Revitalising The Inner City Neighbourhood Planning With The Challenges And Opportunities In Sustainable Re-development

A Thesis

Submitted in partial fulfillment of the requirements for the award of Master of Architecture degree in Sustainable Architecture

by

CHANDHINI MENON S (39890004)

DEPARTMENT OF ARCHITECTURE
SCHOOL OF BUILDING AND ENVIRONMENT

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

MAY 2021

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119
www.sathyabama.ac.in

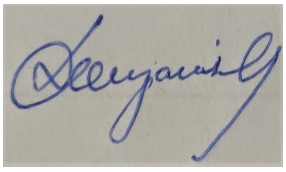
DEPARTMENT OF ARCHITECTURE

BONAFIDE CERTIFICATE

This is to certify that this Report is the bonafide work of **CHANDHINI MENON S (39890004)** who carried out the Thesis entitled "**Revitalising The Inner City Neighbourhood Planning With The Challenges And Opportunities In Sustainable Re-development"** under our supervision from January 2021 to May 2021.



Internal guide	**Internal Panel Member**	**External guide**
(DR.DEVYANI GANGOPADHAY)	(Ar. SHEETAL AMRAOTKAR)	(Ar.Balamurugan Rajakumar)



DR. DEVYANI GANGOPADHYAY
Dean, School of Building and Environment
Department of Architecture

Submitted for Viva voce Examination held on 31 – 05 - 2021

`

Internal Examiner **External Examiner**

DECLARATION

I **CHANDHINI MENON S** hereby declare that the Thesis Report entitled "**Revitalising The Inner City Neighbourhood Planning With The Challenges And Opportunities In Sustainable Re-development**" done by me under the guidance of DR.DEVYANI GANGOPADHAY (Internal) and **Ar. BALAMURUGAN RAJKUMAR, Principal Architect -Proton Ateliers** (External) at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Master of Architecture degree in Sustainable Architecture.

DATE: 28 – 05 - 2021

PLACE: CHENNAI **SIGNATURE OF THE CANDIDATE**



ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this Thesis project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. Devyani Gangopadhyay, Dean and Head of the department, Dept. of Architecture, School of Building and Environment,** for providing me necessary support and details at the right time during the progressive reviews.

My special thanks to **Dr. Suresh Kuppusamy,** our Design chair and **Ar.Balamurugan Rajakumar,** (External guide) and **Ar. Sheetal Amraotkar** (Thesis Coordinator) for their valuable comments and guidance during the project work.

I would like to express my sincere and deep sense of gratitude to my Project Guide **DR.DEVYANI GANGOPADHAY** for **her** valuable guidance, suggestions and constant encouragement which paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Architecture who were helpful in many ways for the completion of this Thesis.

ABSTRACT

In this stage of rapid development of cities and urban settlements there is an imbalance that affect the development in the recent years, where as urban neighbourhoods find especial position in the formation of cities. Besides, concept of sustainable development emerged as a major part of literature review in urban design and planning. There are numerous reasons to apply sustainability concept in urban design and planning that generally can be mentioned as preserving of natural systems and resources, and social equitable communities. Applying aspects of sustainable development within conventional practice of neighbourhood planning is a vital approach to achieving sustainable cities throughout the world.

TABLE OF CONTENTS

CHAPTER No.	TITLE	PAGE No.
	ABSTRACT	**v**
	LIST OF TABLES	**ix**
	LIST OF FIGURES	**x**
	LIST OF SYMBOLS AND ABBREVATIONS	**xi**
1	**INTRODUCTION**	**1**
1.1	INTRODUCTION	11
1.2	AIM	11
1.3	METHODOLOGY	12
1.4	SCOPE OF STUDY	13
1.5	LIMITATIONS	13
1.6	RESEARCH QUESTIONS	13
2	**SITE ANALYSIS**	**13**
2.1	BACKGROUND LITERATURE	
2.2	SITE STUDY	14
3	**STUDY OVERVIEW**	**15**
3.1	AREA OF STUDY	15
3.2	LAND USE	15

3.3 HEIGHT MAPPING 16
3.4 VEGETATION MAPPING 16
3.5 PARKING MAPPING 17
3.6 AGE MAPPING 17
3.7 PATCH ANALYSIS 18
3.8 PARK MAPPING 18

4 GUIDELINE ANALYSIS 19

4.1 COMPARITIVE ANALYSIS 19
4.2 COMPARITIVE ANALYSIS 20
4.3 GUIDELINE DETAILS 21
4.4 LEED RATING DETAIL 26

5 LEED ANALYSIS 29

5.1 STREET ANALYSIS 29
5.2 LEED ANALYSIS 22
5.3 LEED RATING 41
5.4 SIMULATIONS 44

6 PROPOSAL 47

6.1 BUILDING 47
6.2 STREET 48
6.3 PARKING 49

REFERENCES 67

LIST OF TABLES

TABLE No.	TITLE	PAGE No.
1.1	GUIDELINES	20
2.1	LEED	27
3.1	LEED RATING	41
4.1	LEED RTAING	67

LIST OF FIGURES

FIGURE No.	TITLE	PAGE No.
3.1.1	MAPPING	14
3.1.2	ANALYSIS	29
3.2.1	WASTE MANAGEMENT	38
3.2.2	SIMULATIONS	42
4.1	PROPOSAL RENDER	49
5.3.1	SIMULATION	65

CHAPTER 1
INTRODUCTION

1.1
INTRODUCTION

In this stage of rapid development of cities and urban settlements there is an imbalance that affect the development in the recent years, where as urban neighbourhoods find especial position in the formation of cities. Besides, concept of sustainable development emerged as a major part of literature review in urban design and planning. There are numerous reasons to apply sustainability concept in urban design and planning that generally can be mentioned as preserving of natural systems and resources, and social equitable communities. Applying aspects of sustainable development within conventional practice of neighbourhood planning is a vital approach to achieving sustainable cities throughout the world.

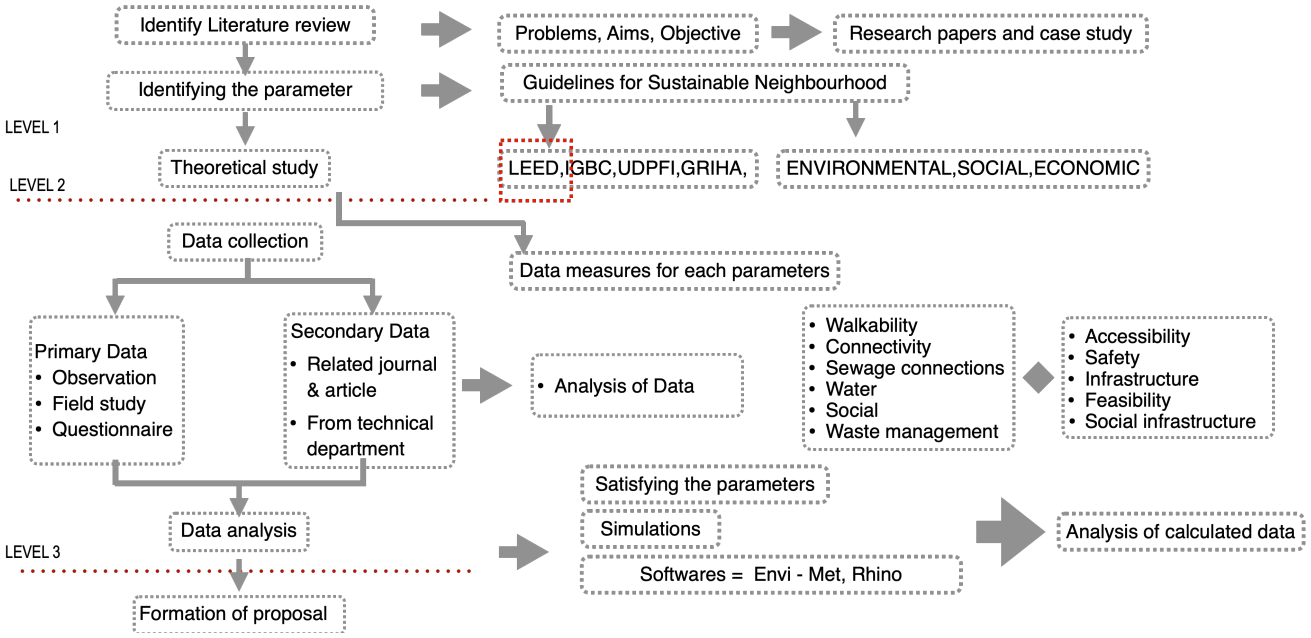
AIM

The main aim of this study is concentrated to make clear definition of sustainable neighbourhood and clarifying the main factors ,principles and parameters which are affective to achieve a sustainable redevelopment of neighbourhood as the major criteria

OBJECTIVE

1. Identify the parameters of the sustainability in a neighbourhood
2. Identify the study parameters measures for the neighbourhood
3. Identifying how they are measured considering the re-development
4. Providing sustainable solutions for the re-development
5. Proposal for the improvements in Sustainable approach.

METHODOLOGY : The method of the study is categorised into theoretical and empirical aspects.



Tab 1.1 Methodology

- First Stage: Identify the Problem Statement and Objectives .- Identifying the problem statement, the objectives, significance, scope and limitations of the study.
- Second Stage: Theoretical Research. The study emphasises on gathering theories that are relevant to the study. - key issues - The relevant materials for the literature review
- Third Stage: Data Collection. There are two types of data which have been gathered to gain a better understanding for this study. In order to achieve the first objective, the primary data will be collected
- Fourth Stage: Analysis and Findings. Analysis, to achieve the objectives of the study, the data derived from the structured interviews and open-ended questionnaires, the study utilised the quantifying method.

Significance of the Study :

The significance of this study is particularly important in the provision of housing that emphasises the environmental issues. The study outcome indirectly will be able to give and clear understanding of the Green Neighbourhood concept in developed housing neighbourhood. This is study is also important because it will provide exposure and early predictions about ways to reduce the environmental issues that arise.

SCOPE OF THE STUDY

- **Walkability and connectivity :**

  This study will identify the provision of pedestrian walkways that interconnected and accessible to all amenities and services, the walking distance to the destination and amenities and the provision of public transportation.

- **Safe neighbourhood :**

  Identify the application of Crime Prevention Through Environmental Design (CPTED) in designing a green neighbourhood.

- **Public open space :**

  This study will identify the provision of public open space according to the guideline and the location of the public open space.

- **Green network :**

  This study will identify the availability of planting strips and street trees and the neighbourhood farming plot and home „green plots".

- **Green infrastructure :**

  This study will identify the provision of green infrastructure through using natural method such as permeable paver, roof top garden and others .

- **Water Management :**

  The study of water connectivity and availability of water.

- **Solid Waste Management :**

  The study of waste management and the connection network available in the area.

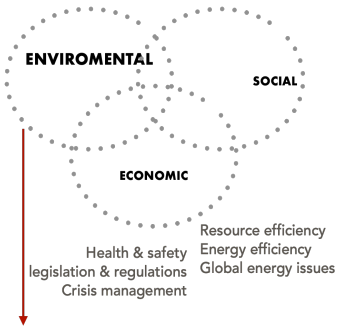
- **Sewage Connection :**

  The study of sewage connections and network

x

LIMITATIONS

- Planning at a regional level, focussing on the area around the neighbourhood
- The existing neighbourhood will be redeveloped
- The neighbourhood development of the recreational areas for future development will be shown in the master plan level
- The surrounding buildings in the neighbourhood will not be redeveloped
- In the site with interventions, Residential blocks (LIG, MIG, HIG housing) will be shown as single line plans
- Car parking, Landscaping and sustainable envelope features will be shown



RESEARCH QUESTIONS

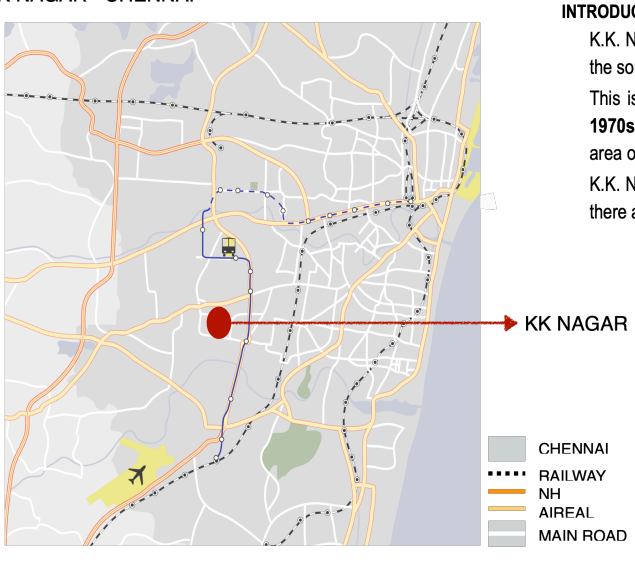
- What are the Major arterials through **traffic routes** which passes through residential neighbourhoods. Instead these streets should provide boundaries of the neighbourhood.
- Denoting Interior street patterns which helps in light duty surfacing so as to encourage a quiet, safe and low volume traffic movement and preservation of the residential atmosphere.
- What is the population of the neighbourhood divided in sectors .
- What are the neighbourhood focal point which can be designed as a central location for common area or green area , along with other institutions that have service areas coincident with the neighbourhood boundaries.
- What is the radius of the neighbourhood. The maximum of one quarter mile (647497 sq.m) thus precluding for walking.
- Location of Commercial spaces likes Shopping districts that can be sited at the edge of neighbourhoods preferably at major street intersections.

ENVIRONMENT

- Use of natural resources
- Environmental protection
- Permit & license compliance
- Emission to air
- Water /Chemical usage * discharge
- Shift of renewable resources
- Protecting health of eco-system
- Avoid excess pollution
- Integrated decisions
- Target welfare not GDP

SITE - STUDY

- KK NAGAR - CHENNAI



BASE CASE - Kalaigar Karunanithi Nagar / KK Nagar

INTRODUCTION

K.K. Nagar (shortened from Kalaignar Karunanithi Nagar) is a small township located in the southern part of Chennai, India.

This is situated west of Ashok Nagar and K.K. Nagar was a locality developed in the **1970s and early 1980s** along with the neighbourhood of Ashok Nagar covering a total area of 7 sq km.

K.K. Nagar is roughly 5 km² in area. K.K. Nagar is organised by sectors and streets, and there are 15 sectors, and around 102 streets.

The Land parcels were sold in plots while apartment was developed by the state board oh housing board. The large scale neighbourhood development of TNEB with full infrastructure acted as a catalyst for private development for residential use around.

KK Nagar is a primary residential area planned on gridiron street network to create twelve squarish sectors of roughly 300X300m, systematically lined with avenue trees.

The surveys have confirmed that this scale has enables residents - Men, Women and children to explore and understand the extends of their neighbourhood intimately.

Total area - 231 Acre

Fig. 1.1 – Site Location

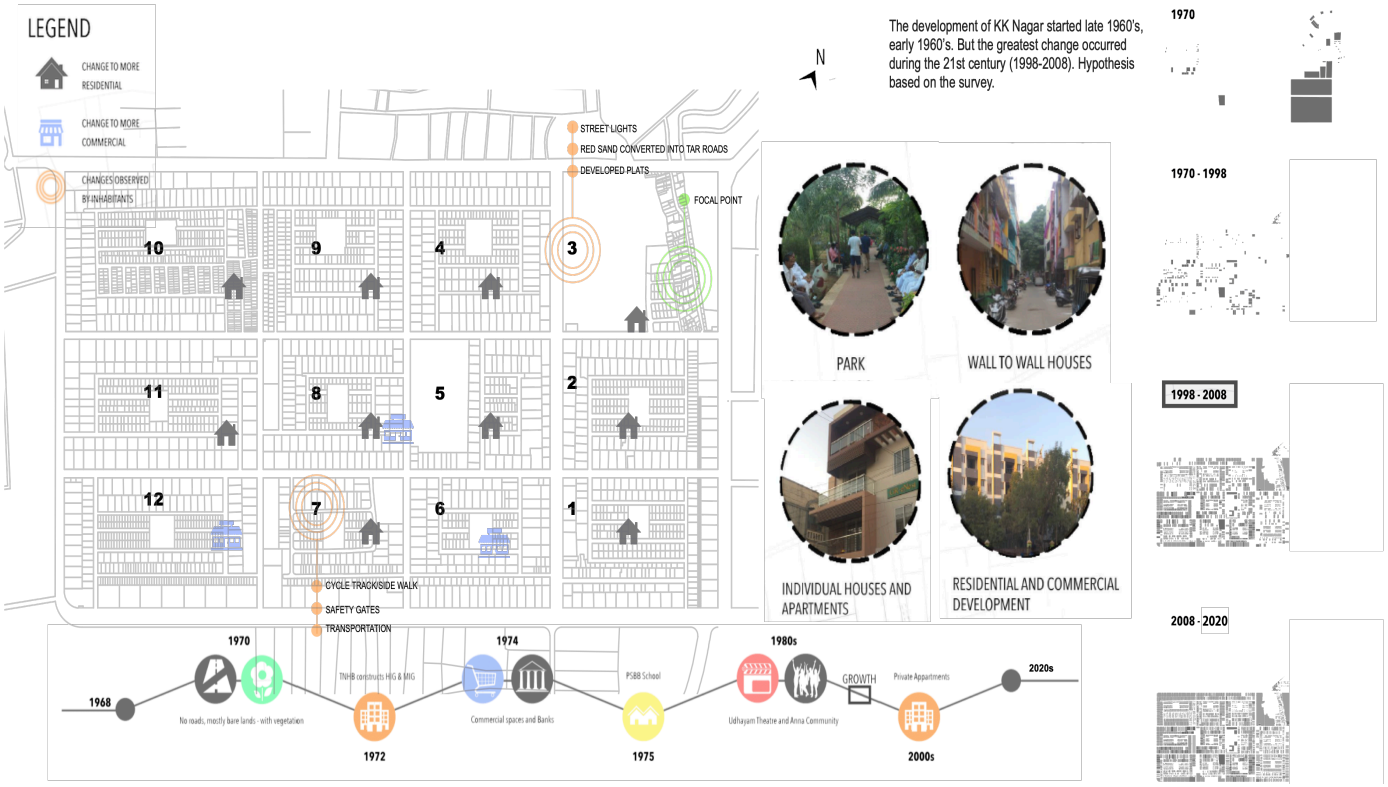


Fig. 1.2 – site understanding

Fig. 1.1 – Site evolution



Fig. 1.3 – Site understanding

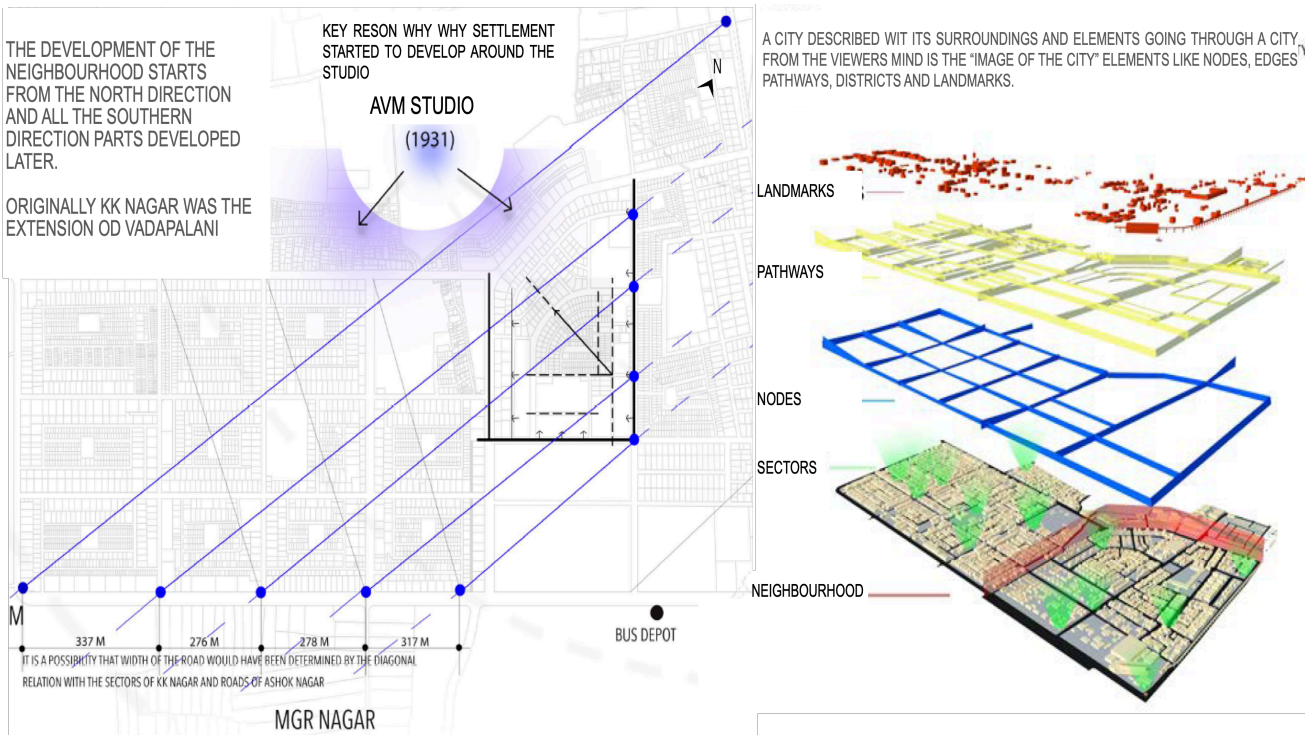


Fig. 1.4 – Site surroundings

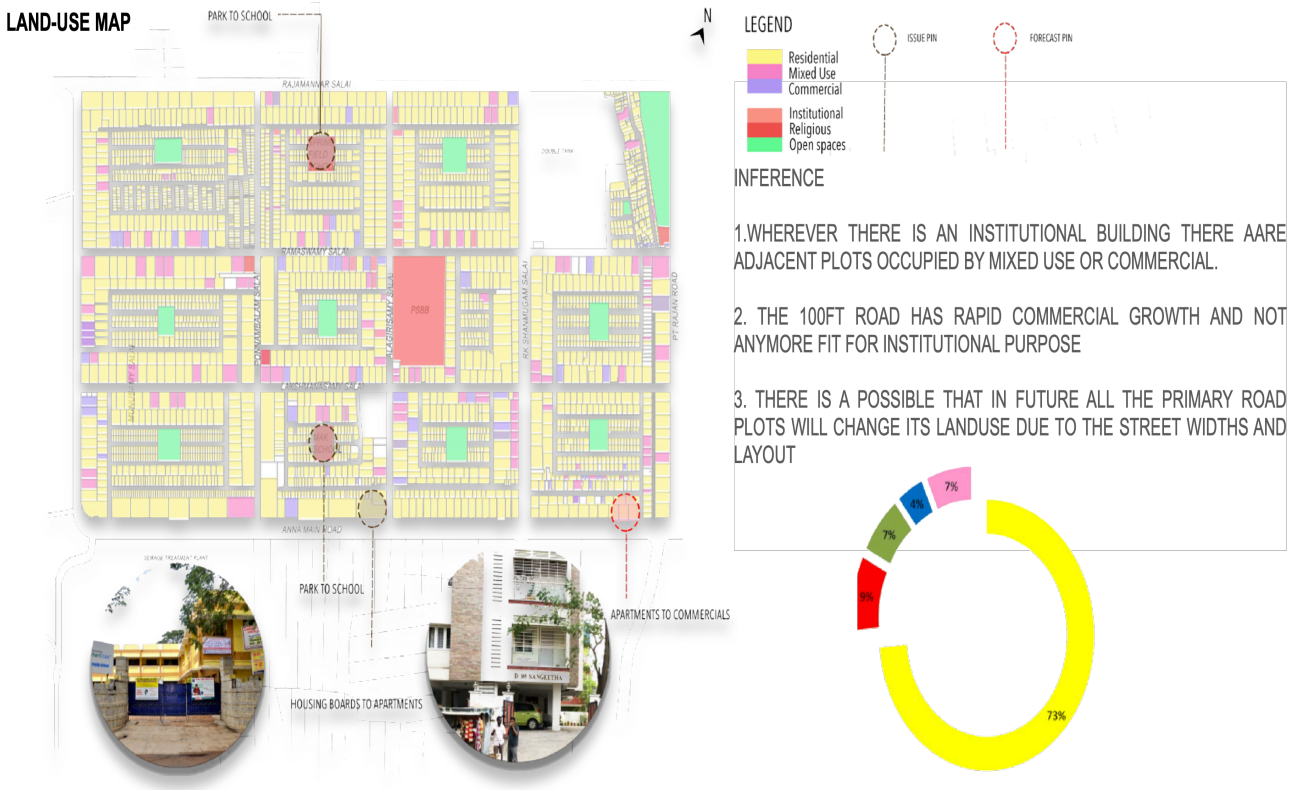


Fig. 1.4 – Land use map

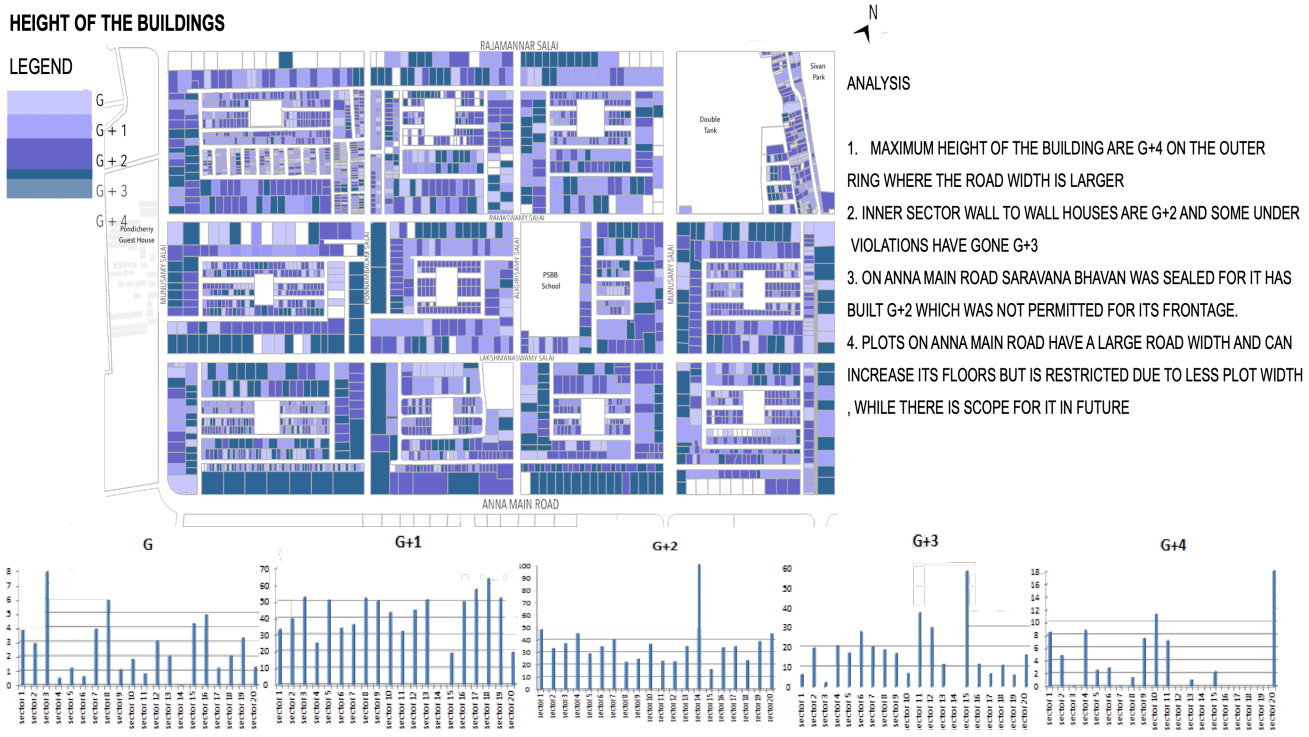


Fig. 1.5 –Heights mapping

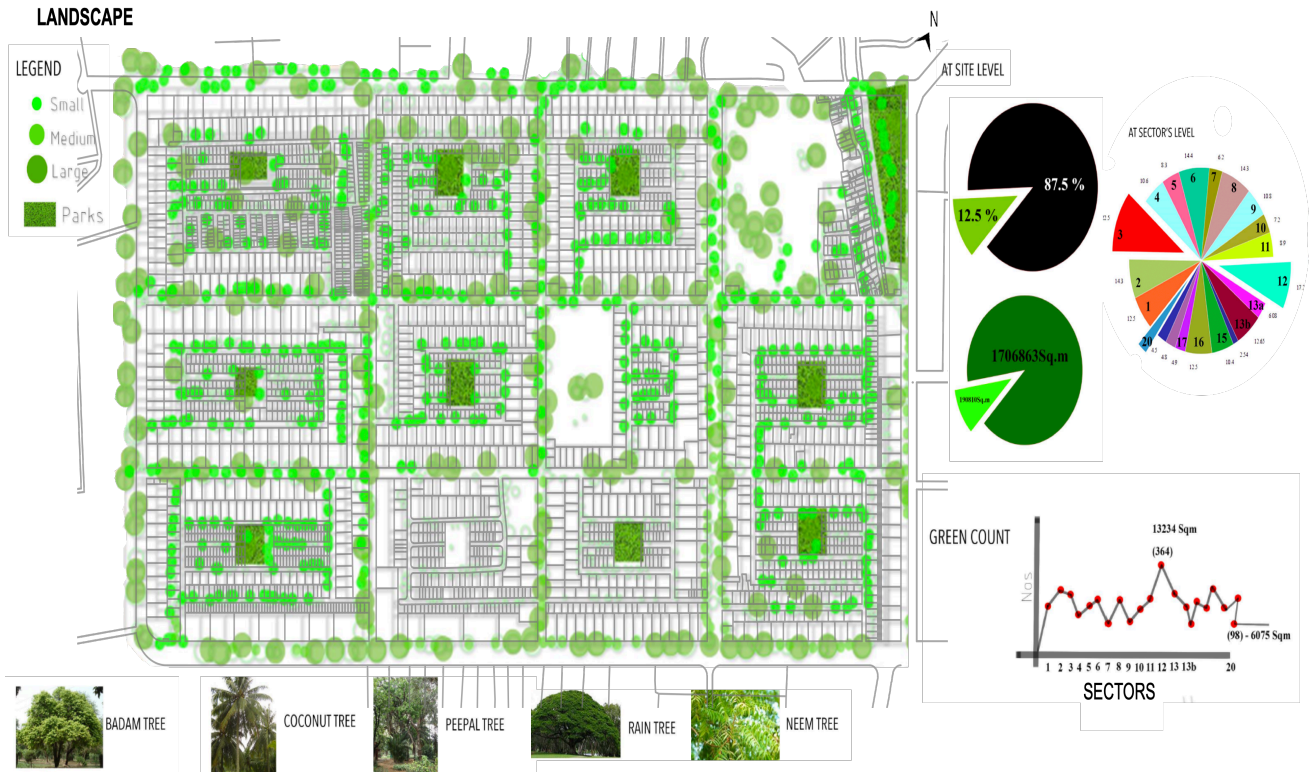


Fig. 1.6 – Vegetation map



Fig. 1.7 – Parking

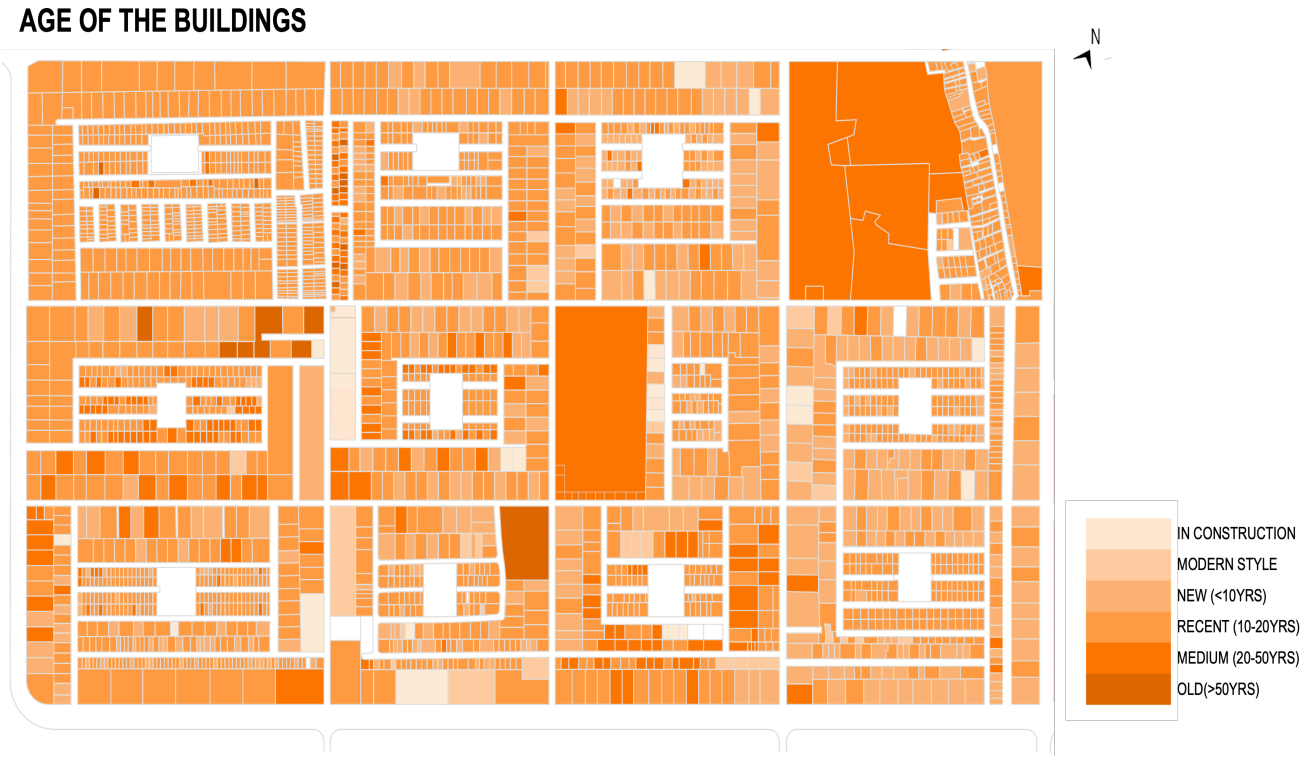


Fig. 1.8 – Age of the buildings map



Fig. 1.9 – Patch analysis

STREET LEVEL details :

- SECTOR PARK 01 : 1768 sq.m.
- SECTOR PARK 02 : 2062 sq.m.
- SECTOR PARK 04 : 2552 sq.m.
- SECTOR PARK 06 : 2700 sq.m.
- SECTOR PARK 07 : 5229 sq.m.
- SECTOR PARK 08 : 2117 sq.m.
- SECTOR PARK 10 : 2132 sq.m.
- SECTOR PARK 11 : 3828 sq.m.
- SECTOR PARK 12 : 1760 sq.m.

