Rooting in the city

Urban Agriculture-Led Design for High-Density Housing in Ahmedabad, India



5315859

AR4GH010 Global Housing Graduation Studio

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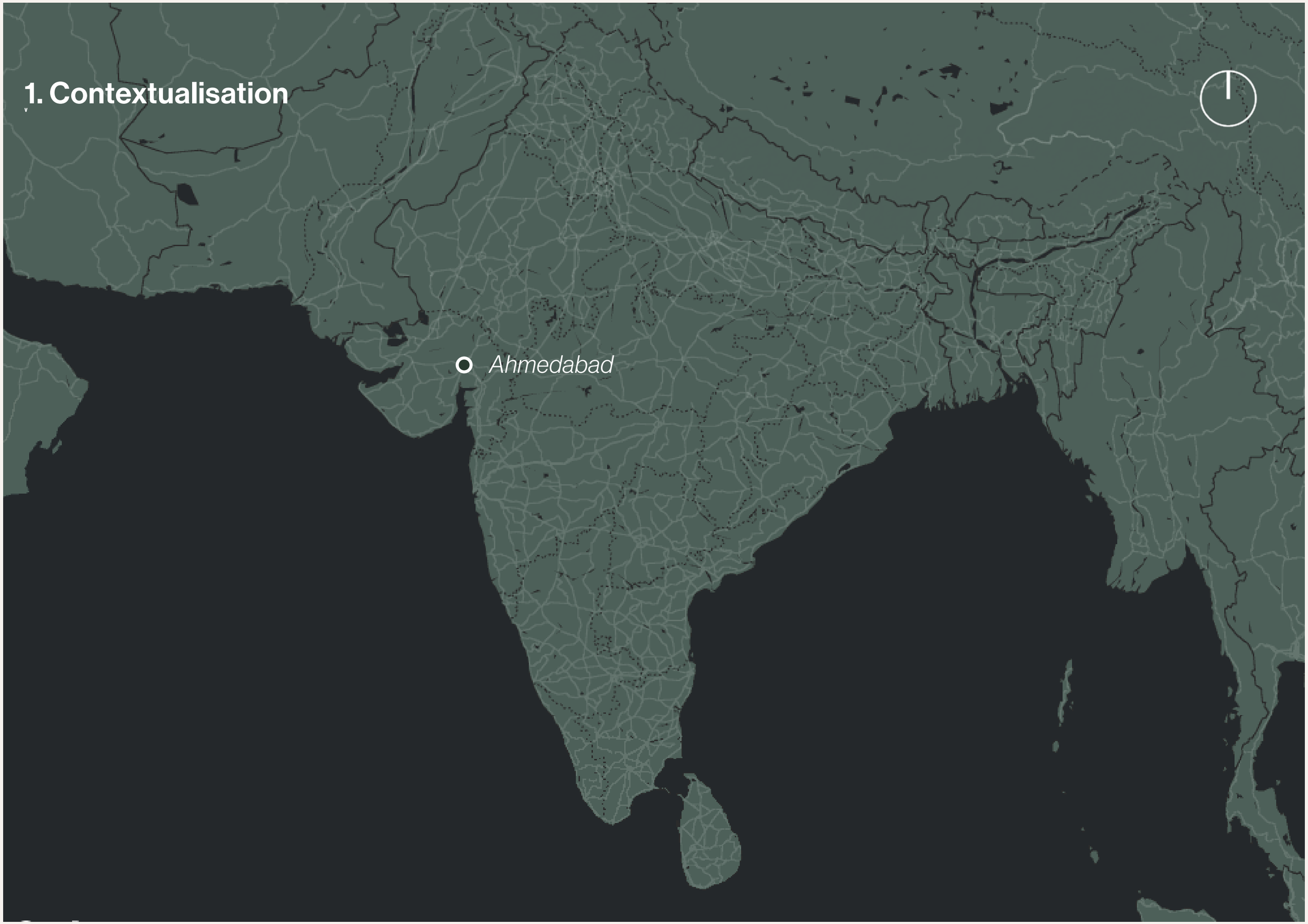
1. Contextualisation



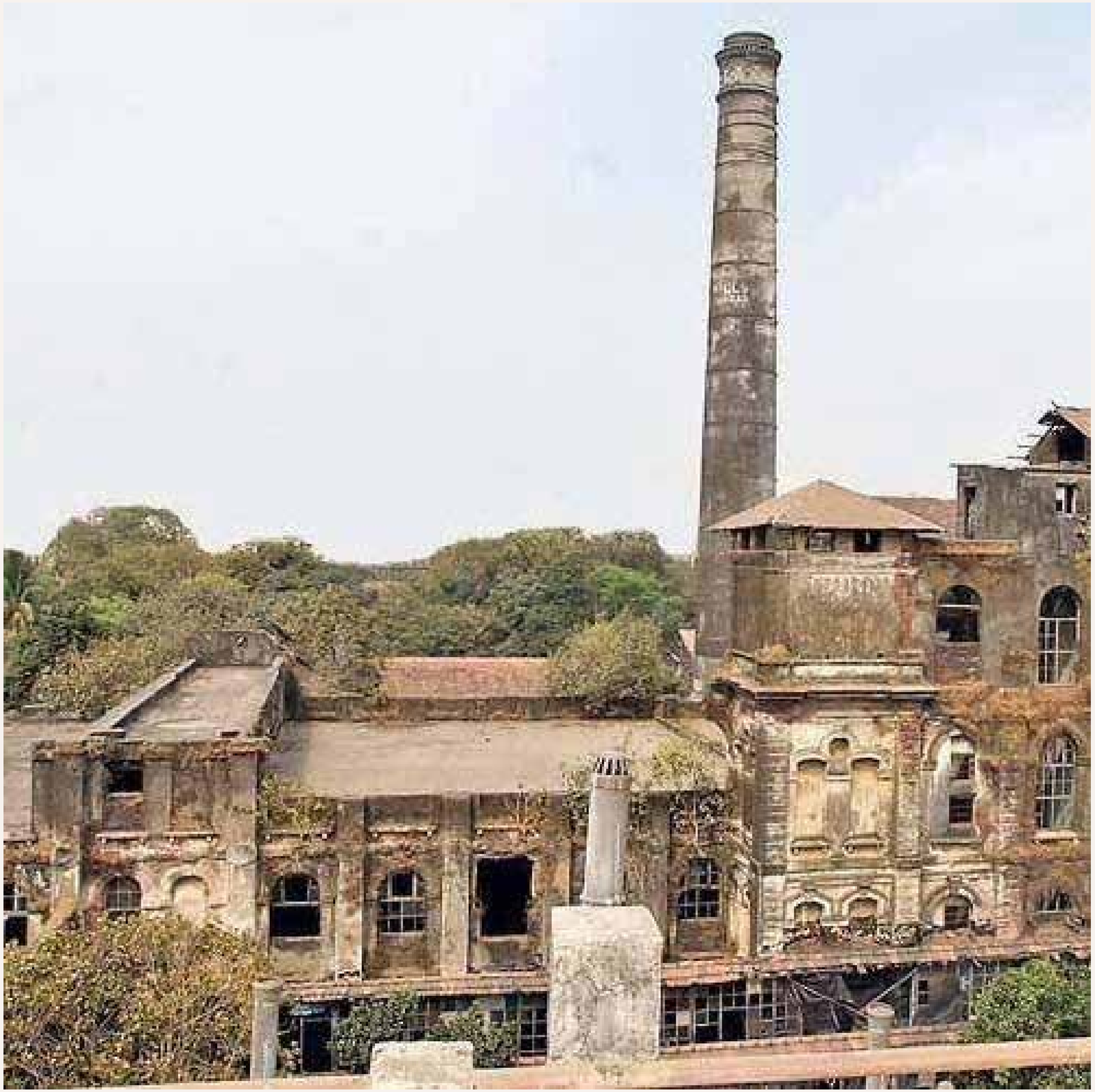
India as a country



Climate and location



History



Food production



2: Challenges and problems



Agricultural resilience



Agriculture in the city





Adaptation to the Ahmedabad households



3. Research- and design question

How can low-input urban agriculture support households' everyday livelihoods and engagement in sustainable food practices in the context of low-rise, high-density housing on underused urban and peri-urban plots in Ahmedabad, India?

Research framework



Urban agriculture context

Literature review
Fieldwork

Technical context

Literature review

Socio-economic context

Literature review
Fieldwork

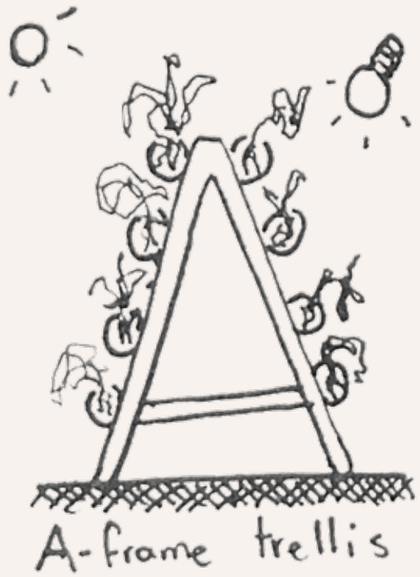
Spatial context

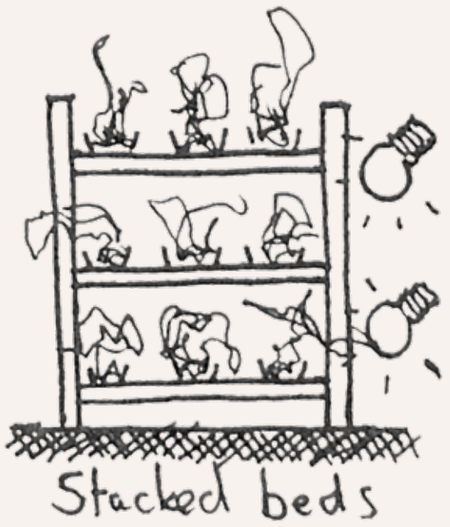
Fieldwork
Literature review
Research by design

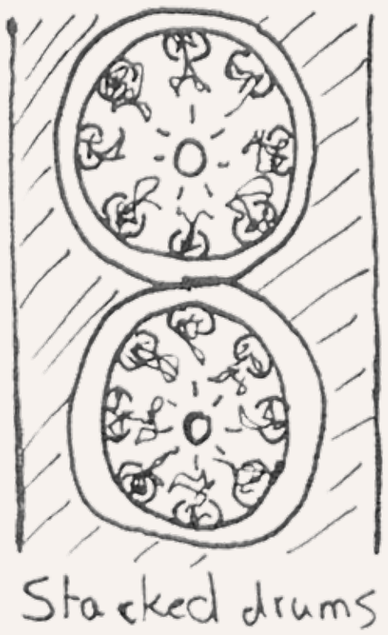
Managerial context

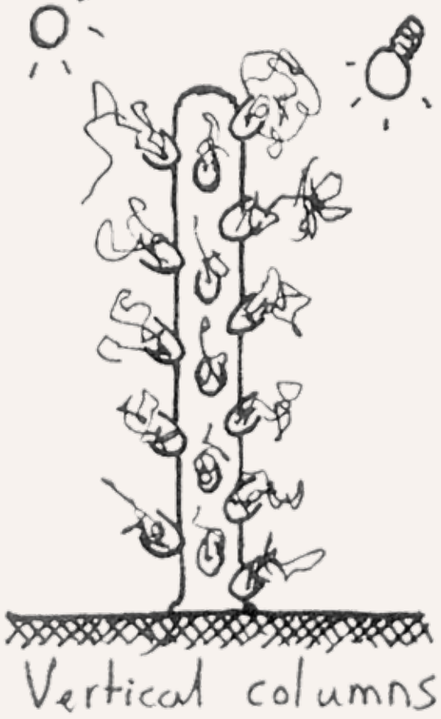
Literature review
Casestudy analysis

Technical context









Socio-economic context

Although women take lead in UA practices, it is noteworthy that men also make a substantional contribution to cultivation efforts.



Youngsters: "We have an inclination toward innovation and a keen aspiration for sustainability".





Addaptive strategies such as vertical stacking, composting and reuse of materials are practiced.

The older age group commonly favors traditional and organic farming methods.

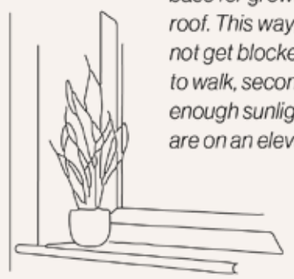


Spatial constraints strongly shape these practices. In formal housing, cultivation is typically limited to small balconies, while in informal settlements, access to land is more flexible but insecure.

Knowledge exchange from young and old through friends, neighbors and social media platforms.

Another farmer from Prune: *"We don't want to spray chemicals. 70% of formal and 20% of informal settlement practicioners practice composting mainly with their kitchen waste".*

Homegarden waste composting is a longstanding tradition in Indian households.



"Hence, we used planks as a base for growing plants on our roof. This way, the space does not get blocked for other people to walk, second, the plants get enough sunlight because they are on an elevation".

"Whenever construction or demolition was going on, we get soil from there. The subsurface is very fertile. It doens't need too many inputs and is moist too."

"We are a group of gardeners. We save and share plants among ourselves and try to keep them alive in our garden. Now we rarely buy seeds."



"She waters and takes care of my plants. I do the same when she is away."

"I wish to grow so many more plants, but where is the space? I know how to grow potatoes and all such vegetables, but I don't have enough space."



Leisure, aspiration, teaching sustainable food practices

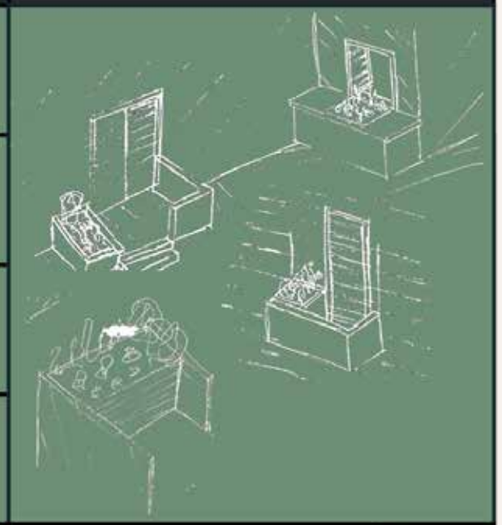
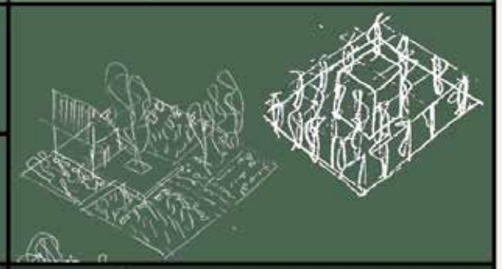
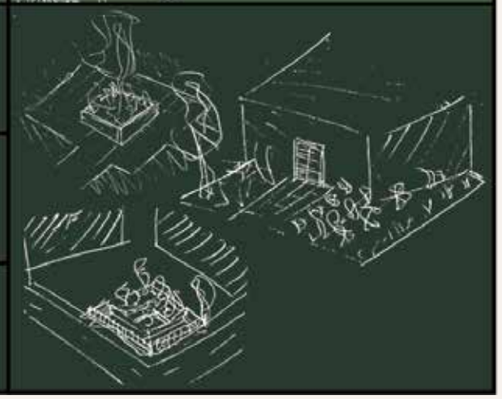
Construction worker in Bangaluru: *"This land is not ours, how can we grow here"?'. "This land is empty, so I am growing here, if the municipality decided to build a house here, there is a risk that they would come and clear mt gardens. I am not allowed to farm here officially." "I wish to grow so many more".*



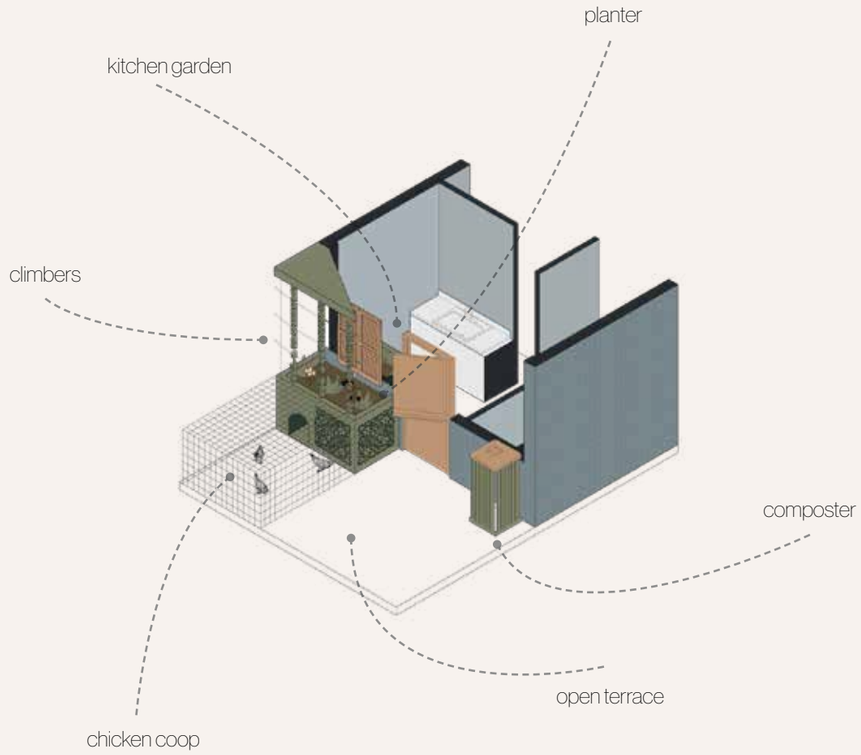
Design framework

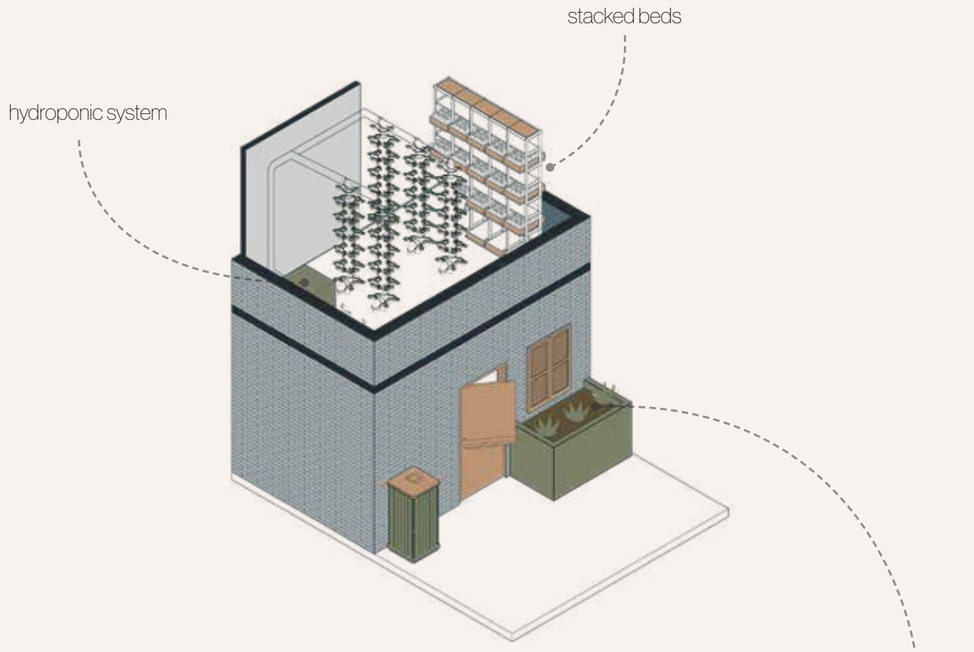
Type of UA	Soil-based / Soil-less	Working scale	Placement	Footprint (m)
Herbs	*soil-based / soil-less*	*typology*	*interior*	*1 x 1*
Vegetables	*soil-based / soil-less*	*typology, cluster, urban*	*roof, balcony, facade, plot,*	*1 x 1*
Plant horticulture	*soil-based / soil-less*	*typology, cluster, urban*	*interior, facade, roof, balcony, plot, communal, urban*	*1 x 1*
Climbers	*soil-based / soil-less*	*typology, urban*	*facade, urban*	*1 x 2*
Shrubs	*soil-based*	*typology, cluster, urban*	*roof, balcony, plot, communal, urban, professional*	*1 x 2*
Small tree	*soil-based*	*typology, cluster, urban*	*plot, communal, urban, professional*	*3 x 3*
Tree	*soil-based*	*typology, cluster, urban*	*plot, communal, urban, professional*	*4 x 5*
Cow	*soil-based*	*cluster, urban*	*communal, professional*	*4 x 5*
Goat	*soil-based*	*cluster, urban*	*communal, professional*	*3 x 6*
Chicken	*soil-based*	*typology, cluster, urban*	*roof, balcony, plot, communal, professional*	*1 x 2*
Fish pond	*soil-less*	*typology*	*plot*	*4 x 4*
Fish tank	*soil-less*	*typology*	*interior, balcony*	*1 x 1*
Bees	*soil-based*	*cluster*	*communal*	*2 x 4*
Vertical drum	*soil-less*	*urban*	*professional*	*1 x 1*
Vertical column	*soil-less*	*typology, urban*	*roof, balcony, professional*	*1 x 1*
A-frame trellis	*soil-less*	*typology, urban*	*roof, balcony, professional*	*1 x 2*
Stacked beds	*soil-less*	*typology, urban*	*roof, balcony, professional*	*1 x 2*
Aquaponics	*soil-less*	*typology, urban*	*interior, balcony, roof, professional*	*1 x 2*

