# REPEAT

## Densifying and revitalizing post-war neighborhoods through an ecosystem approach

P5 Architectural Engineering
Lisa Blok

# CONTENT



# Problem statement

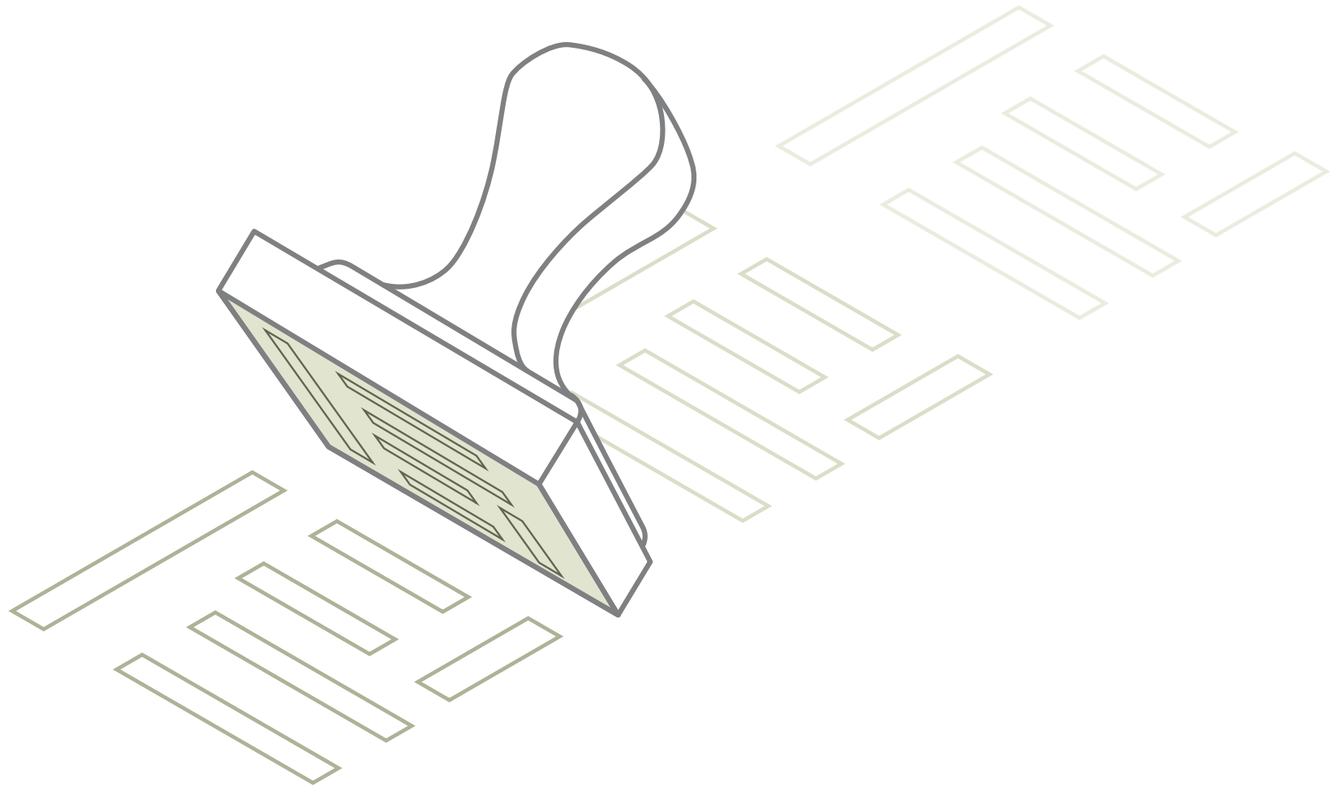
## Housing shortage

# Problem statement

## Sustainable improvements

## Problem statement

### Post-war housing stock



# Problem statement

## Post-war neighborhoods

Neighborhoods where more than 50% of the housing stock consists of post-war dwellings

*Source data: https://www.kaw.nl/wp-content/uploads/2020/06/KAW_RUIMTE_ZAT20200623.pdf*

# Problem statement

## Post-war neighborhoods

Schalkwijk, Haarlem

Mariahoeve, Den Haag

Pendrecht, Rotterdam

*Source data: https://www.kaw.nl/wp-content/uploads/2020/06/KAW_RUIMTE_ZAT20200623.pdf*