SITE AREA : 18,121 sq.m.

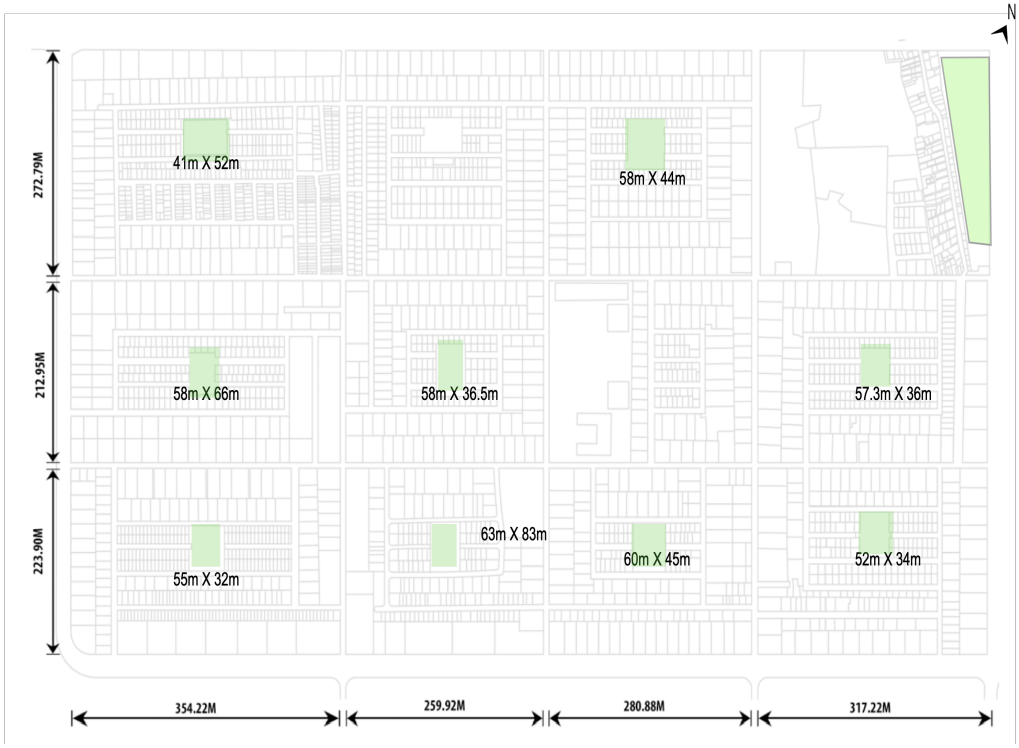


Fig. 1.1.1 – Park level detail

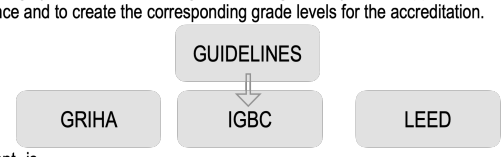


Fig. 1.1.2 – sector 9 detail

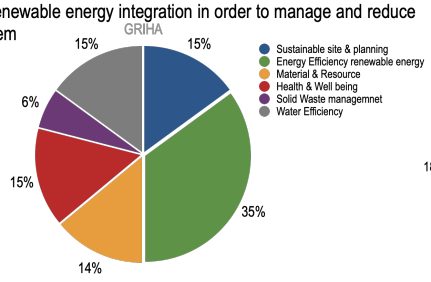
2. GUIDELINE ANALYSIS

COMPARATIVE ANALYSIS OF GUIDELINES

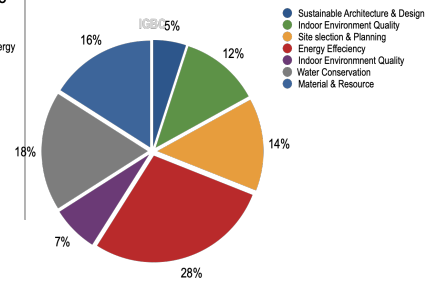
LEED, IGBC and GRIHA are the most recognised rating systems in the Indian green building industry. In this approach, the LEED India and GRIHA systems are likely in aims, process. Thus, framing to rate the building performance and to create the corresponding grade levels for the accreditation.



GRIHA - Green Rating for Integrated Habitat Assessment, is India's National Rating System. It was developed by TERI and approved by the MNRE. It follows five 'R' philosophy viz, Refuse, Reduce, Reuse, Recycle and Reinvent. GRIHA attempts to quantify aspects, like Energy / power consumption, Water consumption, Waste generation and Renewable energy integration in order to manage and reduce them



The objective of IGBC Green New Buildings rating system is to facilitate a holistic approach to create environment-friendly buildings, through architectural design, water efficiency, effective handling of waste, energy efficiency, sustainable buildings, and focus on occupant comfort & well-being.



Leadership in Energy and Environmental vogue (LEED) is also a classification system devised by the US inexperienced Building Council (USGBC) to classify the environmental conduct of a building and applaud market transfiguration towards property vogue. The system is credit-established, permitting comes to earn points for environ friendly behavior taken throughout construction and purpose of a building.

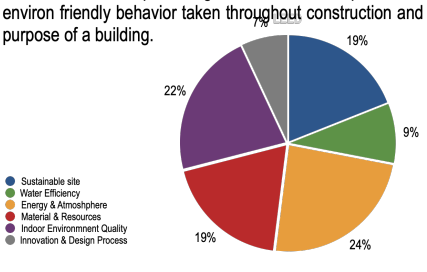
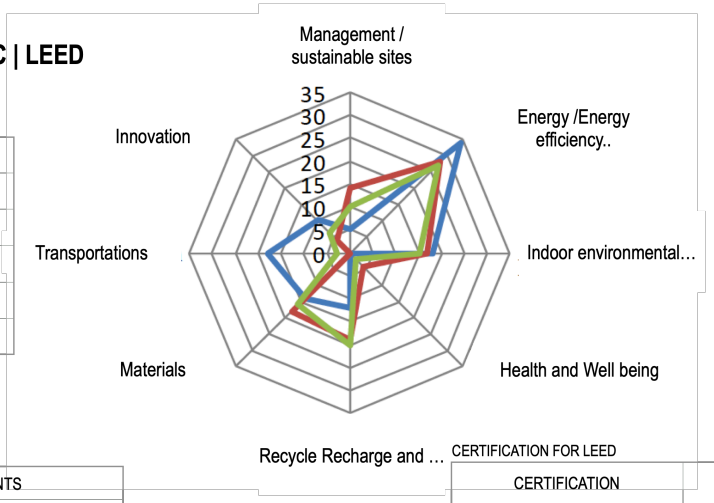


Chart. 2.1 – Comparative analysis

Comparison Between GRIHA | IGBC | LEED

POINTS ACHEIVED FOR GRIHA RATING

CERTIFICATION LEVELS	POINTS
1 STAR	25 - 30
2 STARS	31 - 35
3 STARS	36 - 40
4 STARS	41 - 45
5 STARS	46 - 50



CERTIFICATION FOR IGBC RATING

CERTIFICATION LEVELS	POINTS
Certification	50 - 59
Silver	60 - 69
Gold	70 -79
Platinium	80 -89
Super platinium	90 - 100

CERTIFICATION FOR LEED

CERTIFICATION	POINTS
Certification	40-49
Silver	50 - 59
Gold	60- 79
Platinium	80 Points and above

Chart. 2.2 – Comparative analysis

List of criteria and points for GRIHA:

NO.	CRITERION	POINTS	
1	*Site selection*	1	SITE PLANNING
2	*Preserve and protect landscape during construction*	5	
3	*Soil conservation (till post-construction)*	2	
4	*Design to include existing site features*	4	
5	*Reduce hard paving on-site and/or provide shaded hard-paved surfaces*	2	
6	*Enhance outdoor lighting system efficiency and use renewable energy system for meeting outdoor lighting requirements*	3	
7	*Plan utilities efficiently and optimize on-site circulation efficiency*	3	
8	*Provide minimum level of sanitation/safety facilities for construction workers*	2	HEALTH AND WELL BEING
9	*Reduce air pollution during construction*	2	
10	*Reduce landscape water requirement*	3	BUILDING PLANNING AND CONSTRUCTION STAGE
11	*Reduce water use in the building*	2	
12	*Efficient water use during construction*	1	
13	*Optimize building design to reduce conventional energy demand*	8	
14	*Optimize energy performance of building within specified comfort limits*	16	
15	*Utilization of fly-ash in building structure*	6	
16	*Reduce volume, weight, and construction time by adopting efficient technologies (such as pre-cast systems)*	4	
17	*Use low-energy material in interiors*	4	
18	*Renewable energy utilization*	5	
19	*Renewable-energy-based hot water system*	3	
20	*Waste water treatment*	2	RECYCLE,RECHARGE &REUSE
21	*Water recycle and reuse (including rainwater)*	5	

NO.	CRITERION	POINTS	
22	*Reduction in waste during construction*	1	WASTE MANAGEMENT
23	*Efficient waste segregation*	1	
24	*Storage and disposal of wastes*	1	
25	*Resource recovery from waste*	2	
26	*Use low-VOC paints/adhesives/sealants*	3	HEALTH &WELL BEING
27	*Minimize ozone depleting substances*	1	
28	*Ensure water quality*	2	
29	*Acceptable outdoor and indoor noise levels*	2	
30	*Tobacco smoke control*	1	
31	*Provide at least the minimum level of accessibility for persons with disabilities*	1	
32	*Energy audit and validation*	*MANDATORY*	
33	*Operation and maintenance*	2	
34	*Innovation points*	4	

The basic features of GRIHA

The system was developed to 'design and evaluate' new buildings. A building is evaluated based on its performance that was predicted for its entire life span – inception through operation. The stages of the life cycle that are identified for assessment are:

.Pre-construction stage
.Building planning and construction stages
.Building operation and maintenance stage

The benefits : This system will benefit the community by decreasing adverse effect on the environment by decreasing GHG (greenhouse gas) emissions, decreasing energy/ power consumption and dependence on natural resources [9].

Some of the benefits of a green building to owner, user, and the society are:

.Reduction in energy consumption without compromising the comfort levels
.Decreased destruction of natural areas, habitats, and biodiversity, and reduced soil erosion etc.
.Reduced air pollution and water pollution (direct health benefits)
.Reduced water consumption
.Reduced waste generation because of recycling and reuse

POINTS ACHEIVED FOR GRIHA RATING

CERTIFICATION LEVELS	POINTS
1 STAR	25 - 30
2 STARS	31 - 35
3 STARS	36 - 40
4 STARS	41 - 45
5 STARS	46 - 50

Tab 2.1 – Griha analysis

LIST OF CERTIFICATION POINTS OF IGBC

IGBC Green Residential Societies Rating System – CHECKLIST		
Credits		**Points**
Facility Management (FM)		
FM Credit 1	No Smoking in Common Areas	3
FM Credit 2	Maintenance of Facility	4
FM Credit 3	Basic Amenities	2
FM Credit 4	Green Housekeeping in common areas	1
FM Credit 5	Green Education for Occupants	1
FM Credit 6	Minimize Heat Exposure – Roof: 30, 40, …… 80%	6
FM Credit 7	Covered External Lighting Fixtures : 50, 75, 95%	3
FM Credit 8	Design for Differently Abled	3
FM Credit 9	Facilities for Health & Wellbeing	2
	TOTAL	**25**
Sustainable Water Practices (SWP)		
SWP Credit 1	Rain Water Harvesting : 10, 20, ……100%	10
SWP Credit 2	Landscape Areas: 20, 25, …… 40%	5
SWP Credit 3	Water Sub Metering	4
SWP Credit 4	Water Efficient Fixtures : 40, 50, …… 90%	6
SWP Credit 5	On-Site STP: 50, 75, 95%	3
SWP Credit 6	Automatic water level controllers	1
	TOTAL	**29**

Energy Conservation (EC)		
EC Credit 1	CFC Free Appliances	3
EC Credit 2	Efficient Lighting Fixtures: 25, 50, 75, 95%	4
EC Credit 3	Solar power for street & Common Area Lighting: 20, 30 ……. 80%	7
EC Credit 4	Energy metering	2
EC Credit 5	Solar Water Heating Systems: 20, 30. …… 70%	6
	TOTAL	**22**

Innovative Practices (IP)		
IP Credit 1	Exceptional Green Practices	
IP Credit 1.1	Water Meters for Dwelling units (50, 75, 100%)	3
IP Credit 1.2	Reuse of treated waste water for landscaping	1
IP Credit 1.3	Fresh water treatment plant	1
IP Credit 1.4	Electric charging points for vehicles in common areas (2.5%, 5%)	2
IP Credit 1.5	LPG/CNG Gas geysers for water heating (20, 40%)	2
IP Credit 1.6	Day-Light / Motion Sensors in common areas	1
IP Credit 2	IGBC Accredited Professional	1
IP Credit 3	Other Innovative practices	3
	TOTAL	**14**
	Total Number of Points	**100**

LIST OF CERTIFICATION POINTS OF LEED

Table 3.2 LEED for Neighbourhood Development v4 – sustainability actions – Neighbourhood Pattern and Design

Subcategory	Sustainability Actions
Walkable streets	11. Use in some places a ratio of building height to street width from the street centreline of at least 1:1.5.
	12. Provide walking paths on both sides of street & wide walking paths by retail & mixed use. Limit sidewalk intrusions.
	13. Minimize garage & service bay openings to street. Put building facades close to the street, with frequent entries.
	14. Use clear glass for ground floor retail, & keep unshuttered at night.
	15. For some ground-floor dwellings, have raised ground floors.
	16. For office buildings, have some ground-floor retail, and for mixed use buildings, have some ground-floor retail, live/work units, or dwelling units.
	17. Do not block entrances with parking lots. Provide on-street parking on both sides of street. Put off-street parking to the rear or side, not front, of a building.
	18. Use slow traffic speeds.
Compact development	19. Build at a sufficient density.
Connected & Open Community	20. Ensure good internal connectivity & good connectivity to the surrounding area.
Mixed-Use Neighbourhoods	21. Ensure dwellings are walking distance to a number of different uses.
	22. Ensure that large regional-serving retail is well served by transit.
Housing Types & Affordability	23. Provide a variety of housing types & sizes, including affordable housing.
Reduce parking footprint	24. Reduce parking footprint.
Transit Facilities	25. Provide safe & comfortable shelters protected from wind & rain & with seating, illumination, & signage.
Transportation Demand Management	26. Provide free transit passes to residents & employees for a year, or provide developer sponsored transit for at least 3 years beyond project build-out.
	27. Provide 1 shelter & 1 bike rack per transit stop.
	28. Ensure proximity to car sharing services. Prioritize parking for shared cars.
	29. Unbundle parking spaces from dwelling units.
	30. Make parking more expensive than public transit.
	31. Provide guaranteed rides home for employees in case of personal emergencies.
	32. Allow flexible work arrangements (e.g., telework, shifted schedules).
Access to Civic & Public Space	33. Ensure that dwellings & non-residential buildings are close to passive open spaces of a certain size.
Access to Recreation Facilities	34. Ensure that dwellings & non-residential buildings are walking distance to indoor & outdoor recreation facilities.
Visitability & Universal Design	35. Make dwellings & travel routes accessible.
Community Outreach & Involvement	36. Involve community in all stages: predesign, design, construction (including conducting a 2-day design charrette with the community)

Table 3.3 LEED for Neighbourhood Development v4 – sustainability actions – Green Infrastructure and Buildings

Subcategory	Sustainability Actions
Green Building	-- Have one or more LEED buildings (or other similar certification).[a]
	44. Demonstrate high building energy performance.
	45. Reuse existing building parts.
Historic Resource Preservation & Adaptive Reuse	46. Rehabilitate, restore, or preserve historic buildings, buildings contributing to a historic district & cultural landscapes in accordance with guidelines.
Construction Activity Pollution Prevention	47. Have an erosion & sediment control plan.
Minimized Site Disturbance	48. Preserve heritage trees & large native or non-invasive trees. Create a plan for maintaining the health of trees (including fertilizing, pruning, protecting during construction, & eliminating any invasive species that threaten them).
	49. Keep undeveloped land undisturbed, including during construction, & protect in long-term with binding documents.
Water Use Reduction	50. Use water-efficient indoor fixtures.
	51. Reduce potable outdoor water use through plant selection, irrigation efficiency, smart irrigation scheduling, or using an alternate water source.
Rainwater Management	52. Retain some rainwater on-site using low impact development (LID) and Green Infrastructure (GI).
Wastewater Management	53. Retain & reuse >25% of the average annual wastewater.
Heat Island Reduction	54. For paving, install planters, provide shade using plants or structures that house renewable energy or have high reflectance or are vegetated, or use open-grid or high reflectance paving.
	55. For roofs, use high reflectance roofing or vegetated roofs.
Solar Orientation	56. Orient blocks so that they are in an east-west orientation.
	57. Have buildings that are 1.5 times longer in the east-west direction than in the north-south direction.
	58. Ensure surfaces facing south are not significantly shaded.
Renewable Energy Production	59. Have on-site renewables (solar, wind, geothermal, micro-hydro, biomass) to provide a portion of the community's energy.
District Heating & Cooling	60. Install a system that includes at least 2 buildings.
Infrastructure Energy Efficiency	61. Use energy efficient traffic lights, street lights, water & wastewater pumps.
Recycled & Reused Infrastructure	62. Use recycled & reclaimed materials.
Solid Waste Management	63. Have 1 recycling/reuse station.
	64. Have recycling containers every 245 m on a mixed-use/non-residential block.
	65. Reuse, recycle or salvage 50% of non-hazardous construction waste.
	66. Have 1 hazardous waste drop-off point.
	67. Have 1 compost station.
Light Pollution Reduction	68. Only light where necessary. Reduce up-light, back-light & glare.

Tab 2.2 – IGBC analysis

GRIHA	IGBC	LEED
Site selection • Preserve and protect landscape during construction/compensatory depository forestation • Soil conservation (post construction) • Reduce hard paving on-site • Enhance outdoor lighting system efficiency and use renewable energy system for meeting outdoor lighting requirement • Plan utilities efficiently and optimize on-site circulation efficiency • Provide at least minimum level of sanitation/safety facilities for construction workers • Reduce air pollution during construction • Reduce landscape water requirement • Reduce building water use • Efficient water use during construction	• Sustainable Architecture and Design • Water Conservation • Energy Efficiency • Building Materials and Resources • Indoor Environmental Quality • Innovation and Development (EACH TOPIC HAS SUB CREDITS)	• GREEN BUILDING DESIGN & CONSTRUCTION GREEN INTERIOR DESIGN & • CONSTRUCTION GREEN BUILDING OPERATIONS & • MAINTENANCE GREEN HOMES DESIGN & • CONSTRUCTION GREEN NEIGHBOURHOOD • DEVELOPMENT (EACH TOPIC HAS SUB CREDITS)

• Optimize building design to reduce conventional energy demand • Optimize energy performance of building within specified comfort • Utilization of fly ash in building structure • Reduce volume, weight and time of construction by adopting efficient technology (such as pre-cast systems, ready-mix concrete) • Use low-energy material in interiors • Renewable energy utilization • Renewable energy based hot water system • Waste water treatment • Water recycle and reuse(including rainwater) • Reduction in waste during construction • Efficient waste segregation • Storage and disposal of waste • Resource recovery from waste		

• Use of low VOC paints/adhesives/ sealants • Minimize ozone depleting substances • Ensure water quality • Acceptable outdoor and indoor noise levels • Tobacco and smoke control • Universal Accessibility • Energy audit and validation • Operations and maintenance protocol for electrical and mechanical equipment		

Tab 2.3 – guideline comparative analysis

CONCLUSION

Since these three systems supported totally different parameters, there's a break of each rating systems rate an equivalent building otherwise. Conjointly they're quite advanced in nature and don't essentially provides a clear plan of the comes effectiveness. Every system has sure robust points and sure weak points and that they don't seem to be specific on certain assessment criteria. As from on top of resemblance study of LEED and GRIHA classification system some appropriate points

In which LEED is more appropriate to the design and comparing the three LEED NC is more relatable in credit categories.

Leadership in Energy and Environmental vogue (LEED) is also a classification system devised by the US inexperienced Building Council (USGBC) to classify the environmental conduct of a building and applaud market transfiguration towards property vogue. The system is credit-established, permitting comes to earn points for environ friendly behaviour taken throughout construction and purpose of a building. LEED was launched in an endeavour to develop a "consensus-established, market-driven scoring system to accelerate the event and implementation of inexperienced building practices." The program isn't bolt structured; no each project should meet identical necessities to qualify.

The LEED products presently available are

LEED - for brand spanking new Construction and Major Renovations
LEED - for Homes
LEED - for Core and Shell
LEED – for Existing Buildings: Service and Conservation
LEED – for business Interior
LEED - for faculties
LEED - for Retail
LEED - for tending
LEED - for Neighborhood Development

LEED'S GOALS

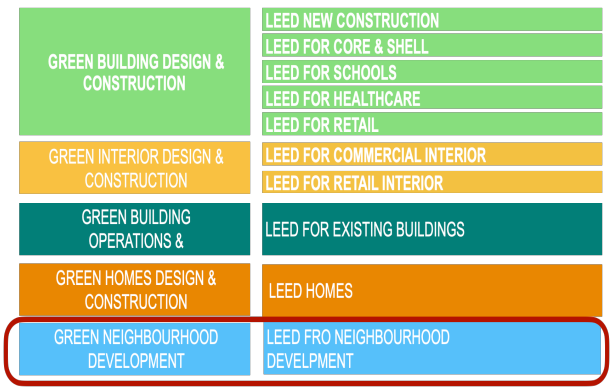
The LEED rating systems aim to promote a transformation of the construction industry through strategies designed to achieve seven goals:
· To reverse contribution to global climate change
· To enhance individual human health and well-being
· To protect and restore water resources
· To protect, enhance, and restore biodiversity and ecosystem services
· To promote sustainable and regenerative material resources cycles
· To build a greener economy
· To enhance social equity, environmental justice, community health, and quality of life.

These goals are the basis for LEED's prerequisites and credits. In the LEED ND rating system, the major prerequisites and credits are categorized as Smart Location and Linkage (SLL), Neighborhood Pattern and Design (NPD), and Green Infrastructure and Buildings (GIB).

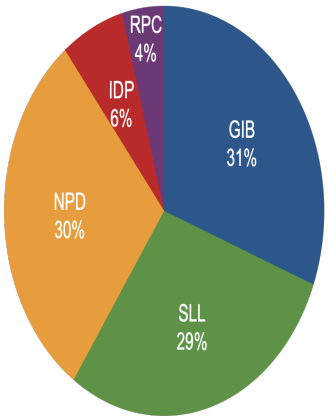
LEED-ND takes the green certification concept beyond individual buildings and applies it to the neighbourhood context. In particular, LEED-ND contains a set of **measurable standards** that collectively identify whether a development or proposed development can be deemed **environmentally superior, considering the development's location and access, its internal pattern and design, and its use of green technology and building techniques**. These standards include prerequisites (required as a baseline for sustainable neighbourhood development) and credits (additional best practice standards for sustainable neighbourhood development).

The standards can be useful to anyone interested in better community planning and design, including neighbors, citizens, community organizations and leaders, government officials, and others.

LEED-ND to evaluate and improve development proposals, to guide improvements to **existing neighbourhoods**, to inform community planning and zoning, and other policy-making.



LEED-ND - Neighbourhood Development





LEED-ND was designed to reflect the key aspects of neighbourhood sustainability. This section of the guide provides neighbourhood sustainability by summarising the key strategies of the **LEED-ND Rating System**, which is organised into three basic sections:

- Smart Location and Linkage (SLL)—where to build
- Neighborhood Pattern and Design (NPD)—what to build
- Green Infrastructure and Buildings (GIB)—how to manage environmental impacts

Neighborhood Pattern and Design (NPD)

Neighborhood Pattern and Design emphasizes the creation of compact, walkable, mixed-use neighborhoods with good connections to nearby communities. These vibrant neighborhoods provide many important benefits to residents, employees, and visitors and to the environment.

Green Infrastructure and Buildings (GIB)

Green Infrastructure and Buildings focuses on measures that can reduce the environmental consequences of the construction and operation of buildings and neighbourhood infrastructure. In account for large shares of energy consumption and water use. Globally, construction consumes a major part of the stone, gravel, sand, and virgin wood used in the world. Sustainable building technologies reduce waste and use energy, water, and materials more efficiently than conventional building practices.

LEED CREDITS SUMMARY

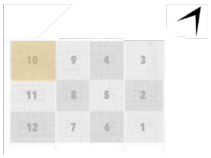
NUMBER	TITLE	POINTS	BRIEF DESCRIPTION
Smart Location and Linkage		**27 Points Possible**	
Prereq 1	Smart Location	Required	Develop on a site that is infill, connected to adjacent development, or served by transit or neighborhood amenities.
Prereq 2	Imperiled Species and Ecological Communities	Required	Conserve any on-site imperiled species and habitat.
Prereq 3	Wetland and Water Body Conservation	Required	Do not build near or on wetlands or water bodies.
Prereq 4	Agricultural Land Conservation	Required	Protect prime agricultural land.
Prereq 5	Floodplain Avoidance	Required	Prevent most building on floodplains.
Credit 1	Preferred Locations	1-10	Develop on a site that is highly accessible and connected to other nearby development.
Credit 2	Brownfield Redevelopment	1-2	Remediate a contaminated site and redevelop.
Credit 3	Locations with Reduced Automobile Dependence	1-7	Develop in an area that is well-served by transit or has a low average driving rate.
Credit 4	Bicycle Network and Storage	1	Locate along a bicycle network and provide bicycle storage and parking.
Credit 5	Housing and Jobs Proximity	1-3	Locate jobs and housing, particularly affordable housing, nearby each other.
Credit 6	Steep Slope Protection	1	Protect steep slopes from development.
Credit 7	Site Design for Habitat or Wetland and Water Body Conservation	1	Conserve pre-existing on-site habitat, wetlands, or water bodies in perpetuity.
Credit 8	Restoration of Habitat or Wetlands and Water Bodies	1	Restore degraded on-site habitat, wetlands, or water bodies, and conserve in perpetuity.
Credit 9	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1	Implement a long-term management plan for on-site habitat, wetlands, or water bodies.
Neighborhood Pattern and Design		**44 Points Possible**	
Prereq 1	Walkable Streets	Required	Include public-facing building entries, building heights appropriate to street widths, continuous sidewalks, and limited garage entries.
Prereq 2	Compact Development	Required	Meet minimum density thresholds.
Prereq 3	Connected and Open Community	Required	Connect neighborhood streets to each other and adjacent areas.
Credit 1	Walkable Streets	1-12	In addition to complying with the items in Prerequisite 1 above, improve the pedestrian experience at the street level by providing: frequent building entries, ground-level windows, on-street parking, elevated ground-floor units, low street speeds, and/or minimal driveway interruptions of sidewalks.
Credit 2	Compact Development	1-6	Add homes and/or nonresidential space to make efficient use of land.
Credit 3	Mixed-Use Neighborhood Centers	1-4	Provide neighborhood shops, services, and amenities clustered in neighborhood centers within walking distance of residents and each other.

Tab 2.4 – Leed detail

Credit 4	Mixed-Income Diverse Communities	1-7	Provide diverse housing types and affordability levels.
Credit 5	Reduced Parking Footprint	1	Minimize surface parking lots and discourage them along building frontages. Also provide bicycle and car-share parking.
Credit 6	Street Network	1-2	Provide superior connection of streets to each other and adjacent areas, and avoid cul-de-sacs.
Credit 7	Transit Facilities	1	Include shelters, benches, lighting, and information displays at transit stops.
Credit 8	Transportation Demand Management	1-2	Encourage use of environmentally preferable transportation choices with transit passes, shuttles, vehicle sharing, and/or unbundled parking pricing.
Credit 9	Access to Civic and Public Spaces	1	Provide squares, parks, and plazas within walking distance of residents and commercial tenants.
Credit 10	Access to Recreation Facilities	1	Provide indoor or outdoor recreational facilities.
Credit 11	Visitability and Universal Design	1	Design public spaces and dwelling units for all abilities.
Credit 12	Community Outreach and Involvement	1-2	Base project designs on community input.
Credit 13	Local Food Production	1	Provide access to gardening space, local produce, or a farmer's market.
Credit 14	Tree-Lined and Shaded Streets	1-2	Line and shade streets with trees.
Credit 15	Neighborhood Schools	1	Locate within walking distance to local schools.
Green Infrastructure and Buildings		**29 Points Possible**	
Prereq 1	Certified Green Building	Required	Include at least one building certified under LEED or a similar green building rating system.
Prereq 2	Minimum Building Energy Efficiency	Required	Meet minimum requirements for building energy efficiency.
Prereq 3	Minimum Building Water Efficiency	Required	Meet minimum requirements for building water efficiency.
Prereq 4	Construction Activity Pollution Prevention	Required	Implement an erosion and sedimentation control plan for construction.
Credit 1	Certified Green Buildings	1-5	Include multiple buildings certified under LEED or a similar green building rating system.
Credit 2	Building Energy Efficiency	1-2	Provide superior building energy efficiency.
Credit 3	Building Water Efficiency	1	Provide superior building water efficiency.
Credit 4	Water-Efficient Landscaping	1	Reduce water consumption for outdoor landscaping.
Credit 5	Existing Building Use	1	Reuse existing buildings.
Credit 6	Historic Resource Preservation and Adaptive Use	1	Reuse and restore historic buildings.
Credit 7	Minimized Site Disturbance in Design and Construction	1	Preserve heritage trees and previously undeveloped land.
Credit 8	Stormwater Management	1-4	Retain and treat stormwater on-site.
Credit 9	Heat Island Reduction	1	Use roofing and paving that reflects instead of absorbs solar heat.