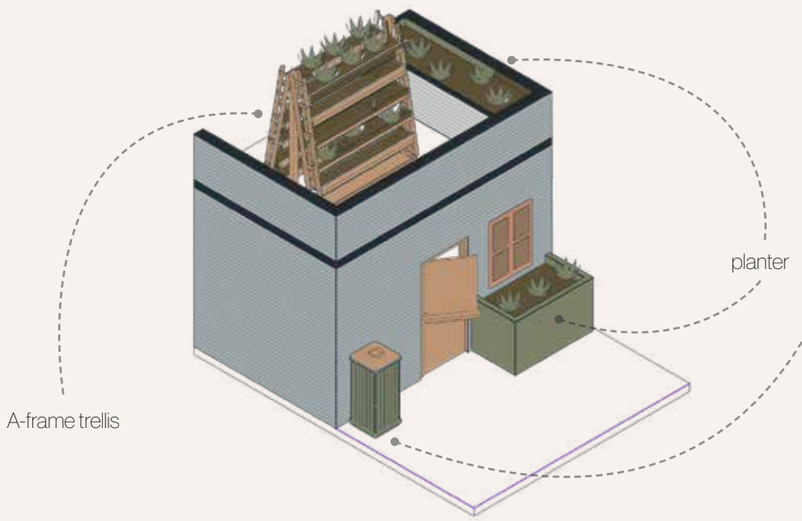
Working scales of UA practices

Working scale	Architectural space	Impression
Typology	*kitchen*	
	otla	
	balcony / terrace	
	roof	
Cluster	*inner courtyard*	
	vertical farm	
Urban	*public courtyard*	
	community-center plot	
	(market)square	

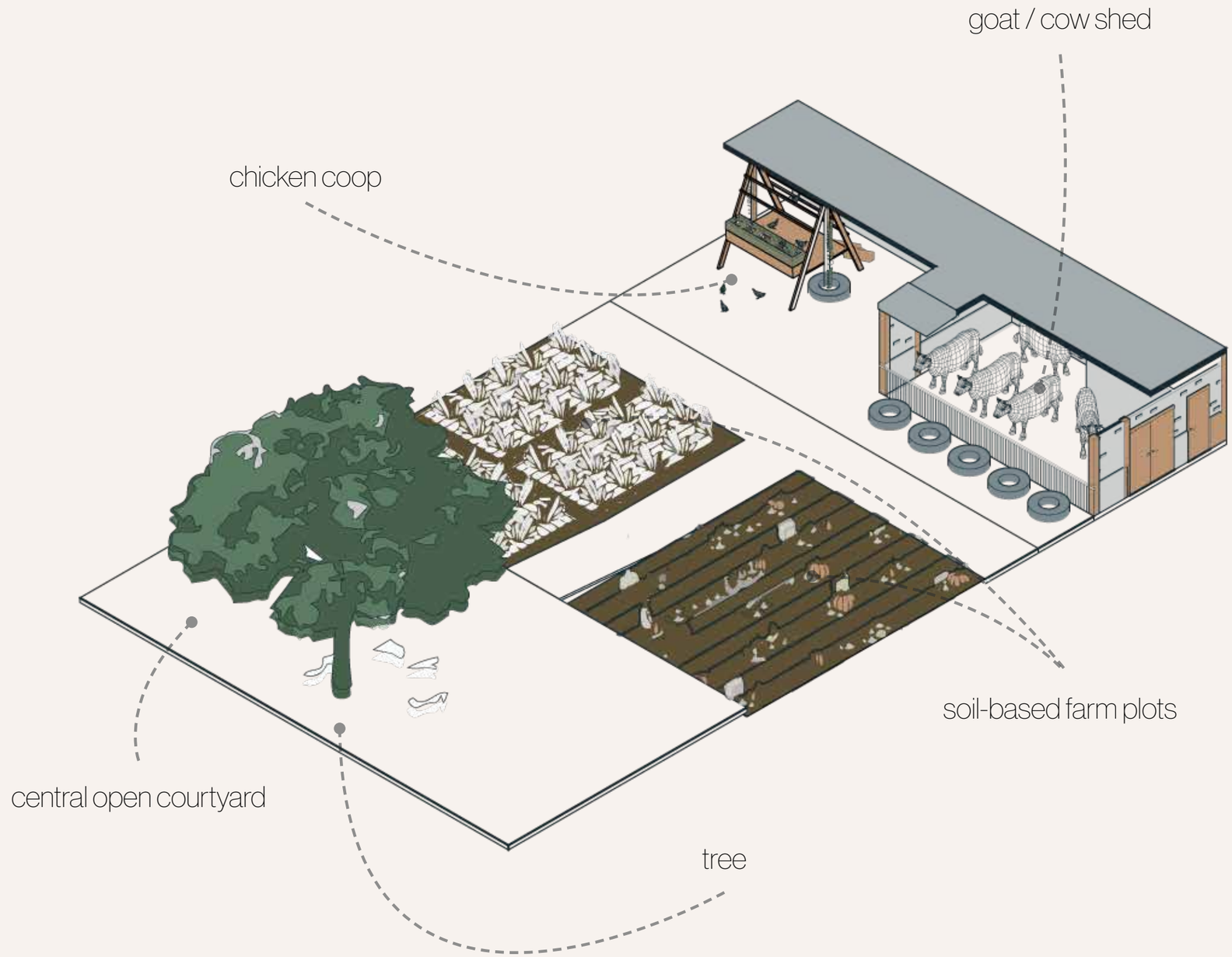
Typology scale



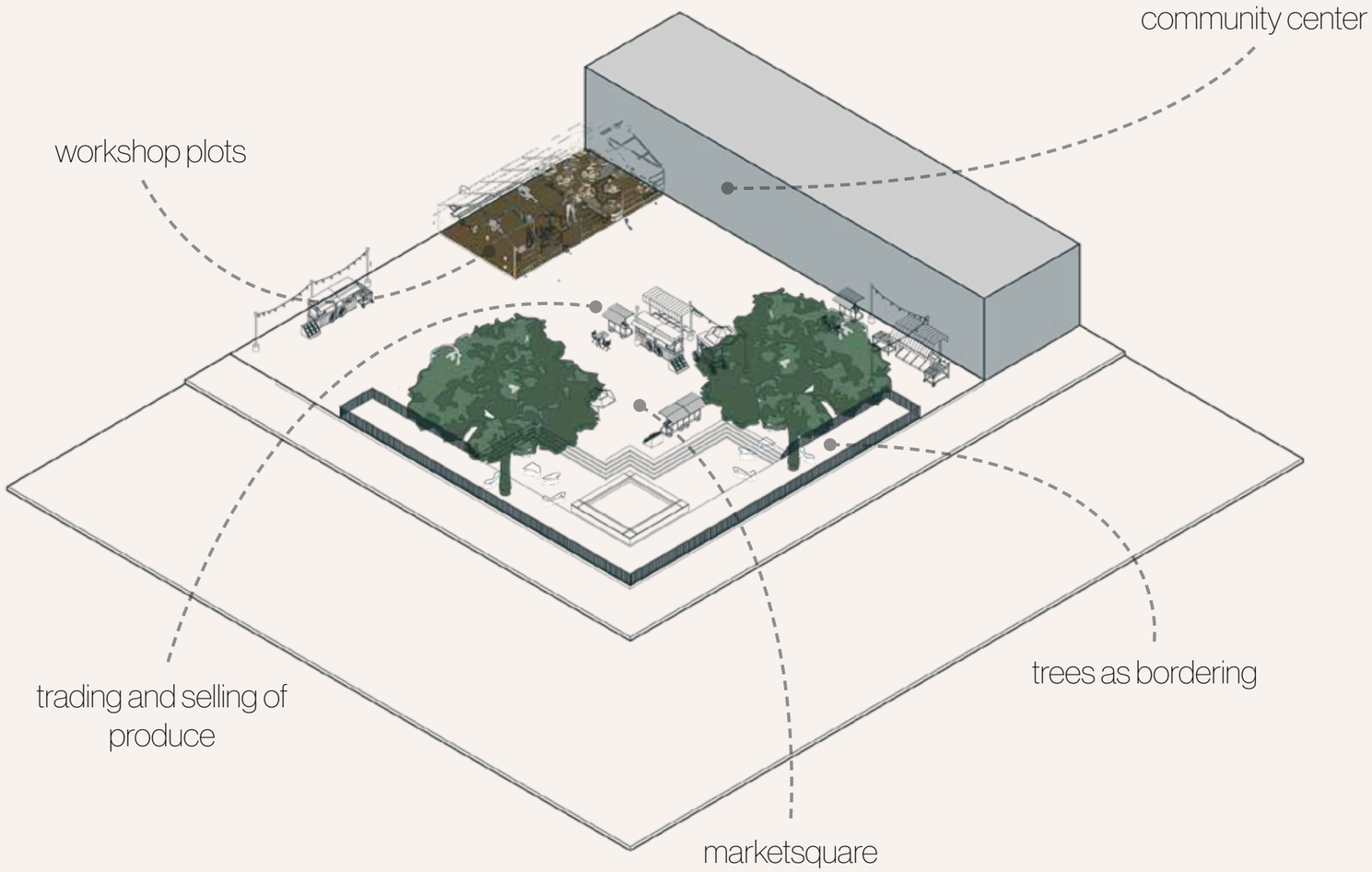




Cluster scale



Urban scale


community center
workshop plots
trading and selling of produce
marketsquare
trees as bordering

