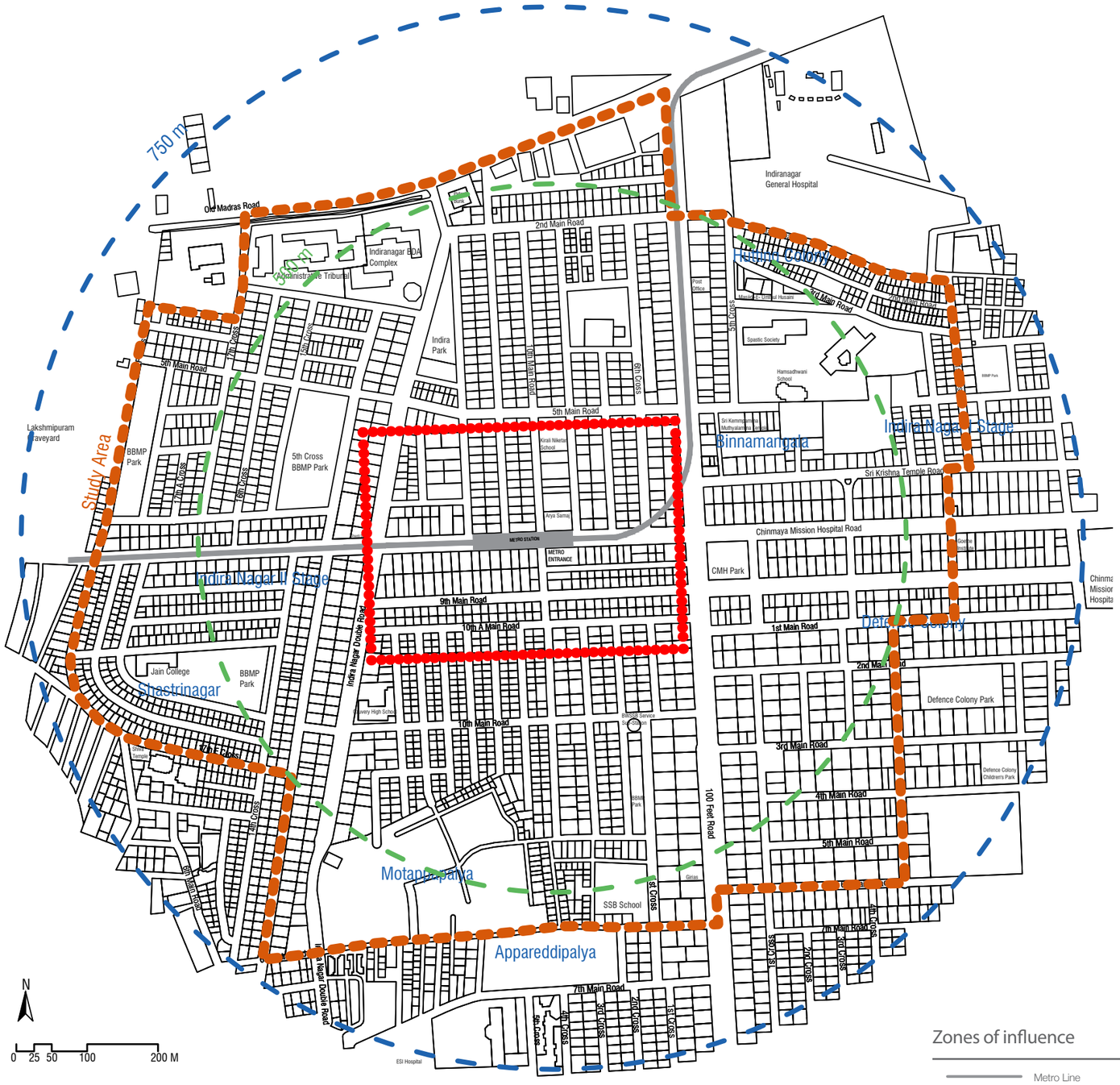
The Metro line runs along CMH Road, 100 Feet Road and Old Madras Road and the turnings occur at the intersections of 100 Feet Road with CMH Road and with Old Madras Road. The Indiranagar Metro Station is located on CMH Road before the turning of the line. The study area lies within a radius of 750m around the Metro Station. It includes Indiranagar 1st and 2nd Stage, Defence Colony, and also the two old villages of Binnamangala and Motappapalya. It is bound by Old Madras Road to the north and 80 feet road to the East. (Refer Fig: 1)

Defence colony, Indiranagar 1st and 2nd Stages and the villages are residential areas, while most of the commercial activity lies along CMH Road, Sri Krishna Temple Road and 100 feet road hosting a wide range of apparel showrooms, appliance showrooms, salons and restaurants. This area also has several educational institutions, hospitals and a bus depot.

Methodology: Station Level Analysis

The Methodology involves the following steps:

1. Demarcation of Station area boundary through rationalisation of the 500m radius around the Metro Station to follow features such as roads, railway lines or drains and to include any activity generators or areas lying just outside this zone if they have an impact on the Station area.
2. Data collection through primary sources for area studies in terms of:
    - Plot sizes and street networks
    - Current land use
    - Current building heights
    - Building typologies based on predominant land use
    - Façade characteristics of buildings along major streets
    - Vacant land, buildings under construction and new constructions
    - Environmental constraints (if any)
    - Heritage components (if any)
    - Market values
    - Employment centres, shopping areas, amenities and other activity generators
    - Informal activities
    - Pedestrian volume counts near major junctions and activity generators
    - Perception of residents, shop owners and investors
    - Origin and destination details of Metro users
    - Investment in infrastructure
3. Review of Statutory Documents for the analysis of the Station area in terms of
    - Land use zoning as per the RMP 2015
    - Zonal regulations as per the RMP 2015
    - Amendments of the UDD notification to the RMP 2015
    - Guidance value
4. Simulation of ground conditions based on the above data for the following Scenarios
    - Before or during the construction of the Metro (if available)
    - After the opening of the station (or the current scenario if station is not yet opened for use)
    - The scenario envisioned by the RMP for its horizon period.
    - The scenario envisioned for the horizon period with the amendments of the UDD Notification
5. Comparison of the different scenarios to arrive at inferences regarding
    - Relation between plot sizes and street network with land use and FAR, market trends and the pattern of change.
    - Relation between formal and informal activities and pedestrian movement patterns.
    - Relation between population density distribution and carrying capacity of the infrastructure.
    - Pattern of change in land use and building heights over the years (before and after the inauguration of the metro station)
    - Deviation on ground from the proposals of the Master Plan
6. Identification of areas for intervention based on
    - Areas or attributes that need to be conserved (e.g., ecology, history, green cover, occupational heritage, social/ cultural/ religious spaces or factors contributing to the identity of the areas)
    - Areas with potential for growth
    - Areas requiring specific regulations (e.g., pedestrian priority zones, connections to amenities, public transportation systems etc)
    - Areas with constraints (e.g., ecologically sensitive areas, areas within ASI restricted zones, areas within the flight path around airports/ aerodromes etc)



Zones of influence

- Metro Line
- Core Zone: 150 m from edge of Metro Station (UDD Notification)
- 500 m radius, 10 minute walking distance
- 750 m radius, 15 minute walking distance
- Study Area

Fig 4.2: Map of Indiranagar Metro Station area
Map generated by EMBARQ India
Data Source: Sky Group, UDD Notification - 93 MNJ 2008, dated 21.11.2008

Station area Definition

The Station area is defined by roads along the edge of a radius of 500m from the Metro Station. It follows Old Madras Road in the north, 17th E Cross in the West, Indiranagar 6th Main Road in the South and 1st A Cross and 6th Cross Road in the East.
Further, the three major roads, i.e., CMH Road, Double Road and Indiranagar 100 Feet Road are used to delineate the Station area into six sectors for the purpose of this study. (Refer Figure 3.2)
Sector N1 contains the Indiranagar Bus Depot, the RTO, Administrative Tribunal Office, BESCOM Office and BDA Complex along the North Edge, a number of offices and eateries along Double Road and Retail outlets on CMH Road. The remaining plots within the sector are residential. Beyond the West Edge is the Lakshmipuram graveyard.
Sector N2 contains a mix of residential, commercial, institutional and religious buildings. Closer to the main roads are the large showrooms, banks and convenience stores while the interior of the sector contains completely residential and mixed-use buildings. The Metro line runs along the south and east edges of the sector.
Sector N3 covers Indiranagar 1st Stage, Binnamangala and Hutting Colony. It has a mix of large plots where most of the educational and medical institutions are located; medium sized plots along the edges and CMH Road and Sri Krishna Temple Street containing houses and offices; and smaller plotting in the old village areas of Binnamangala and Hutting Colony. It also has an informal settlement (New Binnamangala) at the Northern edge of the study area.
Sector S1 consists of small residential and mixed-use plots. This area is identified more with the adjoining Eshwara Layout and is connected better to Jogupalya and Ulsoor than Indiranagar itself. Most commercial areas are along CMH Road and along the southern edge close to ESI Hospital.
Sector S2 contains medium sized plots with residential and mixed-use buildings, as well as the Motappapalya village with high density development. Almost all plots on CMH Road and the parallel streets are commercial retail shops or offices. This sector also contains a school and the Indiranagar Water Tank.
Sector S3 comprises of the Defence Colony and HAL 2nd Stage and is the part of the study area with the highest land value and market rates. Besides CMH Road and the parallel street, all plots are completely residential. This sector is characterized by the highest percentage of green cover and well maintained parks. Along the edges of the study area one can find many builder floor apartments while most plots within are low-rise individual houses.
This Section shows the analysis of the collected data and highlights the inferences that inform the proposals.

Indiranagar Area Statistics	
Wards	Hoysala Nagar, Jogupalya
Population	34,490
PIN Code	560 038
Major Institutions	Sir C V Raman General Hospital, Jain College, Lakshmipuram Graveyard, Indiranagar General Hospital, Spastic Society, Hamsahwani School, SSB School, Administrative Tribunal, Indiranagar BDA Complex, Arya Samaj, Kirali Niketan School, Cauvery High School
Major Roads	CMH Road, 100 feet Road, Old Madras Road
Neighbourhoods	Indiranagar I, II and III stage, Eshwara Layout, Defence Colony
BESCOM Administrative Boundary	Zone: BMAZ East Circle E6, O&M1, Indiranagar Office
BWSSB Administrative Boundary	East - 2 subdivision
Resident Welfare Associations (RWAs)	Indiranagar RWA, Defence Colony RWA (DECORA)

Table 4.1: Indiranagar Statistics
Generated by EMBARQ India
Data Source: Census of India, BWSSB, BESCOM

Plot Sizes

- 240 sqm or lesser
- 241 to 360 sqm
- 361 to 1,000 sqm
- 1,001 to 2,000 sqm
- 2,001 to 4,000 sqm
- 4,001 to 12,000 sqm
- 12,001 sqm or greater

Fig 4.3: Distribution of Plot Sizes

Map generated by EMBARQ India
Data Source: Sky Group, Ground Survey (2013)

STATION LEVEL ANALYSIS

Station area Characteristics | Plot Sizes

The Station area predominantly consists of plotted developments except for the two traditional settlements of Binnamangala and Motappapalya. The plot sizes range from 30 sqm to 30000sqm, with the average plot size being 225 sqm. 84% of plots are smaller than 360 sqm, 15% of plots lie in the 360-1000sqm range.

Plots zoned Residential or Commercial Axis fall in the 30-20000sqm range. The smallest of these plots (0-180 sqm) are concentrated in Hutting Colony (Sector N3), Eshwara Layout (Sector S1) and to the north of Motappapalya in Sector S2. The bigger plots (360-1000 sqm) are found in Defence Colony and along 100 Feet Road (Sector S3).

Most of the larger plots in the range of 1000-30000sqm are zoned Public/ Semi-public or Parks and Open Spaces located in all the six sectors of the Station area.
Within 150m of the Metro Station, 86% of plots are smaller than 360sqm. Of the common plotting sizes, 46% of plots fall in the 30'x40' range and 19% in the 40'x60' range. Only 13% of plots are larger than 50'x80' (approximately 370sqm).

The character of a neighborhood is defined by the size of plots, width of roads, scale of buildings and the open spaces in addition to the land use of the area.

While the varied range of plot sizes in the residential zones provides equal opportunity for all scales of residential developments, the large plots along the mutation corridor encourage the location of high end retail outlets along 100 feet road. Thus, the plotting pattern plays a major role in giving Indiranagar its identity as a neighborhood for all economic groups as well as a city level shopping destination.

Hence, the size of plots becomes a critical determinant of the character of the station area. It then becomes important to maintain the range of plot sizes. At the same time, encouraging amalgamations, especially along major commercial corridors, allows for fulfilling the real estate trends or potentials due to growth.

STATION LEVEL ANALYSIS

Station area Characteristics | Street Networks and Sidewalks

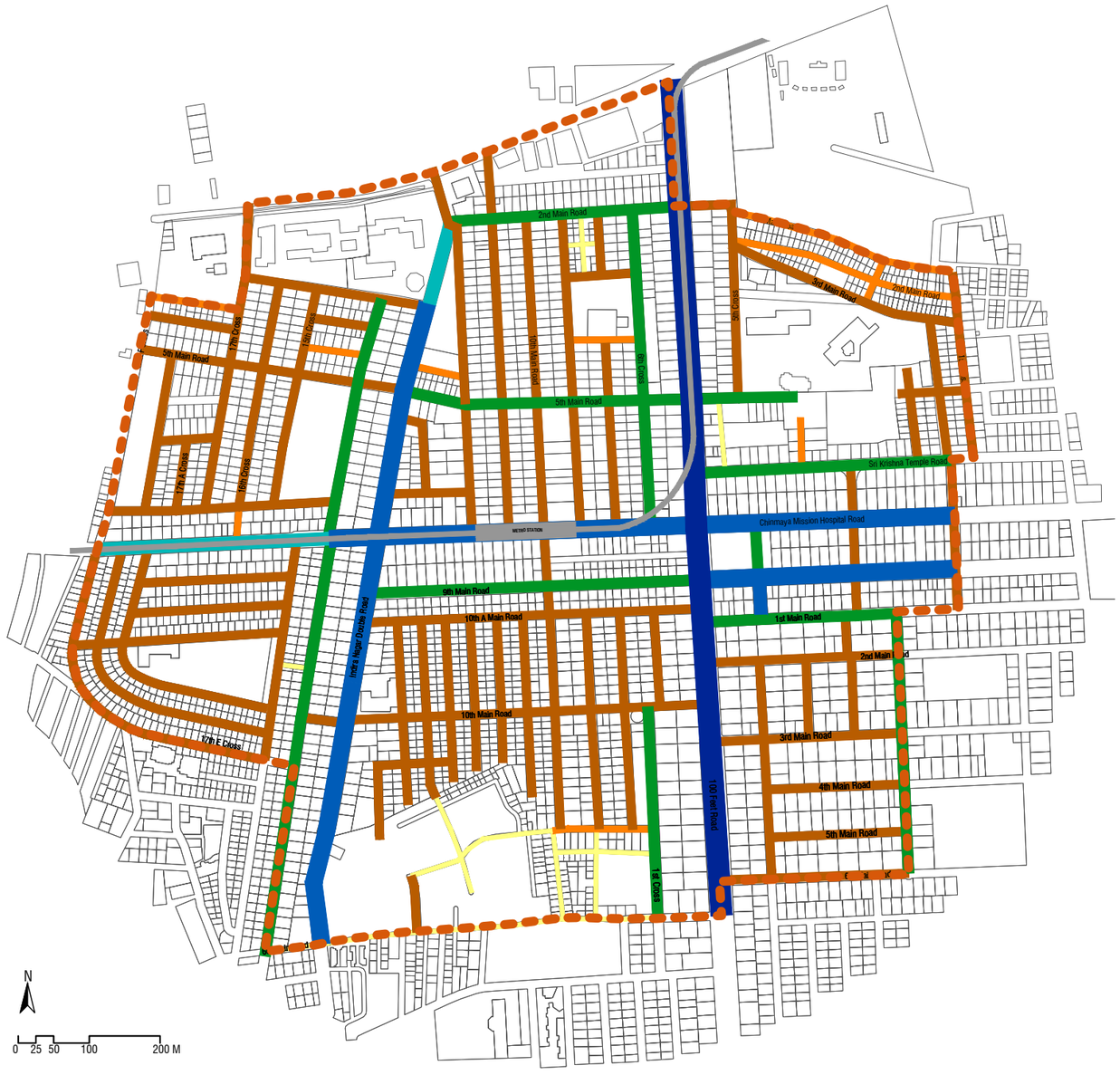
The Station area has roads of width (Right of Way or RoW) ranging from 6m to 45m. The widest roads are the two Mutation Corridors – Old Madras Road of RoW 45m and 100 feet road of width 30m. The two main Commercial Axes – CMH Road and Double Road have varying road widths with the average being 24m. Other Commercial Axes and roads parallel to these main roads have 15m RoW constituting 12% of the roads. 60% of the roads in the station area are the internal streets of 12m RoW. Access roads to the traditional settlements and streets within Hutting Colony are of width 9m, while streets within the traditional settlements are of width 6m.

The widest pavements can be found on Double Road and 100 Feet Road (3-5m width) and the largely residential section of CMH Road (between 100 Feet road and 80 feet road). On the contrary, portion of CMH Road with the highest commercial activity (beginning at 100 feet road junction and extending towards Ulsoor) has pavements as narrow as 1-2m. In many areas along this stretch, the pavements are broken, uneven, encroached upon by shop fronts, parking and vending activities. The pavement immediately around the metro station is hardly 2m wide where up to 1m is occupied by the columns of the Metro Station. This greatly reduces the effective walkway width in the area with the highest pedestrian volume. The 15m wide roads (13th Cross Road, 9th A Main Road, Krishna Temple Street, 2nd Main Road, 5th Main Road etc) have 1-2m of pavements on either sides which are encroached upon by parking and landscaping in many areas. The narrower streets of 6-9m width do not have any pavements and see mixed traffic within the carriageway.

Within 150m of the metro station 45% of road length is taken up by the 12m wide interior roads along which 36% of the plots are located. CMH Road, Double Road and 100 Feet Road constitute 29% of the road lengths providing direct access to 29% of the plots within the Station area.

Providing high levels of service for pedestrians around the metro station is one of the foremost objectives of the proposals. To achieve this, it is imperative to contain the spillover activities within the plot lines of commercial buildings and organize the distribution of vending activities on pavements so as to maintain sufficient clear walkway width for comfortable flow of pedestrians.

Hence the building lines specified for the major commercial roads must be reinforced and followed strictly. It is also essential to control the vehicular entry and exit points along roads with high pedestrian traffic to ensure minimum interference to continuous walkways.

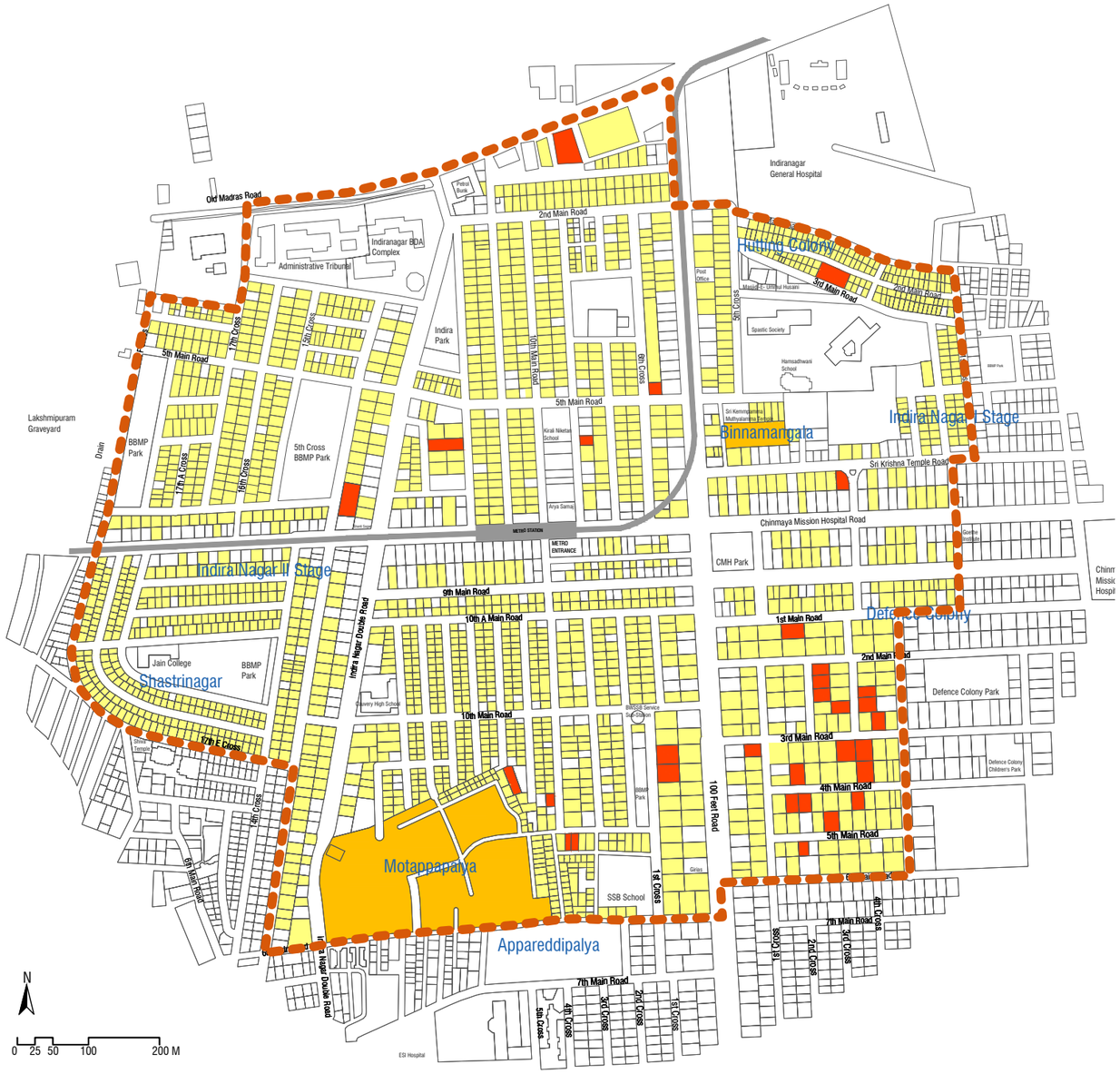


Road Widths

- 30 m
- 24 m
- 18 m
- 15 m
- 12 m
- 9 m
- 6 m

Fig 4.4: Road Widths

Map generated by EMBARQ India
Data Source: Sky Group



Plot Sizes

- Single family homes
- Appartments
- Informal settlements
- Traditional settlements

Fig 4.5: Typologies of Residential Units - 2013

Map generated by EMBARQ India
Data Source: Ground Survey (2013)

STATION LEVEL ANALYSIS

Station area Characteristics | Residential Building Typologies

Independent homes: on small to medium sized plots account for 421579 sqm or 86% of plot area within the Station area and 80% of the plots. Of these, the larger plots adjoining the main roads have single family occupancy and large private open spaces within the plots greatly contributing to the green cover of the area. The smaller plots are spread across all the sectors of the Station area. They typically have 2 to 4 stories and single family ownership with multiple families occupying the different floors. They are the biggest source of rentable residential property in this area.

Apartments: and luxury homes are concentrated in Defence Colony and in a few areas adjoining the 15m wide roads parallel to the main roads. These are 6 to 8 stories high and designed as multi-family dwelling housing 6 to 16 families per building. In Indiranagar, these provide the market for luxury residences and serviced apartments. They contribute to merely 4% of the residential land use in the station area.

Traditional Settlements: occupy 10% of the plot area and are characterized by organic street networks, narrow roads, small plot sizes with little or no setbacks. The buildings are two or three storied high often occupied by multiple families on the different floors.

Mixed-use is commonly seen in the small and medium sized plots while most of the larger properties are purely residential. Conversion of large homes into offices is seen along the 15m wide roads parallel to CMH Road between 100 Feet Road and 80 Feet Road. Even within 150m (Core Zone) of the metro station, 62% of all plots are independent homes while only 1% (3 plots) contains apartments. While areas to the south of the metro station are smaller and house commercial activities at the entrance level, plots to the north contain low-rise independent homes with considerable setbacks and green areas within the plots.

Indiranagar is characterized by the versatility of the plotted settlement which accommodates independent single-family homes as well as low rise multi-dwelling units. The presence of large independent properties with ample open space has also contributed to the green cover of the area thus preserving the old world charm of this neighborhood. This plotting pattern also makes valuable real estate such as land, independent homes, apartments and affordable housing available within walking distance of the metro station.

Although it is necessary to provide for the growth and transformation expected to take place with the completion of the metro network, it is crucial to preserve the scale and composition of the inner residential zones in order to make the station area an attractive and affordable neighborhood for all economic groups.

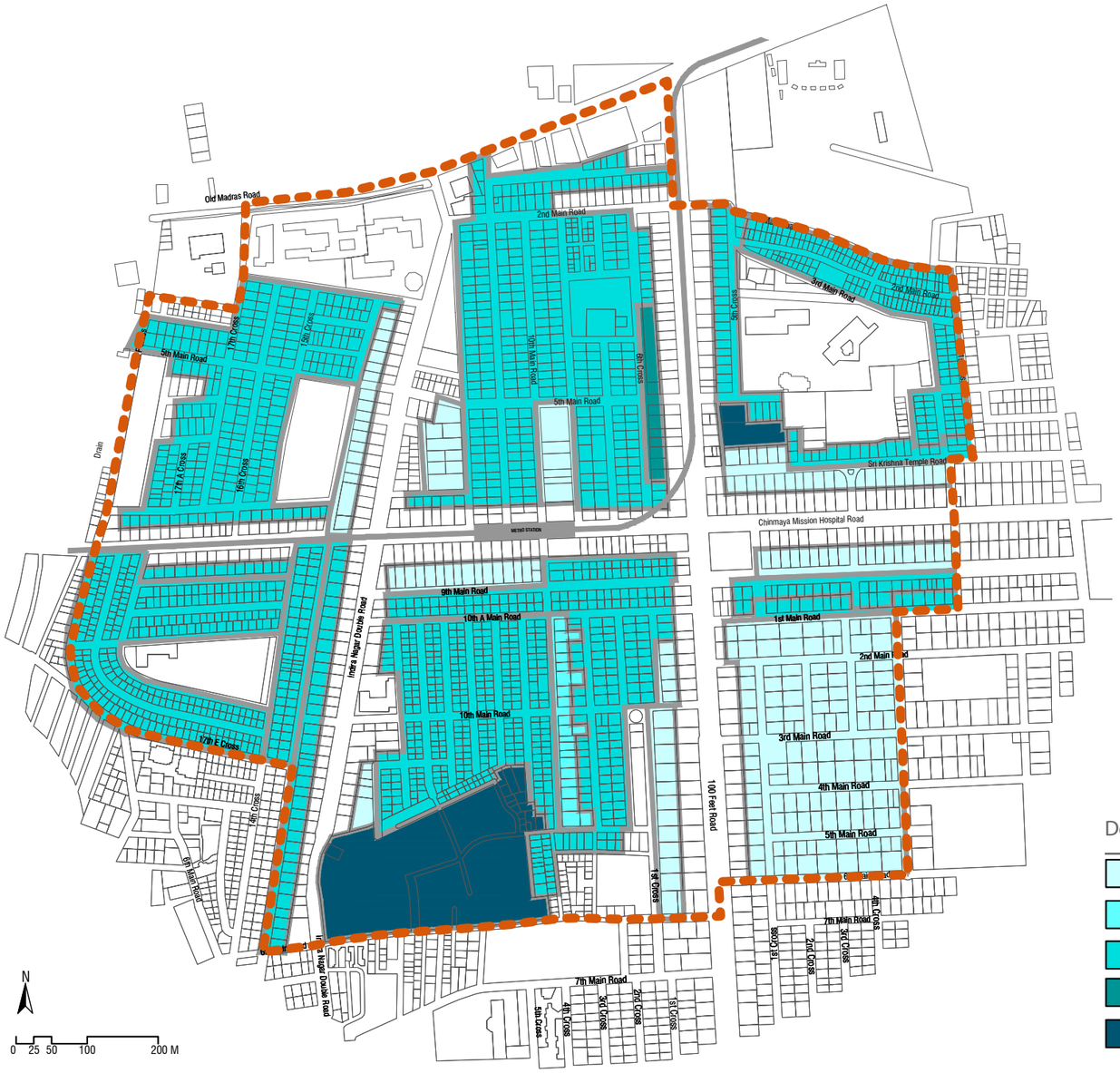


Fig 4.6: Distribution of Population Density - 2013

Map generated by EMBARQ India
Data Source: Ground Survey (2013)

STATION LEVEL ANALYSIS

Station area Characteristics | Density Distribution

The population density is also an indication of the economic level of the residents of the area. Since the station area comprises of a wide range of economic groups, the population density varies from one sector to the next. This directly influences the pressure on infrastructure provided for the respective areas. In general, high density (900-1200pph) is found in the interior blocks of all sectors while plots closer to the main road have lesser density (300-600pph). The traditional settlements have the highest density of 5000pph. Defence Colony also falls in the lowest density range of 300-600 pph.

Sector S2 has the highest share of the total residential plot area (30%) as well as residential population (45%) making it the most dense part of the Station area (1261pph). This is due to the presence of the traditional settlement of Motappapalya. Similarly the traditional settlement of Binnamangala makes sector N3 the second highest in density (977pph) although of the six sectors, it ranks 3rd in population, with the least area given to residential plots. Sector S3 comprising mainly of the Defence Colony has the smallest share of residential population (9%) and the least density of 443pph. Densities in all the other sectors range between 617pph to 659pph. (These calculations are with reference to only plots within residential blocks)

The study also shows that the population density of the entire station area was 424pph in 2011 and 440pph in 2013. The population density estimated for 2015 as per the RMP 2015 for this area is 388pph, of which density within 150m of the metro station is estimated to be 306pph. With the introduction of the UDD Notification, density within the 150m zone would increase to 597pph and within the station area to 437pph . (These calculations are inclusive of all plots in the station area irrespective of land use)

The current population has already exceeded the limit as envisioned by the RMP 2015. Introduction of the UDD Notification further concentrates the highest densities within 150m of the metro station. These areas already have an average residential density of 640pph. Concentrating all the growth within the 150m zone will nearly double the load on the infrastructure within a small area. On the other hand, many residential blocks across the station area have low densities and are within walking distance of the station. These areas have a potential for growth which is currently restricted due to the regulations of the RMP 2015 on the basis of their plot size and road widths.