Credit 10	Solar Orientation	1	Increase passive and solar access by orienting buildings or dense blocks to maximize north- and south-facing exposure.
Credit 11	On-Site Renewable Energy Sources	1-3	Generate renewable energy on-site.
Credit 12	District Heating and Cooling	2	Provide building heating and cooling through a shared neighborhood-wide system.
Credit 13	Infrastructure Energy Efficiency	1	Provide energy-efficient neighborhood infrastructure.
Credit 14	Wastewater Management	1-2	Reuse treated wastewater.
Credit 15	Recycled Content in Infrastructure	1	Use recycled content in neighborhood infrastructure.
Credit 16	Solid Waste Management Infrastructure	1	Provide neighborhood composting, recycling, and hazardous waste collection.
Credit 17	Light Pollution Reduction	1	Limit exterior illumination and direct it downward.
Innovation and Design Process		**6 Points Possible**	
Credit 1	Innovation and Exemplary Performance	1-5	Exhibit exemplary environmental performance in areas not addressed by the LEED-ND rating system.
Credit 2	LEED Accredited Professional	1	Have a team member that is: a LEED Accredited Professional, and credentialed in smart growth by the Natural Resources Defense Council and Smart Growth America, or credentialed in new urbanism by the Congress for the New Urbanism.
Regional Priority Credit		**4 Points Possible**	
Credit 1	Regional Priority Credit	1-4	Address geographically specific environmental, social equity, or public health priorities.
Project Totals (Certification estimates)		**110 Points Possible**	
Certified: 40-49 points	**Silver:** 50-59 points	**Gold:** 60-79 points	**Platinum:** 80+ points

Neighborhood Pattern and Design (NPD)

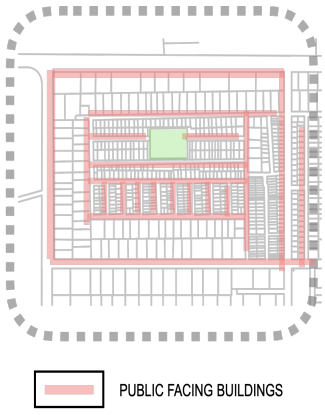


1. WALKABLE STREETS

Include public-facing building entries, building heights appropriate to street widths, continuous sidewalks, and limited garage entries.

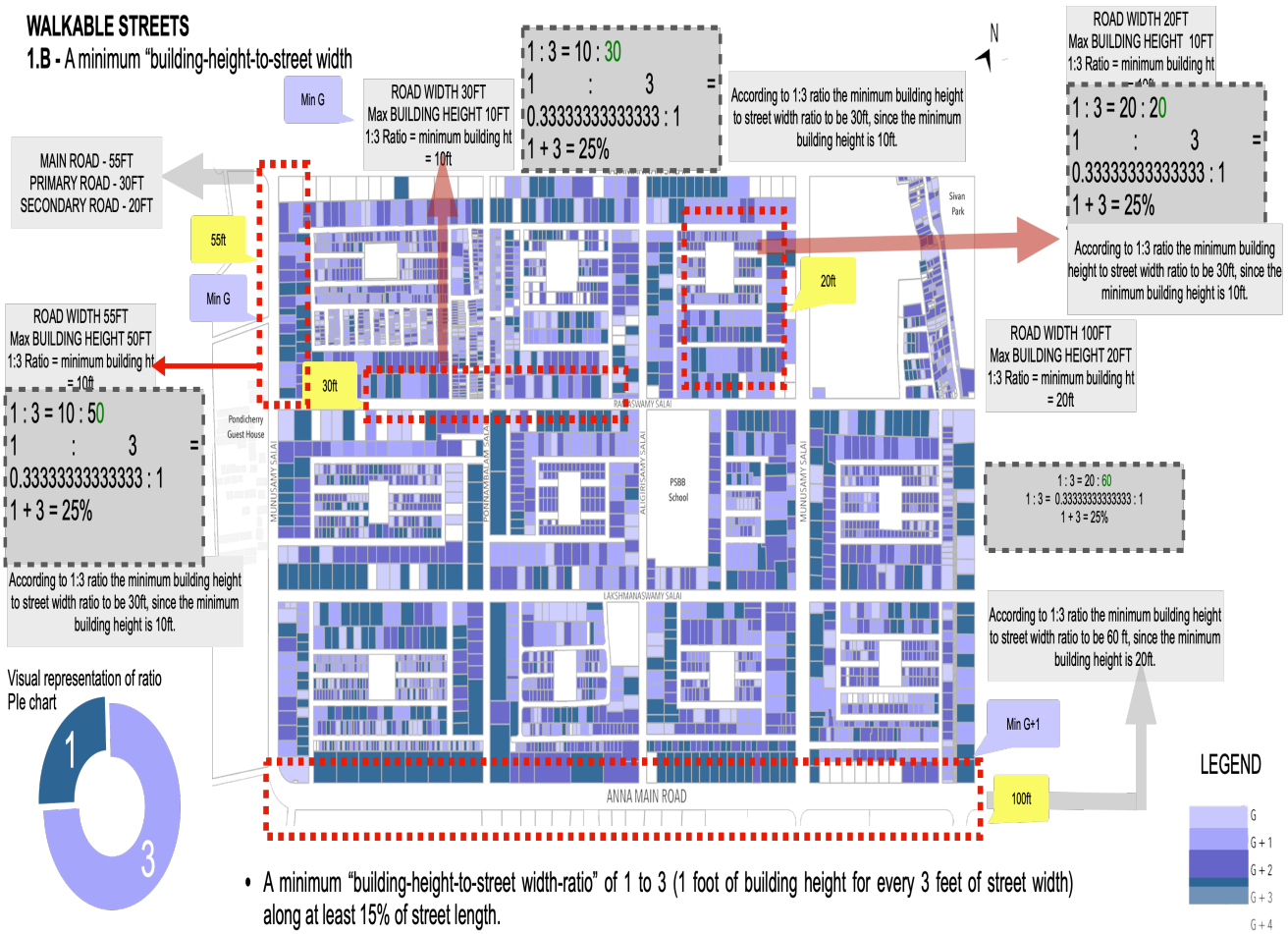
1.A - Public-facing building entries.





WALKABLE STREETS

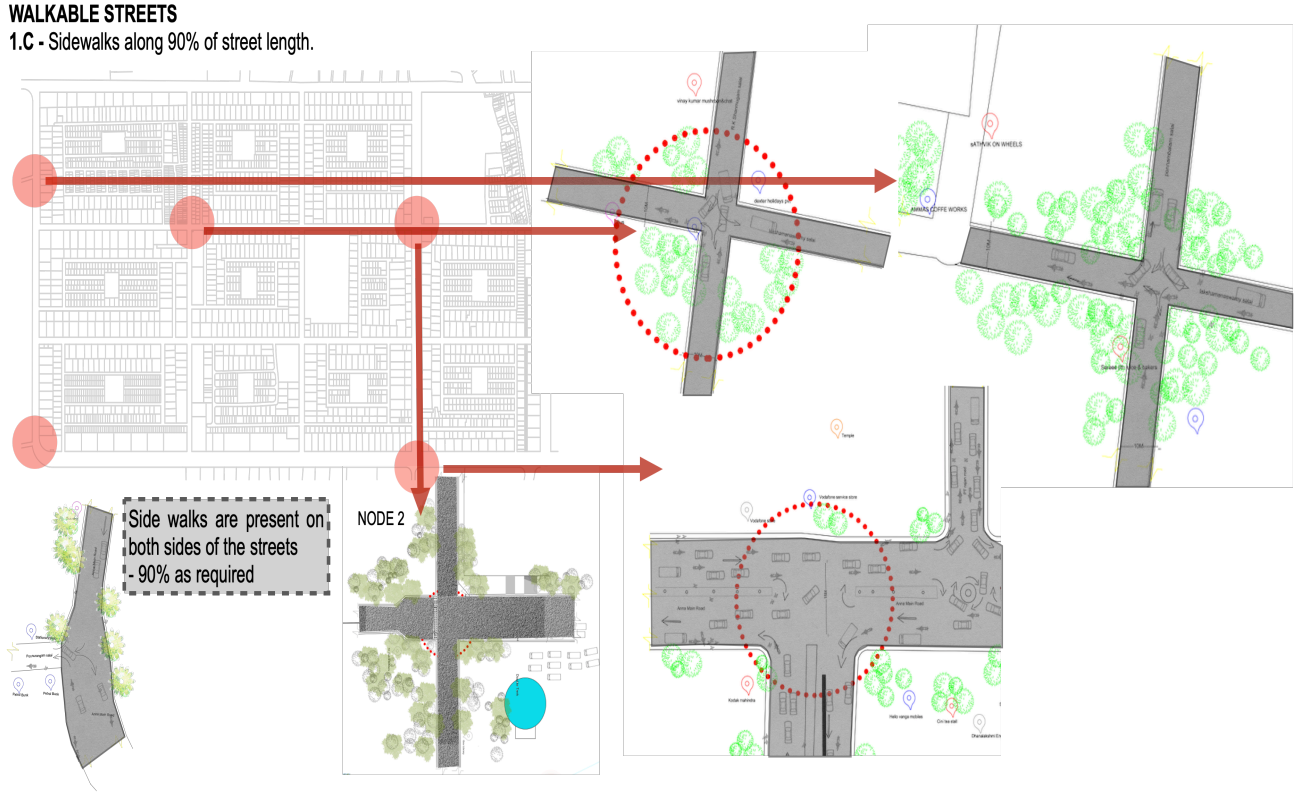
1.B - A minimum "building-height-to-street width



- A minimum "building-height-to-street width-ratio" of 1 to 3 (1 foot of building height for every 3 feet of street width) along at least 15% of street length.

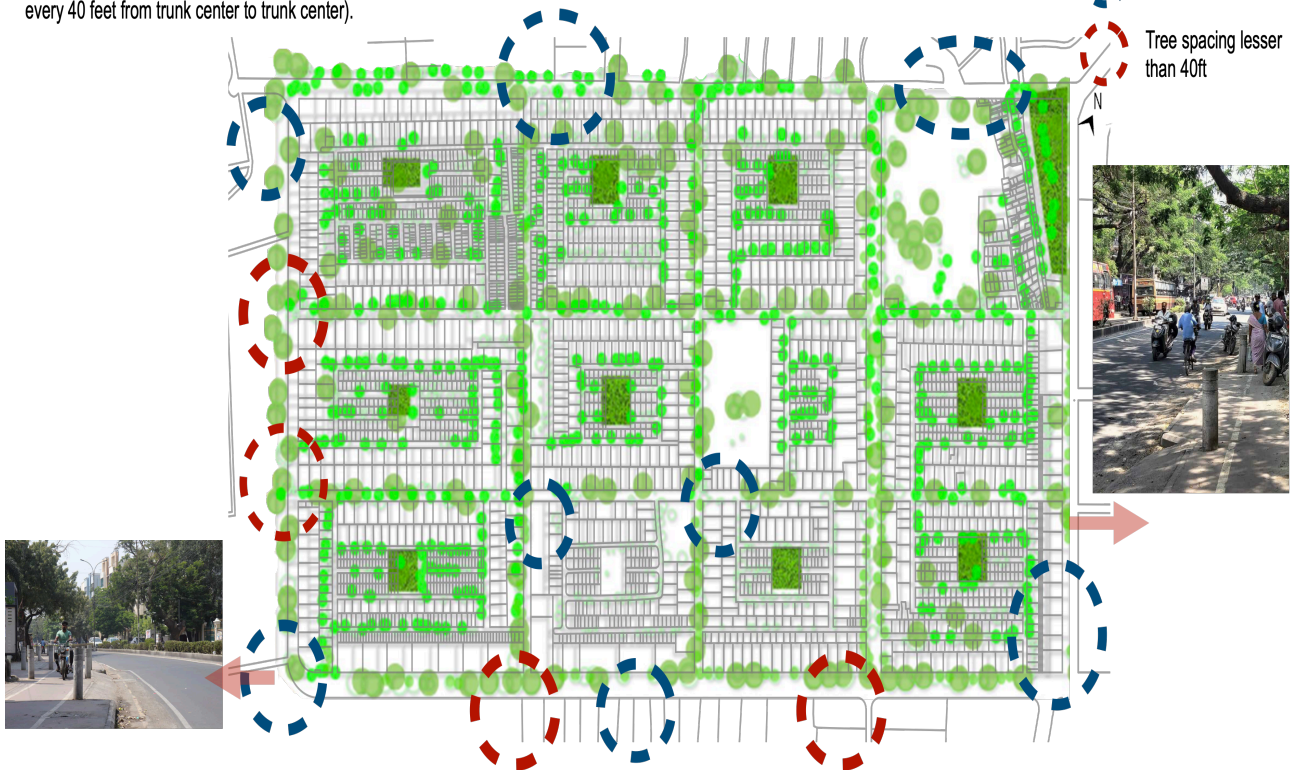
WALKABLE STREETS

1.C - Sidewalks along 90% of street length.



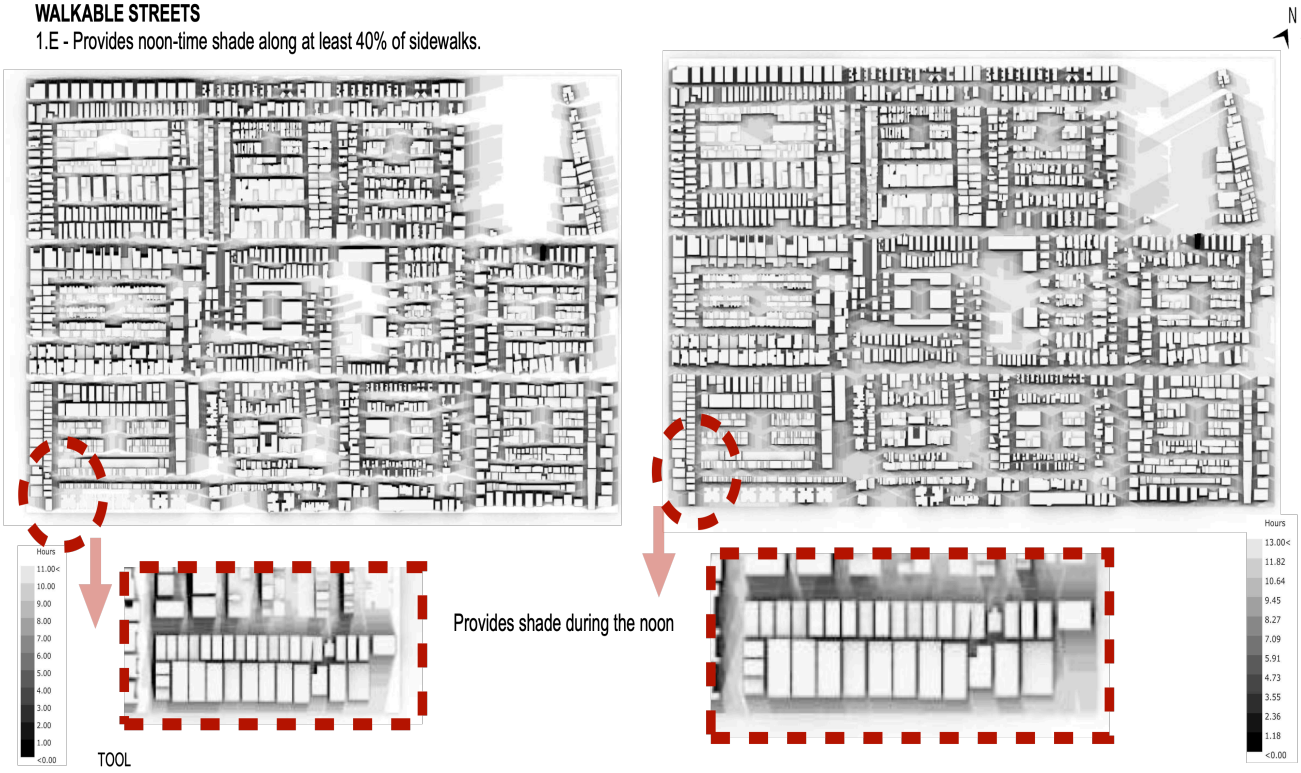
WALKABLE STREETS

1.D - Lines 60% of street length with non-invasive trees (spaced an average of at least every 40 feet from trunk center to trunk center).



WALKABLE STREETS

1.E - Provides noon-time shade along at least 40% of sidewalks.



2. Compact Development

2.A Meets minimum required densities (At least seven dwelling units per acre for residential and 0.50 floor-area ratio for non-residential—see Rating System for calculation and scoring details).

2. B Exceeds increasing density thresholds (At least 10 dwelling units per acre for residential and 0.75 floor-area ratio for non-residential—see Rating System for calculation and scoring details).

Points for density per acre (hectare) of buildable land

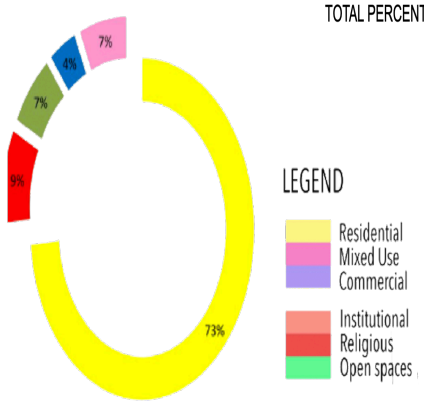
Residential density		Nonresidential density (FAR)	Points
DU/acre	DU/hectare		
> 10 and ≤ 13	> 25 and ≤ 32	> 0.75 and ≤ 1.0	1
> 13 and ≤ 18	> 32 and ≤ 45	> 1.0 and ≤ 1.25	2
> 18 and ≤ 25	> 45 and ≤ 62	> 1.25 and ≤ 1.75	3
> 25 and ≤ 38	> 62 and ≤ 94	> 1.75 and ≤ 2.25	4
> 38 and ≤ 63	> 94 and ≤ 156	> 2.25 and ≤ 3.0	5
> 63	> 156	> 3.0	6

DU = dwelling unit; FAR = floor-area ratio.



TOTAL PERCENTAGE OF RESIDENTIAL - 73%

TOTAL PERCENTAGE OF NON RESIDENTIAL - 27%



Approx of 1585 Residential plots

Per acre - 396 residential plots

> 156 = 6 points

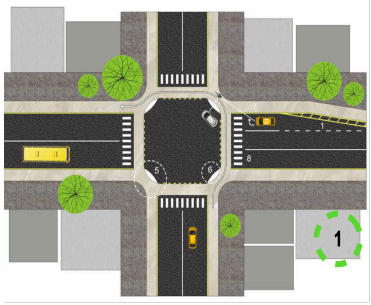
Approx of 1585 Non Residential plots

Per acre - 396 Non residential plots

FAR = > 1.0 and > 1.25 = 2 points

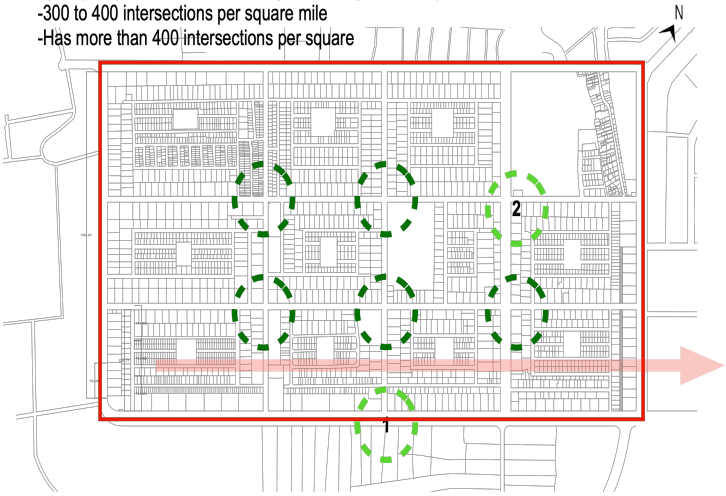
3. Neighborhood Connections

3.A - Includes a street or pathway into the project at least every 800 feet, and has at least 140 intersections per square mile within the project (estimate if possible).



3.B -

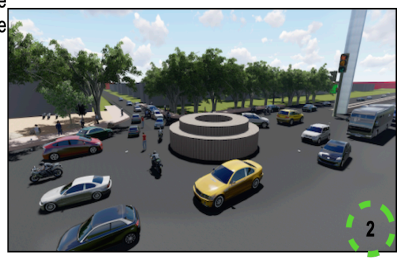
- Does not include cul-de-sacs. - NO DEAD ENDS
- Includes a street or pathway into the project at least every 400 feet. Has high intersections per square mile within the project (pick just one of the following for scoring this credit):
  -300 to 400 intersections per square mile
  -Has more than 400 intersections per square



Street that is cal is
Total - 0.37 sq.mile

Total streets 102 streets

Inner streets have latest one to more pathways/ streets



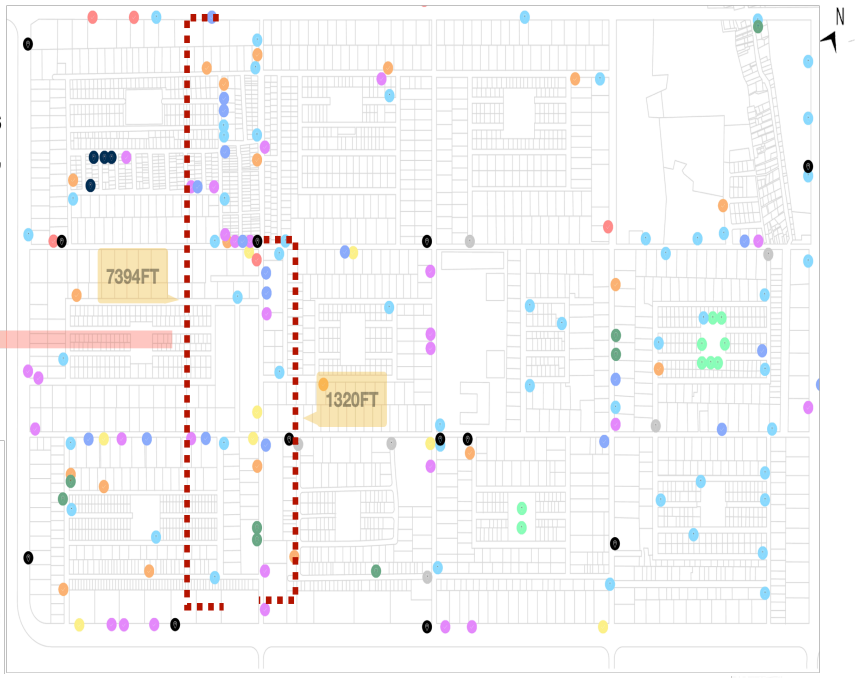
4. Mixed Uses

4.A - Enables walking access (within 1/4 mile) to the following number of existing or new land uses, clustered within neighbourhood centres (pick just one of the following for scoring this credit):

- 4 to 6 uses
- 7 to 10 uses
- 11 to 18 uses
- More than 19 uses

Uses can include commercial or civic facilities such as restaurants, schools, pharmacies, supermarkets, theatres, parks, libraries, or shops.

TOTAL LENGTH IS ABOUT 7394FT
ENABLE WALKING ACCESS IS 1/4 = 1320FT



6. Parking and Transportation Demand

6.A

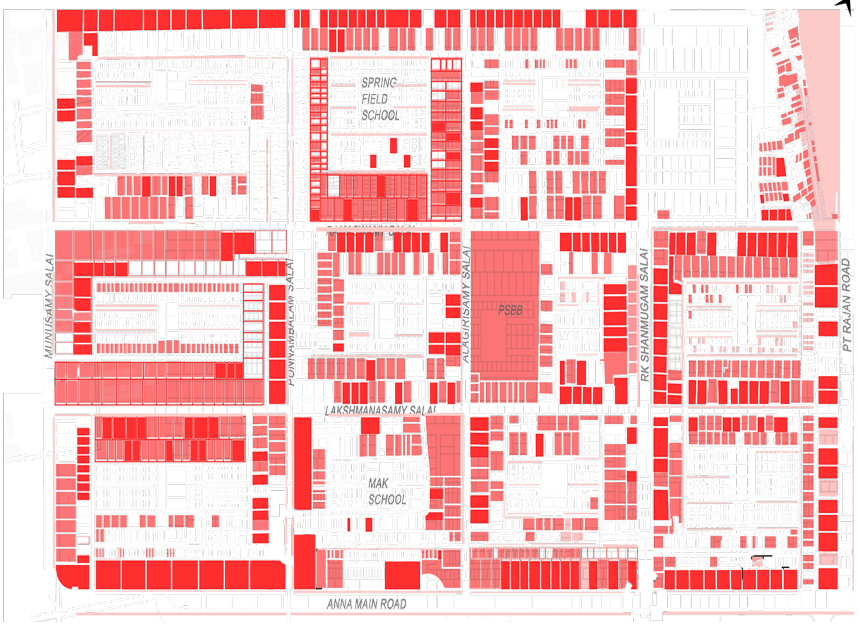
- Minimises total surface parking area (no greater than 20% of development area) and includes no individual surface lot over 2 acres.
- Locates any off-street parking at the side or rear of buildings (not along the sidewalk).
- Provides bicycle storage for building occupants, bicycle parking for visitors, and spaces for carpool or shared vehicles.

6 B - Includes shelters, benches, lighting, and information displays at all new and existing transit stops.

6C -

- Subsidised transit passes to half of regular price or cheaper.
- Developer-sponsored-transit services—such as a shuttle—to off-site employment centres and/or major transit facilities.
- Well-publicised vehicle sharing facilities on-site, or within . mile walk distance.
- For 90% of dwelling units or non-residential space, separates the cost of a parking space from the price of dwelling units or non-residential space.
- A comprehensive transportation demand management (TDM) program to reduce trips by 20%.





7. Parks and Recreation

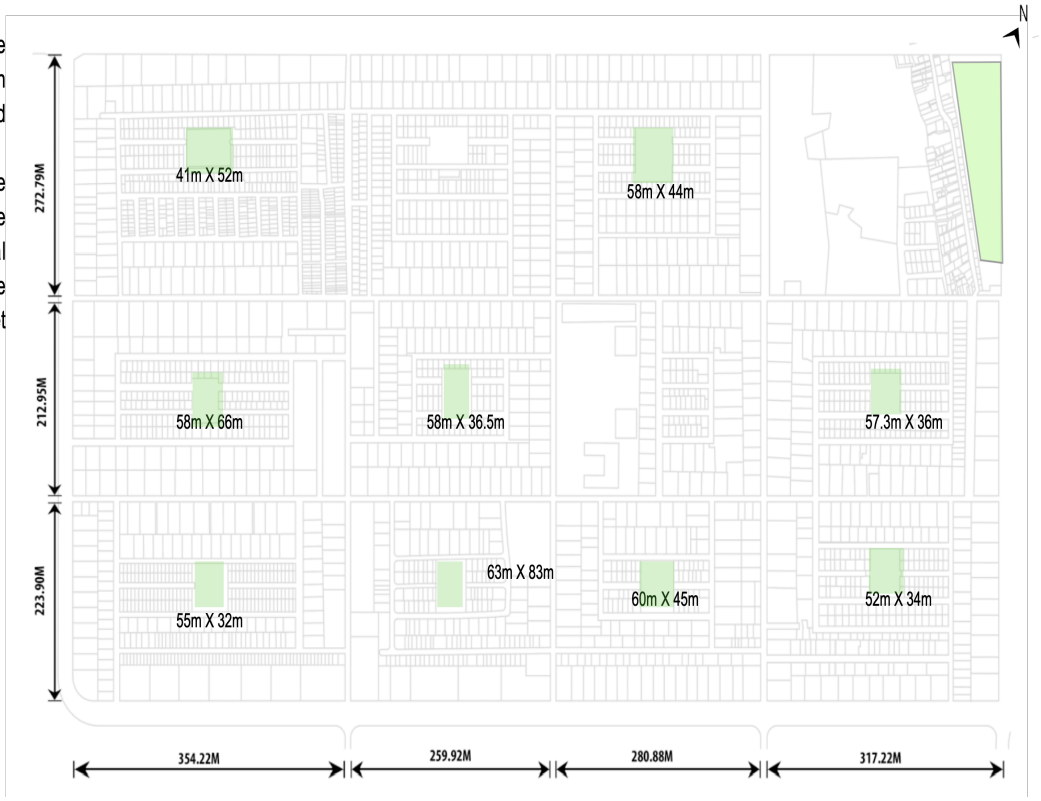
7.A - Enables access (within . mile walk distance) to public space such as squares, parks, paseos, and plazas.

7.B - Enables access (within . mile walk distance) to publicly accessible indoor or outdoor recreational facilities (at least 1 acre in size outdoor or 25,000 square feet indoor).

STREET LEVEL details :

- SECTOR PARK 01 : 1768 sq.m.
- SECTOR PARK 02 : 2062 sq.m.
- SECTOR PARK 04 : 2552 sq.m.
- SECTOR PARK 06 : 2700 sq.m.
- SECTOR PARK 07 : 5229 sq.m.
- SECTOR PARK 08 : 2117 sq.m.
- SECTOR PARK 10 : 2132 sq.m.
- SECTOR PARK 11 : 3828 sq.m.
- SECTOR PARK 12 : 1760 sq.m.

SITE AREA : 18,121 sq.m.



10. Local Food

- Permanently set aside gardening space, free local produce shares (from within 150 miles) for residents, or proximity to a farmer's market (on-site or within . mile walk distance).
- Allows growing of produce, including in yards or on balconies, patios, or rooftops.

Not found

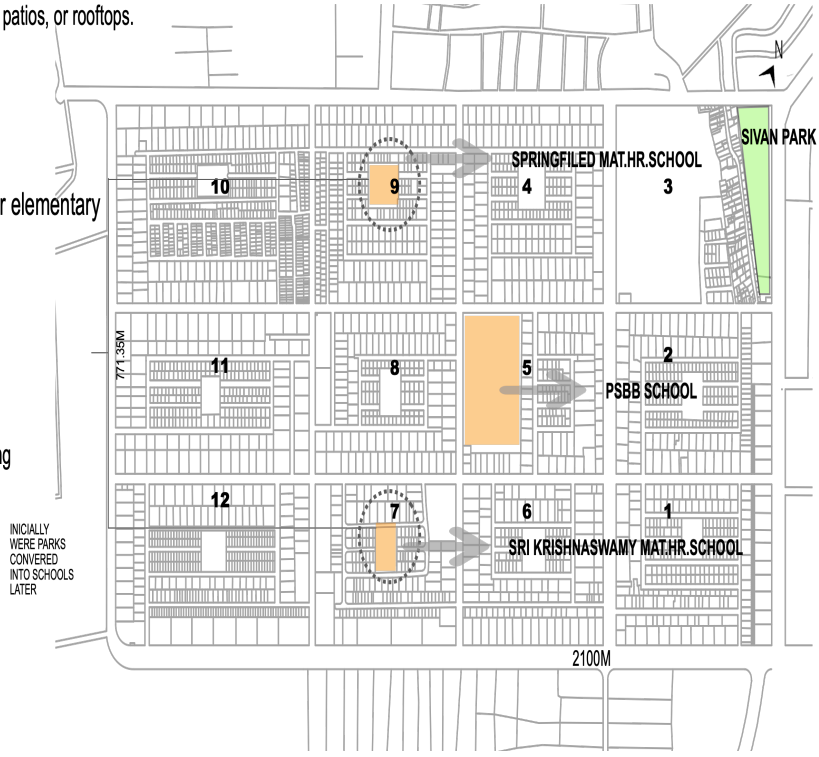
11. School Access and Design

- Is located within walking distance of a school (. mile for elementary and Schools middle schools; 1 mile for high schools).

YES

Main Schools such as Springfield Mat.hr. school
- PSBB
- Sri Krishnaswamy mat.hr schools are located within walking distance of schools are 1mile.





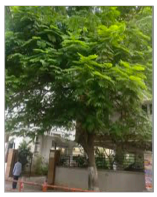
Green Infrastructure and Buildings (GIB)

1.B

- Preserves all heritage trees and most other noninvasive trees, especially larger ones.

Larger trees

- Preserves a proportion of previously undeveloped land (10% to 20%) on the project site.











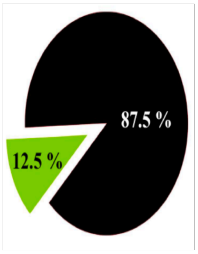
1.B

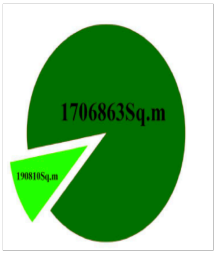
- Preserves all heritage trees and most other noninvasive trees, especially larger ones.
- Preserves a proportion of previously undeveloped land (10% to 20%) on the project site.

