TOWARDS A WALKABLE AND **SUSTAINABLE BENGALURU**

A Safe Access Project for Indiranagar Metro Station

EXECUTIVE REPORT

EMBARQ India

ACKNOWLEDGEMENTS

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EMBARQ India

PROJECT DEFINITION

The influence of the introduction of the Metro Rail system on the development of Bengaluru city in India has increased over the years and is now beginning to define its pattern of change. In order to capitalize on this public transport system and its impact on the growth of the city, EMBARQ India has been working in collaboration with the Directorate of Urban Land Transport (DULT), Government of Karnataka in developing methodologies to help design and develop suitable public spaces and built environment around the Metro stations in Bangalore.The project focusses on Indiranagar metro station in particular as a pilot project (for demonstration) to be scaled up acorss all 40 stations of metro phase 1 alignment. The project comprises of two parts - the Safe Access design & the Development Control Regulations (DCR) proposal for Indiranagar station.

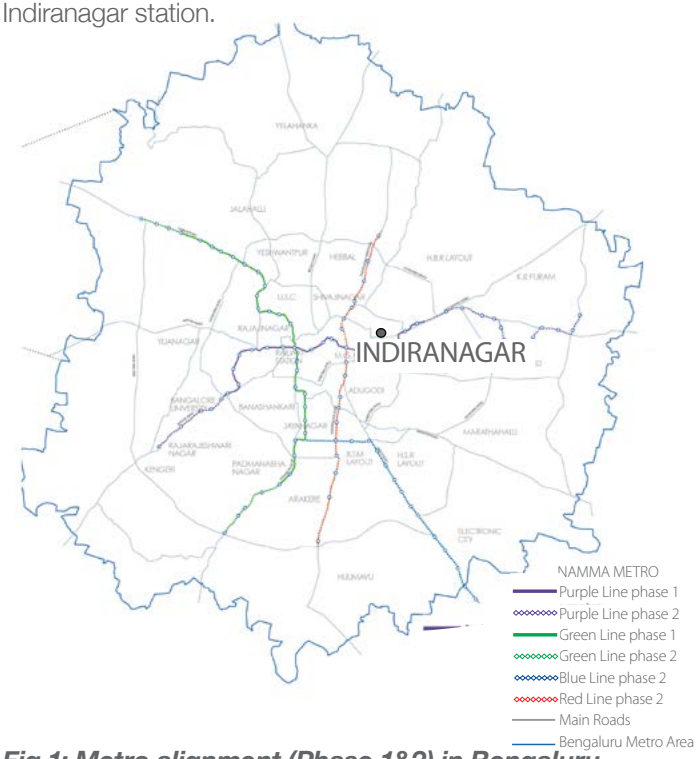


Fig 1: Metro alignment (Phase 1&2) in Bengaluru metropolitan area. Source: BMRCL

Fig2: Location of Karnataka, India

Fig3: Location of Bengaluru in Karnataka

BMR: Bengaluru Metropolitan Region (8005 sq.kms)
BDA: Bengaluru Development Authority (1279 sq.kms)
BBMP: Bruhat Bengaluru Mahanagara Palike (741 sq.kms)

Fig4: Administrative Boundaries in Bengaluru

INTRODUCTION

The Indiranagar metro station, selected for this pilot study is elevated and located on East-West corridor (Purple Line) from Baiyappannahalli to Mysore Road (refer fig 3). Operations between M.G.Road and Baiyappanahalli started in Oct 2011. The proposed Phase 2 of metro alignment connects Whitefield further on the eastern side with Baiyappannahalli and Kengeri on the western side.

Currently only a segment of phase 1, covering a length of 6.7 km and 6 stations, is in operation. It originates at MG Road - a high-end commercial zone and passes through the old dense fabric of Halasuru, runs along CMH Road - a commercial corridor in the planned residential area of Indiranagar, and then ends at Byappanahalli, a train station with industrial / institutional uses around it. Located between Halasuru and Swami Vivekananda Metro stations, Indiranagar station area is a predominantly residential neighbourhood with a high concentration of commercial activities along the main roads. A number of medical and educational institutions are in proximity to the station, thus resulting in a large number of resident and working population and a high potential for metro ridership. The station area is also undergoing transformation with mixed and commercial uses located along major roads, changing the character of residential area. For these reasons, Indiranagar station area was chosen as a demonstration area by EMBARQ India.

SAFE ACCESS DESIGN

OBJECTIVES

- To develop a safe pedestrian and bycicle access to metro stations from a distance of 500 metres around.
- To ensure safe and easy integration of metro passengers with other public transport and intermediate public transport modes
- To design the environment to allow for comfortable, efficient and easy access to the metro station.
- To ensure through design proposals tha the street and pavement space responds to needs of a rapidly transforming neighbourhood.

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

PROJECT DEFINITION

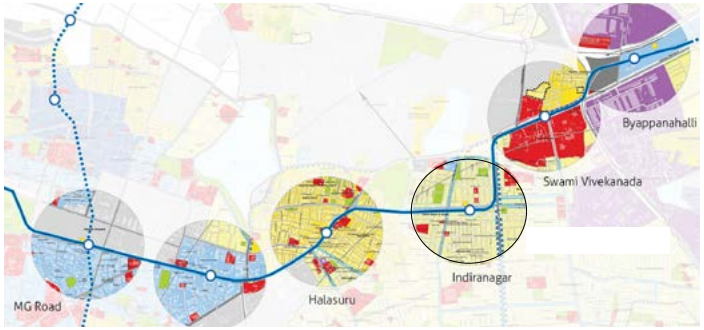


Fig 5: Purple Line - Reach I stations. Data Source: BMRKCL, RMP 2015

The Indiranagar Metro Station Area Project for Development Control Regulations aims to shape the built environment around the metro station to support the design proposals of the Indiranagar Safe Access Project, with a focus on contributing to providing a safe and pedestrian friendly environment for Metro users as well as residents of adjoining neighbourhoods.

DEVELOPMENT CONTROL REGULATIONS PROPOSAL

OBJECTIVES

- To facilitate a development trend that allows higher numbers of people to use the Metro system and discourage automobile dependent activities around the station area.
- To make the area investment friendly as well as inclusive
- To guide the design of built form to improve the street interface thereby creating a more pedestrian friendly and safe environment.
- To develop a station area analysis and development plan methodology that can be applied to stations across the city while ensuring that each DCR proposal caters to the needs of the context (ecological, historical, developm ent) in which the station is set.

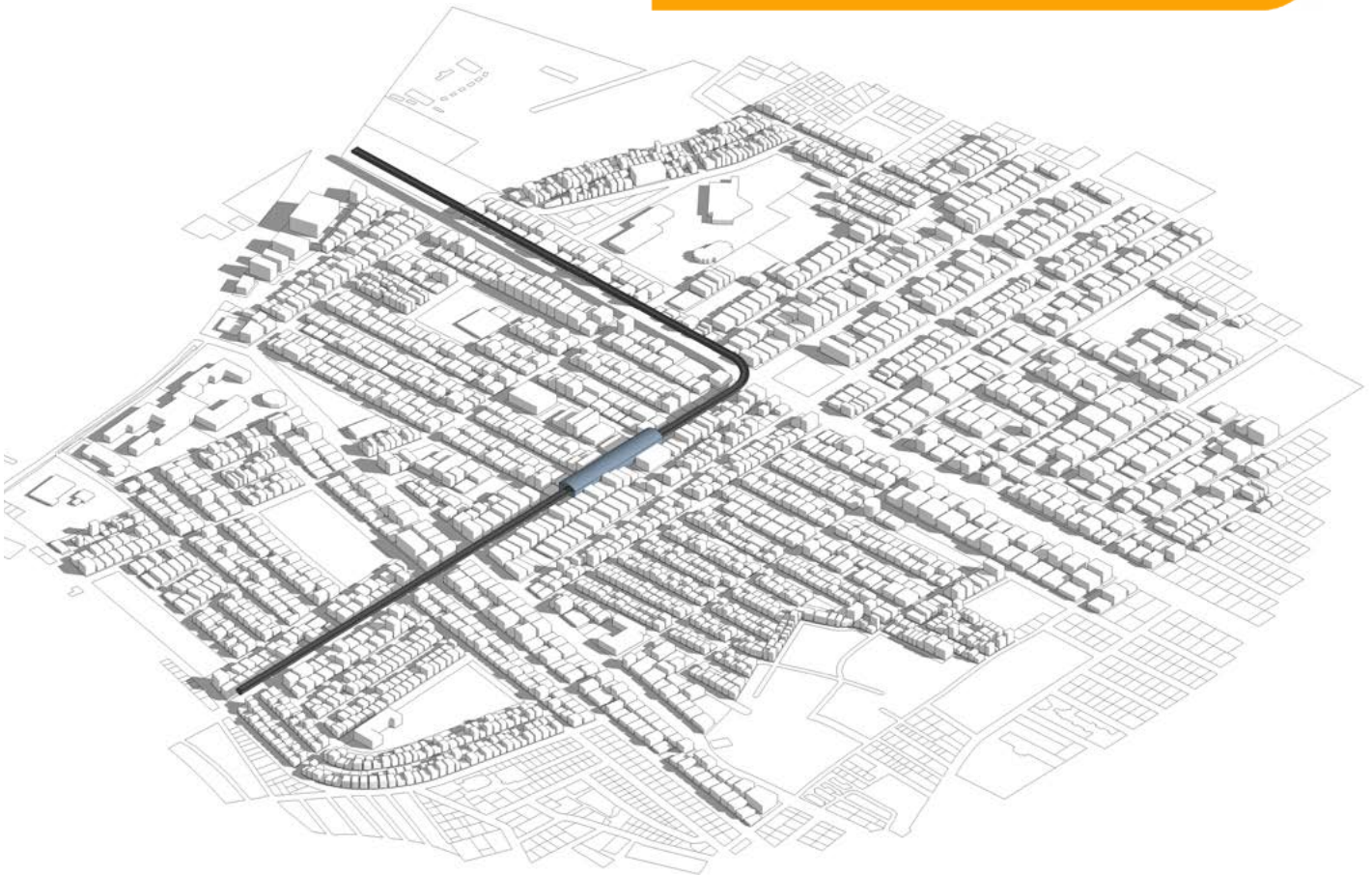


Fig 6: 3D Simulation of existing built form around Indiranagar Metro Station. Source: EMBARQ India, 2013

