

*Re-imagining Resilience using Micro-Migration:
Applying Traditional Knowledge and Migratory Patterns to New Housing Solutions in Flood-Affected Sylhet*

Author: Genora Jankee | 6094627

June 30th, 2025
Delft University of Technology
Faculty of Architecture and the Built Environment
Global Housing Graduation Studio
Architecture of Transition in the Bangladesh Delta: Autumn Semester 2024/25 [AR3AD105]

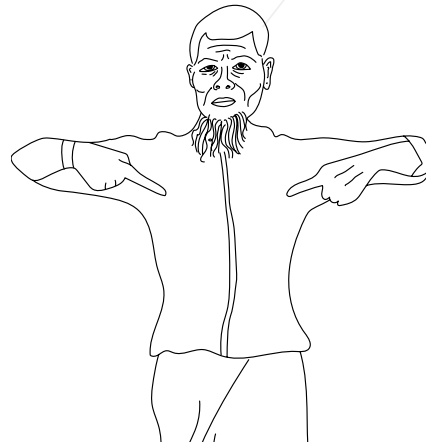
The problem

“When the floods came last year the waters covered my head. I live here with my husband and my grandchildren. We all had to move to the primary school on the highway for one month. After the flood, the house was filled with mud and ruined. We had to do a lot of damage control and repairs. I sometimes fear for the lives of my grandchildren.”



Palki: a grandmother

“Last year (2023) the waters came up to my chest. - We have made “kola velas” for generations, we use them to move and take shelter at the school on the highway. The school is at a higher level than the village so it does not get flooded badly. We take important things with us, when the water recedes we return home.”



Fahim: a community leader

“Of course everyone cannot sleep at the school. Sometimes women and children sleep standing up because of lack of space. Men sometimes sleep on the roof, on kola velas or make temporary shelters close by.”



Ahnaf: a tailor and father

The problem

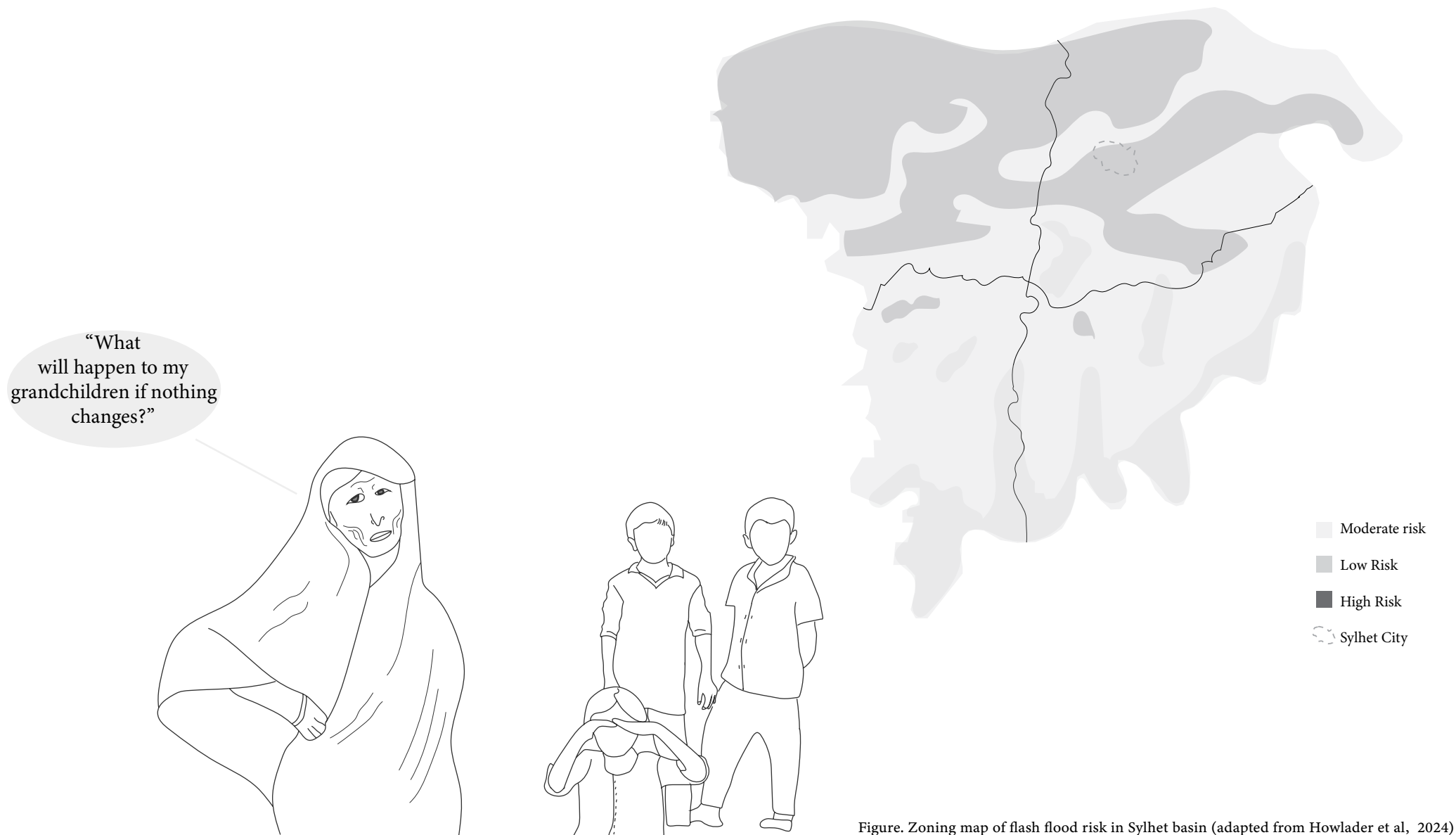


Figure. Zoning map of flash flood risk in Sylhet basin (adapted from Howlader et al, 2024)

Learning from indigenous people



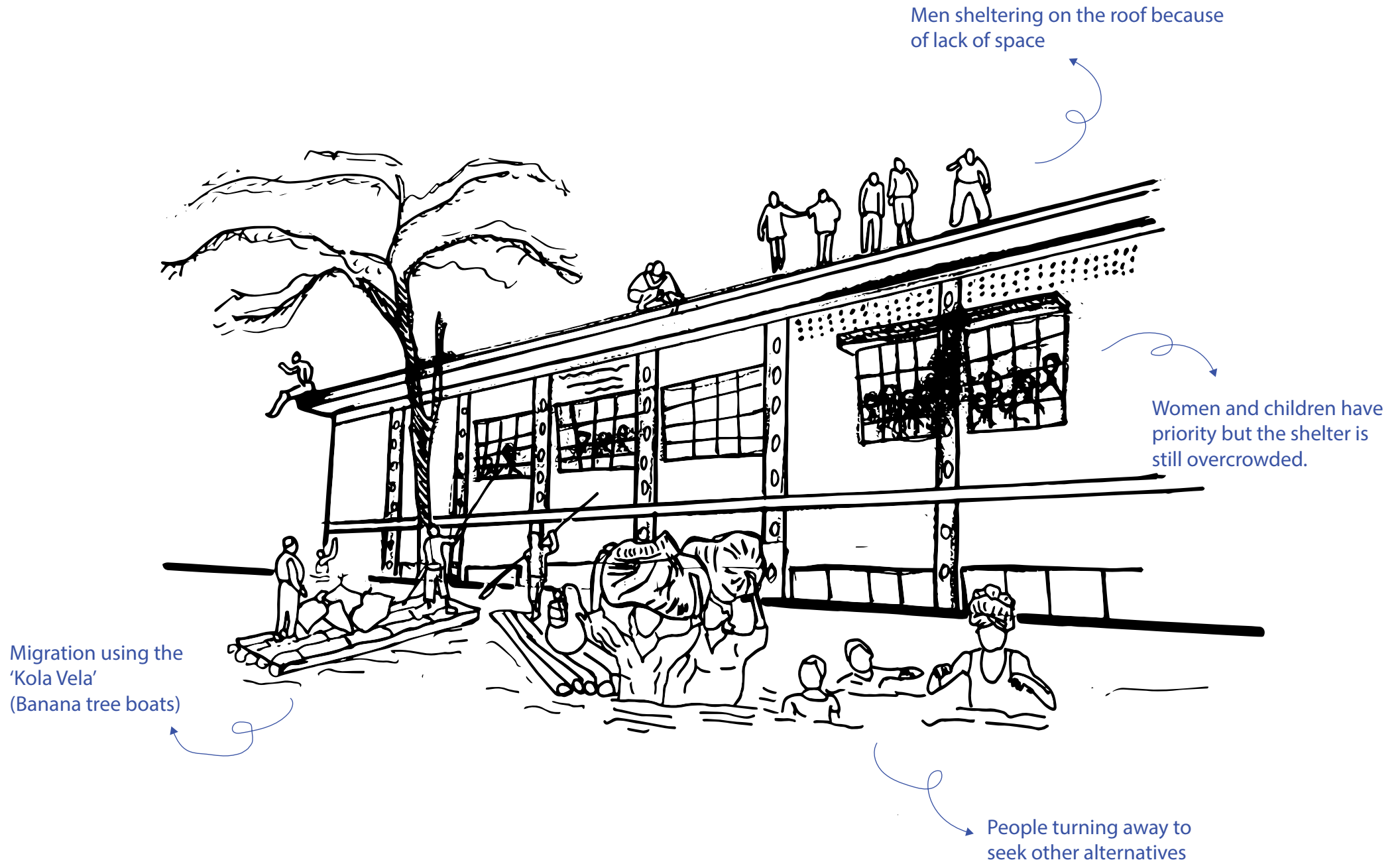
Question:
How long have your people lived here and approximately how many people live in the village now?

We have been here since after the British colonial rule, around 1947. We have inherited this land from our forefathers, this is our home. About 250 families live here now.

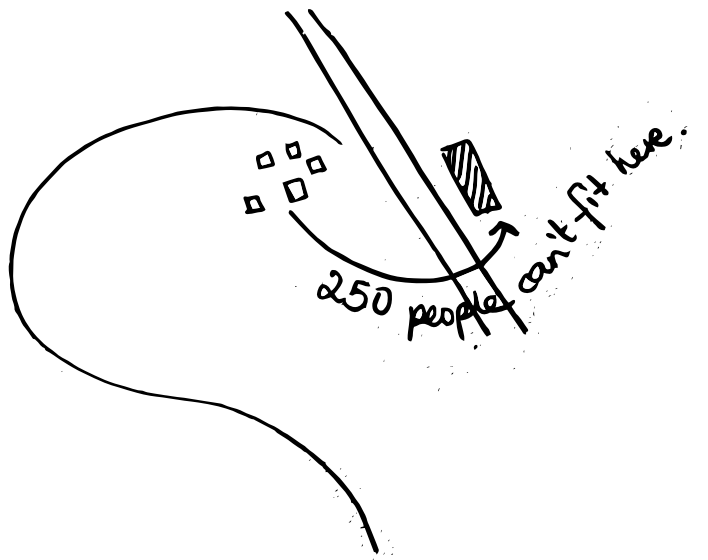


Fahim : community leader

Micro-migration

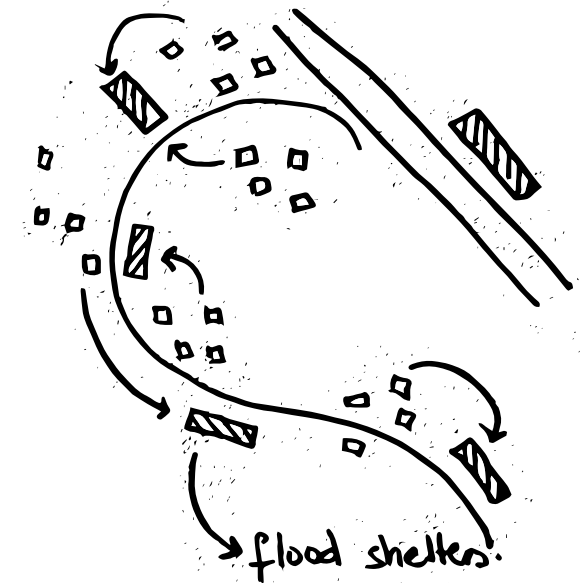


Scenario



Shonatola suffers from severe flooding annually and is unable to develop further because of constant economic loss

Manifesto



1. Families are prepared before floods
2. Employment and economic development in Shonatola
3. Better living conditions

Program of requirements

Neighbourhood	Compound	Cluster	Dwelling
Public ponds Farm land Connecting bridges/walk-ways	<div> <div> Connected Clusters Communal ponds Communal Farmland 1 shelter/community center per compound </div> <div>3-4 stories</div> </div> <div>Shelters</div> <div> <div>Dry Season (Community Space)</div> <div> - Cultural /event space - Educational space - Medical Space - Workshop space - Play space for children - Commercial stores </div> <div> <div>Wet Season (Flood Shelter)</div> <div> - Boat docking area - Sanitation facilities - Cooking facilities - Garden for food supply - Cattle space </div> </div> </div>	<div> Communal court-yards Semi-public, semi-private, private space Rain water collection and storage - Stilt structure - Ground floor access - Flood resilience </div> <div>80-150m2</div>	<div> Low income type Middle income type High income types Wet areas, living space, sleeping space, storage - Context sensitive - Affordable housing - Culturally relevant </div> <div> 20-40m2 40-70m2 70m2 + </div>

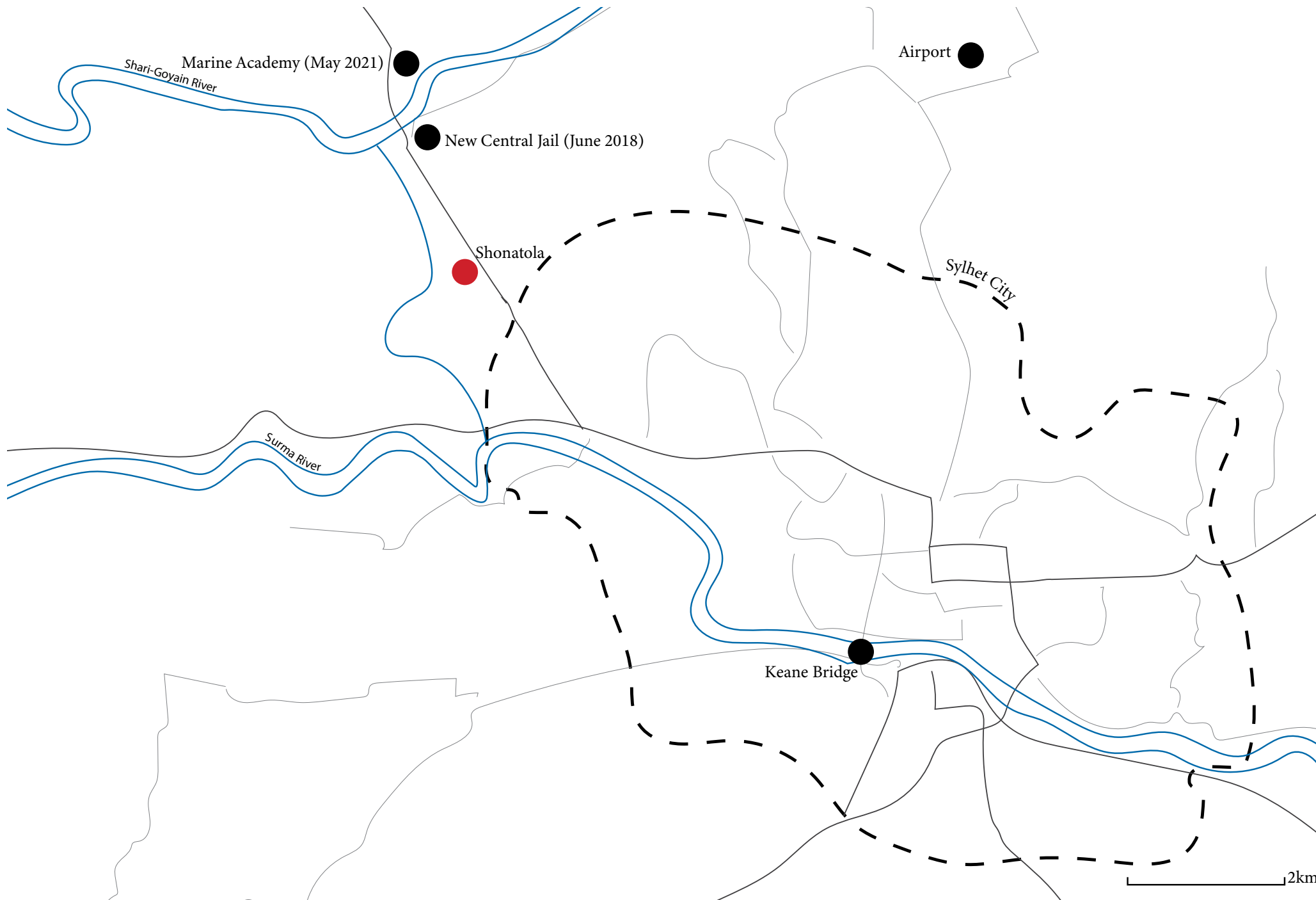
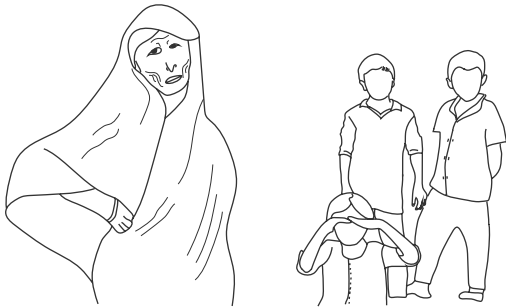


Figure. Map showing Shonatola in relation to Sylhet city

Target group

Flood affected families of Shonatola



People from Shonatola who cannot afford to move and need to use flood shelters like Palki and her family.

Economically stable households of Shonatola



People from Shonatola who can afford to move to the new development like Fahim, a community leader and farmer who has some savings...



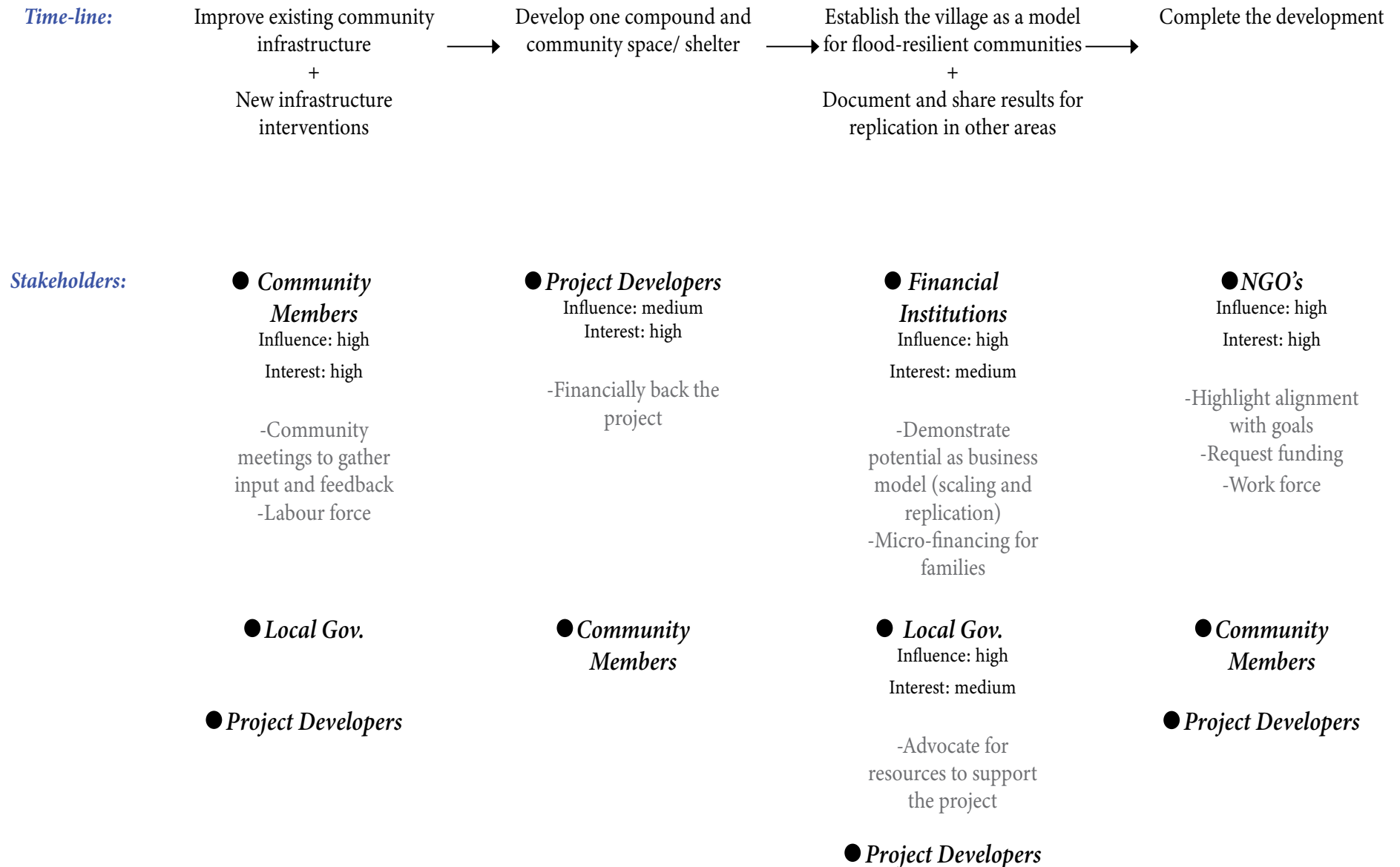
... and Ahnaf's family because his son got a job at the new jail.

Urban to rural migrants

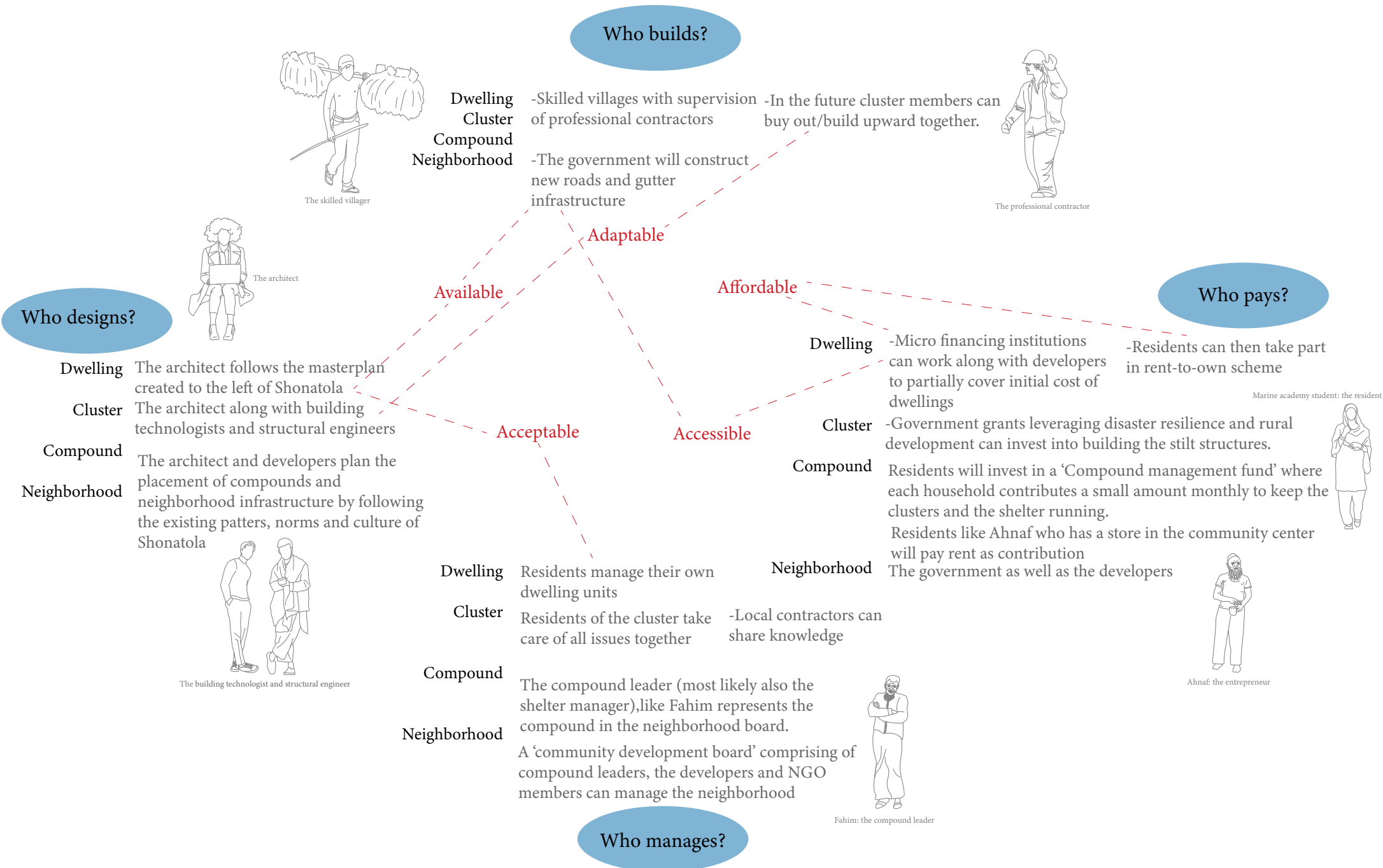


People migrating from the city to rural areas because of the gradual expansion of the city or people who are attracted by the new developments (marine academy and jail) like young students.