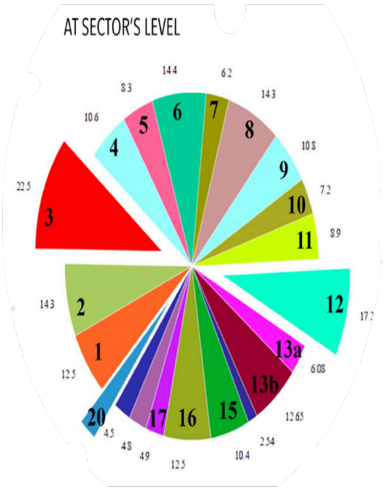
INFERENCE

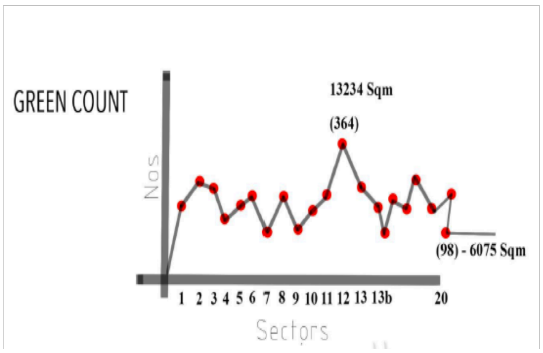
The tree have become one characteristic feature for KK nagar.

Inspite of losing a lot of trees during the Varada cyclone, the character is retained.











BADAM TREE



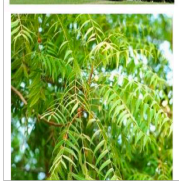
COCONUT TREE



PEEPAL TREE



RAIN TREE



NEEM TREE

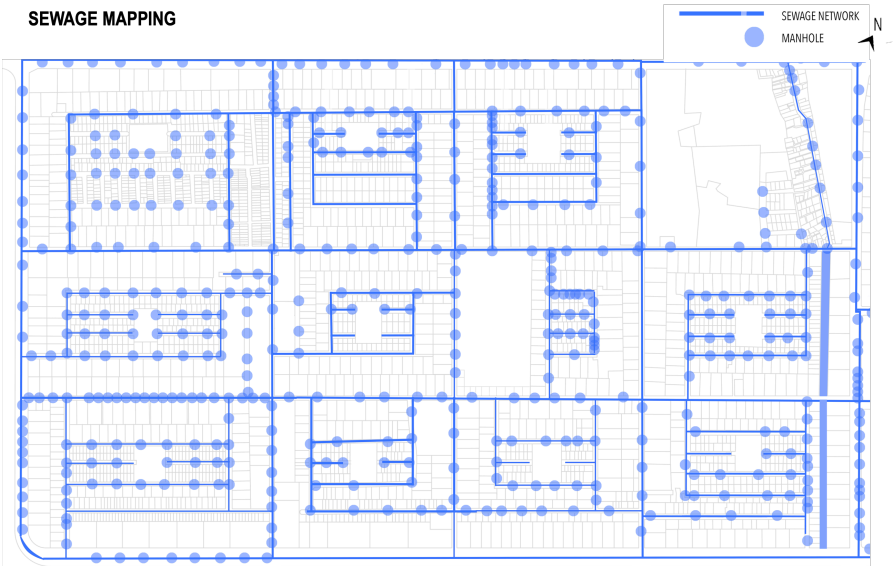
WATER SUPPLY

Estimates of water requirements					
I. Chennai City		Year			
		2011	2016	2021	2026
1.	Population in lakhs	49.95	52.39	55.4	58.56
2.	Water requirement in MLD for the resident population				
(a)	@ 150 lpcd	749	786	831	878
(b)	@ 120 lpcd	599	629	665	703
(c)	@ 100 lpcd	500	524	554	586
3.	Water requirement in MLD for the other than residential use such as office, commercial, industrial premises and other places of employment, education, etc.				
(a)	@ 30% of 2(a) above	225	236	249	264
(b)	@ 25% of 2 (b) above	150	157	166	176
(c)	@ 20% of 2(c) above	100	105	111	117
4.	Industrial use				
(a)	@ 10% of the 2(a) above	75	79	83	88
(b)	@ 10% of the 2(b) above	60	63	66	70
(c)	@ 10% of the 2(c) above	50	52	55	59
5.	Total requirement				
	@150 lpcd	1049	1100	1163	1230
	@120 lpcd	809	849	897	949
	@100 lpcd	649	681	720	761

Table No:6.5 Estimation of Water Requirements for Various Uses - CMA (in MLD)			
Use	High - Scenario 1	Medium – Scenario 2	Low – Scenario – 3
Residential	1606	1296	1046
Commercial	482	324	210
Industrial	161	130	105
Total	**2248**	**1750**	**1360**

Source - Vol 1, chapter VI
infrastructure water supply and sanitation CMDA

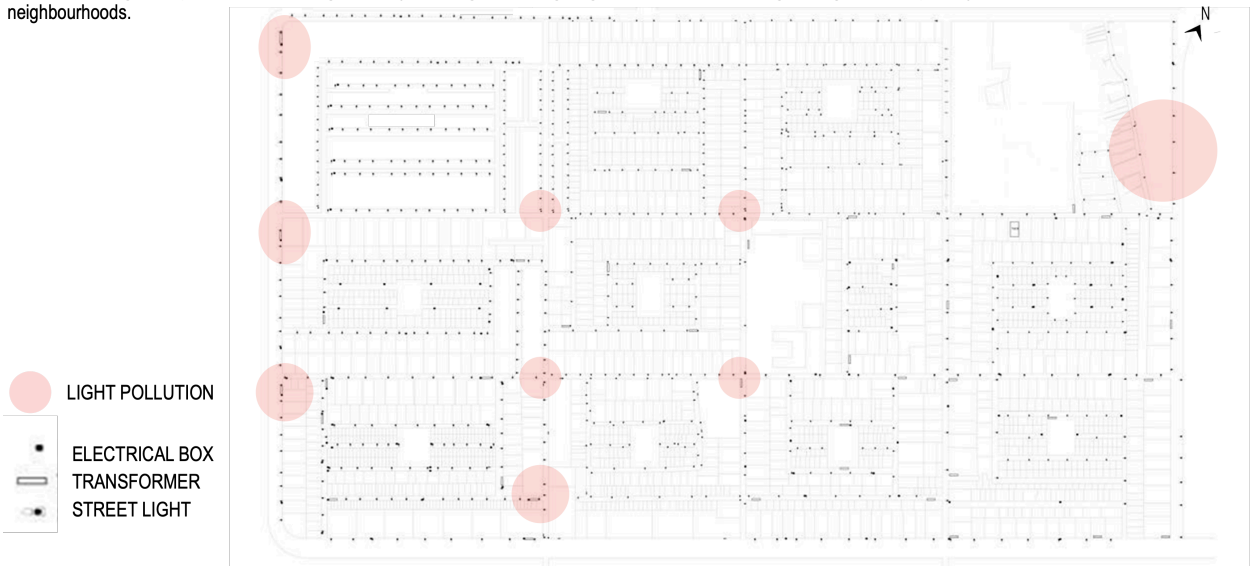
SEWAGE MAPPING



10.Light Pollution

10.A - Motion sensors in “shared areas” (publicly or privately owned) to reduce lighting when unoccupied and during daylight hours.

10.B - Limits “light trespass” to surrounding areas by directing exterior lighting downward and reducing its brightness, especially in rural areas and residential or mixed use neighbourhoods.



WASTE MANAGEMENT



CORPORATION	ONYX	NME	COC/RAMKY
It was the introduction of dustbins to the city in a small scale dustbin back then were just cement storage tanks where people dumped the waste without any awareness. It was difficult for the cleaners to do their job. Due to the lack of equipment. 	Then this was all changed by a foreign company which understood that the workers are the first preference, and so they introduced various new equipments and the idea of hand-free cleaning that is by using gloves ,shovel, iron plate ,brooms ,basket and provided them with vaccinations. in the later years as the demand started to rise they weren't able to meet the daily needs and so their contract was given to nmf.	Later on this contract was given to NMF where the work was not done properly since the management was not functioning well. but they had introduced the idea of segregation of waste into bio-degradable and non bio-degradable waste and putting them into best use.but before it could be implemented their contract was shifted to COC.	The COC now follows all the techniques started by onyx and NMF and is functioning well than expected.they segregate the waste into bio-degradable and non bio-degradable and then put them into best use like recycling the non bio-degradable waste into bottles and for plastic roads and bio-degradable into manures and bio-gas.

WASTE MANAGEMENT



CORPORATION	ONYX	NME	COC/RAMKY
It was the introduction of dustbins to the city in a small scale dustbin back then were just cement storage tanks where people dumped the waste without any awareness. It was difficult for the cleaners to do their job. Due to the lack of equipment. 	Then this was all changed by a foreign company which understood that the workers are the first preference, and so they introduced various new equipments and the idea of hand-free cleaning that is by using gloves ,shovel, iron plate ,brooms ,basket and provided them with vaccinations. in the later years as the demand started to rise they weren't able to meet the daily needs and so their contract was given to nmf.	Later on this contract was given to NMF where the work was not done properly since the management was not functioning well. but they had introduced the idea of segregation of waste into bio-degradable and non bio-degradable waste and putting them into best use.but before it could be implemented their contract was shifted to COC.	The COC now follows all the techniques started by onyx and NMF and is functioning well than expected.they segregate the waste into bio-degradable and non bio-degradable and then put them into best use like recycling the non bio-degradable waste into bottles and for plastic roads and bio-degradable into manures and bio-gas.

WASTE MANAGEMENT

Types and collection method of waste

THREE MAJOR TYPE OF COLLECTION

The wastes are collected by the tri-cycle by means of sweeping & door-door collection. the capacity of the tri-cycle is about 200kg and the production cost is Rs.16,000 - Rs.25,000.the best use of the tri-cycle is that it can go to small sector roads and the work gets done easily.

Then from the dustbins the waste is collected by the compactor which can hold up to 16tones, the production cost of this vehicle is about 40lakhs

Once the trig-cycle is full the garbage is disposed to the nearest dustbin. the capacity of this dustbin is 400kg, and the production cost is about Rs.20,000.







WASTE MANAGEMENT

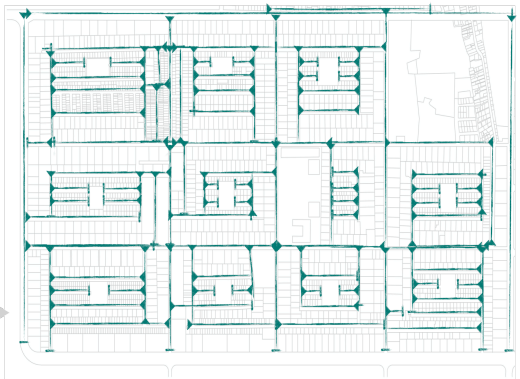


BINS ROUTE MAP NETWORK
FIRST SHIFT
SECOND SHIFT
TRI-CYCLE ROUTE

STREET NAME	TIMING
9TH SECTOR	7:30-8:30AM
10TH SECTOR	8:25AM
2ND & 5TH SECTOR	8:30-9:40AM
1ST &6TH SECTOR	9:25-9:55AM
3RD SECTOR	10:05AM
173RD STREET	10:000AM
4TH SECTOR	7:30AM
11TH SECTOR	10:10-10:40AM
12TH	8:15-9:15AM
85TH STREET	11:30AM-12:15PM
A.P PATRO STREET	12:20-12:35PM
DR NATESAN	12:40-1:10PM
SOUNDARAJAN	1:25-1:40PM
P T RAJAN	8:30-9:30AM
80TH STREET	12:20-12:35PM

N

TRI-CYCLE ROUTE



WASTE MANAGEMENT

STREET TIMING FOR GARBAGE COLLECTION

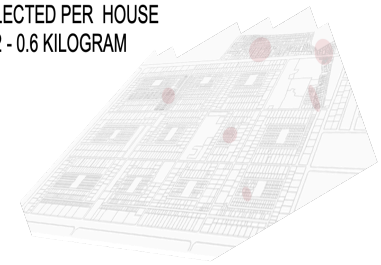
- RAJAMANNAR SALAI - 7:30AM- 8;20AM
- VANNIYUR KUTTAI - 8;25AM
- MUNUSAMY SALAI - 8:30AM - 8:40AM
- RAMASWAMY SALAI - 8:45AM - 9:20AM
- LAKSHMANAN SWAMY SALAI - 9:25AM - 9:55AM
- MUNUSAMY SALAI - 10:05AM
- 173RD STREET - 10:00AM
- 4TH SECTOR - 07:30AM
- 10TH SECTORE - 10:10 - 10:20AM
- 1ST SECTOR - 8:15AM - 9:10AM
- 13TH STREET - 8:15AM - 09:10AM

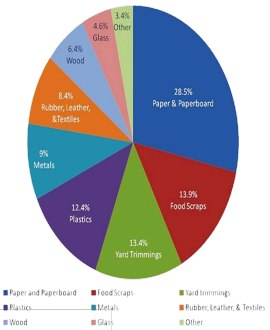
FIRST SHIFT

- RAJAMANNAR SALAI - 11:30AM - 12:15PM
- ALAKIRISAMU SALAI - 12:20PM- 12:35PM
- LAKSHMANAN SAMY SALAI - 12:50PM - 12:35PM
- MUNUSAMY SALAI - 1:15PM
- RAMASWAMY SALAI - 1;25PM-1:40PM
- PONNAMBALAM SALAI - 1:45PM -2:10PM

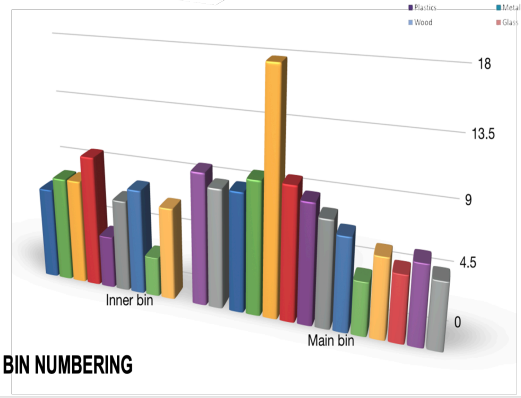
SECOND SHIFT

WASTE COLLECTED PER HOUSE
IS MIN OF 0.2 - 0.6 KILOGRAM





SOURCE OF WASTE



Methods of collection

1.Sweeping and door-door collection By Tricycle, capacity-200Kg its used in smaller& narrow streets.
2.dust bin collection kept it all the street conners for easy accessibility it can had upto 400kg.
3. conpactor collection all the main road dustbins are collected by the compactor and disposed .

BIN NUMBERING

	sector 12	sector 11	sector 10	sector 9	sector 8	sector 7	sector 6	sector 5	sector 4	sector 3	sector 2	sector 1
Inner bin	7	8	8	10	4	7	8	3	7		10	9
Main bin	9	10	18	10	9	8	7	4	6	5	6	5

CYCLE OF GARBAGE DISPOSAL






sweeping - street collection - segregation - door to door collection - compactor collection -plant - manure - sold.



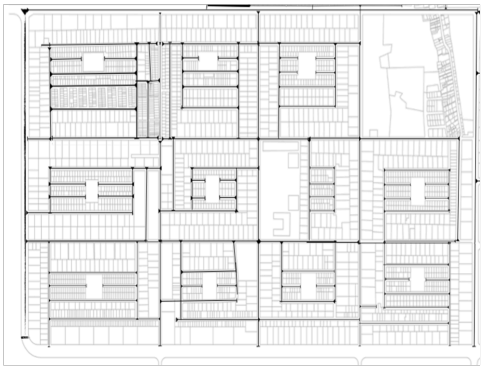



Wasted collected - per day
Bin capacity 400kg (precent used bins)
Per ward 75 bins are present

Apx 33 tones of waste is collected
Night shift (if needed) + 10 tones .
Then Per day-per ward = apx 40 tones.

WASTE MANAGEMENT

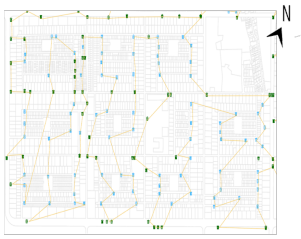
Tri-cycle capacity 200Kg

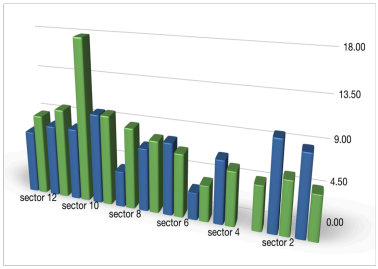


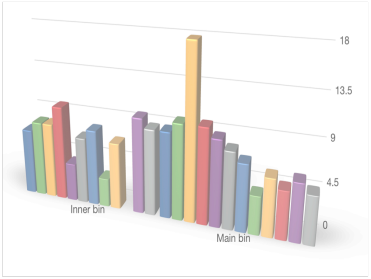
Compactor capacity is 16 tones



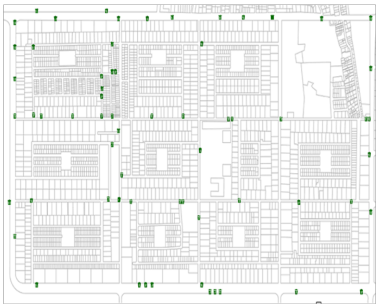
Total solid waste per area is 30-40 tones





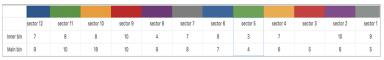


Per Dustbin capacity 400kg



No of bins per sector





ADVANTAGE

The best part of waste disposal management is that, the waste is been segregated into Biodegradable & Non-Biodegradable waste and are taken care that these wastes are put into their best use.

BIODEGRADABLE WASTE

These waste are processed into fertilisers and manure and are sold in public gathering spaces for Rs.20 by the government.
these are also used for making bio-gas used used in “amma unavagam” and this is one of the reason that the gov.can provide us with food at a very low cost.

Non Biodegradable Waste

The gov.has proposed an idea of processing the waste such as plastics to be used for roads





DISADVANTAGE

Biodegradable

The idea of recycling is good unless and until its left maintained and taken care off.
Although these waste are processed into fertilisers and manure they still are garbage and waste.
can lead to lots of disease and uncleaned environment when its not taken care off.
since that lot of money is invested for the machines it has to be used on a regular basis, failing which it would lead wear and tear of the machines.

Non-Biodegradable

recycling the plastics is one of the effect ways of using them but this cannot be continued in the long run.
since these plastics tend to give out lot of toxins and harm the ozone.
so the idea of using plastic in roads is not advisable, the roads are directly exposed to sun.

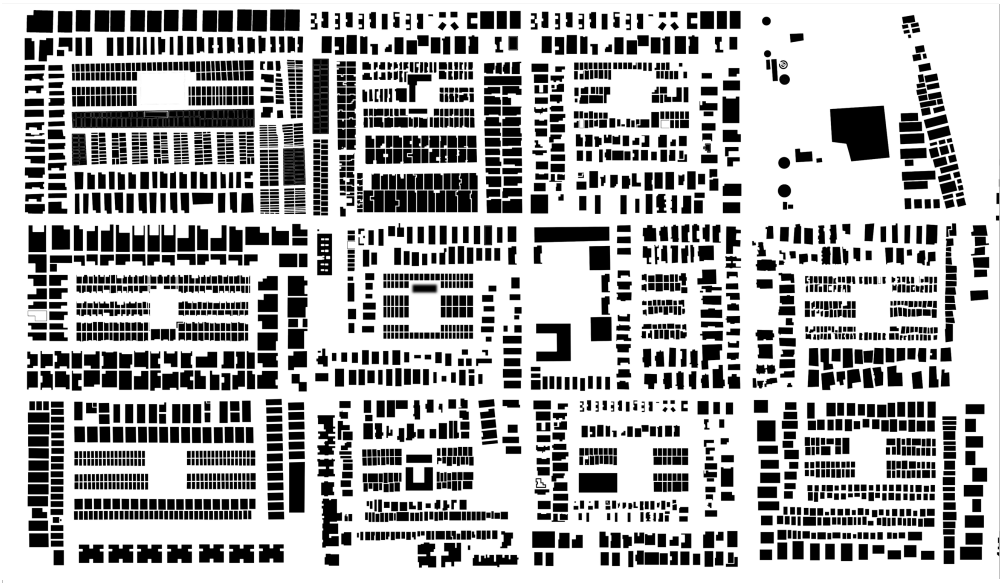
HUMAN FLAWS

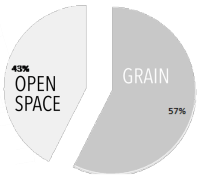


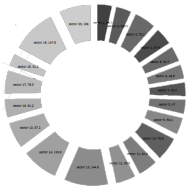




GRAIN MAP







LEED v4 for Neighborhood Development Plan
Project Checklist

Project Name: Revitalising The Inner City Neighbourhood Planning With The Challenges And Opportunities In Sustainable Re-development

Yes	?	No				
21	0	0	**Neighborhood Pattern & Design**			41
Y			Prereq	Walkable Streets	Required	
Y			Prereq	Compact Development	Required	
Y			Prereq	Connected and Open Community	Required	
7			Credit	Walkable Streets	9	
6			Credit	Compact Development	6	
2			Credit	Mixed-Use Neighborhoods	4	
0			Credit	Housing Types and Affordability	7	
0			Credit	Reduced Parking Footprint	1	
2			Credit	Connected and Open Community	2	
0			Credit	Transit Facilities	1	
0			Credit	Transportation Demand Management	2	
1			Credit	Access to Civic & Public Space	1	
1			Credit	Access to Recreation Facilities	1	
0			Credit	Visitability and Universal Design	1	
0			Credit	Community Outreach and Involvement	2	
0			Credit	Local Food Production	1	
1			Credit	Tree-Lined and Shaded Streetscapes	2	
1			Credit	Neighborhood Schools	1	

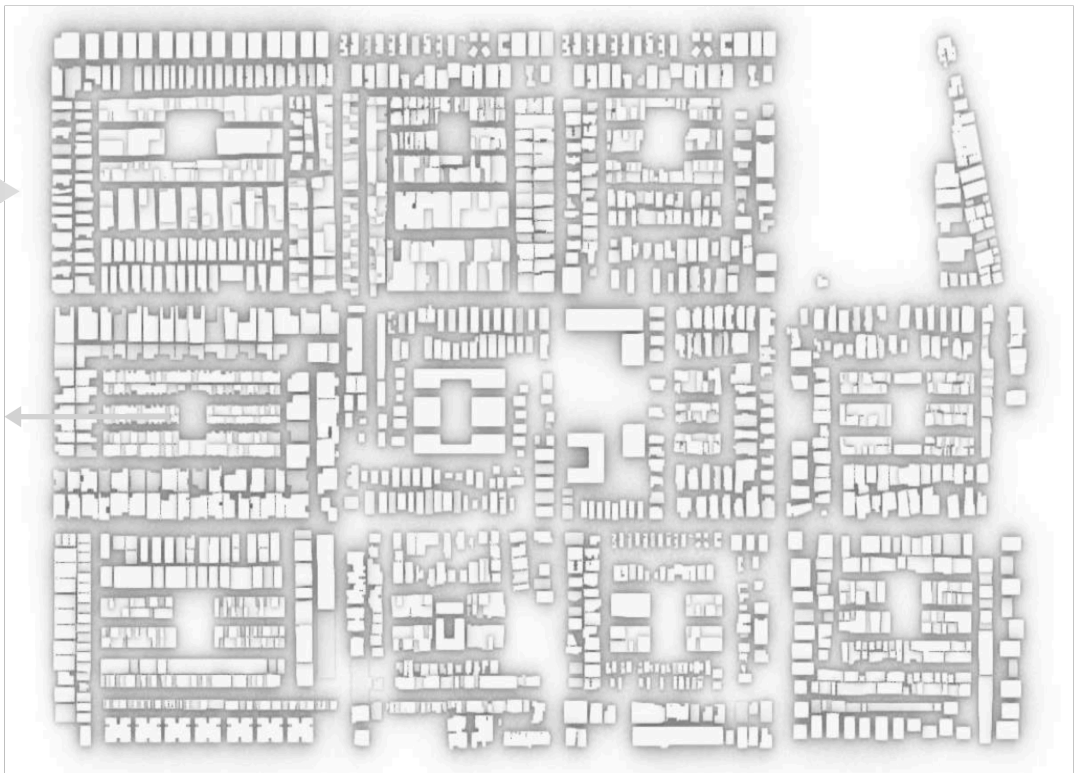
Yes	?	No				
5	0	0	**Green Infrastructure & Buildings**			31
Y			Prereq	Certified Green Building	Required	
Y			Prereq	Minimum Building Energy Performance	Required	
Y			Prereq	Indoor Water Use Reduction	Required	
Y			Prereq	Construction Activity Pollution Prevention	Required	
3			Credit	Certified Green Buildings	5	
0			Credit	Optimize Building Energy Performance	2	
0			Credit	Indoor Water Use Reduction	1	
0			Credit	Outdoor Water Use Reduction	2	
0			Credit	Building Reuse	1	
0			Credit	Historic Resource Preservation and Adaptive Reuse	2	
0			Credit	Minimized Site Disturbance	1	
0			Credit	Rainwater Management	4	
0			Credit	Heat Island Reduction	1	
0			Credit	Solar Orientation	1	
0			Credit	Renewable Energy Production	3	
0			Credit	District Heating and Cooling	2	
0			Credit	Infrastructure Energy Efficiency	1	
0			Credit	Wastewater Management	2	
0			Credit	Recycled and Reused Infrastructure	1	
1			Credit	Solid Waste Management	1	
1			Credit	Light Pollution Reduction	1	
26	0	0	**PROJECT TOTALS (Certification estimates)**			73

Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80+ points

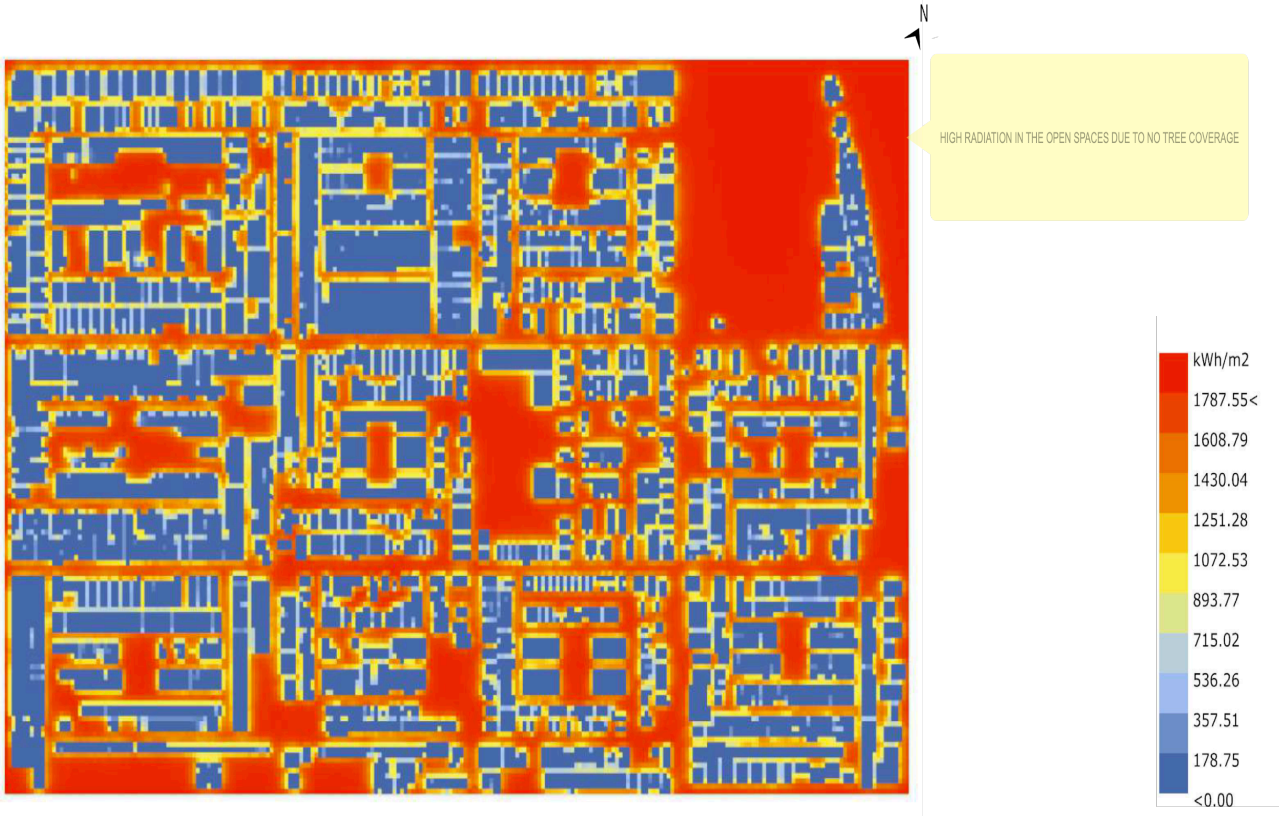
SHADOW ANALYSIS

BUILDING SHADOW ANALYSIS,TOWARS THE STREET SPACE AND PLOT AREA

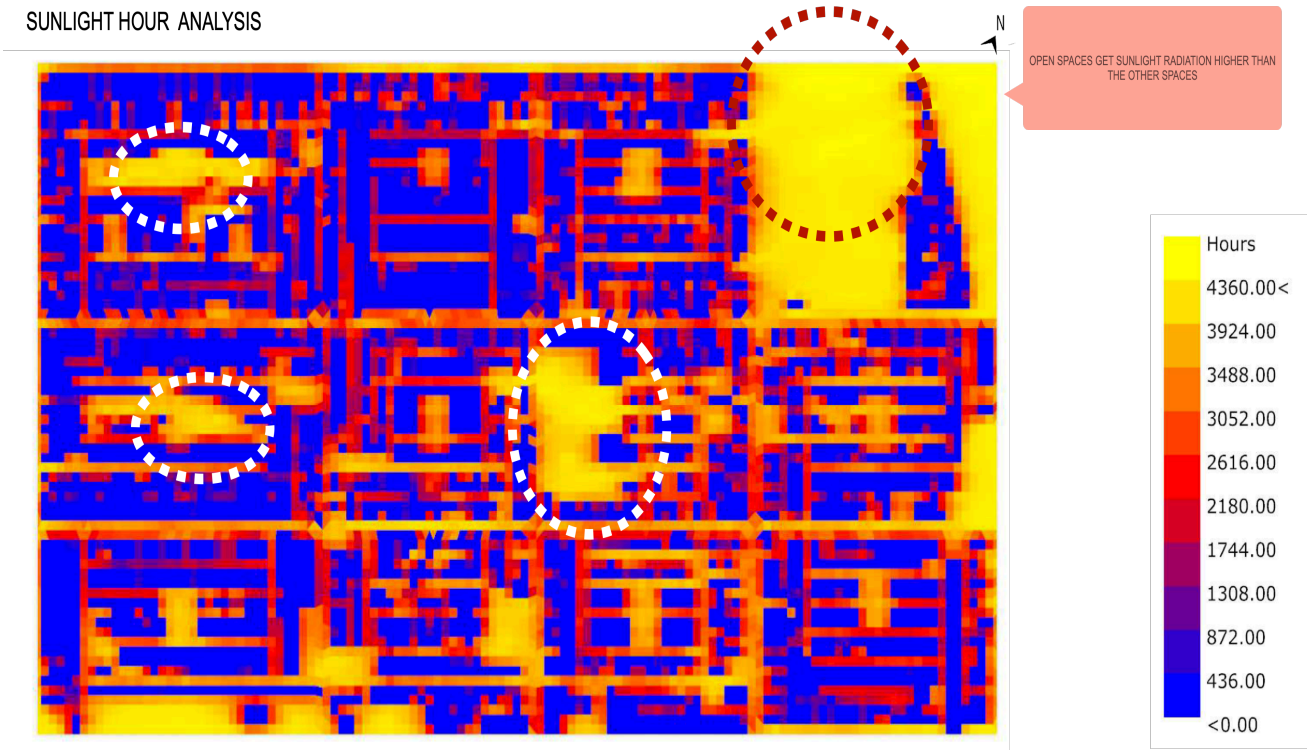
GREEN SPACE



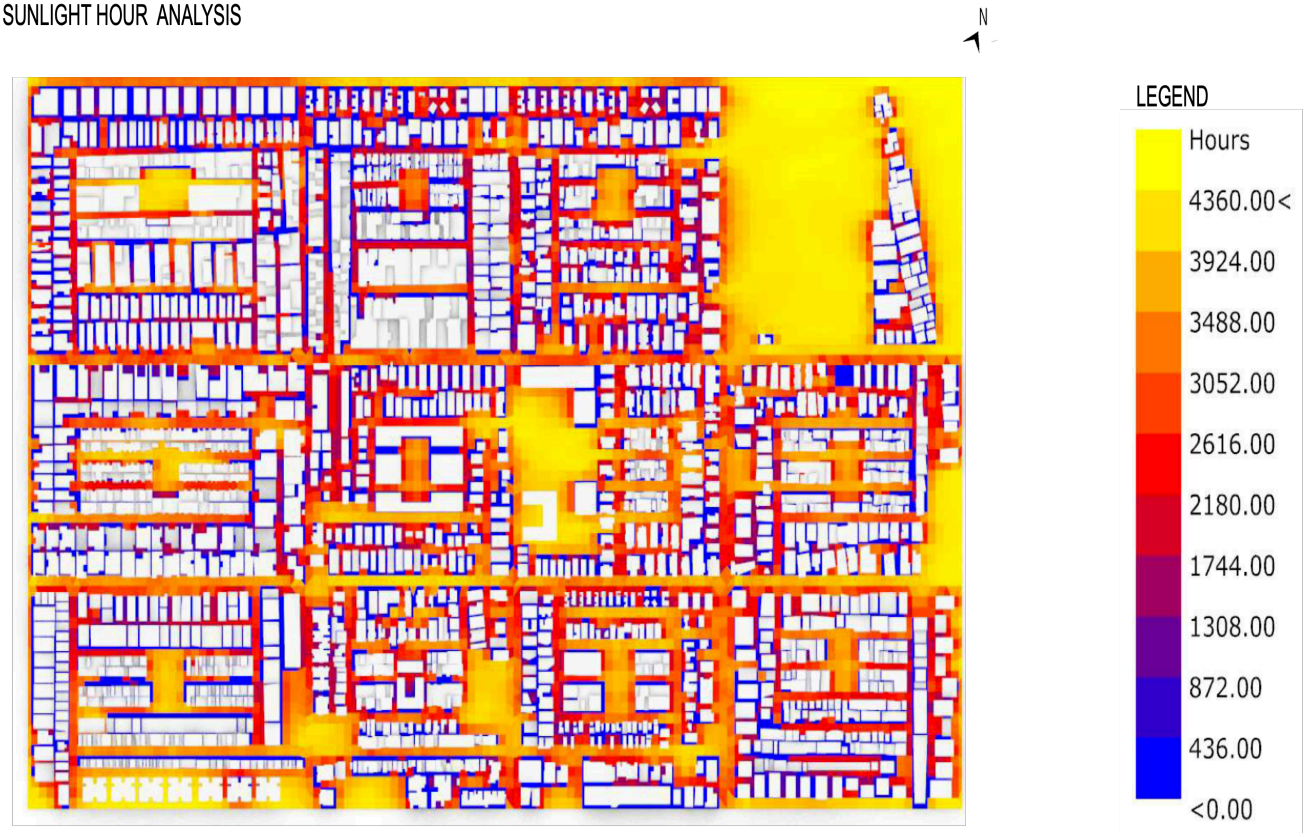
RADIATION ANALYSIS



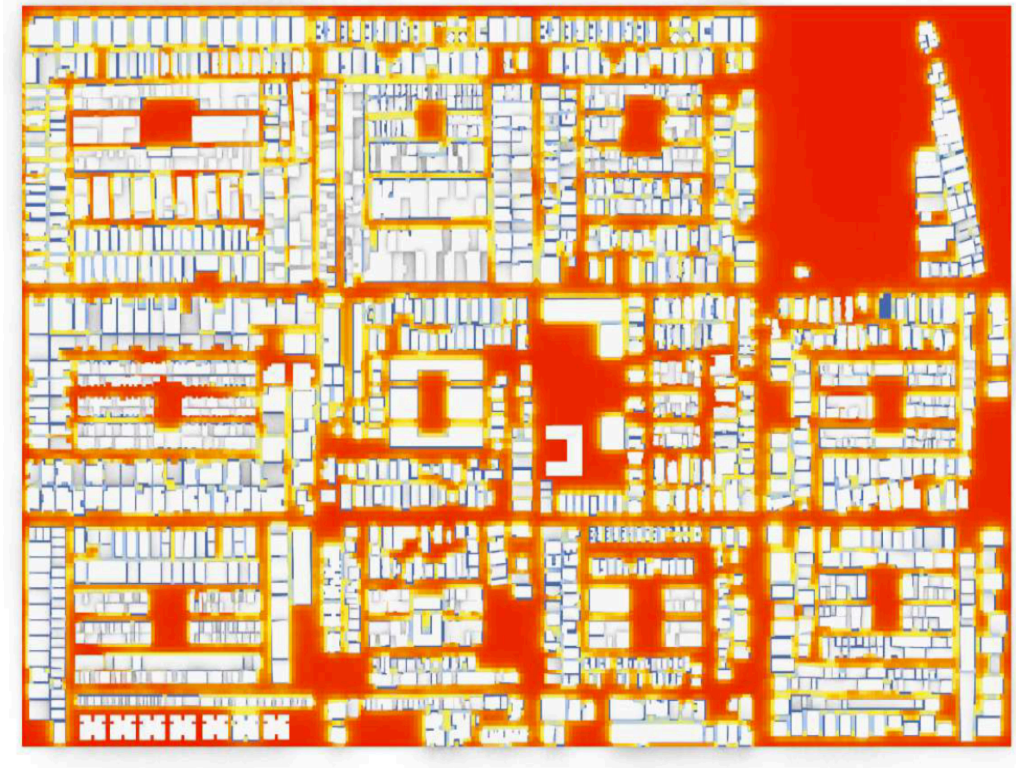
SUNLIGHT HOUR ANALYSIS

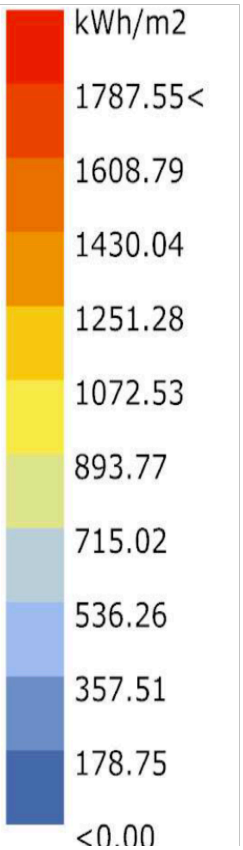


SUNLIGHT HOUR ANALYSIS

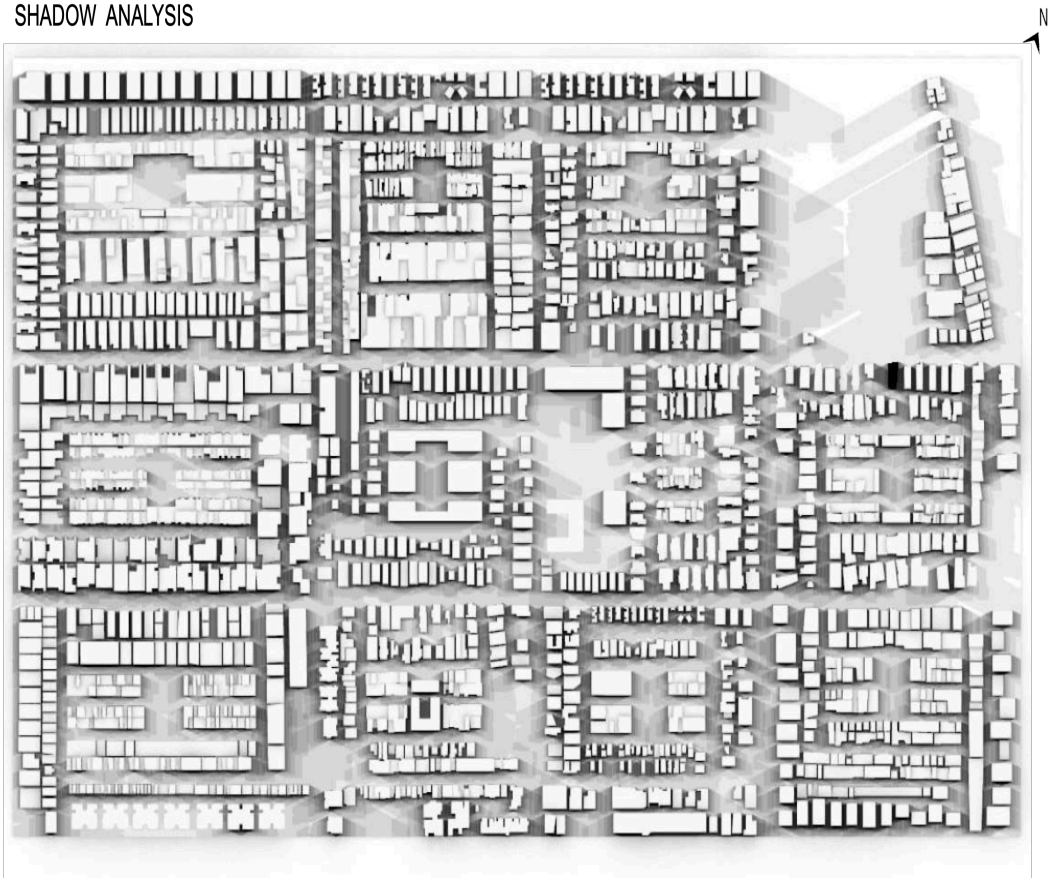


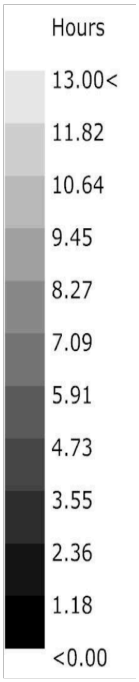
RADIATION ANALYSIS



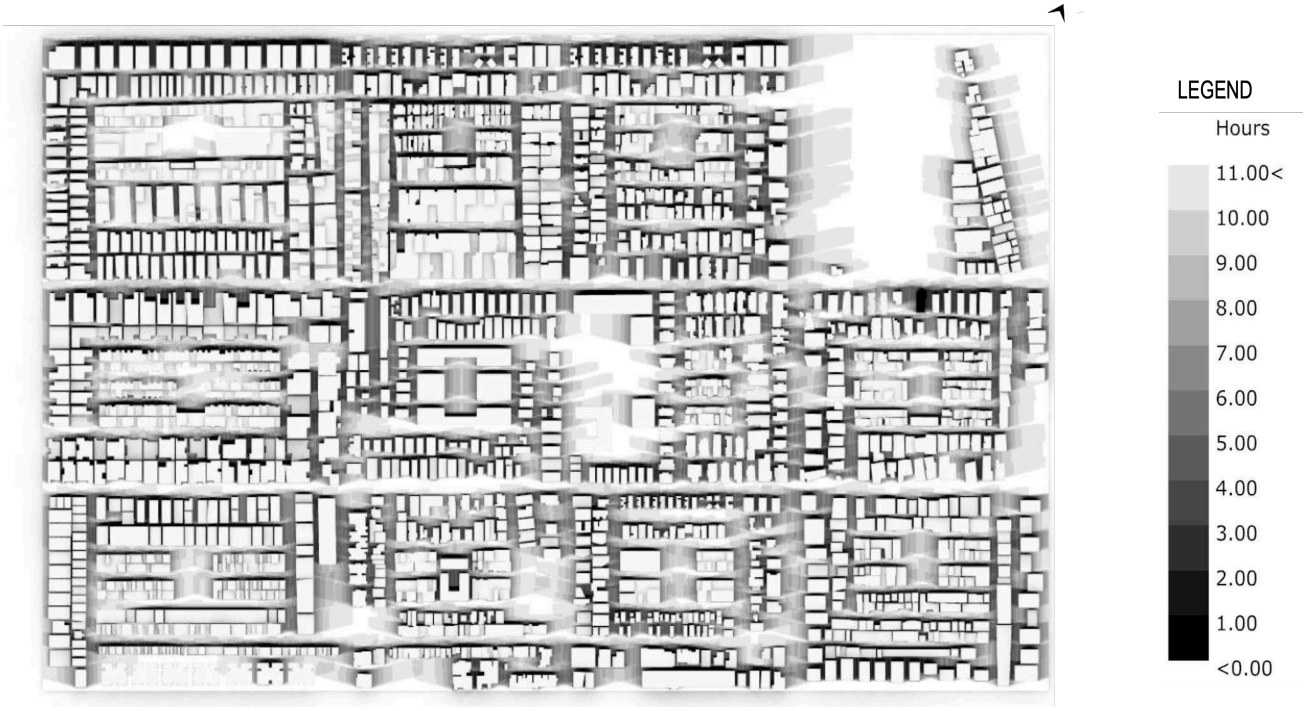


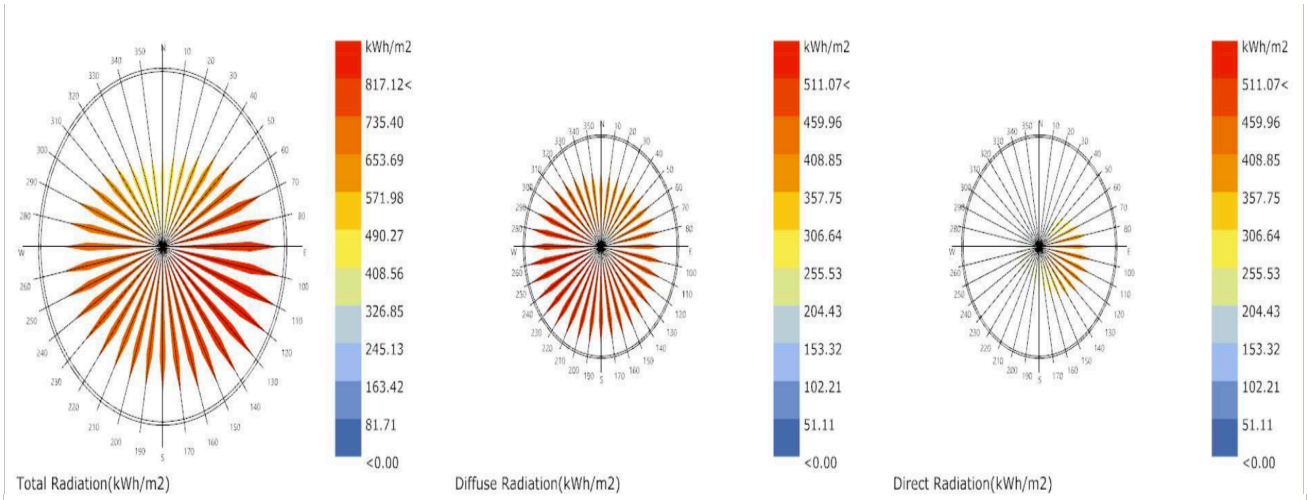
SHADOW ANALYSIS

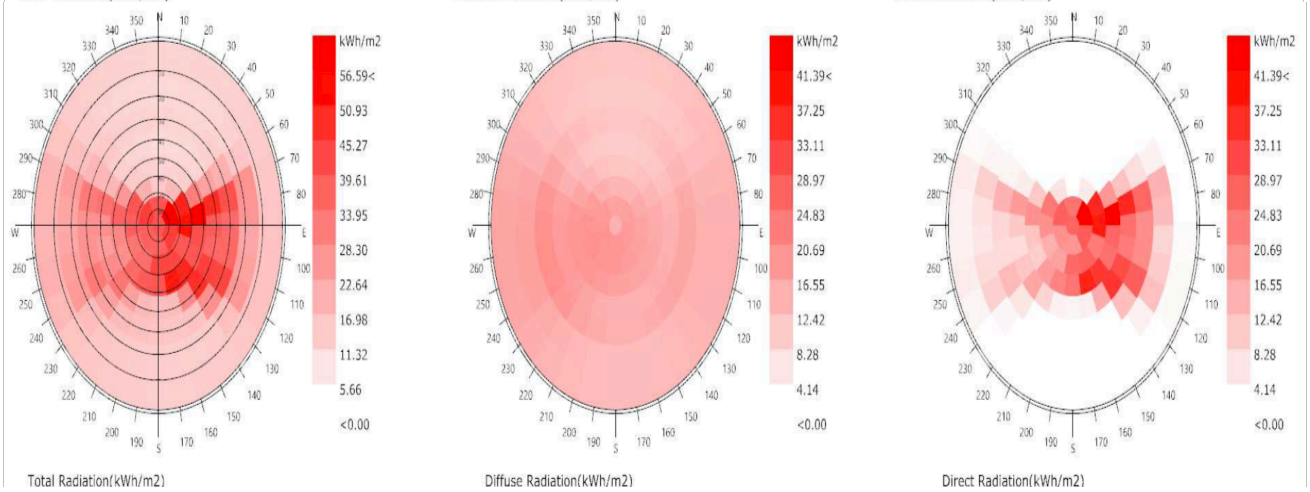


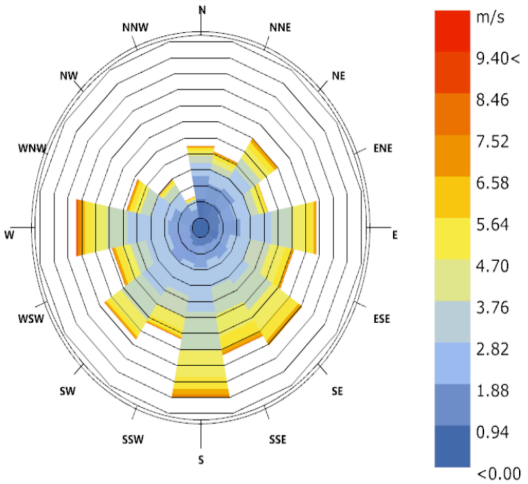


SHADOW ANALYSIS

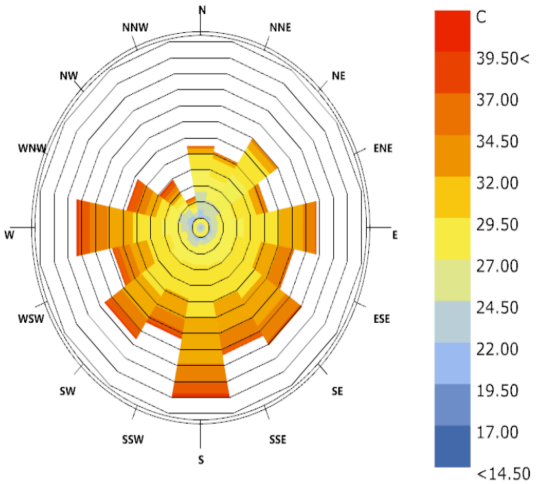




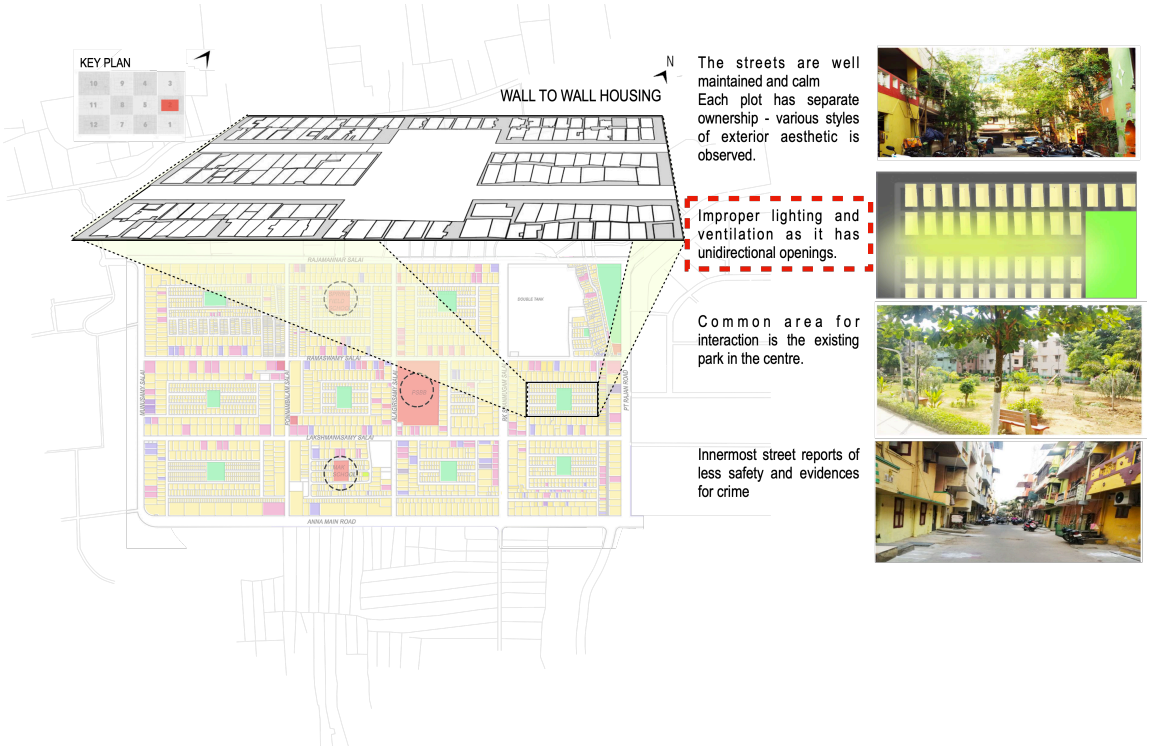




Wind-Rose
Chennai-Madras_Tamil Nadu_IND
1 JAN 1:00 - 31 DEC 24:00
Hourly Data: Wind Speed (m/s)
Calm for 9.22% of the time = 808 hours.
Each closed polyline shows frequency of 0.9%. = 83 hours.



Wind-Rose
Chennai-Madras_Tamil Nadu_IND
1 JAN 1:00 - 31 DEC 24:00
Hourly Data: Dry Bulb Temperature (C)
Calm for 9.22% of the time = 808 hours.
Each closed polyline shows frequency of 0.9%. = 83 hours.



PROPOSAL

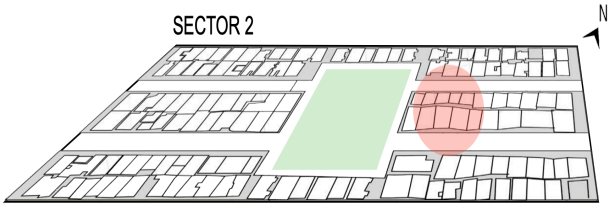
PROPOSAL

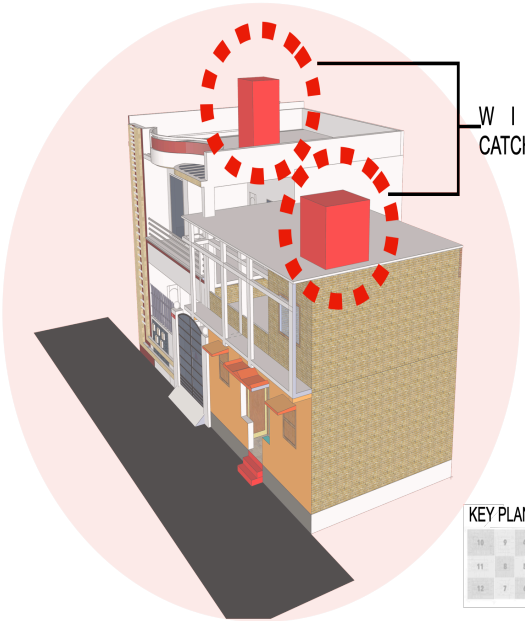
To reduce the UHI and for the better of health conditions of the people in the neighbourhood every house should possess with **WIND CATCHERS, COURTYARD** and other passive cooling techniques for air flow and ventilation.
Every house should achieve **60%** of lighting of the habitable spaces

The air **temperature** decreased by 3 ˚C - 4 ˚C at 12:00 PM when the **wind** started to flow inside the **wind catcher**. It **is** worth noting that continuous airflow and sufficient **temperature difference between** the supply channel and cool sink are required **for** continuous cooling.

WIND ANALYSIS

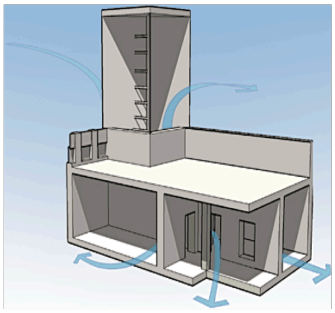
SECTOR 2





KEY PLAN

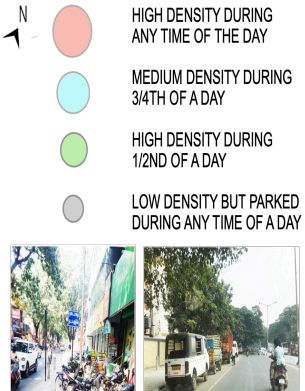




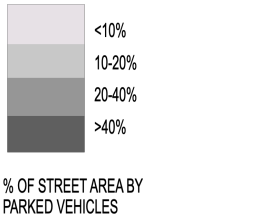
This method helps to adapt in the houses and it's affordable.

PARKING DENSITY

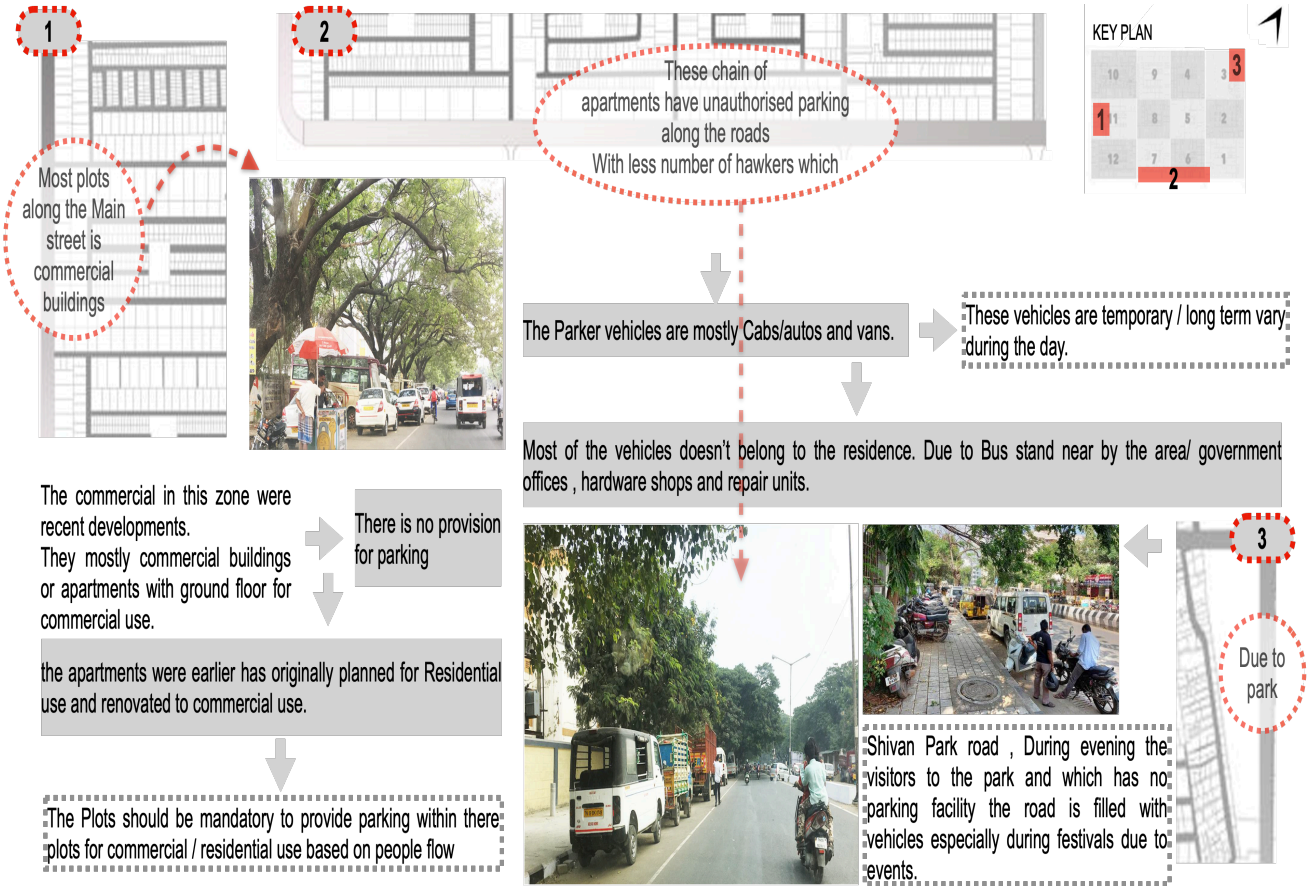




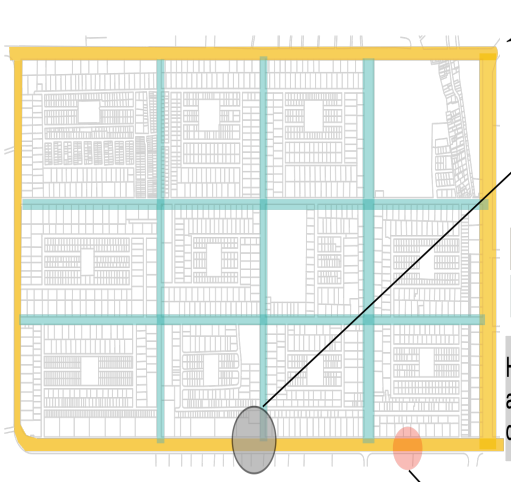


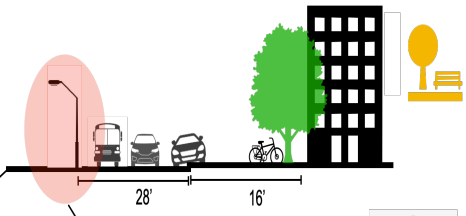


% OF STREET AREA BY PARKED VEHICLES


1
2
KEY PLAN
3
1
2
Most plots along the Main street is commercial buildings
These chain of apartments have unauthorised parking along the roads With less number of hawkers which
The Parker vehicles are mostly Cabs/autos and vans.
These vehicles are temporary / long term vary during the day.
Most of the vehicles doesn't belong to the residence. Due to Bus stand near by the area/ government offices , hardware shops and repair units.
The commercial in this zone were recent developments.
They mostly commercial buildings or apartments with ground floor for commercial use.
There is no provision for parking
the apartments were earlier has originally planned for Residential use and renovated to commercial use.
The Plots should be mandatory to provide parking within there plots for commercial / residential use based on people flow
Shivan Park road , During evening the visitors to the park and which has no parking facility the road is filled with vehicles especially during festivals due to events.
3
Due to park

PARKING & PEDESTRIAN WALK WAY PROPOSAL

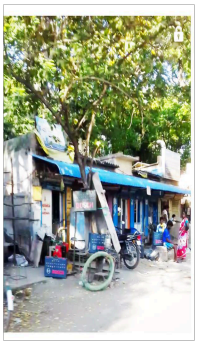




55FT ROAD

30FT ROAD

Hawkers on the streets are less disturbing but disorganised



On street parking, problems on occupying road by unauthorised parking.

Existing Landuse

Seating space is missing along which plays a major role.

Garbage bins helps to achieve better environment and segregation of wastes.



Bollard lights - which is solar helps walkway and cycle tracks effective.