PROJECT DEFINITION

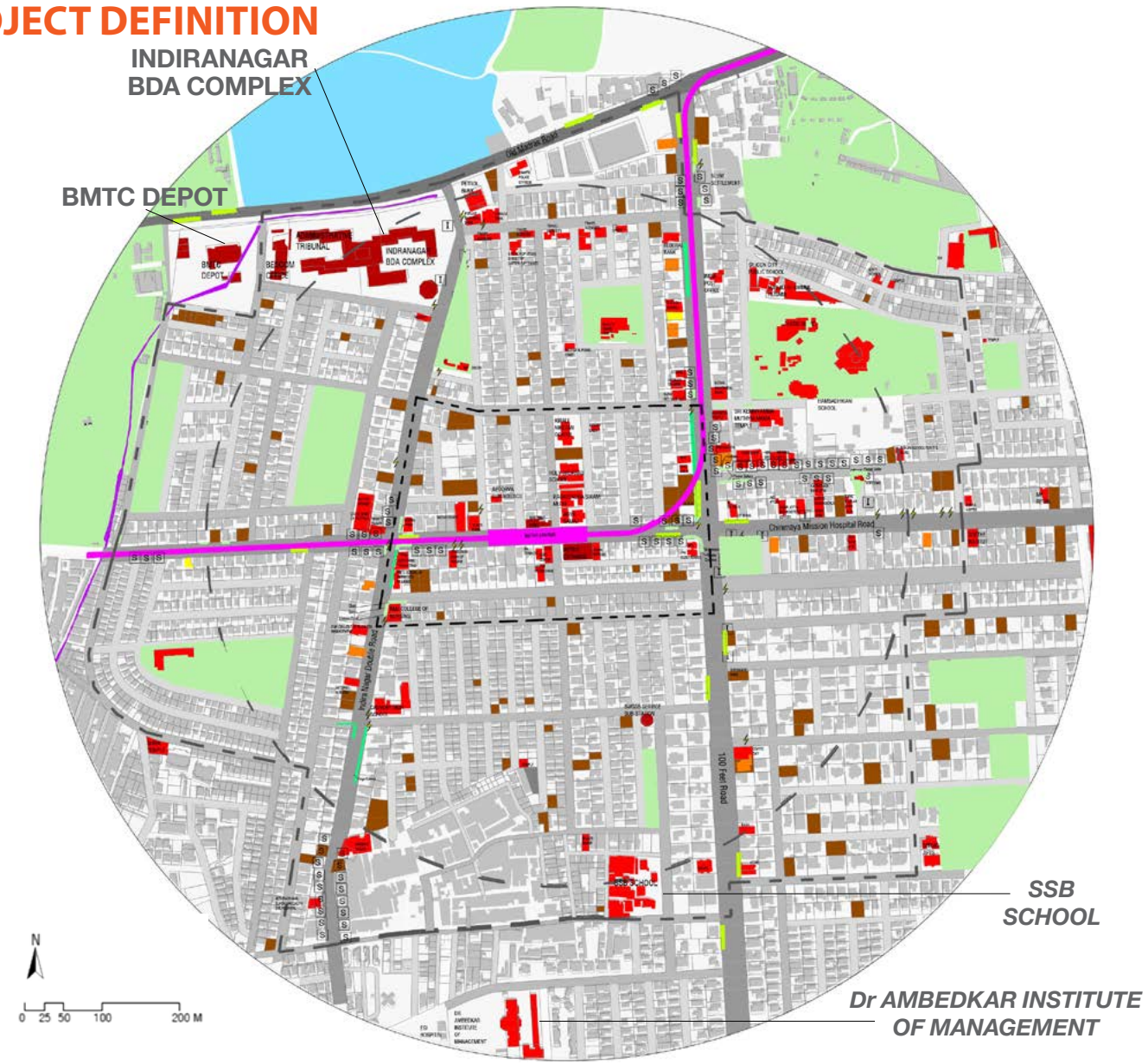


Fig 7: Indiranagar metro station study area activities and generators, Source: EMBARQ India
**Estimated based on the methodology developed by EMBARQ India*

STATION AREA	
Population (2011)	25,000
Decadal Growth Rate (2001-2011)	-2%
Density	230 pph
Ward Names	Hoysala Nagar(80), Jogupalya(89)
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 Rd, Old Madras Rd, Indiranagar Double Rd
Neighbourhoods	Indiranagar I, II, III stage, Eshwara layout and Defence colony
BESCOM Admin. Boundary	Zon e - BMAZ East Circle E6, O&M1, Indiranagar Office
BWSSB Admin. Boundary	East – 2 Subdivision
Resident Welfare Associations (RWA)	Indiranagar RWA, Defence Colony RWA (DECORA)

PROJECT IMPACT

- Rs. 1,000 Crore outlay leveraged by DULT from BBMP
- Over 100,000 people have enhanced pedestrian access to the physical environment
- 3 additional cities in India with upcoming metro follow the guiding framework
- 3 lives/year on an average, are saved after implementation of Indiranagar SAP*
- 470 tonnes of carbon/year on an average, reduced after implementation of Indiranagar SAP.

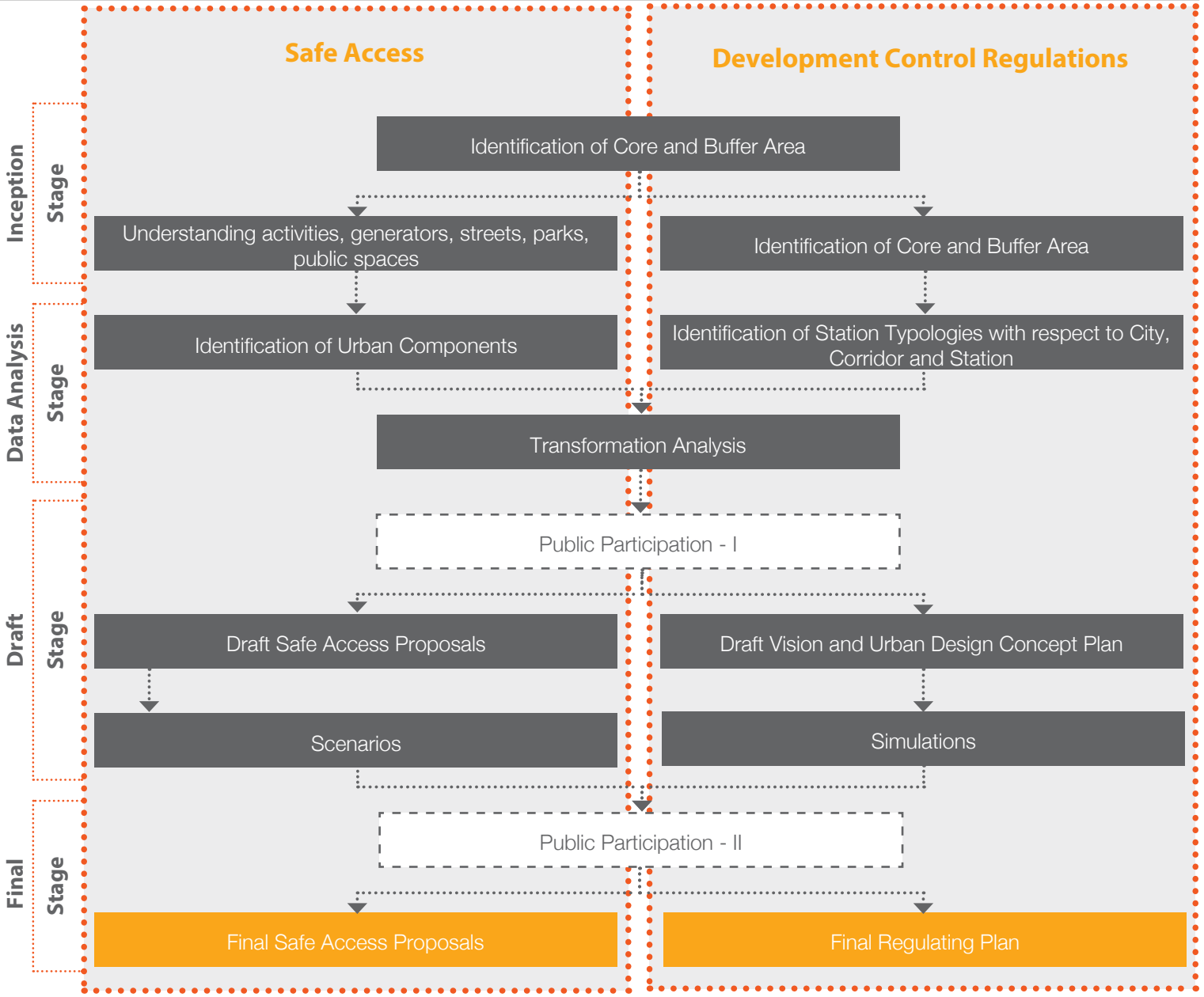
METHODOLOGY

One of the primary objectives of the safe access project was to set in place a robust methodology that addresses the different contextual conditions in which the safe access needs to be enhanced and therefore the tasks are split into the physical design of the built environment and Development Control Regulations to regulate the development.

Indiranagar SAP consists of two studies undertaken in 2011 and 2013:

(i) Safe access design.

(ii) DCR' recommendations (2013)



The detailed methodologies for each of the projects can be referred to in the Appendix.

RECOMMENDATIONS SAFE ACCESS DESIGN

The first set of recommendations is part of the Safe Access proposal. This has three phases of implementation:

Phase 1: Immediate Implementation
Phase 2: After N-S Corridor of metro gets completed, after 5 years
Phase 3: After all corridors of metro get completed, after 10 years

PHASE 1

1. Table top crossing

- Surface treatment as traffic calming technique.
- Move the bus stops away from traffic junction.
- Auto rickshaw pick up and drop-off point on either side of the road.

2. Raised crossing

- Surface treatment as traffic calming technique.
- Move the bus stops away from traffic junction.

3. Restricted vehicular access from CMH Road

Continuous pavement with bollards to restrict 2-wheeler traffic.
Shared space on secondary roads for pedestrian and vehicular movement, & parking.
Cul-de-sac towards CMH Road with sufficient turning radius.

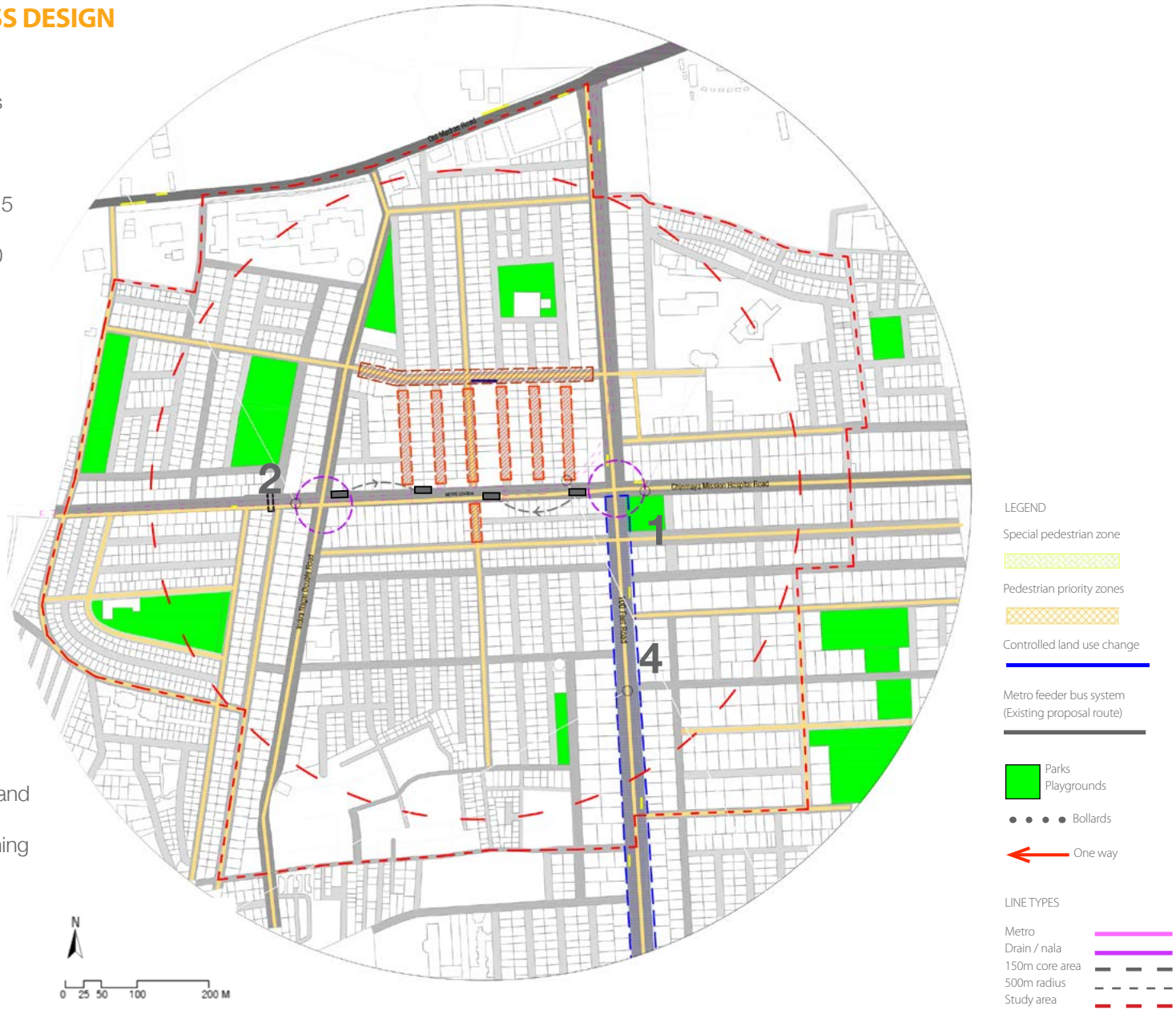


Fig 8: Phase 1- Immediate Implementation

RECOMMENDATIONS SAFE ACCESS DESIGN

PHASE 2

1. BDA complex:

Create multilevel parking for metro users

2. 100 Feet road:

