



Accessible, Safe  
and Inclusive  
Neighbourhood  
design in a  
Green-field  
scenario

Case – Naya Raipur,  
Sector 31



# STRUCTURE

1 – Engagement with NRDA

2 - Context and Dynamics

3 – Sector Design

4 – Street Design

5 – Open Space Design

6 – Housing

7– Project Impact



An aerial photograph of a coastal area, likely a bay or large lake, surrounded by urban development. The water is a deep blue, and the surrounding land is a mix of green (parks or undeveloped land) and brown/tan (buildings and paved areas). A prominent road or highway runs along the right side of the water. The overall image has a warm, orange-brown tint.

# 1 - ENGAGEMENT WITH NRDA

# Long term partnership with NRDA

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## WORKSHOP 1 - The Importance of Sustainable Transport in Indian Cities.

- On 15<sup>th</sup> March 2010, NRDA and EMBARQ signed a Memorandum of Understanding (MOU) to have an integrated, systematic effort to address transport challenges in Naya Raipur City in economically, socially and environmentally sustainable ways.
- The first half-day workshop on March 25, 2011 highlighted 'The Importance of Sustainable Transport in Indian Cities'. The workshop involved more than 50 senior government officials and delegates from the state of Chhattisgarh.
- EMBARQ Senior Transport Engineer Dario Hidalgo presented on "Urban Transport: Problems and Perspectives" to share principles of sustainable transport from around the world. EMBARQ India's Senior Transport Specialist Amit Bhatt gave a presentation exploring the possibility of extending a bus rapid transit (BRT) system in Naya Raipur.



# Long term partnership with NRDA



## WORKSHOP 2 - The Concepts of Transit Oriented Development.

- The second one-day workshop on 4th August 2011 was on 'The Concepts of Transit Oriented Development'. Salvador Herrera, Deputy Director of Centre for Sustainable Transport Mexico (CTS-Mexico) was invited as a special guest speaker to share their work and experience in Transit Oriented Development projects in Latin America.
- The workshop was preceded by a daylong site visit to Naya Raipur to see the ongoing construction of the city. This was followed by taking one sector as an example to assess the principles of TOD.



# Long term partnership with NRDA

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## WORKSHOP 3 - Translating the Concepts of Integrated Development.

- The third two-day workshop held on 9th and 10th February 2012 focused on 'Translating the Concepts of Integrated Development to Sector Planning and Design'.
- This was conducted by the EMBARQ India and included the officers and staff of NRDA, consultants to NRDA, real estate developers, architects and undergraduate architecture students from Raipur.
- The participants of the workshop, through the demonstrated principles and design steps, arrived at 8 conceptual designs for Sector 31 that were then evaluated for its strengths and weakness in facilitating Transit and People Oriented Development.

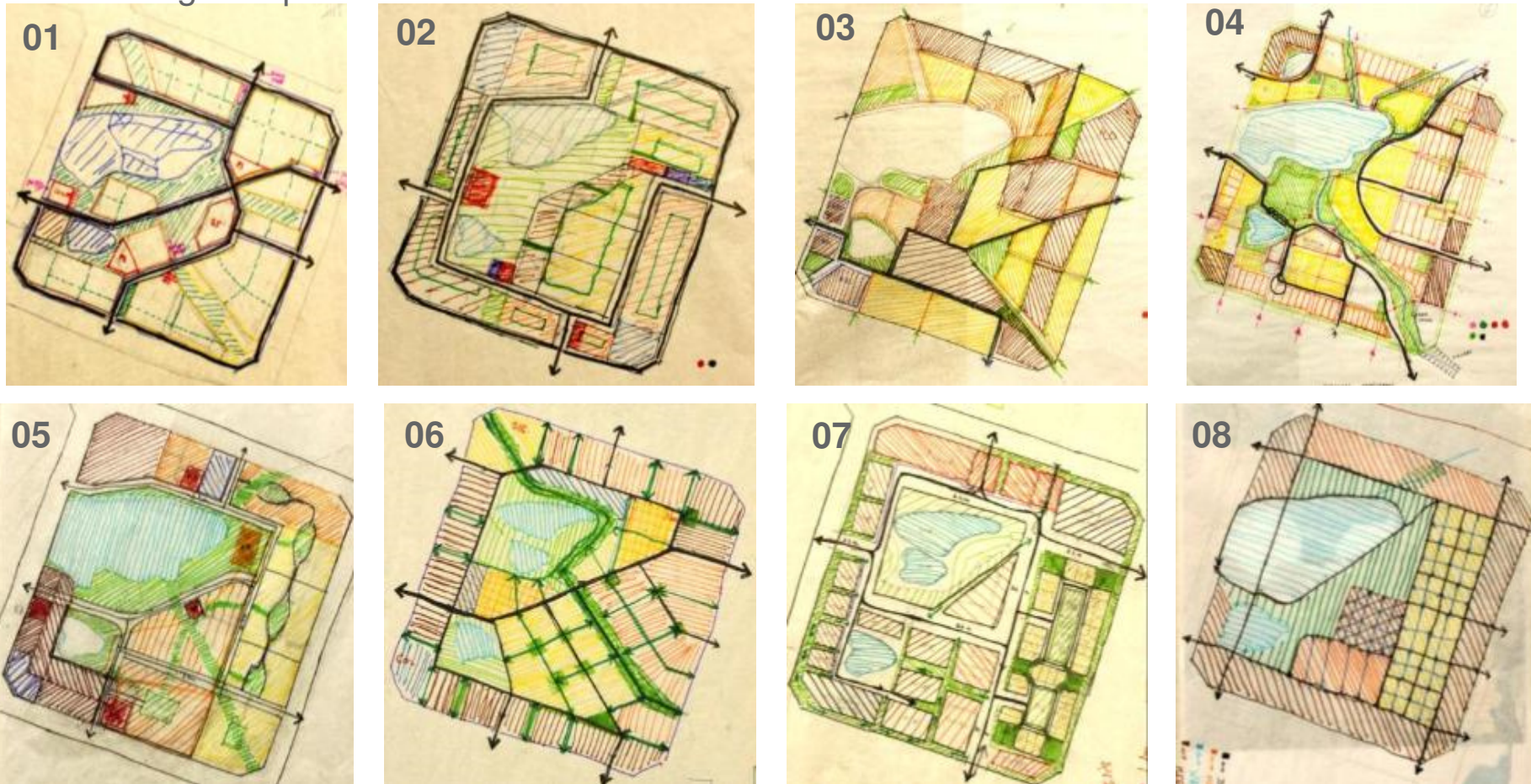




# Long term partnership with NRDA

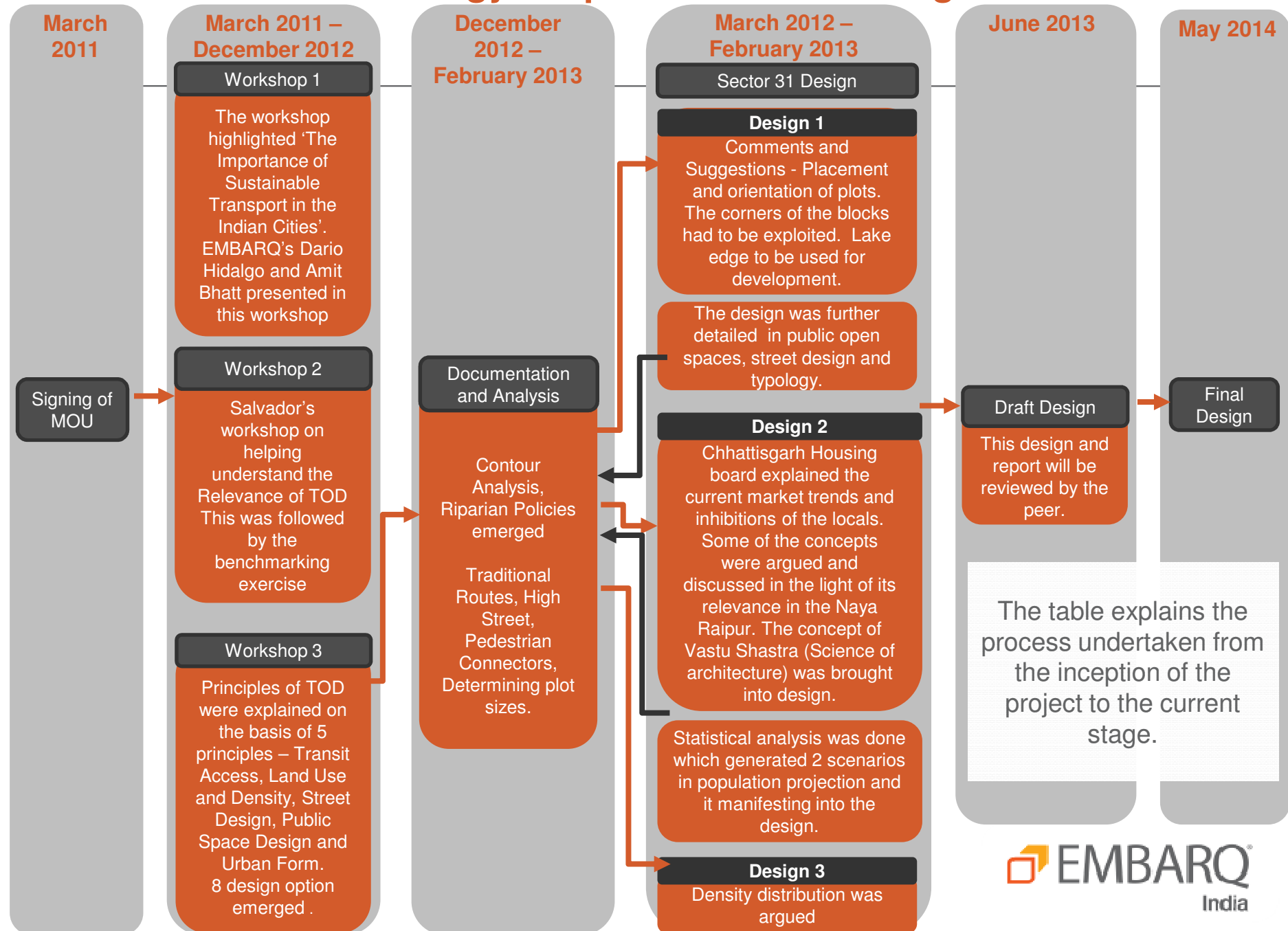
## WORKSHOP 3 - Translating the Concepts of Integrated Development.

### ➤ 8 Design Proposals



The participants came up with 8 proposals. The strengths and weakness were weighed to come up with a holistic proposal by EMBARQ India.

## 2 - Process and Methodology adopted for Sector Design



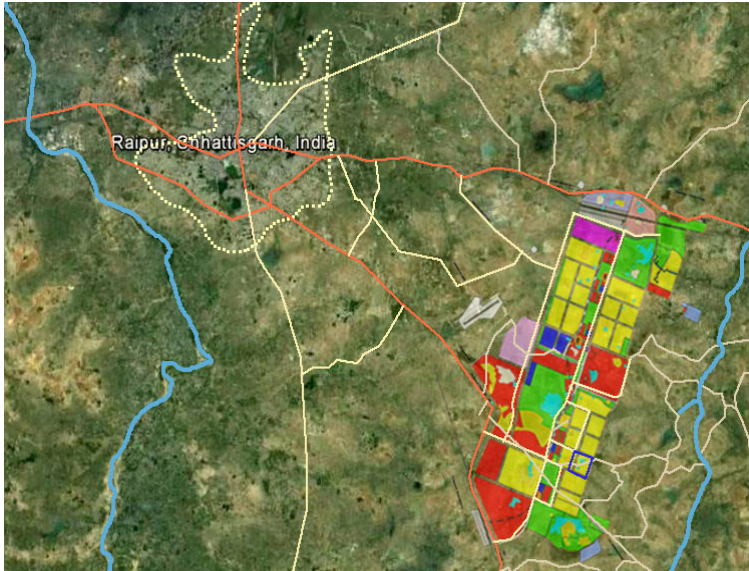




## 2 - CONTEXT AND DYNAMICS

# Context and Dynamics

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Location – Raipur and Naya Raipur

## Objectives:

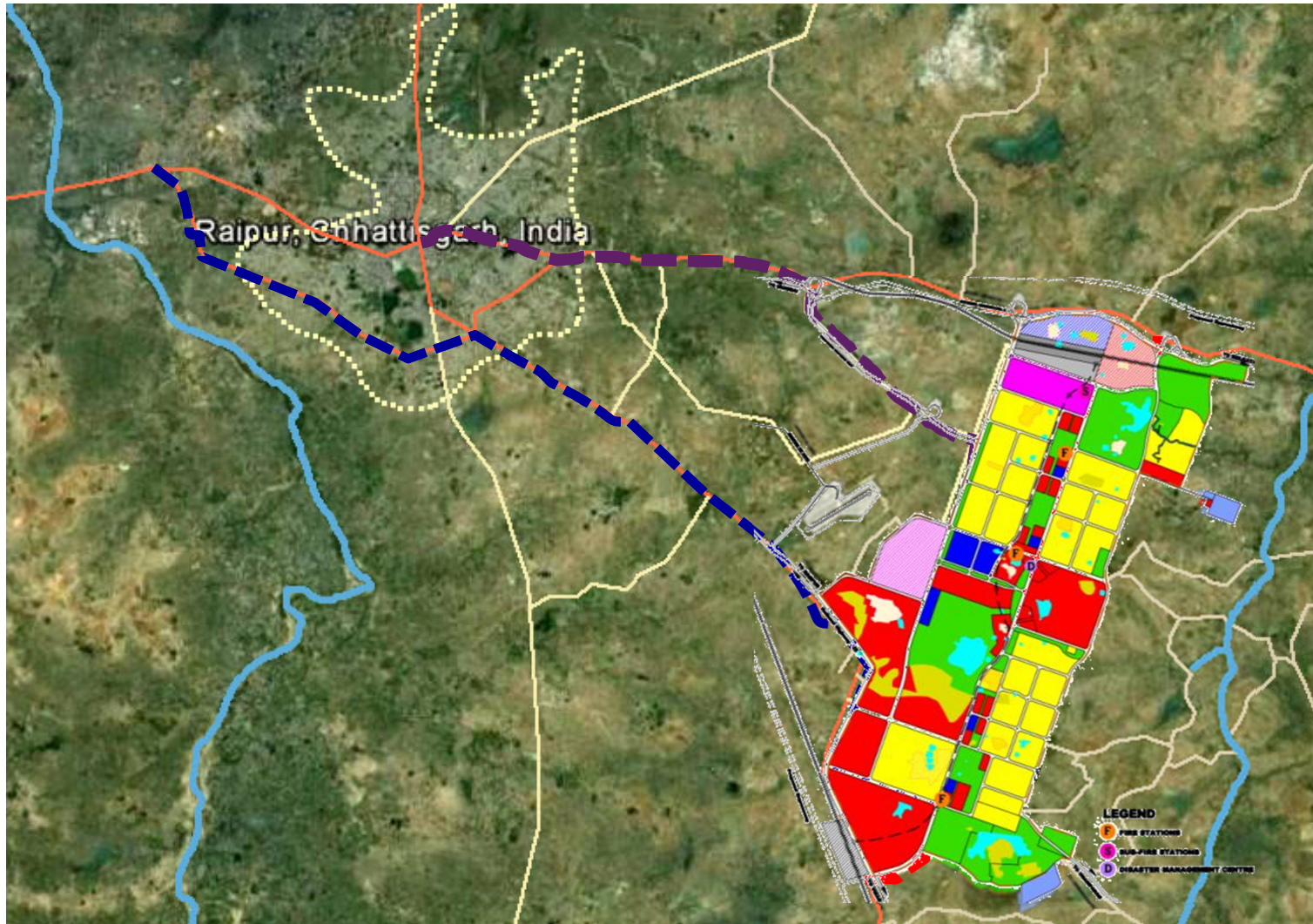
1. To develop safe and better accessible sector for all street users;
2. To draft guidelines for better street edge design;
3. To generate visible and active public spaces connected by NMT corridors
4. To make the design responsive to the natural terrain and water networks, and
5. To assist in developing service plan for buses/BRT identifying appropriate BRTS architecture



Existing Site conditions – Lake and Channels carrying water

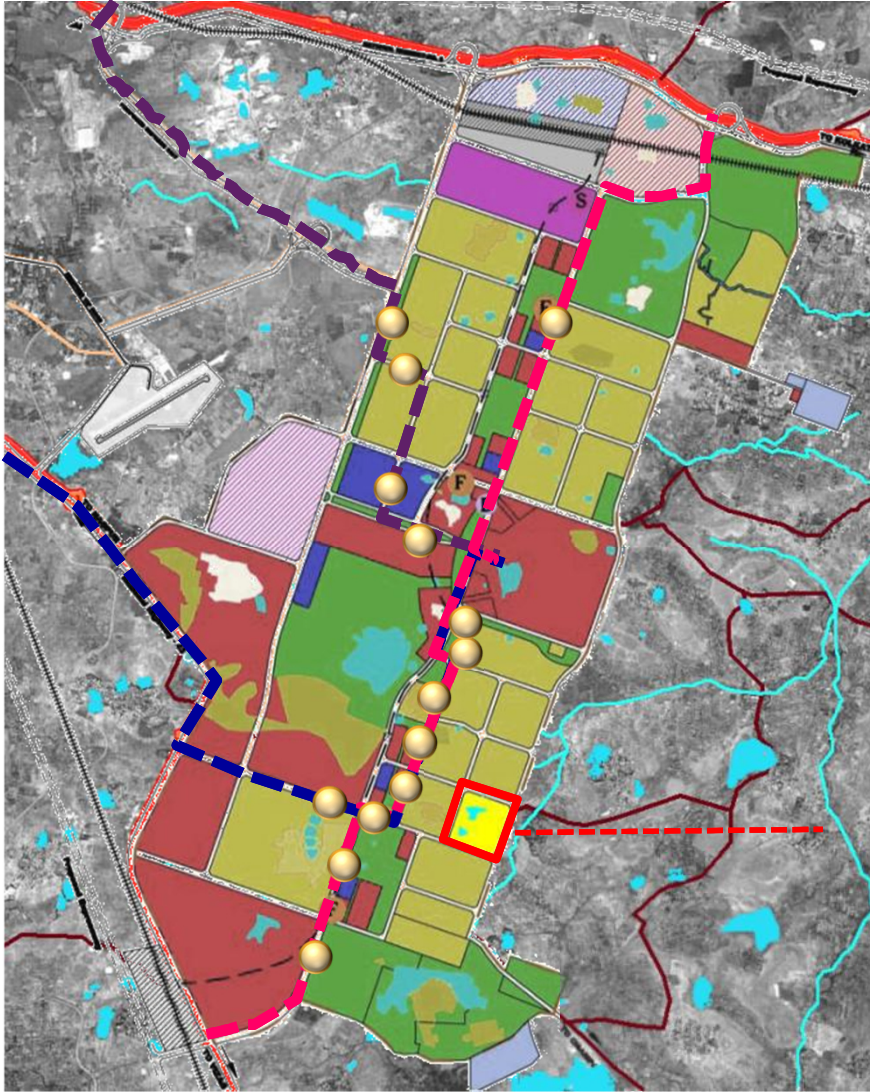


# Context and Dynamics



- Raipur Agglomeration
- Naya Raipur Master Plan
- National Highways
- Other roads
- Natural Streams
- Proposed BRTS Corridor