Hence, to optimize the growth of the station area, it is essential to modify the regulations and redistribute the increase in density across areas better suited to support them.

For calculating the density of each sector, the following steps have been adopted:

1. Within each sector, plots adjoining all commercial axes and mutations corridors were excluded.
2. Plots of similar area were grouped together as blocks. Based on general observations on site, the blocks were classified into low-density, medium-density and high-density areas.
3. Projected populations were calculated for each of these blocks from the plot area and the corresponding unit density assumptions.

The population densities for Sectors have been calculated as follows:

1. Density = (super built up area of block) / (unit density * gross area of block)
2. Super built up area of block = (average plot size within block * permissible ground coverage * percentage distribution of different number of floors) * number of plots within the block
3. Assumptions for unit density:
   a. Low density areas: 40 sqm per person (for plot sizes in the range of 360-1000 sqm with single dwelling units per plot)
   b. Medium density areas: 15 sqm per person (for plot sizes in the range of 0-360 sqm; for plot sizes in the range of 360-1000sqm with multiple dwelling units per plot)
   c. High density areas: 5 sqm per person (in the traditional settlements of Binnamangala and Motappapalya)

The projected population densities for Station area have been calculated as follows:

1. Density=(super built up are of all plots)/ (unit density of Station area*gross area of Block)
2. Super built up area of all plots = Sum of (plot area*FAR as per applicable regulations)
3. Assumption: Unit density of Station area = 40 sqm per person

RMP

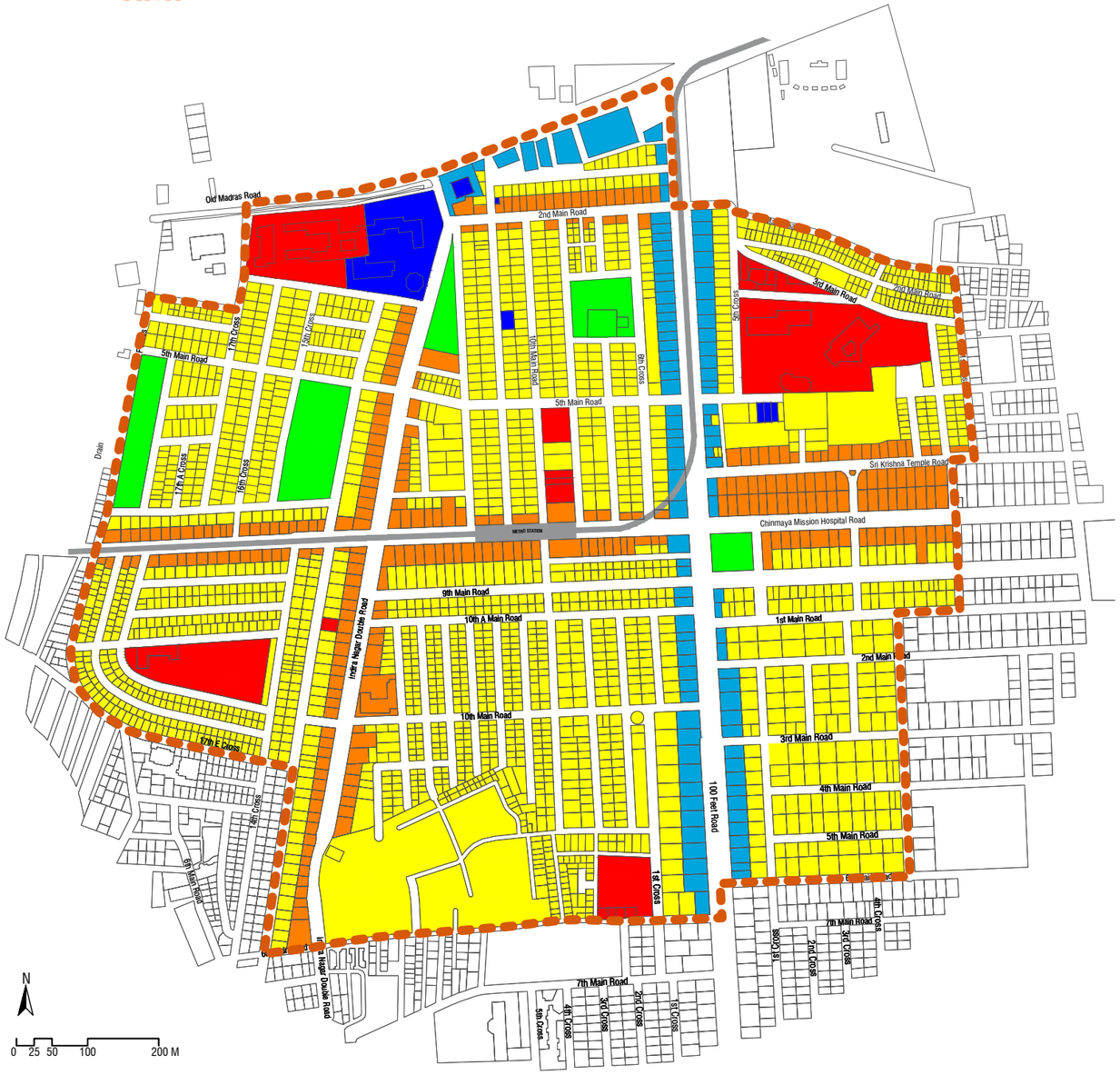


Fig 4.7-a: Interpretation of Landuse Distribution as per RMP 2015

Map generated by EMBARQ India
Data Source: Bangalore Master Plan 2015

2011

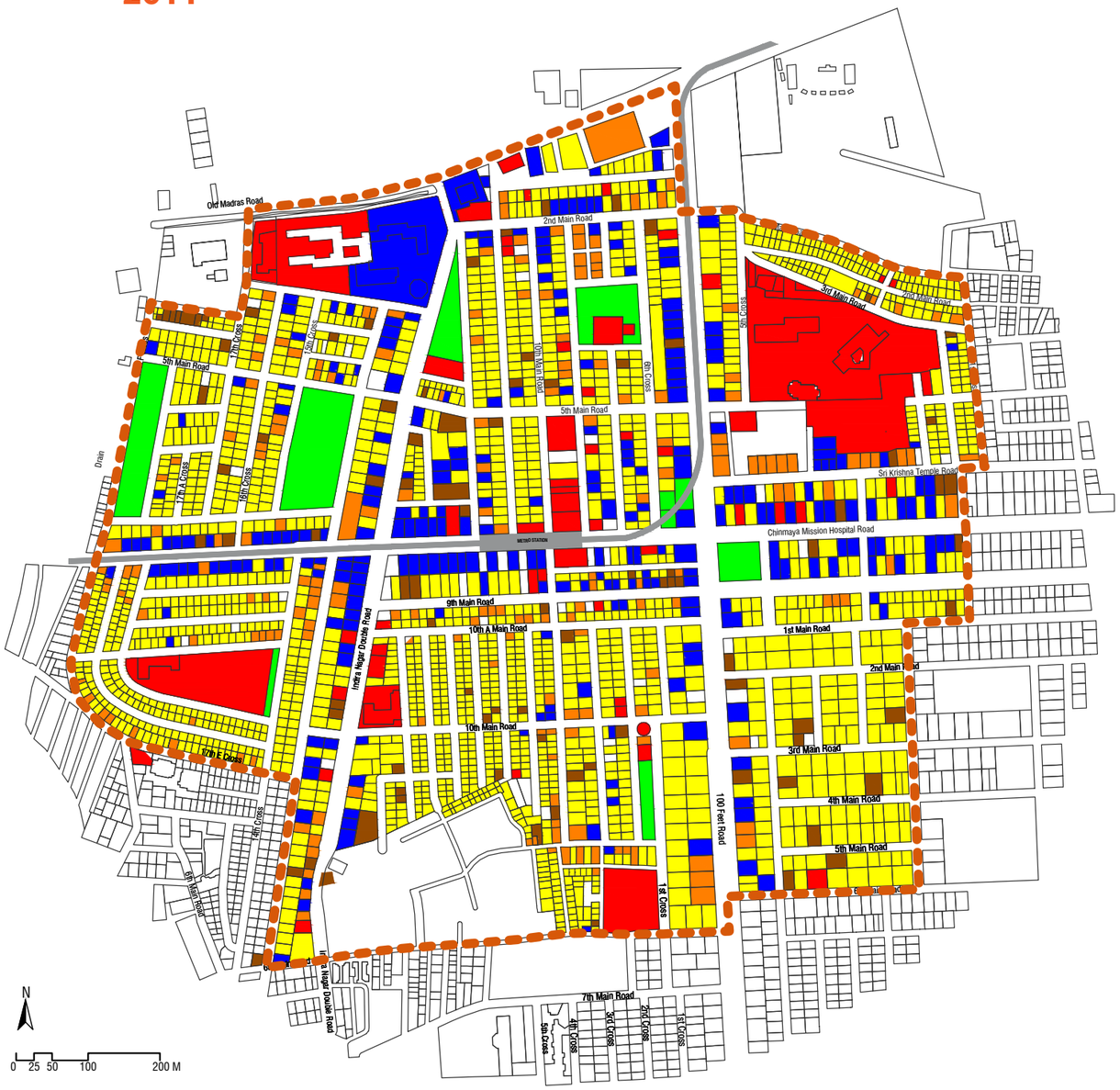
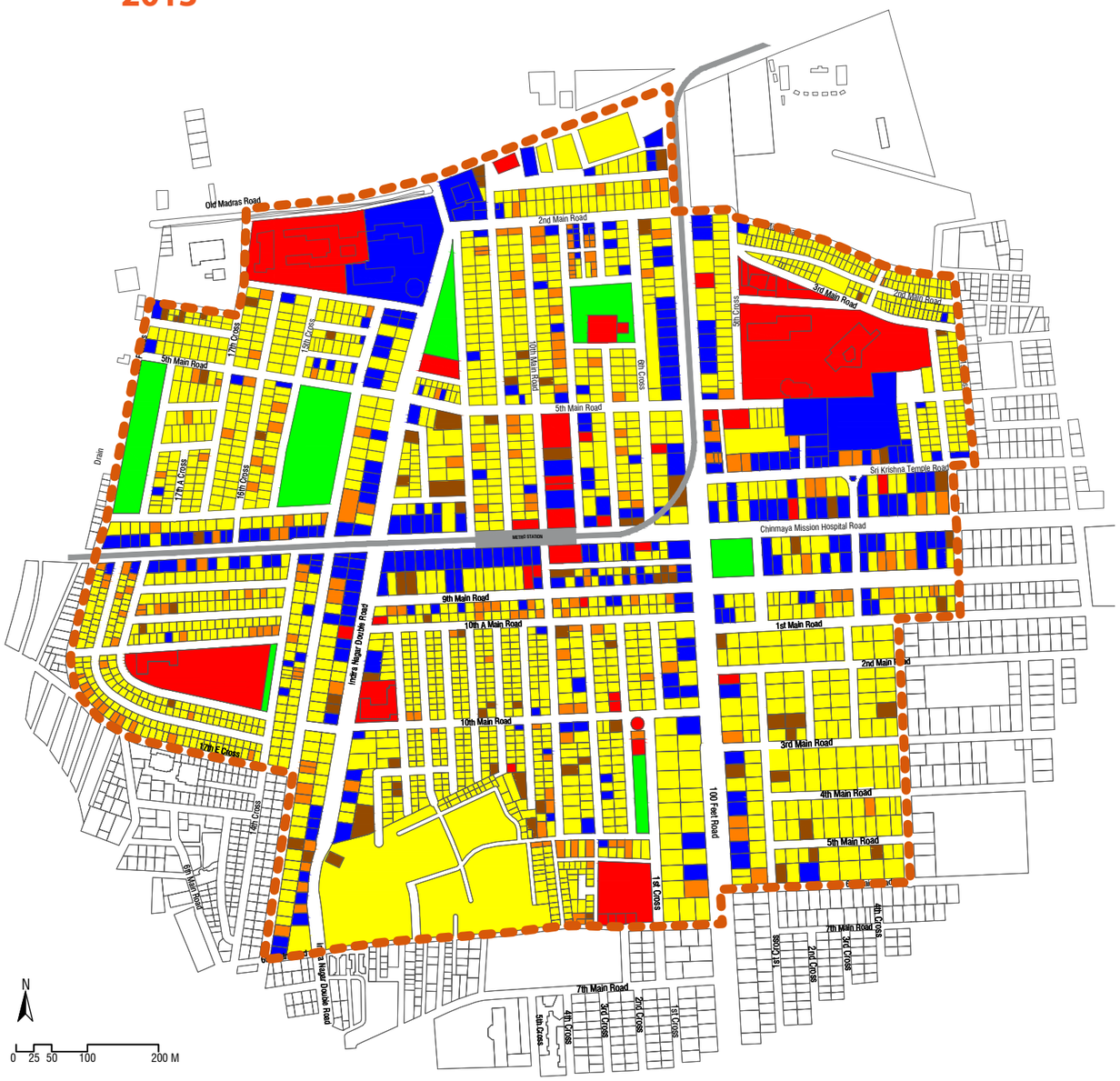


Fig 4.7-b: Distribution of Landuse as per Ground Conditions, 2011

Map generated by EMBARQ India
Data Source: Ground Survey (2011)

EMBARQ India

2013



Landuse

- Residential
- Mixed Use
- Commercial
- Public
- Parks/ Playgrounds

Fig 4.7-c: Distribution of Landuse as per Ground Conditions, 2013

Map generated by EMBARQ India
Data Source: Ground Survey (2013)

STATION LEVEL ANALYSIS

Station area Transformations | Land Use

The RMP 2015 designates the whole Station area as Residential Main zone with the exception of parks, educational, medical and cultural institutions, the BDA Complex and the bus depot. 100 Feet Road and Old Madras Road are noted as a Mutation Corridors, while CMH Road, Double Road, Sri Krishna Temple Road and 2nd Main Road are designated as Commercial Axes. In the residential area, the RMP 2015 also permits the inclusion of minor commercial activities in residential areas as ancillary use.

Since CMH Road, Double Road and Sri Krishna Temple street are zoned Commercial Axes, the commercialization of properties on these roads is in line with the vision of the RMP 2015. However, transformation is noticed only in some parts of these roads. The stretch of CMH Road between 100 feet road and 80 feet road still remains largely residential as do many plots along Double Road. Similarly a low rate of commercialization is seen along most of 100 feet road. Close to the metro station, properties on CMH Road and 9th main road (in Sector S2) are completely commercial. Many properties on CMH road extend up to the parallel roads where they have no interaction with the streets. The other Commercial Axis which has very low rate of commercialization is the 2nd Main road in N2. Commercial activities on this road are concentrated close to its intersection with Double Road.

Areas that have completely retained the residential character are mostly within Defense Colony in Sector S3 and to the north of CMH Road in Sector N1. In contrast, the residential properties in the interior zones of all other sectors have either allowed a higher percentage of ancillary commercial uses within the plots or begun to include commercial activities on the lower floors and hence turned into Mixed Residential areas.

Much of the complete conversion from residential to commercial use is taking place along the 15m wide roads parallel to the main roads where houses are being converted to house offices and small businesses. A possible explanation for this may be the relatively low property rates of these plots with the advantage of proximity to the main roads. Land use transformations are also seen close to intersections of main roads and intersections of internal roads connecting to these main roads. These are small-scale commercial activities catering to the requirements of the surrounding neighborhoods.

In general, most plots undergoing a land use change are in the range of 360-1000sqm area. Immediately around the metro station, most properties on CMH Road and parallel streets in Sector S2 are completely commercial. Buildings on CMH Road have their rear facades on the NGEF lane which have little or no interaction with the street. These streets hence become completely unsafe for pedestrians beyond working hours when all activities are stopped. Streets to the north of CMH Road have completely residential plots with low rise buildings set back from the street and landscaping along the frontage. This also fails to ensure eyes on the street thus making these streets unsafe for pedestrians as well.

Large stretches of plots around the metro station with single building use are detrimental to the creation of safe pedestrian environments. The RMP 2015 permits ancillary uses on 20% of built area of residential plots, but the demand for commercialization along wider roads and around major junctions are much higher and cannot be met with these regulations. It is necessary to create mixed land use around the metro station and other pedestrian priority areas to ensure eyes on the street at all times. Hence the regulations must be modified to specify a minimum percentage of residential as well as pedestrian friendly ancillary uses in these zones.

RMP

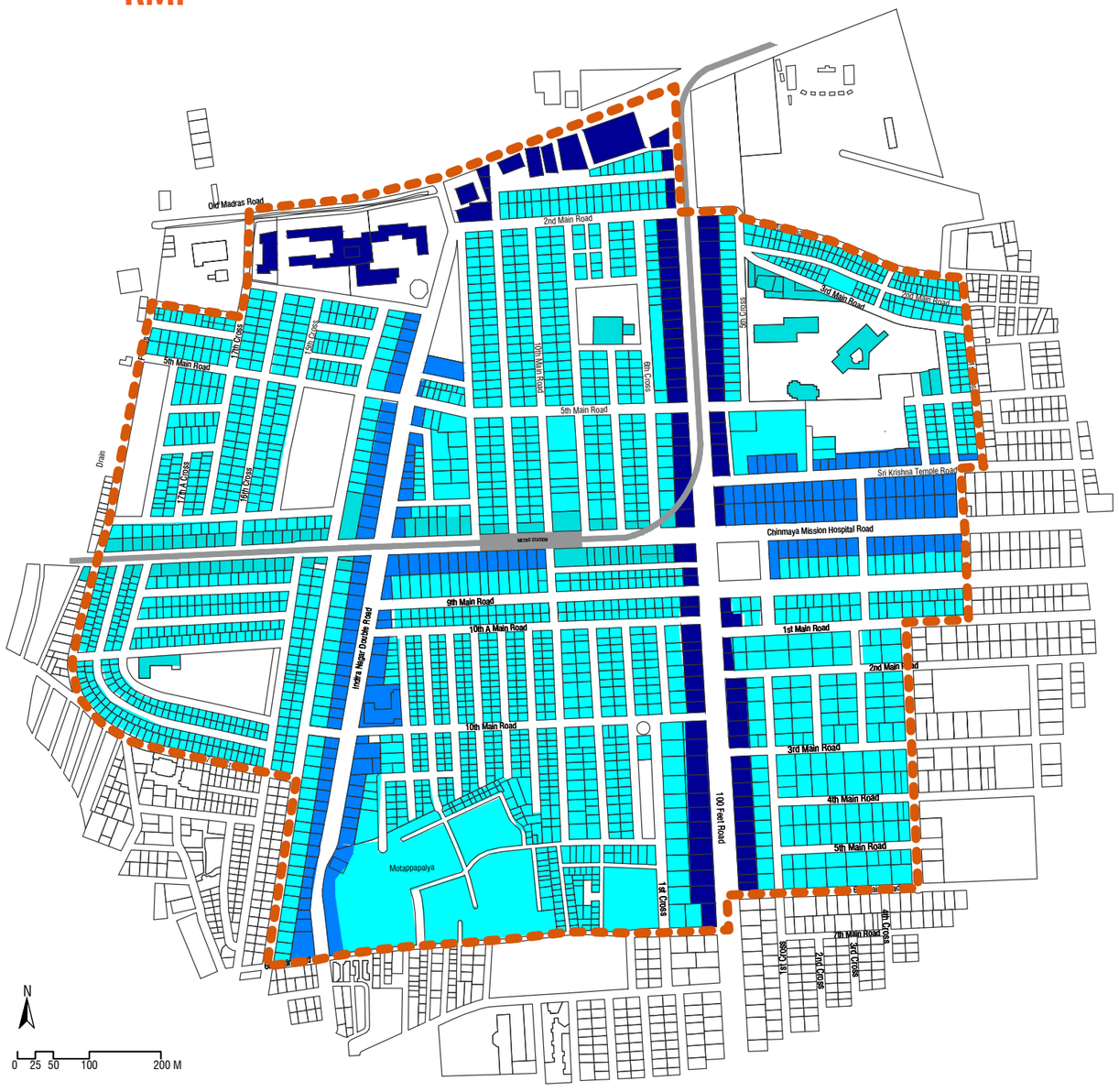


Fig 4.8-a: Interpretation of Maximum Permissible Building Heights as per the RMP 2015

Map generated by EMBARQ India
Data Source: Revised Master Plan 2015

2011

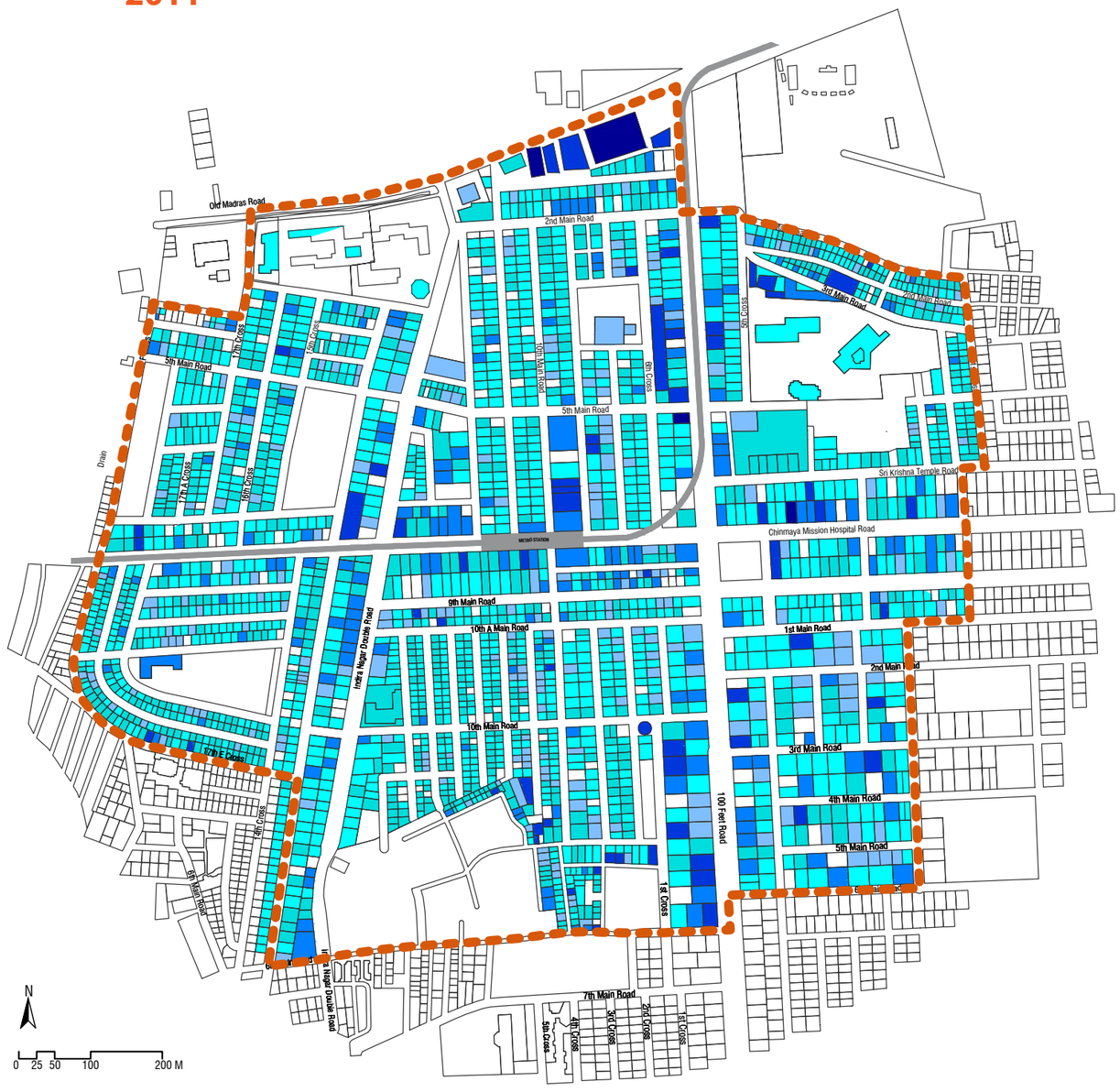


Fig 4.8-b: Mapping of Building Heights as per Ground Conditions - 2011

Map generated by EMBARQ India
Data Source: Ground Survey (2011)

STATION LEVEL ANALYSIS

Station area Transformations | Building Heights

Along the Mutation Corridor, the RMP 2015 allots FAR 2.75 and ground coverage of 55% for all plots abutting a road of width 30m or lesser. This implies that buildings along the 100 Feet road would have a maximum height of 5-6 floors. Regulations for FAR and ground cover of plots on commercial axes follow those of the surrounding residential plots. By this rule, most buildings on CMH Road would have a maximum height of 3-4 floors. Residential buildings on smaller plots (up to 360sqm) and long 12m wide roads are permitted a maximum FAR of 1.75 or 2-3 floors while larger plots (360-1000sqm) on wider roads are permitted a maximum FAR of 2.25 or 3-4 floors.

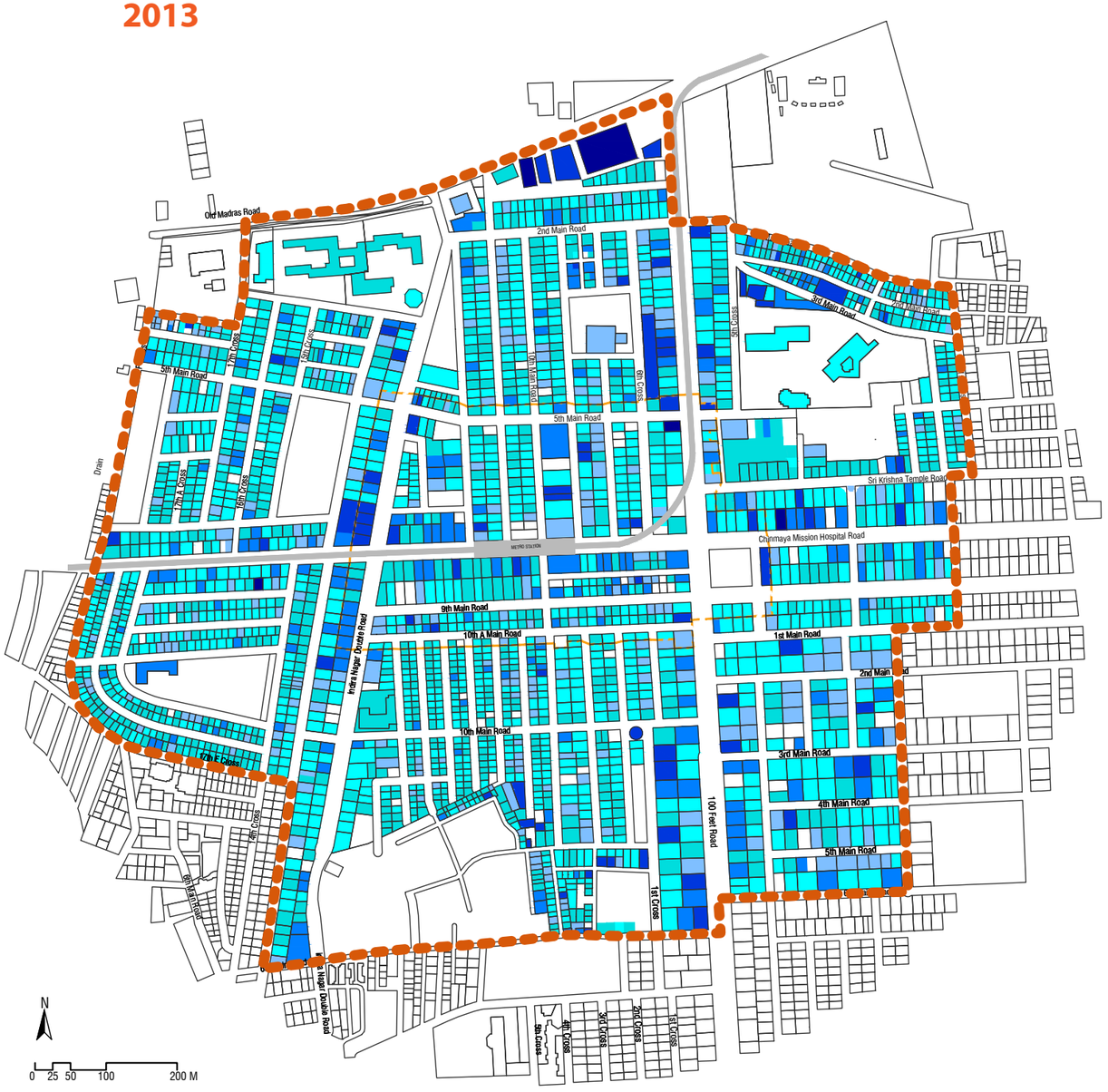
As per existing ground conditions, most of the properties along the Mutation Corridor are 2 storied with a few buildings of 4 or more floors. Along CMH Road, most properties are 4- 5 floors high with properties around the Metro Station having 3- 4 floors.

There is a concentration of taller buildings around the intersection of CMH Road with Double Road. In general, 49% of properties in the Station area are 2 floors high, 27% are 3 floors high. Between 2011 and 2013, 10% of the properties have increased in height. Most of the transformation is from 4 to 5 floors or 3 to 4 floors. Much of the transformation is concentrated in the interior parts, especially along the 15m wide roads and the smaller plot clusters in Hutting Colony (N3) and Eshwara Layout (S1).

As per general guidelines of the National Building Code (NBC) as well as RMP 2015, the height of a building must not exceed 1.5 times the width of the abutting road plus the front setback. Since most roads around the metro station are 12m wide, the height of buildings on these roads must not exceed 19.5m. Increase in FAR to 4.00 as per the UDD notification translates to an addition of 3-4 floors on the smaller plots resulting in 15-18m high structures on plots as small as 360sqm.

The proposed regulations must hence control the increase in heights of buildings on narrower plots and instead encourage development on roads with greater RoW capable of achieving greater FAR without greatly altering the scale of the neighborhood or obstructing availability of natural light and ventilation to the lower stories.