Parking: Underground, side or rear plot parking.
Keep 100 feet Road at 100' right of way
Biking lanes off pavements

3. Joint development:

By BMRCL & private property owners

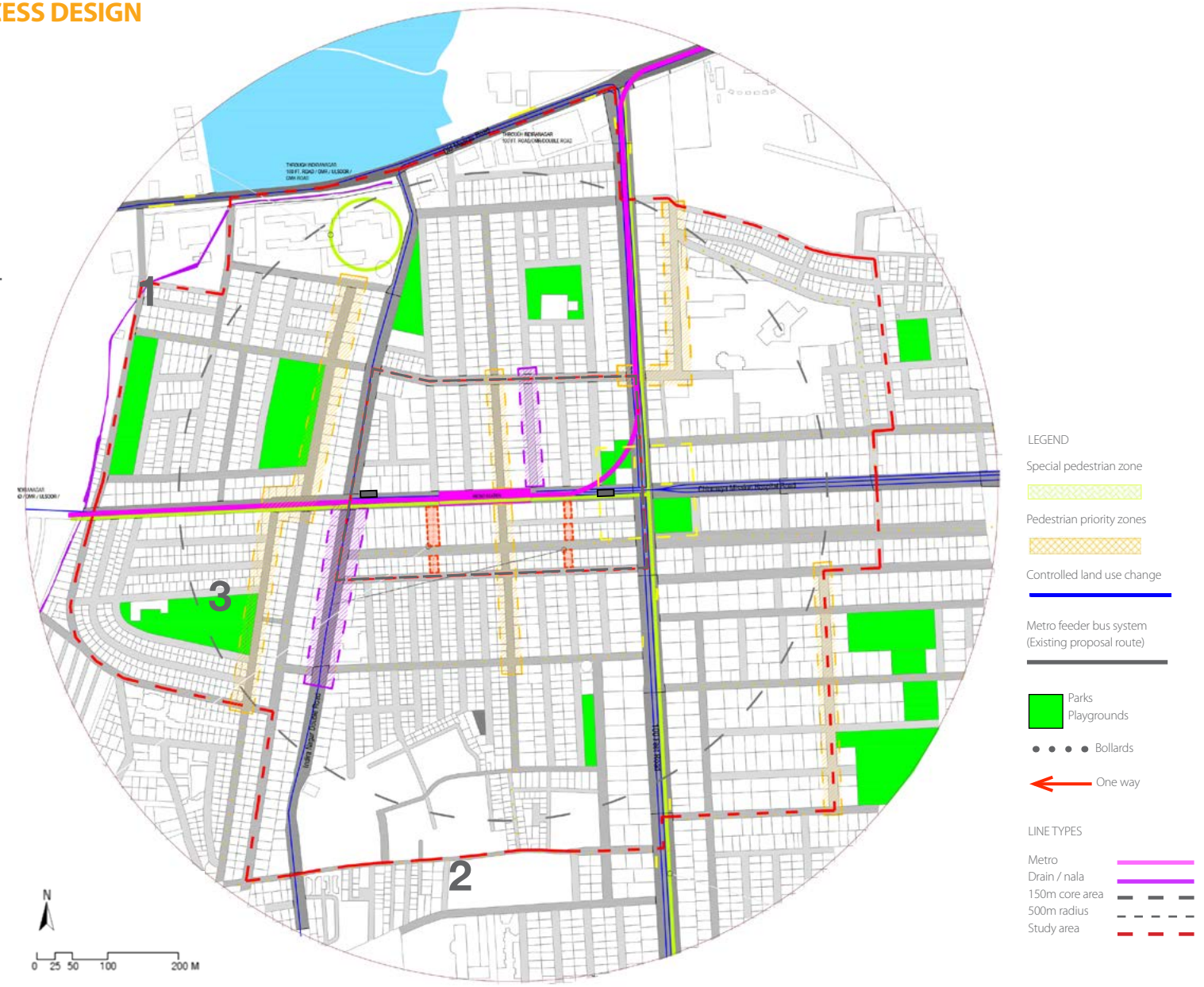


Fig 9: Phase Two - Implementation after 5 Years (after N-S Corridor of Metro is Completed)

RECOMMENDATIONS SAFE ACCESS DESIGN

PHASE 3

1. BDA Complex:
Additional parking capacity for commercial users of the entire neighbourhood.

2. Half Right of way for pedestrians
Parking for 2 wheelers only.

3. Building on Stilts
Public connection between roads on ground level.

4. Residential roads:
Regulate parking.
Treat Intersections(corners).
Improve Pavements.

5. 100 Feet road:
Parking: Basement Parking compulsory for all new developments.

6. Shared car parking
Share the community center off street parking with other uses.

7. Interventions:
Reduced carriageways.
Wider pavements.
Street Furniture.

8. Restricted vehicular access from CMH Road
Continuous pavement with bollards to restrict 2-wheeler traffic.
Shared space on secondary roads for pedestrian & vehicular movement, & parking.
Cul-de-sac towards CMH Road with sufficient turni radius.

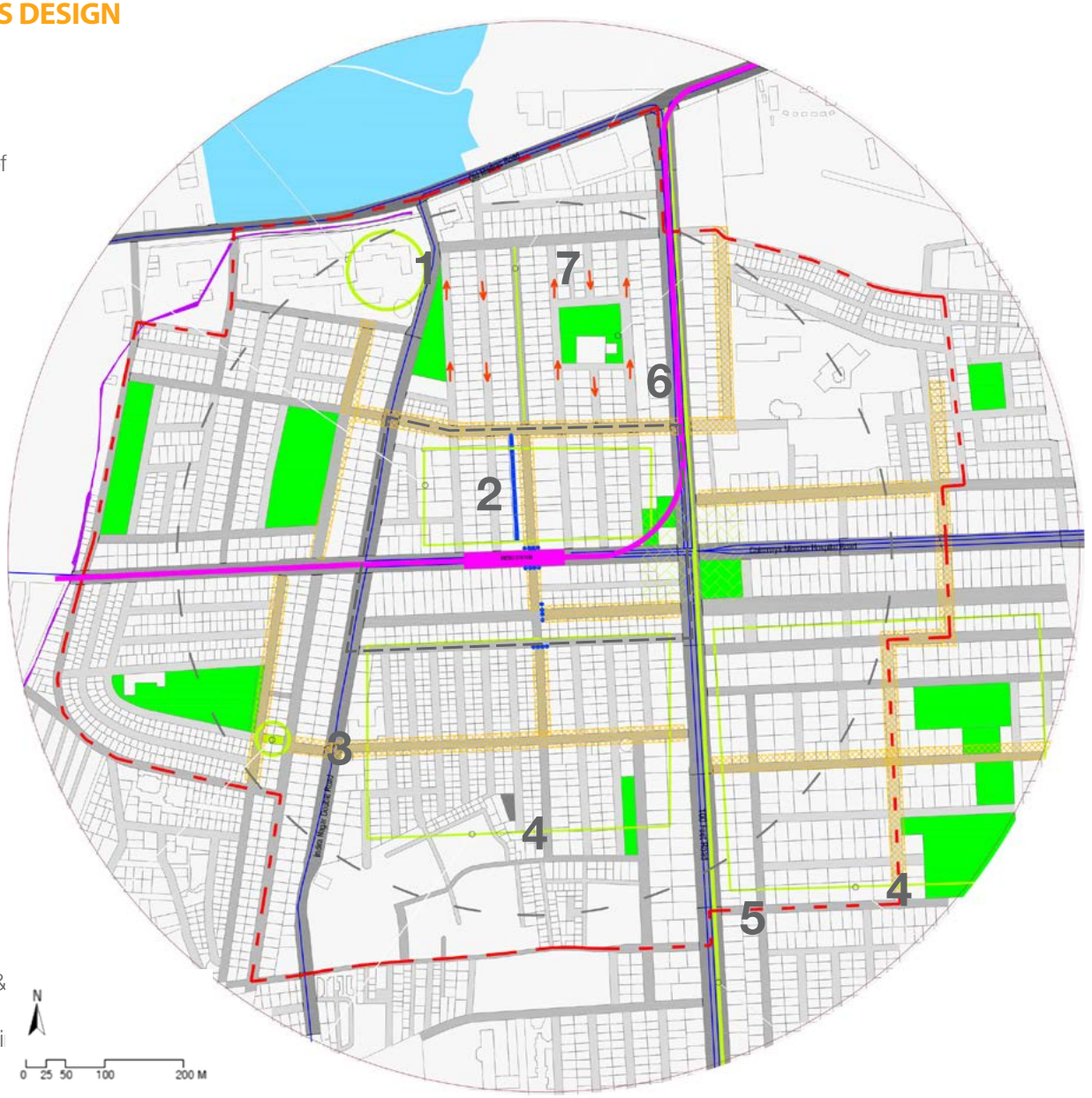


Fig 10: Phase 3, Implementation after 10 Years (after all corridors of Metro is Completed)