# Understanding detailed context

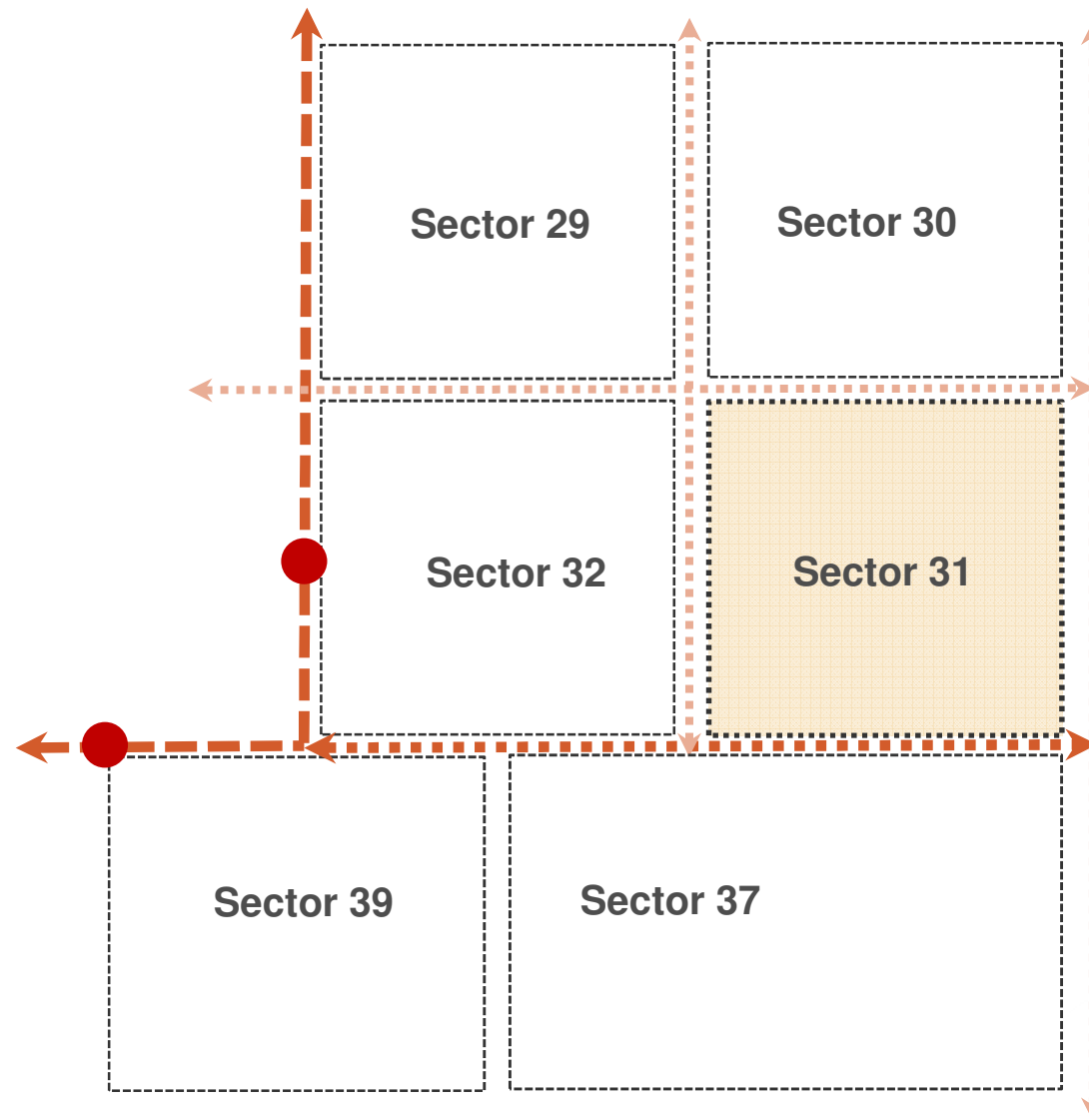


Sector 31



# Sector Under Consideration: Sector 31

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# Context

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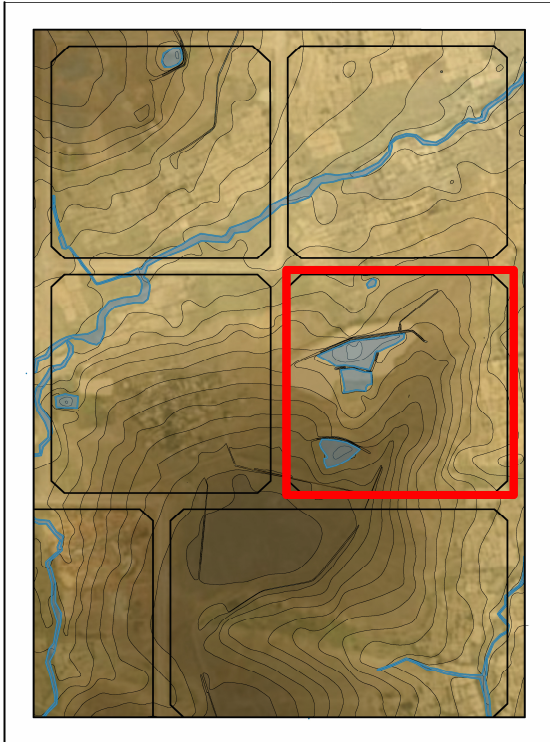
- The current master plan proposes car centric development. The aim is therefore to guide development of the built form to become safe pedestrian access from car centric design.
- The 'green field' setting serves as a paradigm to demonstrate transit and people oriented development (TPOD) concepts .



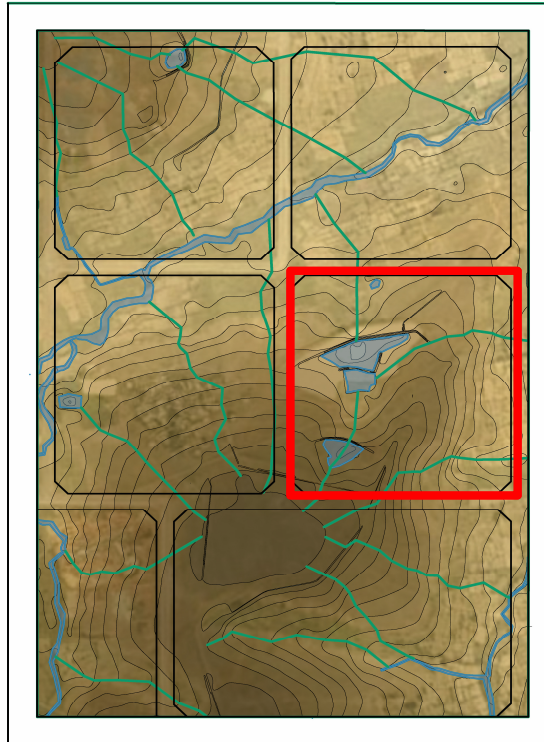


# Context – Contour Analysis

## Sector 31 – Sector Level Analysis

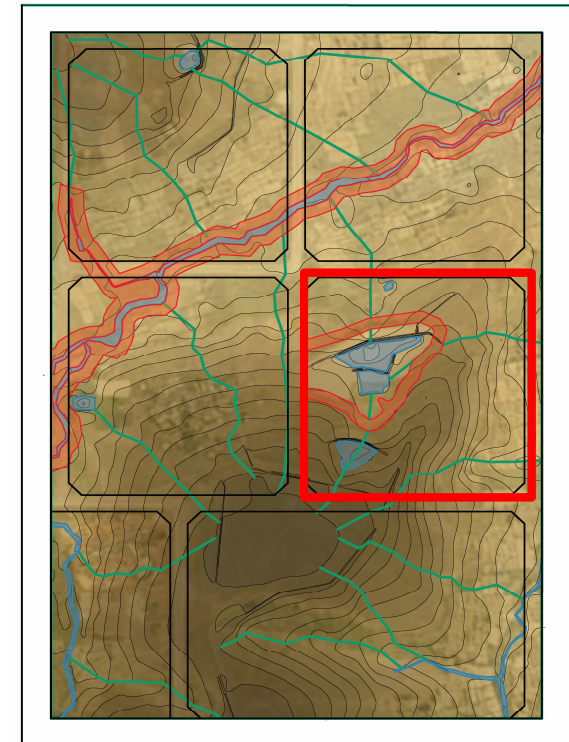


➤ Site Topography



➤ Mapping Valleys

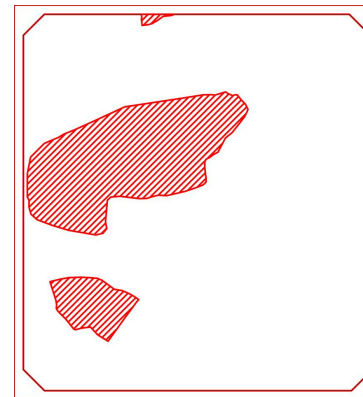
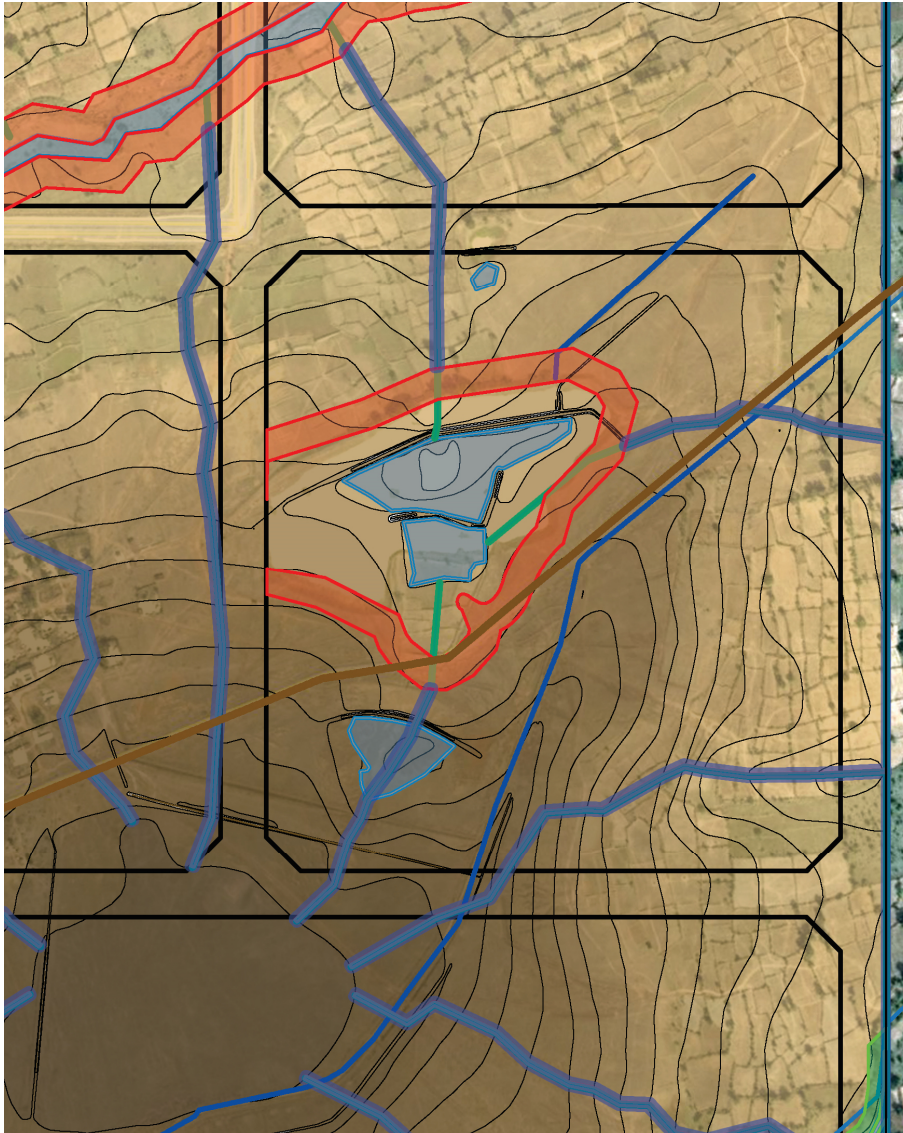
By Contour analysis, valleys are generated. Valleys are low area, an internal angle formed by intersection of planes by the slope of the terrain.



➤ Riparian Zone

Riparian Zone for Lakes – 25 m  
Riparian Zones for Valleys – 10m

# Buildable areas and Riparian Boundaries



Area of	Sq. Mts	Ha	Acres	%
<b>SECTOR</b>	<b>603470.6</b>	<b>60.3</b>	<b>149.1</b>	<b>100</b>
Lake 1	84255.5	8.4	20.8	14
Lake 2	15973.8	1.6	3.9	2.6
Lake 3	870.4	0.1	0.2	0.1
<b>Total</b>	<b>101099.7</b>	<b>10.1</b>	<b>25.0</b>	<b>16.8</b>

	Sq. Mts	Ha	Acres	%
Developable Area (Out of Net Area)	424726.0	42.5	104.9	76.6




# Key Features

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## Neighbourhood Accessibility Design

- Green field
- Demonstration Site: Residential Sector
- 16,000 population in 60.3 Ha site
- Features existing on site: Lakes, Village routes, temple and tombs
- Environmental features: Network of seasonal valleys and lakes
- **Challenge: Trend Setting in a green field scenario**
- Opportunity: Buy in to demonstrate the sector, will influence the Development Plan 2031
- Estimated cost is \$50 M or INR 300 crores *(approx. amount based on costing of adjoining sectors)*



## 3 - SECTOR PLAN DESIGN

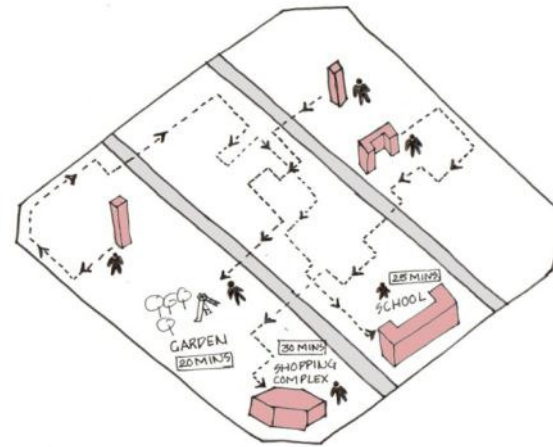


# Design Concepts

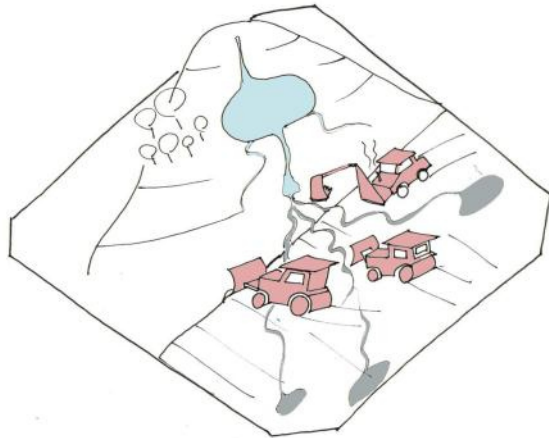
## CONVENTIONAL Design



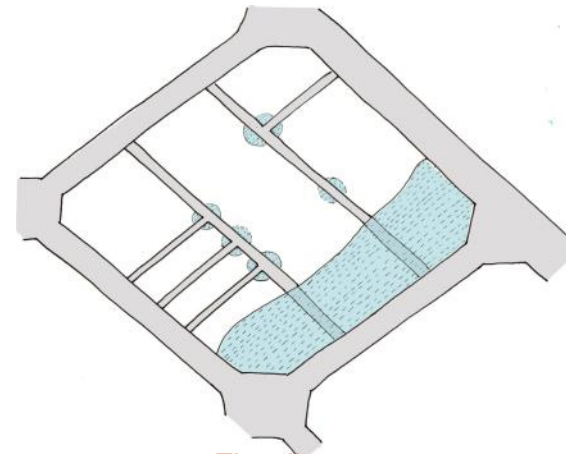
Dispersed mass and segregated landuse



Increase in trip length



Flattening of terrain

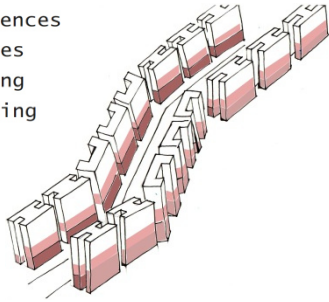


Flooding

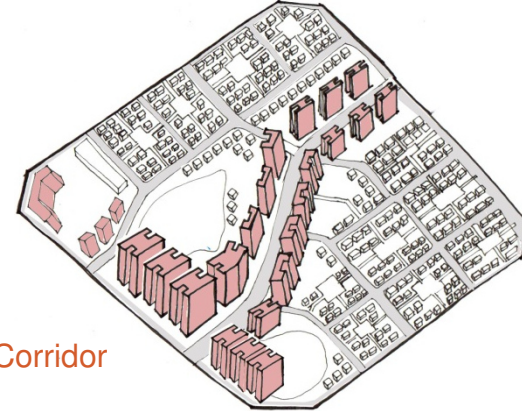
# Design Concepts

## TRANSIT and PEOPLE Oriented Design

- Residences
- Offices
- Parking
- Shopping

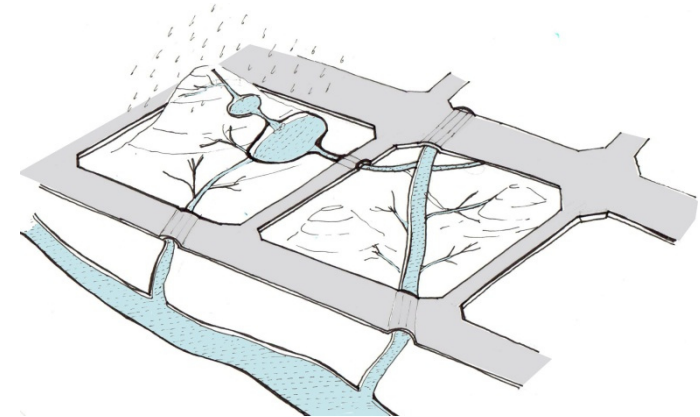
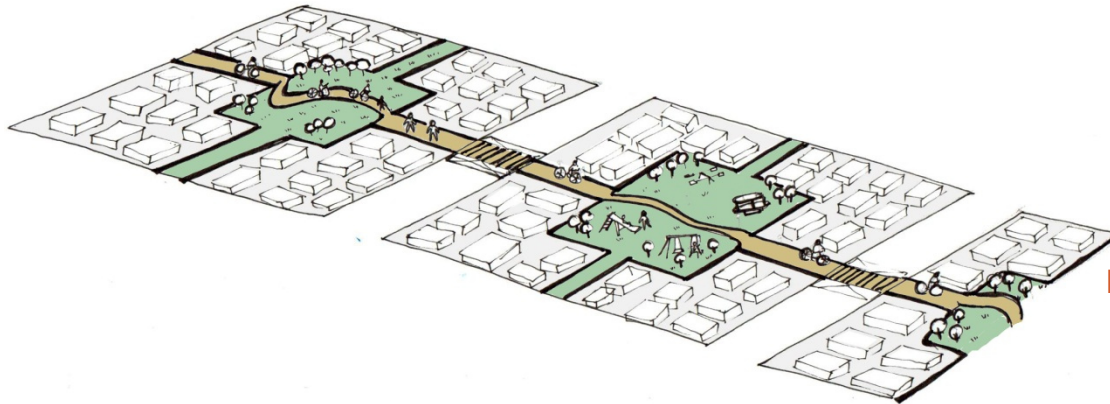


Mixed Use Core



High Density Transit Corridor

Development as per the contours. Water network has been retained.