# Problem statement

## Soil types

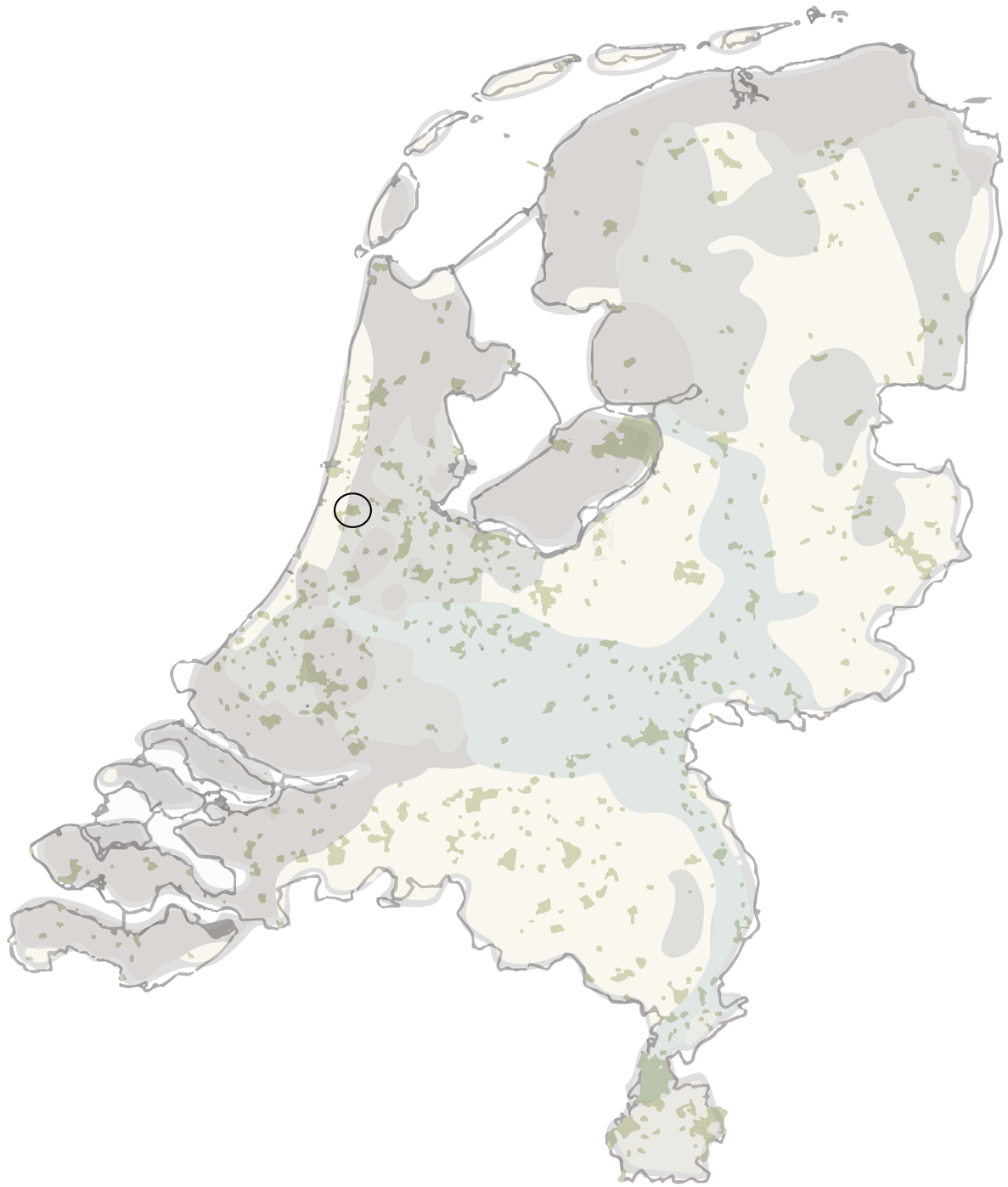
Soil type

- Sand
- Peat
- Sea clay
- River clay
- Löss

*Source data: https://florum.nl/grondsoorten/grondsoorten-nederland/*

# Problem statement

## Schalkwijk in Haarlem



# HISTORY

# History

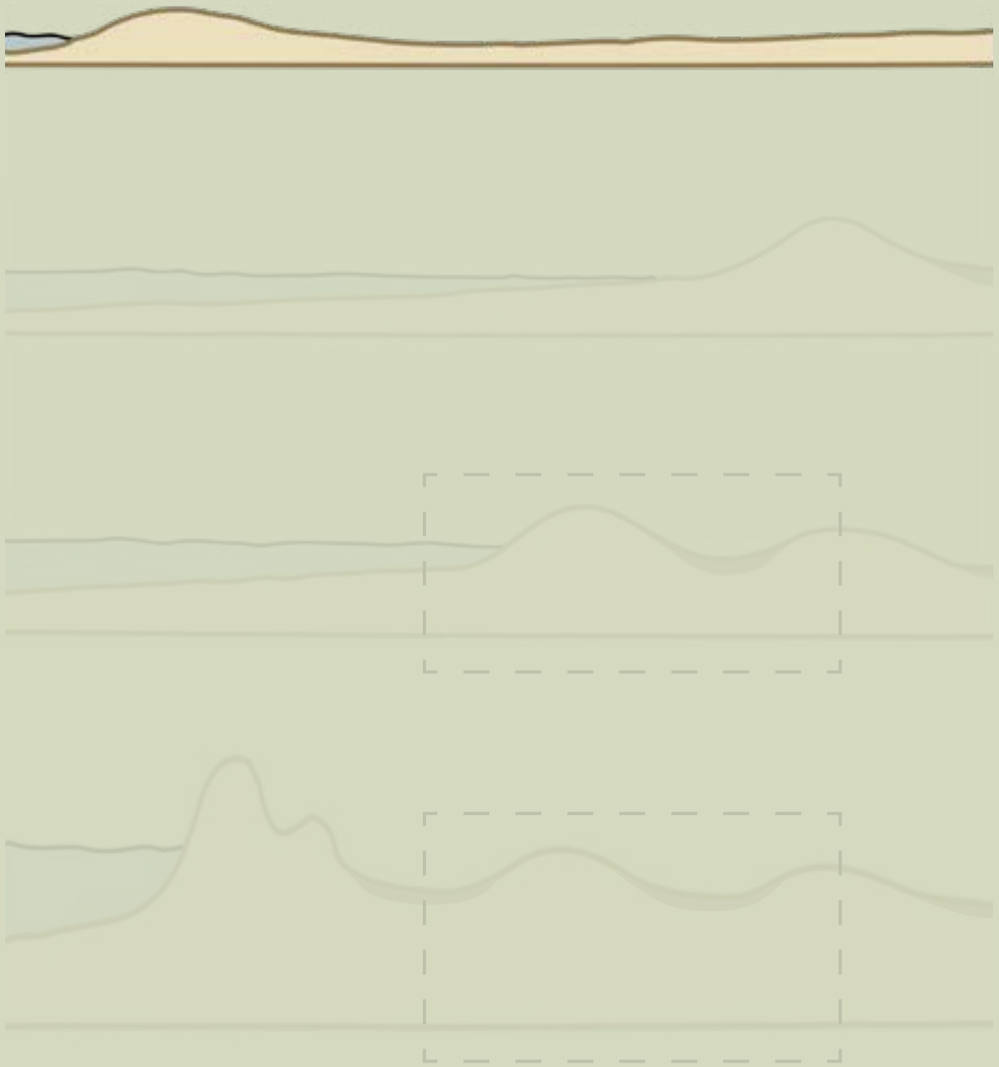
## Landscape formation

10.000 years ago

5000 years ago

1000 years ago

Currently

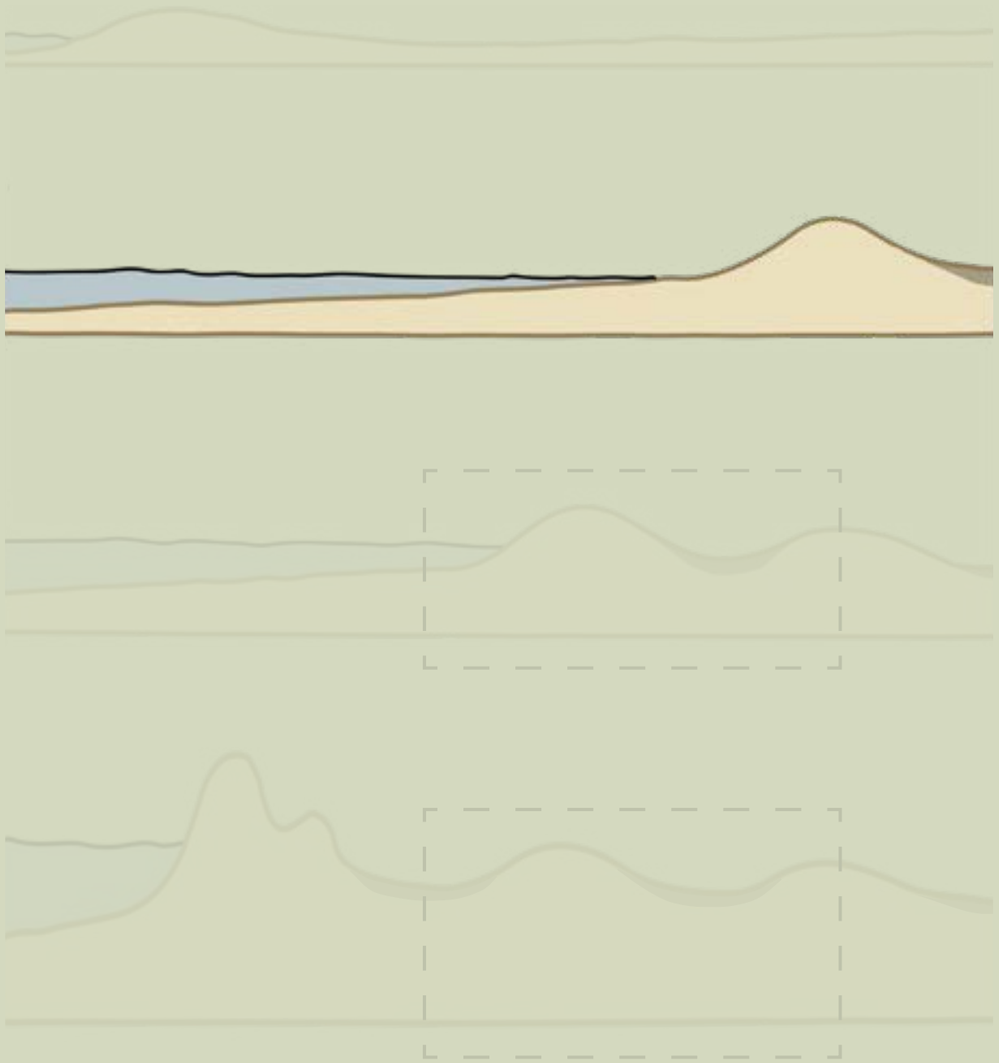


During the last Ice Age, Haarlem was covered by glaciers. As these retreated, they left behind a landscape of sandy soils.

# History

## Landscape formation

10.000 years ago



5000 years ago

1000 years ago

Currently

The climate warmed, and melting ice and rising sea levels caused the formation of dunes and the westward movement of the Dutch coast.

# History

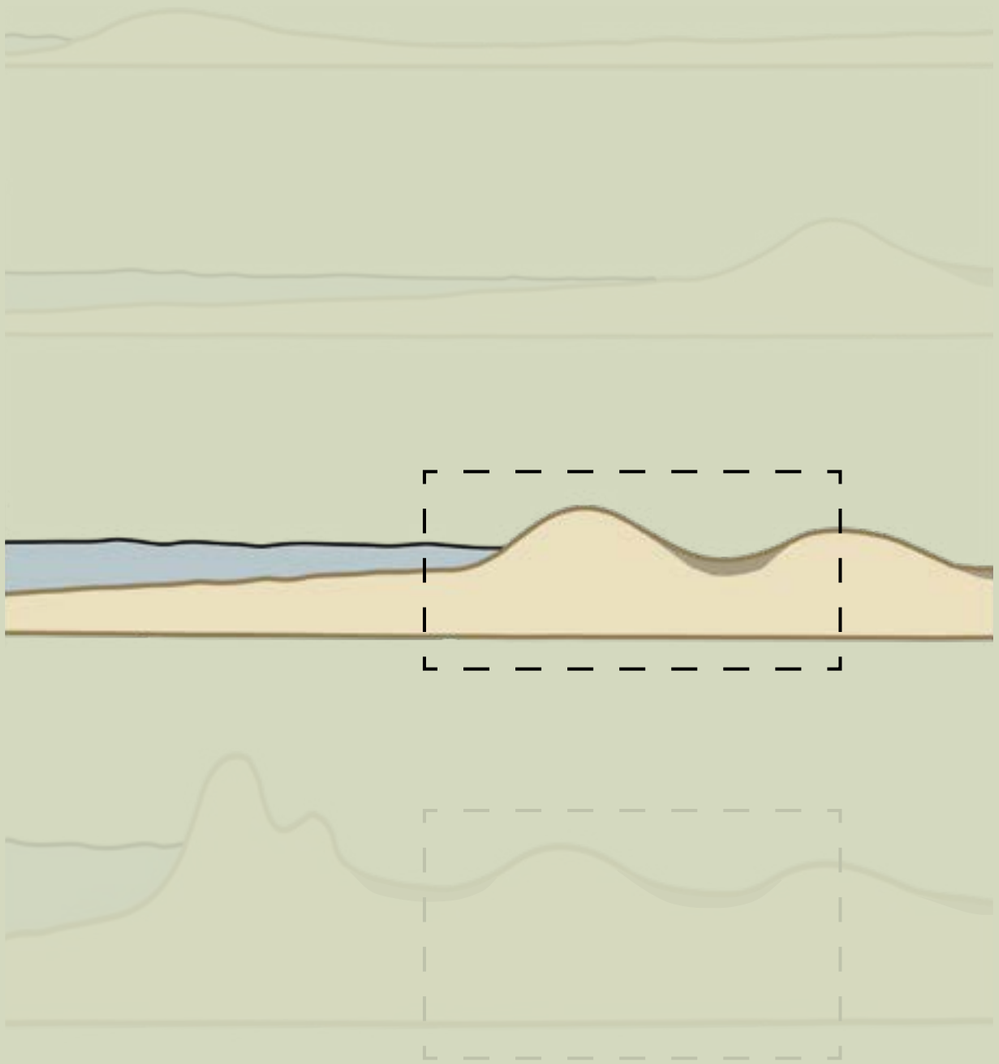
## Landscape formation

10.000 years ago

5000 years ago

1000 years ago

Currently



A new row of dunes had formed, and rainwater accumulated on the beach terraces. This led to the formation of wetland areas. Organic material started to accumulate, creating peat deposits.

