

# EMPOWERING AGING

enhancing mobility and social  
connections for active aging





Health elderly



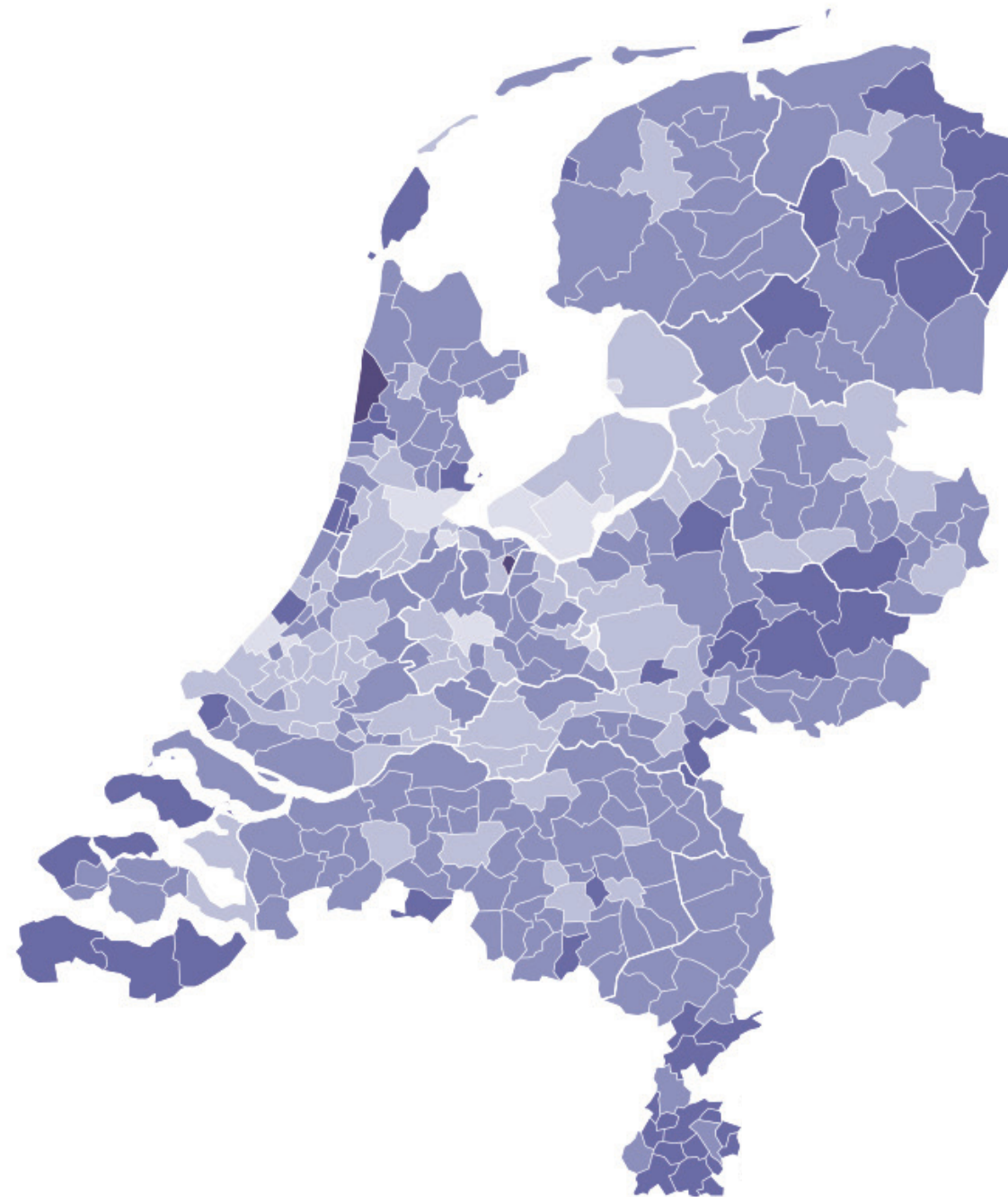
Elderly facing physical  
impairment



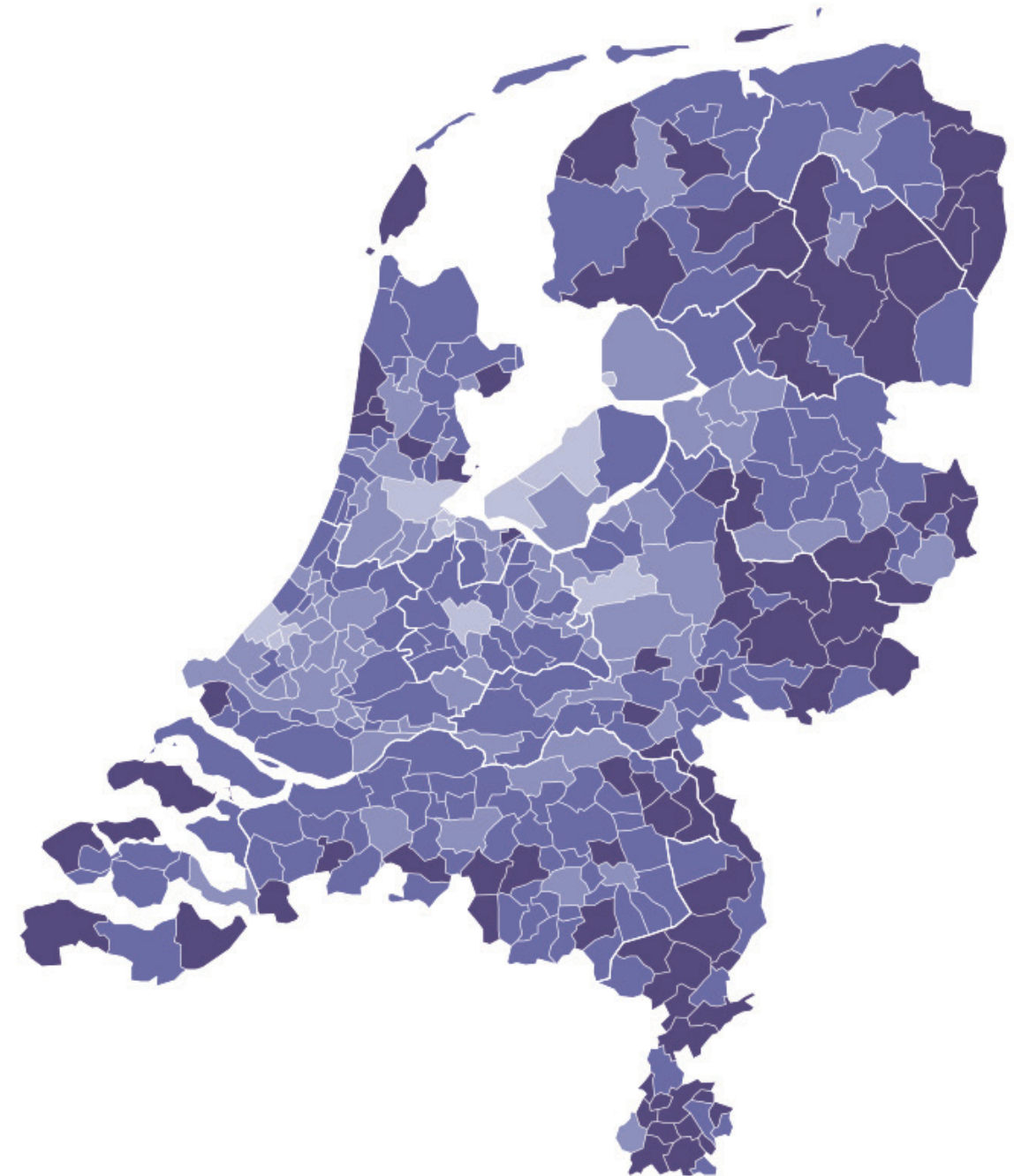
Environments that are poorly designed can increase the risk of loneliness, isolation, and physical limitations, especially for vulnerable target groups, such as elderly.



2021



2035



In 2035, more than 24% of the population of the Netherlands will be 65 years old or more.

% van de bevolking  
15 of minder  
15 – 20  
20 – 25  
25 – 30  
Meer dan 30  
(CBS, 2022)



**Active aging**



**Mobility limitations**



**Loneliness**







TARWEWIJK





**67%**

**of the elderly populations of  
Tarwewijk faces difficulties  
conducting daily activities**

**35%**

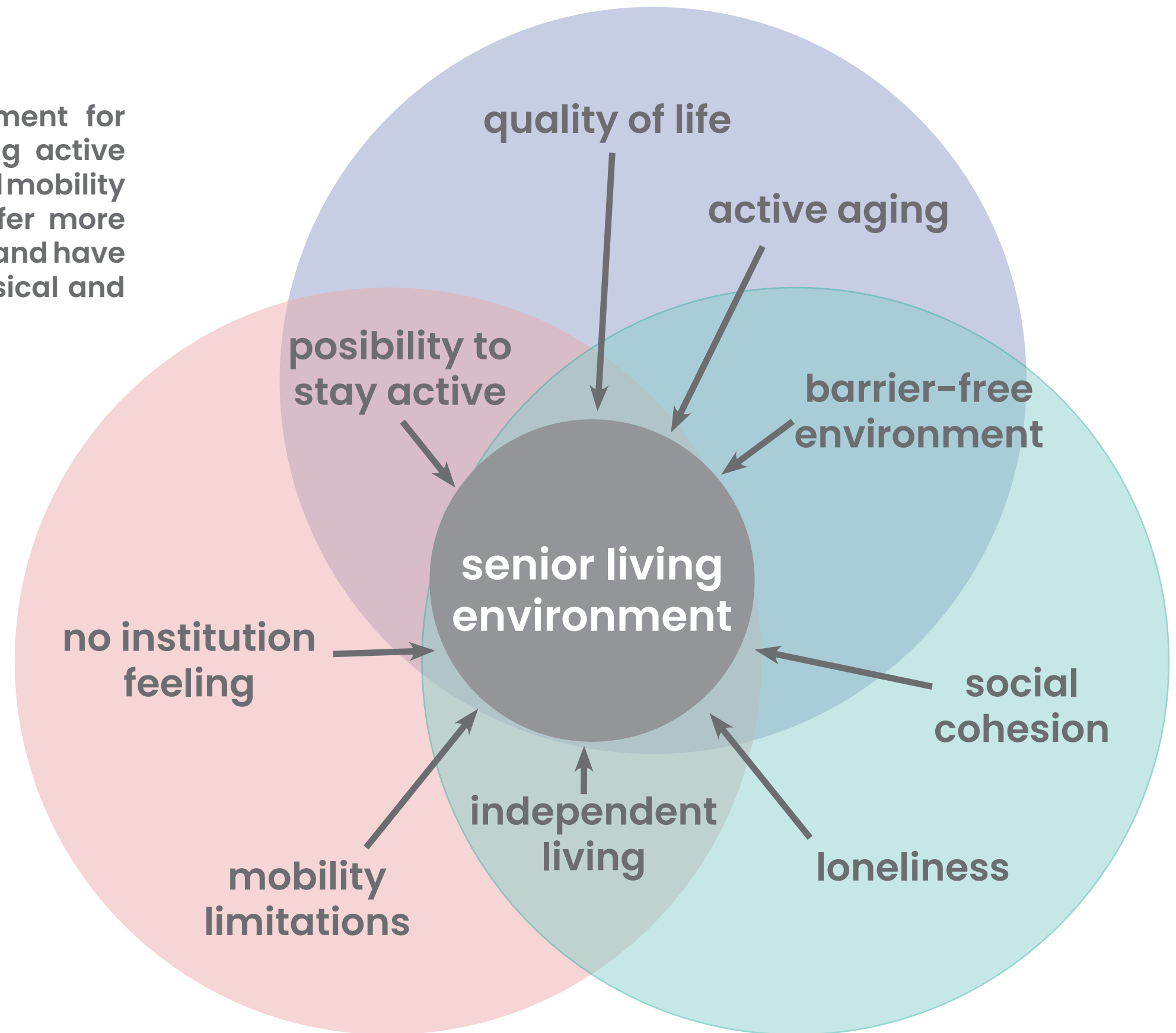
**of the elderly populations  
of Tarwewijk faces mobility  
limitations**

(Gezondheidmonitor Volwassenen en Ouderen, Rotterdam)



## Hypothesis

By designing a living environment for seniors focused on encouraging active aging, combating loneliness, and mobility limitations, Tarwewijk would offer more suitable places for elderly to live and have a healthier lifestyle, from a physical and mental point of view.



**How can the architectural and urban design of senior living environments be optimized to reduce loneliness, promote active aging, and support people with mobility limitations?**



```
graph TD; A[How can the architectural and urban design of senior living environments be optimized to reduce loneliness, promote active aging, and support people with mobility limitations?] --> B[What design strategies can facilitate accessibility and mobility for seniors, thereby promoting active aging and encouraging physical engagement within the community?]; A --> C[How can the integration of supportive care facilities within architectural and urban designs enhance the overall well-being and independence of seniors in co-housing settings?]; A --> D[What architectural elements and design features effectively enhance social interaction among residents in senior living environments?];
```

What design strategies can facilitate accessibility and mobility for seniors, thereby promoting active aging and encouraging physical engagement within the community?

How can the integration of supportive care facilities within architectural and urban designs enhance the overall well-being and independence of seniors in co-housing settings?

What architectural elements and design features effectively enhance social interaction among residents in senior living environments?



**LITERATURE | FIELDWORK | INTERVIEWS | CASE STUDIES**



The fieldwork at Liv Inn provided the opportunity to analyze an alternative living environment for seniors, focusing on active aging and creating a community.






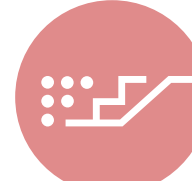








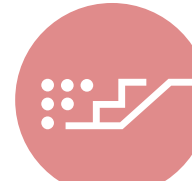




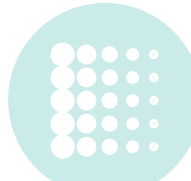




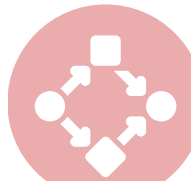




**Aging among  
fellow elderly**



**Aging surrounded  
by family**



# NEIGHBORHOOD | BUILDING | INTERIOR LEVELS

	Active Aging	Mobility Limitations	Loneliness
Neighborhood Level	<div>  <p>Different green spaces</p> </div> <div>  <p>Pedestrian and bicycle paths</p> </div> <div>  <p>Proximity to amenities</p> </div>	<div>  <p>Barrier-free surroundings</p> </div> <div>  <p>Living on ground floor</p> </div> <div>  <p>Frequent benches</p> </div>	<div>  <p>Shared garden</p> </div> <div>  <p>Intergenerational and intercultural community functions</p> </div> <div>  <p>Outdoor transitions private-public</p> </div>
Building Level	<div>  <p>Centralized attractive staircase</p> </div> <div>  <p>Maximize visual connection to nature</p> </div> <div>  <p>Intuitive layouts</p> </div>	<div>  <p>Barrier-free floorplans</p> </div> <div>  <p>Caring facilities</p> </div> <div>  <p>Physiotherapy facilities</p> </div>	<div>  <p>Communal functions</p> </div> <div>  <p>Multifunctional spaces</p> </div> <div>  <p>Gradients of interaction</p> </div>
Interior Level	<div>  <p>Private outdoor spaces</p> </div> <div>  <p>Housing variety</p> </div> <div>  <p>Sufficient natural and artificial light</p> </div>	<div>  <p>Wheelchair-friendly apartments</p> </div> <div>  <p>Adaptable apartments</p> </div> <div>  <p>Avoid institutional feeling</p> </div>	<div>  <p>Spontaneous meeting spots</p> </div> <div>  <p>Avoid long and dark corridors</p> </div> <div>  <p>Visual connectivity private-public</p> </div>