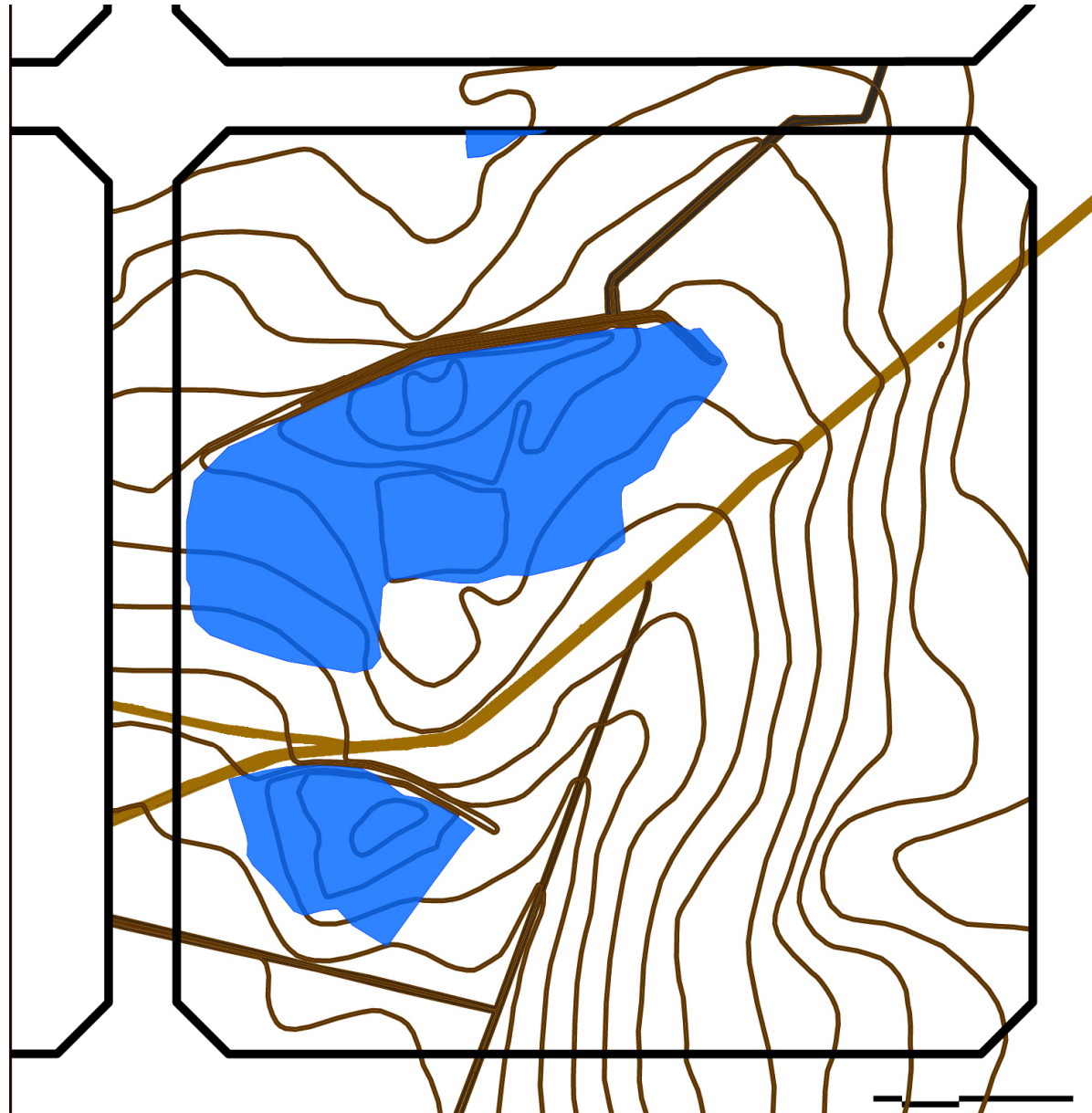


Hierarchy of greens connecting to the amenities within walkable distance through permeable strips



# Sector Design

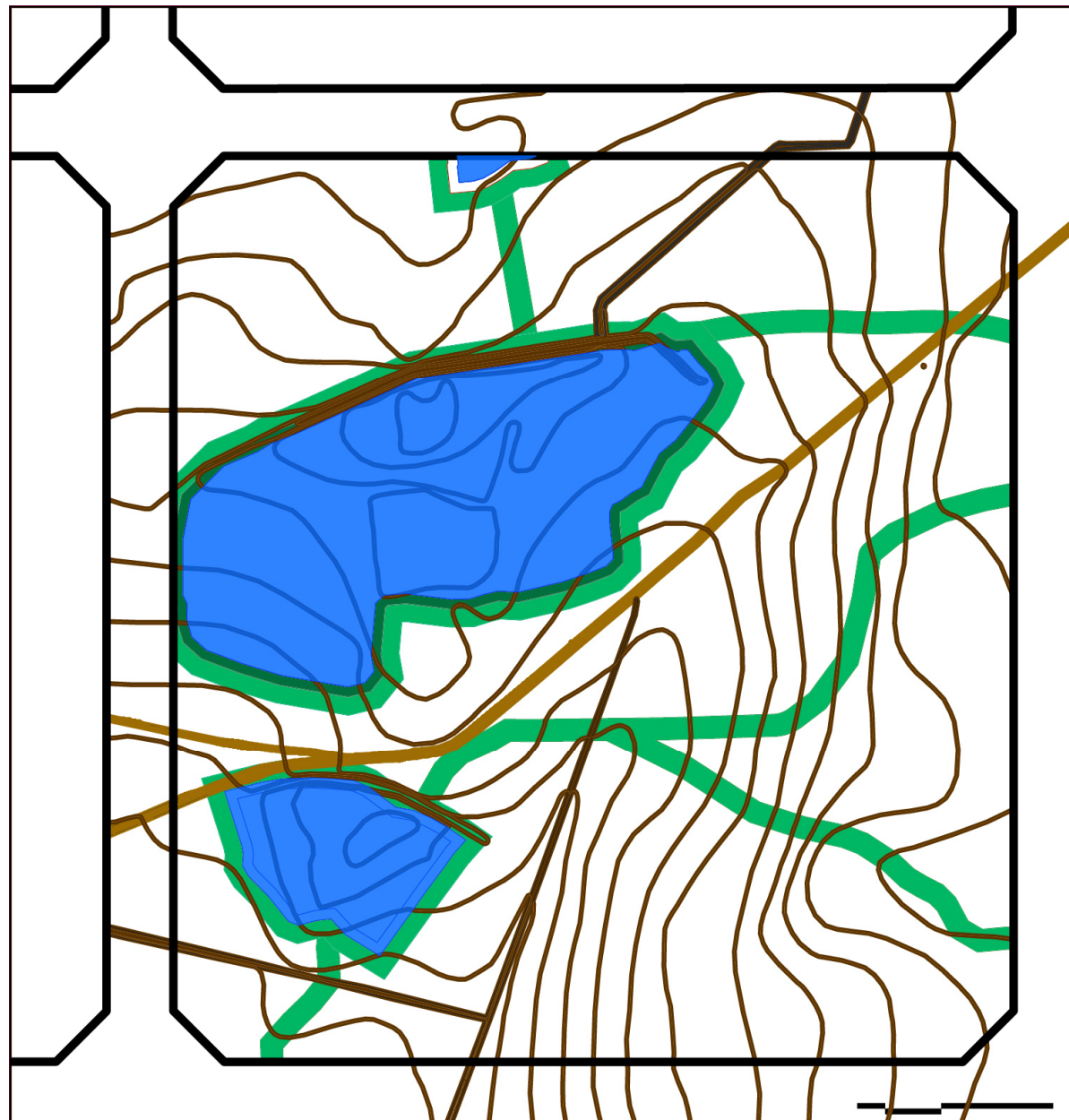
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## Existing Markers

- Lakes
- Terrain
- Village Route leading towards village Khapri to the west

# Sector Design

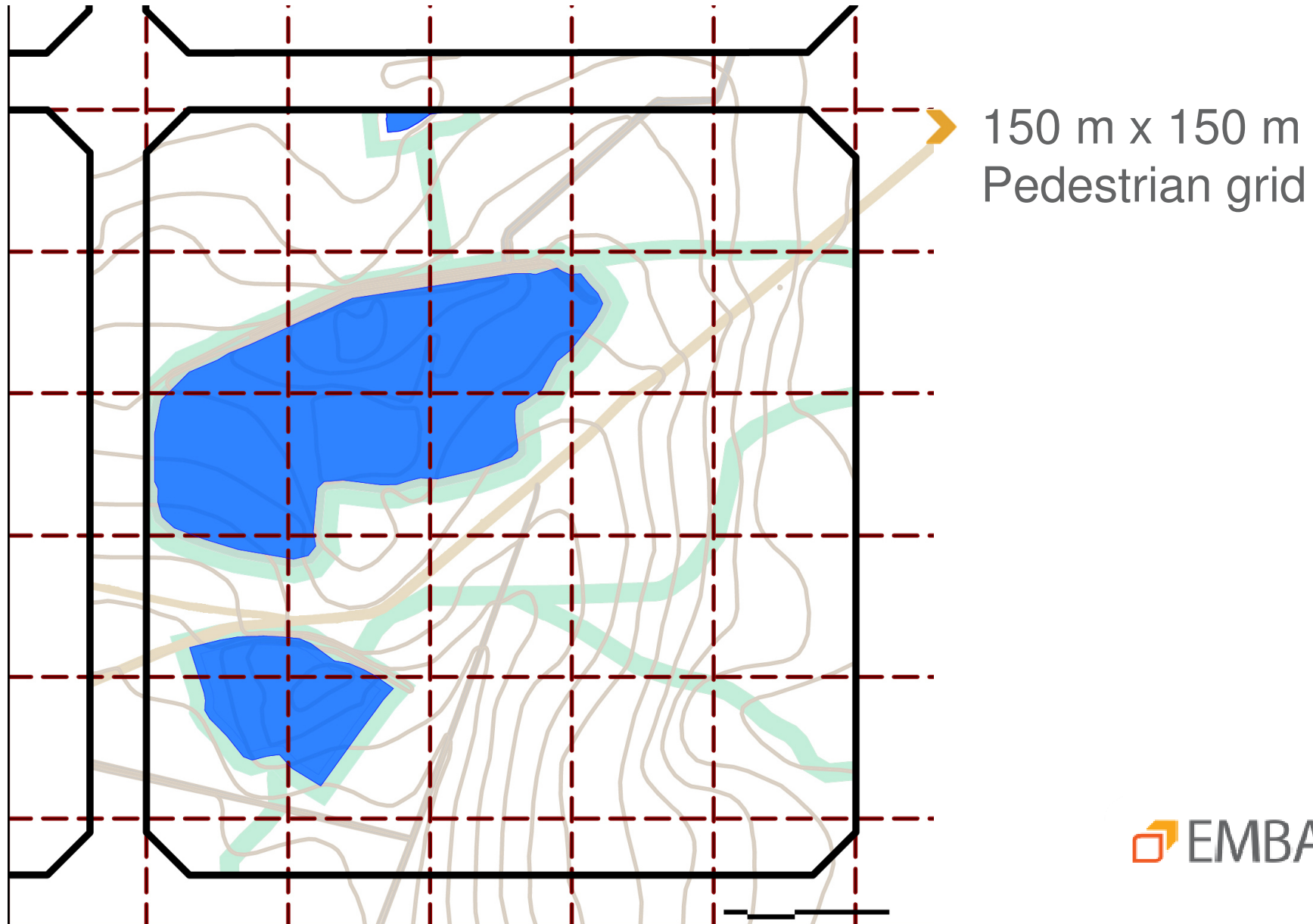


➤ Demarcating  
Riparian  
boundaries



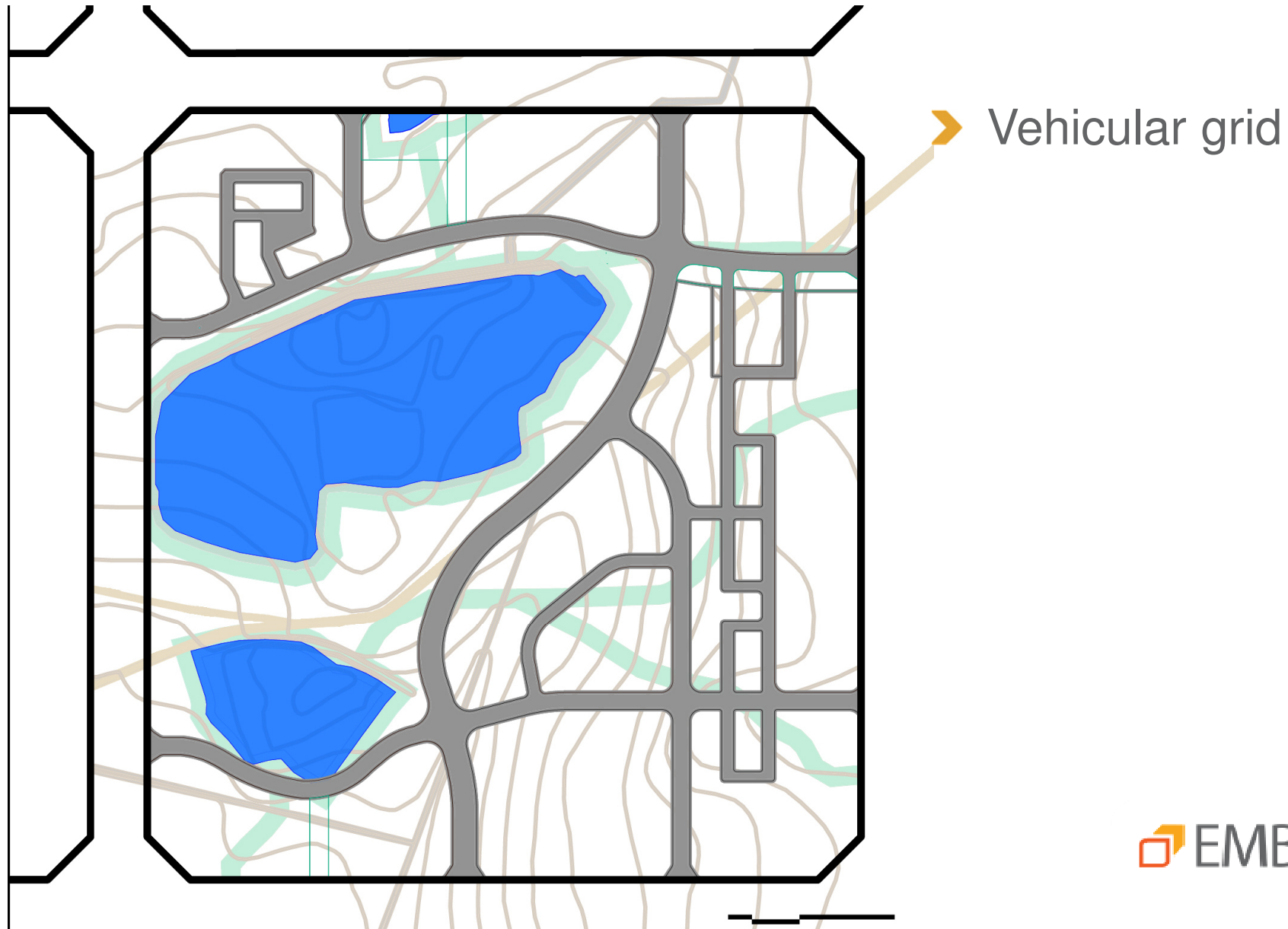
# Sector Design

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# Sector Design

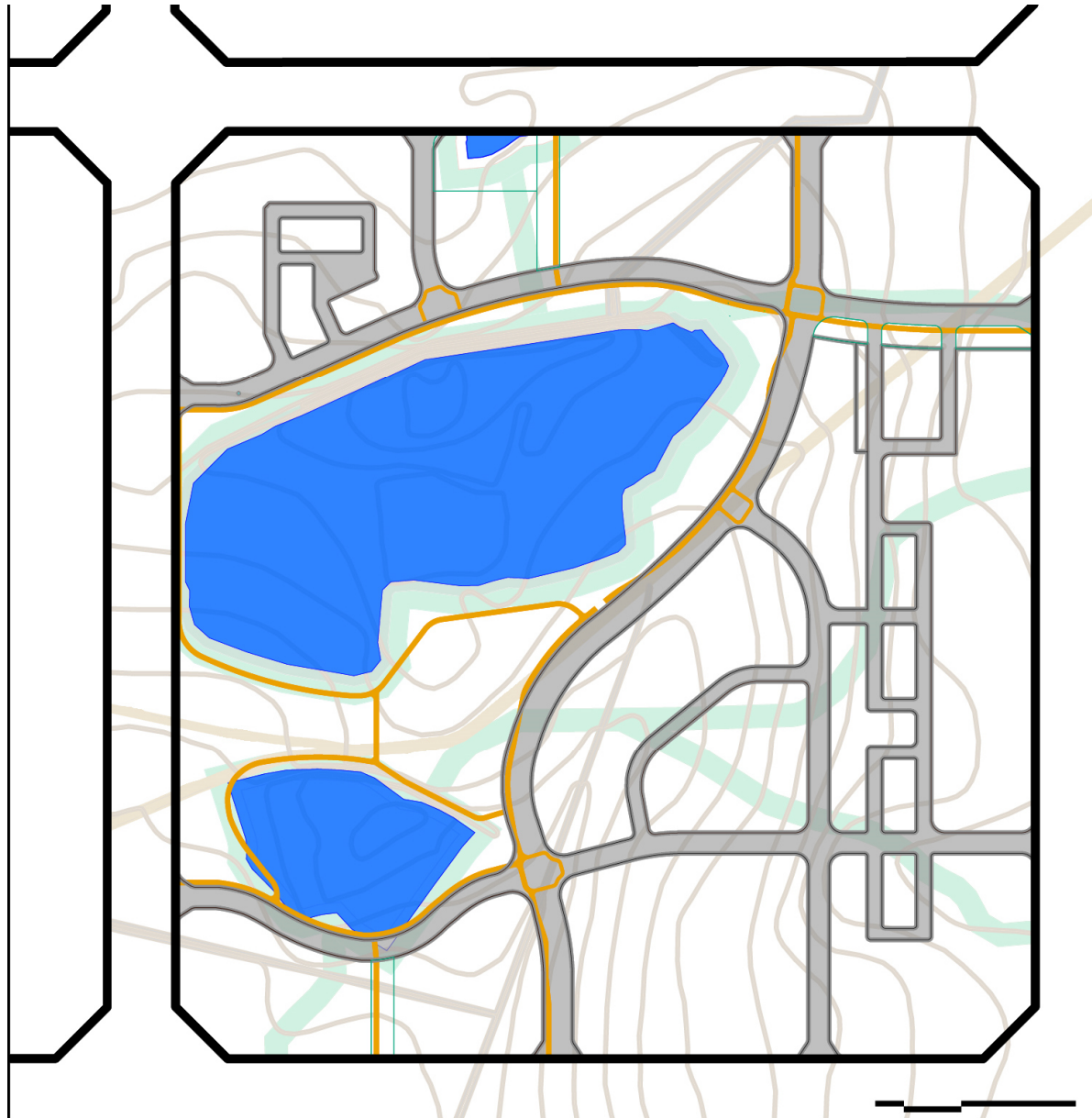
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# Sector Design

