GUIDELINES FOR URBAN REGENERATION IN INDIA THROUGH PARAMETERS OF LANDSCAPE TRANSFORMATION

Samir Mathur[1], Aastha Singh[2], Sunetra Surabhi[3]

[1] Principal Landscape Architect, Integral Designs; Convener, Standing Committee on National Building Code 2016; *International Member of American Society of Landscape Architects; Fellow, Indian Society of Landscape Architects; Fellow, Indian Institute of Architects; Former Member of DUAC, New Delhi, India, [2]Design Director, Integral Designs; [3] Associate, Indian Society of Landscape Architects; Design Director, Integral Designs.*

THE AUTHORS

Samir Mathur *Director/ Principal Landscape Architect, Integral Designs*

Samir Mathur was trained as a landscape architect in the United States, and moved to India in 1993. Over the last 30 years, he has made a significant impact in the profession of landscape architecture in India. At his firm, Integral Designs, he has explored the challenges of planning, design and implementation of contemporary landscape design in India. In academia, he has articulated a sustainable vision for the challenging urban landscape environment in the megacities of India.

Sunetra Surabhi *Design Director, Integral Designs*

Sunetra Surabhi has an extensive management and design experience in Landscape architecture working on both public and private projects in India. Her key areas of interest lie in efficient water management systems in large developments and valuation of ecosystem services. As an urbanist, she believes in the potential of shared public realm as key to solving problems in cities and the role of landscape architect as an ensurer of high quality urbanscapes.

Aastha Singh *Design Director, Integral Designs*

Aastha Singh is a trained Architect and Landscape Architect. With over a decade of experience in both academia and landscape architecture practice, Aastha aims to integrate research and practice to develop a sustainable model for rapidly urbanizing cities that respects and integrates the culture and history of those places. Her interest lies in grassroot change to establish Landscape Urbanism as the future direction for Sustainable Cities.

OTHER PROFESSIONAL INVOLVEMENTS

National Building Code 2016
Integral Designs has played an integral part in drafting the landscape guidelines for the new National building code 2016. The National Building Code of India (NBC), a comprehensive building Code, is a national instrument providing guidelines for regulating the building construction activities across the country.

Heritage Conservation Committee
Samir Mathur has previously been an active member of the Heritage Conservation Committee since 2013. Heritage Conservation Committee (HCC) is a committee setup under the chairmanship of Special Secretary / Additional Secretary, Ministry of Urban Development as per provisions of Section 23 in Delhi Building Byelaws, 1983(Clause 7.26 of the Unified Building Bye Laws for Delhi 2016) for protection of Heritage Buildings, Heritage Precincts and Natural features in Delhi.

Delhi Urban Arts Commission
Samir Mathur is also a member of the Delhi Urban Arts Commission. Delhi Urban Art Commission, set up in May, 1974 is mandated with preserving, developing and maintaining the aesthetic quality of urban and environmental design with in Delhi. The Commission scrutinizes various building and engineering proposals from the perspective of city aesthetics and advices urban local bodies like the Delhi Development Authority, New Delhi Municipal Committee and the three Municipal Corporations of Delhi. It also initiates studies on development and beautification of any areas in Delhi.

School of Planning and Architecture
An active member in academia, Samir Mathur has been visiting professor at the School of Planning and Architecture since 2000. The past 17 years, he has taught many graduating batches of masters students at the landscape department. He frequently is invited as a jury member across Delhi colleges.

INTEGRAL DESIGNS

Integral Designs was established in 1994 with the main objective of providing high quality sustainable landscape design services. Integral designs is headed by Ar. Samir Mathur, a landscape architect who has done his masters program at the university of Massachusetts at Amherst, USA along with Er. Bela Mathur an electrical engineer who has done her specialization in electrical system & lighting design.

We are industry leaders in the field of Landscape Architecture, Urban Planning and MEP Services. With over 20 years of experience in the field of construction, and over a 100 completed projects and 160 ongoing ones, we are focused on design innovation and environmental planning.

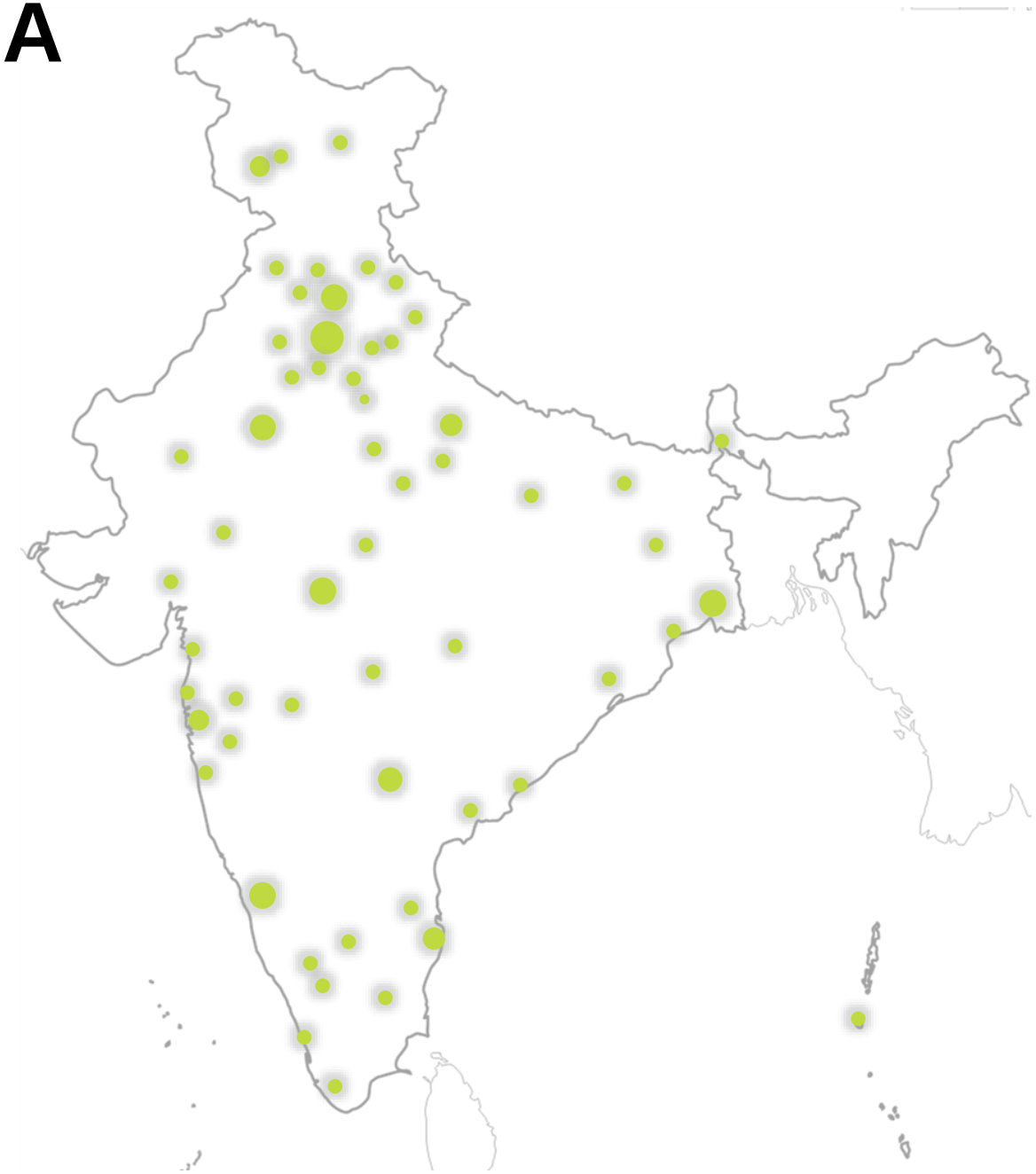
What started as a small office of 4 people has now blossomed into a flourishing firm of over 60 dedicated professionals comprising of landscape architects, architects, MEP engineers, 3-D artists, horticulturists and site engineers with our Our head office in New Delhi and office in Pune . We guarantee complete design solutions from the concept stage through government clearances right up to execution for all our clients.

Our clients range from private homeowners, government agencies to real estate companies. We have worked with prominent Indian and International architecture firms, Industry leaders in construction and real estate. Our projects span across India, from small towns to big metropolitans. In the past 6 years, we have also ventured outside India, with projects in Hanoi, Bali, Surabaya, Dominica and South Africa.

AROUND THE GLOBE

PROJECTS ACROSS INDIA

AGRA
AHMEDABAD
ALIBAGH
ALIGARH
ASANSOL
AURANGABAD
BAKOLI
BANGALORE
BAPROLA
BARASAT
BHOPAL
BHUBANESHWAR
CALCUTTA
CHANDIGARH
CHANDIVILI
CHATTARPUR
CHENNAI
COCHIN
COIMBATORE
DARUHERA
DEHRADUN
DHARMAHERA
DULHERA
DWARKA
FARIDABAD
GAJRAULA
GANPATIPULE
GHAZIABAD
GOA
GREATER NOIDA
GULMARG
GURGAON
HAMIRA
HYDERABAD
INDIRIPURAM
INDORE
JAIPUR
JALANDHAR
JAMSHEDPUR
JHANSI
JODHPUR
KAKANAD
KANGRA VALLEY
KANPUR
KASAULI
KHARAR
LEH
LUCKNOW
LUDHIANA
MANESAR
MOHALI
MULLANPUR
MUMBAI
MUSSOORIE
NAGPUR
NAJAFGARH
NASHIK
NATHDWARA
NEEMRANA
NEW DELHI
NOIDA
OOTY
PALWAL
PANCHKULA
PANIPAT
PATIALA
PITAMPURA
PORTBLAIR
PUNE
PURSENI
RAIGADH
RAJOKRI
RISHIKESH
ROHTAK
SANTACRUZ
SHIMLA
SILIGURI
SONIPAT
SRINAGAR
TADOBA
TIRUPATI
TRIVANDRUM
UDAIPUR
VARANASI
VASAI
VIJAYWADA
VISHAKHAPATNAM
VRINDAVAN
WARORA
WEST BENGAL