# History

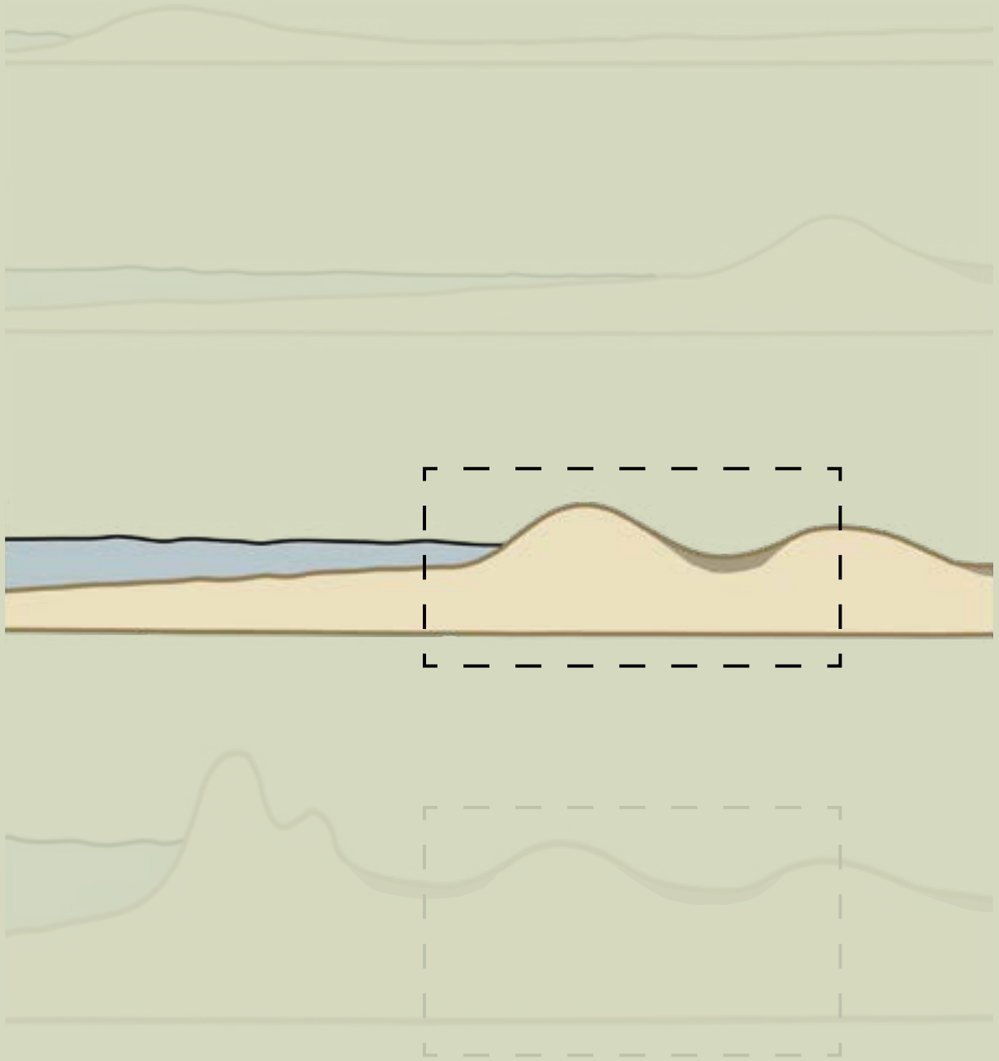
## Landscape formation

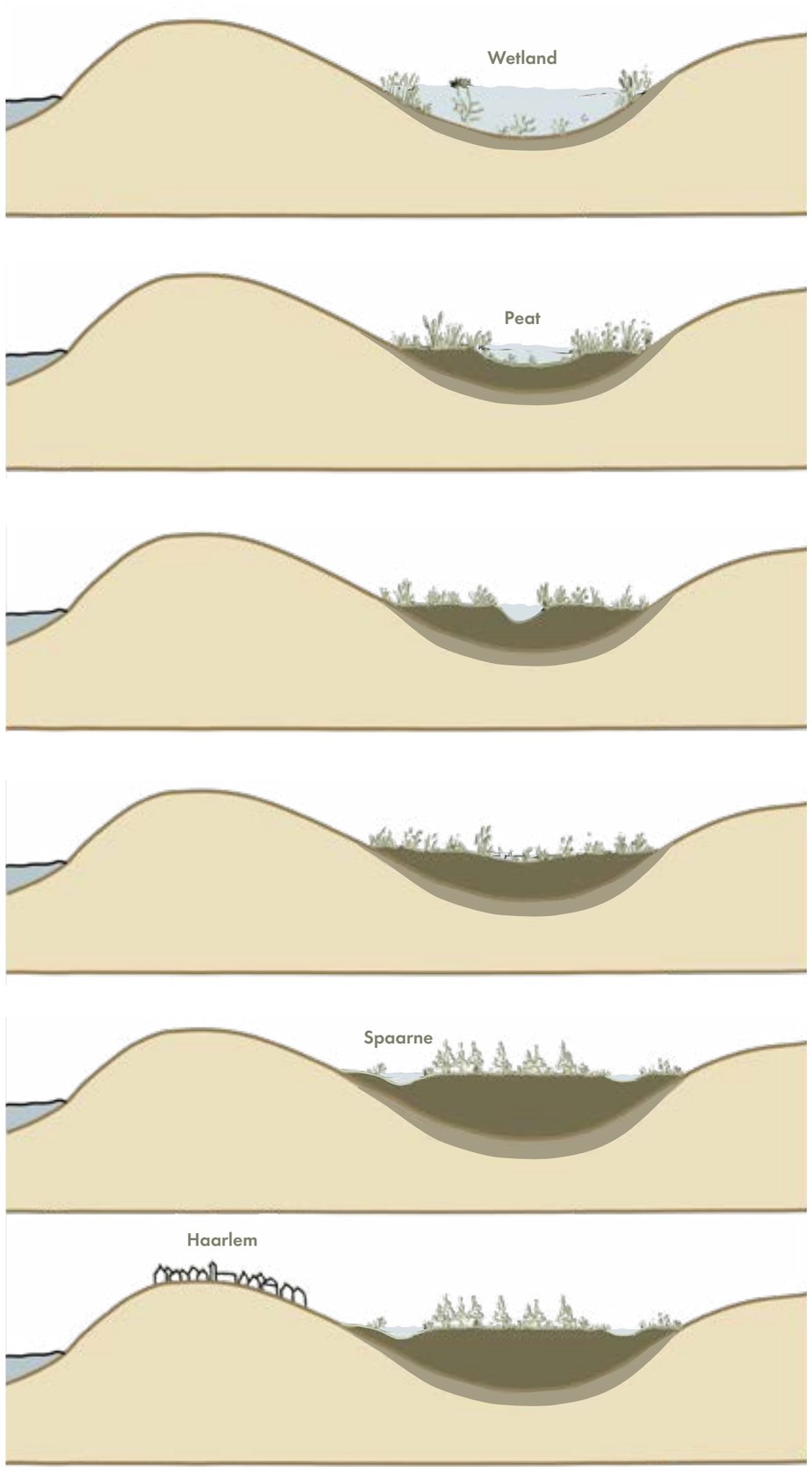
10.000 years ago

5000 years ago

1000 years ago

Currently





# History

## Landscape formation

10.000 years ago

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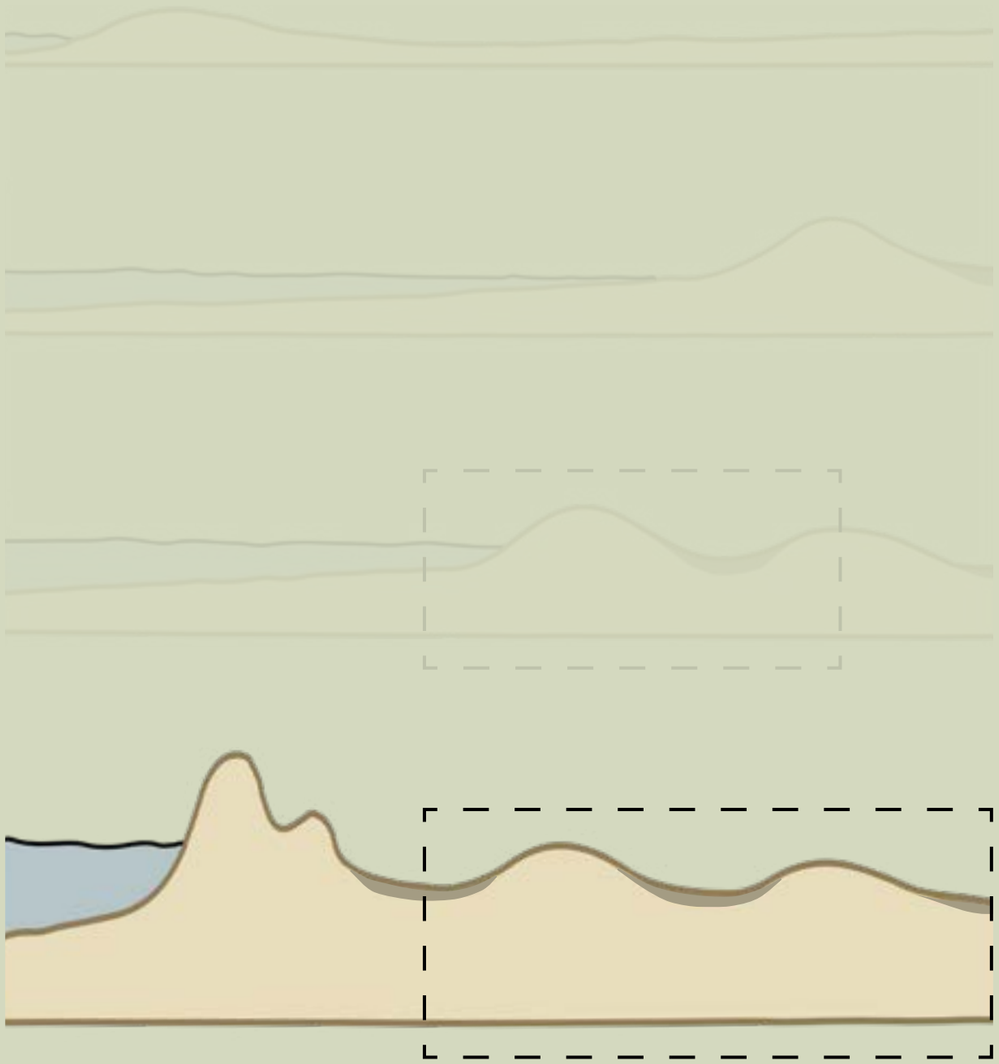
1000 years ago

Currently



Since the founding of the city of Haarlem, human activity has began to shape the landscape sicnificantly. As communities developed, peat was harvested and wetlands were drained for agriculture.

# History

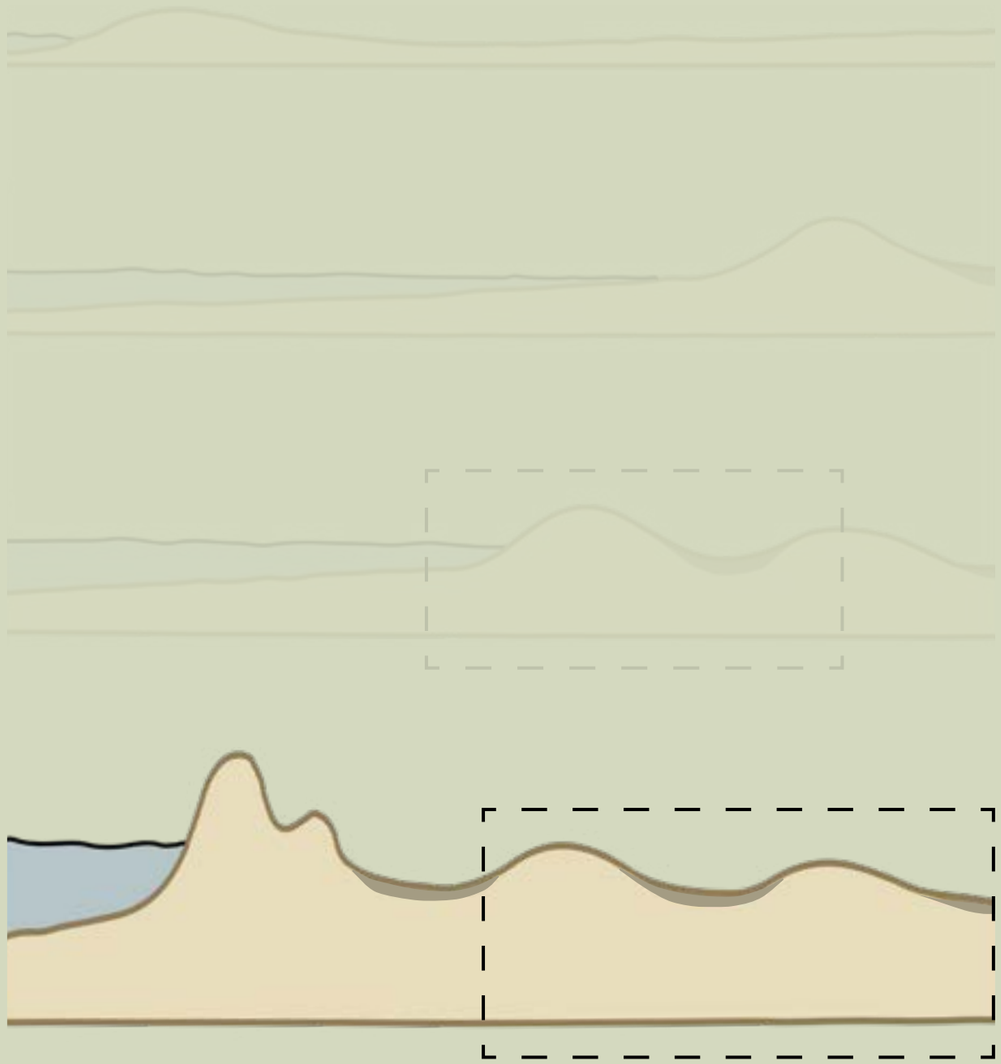
## Landscape changes due to human activity