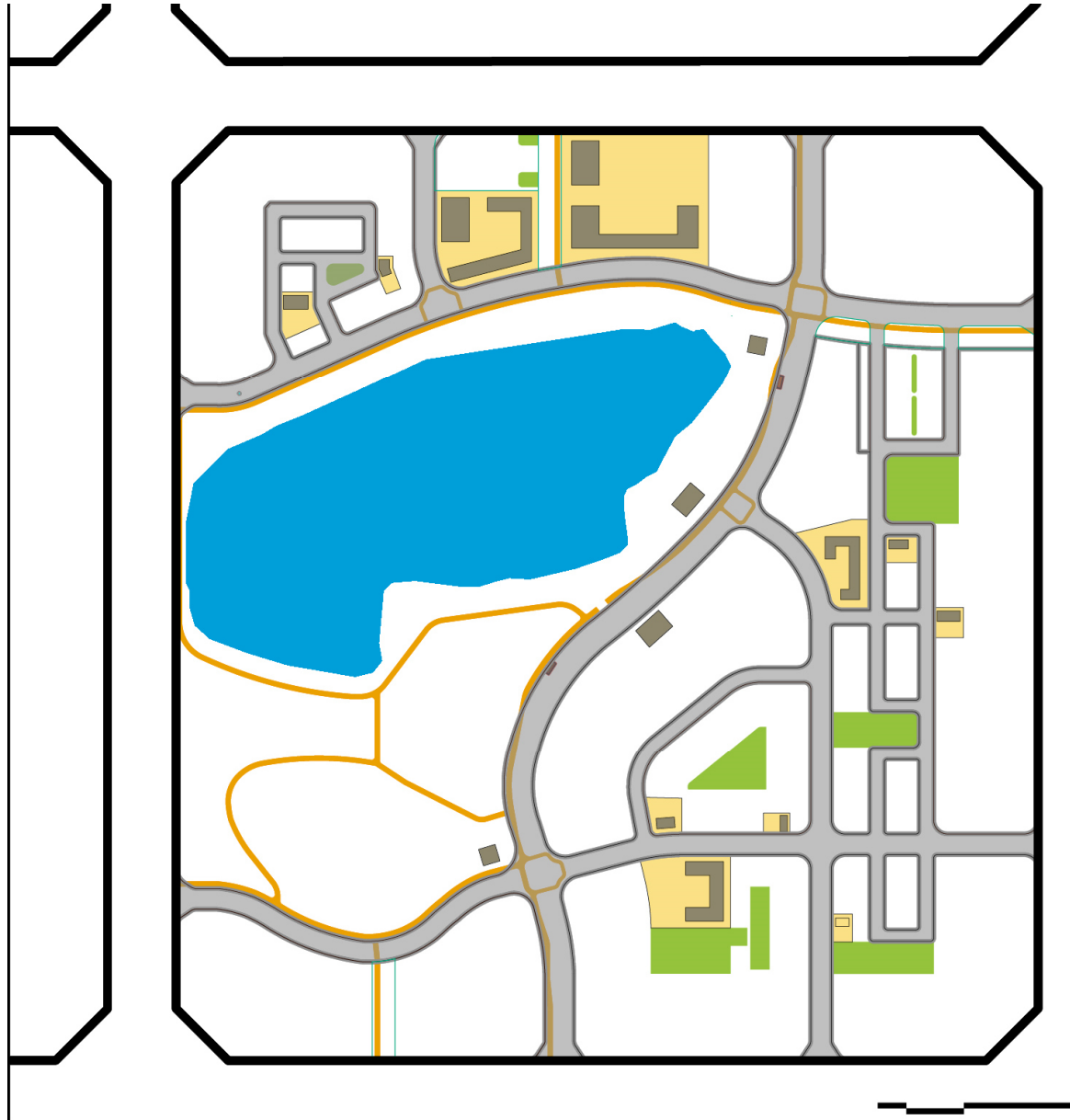
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➤ Cycling track around public open spaces

# Sector Design

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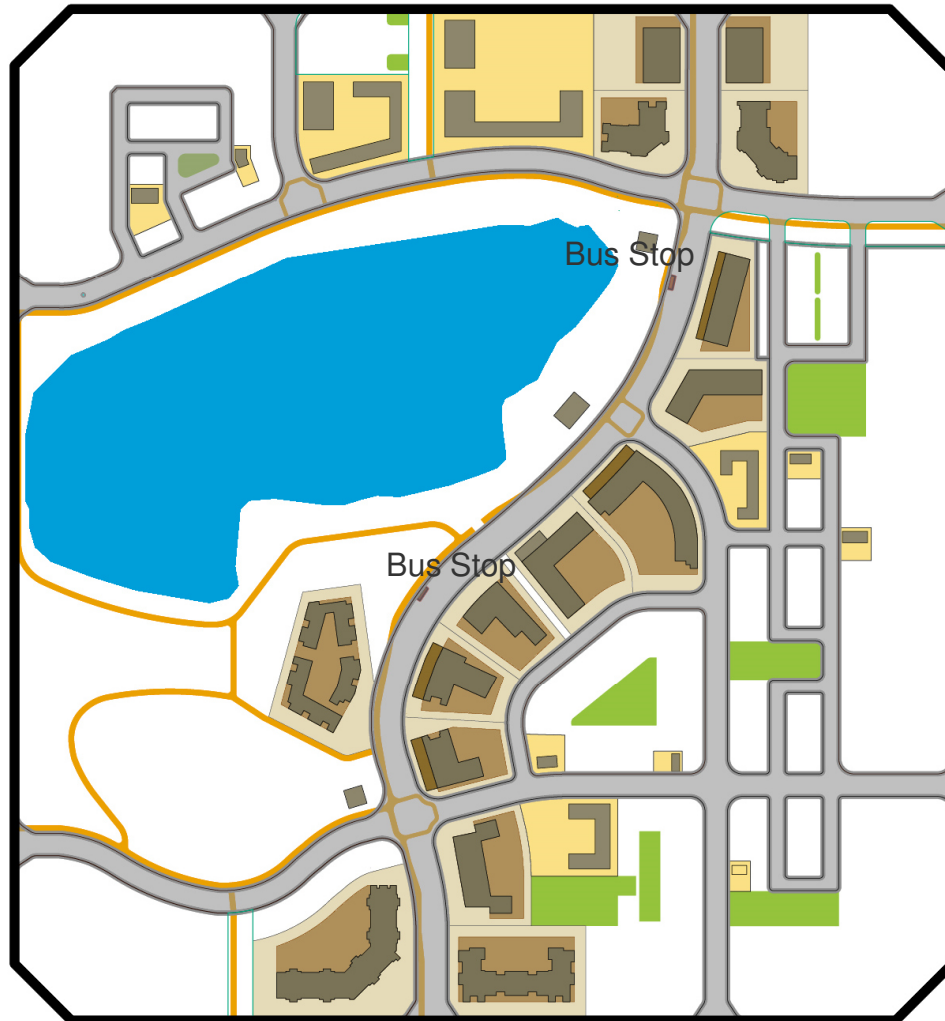
- Amenities and Open Spaces around Cycling track



# Sector Design

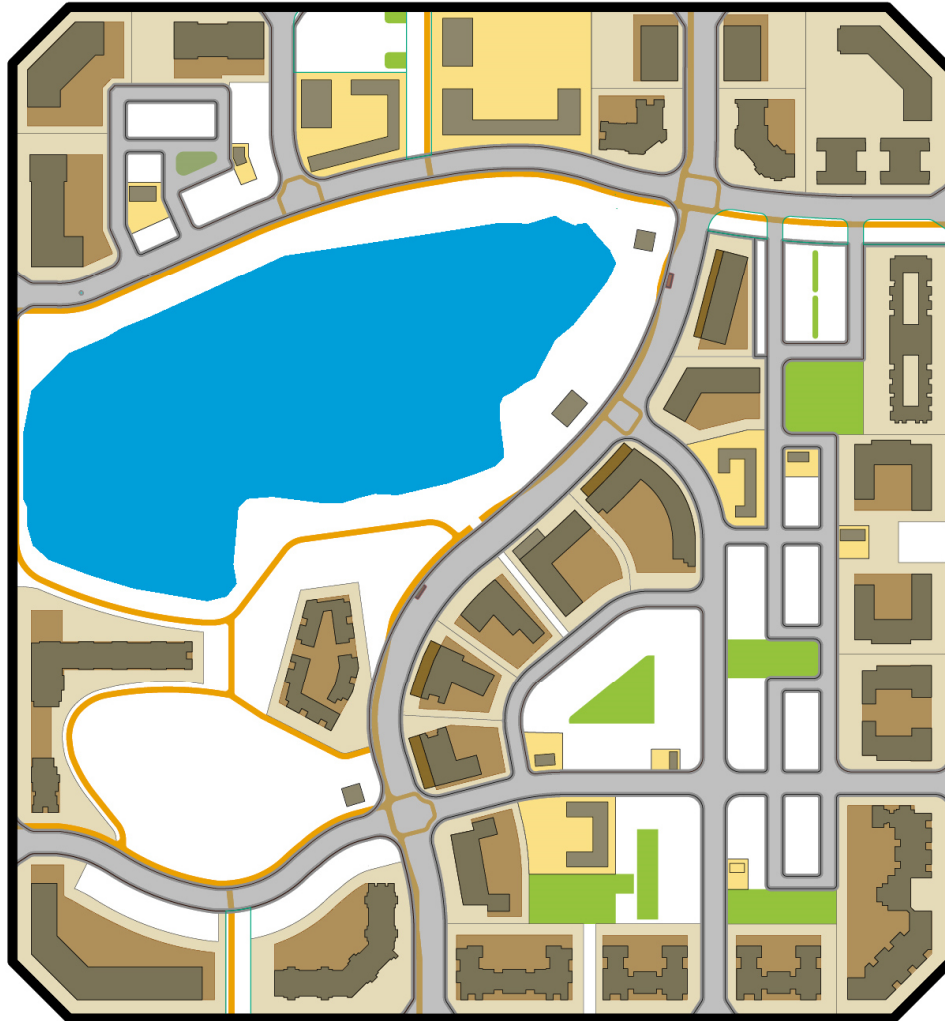
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- Buildings around High Street



# Sector Design

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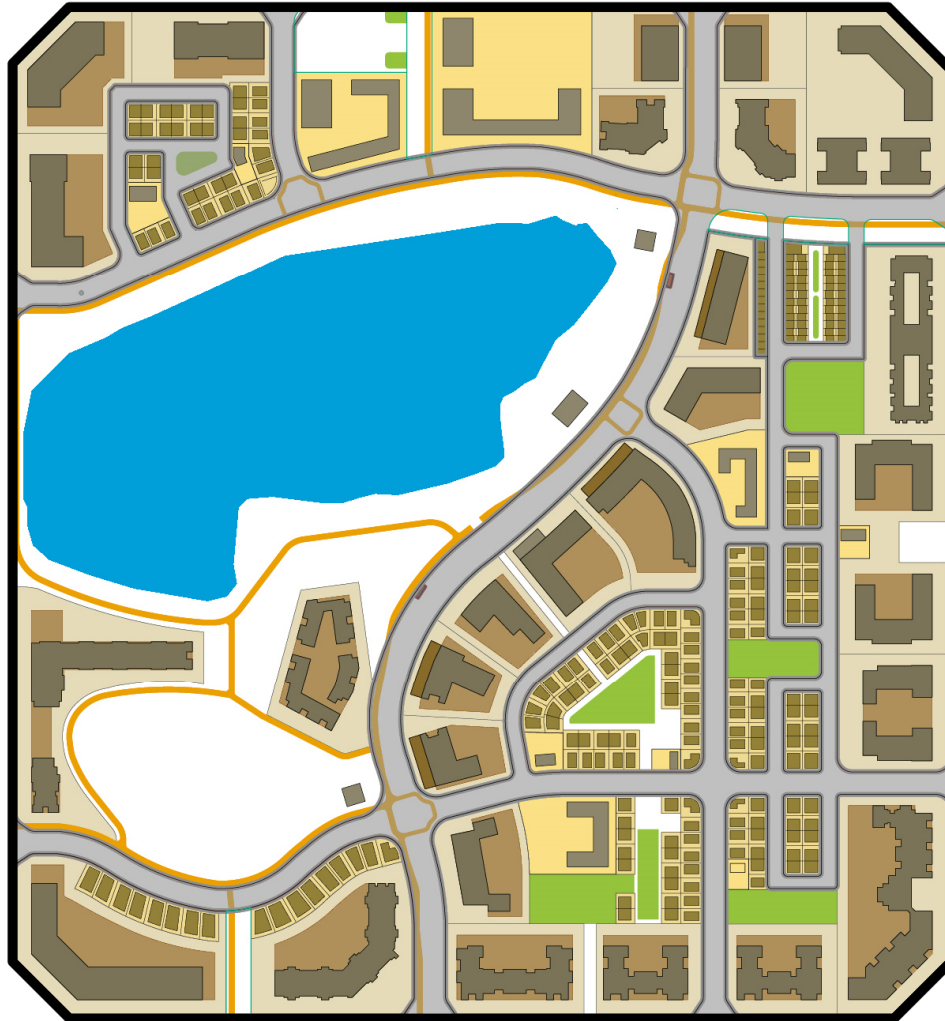


➤ Apartments



# Sector Design

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➤ Plotted typology

# Sector Design

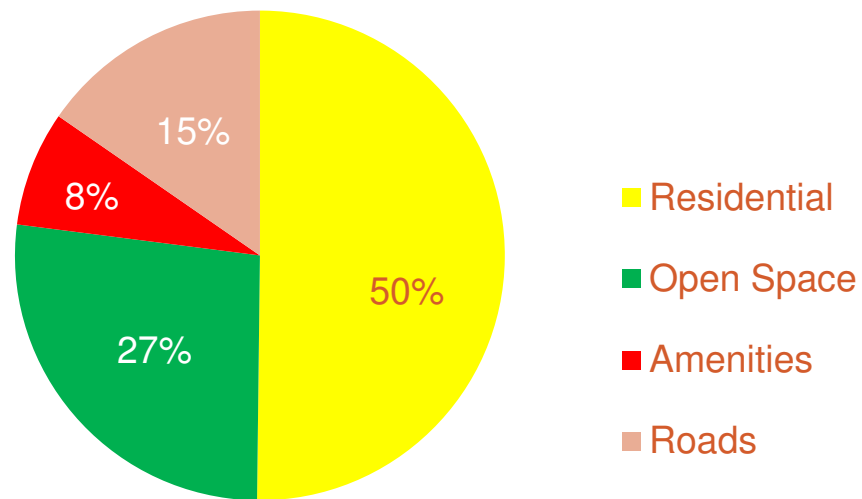
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➤ Final Design

# Land use – Net Calculations

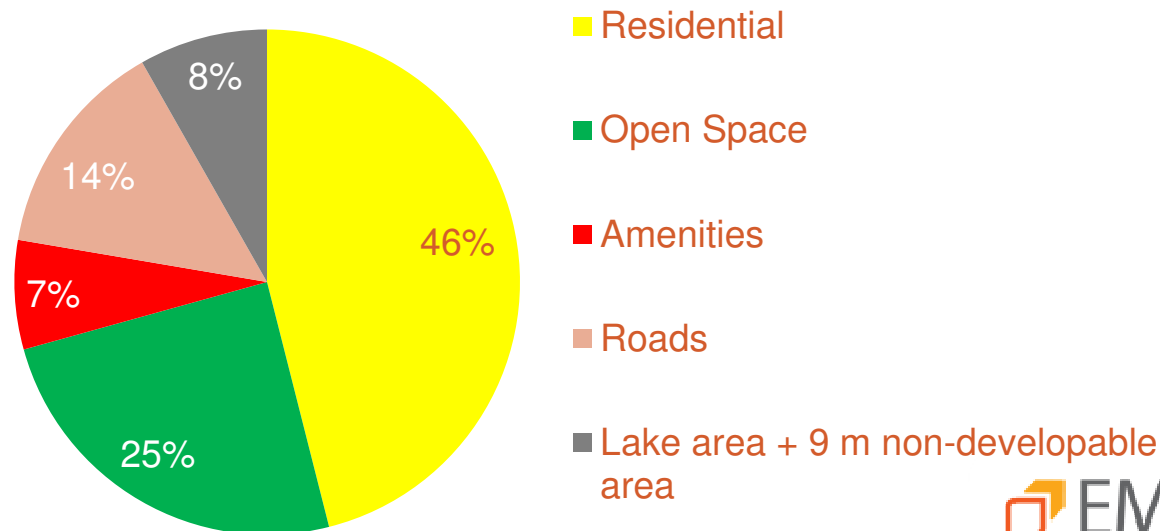
Landuse (Net)			
	Area in sq. m	Area in Ha.	Percentage
Residential	277893.4	27.8	50%
Open Space	148688	14.9	27%
Amenities	42119.8	4.2	8%
Roads	85079	8.5	15%
<b>Total</b>	<b>553780.2</b>	<b>55.4</b>	<b>100%</b>





# Land use – Gross Calculations

Landuse (Gross)			
	Area in sq. m	Area in ha	Percentage
Residential	277893.4	27.8	46%
Open Space	148688	14.9	25%
Amenities	42119.8	4.2	7%
Roads	85079	8.5	14%
Lake area + 9 m non-developable area	49686.4	5.0	8%
<b>Total</b>	<b>603466.6</b>	<b>60.3</b>	<b>100%</b>



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POPULATION	
Apartments	14022
Plotted Housing	1295
<b>Total Population</b>	<b>15317</b>

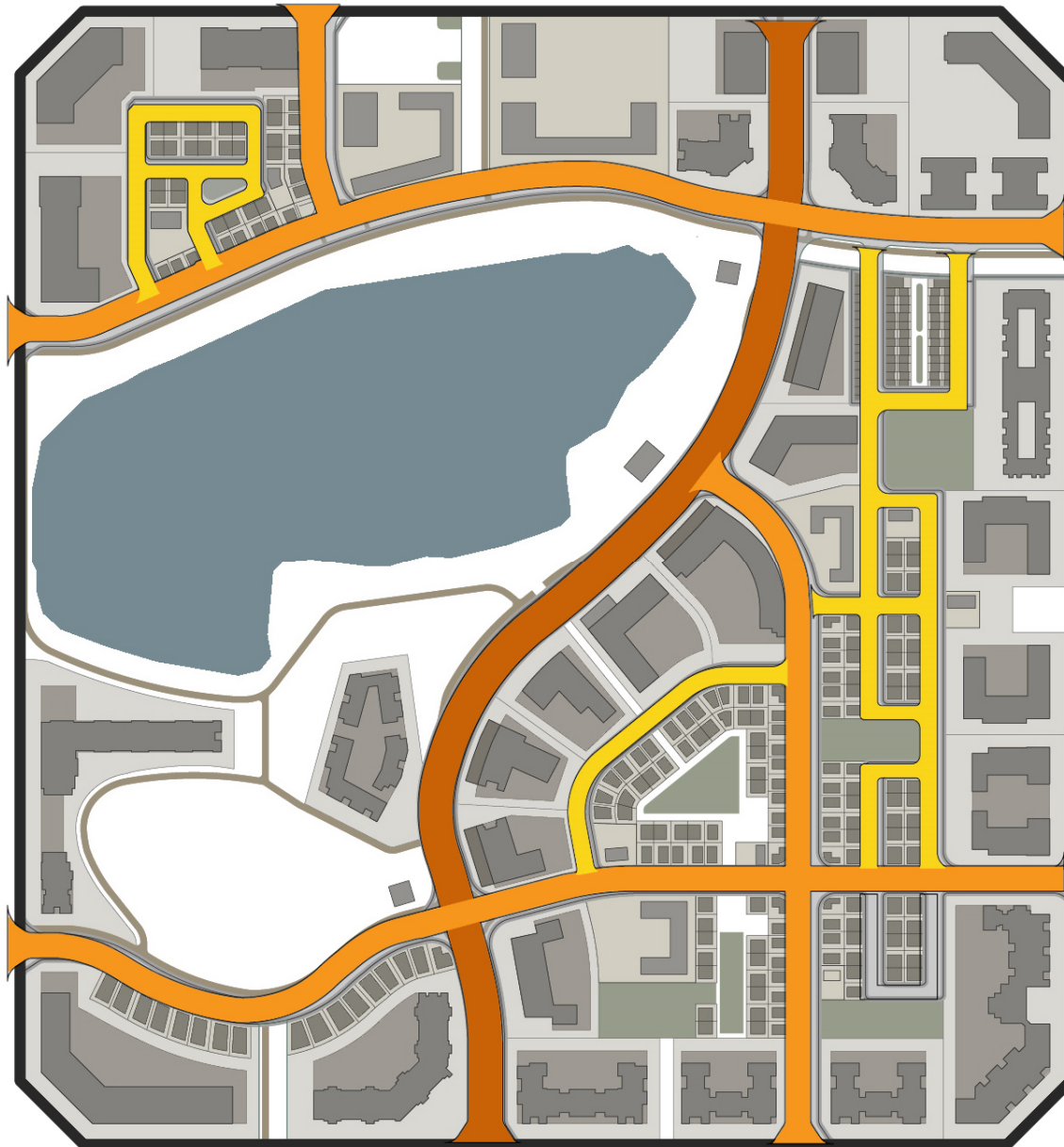
DENSITY (IN PPH)	
Net Density	277
Gross Density	254