MARRIOTT SIGNATURE ANICHI| PICARD, DOMINICA

LOTTE MALL| HANOI, VIETNAM

SOLINTI| JOHANNESBURG, SOUTH AFRICA

ONE GALAXY| SURBAYA, INDONESIA

VILLA OF LIGHT| BALI, INDONESIA

CANOPI RESORT & CHILL COVE| BINTAN, INDONESIA

THE KHYBER- MOUNTAIN RESORT & SPA| GULMARG

THE ROSEATE (DUSIT DEVARANA)| NEW DELHI

ANANDA IN THE HIMALAYAS| RISHIKESH

PLANET HOLLYWOOD BEACH RESORT | GOA

PULLMAN NOVOTEL| AEROCITY, NEW DELHI

NOVOTEL HOTEL| BANGALORE

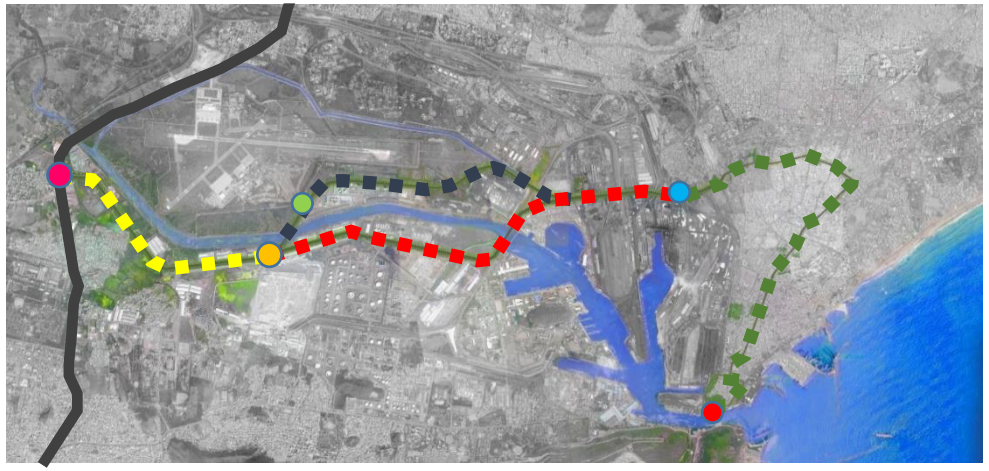
2

HOSPITALITY

SPORTS CITY | GREATER NOIDA

URBAN GREEN FRAMWORK| LUTYEN'S ZONE

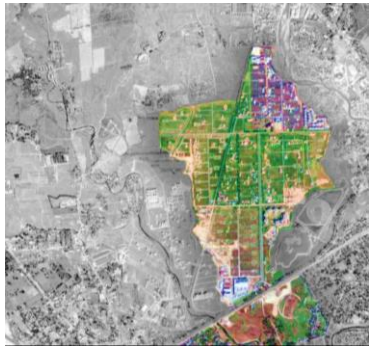
DELHI AEROCITY HOSPITALITY DISTRICT| DELHI



VISHAKAPATNAM PORT REJUVENATION| ANDHRA PRADESH

3

MASTERPLANNING



UTTORAYON| SILIGURI

GOLF FORESTE| GREATER NOIDA

EMAAR GOMTI GREENS| LUCKNOW

EMAAR CONTINENTAL CITY| INDORE

DLF BELLA GREENS| BEGUR

DLF SAMARAYA| GOA

ANTARA SENIOR LIVING| DEHRADUN

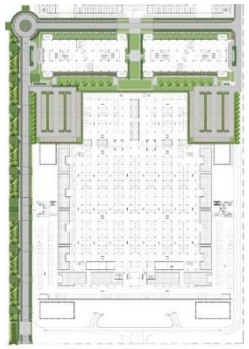
FORTUNE CITY | KOLKATA

COMMONWEALTH GAMES VILLAGE| NEW DELHI

ATS PRISTINE| NOIDA, SCE 150

GODREJ SOUTH ESTATE| NEW DELHI

5 CONDOMINIUMS



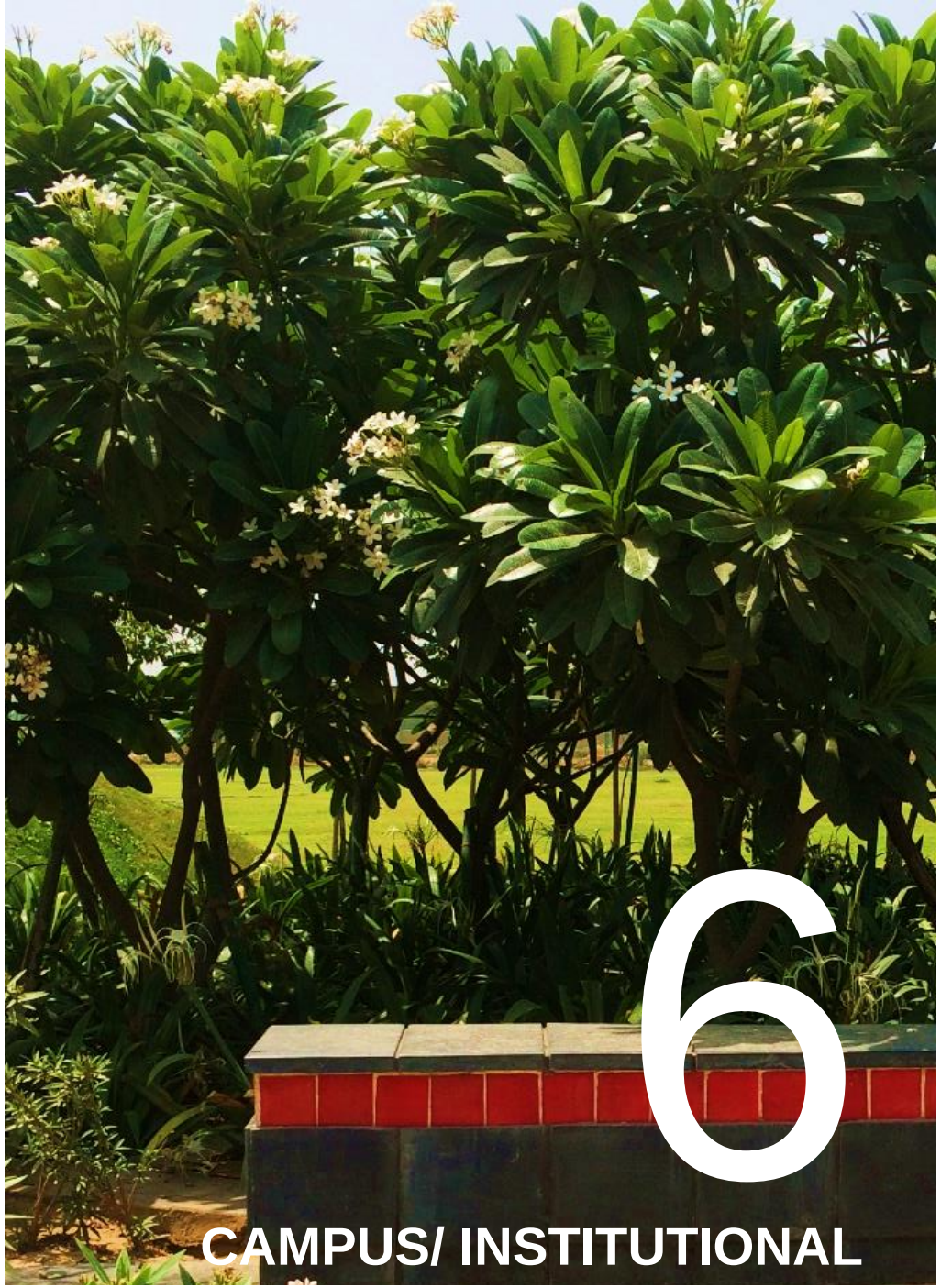
BENNETT UNIVERSITY| GREATER NOIDA

MALAYSIAN HIGH COMMISSION| NEW DELHI

THAPAR UNIVERSITY| PATIALA

PATHWAYS SCHOOL| GURGAON & NOIDA

IIM| NAGPUR



6

CAMPUS/ INSTITUTIONAL

MAKER MAXITY| MUMBAI

DAINIK BHASKAR HEADQUARTER| NOIDA

WIPRO CAMPUS| BENGALURU

WIPRO CAMPUS| HYDERABAD

HCL TECHNOLOGIES| LUCKNOW

7

CORPORATE & IT

MALL OF INDIA| NOIDA

BHARTI WORLDMARK| NEW DELHI, AEROCITY

SHIPRA MALL| GHAZIABAD

PHOENIX MARKET CITY| INDORE

PHOENIX MARKET CITY| LUCKNOW

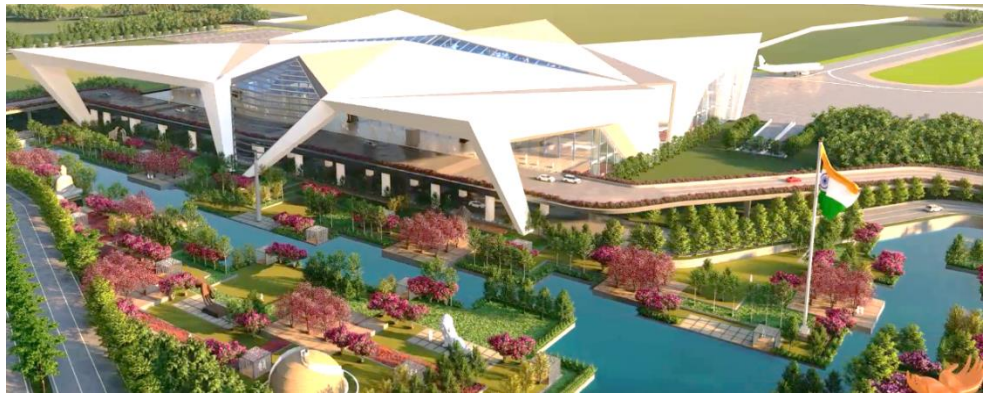
8

RETAIL/ COMMERCIAL

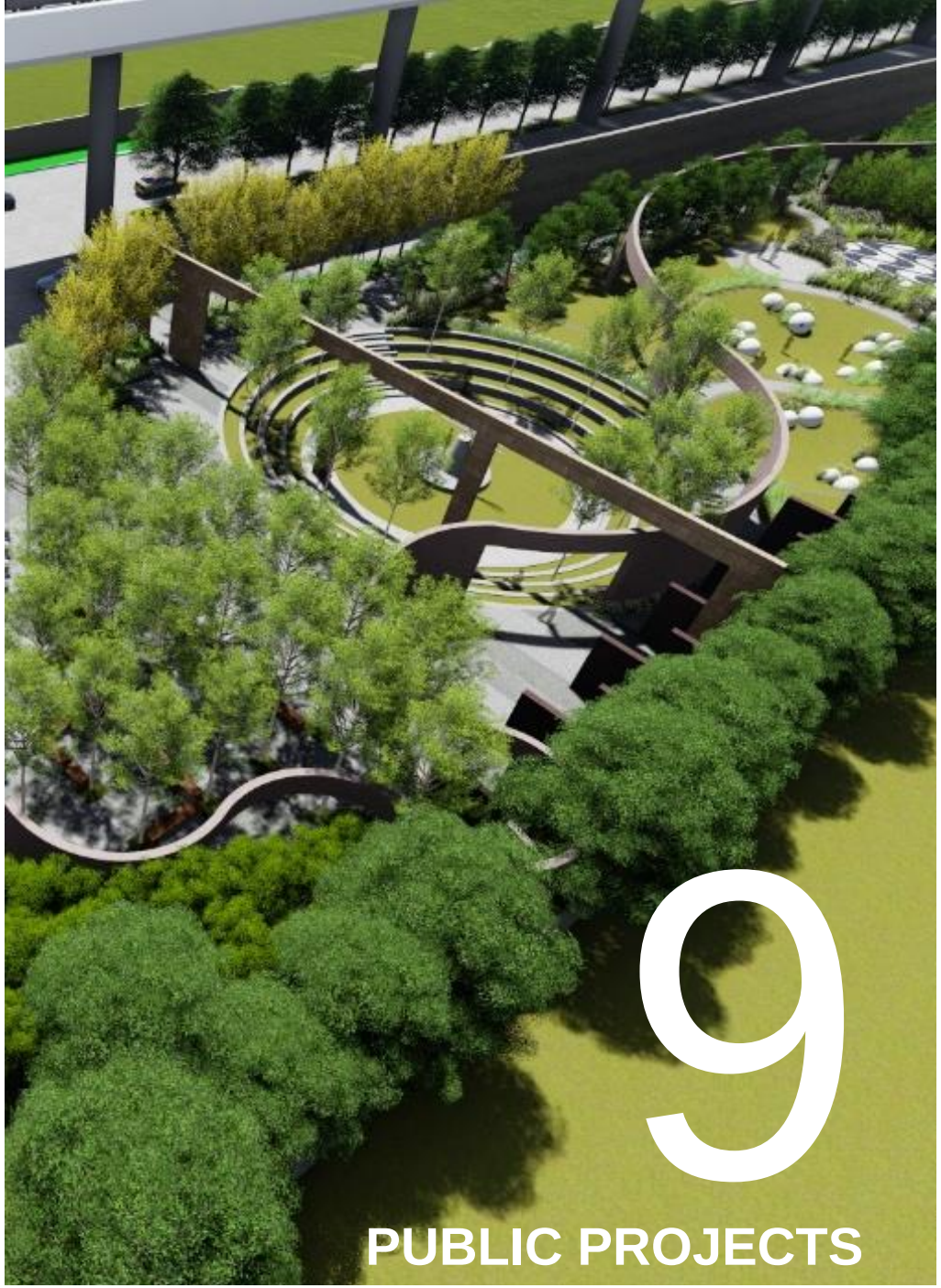
MOTI JHEEL| KANPUR

JUDICIAL DISTRICT COURTS| SAKET | DWARKA

ZERO MILESTONE HERITAGE WALK| NAGPUR



BHITA AIRPORT| PATNA



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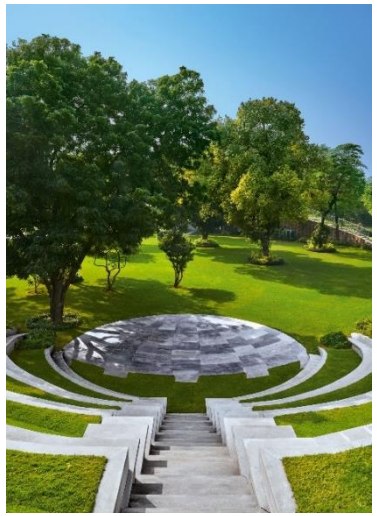
PUBLIC PROJECTS



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PRIVATE RESIDENCES

INTRODUCTION

OVERVIEW

AIM

To suggest a comprehensive strategy for the redevelopment of GPRA colonies that ensures minimum tree-cut , efficient parking strategy, pedestrian friendly & sustainable mobility networks, preservation of native plant species, increase of green areas over hard paved areas and efficient building core design. To establish a catalogue of benchmarking criteria to be used as a guiding framework for future resilient and sustainable urban regeneration interventions in India.

OBJECTIVES

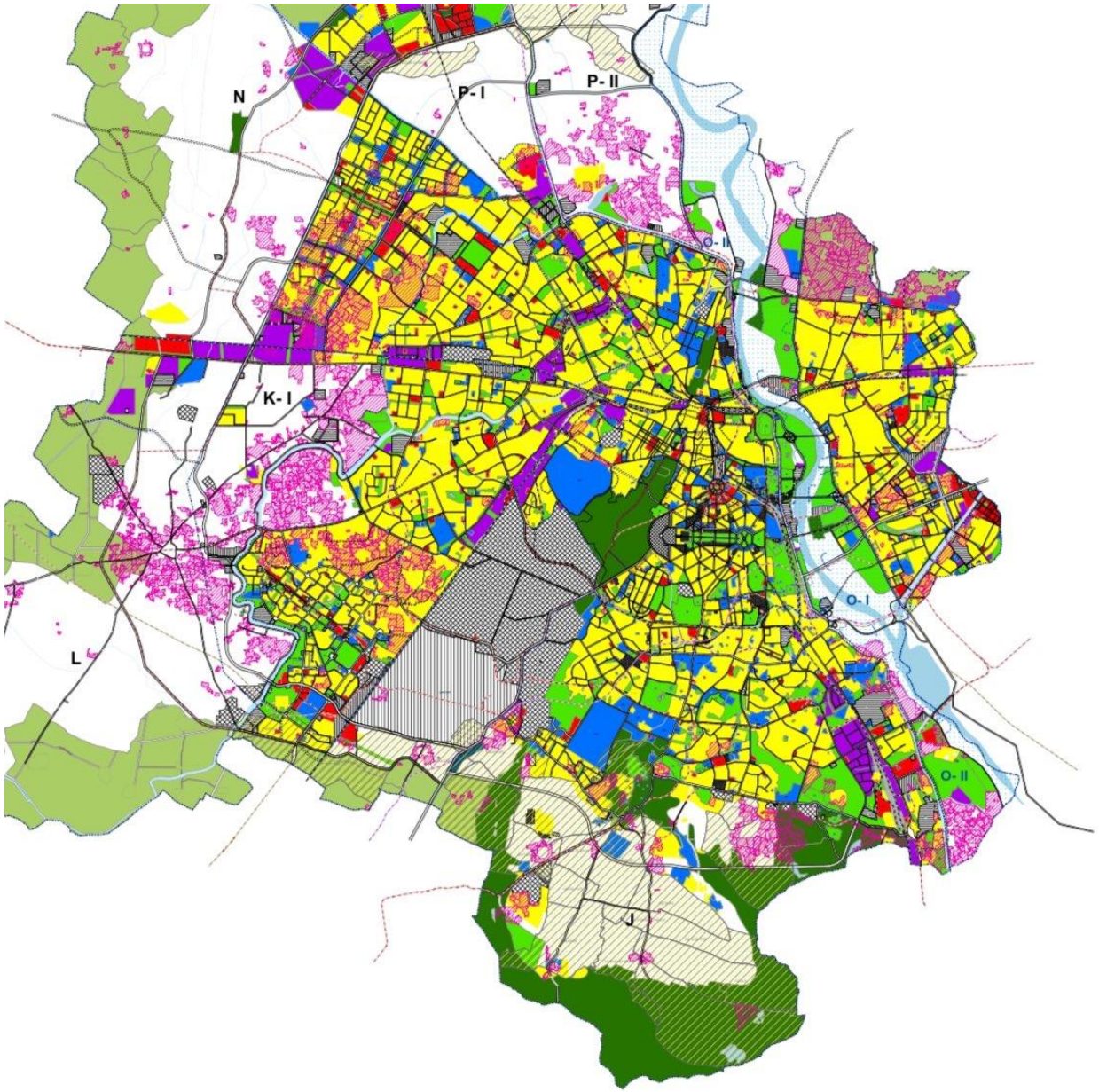
1. EFFICIENCY FACTORS DERIVATION TO ADDRESS Loss of trees, Lack of efficient and adequate parking facilities, Lack of walkable zones, Loss of ecology (native plant species), Excessive run-off due increase in impervious surfaces, and Inefficient core designs leading to excess ground coverage

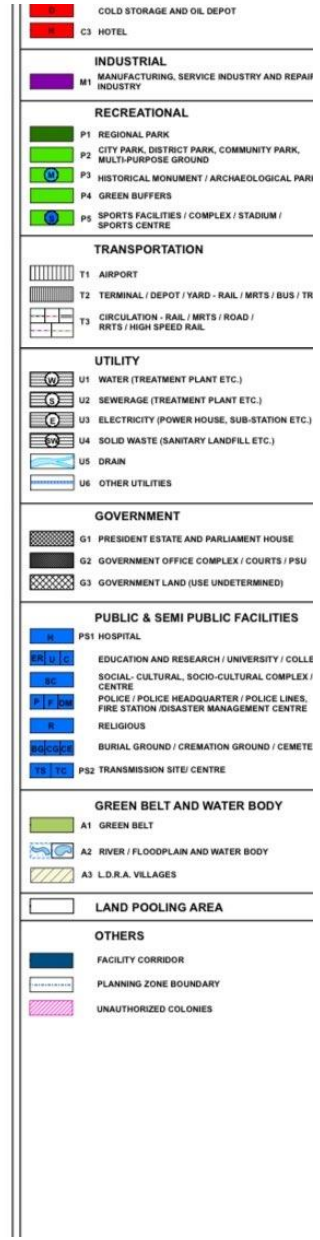
2. ASSESSMENT INDEX FORMULATION (PROFORMA) To guide future redevelopment projects in terms of quantitative and qualitative parameters

3. DEMONSTRATION of feasible densities (conceptual) of colonies with scope of redevelopment in the future.

A study of the GPRA Colonies (Delhi Urban Arts Commission 2020) was also taken up by DUAC from 2019-2020 which was led by Samir Mathur as the Principal Investigator during his tenure at DUAC. The subsequent work was carried out by the authors of this report from 2021-22.

REGULATORY REQUIREMENTS





Source: MPD 2041

MASTER PLAN DELHI 2041

Key Features of the MPD 2041

Six objectives of the MPD:

01 Prioritizing Environmental Sustainability:
Prioritize environmental concerns and focus on rejuvenation of natural assets, reducing pollution, greening of built environments, supporting green economies like urban farming, and creating a diverse portfolio of natural and planned open spaces.

02 Facilitating Economic Development:
To promote clean economies, improve the overall investment climate and support a variety of work and workspace typologies.

03 Enhancing Heritage, Culture and Public Life

04 Improving Housing and Social Infrastructure:
Meet a variety of housing demands across different income groups and typologies and foster walkable mixed-use neighbourhoods.

05 Moving Towards Low-Carbon Mobility:
Encourage modal shift in favour of public and shared modes of transport, reduce vehicular congestion and provide efficient, affordable and green mobility options.

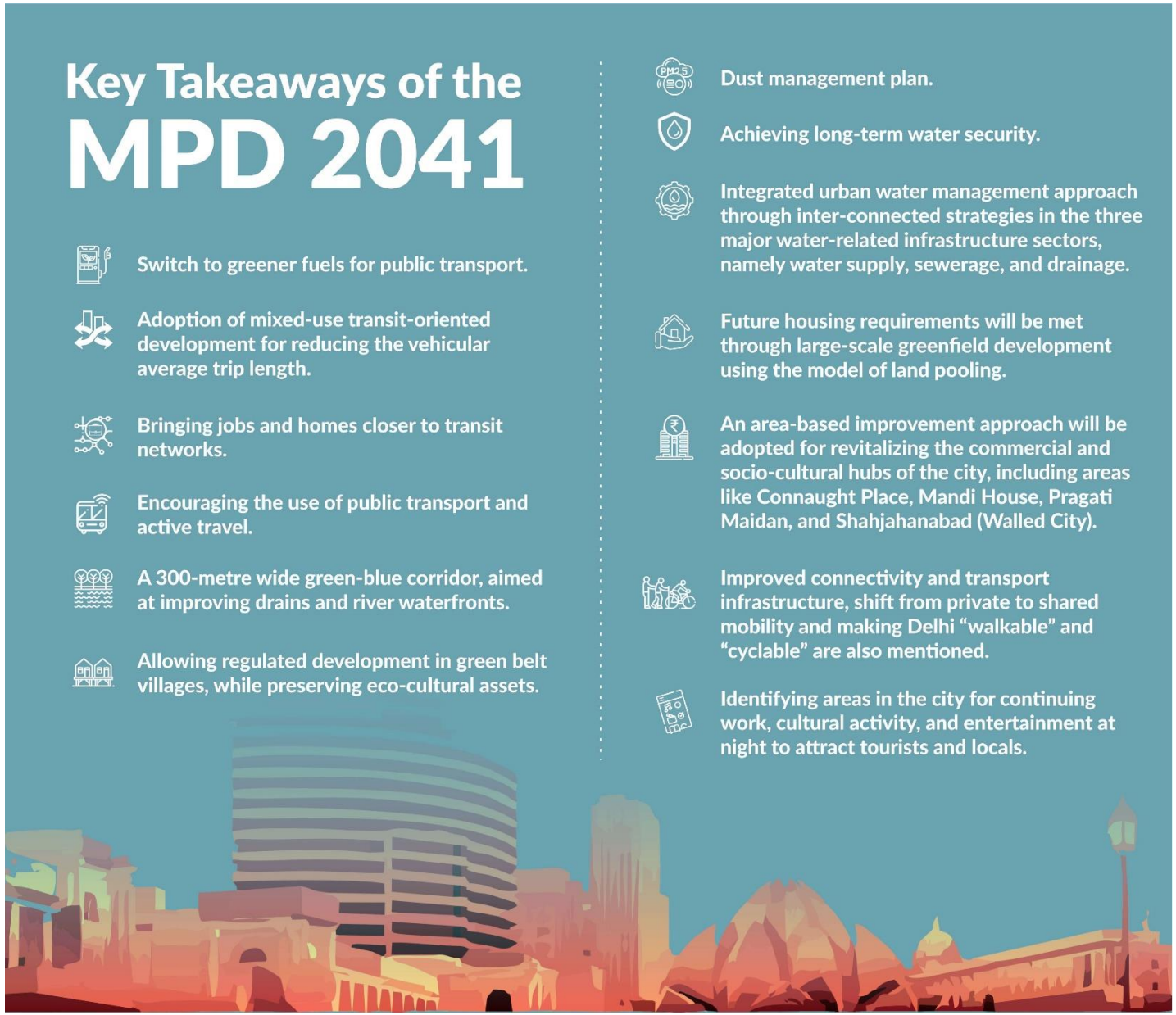
06 Developing Resilient Physical Infrastructure:
To promote a sustainable approach towards the use of resources like water and energy.

Primary Goal:

To make Delhi an environmentally responsible, future-ready city, focusing on ease of living, good quality, affordable, clean and safe living conditions.

Source: The Daily Guardian

MASTER PLAN DELHI 2041



Source: The Daily Guardian

MASTER PLAN DELHI 2041

Source: The Times of India

GPRA General Pool Residential Accommodation in Delhi

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DEMAND AND AVAILABILITY SCENARIO

The demand and availability status of GPRA colonies stated in 2018-19 MoHUA Annual Report (refer to the table) implies that the total shortage of Dwelling Units is 22276, of which the major shortage is for Type II and Type III Dwelling Units. This figure of 22276, justifies the need of re-development with increased density.

Dwelling Unit Typology	Unit Area (Sq.mts)	Availability	Demand	Shortage	% of satisfaction level (Availabilty / demand)
I	40.8	13174	9034	0	151.8
II	54	22781	26933	4152	84.58
III	63	12753	15646	2893	81.51
IV	103	5189	6904	1715	75.16
IV Special	123	790	2565	1775	30.8
VA	166.5	1680	2470	790	68.02
VB		1276	2314	1038	55.14
VIA	225	990	1661	671	59.6
VIB		227	354	127	64.12
VII	308.5	238	232	0	102.59
VIII	424.5	150	254	104	59.06
DS		1658	3390	1732	48.91
SK		291	7570	7279	3.84
		61197	75326	22276	68.08

Demand and Availability status of GPRA in Delhi as on March 2019
Source: 2018-19 MoHUA Annual Report , Chapter 16, Page 179

PROJECTION OF HOUSING STOCK AVAILABILITY

It is inferred that once all the 7 colonies (i.e.Mohammadpur, Thyagraj, Kasturba,Netaji Nagar, Sarojini Nagar, East Kidwai Nigar, Srinivaspuri) get redeveloped and occupied, there will be no shortage of Dwelling Units of Type II, III, IV, V and VI.

Infact, the number will be in surplus, assuming that there is no considerable increase in demand in the near future.

Redevelopment is the need of future because of dilapidation of existing structures, but this projection implies that the increase of density should be strategically decided.

House Type	Demand	Availability as on 22-11-2019	Shortage as on 22-11-2019	Additional Availability (increase of DUs' by re-developemnt of 7 colonies	Shortage	Surplus	Total Availability
	Source: DoE _Demand & Availability Status as on 14-11-2019	Source: DoE Website dated 22-11-2019 (includes East Kidwai Nagar allotment)			After all the 7 colonies get re-developed, assuming that the demand does not increases.		After all the 7 colonies get re-developed
I	7901	15144	0	0	0	7243	15144
II	26802	24208	2594	8168	0	5574	32376
III	17129	14122	3007	7698	0	4691	21820
IV	10050	7075	2975	6242	0	3267	13317
V	4979	3875	1104	2684	0	1580	6559
VI	1910	1660	250	1876	0	1626	3536
VII	241	468	0	0	0	227	468
VIII	254	263	0	0	0	9	263
DS (Double Suits)	3390	1783	1607	0	1607	0	1783
SK (Single Suit with Kitchen)	7570	299	7271	0	7271	0	299
Total	80226	68897	18808	26668			
				After all the 7 colonies get re-developed, there will be no shortage of Type II, III, IV, V, VI., assuming that the demand does not increase in near future.			

Note : The saleable component of DUs', proposed in the 7 re-development approved colonies, are also included in the above calculation of DUs' fulfilling the demand.

Source: Directorate of Estates, MoHUA

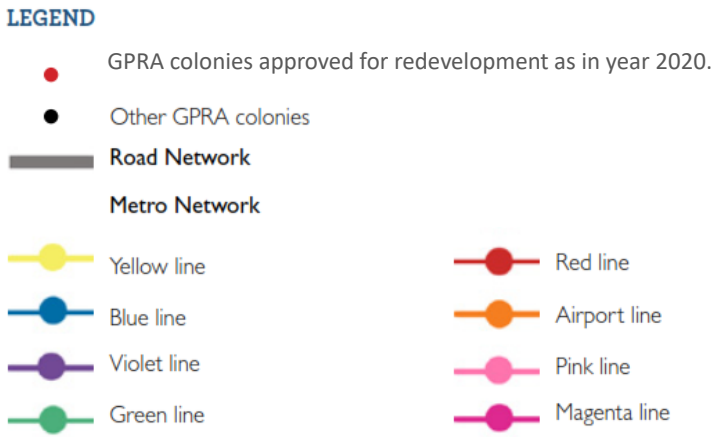
A study of the GPRA Colonies (Delhi Urban Arts Commission 2020) was also taken up by DUAC from 2019-2020 which was led by Samir Mathur as the Principal Investigator during his tenure at DUAC. The subsequent work was carried out by the authors of this report from 2021-22.