**Legend:**  
● 1st importance  
● 2nd importance  
● 3rd importance

# Biophilic design



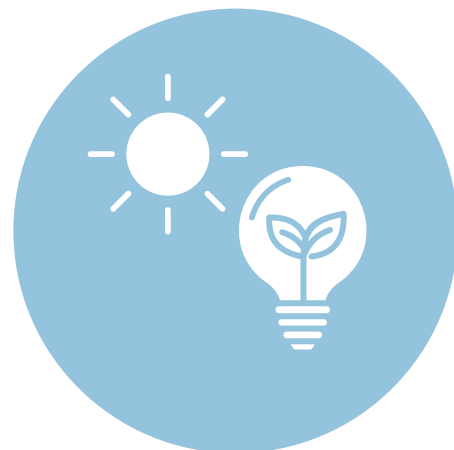
Natural elements –  
greenery and water



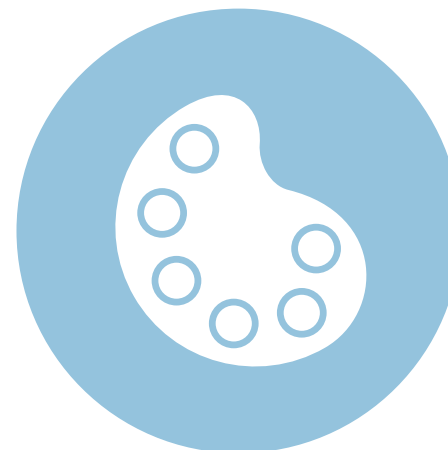
Natural materials



Views of nature



Natural light



Calming colors



Organic shapes and  
forms



# Pleinweg, Tarwewijk



SITE CHOICE



## Traffic



10 20 50 100m

## Transport

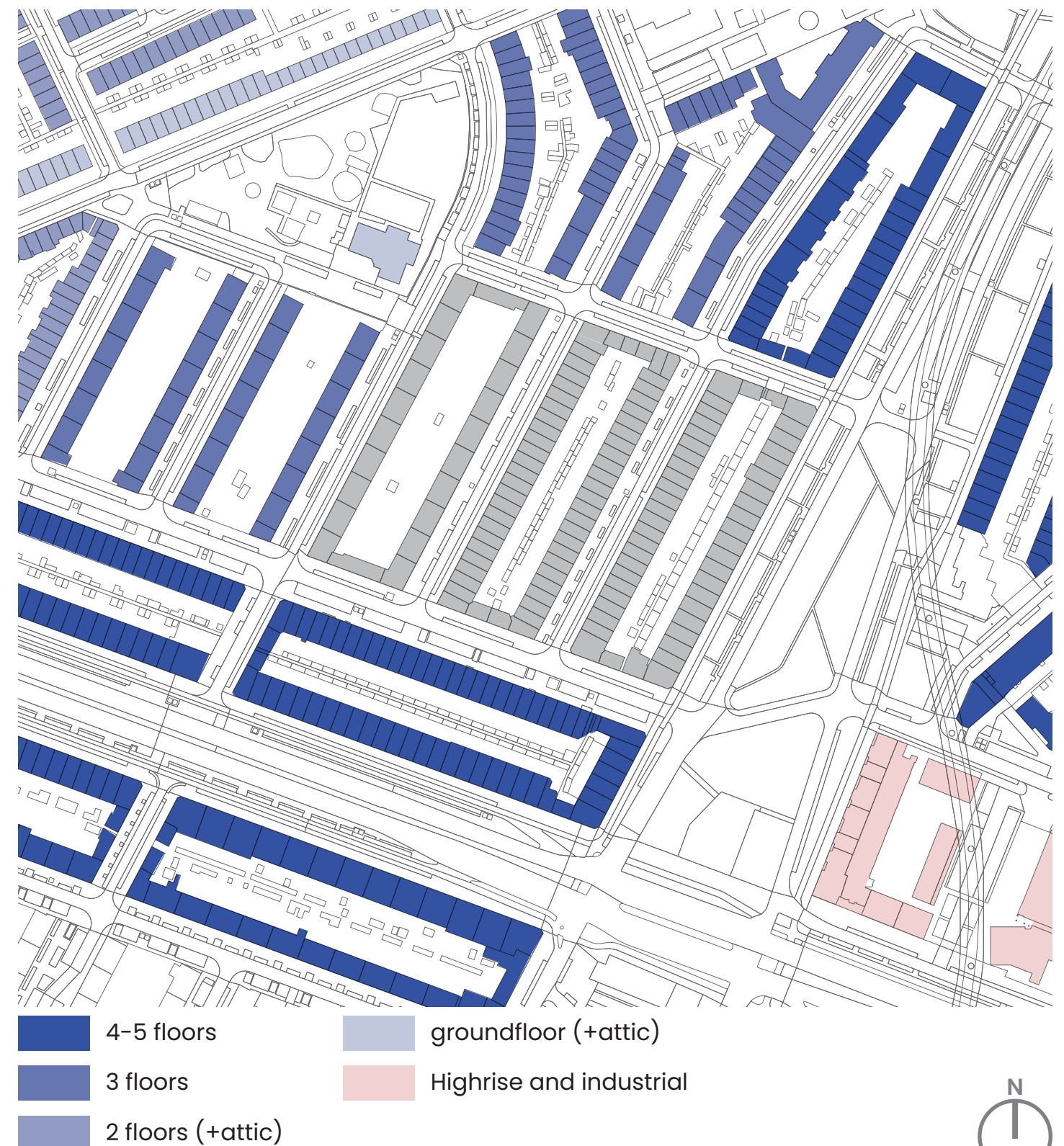


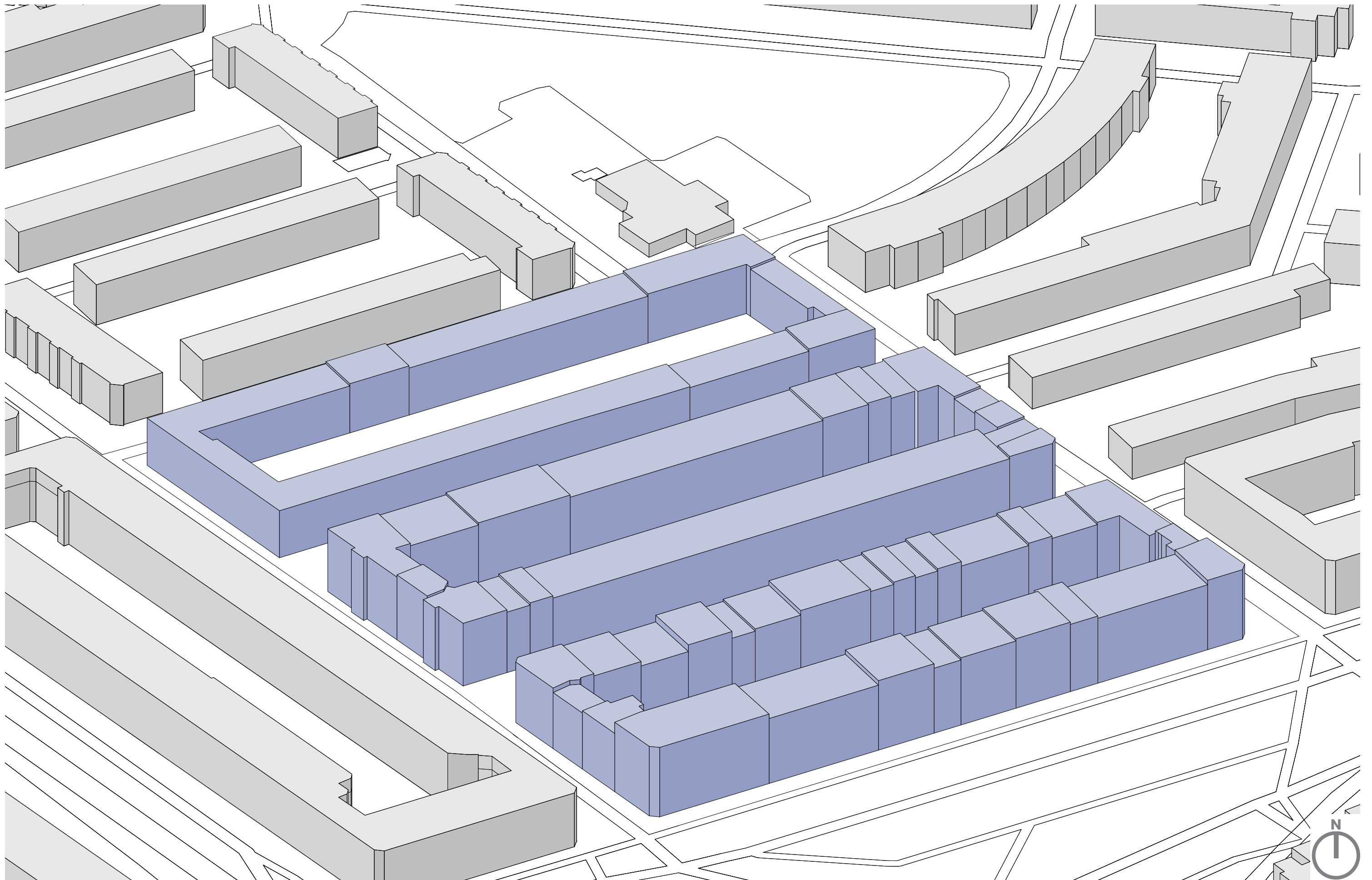


## Green spaces

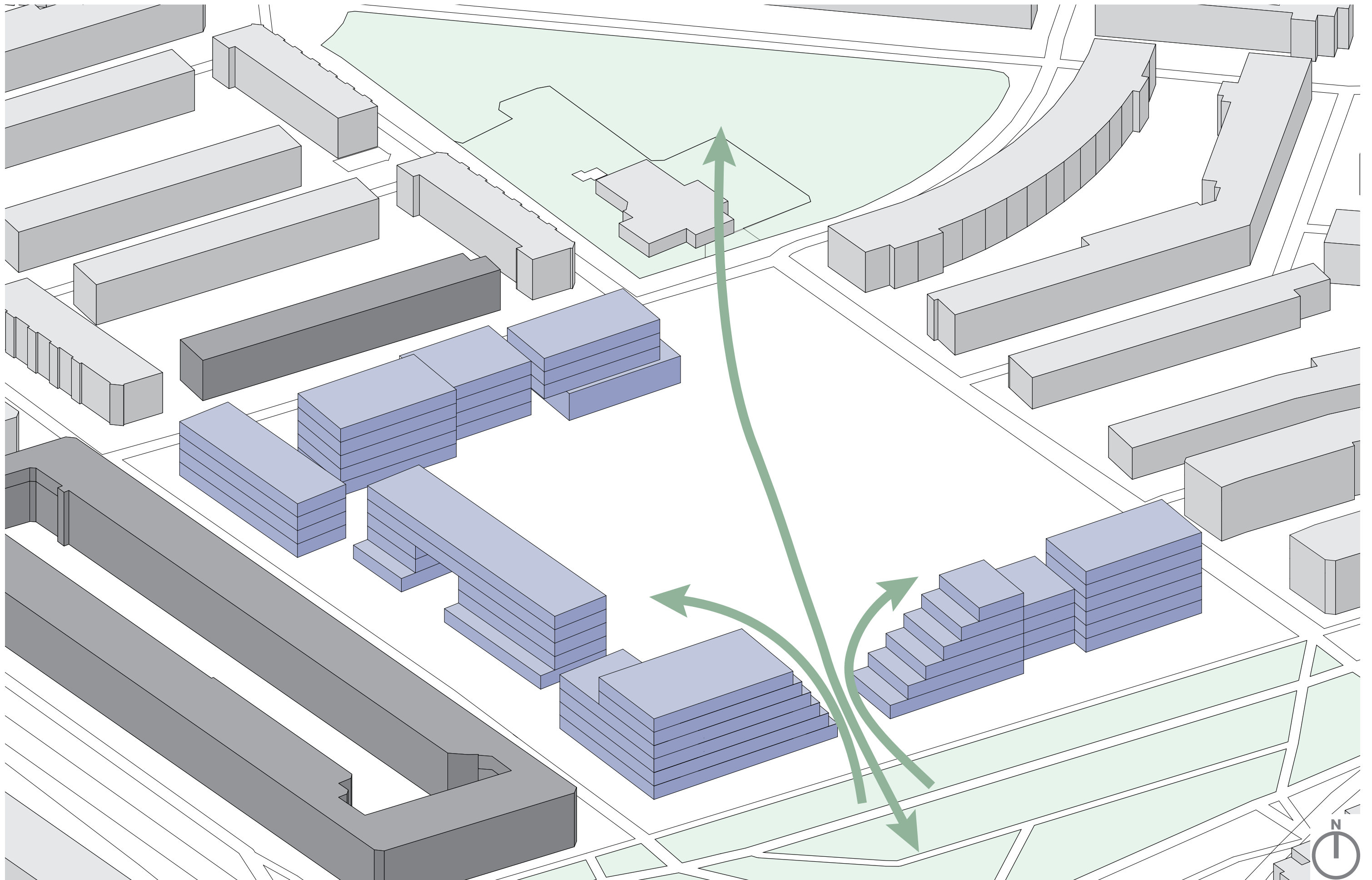


## Building heights



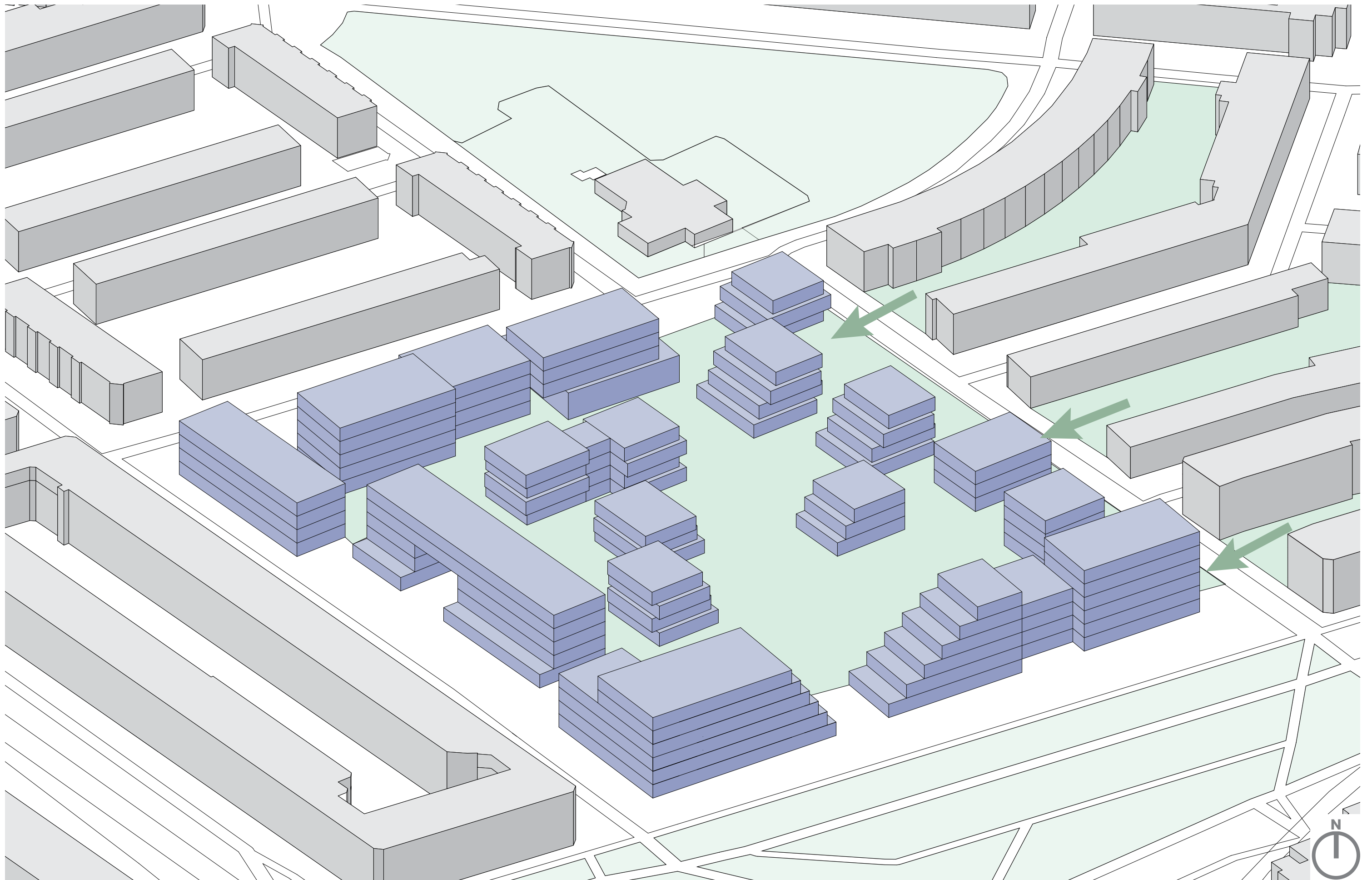






## CONCEPT DIAGRAM



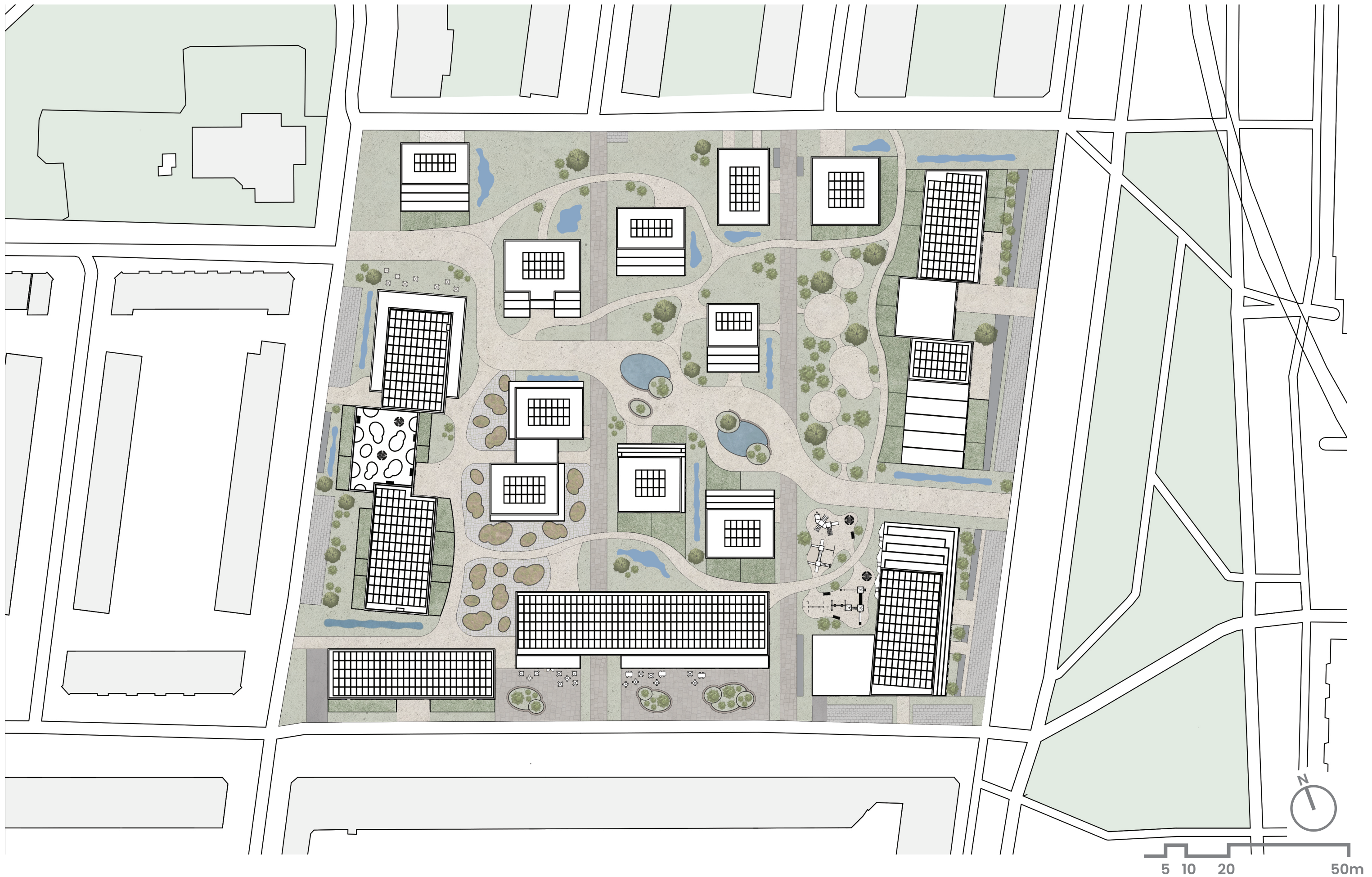






# MASSING





# URBAN PLAN





## GREENERY CONNECTION









(C.F. Møller Architects, 2016)



(Cleveland Manor, 2017)



(Landscape and Plants, n.d.)



(Serene Japandi Outdoor Play Area, n.d.)



(Pinterest, n.d.)



(Pinterest, n.d.)



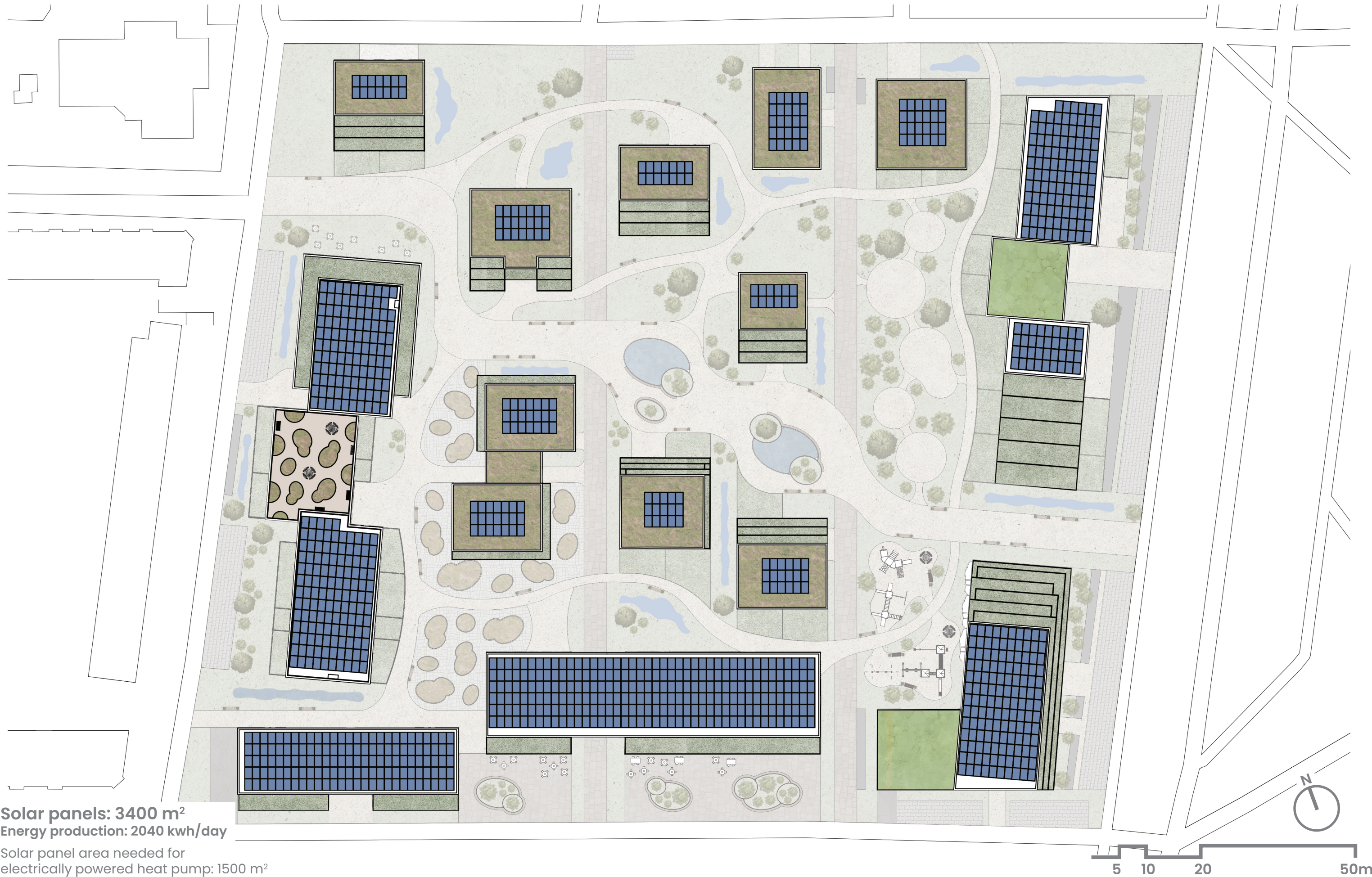
# OUTDOOR SPACES





SUN PATH DIAGRAM

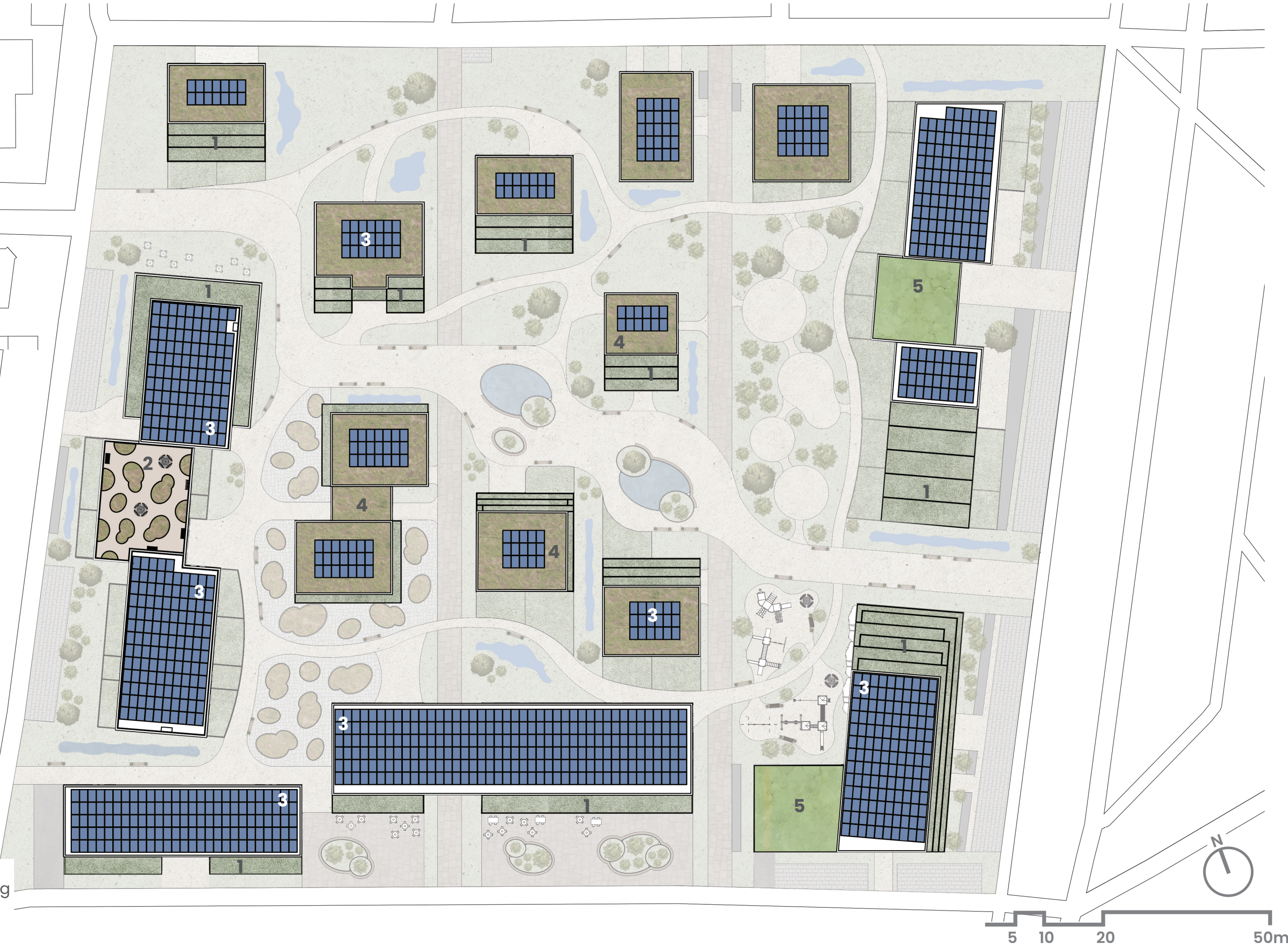




## ROOF STRATEGY



- 1 - private terrace
- 2 - communal gardening
- 3 - solar panels
- 4 - green roof
- 5 - communal terrace