## 4 - STREET DESIGN

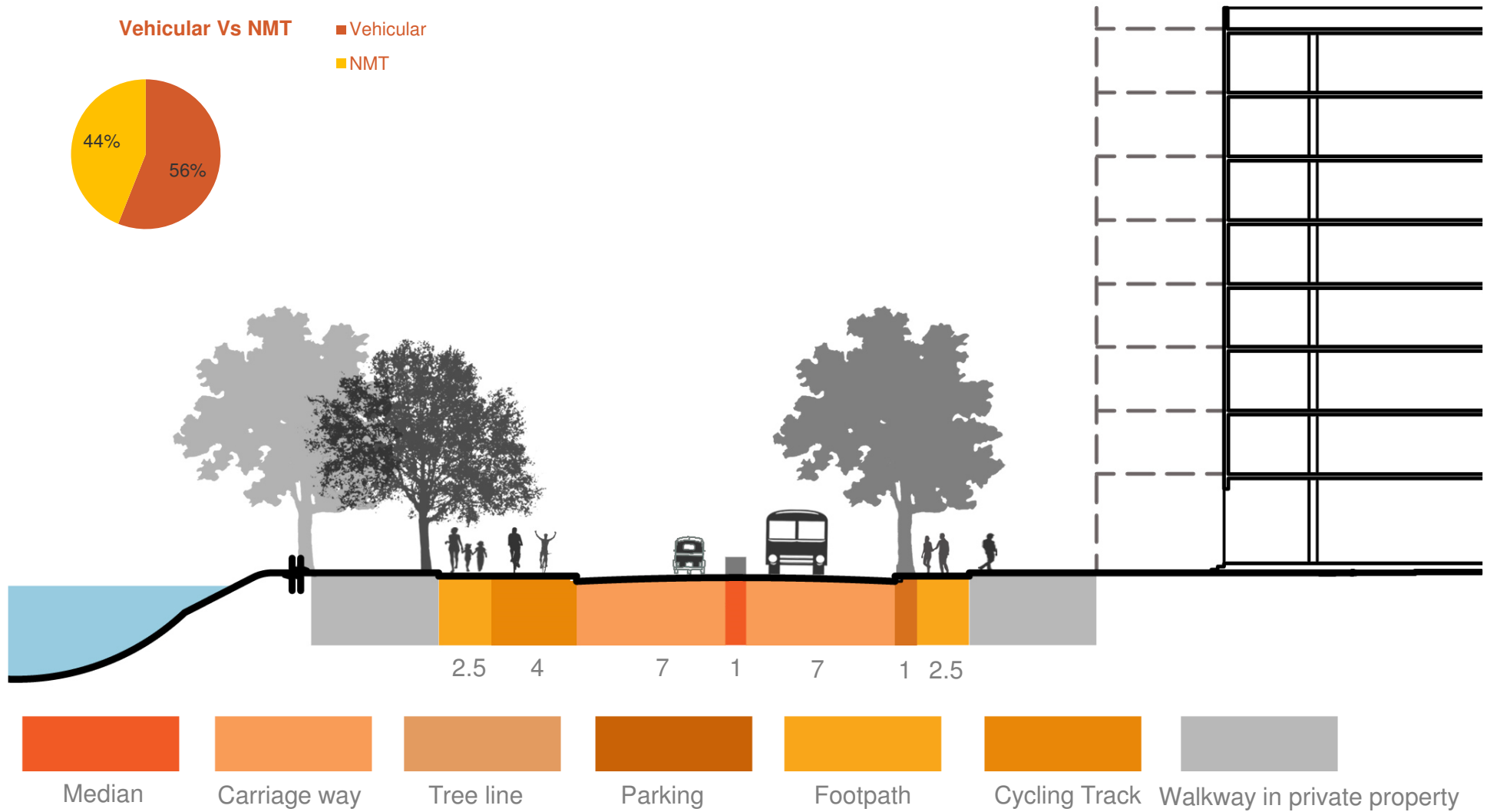


# Road hierarchy

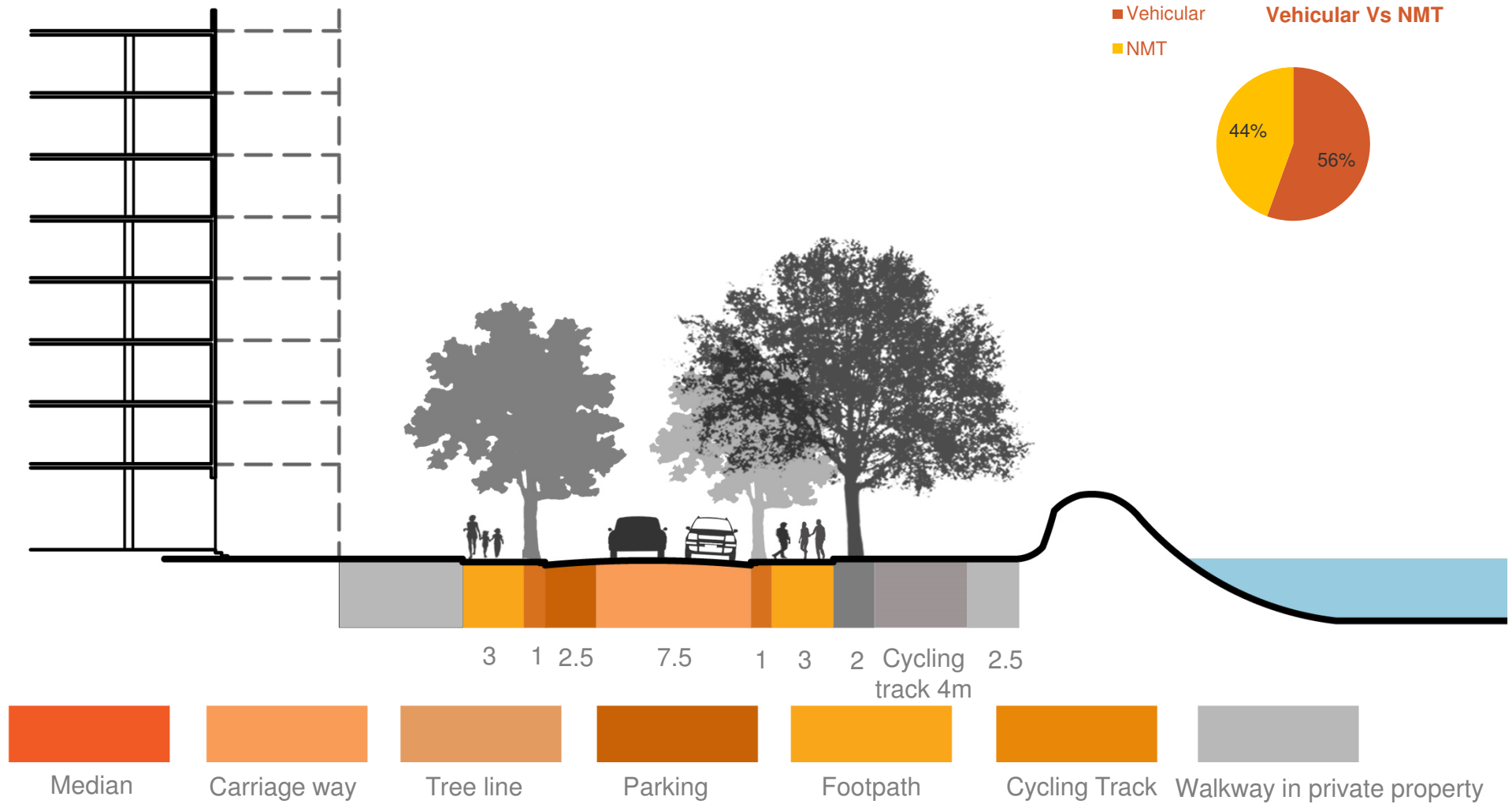


- Local Roads – 12.5 m & 10 m
- Collector roads – 18 m
- Sub- Arterial Road – 25 m

# Section 25 m – High Street

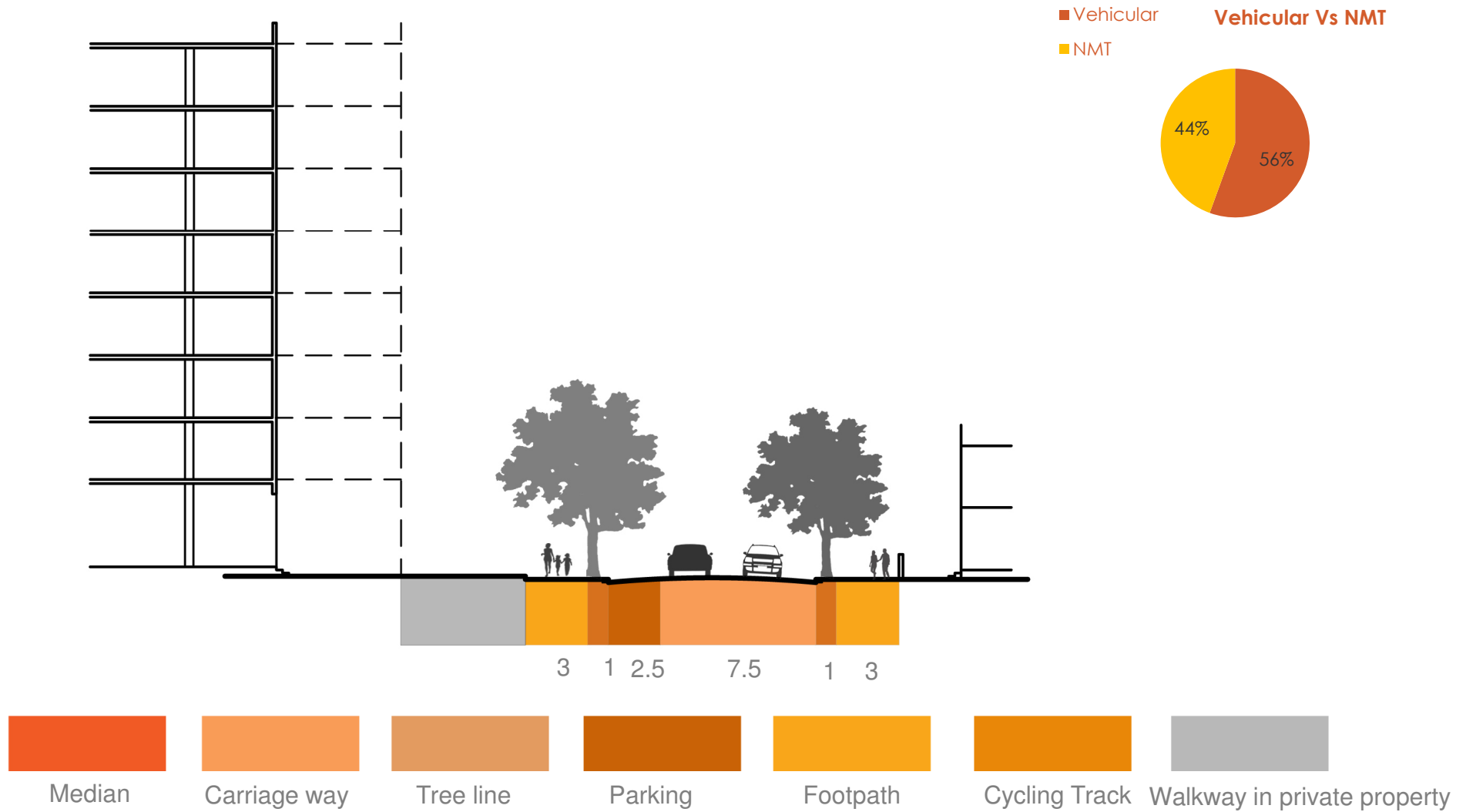


# Collector road – 18 m (adjoining lake)



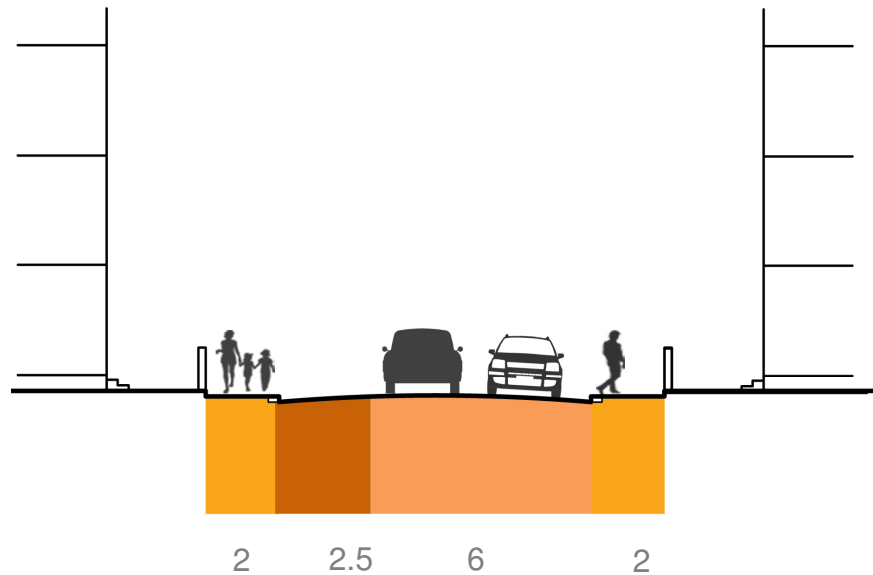
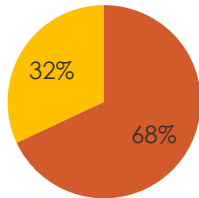


# Collector road – 18 m

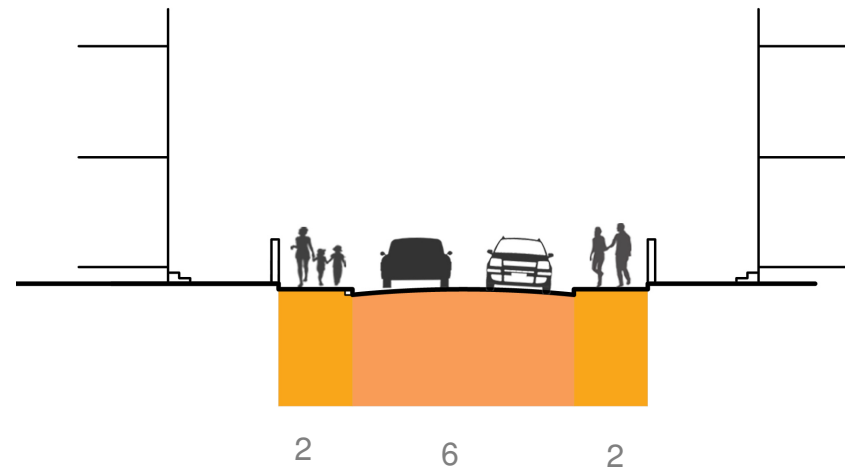
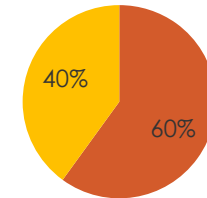


# Local road – 12.5 m and 10 m

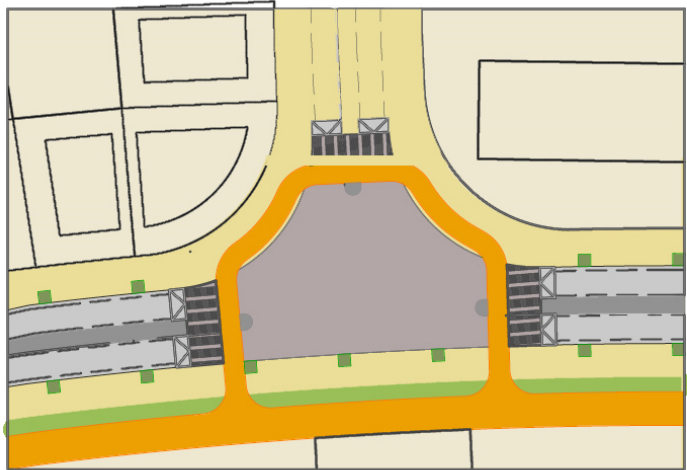
■ Vehicular  
■ NMT  
**Vehicular Vs NMT**



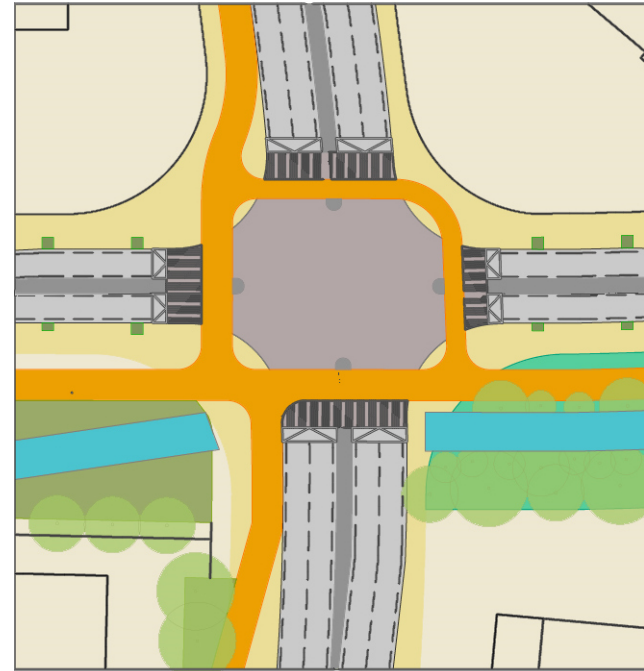
■ Vehicular  
■ NMT  
**Vehicular Vs NMT**