2013



Building Heights

- G + 0
- G + 1
- G + 2
- G + 3
- G + 4
- G + 5 and above

Fig 4.8-c: Mapping of Building Heights as per Ground Conditions - 2013

Map generated by EMBARQ India
Data Source: Ground Survey (2013)

2013

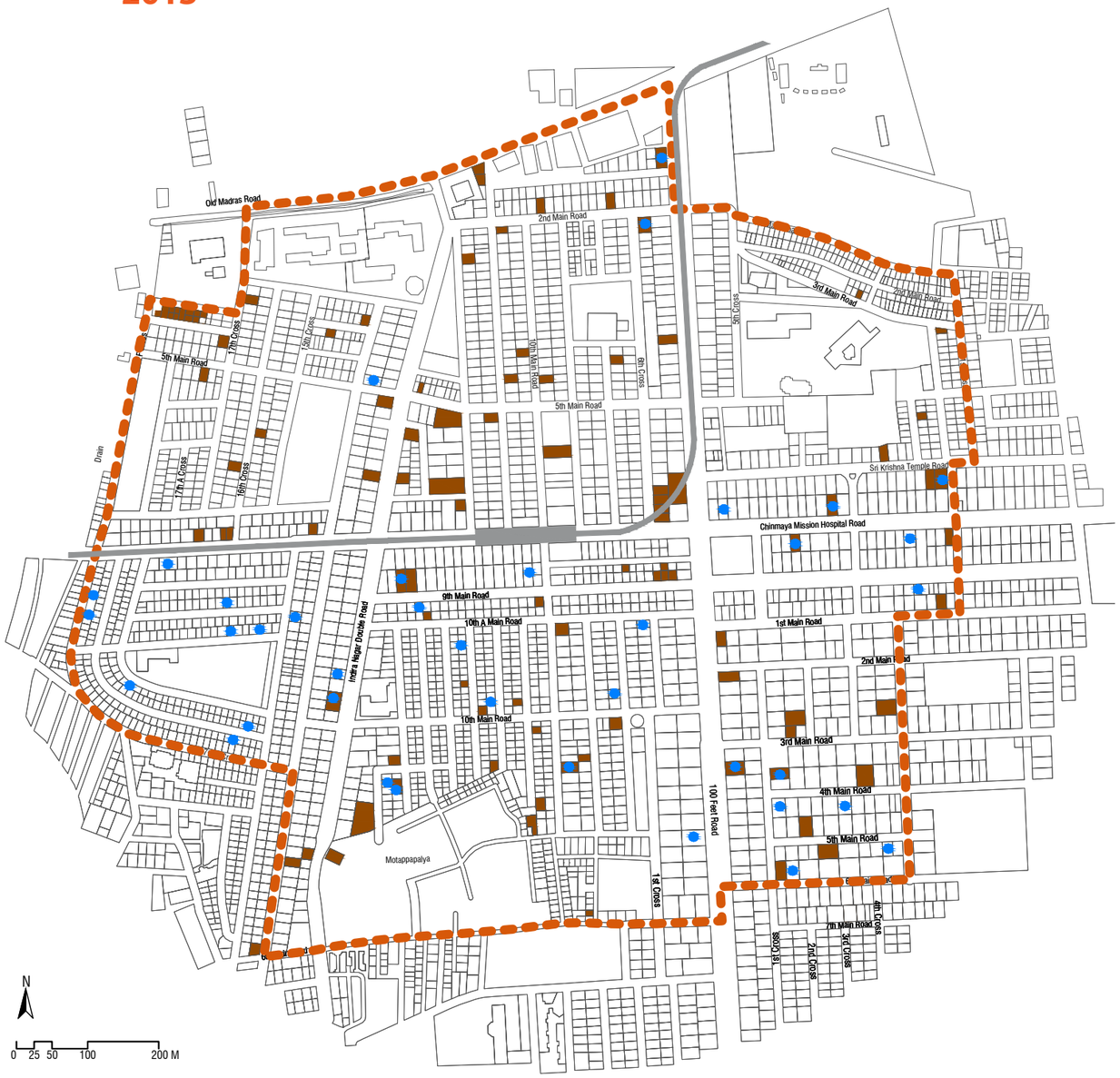


Fig 4.9-a: Vacant plots in 2011 overlaid with plots under construction in 2013

2013

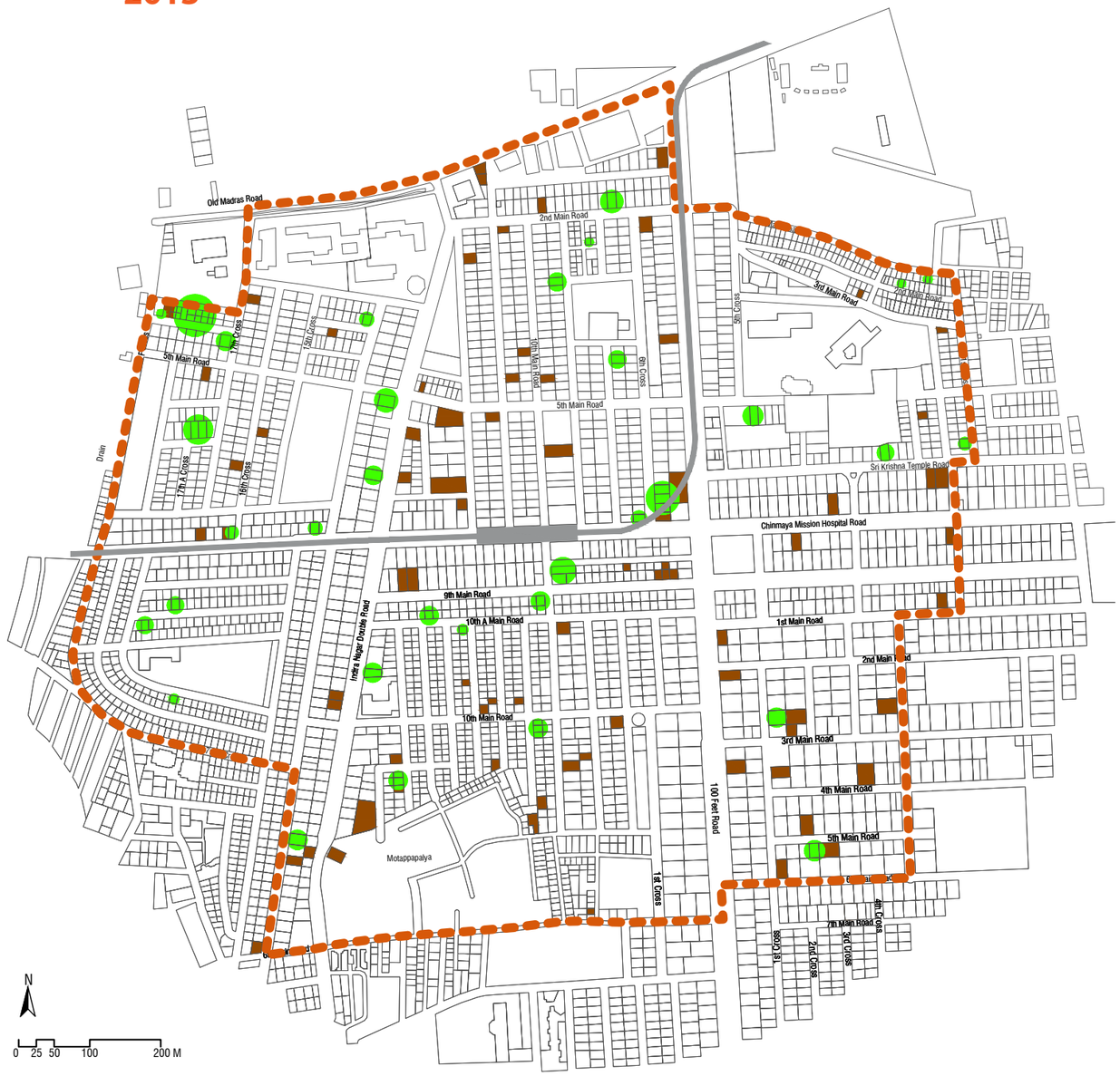


Fig 4.9-b: Vacant plots in 2011 overlaid with plots with new construction in 2013

Map generated by EMBARQ India
Data Source: Ground Survey (2011 & 2013)

EMBARQ India

Construction Activity

- New Construction activity
- Under construction activity
- Empty plots

Fig 4.9-c: Vacant Plots - 2013

Map generated by EMBARQ India
Data Source: Ground Survey (2013)

STATION LEVEL ANALYSIS

Station area Transformations | Construction Activity

295 buildings show an increase in heights between 2011 and 2013 accounting for 12% of all construction activities in the station area. Between 2011 and 2013, the number of vacant plots in the Station area has reduced from 94 to 84 implying that merely 10% of vacant plots were built upon. The total number of newly constructed buildings and buildings under construction at the time of this survey was 45. This shows that 35 of these were reconstruction projects on plots that were previously built upon. However, 83% of plots in the station area show no change even after the inauguration of the metro.

The new developments do not show any concentration in any specific sector or plot size range. A few small areas can be identified as being untouched by new construction and reconstruction activities, i.e., blocks to the West of Indiranagar Park in Sector N1, plots between CMH Road and 5th Main Road in N2, most part of Hutting Colony in N3, Eshwara Colony to the north of the Park in Sector S1, plots close to Motappapalya in S2 and a few blocks in Defence Colony between 3rd Main Road and 9th A Main Road.

There is very little vacant land within the station area for completely new developments and much of the construction activity is in the form of redevelopment or extensions to existing structures. It is hence important for the DCRs to take into consideration the constraints of increasing the FAR on existing buildings and modify the regulations to enable them to benefit from the incentives without compromising on the quality of the living environment.

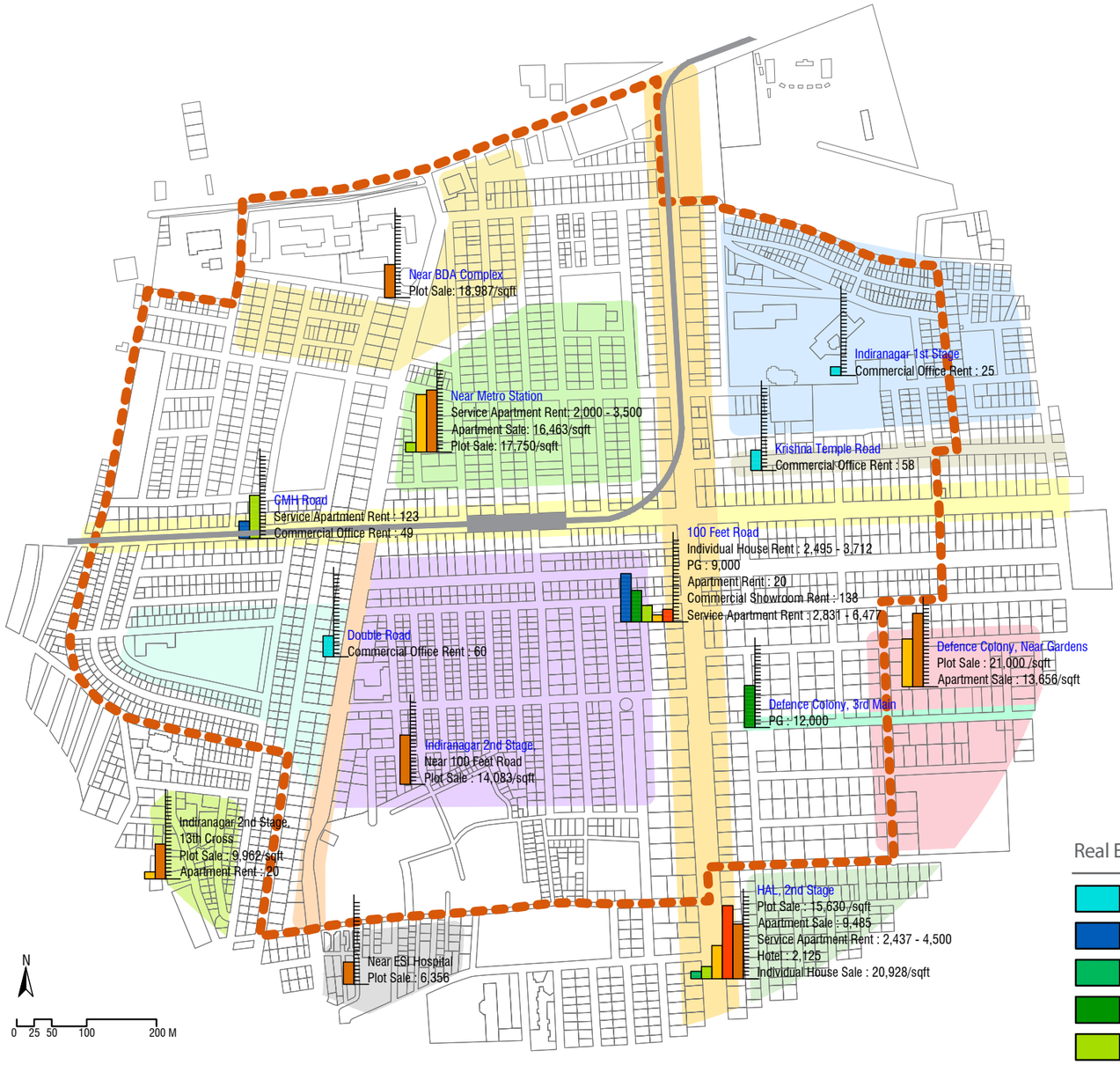


Fig 4.10: Real estate market study (All values are in INR)
Map generated by EMBARQ India
Data Source: Magic bricks, 2013; Guidance Values: BBMP

STATION LEVEL ANALYSIS

Station area Transformations | Real Estate Market

The commercial micro market of Indiranagar plays a major role in setting the retail and shopping trends at the city-level. Emergence of the Indiranagar 100 Feet road as a high street has been quoted by market reports as one of the major factors defining the changes in market conditions in the city. The portion of this road located within the station area and the commercial activities on CMH Road drive the commercial market within Indiranagar. The large plots on the high street are conducive to high end, large format branded stores as well as boutique retail uses. These are supported by high-end residential areas including Defense Colony in Indiranagar, Koramangala to the South of Indiranagar and Whitefield in the East.

On 100 Feet Road rent for commercial spaces is as high as Rs.175 per sq ft., second only to those in MG Road that rate at Rs. 200 per sq ft. The market in Indiranagar saw a slump during the construction of the Metro line, but current trends show a steady increase. This is a result of the new supply of spaces along CMH Road, 100 Feet Road and Sri Krishna Temple Street due to transformation of residential plots, extension of existing structures and high rental values on the main roads.

While the commercial and retail components of the station area are strong, the residential component is also witnessing much change. Between 2011 and 2013, housing units have increased by 6% and 10% of plots have transformed from single homes to multifamily homes. The residential market also is one of the highest in the city. Sale of plots in Defense Colony is at the rate of Rs.17000/sqft. High-end luxury apartments in Defense Colony are Rs.13746/sqft and other multi dwelling apartments in HAL 2nd stage rate at Rs.9485/sqft. In comparison, large apartments located in the fringes of the station area and in adjoining areas of Thippasandra, along Old Madras Road and Domlur are in the range of Rs.6500/sqft on an average.

The capital price in 2012 was Rs.5590 and has risen to Rs.6345 in 2013. The area has shown a 375% increase in returns on investment in property since 2005. The guidance values of 2011 indicate high values in the residential areas of Defense colony (Rs.4990), while HAL 2nd Stage rates only Rs.3860. All other residential areas within the station area are comparatively lower (ranges from Rs.3580 to Rs.2000). The guidance value of transactions on 100 Feet Road is Rs.6490 and on CMH Road is Rs.5520.

The current market trend for Indiranagar shows that though the opportunities for new development in the immediate vicinity are few, investment returns are high. Commercial and retail development is aided by the current Mutation Corridor and Commercial Axis regulations, but residential development is taking place in the limited vacant plots and through amalgamations as this is an established plotted residential area and opportunities are few. It is expected that the Metro, once in operation across the city, will enhance opportunities in Indiranagar.

This reinforces the fact that areas even beyond the 150m radius but within walking distance of the metro station will have to be developed to meet the rising demand for real estate in this area. Additionally, improving the quality of public spaces and accessibility to the metro station will greatly add to the value of properties within the station area.
As per the RMP 2015, the maximum FAR and ground coverage permitted for a plot depend on its land use, plot size and width of road abutting the plot. In case of larger plots located on roads with insufficient road width, the maximum permissible FAR is follows the road width.

As per the RMP 2015 alone, the percentage distribution of plots in each FAR range is as follows:

- 81.4% of plots within the station area are eligible for a maximum FAR of 1.75. Plots smaller than 360sqm and larger plots along roads of width 12m or lesser fall under this category. Most of these are zoned Residential or Commercial Axis; only 4 plots with this FAR are zoned Commercial.
- Of these, 17% have not achieved the maximum FAR limit. These plots are scattered around the Station area in Defence Colony, on Sri Krishna Temple Street and along Double Road in Sector S2. 37% of these plots that have overshot the FAR limit are seen in all sectors with the highest concentration seen in the highly dense pockets of Hutting Colony (N3), Eshwara Layout (S1) and close to Motappapalya in S2.
- 0.3% of plots are allotted FAR of 2.00. These are plots with Public/ Semi-Public land use and area between 1000-2000sqm.
  Of these, 4 plots located along Double Road have under-achieved FAR. Two plots including the Kairali Niketan School in Sector N2 have overshot the FAR limit.
- 13.7% of plots are eligible for an FAR of 2.25. Plots zoned Residential or Commercial Axis with area in the range of 360-1000sqm and Public/ Semi-public with area greater than 2000sqm fall under this category.
  Of these, 44% of plots have not achieved the maximum FAR. They include most plots along Sri Krishna Temple Street and Double road under the Commercial Axis land use and residential plots on the street parallel to Double road in Sector S1. 24% of plots have overshot this FAR limit of which most are residential plots in Defence Colony (S3), along 9th Main Road and 1st Cross Road (S2). A small number of plots in this category are zoned Commercial Axis and are clustered around the intersection of CMH Road with Double Road.
- 4.6% of plots in the station area can take an FAR of 3.25. These are plots adjoining the Mutation Corridors – 100 Feet Road and Old Madras Road.
  Hardly 12% of these plots have achieved the FAR limit. These plots are found on Old Madras road and on 100 Feet Road to the north of its intersection with 5th Main road of Sector N2. The underachieved plots form the majority with 88 % and are located all along 100 feet road.

As a general trend, plots close to major road intersections, parks and public amenities and along Double Road and CMH Road have achieved the maximum permissible FAR. Plots that have overshot the limit are seen in the residential low rise high density clusters and along roads parallel to the main roads. Overshooting the FAR limit is seen more in residential plots across all sectors and on CMH Road around the metro station. This indicates the typology and location of plots with high demand for higher FAR. Underutilization of FAR is seen mostly in the large plots to the west of 100 Feet Road under all land uses including residential (in Defence Colony and CMH Road) and Mutation Corridor (on 100 Feet Road). These indicate areas with the minimum tendency to transform. While introduction of the 4.00 FAR incentives around the metro station will be well utilized by plots on CMH Road, it may not induce the expected rate of change in the northern blocks. Redistribution of this FAR to areas with higher demand in the station area will ensure that the desired density levels are reached while the demand for increased residential and commercial spaces is met.

RMP

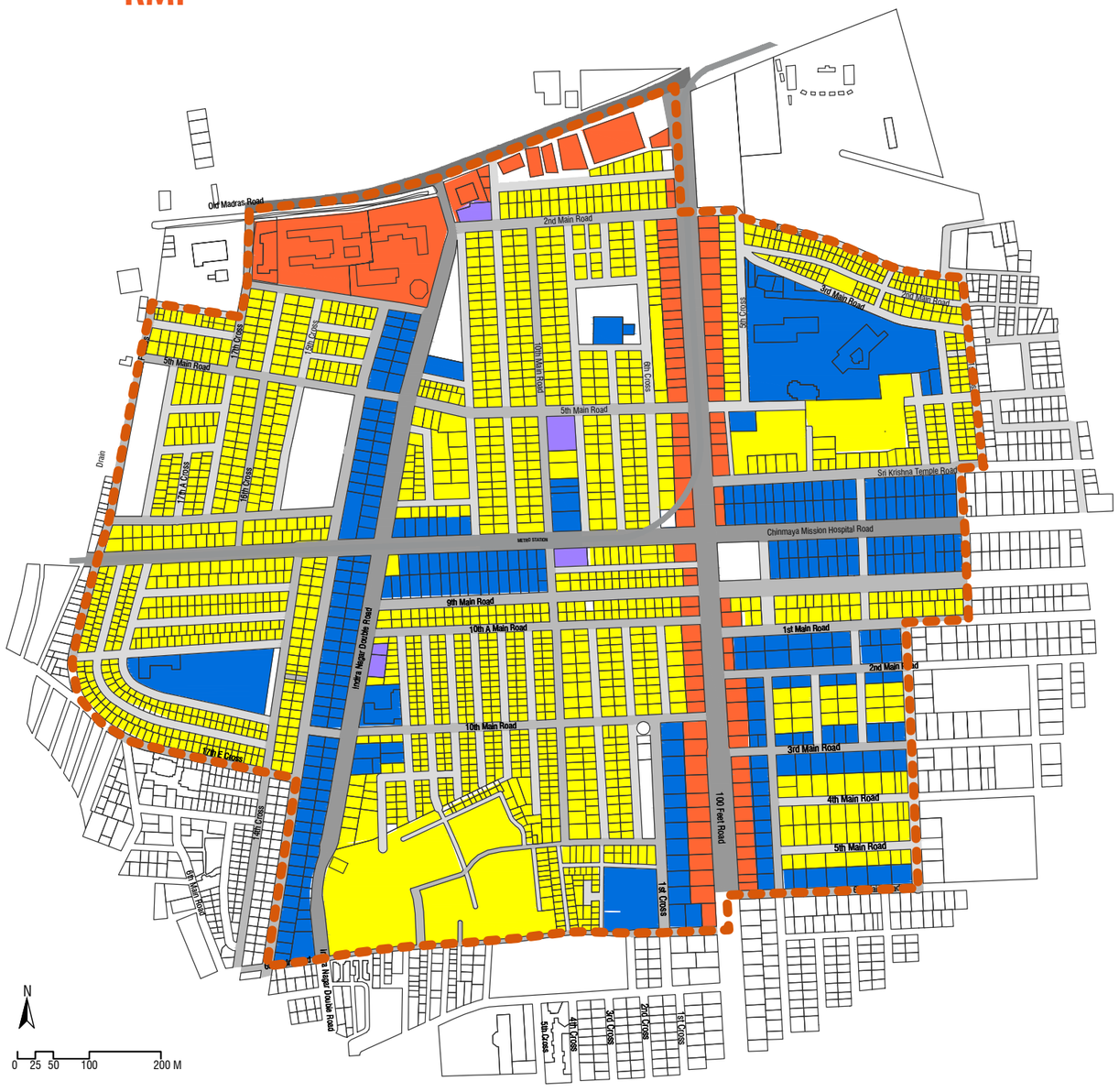


Fig 4.11-a: Interpretation of maximum permissible FAR as per RMP 2015

Map generated by EMBARQ India
Data Source: Revised Master Plan 2015

2011

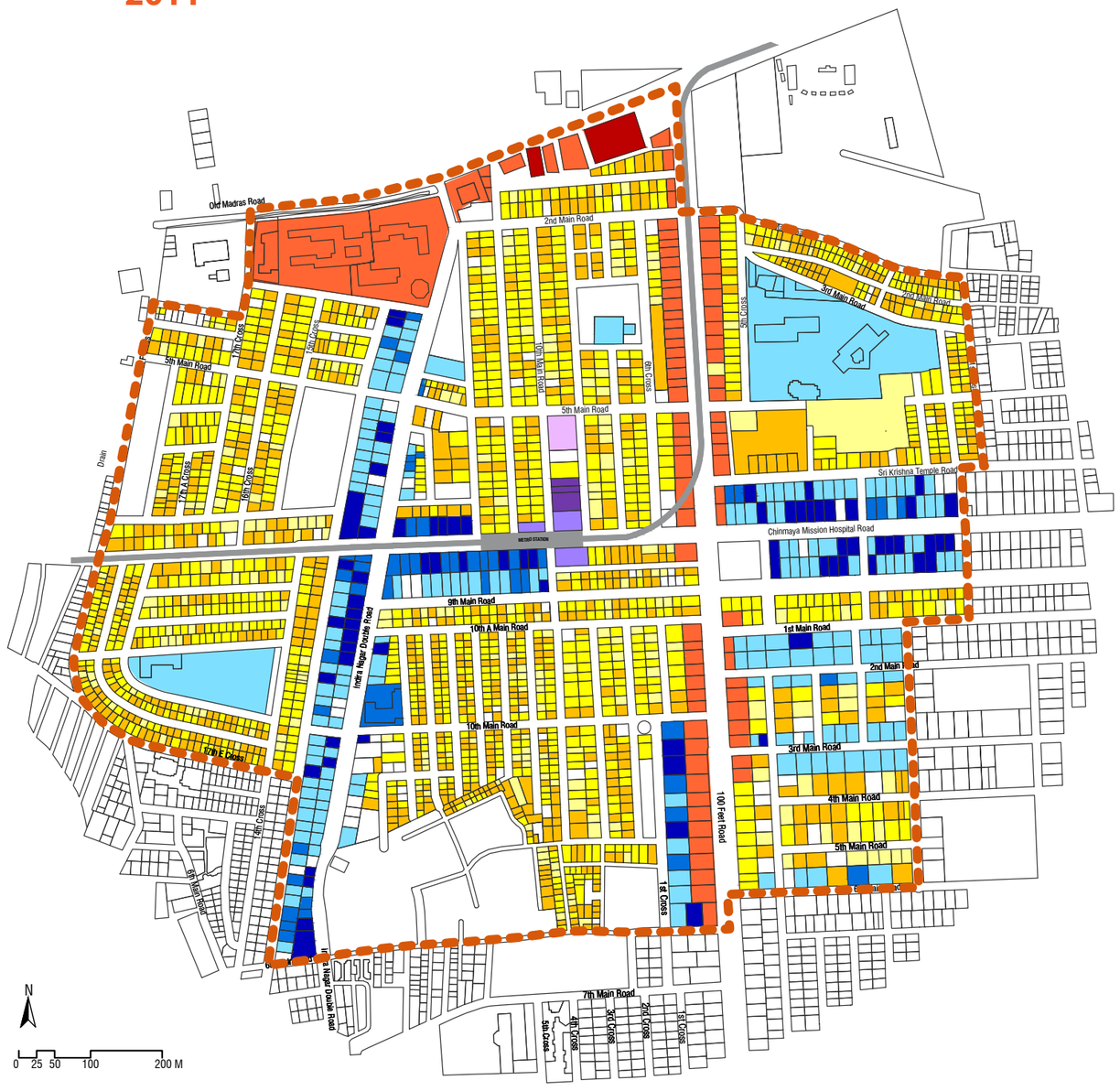


Fig 4.11-b: Interpretation of FAR achieved on ground - 2011

Map generated by EMBARQ India
Data Source: Revised Master Plan 2015, Ground Survey (2011)

EMBARQ India

2013

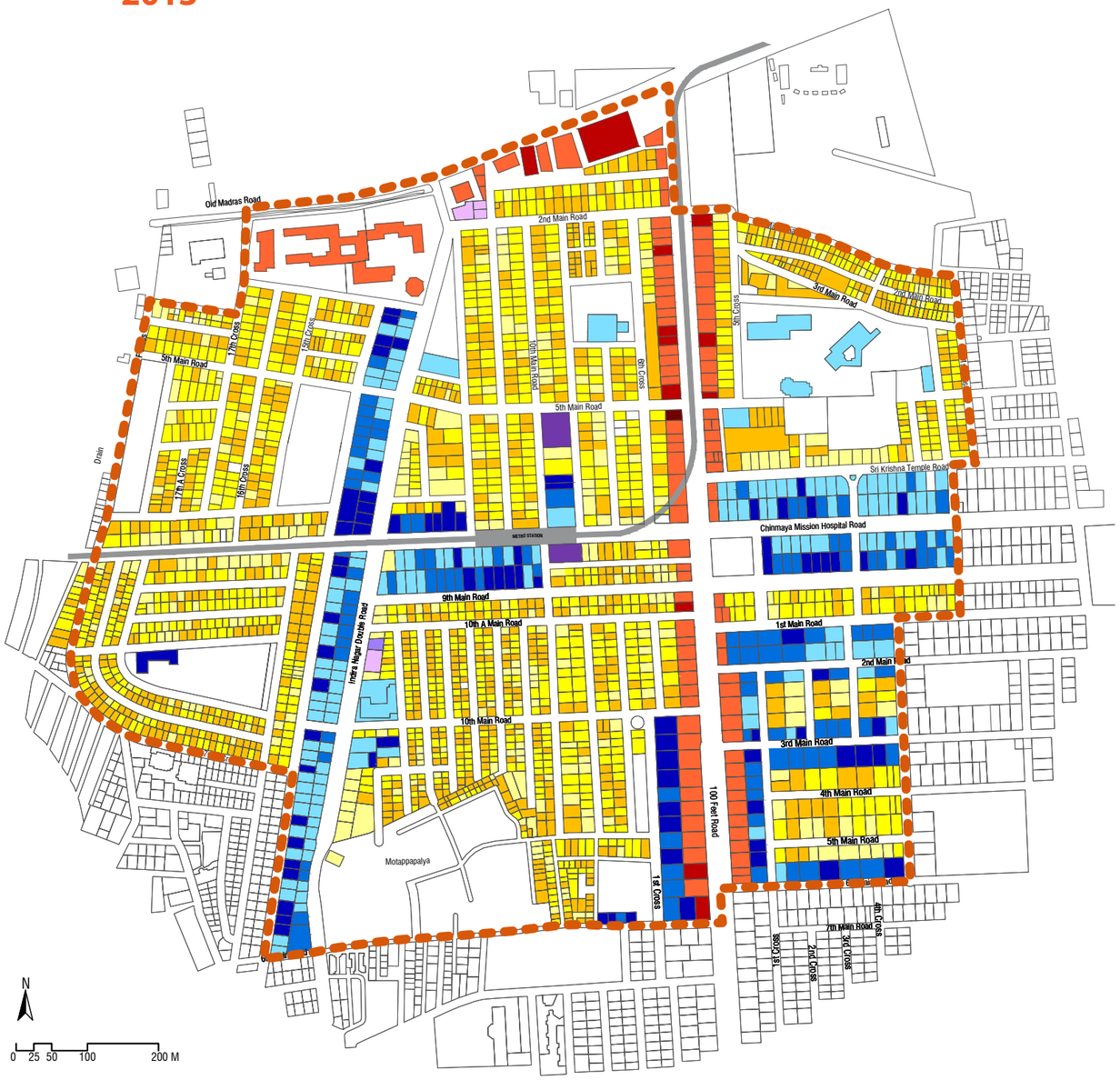


Fig 4.11-c: Interpretation of FAR achieved on ground - 2013

Map generated by EMBARQ India
Data Source: Revised Master Plan 2015, Ground Survey (2013)

STATION LEVEL ANALYSIS

Station area Transformations | Floor Area Ratio

As per the RMP 2015, the maximum FAR and ground coverage permitted for a plot depend on its land use, plot size and width of road abutting the plot. In case of larger plots located on roads with insufficient road width, the maximum permissible FAR is follows the road width. As per the RMP 2015 alone, the percentage distribution of plots in each FAR range is as follows:

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  Of these, 4 plots located along Double Road have under-achieved FAR. Two plots including the Kairali Niketan School in Sector N2 have overshot the FAR limit.
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- 4.6% of plots in the station area can take an FAR of 3.25. These are plots adjoining the Mutation Corridors – 100 Feet Road and Old Madras Road. Hardly 12% of these plots have achieved the FAR limit. These plots are found on Old Madras road and on 100 Feet Road to the north of its intersection with 5th Main road of Sector N2. The underachieved plots form the majority with 88 % and are located all along 100 feet road.