# ROOF STRATEGY





## GROUND FLOOR FUNCTIONS





## GROUND FLOOR FUNCTIONS

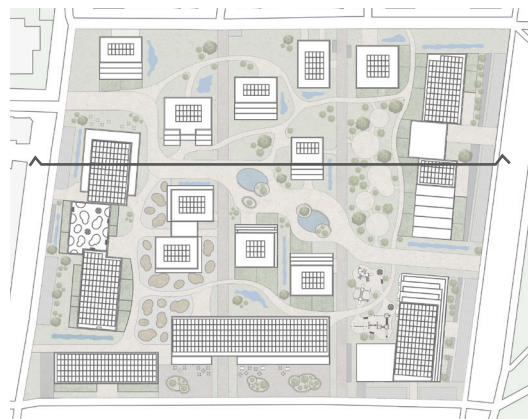




Urban facade – South side



Urban section

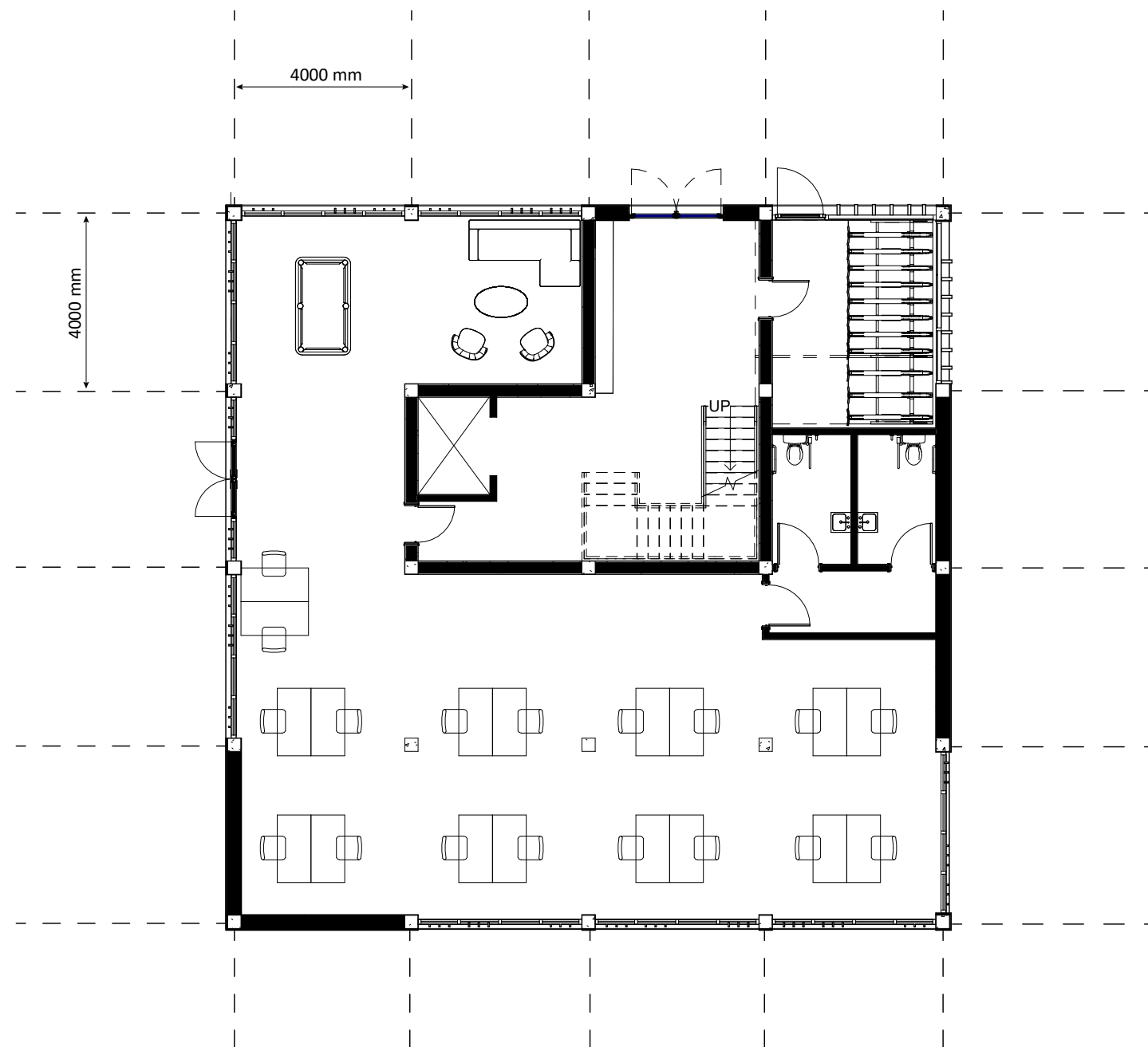


Scale 1:500

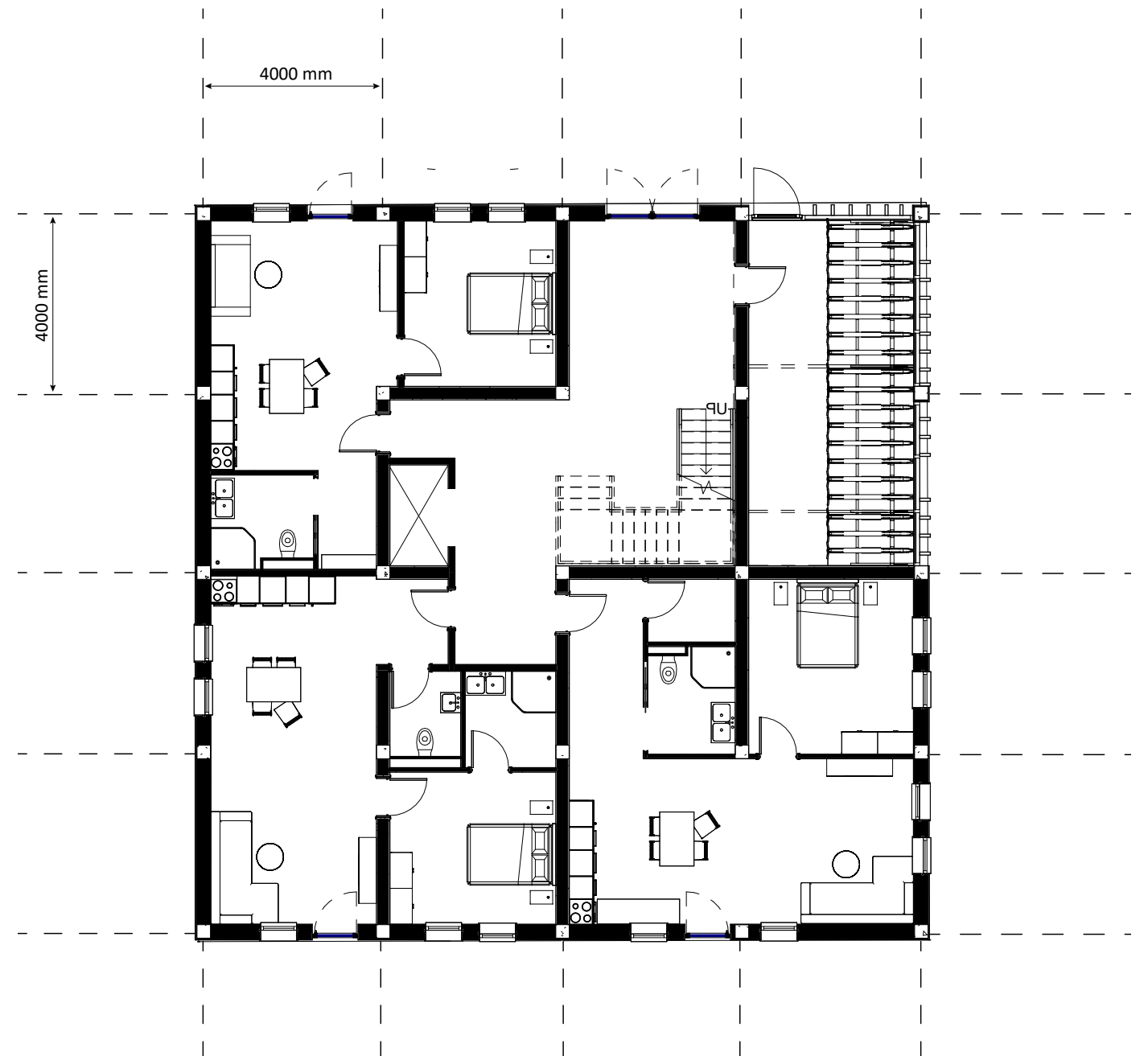


# URBAN SECTION





Floorplan working space



Floorplan with apartments

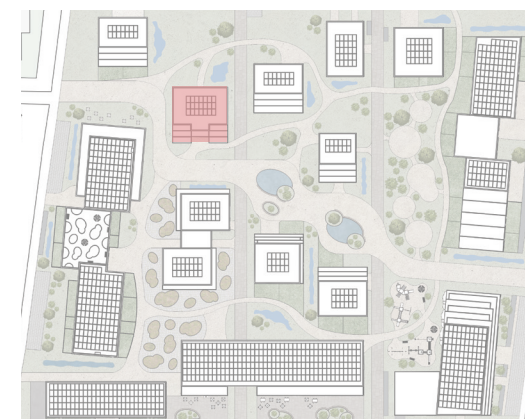




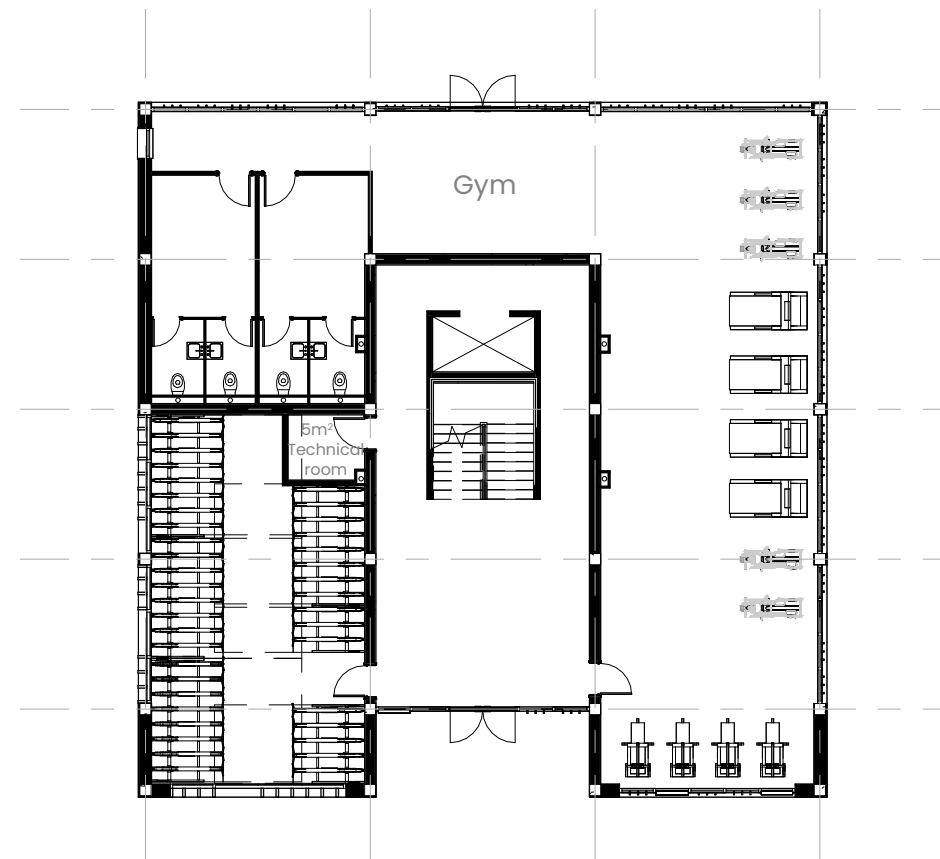


ZOOM IN AREA

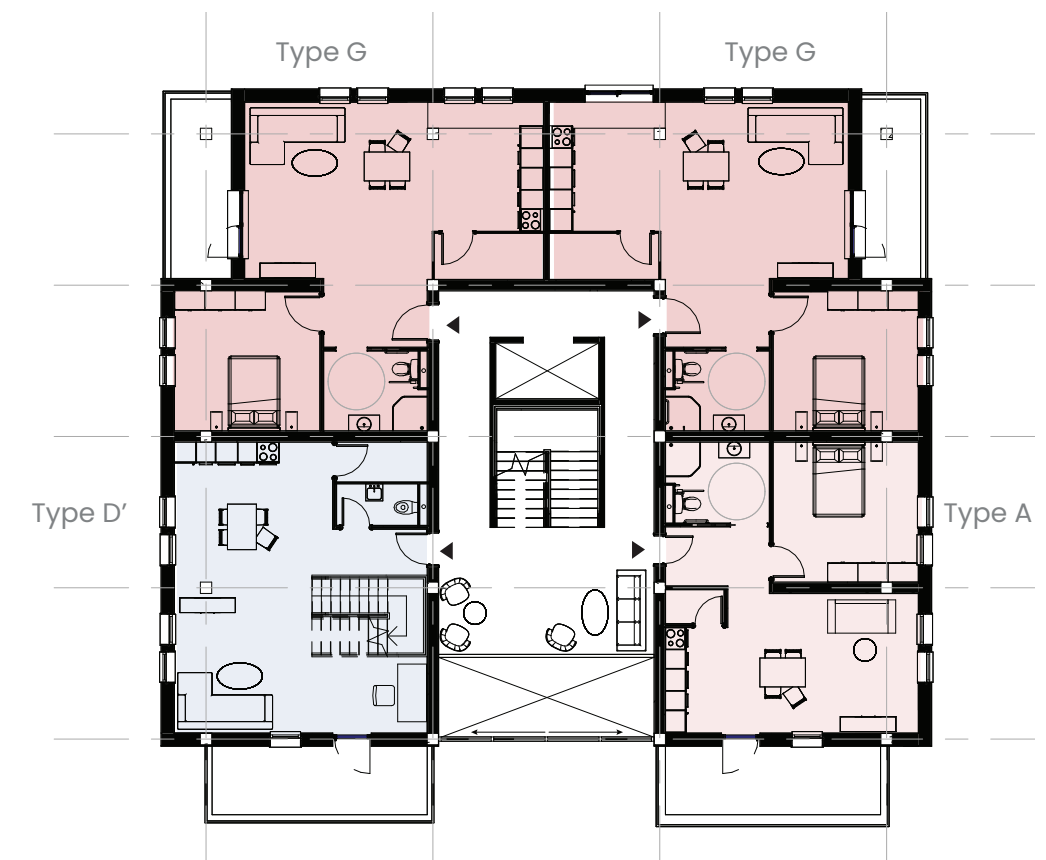




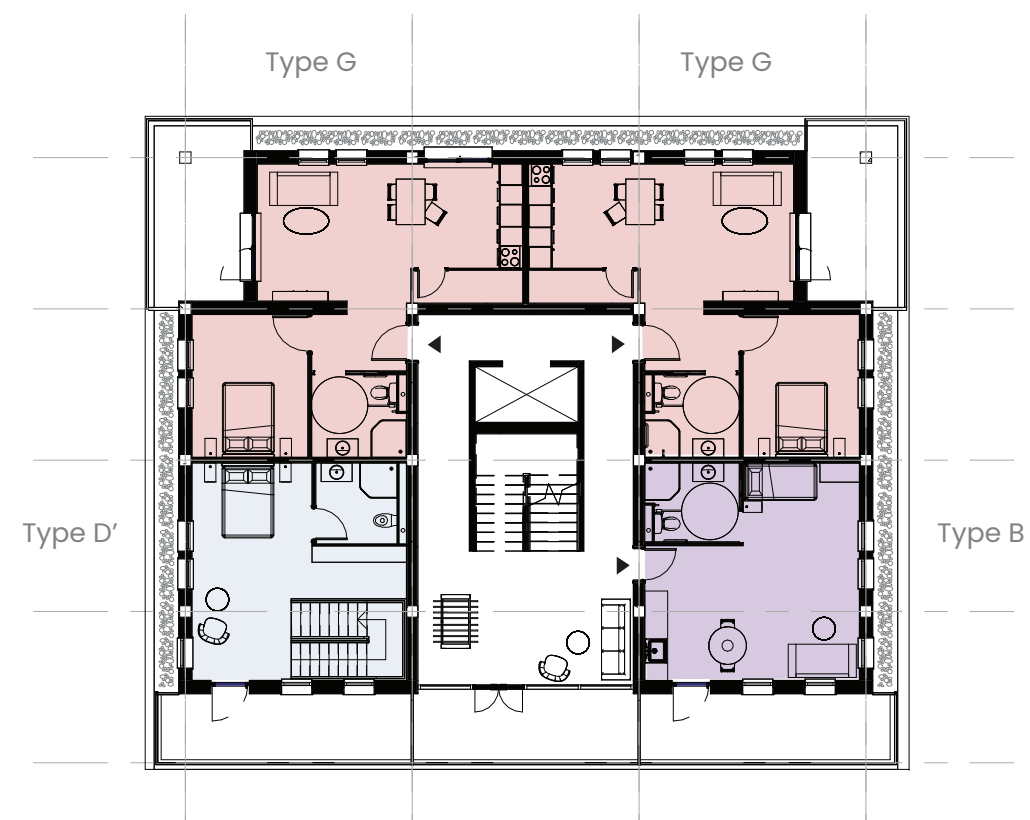




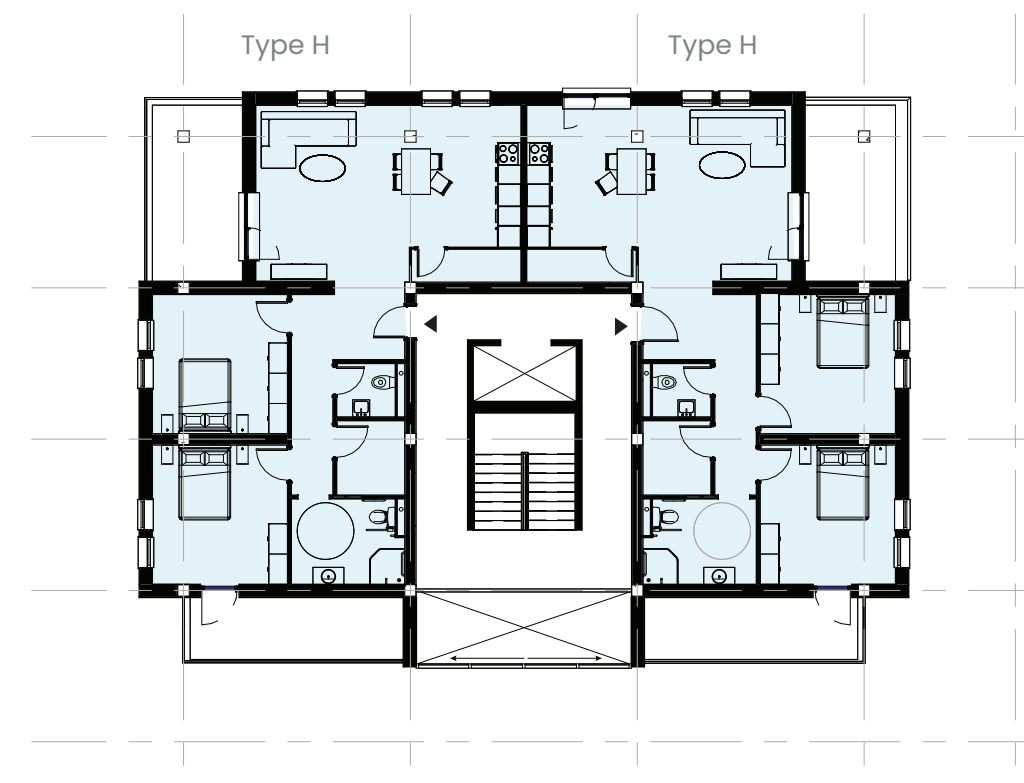
Ground floor



First floor



Second floor



Third floor



Scale 1:200



# URBAN VILLA FLOORPLANS

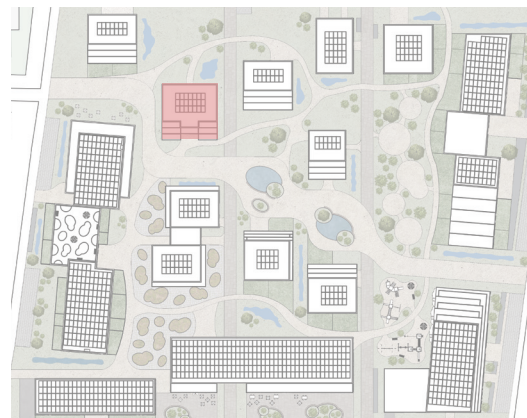




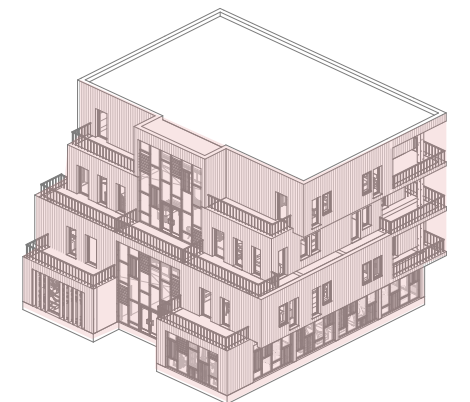
South facade



East facade



Scale 1:200



# URBAN VILLA FACADE



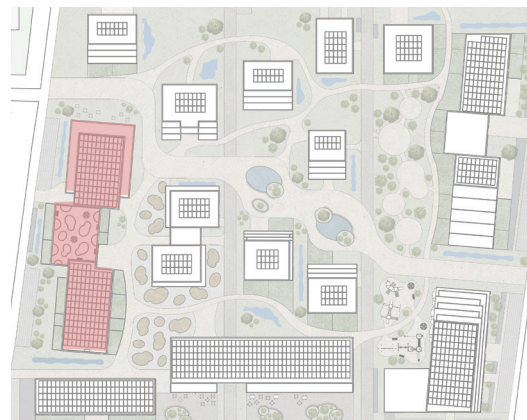


## BORDERING BUILDING TYPOLOGY

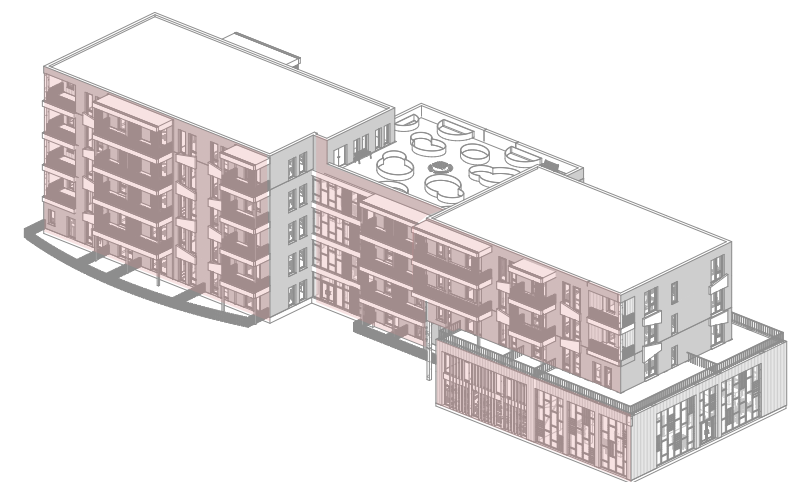




East facade

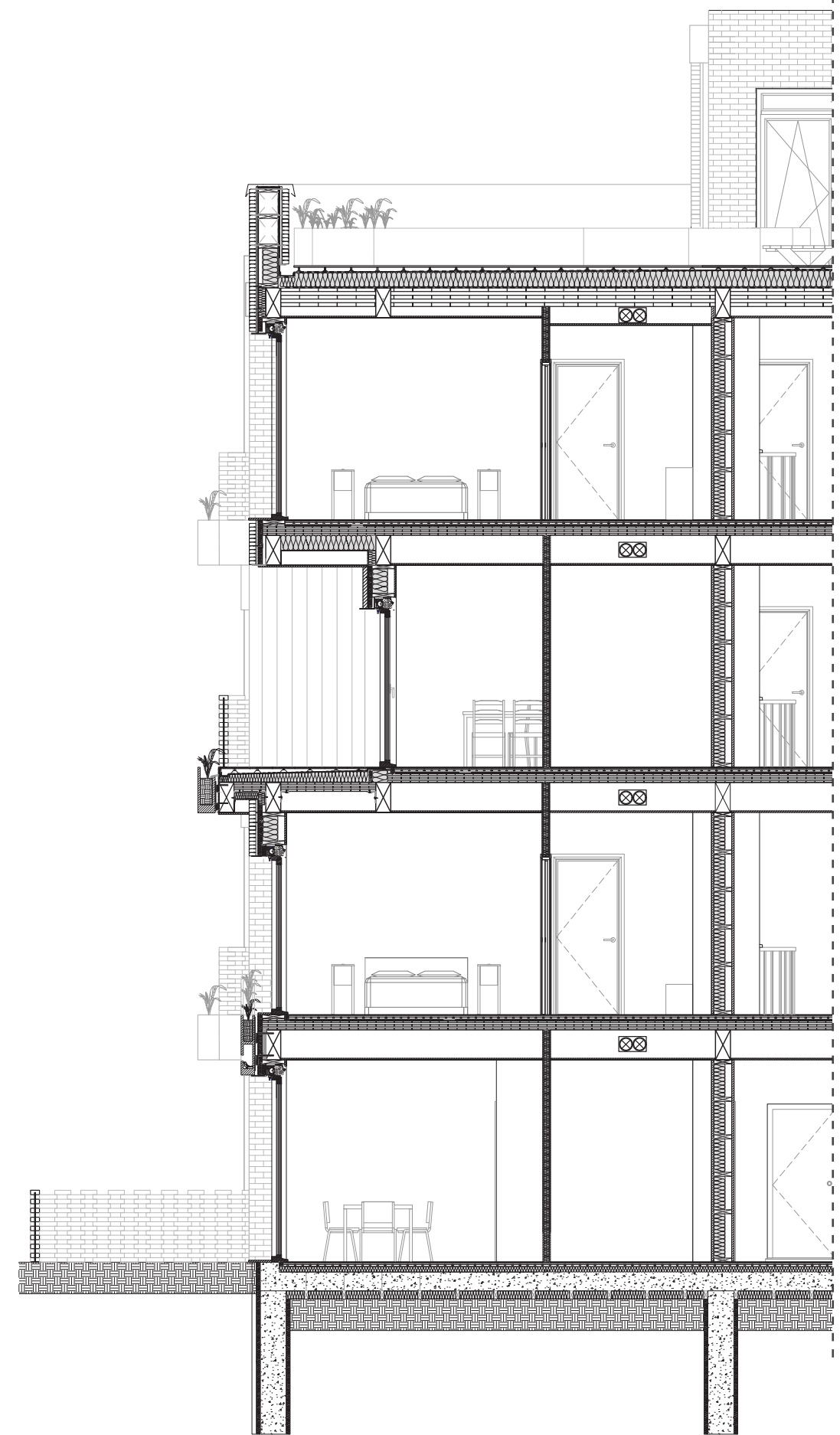


Scale 1:200



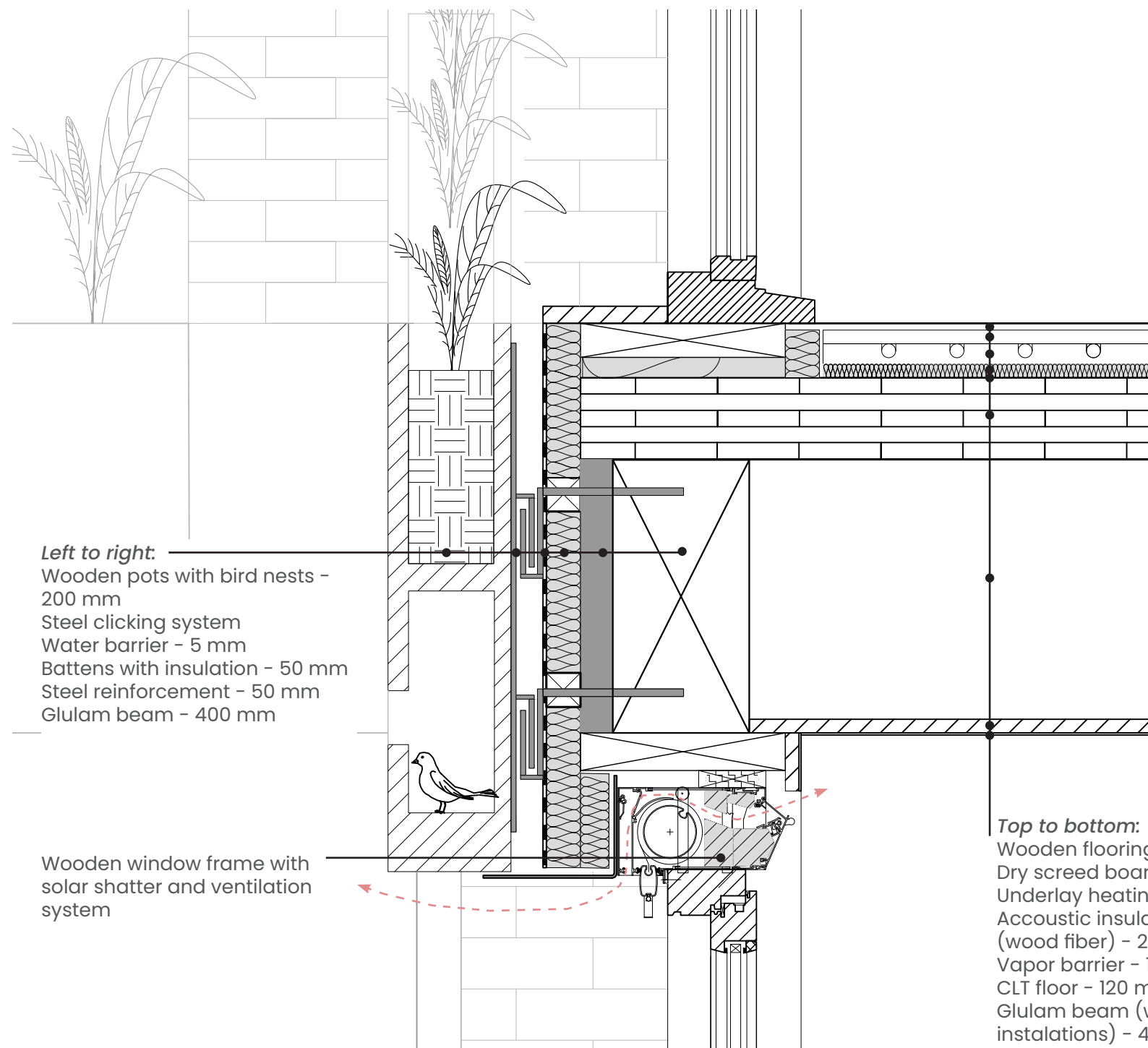
## BORDERING BUILDING FACADE





FRAGMENT



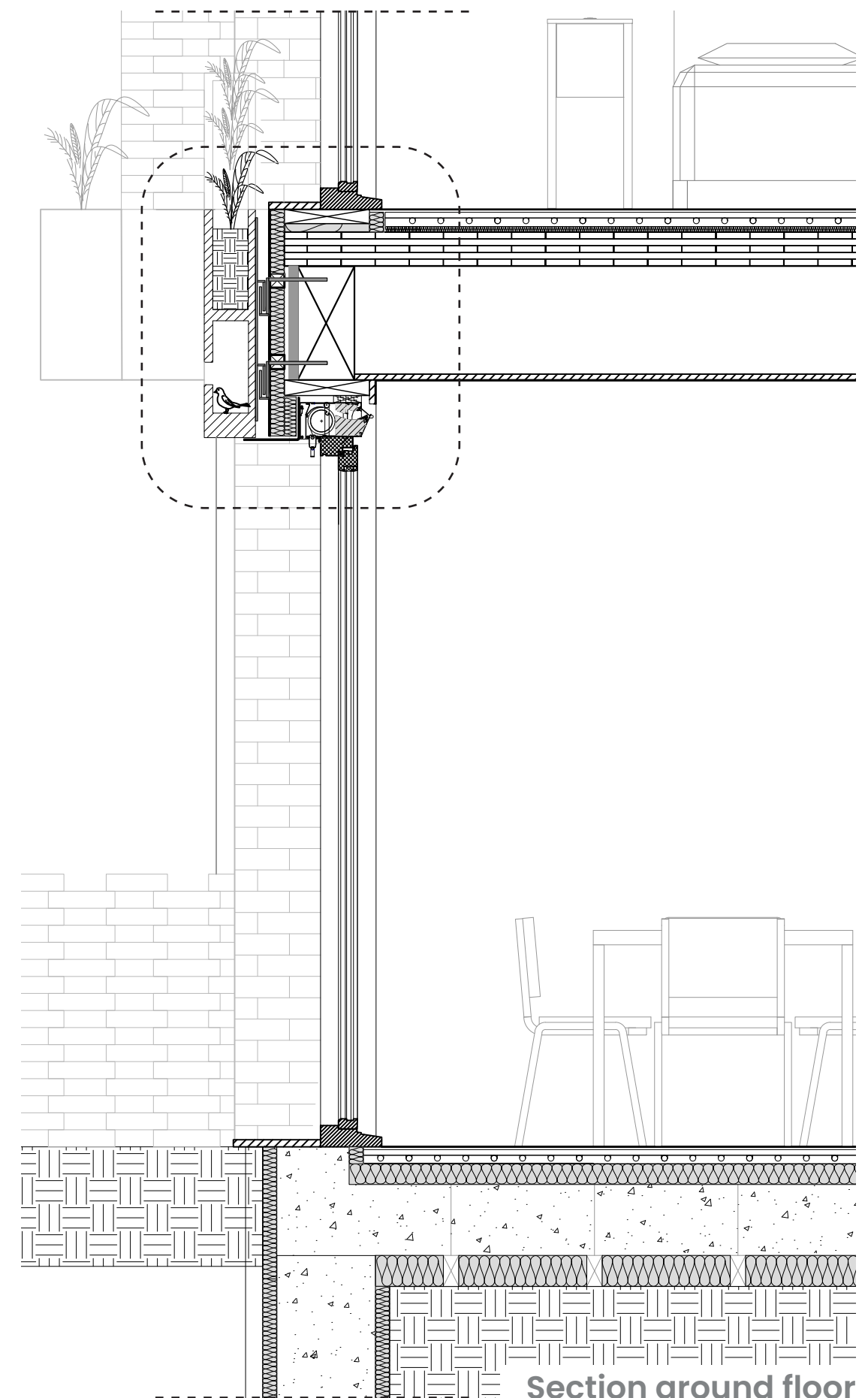


Detail facade planters

Scale 1:5

*Top to bottom:*

- Wooden flooring finish - 10 mm
- Dry screed boards - 20 mm
- Underlay heating - 30 mm
- Acoustic insulation boards (wood fiber) - 20 mm
- Vapor barrier - 1 mm
- CLT floor - 120 mm
- Glulam beam (with space for instalations) - 400 mm
- Plywood board - 20 mm
- Gypsum - 5 mm



Section ground floor

Scale 1:20



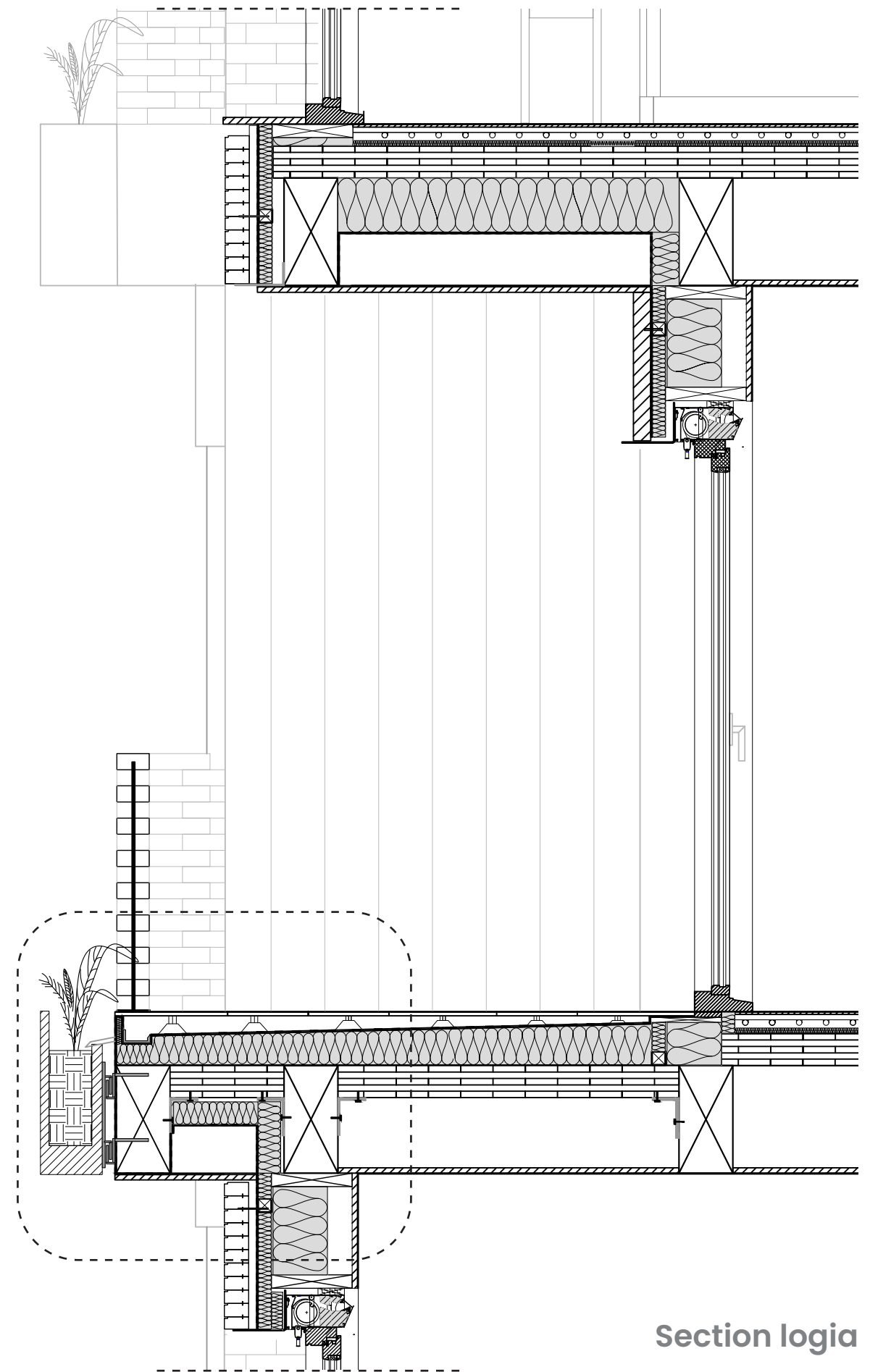
*Left to right*  
 Wooden planters  
 Steel clicking  
 system