RECOMMENDATIONS SAFE ACCESS DESIGN

REDESIGN OF CMH ROAD

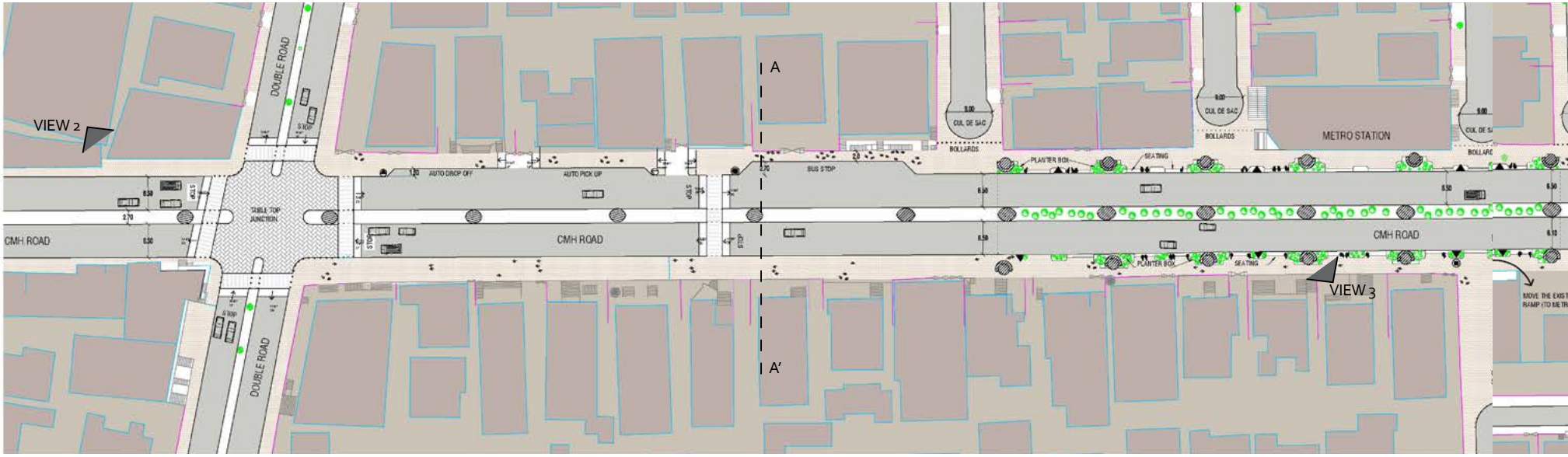


Fig12: Key plan

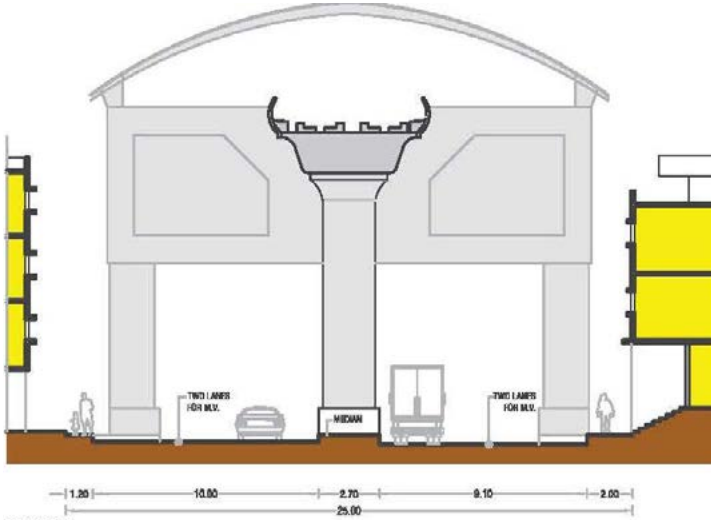


Fig 13: Existing section AA'

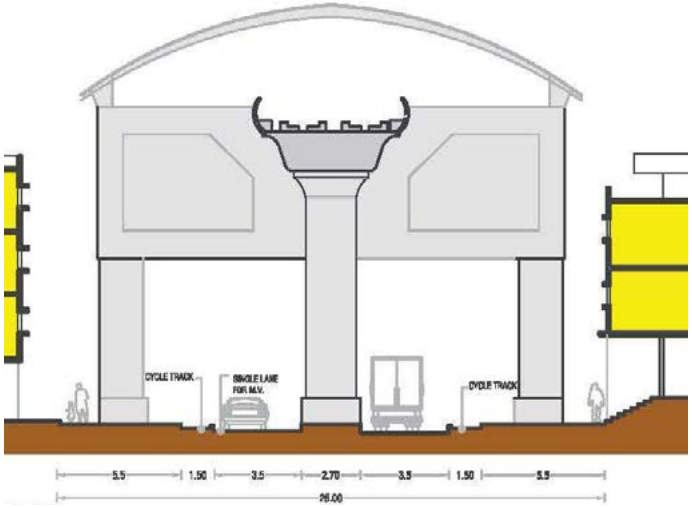


Fig 14: Proposed section AA'

RECOMMENDATIONS SAFE ACCESS DESIGN

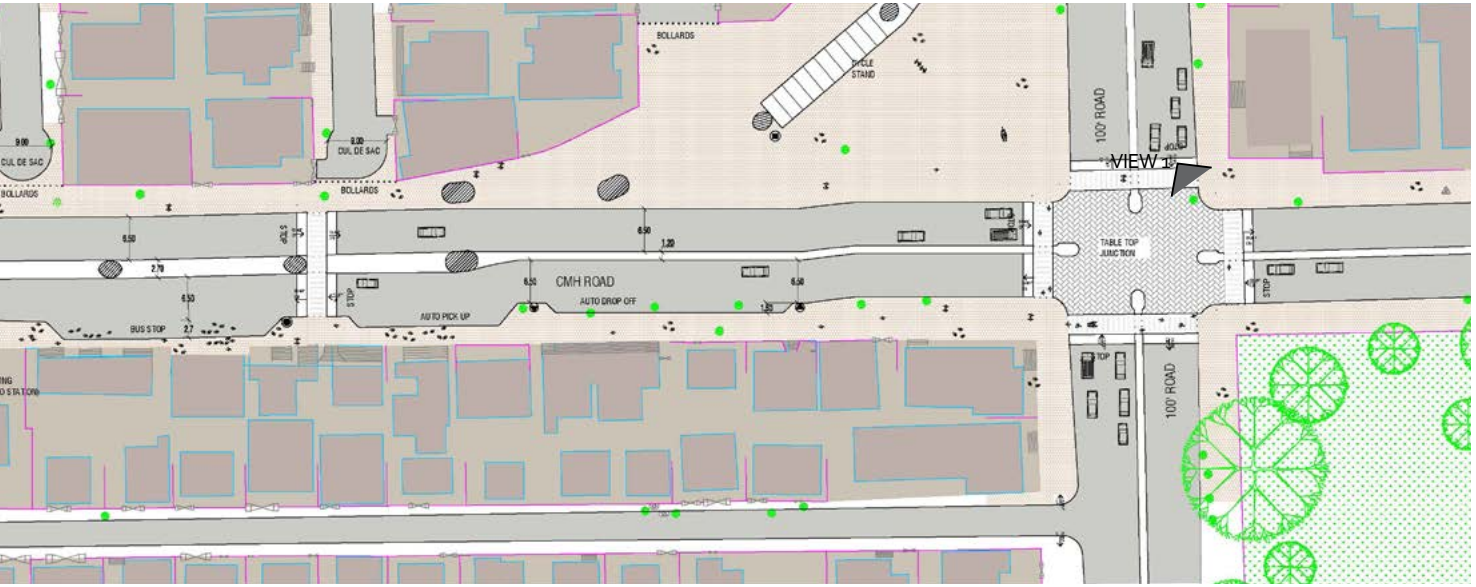
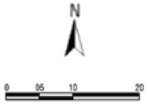
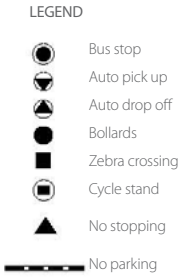


Fig 11: Overall safe access proposal for CMH road proposed by EMBARQ India.





Three major interventions are proposed on CMH Road. At every junction, tabletop crossings with surface treatment are present which act as a traffic calming technique. There will also raised pedestrian crossings and the bus stops would be moved away from the traffic junction. In order to avoid a dead street edge, it is recommended that the buildings abutting CMH Road must be on stilts. This would allow for a public connection between the roads on ground. All the minor roads approaching the CMH Road have cul-de-sacs. Besides these, auto-rickshaw pick-up and drop-off points are placed on either side of the road.

The Safe Access proposal demonstrates ways of addressing issues relating to the improvement of safe access to metro stations within the realm of urban transformation

Fig 15: View 1

Fig 17: View 3

Fig 16: View 2

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

The second part of the recommendations are the Development Control Regulations Proposal.

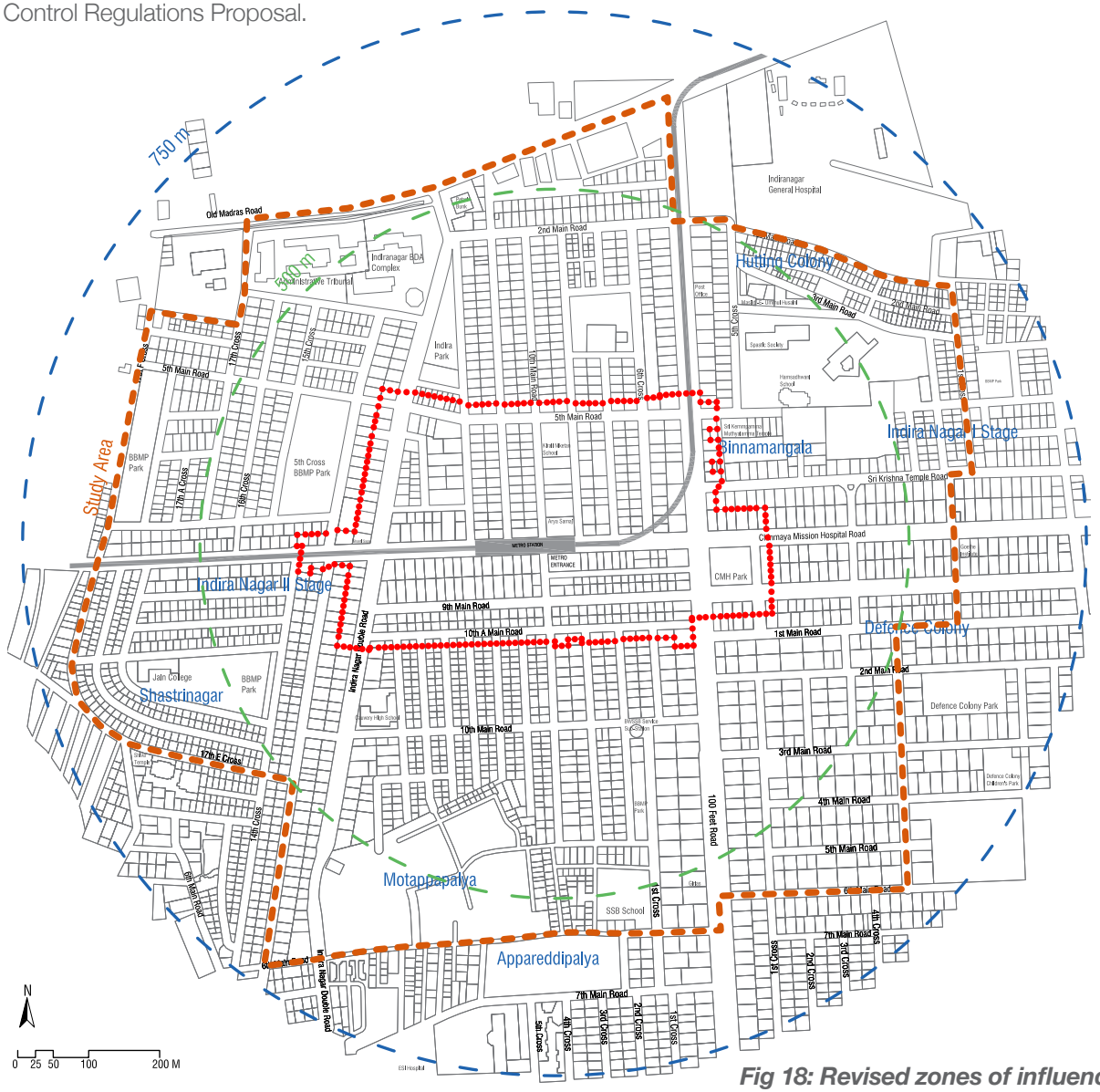


Fig 18: Revised zones of influence

REVISED ZONES OF INFLUENCE

- Revised core zone (150m from outer edge of metro station).
- Buffer zone (approx. 500m or 10 min walking distance from metro station.)

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 safe access.

INDIRANAGAR STATION AREA OVERLAY ZONE

The boundaries of the Indiranagar Station Area Overlay Zone (henceforth referred to as Overlay Zone) correspond to the boundaries of the Demonstration Area defined in the Safe Access proposal.