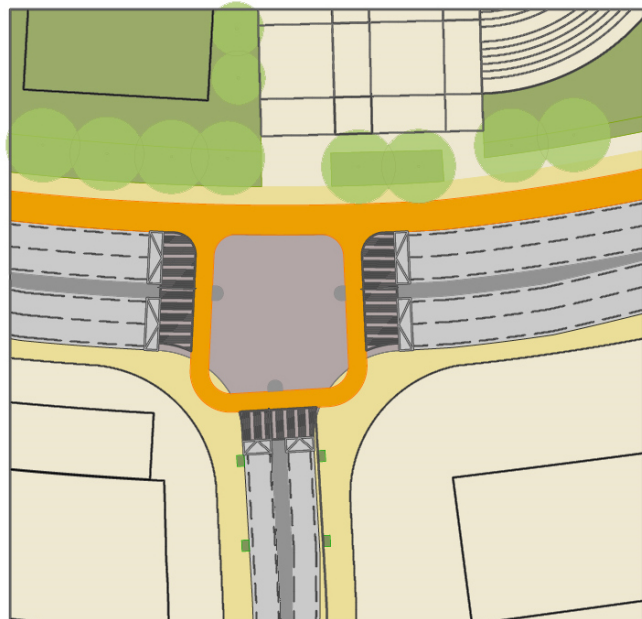
# Junction details



1



2



3





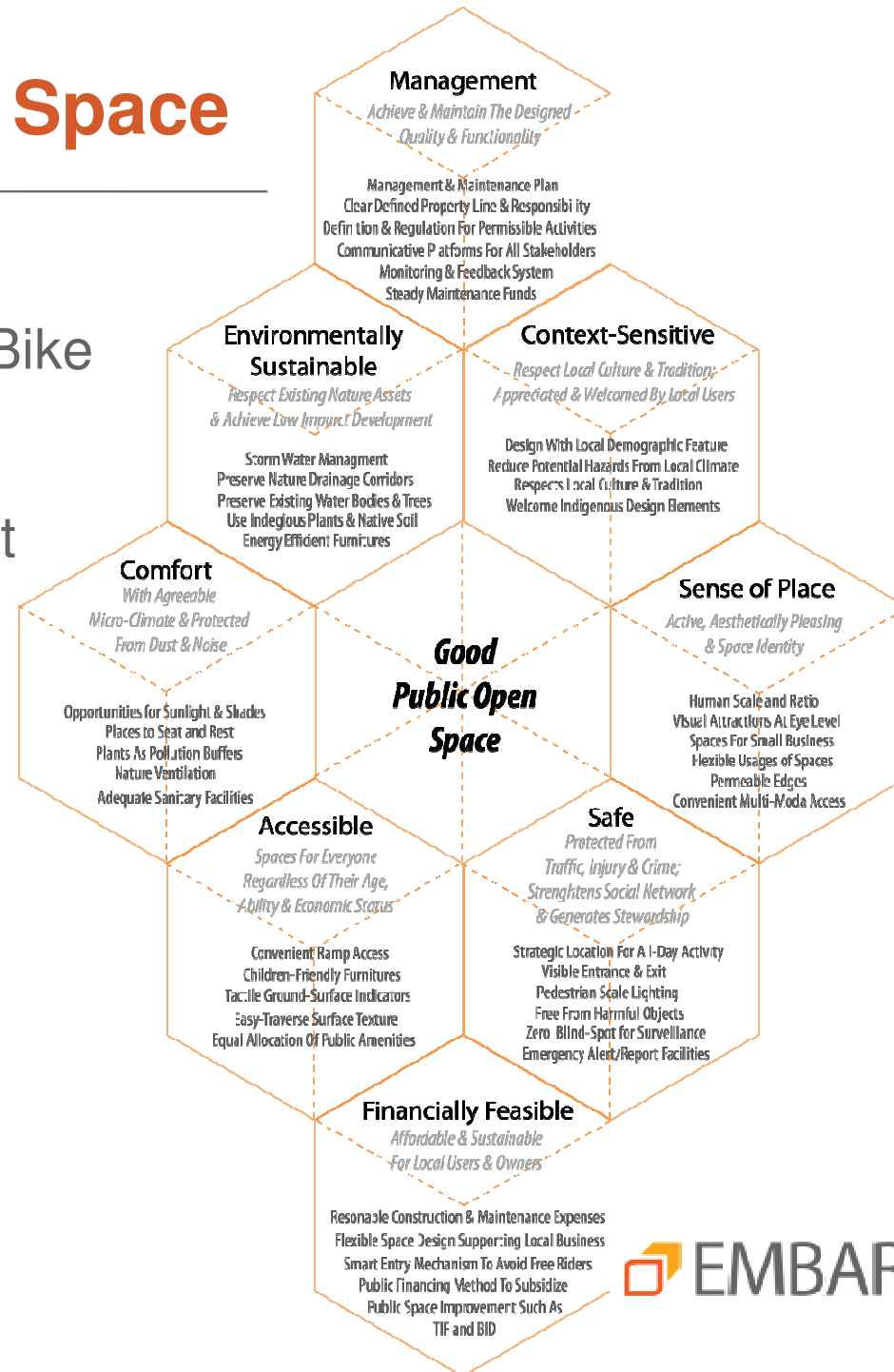


# 5 - OPEN SPACE DESIGN

# Design- Public Open Space

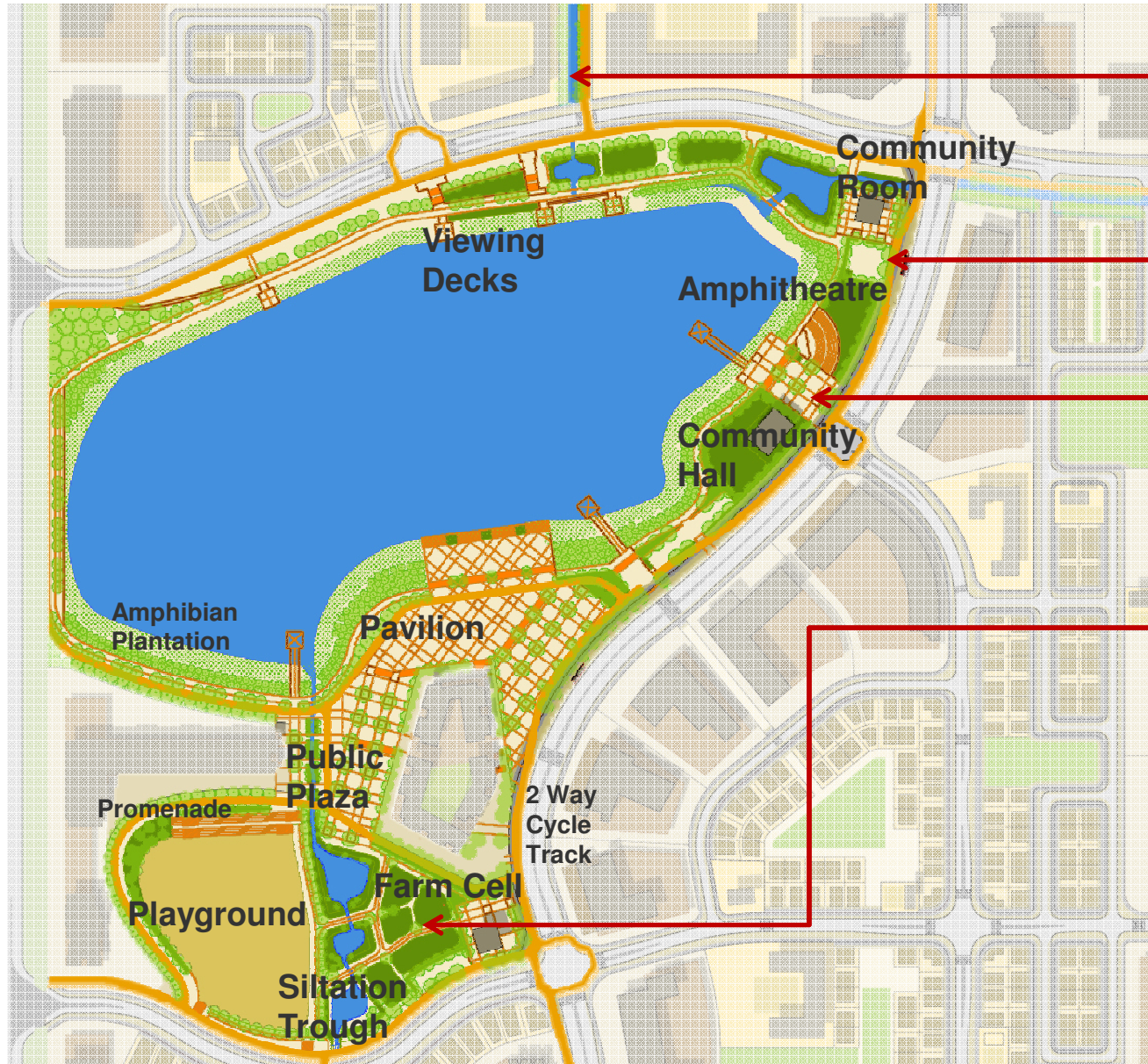
## DESIGN PARAMETERS

- Connected Pedestrian & Bike Network
- Green network
- Storm Water Management Design
  - Follow the Landscape
  - Porous Paver
- Handicap Accessibility
  - Ramp
  - Tactile Paving
- Vending Space
- Low Maintenance
- Local Context





# Open Space Design



Natural systems continuity

Bicycle tracks and NMT

Pedestrian walkways and  
Plazas

Community gardens / urban  
farms / Nursery

Planters/ Vegetation  
hierarchy



# Open Space Design – Siltation Ponds

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Image Courtesy: <http://1.bp.blogspot.com/-0mGpladZK2g/TzEc3bTqe-I/AAAAAABBBk/kJ5YgDVGIH8/s640/page+1+pic+Siltation+Ponds.jpg>

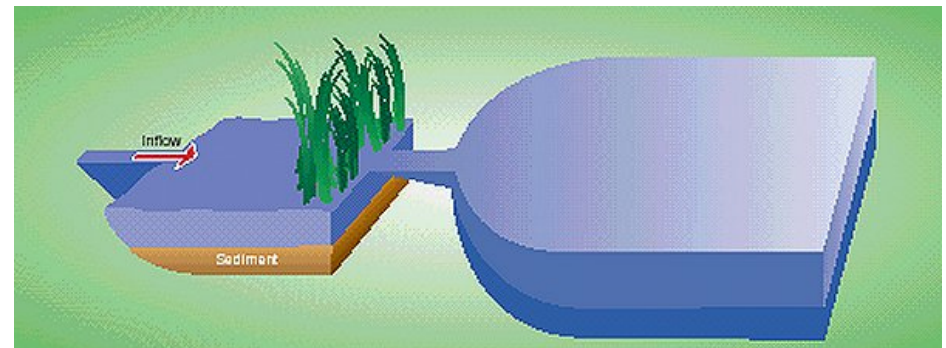
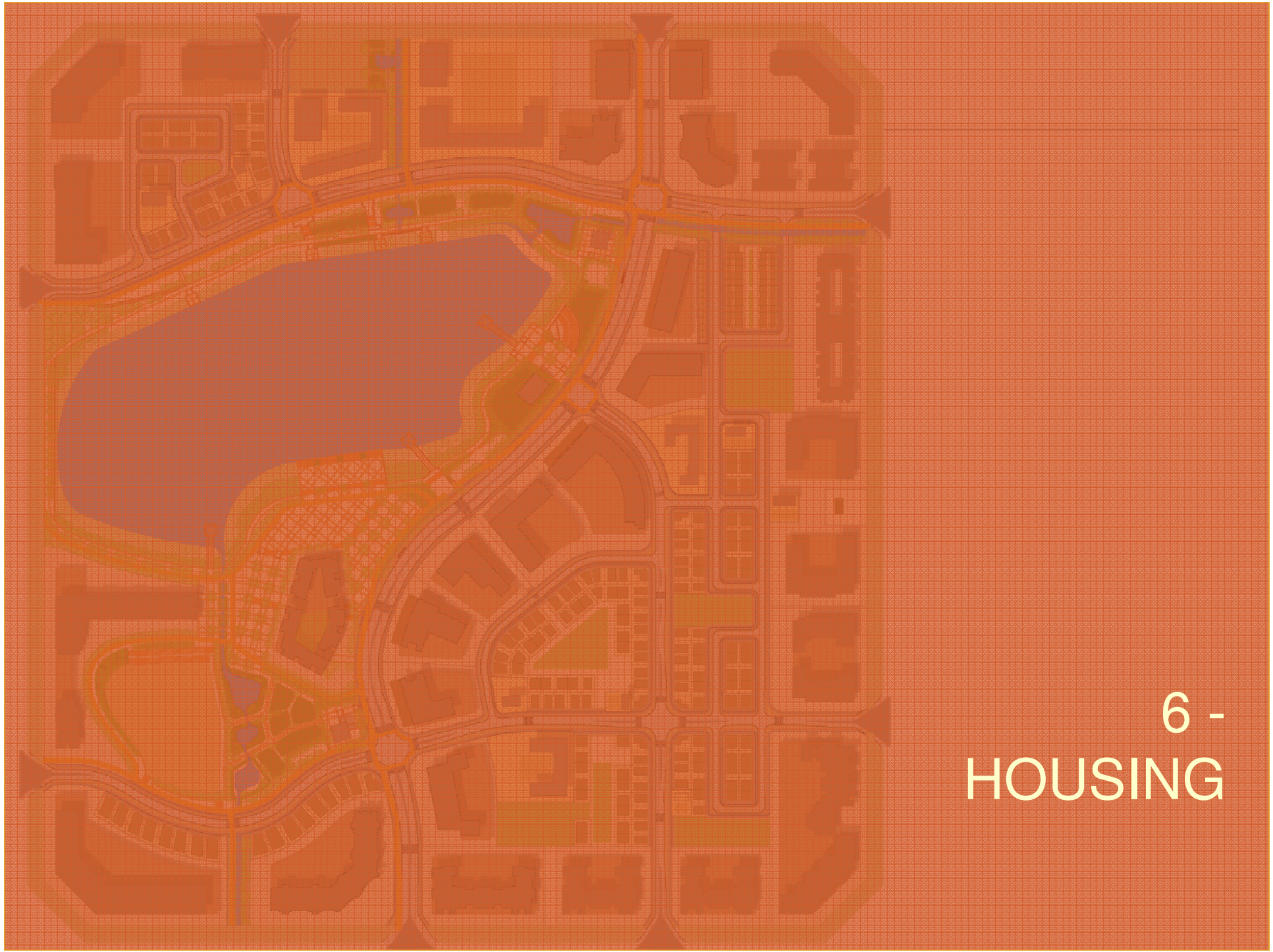


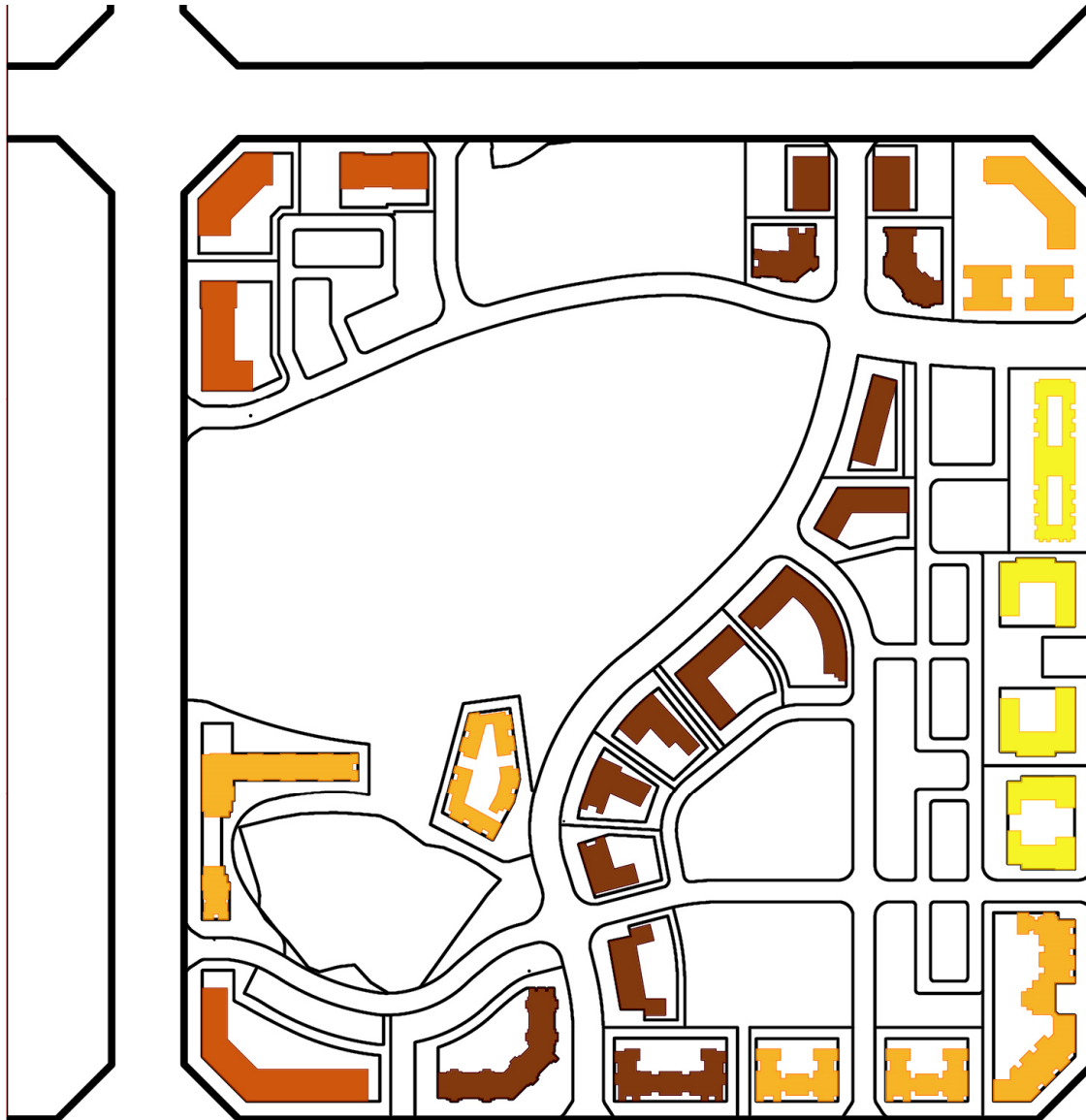
Image Courtesy:  
[http://adlib.eversite.co.uk/resources/000/011/619/Ponds\\_fig26.jpg](http://adlib.eversite.co.uk/resources/000/011/619/Ponds_fig26.jpg)



## 6 - HOUSING



# Housing - Building Heights - Apartments





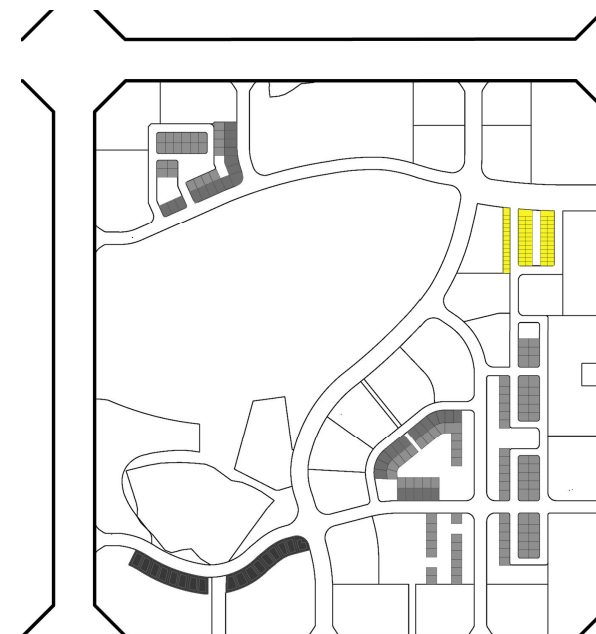
# Housing - Plotted types

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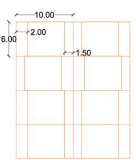
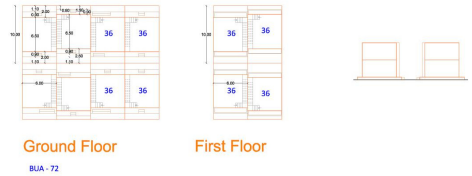