*Top to bottom:*  
 Support system for perforated  
 brick railing  
 Water drainage gutter leading  
 to the pots

*Top to bottom:*  
 Exterior flooring tiles - 15 mm  
 Tile support - 40 mm  
 Water barrier - 5 mm  
 Sloped insulation - 150 mm  
 Vapor barrier - 1 mm  
 CLT floor - 120 mm  
 Steel support anchor  
 Glulam beam (with space for  
 instalations) - 400 mm  
 Plywood board - 20 mm

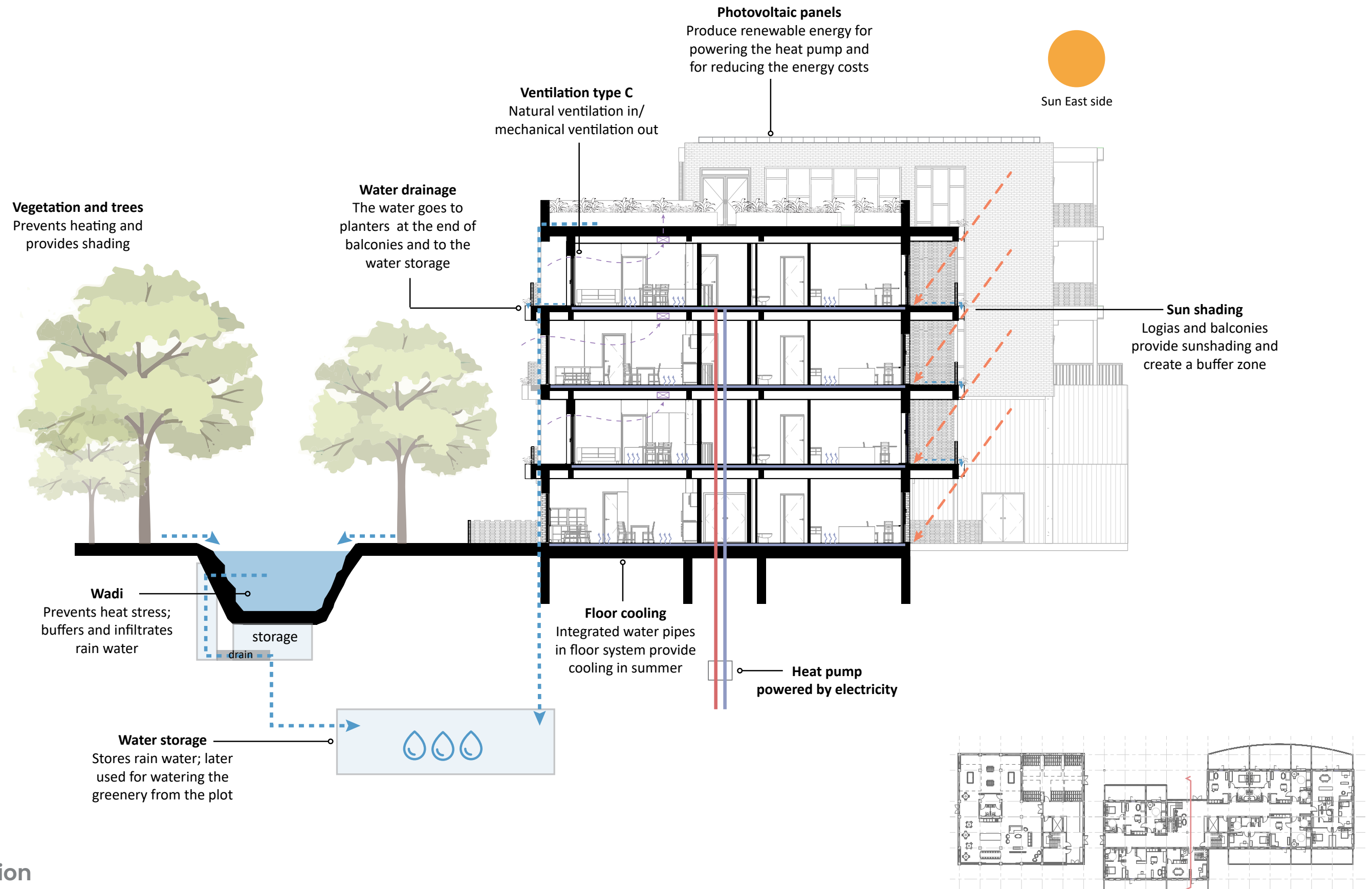
*Left to right:*  
 Pirouette click-brick - 90 mm  
 Air cavity - 30 mm  
 Water barrier - 5 mm  
 Battens with Hemp insulation -  
 50 mm  
 Prefabricated timber frame wall  
 with Hemp insulation - 200 mm  
 Plywood board - 20 mm  
 Gypsum - 5 mm

**Detail logia**  
**Scale 1:5**



**Section logia**  
**Scale 1:20**



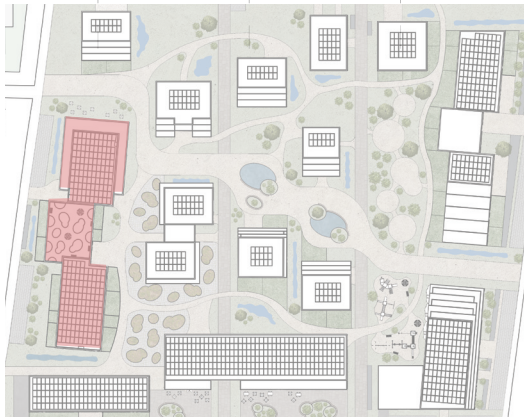
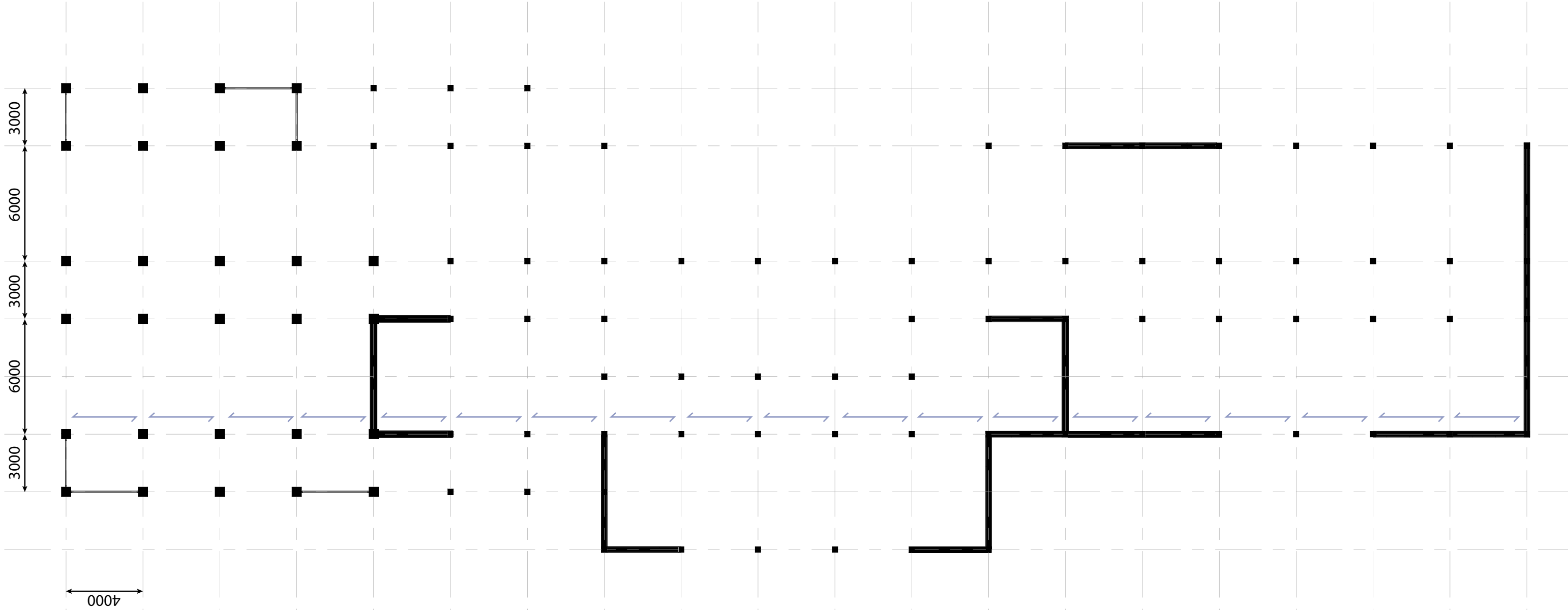


Summer situation



# CLIMATE DIAGRAM



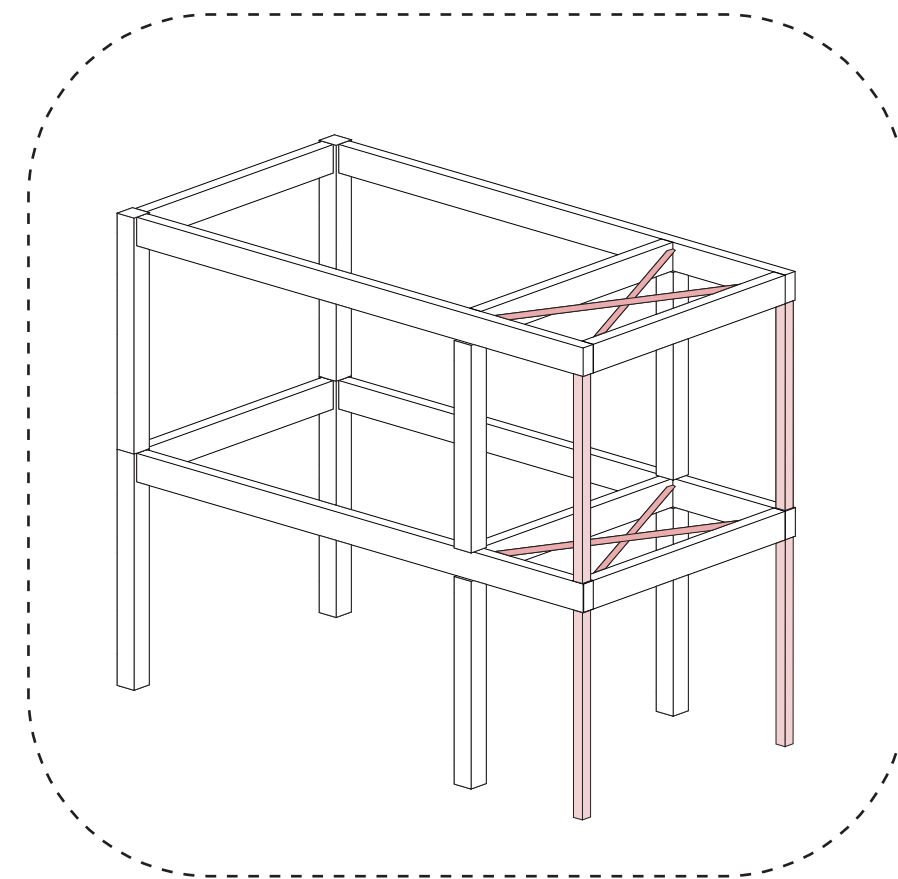
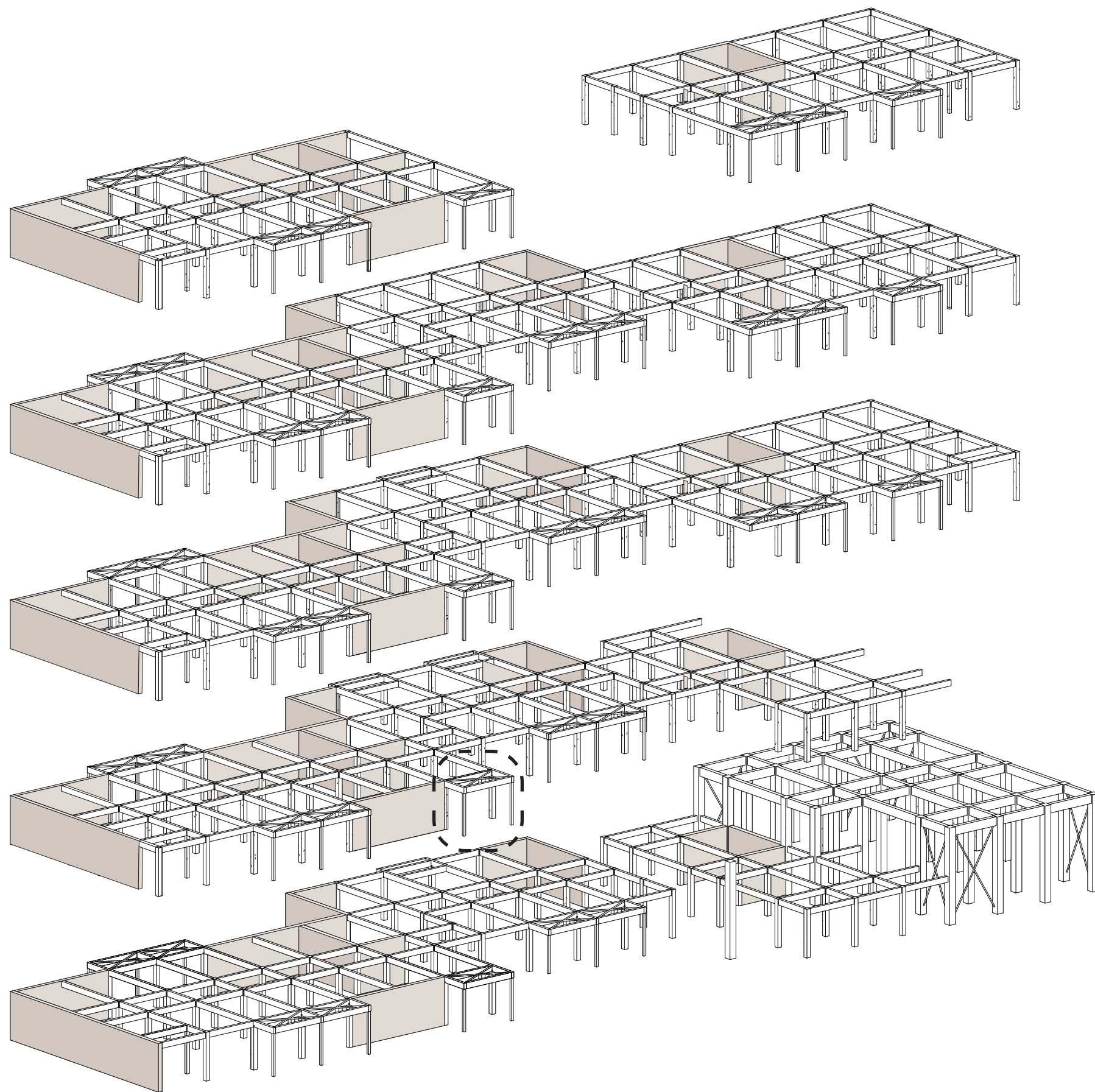


Structural grid plan

Scale 1:200

# STRUCTURE DIAGRAM

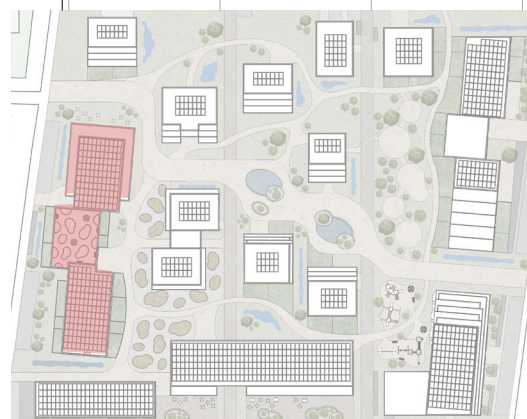




Balcony structure

Building structure





# FLOORPLANS





## COMMON ROOM





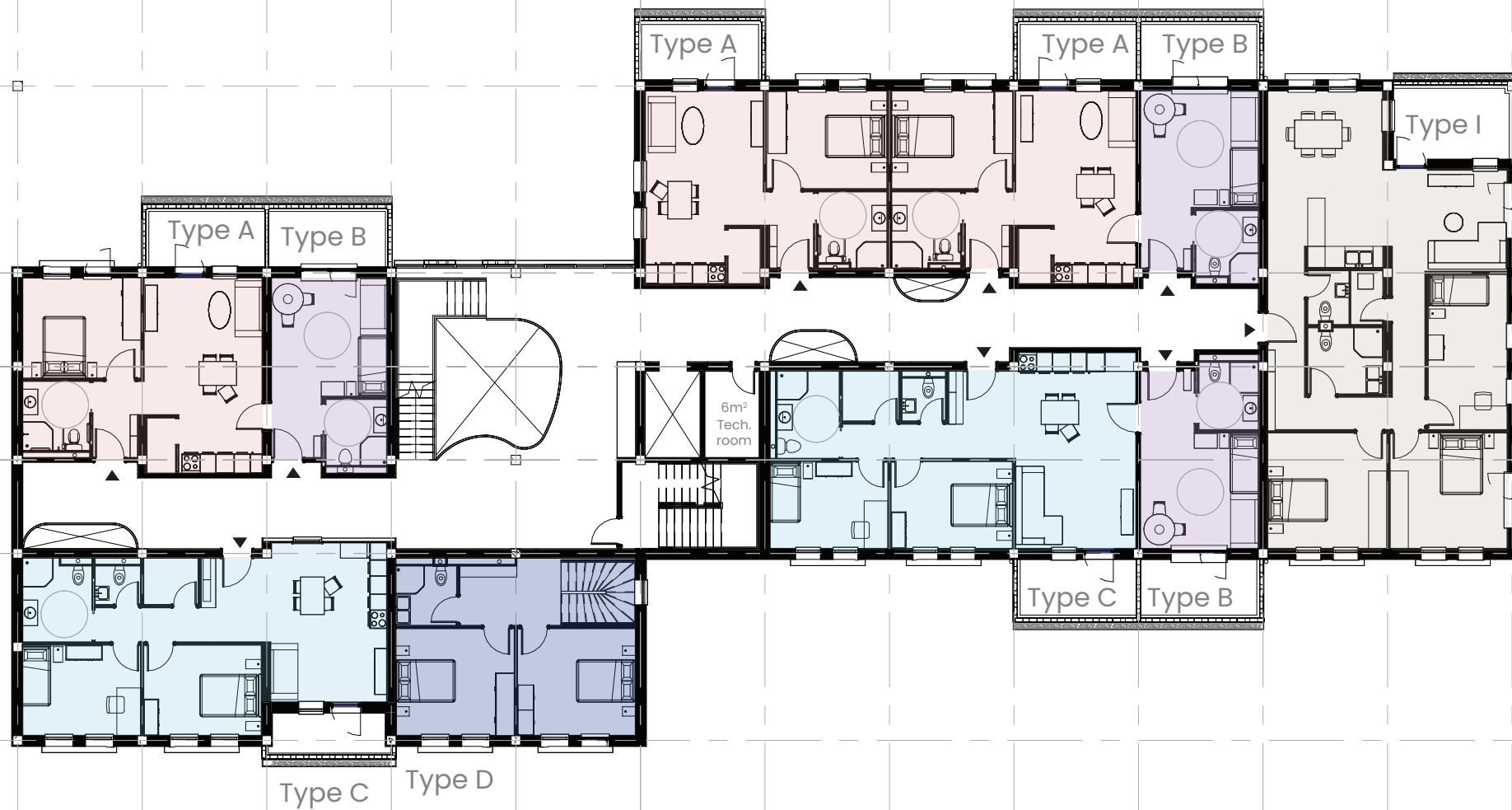
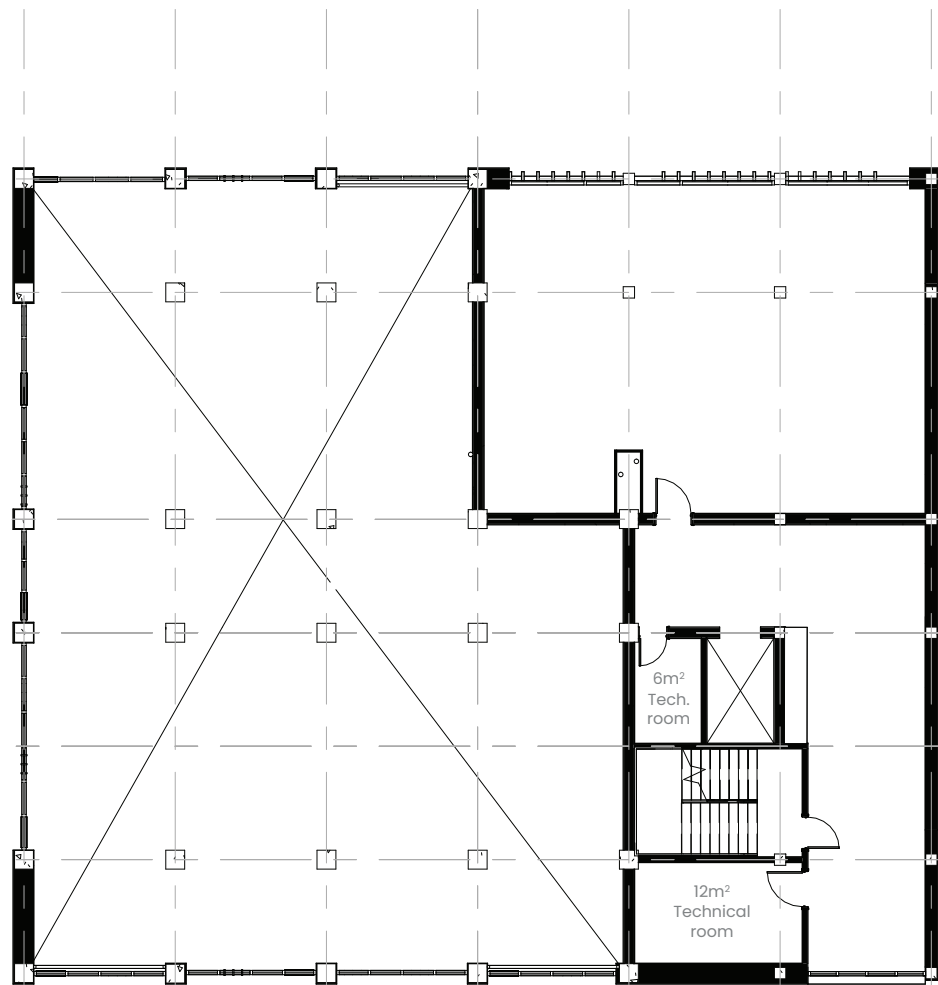
Ground floor plan