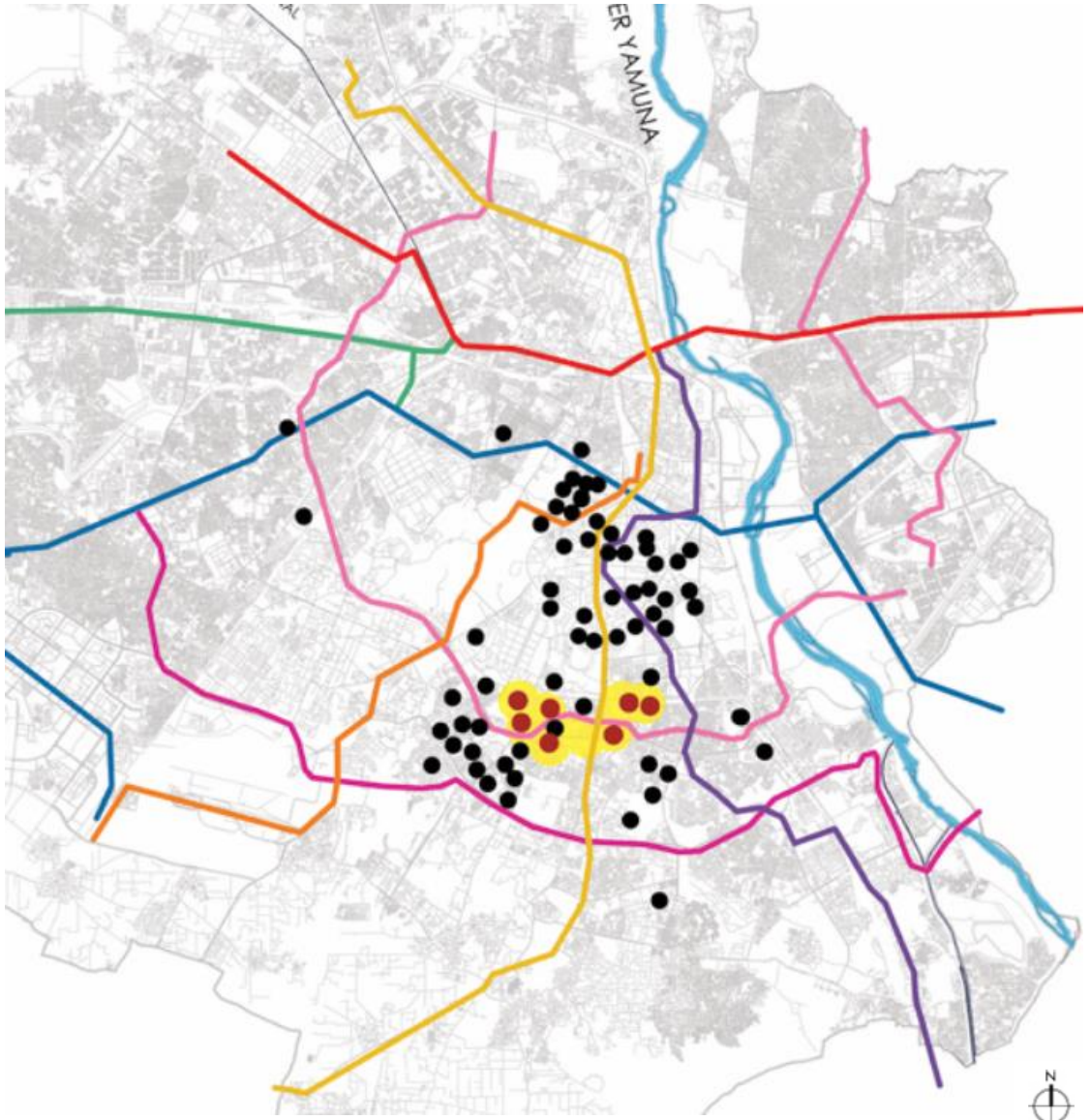
PRESENT REDEVELOPMENT PATTERNS OF GPRA

The map shows the year 2020 scenario where the GPRA colonies are observed to be located along different metro networks in the south of Delhi. Colonies marked on this map accommodate more than 50 DUs .

Seven colonies approved for redevelopment (one colony already redeveloped and other six are under the process of same as in year 2020), depicted in red dots within yellow zone are concentrated along the same metro and road corridor.

A well-integrated, comprehensive and strategic approach is required for the re distribution of the GPRA colonies in the city to facilitate efficient connectivity and reduce dependence on the existing infrastructure.





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GPRA REDEVELOPMENT PROPOSAL

ENGLISH தமிழ் বাংলা മലയാളം हिंदी मराठी

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The Indian EXPRESS

Tuesday, June 21, 2022

Home Explained Political Pulse India Cities Opinion Entertainment Education Premium Sports A

Home / Cities / Delhi / In 3 years, officials gave nod to remove 77,000 trees in Delhi

In 3 years, officials gave nod to remove 77,000 trees in Delhi

In total, 77,420 trees have been permitted to be cut or transplanted in 2019, 2020 and 2020 — 29,946 by the tree officers under Section 9 of the DPTA and 47,474 by the government under Section 29 of the DPTA.

A fallen tree inside a local market in New Delhi. (Express Photo by Praveen Khanna)

"The government's reply also reveals that permission for transportation or cutting of 11,335 trees is pending approval from the state environment minister. This includes permission for transplantation or felling of 2,143 trees for implantation of Master Plan of AIMS to convert it into a world-class medical university, and also for transplantation or felling of 1,702 trees for redevelopment of GPRA Colony at Sarojini Nagar, Phase-V."

Source: The Indian Express

Safdarjung Residents Hold Protest March To Save Trees In Delhi

The proposal to cut such a large number of trees had drawn heavy criticism from green activists, politicians and citizens.

Delhi | Press Trust of India | Updated: July 02, 2018 2:03 am IST

Last week, the Housing and Urban Affairs Ministry in a meeting, chaired by Union minister Hardeep Singh Puri, had decided that the National Buildings Construction Corporation (NBCC) and the Central Public Works Department (CPWD) will re-work the design and plan for the redevelopment of the seven General Pool Resident Accommodation (GPRA) colonies to avoid felling or cutting of the trees.

The controversial redevelopment project had earlier triggered a Chipko movement-like agitations in the national citizens of all ages and various walks of life gathered near the sites of these projects and hugged trees in protest against the decision.

Source: NDTV

East Kidwai Nagar Should Serve as a Warning, Not Model, for Delhi's Redevelopment

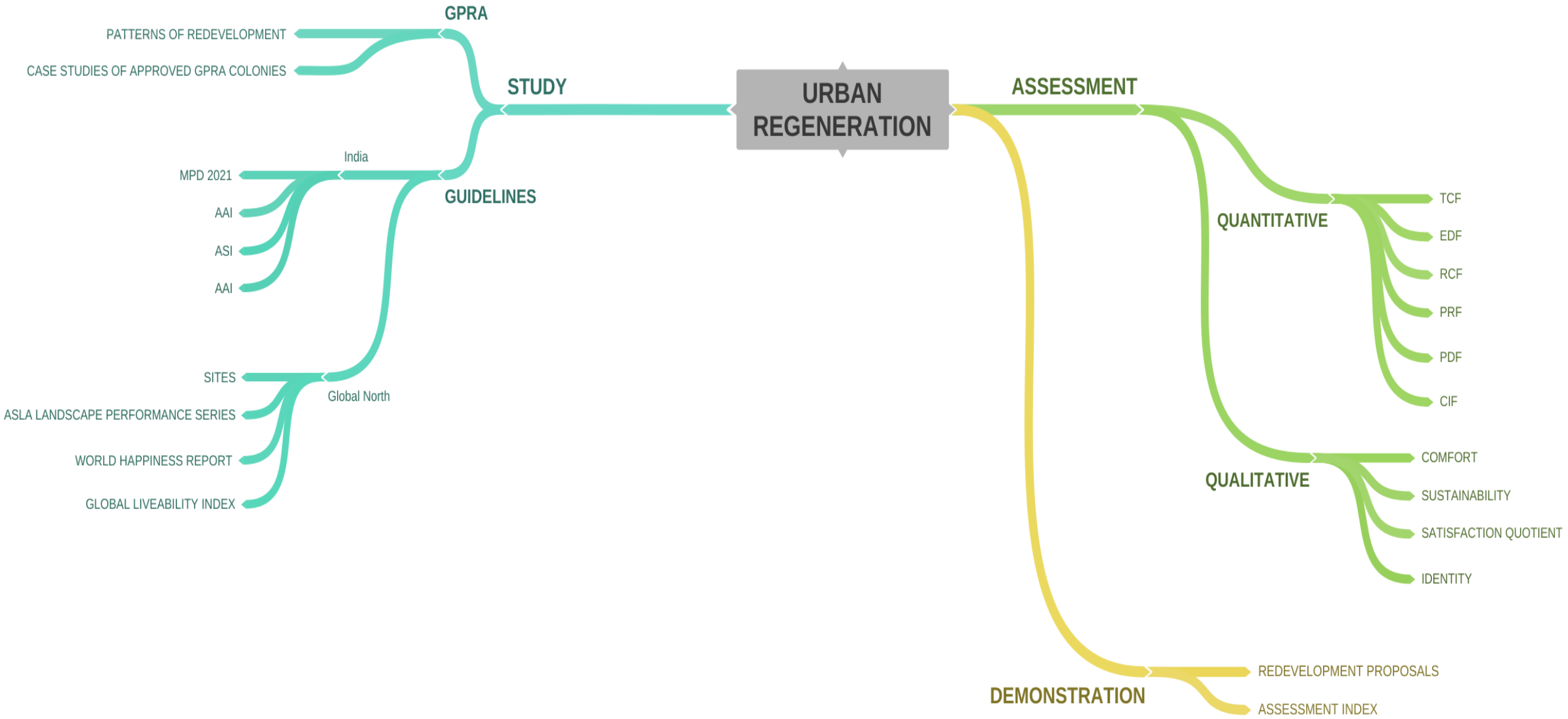
The NBCC 'model' project is hardly the totem of sustainability and responsibility. It has been fined for non-compliance of environment laws, and official planning documents expose its shaky claims of urban design and economic viability.

For over four months, the national capital has seen public protests against the Ministry of Housing and Urban Affair's "redevelopment" of Delhi's seven government housing colonies. Citizens have questioned this project, which will privatise and commercialise public lands, fragment urban landscapes into wastefully designed gated colonies, and lead to congestion and pollution. Not only will this redevelopment impact citizens in the immediate term, but a valuable opportunity for growing city will be lost for another generation.

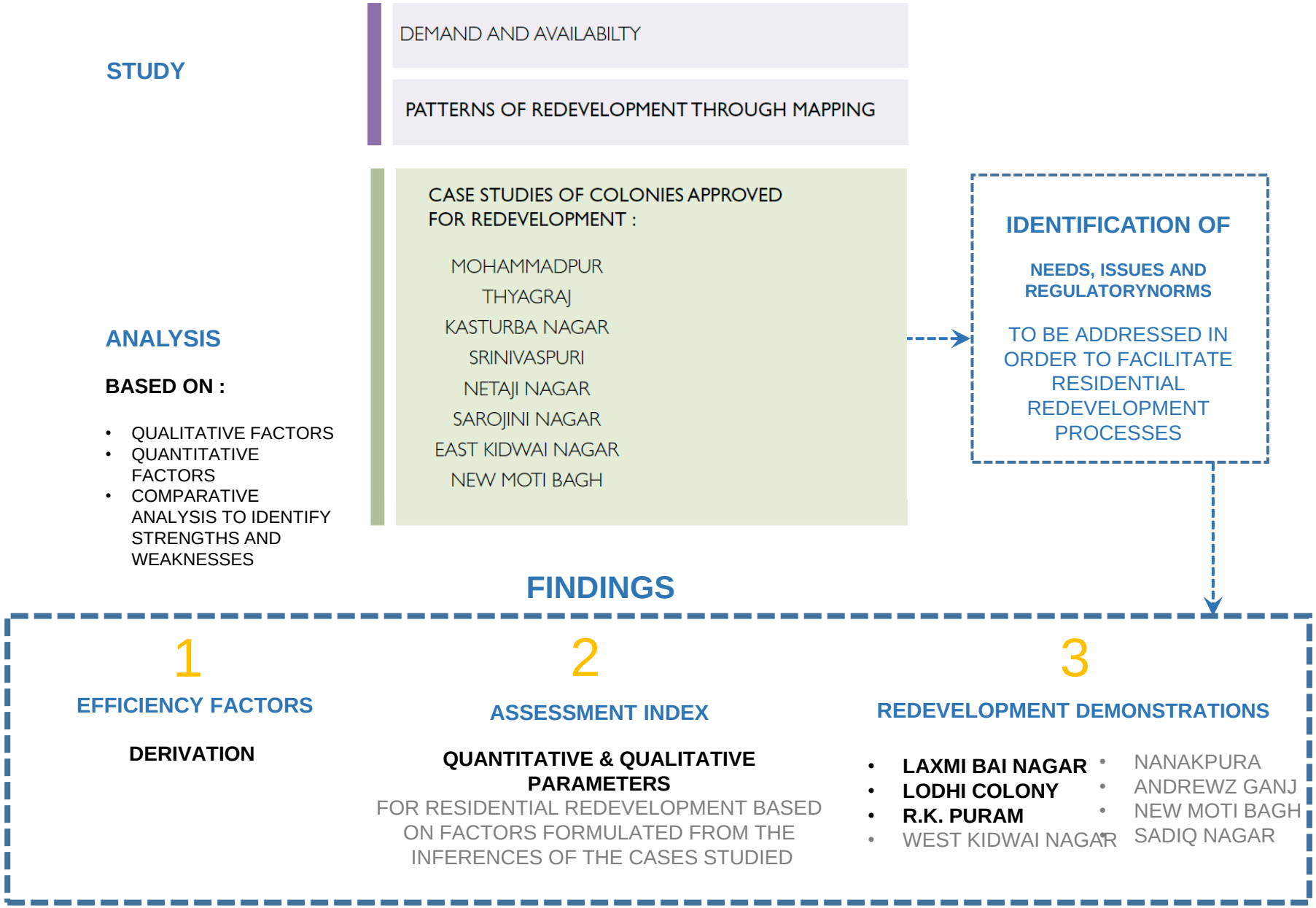
Source: The Wire

METHODOLOGY

RESEARCH FRAMEWORK



RESEARCH FRAMEWORK



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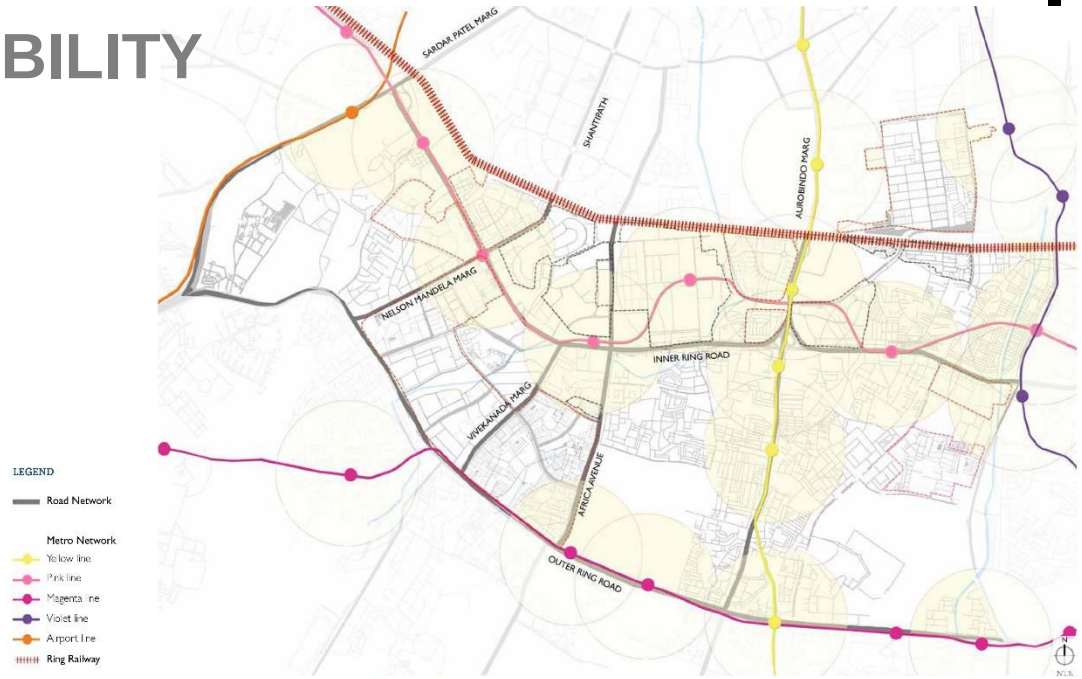
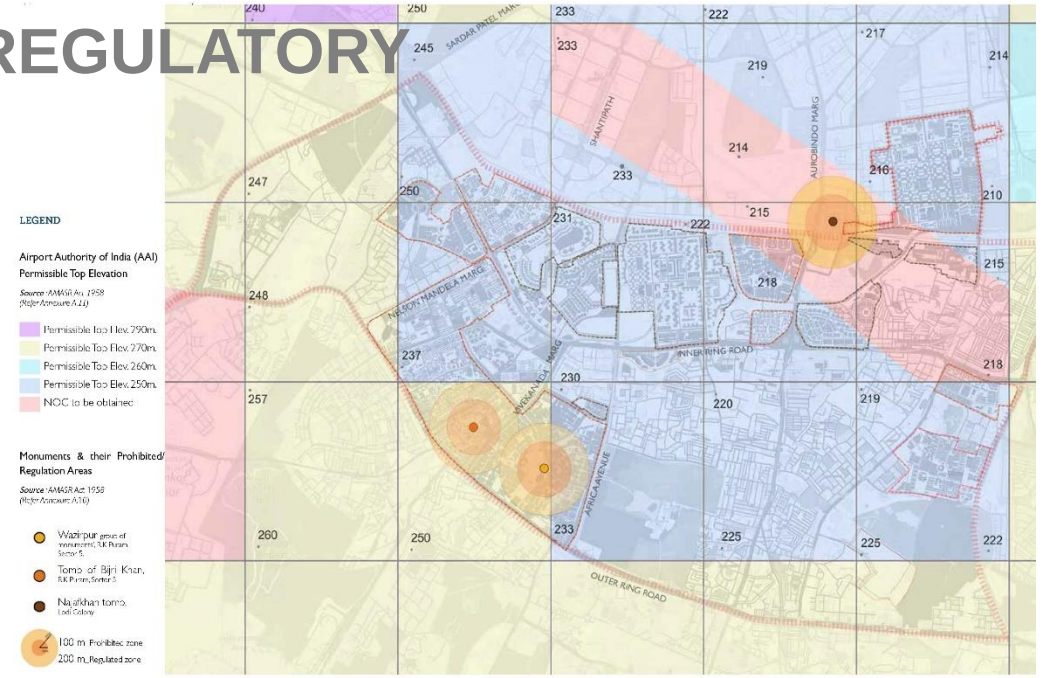
STUDY ZONE ANALYSIS | DEMONSTRATIONS