The site



The plot









The plot

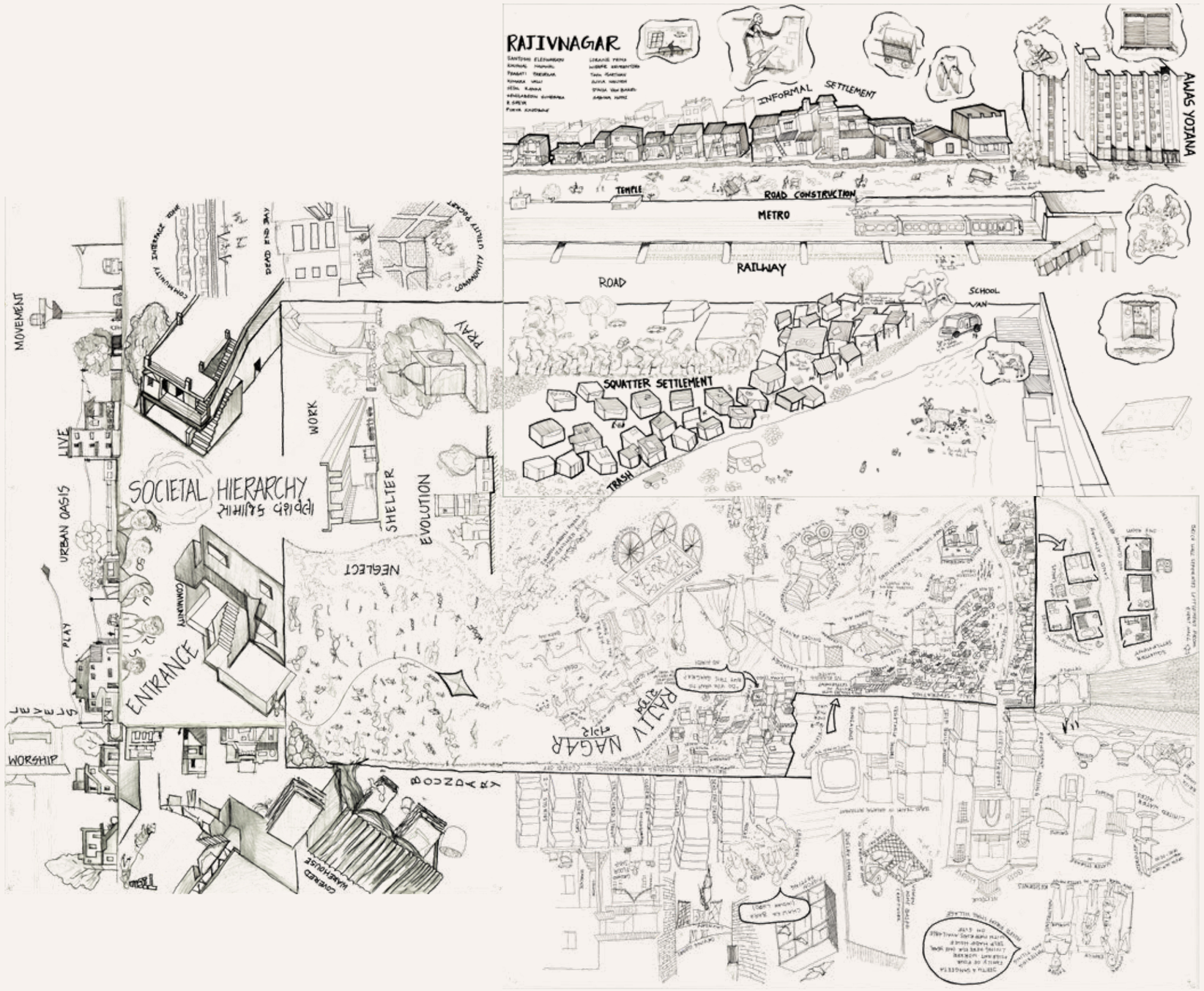








Connection to its surroundings



Farming practices in the area

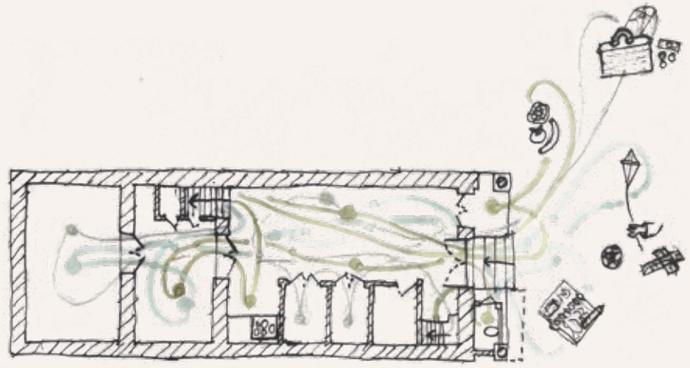








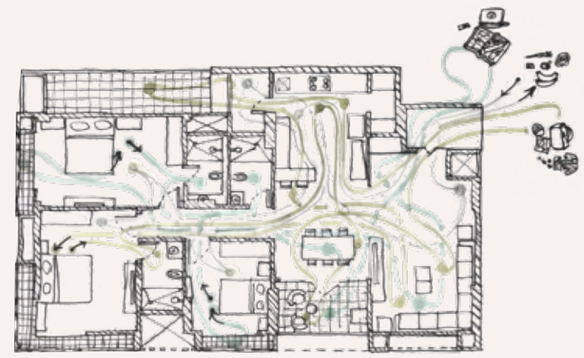
Daily routines of Ahmedabad households



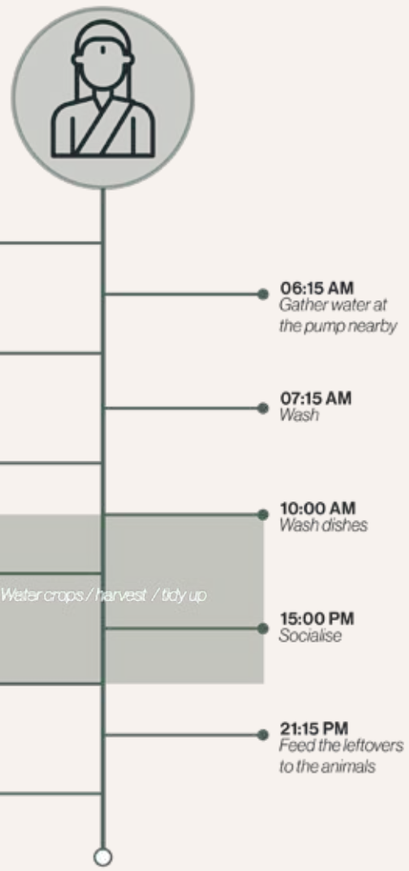
Mother

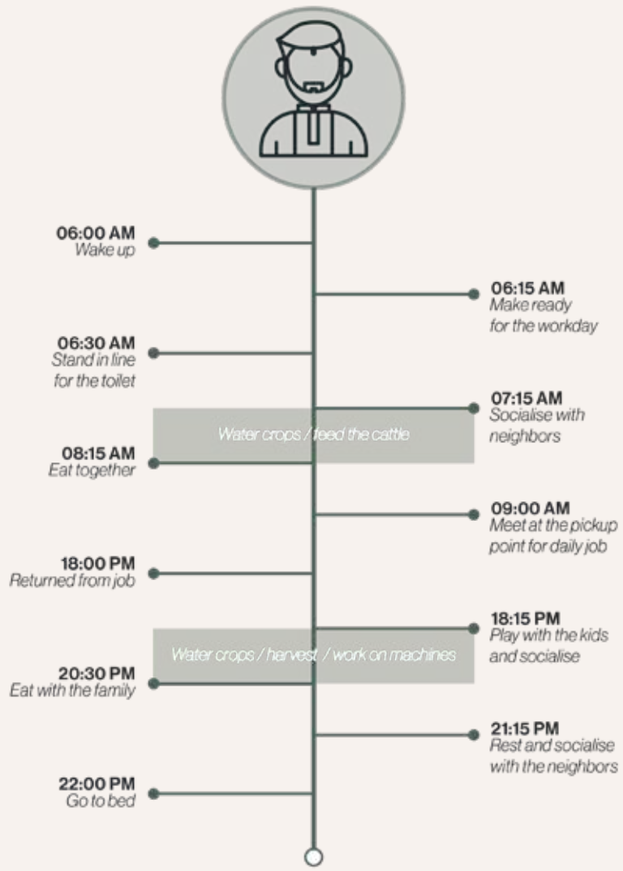


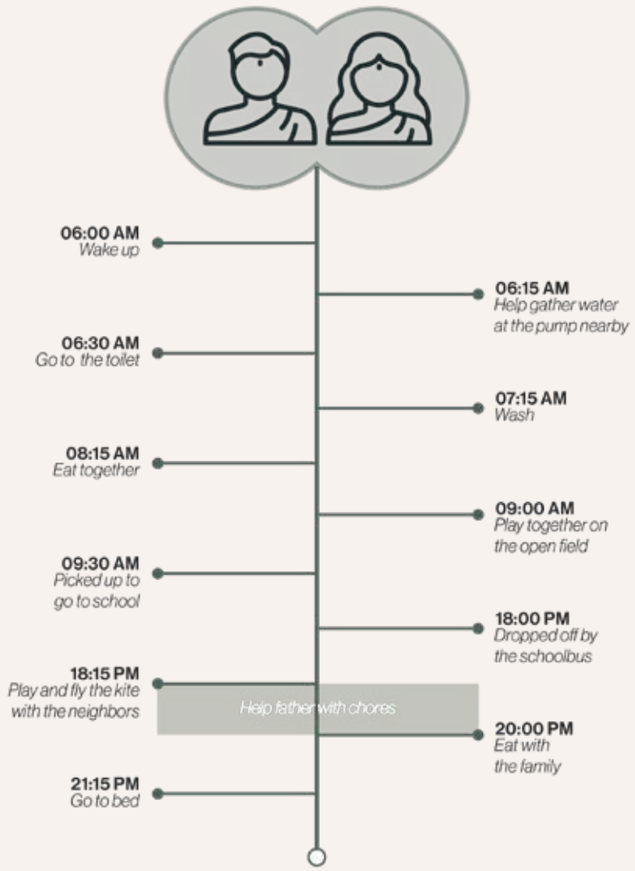
Father



Children

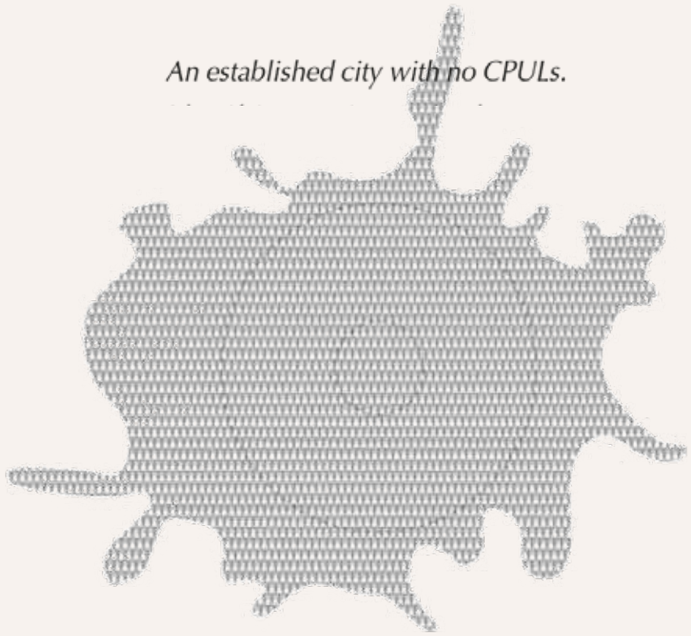




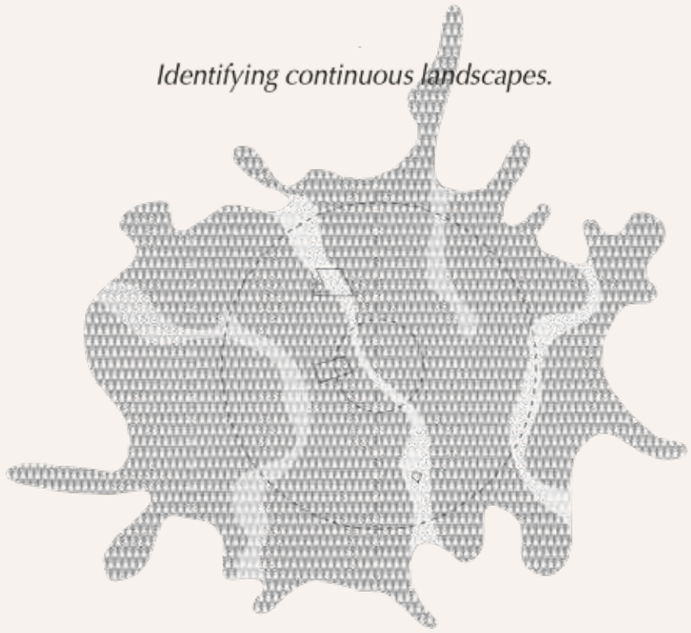


Theory - the CPUL city

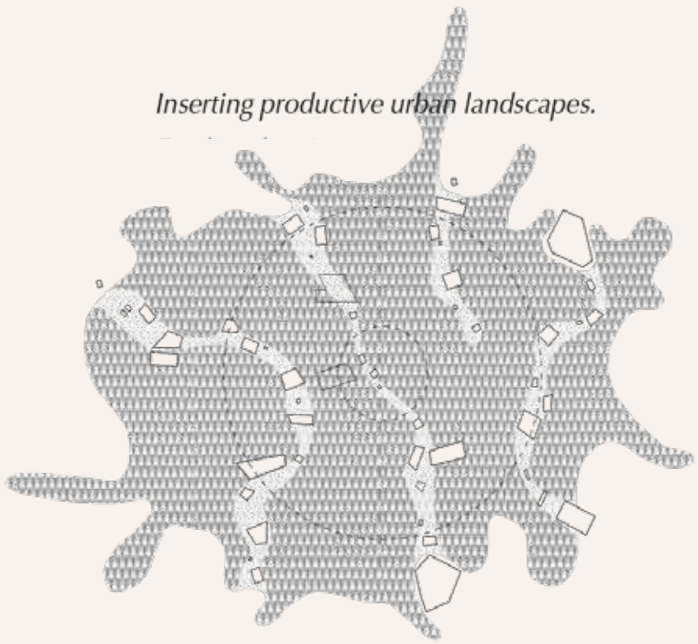
An established city with no CPULs.



Identifying continuous landscapes.



Inserting productive urban landscapes.



Feeding the city.



4. Design synthesis urban masterplan

Bordering

M

+10

+5

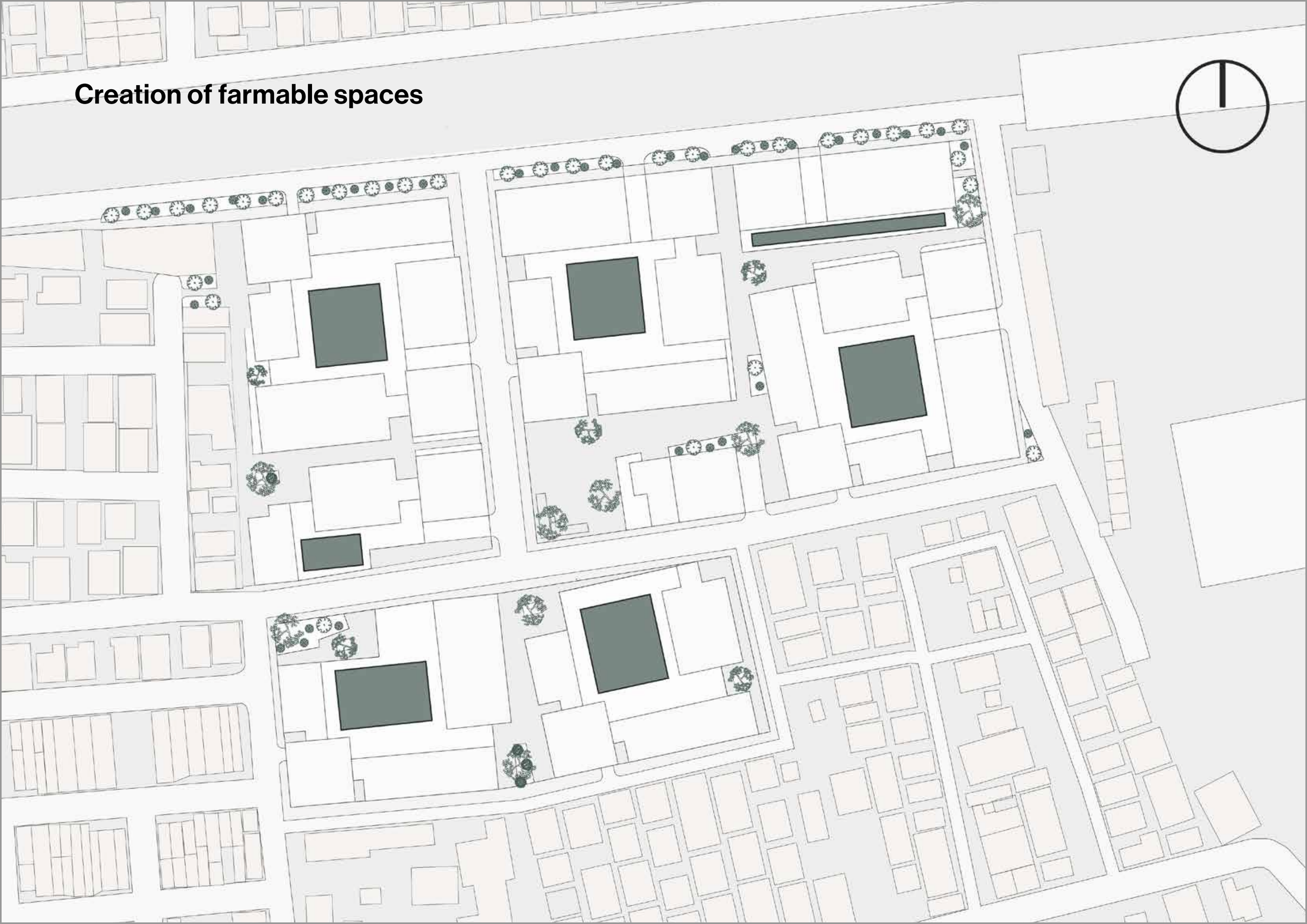
+5

+9

+9

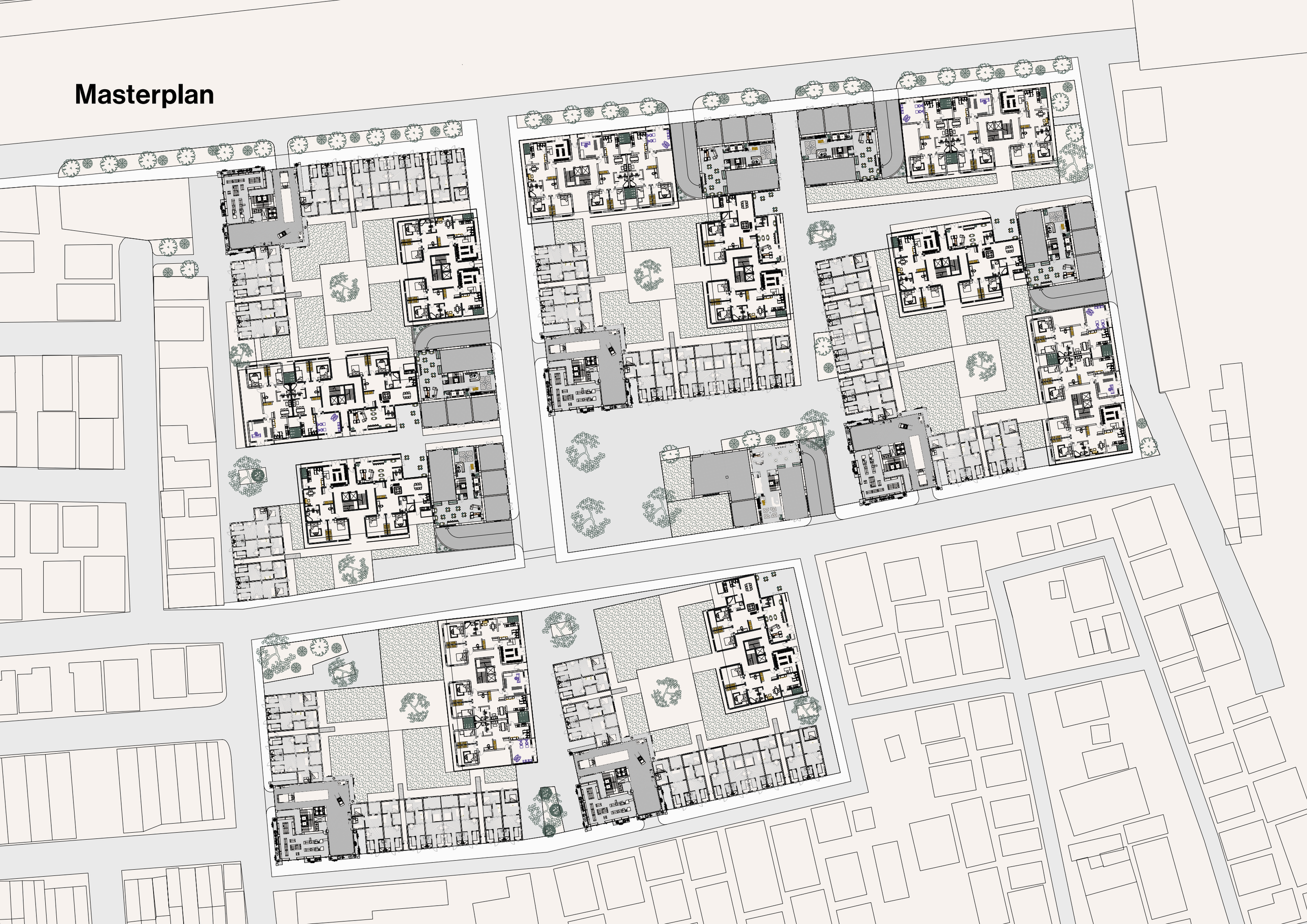
+5

Creation of farmable spaces



Theory - the CPUL city

Masterplan



Typology layout



The following map underlines the four typologies together with the masterplan as a whole to their characteristics and placement.

Total site area:	32.600 m²	
Build footprint:	14.744 m²	(VF included)
Build up area:	53.616 m²	(69.616 m² with VF buildings included)
Farmable footprint area:	20,160 m²	

(actual farmable area dependent on UA type chosen; at least the footprint is returned in farmable area.)

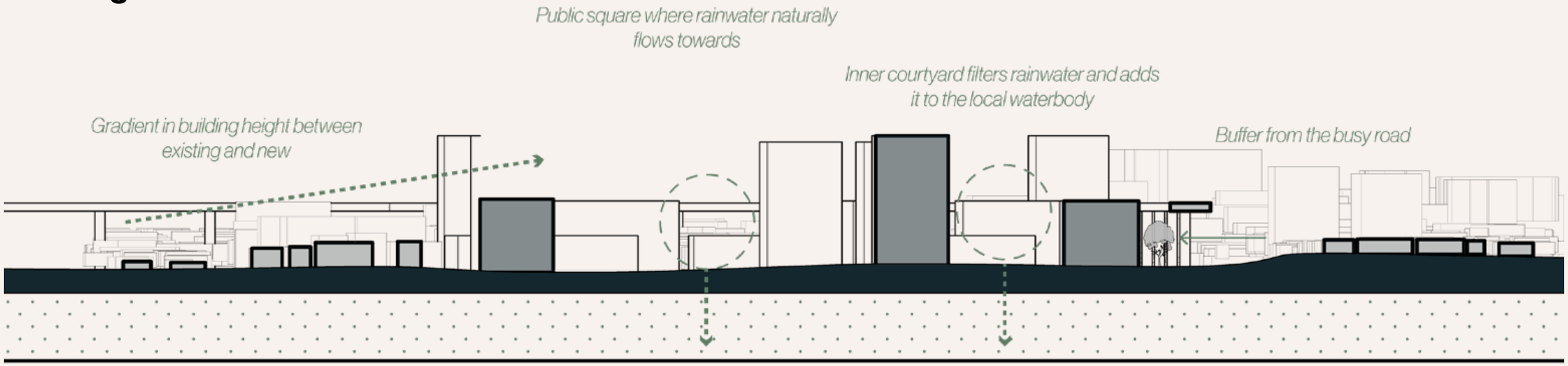
(area for circulation and storage has already been excluded in the calculation.)