Timeline



Managerial strategy



Site Analysis



Density:

≈6 people per House
≈1841 people
≈220 People per Ha

≈ 8.4Ha
≈263 houses
≈32 houses per Ha



Site Analysis

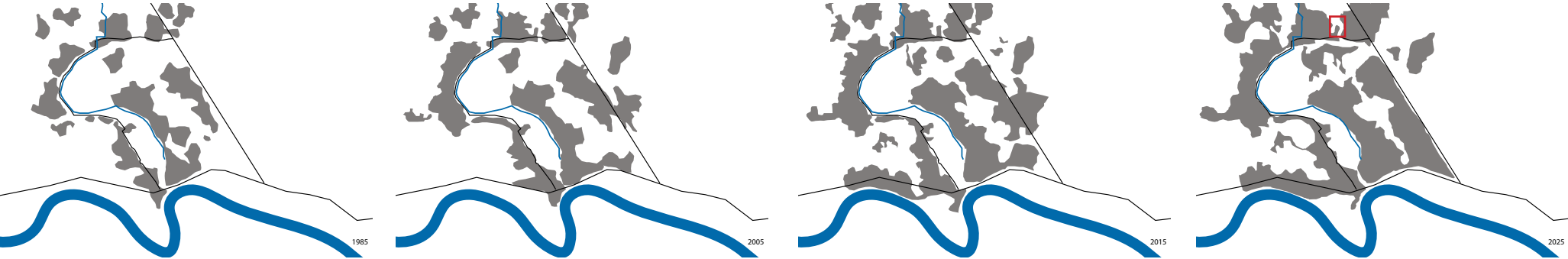


Figure. Growth of chain of villages from 1985-2025



Chosen Site



≈ 5.8Ha

Figure. Chosen location

Site Analysis

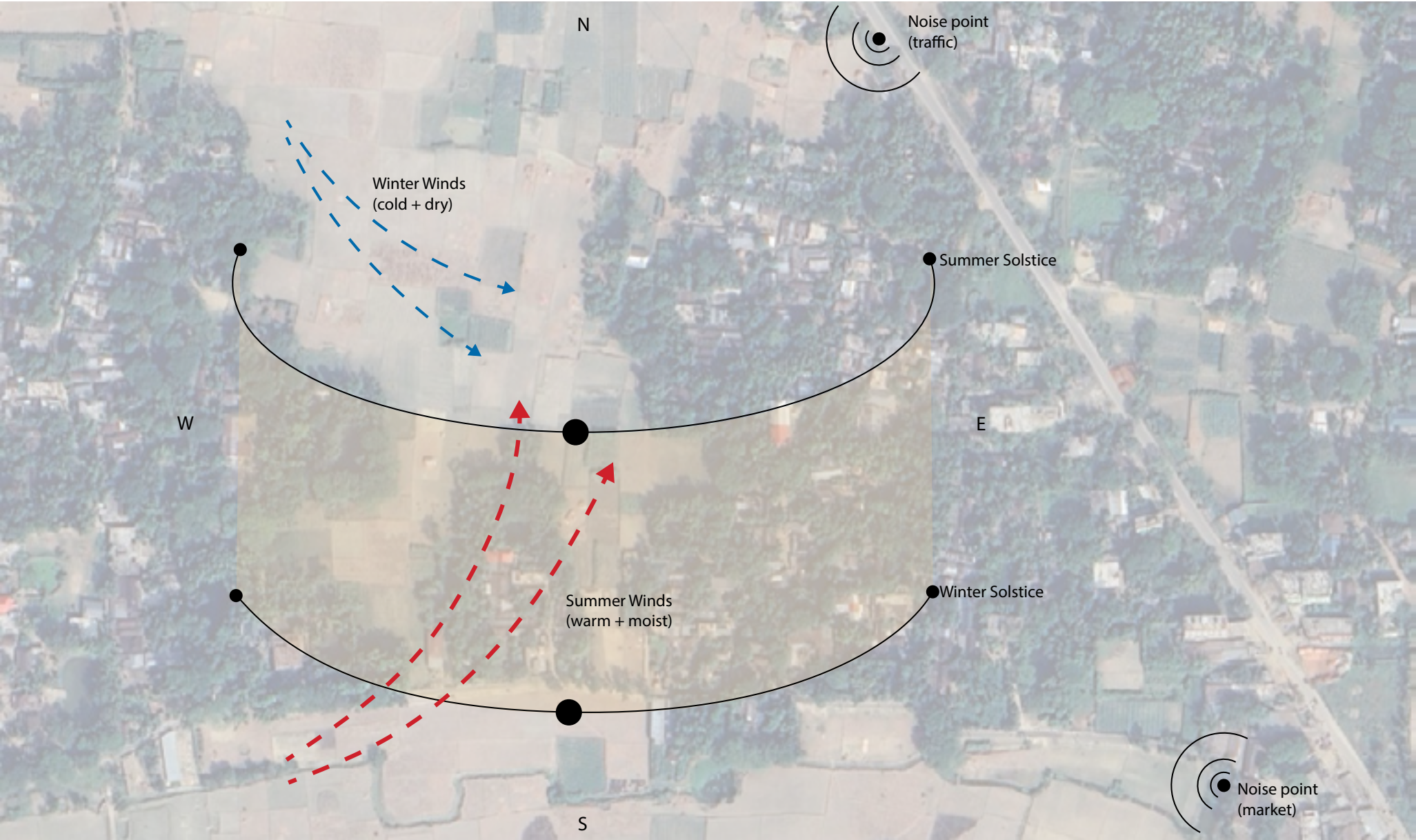


Figure. Site analysis of chosen site

The Neighborhood



Figure 22. New development during dry season

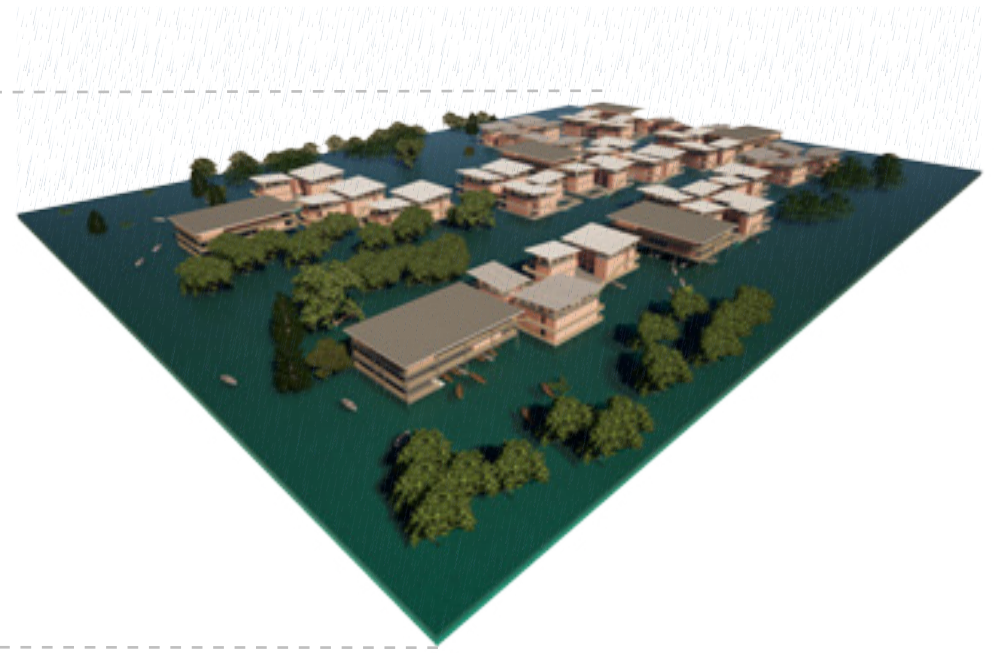


Figure. New development during rainy season

Neighbourhood Strategy

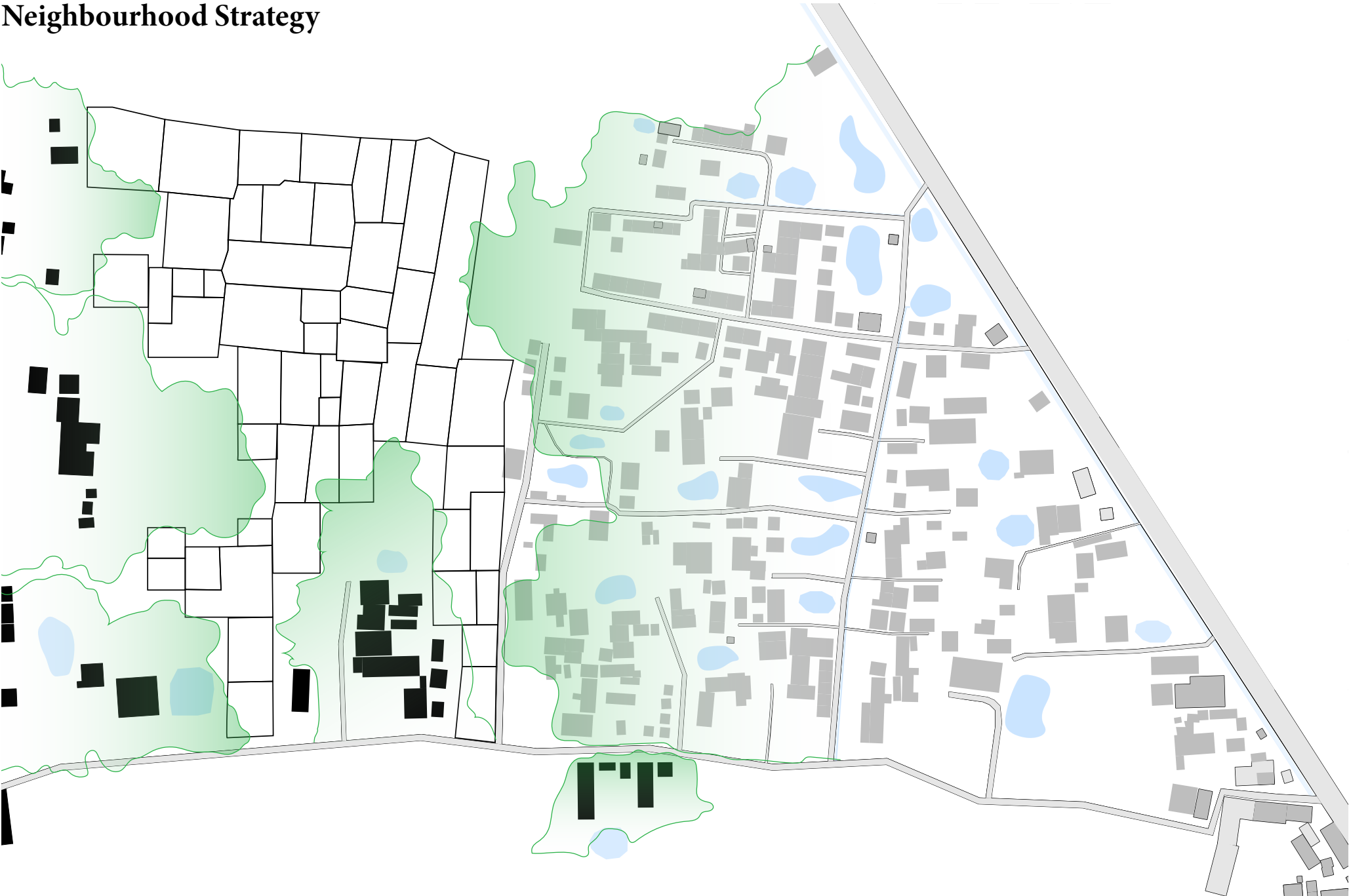


Figure. Existing plot divisions

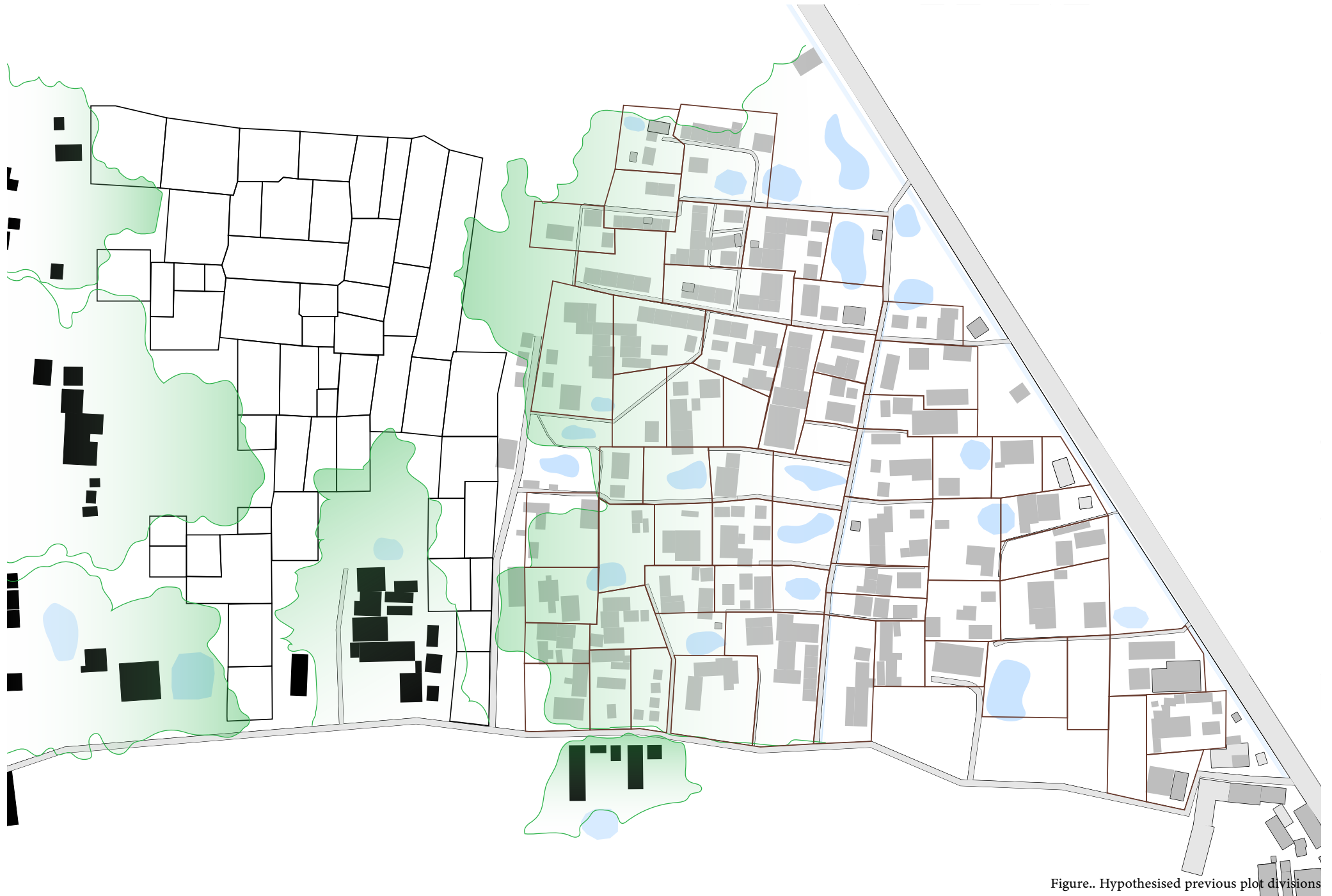


Figure.. Hypothesised previous plot divisions

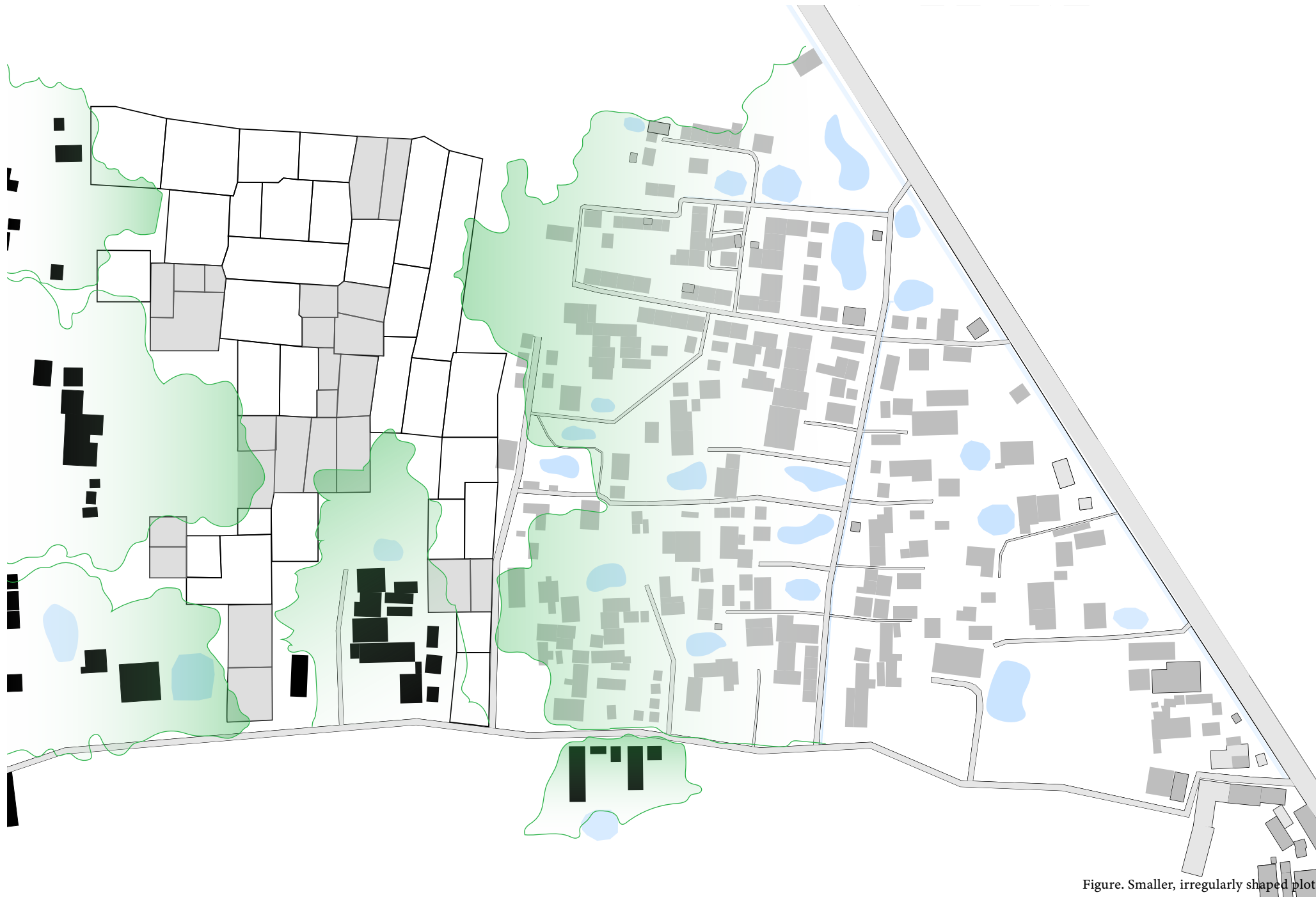


Figure. Smaller, irregularly shaped plots