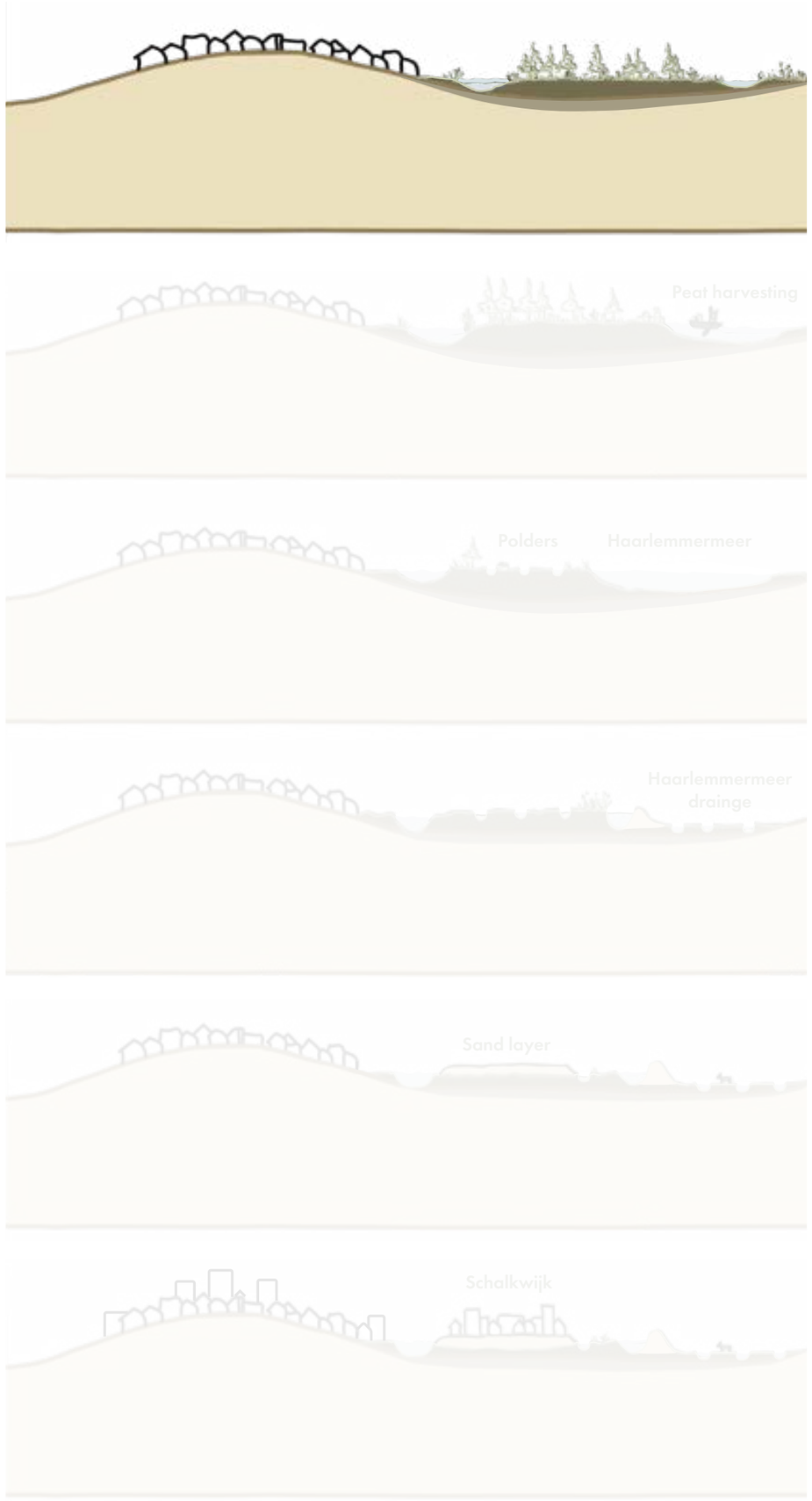
10.000 years ago

5000 years ago

1000 years ago

Currently



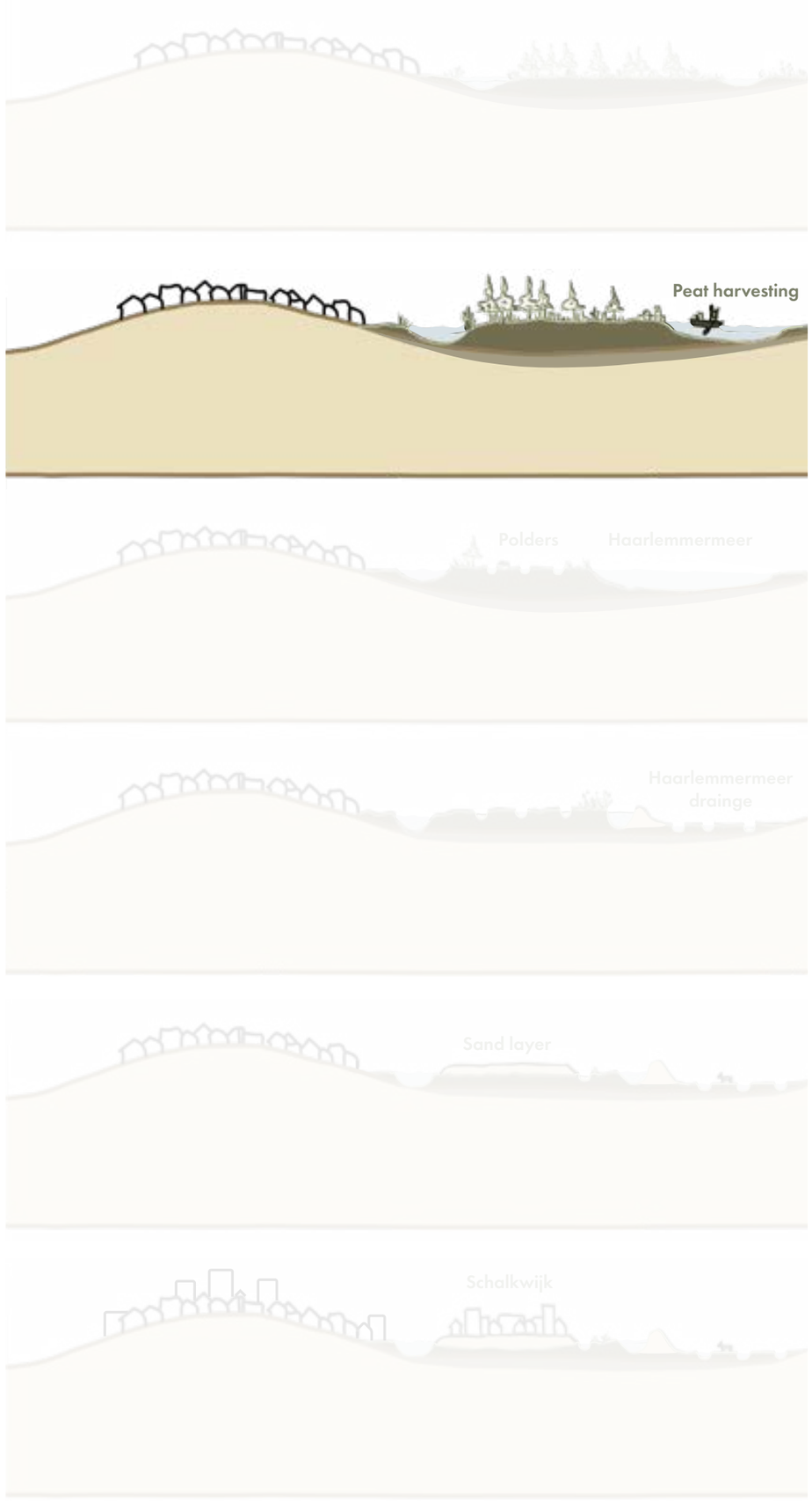


# History

## Landscape changes due to human activity


1531

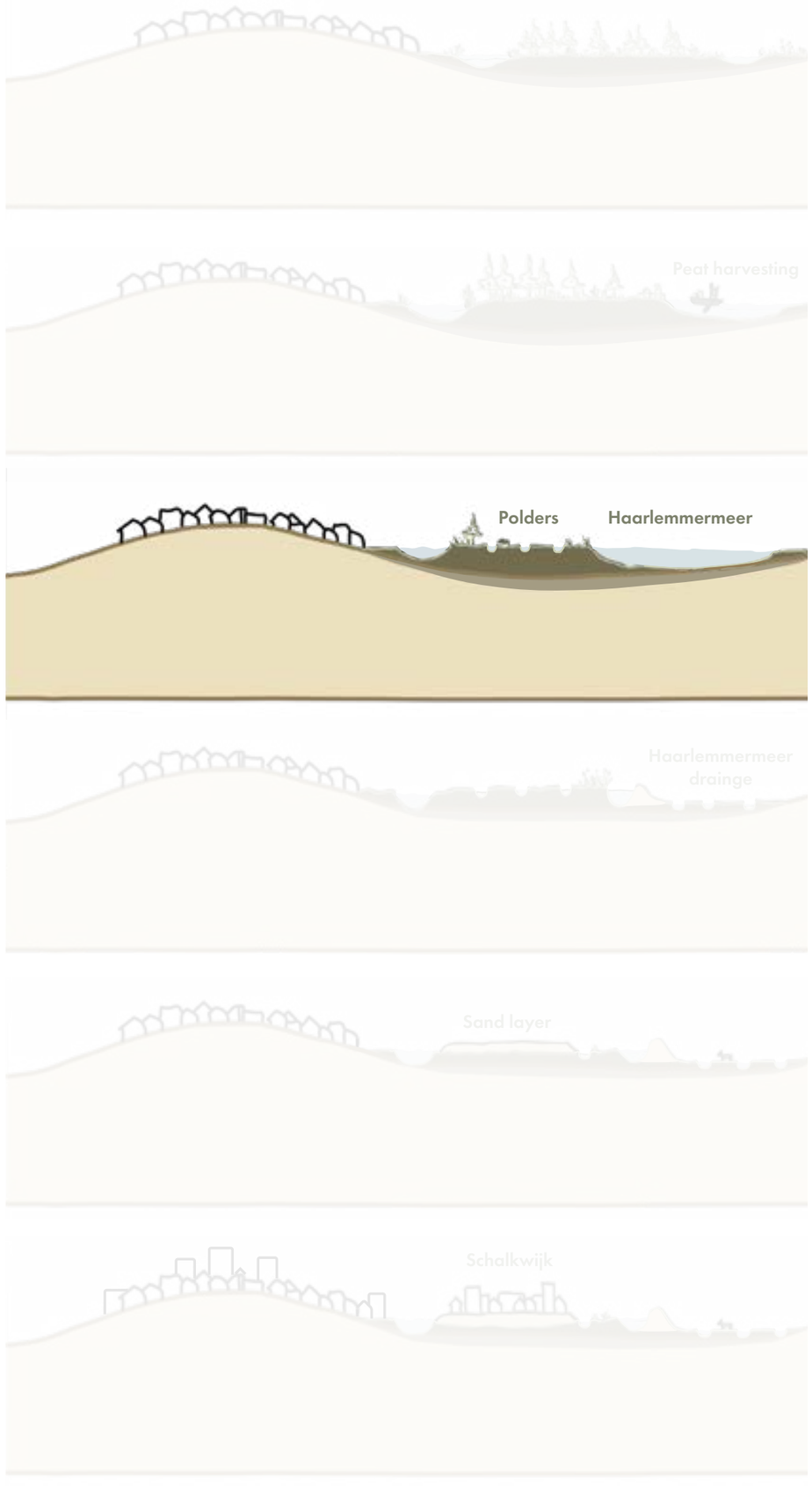
*Source:* Bolstra, 1745



# History

## Landscape changes due to human activity


1740

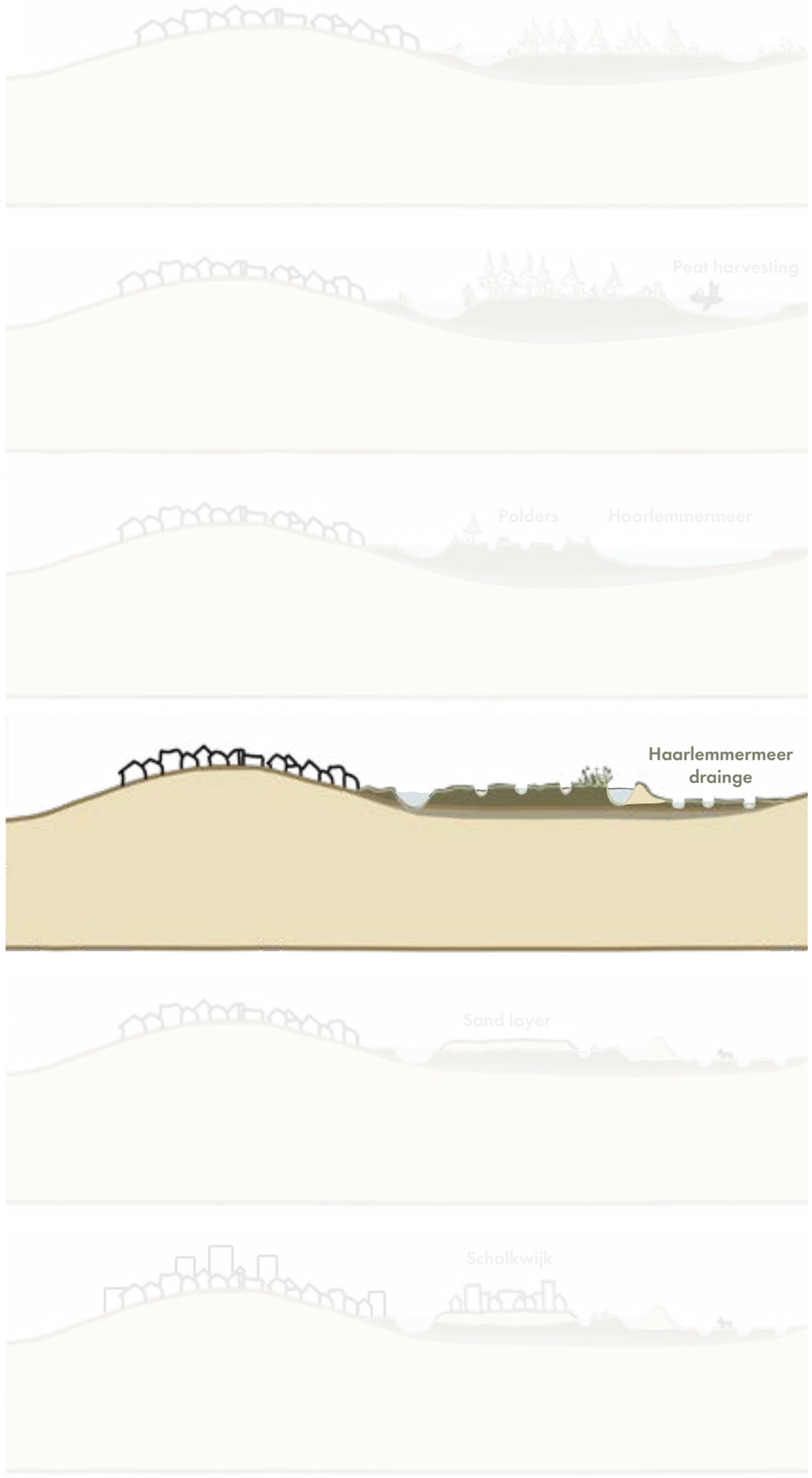



*Source:* Bolstra, *1745*

# History

## Landscape changes due to human activity


Source: De Geus, 1855

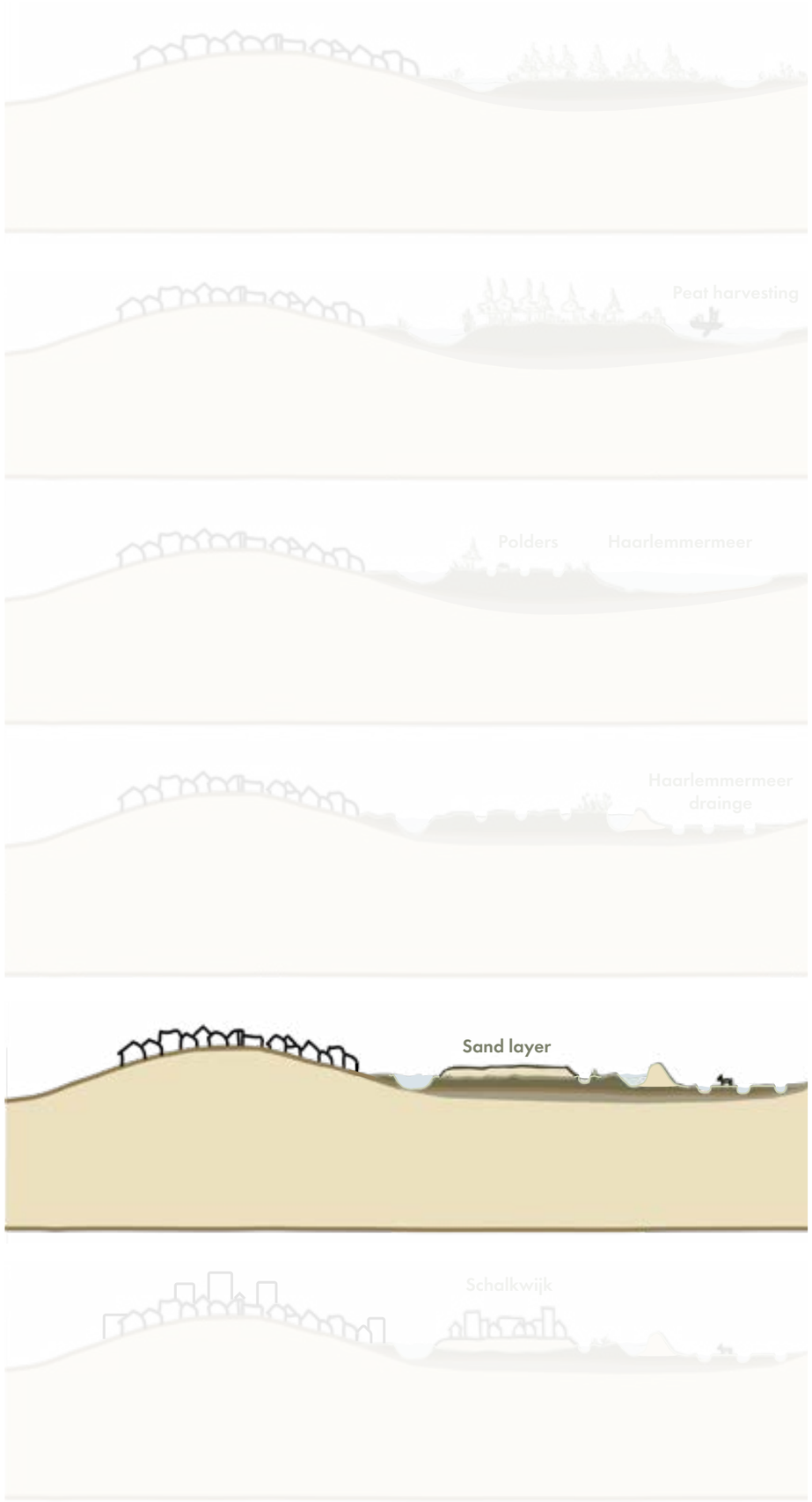


# History

## Landscape changes due to human activity

1957