As a general trend, plots close to major road intersections, parks and public amenities and along Double Road and CMH Road have achieved the maximum permissible FAR. Plots that have overshot the limit are seen in the residential low rise high density clusters and along roads parallel to the main roads. Overshooting the FAR limit is seen more in residential plots across all sectors and on CMH Road around the metro station. This indicates the typology and location of plots with high demand for higher FAR. Underutilization of FAR is seen mostly in the large plots to the west of 100 Feet Road under all land uses including residential (in Defence Colony and CMH Road) and Mutation Corridor (on 100 Feet Road). These indicate areas with the minimum tendency to transform. While introduction of the 4.00 FAR incentives around the metro station will be well utilized by plots on CMH Road, it may not induce the expected rate of change in the northern blocks. Redistribution of this FAR to areas with higher demand in the station area will ensure that the desired density levels are reached while the demand for increased residential and commercial spaces is met.

STATION LEVEL ANALYSIS

Station area Transformations | Implication of the UDD Notification

The UDD Notification states that:

"…Areas which fall within a distance of 150m from the outer boundary of the metro station/ terminals subject to confirmation from Bangalore Metro Rail Corporation Ltd., shall be eligible for a maximum FAR of 4 for all permissible uses, irrespective of the FAR applicable for the respective uses in the respective tables…."

There is no mention of changes to any of the other regulations applicable to the plots as per Zonal Regulations (ZR) of the RMP 2015. This implies that regulations pertaining to Setbacks, Ground Coverage, Building Heights, Parking Requirements etc. continue to remain the same as given in the ZR. This results in many conflicting situations which make it impossible to achieve the prescribed maximum FAR on most of the plots within the station area.

Physical constraints

Figure 4.12: Map of Core Zone (150m from the Metro Station)

a. Plot Size

Within the 150m zone, 93% of plots are zoned residential. 92% of the plots have area lesser than 1000sqm, 75% having areas smaller than 360sqm.
For a Residential plot of size 1000sqm on a road of width up to 18m, the prescribed ground coverage (Table 10. RMP 2015) is 65% (Figure 21).

To achieve 4 FAR, the total built up area would be 4000sqm on a foot print of 650sqm. This results in at least 6 floors or a minimum of 18m building height (Figure 22).
As per Table 9- RMP 2015, for this height, the building should have a setback of at least 6m on all sides. This further reduces the foot print of the building to 385sqm (38.5% GC) and increases the building height to 30m (10 floors) (Figure 23-24). This in turn increases the prescribed setbacks to 10m, and reduces the ground coverage to 135sqm (Figure 25) thus making it impossible for these plots to achieve the maximum permitted FAR while adhering to all the regulations.

Around the Indiranagar Metro Station, this condition is applicable to 92% of the plots.

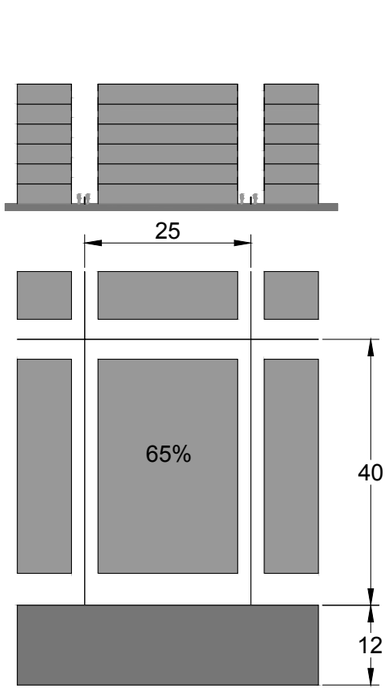


Figure 4.13 -a : Plan and Section - plot size of 1000 sqm with FAR, ground coverage and setbacks as per RMP 2015 (Table 8, RMP 2015)

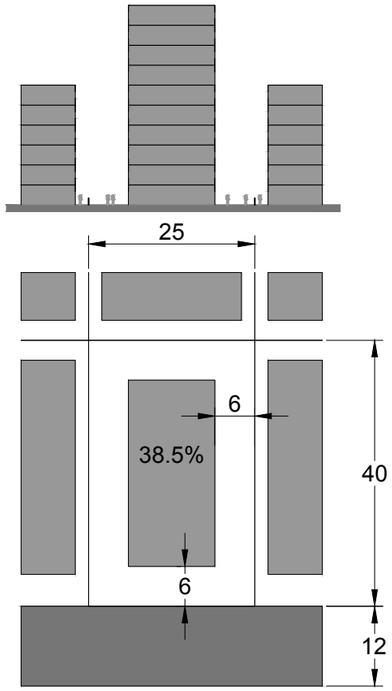


Figure 4.13 - b: Plan & Section - plot of size 1000 sqm; with revised setbacks based on building height as per RMP 2015 (Table 9, RMP 2015)

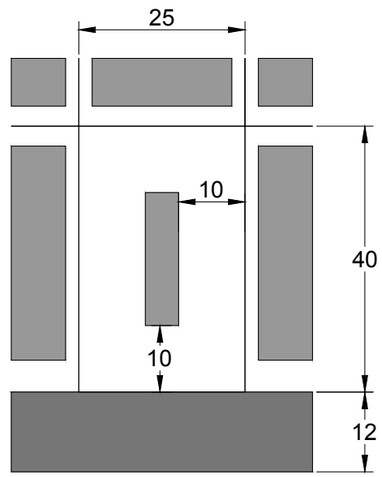


Figure 4.13 - c: Plan - plot of size 1000 sqm; with revised setbacks based on building height as per RMP 2015 (Table 9, RMP 2015)

b. Light and Ventilation

Application of the UDD Notification on existing plots would result in retention of the existing setbacks and increase in number of floors. For a residential plot of size 360sqm this translates to approximately 2.27m of front setback and 1.5m setbacks (Table 8- RMP 2015) on all other sides for a building of 6 floors (Figure 26). The effective space between adjoining buildings thus remains at a maximum of 3m while the height of the structures increases to 18m. In such conditions, the lower floors of the buildings get very little light and ventilation.

This condition is applicable to at least 75% of the plots in the 150m zone.

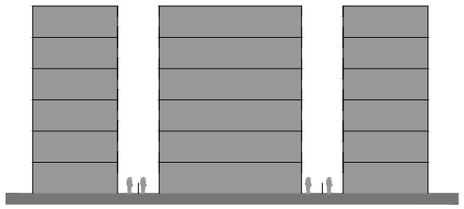


Figure 4.13 - d; Section - buildings on plot size 360 sqm with 8% side setbacks as per RMP 2015 (Table 8, RMP 2015)

Traffic Constraints

Figure 4.14: Roads by RoW within 150m of the Metro Station

a. Road width

The total length of roads in the 150m zone is 4.93km. Of these, 45% are 12m wide roads, 15-18m roads constitute 21%, 24m roads (Double Road and CMH Road) constitute 23%, the 100 feet road constitutes 6% and the NGEF Road, 9m in width, constitutes 4%. 65% of the plots in this zone abut roads of width 15m or less. Assuming a constant population density, application of the UDD notification results in a 95% increase in the built up area, total population and number of households within the 150m zone. Assuming a minimum requirement of one car per household, this also translates to a 95% increase in the number of 4-wheelers owned within the 150m area with no increase in the amount of road or parking space to accommodate it.

b. Pavement Width

The highest pedestrian activity in Indiranagar is known to be along CMH road which is now further increased by the arrival of the Metro Station. The average pedestrian walkway width along the stretch of CMH Road within 150m of the Station is approximately 1.5m. The pedestrian level of service along 40% of these pavements is below the acceptable limit (Refer Level of Service). The UDD notification does not address the need to design the interaction between the buildings and public spaces to ensure a safe and friendly environment for the pedestrians in these areas.

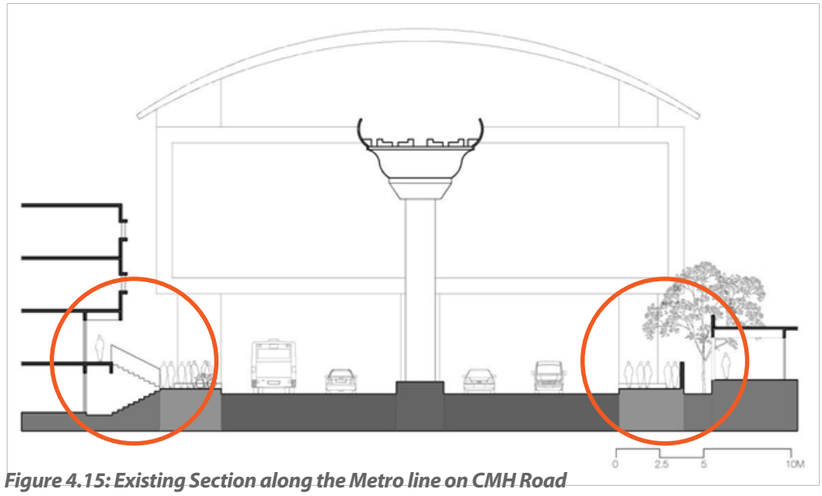


Figure 4.15: Existing Section along the Metro line on CMH Road

Loss of Area Character

Figure 4.16: Residential plots within 150m of the Metro Station

a. Plot size

69% of plots within the 150m zone are residential in character, 62% of which comprise of plotted development and only 1% (3 plots) has multi-storeyed apartments. This is also consistent across the Station area where 80% of plots have independent homes and 2% have apartments. The Station area houses the entire economic spectrum from the informal settlement on 100 feet road to the lower income group in the traditional settlements to the higher income group in Defence Colony. 61% of the residential plots within the 150m zone are smaller than 360sqm (3600sqft), 46% of the plots being in the 40ft x 60ft range.

One of the major implications of the UDD notification is the inability of smaller plots to benefit from the FAR incentive without amalgamation. As per the existing conditions, only plots bigger than 1000sqm area are capable of achieving the 4.00 FAR without violating the other regulations of the RMP 2015. However, these form hardly 2% of the plots within the specified zone. Thus, the smaller plots are forced to amalgamate to be able to utilize the incentive. Such amalgamation across the entire 150m zone would lead to a drastic change in the scale of the neighbourhood. Furthermore, the market value of these plots is already high due to their proximity to the Metro Station. This implies that the new housing stock on the amalgamated plots would be unaffordable to the existing residents of this area whole fall within the lower and middle income brackets. This will invariably lead to gentrification and will result in a complete loss of character of the area.

Figure 4.17: Land use within 150m of the Metro Station

b. Landuse

CMH Road along which the metro line runs is already one of the more popular commercial areas of the city. 55% of plots along this road within 150m of the Metro station are completely commercial. The market rates in along this road are very high with the guidance value itself in the range of Rs.5500 . Introduction of the metro line has further caused the property rates to increase while also increasing the demand for commercial space in this area. It has been observed that within the station area, plots on streets parallel to the main commercial streets are showing a high degree of commercialization.
Such commercialization is bound to occur to a high degree around the Metro station. Such a change in the land use will contribute to a radical change in the character of the area. Concentration of mono functional commercial activities in the area around the metro station will result in dead spaces after working hours which makes it unsafe for pedestrians and users of the metro at those times.

Plot Sizes

- Single family homes
- Appartments
- Informal settlements

Fig 4.18: Informal Activities in Indirangar Metro Station area

Map generated by EMBARQ India
Data Source: Ground Survey (2013)

STATION LEVEL ANALYSIS

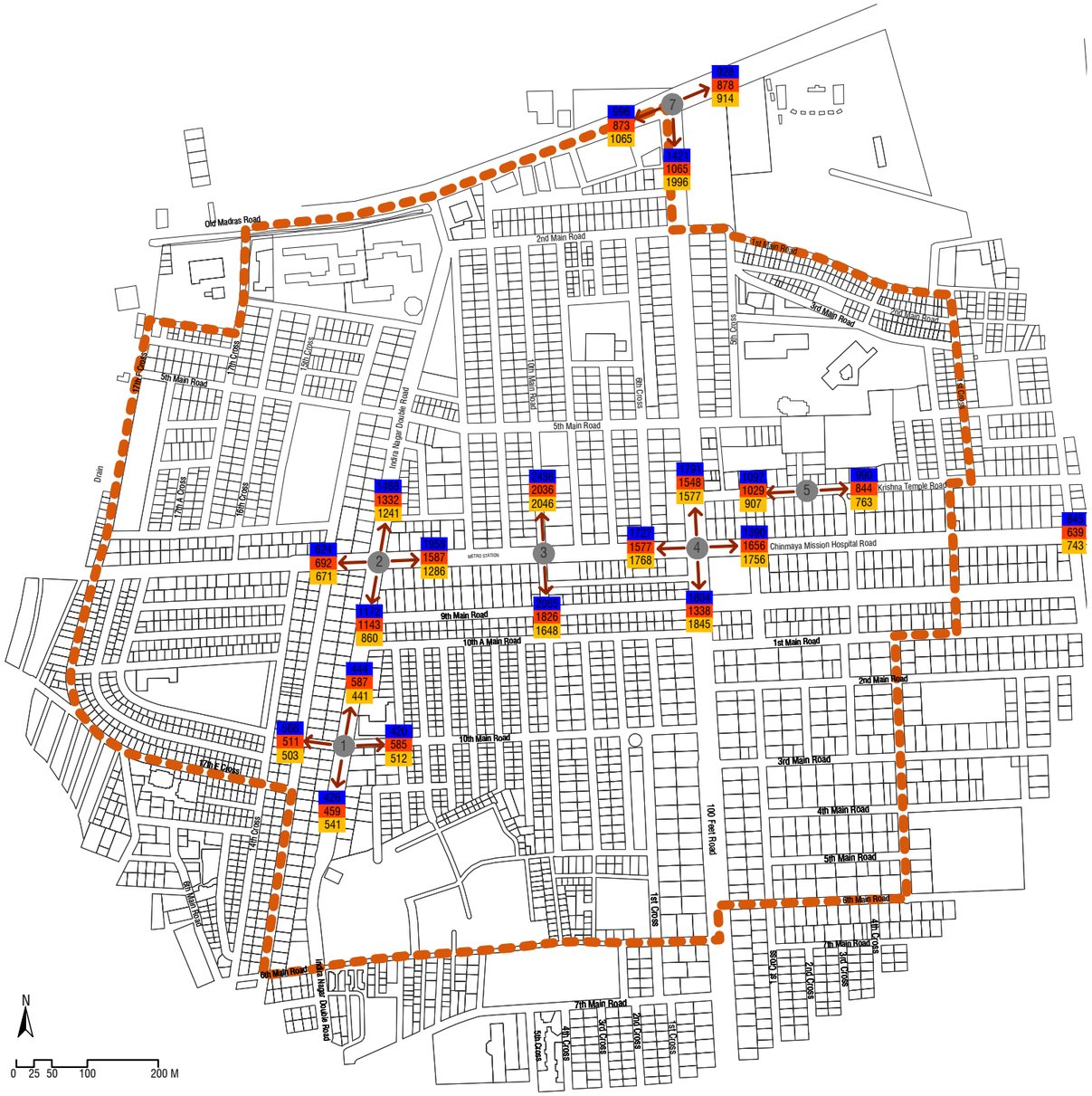
Station area Activity Patterns | Informal Activities

Vendors and hawkers selling all kinds of articles from fruits, vegetables and flowers to garments, snacks and beverages are seen in all sectors across the station area. They are generally found located close to formal activity generators such as public amenities, parks, schools, commercial streets or transit stations including the metro station, bus stops, auto stands and at intersections of major roads.

The most common of these, push carts selling street food, are found close to schools and parks while temporary stalls selling fruits and vegetables are set up close to the traditional settlements and other low-rise high-density areas. Stalls selling flowers and other articles for worship are found close to the temples, while florist-stalls are located close to the mid-level retail outlets on Double Road. Vendors selling garments, accessories and memorabilia are seen most commonly close to the intersection of major roads.

Within the station area, they are concentrated mostly on CMH Road around the Metro Station, along the neighborhood level connector streets such as 5th Main Road, 10th Cross Road and at the intersections of these connector streets with all the major roads.

Although the concentration of informal activities coincides with areas of high pedestrian activity, their haphazard positioning, mostly encroaching upon pavement space, is the primary cause of obstruction to smooth pedestrian movement. Presence of vendors and hawkers, while making the public spaces more lively and attractive, also requires supply of adequate space and some basic infrastructure like lighting, seating and other street furniture. While this comes mostly under the purview of street design and safe access, DCRs can be framed with provisions to accommodate the vendors within the front setback or other open areas of plots with compatible uses, through rent or other initiatives, thereby contributing to the organization of the informal sector.



Construction Activity

- New Construction activity
- Under construction activity
- Empty plots

Fig 4.19: Pedestrian movement patterns in Indirangar Metro Station area

Map generated by EMBARQ India
Data Source: Ground Survey (2013)

STATION LEVEL ANALYSIS

Station area Activity Patterns | Pedestrian Movement Patterns

Based on the clustering of retail and informal activities, 7 nodes were identified around the station area where a survey of pedestrian volume counts was conducted through the day. It indicates that the CMH Road – 100 Feet Road Junction sees the highest pedestrian traffic, followed by the CMH Road – Double Road junction. The count between these two nodes at the intersection of CMH Road with 10th Cross road also has comparable numbers.

The morning peak is highest at the intersection of 100 Feet Road with CMH Road and Old Madras Road, both of which coincide with the location of bus stops. The midday peak is highest close to the schools as is indicated by the count at the intersection of Double Road with 10th Main Road. CMH Road shows highest activity during the evening peak as is seen at the intersection of CMH Road with Double Road, 10th Cross Road and 80 Feet Road.

The direction of movement indicates that most pedestrian traffic on CMH Road moves towards the Metro Station, and under the Metro Station itself, along 10th Cross Road. This highlights the automatic prioritization by pedestrians of specific internal streets that connect the interior residential blocks to transit stations, commercial areas and public amenities. Four such roads are identified in the proposal, which are to be enhanced through specific building guidelines for the adjoining plots. These include:

- Sector N2: Part of 9th Cross from 5th Main road to 2nd Main road; part of 10th Main road from 5th Main road to CMH Road
- Sector S1: Part of 14th Cross from 17th E Cross road to CMH Road
- Sector S2: Length of 10th Cross road from Motappapalya to CMH Road
- Sector S3: Part of 6th Main road from Park to 100 feet road
- Additionally, pedestrian access ways proposed by the Safe Access Project have been included under the Pedestrian Priority Streets. (Pedestrian connections between 10th A Main road and CMH road at ground level through joint venture between BMRCL/ BDA and private property owners) .

STATION LEVEL ANALYSIS

Station area Public Perception

A series of surveys were conducted to assess the public perception in Indiranagar with respect to the real estate market, existing regulations, incentives for areas around metro stations and quality of pedestrian infrastructure around the station.

The perception survey was conducted at different locations within the station area. Locations chosen to approach the individuals were outside public spaces such as Banks, ATMs, Supermarkets, restaurants, parks etc. Only individuals residing or working in Indiranagar were interviewed.

Survey of Individuals

Profile of respondents: A total of 300 respondents, spread out almost evenly across all six sectors, were interviewed. 43% of respondents belonged to the age group of 30-40 years and 32% in the age group of 40-50 years. 83% of respondents were male, 42% in the Rs.1- 1.5 lakh per month (individual) income group and 23% of respondents earning less than Rs.1lakh per month. 60% of people interviewed are owners of property within the Station area of which 47% own independent homes, 18% own homes in apartments, 14% own land and 8% own commercial offices.

In relation to the real estate market, 99% of respondents are of the opinion that conditions have improved in the last 3 years. Preference for property within the station area is highest (35%) for independent homes. 29% of the people prefer to purchase retail space while 12% prefer apartments.

Regarding the zonal regulations specified by the RMP 2015, 28% of respondents do not feel that any revision is required to improve their efficacy. 17% of respondents are in favor of relaxation of setback regulations while 11% favor relaxation in parking regulations. Given an option, 47% of the people said that they would not prefer to purchase additional FAR from the BBMP at the guidance value. Of the 9% that are willing to purchase additional FAR, majority is in favor of an increase of 0.50 to 1.00 in FAR which they estimate will be consumed in 5-7 years.

Regarding the UDD notification for areas around the metro station, 70% respondents agree that the increase in FAR is incentive enough to encourage greater development in the neighborhood. Of the 25% who disagree, 31% suggest that relaxation in setbacks will need to be introduced as well, 13% ask for reduction in parking requirements and 22% say that the incentive should be made available to areas within a larger radius from the metro station.

When asked to rate parameters of the metro system on a three point scale, following comments were recorded:

A large majority of 70% agrees that the accessibility to the metro station within Indiranagar is good but connectivity to destination is ‘average to poor’. 73% feel that the metro’s connectivity to other modes of public transport is just average.

Although 89% agree that the metro provides good travel time, 95% find the travel cost to be high. However there is a complete 100% agreement on the good comfort level in travelling by the metro. Finally, a majority of 62% rate the parking facilities at the metro stations as being average, while 27% rate it as being good.
Survey of Builders/ Developers

Profile of respondents: 9 of the 13 respondents were representative of real estate companies, while 4 were owners of service apartments in Indiranagar. 69% had less than 5 years of experience in the field.

85% of the respondents agree that there has been an improvement in market conditions as well as the general performance of their investments in the last 3 years. According to the respondents, 69% of properties bought and sold in the last 3 years were residential. Regulations of the RMP 2015 that most respondents feel require revision are in the aspects of ground coverage (16% of respondents), maximum permissible FAR (15%) and parking norms (54%).

69% of respondents show willingness to purchase additional FAR from BBMP at guidance value, 56% of them opting for an additional FAR of 0.5-1.00 and 44% for 1.00-2.00. Further, a large majority of 77% is in favor of provision of additional chargeable FAR by BBMP as they feel it will give a boost to the market. They unanimously agree that any additional FAR will be utilized in 1-2 years.

69% of respondents feel that the 4.00 FAR offered by the UDD notification will encourage development around metro stations, which they unanimously agree will be achieved in under 2years. While most feel that the additional FAR is sufficient to incentivize growth, one respondent suggests that parking regulations will need to be relaxed in order to have a positive impact on the station area.

Fig 4.20 - a: Age-wise Distribution

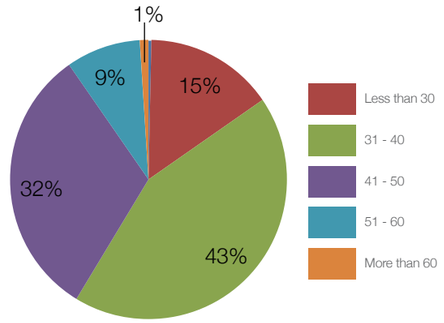
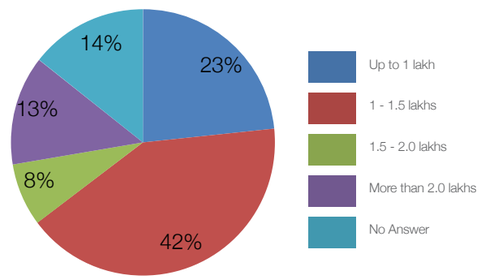


Fig 4.20 - b: Monthly Household Income Distribution



Perception regarding existing regulations

Fig 4.20 - c: Preferred area of Investment

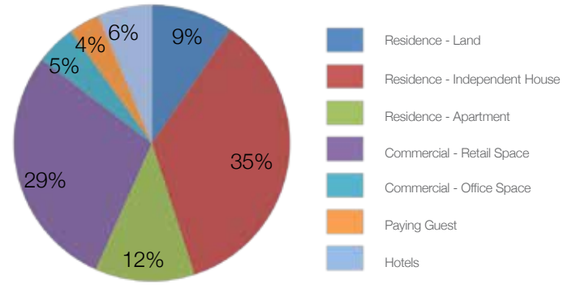


Fig 4.20 - d: Other possible incentives to attract investments

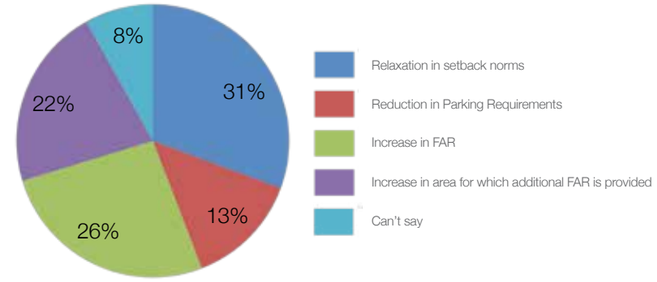


Fig 4.20 -e: Expected time period for consumption of proposed FAR around Metro Stations

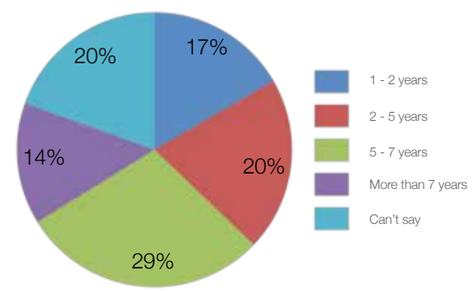
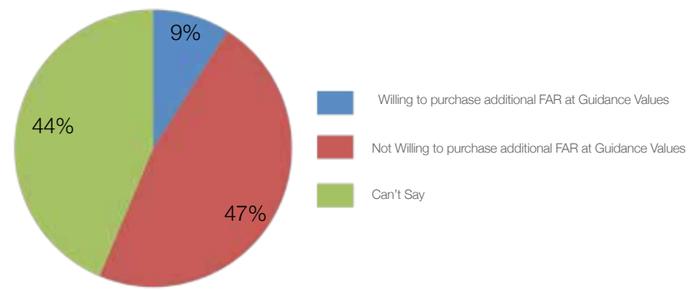


Fig 4.20 - f: Opinion on offer of additional chargeable FAR



STATION LEVEL ANALYSIS

Station area Carrying Capacity

The Metro line passes through a wide variety of areas with density ranging from 45pph (Vasantpura) in the outskirts of the city to 937 pph (Kempapura Agrahara) close to the core of the city . The density for each planning district is indirectly controlled by the Master Plan through its regulations for land use and FAR. The infrastructure provided for these areas (for water supply, sewage and roads) is also allocated proportionally for a certain horizon period and increased periodically depending on the growth of population. The horizon period for the current master plan for Bengaluru is 2015 and for major infrastructure improvement projects by BWSSB is 2031.

The UDD Notification provides for an additional FAR, inducing a sudden increase in the population of the station area. Such an increase is not accounted for within the horizon period, and the existing infrastructure may or may not be sufficient to take the additional load.

Hence it is essential to evaluate the maximum carrying capacity of the existing infrastructure in the Station area and ascertain the urgency and need to increase the infrastructure. Depending on the gap in the projected demand and existing supply, measures can be taken to relay the existing infrastructure or provide temporary solutions until the critical limit of density is reached. The project includes Carrying capacity analyses for:

- Accessibility (which addresses the requirements of pedestrian streets and public spaces)
- Infrastructure (which addresses the requirements of water supply and sewage)

Methodology for Carrying Capacity Analysis – Accessibility

The Level of Service (LoS) Analysis has been used for the assessment of the Carrying capacity of the pedestrian infrastructure within the area targeted for maximum increase in density as per the UDD notification. The TCRP manual was used as standard for reference in this analysis with the average walking speed as 4.98kmph . The Levels of Service of the footpaths at major junctions were compared for the following scenarios:

- Existing Footpath conditions and current population (2013)
- Existing footpath conditions and projected population
- Proposed footpath conditions and projected population

The junctions considered were the:

- CMH Road – Double Road Junction
- CMH Road under the Metro Station
- CMH Road – 100 Feet Road Junction

The analysis shows that the existing LoS is high (D – A) at J3, and on a few footpaths at J2. The footpaths below the Metro Station have very low LoS (C – F). This is due to the location of the columns of the Metro Station on the pavement thus leaving very little space for pedestrian flow. Most footpaths at the J2 also have low LoS (F) due to insufficient width and the presence of obstacles such as light poles, electric and telephone junction boxes on the footpath.

The DCRs can contribute to the mitigation of these issues by

- Controlling the increase and concentration of density immediately around the metro station so as to not over congest the existing pedestrian facilities
- Identifying and developing alternative pockets of activity centres within walking distance of the metro station to support the growing demands.