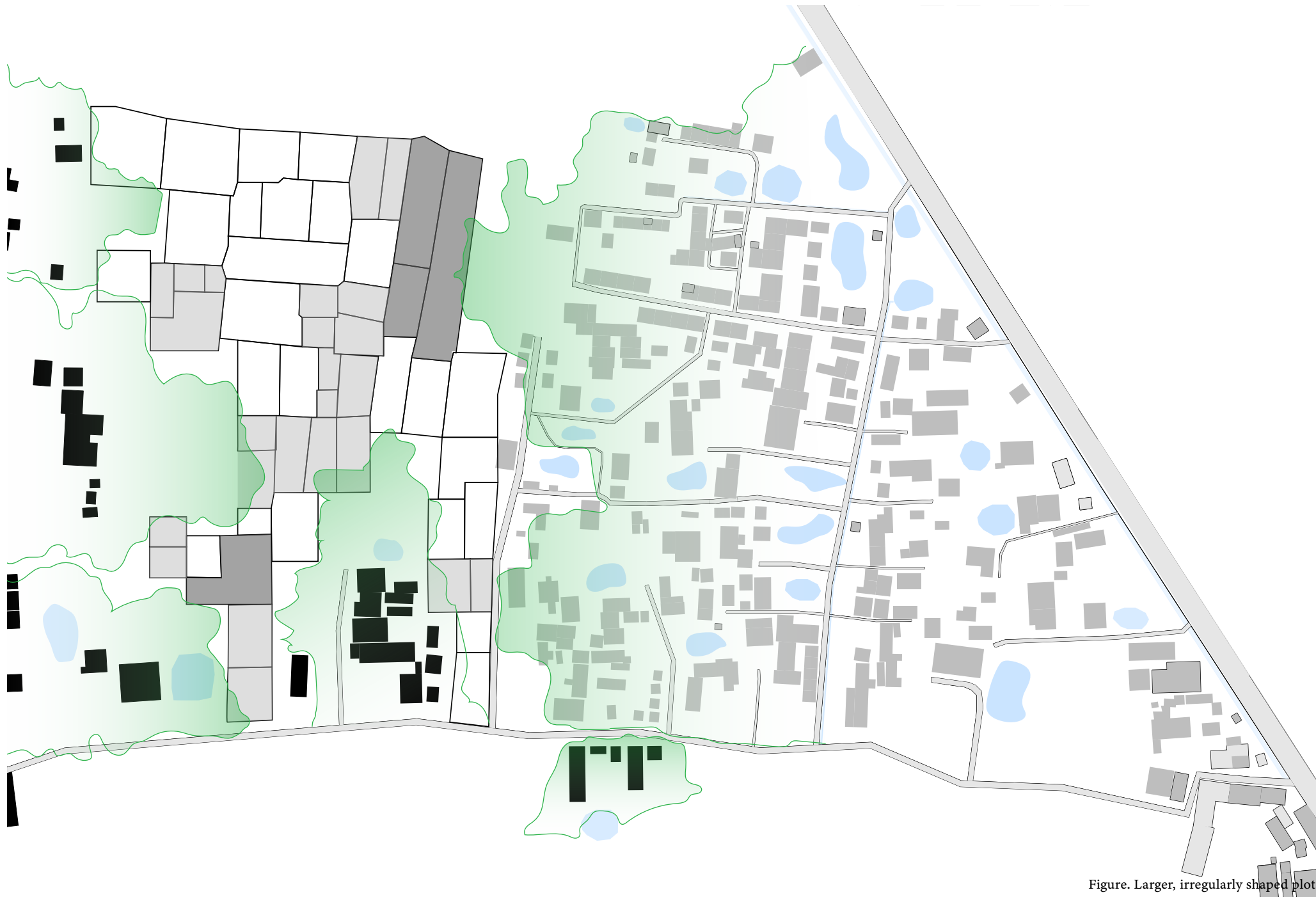


Figure. Larger, irregularly shaped plots

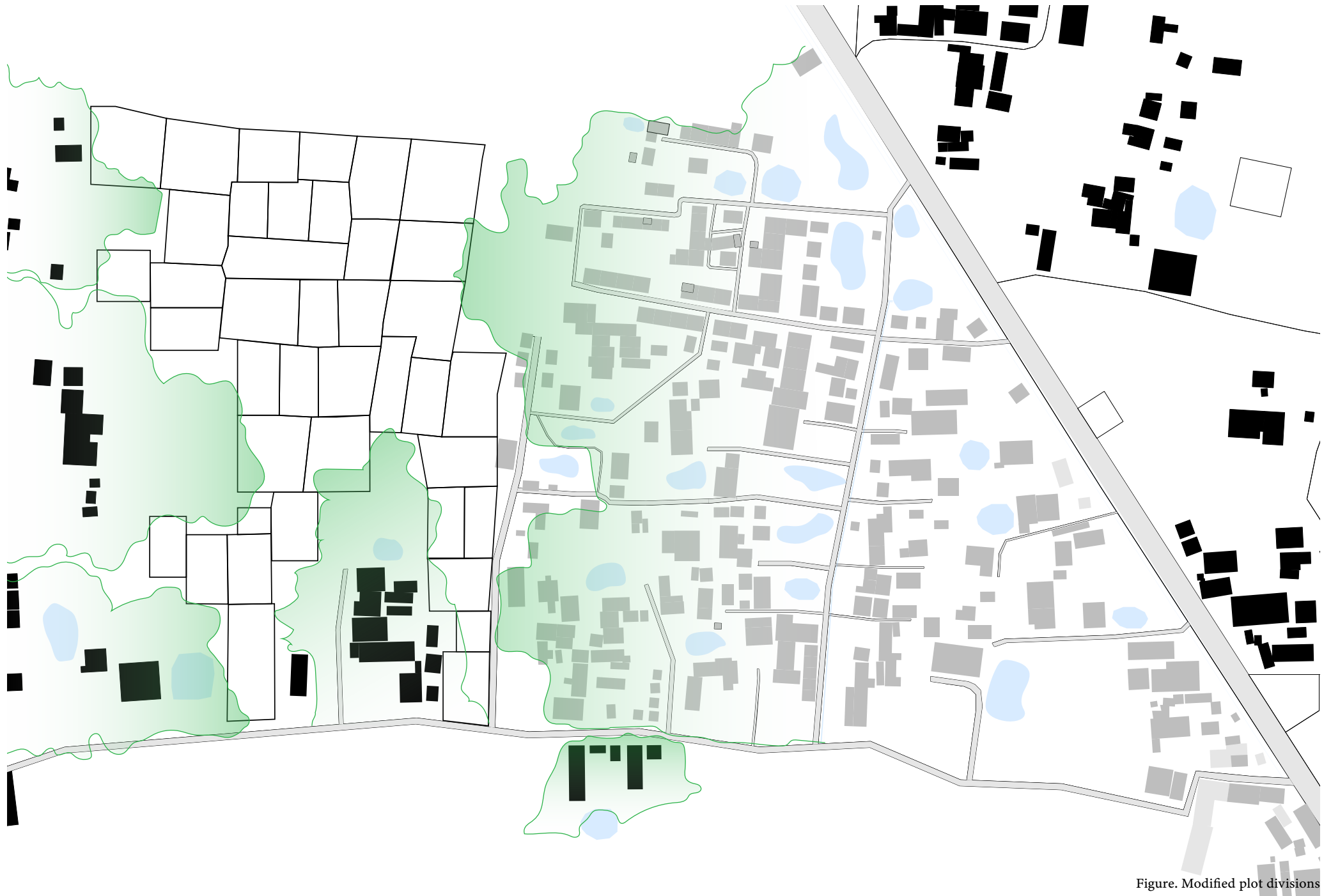


Figure. Modified plot divisions

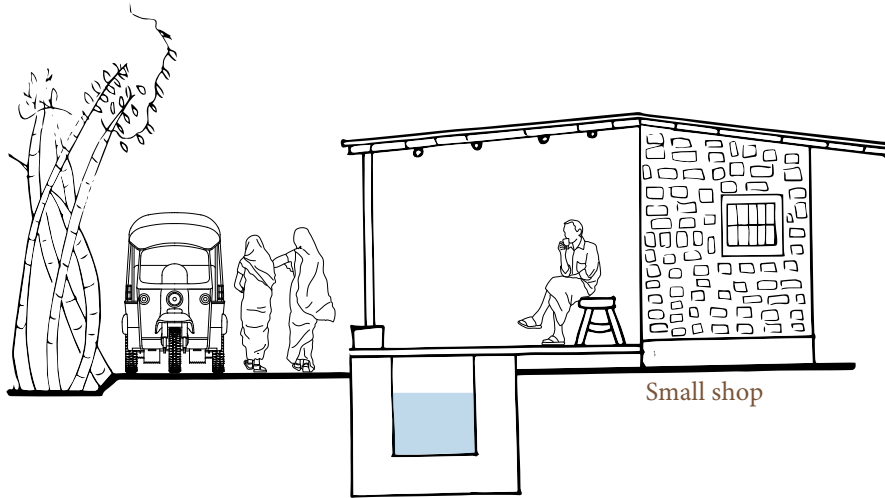
Neighbourhood Strategy



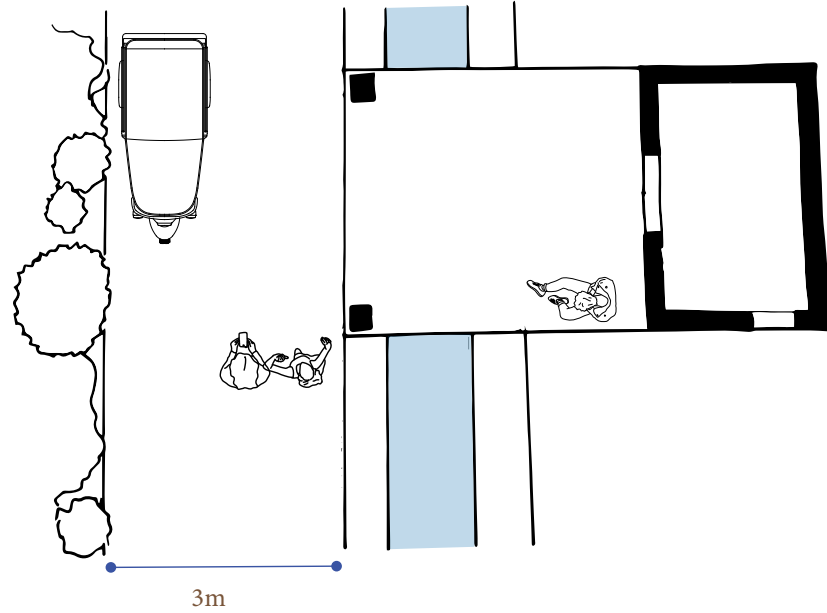
156 new dwellings
FSI: 0.3

Figure. Urban Strategy

Main Street

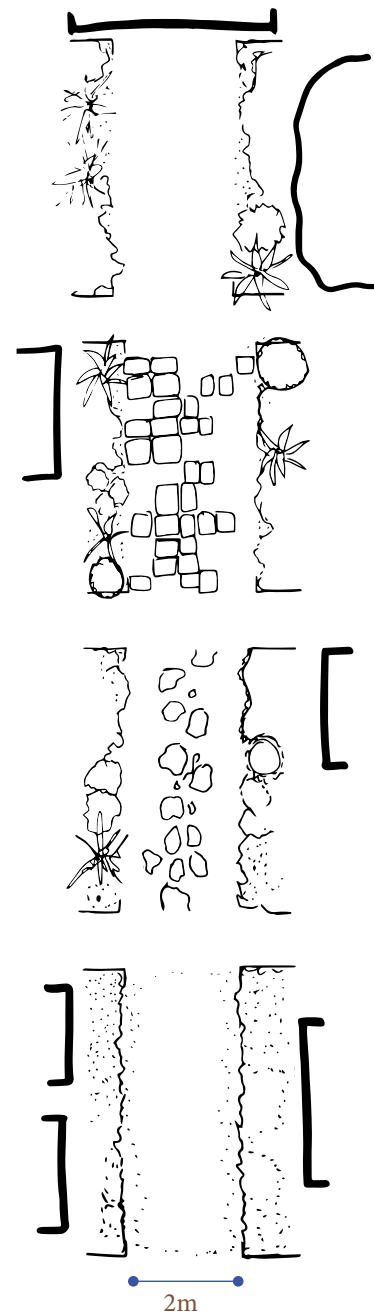


Small shop



3m

Narrow roads



Paved

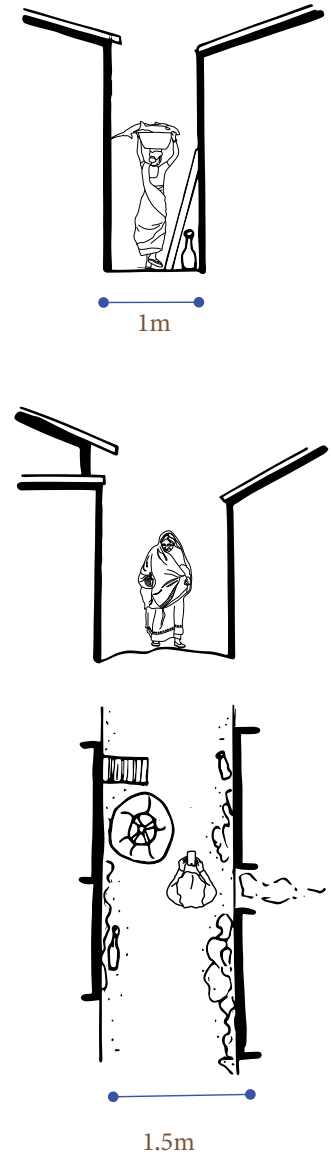
Brick

Stone

Earth

2m

Alleyways

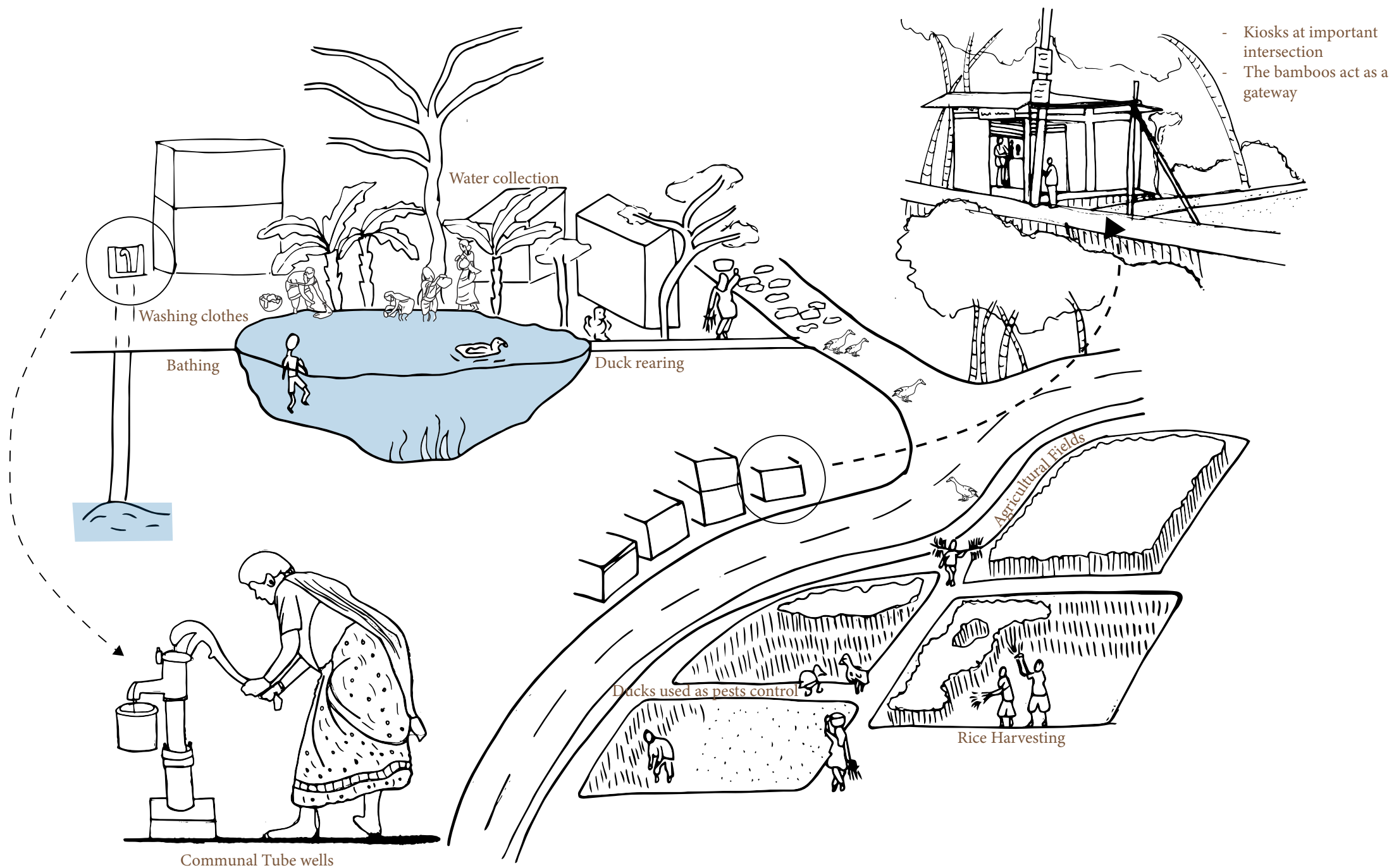


1m

1.5m

Connection Strategy





Water Management Strategy



Figure. Water strategy drawing

Water Management Strategy



The Shelter

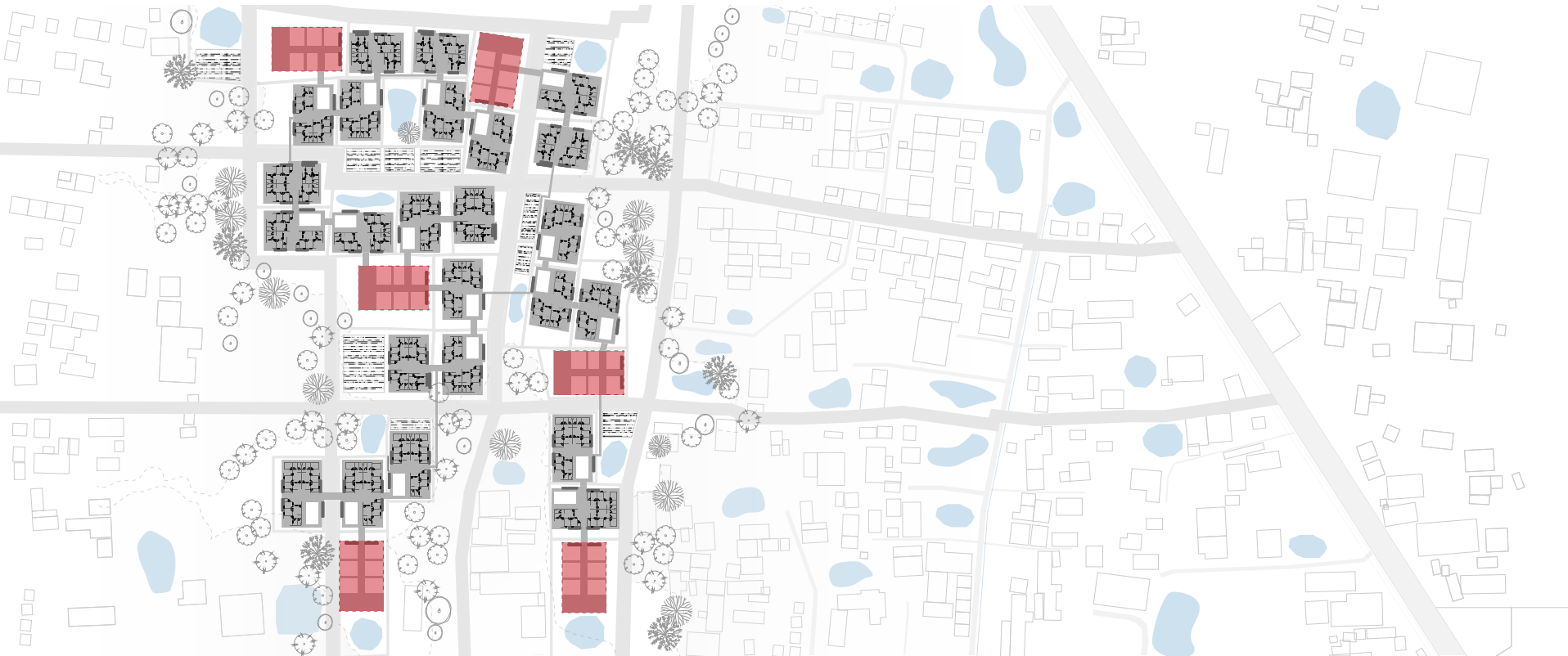
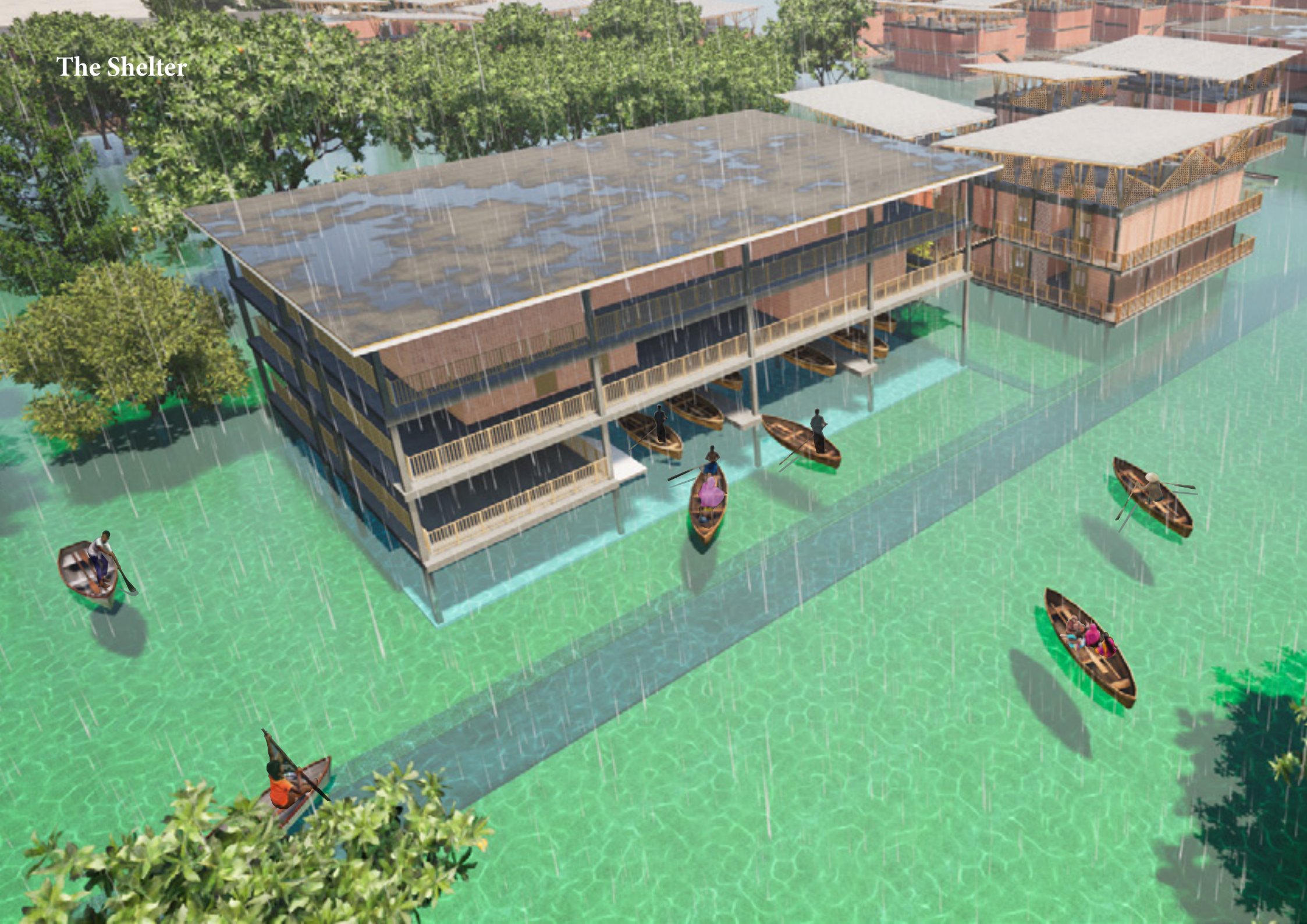
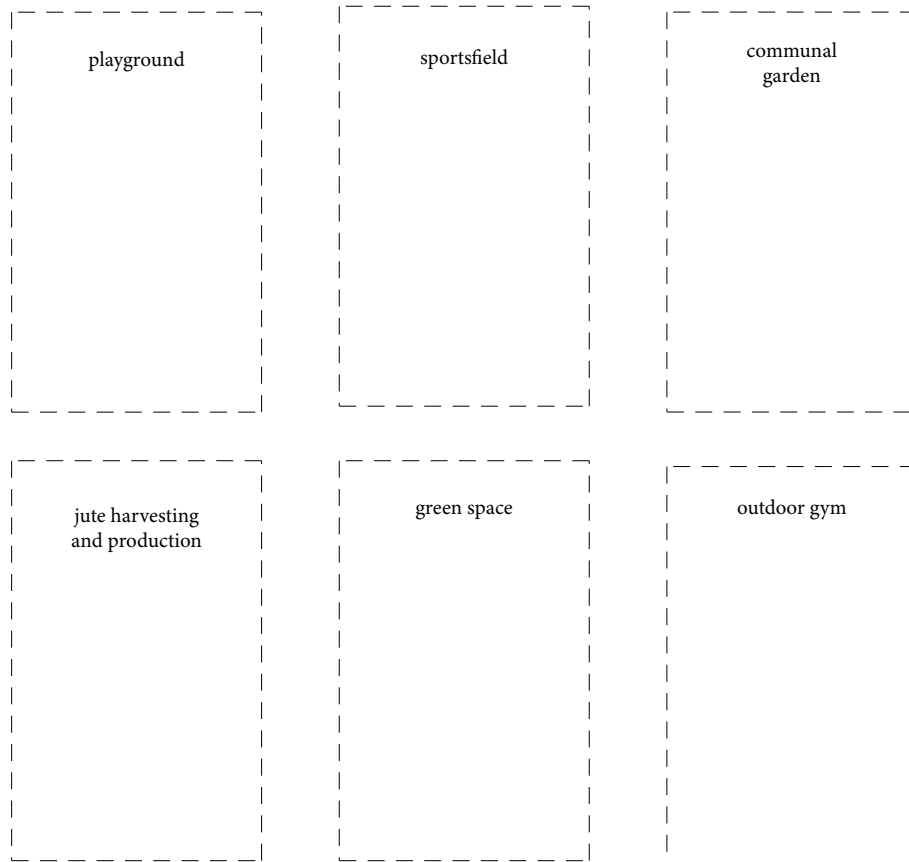