Street lights - solar run

They do not consist of any shading elements and solar street lights can be implemented for efficient energy use

AIM of the proposal to enhance the space functionally sustainable to the urban area providing street elements, defined spaces, cycle track and landscape









HAWAKERS

Fruits/Vegetables

Cooked food

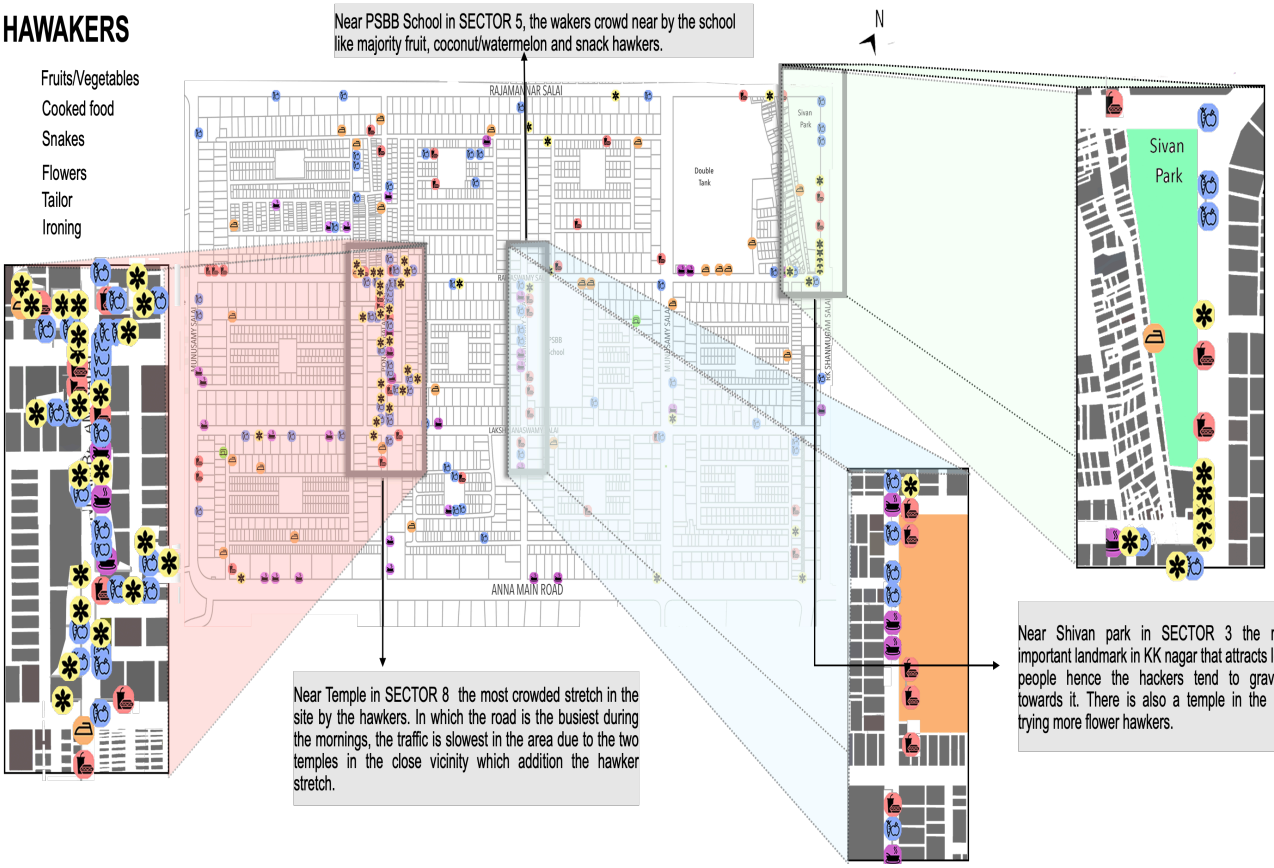
Snakes

Flowers

Tailor

Ironing

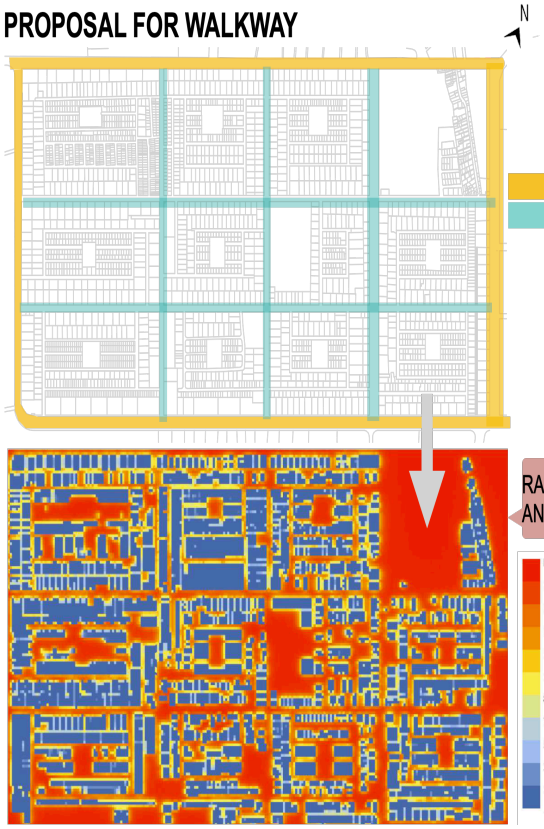
Near PSBB School in SECTOR 5, the wakers crowd near by the school like majority fruit, coconut/watermelon and snack hawkers.



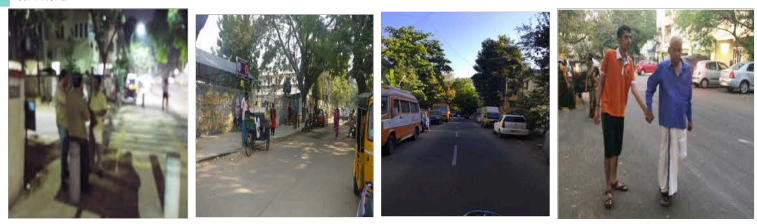
Near Temple in SECTOR 8 the most crowded stretch in the site by the hawkers. In which the road is the busiest during the mornings, the traffic is slowest in the area due to the two temples in the close vicinity which addition the hawker stretch.

Near Shivan park in SECTOR 3 the most important landmark in KK nagar that attracts lot of people hence the hackers tend to gravitate towards it. There is also a temple in the park trying more flower hawkers.

PROPOSAL FOR WALKWAY



Shade, in tropical climates, makes for liveable outdoor spaces. Sidewalks are the most common and thus critical open spaces in the streets, not only as transit areas, but also for their different potential uses, such as small aggregations, recreation or shopping spaces In order to expand the potential uses of sidewalks, shading them is a crucial prerequisite.

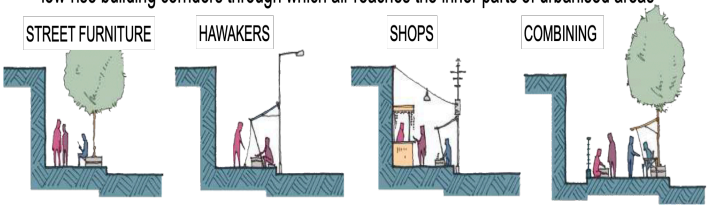


Due to the sun paths of the tropical latitudes, it is impossible to have all the points of the ground level of an urban canyon shaded for the whole day or all year round, and around noon only horizontal sun protections can provide shade. There are many examples of movable horizontal protections across the street, Mobile horizontal protections are particularly effective if they are removed at sunset and activated again in the early morning, because in this way night cooling is not precluded.

Permeability equivalent to 20% to 33.3% is a good starting point for neighbourhood design

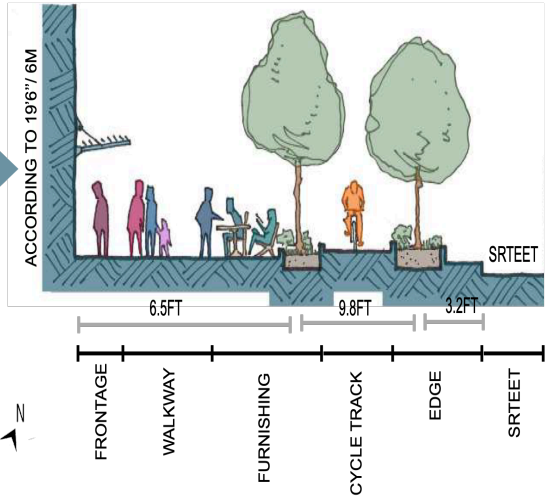
PROPOSAL FOR WALKWAY

It is important, in hot humid climates, to let more wind penetrate through the neighbourhood texture. Breezeways can be in the form of roads, open spaces and low-rise building corridors through which air reaches the inner parts of urbanised areas



SECTIONS OF MULTIPLE METHOD OF STREET SEMI-OPEN SPACES . WHICH WOULD HELP FOR HAWKERS AND PEDESTRIANS TO HAVE AN UNINTERRUPTED WALKWAY AND EFFECTIVE USEAGE OF FURNITURE

SECTION

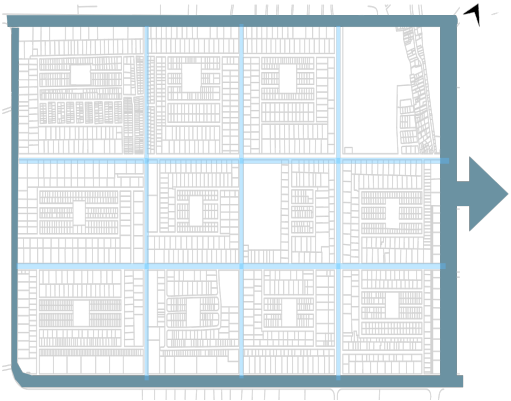


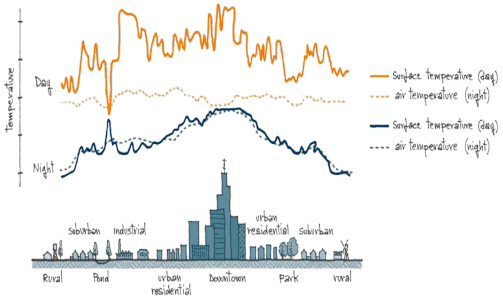


PLAN

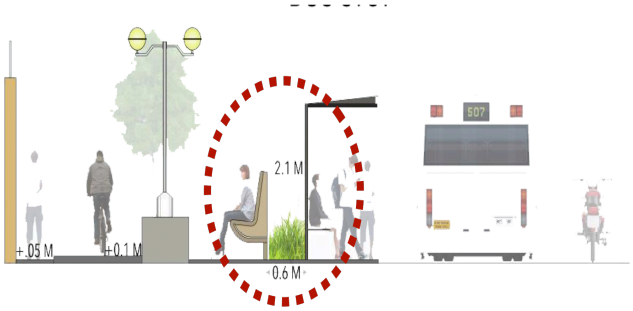
55FT ROAD
30FT ROAD

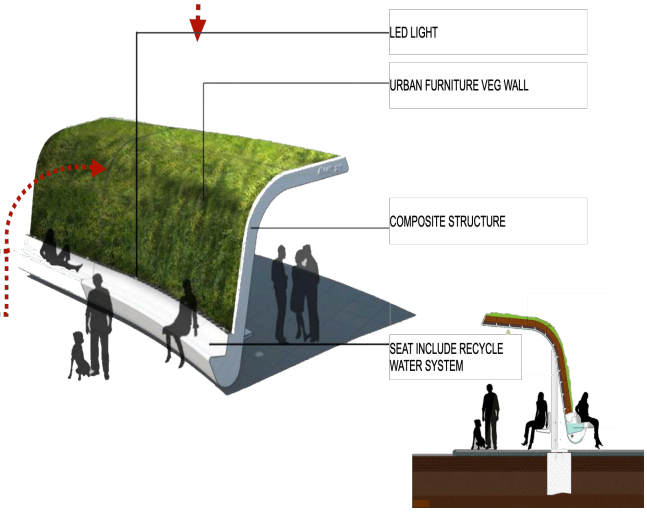
THIS WILL BE APPLIED IN ZONES WHERE THE ROAD WIDTH IS 55FT AND HAS LARGE EXISTING WALK WAY











To sum up, vegetation affects the energy exchanges between buildings and the environment in three ways:

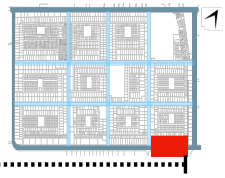
• Because of evapotranspiration, plants release less sensible heat to the adjacent air, so that buildings are exposed to cooler ambient temperatures;

• Cooler surfaces emit less infrared radiation, thus reducing the radiant load on building surfaces (e.g. a lawn vs. a bare parking lot);

• When vegetation provides shading, the solar heat load on surfaces is significantly reduced.

The intra urban temperature differences between parks and built-up areas can be up to 7C

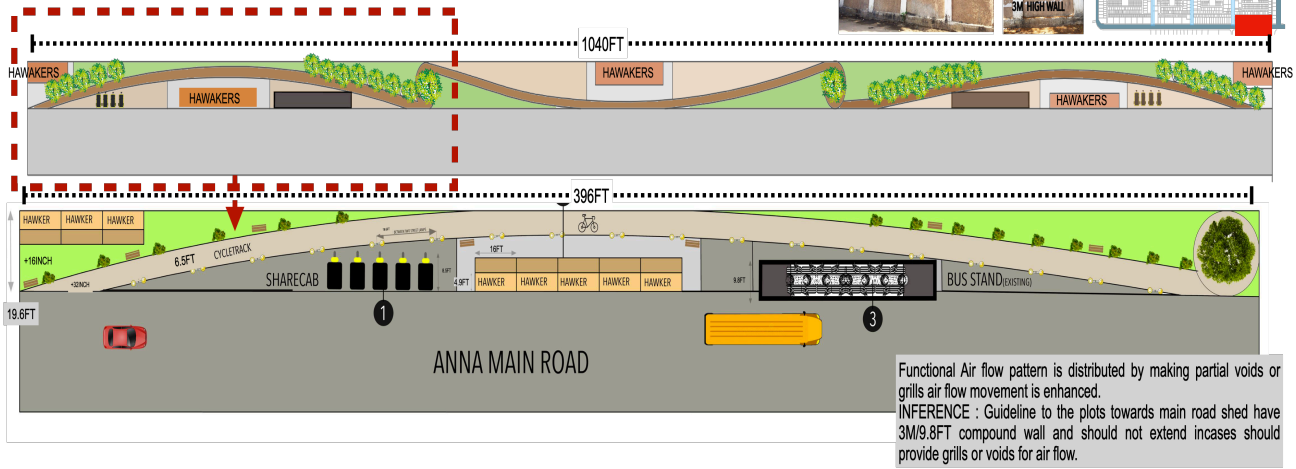
KEY PLAN



THE SPACE IN FRONT OF THE QUARTERS CAN BE USED FUNCTIONALLY CURRENTLY THE SPACE UTILISED BY UNAUTHORISED PARKING, HAWKERS DEAD SPACES.HIGHLY DIS-ORGANISED



PLAN

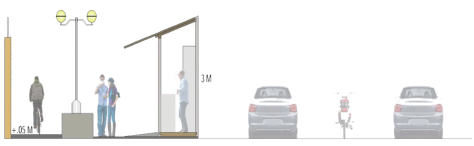


Functional Air flow pattern is distributed by making partial voids or grills air flow movement is enhanced.
INFERENCE : Guideline to the plots towards main road shed have 3M/9.8FT compound wall and should not extend incases should provide grills or voids for air flow.

1 AUTORIKSHAW STAND

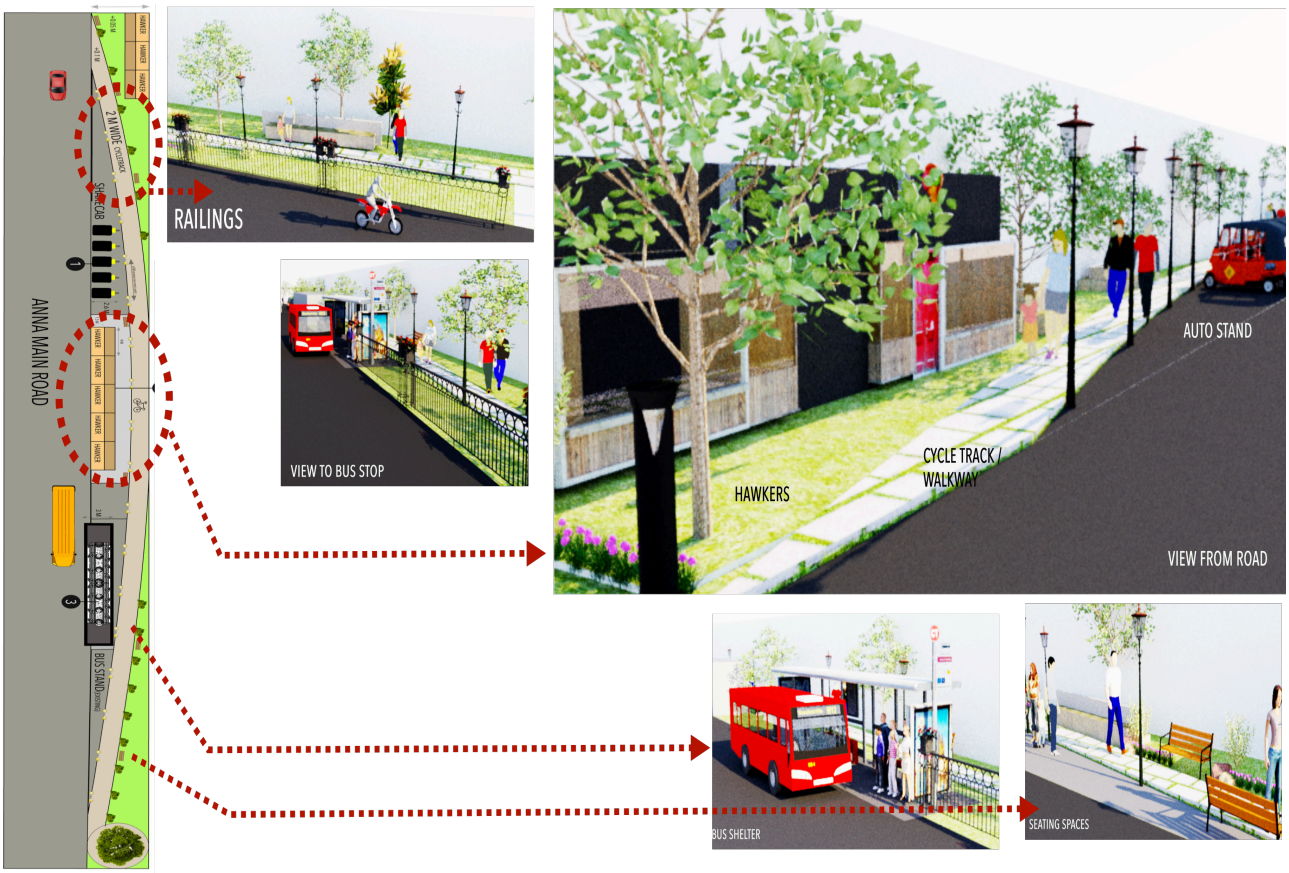


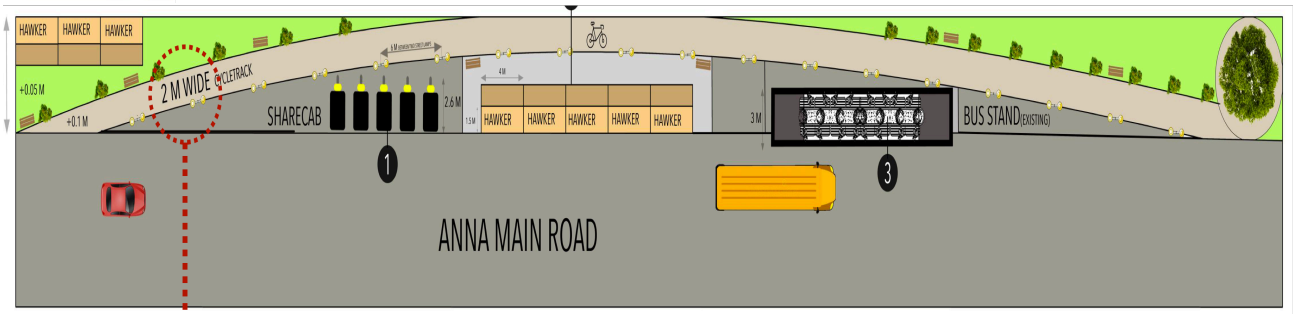
2 HAWAKERS



3 BUSTOP

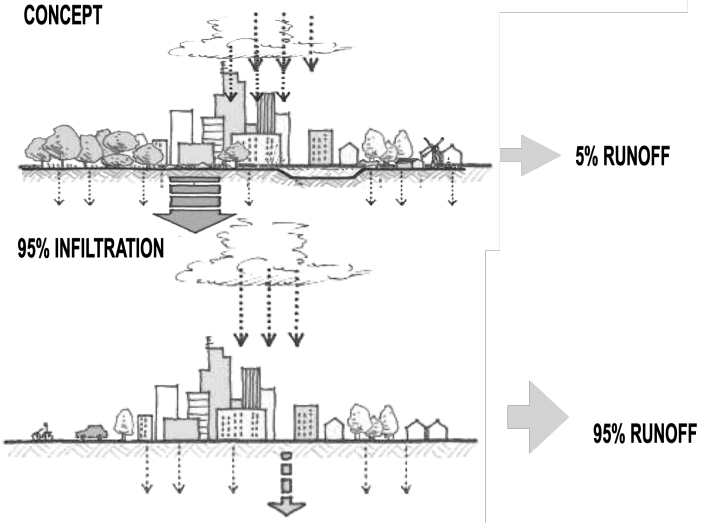



ANNA MAIN ROAD
RAILINGS
VIEW TO BUS STOP
HAWKERS
CYCLE TRACK / WALKWAY
AUTO STAND
VIEW FROM ROAD
BUS SHELTER
SEATING SPACES


HAWKER
2 M WIDE CYCLETRACK
SHARECAB
BUS STAND(EXISTING)
ANNA MAIN ROAD


HAWKERS
CYCLE TRACK / WALKWAY
PROPOSED

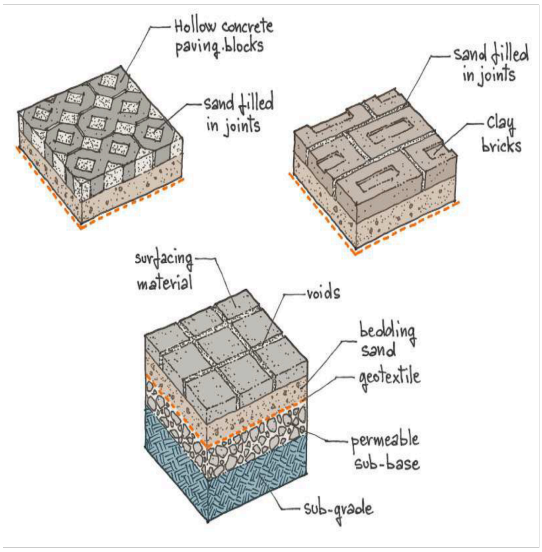

EXSISTING

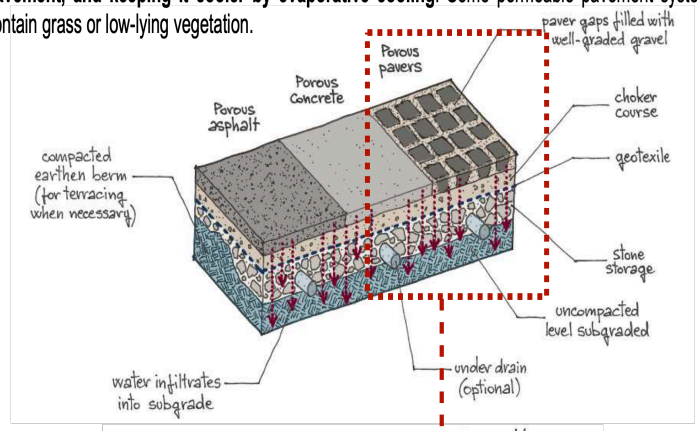

CONCEPT
5% RUNOFF
95% INFILTRATION
95% RUNOFF

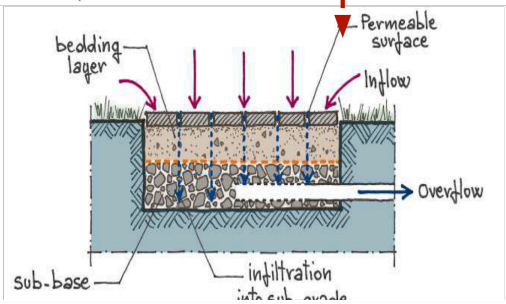
MATERIAL AND DETAILS

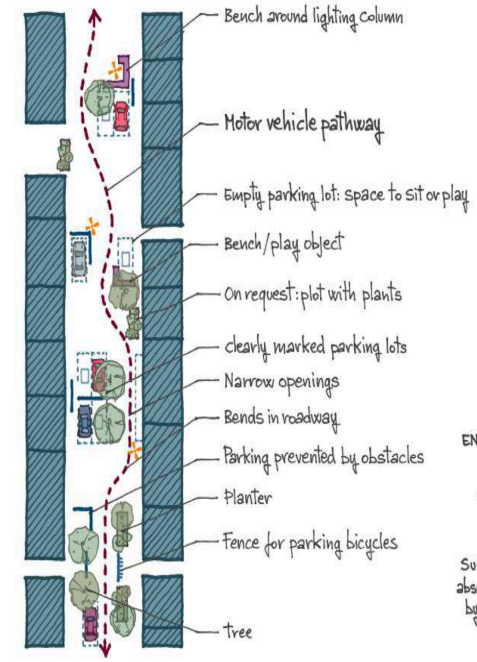
A large proportion of the ground surface of the neighbourhood is covered with pavements, which are usually made of concrete; because of the low albedo of such materials (0.5-0.35) on clear days, during the hours in which the sun is high in the sky, their surface can reach peak temperatures of up to **60-70degreeC**, as they absorb **95 to 65%** of the **solar radiation** reaching them.

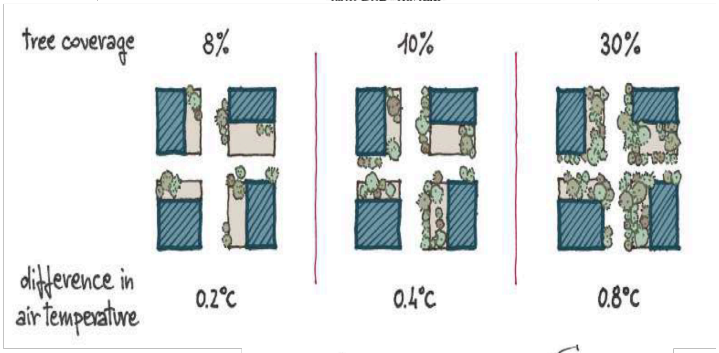
Pavement technologies include porous asphalt applications, pervious concrete applications, permeable pavers, and grid pavements and are designed to **allow air, water, and water vapour into the voids of their surface**. When wet, the water passes through the voids into the soil or supporting materials below. **Moisture evaporates slowly as the surface heats, thus drawing heat out of the pavement, and keeping it cooler by evaporative cooling**. Some permeable pavement systems contain grass or low-lying vegetation.

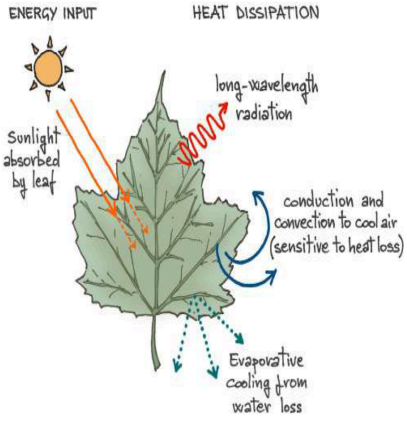


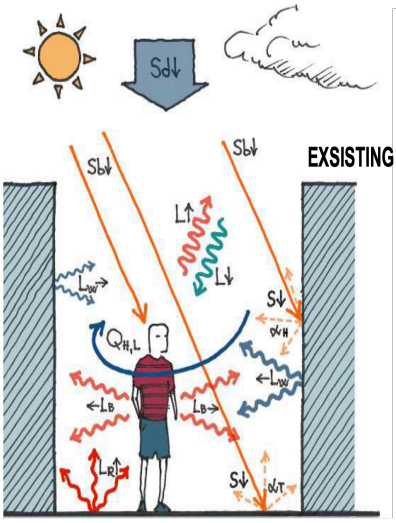




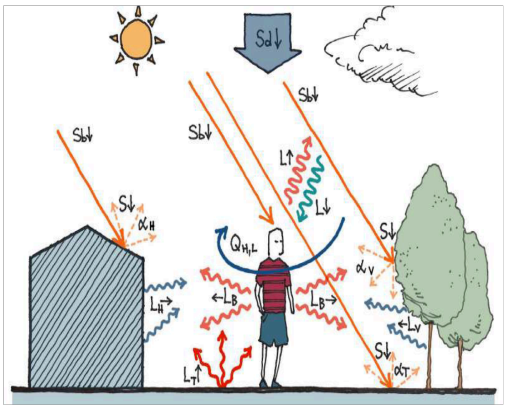








PROPOSED



The reference environment is characterised by:

- wind speed of ≈ 0.3 m/s at 1.1 m),
- mean radiant temperature equal to air temperature,
- vapour pressure that represents a relative humidity of 50%. At high air temperatures (>29 degreeC) the reference humidity is taken as a constant at 20 hPa.
- The representative outdoor activity is that of a person walking at a speed of 4 km per hour (≈1.1 m/s). So, the rate of metabolic heat production is assumed to be 2.3 MET (≈135 W/m).

In a landscaped space constructions and trees have different albedo and temperature, thus eqn.

$(M + S\downarrow + S\downarrow + \alpha hS\downarrow + \alpha vS\downarrow + \alpha tS\downarrow + L\downarrow + Lh + Lv + Lt\uparrow) - (L\uparrow + Lb + Qh,l) = 0$ eqn. A2.2

where:

αh = albedo of constructions

αv = albedo of trees

L = Long-wave radiation from constructions

L = Long-wave radiation from trees

L = Long-wave radiation emitted by the body

towards the terrain and the surrounding surfaces

In an urban canyon (Figure A2.6) eqn. A2.2 becomes:

$(M + S\downarrow + S\downarrow + \alpha wS\downarrow + \alpha rS\downarrow + L\downarrow + Lw + Lr\uparrow) - (L\uparrow + Lb + Qh,l) = 0$ eqn. A2.3

where:

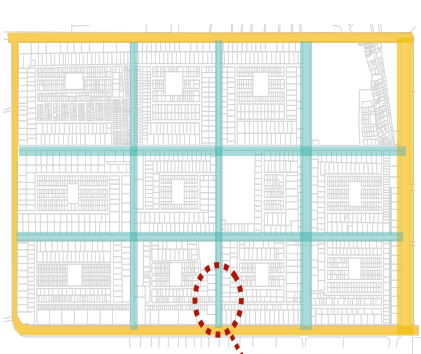
αw = albedo of wall surface

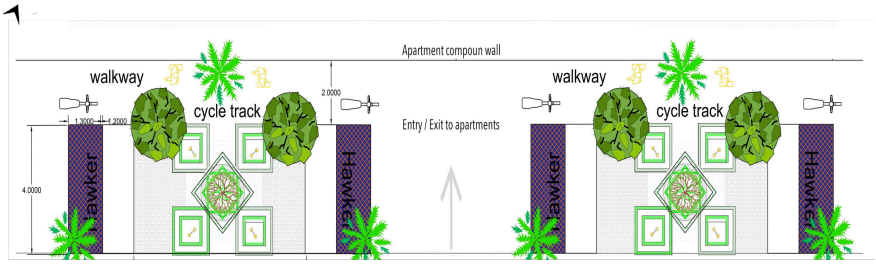
αr = albedo of road surface

Lw = Long-wave radiation from wall surface

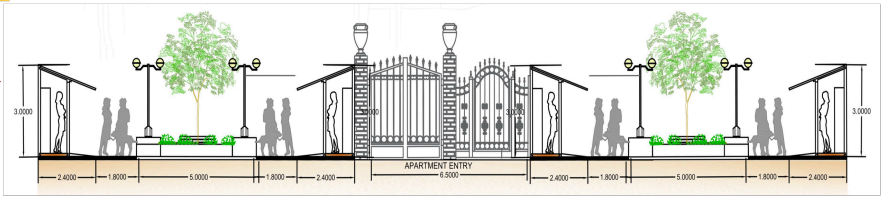
Lr↑ = Long-wave radiation from road surface

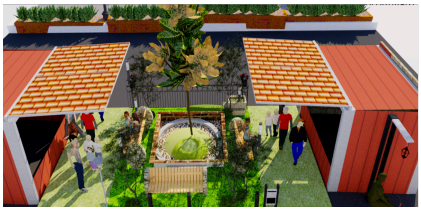
above	46	extreme	heat	stress
+38 to	46	very st	rong	heat stress
+32 to	38	strong	heat	stress
+26 to	32	moderat	e hea	t stress
+9 to	26	no therm	al st	ress
+9 to	0 sl	ight col	d str	ess
0 to -	13 m	oderate	cold	stress
-13 to	-27	strong	cold	stress
-27 to	-40	very st	rong	cold stress
below	-40	extreme	cold	stress











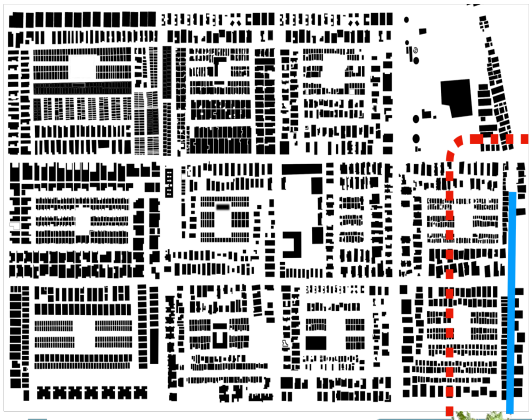


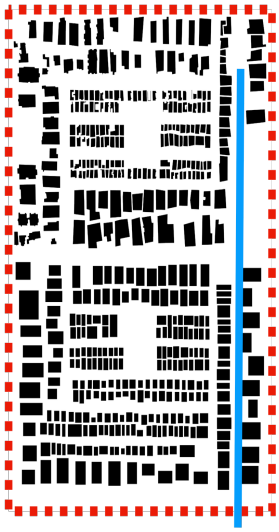


KK NAGAR CANAL - NALA

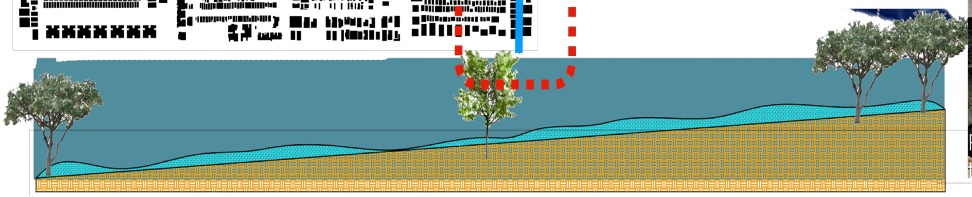
THIS CANAL RUNS UPTO 1.10Km FROM RAMASWAMY SALAI TO ANNA MAIN ROAD IN K K NAGAR. WHICH CONNECTS TO ADYAR RIVER THRO--UGH VENKATARAMANA TO ADYAR RIVER. THIS MAY HAVE BEEN THE PADDY FEILD WATER RESOURCE. WHERE AS AFTER THE RAIN RAIN IN CHENNAI THE CANAL CONTAINS GOOD WATER FOR ABOUT 2-3 MONTHS. BIOLOGIAL SYSTEM WHICH ALSO GONE MISSING DUE TO THE POLUTION IN THE CANAL.THIS CANAL HAS NATURAL DRAIN SLOPE TILL ADYAR RIVER.