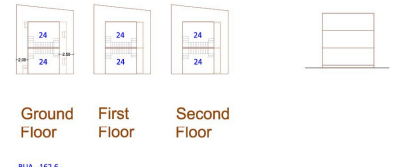
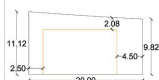
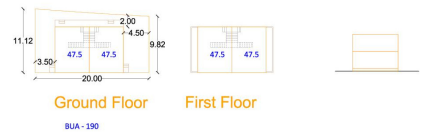
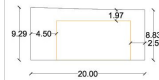
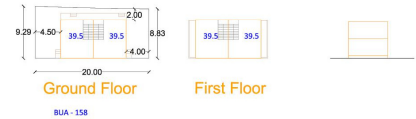
# Typology Guidelines – Plotted – 1 BHK

Building Typology:		1 BHK Housing Row Housing
1 Plot Area		60 sq. m 60-200 sq.m Corner Plots
2 Permissible FSI		1.3
2 Ground Coverage		65% Below 60 Incremental Hsg 60%
3 Footprint		36-100 sq.m
Allowed Footprint		39-130 sq.m
4 Setbacks	Front	1.5 m
	Rear	2 m
	Side 1	3 m
	Side 2	0/2 m
Minimum Setbacks (DCR)	Front	2 / 1 (<60 sqm)
	Rear	2
	Side 1	0
	Side 2	0
5 Building Height		7.5m (G+1) Interior plots 7.5/10.5 (G+1/2) Corner Plots
6 No of dwelling units		1 Interior Plots 2 Corner plots
7 Total BUA		70-200 Interior Plots
Permissible BUA		78 -331 sq.m
Compound Wall		1.5 m = 1.0 solid opaque + 0.5 m visible edge around the entire plot line



Similar guidelines have been drafted for rest of the Plotted typologies

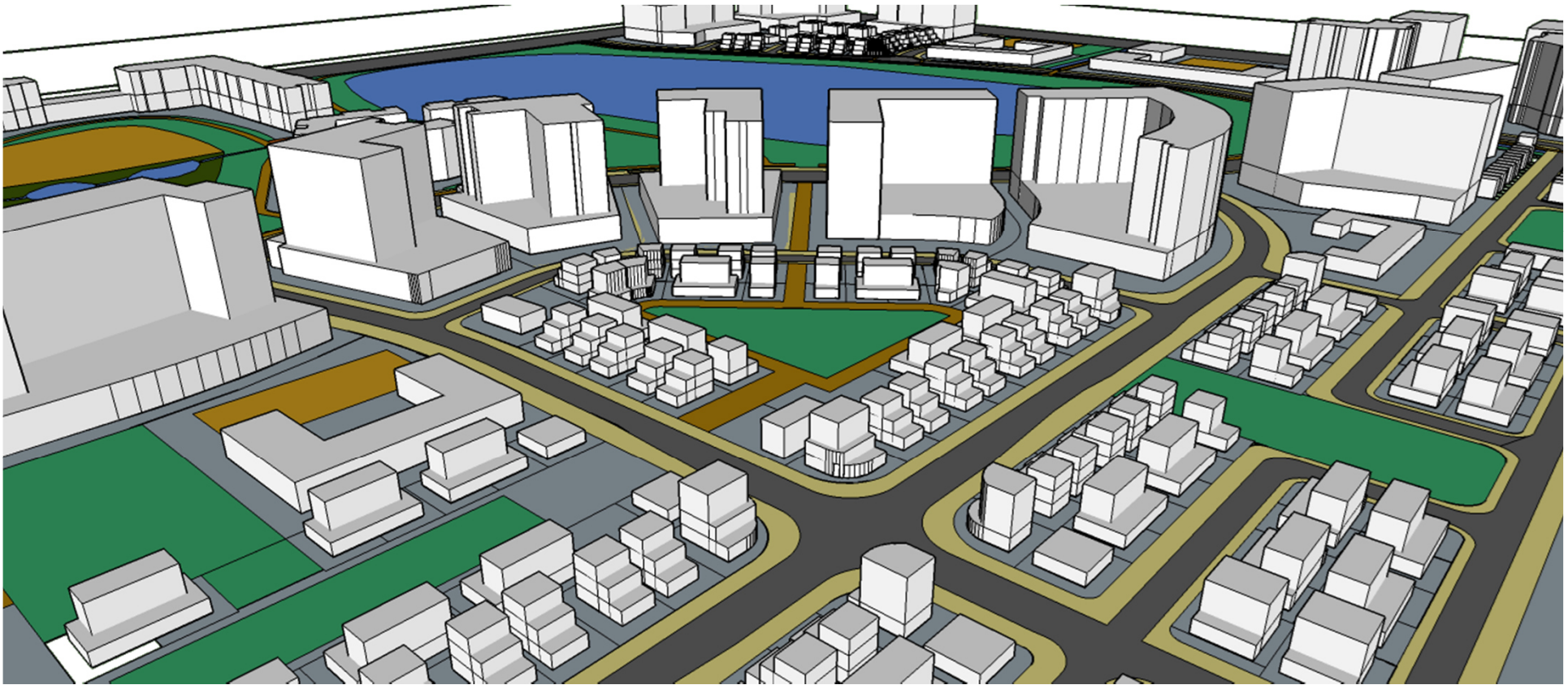
# Form based Guidelines

1 BHK Typology			
	<p>32'.8 x 19.7' = 645.8 sq. ft.</p>	<p>10 m x 6 m = 60 sq. m</p>	 <p>Ground Floor First Floor</p> <p>BUA - 72</p>
<p>Corner Typology next to greens</p> 	<p>1235.7 sq. ft.</p>	<p>114.8 Sq. m</p>	 <p>Ground Floor First Floor Second Floor</p> <p>BUA - 162.6</p>
<p>Corner Typology next to greens</p> 	<p>2244.3 sq. ft.</p>	<p>208.5 Sq. m</p> <p>need to be less than 200</p>	 <p>Ground Floor First Floor</p> <p>BUA - 190</p>
<p>Corner Typology next to greens</p> 	<p>1940.7 sq. ft.</p>	<p>180.3 Sq. m</p>	 <p>Ground Floor First Floor</p> <p>BUA - 158</p>



# Massing

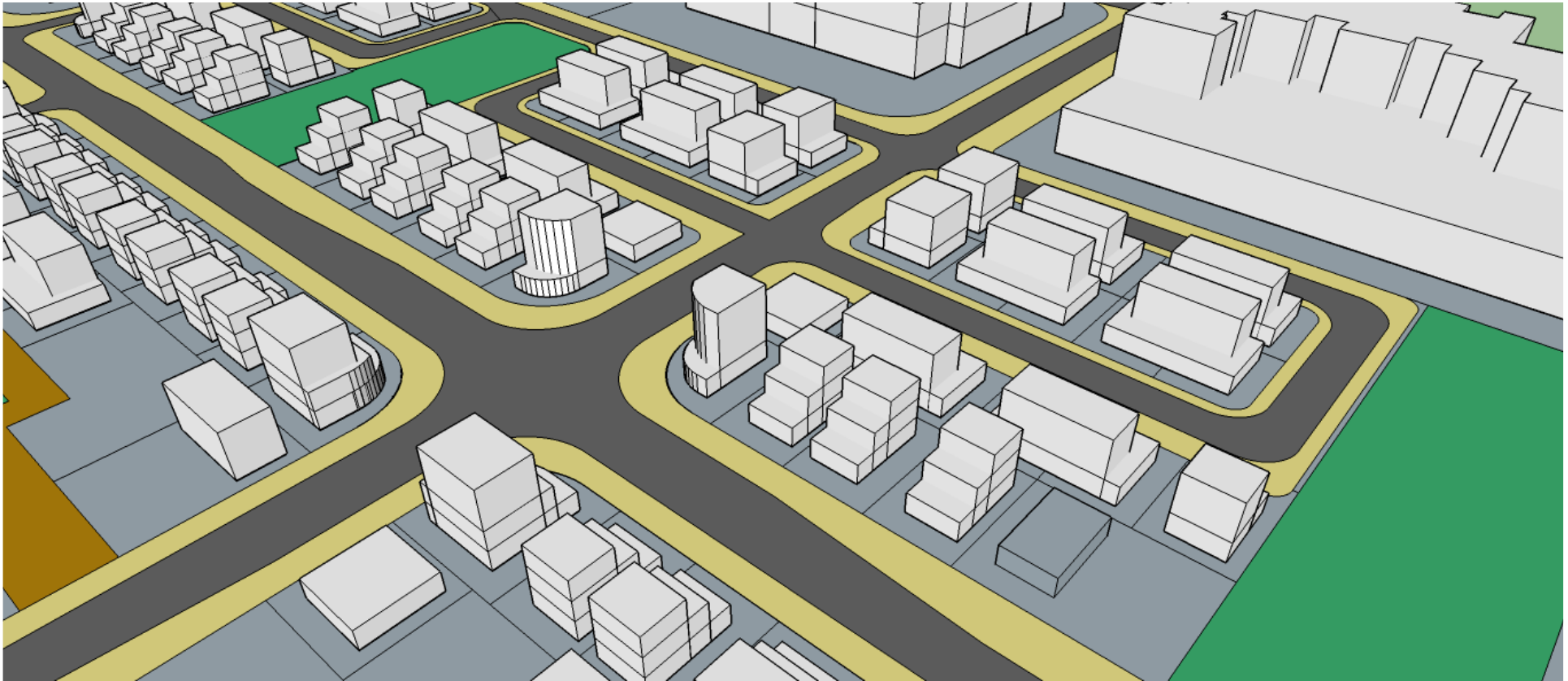
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Street vistas leading to the lake through public open spaces

# Massing

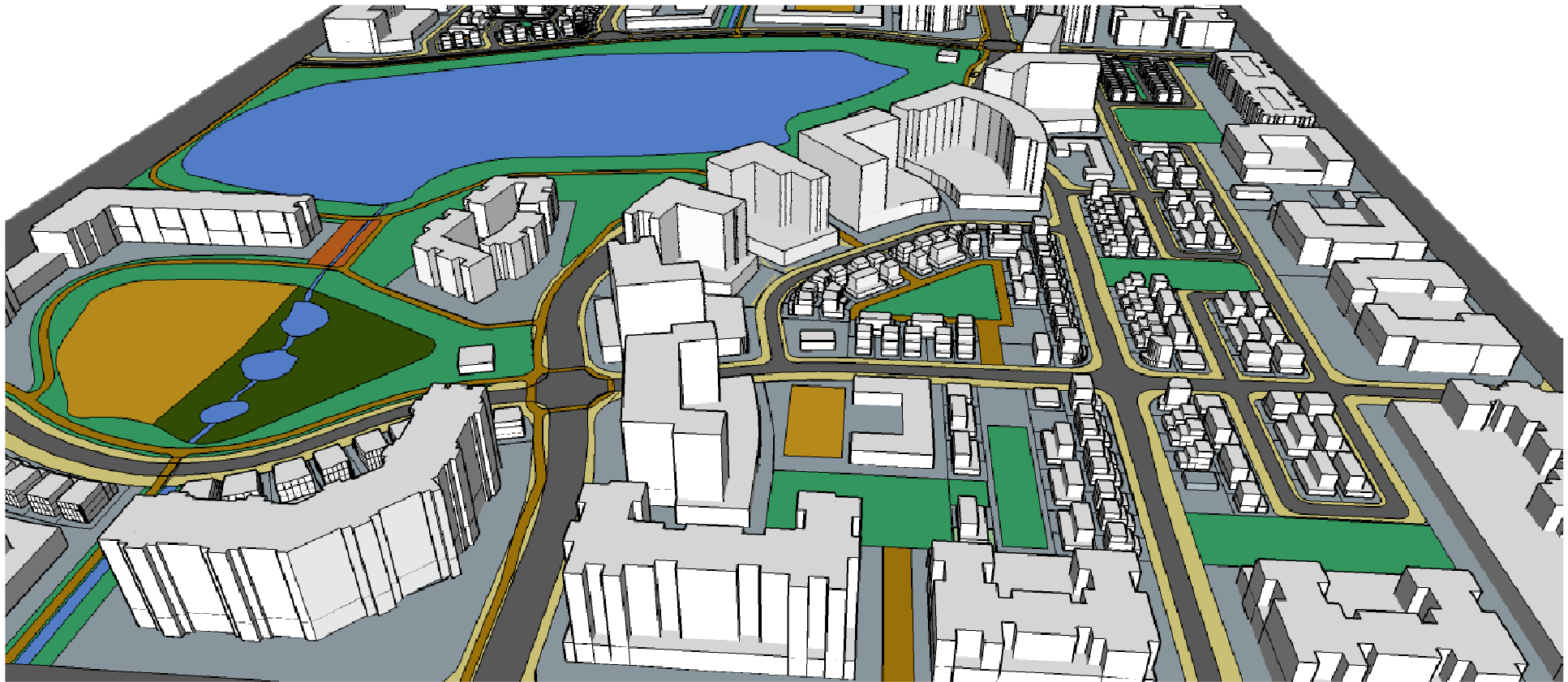
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Stepped typology and public commercial node

# Typology Guidelines – Apartments abutting High Street

Apartment Type 1		Apartments abutting High Street		
		Regulations as per DP NRDA		
1 Plot Area		more than 4000	more than 4000	sq.m
2 FSI		2.5	upto 2.5	
3 Coverage		30%	30%	sq.m
4 Setbacks	Front	15	15 m	
	Front + Commerce		6 m (9 m commercial unit)	
	Rear	6 m - upto 10000 sq.m 9m for > 10000 sq. m	6 m - upto 10000 sq.m 9m for > 10000 sq. mm	
	Side 1	6 m - upto 10000 sq.m 9m for > 10000 sq. m	6 m - upto 10000 sq.m 9m for > 10000 sq. mm	
	Side 2	6 m - upto 10000 sq.m 9m for > 10000 sq. m	6 m - upto 10000 sq.m 9m for > 10000 sq. mm	
5 Building Height			G + 12 High Street	
6 Wall	Compound Wall		1.0 solid opaque + 0.5 m visible edge around the entire plot line units	Buildings without commercial units
			1.0 solid + 0.5 m visible The wall shall start abutting the front wall of the commercial units ; 6 m from front edge units	Buildings with commercial units

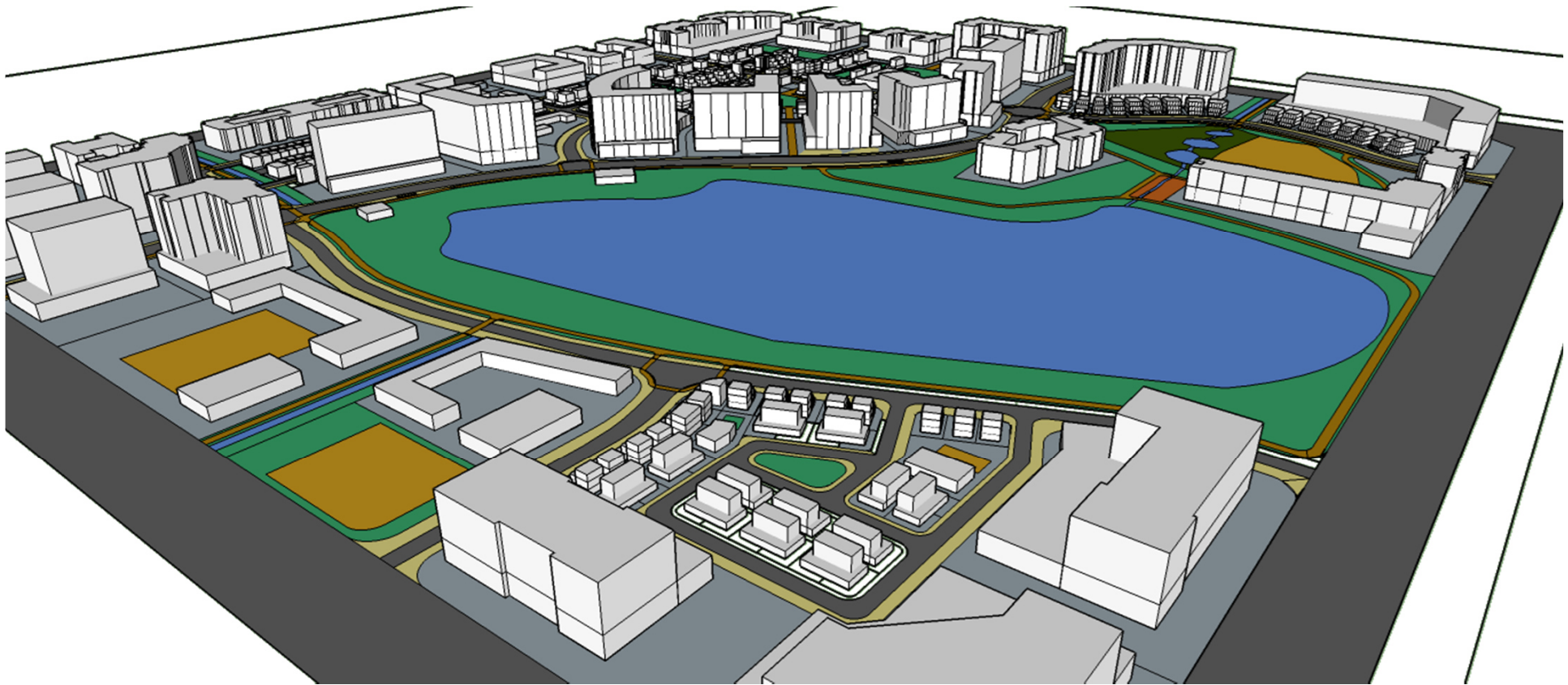


The High density high rise abutting the lake edge.



# Typology Guidelines — Apartments abutting Sector entrances

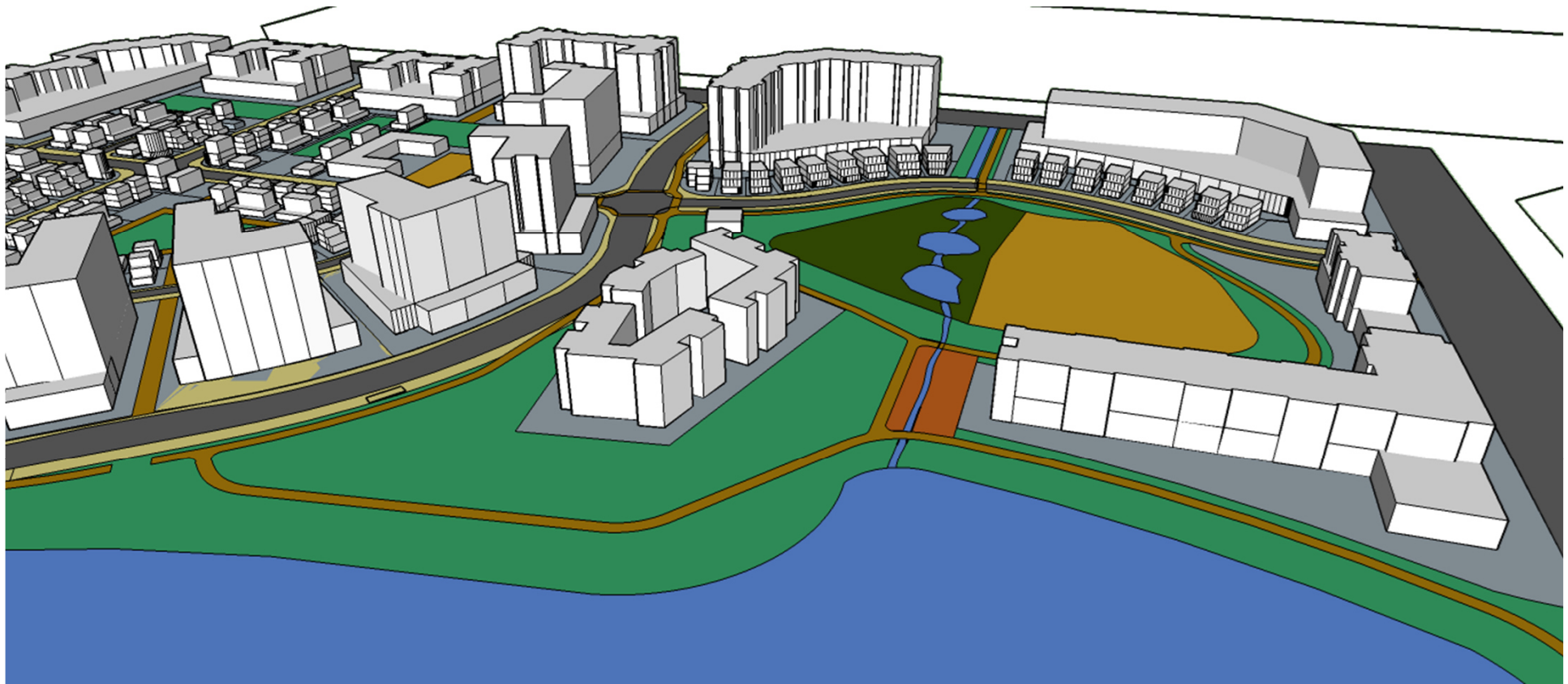
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Apartments abutting the sector entrances. Plotted and midrise typology abutting the open spaces and facing the lake.