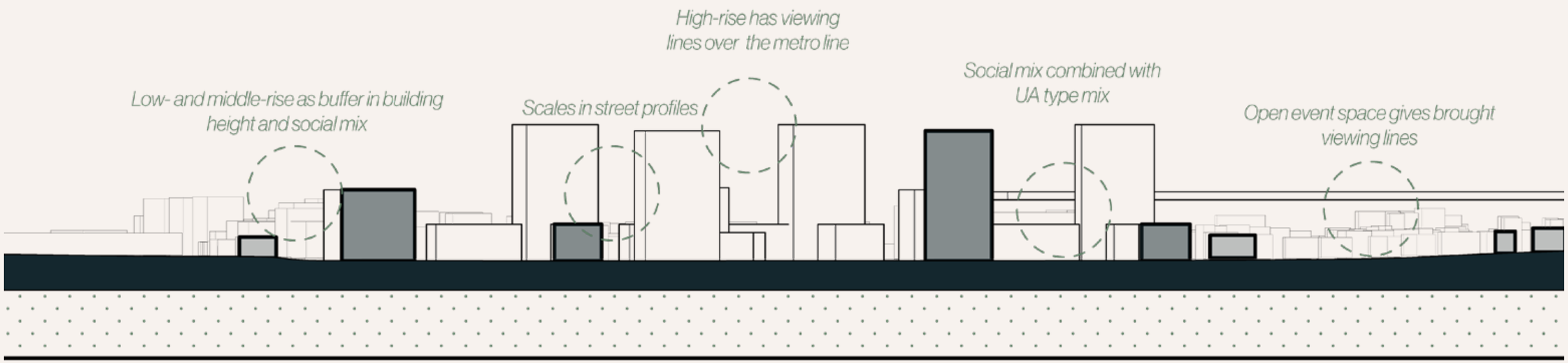
GSI:	0,45		
FSI:	1,64	/	2,14

Amount of buildings of each typology:

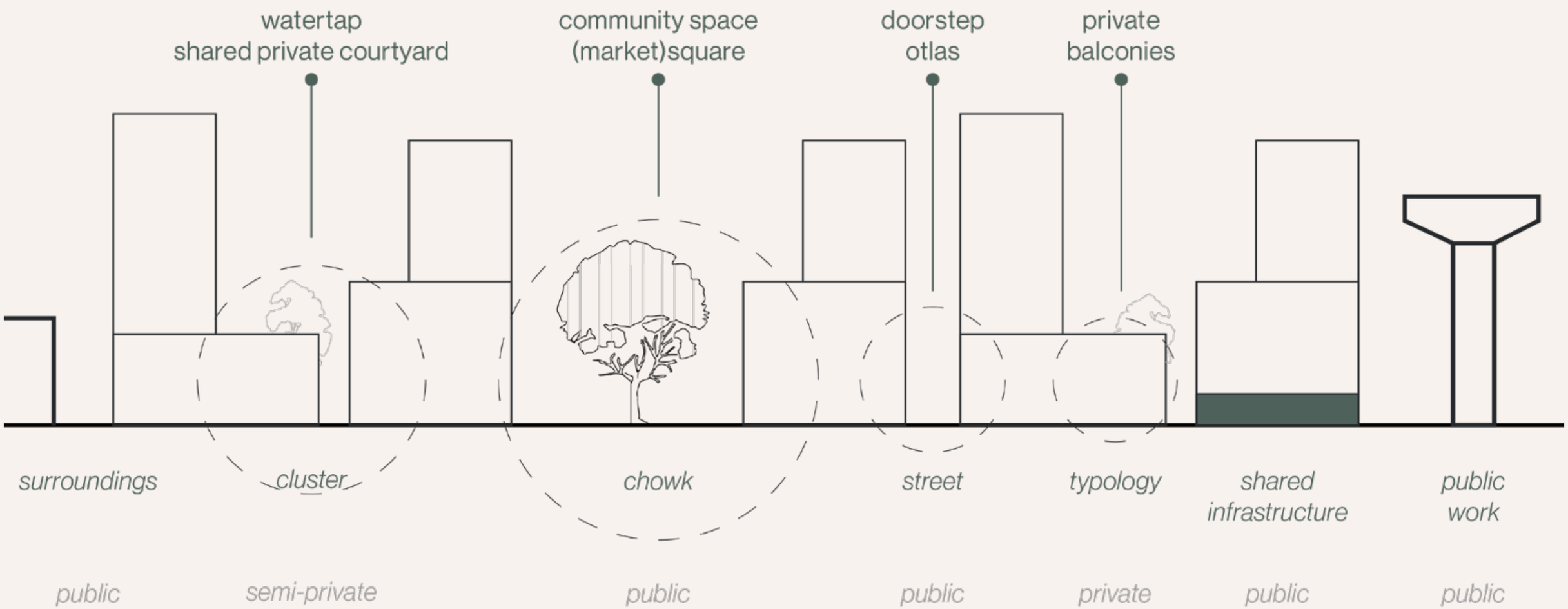
- EWS / LIG = 160 dwelling units
- MIG = 115 dwelling units
- HIG = 48 dwelling units
- VF = 5 building units

Integration into the urban fabric

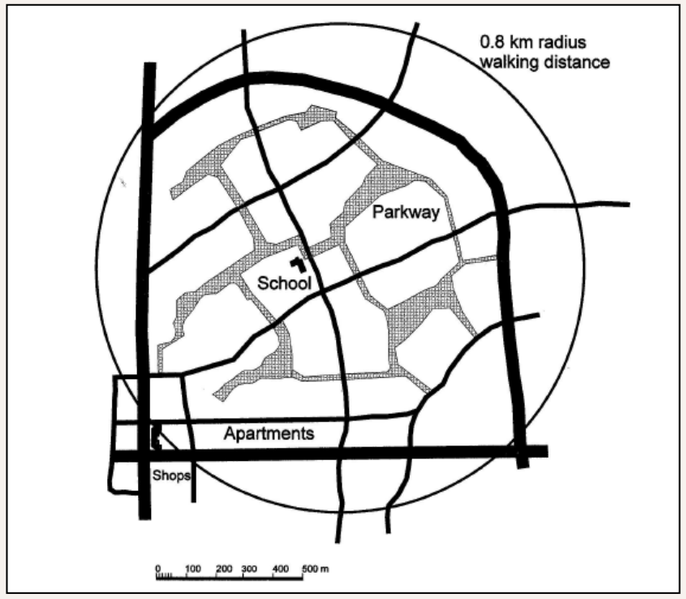


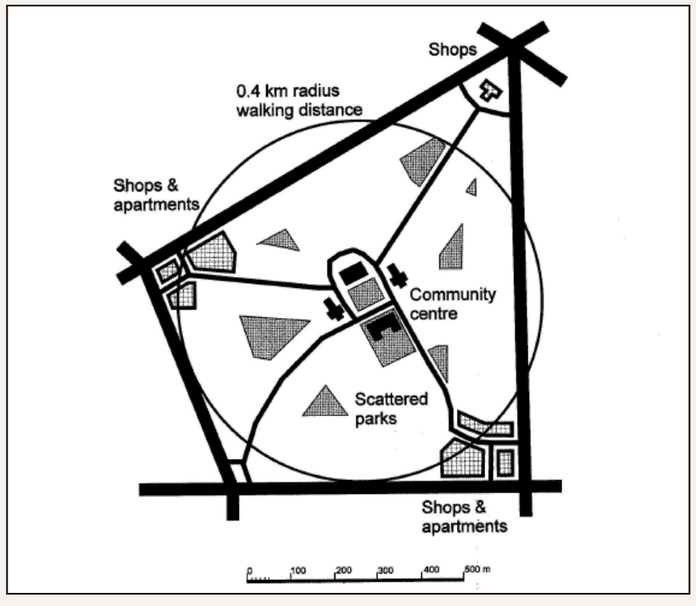


Scales of open spaces



4. The housing cluster



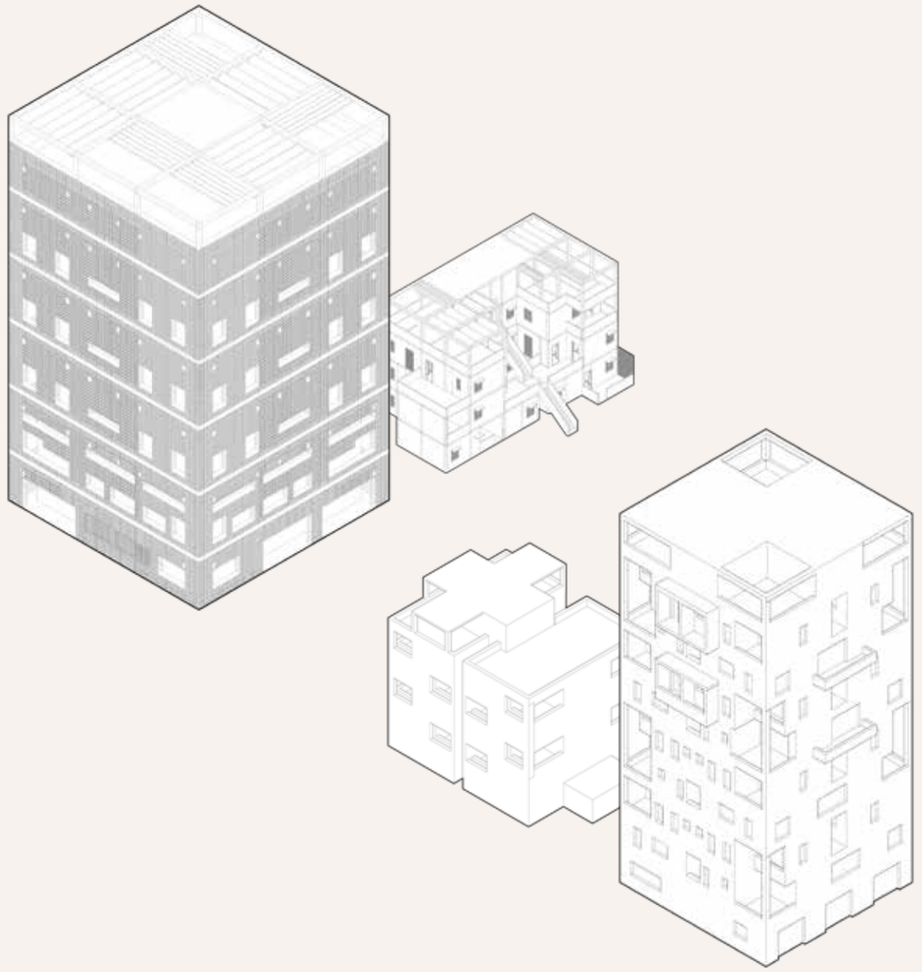




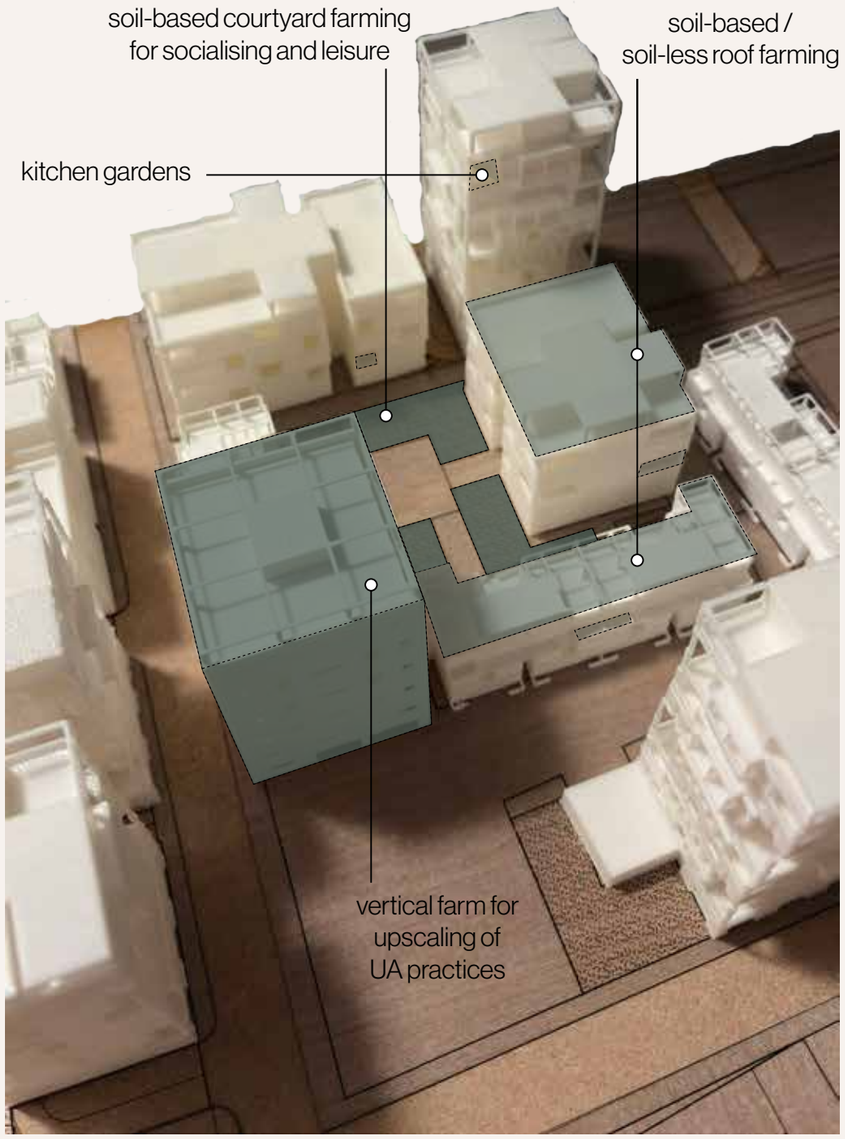
Social mix of households

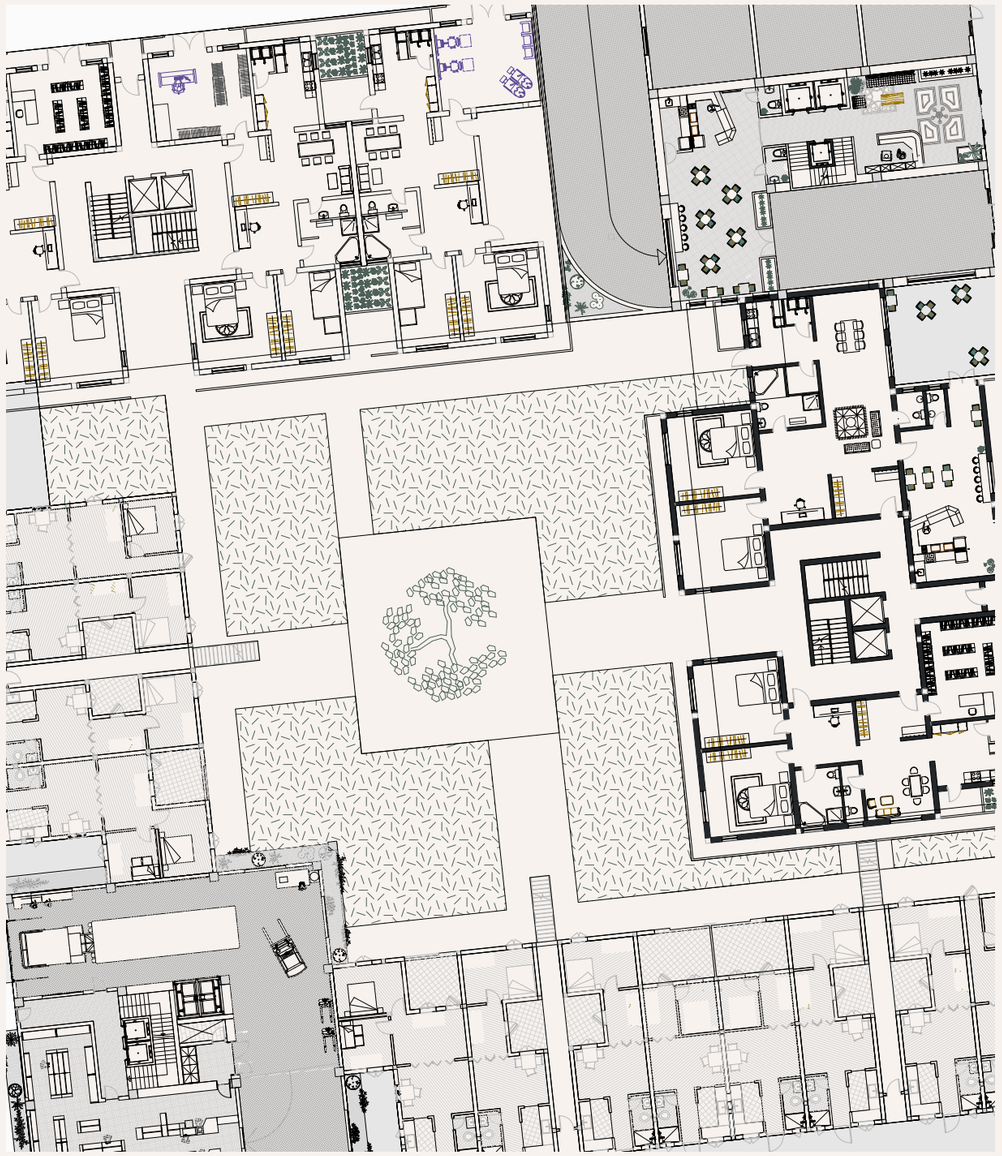
Target groups with their spatial aspirations

Group	m² (excl. outdoor)	Spatial qualities
EWS / LIG	36 - 60	- otla (public and on ground floor only) - wada (private outdoor space) - connection to the street - multifunctional indoor spaces - possibility to expand and grow in time - clear landownership and security/safety - flexible living environment - shared outdoor spaces - shared input UA practices (lower investment costs) - UA as leisure and supplement for cooking - scaling up of UA practices over time
(low and high) MIG	90 - 160	- privacy (only dwellings facing inward the cluster on the groundfloor) - wada (private outdoor space) - multiple bedrooms - elevator - public and private parts of the dwelling are clearly seperated - parking under the building is tried to be provided - kitchen garden - scaling up of UA practices over time - lucrative UA practicing
HIG	200+	- seperate entrance and room for the servant - entrance close to the elevator - multiple large wadas (private outdoor space) - public and private parts of the dwelling are clearly seperated - multiple bedrooms with on-suite bathrooms - parking under the building - kitchen garden (tended by the servant)
VF	- needs to bring back the footprint of the building in multiples of farmable area	- waste management - storage - public plinth of shops and delivery area - food processing - offices and control room - germination and cleaning layer - production floors - environmental control levels - climate installation spaces (water, electricity, ventilation) - storage tanks - soil-less UA practices placement - roof is also farmable area



UA type mix


soil-based courtyard farming
for socialising and leisure
soil-based /
soil-less roof farming
kitchen gardens
vertical farm for
upscaling of
UA practices