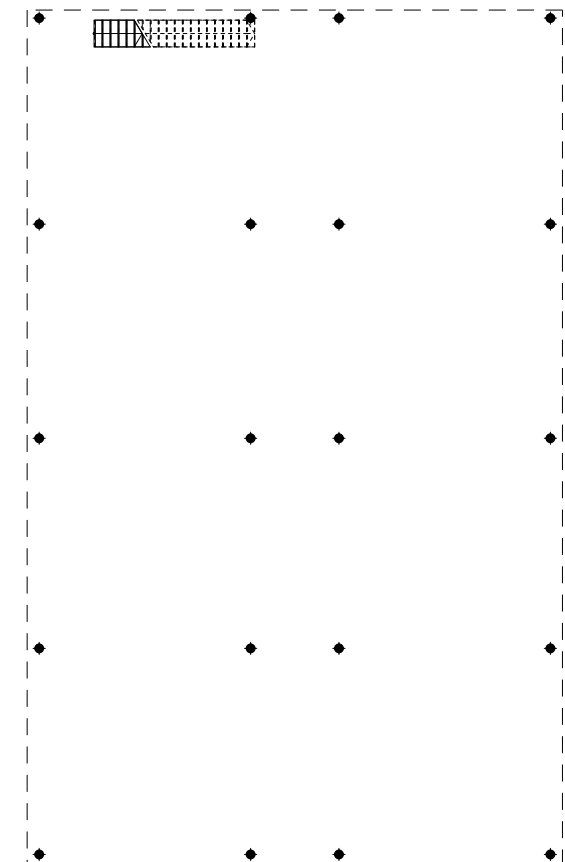
Figure. Neighbourhood plan highlighting shelters

The Shelter



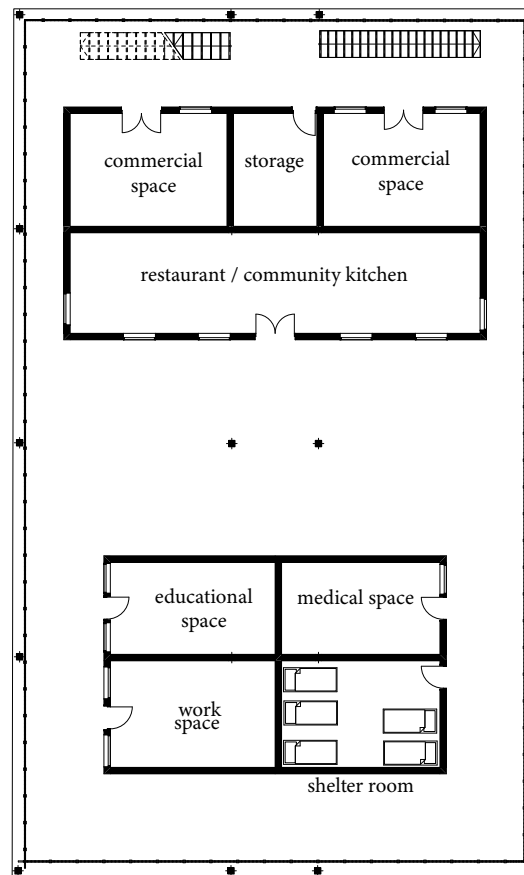
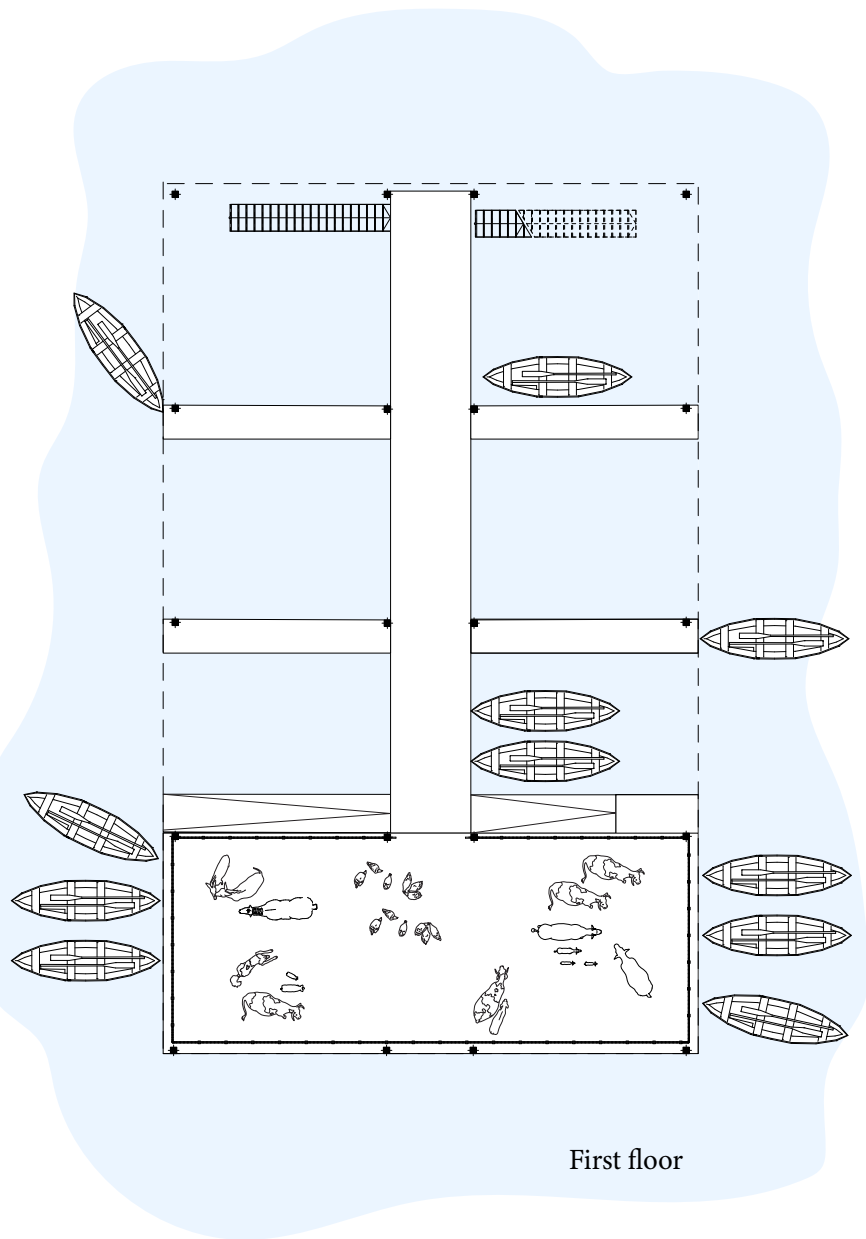


Ground floor functions per shelter



Ground floor

Figure. Floor plans of the shelters



0 10m

Figure. Floor plans of the shelters

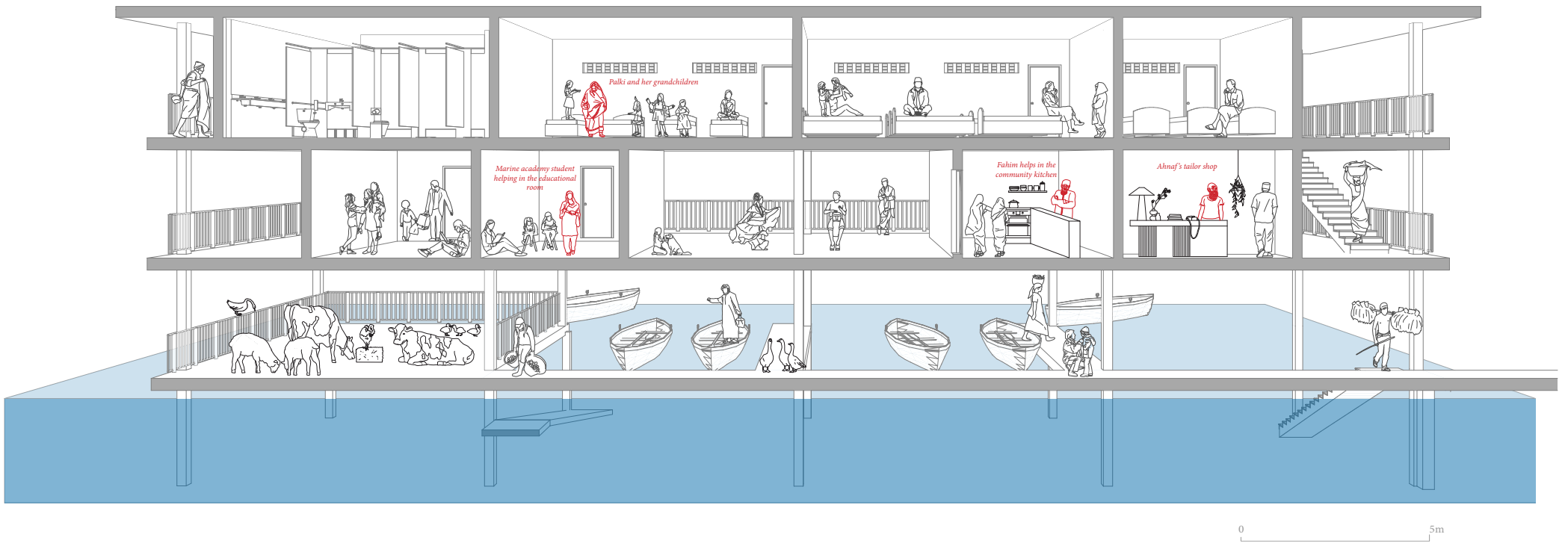
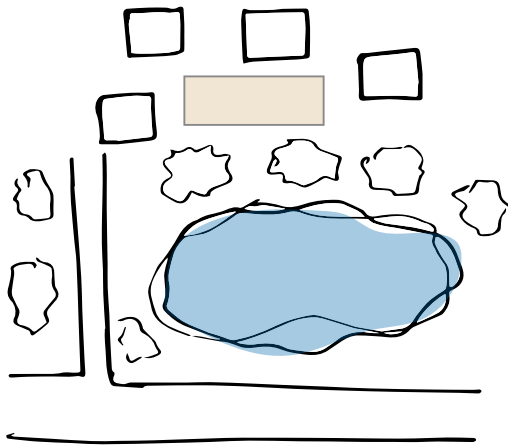


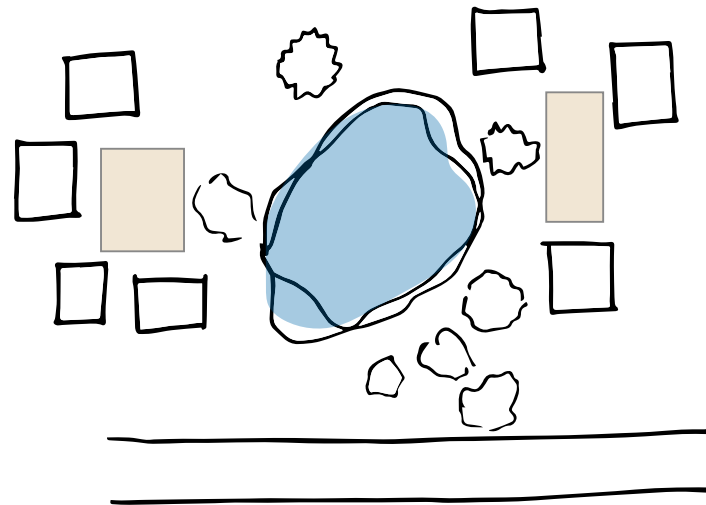
Figure. Section of shelter during the wet season