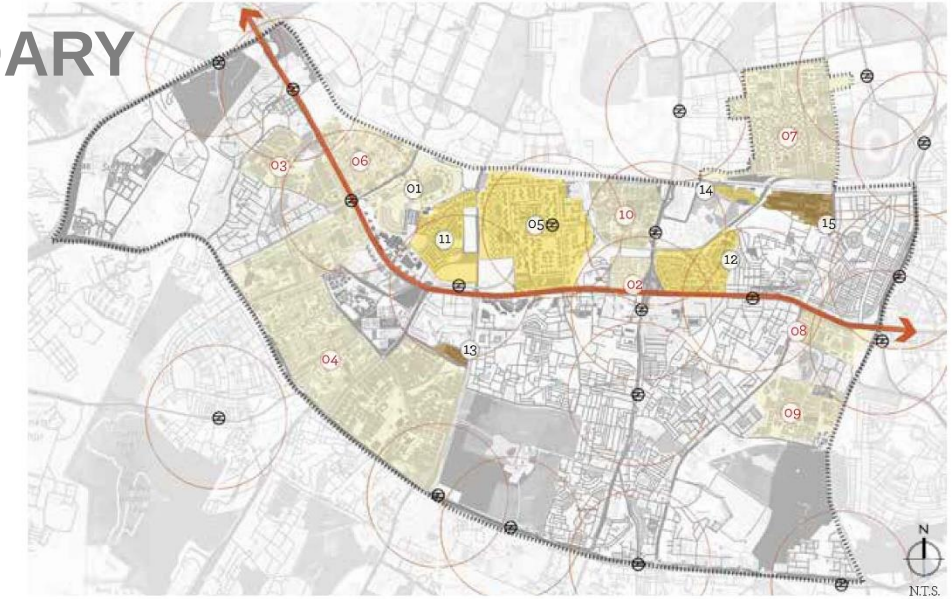
MOBILITY



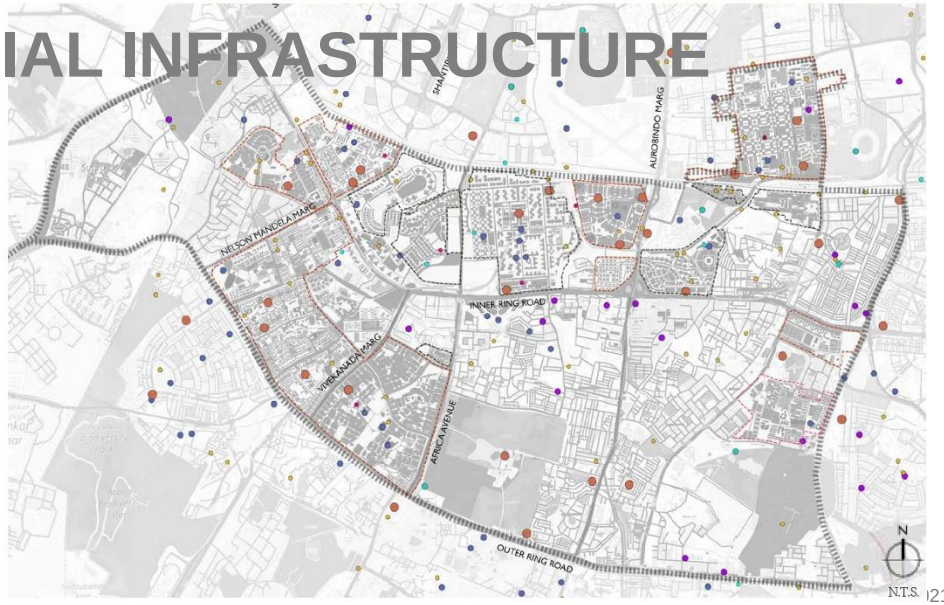
REGULATORY



BOUNDARY



SOCIAL INFRASTRUCTURE



STUDY ZONE ANALYSIS | REGULATORY

MASTER PLAN FOR DELHI 2021

DELHI DEVELOPMENT AUTHORITY

PARKING (Free from F.A.R Structure)	
Stilts	Basement
If the building is considered with stilt area of non-habtable height and is proposed to be used for parking, landscaping etc. the stilt floor need not to be included in F.A.R and shall be counted towards height.	**Basement, if considered and used only for parking, utilities and services shall not be controlled towards F.A.R**

PARKING STANDARDS			
Use Premises	Residential	Commercial	Public and Semi Public Facilities
Permissible Equivalent Car Spaces (ECS per 100 sq.m. of floor area)	**2**	**3**	**2**

CONTROL FOR BUILDING/ BUILDINGS WITHIN RESIDENTIAL PREMISES | CLUSTER COURT HOUSING

Source : MPD 2021
Chapter 4.0 Shelter, Section 4.4 Development Controls for Residential Use Zone,
Sub-Section 4.4.3 Control for Building/ Buildings within Residential Premises,
Sub Section 4.4.3 C Cluster Court Housing

Cluster Court Housing				
Plot Size Minimum (sq.m.)	Maximum Ground Covergae	Maximum F.A.R	Height	Parking
3000	**maximum coverage 100% subject to light and ventilation condition**	**175**	**15 M.**	**2.0 ECS / 100 sq.m. Built Up Area**

PARKING (Free from F.A.R Structure)	
Stilts	Basement
If the building is constructed with the stilt area of non-habitable height and is proposed to be used for parking, landscaping etc., the stilt floor need not be included in the FAR but would be-counted towards height (within stipulated height).	a) Basement if constructed shall not be included in FAR calculations. b) Basement shall be below the ground floor. Basement area may, however, be extended below the internal courtyard and shaft.

INFRASTRUCTURE REQUIREMENT FOR LAYOUT AT RESIDENTIAL NEIGHBOURHOOD LEVEL

Source : MPD 2021
Chapter 4.0 Shelter, Section 4.4 Development Controls for Residential Use Zone,
Sub-Section 4.4.2 B Use Premises for Residential Use Zone at Community Level and Above, Table 4.2

Provision of Social Infrastructure				
Level	Facilities	Area (sq.m.)		
		No.	Per unit	Total
Neighbourhood Population - 10,000	**Primary School**	**1**	**2,000 - 4,000**	**2,000 - 4,000**
	Sr. Secondary School	**1**	**6,000 - 8,000**	**6,000 - 8,000**
	Religious buildings	**2**	**400**	**400**
	Electric Sub Station 11 KV	**1**	**80**	**80**
	Banquet Halls	**1**	**800 - 2,000**	**800 - 2,000**
	Local Shopping	**1**	**3,000**	**3,000**
	Service Market	**1**	**2,000**	**2,000**
	Informal Bazaar	**1**	**1,000**	**1,000**
	Three Wheeler and Taxi Stand	**1**	**400**	**400**
	Neighbourhood Park	**1**	**10,000**	**10,000**
	Neighbourhood Play Area	**1**	**5,000 - 10,000**	**5,000 - 10,000**
	Underground Water Tank	**1**	**2,000**	**2,000**
	Sewage Pumping Station	**1**	**500**	**500**
	Coaching centres, IT and language training centres	**1**	**500**	**500**
	Dhalao including segregation	**1**	**200**	**200**
	Local Level waste water treatment facility	**1**	**800 - 1200 (as per requirement)**	

CONTROL FOR BUILDING/ BUILDINGS WITHIN RESIDENTIAL PREMISES | GROUP HOUSING

Source : MPD 2021
Chapter 4.0 Shelter, Section 4.4 Development Controls for Residential Use Zone,
Sub-Section 4.4.3 Control for Building/ Buildings within Residential Premises,
Sub Section 4.4.3 B Residential Plot - Group Housing

Residential Plot | Group Housing				
Plot Size Minimum (sq.m.)	Maximum Ground Covergae	Maximum F.A.R	Height	Parking
3000	**33.33 % (In case of addition/ alteration of existing DU's for availing balance F.A.R, Ground Covergae upto 40 % may be allowed)**	**200**	**(Subject to clearance from AAI /Fire Department and other statutory bodies)**	**2.0 ECS / 100 sq.m. Built Up Area**

Source: MPD 2021

Courtesy: MPD 2021 Colonies (Delhi Urban Arts Commission 2020) was also taken up by DUAC from 2019-2020 which was led by Samir Mathur as the Principal Investigator during his tenure at DUAC. The subsequent work was carried out by the authors of this report from 2021-22.

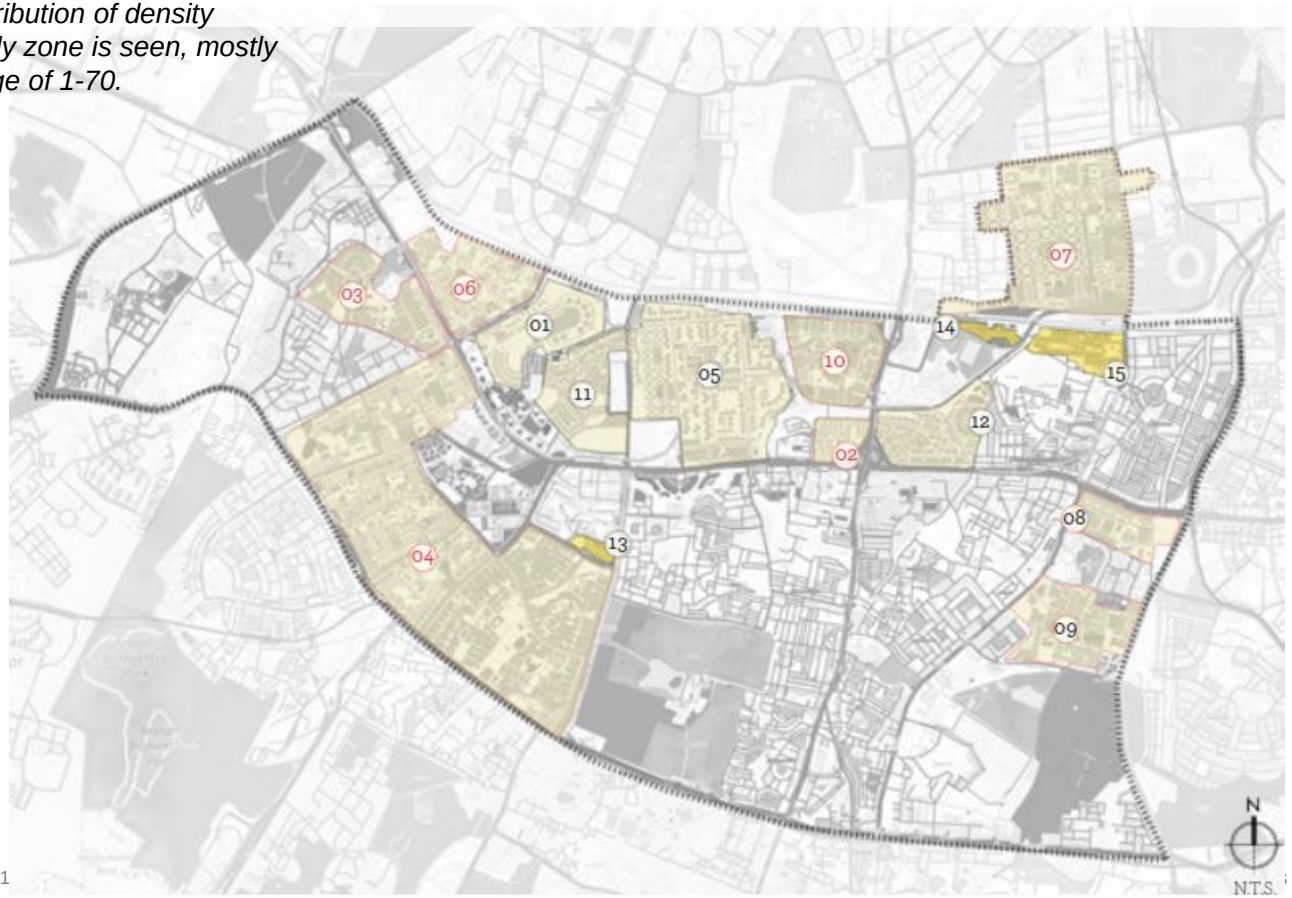
STUDY ZONE ANALYSIS | DENSITY

DENSITY | 0-70 DU/ha	
01 New Moti Bagh	1.12
02 West Kidwai Nagar	22.86
03 Nanakpura	37.10
04 RK Puram	40.79 (average)
05 Sarojini Nagar	44.90
06 NW Moti Bagh	45.08
07 Lodhi Colony	53.11
08 Andrews Ganj	53.89
09 Sadiq Nagar	55.09
10 Laxmi Bai Nagar	57.89
11 Netaji Nagar	62.70
12 East Kidwai Nagar	67.00

DENSITY | 71-140 DU/ha	
13 Mohammadpur	89.10
14 Thyagraj	111.90
15 Kasturba	118.00

DENSITY | 141-210 DU/ha
No colony within study zone

A uniform distribution of density within the study zone is seen, mostly within the range of 1-70.



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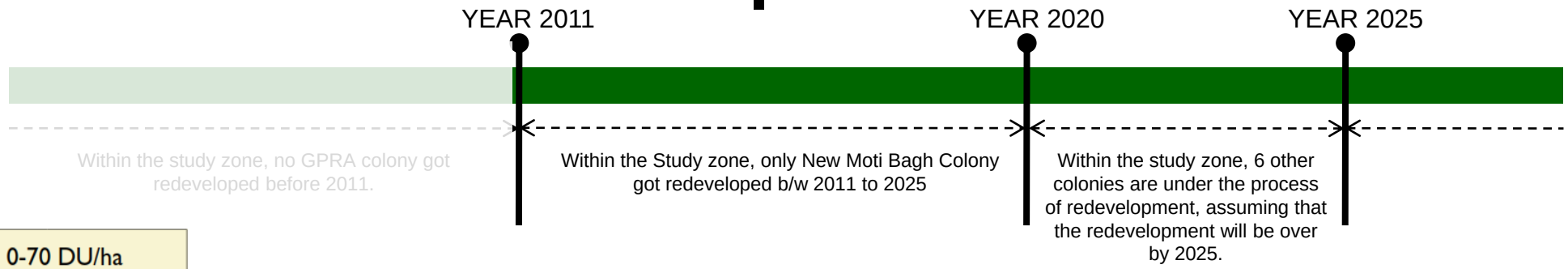
STUDY ZONE ANALYSIS | DENSITY



DENSITY | 0-70 DU/ha	
01 New Moti Bagh	11.04
02 West Kidwai Nagar	22.86
03 Nanakpura	37.10
04 RK Puram	40.79 (average)
06 NW Moti Bagh	45.08
07 Lodhi Colony	53.11
08 Andrews Ganj	53.89
09 Sadiq Nagar	55.09
10 Laxmi Bai Nagar	57.89

DENSITY | 71-140 DU/ha	
05 Sarojini Nagar	95.90
11 Netaji Nagar	106.80
12 East Kidwai Nagar	132.40
14 Thyagraj	137.50

DENSITY | 141-210 DU/ha	
15 Kasturba	167.80
13 Mohammadpur	192.40

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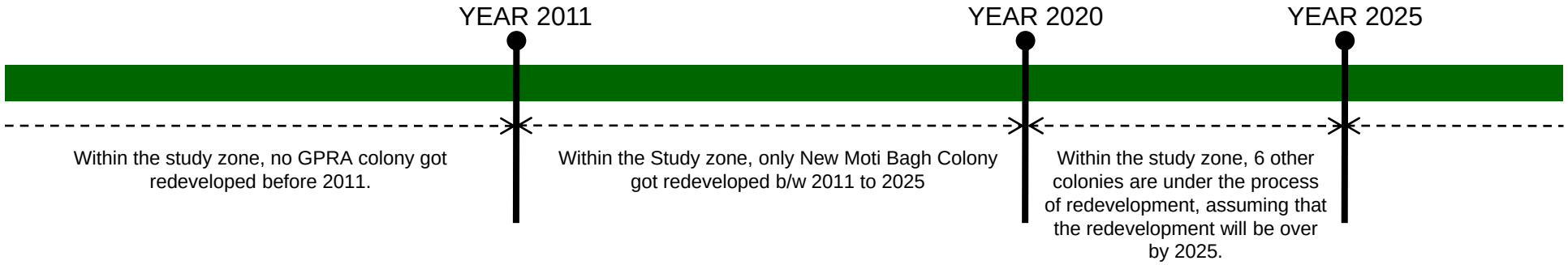
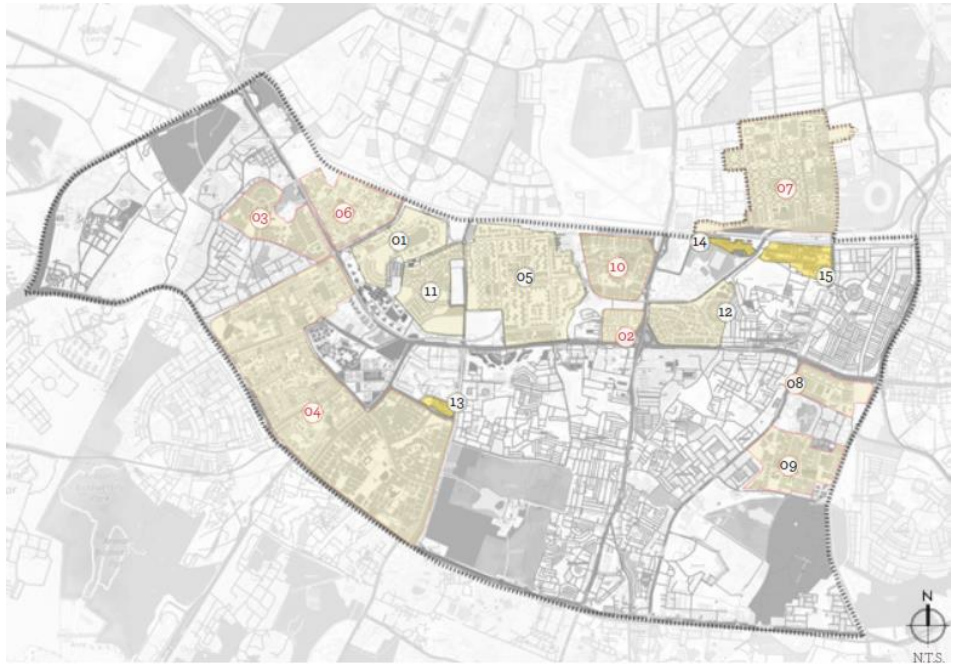
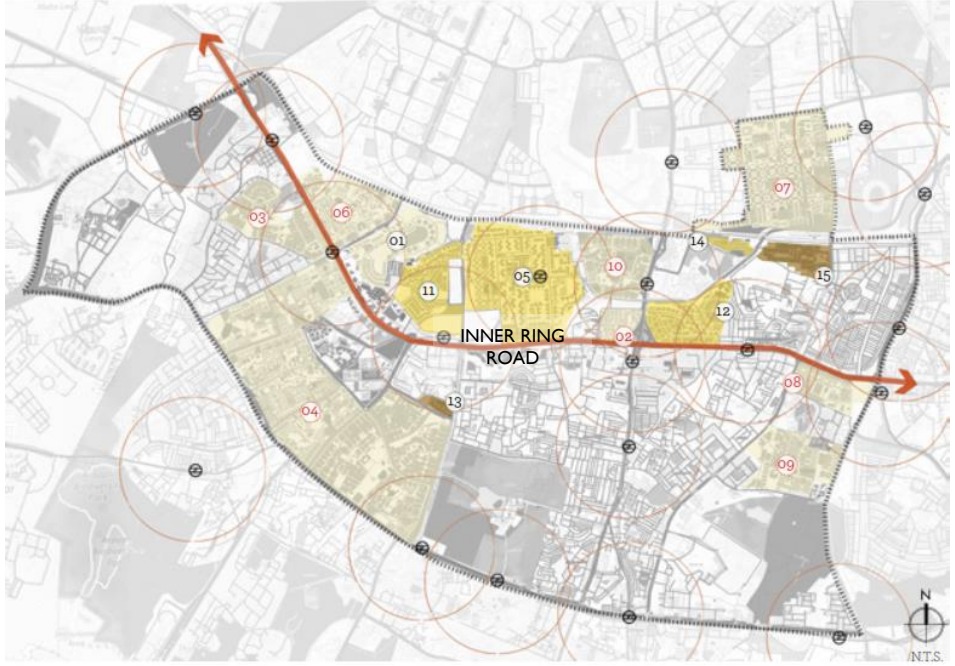
STUDY ZONE ANALYSIS | DENSITY



In Year 2011



In Year 2025 (projected)