Scale 1:200



# FLOORPLANS





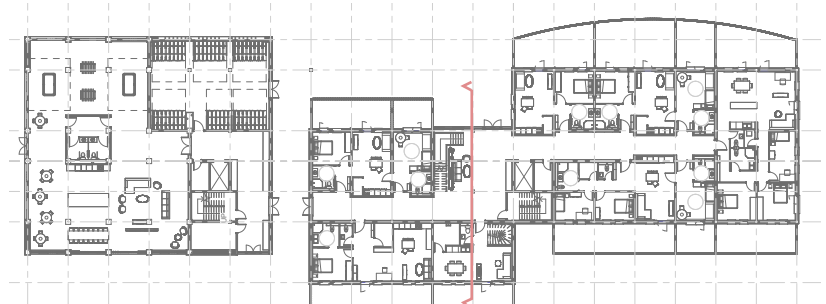
First floor plan

Scale 1:200



# FLOORPLANS





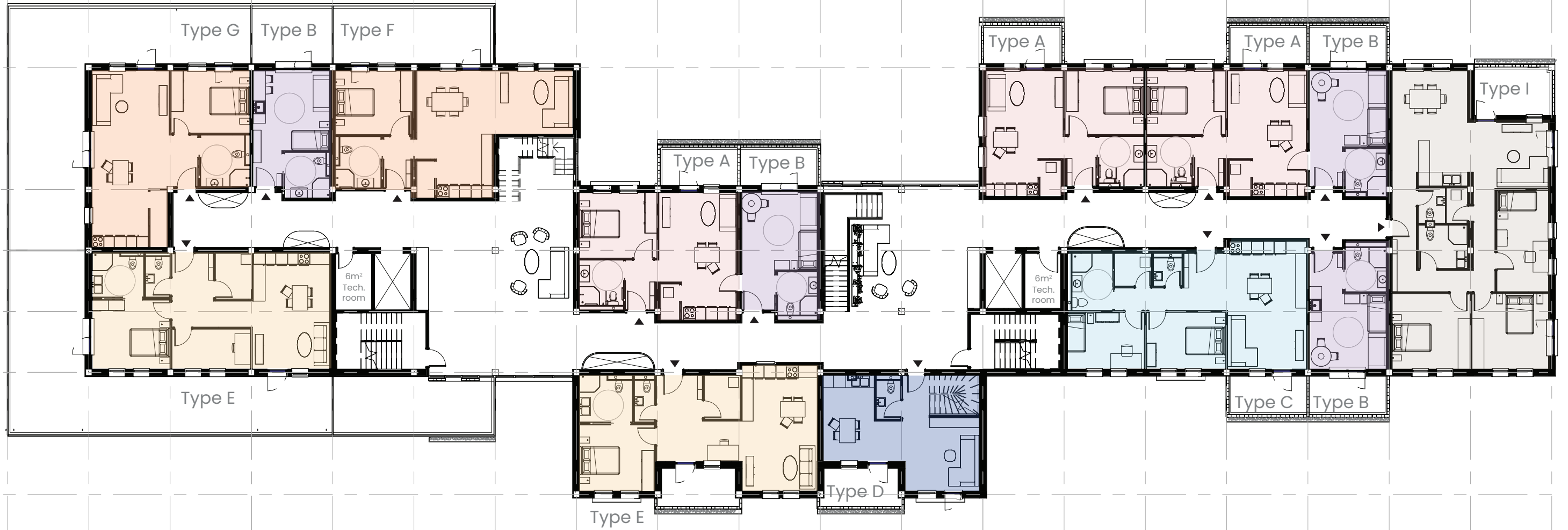
# PERSPECTIVE SECTION





## MEETING SPACE





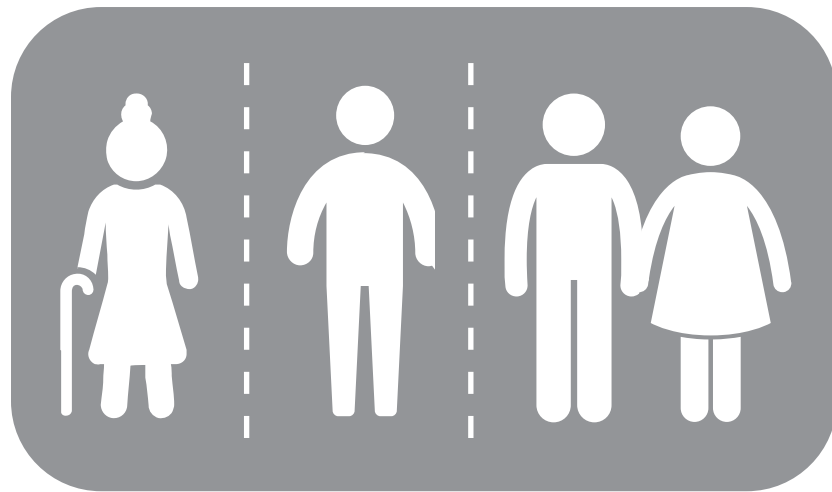
Second floor plan

Scale 1:200



# FLOORPLANS

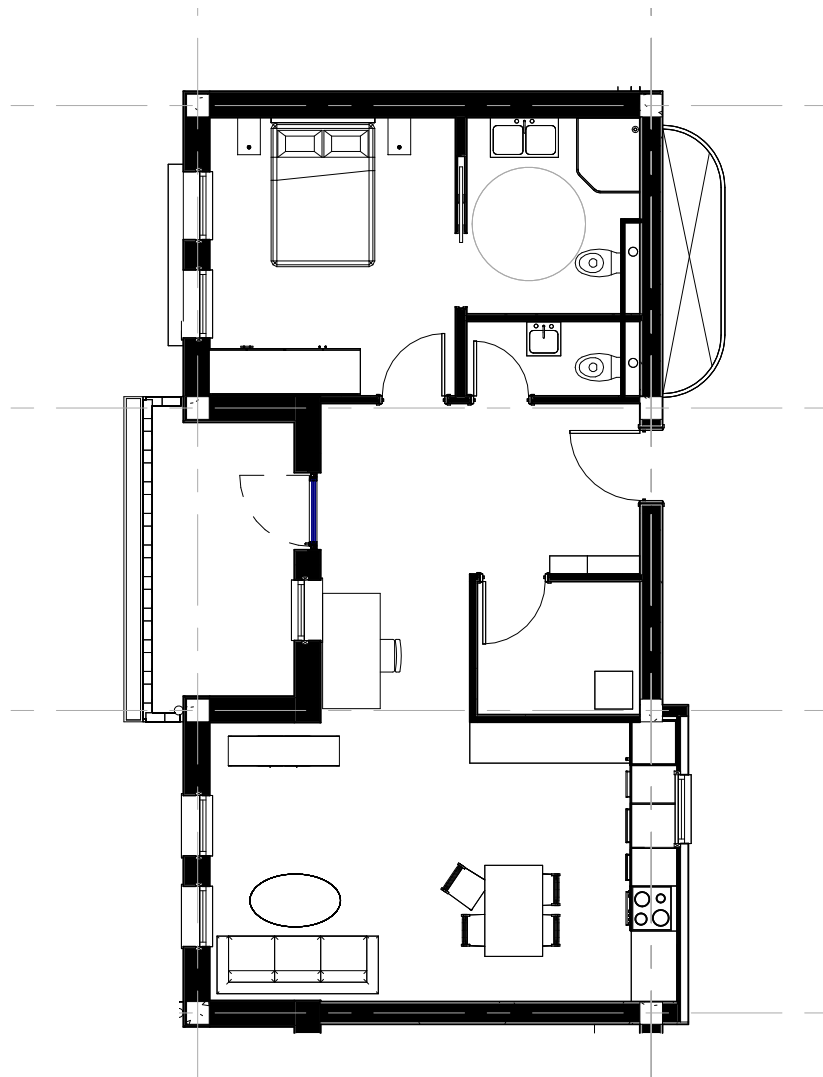




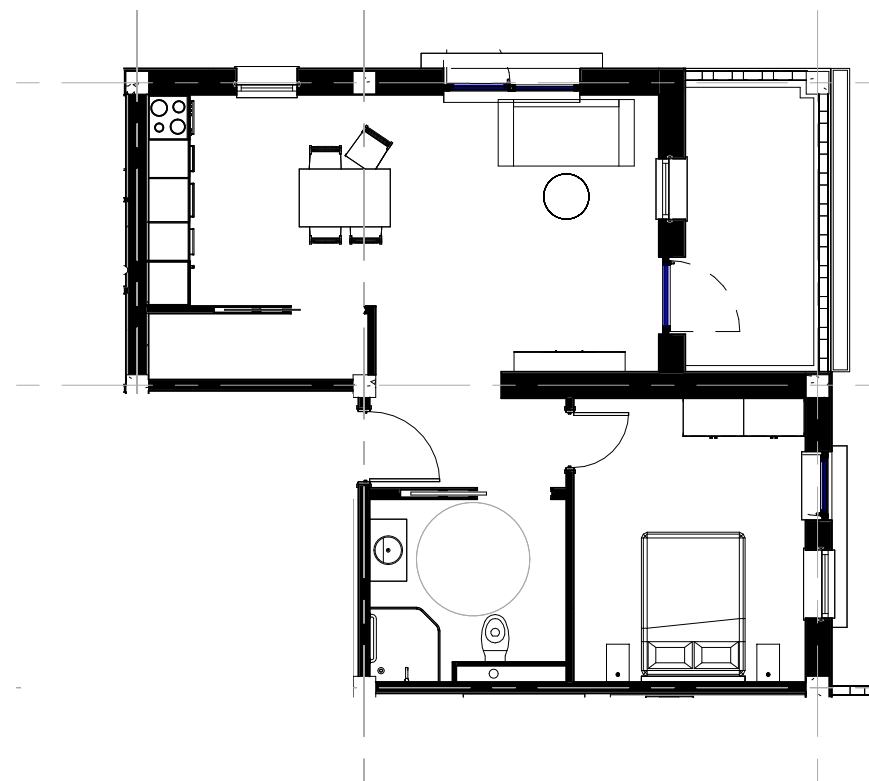
## ONE-BEDROOM APARTMENT

48-60 m<sup>2</sup>

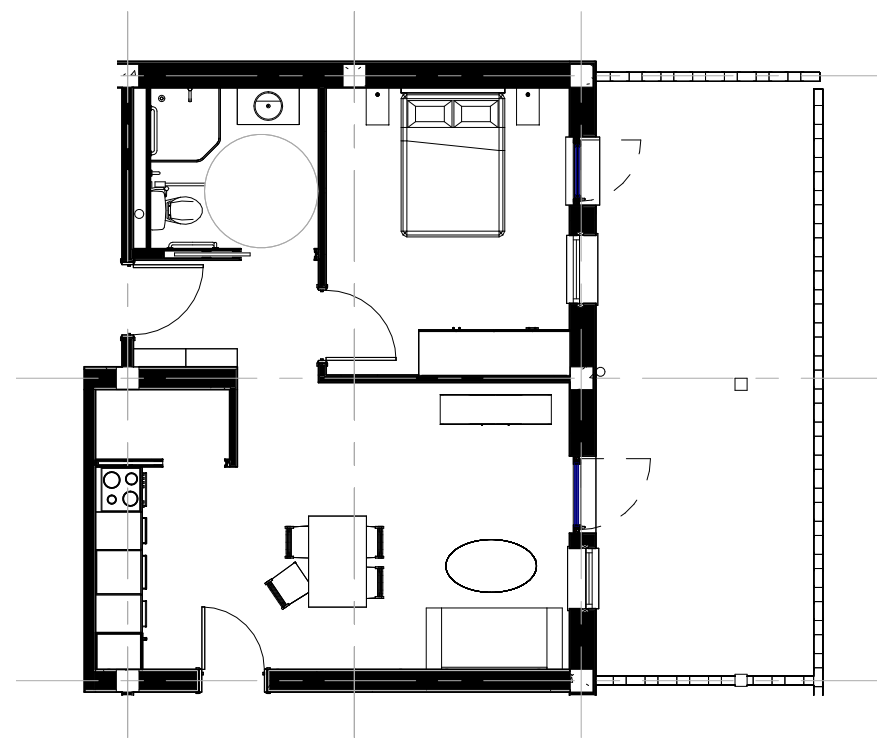
Elderly, young individuals,  
couples



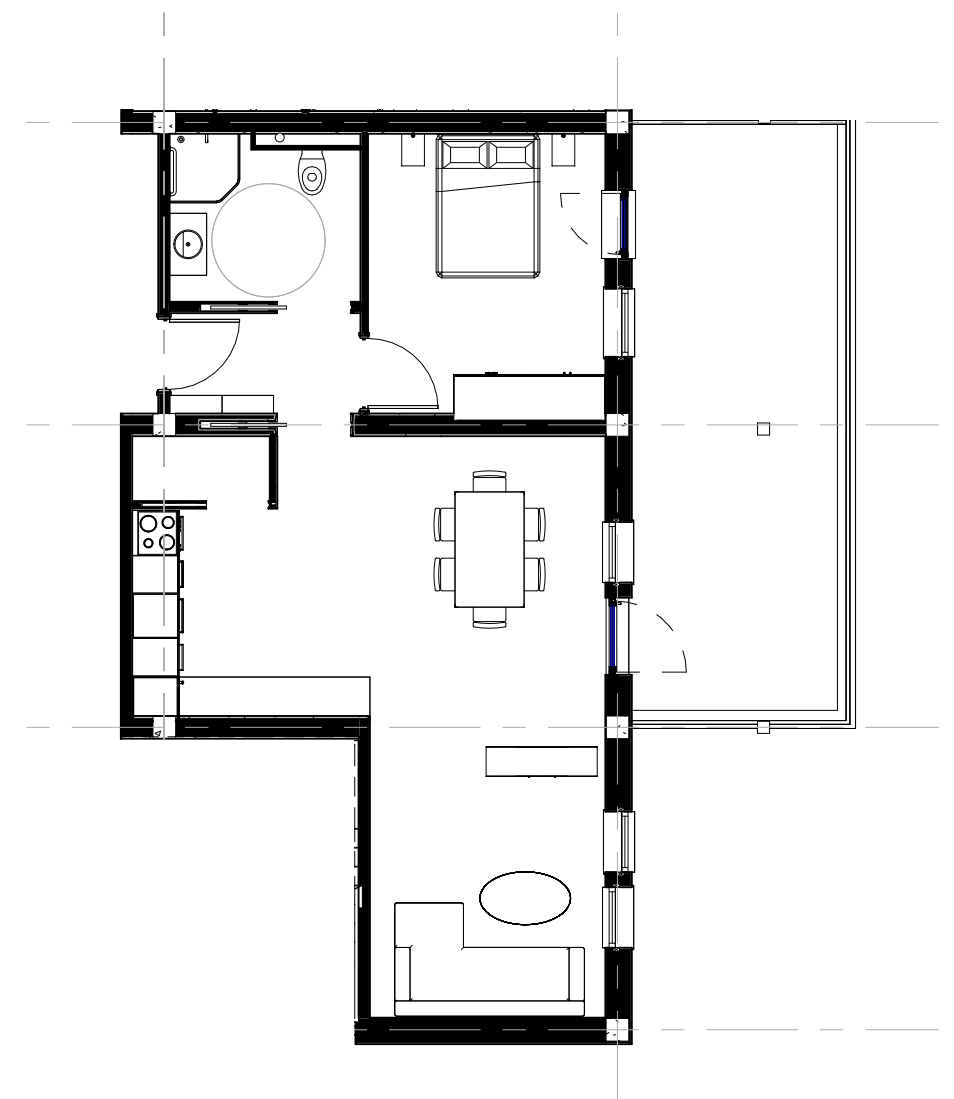
Type E - one bedroom apartment



Type G - one bedroom apartment



Type A - one bedroom apartment



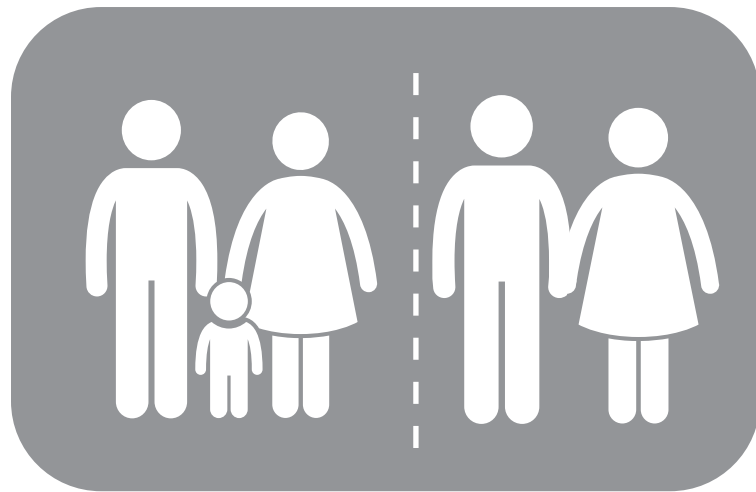
Type F - one bedroom apartment

Scale 1:100



## APARTMENT TYPES

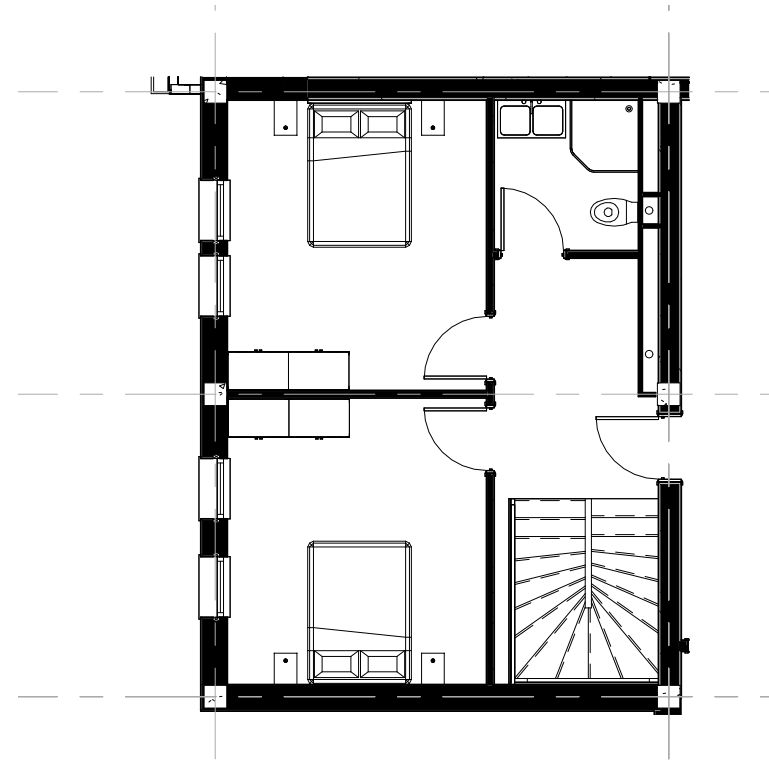




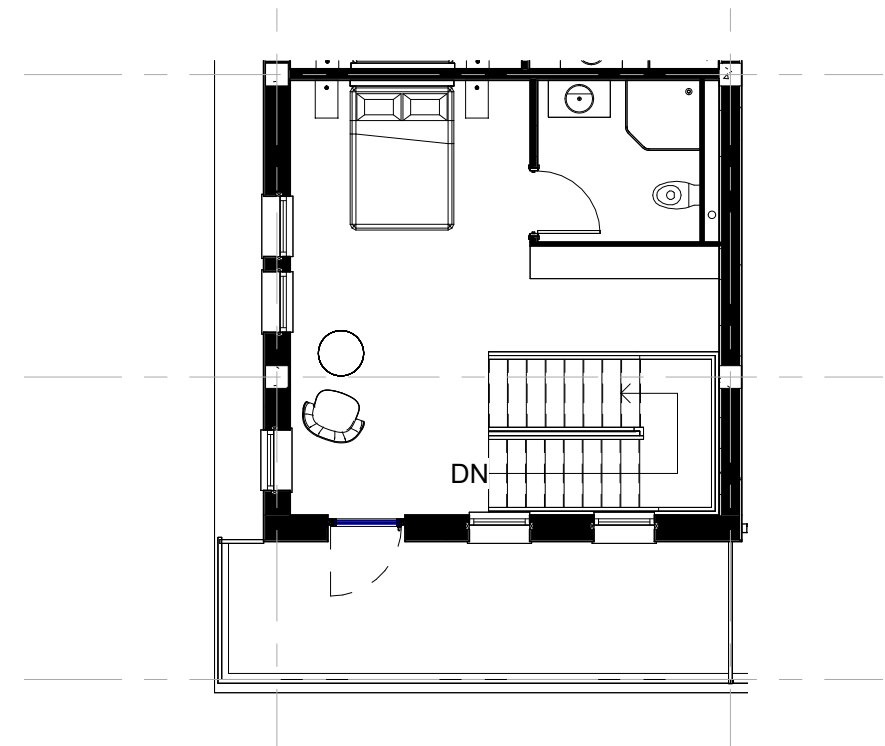
## DUPLEX

90-100 m<sup>2</sup>

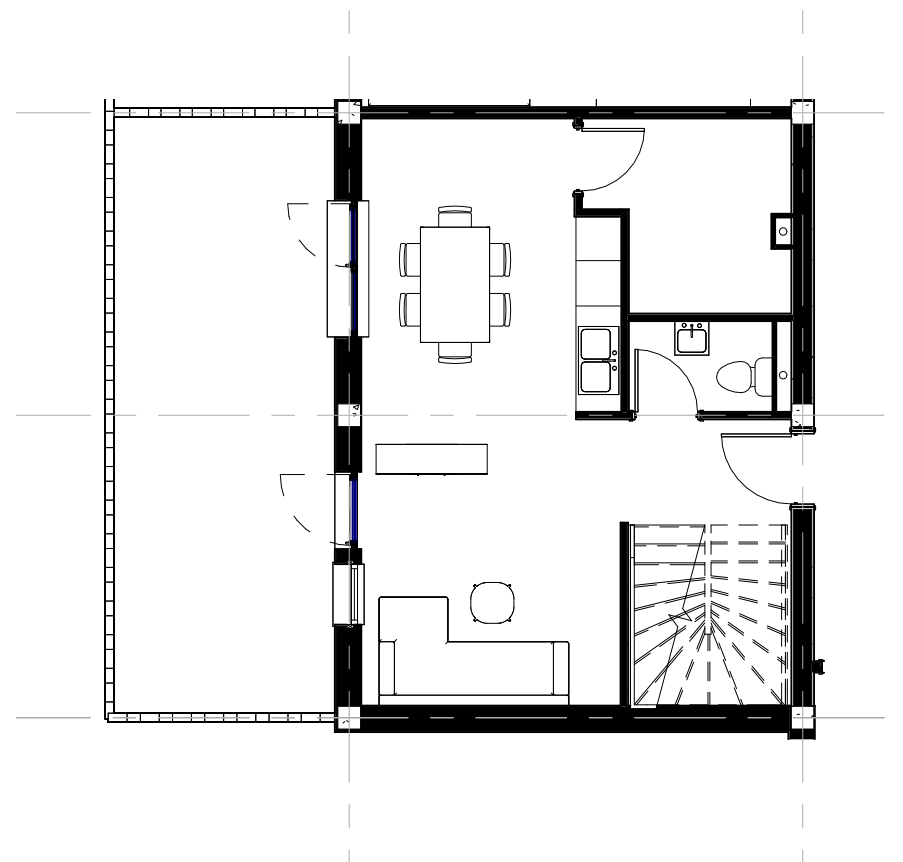
Small families, couples



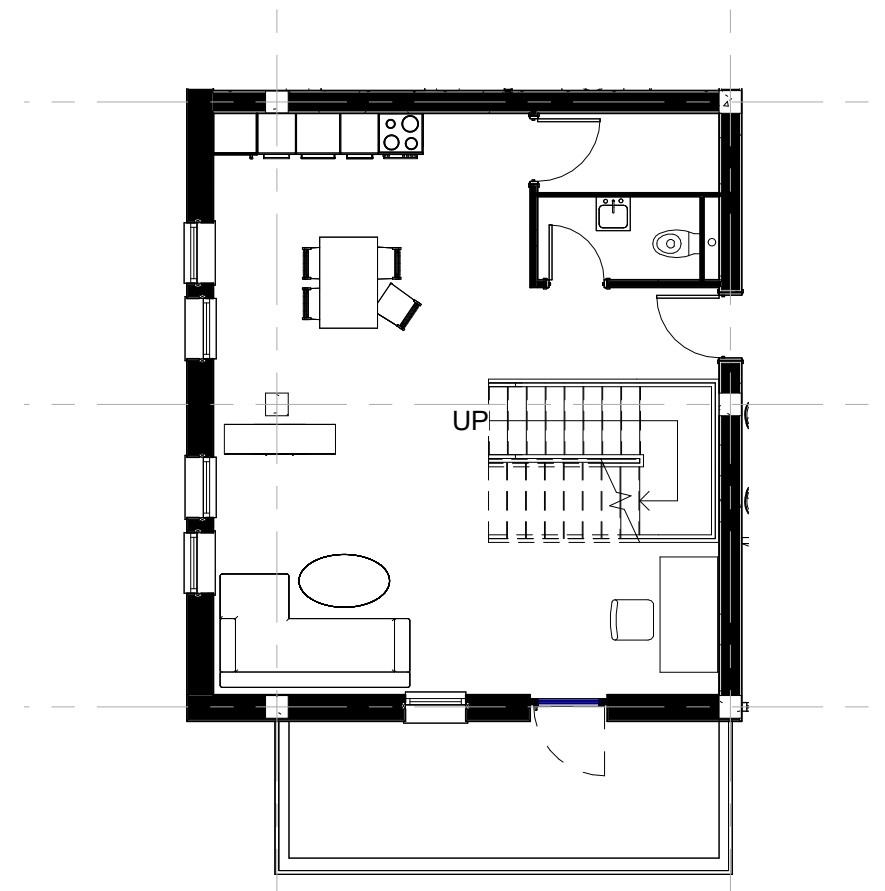
Type D - Duplex two bedrooms  
Second floor