IT IS LOCATED BETWEN SECTOR 1 AND SECTOR 2





SECTION



HISTORY



The canal was presumed to be used as a irrigation channel for the feilds then. It was belived to be formes by its own by an unknown water source.

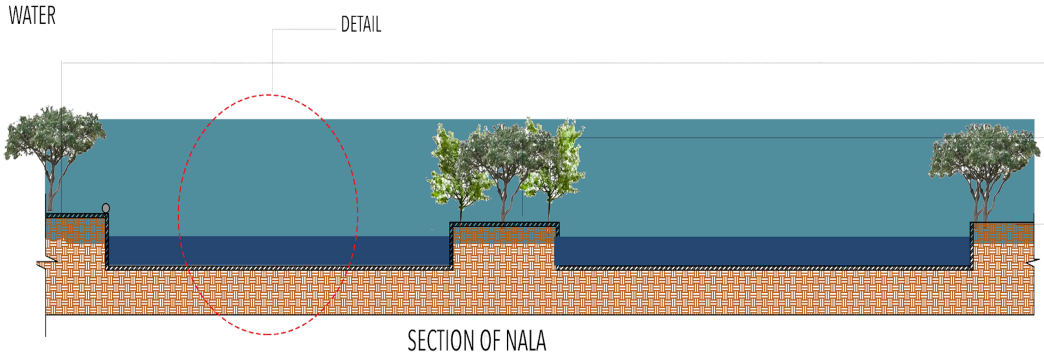


Later when development has started in the area people had forgo--tten the existance of the canal. This development made to loose the importanceof the canal.

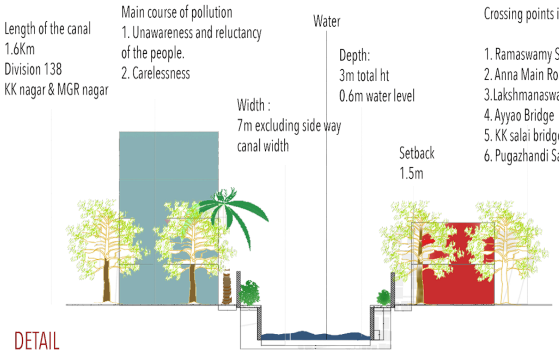


Present image of MGR canal , that has been highly polluted and does not serve any

THE CANAL RUNS FROM RAMASWAMY SALAI (K K NAGAR) JUST BEFORE SHIVAN PARK TO ADYAR RIVER, WHICH HAS A GRADUAL SLOPE FROM THE STARING POINT TO ADYAR RIVER. WHICH ALL TIME HAVE ATLEAST OF 06M OF WATER.



SECTION OF NALA



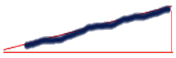
DETAIL

THE CANAL IS ABOUT 7M WIDE
THE HEIGHT OF THE CANAL IS APX 3M INCLUDING THE WALL BUILT ON THE SIDES .
THE WALLS ARE BUILT TO AVOID ENCROACHMENT OF THE BUILDING ON EITHER SIDES.

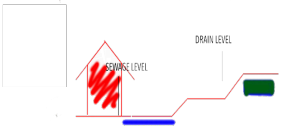
THE STILL WATER IN THE CANAL IS ABOUT 0.6M, BELOW ROAD LEVEL.

THE CANAL HAS OFFSET ON EITHER SIDES FOR ABOUT 1.5M.

ANALYSIS



THE MAIN FEATURE OF THE CANAL IS THAT IT HAS A NATURAL SLOPE, SO THERE IS NO STAGNATION OF WATER.
DUE TONTHIS AFTER HEAVY RAIN FALL THERE IS A SOURCE OF FRESH FOR ATLEAST A PERIOD OF 3 MONTHS.



SUMMRY OF THE SURVEY IS THAT THERE IS A SLAM NAER THE CANAL WHERE PEOPLE DO NOT HAVE BASIC SERVICES AND FASILITIES, SO ALL THERE WASTE SEWAGE AND GARBAGE IS BEEN DUMPED INTO THE CANAL

IMPROVING THE CANAL

AFTER CAREFUL ANALYSIS AND STUDY ABOUT THE CANAL WE HAVE COME TO KNOW THAT THE CANAL WAS A NATURAL WATER FLOW AREA WHICH WAS POLUTED DUE TO HUMAN.

FLOWS AND URBAN DEVELOPMENT.
PEOPLE HAS NOT PAYED ATTENTION TO THE NATURAL SYSYTEM CONNECTED TO THE AREA WASTE GENERATED DUE TO DAILY ACTIVITIES OF THE PEOPLE LIVING IN THE HOUSES ALO-
-NG . THE CANAL, ARE ALSOTHROWN INTO THE CANALWHICH LEAVES THE CANAL WATER HIGHLY POLLUTED.
IF WE HAVE TO CONTROL WATER POLLUTION, WE WILL HAVE TO FIND OUT A WAY, DEVISE LAWS AND STRATEGIES.
WE SHOULD STRICTLY FOLLOW THE LAWS REGARDING THE WATER POLLUTION.

THE BY LAW :
IMPLEMENTED EFFECTIVELY AND SO WE WILL HAVE TO GET THESE IMPLEMENTATED STRICTLY FOR EFFECTIVE PREVENTION OF WATER POLLUTION. WATER CESS ACT 1977 IS ANOTHER IMP-
-ORTANT LAW WHICH AIS TO REDUC3E AND PREVENT WATER POLLUTION;HOWEVER, ITS EFFE-
-CTS HAVE BEEN LIMITED. APART FROM THE LAWS, CREATING AWERNESS ABOUT THE IMPACT OF WATER POLLUTION IS REQUIRED.THROUGH THE PUBLIC AWERNESS AND EFFECTIVE IMPL-
-EMENTATION LAWS, WATER POLLUTION CAN BE REDUCED.

PRESENT STATE OF THE CANAL

THE CANAL ID POLLUTED WITH GARBAGE LIKE HOUSE OLD WASTE, PLATIC BAGS, BOTTLES ETC,.



VIEW FROM ANNA MAIN ROAD



LAKSHMANASWAMY NAGAR

THE CLEANING PROCESS IS DONE BY THE ROBOT EXCAVATOR ONCE A YEAR BY THE CORPORA-
-TION DEPARTMENT CHENNAI.



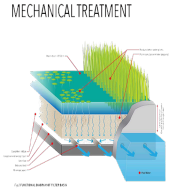
DRAIN CONSTRCTION :

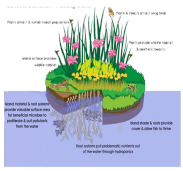
The top level of the slab and man hole doors should be flush with the footpath slab level.
In all roads crossing the slab should be flush with road level.
The drain should be in straight alignment.
Man hole door with chute pipes is provided at every 5 m intervals. In addition to that Inlet chambers with Rain Water Harvesting is also provided at every 30m intervals to collect the rain water and to increase the ground water level. Pre-cast RCC drains are proposed according to the site condition with inlets at 10m interval. The Canals are constructed with retaining wall which retains the earthen banks,caving of earth during flood and gives an aesthetic appearance to the canal.

CLEANING THE DRAIN

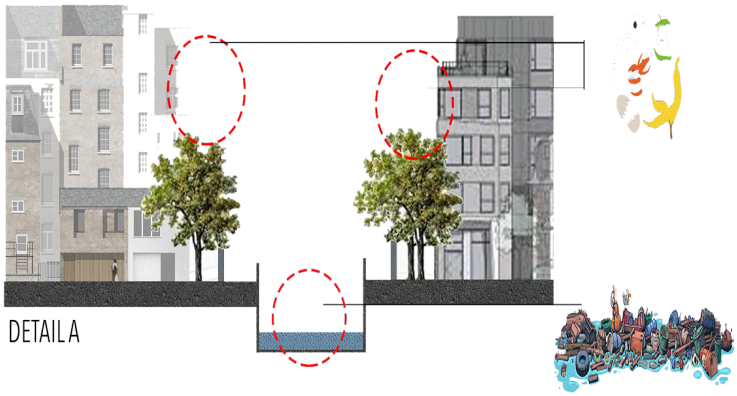
BIOLOGICAL METHOD
SPECIES MANIPULATION IS THE
MAIN IN BIOLOGICAL METHOD OF RESTORATION. THE METHOD CONSIDER THE INTRODUCTION OR PROMO-
-TION OF ORGANISMS THAT ARE INIMICAL TO THE TARGET ORGANISMS. IN NATURE, PREDATION BY ZOOPLANKTON AND FISH SPECIES KEEPS A SORT OF CONTROLON ALGAL POPULA-
-TIONS.

MECHANICAL TREATMENT

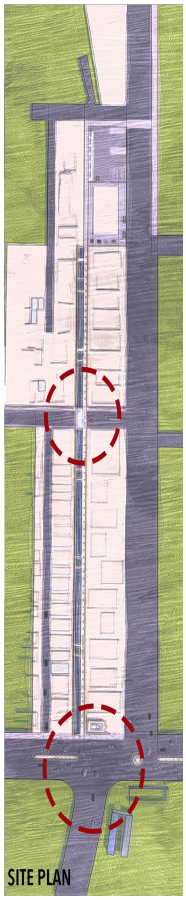












DUMPING OF WASTE INTO THE CANAL.
AND POLUTING THE CANAL.

PROPOSAL

The area was an unvalued part of KK Nagar,as per the study the historical importance of the canal has been detected and bring back to the value by putting it into its best use.

Aim is to clear the poor and damaged area bring back the good maintenance which could benefit the Urban rehabilitation.
Main aim is to changed the environment of the existing area and make the area purposeful and to maximise the area potential of the place.

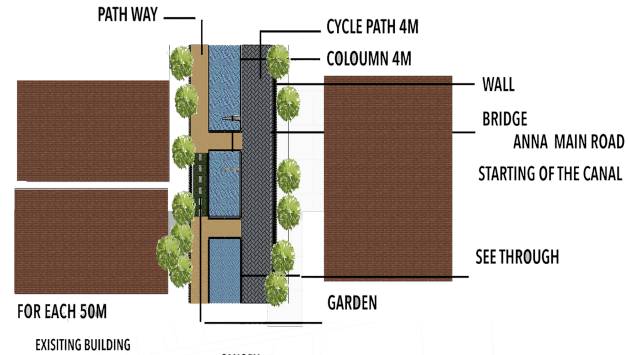
DESIGN
The canal was subjected to a form urban rework and retaining the same elements creating Cycle track to connect through the street and pedestrian walk.
The pedestrian and the cyclist can feel the water and eco-system.

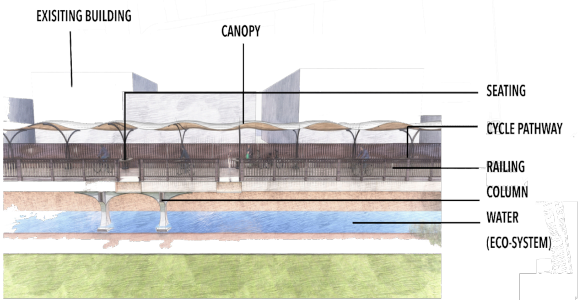
EXSISTING

ANNA MAIN ROAD

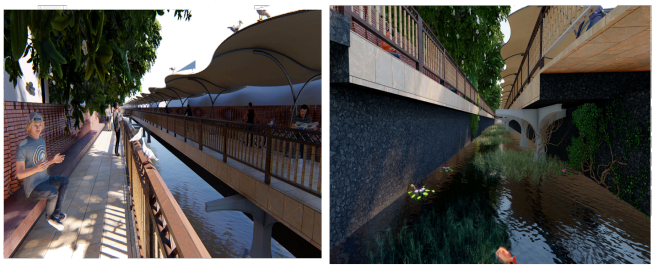
BEFORE : this road had no proper connection to the KK Nagar cycle track. The canal was left open with no proper maintenance .

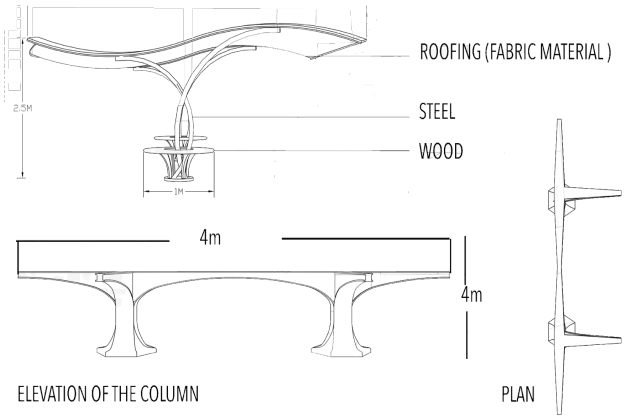
AFTER : NODE is been created for the pedestrians, cyclist and vehicular movement is connected and the canal is aesthetically pleasing, with sustainable recovering the water body in the particular site.

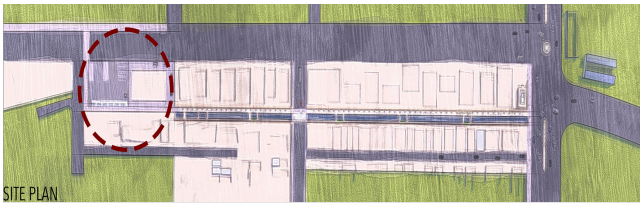












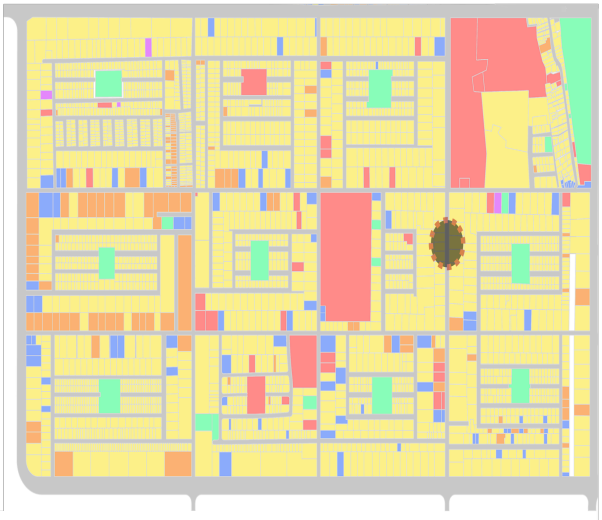




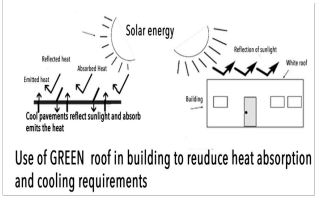


URBAN PROPOSAL





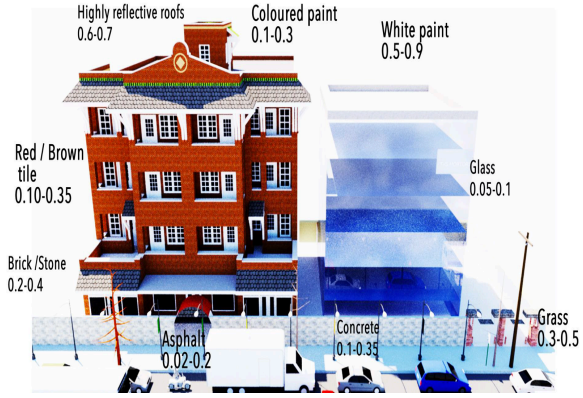




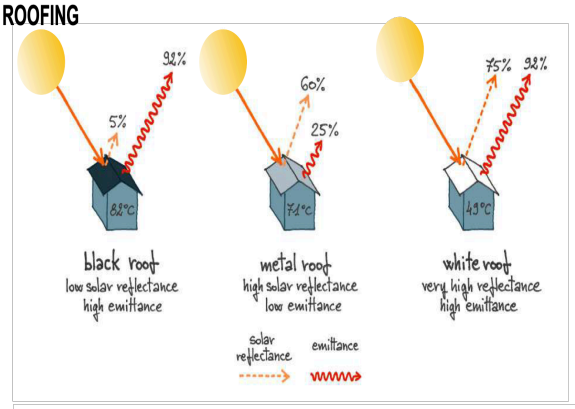
Use of GREEN roof in building to reuduce heat absorption and cooling requirements

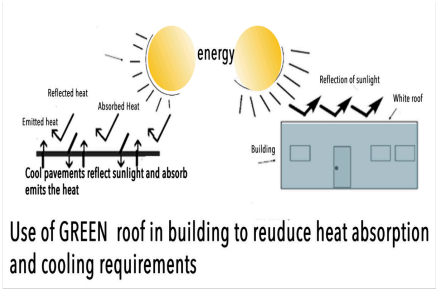


Bare concrete roof gave rise to a room temperature of nearly 40C, with ivy cover the room temperature dropped to 24-25C. However, the night-time cooling experienced by the bare concrete roof was slightly better than the ivy-covered roof;



ROOFING





Use of GREEN roof in building to reuduce heat absorption and cooling requirements

Urban heat island

An urban heat island (UHI) is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities

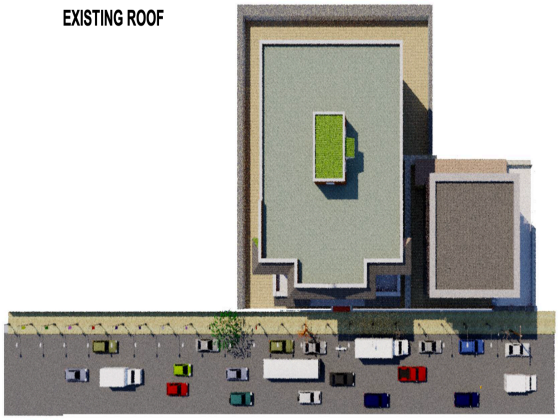
Issue
Use of materials like glass , concrete which absorbs voluminous heat creates UHI and affects the microclimate of that area .
Use of glass is being adopted in every building from windows to treatment of facades

Percentage of glass used in building facade 1 - 30% (Residential)
Percentage of glass used in building facade 2 - 80% (Commercial)

Proposal
Gudeline to to restrict the use of glass as a facade elemnt.

Percentage of glass used in the facade of any building should not exceed certain percentages calculated from uhi

EXISTING ROOF



PROPOSED ROOF



FACADE TREATMENT

GREEN FACADE

Green facade are defined acording to the application of climbers (deciduous or evergreen), as attaching themselves directly to the building elevation or Indirectly with supportive structure.

The blocking of direct sunlight sunlight disposal ensures a cooling effect in a warm humid climate and also helps in reducing the heat island effect especially in neighbourhood level.

Due to the evaporation, green facade cool the heated air through evaporation of water.
Energy saving with the green facade is 9.5 - 18% of the cooling energy consumed but the building.

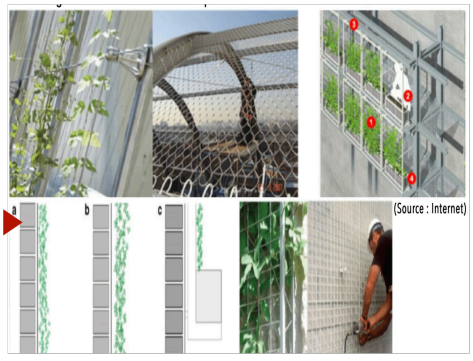


Proposed achievement
Heat diffusion
Sound Insulation
Energy of the sun reduces by 5-30% while passing through the planters / leaf

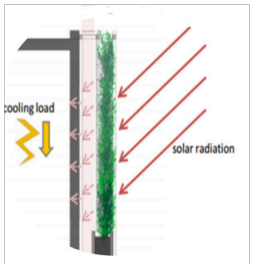
Direct system
self clinging plants
Time period of growth : 3-5 years
Max ht : 25mt

Indirect system
supported by cables or mash of aluminium or plastic

Planters boxes
Grows in individual boxes can cover vast area of facade



(Source : Internet)



Proposal achievements
Heat diffusion
Sound Insulation
Energy of the sun reduces by 5-30% while passing through the leaves

PROPOSAL GUIDELINES FOR APPARTMENTS



Issue 1
Some of the apartments occupy the entire frontage of their plot . This affects the street life .



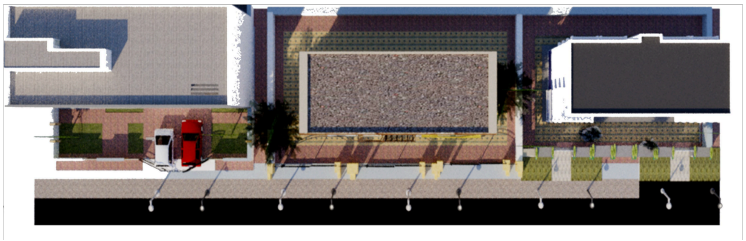
Proposal 1
Parking for the vehicles should be given within the plot
Number of vehicles owned by the stakeholders should be restricted.

Issue 2
Sidewalks are occupied by parking vehicles and is a building violation .





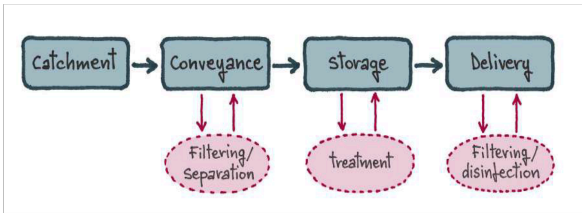
Proposal 2
Apartments should be planned with one entry and exit each 3 mt
The remaining area of sidewalk becomes an urban element and it improves street life.



WATER MANAGEMENT

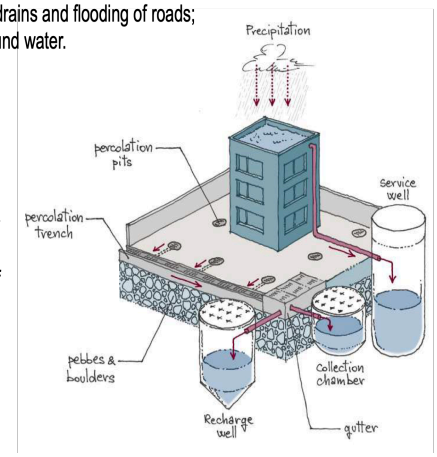
Rainwater is a free source of nearly pure water; rainwater harvesting is the process of intercepting stormwater runoff from a surface (e.g. roof, parking area, land surface), and putting it to beneficial use. The benefits are several :

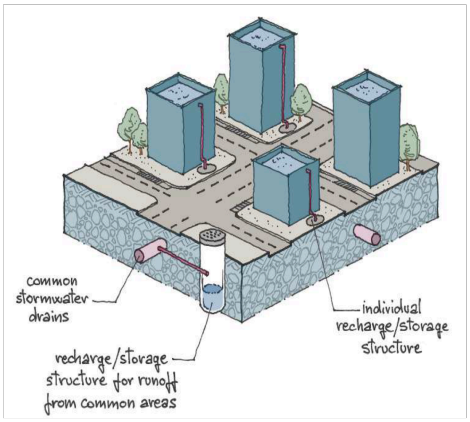
- Capturing and using stormwater runoff reduces site discharge and erosion, and the potential transport of stormwater pollutants;
- Collecting and storing water within an accessible distance of its place of use greatly enhance the accessibility and convenience of water supplies;
- Raising the water levels in wells and bore holes that are drying up;
- Solving water problems in areas that have inadequate water resources;
- Reducing soil erosion as the surface runoff is reduced;
- Decreasing the blocking of storm water drains and flooding of roads;
- Saving the energy used for raising ground water.

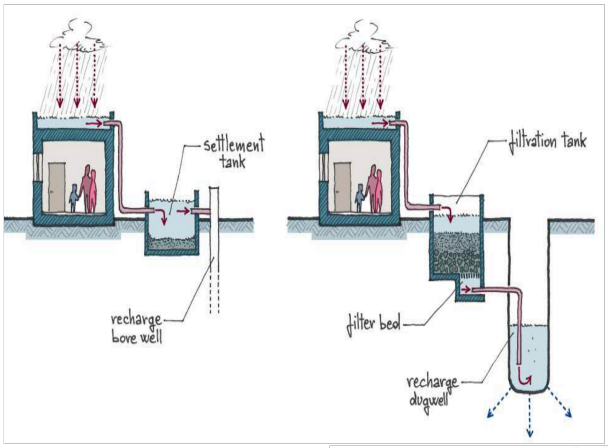


Rainwater can be harvested from:

- Rooftops;
- Paved and unpaved areas, i.e. storm water drains, roads and pavements and other open areas;
- Storm water drains; if properly designed and maintained they offer a simple, cost effective means of rainwater harvesting.



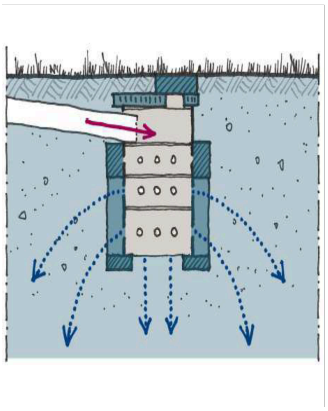


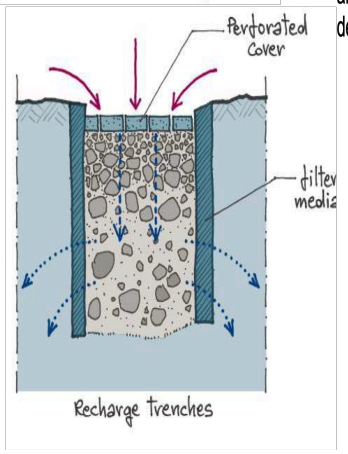


DEWATS

DEWATS (Decentralised Wastewater Treatment System) is a modular system approach to ensure efficient performance in wastewater treatment.

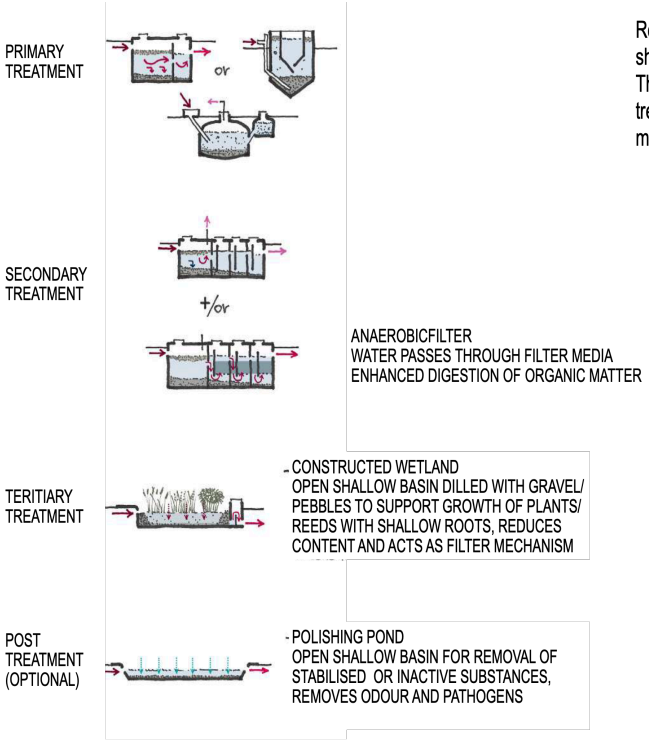
It is a different, decentralised approach, suitable at neighbourhood scale, that allows the on-site closure of the water cycle. In addition, it is an approach that does not necessarily have highly skilled manpower and maintenance requirements (but has high quality standards in planning and construction) and its energy demand is far less than conventional treatment systems. It provides treatment for wastewater flows from 1 m to 1000 m per day and unit





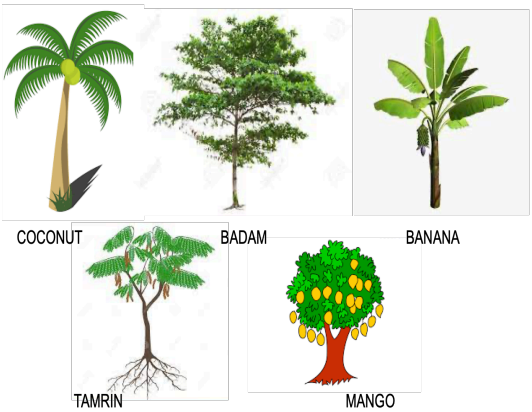
Typical DEWATS applications suitable for wastewater treatment at neighbourhood scale are based on three basic technical treatment modules, which are combined according to demand

Primary treatment in septic tanks, Imhoff tanks, or biodigesters;
- secondary anaerobic treatment in baffled reactors (baffled septic tanks) and fixed-bed filters;
- tertiary aerobic treatment in sub-surface flow filters constructed wetlands (horizontal gravel filters).



Reduction in landscape water demand is possible through the use of native trees and shrubs. Trees and shrubs consume significantly lesser water as compared to grass/lawns. Therefore it is recommended to avoid the use of too much grass-and plant as many native trees and shrubs on site as possible. These promote the local fauna and require limited maintenance over their lifespan.