DENSITY | 0-70 DU/ha

DENSITY | 71-140 DU/ha

DENSITY | 141-210 DU/ha

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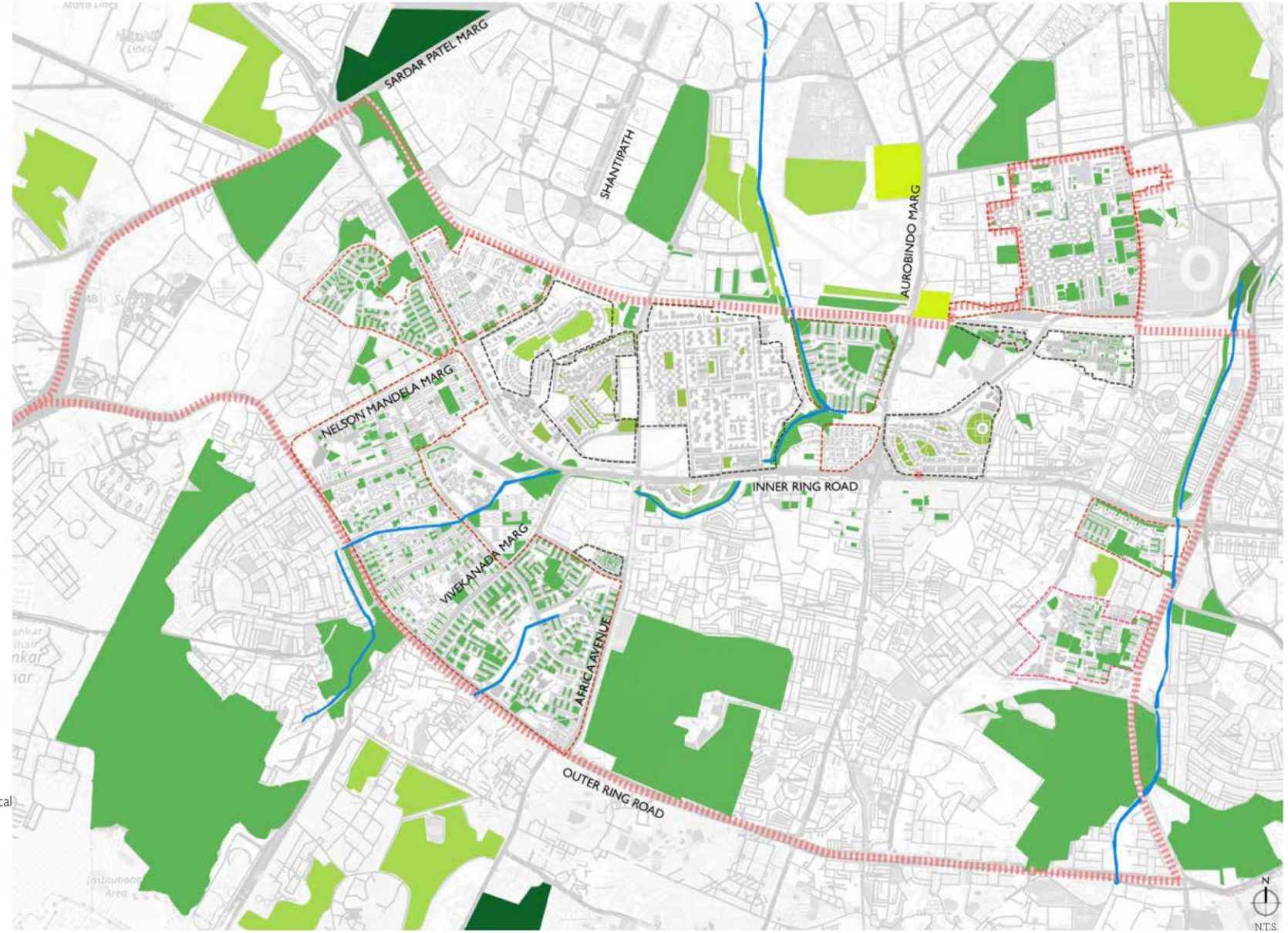
PREVAILING STRATEGY | ISOLATED REDEVELOPMENT

The prevailing strategy is to redevelop the individual colony in isolation as a plotted development, and the result is the scattered pattern of sizeable green zones within the study area, depicted in the map (based on MPD 2020). These zones have the potential to be transformed into functional and ecological zones, **by developing inter-connections along the natural and built corridors.**



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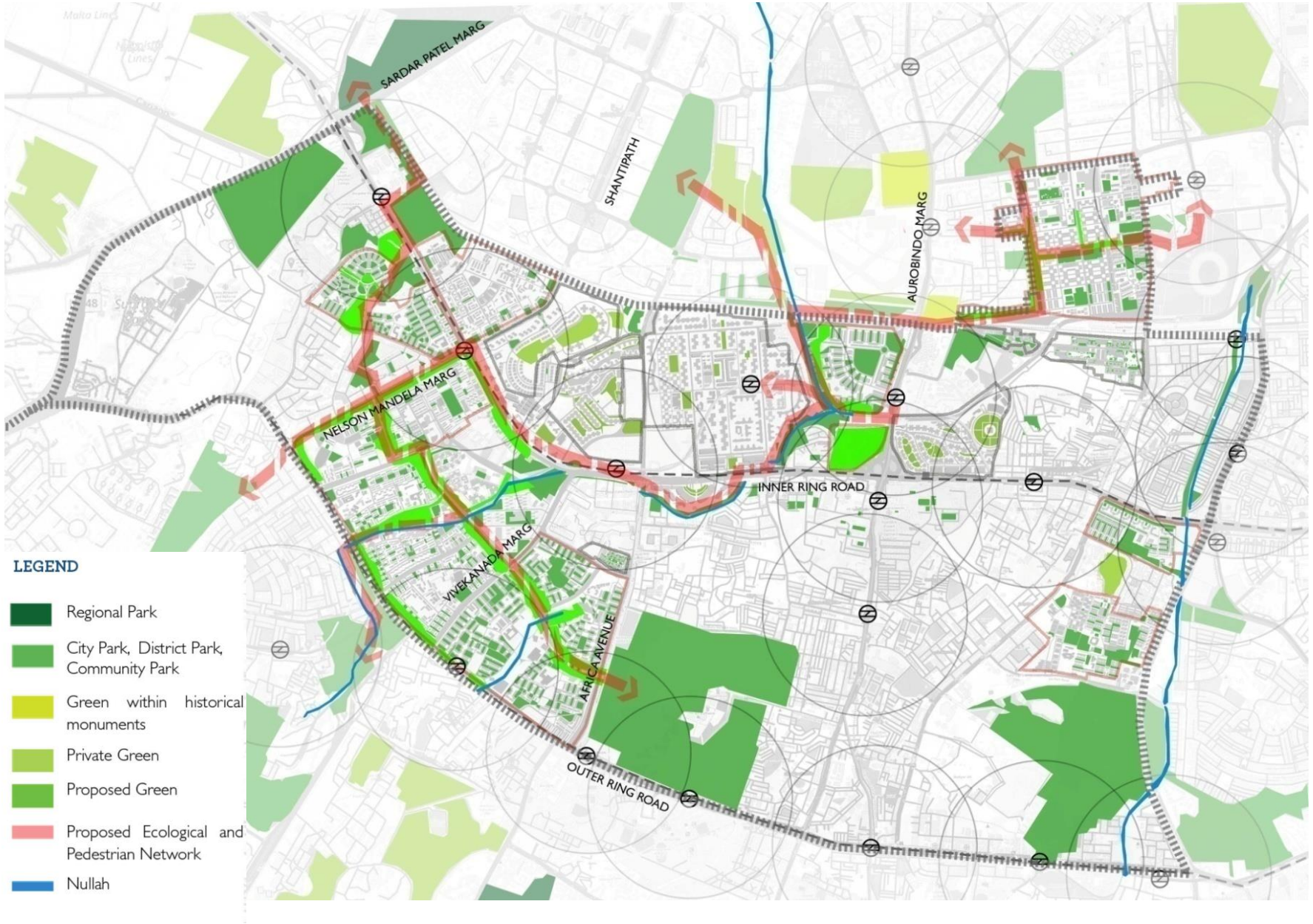
SUGGESTED STRATEGY | COMPREHENSIVE REDEVELOPMENT

A comprehensive strategy with an outward to inward approach should be considered for redevelopment of colonies, by developing Links/connects with the surrounding existing green zones/network/natural features, thus forming continuous mobility network for pedestrians, cyclists, and vehicles.

Considering the same, a conceptual strategy is worked out, showing a possibility of regeneration of green networks, by strategically carving out greens from the individual sites of GPRA colonies such that they get linked with the existing green zones.

The developed green network can form the basis of redevelopment within any particular site.



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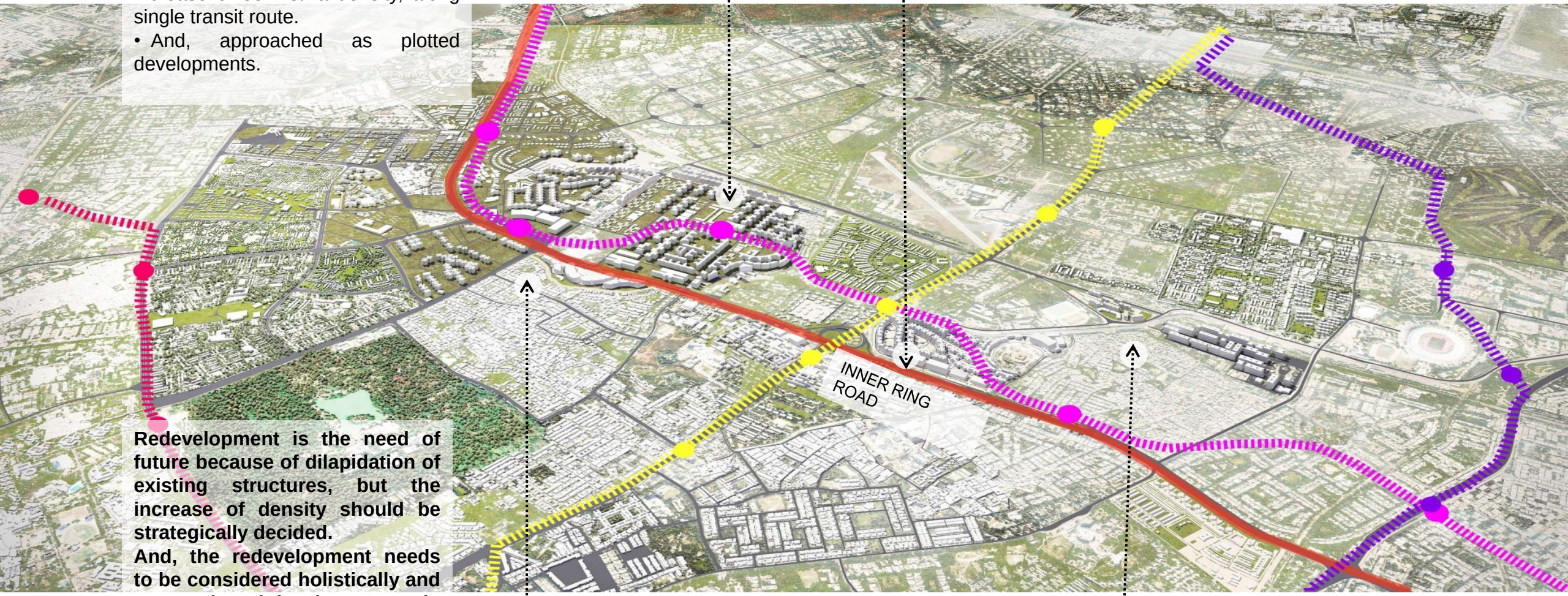
STUDY ZONE | INFERENCES

Prevailing Redevelopment Pattern is -

- Associated with an average increase of 58 DU/ha density, along single transit route.
- And, approached as plotted developments.

A considerable increase of density in Sarojini Nagar (increase of 51 DU/ha) would have not been a viable solution as it is situated along the Pink metro line which is not directly connected with the hub of Government Offices. This would aggravate the mobility issues in this zone.



Redevelopment is the need of future because of dilapidation of existing structures, but the increase of density should be strategically decided.
And, the redevelopment needs to be considered holistically and not as plotted development or in isolation.

Colonies proposed with the maximum increase of density i.e. Kasturba Nagar (an increase of 50DU/ha) and Mohammadpur (an increase of 105 DU/ha), do not fall under the walkability radius of the nearest metro stations .

INNER RING ROAD

METRO LINES

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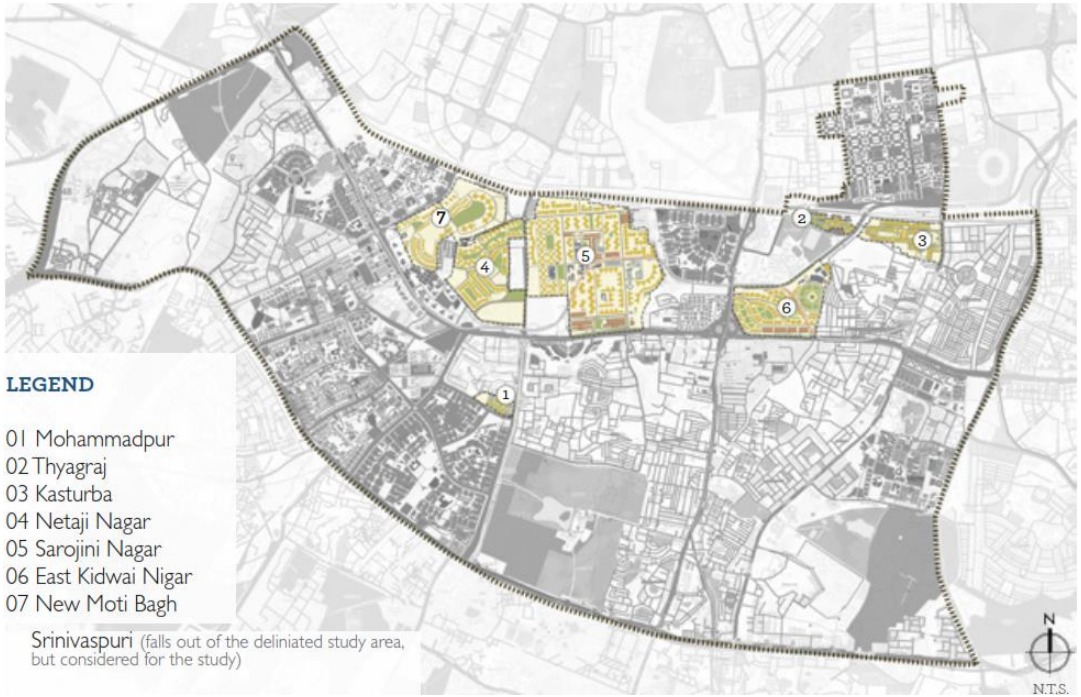
EFFICIENCY

ASSESSMENT AND DERIVATION

EFFICIENCY FACTORS| FORMULATION PROCESS

STEP 1 | DATA COLLECTION

The design proposals of 7 GPRA colonies (one already redeveloped, and other 6 are under the process of same as in year 2020), depicted in the map, were studied thoroughly for their quantitative parameters, and a comparative analysis done to understand the before and after scenarios.



STEP 2 | ISSUES IDENTIFICATION

Key issues were identified through the analysis of the above redevelopment proposals.
To address these identified issues, their corresponding Efficiency Factors are formulated.

STEP 3 | ASSESSMENT & DERIVATION

The relative parameters identified corresponding to each factor are compared and assessed for each of the above colony, to determine an ideal value for each factor.

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STEP 1| DATA INDEX - COMPARITIVE STUDY

		BEFORE REDEVELOPMENT					PROPOSED FOR REDEVELOPMENT						CONCLUSIONS			
Approved GPRA Colonies	Site Area (Ha.)	DU's	Density (DU's/ Ha.)	Average Height (mts.)	Number of trees	Tree density	DU's	Achieved Density (DU's/ Ha.)	Height Achieved (mts.)		Achieved FAR	Trees to be cut	Retained Tree Density	Increased Densities (DU's/ Ha.)	Tree Cut (%)	Remarks
Mohammadpur	3.68	328	89.10	9.00	634	172.28	708	192.40	45.00		137.88	247	105.16	103.30	38.96	•Top elevation was increased by AAI after special permission and thus more number of storeys were allowed to be built • A large volume of trees (approx 40%) were cut on the site to allow development
Thyagraj	5.38	602	111.90	9.00	349	64.87	740	137.50	31.95		107.56	40	57.43	25.60	11.46	• Only 25% increase in density with Type 2,3 and 4 DU's. • Social infrastructure like School, temple etc. are being retained in the site.
Kasturba Nagar	21.37	2521	118.00	9.00	1203	56.29	3585	167.80	43.95		193.30	405	37.34	49.80	33.67	• Type 2 to type 6 DU's with a proposed density of 167DU's/ha.
Srinivaspuri	29.59	1429	48.30	9.00	2763	93.38	4994	168.80	89.05		199.92	1114	55.73	120.50	40.32	• Maximum height achieved amongst all GPRA projects which allowed for more number of dwelling units in the site
Netaji Nagar	44.24	2772	62.70	9.00	3906	88.29	4727	106.80	36.60		120.80	1560	53.03	44.10	39.94	• Approximately 40% of trees are proposed to be cut to accommodate 1955 additional dwelling units while retaining social infrastructure like Schools, post offices etc.
Sarojini Nagar	104.48	4687	44.90	9.00	11913	114.02	10015	95.90	42.45		172.53	3465	80.86	51.00	29.09	• Type 2 to Type 6 units are proposed and maximum social infrastructure is retained
East Kidwai Nagar	34.80	2331	67.00	9.00	Data not available	N/A	4609	132.40	47.70		203.14	1167	N/A	65.40	Data not available	• Type 2 to Type 8 DU with maximum units of Type 3-5. • Presence of ASI Monument restricting the height in certain parts of the site.
New Moti Bagh	44.56	50	1.12	9.30	2266	50.85	492	11.04	36.24		37.98	Data not available	N/A	9.92	Data not available	•Type 6,7 and 8 DU's with mixed development , Low-rise, low density and few blocks of High - rise developments

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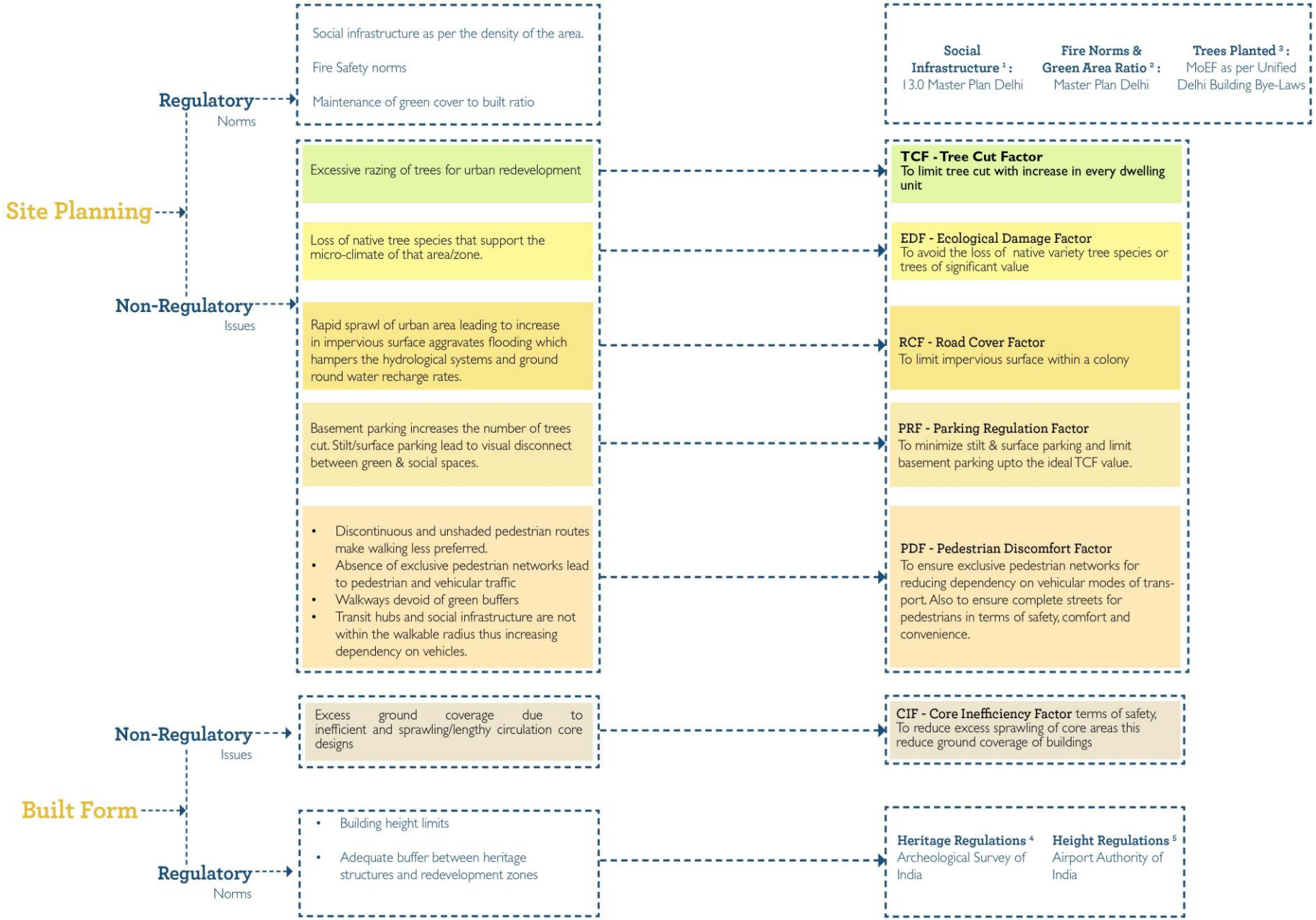
STEP 2| ISSUES AND NORMS OF REDEVELOPMENT



A study of the GPRA Colonies (Delhi

s report from 2021-22.