# Typology Guidelines – Apartments Complete Retail ground floor

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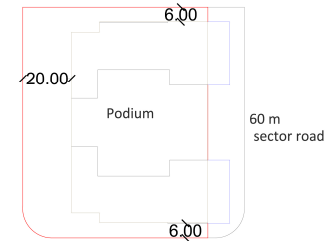
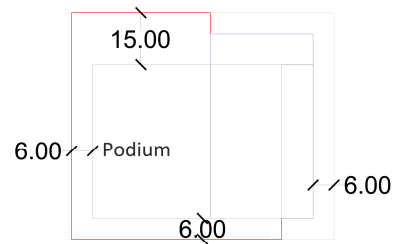
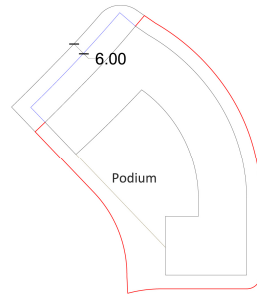
# Form based guidelines

Apartments  
abutting High  
Street

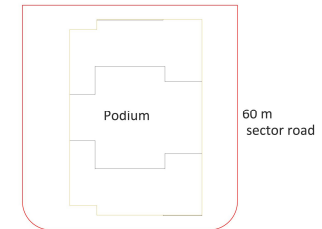
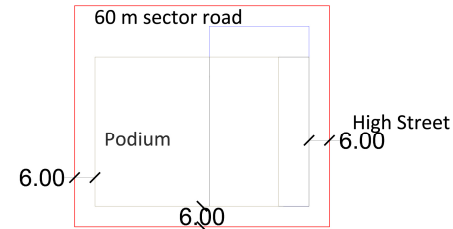
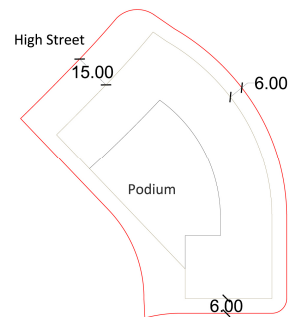
Apartments  
abutting Sector  
entrances

Apartments  
abutting 60 m  
eastern road

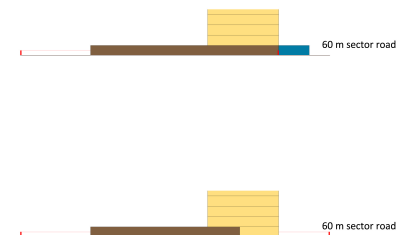
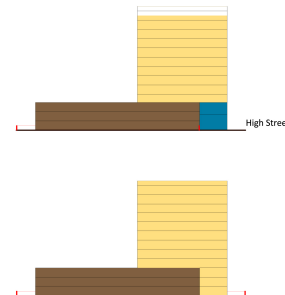
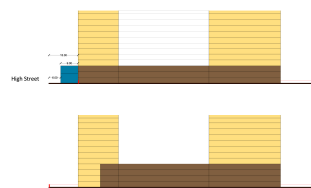
Plan with retail  
front



Plan without  
retail front



Sections







## 7 - PROJECT IMPACT



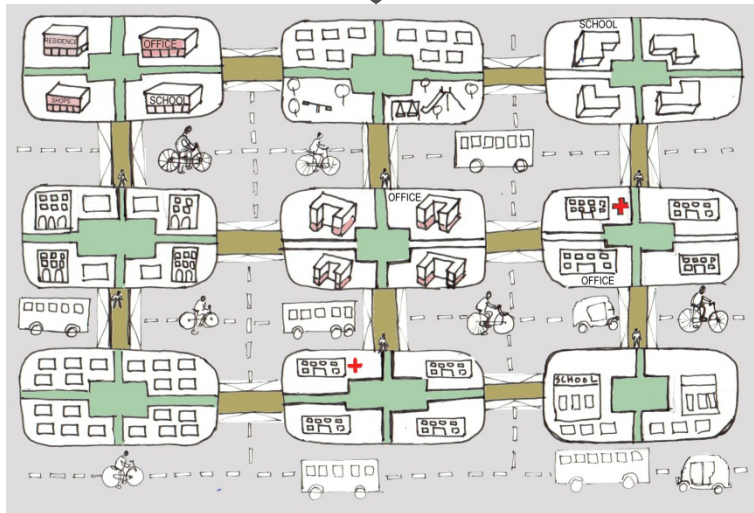
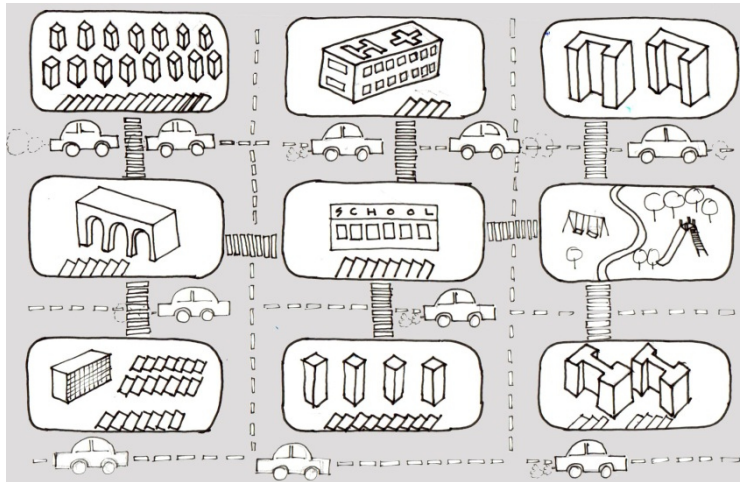
# Sector 31

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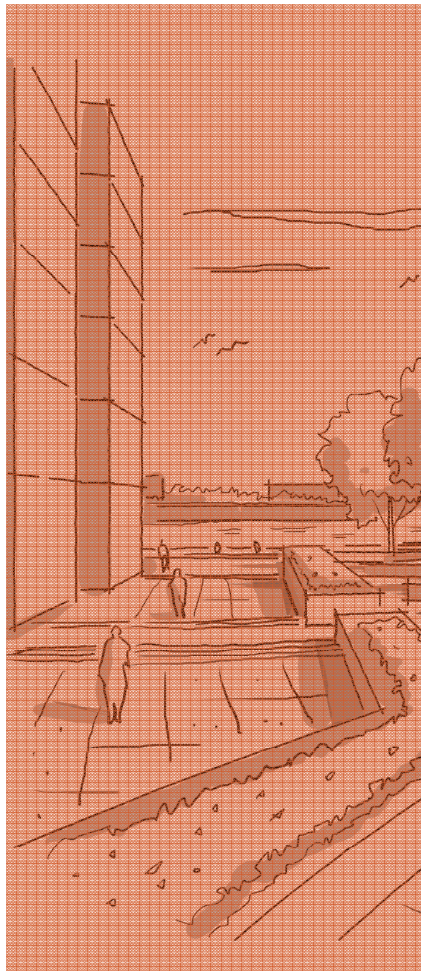


- Pedestrian and NMT oriented design
- Easy access to transit nodes
- Mixed use and high density around sector centre. Concept of 'high street'
- Water networks retained
- Original routes connecting villages are integrated with the new design. Thus establishing connections with the old and the new.
- Equitable design – equal access to all social classes and various physical typologies
- Sector design 'part' of the master plan design and not an 'isolated' entity.

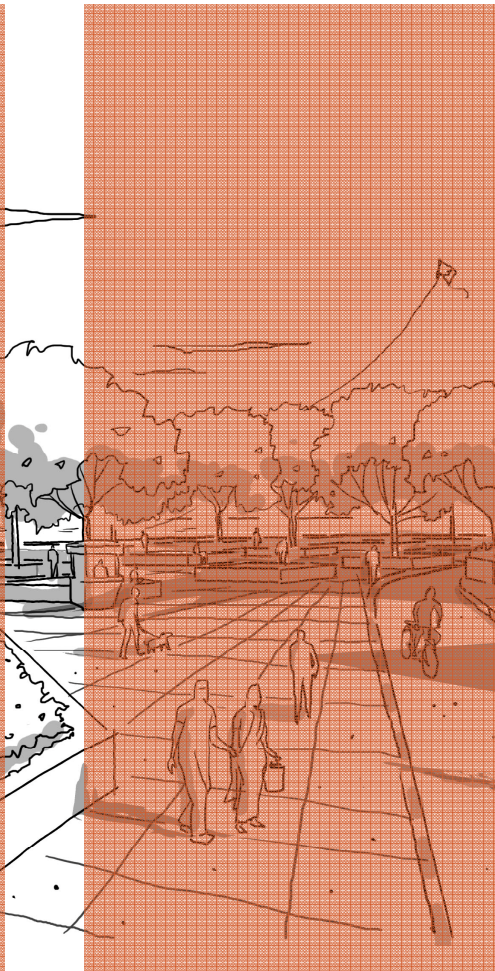
# Project Impact



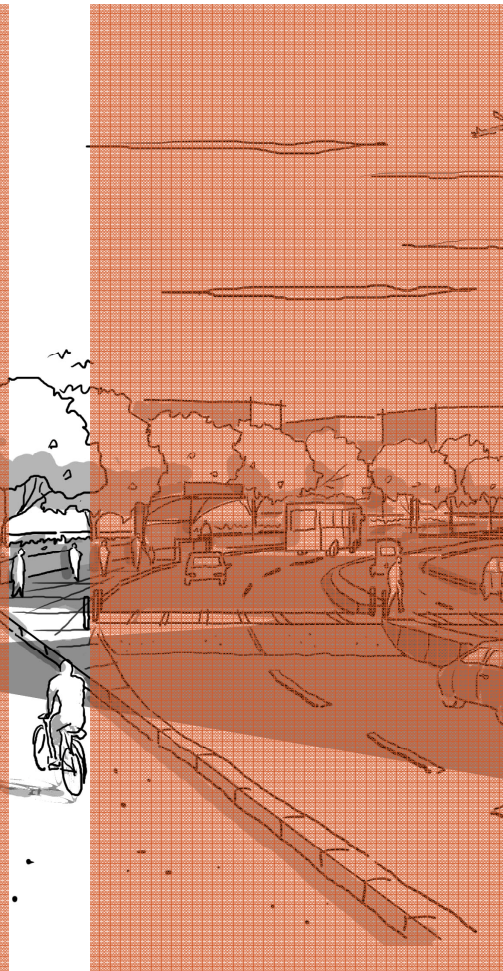
TOD PRINCIPLES	PROPOSALS
Complete streets (Walking and Biking)	Walking Grid of 150m x 150 m, Connected Greens, Safe Junctions, Bicycle Paths
Transit Supportive Uses (Active Edges)	Shared uses along the transit corridors, Mixed/Commercial Uses on the ground floor, Permeable edges.
Integrated Transport (Public Transit)	Design responds to the feeder system which supports the BRT system.
Public Spaces (Open Spaces)	Varied hierarchy, Inclusive greens, Inter-connected
Cultural Landscapes (Historic and Environmental)	The design respects the natural terrain. The valleys are retained. The traditional routes connecting the existing villages are also retained thus helping to preserve the memory of the place.
Compact development (Mixed Use and Density)	Tiered Density along the transit routes. Mixed-uses proposed at the junctions



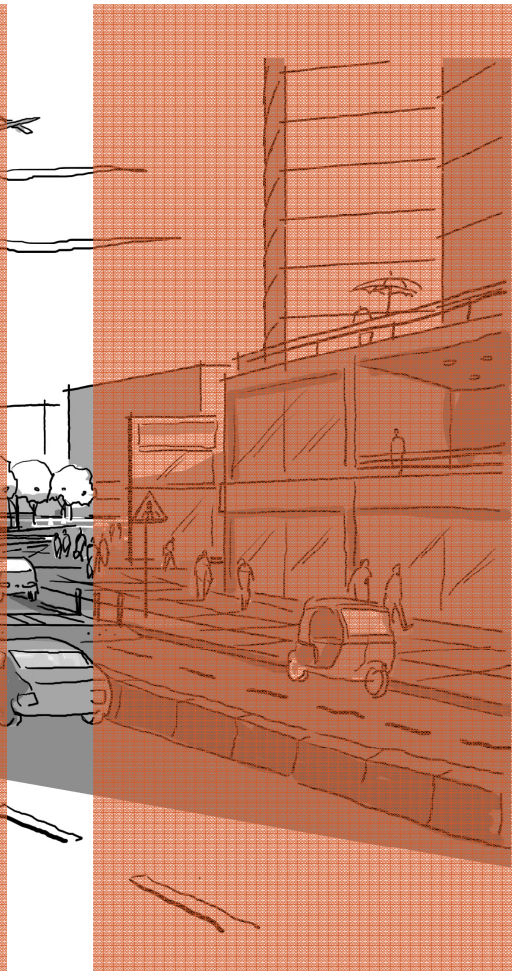
Permeable building edge  
activating the street



Accessible inclusive public  
spaces



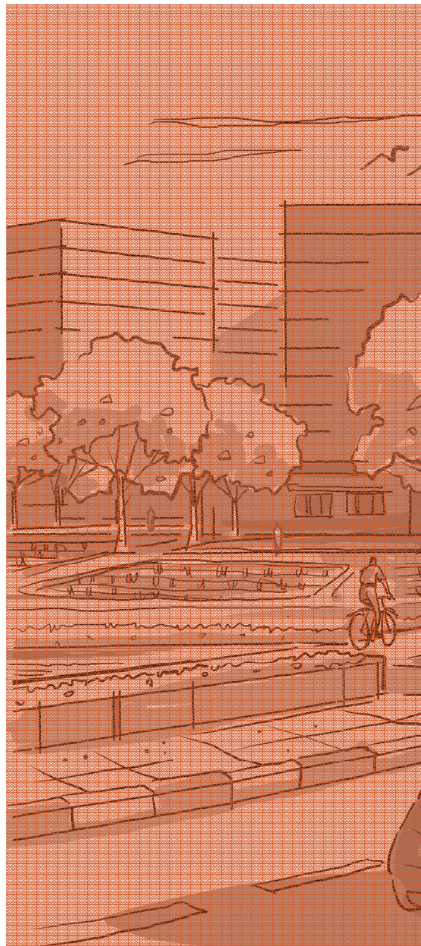
Pedestrian and cycle  
friendly streets



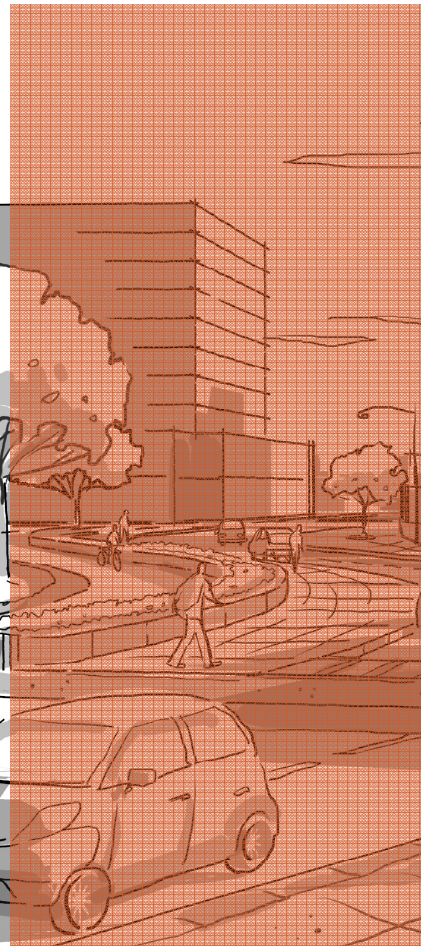
Mixed use edge



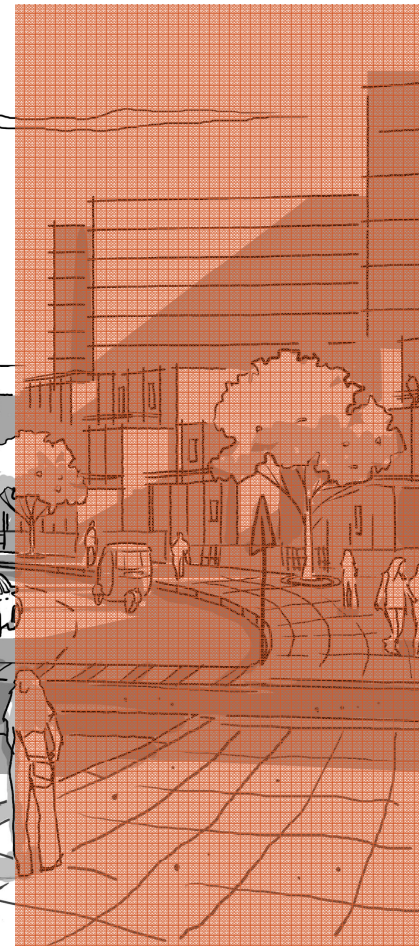
# Accessible, inclusive and safe



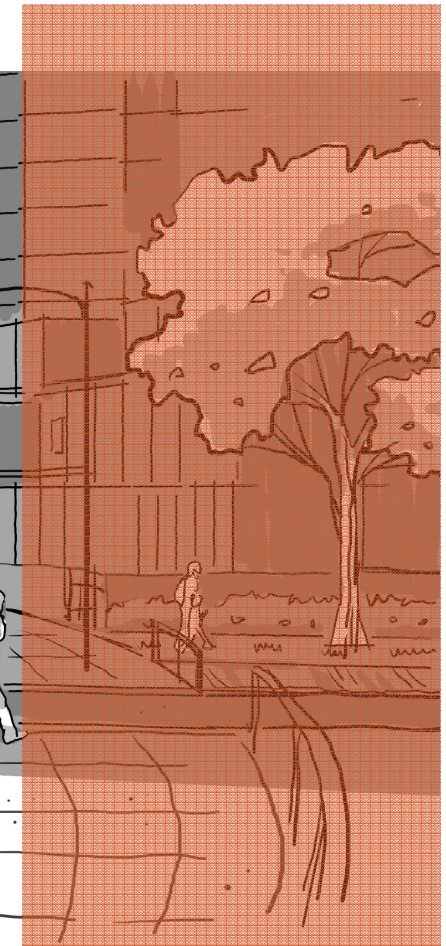
Inclusive public open spaces  
– urban farms



Safe Access



Pedestrian connection  
through blocks



Continuity of water system





**Thank You**