The Compound





Providing privacy



Servicing two clusters

The Compound

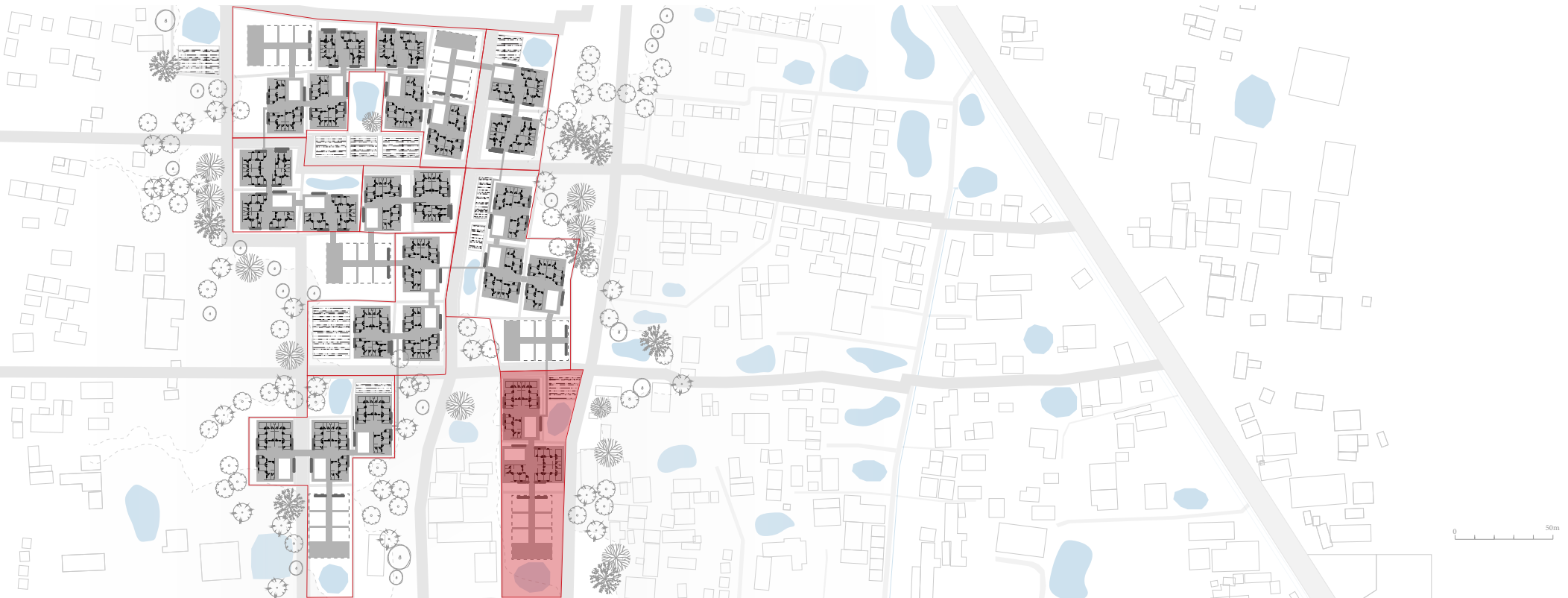


Figure . The 9 compounds

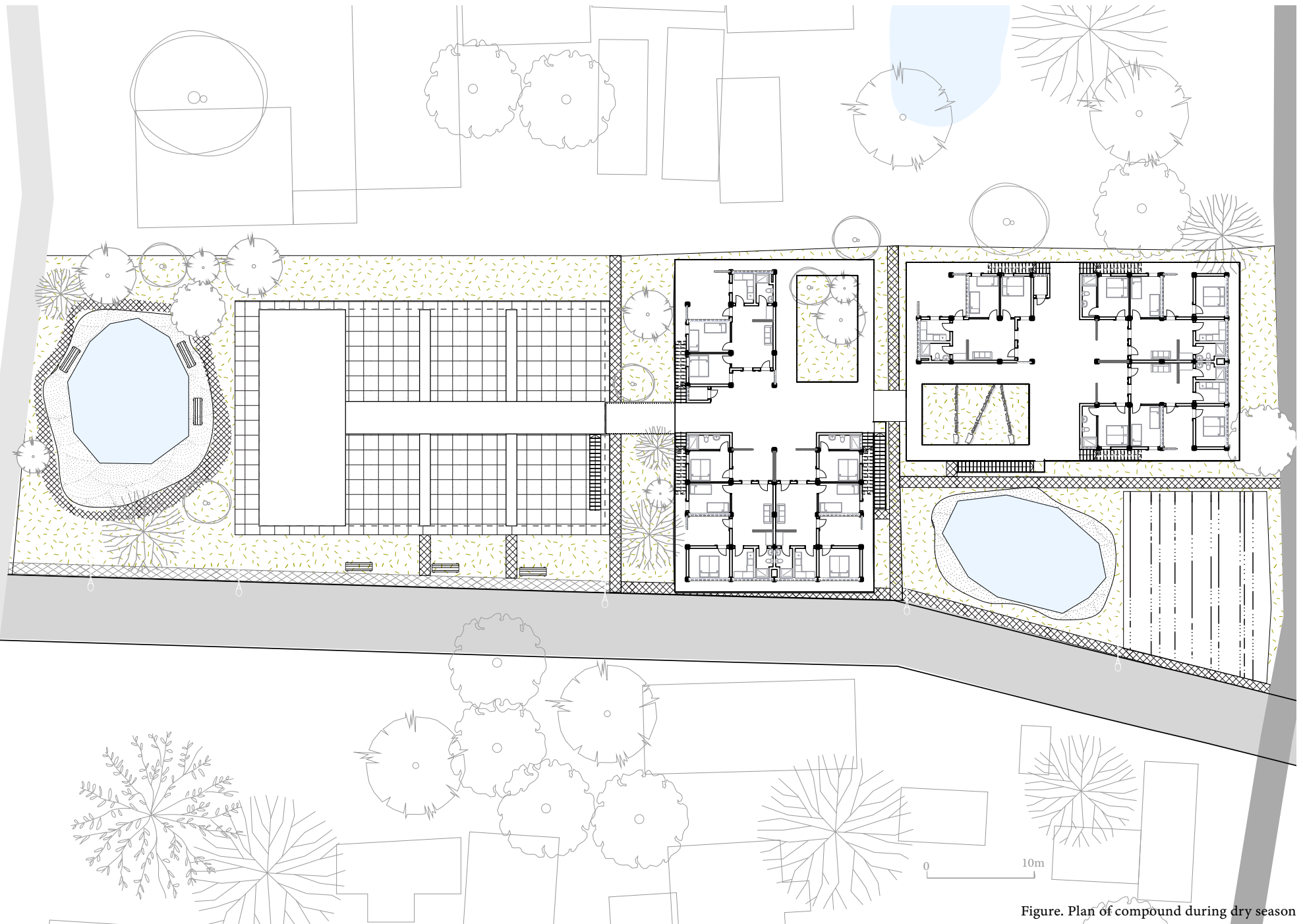


Figure. Plan of compound during dry season

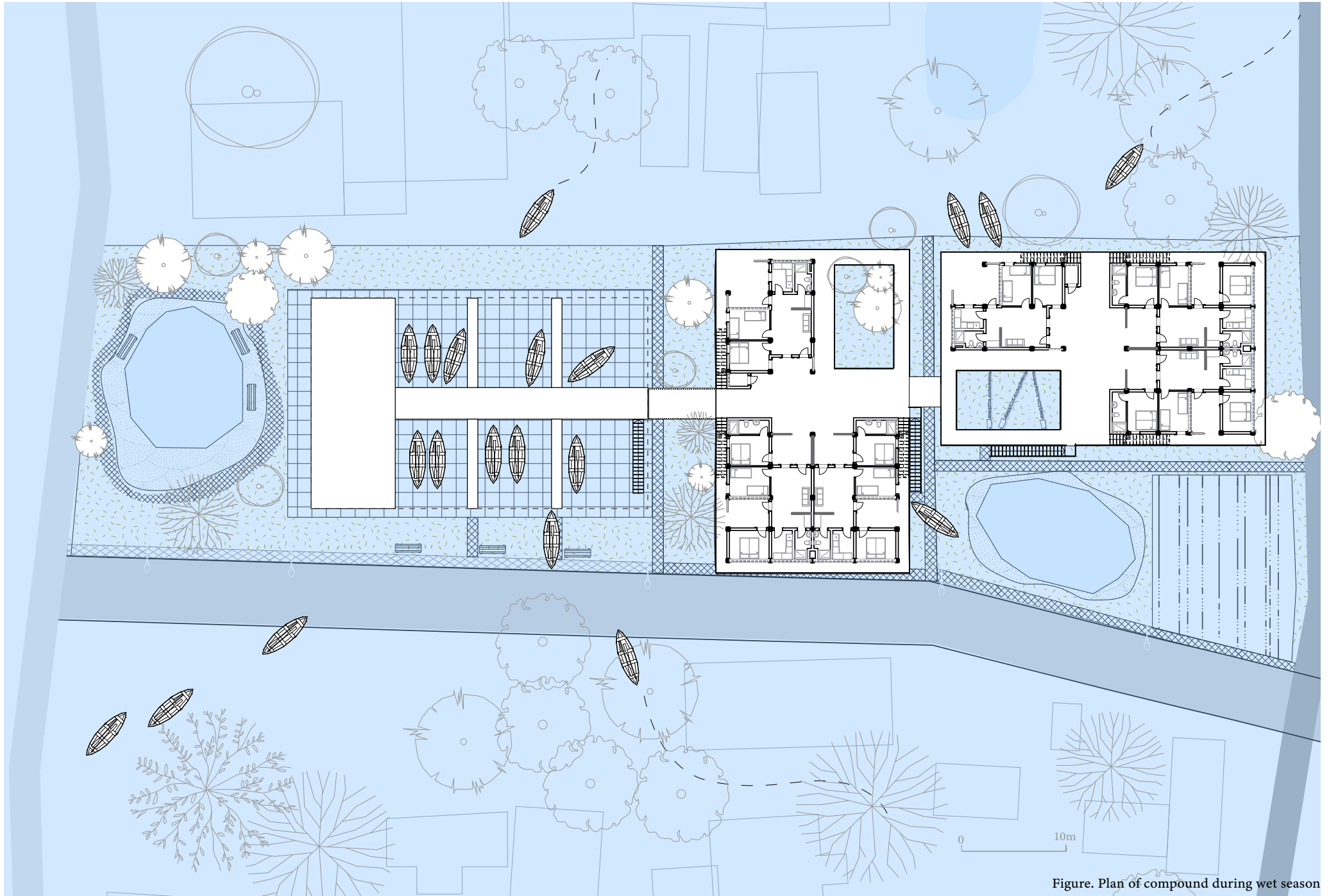


Figure. Plan of compound during wet season

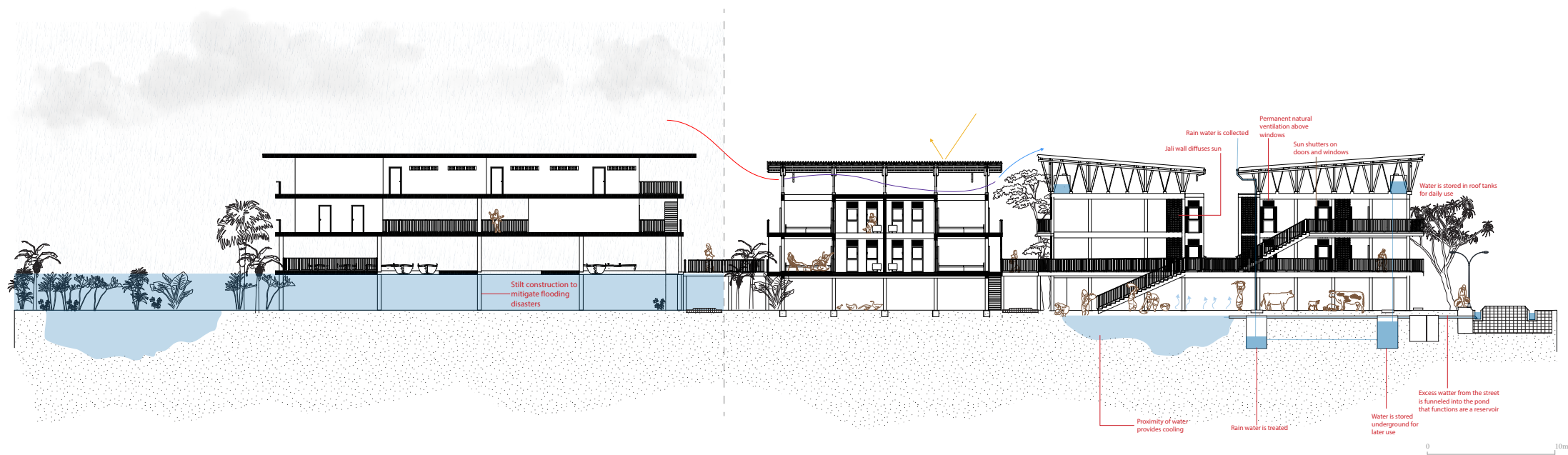
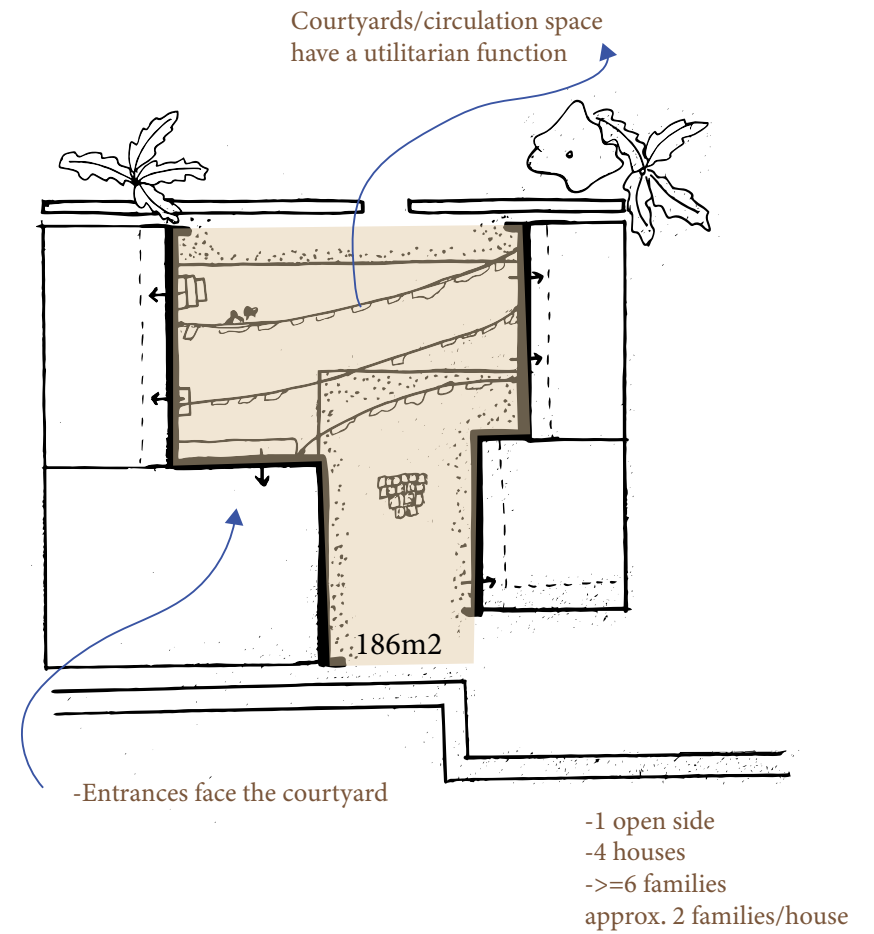
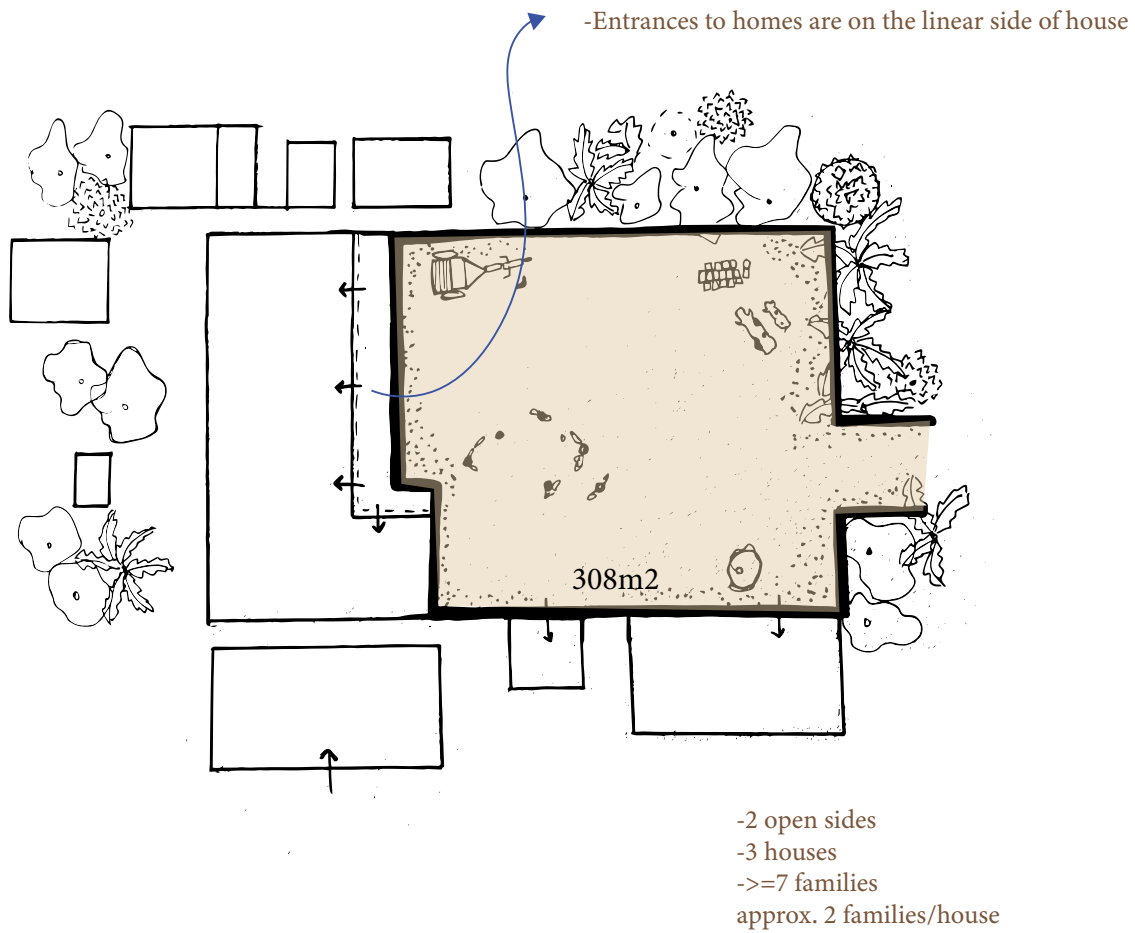
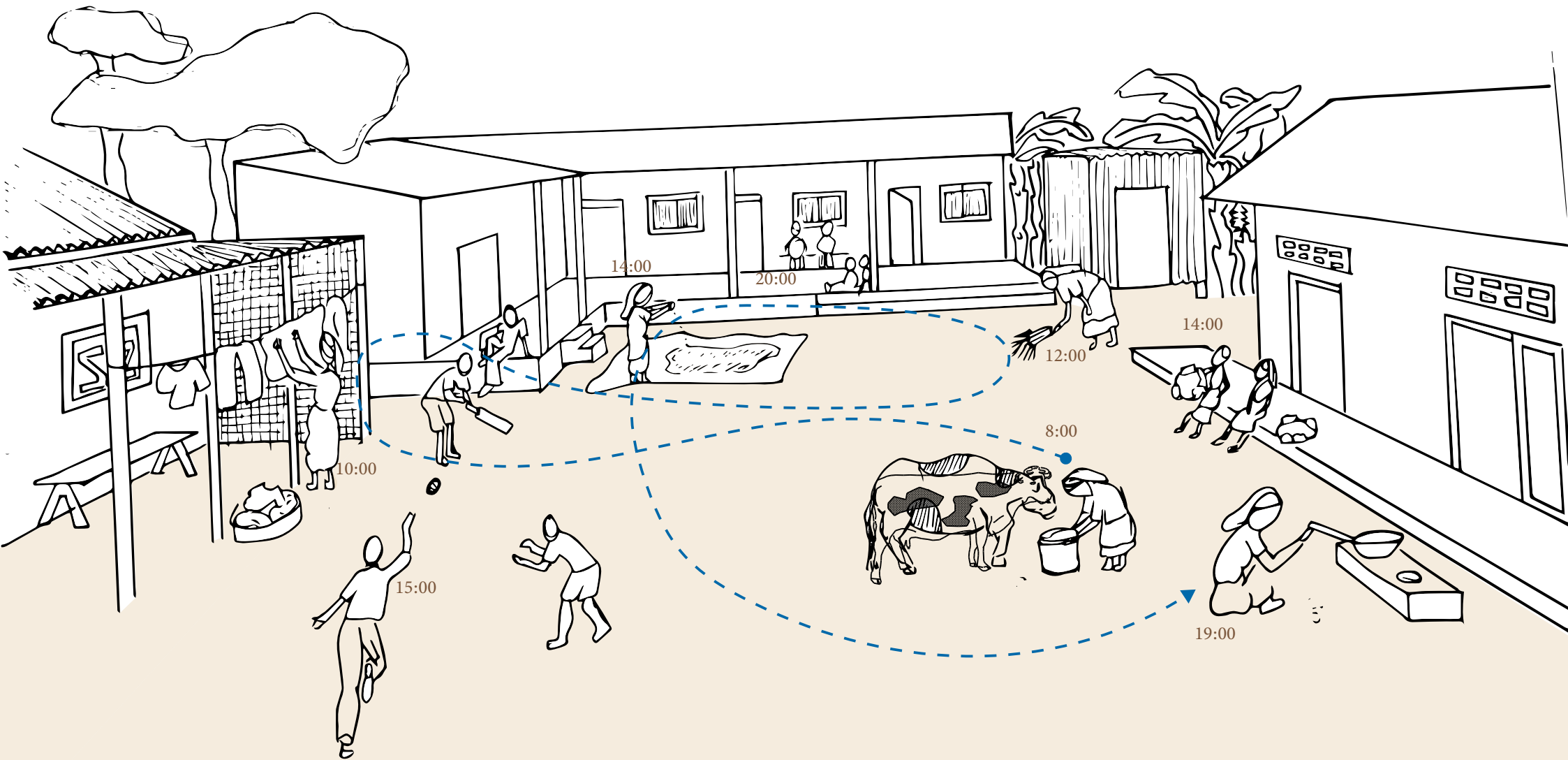


Figure. Climatic and sustainable design

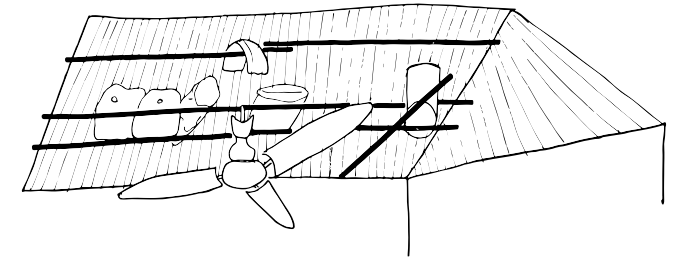
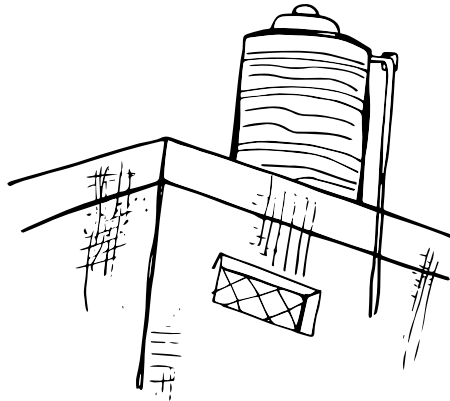
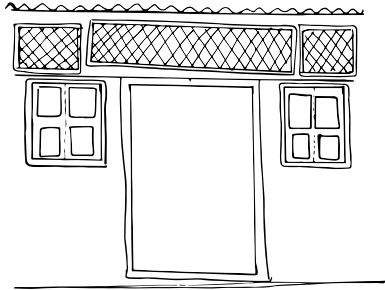
The Cluster



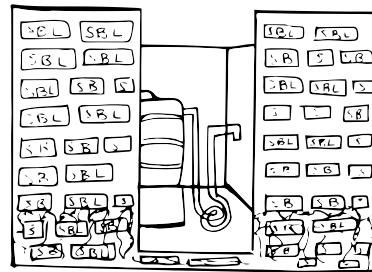
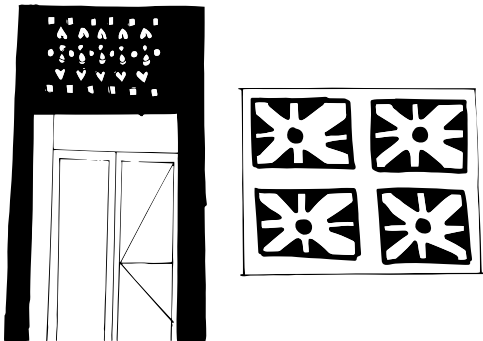




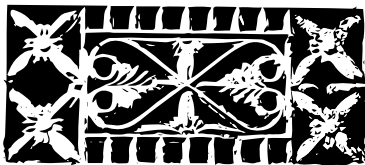
Features of the house



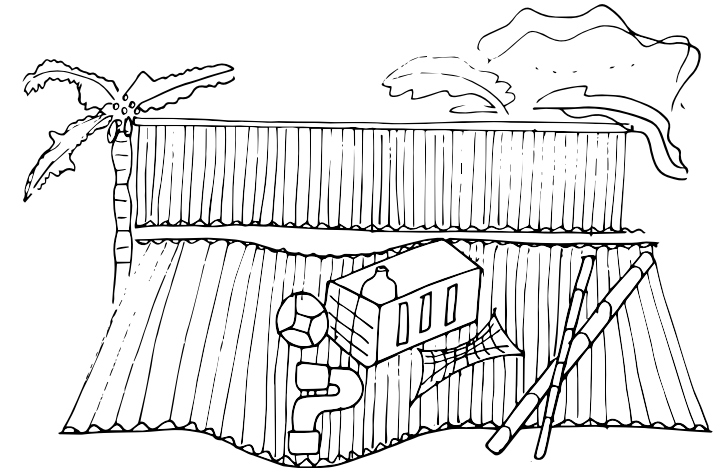
Storage in interior ceiling



Water tanks store ground water for use in times of sparity.



Natural ventilateion through the use of decrative wall preparations are a common feature in the typical Shonatola home.



Storage on outer roof.

Lack of space and storage is an issue in the village. Residents have found ways to deal with this by storing necessities on the interior roof battons and also out the outside of the house usesually on the veranda where things are easily accesible.