STEP 3| ASSESSMENT & DERIVATION

Redevelopment project sites, with the presence of upright full-grown trees, allow two approaches. One, to clear the site and do the desired development. The second is to do the development responsibly considering the value of every tree.

The second approach has been quantified through this Factor, which allows development/ redevelopment in a controlled way and helps in reducing the large-scale tree cutting. Different design strategies (not in the scope of this study) can be worked upon by the designer, to achieve the ideal value of this quantified factor. The achievement of an ideal value will lead to a balanced design which will in turn ensure preservation of the green cover.

STEP 01 | Identification of Relative Parameters

The relative quantitative parameters applicable are

1. Number of Existing trees
2. Number of Trees Cut.
3. Increased number of Dwelling Units

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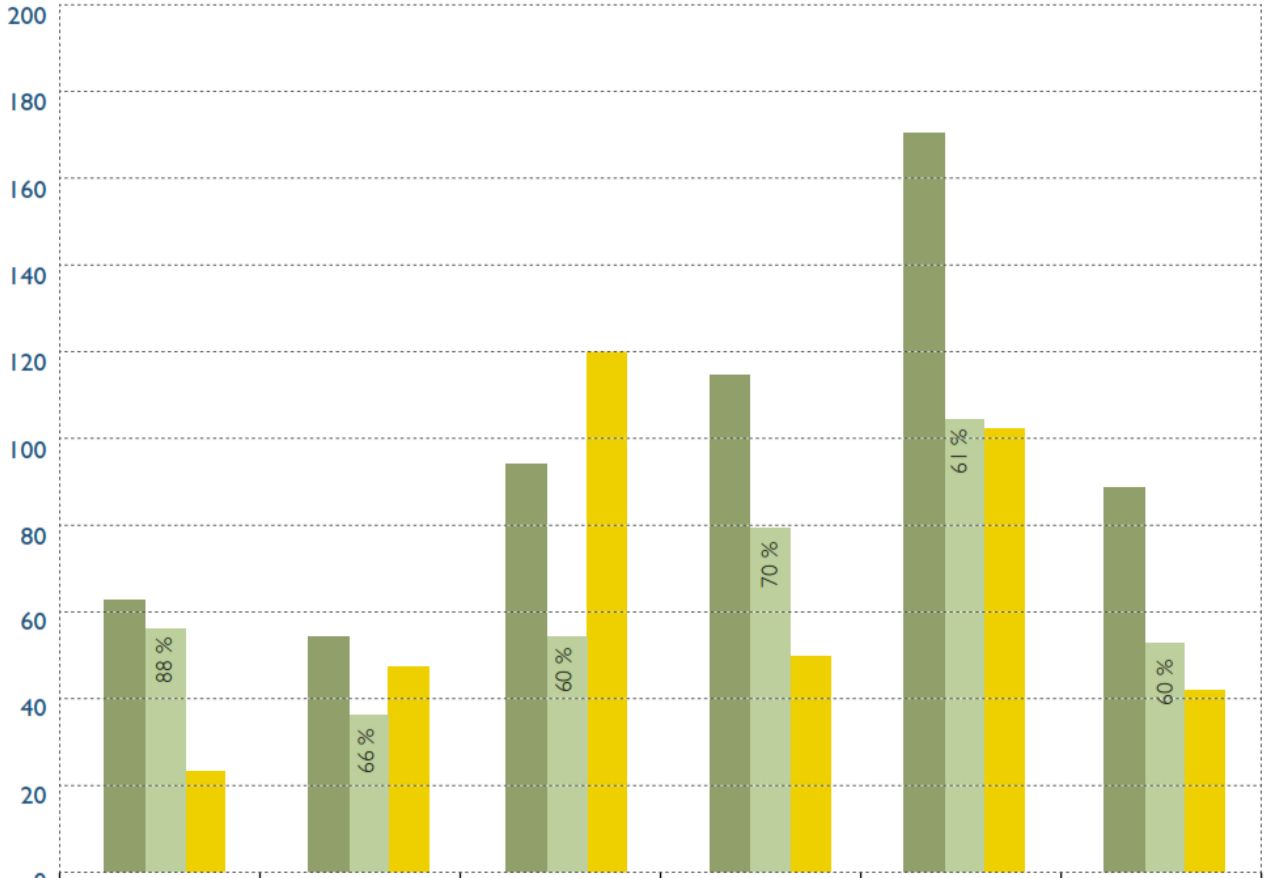
ASSESSMENT & DERIVATION| TREE CUT FACTOR (TCF)

STEP 02 | Assessment

The numeric values of the identified parameters for each colony are put together and analysed through a bar graph illustration, to understand their co-relation.

From the bar graph, it is inferred that the minimum increase in DU density, will lead to the maximum retention of tree density.

Therefore, the Dwelling Units are increased at/against the cost of existing trees



	Thyagraj 01	Kasturba Nagar 02	Srinivaspuri 03	Sarojini Nagar 04	Mohammad-pur 05	Netaji Nagar 06
Existing Tree Density	64.87	56.29	93.38	114.02	172.28	88.29
Retained Tree Density	57.44	37.34	55.73	80.86	105.16	53.03
Increased DU Density (DU/ha)	25.70	49.80	120.5	51.00	103.30	44.20

Bar Graph depicting the co-relation of Existing Tree Density, Retained Tree Density and Increased DU Density.

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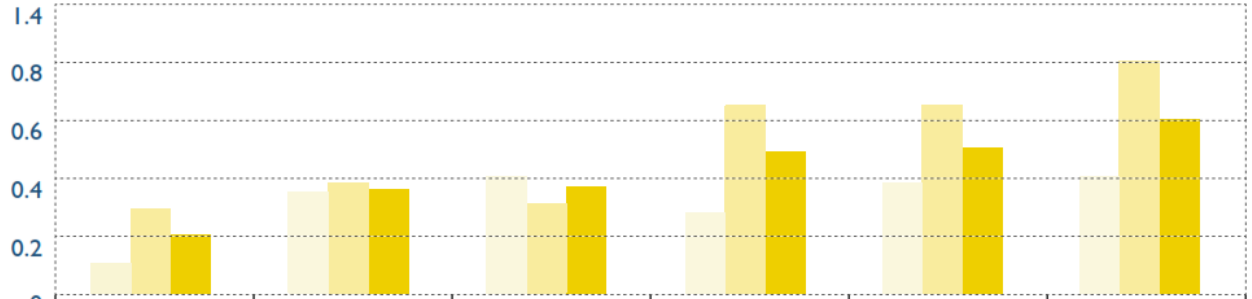
ASSESSMENT & DERIVATION| TREE CUT FACTOR (TCF)

The relationship between the parameters, illustrated in the previous slide graph, is further quantified in two parts i.e.

A : Ratio of 'Number of Trees Cut' to 'Total Number of Existing Trees'
B : Ratio of 'Number of Trees Cut' to 'Increased Number of Dwelling Units'

As both the ratios hold equal importance, an average is calculated to obtain a unique value. The quantified values of the two ratios for each colony are put together for a comparative study and analysed through a bar graph illustration.



	Thyagraj 01	Kasturba Nagar 02	Srinivaspuri 03	Sarojini Naagr 04	Mohammadpur 05	Netaji Nagar 06
Number of Tree Cut/ Number of Existing Trees **A**	0.11	0.34	0.40	0.29	0.39	0.40
Number of Tree Cut/ Increased no. of DU **B**	0.29	0.38	0.31	0.65	0.65	0.80
A+B/2	**0.20**	**0.36**	**0.36**	**0.47**	**0.52**	**0.60**

Bar Graph depicting the co-relation of two ratios and their average value

•In the case of Thyagraj, more number of Dwelling Units are accommodated with optimum number of tree cuts, as the average value is minimum i.e. 0.2
•In the case of Netaji Nagar, the colony did not accommodate more Dwelling Units even by increasing the number of tree cuts, as the average value is maximum i.e. 0.6

From the above observations, it is concluded that Thyagraj's proposal is the most efficient, thus the average value i.e.0.2, is considered to be the TCF ideal value (maximum).

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ISSUE| CORRESPONDING FACTOR

Excessive razing of trees for urban redevelopment

TCF

Tree Cut Factor

A factor, which evaluates the tree cut ratio and the cost of one dwelling unit in terms of number of trees cut.

DERIVED FORMULA

$\frac{\text{NUMBER OF TREES CUT}}{\text{TOTAL NUMBER OF EXISTING TREES}}$	A*
$\frac{\text{NUMBER OF TREES CUT}}{\text{INCREASED NUMBER OF DWELLING UNITS}}$	B*

TREE CUT FACTOR I TCF

$$TCF = \frac{A + B}{2}$$

* Each value should be ≤ 0.2

Ideal Value ≤ 0.2

Note : Derived Ideal Value i.e. 0.2 is based on the case studies of Redevelopment Proposals of 7 GPRA colonies.
Base DU Density before redevelopment is 77DU/ha (this value is the average of the 7 proposals Densities before redevelopment)

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ISSUE| CORRESPONDING FACTOR

Loss of native tree species that support the micro-climate of the area/zone

EDF

Ecological Damage Factor

A factor, which evaluates the ecological value of the trees cut to assess the impact on the surrounding environment.

DERIVED FORMULA

$\frac{\text{NUMBER OF TREES CUT with calibre} \geq 300\text{mm}}{\text{TOTAL NUMBER OF TREES CUT}}$	A*
$\frac{\text{NUMBER OF NATIVE TREES CUT}}{\text{TOTAL NUMBER OF TREES CUT}}$	B*

TREE ECOLOGY DAMAGE FACTOR I EDF

$$EDF = \frac{A + B}{2}$$

* Each value should be ≤ 0.2

Ideal Value ≤ 0.2

Note : Derived Ideal Value i.e. 0.2 is based on the case studies of Redevelopment Proposals of 7 GPRA colonies.

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ISSUE| CORRESPONDING FACTOR

Rapid sprawl of urban areas has led to increase in the extent of impervious surface that:

- Aggravates flooding
- Hampers the hydrological balance &
- Disturbs the rate of groundwater recharge

RCF

Road Cover Factor

A factor, which evaluates the road area in respect to its site area, to assess the heat-island effect and stormwater run-off.

DERIVED FORMULA

ROAD SURFACE AREA (sq.m)	A
SITE AREA (sq.m)	B

ROAD COVER FACTOR I RCF

$$RCF = \frac{A}{B}$$

Ideal Value ≤ 0.2

Note : Derived Ideal Value i.e. 0.2 is based on the case studies of Redevelopment Proposals of 7 GPRA colonies.

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ISSUE| CORRESPONDING FACTOR

Discontinuous and unshaded pedestrian routes make walking less preferable

Absence of exclusive pedestrian networks lead to conflict between pedestrians and vehicular traffic

Walkways devoid of green buffers

Transit hubs and social infrastructure are not within the walkable radius thus increase dependency on vehicles

PDF

Pedestrian Discomfort Factor

A factor, which evaluates the pedestrian ease of mobility to assess the discomfort of residents.

DERIVED FORMULA

PEDESTRIAN DISCONTINUITY	A (score*)
UNSHADED WALKWAYS	B (score*)
WALKWAY DEVOID OF GREENS	C (score*)
UNSIGNALIZED PEDESTRAIN CROSSINGS	D (score*)
AVG. WALKING DISTANCE from TYPE II & TYPE III TOWERS TO TRANSIT HUBS > 800M	E (score*)
AVERAGE WALKING DISTANCE from TYPE II & TYPE III TOWERS to SOCIAL INFRASTRUCTURES > 800M	F (score*)

PEDESTRIAN DISCOMFORT FACTOR I PDF

$$PDF = \frac{A+B+C+D+E+F}{6}$$

Ideal Value ≤ 0.2

*Score | 0.0 | if the condition is not met
*Score | 0.4 | if the condition is met 50%
*Score | 0.8 | if the condition is met 100%

Note : Derived Ideal Value i.e. 0.2 is based on the case studies of Redevelopment Proposals of 7 GPRA colonies.

ISSUE| CORRESPONDING FACTOR

Excessive ground coverage due to inefficient and sprawling/lengthy circulation/core designs

CIF

Core Inefficiency Factor

A factor, which evaluates the core area of a tower in respect to the dwelling unit area to assess the inefficient use of space

DERIVED FORMULA

TOTAL BUILT UP AREA PER FLOOR (sq.m)	A= B+C
CORE AREA PER FLOOR (sq.m)	B
DU's AREA PER FLOOR (sq.m)	C

CORE INEFFICIENCY FACTOR I CIF

$$CIF = \frac{B}{C}$$

Ideal Value ≤ 0.2

Note : Derived Ideal Value i.e. 0.2 is based on the case studies of Redevelopment Proposals of 7 GPRA colonies.

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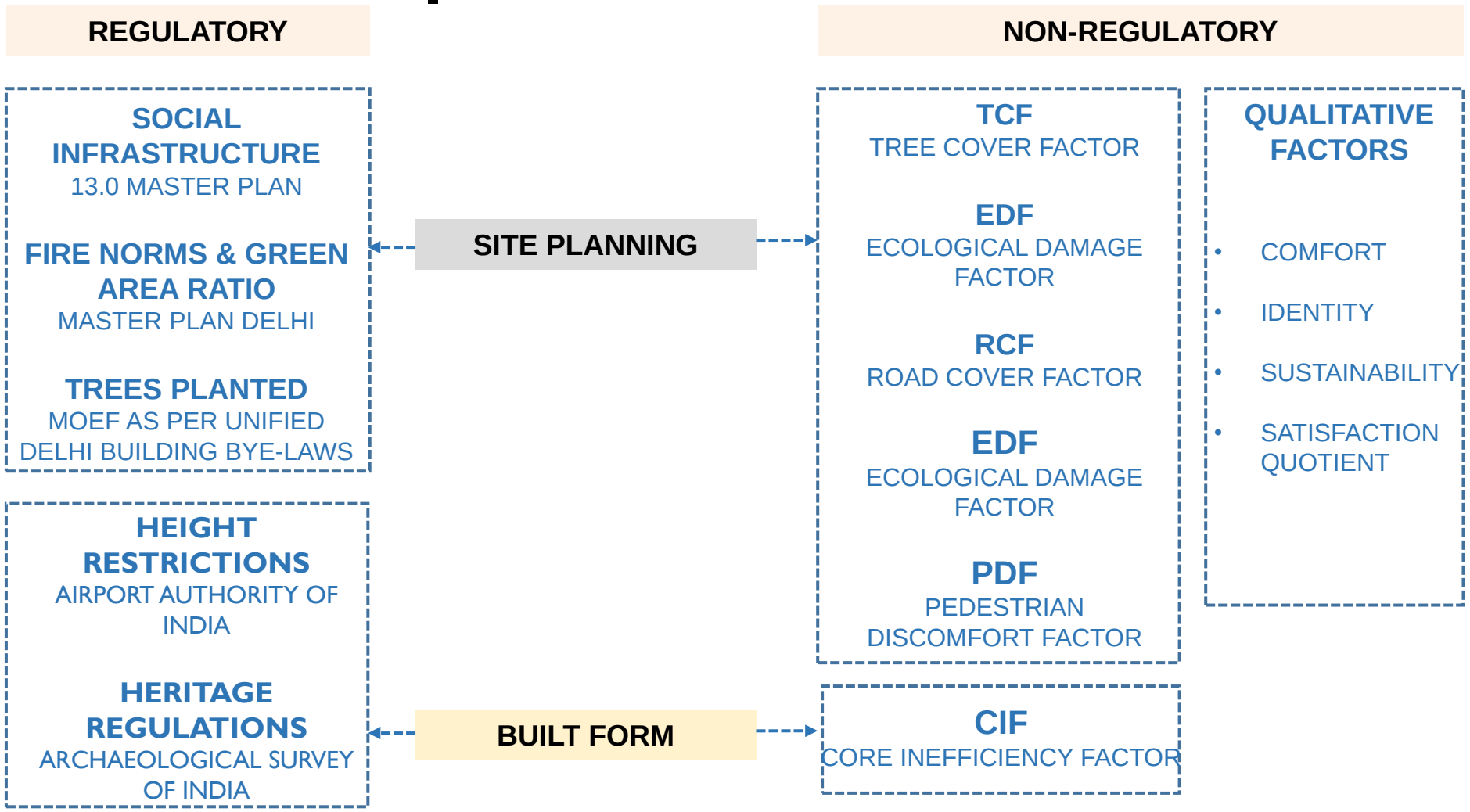
DEMONSTRATIONS

FEASIBLE DENSITIES

KEY PRINCIPLES| DEMONSTRATIONS



THESE PRINCIPLES HAVE BEEN COLLECTIVELY USED TO DEMONSTRATE THE FEASIBLE DENSITIES

- THE FINANCIAL ASPECT FOR REDEVELOPMENT HAS NOT BEEN CONSIDERED IN THESE PROPOSALS
- THESE ARE NOT DESIGN DEMONSTRATIONS

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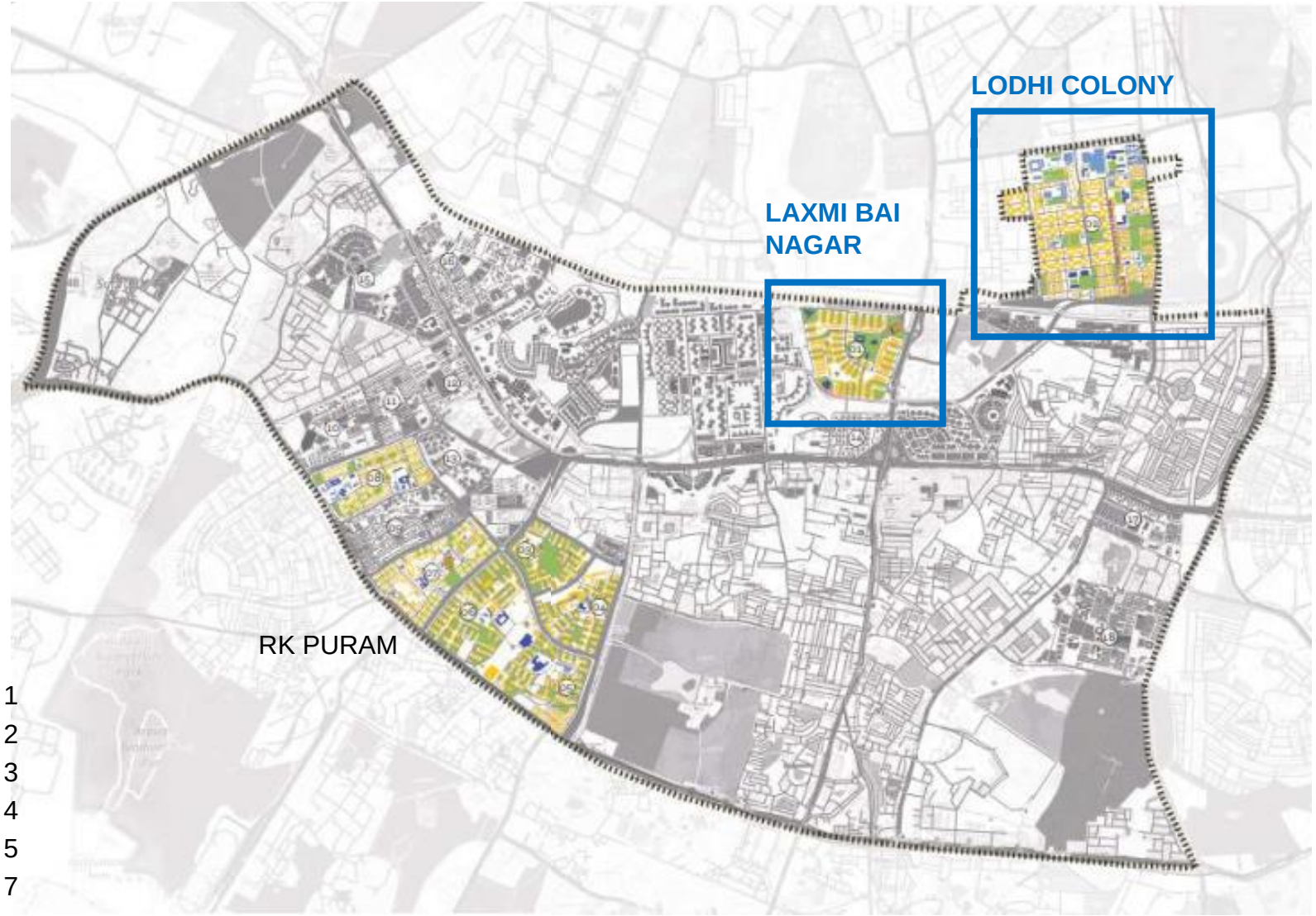
DEMONSTRATIONS| LAXMI NAGAR , LODHI COLONY



LAXMI BAI NAGAR
LODHI COLONY
RK PURAM SECTOR 1
RK PURAM SECTOR 2
RK PURAM SECTOR 3
RK PURAM SECTOR 4
RK PURAM SECTOR 5
RK PURAM SECTOR 7

A study of the GPRA Colonies (Delhi Urban Arts Commission 2020) was also taken up by DUAC from 2019-2020 which was led by Samir Mathur as the Principal Investigator during his tenure at DUAC. The subsequent work was carried out by the authors of this report from 2021-22.