Type D' - Duplex one bedrooms  
Second floor



Type D - Duplex two bedrooms  
First floor



Type D' - Duplex one bedroom  
First floor

Scale 1:100



# APARTMENT TYPES

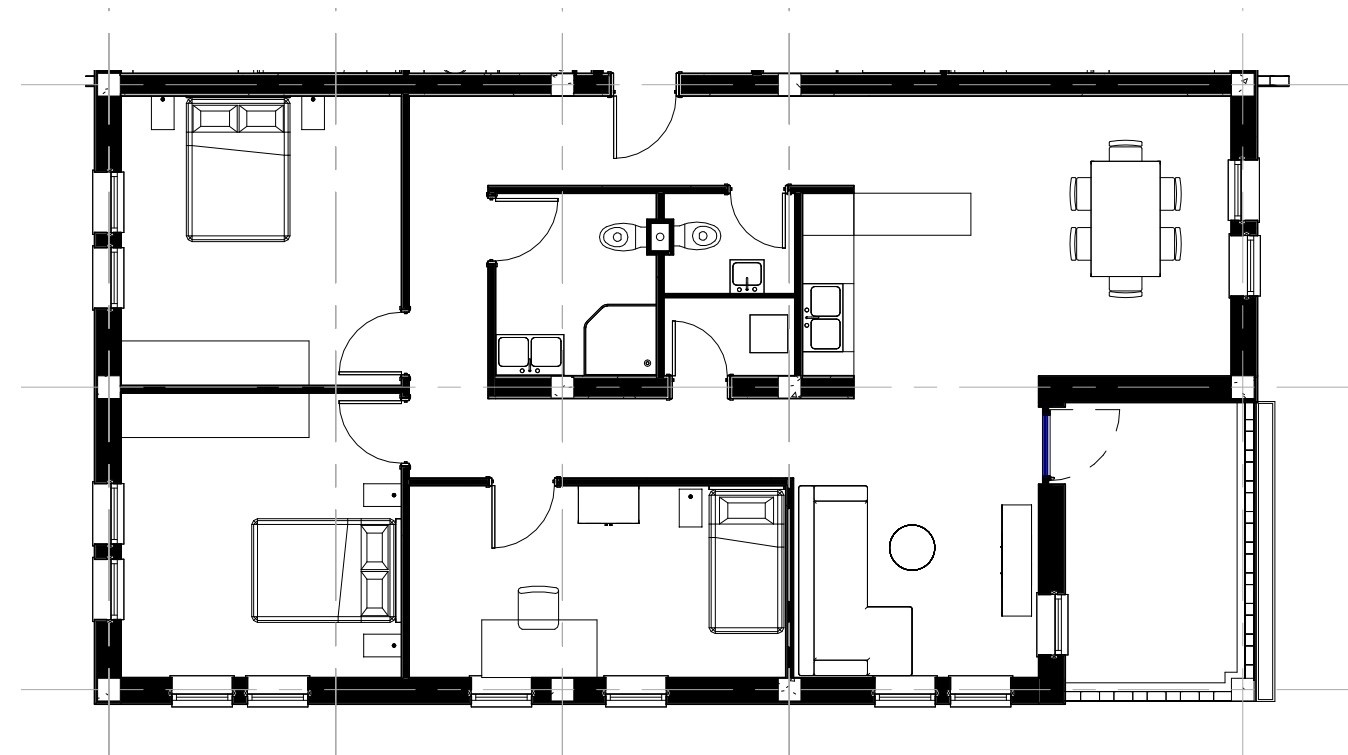




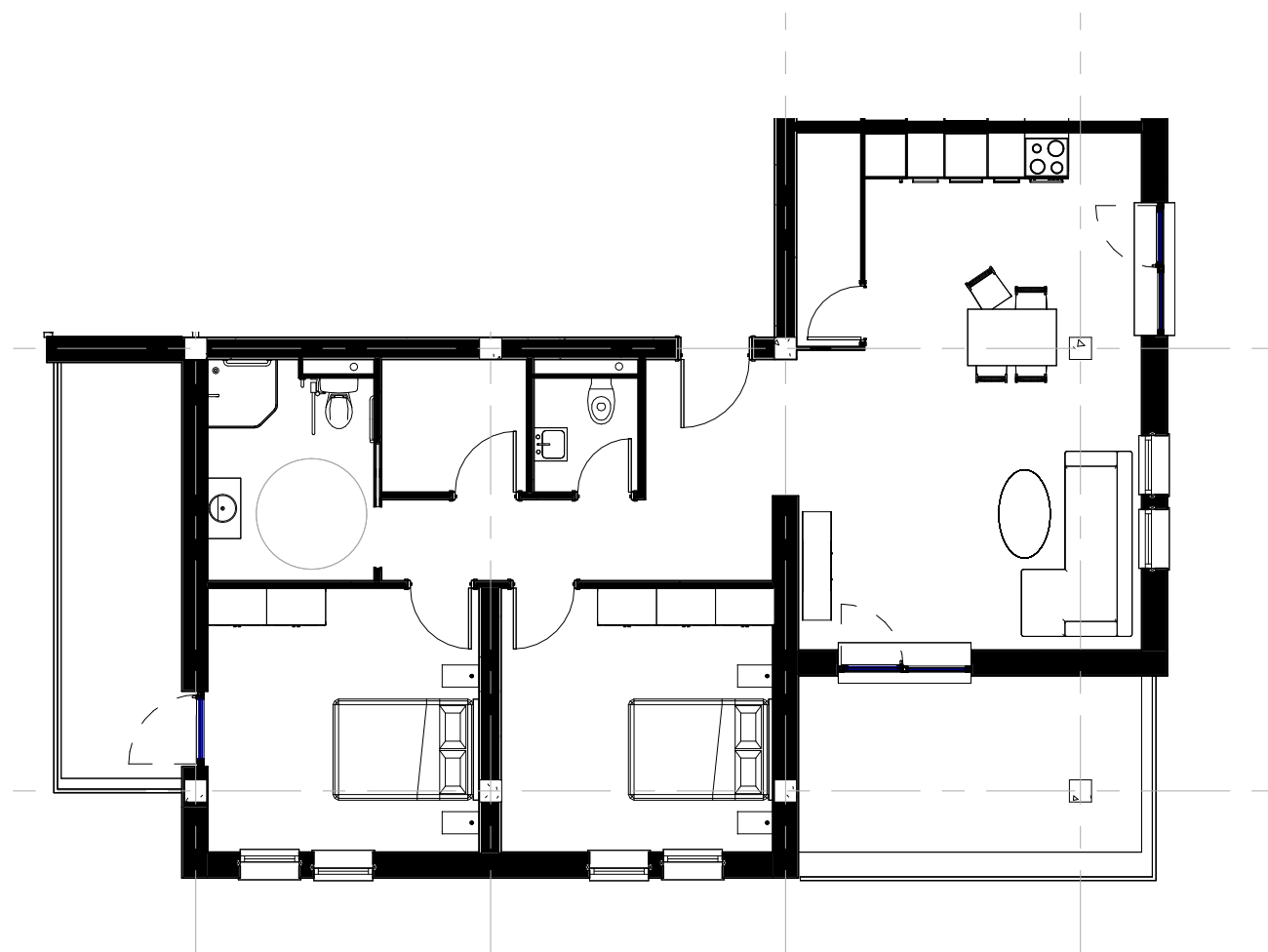
## TWO/THREE BEDROOM APARTMENTS

75-120 m<sup>2</sup>

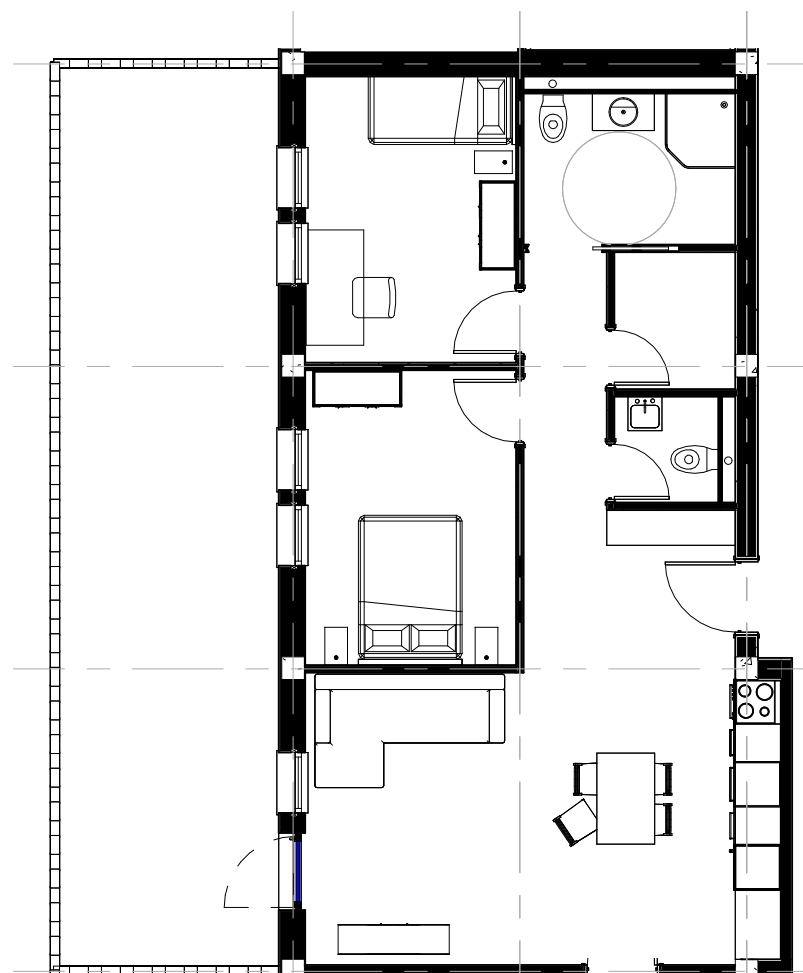
Families, intergenerational families



Type I - three bedroom apartment



Type H - two bedroom apartment



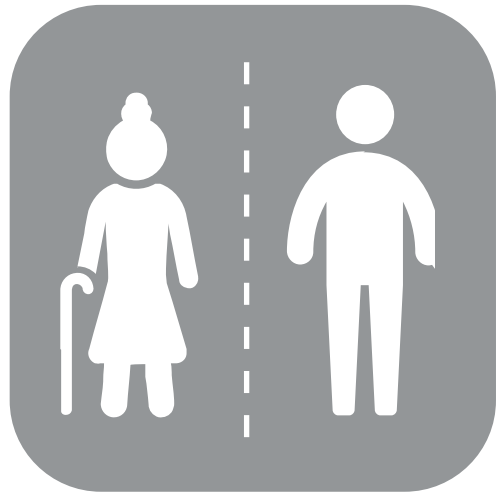
Type C - two bedroom apartment

Scale 1:100



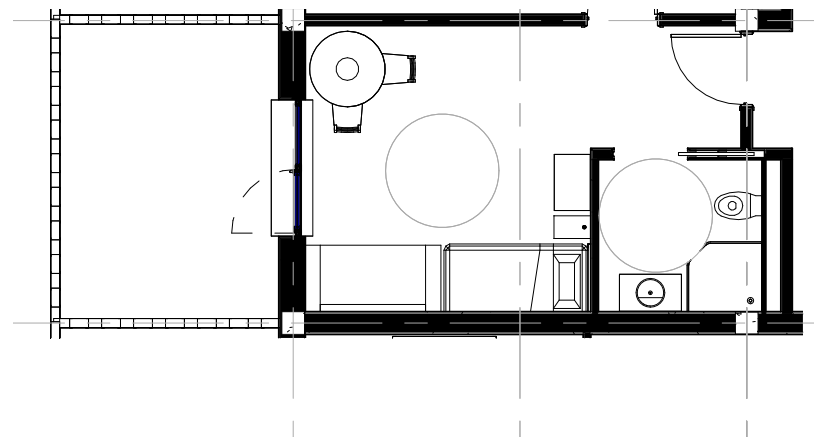
## APARTMENT TYPES



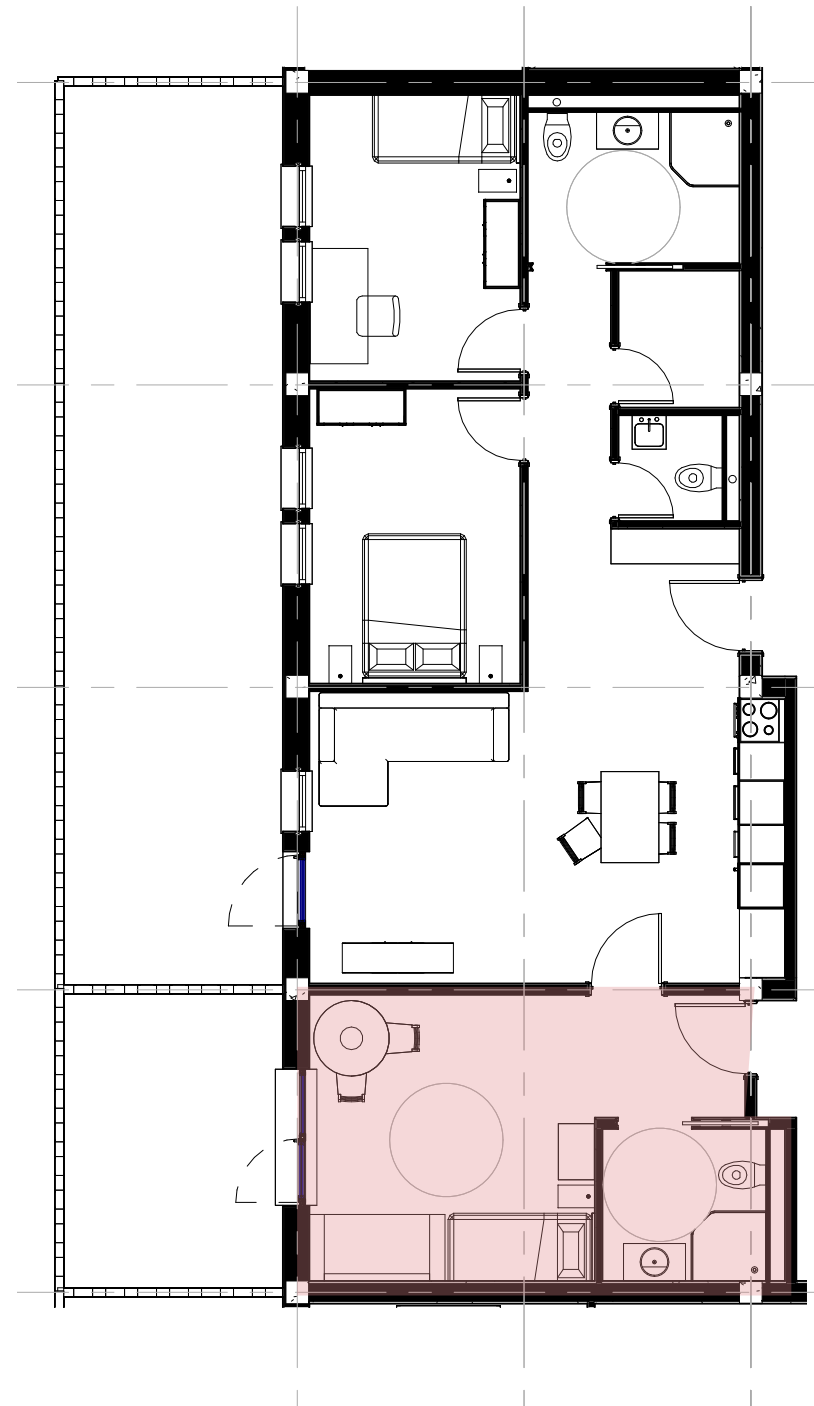


## STUDIO

25 m<sup>2</sup>  
Elderly



Type B - studio apartment

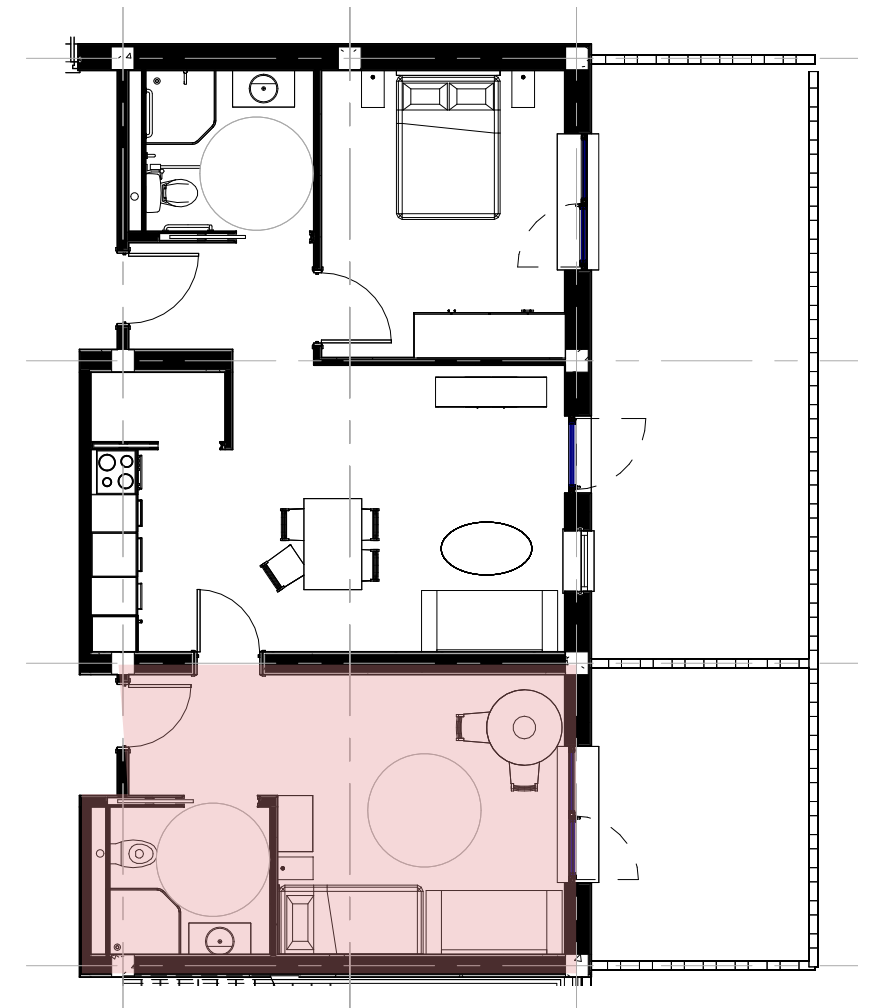


Kangaroo apartment



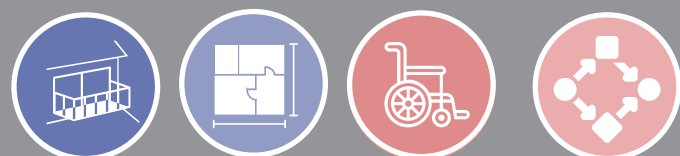
## KANGOROO APARTMENTS

72-96 m<sup>2</sup>  
Intergenerational families



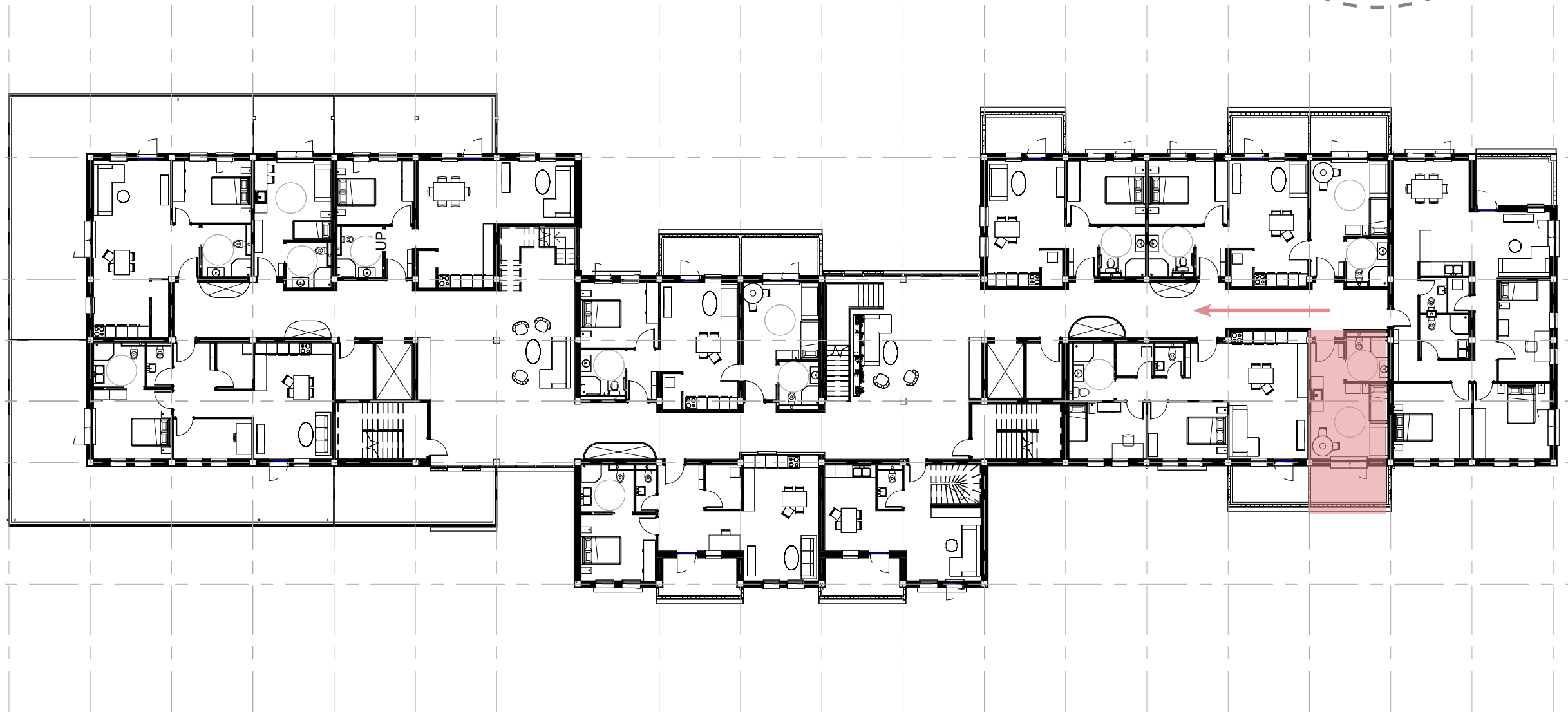
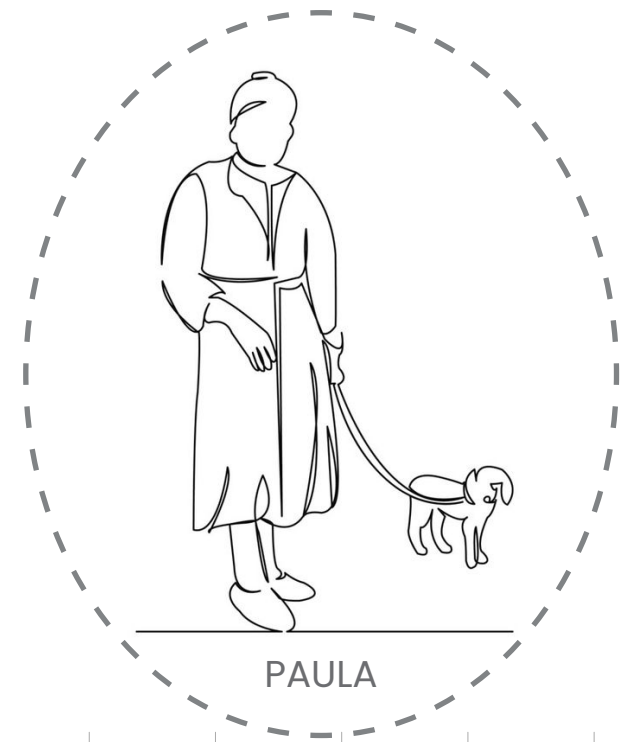
Kangaroo apartment

Scale 1:100



# APARTMENT TYPES









ATMOSPHERE









## ATMOSPHERE









# ATMOSPHERE





## ATMOSPHERE







**THANK YOU**







## ATMOSPHERE

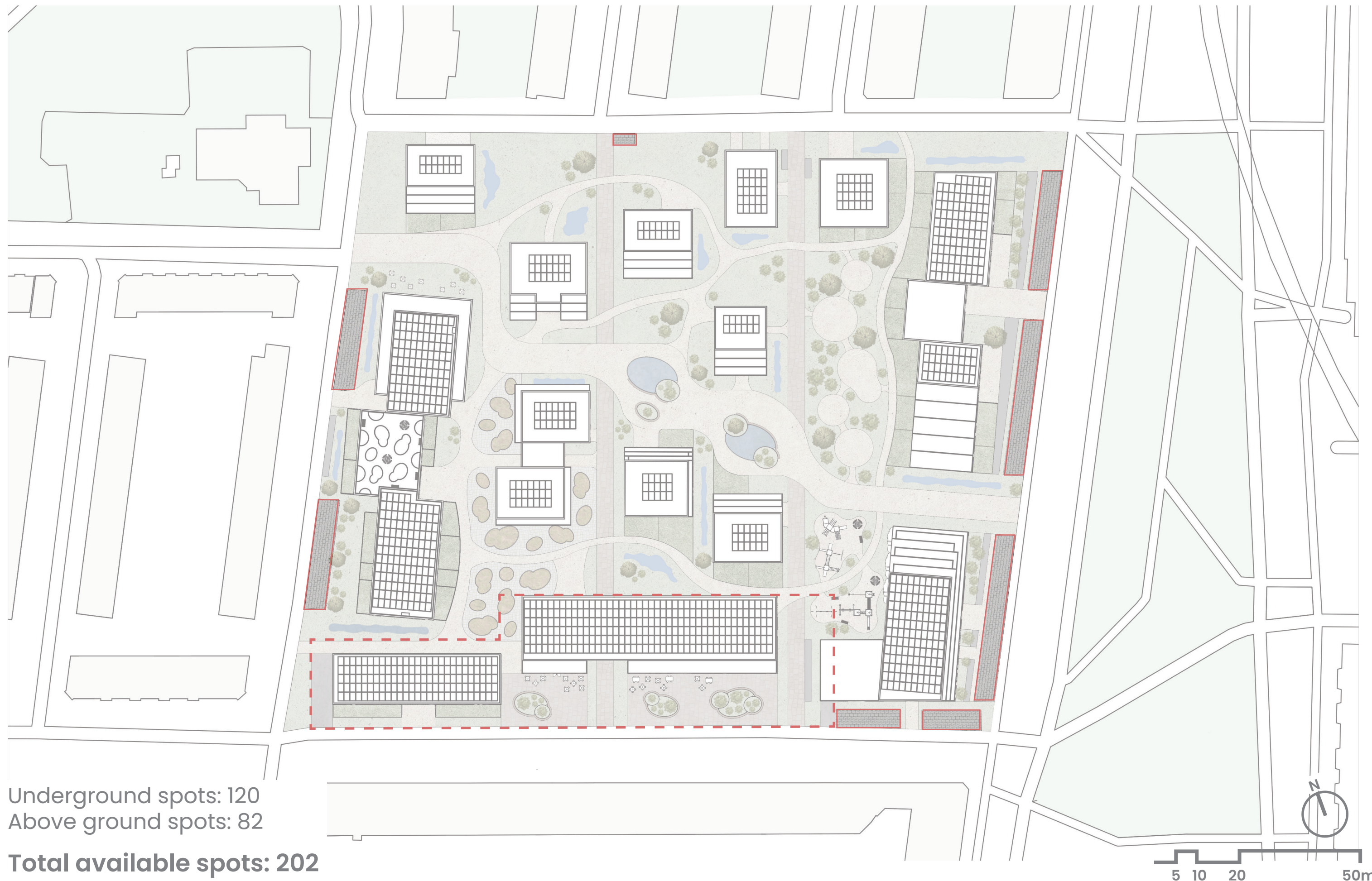






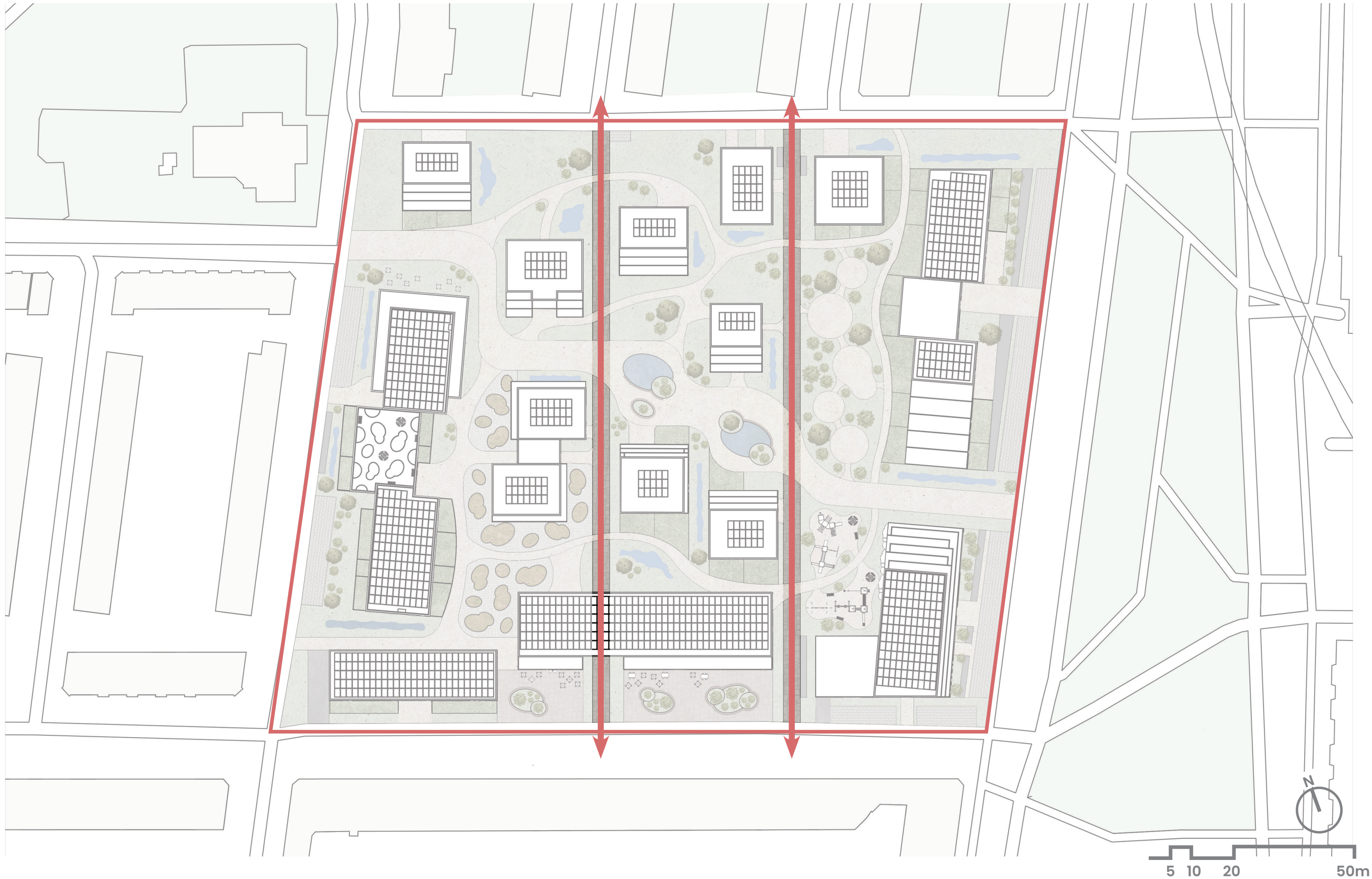






## PARKING







## RECYCLED MATERIALS

### BRICKS



#### Pirouet bricks

- made of recycled steel
- CO2-negative product
- CO2-neutral production
- Reduced use of primary raw materials
- Less waste

#### Click-brick system

- ensures easy demountability
- possibility to reuse the bricks in other future projects

## BIOBASED MATERIALS

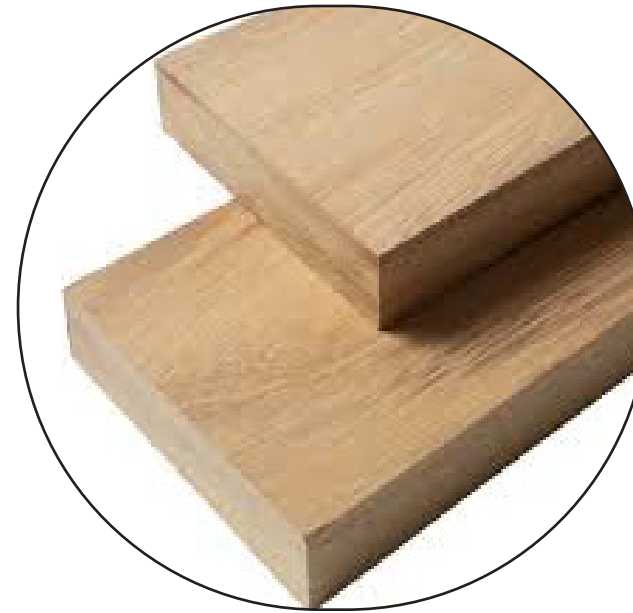
### INSULATION



#### Hempwool insulation

- CO2-negative crop
- Biodegradable, compostable

### WOOD



#### CLT columns and beams

- Ensures flexibility and adaptability of the floorplan
- Futureproofing the building for possibility to change the function

#### Wooden facade

- natural material

### Recycle & Reuse

The brick facades are composed of two types of bricks: repurposed bricks from previous buildings on the plot, and Pirouette bricks that are made of recycled steel.