Methodology for Carrying Capacity Analysis - Infrastructure

1. Compare the population density in the Station area for the following scenario:
   - Existing (from FAR/ building heights)
   - As per FAR proposed by RMP 2015
   - As per FAR proposed by UDD Notification
   - As per FAR in DCR proposal

2. Compare the densities with the maximum capacity of the infrastructure for water supply and sewerage.

- Water Supply: In case there is continuous water supply, depending on the percentage increase in density, it would be necessary to increase the diameter of the existing pipes or add a parallel line to support the additional load. But in the current scenario in Bengaluru, the water supply to all parts of the city is intermittent and at designated timings on specific days. Hence, in order to accommodate the additional load, it would be sufficient to stagger the supply timings. Alternative measures such as ground water supply and rain water harvesting may be suggested for some zones within the Station area depending on the context and specific requirements.

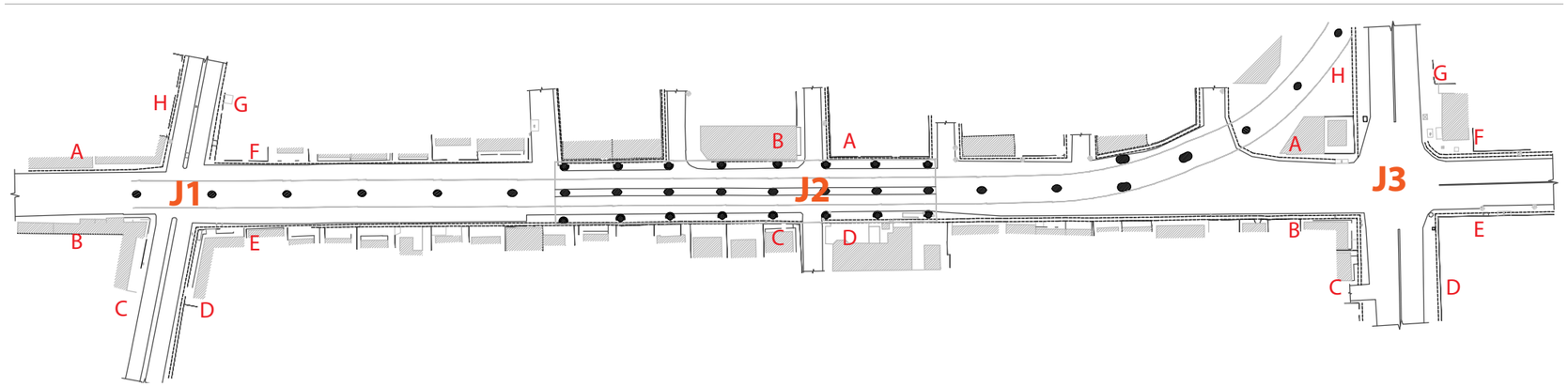
- Sewerage: Earlier, the sewerage lines were designed to carry up to 2/3rds full or 67% capacity of the pipes (i.e., d/D = 0.65). But the recent revision as per the CPHEEO manual, has redesigned the diameter to carry up to 80% full (i.e., d/D = 0.80) . Hence the lines can accommodate an increased density of up to 35%. Besides, the sewerage lines are designed after forecasting the population for a period of 30 years. Hence, in the current scenario, there is a need to redesign and replace the sewerage line(s) until the density of the Station area increases by more than 35%.

Carrying Capacity for Indiranagar

1. The existing population density (gross) within the Station area as of May 2013 is 340pph.
2. Population density as per the regulations of RMP 2015 is 392pph
3. Population density expected after the increase in FAR as per the UDD Notification is 442pph.
4. The population density as per the proposal for DCRs is 449pph
5. The proposed increase is 14% of the density as per the RMP 2015 and 0.02% of the density as per the UDD Notification.

Since the proposed increase in density is less than 35% for the horizon period, the existing infrastructure will suffice for both water supply and sewerage lines.

Requirements for rainwater harvesting systems shall continue to be applicable as per the existing norms in the RMP 2015.



J1 – ***Intersection of CMH Road and Double Road***

J2 – ***CMH Road at Metro Station***

J3 – ***Intersection of CMH Road and 100 Feet Road***

Source: Sky Group

Fig 4.21: Map indicating LOS Junctions for LOS study for Indirangar Metro Station area
Source: Sky Group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DETAILED PROPOSALS

Station area Overlay Zone
Regulating Plan
Scenario Comparison
Comparison of FAR distribution as per zones and landuse

PROPOSAL

Station area Overlay Zone

The primary aim of the proposal is to plan for enhanced accessibility to the Metro station and encourage transit supportive development in its vicinity. To this effect dominant factors impacting the station area are studied and regulations are proposed for:

- Increasing the development potential, and
- Improving the design of the public realm, while enhancing and shaping the area's character

This is achieved through the Station area Overlay Zone. A Station area Overlay Zone is a zoning tool that requires specific development and design regulations for a defined area around a station area. The overlay zone is used to either protect the existing assets and character of the area or to envision an enhanced character. It aims at achieving population densities in proximity to the station and enhancing design and character of public spaces to improve accessibility.

The Overlay Zone proposals may include regulations for land uses, FAR (density) , design of built environment and street edges, design of area character, vending and informal activity, pedestrian accessibility and street connections, accessibility to public amenities, and parking and auto oriented uses, among others. The proposals are defined through:

- A vision statement for the future development of the area;
- An urban design plan that provides a framework for shaping the area's built environment and character and improving accessibility; and
- A Regulating Plan that proposes
  - i. Land uses that will support pedestrian activities and use of the Metro; and
  - ii. Development and design regulations to guide development, shape built form and facilitate a transit and pedestrian-friendly environment.

In the context of Bengaluru, the regulations of the Station area Overlay Zone shall supersede the zonal regulations of the Revised Master Plan 2015, when applied to the station area, unless specified in the Regulating Plan.

Indiranagar Station area Overlay Zone

The Indiranagar Metro Station area includes Indiranagar 1st and 2nd Stages, Defence Colony, HAL 2nd Stage (part), and the urban villages of Motappapalya and Binnamangala (part).

A Station area Overlay Zone is adopted for the areas within a distance of 500 m from the outer boundary of the Indiranagar Metro station. The boundaries of the Overlay Zone are demarcated by following street and property lines. The boundaries of the Indiranagar Station area Overlay Zone (hence forth referred to as the Overlay Zone) correspond to the boundaries of the "Demonstration Area" defined in the report, An Accessibility Project for Indiranagar Metro Station, 2011. Within the Overlay Zone, two impact areas are defined based on proximity to the Metro station. Proposals for each vary with respect to their specific characteristics and development potentials.

Core Area: It covers the area within a distance of 150 m from the outer boundaries of the Metro Station and includes two major public activity nodes located along CMH Road and adjacent to the 150 m boundary.

Buffer Area: It includes the area outside the Core Area and within the Overlay Zone.

The goals of the proposed regulations of the Overlay Zone are to:

- Promote opportunities for a diverse population to live, work and play closer to the Metro Station, without detracting from the area's residential character. This will support increase in ridership and promote the use of public transit in the city.
- Improve the quality of streets and public spaces and provide safe access for all to the Metro station, public parks and amenities. This will encourage pedestrian activity and use of non-motorized transport and make public spaces diverse and active.

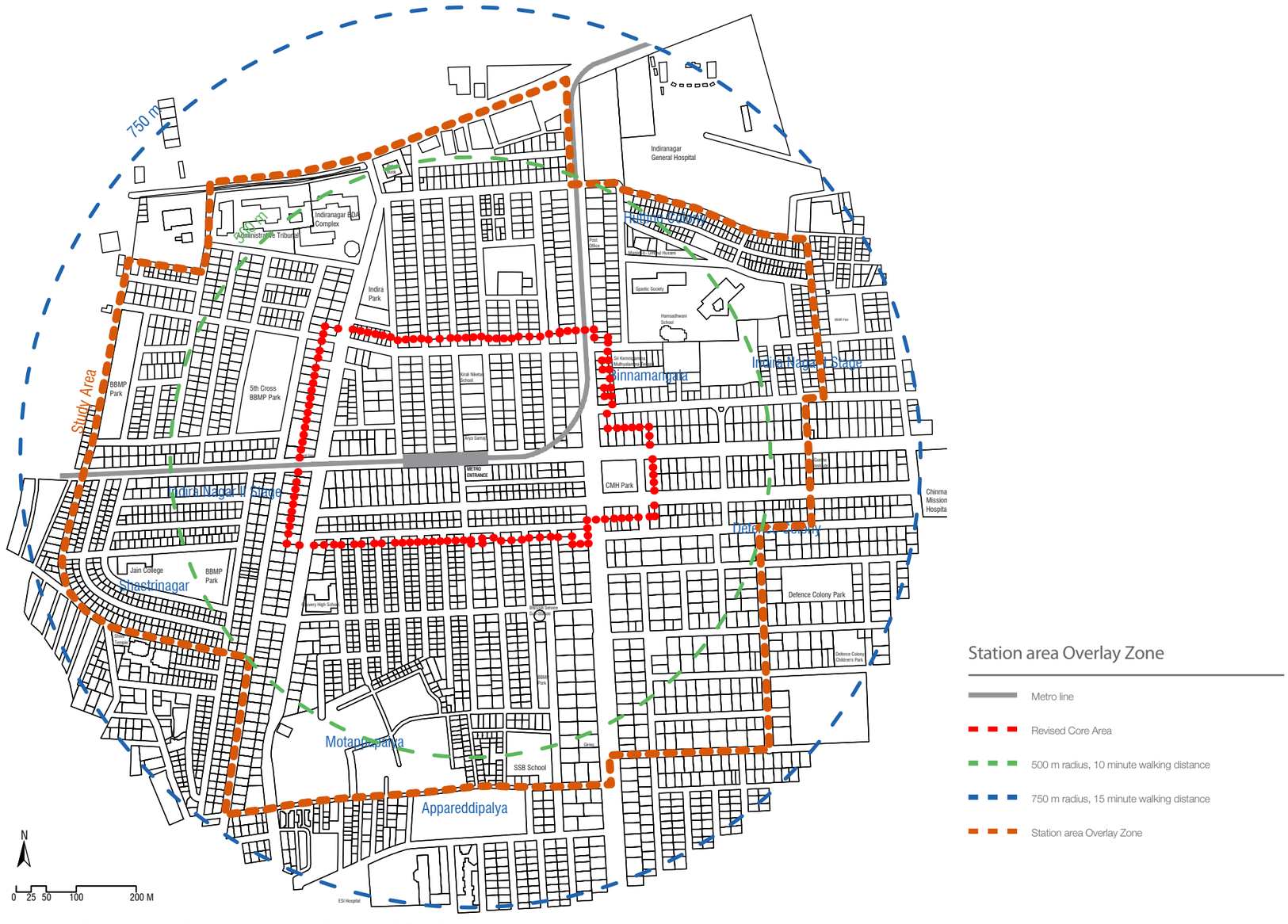


Fig5.1: Revised Core zone with Station area Overlay Zone defined
Source: EMBARQ India

Guiding Principles

The following table shows the principles that guide the proposed regulations, the objectives set under each guiding principle, the strategies to be adopted and the portions of the study that inform these decisions.

Guiding Principle	Objectives	Strategies	Relevant Studies
Compact Development: 	To encourage high density development in areas around metro station and along roads directly connecting to it. To ensure utilization of incentives by maximum number of properties.	Promote highest densities immediately around the metro station. Modify regualtions to enable maximum number of plots are able to achieve the desired densities.	Station area Characteristics | Plot Size Station area Characteristics | Street Networks and Sidewalks Station area Transformations | Building Heights Station area Transformations | Implication of the UDD Notification
	To avoid overloading of infrastructure within a small area.	Limit the increase in densities in areas with insufficient infrastructure to support the growth.	Station area Characteristics | Plot Size Station area Transformations | Implication of the UDD Notification Station area Transformations | Land Use Station area Activity Patterns | Activity Generators
	To extend the benefits of incentives to other activity centres serving the station area with potential for growth	Identify transit nodes and activity centres in buffer zone serving the surrounding areas capable of supporting increased densities. Redistribute the increase in densities to these areas.	Station area Transformations | Land Use Station area Transformations | Floor Area Ratio Station area Transformations | Real Estate Market Station area Activity Patterns | Activity Generators Station area Activity Patterns | Pedestrian Movement Patterns
	To provide opportunities for increased residential and commercial development to meet the market demands in the appropriate areas.	Increase densities of residential and commercial areas along wider roads. Specify minimum percentage of residential and ancillary uses.	Station area Transformations | Land Use Station area Transformations | Floor Area Ratio Station area Transformations | Real Estate Market
Street Design and Access: 	To improve the quality of streets connecting the residential areas to the Metro Station and other amenities such as parks, playgrounds, bus stops, public institutions, schools and colleges.	Identify pedestrian priority streets within station area. Specify minimum percentage of residential and ancillary uses in buildings to ensure mixed use. Locate ancillary uses on entry level and along the frontage of the buildings. Specify guidelines for design of facades at entry level of buildings.	Station area Transformations | Land Use Station area Activity Patterns | Pedestrian Movement Patterns Station area Activity Patterns | Activity Generators Station area Activity Patterns | Informal Activities
	To improve the quality of public spaces in areas with high pedestrian volumes.	Identify activity nodes within station area. Specify minimum percentage of residential and ancillary uses in buildings to ensure mixed use. Locate ancillary uses on entry level and along the frontage of the buildings. Specify guidelines for design of facades at entry level of buildings.	Station area Transformations | Land Use Station area Activity Patterns | Pedestrian Movement Patterns Station area Activity Patterns | Activity Generators Station area Activity Patterns | Informal Activities
	To enhance the quality of public spaces and activity centres by planning for the informal sector	Identify vending zones and accommodate them in the street and building design	Station area Activity Patterns | Pedestrian Movement Patterns Station area Activity Patterns | Activity Generators Station area Activity Patterns | Informal Activities
	To strengthen proposals of the Safe Access Project	Include and integrate areas and proposals identified in the Safe Access Project.	An Safe Access Project for Indiranagar Metro Station EMBARQ India, 2011
Area Character: 	To protect the existing plotted residential character, green areas, and typologies of single homes. To ensure that existing housing stock that is in the mid to low income bracket, including opportunities for hostels, PGs, rental accommodation and service apartments, continues to flourish and makes the area inclusive.	Specify maximum limit for amalgamation of plots. Specify minimum percentage of residential use in buildings. Limit the increase in densities in areas with insufficient infrastructure to support the growth.	Station area Characteristics | Plot Size Station area Characteristics | Residential Building Typologies Station area Transformations | Land Use Station area Transformations | Real Estate Market Station area Transformations | Implication of the UDD Notification
	To enhance the city level commercial centres and corridors in the station area.	Specify minimum percentage of commercial use in buildings. Increase density along major commercial corridors.	Station area Transformations | Land Use Station area Transformations | Implication of the UDD Notification Station area Activity Patterns | Activity Generators
	To reduce conflicts between auto-oriented and pedestrian-friendly uses and activities.	Introduce maximum limits for parking requirements. Include parking area in calculation of FAR. Prohibit on-street parking in pedestrian priority areas. Restrict width of vehicular entry and exits along pedestrian priority streets.	Station area Activity Patterns | Pedestrian Movement Patterns Station area Public Perception Station area Carrying Capacity | Level of Service

Table 5.1: Guiding Principles
Source: EMBARQ India

PROPOSAL

The Overlay Zone proposals are governed by the following two components:

- Vision and Urban Design Concept
- Regulating Plan

Vision and Urban Design Concept

Intent:

The purpose of the Vision Statement and Urban Design Concept Plan for Indiranagar is to prepare a long term strategy for development within the overlay zone and for designing and shaping the character of the built environment and public spaces while promoting transit use. The strategy will address the objectives mentioned earlier. In the concept plan, key urban design features and development opportunities that contribute towards achieving the proposed vision and strategies are defined.

Vision Statement:

The vision for Indiranagar station area is:

- To enhance its identity as a city level commercial center as well as an attractive neighborhood for all sections of the society by ensuring good living and working conditions for all
- To improve the quality of streets and public spaces and create a safe and comfortable environment for pedestrians and bicyclists around the metro station
- To encourage greater development in close proximity to the metro station while preserving the scale and character of the neighborhood and its tree-lined streets
- To achieve optimum growth around the metro station which responds to and capitalizes on the demands of the real estate market
- To ensure safe and active connections for neighborhoods to transit stations and other public amenities

The Urban Design Concept Plan highlights all elements of the urban and transportation systems in the station area, identifies the zones requiring intervention, and the corresponding strategies that are to be applied in these zones:

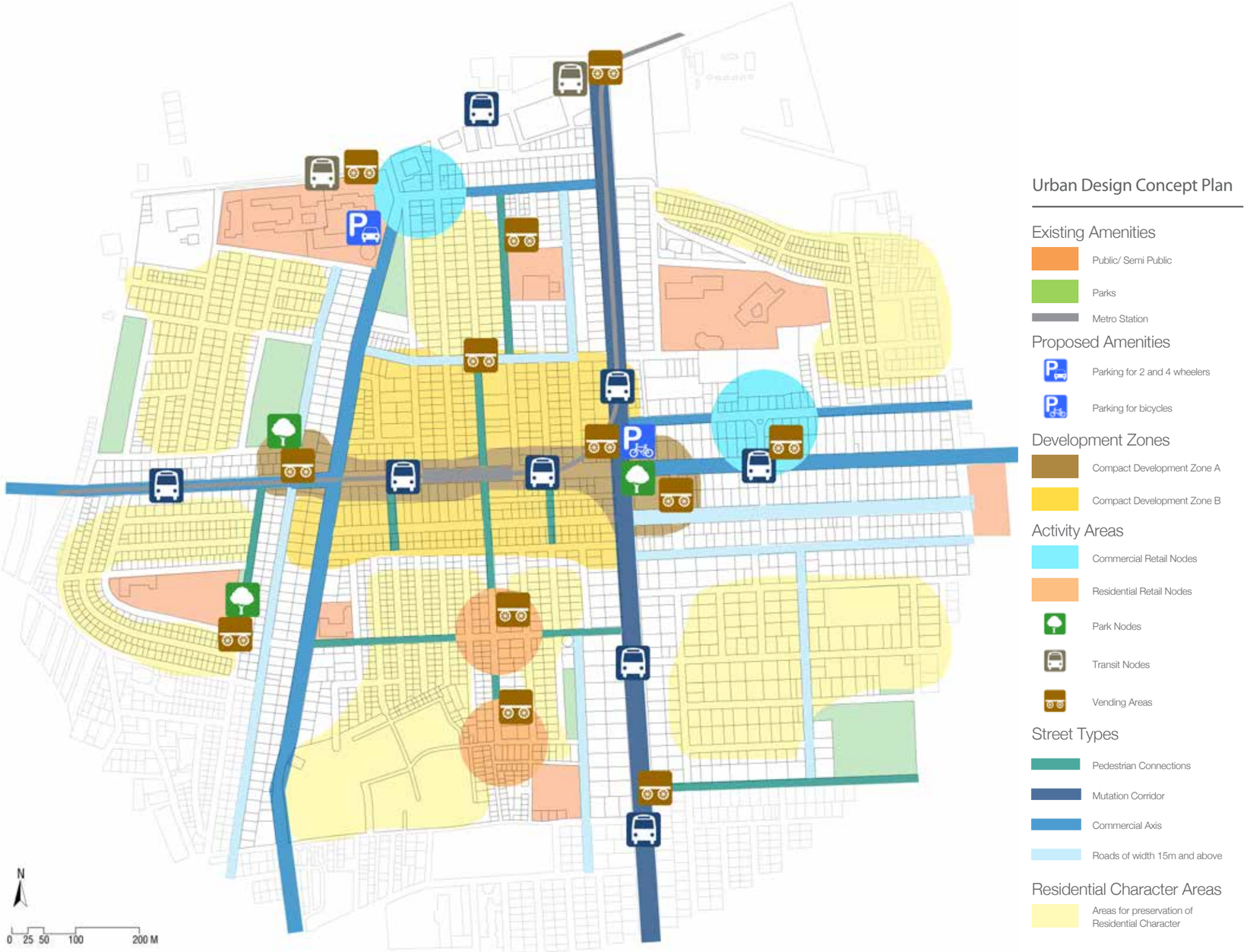
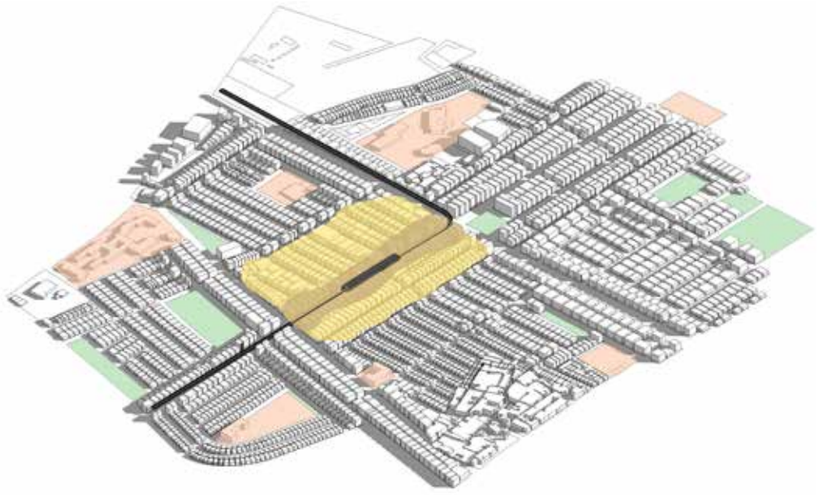


Fig5.2: Urban Design Concept Plan
Source: EMBARQ India

A] Compact Development Zone (Core Area)



Objectives:

- To encourage high-density development in areas around metro station and along roads directly connecting to it.
- To ensure utilization of incentives by maximum number of properties.
- To protect the existing plotted residential character, green areas, and typology of independent homes. To ensure that existing housing stock that is in the mid to low income bracket, including opportunities for hostels, PGs, rental accommodation and service apartments, continues to flourish and makes the area inclusive.
- To enhance the city level commercial centres and corridors in the station area.
- To reduce conflicts between auto-oriented and pedestrian-friendly uses and activities.

Location:

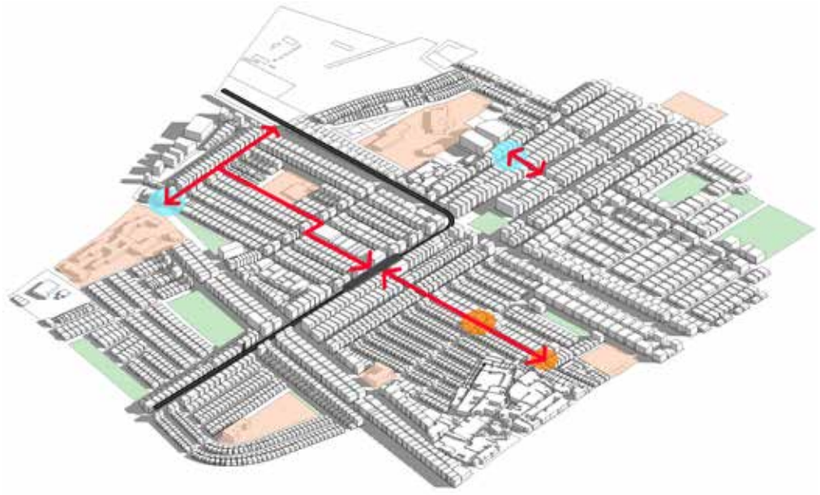
The Compact Development Zone corresponds to the Core Area of the Station area Overlay Zone. It is a rationalization of the 150m zone around the Metro Station, as suggested by the UDD Notification, on the basis of bounding roads and major activity nodes adjacent to it. It consists of two sub zones:

- Compact Zone A – Plots and nodes adjoining CMH Road
- Compact Zone B – Remaining plots within the Core Zone

Strategies:

- Promote highest densities immediately around the metro station (Compact Zone A).
- Modify regulations to enable maximum number of plots are able to achieve the desired densities. Limit the increase in densities in areas with insufficient infrastructure to support the growth. (Compact Zone B).
- Specify maximum limit for amalgamation of plots.
- Specify minimum percentage of residential and ancillary uses in buildings to ensure mixed use. Locate ancillary uses on entry level and along the frontage of the buildings.
- Specify guidelines for design of facades at entry level of buildings.
- Introduce maximum limits for parking requirements. Include parking area in calculation of FAR.
- Prohibit on-street parking in pedestrian priority areas.
- Restrict width of vehicular entry and exits along pedestrian priority streets.

B] Activity Areas (Nodes)



Objectives:

- To extend the benefits of incentives to other activity centres serving the station area with potential for growth
- To improve the quality of public spaces in areas with high pedestrian volumes.
- To enhance the quality of public spaces and activity centres by planning for the informal sector
- To reduce conflicts between auto-oriented and pedestrian-friendly uses and activities.

Location:

The Activity Areas are sets of plots identified around important nodes in the Buffer zone which have the potential to support a higher degree of development than the surrounding areas by virtue of their plot size, location and activities that attract a large number of pedestrians. These are identified on the basis of proximity to public transit stations and network; proximity to schools, parks and other public amenities; intersections of major pedestrian routes and connections to the Metro Station. In the Indiranagar Station area, the identified Activity Areas include:

1. Intersection of 2nd Main Road and Double Road: This node is located close to the bus stop on Old Madras Road and the auto-rickshaw stand on Double Road, includes the BDA Complex where a multi-level car park has been proposed, banks and restaurants on 2nd main road, a park and residences on Double road.
2. Plots around the HOPCOMS on Sri Krishna Temple Street: This node is located on a Commercial Axis, includes HOPCOMS, and vacant area around it which is a focus for high pedestrian activity and informal uses.
3. Intersection of 10th Main Road and 10th Cross Road: This node is located at the intersection of two streets with high pedestrian activity – 10th Cross Road – leading directly to the entrance of the Metro Station and CMH Road and 10th Main Road – connecting Double Road and 100 Feet Road. Plots at this intersection include banks, grocery stores, small eateries and residences.
4. Intersection of 10th Cross Road and Appareddypalya Road: This node is located close to the entrance of Appareddypalya, a high-density settlement of residents in the middle to low income group, includes a wide range of small scale commercial activities, informal markets and residences.

Strategies:

- Identify transit nodes and activity centres in buffer zone serving the surrounding areas capable of supporting increased densities. Redistribute the increase in densities to these areas.
- Specify minimum percentage of residential and ancillary uses in buildings to ensure mixed use.
- Locate ancillary uses on entry level and along the frontage of the buildings.
- Specify guidelines for design of facades at entry level of buildings.
- Introduce maximum limits for parking requirements. Include parking area in calculation of FAR.
- Prohibit on-street parking in pedestrian priority areas. Restrict width of vehicular entry and exits along pedestrian priority streets.

C] Major Roads

Objectives:

- To provide opportunities for increased residential and commercial development to meet the market demands in the appropriate areas.
- To improve the quality of streets connecting the residential areas to the Metro Station and other amenities such as parks, playgrounds, bus stops, public institutions, schools and colleges.
- To enhance the quality of public spaces and activity centres by planning for the informal sector.
- To reduce conflicts between auto-oriented and pedestrian-friendly uses and activities.
- To strengthen proposals of the Safe Access Project.

Location:

Major Roads include all roads of width 15m and above in the Buffer Area, with the exception of Mutation Corridors, and Pedestrian Priority streets.

Strategies:

- Increase densities of residential and commercial areas along wider roads.
- Specify minimum percentage of residential and ancillary uses in buildings to ensure mixed use.
- Locate ancillary uses on entry level and along the frontage of the buildings.
- Specify guidelines for design of facades at entry level of buildings.
- Identify pedestrian priority streets within station area.
- Include and integrate areas and proposals identified in the Safe Access Project.
- Introduce maximum limits for parking requirements.
- Prohibit on-street parking in pedestrian priority areas. Restrict width of vehicular entry and exits along pedestrian priority streets.

PROPOSAL

Regulating Plan

Intent

The Regulating Plan proposes land use, development controls, and design regulations to implement the vision, urban design concept and strategies. Specific regulations are proposed for each component of the urban design concept plan i.e. the Compact Development Zones (Core Areas), Activity Areas (Nodes) and Major Roads (Commercial Axes). The intent is to guide density of development through incentives and controls that shape the built form and create safe, attractive and inclusive public spaces, including streets, open spaces and parks. The Plan considers the notification No. UDD 93 MNJ2008 which addresses the increase in FAR to a maximum of 4 for areas within a distance of 150 m from the outer boundaries of the Metro Station. This regulation is adapted to the context of the Indiranagar Station area after considering the development opportunities and market conditions.

Note: The regulations presented in the following pages are a draft, and will be modified after discussion.