LAXMI NAGAR| PROPOSAL OVERVIEW

BUILDING USE

LEGEND

- Residential
- Commercial
- Institutional
- Public-Semi Public
- Public Greens

Delhi Metro Line

- Pink Line
- Yellow Line

- Site boundary

1. East Kidwai Nagar
2. AIIMS Flyover
3. West Kidwai Nagar
4. Sarojini Nagar
5. Sanjay Jheel Park
6. Delhi Flying Club
7. INA Colony

CONTEXT

- Vehicular
- Pedestrian

- Existing built
- Proposed built
- Existing trees

MOBILITY

EXISTING AND PROPOSED

A study of the GPRA Colonies (Delhi Urban Arts Commission 2020) was also taken up by DUAC from 2019-2020 which was led by Samir Mathur as the Principal Investigator during his tenure at DUAC. The subsequent work was carried out by the authors of this report from 2021-22.

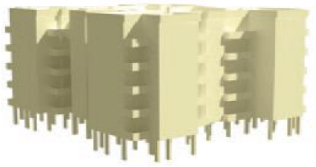
LAXMI NAGAR| EXISTING AND PROPOSED

EXISTING

PROPOSED

TYPE II
CORE: 1 TO 8 DU'S
DU: 1600
EXISTING DU: 1200

TYPE III
CORE: 1 TO 8 DU'S
DU: 896
EXISTING DU: 1200



TYPE IV
CORE: 1 TO 4 DU'S
DU: 704
EXISTING DU: 780

SITE AREA : 34.2 ha | Permissible Height : 32M.**

	EXISTING	PROPOSED
Typology	Type II, IV	**Type II , III, IV**
Number of DU	1980	**3200**
Density (DU/ha)	57.89 DU/ha	**93.57**
Height	G+1	**G+8**
Ground Coverage (%)	91761.40 (26.83%)	**60641.60 (17.73%)**
Road Area (sq.m.)	36917.40	33183.81
Number of Trees*	1502	1249+2268 (Retained+Planted)[1]
Tree Density (no. of trees/ha.)	43.90	**102.84** (Retained +Planted)

Increase in number of DU	**1400** (60% increase)	
Number of Trees Cut	**253**	
Tree Cut Percentage	**16.8 %**	
Tree Cut Factor | **TCF**[2] | Ideal Value ≤ 0.2	**0.18***	
Tree Ecology Damage Factor | **EDF**[2] | Ideal Value ≤ 0.2	**Indeterminate**[2]	
Road Cover Factor | **RCF** | Ideal Value ≤ 0.2	**0.10***	
Parking Requirement (as per norms)	4352	
Parking Provided (total number)	3922	
MLCP (mechanized/ ramp)	2700	
Surface	1222	
Parking Regulation Factor | **PRF**[3] | Ideal Value ≤ 0.2	**0.31***	
Pedestrian Discomfort Factor | **PDF**[4] | Ideal Value ≤ 0.2	**0.10**	
Core Inefficiency Factor | **CIF**[5] | Ideal Value ≤ 0.2	**0.20***	

[1] As per the MoEF environmental condition for green cover : Minimum one tree for every 80sqm of land.
[2] Location of Existing Trees have been take from google image references. Thus, the total number of existing trees and their location is approximate. The tree specifications i.e species and size are indeterminate.
[3] PRF value is not ideal as basement parking has not been considered for this specific proposal.
[4] Pedestrian Discomfort factor calculations here include the average walking distance condition only.
[5] For detail floor plan for towers, refer Annexure Pg. 176-178
* For the calculation of each Efficiency Factor, refer to the Chapter 04, Pg. 15
** Permissible Height = Allowed Height as per AAI - Average Ground Level (existing)

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LAXMI NAGAR| EFFICIENCY VALUE FACTOR CALCULATIONS

A*	NO. OF TREES CUT / TOTAL NO. OF EXISTING TREES	= 253 / 1502	=	0.17
B*	NO. OF TREES CUT / INCREASED NO. OF DWELLING UNITS	= 253 / 1400	=	0.18

*Each value should be ≤ 0.2

TREE CUT FACTOR — TCF

$$\frac{A+B}{2} = \frac{0.17 + 0.18}{2} = \mathbf{0.18}$$

IDEAL VALUE ≤ 0.2

A*	NO. OF TREES CUT with CALIBRE >300MM / NO. OF TREES CUT	= * / *	=	*
B*	NO. OF NATIVE TREES CUT / NO. OF TREES CUT	= * / *	=	*

*Each value should be ≤ 0.2

ECOLOGY DAMAGE FACTOR — EDF

$$\frac{A+B}{2} = \frac{* + *}{2} = *$$

IDEAL VALUE ≤ 0.2

A	ROAD AREA (in Sqm)
B	SITE AREA (in Sqm)

ROAD COVER FACTOR — RCF

$$\frac{A}{B} = \frac{33183.81}{342000} = \mathbf{0.10}$$

IDEAL VALUE ≤ 0.2

X	TOTAL NUMBER OF PARKING PROPOSED	= 3922		
A	STILT PARKING CAPACITY / X	= 0 / 3922	=	0.00
B	NO. OF SURFACE PARKING / X	= 1222 / 3922	=	0.31
C	MLCP CAPACITY (no.) / X	= 2700 / 3922	=	0.69
D	NO. OF BASEMENT PARKING / X	= 0 / 3922	=	0.00

PARKING REGULATION FACTOR — PRF

$$A+B = 0.31 = \mathbf{0.31}$$

IDEAL VALUE ≤ 0.2

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LAXMI NAGAR| EFFICIENCY VALUE FACTOR CALCULATIONS

	CONDITION	SCORE
A*	PEDESTRIAN DISCONTINUITY	0.4
B*	UNSHADED WALKWAYS	0.0
C*	WALKWAY DEVOID OF GREENS	0.4
D*	UNSIGNALISED PEDESTRIAN CROSSINGS	0.0
E*	Avg. WALKING DISTANCE from TYPE II & III TOWERS to TRANSIT HUBS >800M	0.0
F*	Avg. WALKING DISTANCE from TYPE II & III to SOCIAL INFRA. >800M	0.0

*Score |0.0| if the condition is not met ; |0.4| if the condition is met 50% ; |0.8| if the condition is met 100%

PEDESTRIAN DISCOMFORT FACTOR — **PDF**

$$= \frac{A+B+C+D+E+F}{6}$$

$$= \frac{0.4 + 0.0 + 0.4 + 0.0 + 0.0 + 0.0}{6} = \mathbf{0.10}$$

IDEAL VALUE ≤ 0.2

	For Type II - 8 DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	120.99
B	DUs' AREA PER FLOOR (sqm.)	530.64
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	651.63

CORE INEFFICIENCY FACTOR — **CIF**

$$\frac{A}{B} = \frac{120.99}{530.64} = \mathbf{0.22}$$

IDEAL VALUE ≤ 0.2

	For Type III - 8 DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	124.84
B	DUs' AREA PER FLOOR (sqm.)	606.77
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	731.61

CORE INEFFICIENCY FACTOR — **CIF**

$$\frac{A}{B} = \frac{124.84}{606.77} = \mathbf{0.20}$$

IDEAL VALUE ≤ 0.2

	For Type IV - 4 DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	109.82
B	DUs' AREA PER FLOOR (sqm.)	504.31
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	614.13

CORE INEFFICIENCY FACTOR — **CIF**

$$\frac{A}{B} = \frac{109.82}{504.31} = \mathbf{0.21}$$

IDEAL VALUE ≤ 0.2

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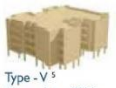
LODHI COLONY| PROPOSAL OVERVIEW

SITE AREA : 86.35 ha | Permissible Height : 38 M.

Type - II [3]
Core : 2 to 12&16DUs
DU : 3100

Type - III [5]
Core : 2 to 12&16DUs
DU : 4736

Type - IV [5]
Core : 1 to 4DUs
DU : 512



Type - V [5]
Core : 1 to 4DUs
DU : 288

MLCP
Parking Provided : 5940

	EXISTING	PROPOSED
Typology	Type II, III, IV, V	Type II, III, IV, V
Number of DU	4586	**8636**
Density (DU/ha)	53.11	**100.01** PDmax_H+T
Height	G+1, G+2	**G+3, G+4, G+9, G+10**
Ground Coverage (%)	254634 (29.49%)	**254785 (29.51%)**
Road Area (sq.m.)	224468	245425
Number of Trees	3600 [2]	2710+1831 (Retained+Planted) [1]
Tree Density (no. of trees/ha.)	41.69	**52.59** (Retained +Planted)

Increase in number of DU	3642
Number of Trees Cut	**890**
Tree Cut Percentage	**24.72%**
Tree Cut Factor | TCF [3] | Ideal Value ≤ 0.2	**0.21***
Tree Ecology Damage Factor | EDF [3] | Ideal Value ≤ 0.2	**Indeterminate [2]**
Road Cover Factor | RCF | Ideal Value ≤ 0.2	**0.28***
Parking Requirement (as per norms)	**9620**
Parking Provided (total number)	**10420**
MLCP (mechanized/ ramp)	5940
Surface	4480
Parking Regulation Factor | PRF [3] | Ideal Value ≤ 0.2	**0.43***
Pedestrian Discomfort Factor | PDF [4] | Ideal Value ≤ 0.2	**0.10***
Core Inefficiency Factor | CIF [5] | Ideal Value ≤ 0.2	**0.22***

[1] As per the MoEF environmental condition for green cover : Minimum one tree for every 80sqm of land. Refer Annexure A.7
[2] Location of Existing Trees have been take from google image references. Thus, the total number of existing trees and their location is approximate. The tree specifications i.e species and size are indeterminate.
[3] PRF value is not ideal as basement parking has not been considered for this specific proposal.
[4] Pedestrian Discomfort factor calculations here include the average walking distance condition only.
[5] For detail floor plan of towers, refer Annexure A.4, Pg. 179-181.
* For the calculation of each Efficiency Factor, refer Page 103
** Permissible Height = Allowed Height as per AAI - Average Ground Level (existing). Refer Annexure A.10, Page 190.

LEGEND

- Residential
- Commercial
- Institutional
- Public-Semi Public
- Public Greens

Delhi Metro Line

- Violet Line
- Yellow Line

- Site boundary

1. Lodhi Colony Railway Station
2. Najaf Khan's Tomb
3. Khanna Market
4. Indira Paryavaran Bhawan
5. Lodhi Garden
6. Indian Islamic Cultural Centre
7. India Habitat Centre
8. Dayal Singh College
9. Sai Mandir
10. Pragati Vihar Hostel
11. JLN Metro Station
12. JLN Stadium
13. Seva Nagar Railway Station

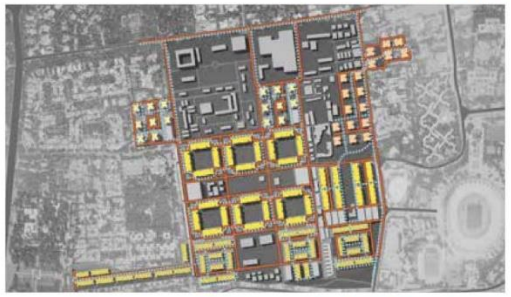
- Vehicular
- Pedestrian

- Existing built
- Proposed built
- Existing trees

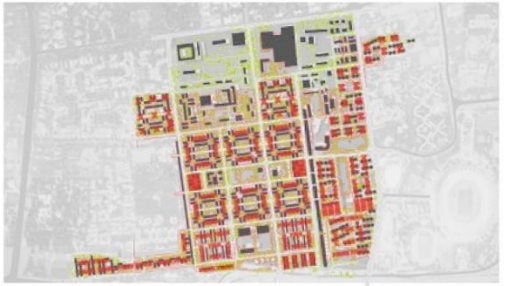
BUILDING USE

CONTEXT

MOBILITY



EXISTING AND PROPOSED



LODHI COLONY| PROPOSAL OVERVIEW

ZONING

1. Small green pockets have been replaced with consolidated greens to accommodate recreational activities and social spaces.

2. MLCP- Multi-Level Car Parking buildings have been placed towards the periphery to allow better vehicular access and maintain an exclusive residential zone.

3. Type2 and Type 3 towers have been placed towards the south west and south east, visually similar to the upcoming neighboring residential colonies.

4. Social infrastructure such as the existing schools and commercial buildings in the site have been retained in place and have been provided with vehicular and pedestrian routes to facilitate easy access.

5. Towers with lower densities have been placed closer to the Lodhi institutional area to suit the visual character of the adjacent built from.

FINAL PROPOSAL

Efficiency Factor Value - Calculations

A*	NO. OF TREES CUT / TOTAL NO. OF EXISTING TREES	= 890/3600	= 0.24	
B*	NO. OF TREES CUT / INCREASED NO. OF DWELLING UNITS	= 890/3600	= 0.24	

*Each value should be ≤ 0.2

TREE CUT FACTOR — TCF

$\frac{A+B}{2} = \frac{0.24+0.24}{2} = 0.24$

IDEAL VALUE ≤ 0.2

A*	NO. OF TREES CUT with CALIBRE >300MM / NO. OF TREES CUT	=	=
B*	NO. OF NATIVE TREES CUT / NO. OF TREES CUT	=	=

*Each value should be ≤ 0.2

ECOLOGY DAMAGE FACTOR — EDF

$\frac{A+B}{2} = \frac{}{2} =$

IDEAL VALUE ≤ 0.2

A	ROAD AREA (in Sqm)		
B	SITE AREA (in Sqm)		

ROAD COVER FACTOR — RCF

$\frac{A}{B} = \frac{245425}{863500} = 0.28$

IDEAL VALUE ≤ 0.2

X	TOTAL NUMBER OF PARKING PROPOSED	= 10420		
A	STILT PARKING CAPACITY / X	=	=	NA
B	NO. OF SURFACE PARKING / X	= 4480/10420	=	0.43
C	MLCP CAPACITY (no.) / X	= 5940/10420	=	0.57
D	NO. OF BASEMENT PARKING / X	=	=	

PARKING REGULATION FACTOR — PRF

A+B = 0.43 = **0.43**

IDEAL VALUE ≤ 0.2

	CONDITION	SCORE
A*	PEDESTRIAN DISCONTINUITY	0.4
B*	UNSHADED WALKWAYS	0.0
C*	WALKWAY DEVOID OF GREENS	0.0
D*	UNSIGNALISED PEDESTRIAN CROSSINGS	0.0
E*	Avg WALKING DISTANCE from TYPE II & III TOWERS to TRANSIT HUBS >800M	0.4
F*	Avg WALKING DISTANCE from TYPE II & III to SOCIAL INFRA. >800M	0.0

*Score |0.0| if the condition is not met ; | 0.4 | if the condition is met 50% ; | 0.8| if the condition is met 100%

PEDESTRIAN DISCOMFORT FACTOR — PDF

$= \frac{A+B+C+D+E+F}{6} = \frac{0.4+0.0+0.0+0.0+0.4+0.0}{6} = 0.1$

IDEAL VALUE ≤ 0.2

	For Type II - 12DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	214.52
B	DUs' AREA PER FLOOR (sqm.)	888.72
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	1103.24

CORE INEFFICIENCY FACTOR — CIF

$\frac{A}{B} = \frac{214.52}{888.72} = 0.24$

IDEAL VALUE ≤ 0.2

	For Type II - 16DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	244.6
B	DUs' AREA PER FLOOR (sqm.)	1184.96
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	1429.56

CORE INEFFICIENCY FACTOR — CIF

$\frac{A}{B} = \frac{244.6}{1184.96} = 0.20$

IDEAL VALUE ≤ 0.2

	For Type III - 16DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	326.94
B	DUs' AREA PER FLOOR (sqm.)	1315.49
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	1642.43

CORE INEFFICIENCY FACTOR — CIF

$\frac{A}{B} = \frac{326.94}{1315.49} = 0.24$

IDEAL VALUE ≤ 0.2

	For Type IV - 4DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	109.82
B	DUs' AREA PER FLOOR (sqm.)	504.31
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	614.13

CORE INEFFICIENCY FACTOR — CIF

$\frac{A}{B} = \frac{109.82}{504.31} = 0.21$

IDEAL VALUE ≤ 0.2

	For Type V - 4DU Cluster	
A	CORE AREA PER FLOOR (sqm.)	120.99
B	DUs' AREA PER FLOOR (sqm.)	530.64
C	TOTAL BUILT-UP AREA PER FLOOR (sqm.) | A+B	651.63

CORE INEFFICIENCY FACTOR — CIF

$\frac{A}{B} = \frac{120.99}{530.64} = 0.22$

IDEAL VALUE ≤ 0.2

FINDINGS 01

PARAMETERS OF LANDSCAPE TRANSFORMATION

COMPREHENSIVE STRATEGY| GPRA COLONIES

FINDINGS

1
EFFICIENCY FACTORS

ENSURES MINIMUM **TREE-CUT** , EFFICIENT **PARKING** STRATEGY, WALKABLE & SUSTAINABLE **MOBILITY** NETWORKS, PRESERVATION OF **ECOLOGY,** INCREASE OF **GREEN AREAS** OVER HARD PAVED AREAS AND EFFICIENT BUILDING **CORE DESIGN**

2
ASSESSMENT INDEX

INDICATES THE LIVEABILITY STANDARDS OF A RESIDENTIAL AREA, BY ASSESSING AN AREA IN TERMS OF QUALITATIVE PARAMETERS SUCH AS **COMFORT, SATISFACTION, IDENTITY & SUSTAINABILITY** WITH THE RESPECTIVE QUANTITATIVE PARAMETERS

3
REDEVELOPMENT DEMONSTRATIONS

EXHIBITS THE **FEASIBLE DENSITIES** AND POSSIBLE OUTCOMES WHEN REDEVELOPMENT PROPOSALS ARE WORKED OUT BASED ON THE SUGGESTED EFFICIENCY FACTORS AND IN COMPLIANCE WITH THE EXISTING BUILDING NORMS.