GUIDING PRINCIPLES

Promote appropriate densities around the station to form compact development.

Design the public realm to enhance pedestrian, bicycle and non motorized transport safe access to the station.

Maintain the station area characteristics.

Ensure public places, activities, and opportunities for living, working and recreation are inclusive.

The primary aim of the Indiranagar Station Overlay Zone is to plan for enhanced safe access to the Metro station and encourage transit supportive development in its vicinity.

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

URBAN DESIGN CONCEPT PLAN

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.

The Urban Design Concept Plan illustrates the existing and proposed elements and their contribution to key strategies for the development of the station area. The elements / features include:

- Development Zones
- Activity Areas
- Street types
- Residential character areas

The Urban Design Concept Plan illustrates the following elements:
A: Development Zones
B: Activity Areas
C: Street types
D: Residential character areas

Fig 19: Urban Design Concept Plan

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

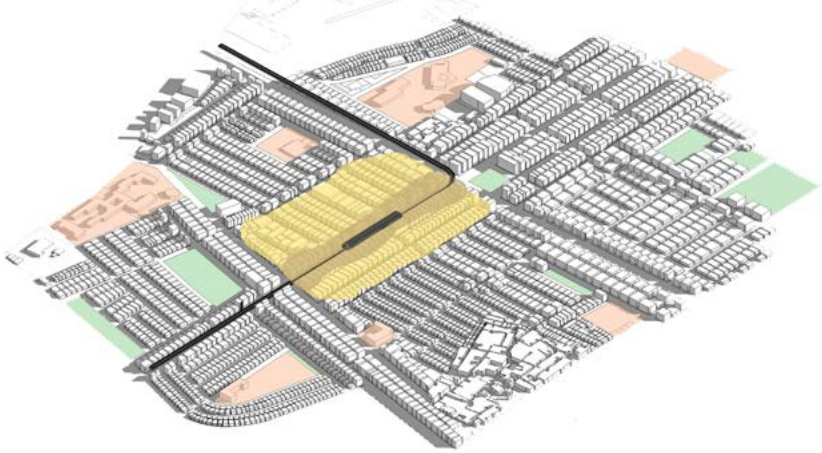


Fig 20

Encourage compact high density mixed use development in proximity to the Metro station within the Core area

Fig 21

Focus increased density along commercial corridors and streets of 15 m and above width within the Buffer area

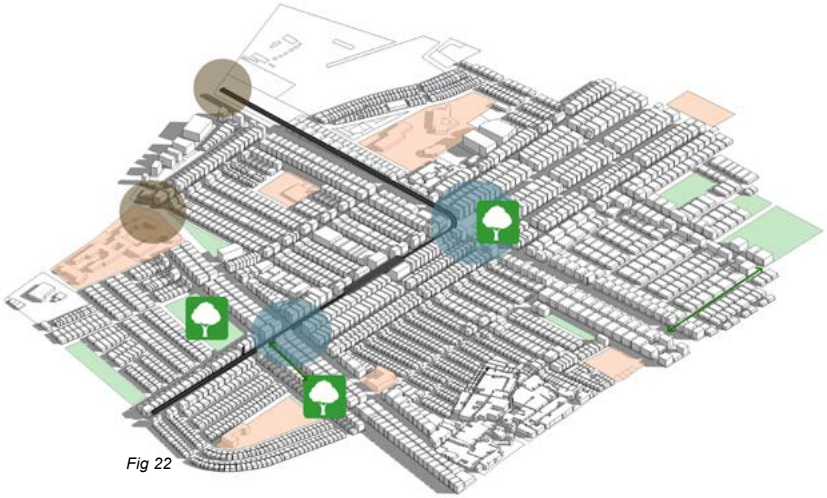


Fig 22

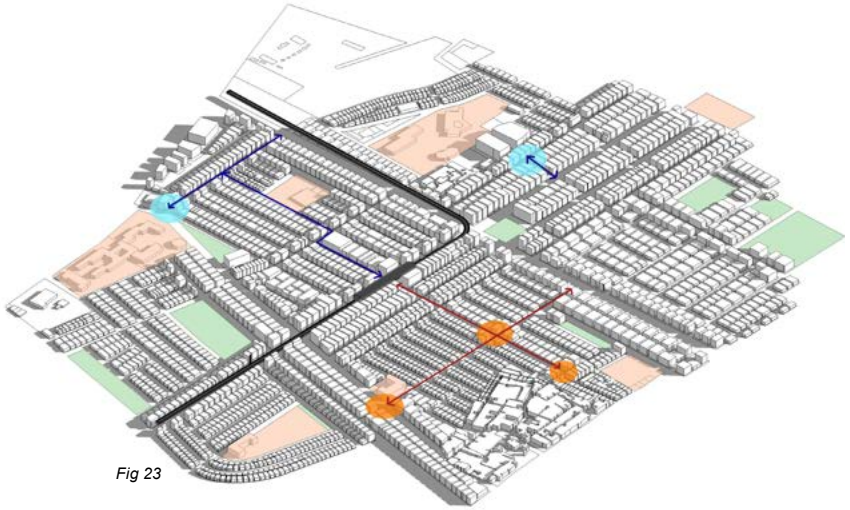


Fig 23

Encourage development of activity nodes at the City level and neighbourhood levels.

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

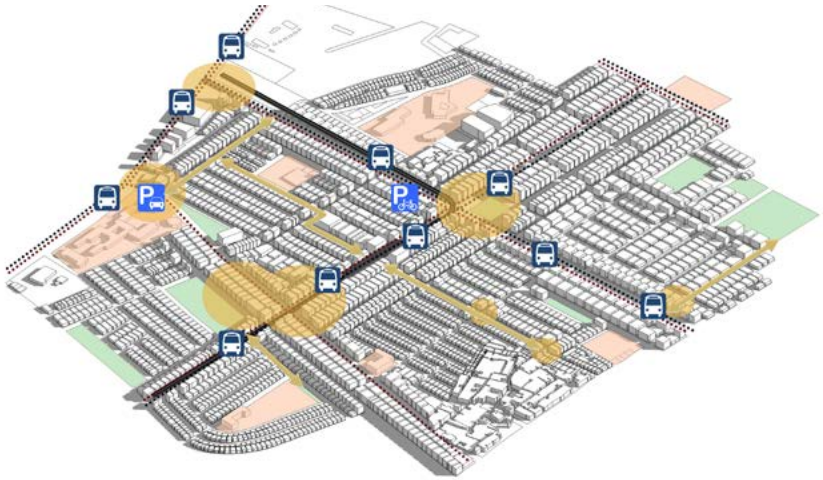


Fig 25

Connect public amenities, parks, activity nodes, transit nodes, commercial corridors, proposed facilities such as the parking garage at the BDA and the residential neighbourhoods to the Metro station through pedestrian priority streets, cycle lanes, and feeder bus service routes.

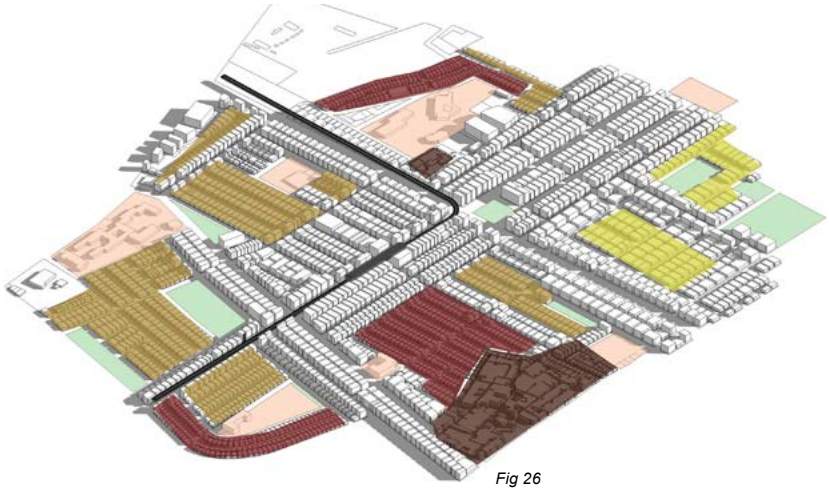


Fig 26

Maintain the character of residential in the Buffer area by requiring the allowed ancillary uses in the Residential Main zone to locate along commercial corridors, along pedestrian priority streets, at activity areas and nodes, and in the Core area.

Fig 27

Design the built form along commercial corridors to facilitate pedestrian oriented activities between the building and the street.

Fig 28

Facilitate street activities (including vending) along the commercial corridors, at the commercial and retail activity nodes, near public institutions, at transit stops, around parks, and along the Metro station in the core area.

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

PROPOSED DESIGN TYPOLOGIES

The urban design plan highlights the various existing and proposed elements that contribute to achieving the vision and strategies. These include development zones and opportunities, residential character areas, proposed street types and public activity areas, which are described below.

DEVELOPMENT ZONES

Fig29: Key Map

This zone encourages high density commercial and mixed use development in proximity to the Metro station and along the commercial corridor of CMH Road, within the Core area.

ACTIVITY AREAS: CITY AND NEIGHBORHOOD LEVEL NODES

Fig32: Key Map

The commercial and retail uses already existing at these intersections are strengthened to form high intensity active areas. These activity nodes are within walking distance from the Metro station.