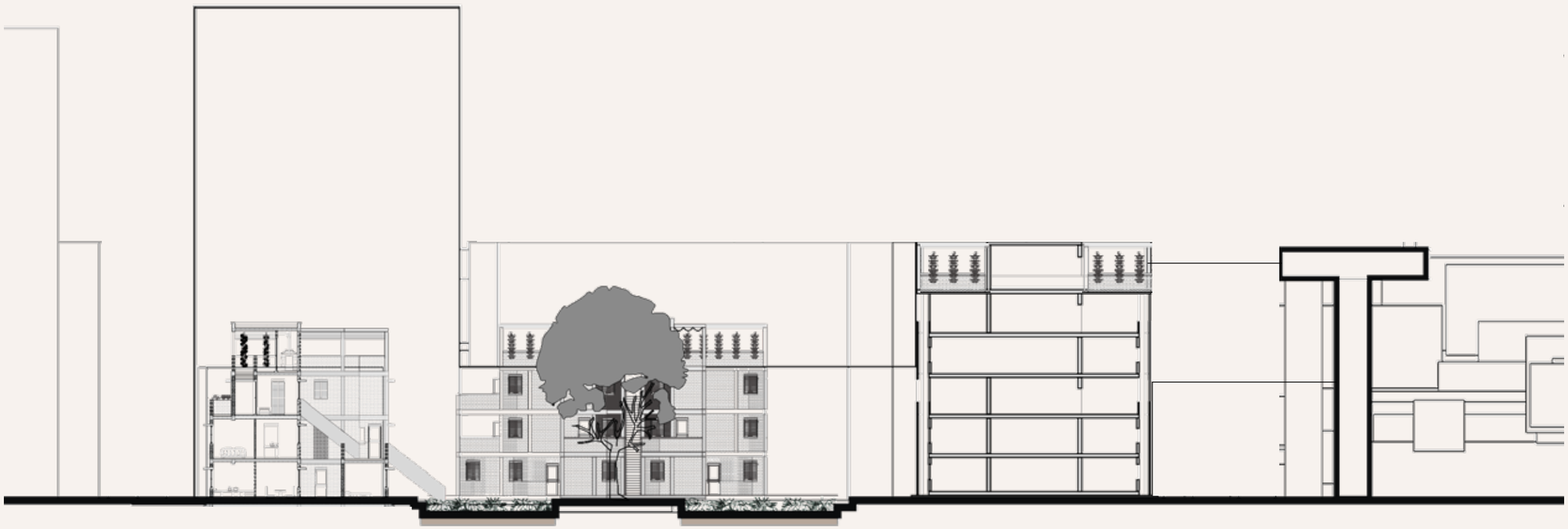


Cluster buildup

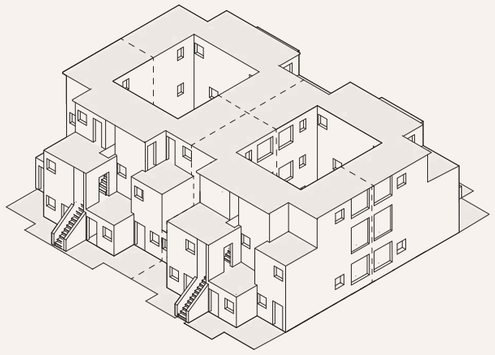


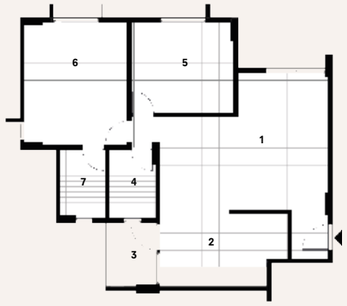


Typical section through the cluster



Case study analysis for every typology type





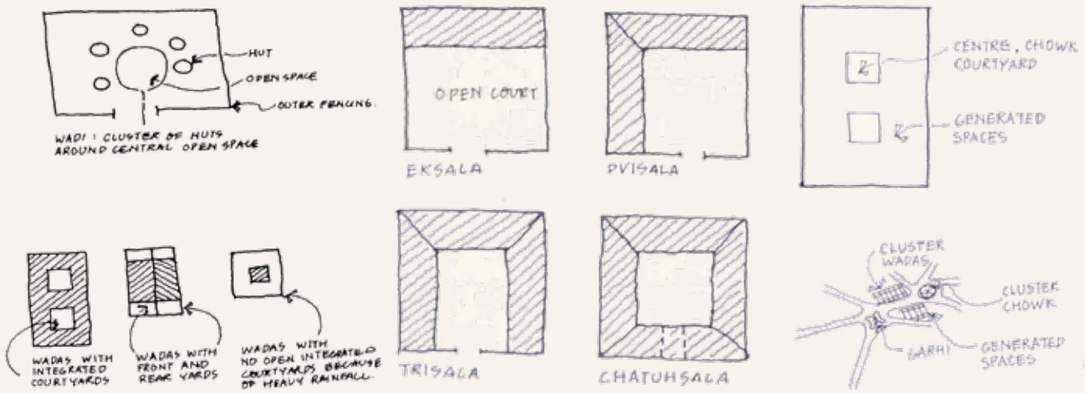


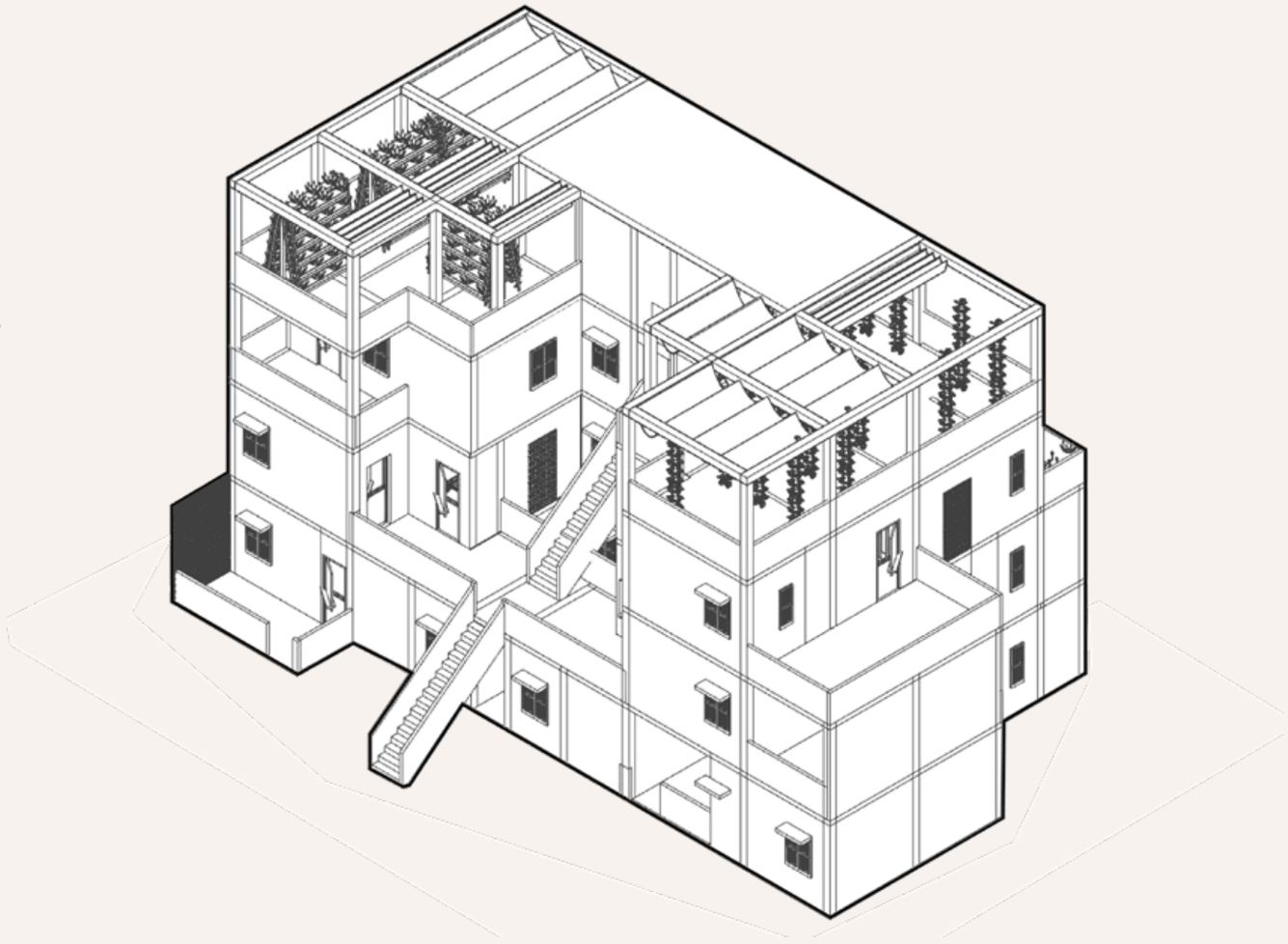




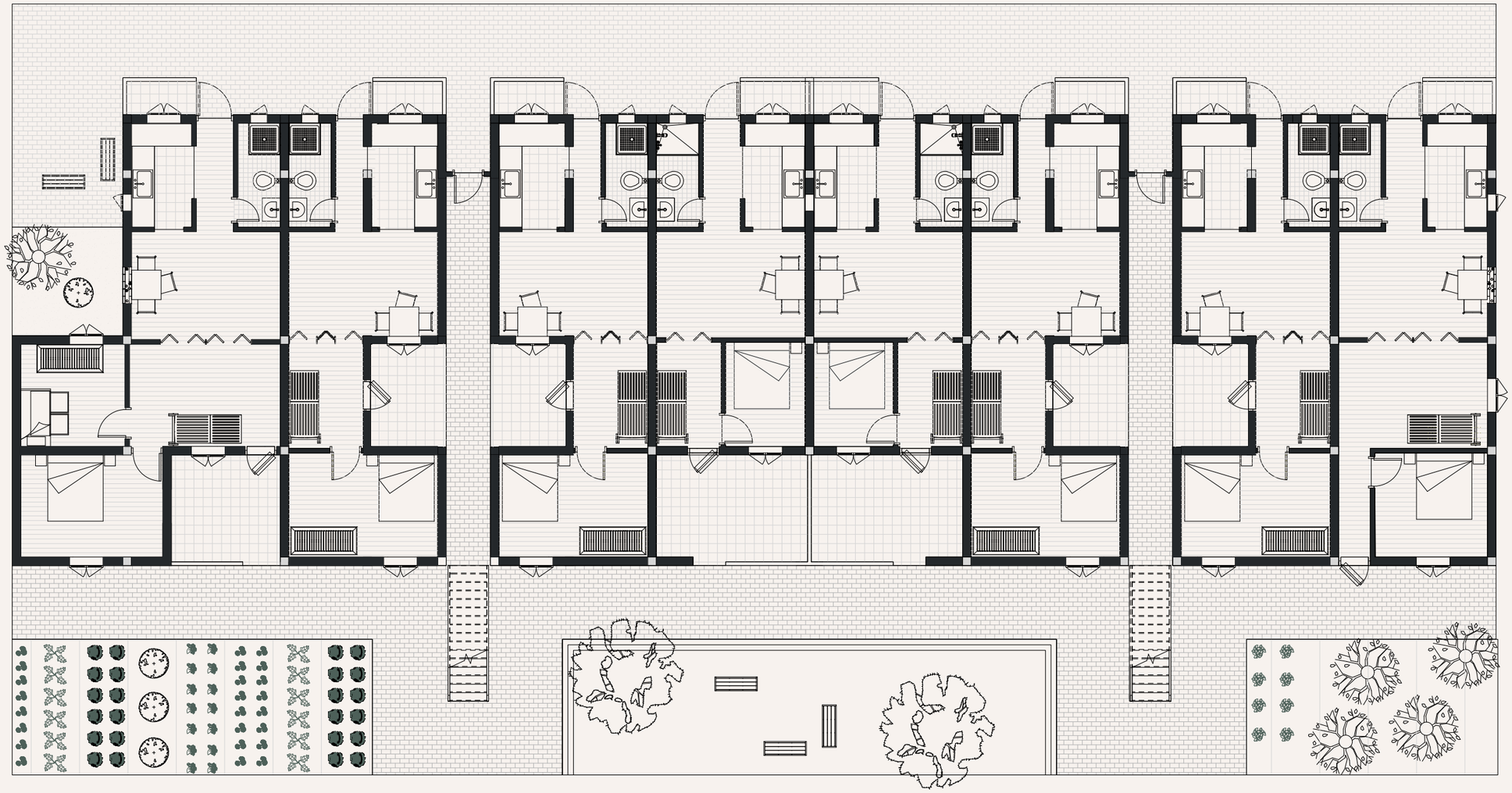


4. LIG housing unit

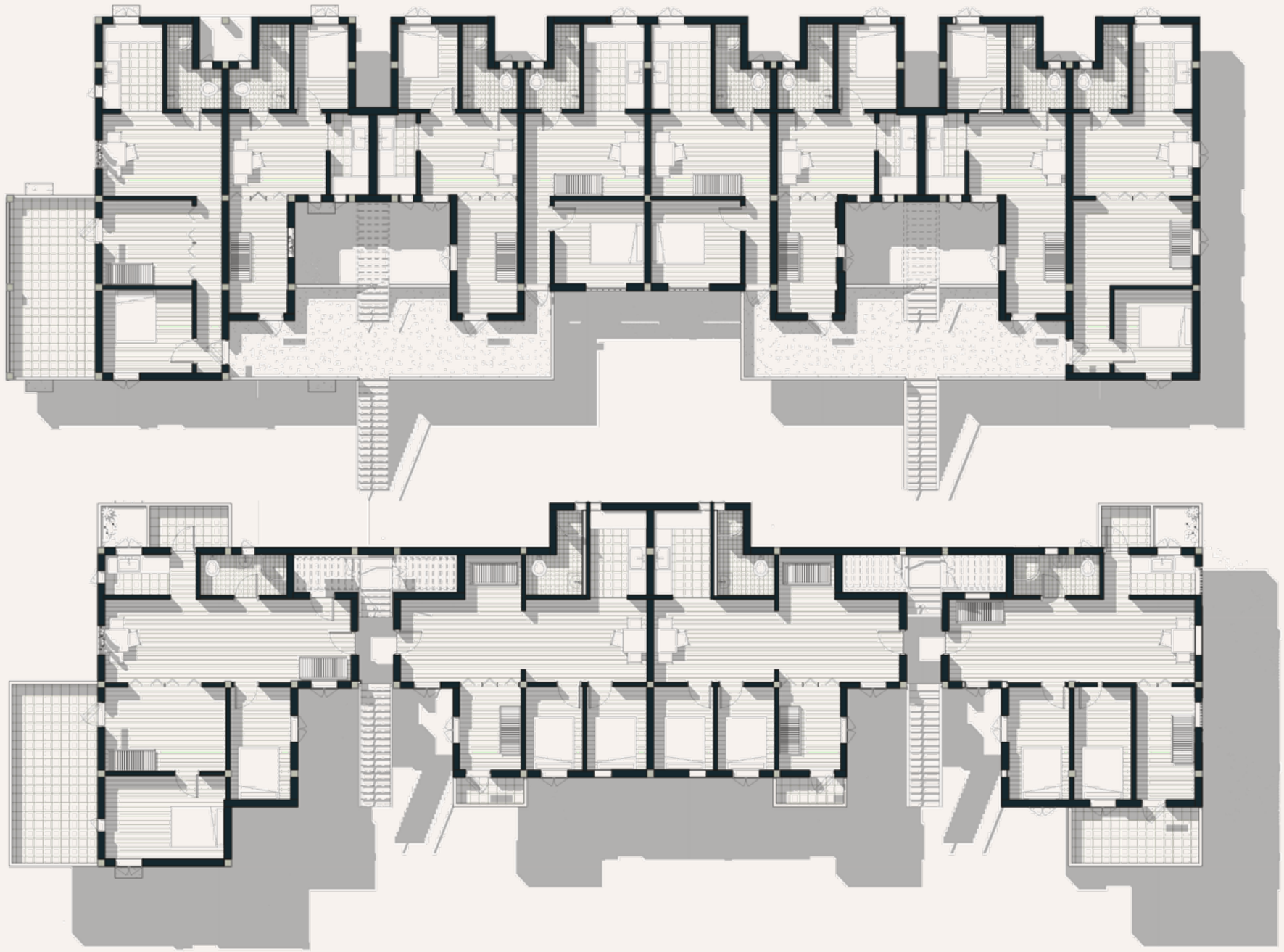




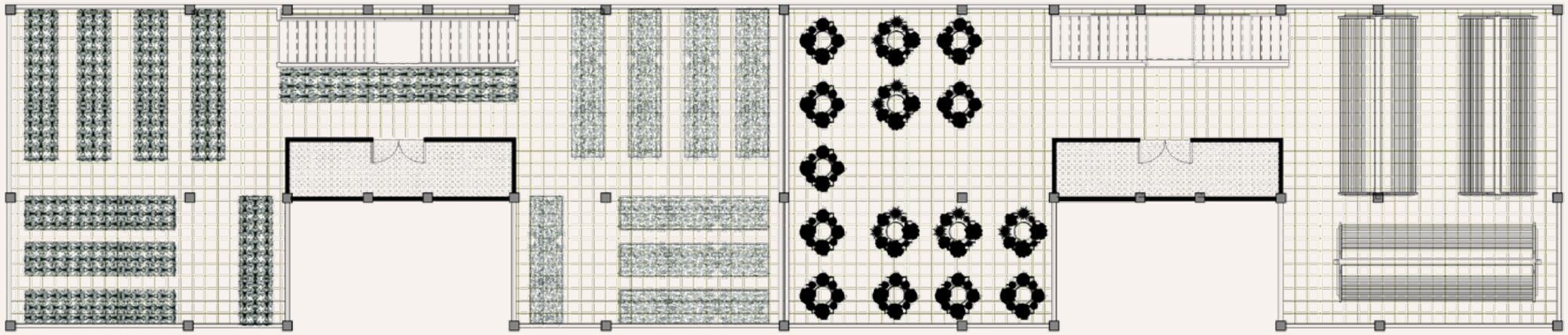
Groundfloorplan



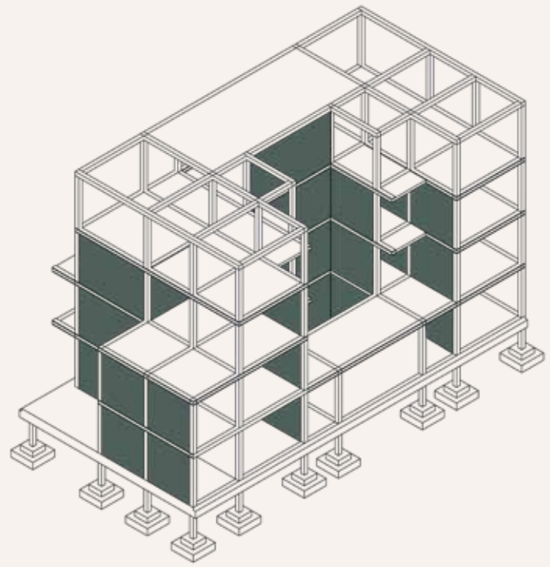
Floorplans

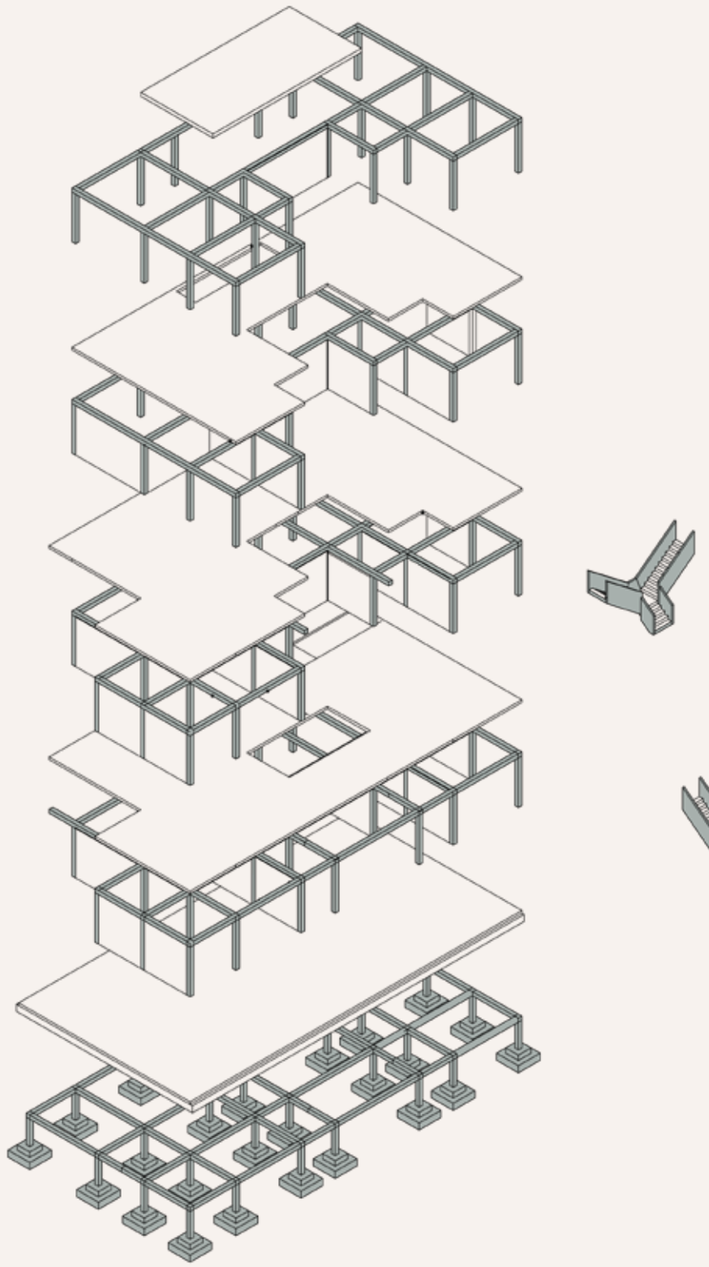