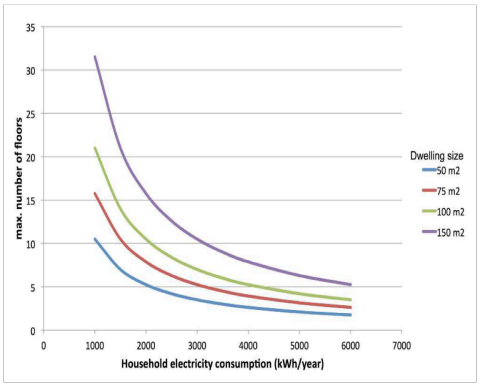
Landscape water requirement (lpd) = (Plant factor × Evapotranspiration rate (mpd) × Canopy area (sq.m)
Irrigation system efficiency× 1000
For Non Turf Perennial Ground cover - 2.5 L/Sq.m per day
For Native tree species - 2.4 L/Sq.m per day



ENERGY MANAGEMENT

ENERGY USE PATTERN IN BUILDINGS

- Lighting 60%
- Air conditioning 32%
- Other applications 8%
- In conventional Indian buildings, energy consumption is 200 kWh per sq. meter

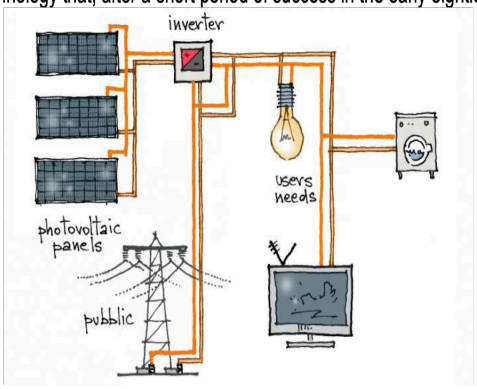


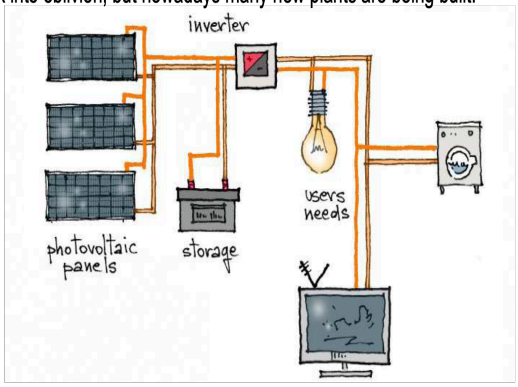
This energy consumption can be **reduced to 120 kWh per sq. meter** by applications of energy efficient building techniquesSaving up to 60% can be achieved.

Coverage : 880 sqmTotal solar panels area – 755 sqmTotal power gain by the solar panels – 500 unit/day

Solar thermodynamic power stations

Solar energy, converted into heat, can also be used for electricity production.
The most suitable technologies for neighbourhood scale are the parabolic through, the linear Fresnel and the dish/engine. A solar power plant with parabolic through concentrators is a technology that, after a short period of success in the early eighties, sank into oblivion, but nowadays many new plants are being built.

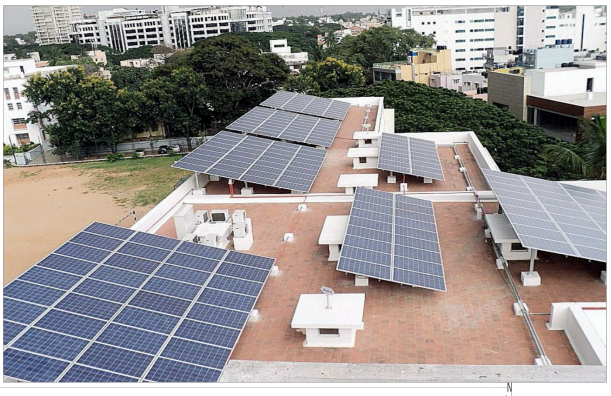


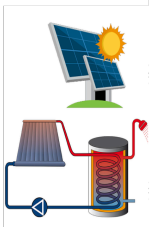


The average annual electricity consumption of each 100 m apartment into which the building is subdivided is 3,000 kWh, then – with a PV production of 1,500 kWh/kW.
The roof area needed by each apartment is 3,000/1,500 x 7,5 = 15 m.
Thus, the maximum height of the building, in order to provide the required energy, is 100/15 ≈ 6-7 floors. The PV area required is larger and the maximum building height lower if the roof of the building has to supply all or part of the electricity needed for common services in the building, such as lighting, elevator, water pumping, etc., or for other uses, such as commercial buildings, street lighting, car battery charging, etc.

A simple rule of thumb is to take 100 sqft for every 1kW of **solar panels**. Extrapolating this, a 1 MW **solar PV power plant** should **require** about 100000 sqft (about 2.5 acres, or 1 hectare).

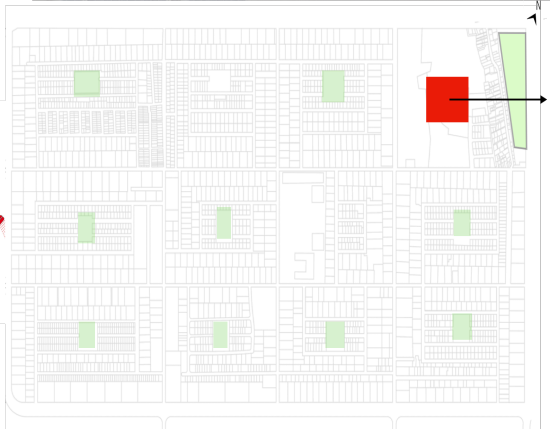
Installing a **10x12 feet split solar panel** with a capacity of **1.5KW** that generates six kilowatt hours (six units a day). The two-way net electricity meter reads both incoming and outgoing electricity.
3KW inverter has the capacity to support another 1.5KW panel and all set to double production by installing additional solar panels.





USE OF RENEWABLE ENERGY ON SITE

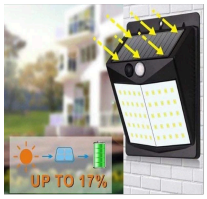
To promote the use of renewable energy , solar water of 200L capacity for each family.
Approx 15000kW-hr (10 Kw-he/family) of energy is saved by using solar heaters in terms of electricity required for water heating using Geyser



TOATL ENERGY REQUIRED = 5,80,6022 KW/YEAR
DESIGN CASE WITH SOLAR = 1,80,7488 KW/YEAR WILL BE THE ENERGY DEMAND WHCH SAVES 65-70% FROM THE BASE CASE

STREET LIGHTING

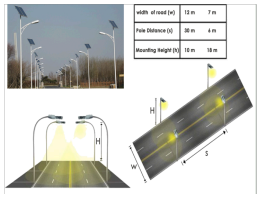
Lighting is the largest electricity consuming end-user within a building in India
Occupancy sensor to automatically switch on/off the lights after 15mins of inactivity.
Using automatic charging light during the day. which saves upto 17%





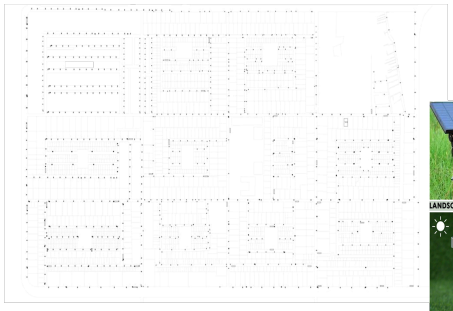
STREET LIGHTING

Most urban are using combination of fluorescent, CFL high pressure sodium lamps or metal halide bulbs which are not designed to meet are wise lighting needs.
The lighting needs of vehicular traffic in high speed zones are different from low speed zones. Like wise in primary and secondary roads are different .
Use of independent street lights that have minimal-to-no dependency on grid-based electric supply. When used with extremely low-power-consuming but high on luminosity LED bulbs, the potential power saved from grid-based supply is significant. With volume production, the per capita cost of both the solar panel and LED bulb will come down further, making the adoption even more viable.
The LED offers 50-80% energy saving over Sodium Vapour Lamp, has a life of over 50,000 hours – working 10 hours a day for 13 years which is more than 5-10 times the life of a SVL or mercury lamp and offers far higher luminosity over a SVL.



CALCULATIONS

Total Solar street light Demand within the neighbourhood = 4300 posts (12kw) = 51,600 kw
Solar street light has back up of three days . It needs 5hrs time for battery recharge.



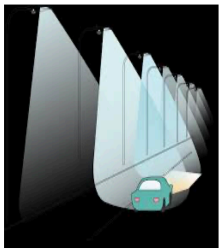


LANDSCAPE LIGHTING• Landscape lamps refer to low lamps arranged on one side or both sides of roads in public places such as urban slow lanes, narrow lanes, residential quarters, tourist attractions, parks, squares, private gardens, courtyard corridors, lawns, and other public places. advantages of solar landscape lights compared to traditional landscape lights1. Energy saving and environmental protection. Traditional landscape lights use city electricity, which increases the electricity load in the city and generates electricity charges. Solar landscape lights use solar cells to convert light energy into electricity and store them in batteries, saving energy and protecting the environment.2. Easy installation. Traditional landscape lights need to be ditched and wired before installation; solar landscape lights only need to be plugged into the landscapeusing the ground plug.

Advantages of solar landscape lights compared to traditional landscape lights

1. Energy saving and environmental protection.
2. Traditional landscape lights use city electricity, which increases the electricity load in the city and generates electricity charges.
3. Solar landscape lights use solar cells to convert light energy into electricity and store them in batteries, saving energy and protecting the environment.
4. Easy installation. Traditional landscape lights need to be ditched and wired before installation; solar landscape lights only need to be plugged into the landscapeusing the ground plug.
5. High safety factor. The mains voltage is high, which is prone to accidents; the solar cell is only 2V, which is safe at low voltage.
6. Intelligent light control.
7. The switching light of the traditional landscape light requires manual control; and the solar landscape light has a built-in controller that controls the light source part on and off by collecting and judging the light signal.
8. LIGHTING WITH motion detecting
9. SENSORSMotion sensor lighting helps reduce and conserve.
10. After the relatively small initial costs, motion sensors gets to work on saving you money.
11. No need for full-time outdoor security lights. Motion activation saves thousands of hours of run time per year, and prolongs the life those expensive flood lights.
12. Prevent lights from being left on by children and guests.
13. No accidentally left on lights in garages, attics, or any space where you might occasionally find that the light was left on.







BIO GAS PLANT

To treat 20TONES of biowaste per day, 1000 m3 biogas plant is needed

.• Each cubic meter (m3) of biogas contains the equivalent of 6 kWh of heating energy.

• The energy conversion efficiency of using biogas is 60 % as CNG, but only 20 % AS electricity.



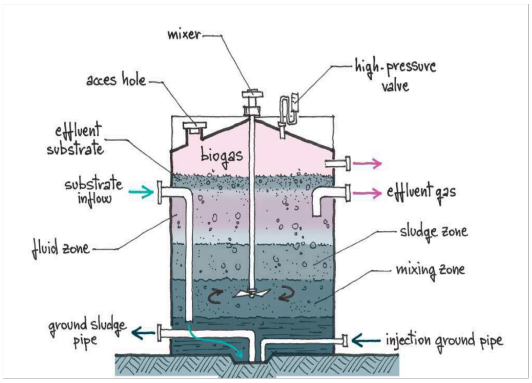
1kg waste = 0.45 cu.m bio cng
2000kg waste = 120 cu.m bio cng
when liquid 160 litre but LPG installing of 1000 cu.m bio gas

CNG vehicles could be provided within the neighbourhood so it would be easier for the people inside the neighbourhood providing sustainable transport

ELECTRICAL INCINERATOR

the machine with the capacity of 100 - 130 napkins per day is installed in each sector. Installing disposal of used napkins in a very scientific and hygienic way .
This ash is collected in the asj collection tray at the bottom of the incinerator .
complete burning of napkins only less than 5% ash per napkin is generated this helps sustainable ENVIRONMENT and easy maintenance

SOURCE : https://www.researchgate.net/publication/334290335_Design_of_Domestic_Incinerator_for_the_Safe_Disposal_of_Menstrual_Waste_in_the_Rural_Areas



Generation of biogas and fertiliser

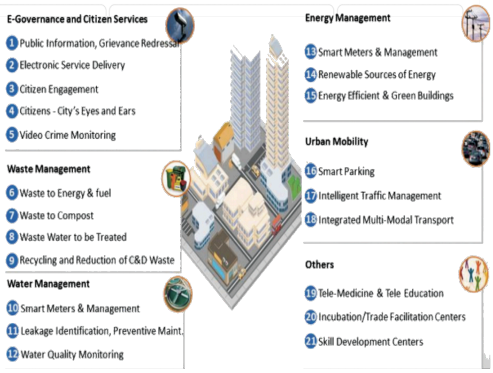
• Reduction of greenhouse gas emissions through methane recovery
• Combined treatment of different organic waste and wastewaters
• Reduction of solids to be handled (e.g. less excess sludge)
• Good pathogen removal depending on temperature
• Process stability (high loads can be treated but anaerobic sludge can also be preserved for prolonged periods without any feeding)

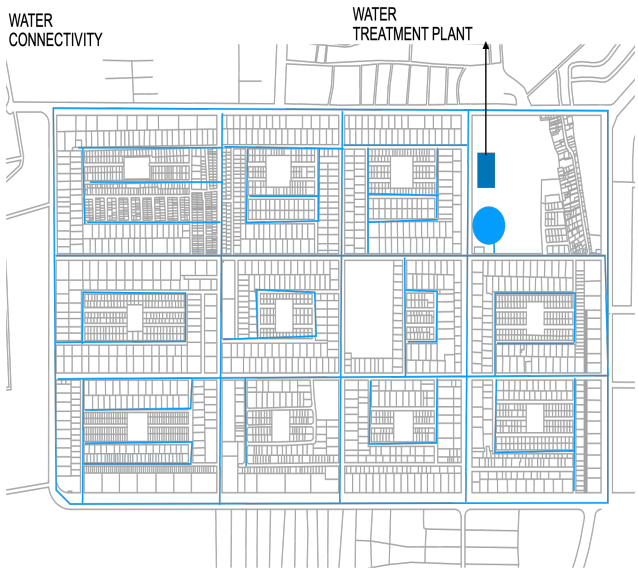
SHREDDING OF SOLID WASTE → COLLECTION TANK → ANAROBIC DIGESTER → BIO GAS

ORGANIC MANURE

http://task37.ieabioenergy.com/files/daten-redaktion/ download/Technical%20Brochures Wastewater_biogas_ grey_web-1.pdf

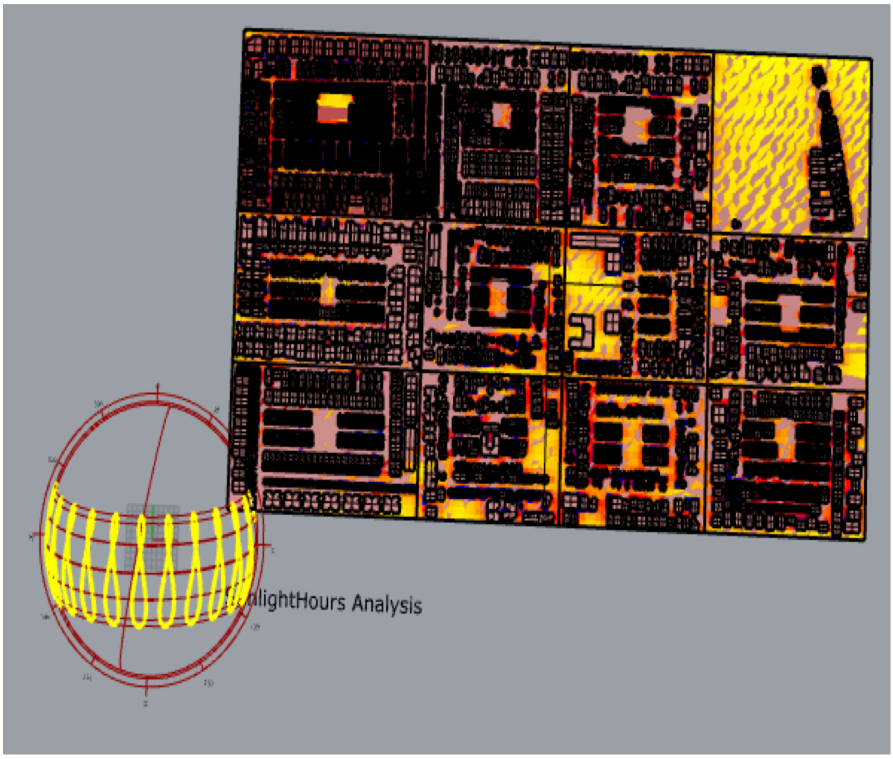


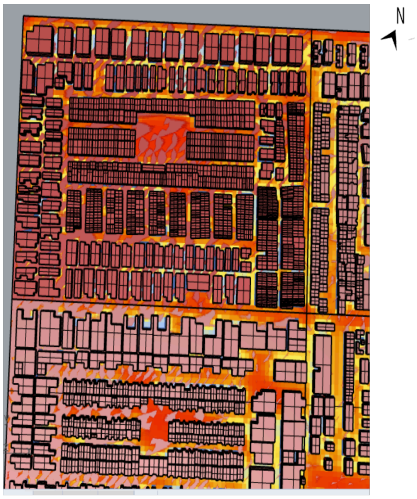


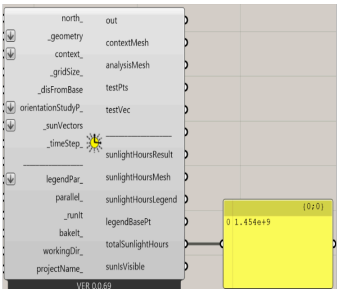


WATER TREATMENT water is used for the landscape present in the neighbourhood area.

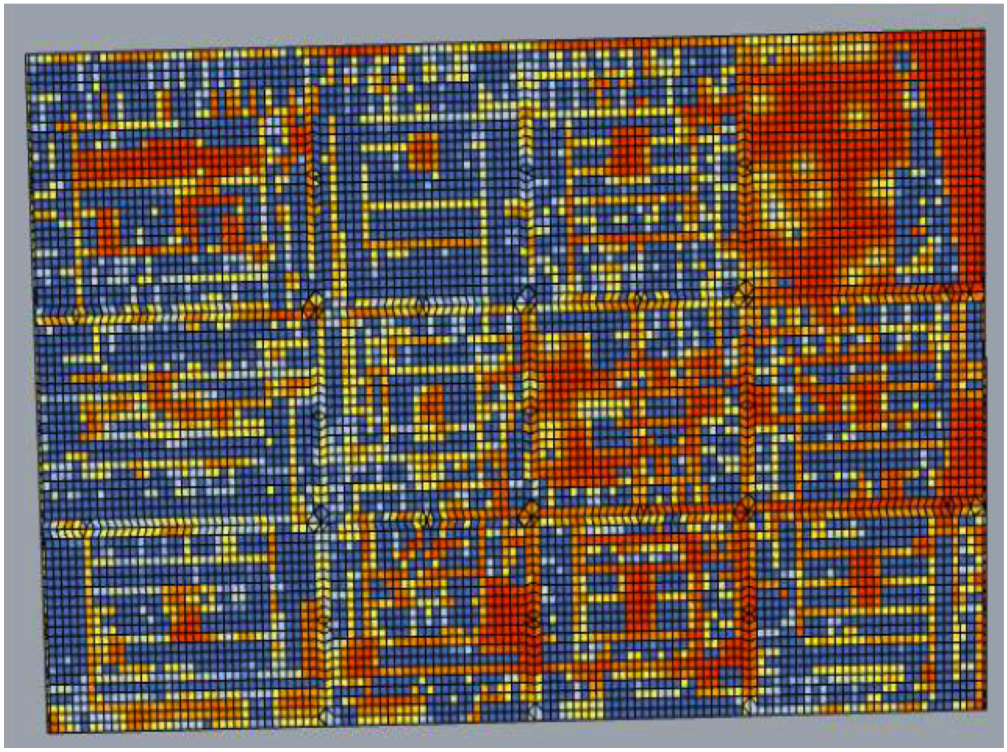
SUNLIGHT HOUR ANALYSIS

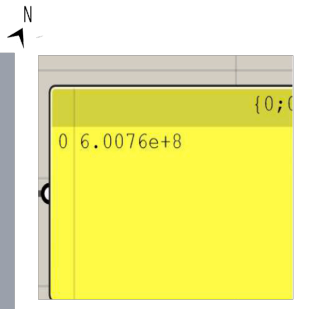






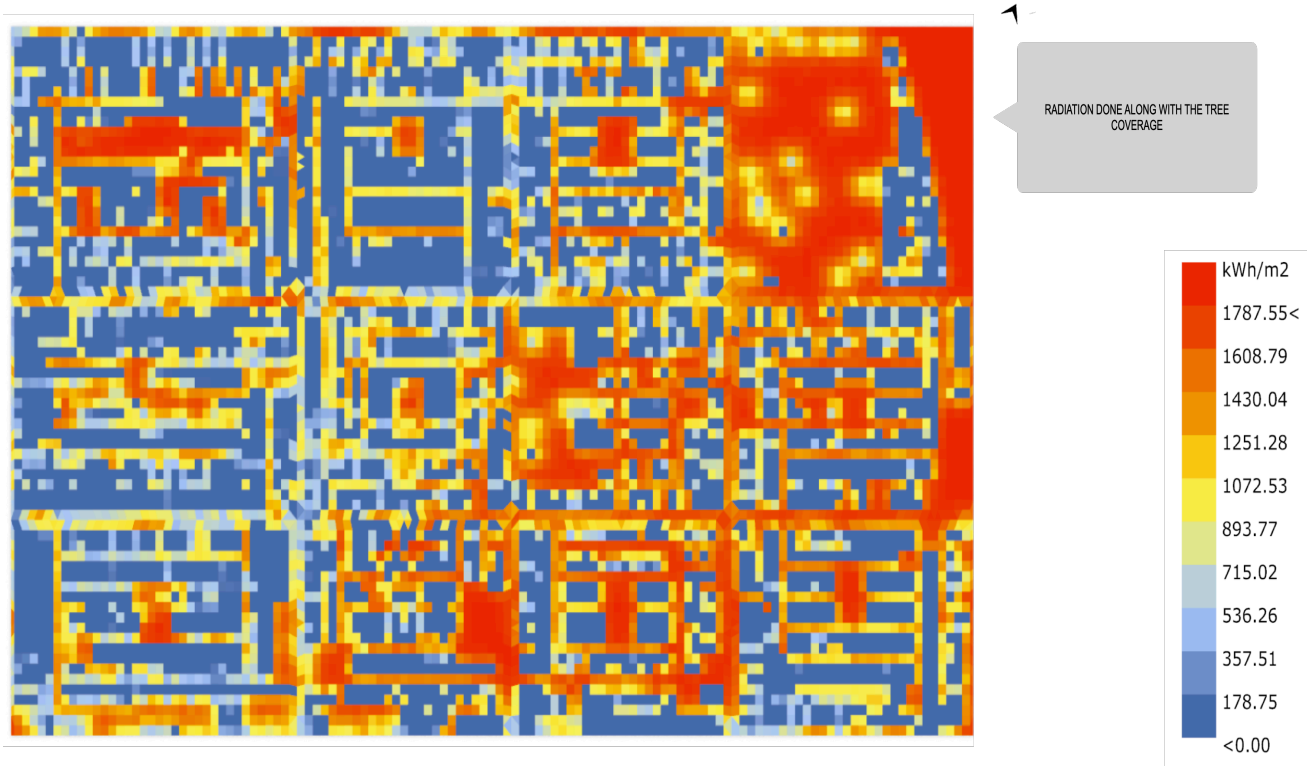
RADIATION ANALYSIS



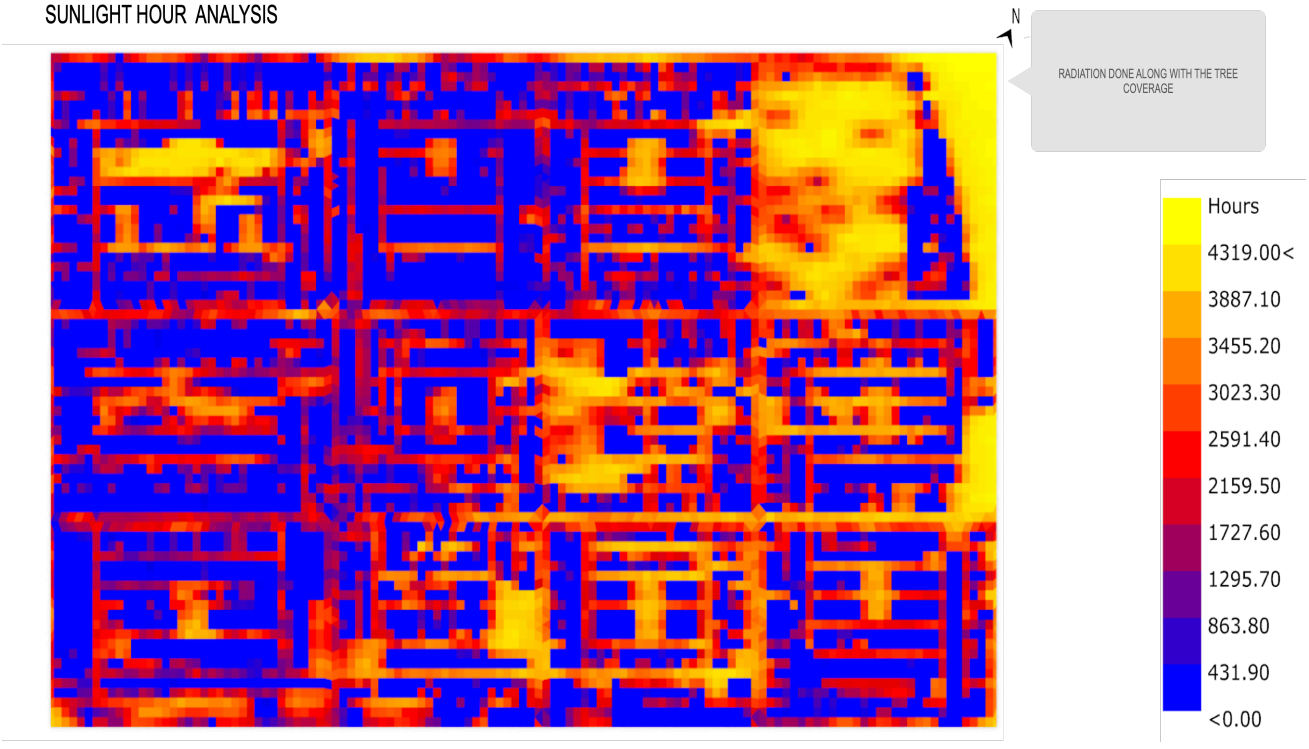


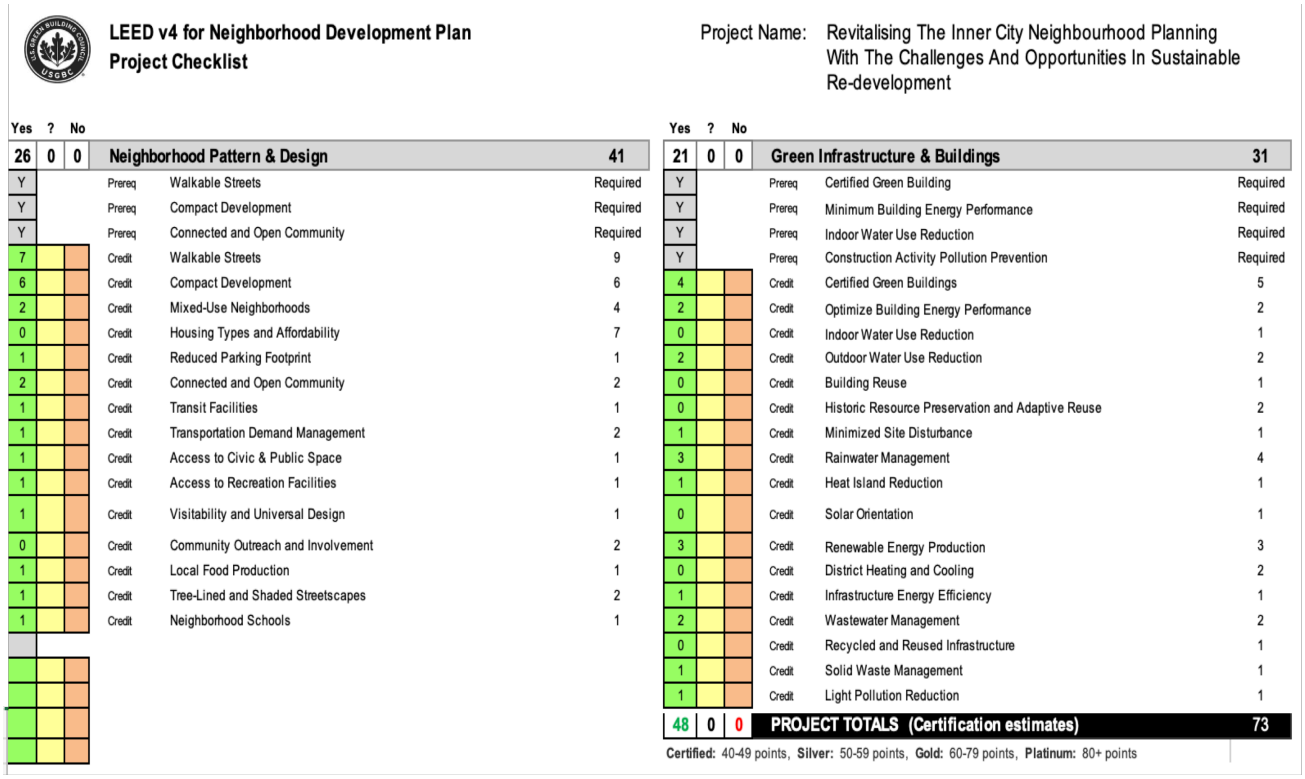
RADIATION DONE ALONG WITH THE TREE COVERAGE

RADIATION ANALYSIS



SUNLIGHT HOUR ANALYSIS





LEED v4 for Neighborhood Development Plan
Project Checklist

Project Name: Revitalising The Inner City Neighbourhood Planning With The Challenges And Opportunities In Sustainable Re-development

Yes	?	No	Neighborhood Pattern & Design		41
Y			Prereq	Walkable Streets	Required
Y			Prereq	Compact Development	Required
Y			Prereq	Connected and Open Community	Required
7			Credit	Walkable Streets	9
6			Credit	Compact Development	6
2			Credit	Mixed-Use Neighborhoods	4
0			Credit	Housing Types and Affordability	7
1			Credit	Reduced Parking Footprint	1
2			Credit	Connected and Open Community	2
1			Credit	Transit Facilities	1
1			Credit	Transportation Demand Management	2
1			Credit	Access to Civic & Public Space	1
1			Credit	Access to Recreation Facilities	1
1			Credit	Visitability and Universal Design	1
0			Credit	Community Outreach and Involvement	2
1			Credit	Local Food Production	1
1			Credit	Tree-Lined and Shaded Streetscapes	2
1			Credit	Neighborhood Schools	1

Yes	?	No	Green Infrastructure & Buildings		31
Y			Prereq	Certified Green Building	Required
Y			Prereq	Minimum Building Energy Performance	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Construction Activity Pollution Prevention	Required
4			Credit	Certified Green Buildings	5
2			Credit	Optimize Building Energy Performance	2
0			Credit	Indoor Water Use Reduction	1
2			Credit	Outdoor Water Use Reduction	2
0			Credit	Building Reuse	1
0			Credit	Historic Resource Preservation and Adaptive Reuse	2
1			Credit	Minimized Site Disturbance	1
3			Credit	Rainwater Management	4
1			Credit	Heat Island Reduction	1
0			Credit	Solar Orientation	1
3			Credit	Renewable Energy Production	3
0			Credit	District Heating and Cooling	2
1			Credit	Infrastructure Energy Efficiency	1
2			Credit	Wastewater Management	2
0			Credit	Recycled and Reused Infrastructure	1
1			Credit	Solid Waste Management	1
1			Credit	Light Pollution Reduction	1
48	0	0	**PROJECT TOTALS (Certification estimates)**		73

Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80+ points

THANK YOU

References

- **References**.

- Butera, F. M. (1998), Urban development as a Guided Self-Organisation Process, in C.S Bertuglia, G. Bianchi, A Mela (eds.), The City and Its Sciences, Physica-Verlag
- UN-Habitat (2014), The state of African cities 2014- http://unhabitat.org/books/state-of-african-cities-2014-reimagining-sustainable-urban-transitions/
- IPCC (2014), Climate Change 2014, Mitigation of Climate Change, Chapter 12: Human Settlements, Infrastructure and Spatial Planning, Cambridge University Press
- USGS Water Science School (n.d -a) - Infiltration - http://water.usgs.gov/edu/watercycleinfiltration.html
- SSWM (2016), UASB Reactor - http://www.sswm.info/ category/implementation-tools/wastewater-treatment/hardware/semi-centralised-wastewater-treatments/u