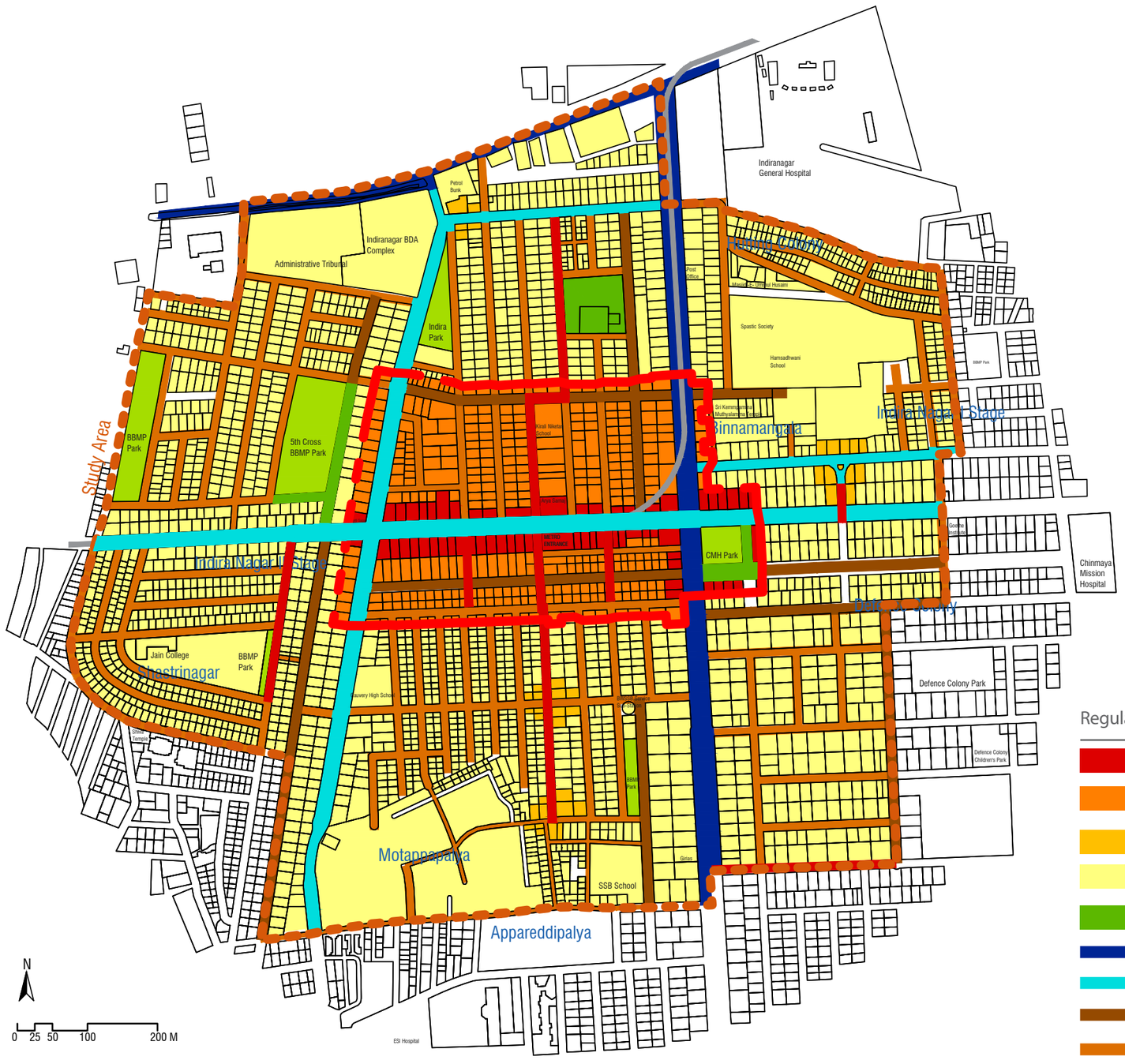


Fig5.3: Regulating Plan
Source: EMBARQ India

Regulations applicable to all properties within the Station area Overlay Zone (the Core and Buffer areas)

1. For Amalgamation of plots
   - Within Compact Zone A and B: Area of the amalgamated plot shall not exceed 1000sqm.

2. All ancillary uses shall be located along the front of the building and at the entry level.

3. For Commercial use at entry level of building:
   - Front setback space shall be used for activities such as outdoor display of goods, kiosks, outdoor seating, landscaping and other informal/non-permanent activities and uses.
   - No boundary walls or barrier of any nature shall be allowed along the front plot line.
   - Awnings at ground level and balconies on the top floors may be projected into the front setback area.
   - A minimum of 80% of ground level façade shall have windows or openings with transparent, non-reflective materials.

4. For Residential use at entry level of building:
   - A boundary wall with a maximum height of 1.5m is permitted.
   - The boundary wall shall be solid up to a height of 0.45m from ground and the top portion of the wall must be transparent to facilitate visual link from the pedestrian walk way to the front of the building.

5. Plots around Parks:
   - Balconies and active uses located at top level of buildings to overlook the park to maintain a visual connection.
   - Park boundary to be demarcated using grills or other material to facilitate visual link between pedestrians and park activity.

6. A maximum of 3 ECS for plots of area up to 360sqm and a maximum of 6 ECS for plots of area up to 1000sqm shall be permitted. No on-site parking along the frontage of plot.

7. Above 24m height: NOC required from Fire Force and Pollution Control Board (KSPCB shall mention the need for environment clearance if any in the NOC). (As per the RMP 2015).

8. Above 15m height: buildings must comply with criteria for earthquake resistant design of structures as per National Building Code. (As per the RMP 2015).

9. Vehicular entry to site is permitted. Entry driveway width shall not be greater than 3.5m for plots upto 360sqm and 6m for plots upto 1000sqm.

10. Non-Permissible Uses for all new projects within Intense Zone:
    - Car-sales showrooms
    - Banquet halls
    - Automobile-repair/ services/ vehicular servicing shops
    - LPG Godowns
    - Electric Substation 220 KV (locational requirements and restrictions to be determined by EIA)
    - Bus Depot (permitted only if clubbed with terminal and in the form of mixed-use development site)
    - Cremation ground
    - Stand-alone Multi Level Parking without on-site mixed use.
    - Open ground parking lot (if provided shall be counted as FAR consumption)
    - Any trade or activity involving any kind of obnoxious, hazardous, inflammable, non-compatible and polluting substance or process shall not be permitted. (As per UTTIPEC document)

PROPOSAL

Regulations for Compact Zone A

Zone	Plot Size (sqm)	Road Width (m)	Land use	Maximum Permissible FAR	Max. Ground Coverage (%)	"Setbacks (m) F|L|R|B"	Parking	Building Orientation	Building Design
Compact Zone A ***(As per UDD Notification and RMP 2015)***	*Upto 360* *360-1000* *1000-2000* *2000-4000* *4000-20000*	*Up to 12m* *12-18m* *18-24m* *24-30m* *Above 30m*	*Residential (Main)* *Commercial Axis* *Mutation Corridor* *(as specified in the RMP 2015)*	*4.00*	*75%* *65%* *60%* *55%* *50%*	*Upto 11.5m Ht* *12%, 8%, 8%, 8%* *Above 11,5m Ht* *increment of 1m per floor*	*Any place used for parking is not included in the calculation of FAR* *As per Table 23 (RMP 2015)*	*RBL for CMH Road : 3m*	*No guidelines*
Compact Zone A **(As per proposal)**	Upto 1000	All	(as specified in the RMP 2015) Minimum 40% of FAR shall be residential	4.00	75%	For all construction upto 6 floors or 18 m (whichever is lesser) 2m, 8%, 8%, 8% No increment of setback with increase in height. As per RMP for all construction over 6 floors/ 18 m.	ALL parking included in FAR No on-site parking along the frontage of plot	RBL: 2m -Minimum 75 % of building shall meet the RBL -All properties shall have their front entrances from CMH Road.	After height of 12m or 4 floors the remaining floors shall be set back by a minimum of 2 m

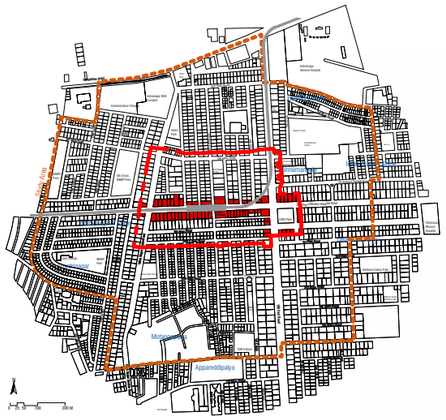


Fig5.4: Key map highlighting Core Zone A
Source: EMBARQ India

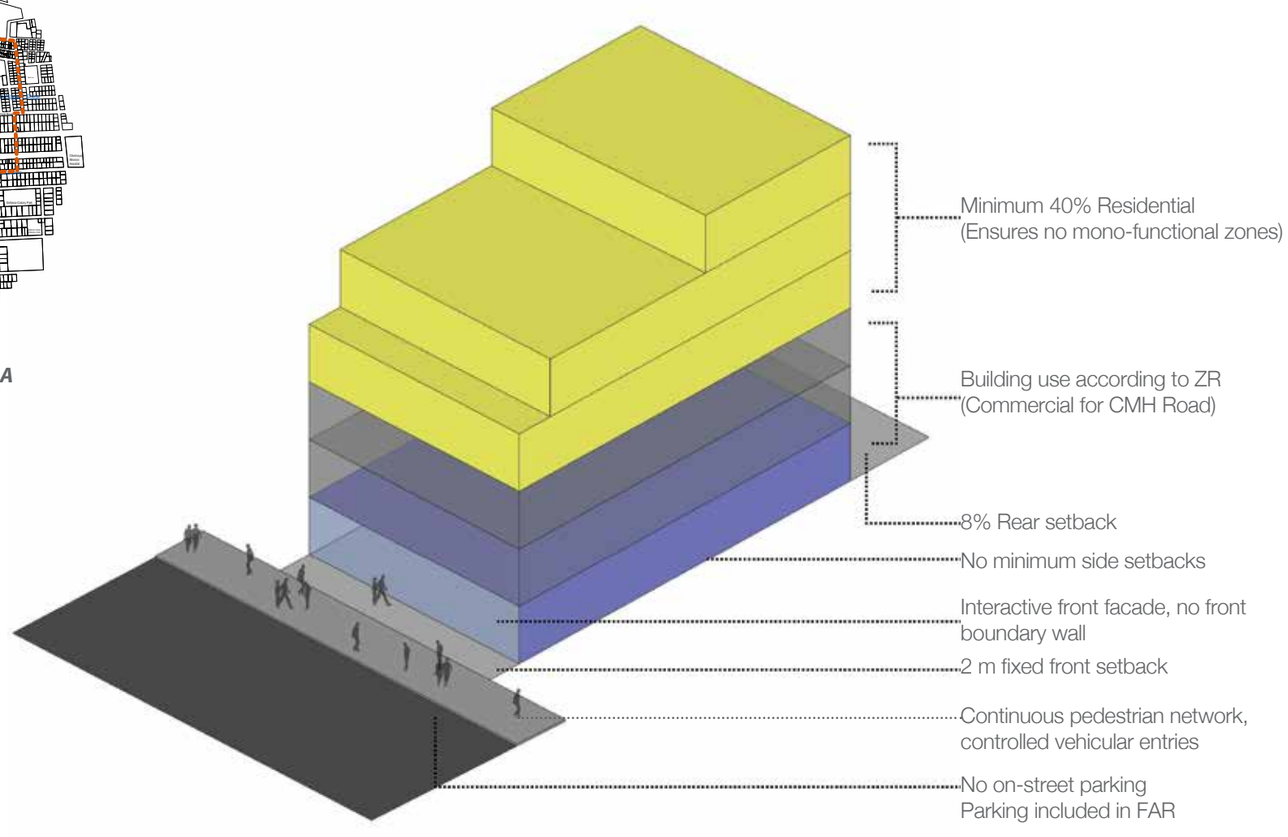


Fig5.5: Typical built form for Core Zone A
Source: EMBARQ India

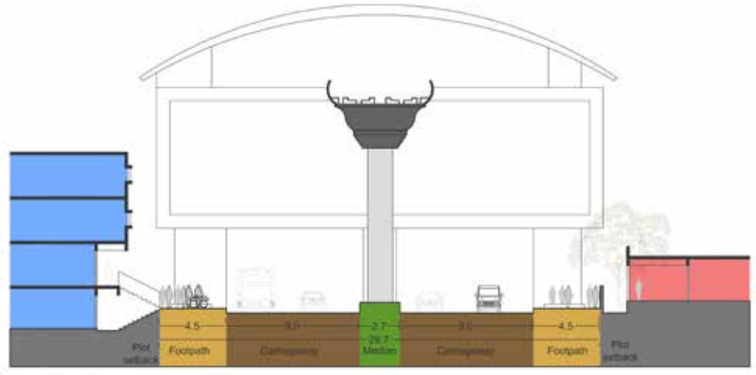


Fig5.6: Existing section across CMH Road
Source: EMBARQ India

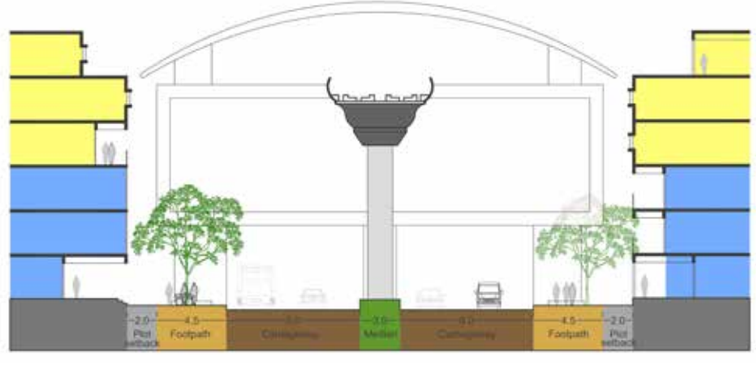


Fig5.7: Proposed section across CMH Road
Source: EMBARQ India

Regulations for Compact Zone B

Zone	Plot Size (sqm)	Road Width (m)	Land use	Maximum Permissible FAR	Max. Ground Coverage (%)	"Setbacks (m) F|L|R|B"	Parking	Building Orientation	Building Design
Compact Zone B ***(As per UDD Notification and RMP 2015)***	*Upto 360* *360-1000* *1000-2000* *2000-4000* *4000-20000*	*Up to 12m* *12-18m* *18-24m* *24-30m* *Above 30m*	*Residential (Main)* *Mutation Corridor* *Public/ Semi public* *Park and Open Spaces* *(as specified in the RMP 2015)*	*4.00*	*75% (67.2%)* *65%* *60%* *55%* *50%*	*Upto 11.5m Ht* *12%, 8%, 8%, 8%* *Above 11,5m Ht* *increment of 1m per floor*	*Any place used for parking is not included in the calculation of FAR.* *As per Table 23 (RMP 2015)*	*RBL for CMH Road: 3m* *RBL for 100 Feet Road: 3m*	*No guidelines*
Compact Zone B **(As per proposal)**	Upto 1000	All	(as specified in the RMP 2015) Minimum 60% of FAR shall be residential	3.00	67.2% for plots under 360sqm As per RMP 2015 for plots above 360sqm.	For all construction upto 5 floors or 15 m (whichever is lesser) 12%, 8%, 8%, 8% No increment of setback with increase in height. As per RMP for all construction over 5 floors / 15 m.	Plots up to 360sqm maximum of 3 ECS Plots up to 1000sqm maximum of 6 ECS	RBL: As per RMP 2015 where applicable - Minimum 75 % of building shall meet the RBL or front setback - Entry to the retail and commercial uses shall be from the street	Refer to General Regulations for Commercial and Residential Uses at entry level.

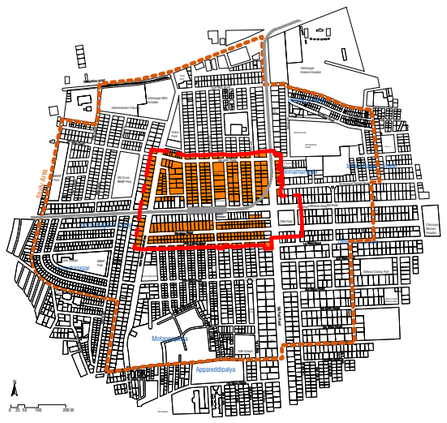


Fig5.8: Key map highlighting Core Zone B
Source: EMBARQ India

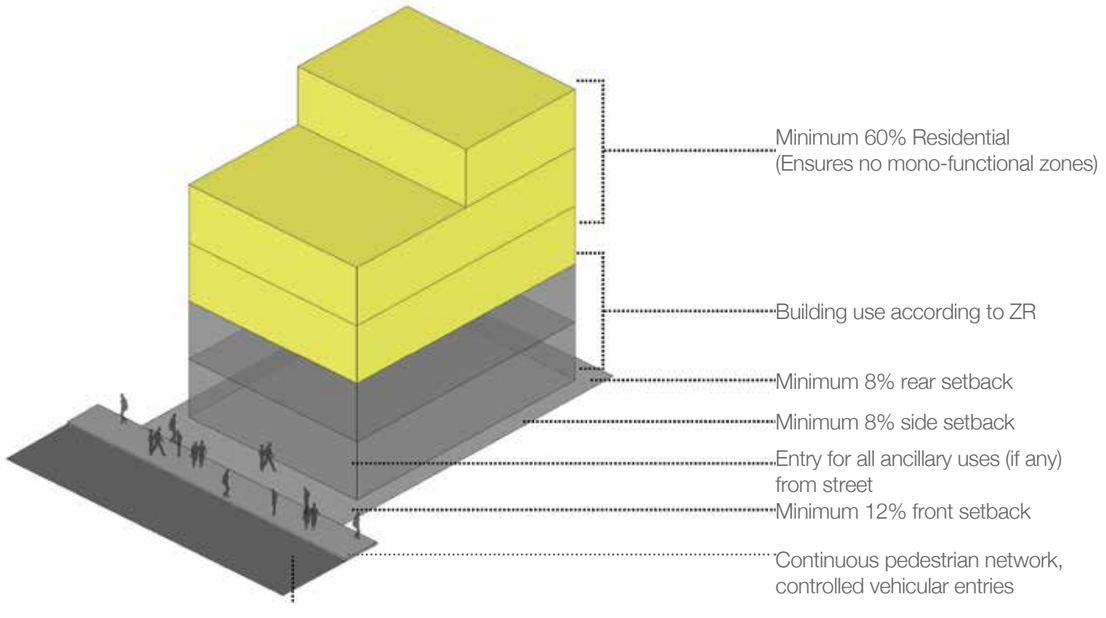


Fig5.9: Typical built form for Core Zone B
Source: EMBARQ India

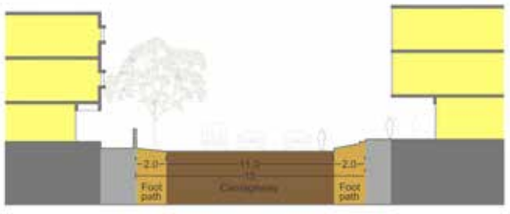


Fig5.10: Existing typical section across Core Zone B
Source: EMBARQ India

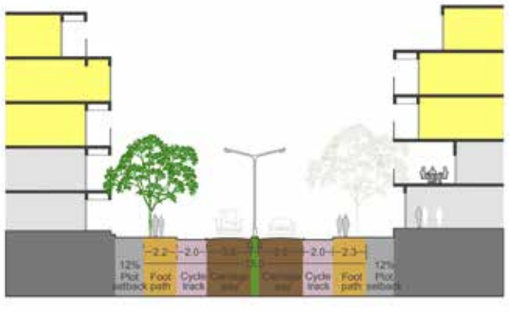


Fig5.11: Proposed typical section across Core Zone B
Source: EMBARQ India

PROPOSAL

Regulations for Nodes

Zone	Plot Size (sqm)	Road Width (m)	Land use	Maximum Permissible FAR	Max. Ground Coverage (%)	"Setbacks (m) F|L|R|B"	Parking	Building Orientation	Building Design
Nodes ***(As per UDD Notification and RMP 2015)***	*Upto 360* *360-1000* *1000-2000* *2000-4000*	*Up to 12m* *12-18m* *18-24m* *24-30m*	*Residentilal (Main), Commercail Axis as per zoning in Master Plan*	*1.75* *2.25* *2.50* *3.00*	*75%* *65%* *60%* *55%*	*Upto 11.5m Ht* *12%, 8%, 8%, 8%* *Above 11,5m Ht* *increment of 1m per floor*	*Any place used for parking is not included in the calculation of FAR*	*RBL for CMH Road: 3m* *RBL for 100 Feet Road: 3m*	*No guidelines*
Nodes **(As per proposal)**	Upto 2000	All	(as specified in the RMP 2015) Minimum 40% of FAR shall be residential Minimum 20% of FAR shall have ancillary uses	3.0	As per RMP 2015	For all construction upto 5 floors or 15 m (whichever is lesser) 12%, 8%, 8%, 8% No increment of setback with increase in height. As per RMP for all construction over 5 floors/ 15 m.	Parking shall be permitted only for the residential units in the building Plots up to 360sqm maximum of 3 ECS Plots up to 1000sqm maximum of 6 ECS Any additional parking shall be included in the total built up area for calculation of FAR No on-site parking along the frontage of plot	RBL: As per RMP 2015 where applicable - Minimum 75 % of building shall meet the RBL or front setback - Entry to the retail and commercial uses shall be from the street	A minimum of 50% of ground level façade shall have windows or openings with transparent, on reflective materials - Refer to General Regulations for Commercial and Residential Uses at entry level. - Refer to General Regulations for plots around Parks where applicable

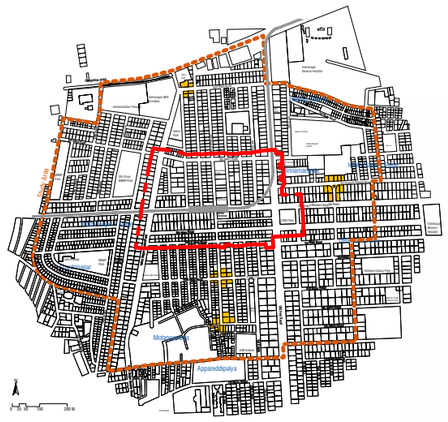


Fig5.12: Key map highlighting Nodes
Source: EMBARQ India

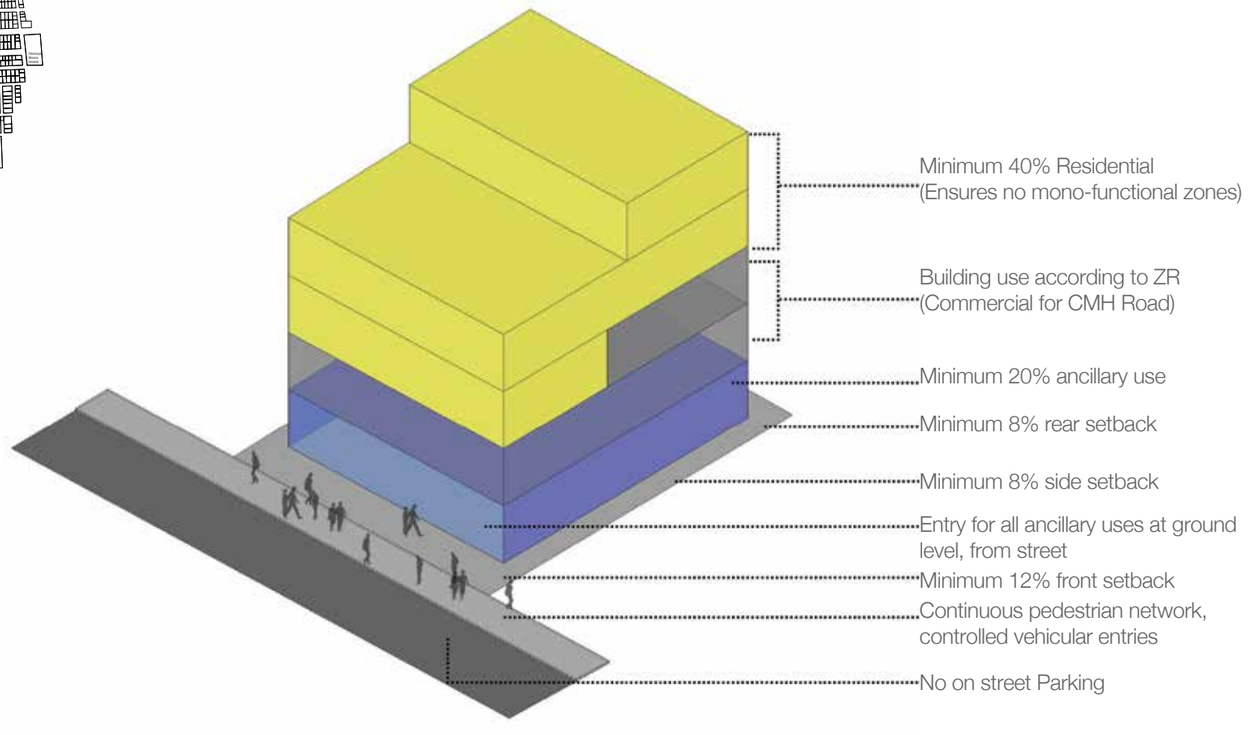


Fig5.13: Typical built form for Core Zone A
Source: EMBARQ India

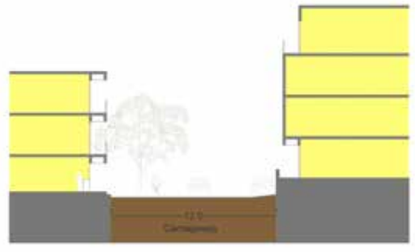


Fig5.14: Existing typical section across Nodes
Source: EMBARQ India

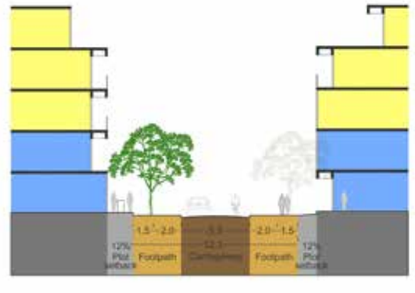


Fig5.15: Proposed typical section across Nodes
Source: EMBARQ India

Regulations for Streets

Zone	Plot Size (sqm)	Road Width (m)	Land use	Maximum Permissible FAR	Max. Ground Coverage (%)	"Setbacks (m) F|L|R|B"	Parking	Building Orientation	Building Design
Mutation Corridor ***(As per UDD Notification and RMP 2015)***	*Upto 12000*	*Upto 30m* *Above 30m*	*Mutation Corridor*	*2.75* *3.25*	*55%* *50%*	*Upto 11.5m Ht* *12%, 8%, 8%, 8%* *Above 11,5m Ht* *increment of 1m per floor*	*Any place used for parking is not included in the calculation of FAR.* *As per Table 23 (RMP 2015)*	*RBL for 100 Feet Road: 3m*	*No guidelines*
Mutation Corridor **(As per proposal)**	Upto 12000	Upto 30m Above 30m	Regulations for Mutation Corridor as defined in RMP 2015 unless specified otherwise in this table	3.00 3.25	67.2% for plots under 360sqm As per RMP 2015 for plots above 360sqm.	3m, 8%, 8%, 8%	Plots up to 360sqm maximum of 3 ECS Plots up to 1000sqm maximum of 6 ECS	RBL for 100 Feet Road: 3m -Minimum 75 % of building shall meet the RBL - Entry to the retail and commercial uses shall be from the street	Refer to General Regulations for Commercial and Residential Uses at entry level. - Refer to General Regulations for plots around Parks where applicable
Major Roads with the exception of Mutation Corridors ***(As per UDD Notification and RMP 2015)***	*Upto 360* *360-1000* *1000-2000* *2000-4000* *4000-20000*	*Up to 12m* *12-18m* *18-24m* *24-30m* *Above 30m*	*Residential (Main)* *Commercial Axis* *Public/ Semi public* *Park and Open Spaces* *(as specified in the RMP 2015)*	*1.75* *2.25* *2.50* *3.00* *3.25*	*75%* *65%* *60%* *55%* *50%*	*Upto 11.5m Ht* *12%, 8%, 8%, 8%* *Above 11,5m Ht* *increment of 1m per floor*	*Any place used for parking is not included in the calculation of FAR* *As per Table 23 (RMP 2015)*	*No guidelines*	*No guidelines*
Major Roads with the exception of Mutation Corridors **(As per proposal)**	All	15m and above	(as specified in the RMP 2015)	3.0	67.2% for plots under 360sqm As per RMP 2015 for plots above 360sqm.	For all construction upto 5 floors or 15 m (whichever is lesser) 12%, 8%, 8%, 8% No increment of setback with increase in height. As per RMP for all construction over 5 floors/ 15 m.	Parking shall be permitted only for the residential units in the building Plots up to 360sqm maximum of 3 ECS Plots up to 1000sqm maximum of 6 ECS Any additional parking shall be included in the total built up area for calculation of FAR No on-site parking along the frontage of plot	RBL: As per RMP 2015 where applicable - Minimum 75 % of building shall meet the RBL or front setback - Entry to the retail and commercial uses shall be from the street	Refer to General Regulations for Commercial and Residential Uses at entry level.
Pedestrian Priority Streets ***(As per UDD Notification and RMP 2015)***	*Upto 360* *360-1000* *1000-2000* *2000-4000* *4000-20000*	*Up to 12m* *12-18m* *18-24m* *24-30m* *Above 30m*	*Residential (Main)* *Public/ Semi public* *Park and Open Spaces* *(as specified in the RMP 2015)*	*1.75* *2.25* *2.50* *3.00* *3.25*	*75%* *65%* *60%* *55%* *50%*	*Upto 11.5m Ht* *12%, 8%, 8%, 8%* *Above 11,5m Ht* *increment of 1m per floor*	*Any place used for parking is not included in the calculation of FAR* *As per Table 23 (RMP 2015)*	*No guidelines*	*No guidelines*
Pedestrian Priority Streets **(As per proposal)**	All	All	(as specified in the RMP 2015)	As per RMP 2015	As per RMP 2015	As per RMP 2015	No on-site parking along the frontage of plot	RBL: As per RMP 2015 where applicable - Minimum 75 % of building shall meet the RBL or front setback - Entry to the retail and commercial uses shall be from the street	Refer to General Regulations for Commercial and Residential Uses at entry level. - Refer to General Regulations for plots around Parks where applicable

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Scenario Comparison

The initial FAR distribution as per the RMP 2015 had highest density along the Mutation Corridor and greater density for larger plots on wide roads. Proposed increase in FAR as per the UDD notification results in a higher density in the core area irrespective of plot size and width of roads and a much lower density in all the remaining surrounding areas. The Proposal for the Indiranagar Station area assigns highest density to plots on CMH road around the metro station. Other plots within the core area, plots in activity areas and all plots along roads of width 15m and above, in addition to the Mutation Corridor, in the Buffer area are also assigned higher density than the surrounding areas.

While with the UDD notification, the density in the Station area increases by 13%, with the proposals, there is a 16% increase in density as compared to the RMP 2015.