UA practice space on the roof

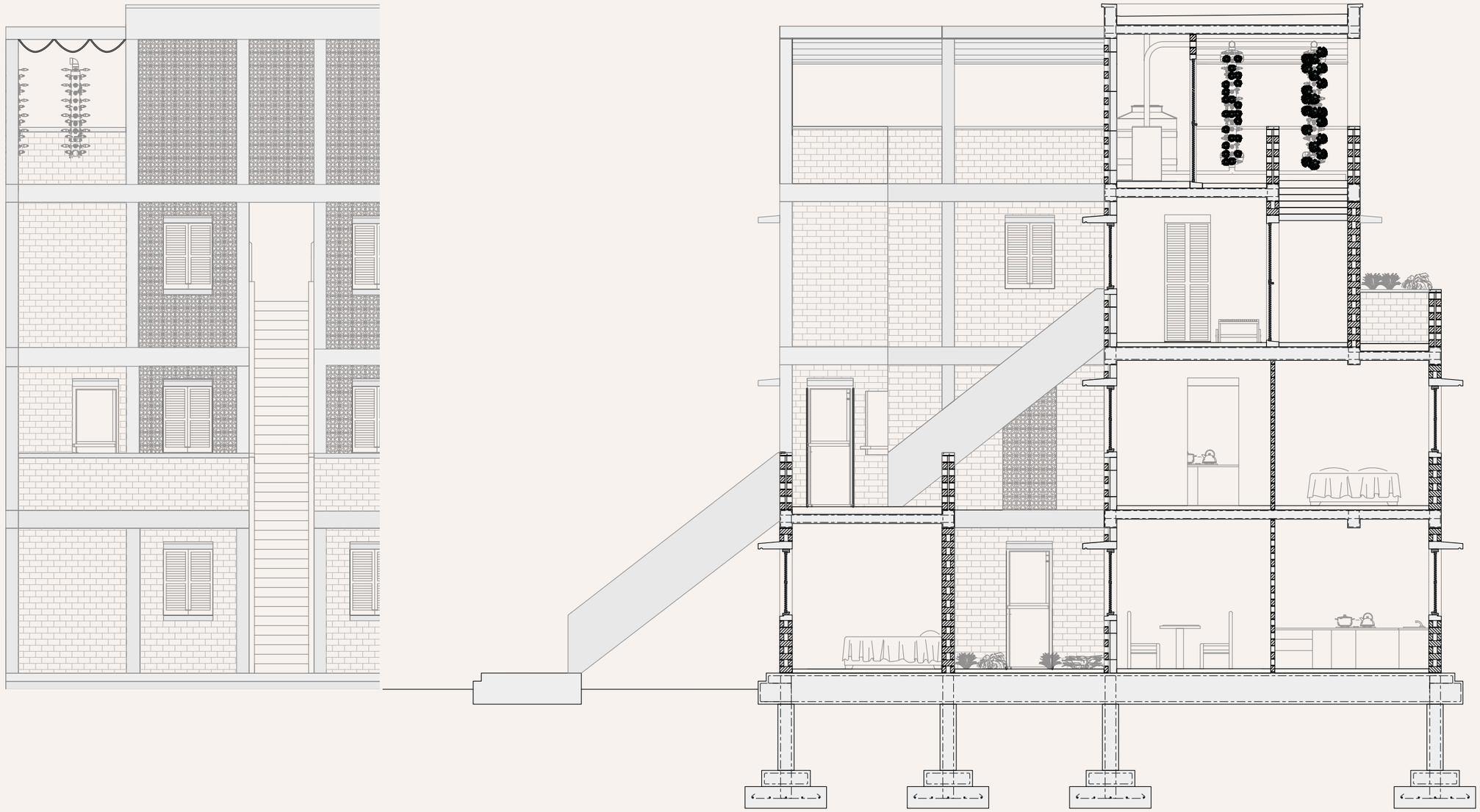


Construction

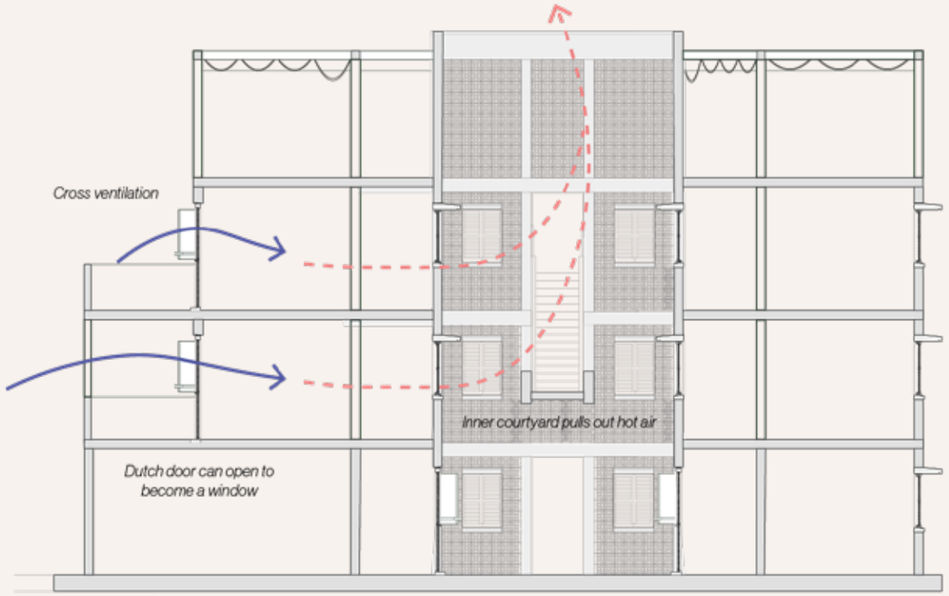


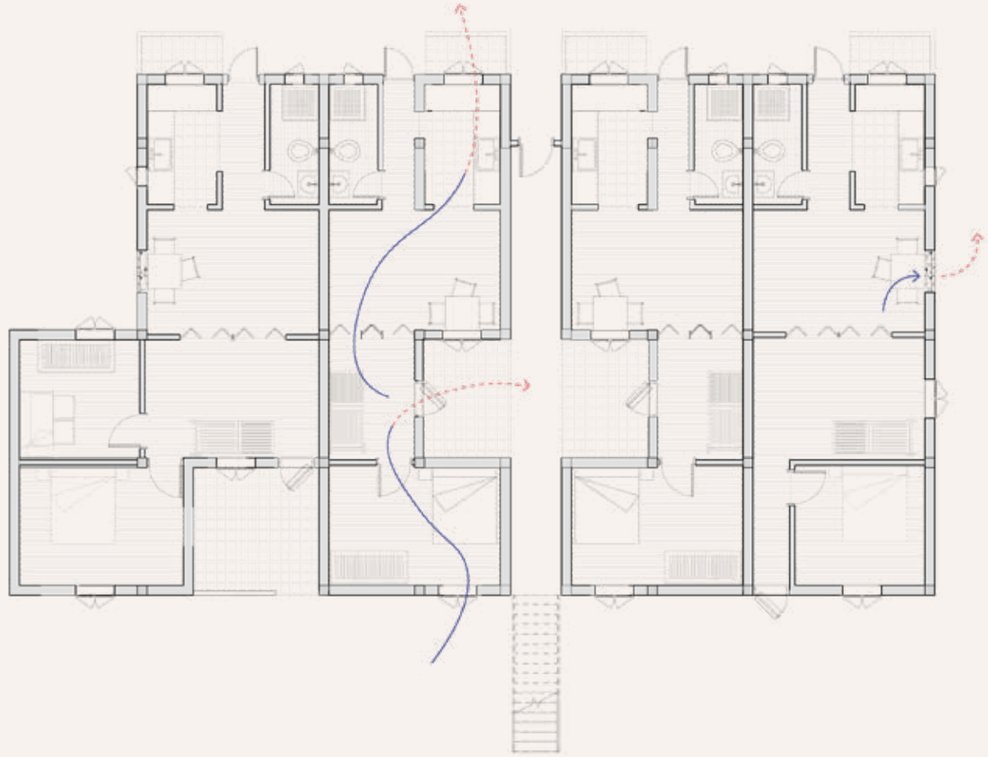


Dwelling units forming around the center courtyard

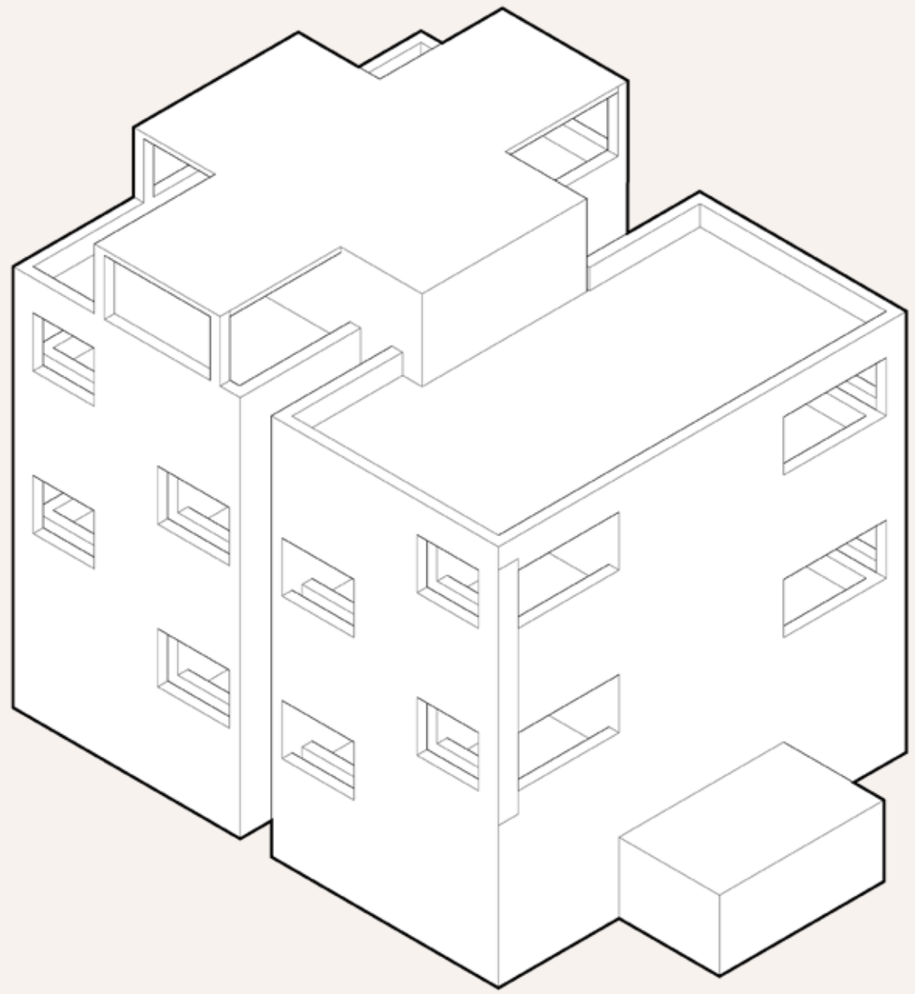


Climate design





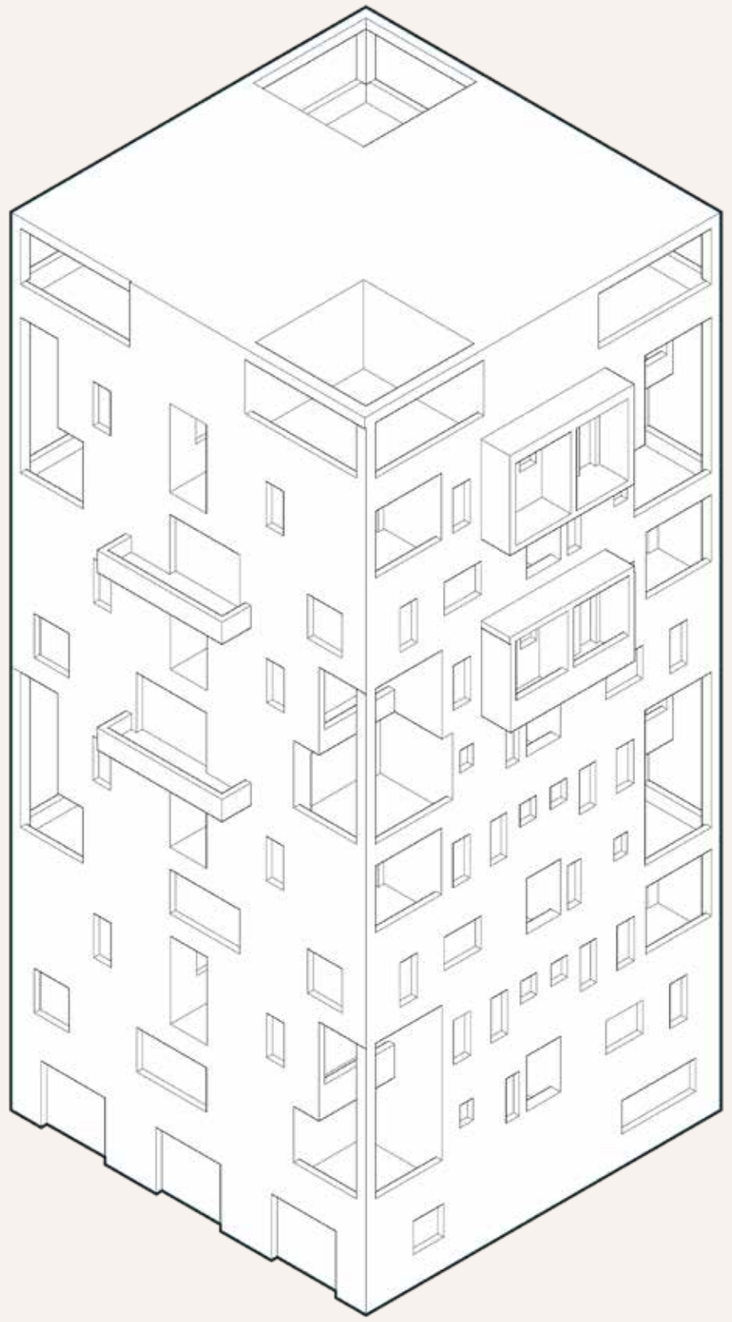
4. MIG typology



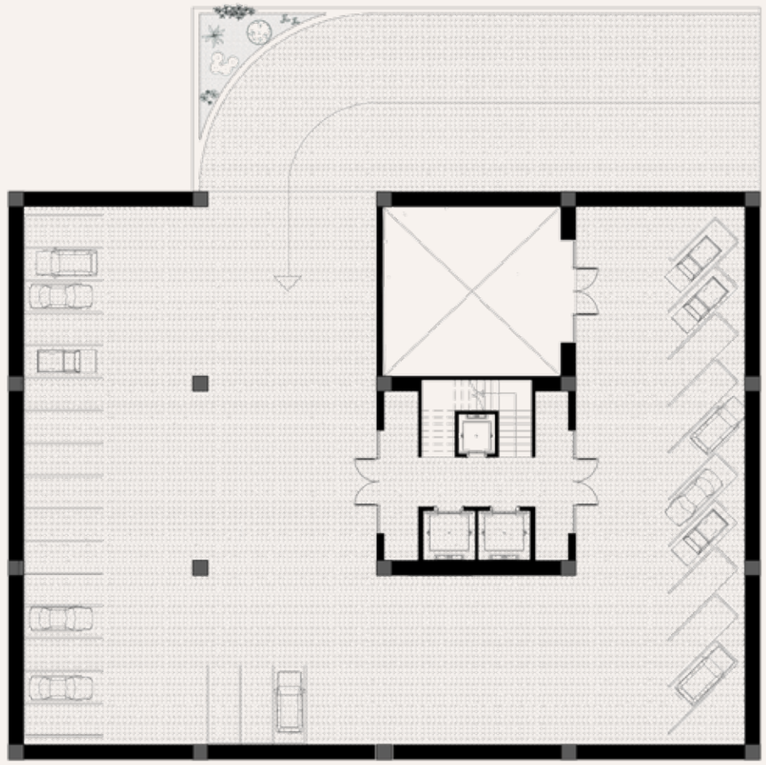
Typical groundfloor plan layout



4.HIG typology

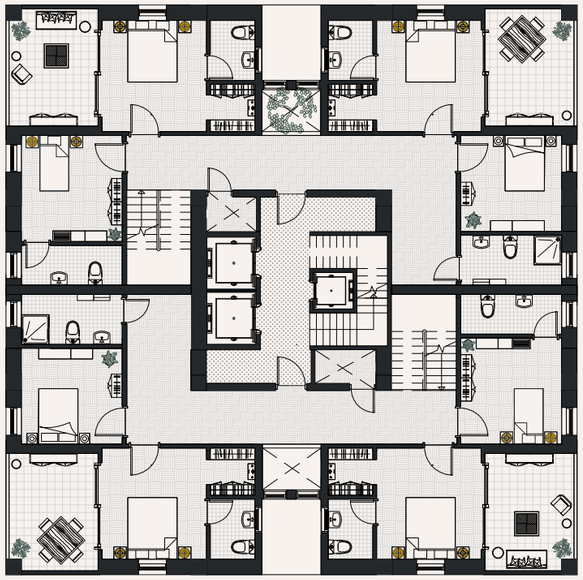


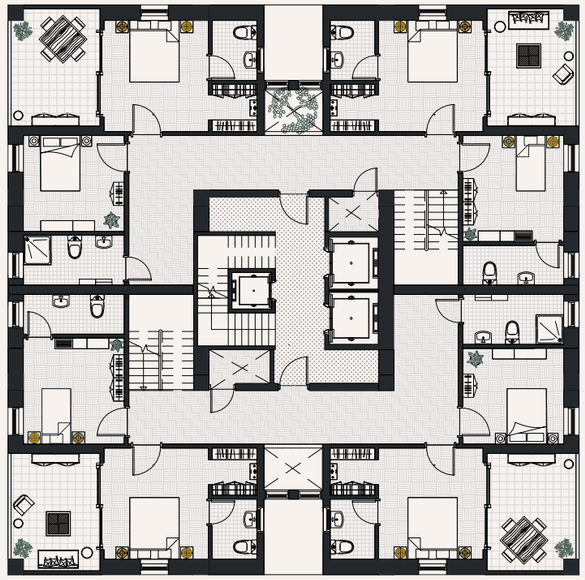
Underground parking and public groundfloor plinth