Source: Haarlems Dagblad, 1957b

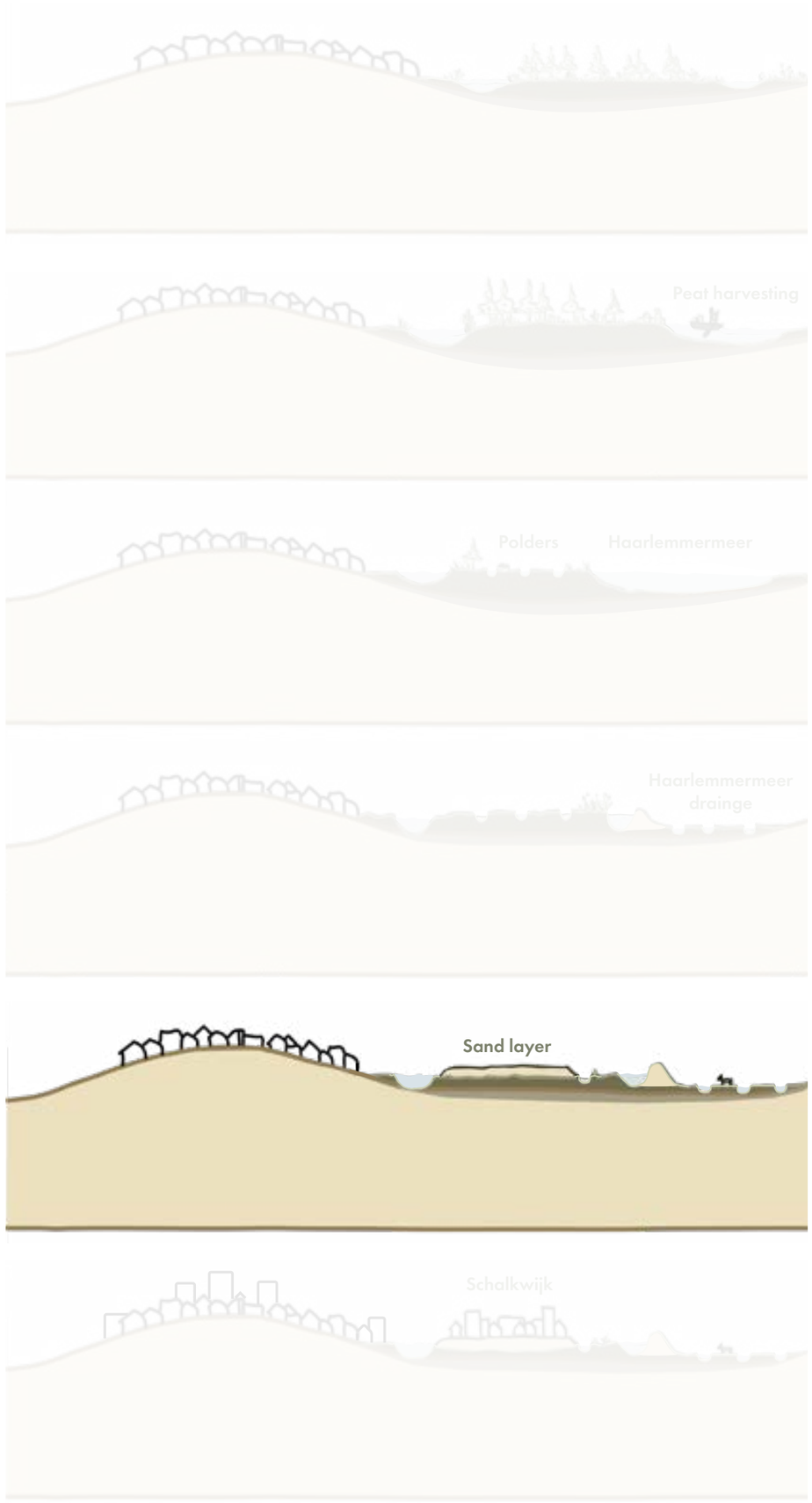


# History

## Landscape changes due to human activity

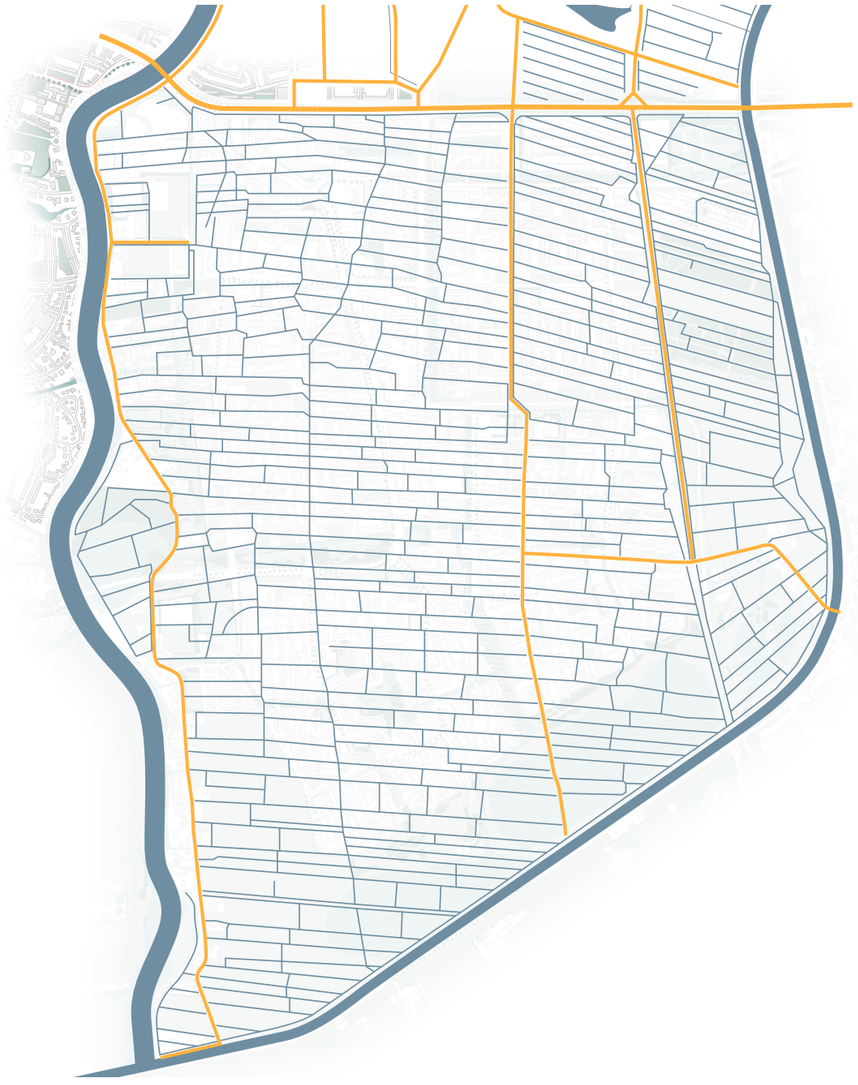
1958

Source: [Spraying sand and preparing the land in Schalkwijk for housing construction], 1958



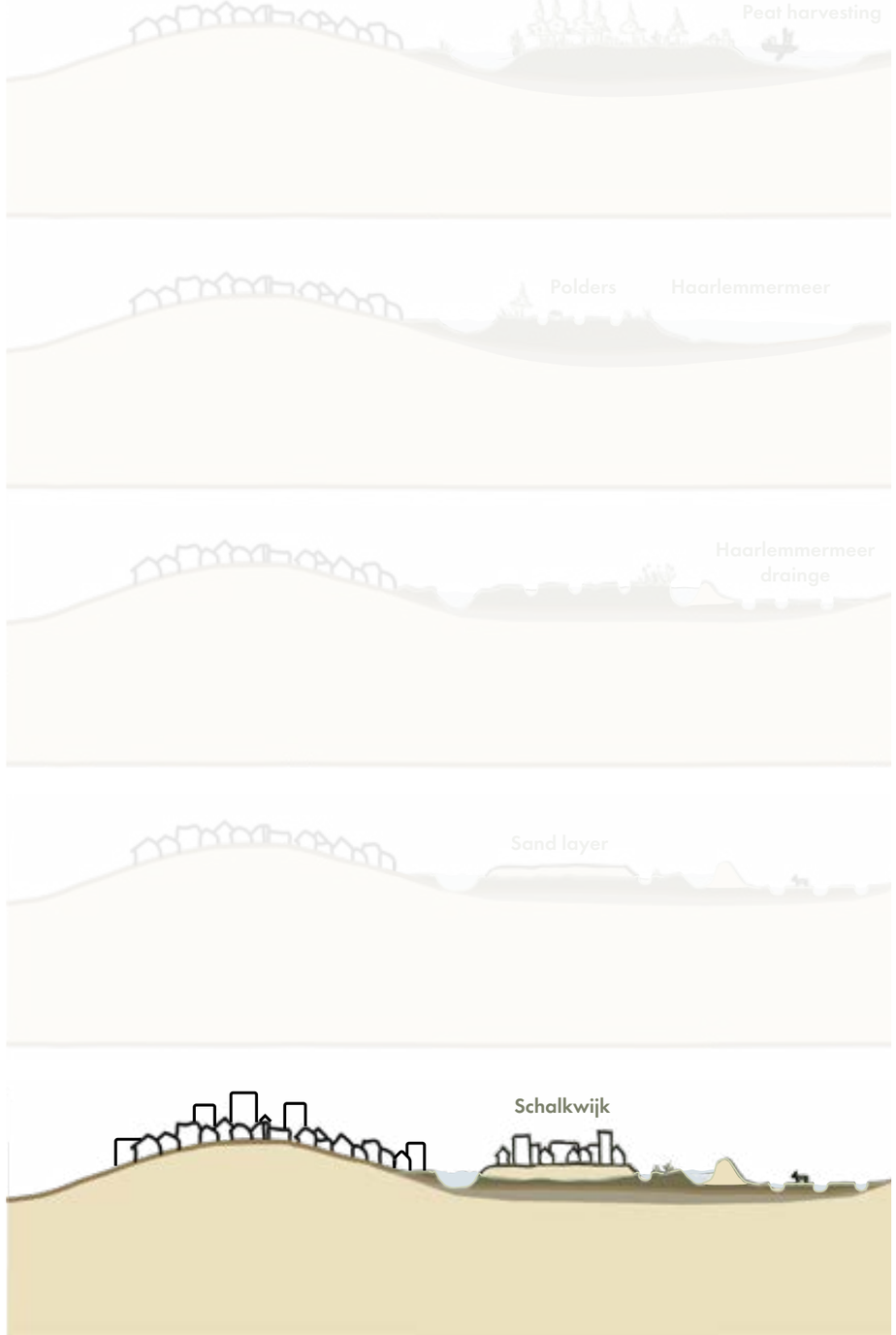
# History

## Landscape changes due to human activity



# History

## Landscape changes due to human activity



# History

## Boerhaavewijk

## Boerhaavewijk

### Disconnection between neighborhood and landscape

## Boerhaavewijk

### Disconnection