Summary of Built Up Area (all numbers are in sqm)								
	Compact Zone A	Compact Zone B	Core	Activity Nodes	Major Roads	Other Areas	Buffer	Total
RMP 2015	54,791	1,70,721	2,25,512	22,458	4,89,137	9,72,687	14,84,282	17,09,794
UDD	98,516	3,41,432	4,39,948	22,458	4,89,137	9,72,687	14,84,282	19,24,230
Proposal	98,516	2,57,721	3,56,237	34,620	6,21,784	9,72,687	16,29,091	19,85,328

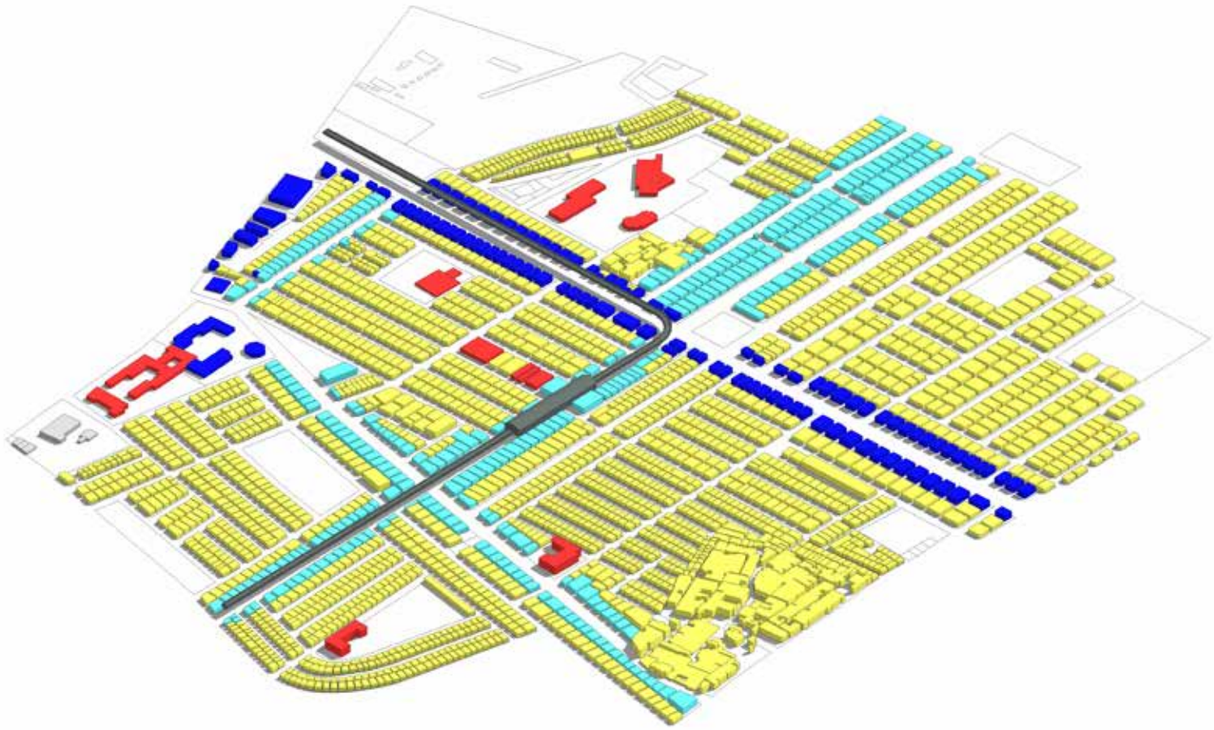
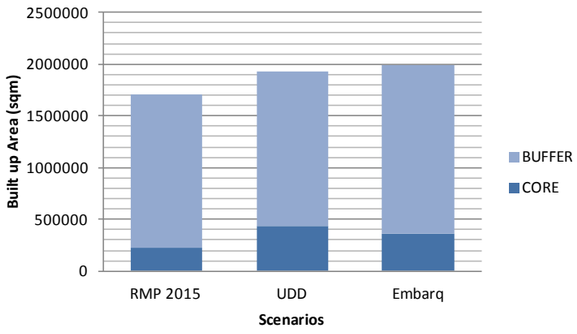
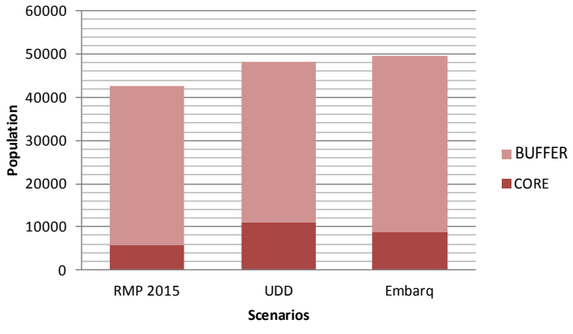


Fig5.16: Simulation of RMP 2015
Source: EMBARQ India





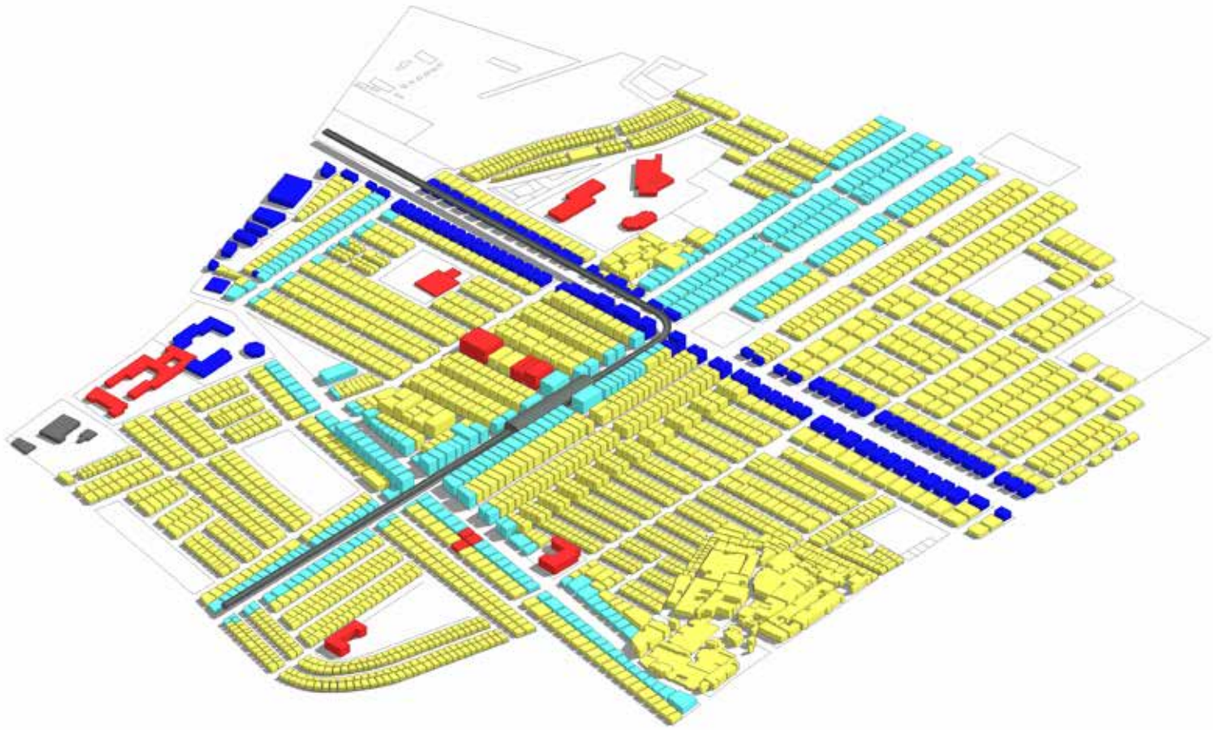


Fig5.17: Simulation of RMP 2015, with UDD Notification
Source: EMBARQ India

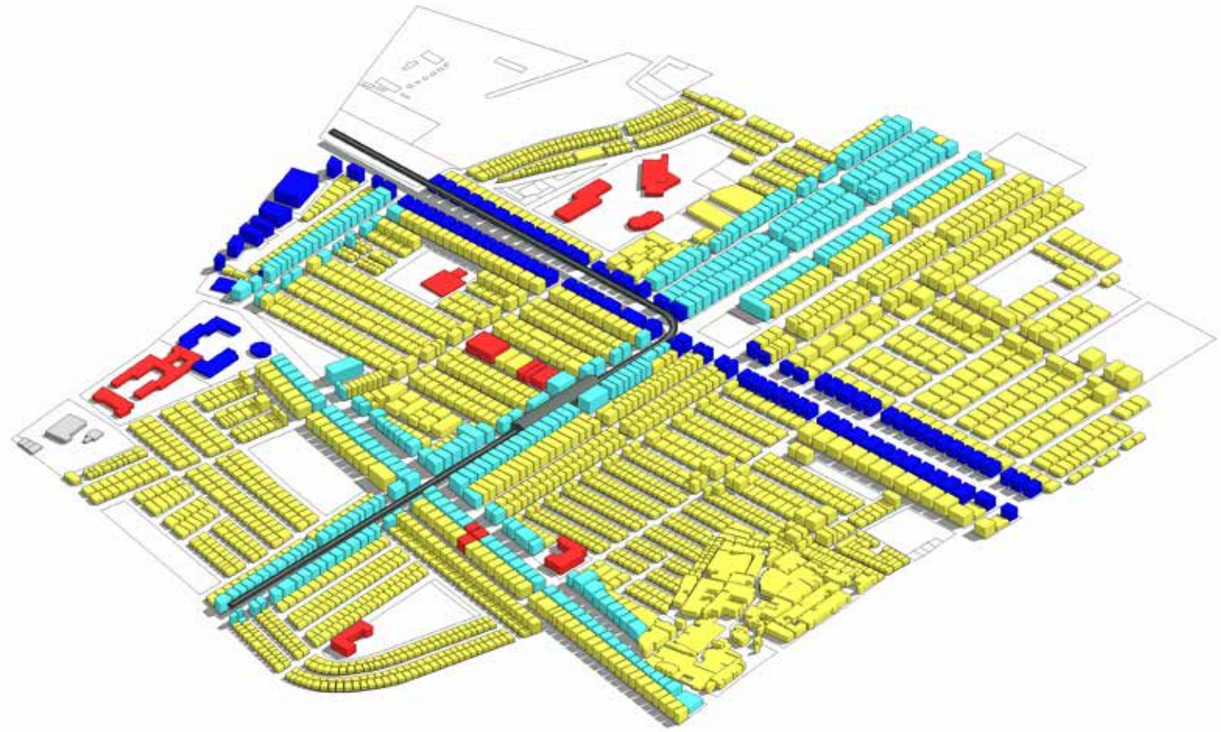


Fig5.18: Simulation of EMBARQ India proposal
Source: EMBARQ India


JAGATE GENSETS
KA 05
B 5843
TINY TOTS

REFERENCES

Map of Bangalore indicating metro routess and stations

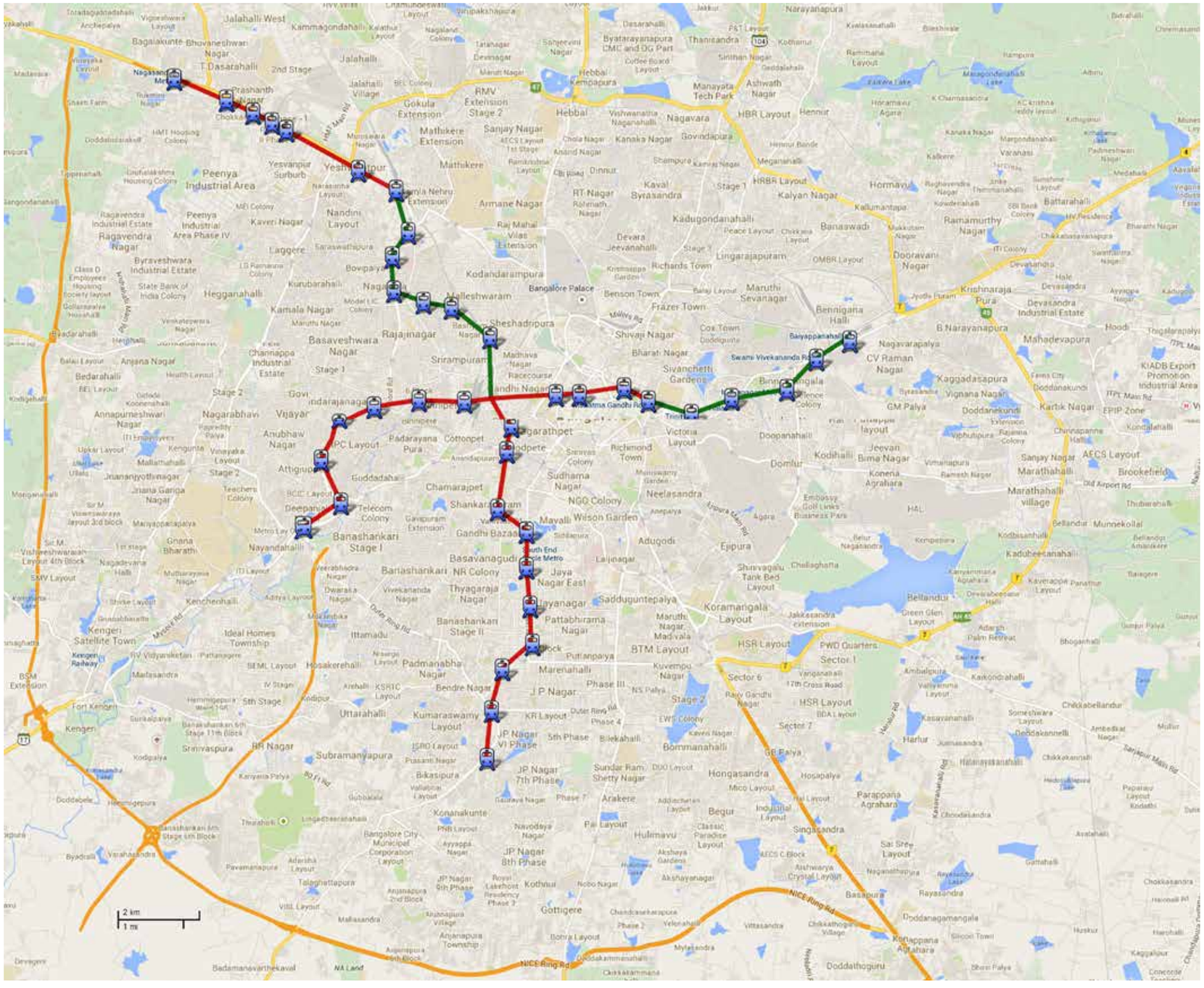
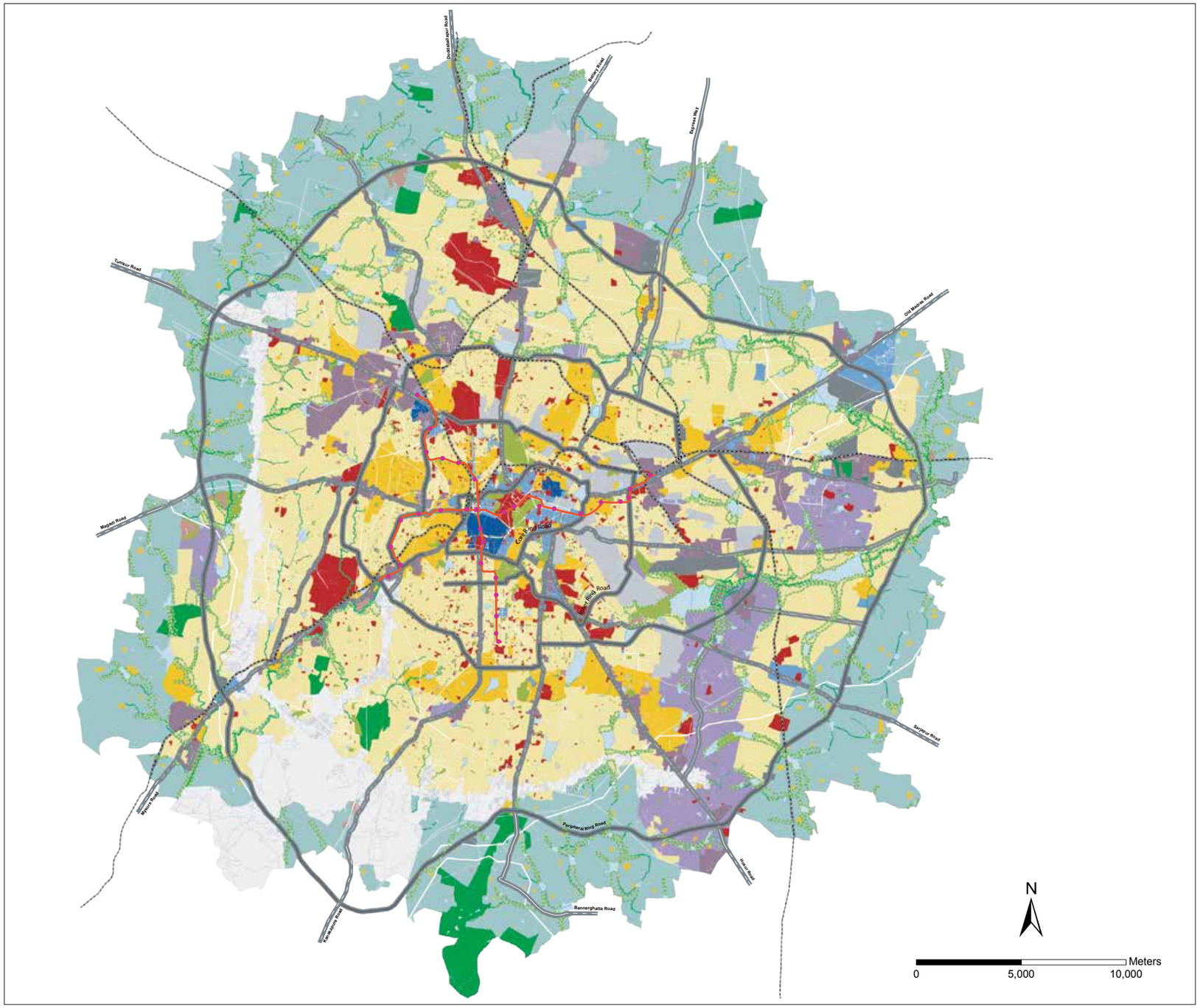


Fig: Map of Bangalore with Metro routes and stations
Source: bmrc.co.in

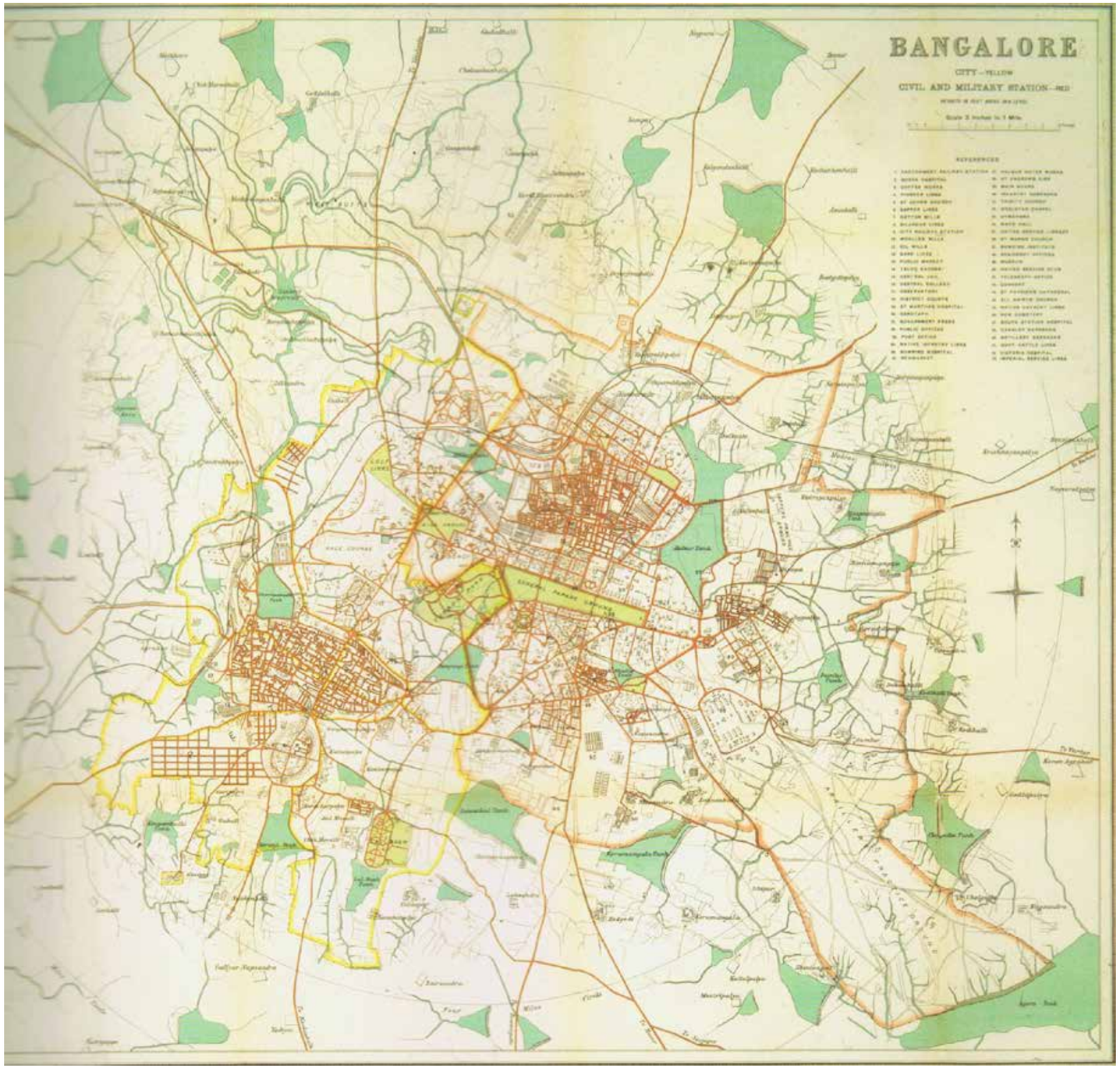
Bengaluru, RMP 2015



B A N G A L O R E
Revised Master Plan 2015
Proposed Land Use Map

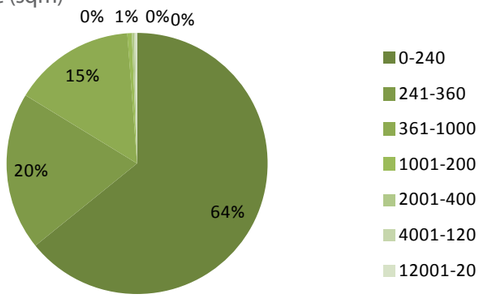
Consolidated Map

Map of Bengaluru, 1896

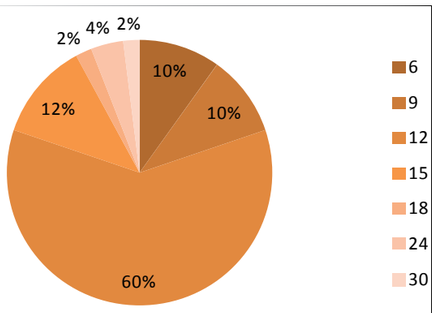


Station area analysis

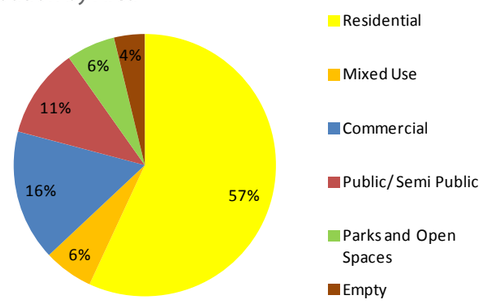
Plot Size (sqm)



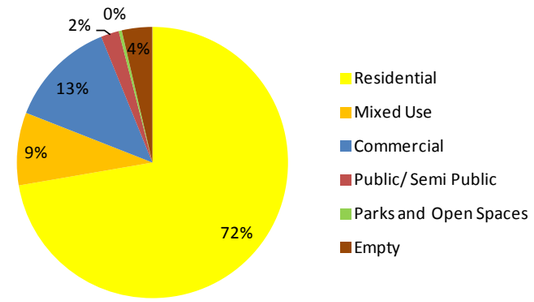
Road widths (m)



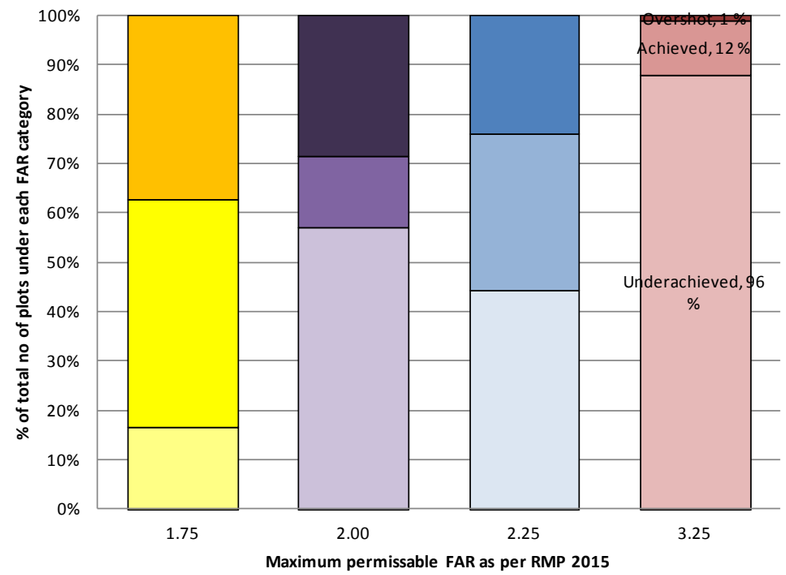
Land distribution by Area



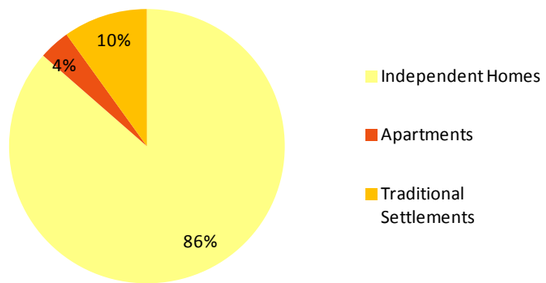
Land distribution by no of plots



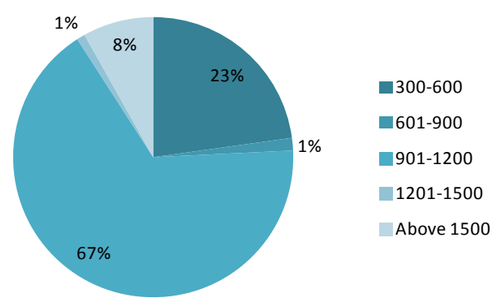
Status of FAR achieved as per no of plots



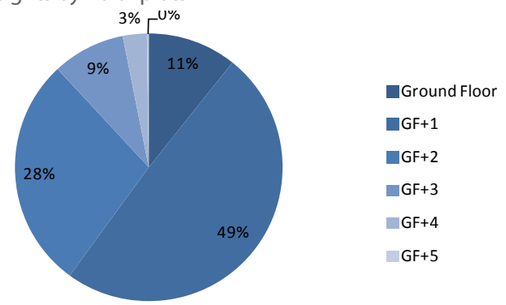
Plot sizes



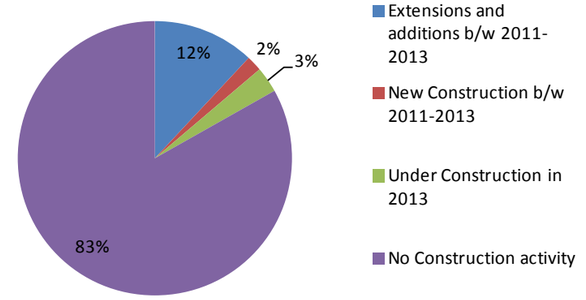
Densities



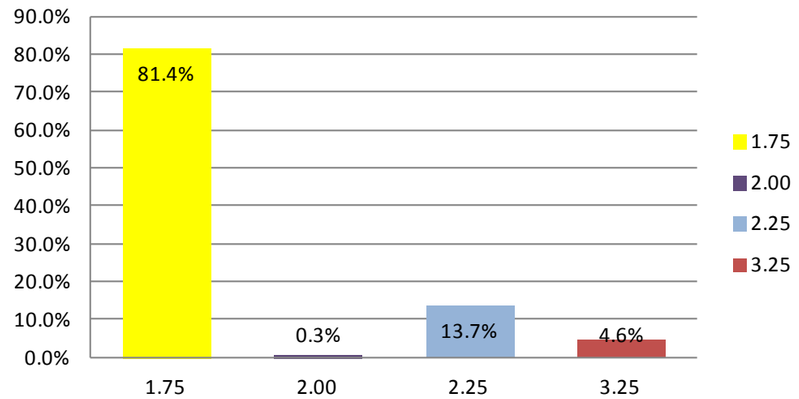
Building heights by no of plots



Nature of construction activities



FAR distribution as per no of plots



Summary of FAR Changes

CDP - All Areas

FAR — RESIDENTIAL (MAIN) & COMMERCIAL AXES

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	20000	50	2001	10000	**3.25**	13003	65000	7	Above 30m
2001	4000	55	1101	2200	**3**	6003	12000	5	24- 30m
1001	2000	60	601	1200	**2.5**	2503	5000	4	18- 24m
360	1000	65	234	650	**2.25**	810	2250	3	12- 18m
0	360	75	0	270	**1.75**	0	630	2	Upto 12m

FAR — COMMERCIAL (BUSINESS)

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	12000	40	1600	4800	**3.25**	13003	39000	8	Above 30m
2001	4000	40	800	1600	**3**	6003	12000	8	24- 30m
1001	2000	45	450	900	**2.5**	2503	5000	6	18- 24m
361	1000	50	181	500	**2.25**	812	2250	5	12- 18m
241	360	50	121	180	**1.75**	422	630	4	9- 12m
0	240	55	0	132	**1.5**	0	360	3	Upto 9m

FAR — MUTATION CORRIDORS

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
0	12000	50	0	6000	**3.25**	0	19500	3	Above 30m
0	12000	55	0	6600	**2.75**	0	18150	3	Below 30m

FAR — PUBLIC & SEMI PUBLIC

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	45	900	900	**2.25**	4502	4502	5
1001	2000	50	501	1000	**2**	2002	4000	4
501	1000	55	276	550	**1.75**	877	1750	3
0	500	60	0	300	**1.5**	0	750	3

FAR — ROAD TRANSPORT

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	45	900	900	**1.5**	3002	3002	3
1001	2000	50	501	1000	**1.5**	1502	3000	3
501	1000	55	276	550	**1.25**	626	1250	2
0	500	60	0	300	**1**	0	500	2

EMB - Compact Zone A

FAR — RESIDENTIAL (MAIN) & COMMERCIAL AXES

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	20000	67.2	2689	13440	4	16004	80000	6	Above 30m
2001	4000	67.2	1345	2688	4	8004	16000	6	24- 30m
1001	2000	67.2	673	1344	4	4004	8000	6	18- 24m
361	1000	67.2	243	672	4	1444	4000	6	12- 18m
0	360	67.2	0	242	4	0	1440	6	Upto 12m