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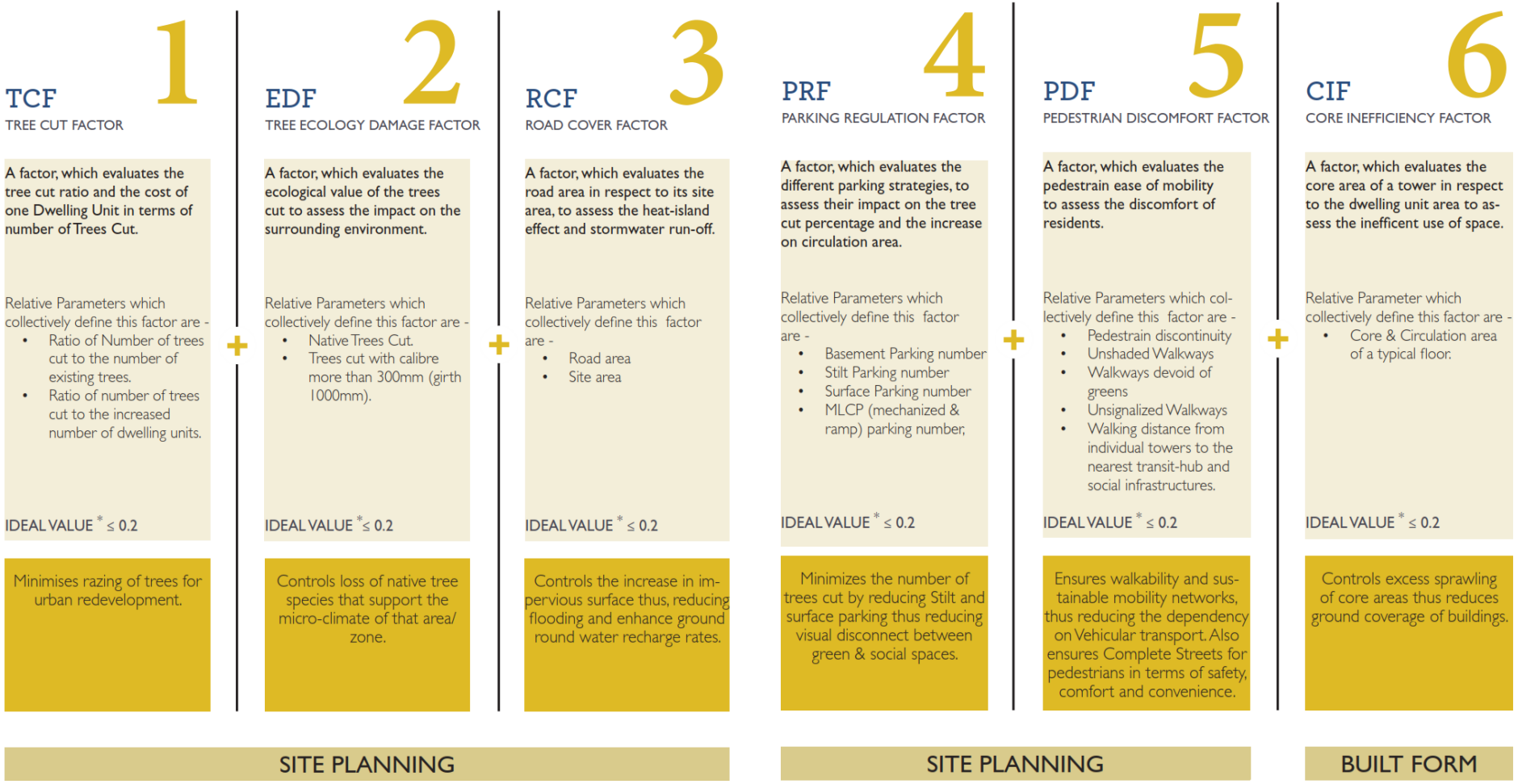
QUANTITATIVE | GPRA COLONIES



* Derived Ideal Values are based on the case studies of Redevelopment Proposals of 7 GPRA colonies.

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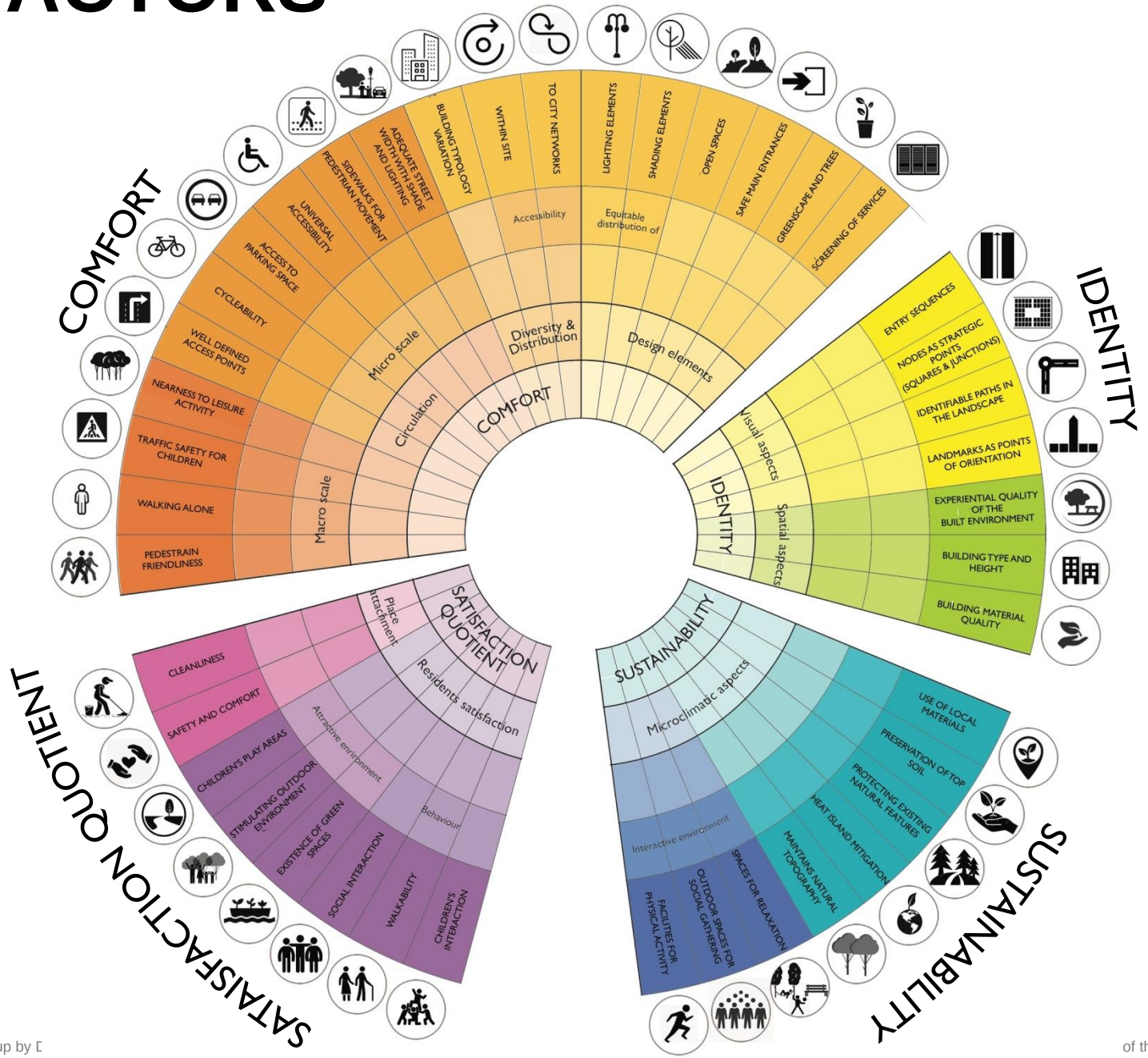
QUALITATIVE FACTORS

- The interpretive framework consists of factors related to the psychological perception of the environment with respect to the physical characteristics.
- Qualitative parameters are general and descriptive but more complex as they involve aspects of social, environmental, economic and aesthetic design.
- **Therefore to access their value they are compared to quantitative factors as a measurable quantity.**



REDEVELOPMENT DEMONSTRATION| FEASIBLE DENSITIES

LEGENDS

ED
Density before Redevelopment

PD
Proposed Density for Colonies which are under the redevelopment process as in the year 2020

PDmax_H+T
Maximum Proposed Density considering AAI Height regulation and Existing Trees for Colonies which have potential of redevelopment after the year 2020 .

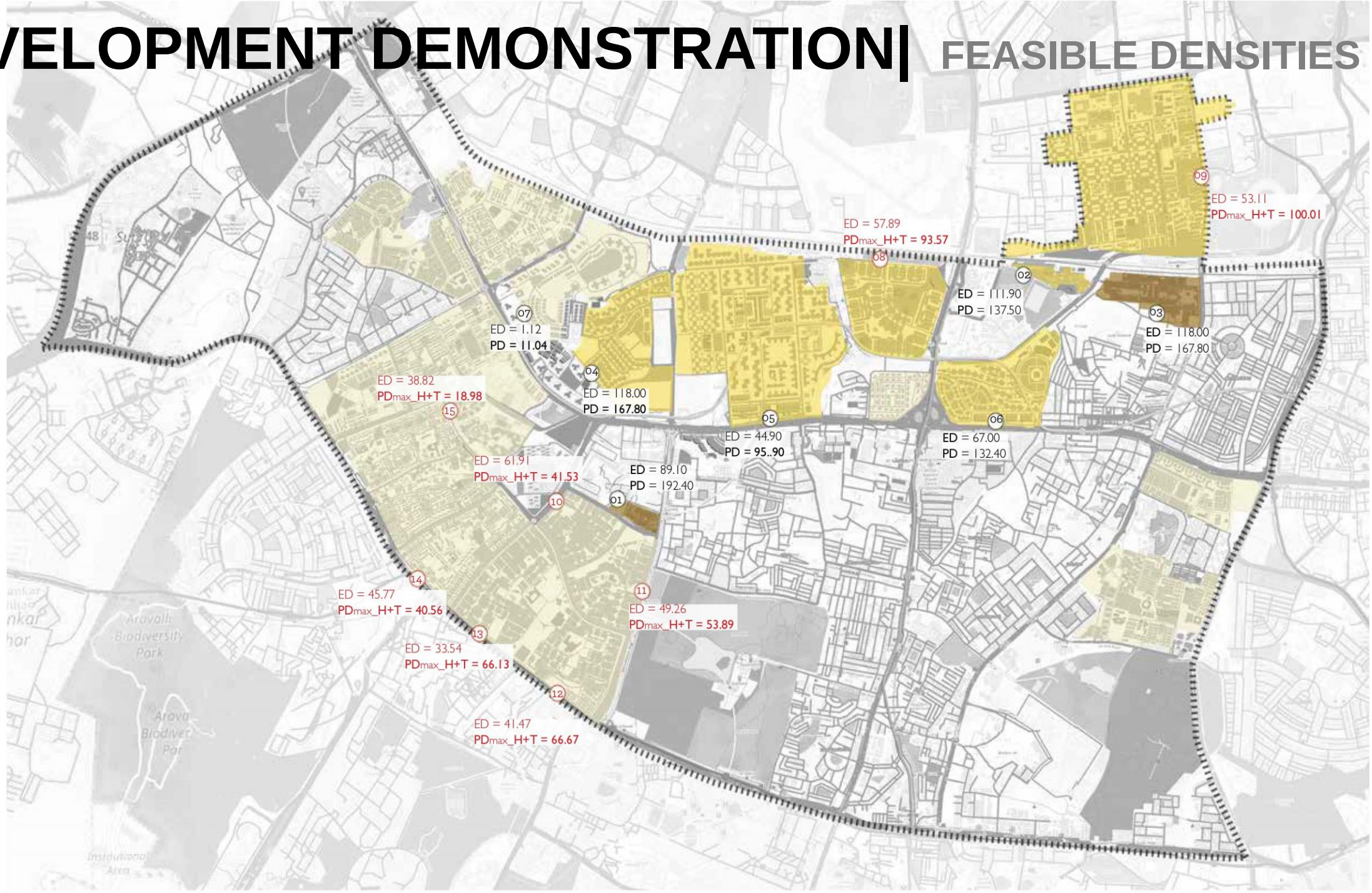
Density | 1-70 DU/ha

Density | 71-140 DU/ha

Density | 141-200 DU/ha

Colonies already redeveloped or proposed for redevelopment, as in year 2020.

Colonies with potential for redevelopment in future.



FINDINGS 02

URBAN REGENERATION IN INDIA

URBAN REGENERATION IN INDIA| DATA INDEX

Data Index : QUANTITATIVE PARAMETERS

A. BUILT FORM

1.	SITE AREA	
2.	DWELLING UNITS (number)	
3.	DENSITY (DU/ha)	
4.	HEIGHT	
5.	F.A.R.	
6.	GROUND COVERAGE (%)	
7.	OPEN AREA (site area - ground coverage) % of site area	
8.	INCREASED DENSITY (proposed density - density before re-development)	

B. SITE PLANNING

7	RETAINING THE EXISTING				
	7.1	Primary Street Patterns retained (approx. %)			
	7.2	Percentage of Trees Retained			
8.	BASEMENT				
	8.1	Area % (of site area)			
	8.2	Extent			
9	PARKING NUMBER				
	9.1	Total four-wheeler Parking number proposed			
		9.1.1	Stilt		
		9.1.2	Surface		
		9.1.3	MLCP (mechanized & ramp)		
		9.1.4	Basement		
10	CIRCULATION				
	10.1	Pedestrian Network			
		6.1.1	Character		
			6.1.1.1	Continuous network without any break points.	
			6.1.1.2	Covered/ Shaded walkways	
			6.1.1.3	Walkways amidst green areas.	
			6.1.1.4	Planned/Designed to have a minimum walking distance	
		6.1.2	Average Walking Distance from Type 2 & Type 3 Residential Towers (from farthest block)		
			6.1.2.1	To nearest Transit-hub	
			6.1.2.1	To social infrastructure and green spaces	
	10.2	Vehicular			
		6.2.1	Tower Drop-off points		
		6.2.2	% of Paved Area at ground level (paved area/site area)		

11	TREE CUT SPECIFICATIONS					
	11.1	Number of Existing Trees				
	11.2	Number of Tree Cut				
	11.3	Tree Cut Percentage				
	11.4	Specifications				
		No. of Trees Cut	Tree Specie	Native/ Non-Native	Girth (with a variance of 100mm)	Age	Life Span
	11.5	Number of Native Trees Cut					
	11.6	Number of Trees cut with girth more than 200/300mm					
	11.6	Number of Trees cut with their age not equivalent to their life span (in a variance of less or more than 5 years)					
12	ADDITIONAL TREES PLANTED SPECIFICATIONS					
	12.1	Number of additional trees planted				
	12.2	Specifications				
		No. of Trees Planted	Tree Specie	Native/ Non-NAtive	Indigenous/ Non-Indigenous	
13	OPEN SPACES QUALITY					
	13.1	Small-open spaces adjacent to each residential tower/ block.				
	13.2	Consolidated green areas for diversified age-groups.				
	13.3	Well-connected green spaces within premises				

C. BLOCKS AND THEIR PLACEMENT

13	BUILT-UP AREA & BLOCK CORE TYPOLOGY					
	Type	Core	Built-up Area per DU	Core+Circulation area per floor	Total Built-up Area (BUA) per floor	(Core+Circulation) % of Total BUA
	II					
	III					
	IV					
	V					
	VI					
14	CLUSTERING OF BLOCKS					

D. MOBILITY

15	TRAFFIC LOAD INCREASED ON PERIPHERAL ROADS		
	15.1	Number of Cars increases	
	15.2	Peripheral Road Widths	
16	PEDESTRIAN CONNECTIVITY TO THE NEAREST TRANSIT NODES		

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URBAN REGENERATION | QUANTITATIVE & QUALITATIVE

5.2 Assessment Index

(Quantitative and Qualitative)

Note: All the √ ticks are counted towards the total assessment to evaluate a project's performance.

Maximum Score = 156

Score Range:
Poor =0-52,
Average = 52- 104,
Good = 104-156

QUALITATIVE FACTORS

			If applicable (then select column below)	COMFORT																				SUSTAINABILITY														IDENTITY							SATISFACTION QUO.						
				Diversity and distribution			Circulation											Design element								Environment and microclimate aspects														Visual aspects				Spatial aspects			Residents satisfaction						
				Building typology variation	Accessibility		Macro scale				Micro scale						Equitable distribution of																																			
					Within site	To city networks	Pedestrian friendliness	Walking alone	Traffic safety for children	Nearness to leisure activity	Well defined access points	Cycleability	Adequate parking space	Adaptations and universal accessibility	Sidewalks for pedestrian movement	Adequate street width with shade and lighting	Lighting elements	Shading elements	Open spaces	Safe main entrances	Greenscape and trees	Screening of services	Use of local materials	Preservation of top soil	Protecting existing water bodies	Heat island mitigation	Maintains natural topography	On-site renewable energy	0% discharge(solid waste & water)	Maintains Microflora & Microfauna	Interactive environment	Spaces for relaxation	Outdoor spaces for social gathering	Facilities for physical activity	Entry sequences	Nodes as strategic points (square & junctions)	Identifiable paths in the urban landscape	Landmarks as points of orientation	Experiential quality of the built environment	Building type and height variation	Building material quality	Architectural details	Attractive environment	Childrens play areas	Stimulating outdoor environment	Existence of green spaces	Behaviour	Social interaction	Walkability	Children's interaction
	If applicable (then select column ahead)			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
QUALITATIVE FACTORS																																																	
SITE PLANNING																																																	
1	TREE CUT FACTOR I TCF	Fill value																																																
	Ideal value ≤ 0.2		√															√		√			√		√	√			√													√	√				
	1.1 No. of existing trees																																																
	1.2 No. of trees cut																																																
	1.3 Increased number of DU																																																
2	TREE ECOLOGY DAMAGE FACTOR I EDF	Fill value																																															
	Ideal value ≤ 0.2		√																			√	√		√	√			√	√	√	√											√				
	2.1 No. of trees cut with calibre more than 300mm (girth 1000mm)																																																
	2.2 No. of native trees cut																																																
3	ROAD COVER FACTOR I RCF	Fill value																																																
	Ideal value ≤ 0.2		√															√					√		√	√			√																		
	3.1 Road area																																																
	3.2 Site area																																																
4	PARKING REGULATION FACTOR I PRF	Fill value																																															
	Ideal value ≤ 0.2		√				√	√	√	√			√	√		√	√	√	√	√	√	√	√	√	√	√	√	√																				
	4.1 Stilt parking number provided																																																
	4.2 Surface parking provided																																																
	4.3 MLCP parking provided																																																
	4.4 Basement parking provided																																																
5	PEDESTRIAN DISCOMFORT FACTOR I PDF	Fill value																																																
	Ideal value ≤ 0.2		√		√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	√	√	√	√	√			√		√	√										√	√	√	√	√	√
	5.1 Pedestrian continuity																																																
	5.2 Unshaded walkways																																																
	5.3 Walkways devoid of greens																																																
	5.4 Unsignalized pedestrain crossings																																																
	5.5 Average walking distance for Type II & Type III > 800 to social infrastructure spaces																																																
	5.6 Average walking distance for Type II & Type III > 800 to the nearest transit hub																																																
6	OPEN SPACES QUALITY	No value					√	√		√	√									√		√									√	√	√	√	√	√	√					√	√	√	√	√	√
	6.1 Green spaces adjacent to each residential tower/block	√																																															
	6.2 Consolidated green areas for diversified age-groups	√																																															
BUILT FORM																																																	
6	CORE INEFFICIENCY FACTOR I CIF	Fill value																																															
	Ideal value ≤ 0.2		√									√																																						
	6.1 Core & circulation area																																																
	6.2 DU area																																																
7	BLOCKS AND THEIR PLACEMENT	No value	√	√	√	√	√	√		√	√						√	√	√	√		√									√	√	√	√					√	√	√	√	√	√	√
	Clustering of Blocks																																																

GUIDELINES FOR URBAN REGENERATION IN INDIA THROUGH PARAMETERS OF LANDSCAPE TRANSFORMATION

Samir Mathur[1], Aastha Singh[2], Sunetra Surabhi[3]

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