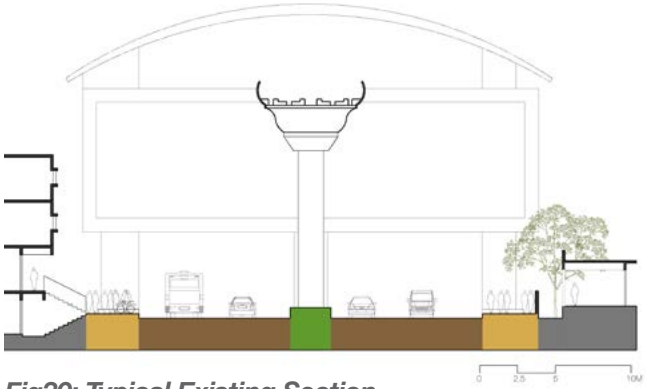


Fig30: Typical Existing Section

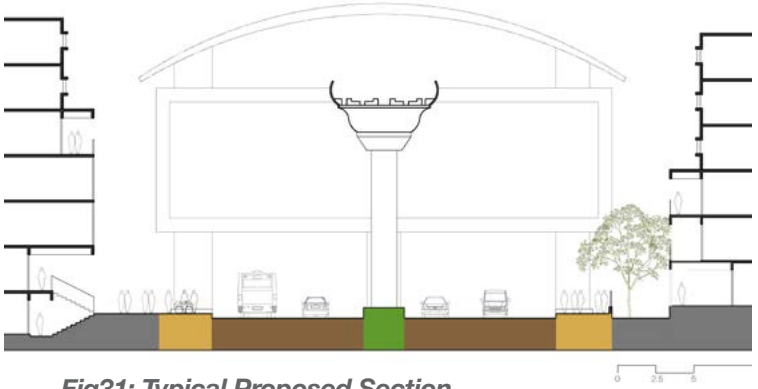


Fig31: Typical Proposed Section

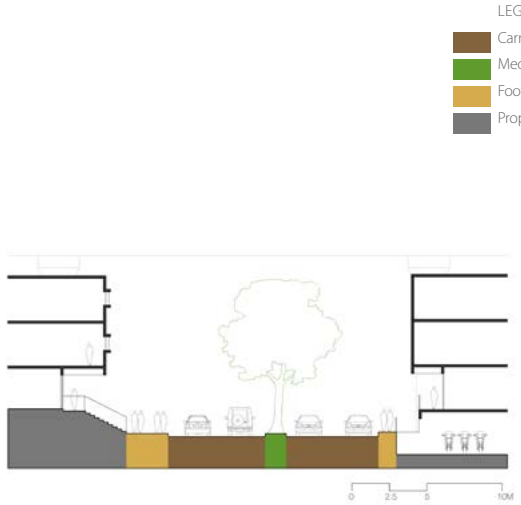


Fig33: Double road and CMH Road : Existing Section

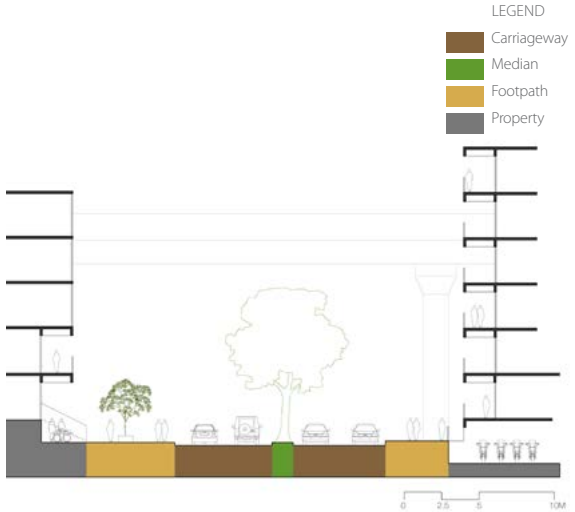


Fig33: Double road and CMH Road : Proposed Section

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

ACTIVITY AREAS: PARK NODES

Fig35: Key Map

The parks in the station area contribute to high level of pedestrian activity. The boundaries of the parks are designed to accommodate informal vending and pedestrian activity. High density housing developments with ground level retail are located around the parks.

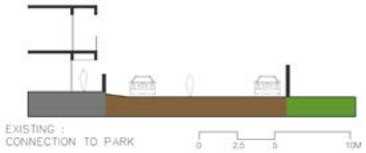


Fig36: CMH Park and 9TH A Main Road : Existing Section

Fig36: CMH Park and 9TH A Main Road : Proposed Section

STREET TYPES:

Fig38: Key Map

The CMH Road commercial axis that has the Metro line is lined with high density retail and commercial uses as described in the Compact Development Zone A. The portions of the CMH Road Commercial and they are in the Buffer area are also targeted for high density development, but of lower intensity that the Core area.

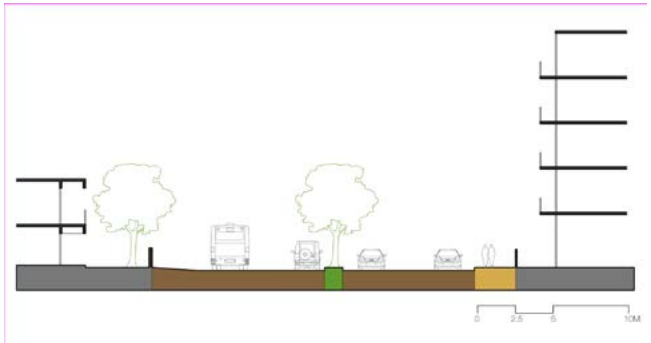


Fig39: Typical Commercial Axis withour Metro : Existing Section

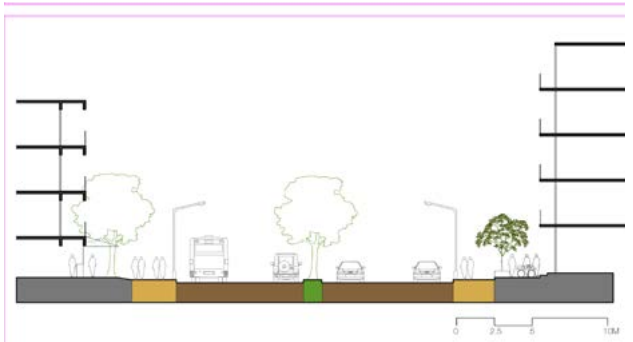


Fig39: Typical Commercial Axis withour Metro : Proposed Section

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

The Plan considers the notification No. UDD 93 MNJ 2008 which addresses the increase in FAR to a maximum of 4 for areas within a distance of 150 m from the Metro Station. This regulation is adapted to the context of Indiranagar after considering the development opportunities and marketconditions".

The intent of Regulating Plan is to guide density of development through incentives and controls that shape the built form, create safe attractive and inclusive public spaces.

Rules applied while formulating the proposal

1.Total built up area for Core Zone calculated on application of UDD Notification, i.e., FAR 4 over 150m zone – Scenario 1.

2.Maximum FAR allotted to the plots along the road providing direct access to the Metro Station.

3.Lower FAR allotted to the remaining plots within the Core based on plot size, road width and proximity to station. However, this remains higher than the FAR applicable in the Buffer zone.

4.Total built up area for Core Zone calculated on application of revised FAR rules – Scenario 2. Difference in built up area between the two scenarios calculated – Balance BUA.

5.Areas demarcated in the Buffer Zone with potential for increase in density based on the Strategies and Zones identified. Number of plots included within the demarcated area to be calculated so as to accommodate the Balance BUA. Difference in built up area as calculated in Step 4 to be assigned to the demarcated area through TDR.

6.Maximum permissible FAR assigned to the demarcated areas in the Buffer Zone according to plot size, road width and connectivity to the Metro Station. This remains lower than the FAR assigned in the Core Area.

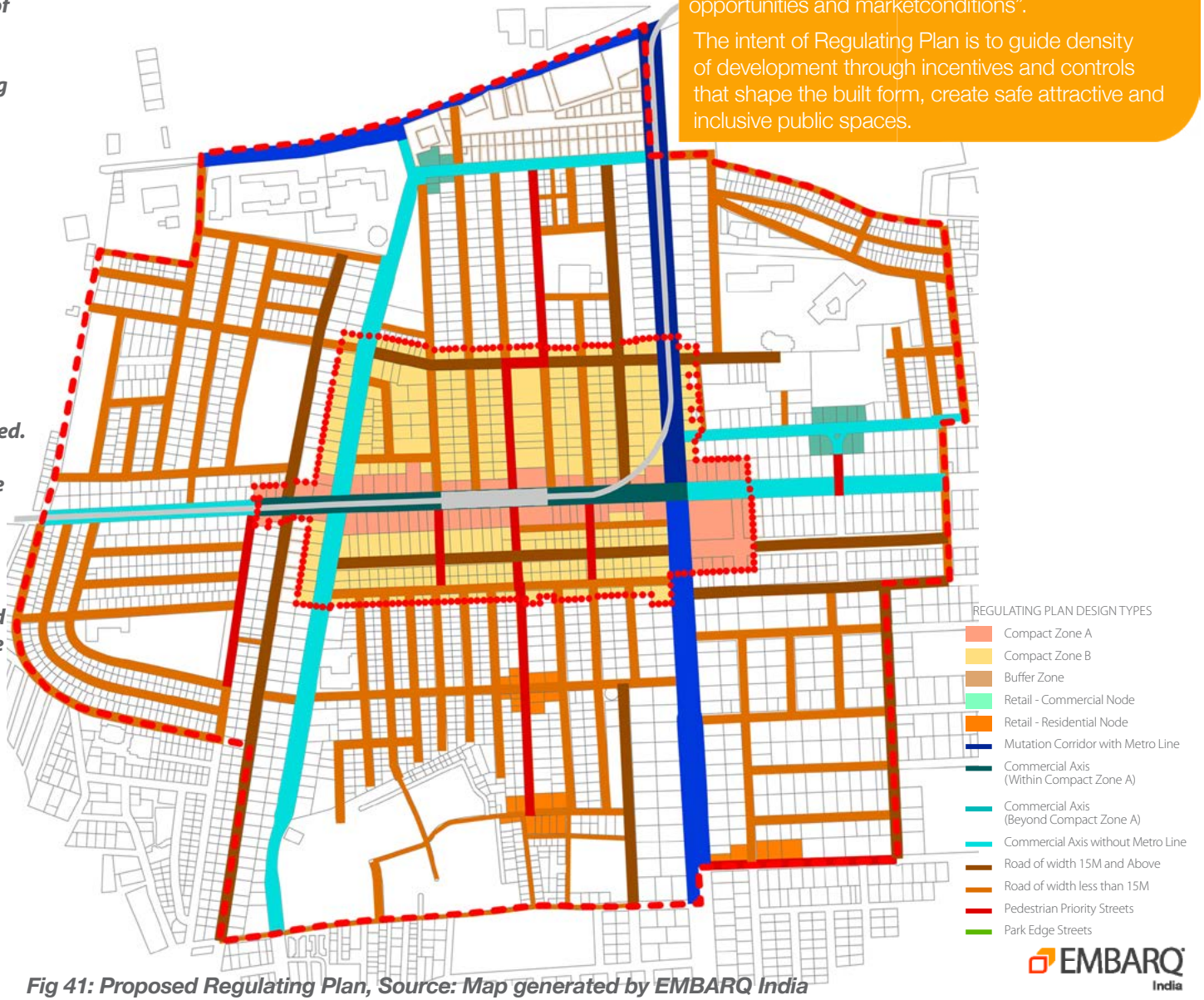


Fig 41: Proposed Regulating Plan, Source: Map generated by EMBARQ India

RECOMMENDATIONS DEVELOPMENT CONTROL REGULATIONS PROPOSAL

3D SIMULATION OF PROPOSAL

Plot Size	Ground Coverage (Compact Zone A)	Ground Coverage (Compact Zone B)	Ground Coverage (Buffer)
0-360	65%	65%	67.2%
360-1000	65%	65%	65%
1000-2000	65%	65%	60%
2000-4000	65%	65%	55%
4000 & above	65%	65%	50%
Land Use	**FAR Range (Compact Zone A)**	**FAR Range (Compact Zone B)**	**FAR Range (Buffer)**
Residential	4.00	2.75 - 3.25	1.75-2.50
Commercial Axis	4.00	3.25	3.00
Mutation Corridor	4.00	3.25	3.25
Public/Semi-Public	4.00	2.75 - 3.25	1.50-2.25
Resulting Density: 453 pph			

The proposal for the Indiranagar Station Area assigns high density to plots on CMH road around the metro station, plots within the core area and all plots along roads of width 15m and above, in addition to the mutation corridor.

Within the core and the buffer area, the density is highest around the important city and neighbourhood level nodes. While the blanket FAR of 4 in the core area shows a 12% increase in density, with respect to the RMP 2015, the proposal shows an increase in overall density of 16% within the station area.