FAR — COMMERCIAL (BUSINESS)

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	12000	67.2	2689	8064	4	16004	48000	6	Above 30m
2001	4000	67.2	1345	2688	4	8004	16000	6	24- 30m
1001	2000	67.2	673	1344	4	4004	8000	6	18- 24m
361	1000	67.2	243	672	4	1444	4000	6	12- 18m
241	360	67.2	162	242	4	964	1440	6	9- 12m
0	240	67.2	0	161.28	4	0	960	6	Upto 9m

FAR — MUTATION CORRIDORS

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
0	12000	67.2	0	8064	4	0	48000	6	Above 30m
0	12000	67.2	0	8064	4	0	48000	6	Below 30m

FAR — PUBLIC & SEMI PUBLIC

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	67.2	1345	1345	4	8004	8004	6
1001	2000	67.2	673	1344	4	4004	8000	6
501	1000	67.2	337	672	4	2004	4000	6
0	500	67.2	0	336	4	0	2000	6

FAR — ROAD TRANSPORT

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	45	900	900	**1.5**	3002	3002	3
1001	2000	50	501	1000	**1.5**	1502	3000	3
501	1000	55	276	550	**1.25**	626	1250	2
0	500	60	0	300	1	0	500	2

UDD - Core Area

FAR — RESIDENTIAL (MAIN) & COMMERCIAL AXES

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	20000	50	2001	10000	4	16004	80000	8	Above 30m
2001	4000	55	1101	2200	4	8004	16000	7	24- 30m
1001	2000	60	601	1200	4	4004	8000	7	18- 24m
360	1000	65	234	650	4	1440	4000	6	12- 18m
0	360	75	0	270	4	0	1440	5	Upto 12m

FAR — COMMERCIAL (BUSINESS)

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	12000	40	1600	4800	4	16004	48000	10	Above 30m
2001	4000	40	800	1600	4	8004	16000	10	24- 30m
1001	2000	45	450	900	4	4004	8000	9	18- 24m
361	1000	50	181	500	4	1444	4000	8	12- 18m
241	360	50	121	180	4	964	1440	8	9- 12m
0	240	55	0	132	4	0	960	7	Upto 9m

FAR — MUTATION CORRIDORS

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
0	12000	50	0	6000	4	0	48000	8	Above 30m
0	12000	55	0	6600	4	0	48000	7	Below 30m

FAR — PUBLIC & SEMI PUBLIC

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	45	900	900	4	8004	8004	9
1001	2000	50	501	1000	4	4004	8000	8
501	1000	55	276	550	4	2004	4000	7
0	500	60	0	300	4	0	2000	7

FAR — ROAD TRANSPORT

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	45	900	900	**1.5**	3002	3002	3
1001	2000	50	501	1000	**1.5**	1502	3000	3
501	1000	55	276	550	**1.25**	626	1250	2
0	500	60	0	300	**1**	0	500	2

EMB - Compact Zone B, Activity Nodes and Major Roads

FAR — RESIDENTIAL (MAIN) & COMMERCIAL AXES

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	20000	50	2001	10000	**3**	12003	60000	6	Above 30m
2001	4000	55	1101	2200	**3**	6003	12000	5	24- 30m
1200	2000	60	720	1200	**3**	3600	6000	5	18- 24m
750	1000	65	488	650	**3**	2250	3000	5	12- 18m
0	360	67.2	0	242	**3**	0	1080	4	Upto 12m

FAR — COMMERCIAL (BUSINESS)

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
4001	12000	40	1600	4800	**3**	12003	36000	8	Above 30m
2001	4000	40	800	1600	**3**	6003	12000	8	24- 30m
1001	2000	45	450	900	**3**	3003	6000	7	18- 24m
361	1000	50	181	500	**3**	1083	3000	6	12- 18m
241	360	50	121	180	**3**	723	1080	6	9- 12m
0	240	55	0	132	**3**	0	720	5	Upto 9m

FAR — MUTATION CORRIDORS

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors	Road Width
0	12000	50	0	6000	**3**	0	36000	6	Above 30m
0	12000	55	0	6600	**3.25**	0	39000	6	Below 30m

FAR — PUBLIC & SEMI PUBLIC

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	45	900	900	**3**	6003	6003	7
1001	2000	50	501	1000	**3**	3003	6000	6
501	1000	55	276	550	**3**	1503	3000	5
0	500	60	0	300	**3**	0	1500	5

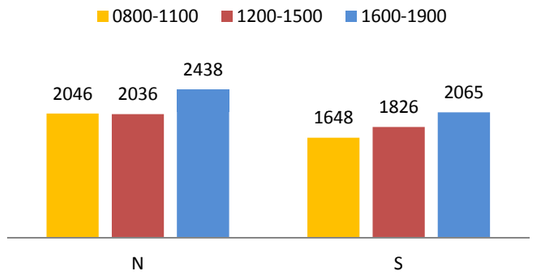
FAR — ROAD TRANSPORT

Plot Area min	Plot Area max	Ground Coverage % Max	Footprint min	Footprint max	FAR	Built Area min	Built Area max	No of floors
2001	2001	45	900	900	**1.5**	3002	3002	3
1001	2000	50	501	1000	**1.5**	1502	3000	3
501	1000	55	276	550	**1.25**	626	1250	2
0	500	60	0	300	**1**	0	500	2

Pedestrian count - pattern - all

Pedestrian count - Pattern (avg) - 2013

L3



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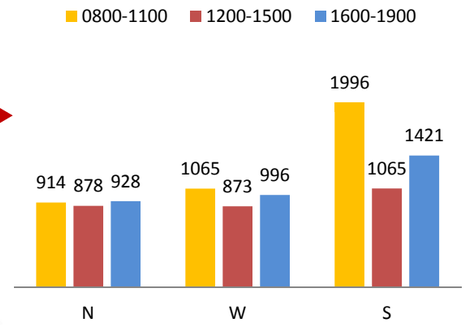

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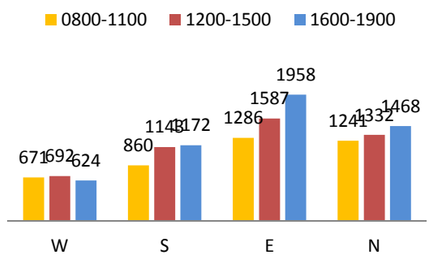

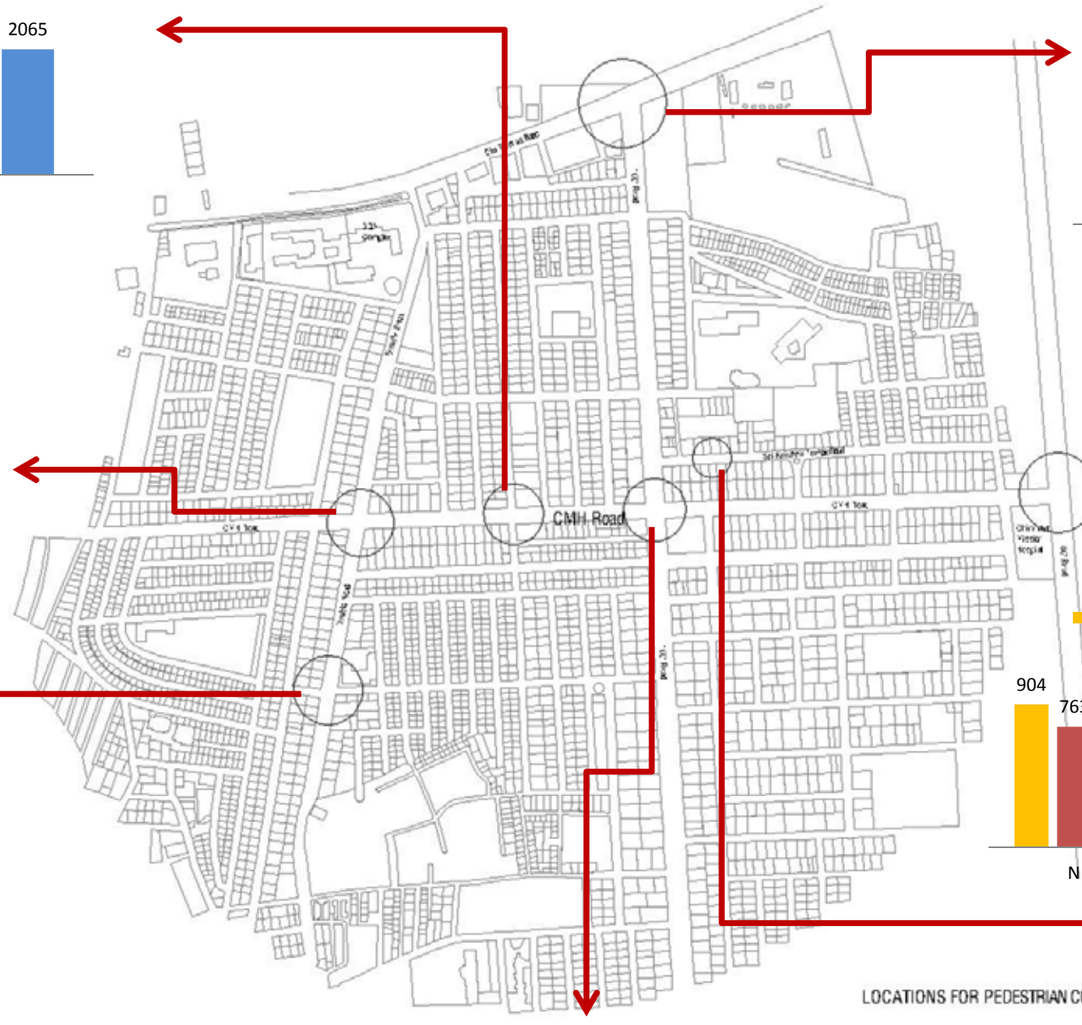

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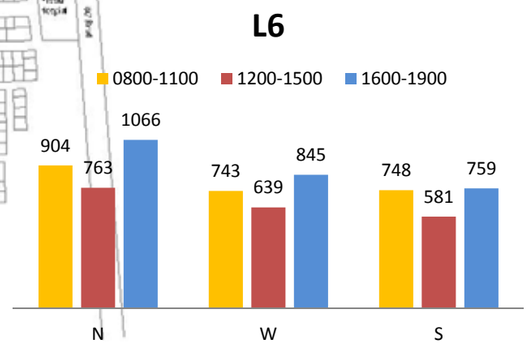
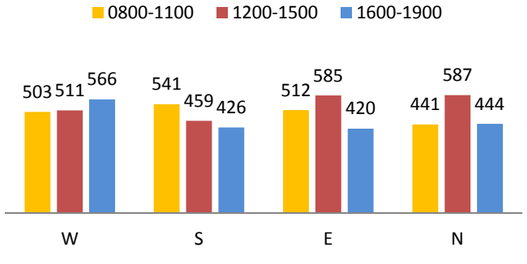
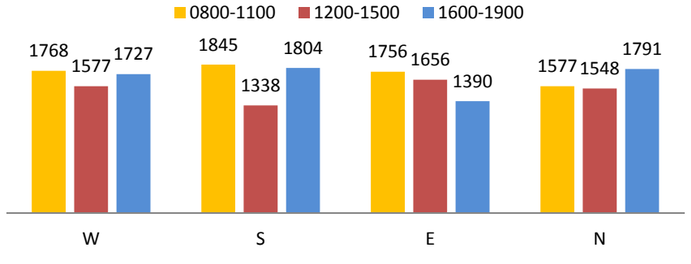


L1



L4



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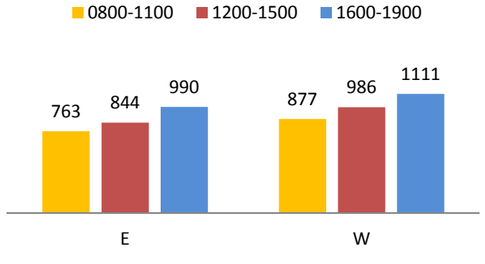
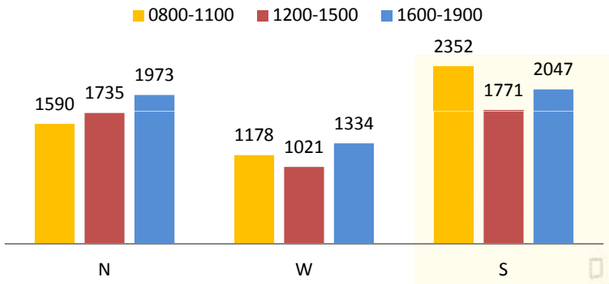
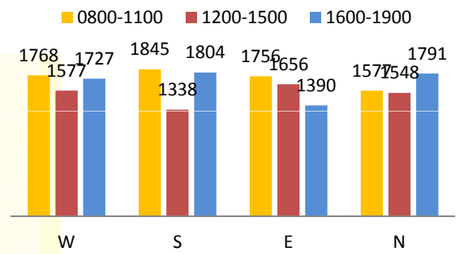


Pedestrian count - 2011 vs 2013

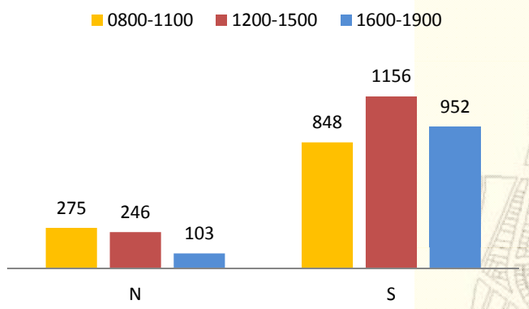
L4 - 2011



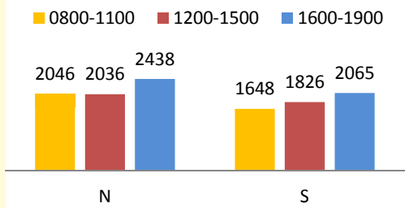
L4 – 2013

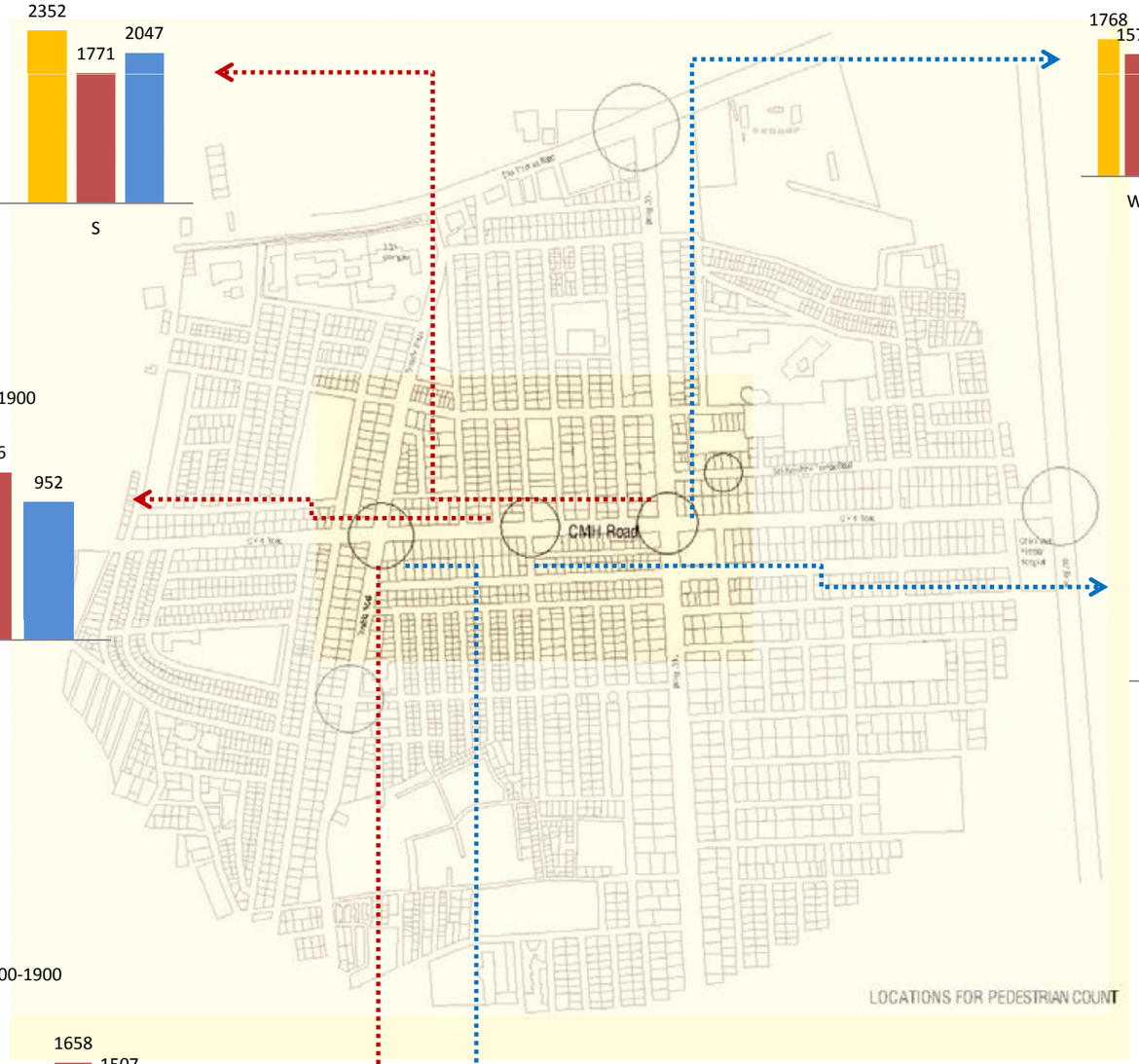


L3 - 2011

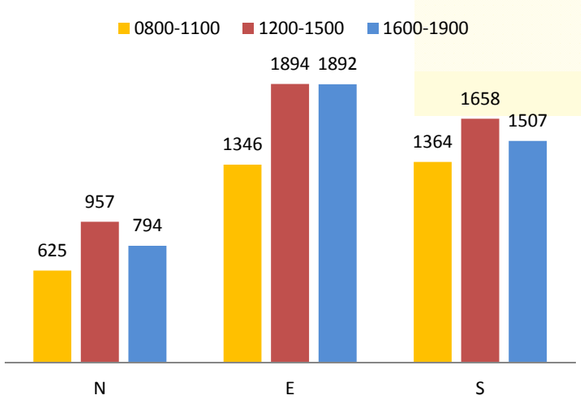


L3 – 2013

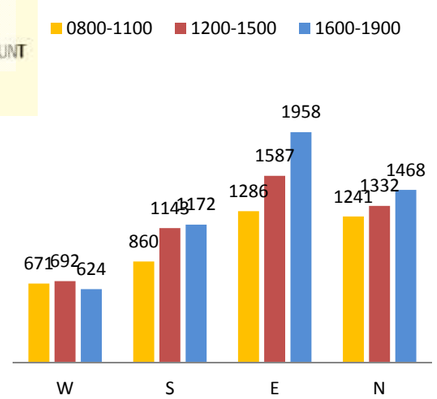




L2 - 2011



L2 – 2013



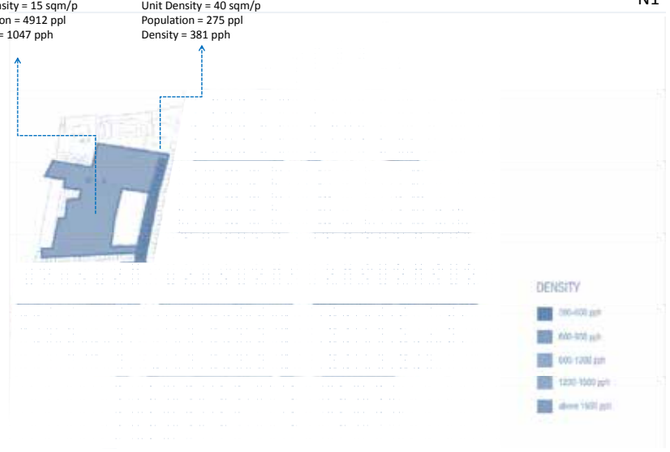
Residential Densities

POPULATION DISTRIBUTION

N1

Avg plot size = 204 sq m
No. of plots = 230 plots
Unit Density = 15 sqm/p
Population = 4912 ppl
Density = 1047 pph

Avg plot size = 401 sq m
No. of plots = 18 plots
Unit Density = 40 sqm/p
Population = 275 ppl
Density = 381 pph



POPULATION DISTRIBUTION

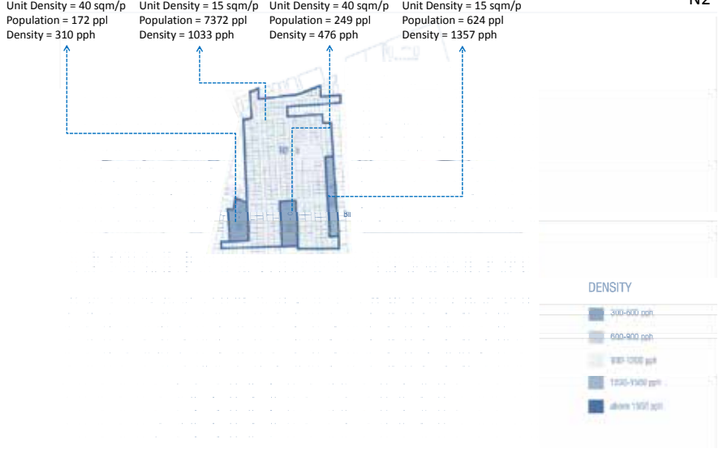
N2

Avg plot size = 554 sq m
No. of plots = 10 plots
Unit Density = 40 sqm/p
Population = 172 ppl
Density = 310 pph

Avg plot size = 224 sq m
No. of plots = 319 plots
Unit Density = 15 sqm/p
Population = 7372 ppl
Density = 1033 pph

Avg plot size = 870 sq m
No. of plots = 6 plots
Unit Density = 40 sqm/p
Population = 249 ppl
Density = 476 pph

Avg plot size = 287 sq m
No. of plots = 16 plots
Unit Density = 15 sqm/p
Population = 624 ppl
Density = 1357 pph



POPULATION DISTRIBUTION

N3

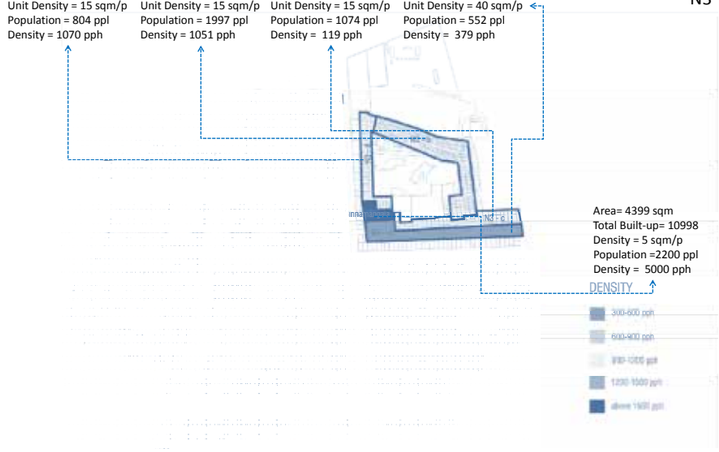
Avg plot size = 268 sq m
No. of plots = 28 plots
Unit Density = 15 sqm/p
Population = 804 ppl
Density = 1070 pph

Avg plot size = 108 sq m
No. of plots = 176 plots
Unit Density = 15 sqm/p
Population = 1997 ppl
Density = 1051 pph

Avg plot size = 246 sq m
No. of plots = 39 plots
Unit Density = 15 sqm/p
Population = 1074 ppl
Density = 119 pph

Avg plot size = 374 sq m
No. of plots =39 plots
Unit Density = 40 sqm/p
Population = 552 ppl
Density = 379 pph

Area= 4399 sqm
Total Built-up= 10998
Density = 5 sqm/p
Population =2200 ppl
Density = 5000 pph



POPULATION DISTRIBUTION

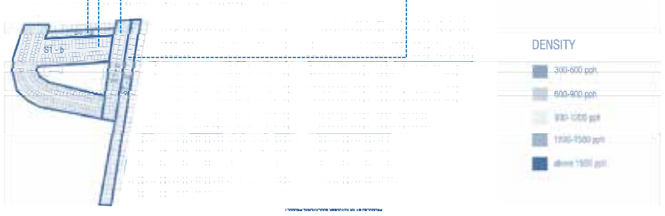
S1

ɜ plot size = 227 sq m
. of plots = 15 plots
it Density = 15 sqm/p
ɔulation = 329 ppl
nsity = 966 pph

Avg plot size = 124 sq m
No. of plots = 249 plots
Unit Density = 15 sqm/p
Population = 3212 ppl
Density = 1044 pph

Avg plot size = 200 sq m
No. of plots = 47 plots
Unit Density = 15 sqm/p
Population = 1017 ppl
Density = 1081 pph

Avg plot size = 344 sq m
No. of plots = 37 plots
Unit Density = 15 sqm/p
Population = 1332 ppl
Density = 1046 pph



POPULATION DISTRIBUTION

S2

Avg plot size = 416 sq m
No. of plots = 17 plots
Unit Density = 40 sqm/p
Population = 271 ppl
Density = 383 pph

Avg plot size = 183 sq m
No. of plots = 210 plots
Unit Density = 15 sqm/p
Population = 3751 ppl
Density = 975 pph

Avg plot size = 399 sq m
No. of plots = 5 plots
Unit Density = 40 sqm/p
Population = 85 ppl
Density = 427 pph

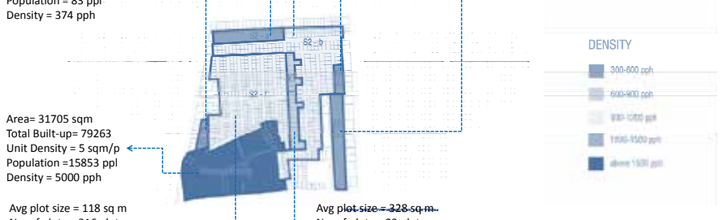
Avg plot size = 360 sq m
No. of plots = 13 plots
Unit Density = 40 sqm/p
Population = 371 ppl
Density = 432 pph

Avg plot size =557 sq m
No. of plots = 4 plots
Unit Density = 40 sqm/p
Population = 83 ppl
Density = 374 ppl

Area= 31705 sqm
Total Built-up= 79263
Unit Density = 5 sqm/p
Population =15853 ppl
Density = 5000 pph

Avg plot size = 118 sq m
No. of plots = 316 plots
Unit Density = 15 sqm/p
Population = 3818 ppl
Density = 1026 pph

Avg plot size = 328 sq m
No. of plots = 23 plots
Unit Density = 15 sqm/p
Population = 1651 ppl
Density = 862 pph



POPULATION DISTRIBUTION

S3

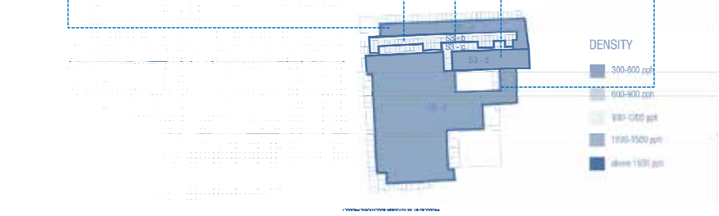
Avg plot size = 374 sq m
No. of plots = 30 plots
Unit Density = 40 sqm/p
Population = 398 ppl
Density = 355 pph

Avg plot size = 219 sq m
No. of plots = 46 plots
Unit Density = 15 sqm/p
Population = 968 ppl
Density = 960 pph

Avg plot size = 314 sq m
No. of plots = 20 plots
Unit Density = 15 sqm/p
Population = 606 ppl
Density = 964 pph

Avg plot size = 382 sq m
No. of plots = 29 plots
Unit Density = 40 sqm/p
Population = 337 ppl
Density = 304 pph

Avg plot size = 515 sq m
No. of plots =163 plots
Unit Density = 40 sqm/p
Population = 3016 ppl
Density =359 pph



List of Figures

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1	8	Figure	1.2	Map of BMA showing alignment Namma Metro	"Bangalore Master Plan 2015, Website of BMRC Source for alignment of Phase 2: www.skyscrapercity.com"
1	11	Figure	1.3	Map of Indiranagar Metro Station area showing Phase I proposals of Accessibility Report	An Accessibility Project for Indiranagar Metro Station
1	11	Figure	1.4	Map of Indiranagar Metro Station area showing Phase II proposals of Accessibility Report	An Accessibility Project for Indiranagar Metro Station
1	11	Figure	1.5	Map of Indiranagar Metro Station area showing Phase III proposals of Accessibility Report	An Accessibility Project for Indiranagar Metro Station
1	13	Figure	1.6	3D Simulation of Indiranagar Metro Station area	EMBARQ India
2	17	Figure	2.1	Station area Regulating plan	EMBARQ India
2	18	Figure	2.2	Key: Proposed FAR plan as per UDD notification	EMBARQ India
2	18	Figure	2.3	Simulation of Indiranagar Station area, according FAR proposed by UDD Notification	EMBARQ India
2	19	Figure	2.2	Key: Proposed FAR plan as per EMBARQ India	EMBARQ India
2	19	Figure	2.3	Simulation of Indiranagar Station area, according to EMBARQ India Proposal	EMBARQ India
3	22	Figure	3.1	Map of BMA showing Namma Metro Alignment and station locations	"Bangalore Master Plan 2015, Website of BMRC Source for alignment of Phase 2: www.skyscrapercity.com"
3	24	Figure	3.2	Concentration of Employment/ Activity generators in BMA	Bangalore Master Plan 2015, Website of BMRC, Google Maps
3	25	Figure	3.3	Landuse Distribution as per Bangalore Master Plan 2015	Bangalore Master Plan 2015, Website of BMRC
3	26	Figure	3.4	Ecological Network and Natural Features	Bangalore Master Plan 2015, Website of BMRC, Google Maps
3	27	Figure	3.5	Monuments and Historical Areas	"Bangalore Master Plan 2015, Website of BMRC Heritage Conservation Areas: RMP 2015 Monuments: bangaloreheritage.in Historic Settlements: Map of Bangalore, 1896"
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