between neighborhood and landscape

# Boerhaavewijk

## Problems

Low quality and unused green spaces

# Boerhaavewijk

## Problems

Neighborhood dominated by infrastructure

# Boerhaavewijk

## Problems

Repetitiveness

# Boerhaavewijk

## Problems

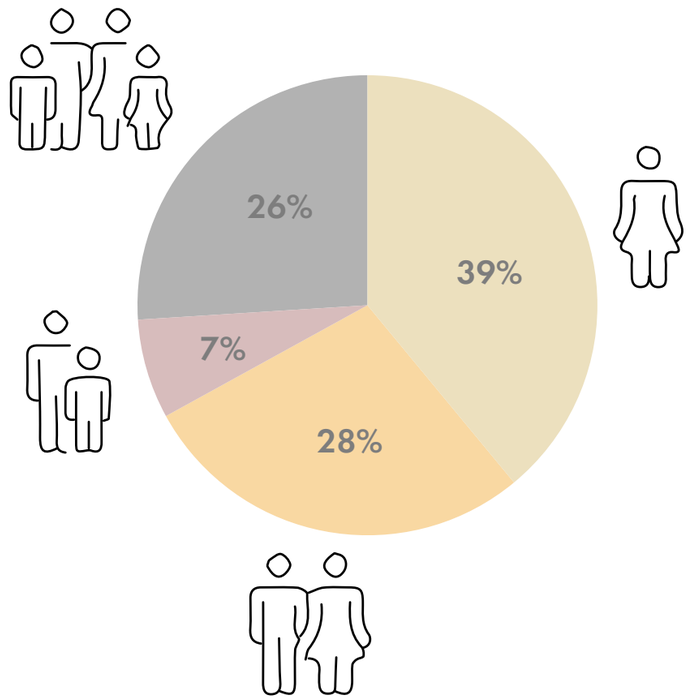




Mismatch housing demand and dwellings

# Boerhaavewijk

## Mismatch between household size & dwelling size



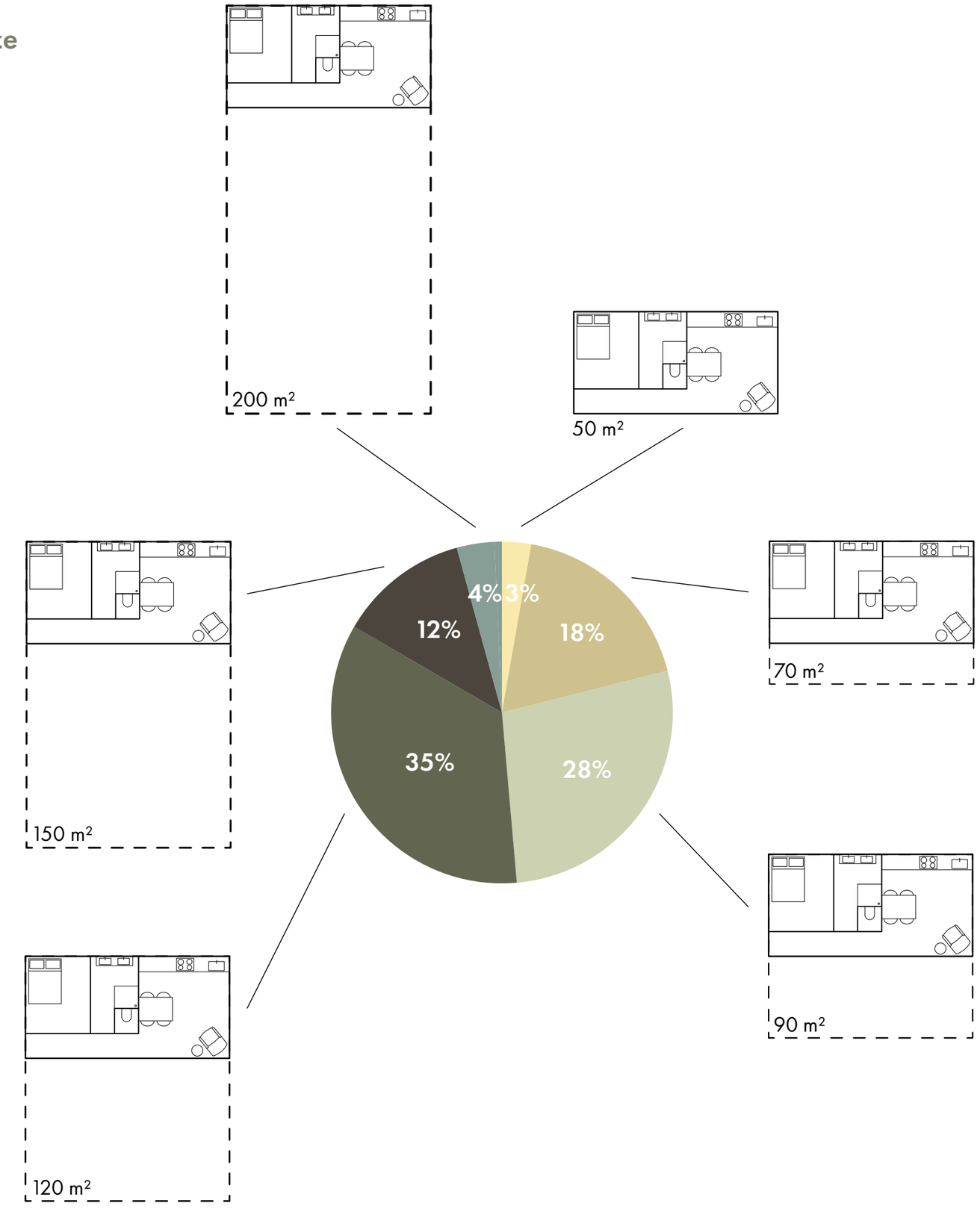

### Composition of households

- Single-person household
- Couples without children
- Single-parent families
- Two-parent families