The Cluster

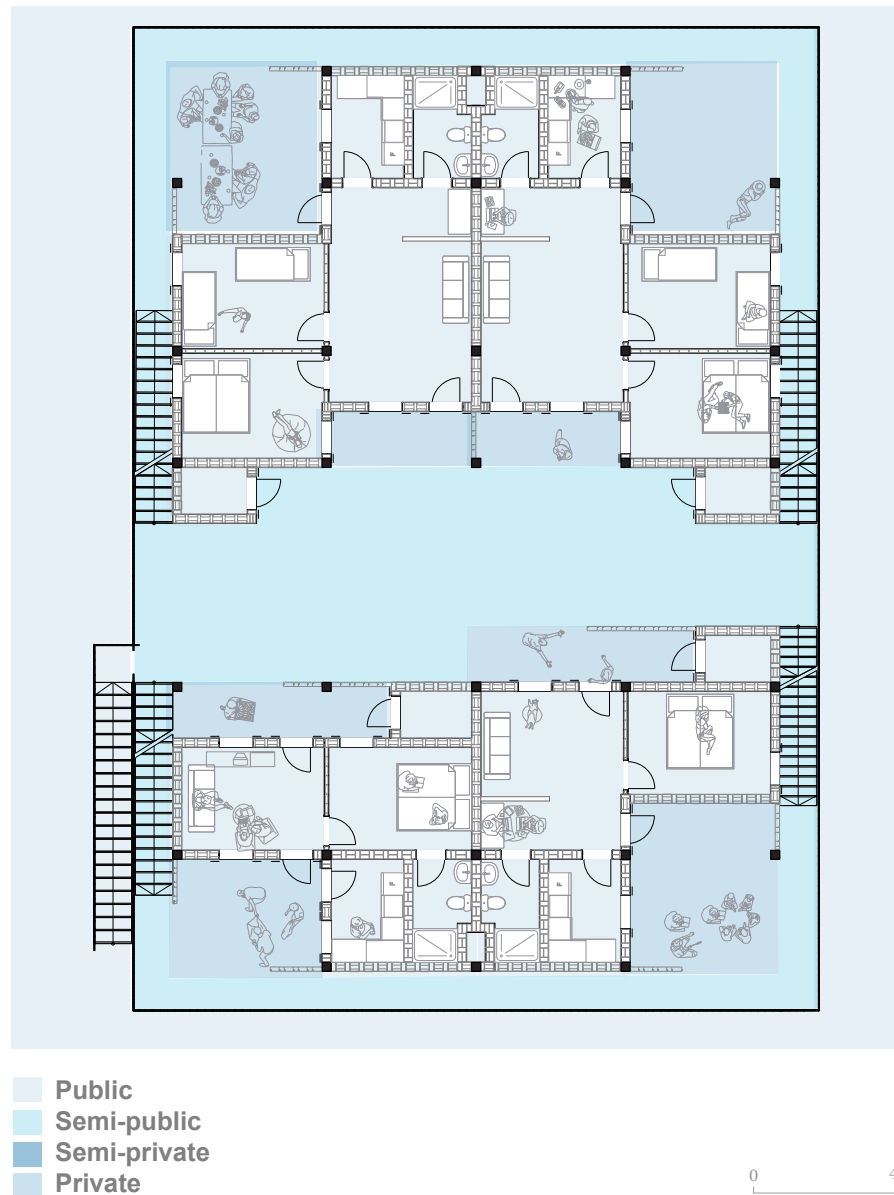


Figure. Hierarchy of privacy on first floor of cluster 2

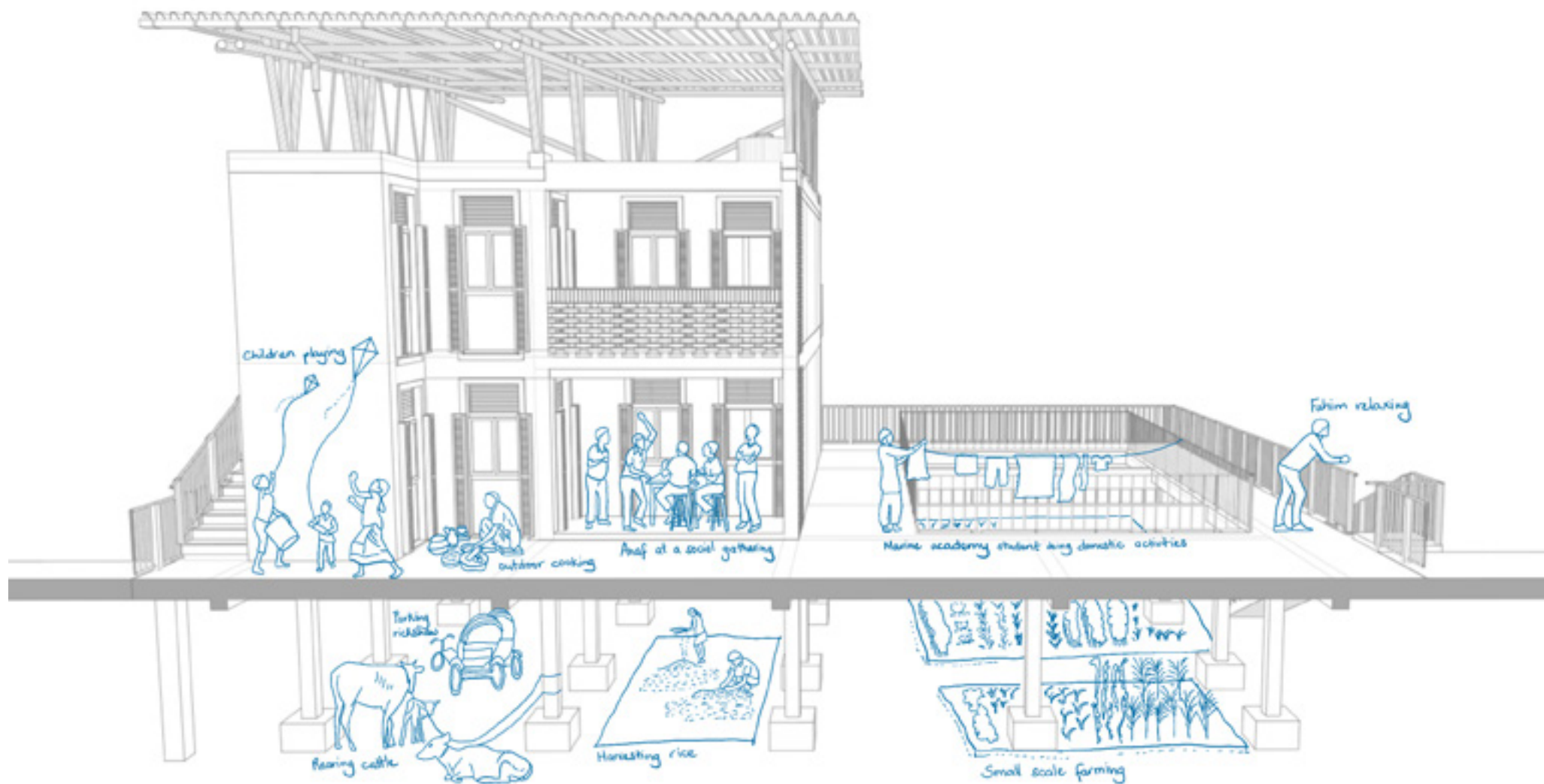


Figure. Division of courtyard activities in new design

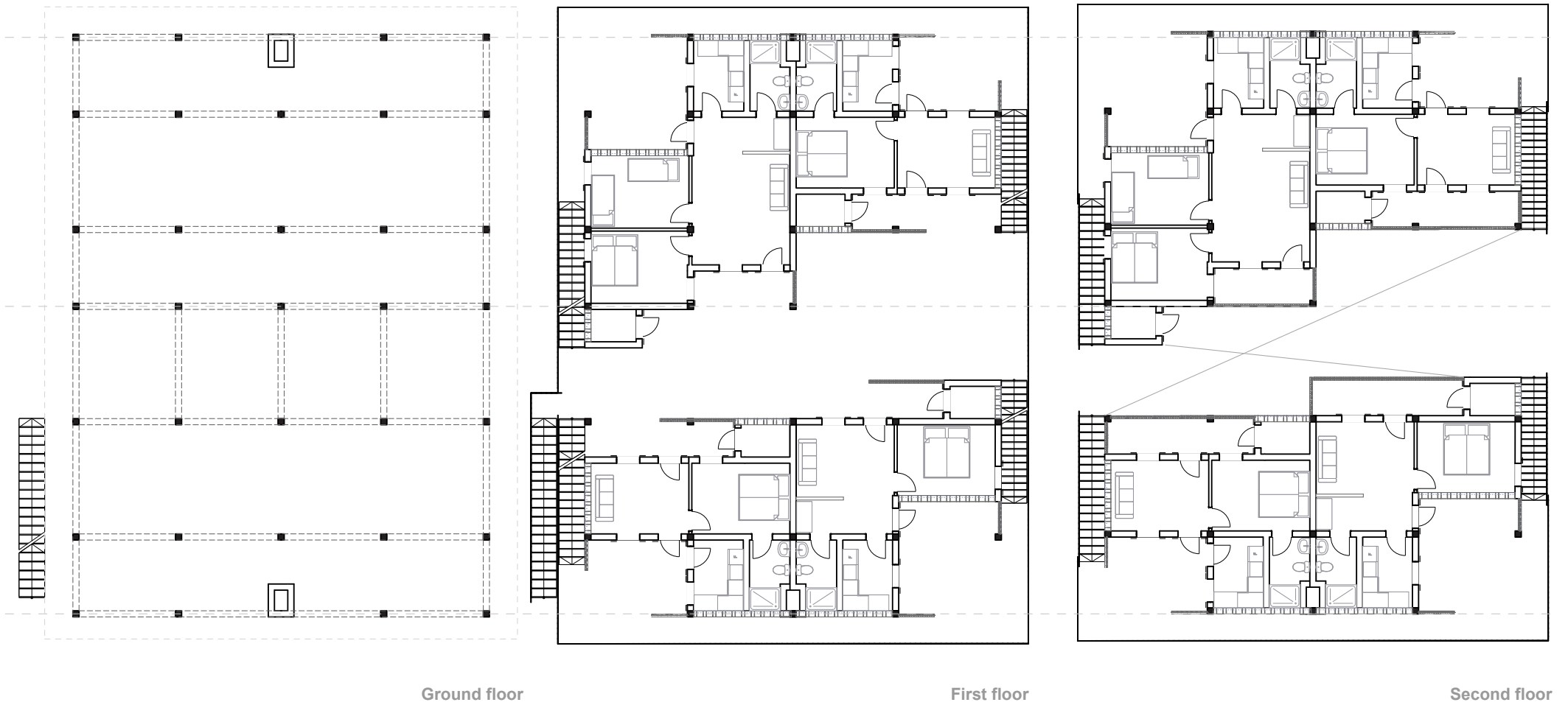


Figure. Cluster 1 - Low income

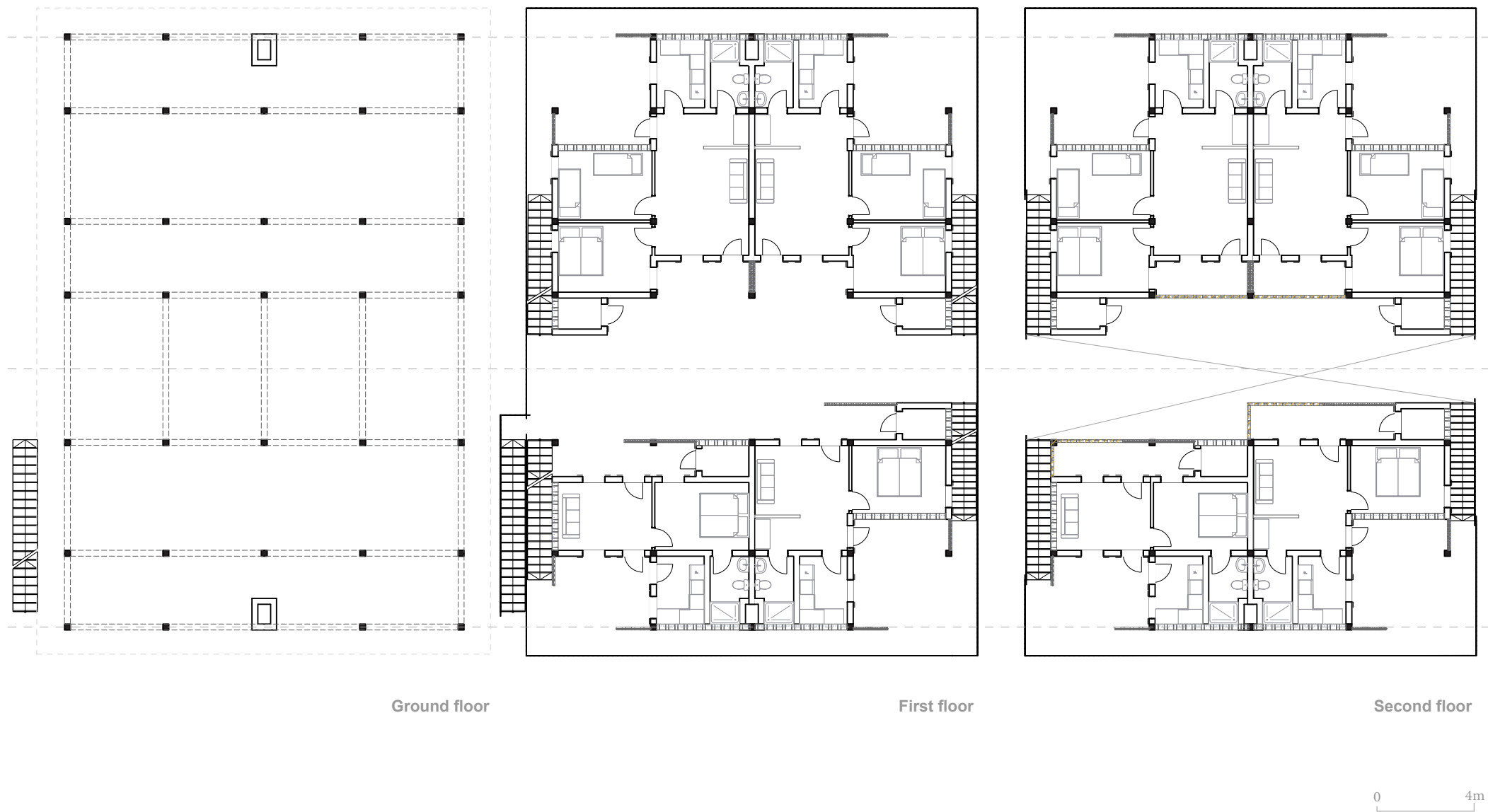


Figure. Cluster 2 - Middle income

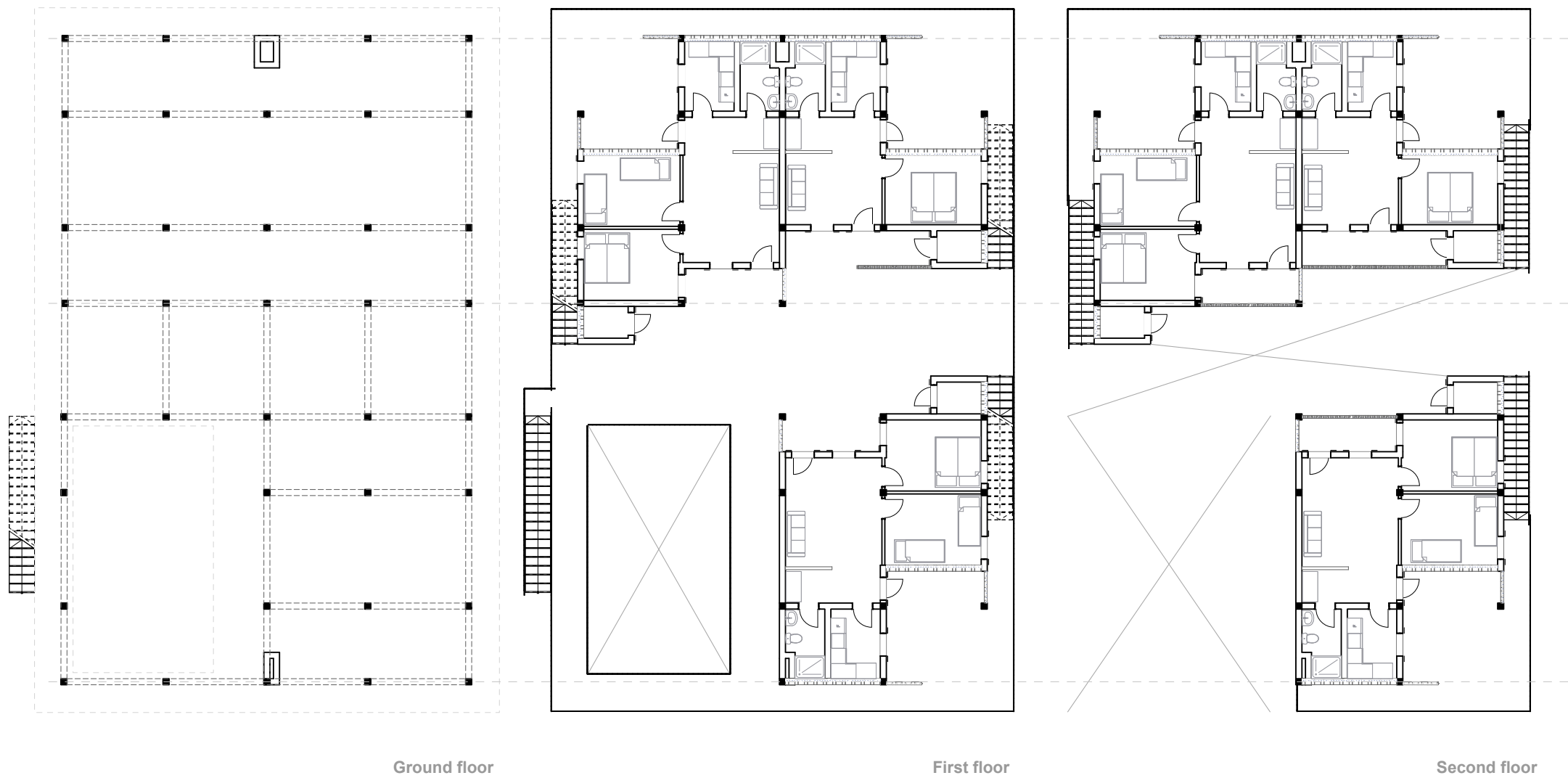


Figure. Cluster 3 - Middle income

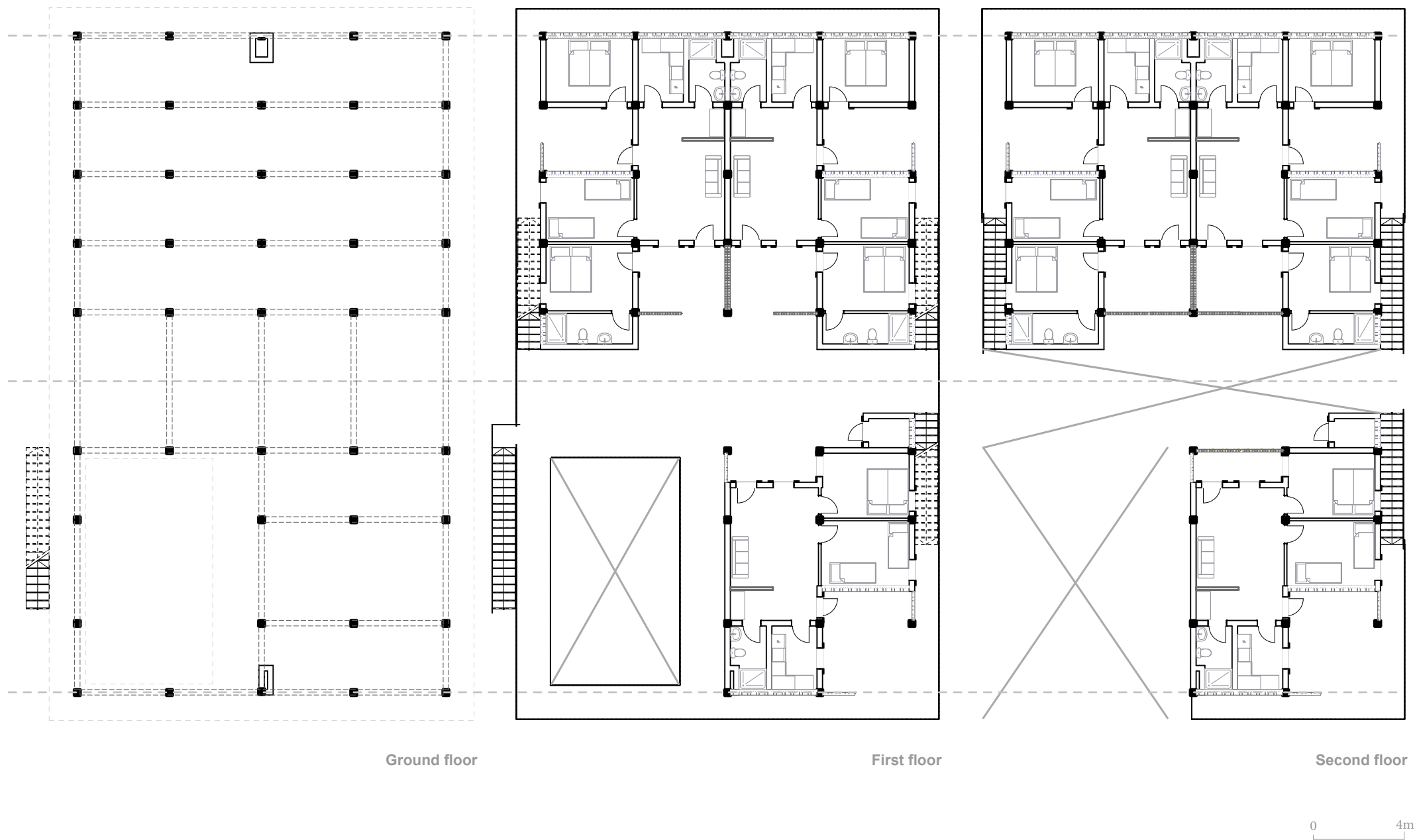


Figure. Cluster 4 - Middle income

The Cluster - Construction

Predicted Flooding

Recent estimates suggest a <5 percent increase in monsoon rainfall by 2050 (Brammer, 2009). Accounts of the people of Shonatola suggest that currently (2025) flood waters can get as high as 1 meter in the village. Considering that the average ground level in Sylhet is 26 meters and the average life span of a residential home is between 50-80 years **we can estimate that by 2075 (50 years from now) flood waters can reach up to 2.65 meters in Shonatola.**

1.

Assuming the total increase over 41 years
(2009-20050) = 5%

The annual rate of increase is $= 5\% / 41 \approx 0.122\%$

Total Increase from 2025–2075 (50 years)

$= 0.122\% \times 50 \approx 6.1\%$

2.

Assuming:

-Ground Level = 26 meters.

-Current Flood Peak = $26 + 1 = 27$ meters (as floodwaters currently rise 1 meter above ground).

-Projected Increase: 6.1% from 2025 to 2075.

3.

Future Flood Peak $= 27\text{m} \times 1.061 \approx 28.65\text{m}$

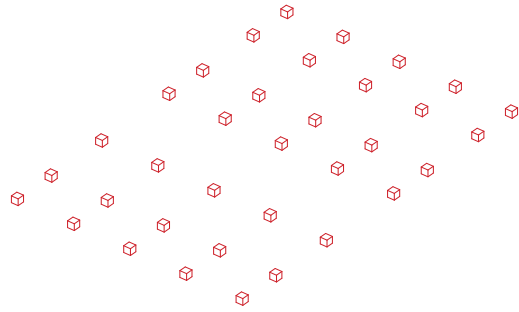
Flood height above ground in 2075 $= 28.65\text{m} - 26\text{m}$

$= 2.65\text{m}$

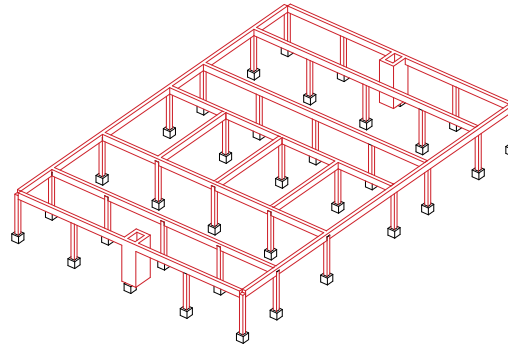


Figure. Partial structure of a cluster

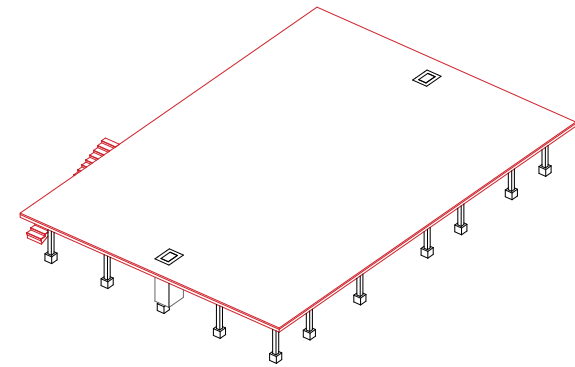
The Cluster - Construction



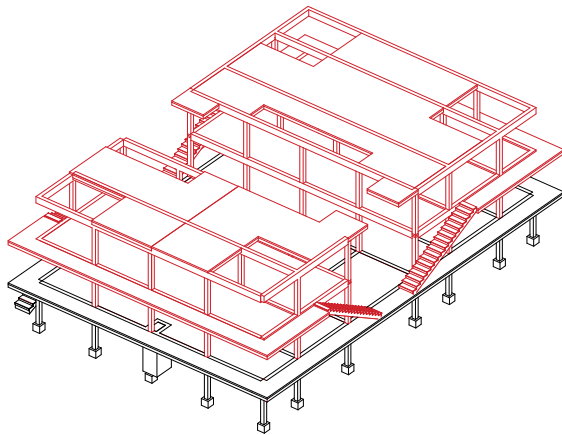
1. Foundations piles are laid



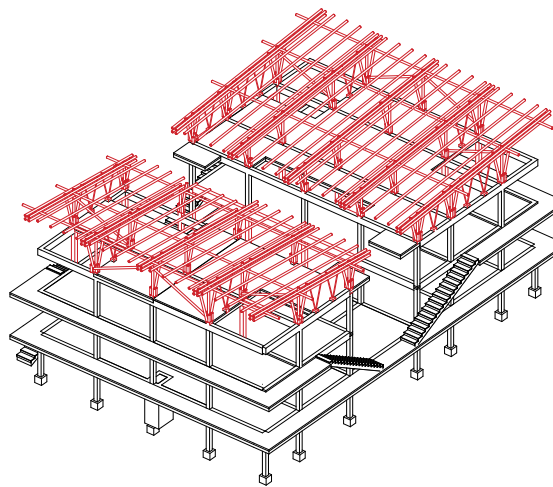
2. Column and beam structure is built



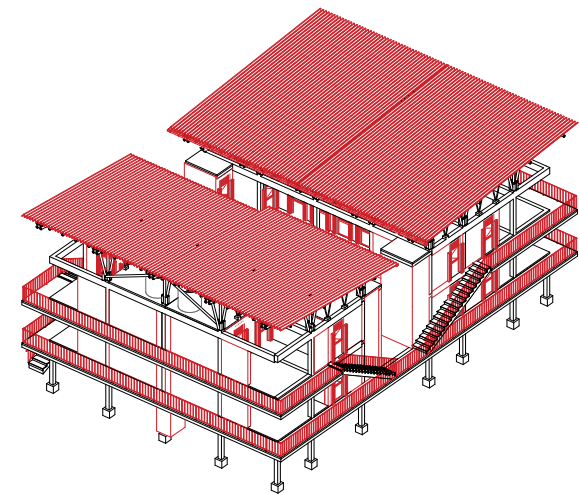
3. First floor slab is constructed



4. Complete structural system is completed



5. Roof structure is built



6. Finishing walls, roof shell, windows/doors and railings are assembled

Figure. Construction process

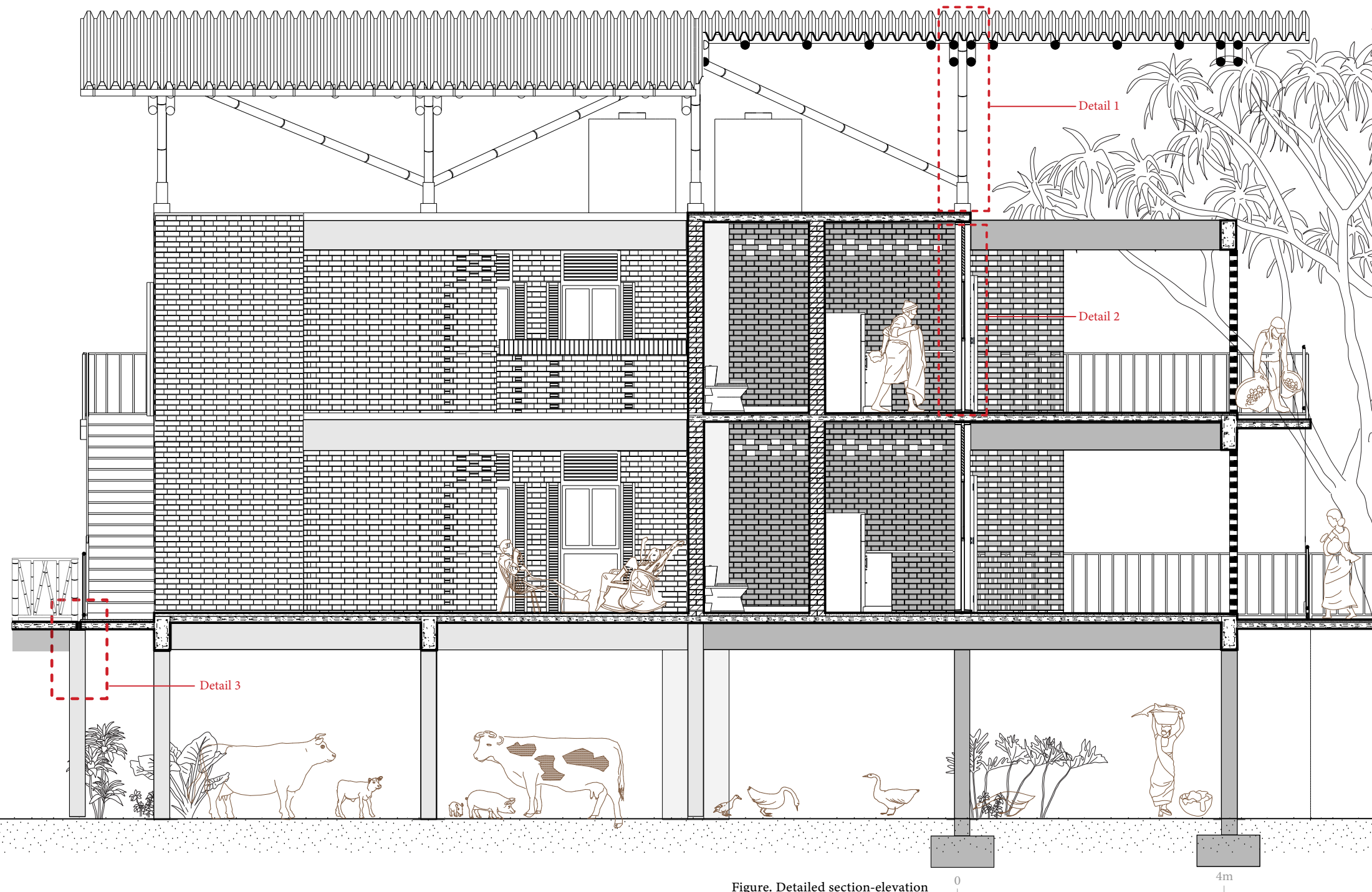
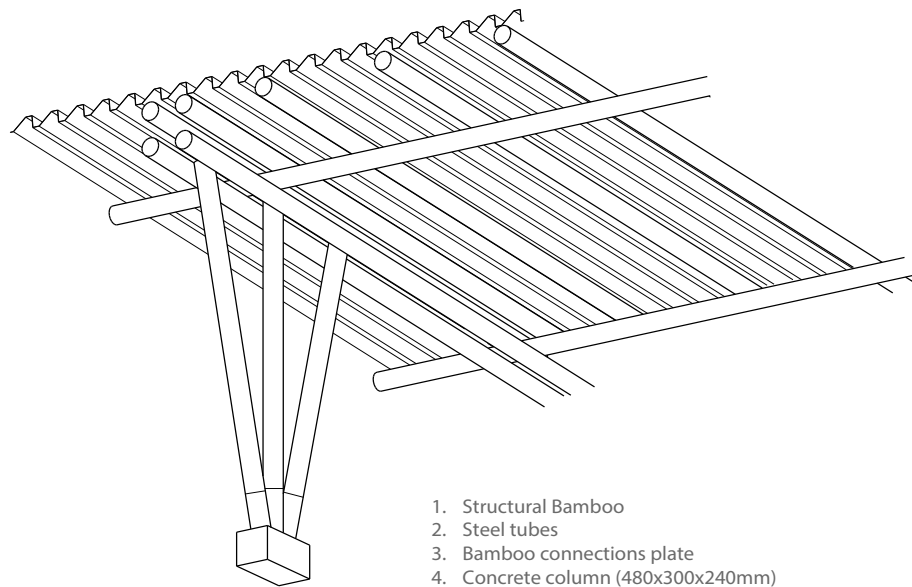