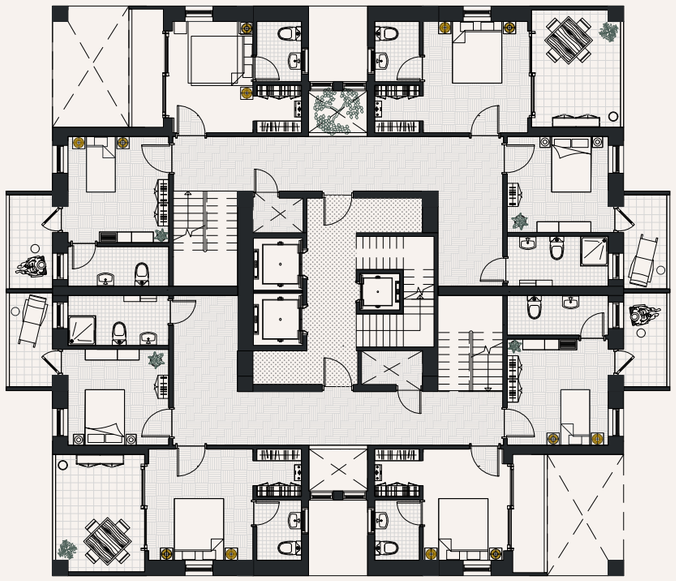


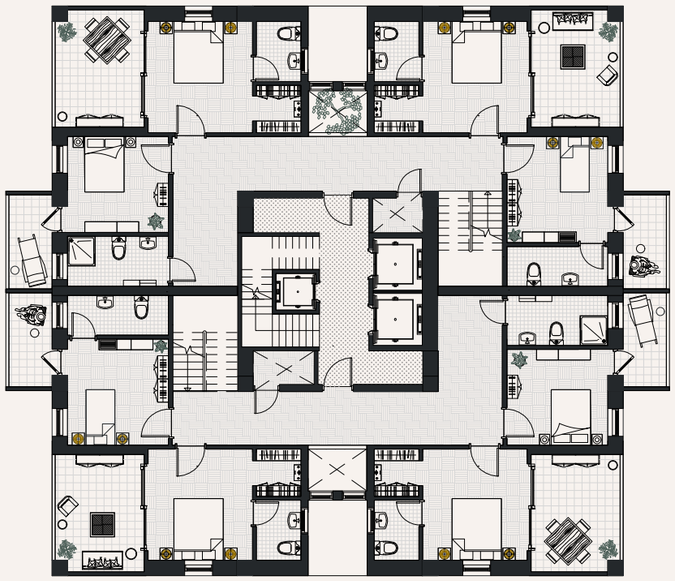


Typical dwelling duplex houses

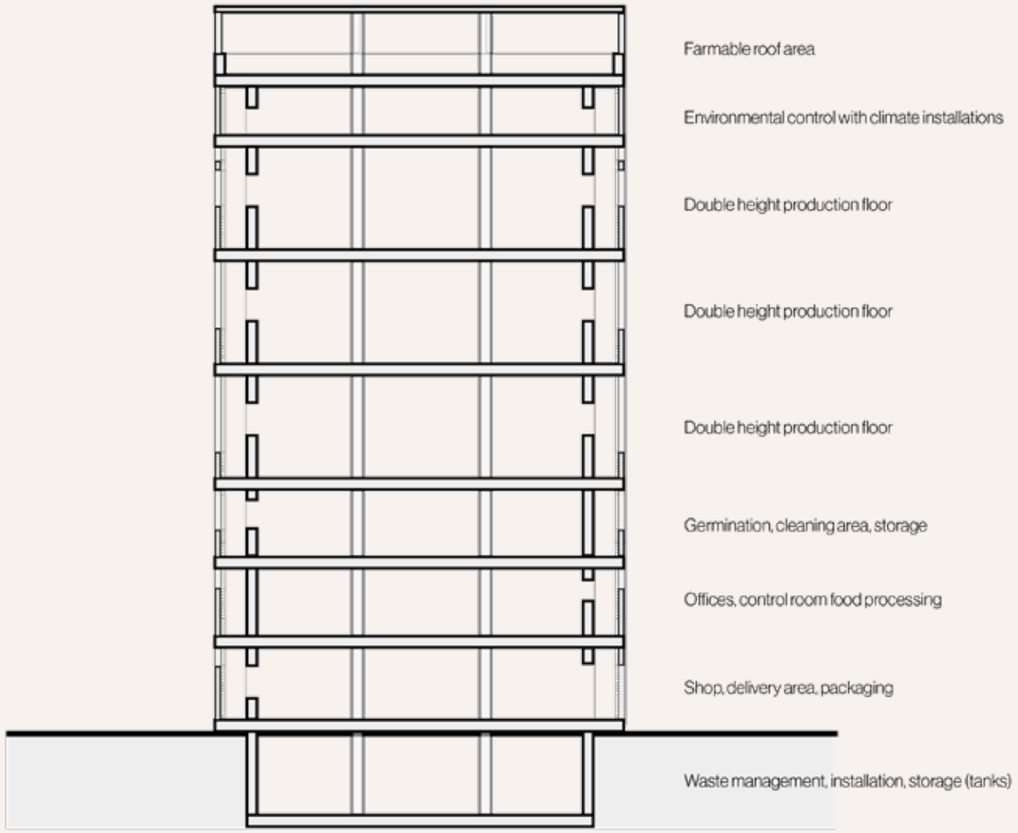


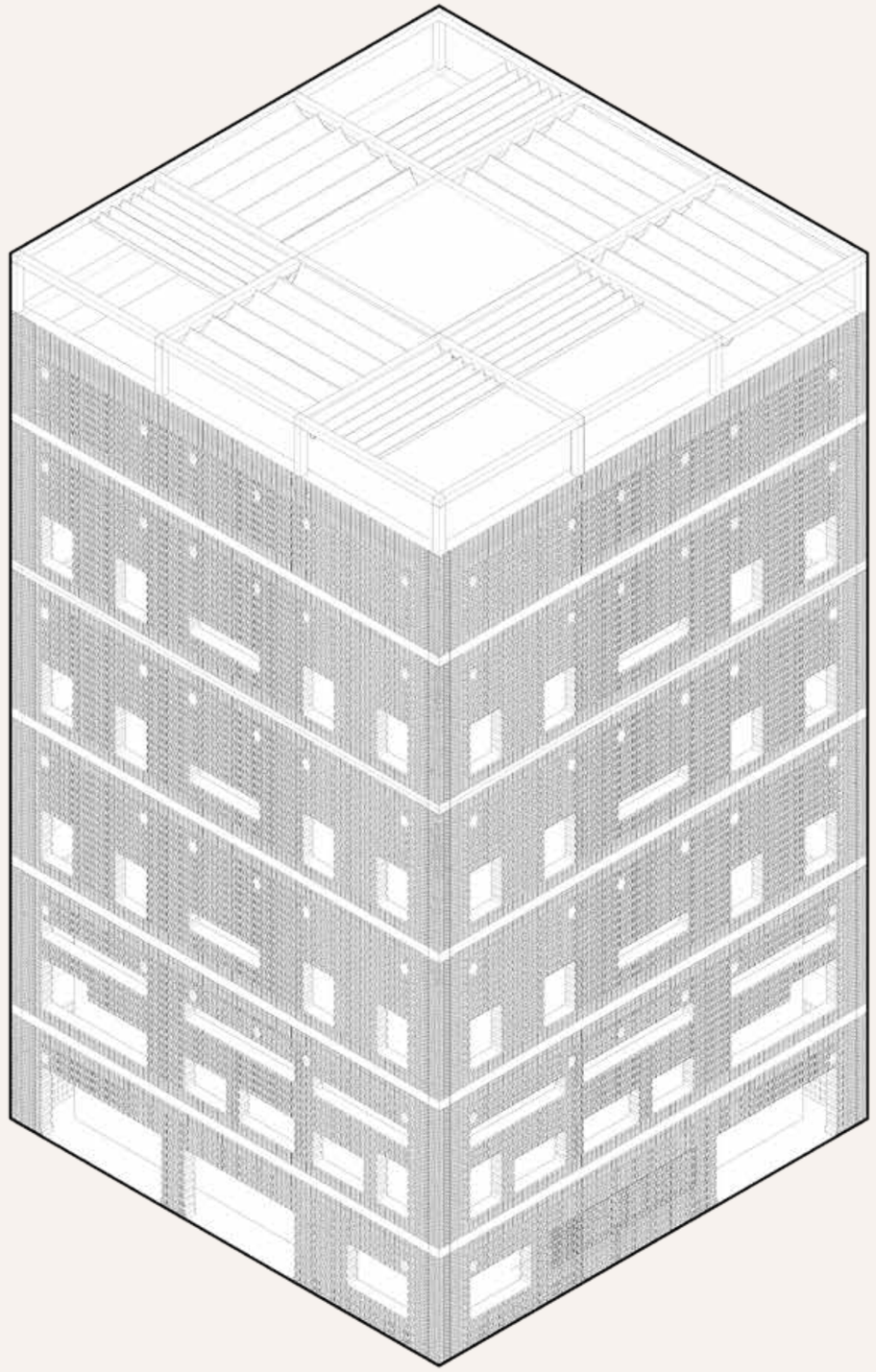




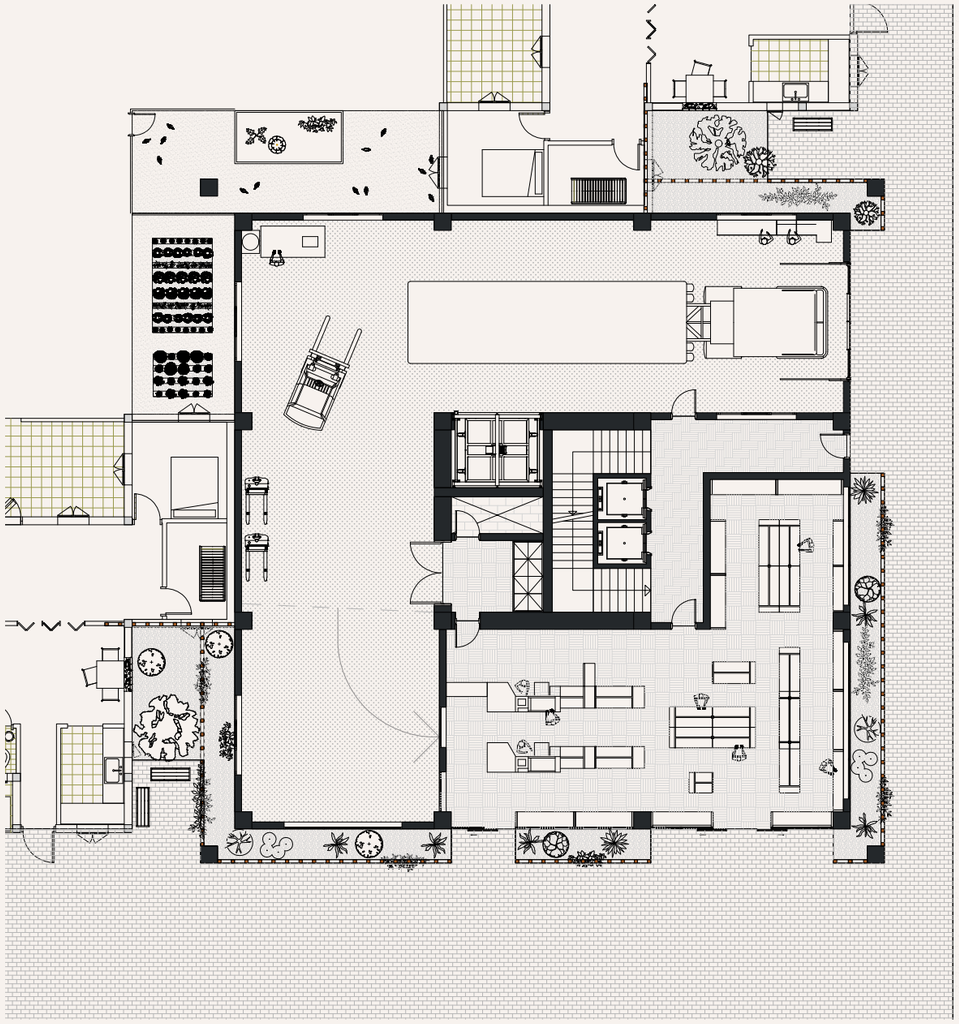


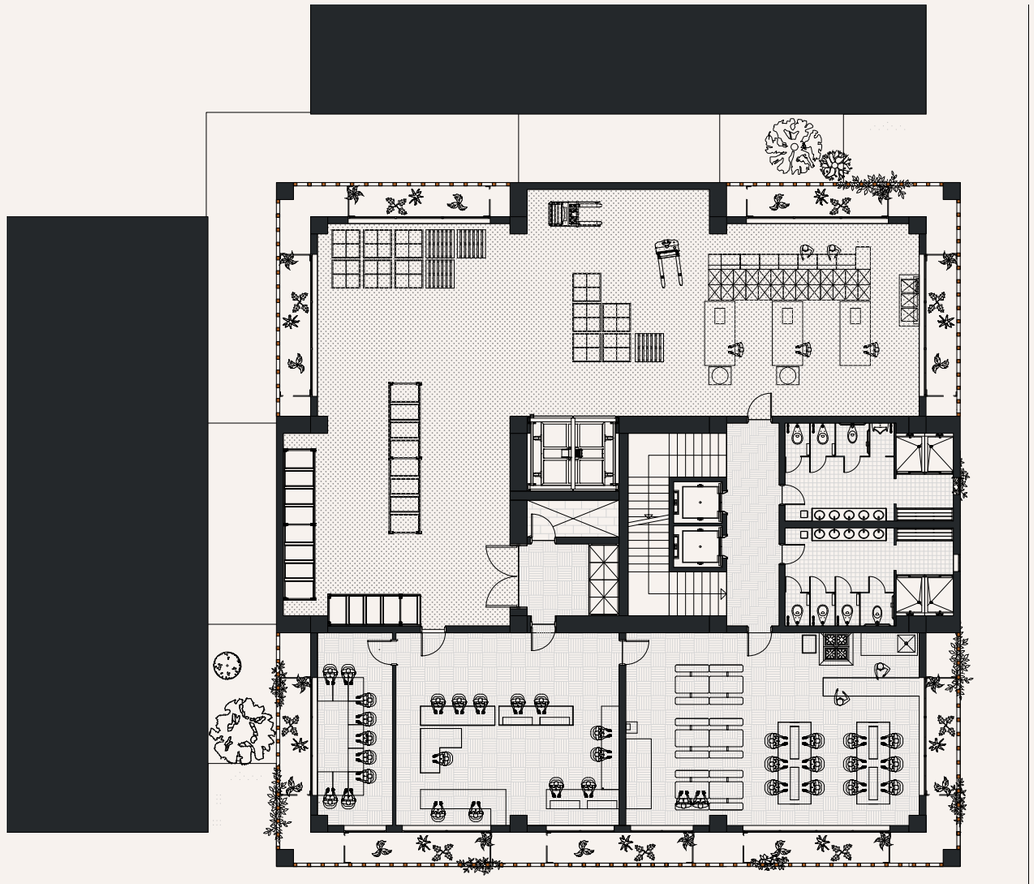
4. Vertical farm



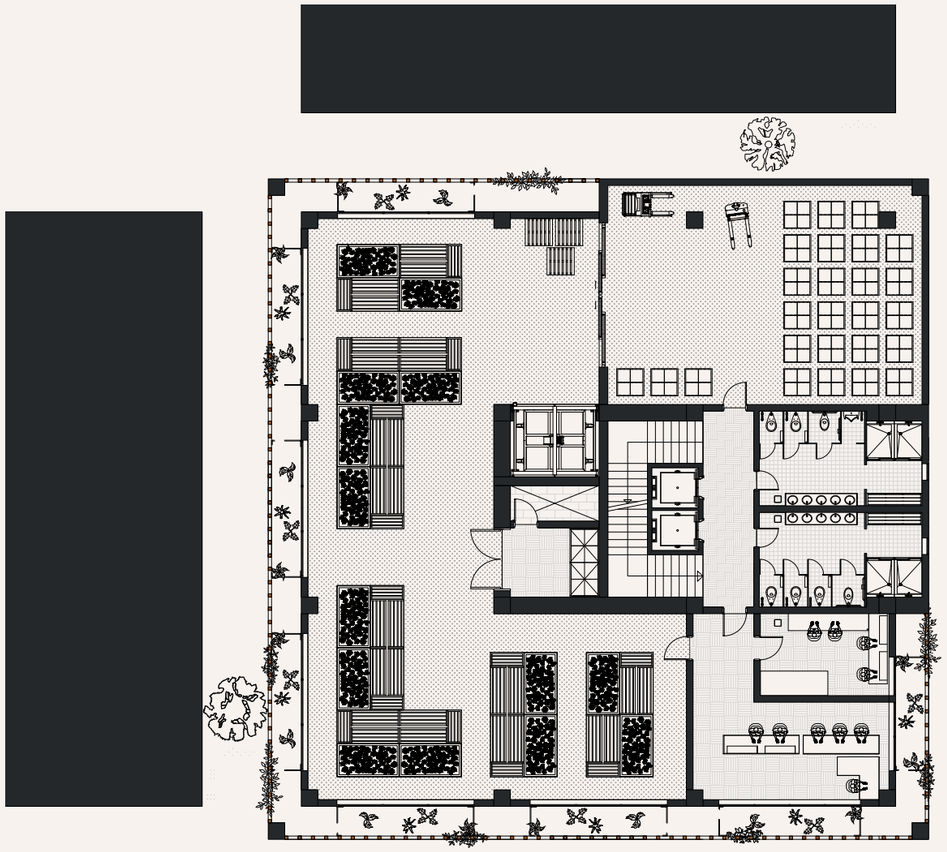


Ground- and first floor plan



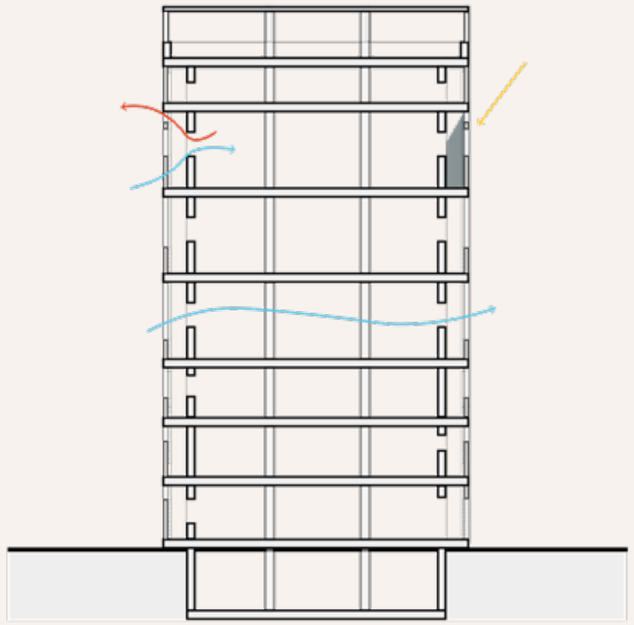


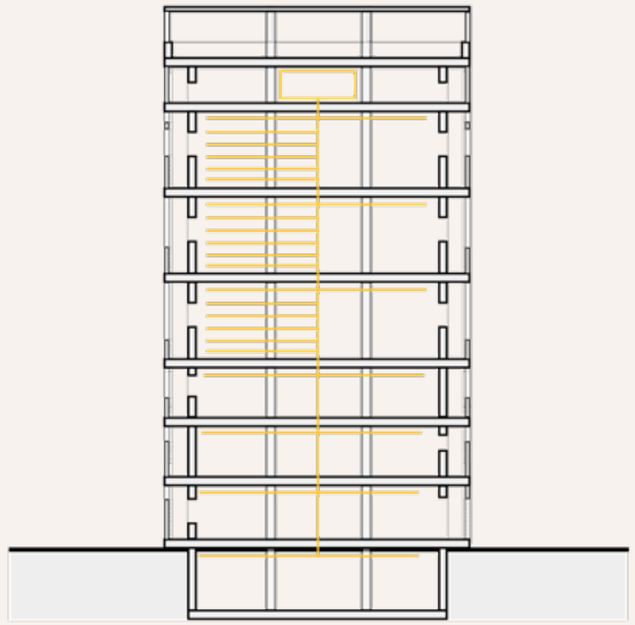
Second floor plan and production floor plan