*Source data: https://www.kaw.nl/wp-content/uploads/2020/06/KAW_RUIMTE_ZAT20200623.pdf*

# Boerhaavewijk

## Mismatch between household size & dwelling size




### Size of dwellings: Boerhaavewijk

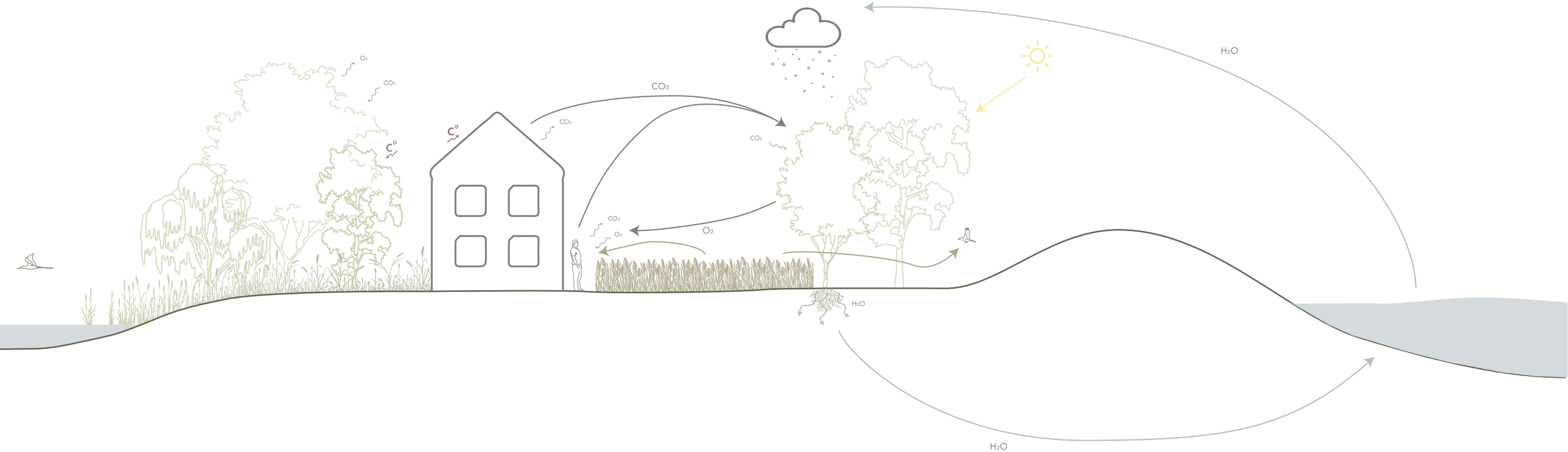
- 0 - 50 m²
- 50 - 70 m²
- 70 - 90 m²
- 90 - 120 m²
- 120 -150 m²
- > 150 m²

*Source data: https://syswov.datawonen.nl//jive*

# RESEARCH

# Ecosystem services

## Imbalance between supply and demand in the city



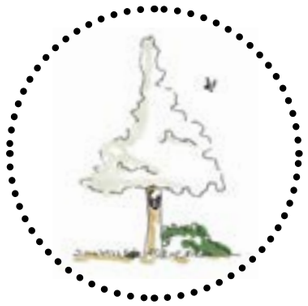
# Ecosystem services

## Imbalance between supply and demand in the city

# Ecosystem services

## Categorization of urban ecosystem services

### SUPPORTING SERVICES



**Provision of habitats**

### PROVISIONING SERVICES

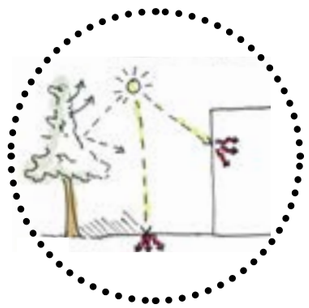
**Food supply**

**Fresh water**

**Raw materials**

### REGULATING SERVICES

**Moderation of climate extremes**



**Urban temperature regulation**

**Carbon sequestration**

**Air quality regulation**

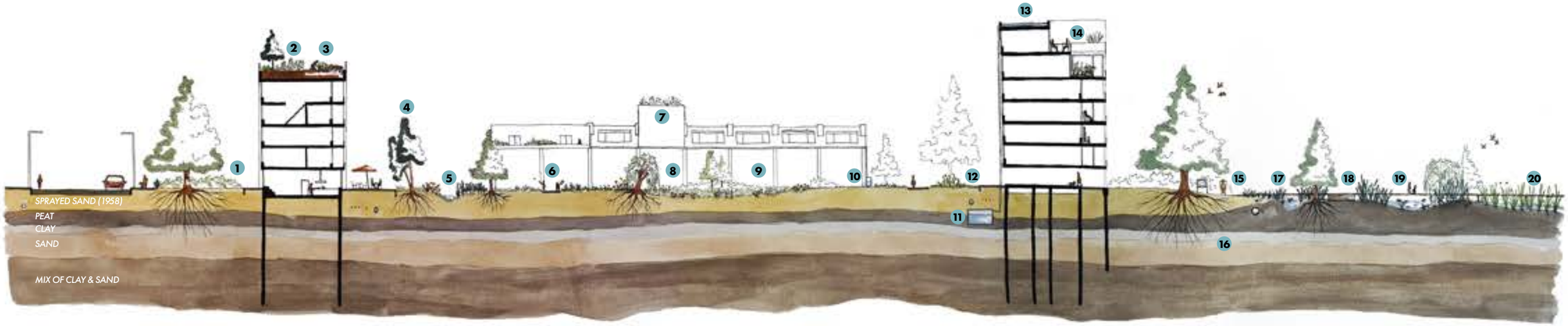
### CULTURAL SERVICES

**Sense of place and social cohesion**

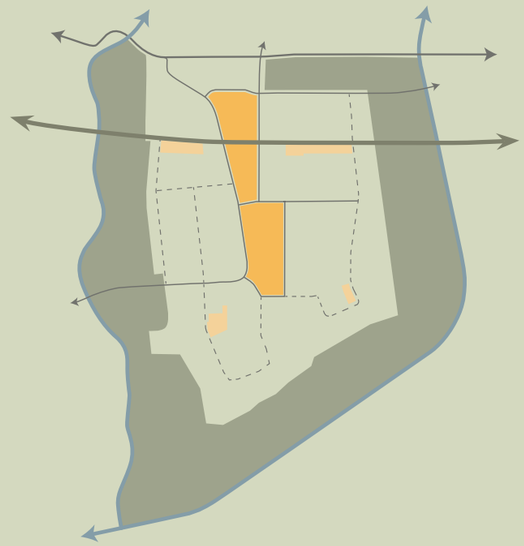
**Recreation**

# Ecosystem services

## Implementation in Boerhaavewijk



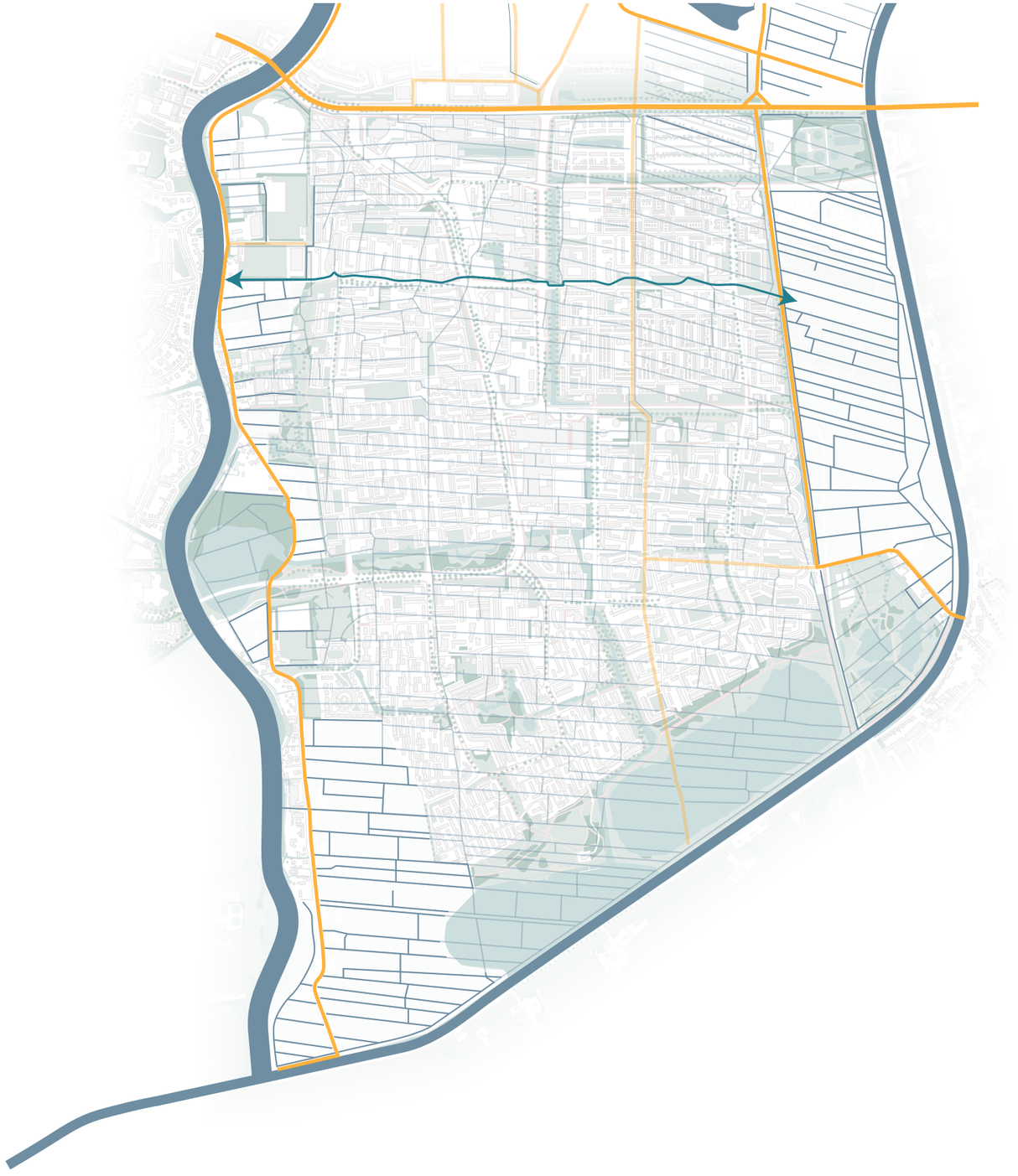

1. Extension of urban green infrastructure near roads
2. Rooftop garden
3. Edible green roof
4. Tree canopy
5. Swale
6. Walkways through urban park
7. Adding greenery to building stock
8. Extension of urban green infrastructure
9. Constructed wetland
10. Water storage
11. Rainwater use system
12. Replacement of paved areas by vegetation
13. Water roof
14. Vegetated outdoor private space
15. Accomodation and nesting facilities for animals
16. Root system
17. Elevation of water table
18. Diversity of micro climates
19. Heightened pathway through peat meadow landscape
20. Production of raw materials