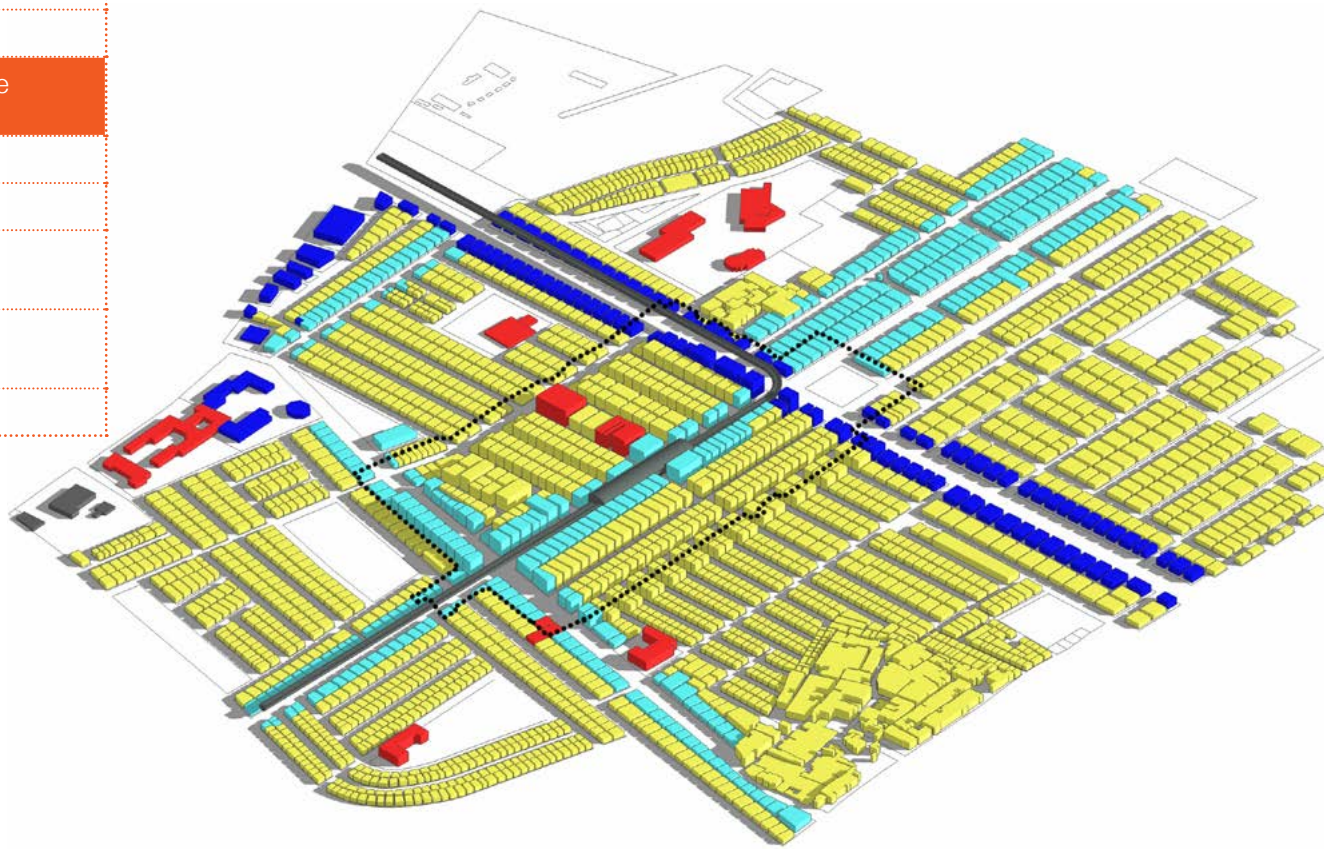


Fig42: 3D Simulation of DCR Proposals

PROJECT TIMELINE ACHIEVEMENTS TILL DATE

Indiranagar metro station safe access project report “Towards a walkable and sustainable Bengaluru” was approved by DULT for scaling up the safe access project across all 40 metro stations in Bengaluru as part of metro phase-1 using the methodology developed by EMBARQ India.

Methodology developed by EMBARQ India for station area safe access project of Indiranagar metro station is used in the RFP document published for selection of consultants to prepare SAPs along Namma Metro stations.

Assisted DULT with technical support to select consultants to prepare SAPs

2012

2013

EMBARQ India helped DULT in writing the Terms of Reference to invite bids from consultants to prepare the Station Area Plans (SAPs) for stations along reach 4-4A.

EMBARQ India’s safe access proposals for Indiranagar metro station has been incorporated in Tender Sure document prepared by India Urban Space Foundation.

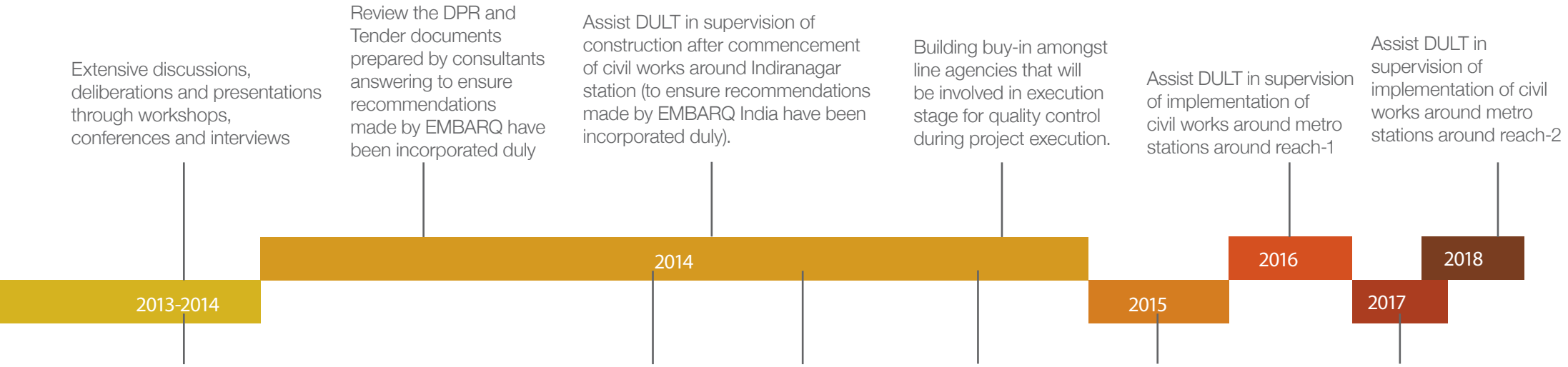
EMBARQ India helped with capacity-building within DULT for doing a Station Area Plan of Swastik metro station. EMBARQ India assisting the DULT team to complete the study for the station by the end of 2013.

PROJECT TIMELINE

NEXT STEPS PLANNED

Scaling up the project to all 40 station areas of phase-1 metro alignment in Bengaluru is going to be taken up in a phased manner and later extend the same to all the proposed station areas of phase-2 and 3 also. DULT is helping in conducting the safe access and DCR recommendation studies around the stations of phase-1 of metro alignment.

DULT, BBMP, BMRCL with the help of multiple parastatal agencies (like BESCOM, BWSSB, BDA, BMTC, BTP, etc.) need to coordinate for the implementation of station area plans. Few of the critical next steps are mentioned below



PROJECT IMPACTS

₹ RS. 1,000 CRORE outlay leveraged by DULT from BBMP

OVER 100,000 PEOPLE have enhanced pedestrian access to the physical environment (35,000 residing in the station area and 70,000 residing in the wards of Hoysalanagara and Jogupalya).

3 ADDITIONAL CITIES in India with upcoming metro follow the guiding framework

3 LIVES/YEAR on an average, are saved after implementation of Indiranagar SAP.*

470 TONNES OF CARBON/YEAR on an average, reduced after implementation of Indiranagar SAP.

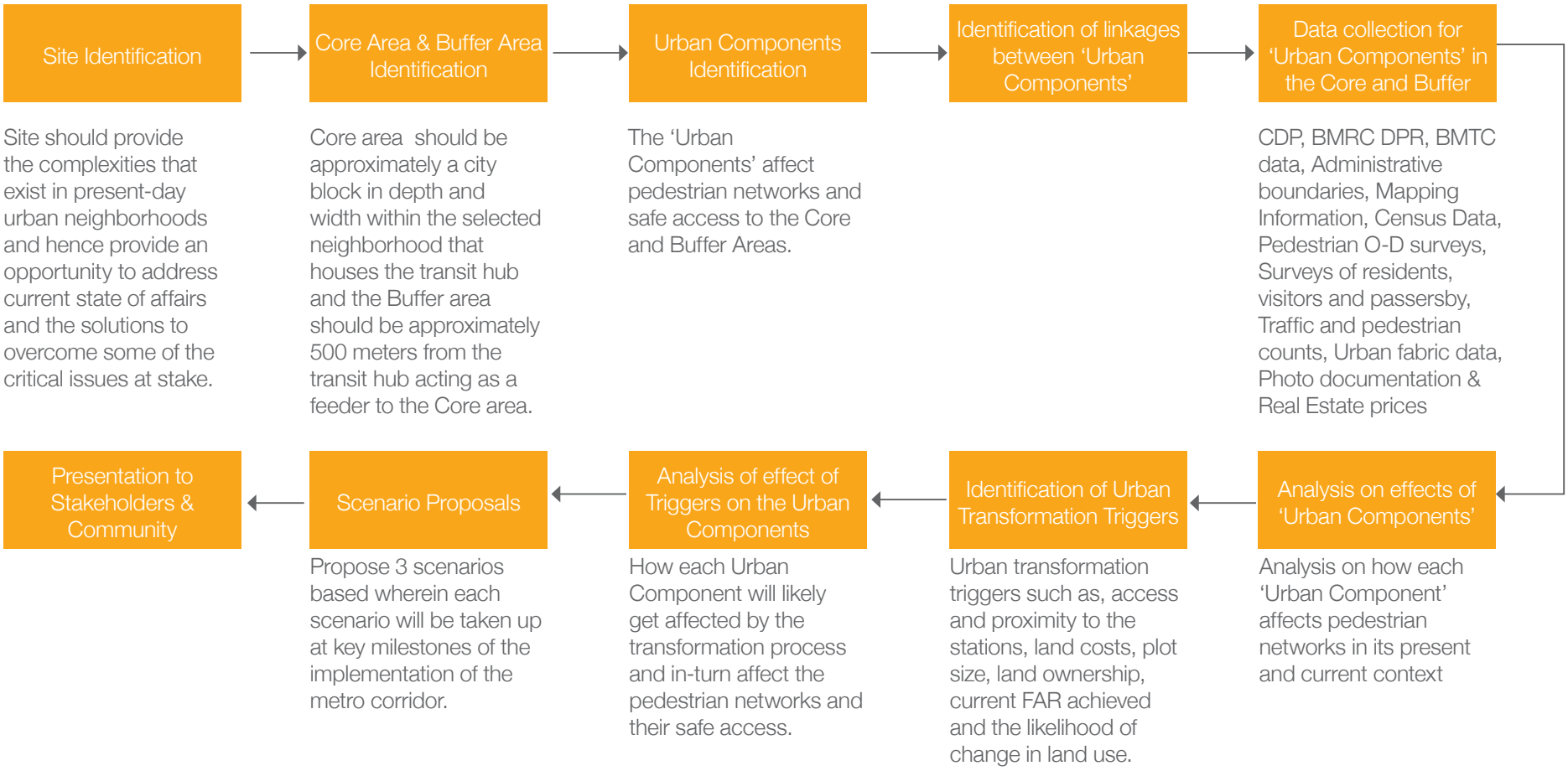
Estimated based on the methodology developed by EMBARQ India

EMBARQ India

APPENDIX

METHODOLOGY FOR Safe access DESIGN

The following are the stages of methdology used in the Safe Access Design:



APPENDIX

METHODOLOGY FOR Safe access DESIGN

The following are the stages of methdology used in the Safe Access Design:

COMPONENTS THAT INFLUENCE URBAN TRANSFORMATION

Urban Components have a direct impact on the pedestrian networks that exist in a city and thus have a bearing on the safe access to mass transit nodes such as bus stops and metro stations. They are as follows:

1 **Physical**

LAND USE	URBAN FABRIC	MOBILITY NETWORKS	STREET ENVIRONMENT
Interpreting land use as defined by pedestrian mobility	Floor Area Ratio (FAR), Land Ownership, Building height, Building use, Setbacks, Ground coverage, Open spaces, Infrastructure, Natural features and environment, Green cover, Legibility of the place	Road networks and hierarchy, Traffic volume studies, Parking, Existing modes of transport, Bicycle networks, if any	Pavements, Lighting, Public toilets, Surface treatment, Age/gender usage, Safety and security