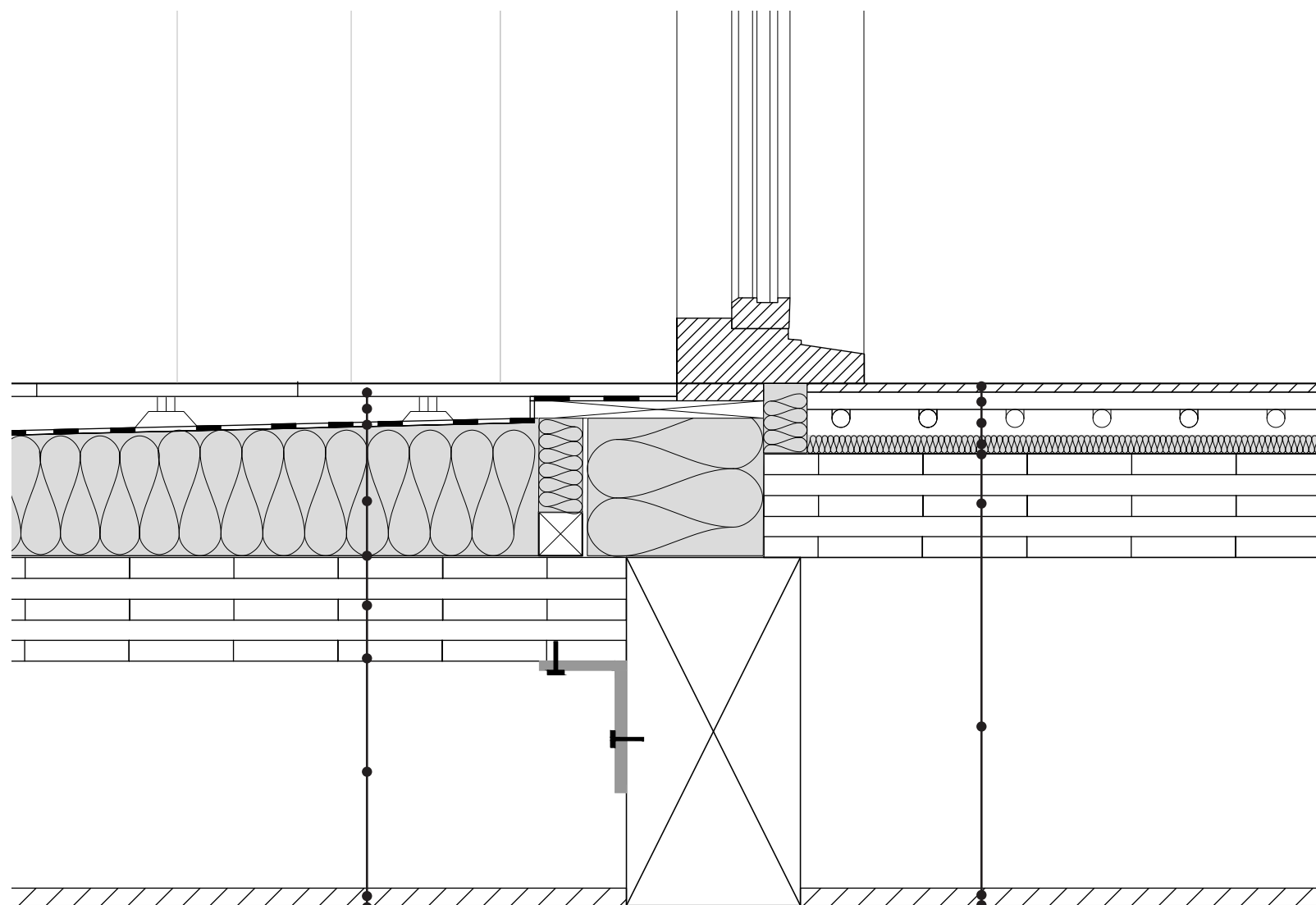
### Rethink

A skeleton structure was implemented to ensure flexibility in use and easy adaptability to changes in time and function, thus future-proofing the building.

### Reduce

Reduce the carbon footprint by using recycled and biobased materials, such as hempcrete and wood.





*Top to bottom:*

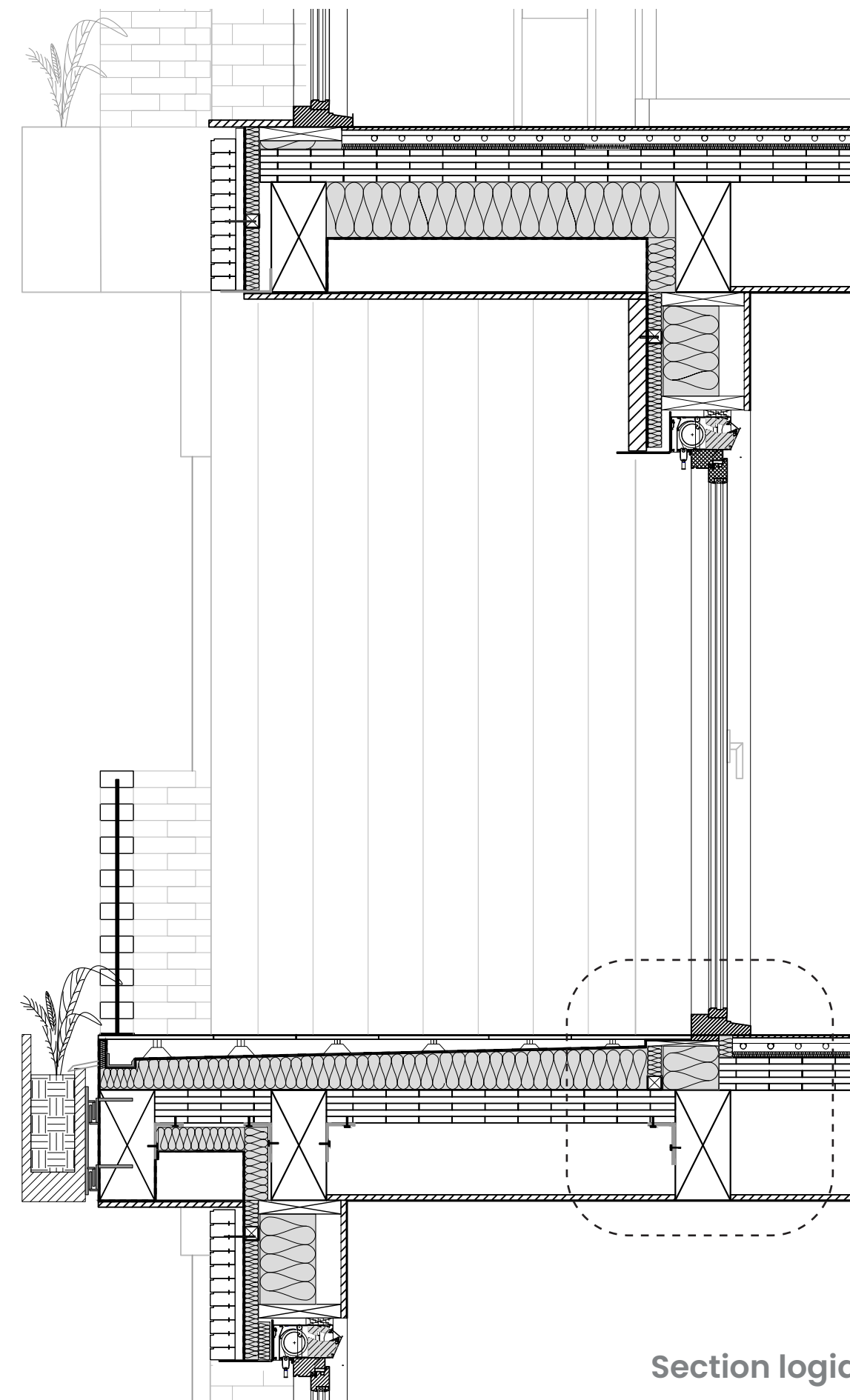
Water barrier - 5 mm  
Sloped insulation - 150 mm  
Vapor barrier - 1 mm  
CLT floor - 120 mm  
Glulam beam (with space for  
instalations) - 400 mm  
Plywood board - 20 mm  
Gypsum - 5 mm

*Top to bottom:*

Wooden flooring finish - 10 mm  
Dry screed boards - 20 mm  
Underlay heating - 30 mm  
Accoustic insulation boards  
(wood fiber) - 20 mm  
Vapor barrier - 1 mm  
CLT floor - 120 mm  
Glulam beam (with space for  
instalations) - 400 mm  
Plywood board - 20 mm  
Gypsum - 5 mm

**Detail logia**

**Scale 1:5**



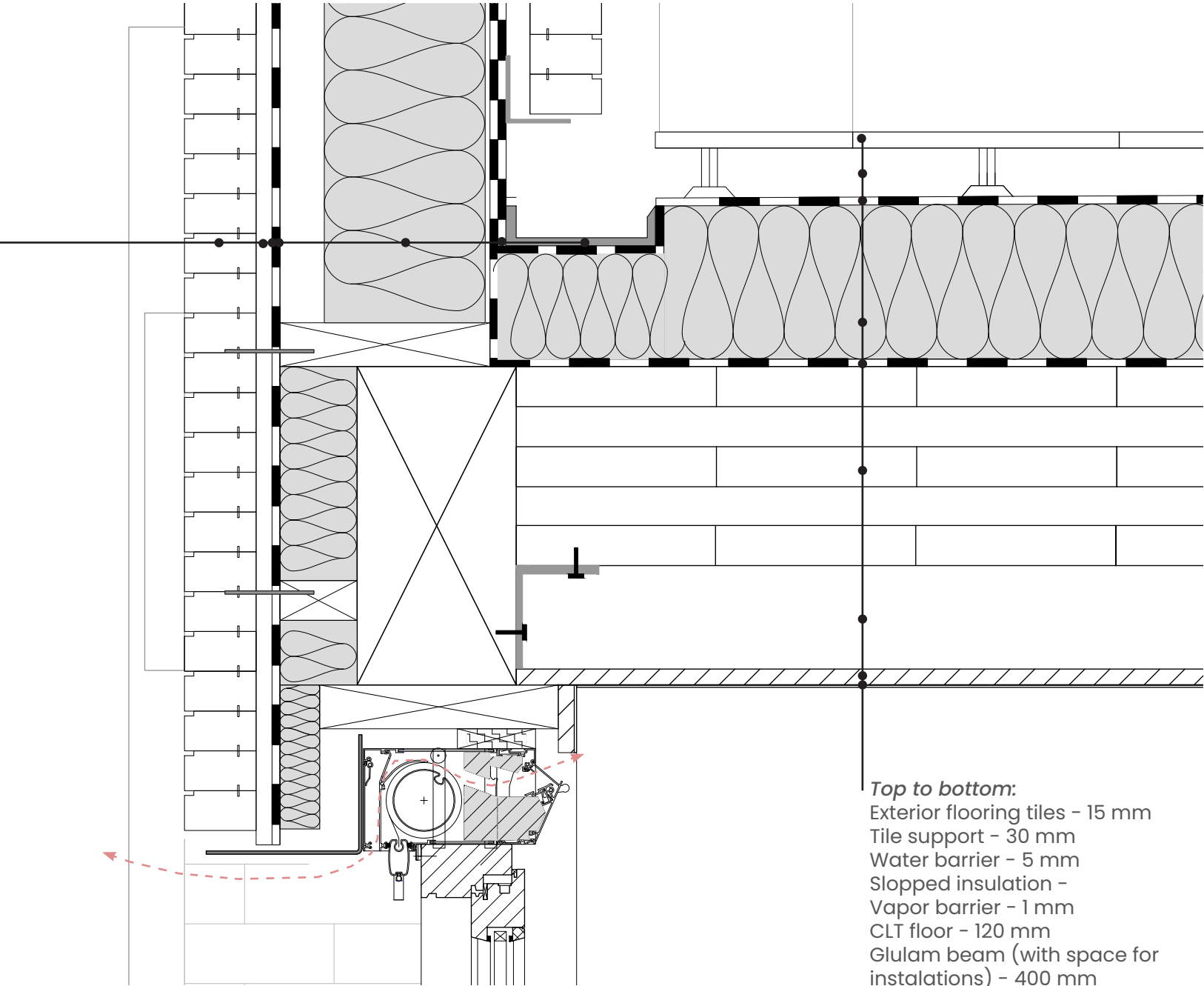
**Section logia**

**Scale 1:20**





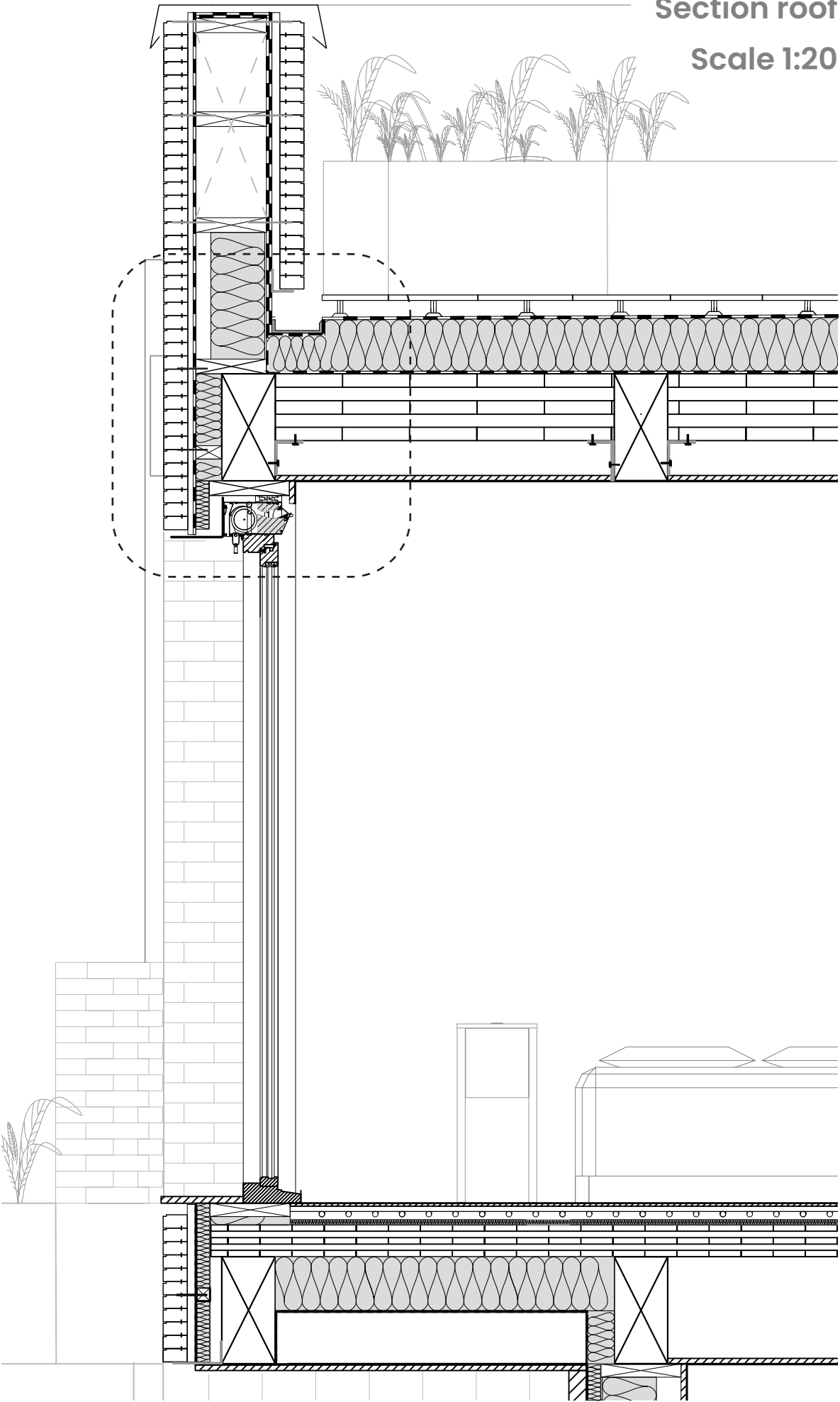
Left to right:  
Pirouette click-brick - 90 mm  
Air cavity - 30 mm  
Water barrier - 5 mm  
Prefabricated timber frame wall  
with Hemp insulation - 200 mm  
Vapor barrier - 1 mm  
Water barrier - 5 mm  
Water drainage gutter



Top to bottom:  
Exterior flooring tiles - 15 mm  
Tile support - 30 mm  
Water barrier - 5 mm  
Sloped insulation -  
Vapor barrier - 1 mm  
CLT floor - 120 mm  
Glulam beam (with space for  
instalations) - 400 mm  
Plywood board - 20 mm  
Gypsum - 5 mm

Detail roof  
Scale 1:5

Section roof  
Scale 1:20



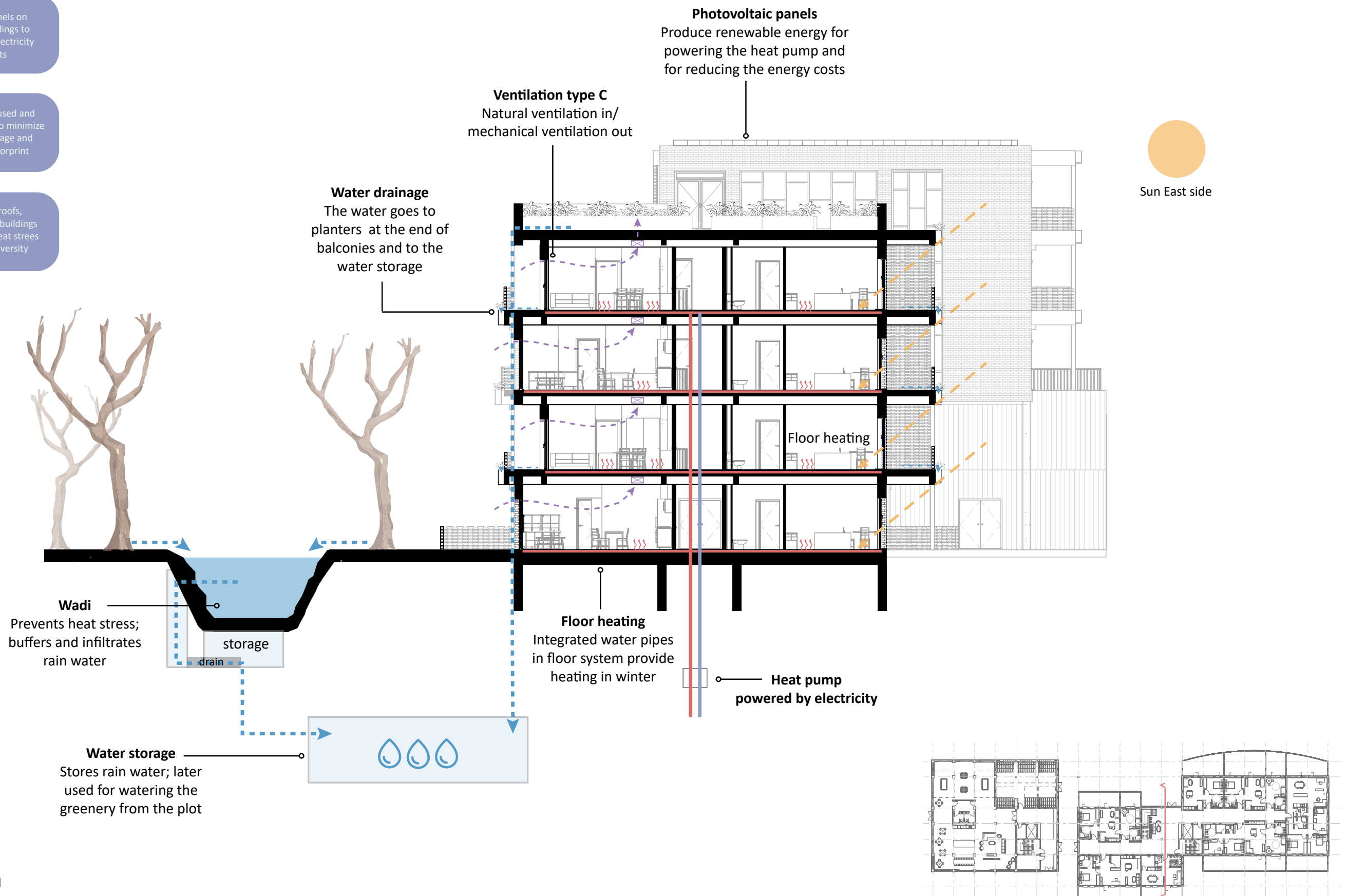


**3 GOOD HEALTH AND WELL-BEING**  
A strong sense of community, communal functions in outdoor and indoor environments, different sports facilities, and elements of biophilic design contribute to the mental and physical well-being

**7 AFFORDABLE AND CLEAN ENERGY**  
Integrating solar panels on the roofs of the buildings to produce renewable electricity and reduce costs

**12 RESPONSIBLE CONSUMPTION AND PRODUCTION**  
Using recycled, reused and biobased materials to minimize environment damage and reduce carbon footprint

**13 CLIMATE ACTION**  
The use of green roofs, greenery around the buildings and wadi to reduce heat stress and increases biodiversity

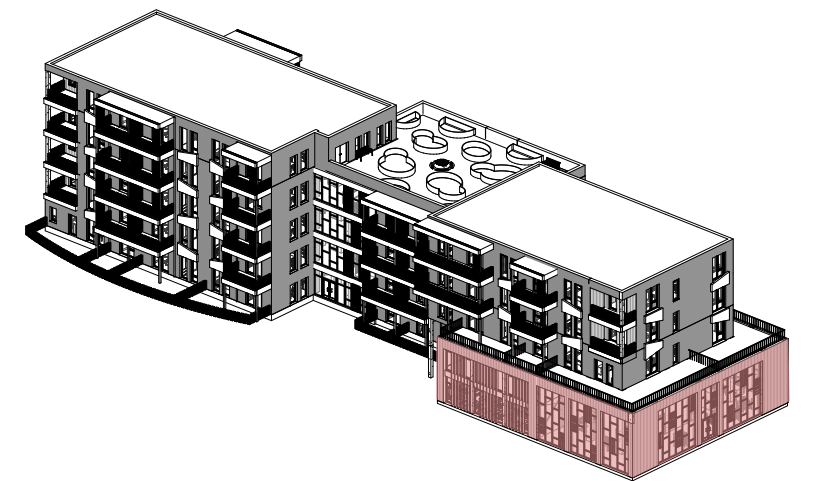
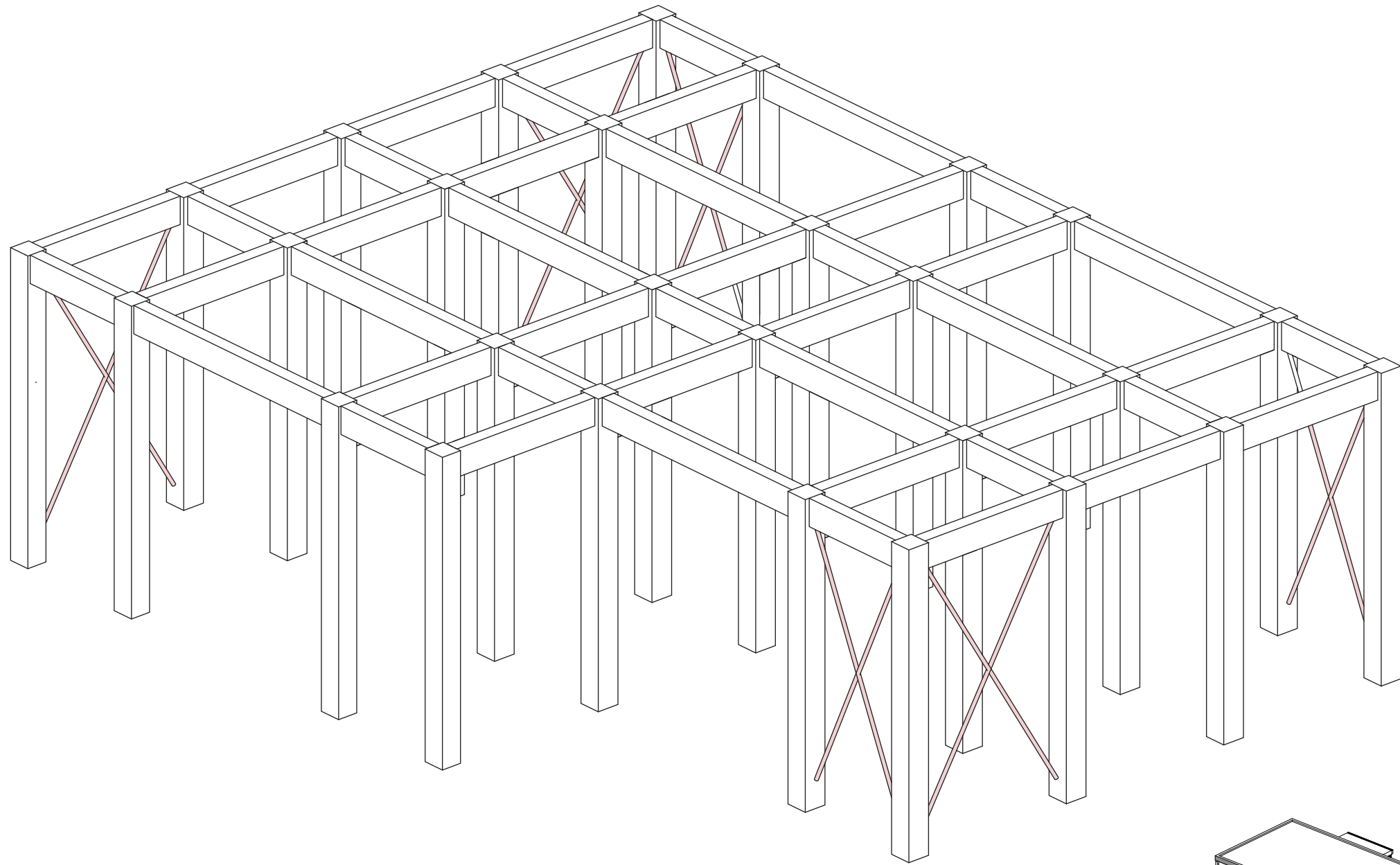