Figure. Detailed section-elevation



1. Structural Bamboo
2. Steel tubes
3. Bamboo connections plate
4. Concrete column (480x300x240mm)
5. Galvanized steel sheet
6. Asphalt layer for water proofing
7. Purlin
8. Concrete beam
9. Rafter
10. Structural Bamboo
11. Bolts

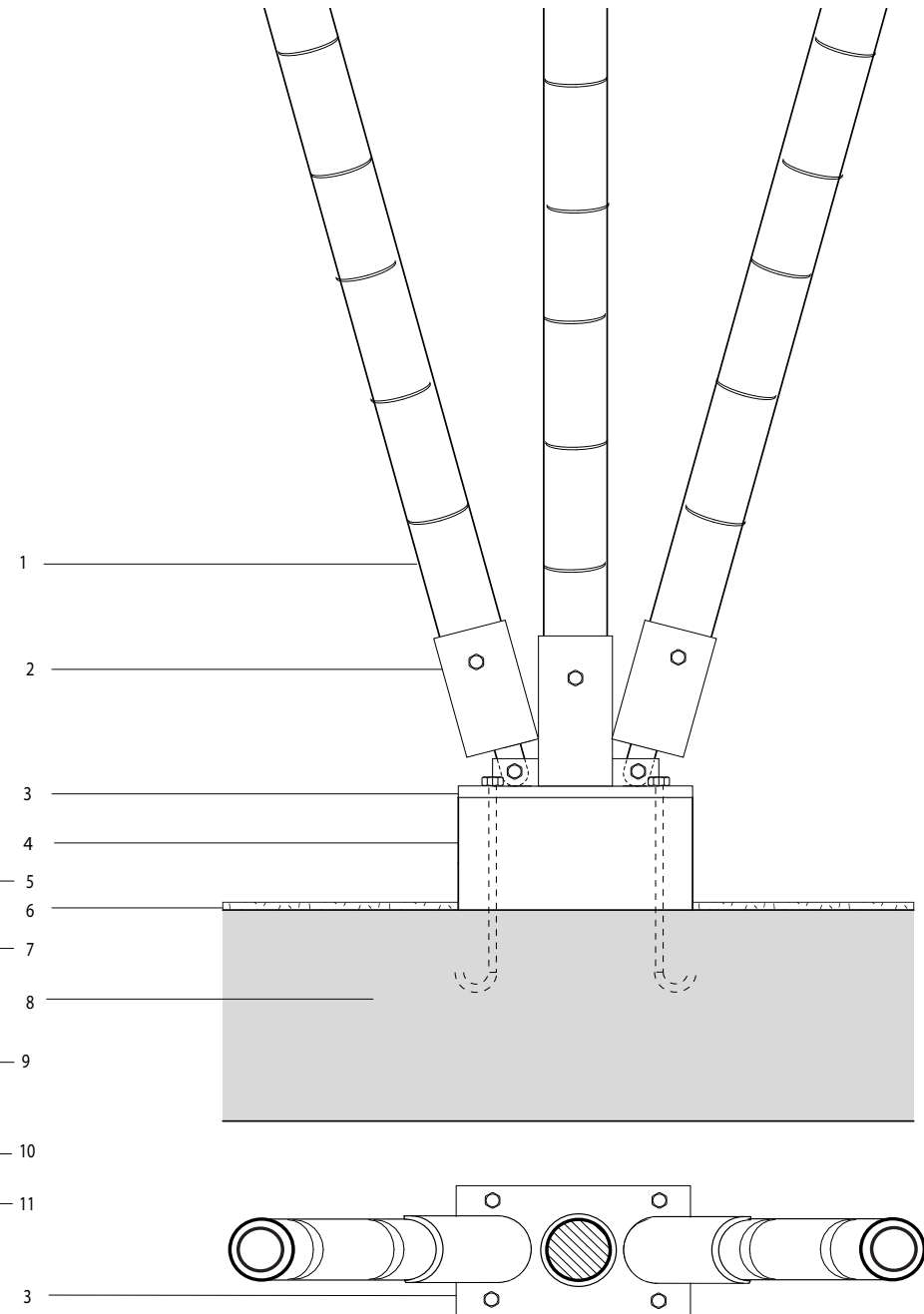
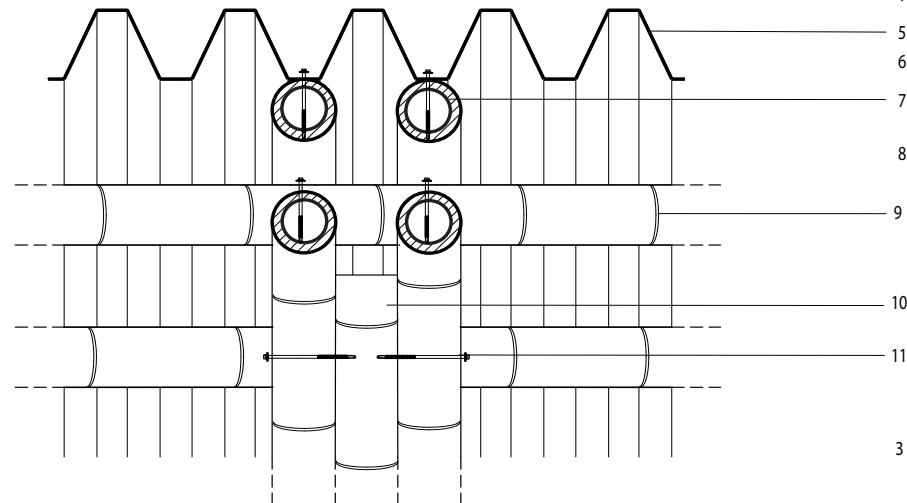


Figure. Detail 1- the roof



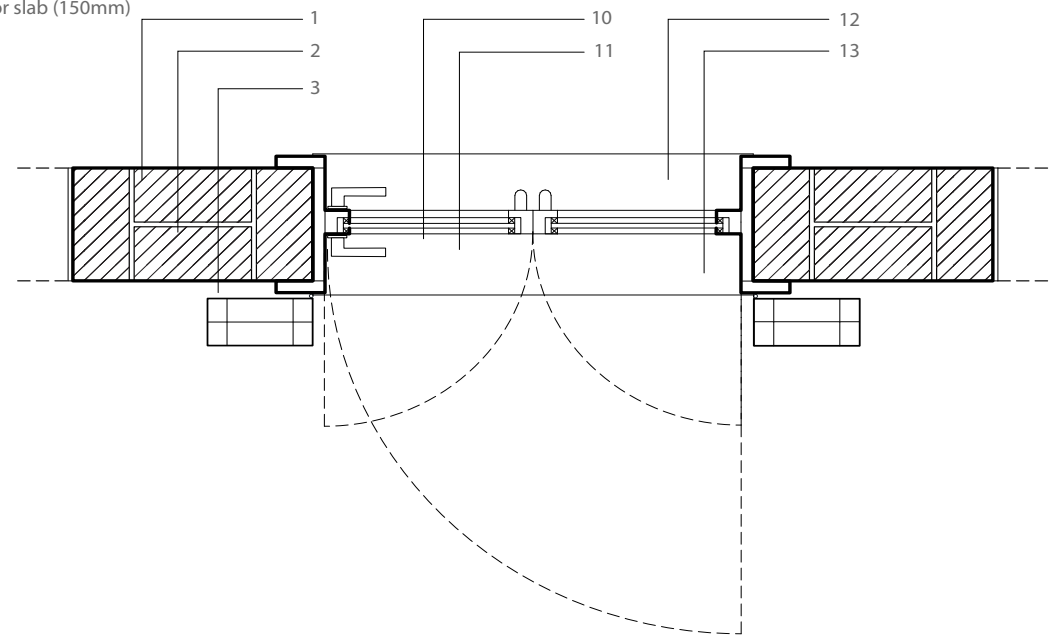
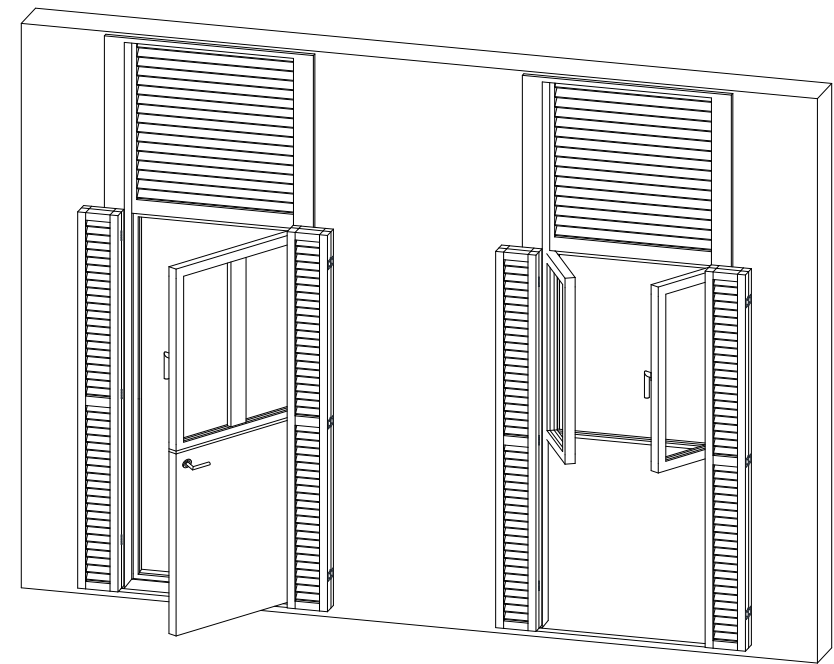
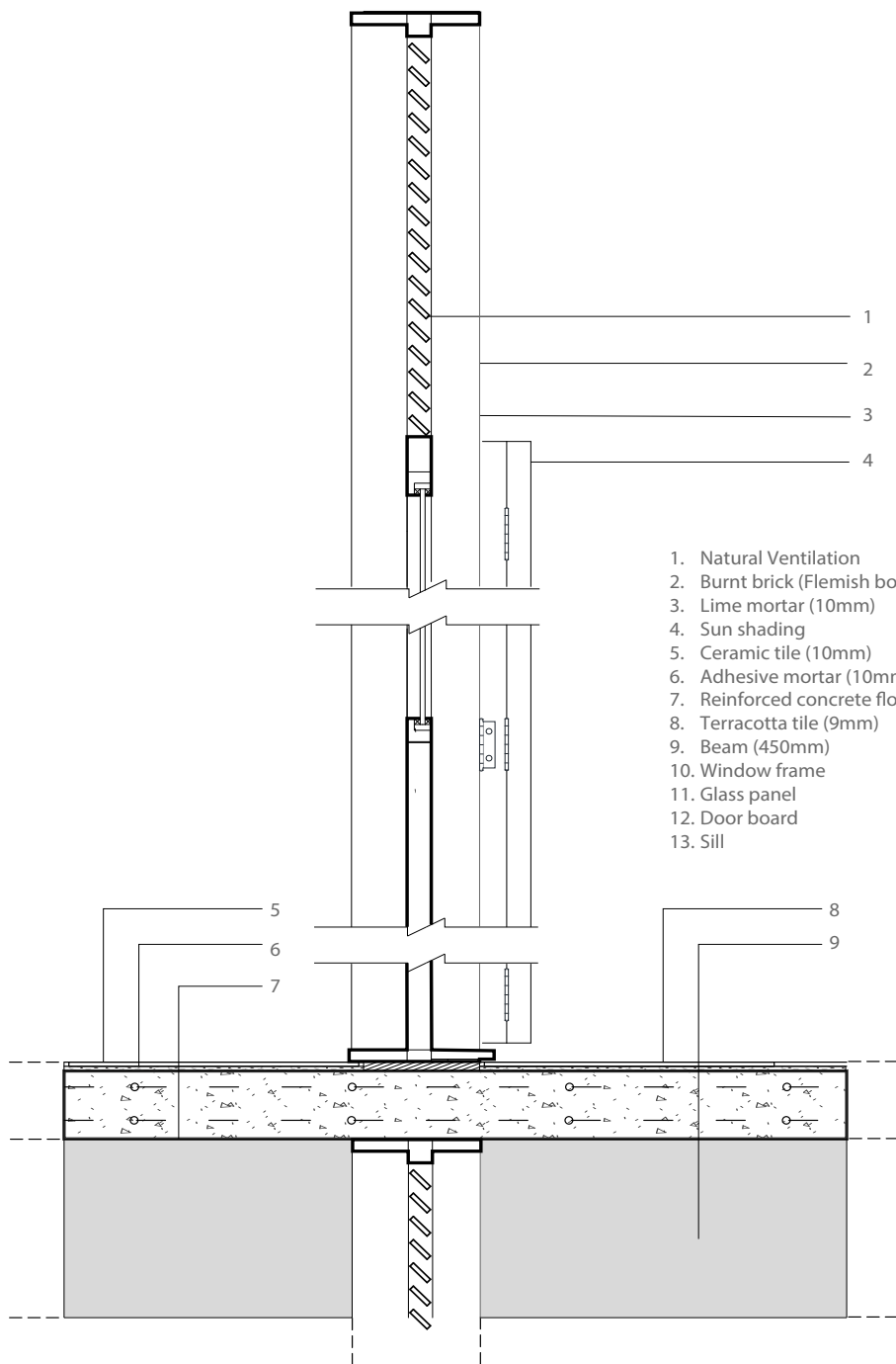


Figure. Detail 2- the threshold



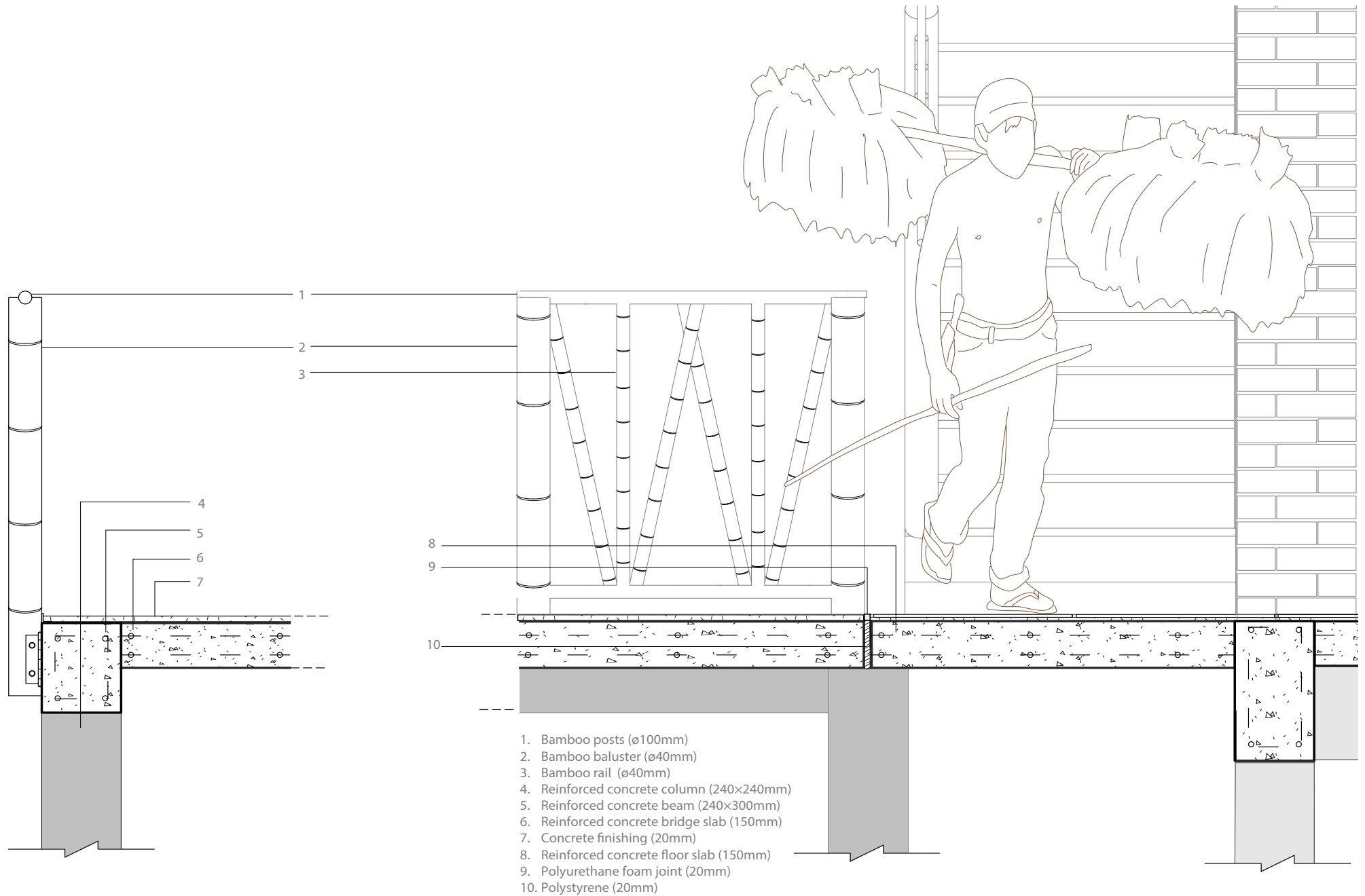


Figure. Detail 3- the bridge



The Dwelling





Figure. Map of Shonatola

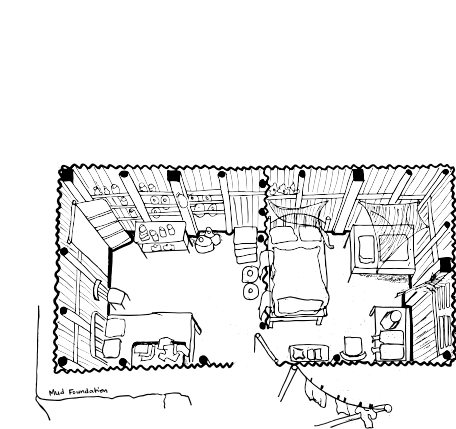


Figure. Palki's tin house

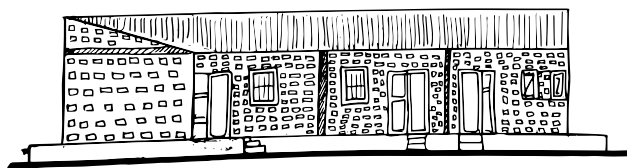
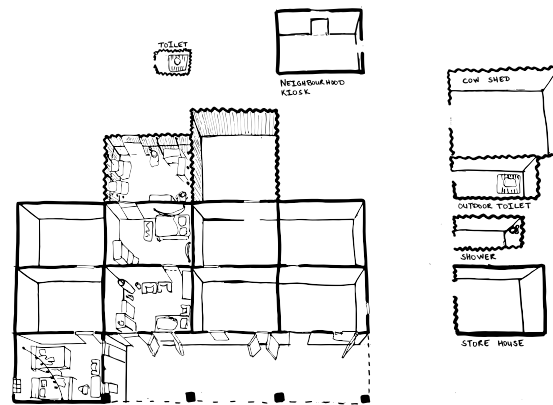


Figure. Fahim's brick house

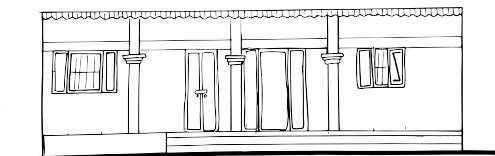
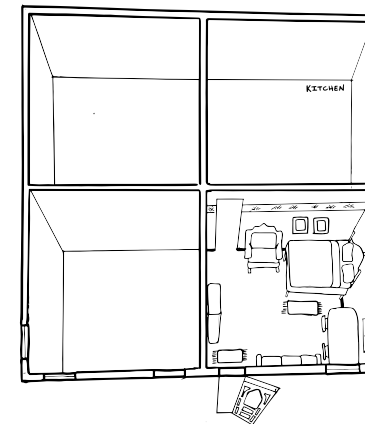
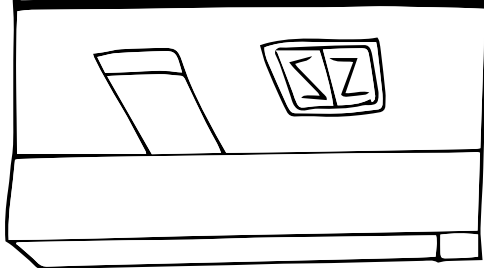
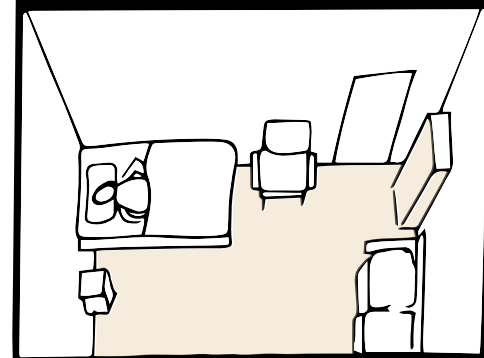
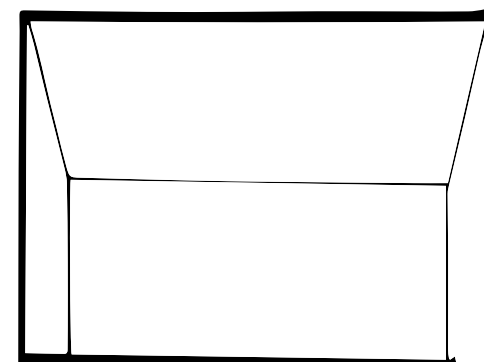
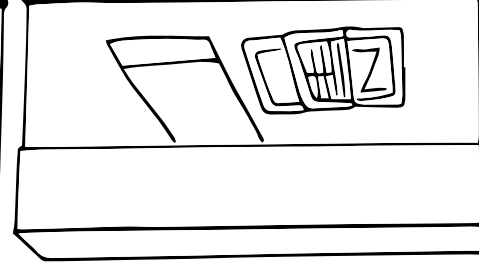
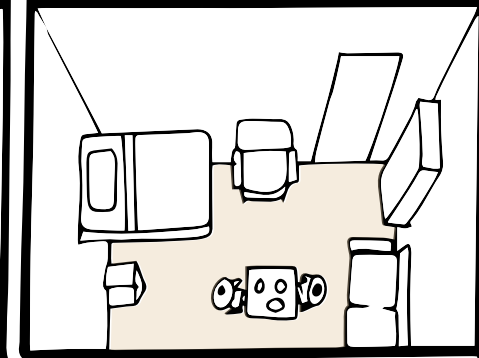
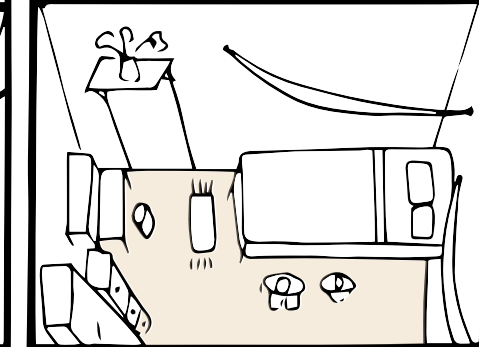
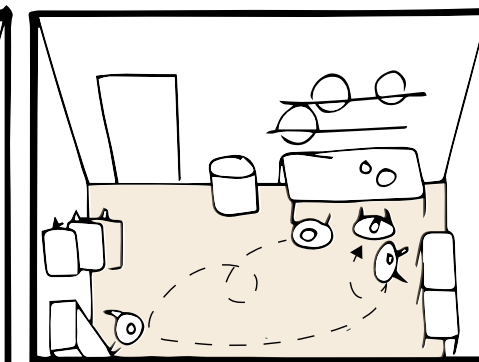