2 **Institutional**

- Administrative boundaries
- Responsible agencies
- Identification of statutory documents
- Resident welfare associations and civil societies

3 **Economic**

- Economic generators
- Supply and demand diagram
- Nature of economy
- Occupational Heritage, if any

4 **Intangible (social & cultural)**

- History and evolution of the settlement
- Demographic distribution of communities
- Spatial organization of communities in the precinct
- Customs, traditions, beliefs, rituals and festivals
- Identity of the precinct

APPENDIX

METHODOLOGY FOR DCR PROPOSAL

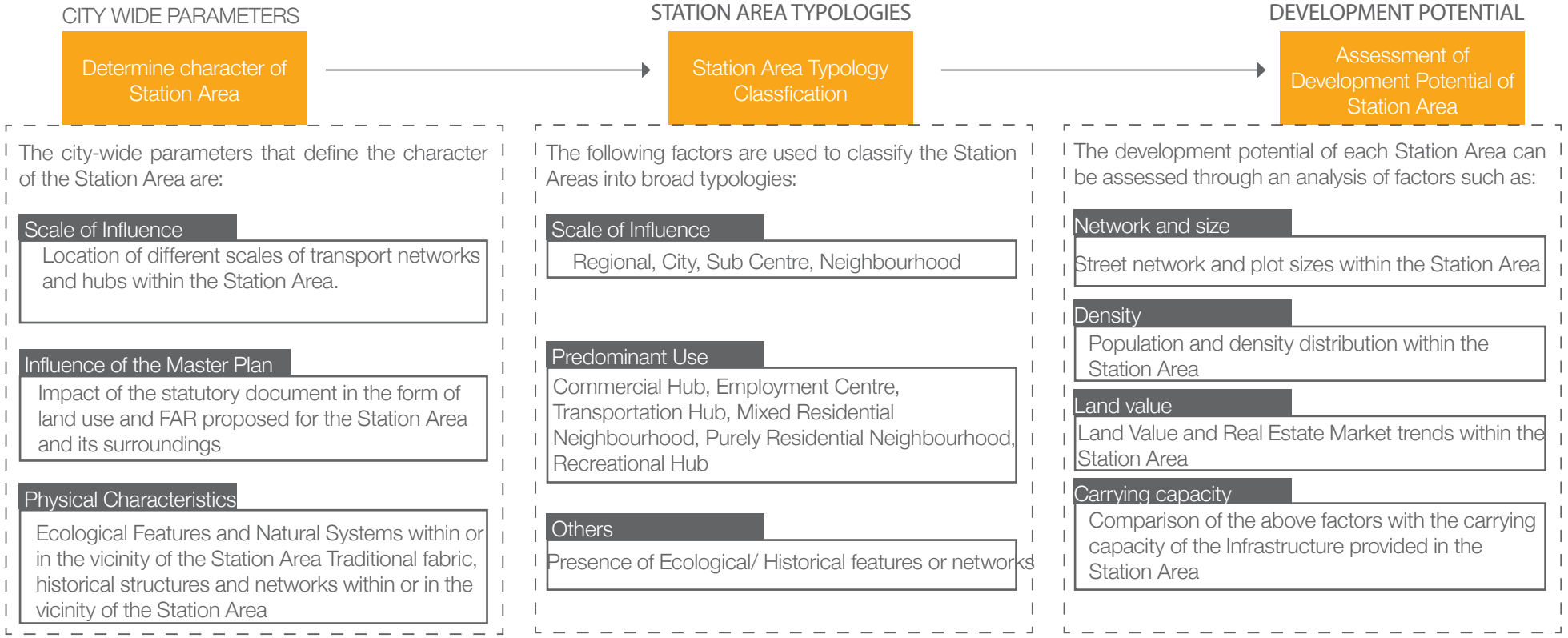
The DCR proposal considers the impact of the Metro stations along Phase 1 of the Metro line. The line passes through a wide variety of localities and neighbourhoods in Ring 1 (areas within Core Ring Road) and Ring 2 (areas within Outer Ring Road) of the city.

Each neighbourhood varies in size, scale and character defined by a number of "Urban Components" i.e., physical, economic, institutional and cultural factors. They are a combination of existing conditions, patterns of change over the years and potential for future growth within the scope of the Master Plan.

While most of the urban components differ from one neighbourhood to another, a few parameters common to all areas within the city can be used to compare the stations across the different Metro lines.

CITY LEVEL ANALYSIS

Areas falling within 500 -750m of the Metro Stations are considered as the influence zone for the study and defined as Station Area.



APPENDIX

METHODOLOGY FOR DCR PROPOSAL

STATION LEVEL ANALYSIS

After the city level analysis, it is suggested that the following methodology be used to analyse the particular station area. This methodology was used for Indiranagar Metro Station Area analysis which ultimately led to the identification of specific issues and areas for intervention.

1. Station Area Boundary Demarcation → 2. Data Collection → 3. Review of Statutory Documents → 4. Simulation of Ground Conditions → 5. Inferences from Scenario Comparison → 6. Identification of Areas for Intervention

1. STATION AREA BOUNDARY

Demarcation of Station Area boundary through rationalisation of the 500m radius around the Metro Station to follow major features such as roads, railway lines or drains and to include any structures or zones lying just outside this zone if they have an impact on the Station Area.

2. DATA COLLECTION

i. Plot sizes and street networks
ii. Current land use
iii. Current building heights
iv. Building typologies based on predominant land use
v. Façade Characteristics of buildings along major streets
vi. Vacant land, buildings under construction and new constructions
vii. Environmental constraints (if any)
viii. Heritage Components (if any)
ix. Market values
x. Activity generators
xi. Informal activities
xii. Pedestrian Volume counts at important locations
xiii. Perception of residents and investors
xiv. Origin and destination details of Metro Users
xv. Investment in infrastructure

3. REVIEW OF STATUTORY DOCUMENTS

i. Proposed Land use
ii. Proposed zonal regulations, including FAR and parking
iii. Any specific regulations applicable to the Station Area
iv. Guidance Value

4. SIMULATION OF GROUND CONDITIONS

i. Before or during Metro construction and post announcement of the alignment
ii. After opening of corridor/station or the current scenario (if station is not yet opened for use)
iii. projected scenario for 2015, the time horizon of the Revised Master Plan for Bengaluru (RMP 2015).

5. INFERENCES FROM SCENARIO COMPARISON

i. Pattern of change in land use and building heights over the years
ii. Deviation on ground from the proposals of the Master Plan
iii. Relation between plot sizes and street network with land use and FAR, market trends and the pattern of change.
iv. Relation between formal and informal activities and pedestrian movement patterns.
v. Relation between population density distribution and carrying capacity of the infrastructure.

6. IDENTIFICATION OF AREAS FOR INTERVENTION

i. Areas or attributes that need to be conserved
ii. Areas with potential for growth
iii. Areas requiring specific regulations
iv. Areas with constraints

APPENDIX DCR PROPOSAL MATRIX

	GUIDING PRINCIPLE	STRATEGY	RELEVANT STUDY
Compact Development: 	Encourage high density development and mixed use in close proximity to the Metro Station and along major commercial corridors linking to the Metro Station	Zoning for high density development in the immediate vicinity of the Station and requiring a percentage of residential uses and commercial uses along selected corridors	"Station Area Transformation | Land Use Market Analysis"
	Increase opportunities for retail and commercial uses to locate along major commercial corridors and minor commercial axis	Requiring a percentage of commercial uses along the commercial corridors	"Station Area Characteristics | Density Distribution Station Area Characteristics | Plot Size Station Area Characteristics | Street Networks and Sidewalks Station Area Transformation | Floor Area Ratio Station Area Transformation | Land Use ; Market Analysis "
	Promote increased residential development in areas with opportunities for multi-dwelling de velopment	Increasing the density (FAR) in selected locations where opportunities for development	"Station Area Characteristics | Density Distribution Station Area Characteristics | Plot Size Station Area Characteristics | Street Networks and Sidewalks Station Area Transformation | Floor Area Ratio ; Market Analysis "
	Identify and respond to causes for and effects of deviations from the existing zonal regulations, where appropriate	Proposing to develop a hybrid of existing regulations and adding new regulations to meet the objectives and vision of the station area, through the Overlay Zone	"Station Area Transformation | Floor Area Ratio Station Area Transformation | Land Use"
	Recognise the urban transformations in land use and development occurring in the area (residential to mixed use, and single homes to multi-dwelling) and consider them in the proposals where suitable	Selecting corridors and activity nodes for enhancing mixed use based on the urban transformation trends	"Station Area Transformation | Land Use Station Area Transformations | Construction Activity Station Area Activity Patterns | Activity Generators"
	Respond to the market conditions and capitalize on the development potentials of the area	Maintain residential areas where the market for these housing types exist and provide incentives to include affordable housing	"Market Analysis Station Area Transformations | Construction Activity"
	Consider people's perception of the development of the area	Proposing a cautious approach to the UDD notification of 4FAR within 150 m of the Metro station and tailoring it to the existing urban fabric	Station Area Public Perception
	Ensure that the proposed development can be supported by the existing and proposed infrastructure facilities of the area	Proposing increased FAR along wider roads and for larger plots, capable for redevelopment	Station Area Carrying Capacity
Street design and Access 	Ensure that the streets connecting the residential areas to the Metro station are pedestrian friendly	Selecting specific streets and proposing development and design regulations to make them a priority pedestrian walkways	"Station Area Activity Patterns | Pedestrian Movement Patterns Station Area Activity Patterns | Activity Generators Station Area Activity Patterns | Informal Activities"
	Enhance connections between public amenities, such as parks, open spaces, bus stops, public institutions, schools and colleges, and the Metro station	Selecting specific streets and proposing development and design regulations to make them a priority pedestrian walkways	"Station Area Activity Patterns | Pedestrian Movement Patterns Station Area Transformations | Land Use Station Area Activity Patterns | Activity Generators Station Area Activity Patterns | Informal Activities"
	Provide for strengthening of the accessibility proposals from the report "An Accessibility Project for Indiranagar Metro Station, 2011".	Considering the accessibility proposals made for the intermediate time frame to develop policy and regulations for the Overlay Zone	"An Accessibility Project for Indiranagar Metro Station EMBARQ India, 2011"
	Plan for informal activity and vending, especially in areas where a market for it exists, i.e. in the vicinity of public amenities and the Metro station and along major pedestrian corridors	Identifying vending zones and accommodating them in the street and building design	"Informal activity documentation and analysis Station Area Activity Patterns | Informal Activities"
Area Character: 	Protect the existing plotted residential character, green areas, and typologies of single homes	Retaining the land use regulations of the Residential Main zone while not permitting the ancillary uses to locate in the single family units residential area	Station Area Characteristics | Residential Building Typologies
	Contain the mixed use development along specific corridors and nodes of activity, and maintain the existing residential character	Selecting corridors and activity nodes for enhancing mixed use based on the urban transformation trends. Focusing the mixed uses on the pedestrian priority streets.	"Station Area Transformations | Land Use Station Area Activity Patterns | Activity Generators Station Area Activity Patterns | Informal Activities"
	Reduce conflicts between auto-oriented and pedestrian-friendly uses	Regulating auto oriented land uses by prohibiting them & reduce parking requirements within the station area	"Station Area Transformations | Land Use, RMP 2015"
	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	Retaining the land use regulations of the Residential Main zone for the traditional and high density residential areas	"Station Area Characteristics | Residential Building TypologiesStation Area Public Perception Market Analysis "

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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
PPH	Persons Per hectare

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