Summer situation



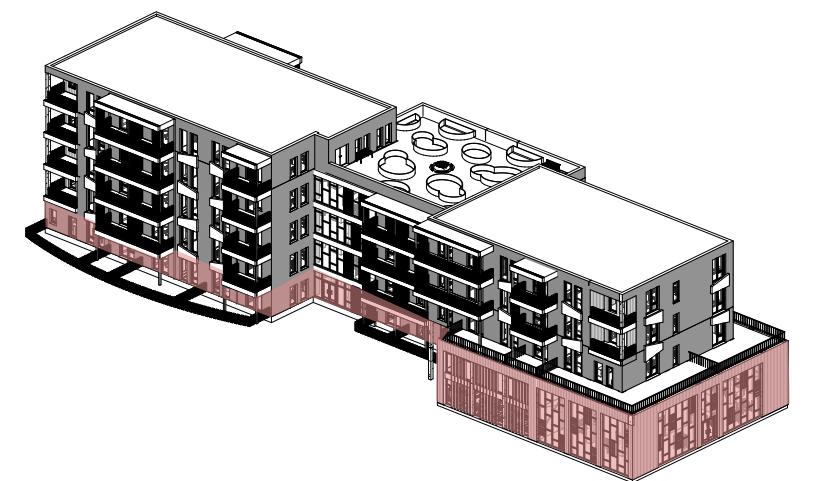
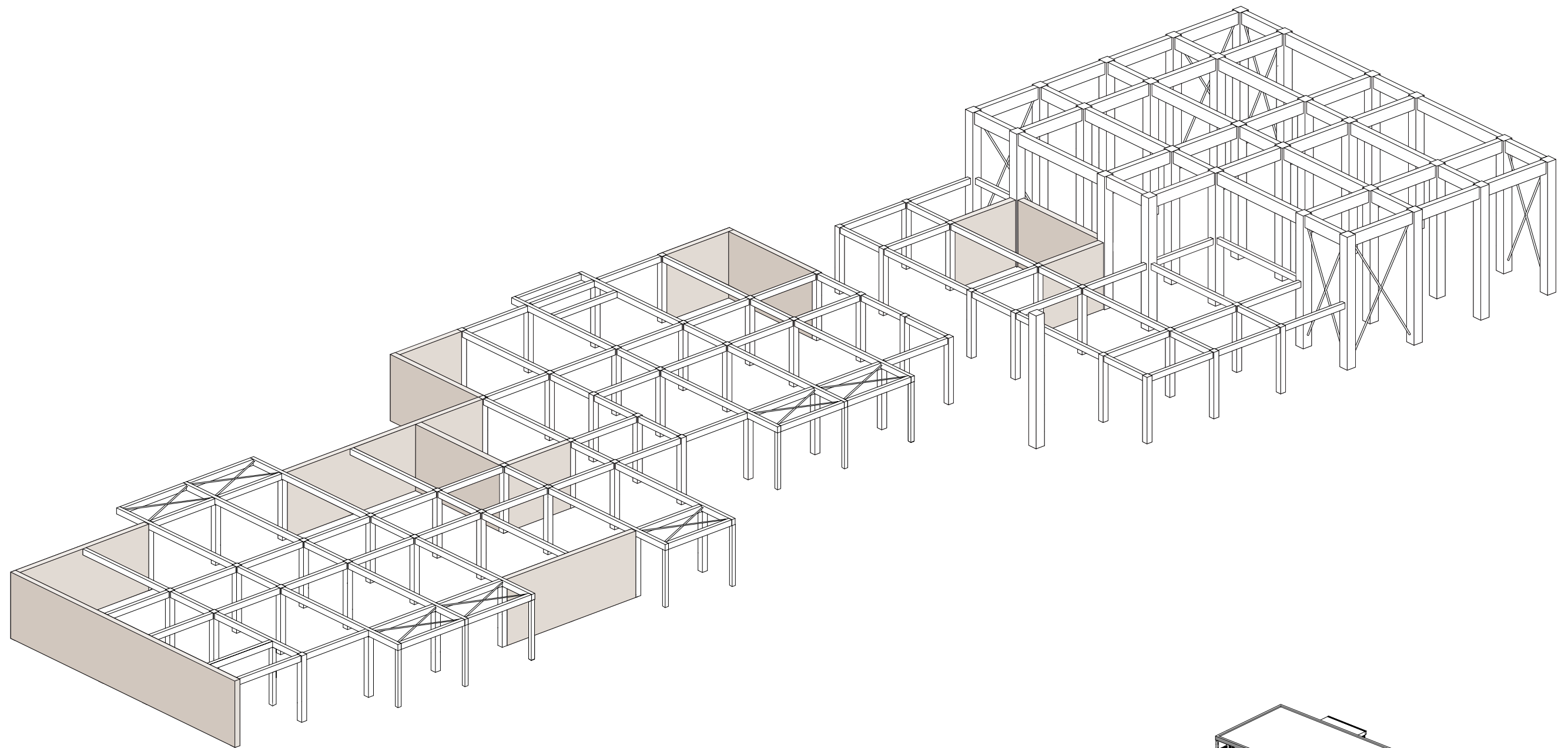
# CLIMATE DIAGRAM





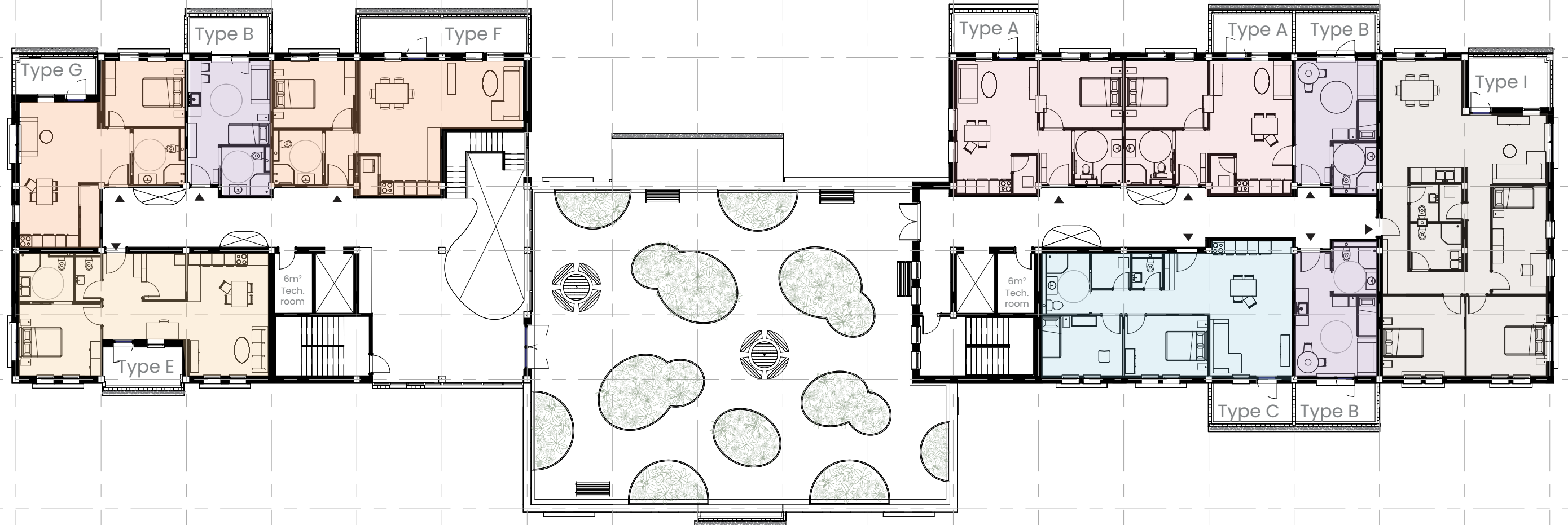
Common area structure





Ground floor structure





Fourth floor plan

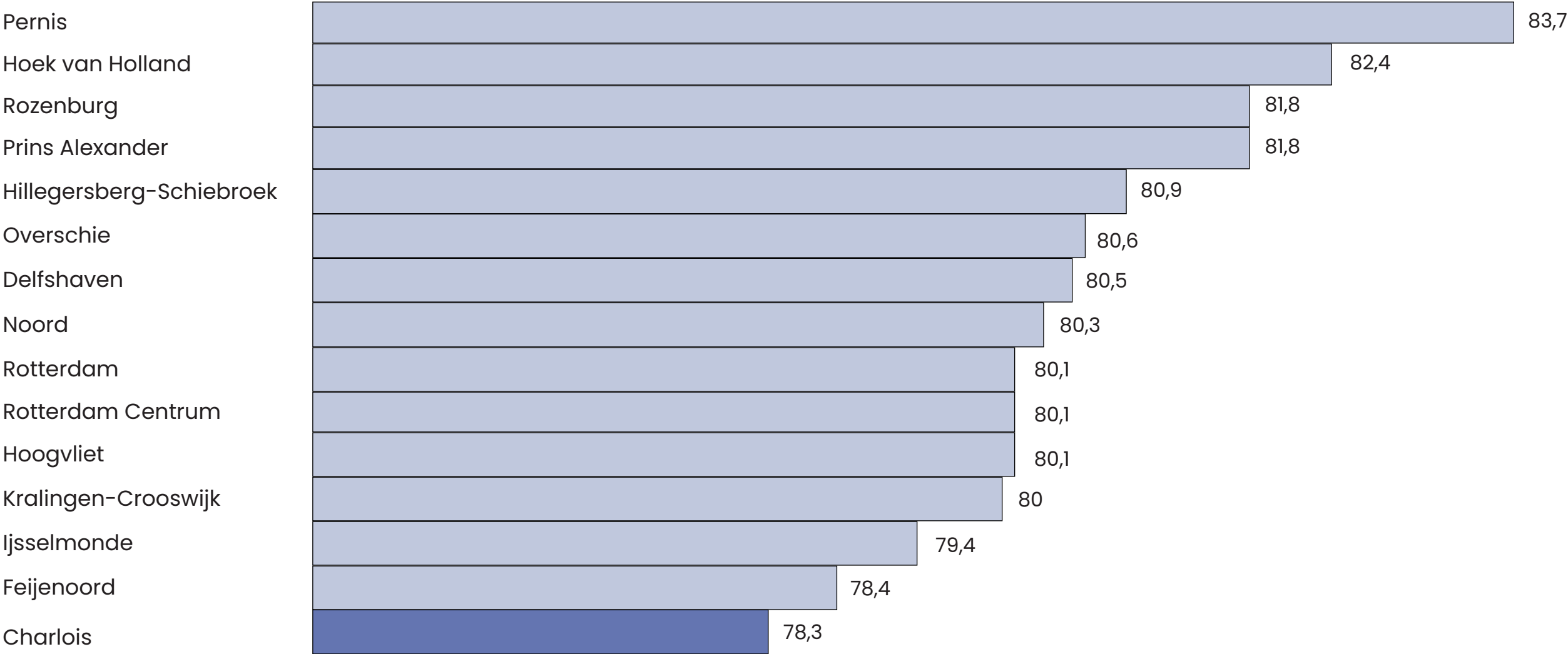
Scale 1:200



# FLOORPLANS



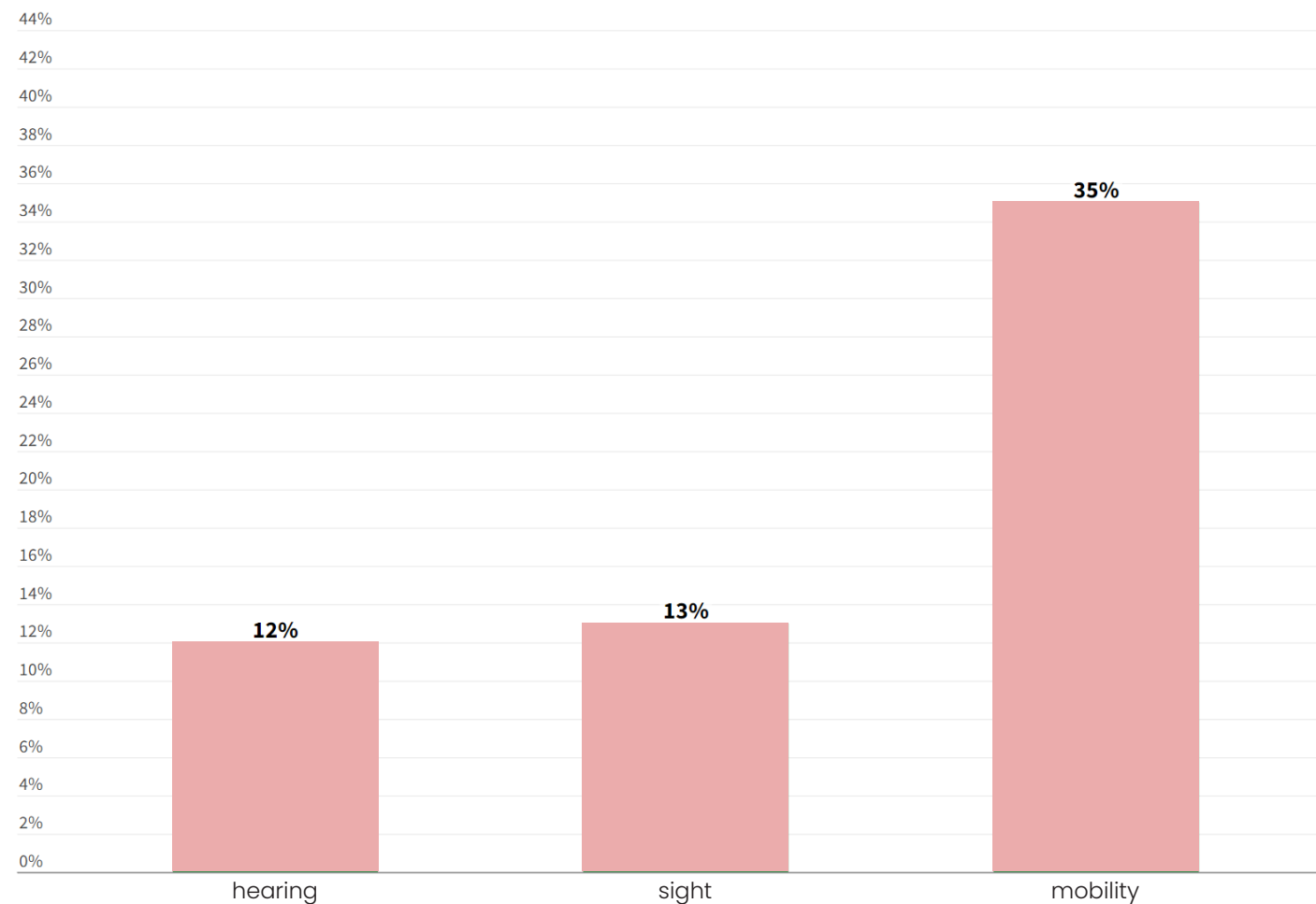
# Life expectancy



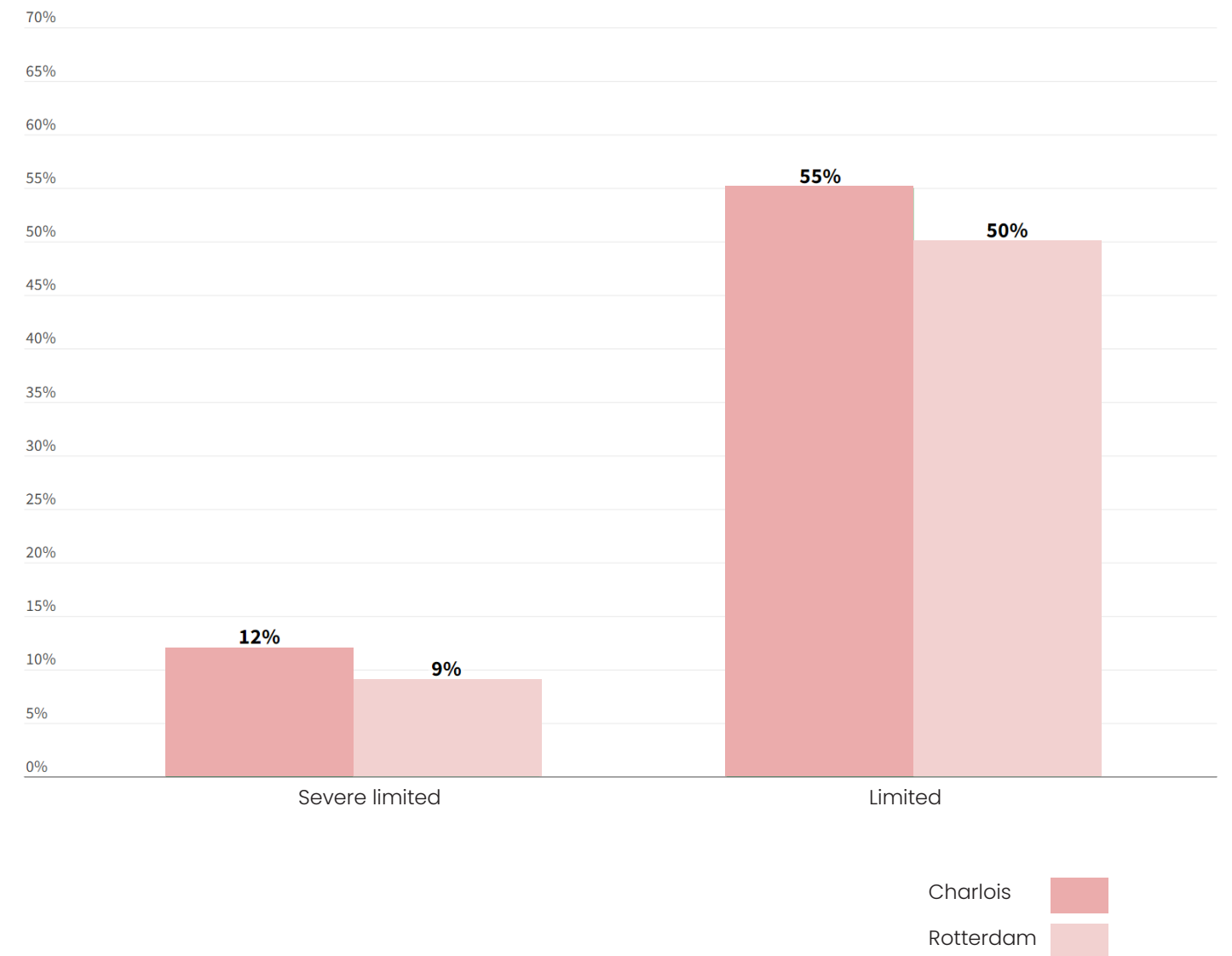
(Gezondheidmonitor Volwassenen en Ouderen, Rotterdam)



## Health limitations, 65 and older



## Limitations in daily activities because of health problems, 65 and older

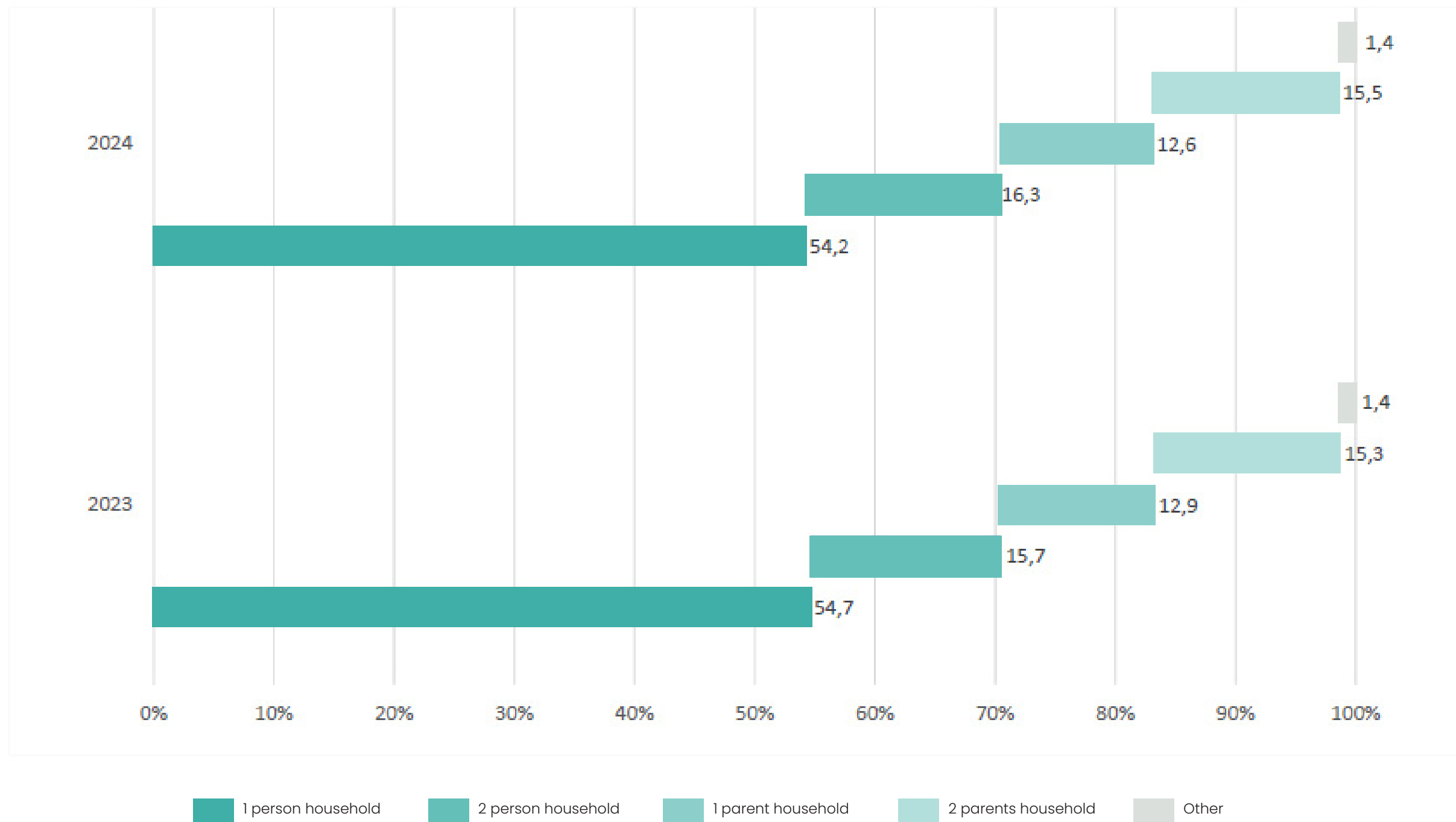


Charlois  
Rotterdam

(Gezondheidmonitor Volwassenen en Ouderen, Rotterdam)



## Household type



(Gezondheidmonitor Volwassenen en Ouderen, Rotterdam)



# NEIGHBORHOOD LEVEL

## ACTIVE AGING



Different green spaces

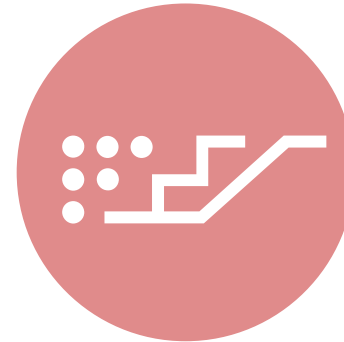


Walking and cycling paths



Proximity to amenities

## MOBILITY LIMITATIONS



Barrier-free surroundings



Living on the ground floor



Frequent resting spots

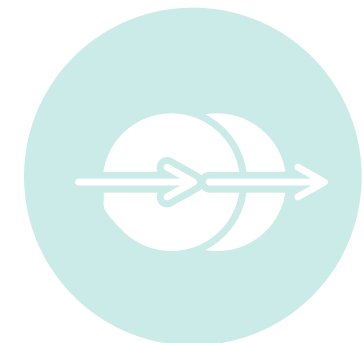
## LONELINESS



Shared gardens



Intergenerational and intercultural  
community functions



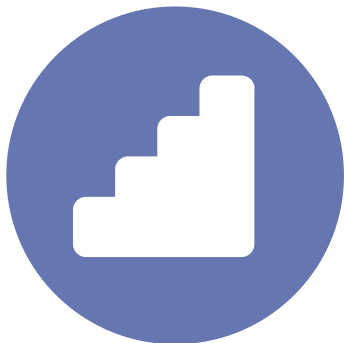
Outdoor transitions  
private-public

**Legend:**  
● 1st importance  
● 2nd importance  
● 3rd importance



BUILDING  
LEVEL

ACTIVE AGING



Centralized attractive staircase

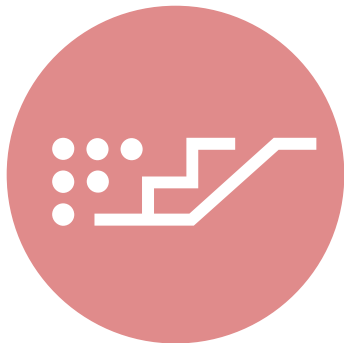


Maximize visual connection to nature



Intuitive layout

MOBILITY LIMITATIONS



Barrier-free floorplans



Incorporate care facilities



Incorporate physiotherapy facilities

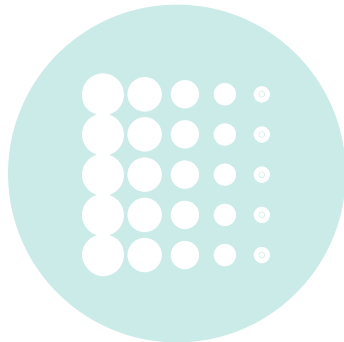
LONELINESS



Shared functions



Multipurpose spaces



Gradients of interactions

Legend:  
● 1st importance  
● 2nd importance  
● 3rd importance



INTERIOR  
LEVEL

ACTIVE AGING



Private outdoor space



Housing variety

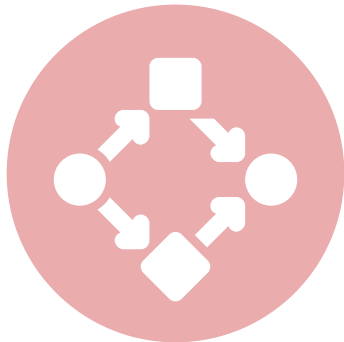


Sufficient natural and artifical lighting

MOBILITY LIMITATIONS



Wheelchair-friendly spaces



Adaptable apartments



Avoid institutional feeling

LONELINESS



Spontaneous meeting spots



Avoid long and dark corridors



Visual connectivity private-public

Legend:  
● 1st importance  
● 2nd importance  
● 3rd importance