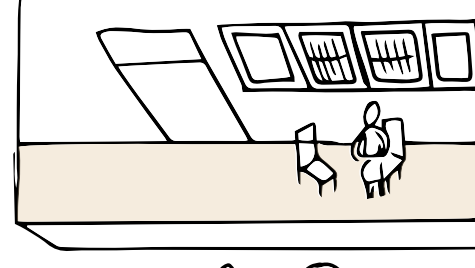
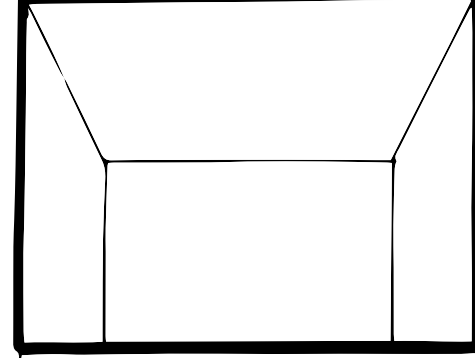
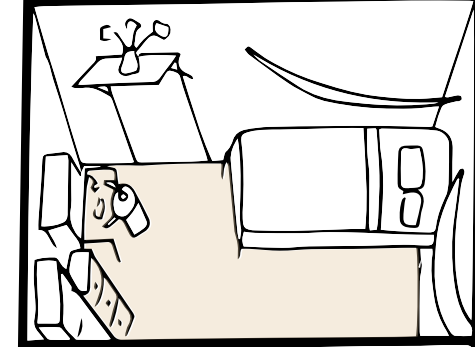
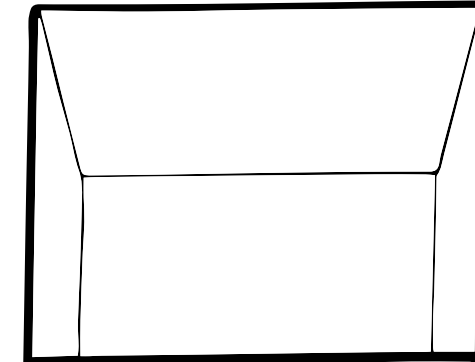
Figure. Ahnaf's concrete house



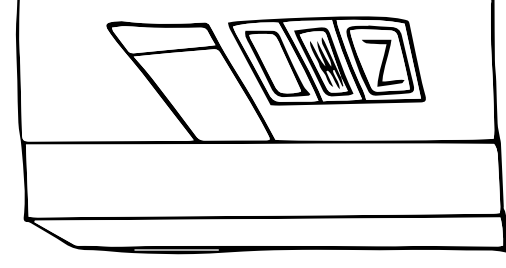
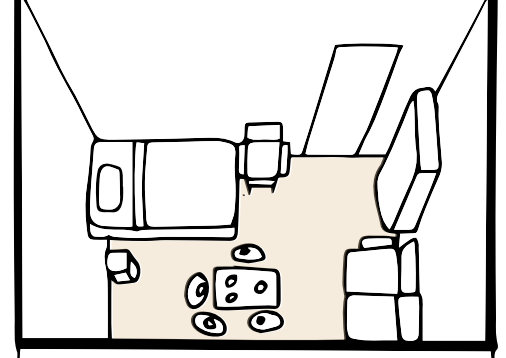
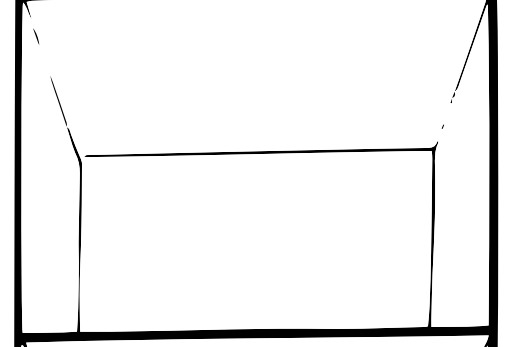
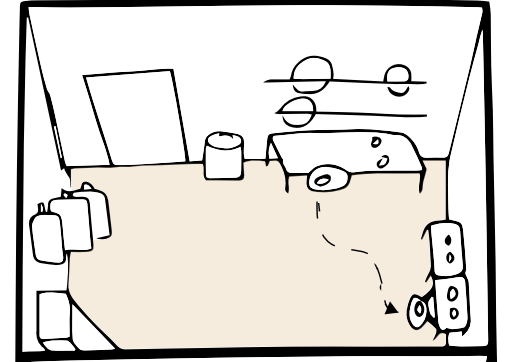
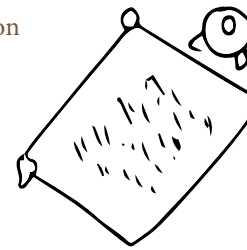
Dawn



Morning



Afternoon



Evening

Extensions to the house

The stoop



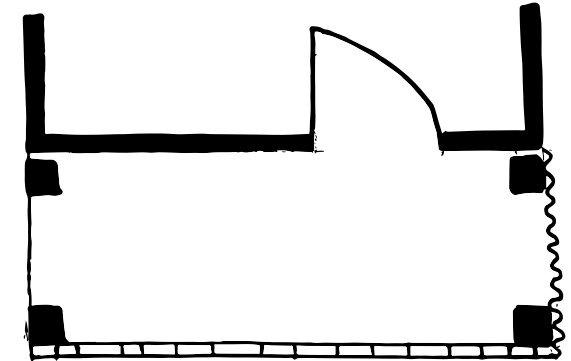
The stoop is an extension to the house that is usually made of compact earth, stone or concrete.

The veranda

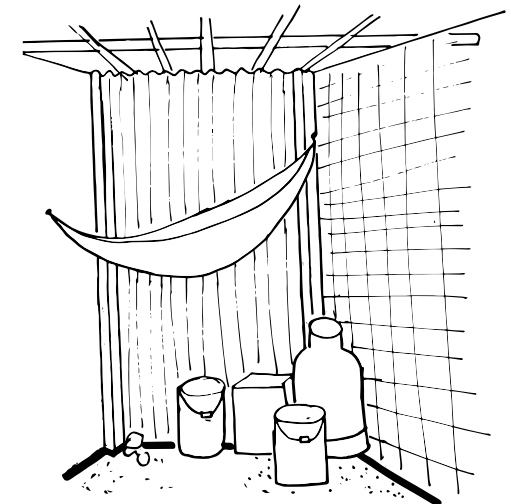
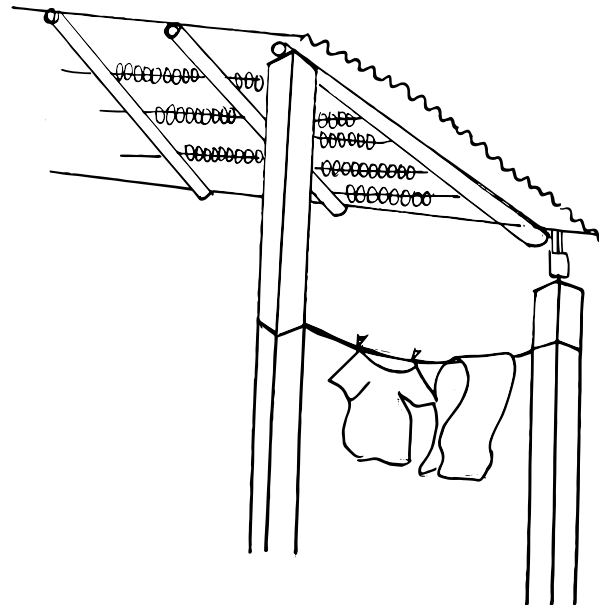


When possible stoops are complimented by a covering creating the veranda, used as an every-day space for domestic and social activities.

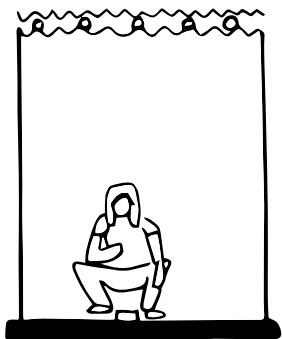
The 'outside room'



Sometimes 1 or two sides of the veranda may be blocked off for privacy creating the outside room. Domestic and social activities still take place here but the room is also used for storage and semi-private relaxation.



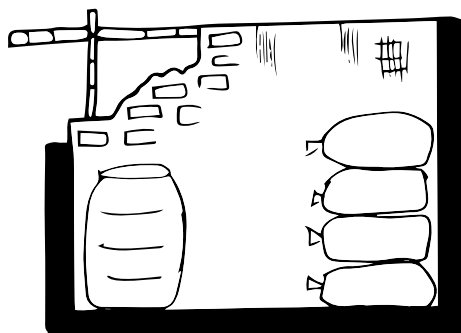
Toilet



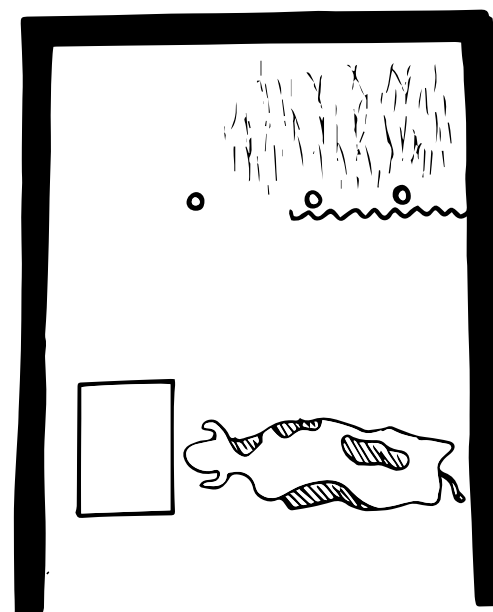
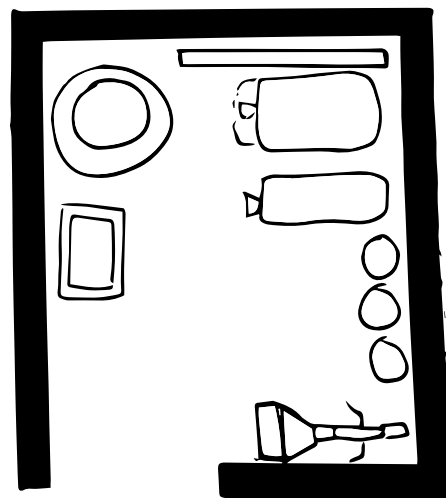
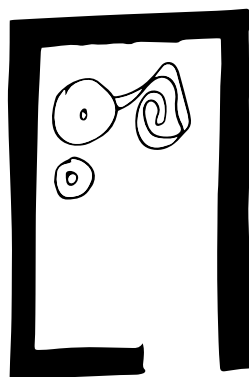
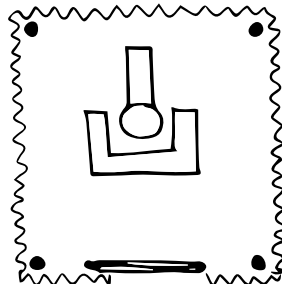
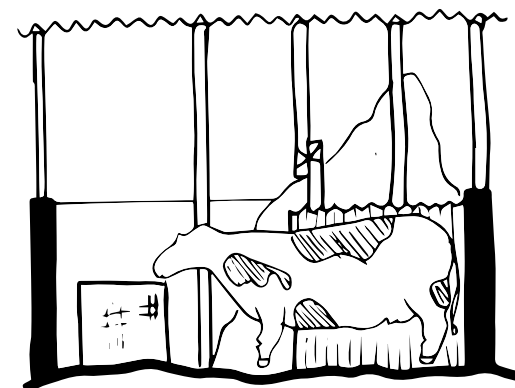
Shower



Storage room



Animal shed



The Dwelling

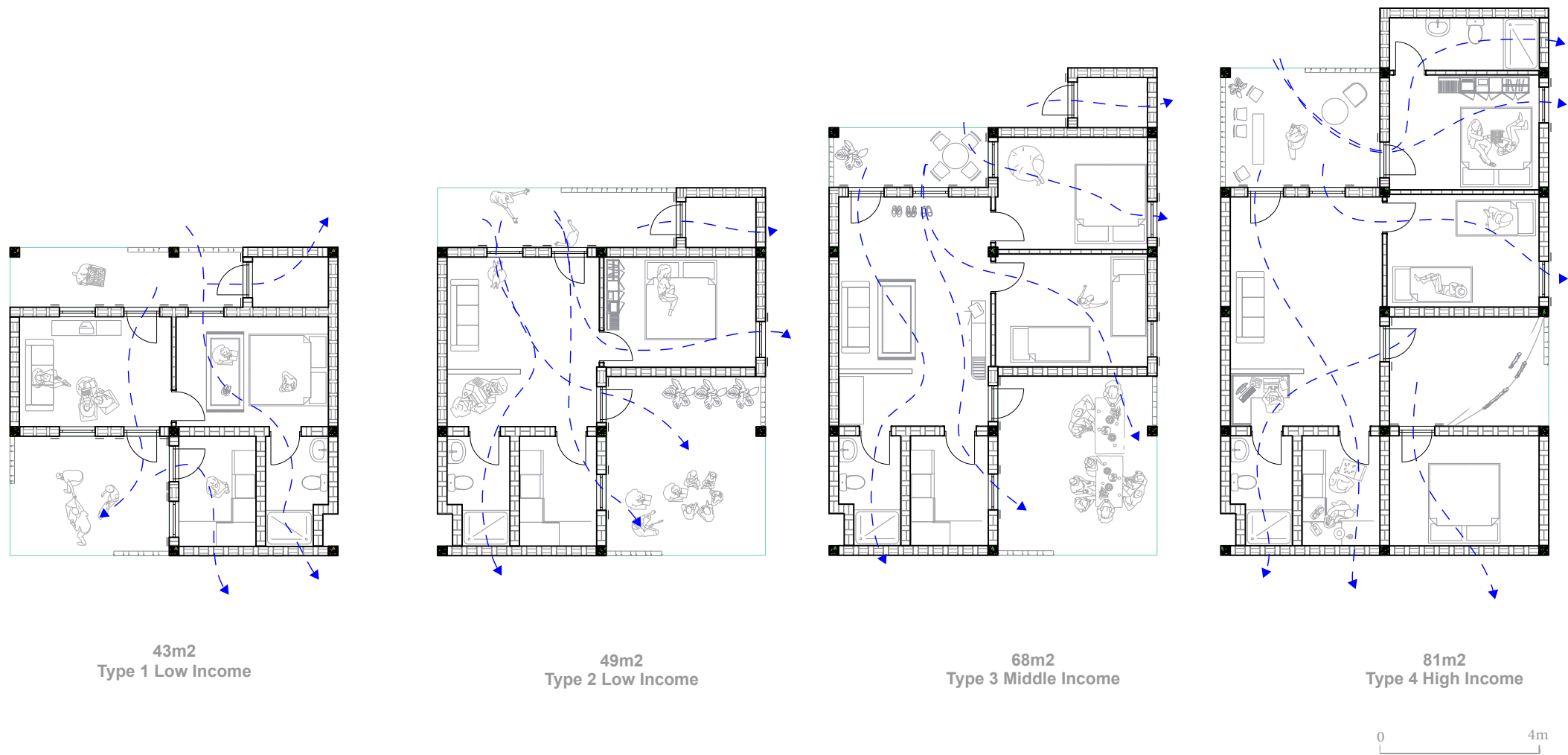
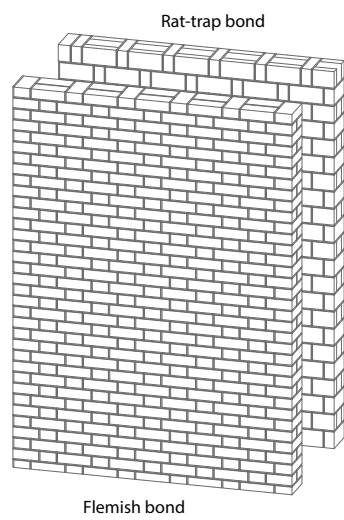
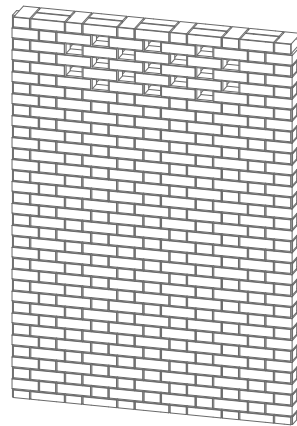


Figure. Dwelling units

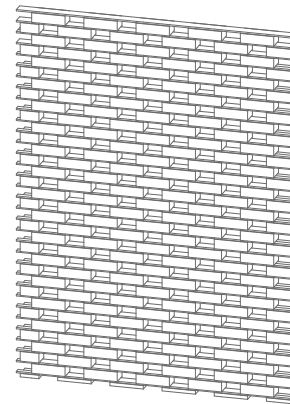


Rat-trap bond

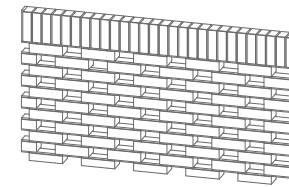
Flemish bond



Ventilated wall



Perforated wall



Perforated railing

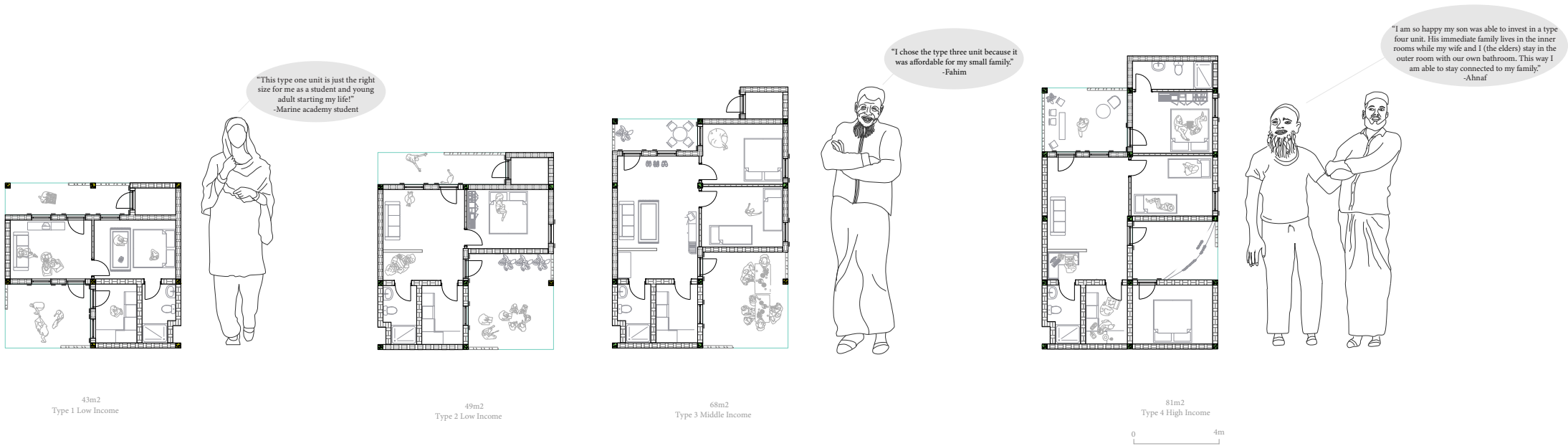
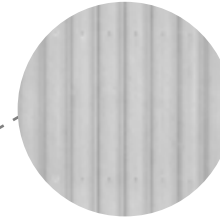
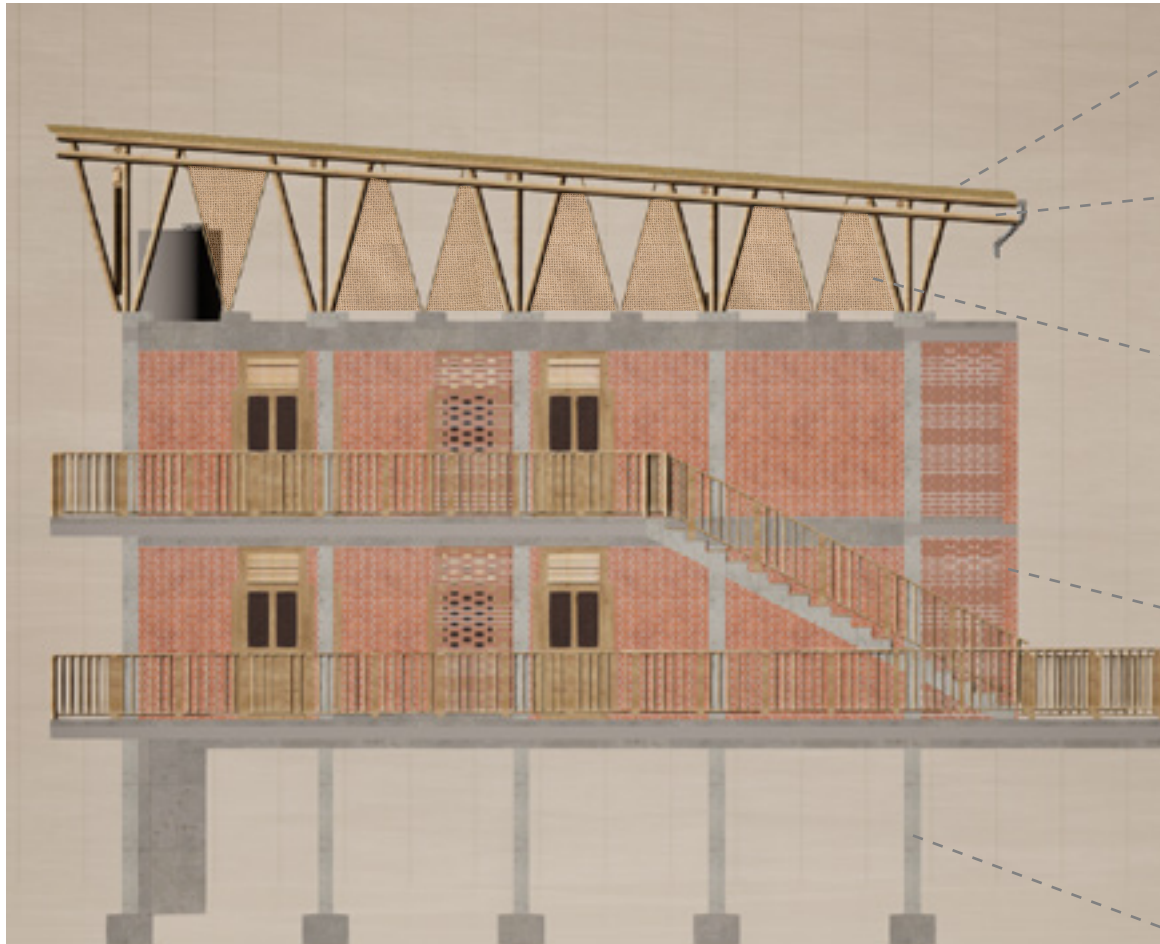
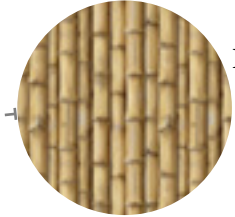


Figure. Dwelling units and target groups

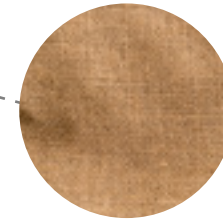
The Dwelling - Materiality



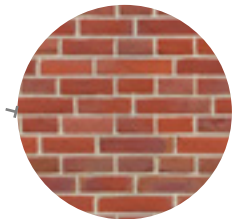
C.I sheets



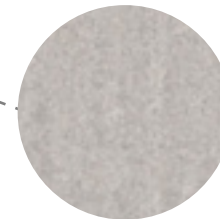
Bamboo roof structure
+ bamboo railings



Woven jute panels



Fired brick



Concrete structure

Figure. Materiality of the dwelling unit