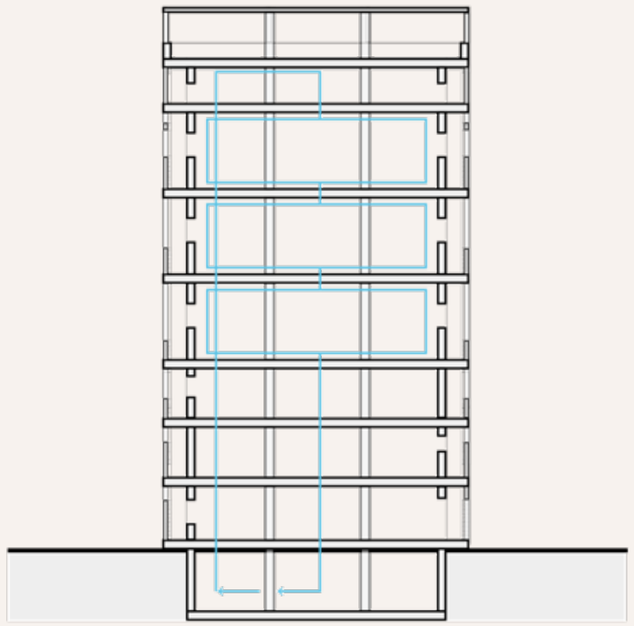


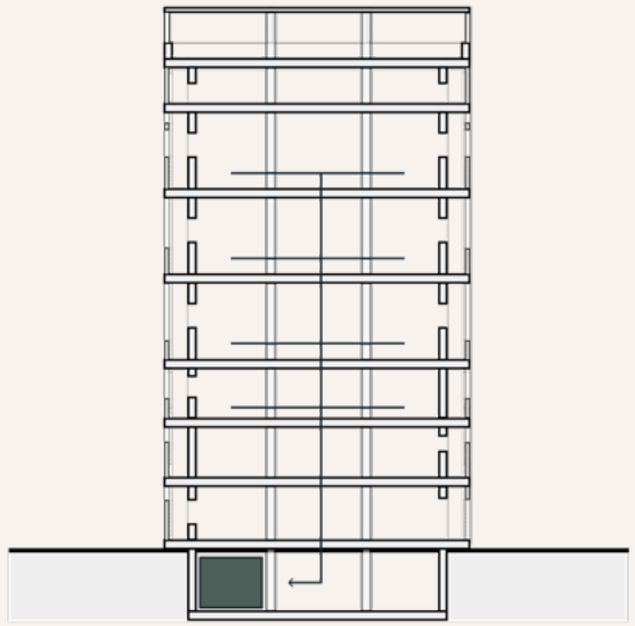


Climate design

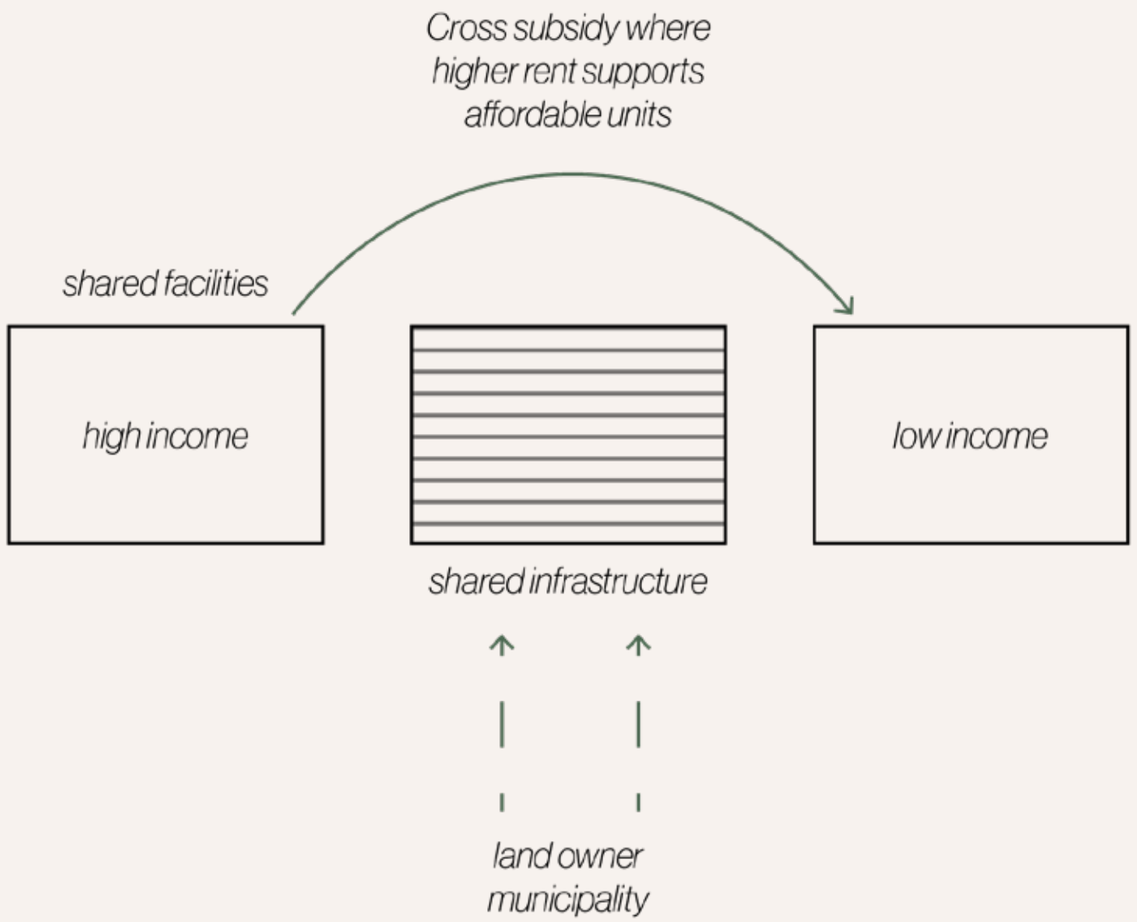




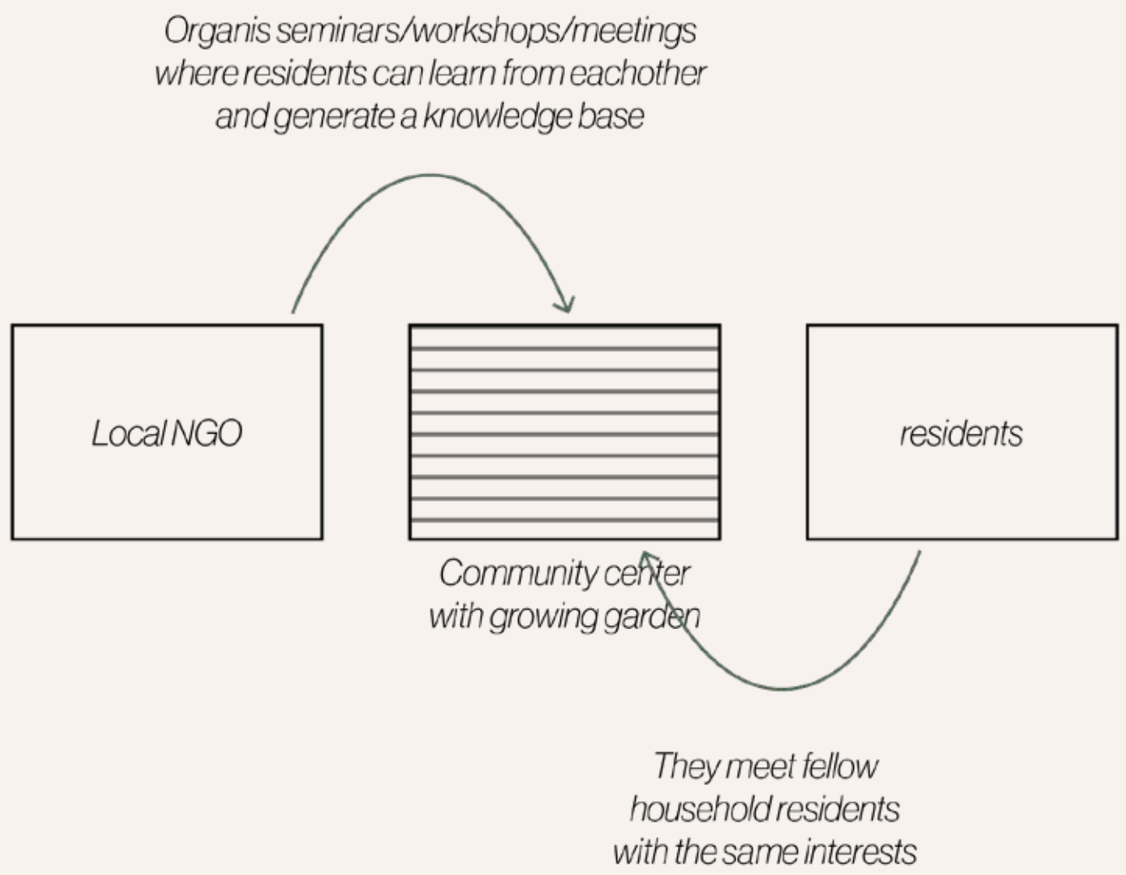




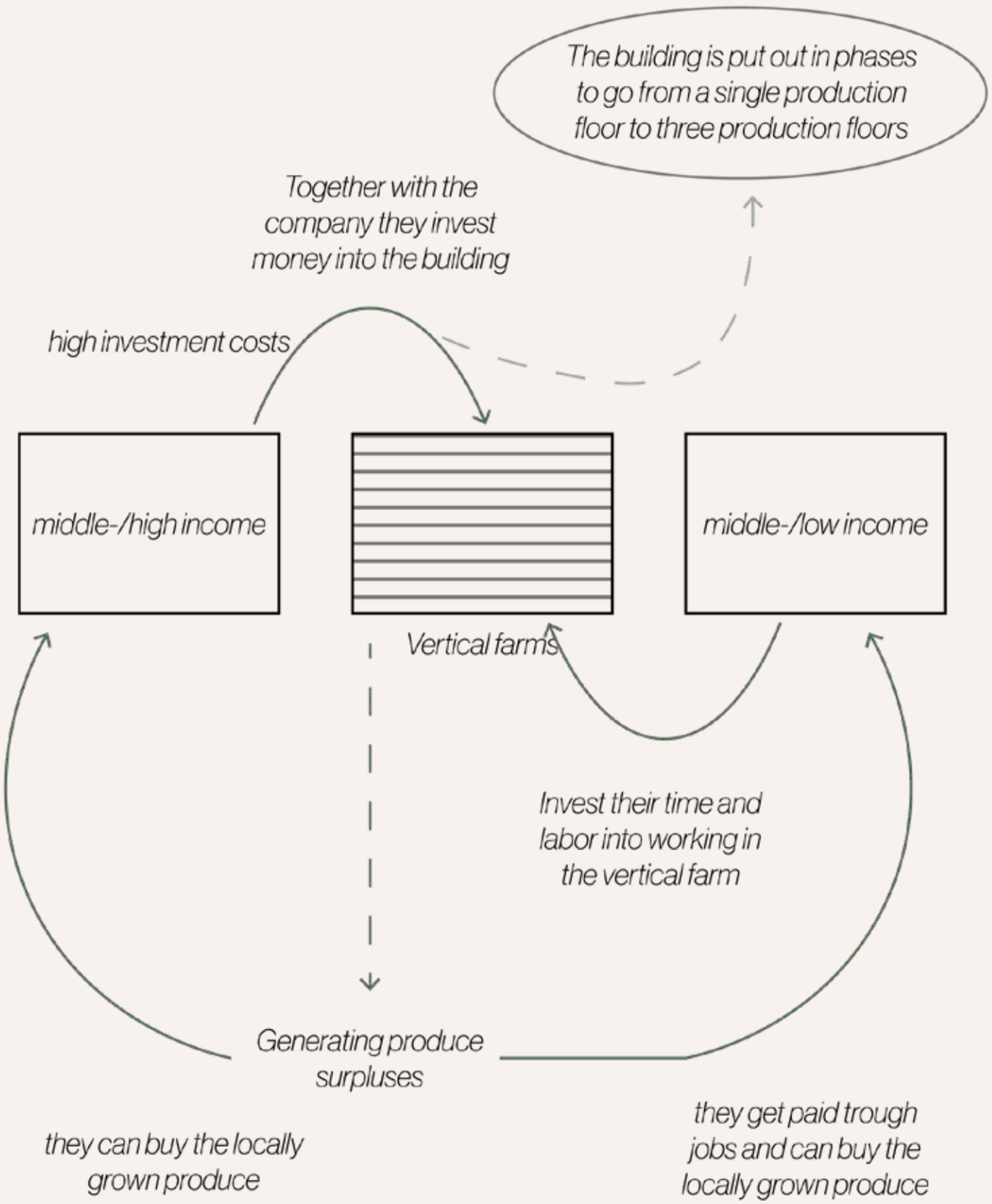
5. Managerial strategy - cross subsidition



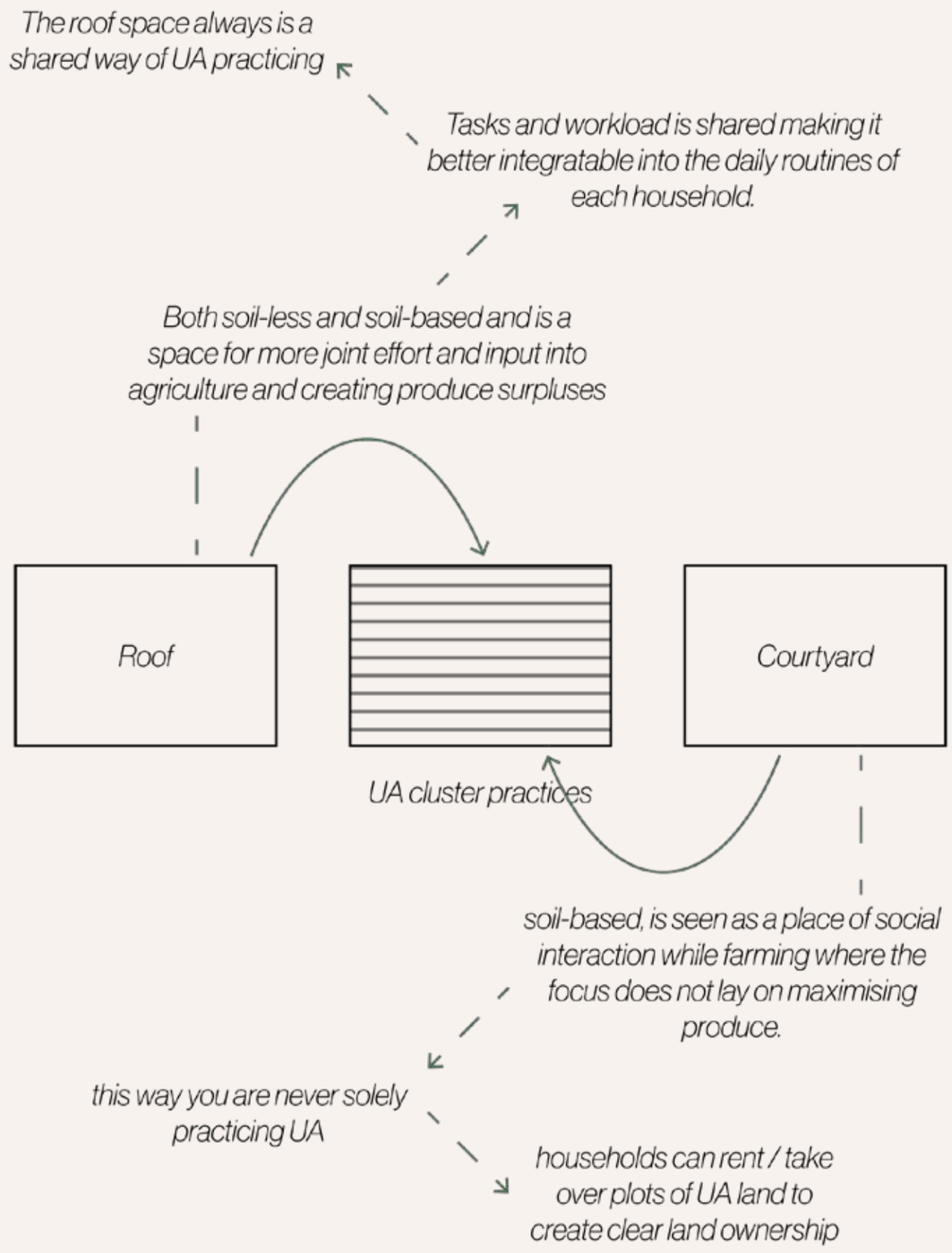
Long-term UA engagement



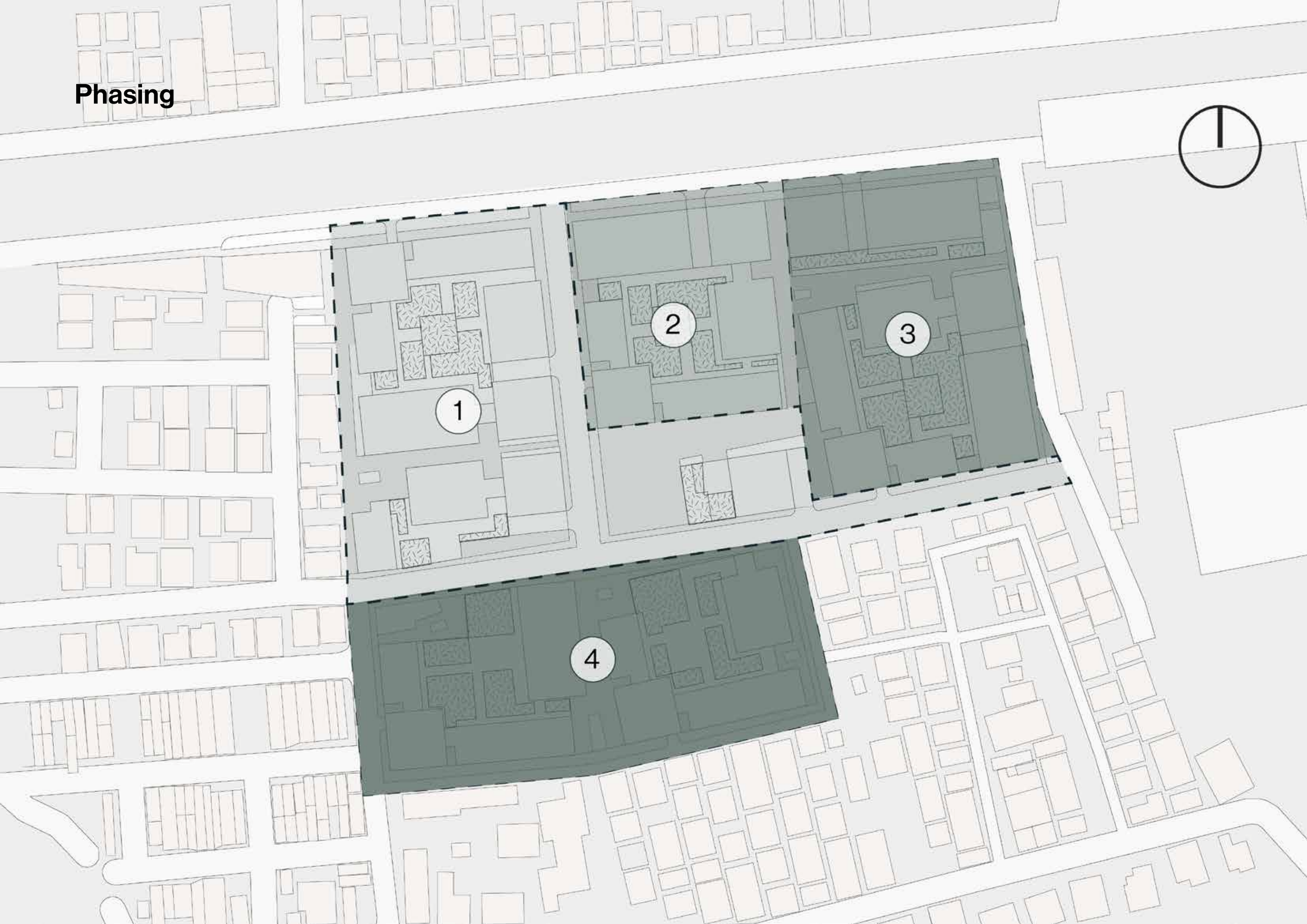
Vertical farm timeline strategy



Cluster UA type mix strategy



Phasing



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