# DESIGN NEIGHBORHOOD

# Schalkwijk

## Connecting the remaining peat meadow landscapes



# Schalkwijk

## Connecting the remaining peat meadow landscapes

# Schalkwijk

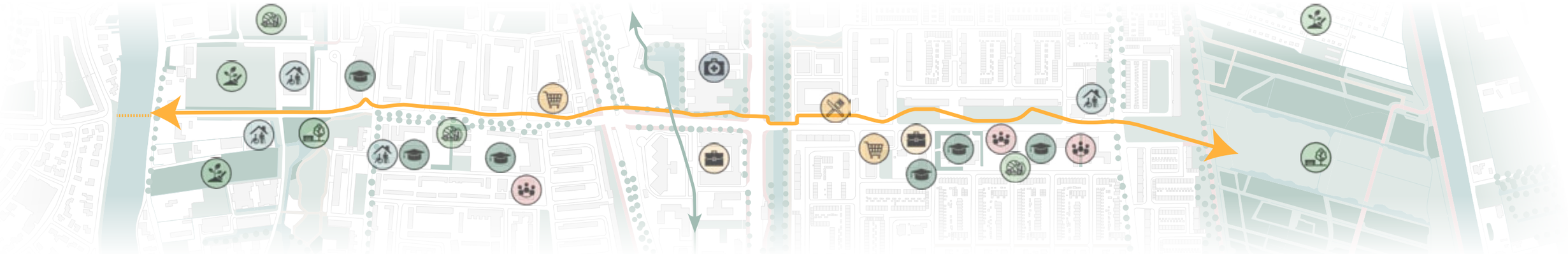
## Connecting the remaining peat meadow landscapes

# Schalkwijk

## Connecting the remaining peat meadow landscapes

# Schalkwijk

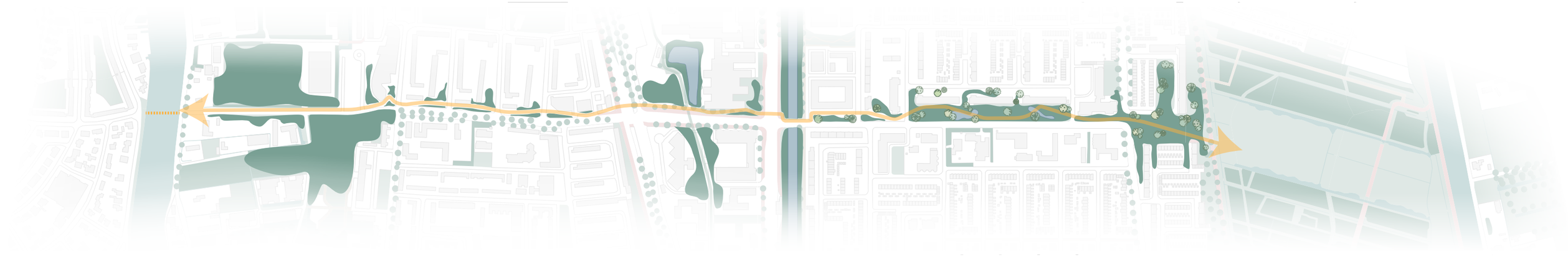
## Amenities



- Catered and assisted living
- Healthcare
- Retail and horeca
- Office
- Education and day/after school care
- Sports and recreation
- Community center and religious meeting place

# Ecological corridor

## Urban green and blue infrastructure

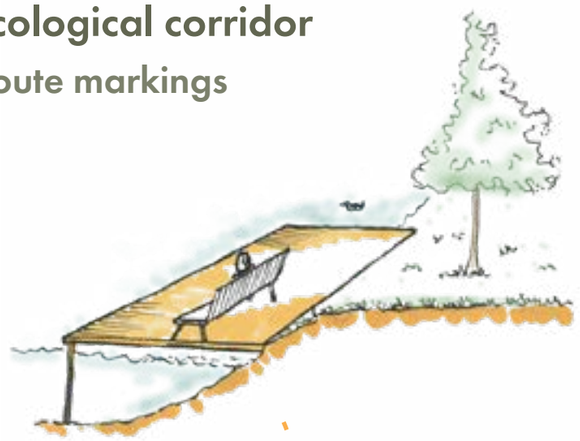


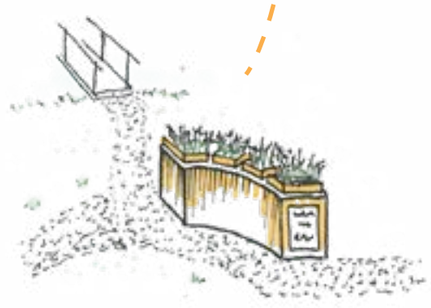
# Ecological corridor

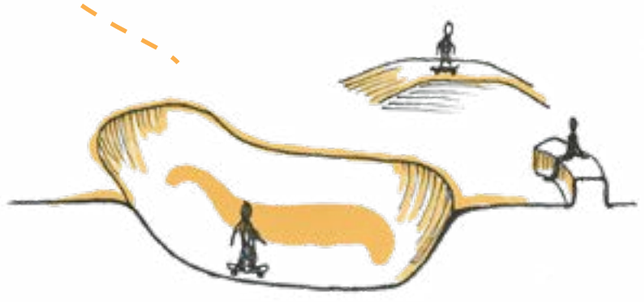
## Route markings

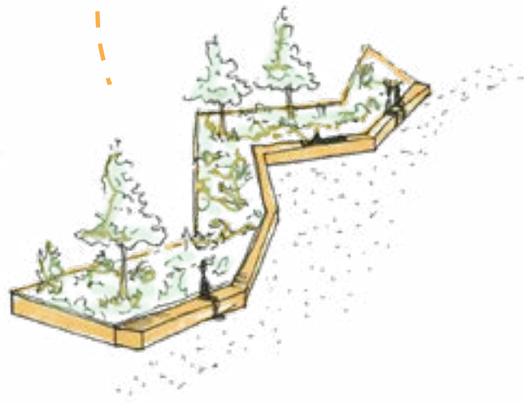
# Ecological corridor

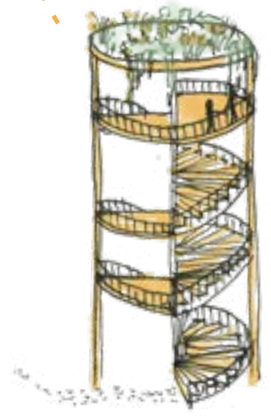
## Route markings











# Ecological corridor

## Isometric Boerhaavewijk

# Ecological corridor

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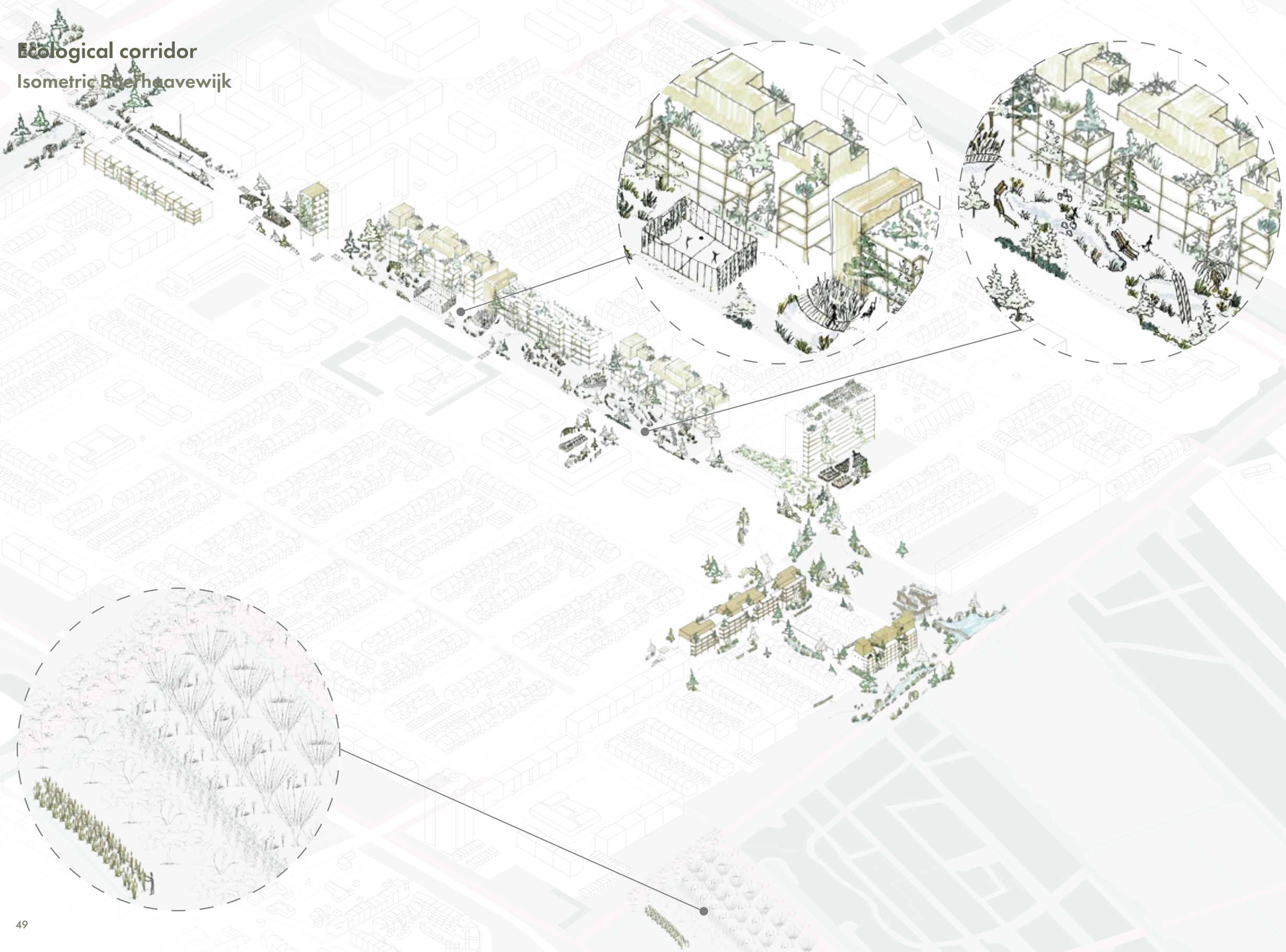
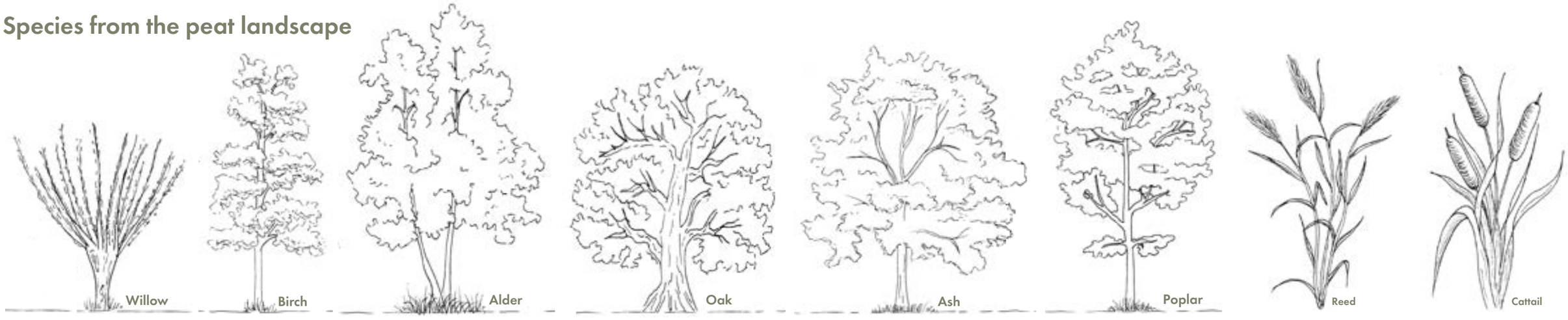
# Ecological corridor

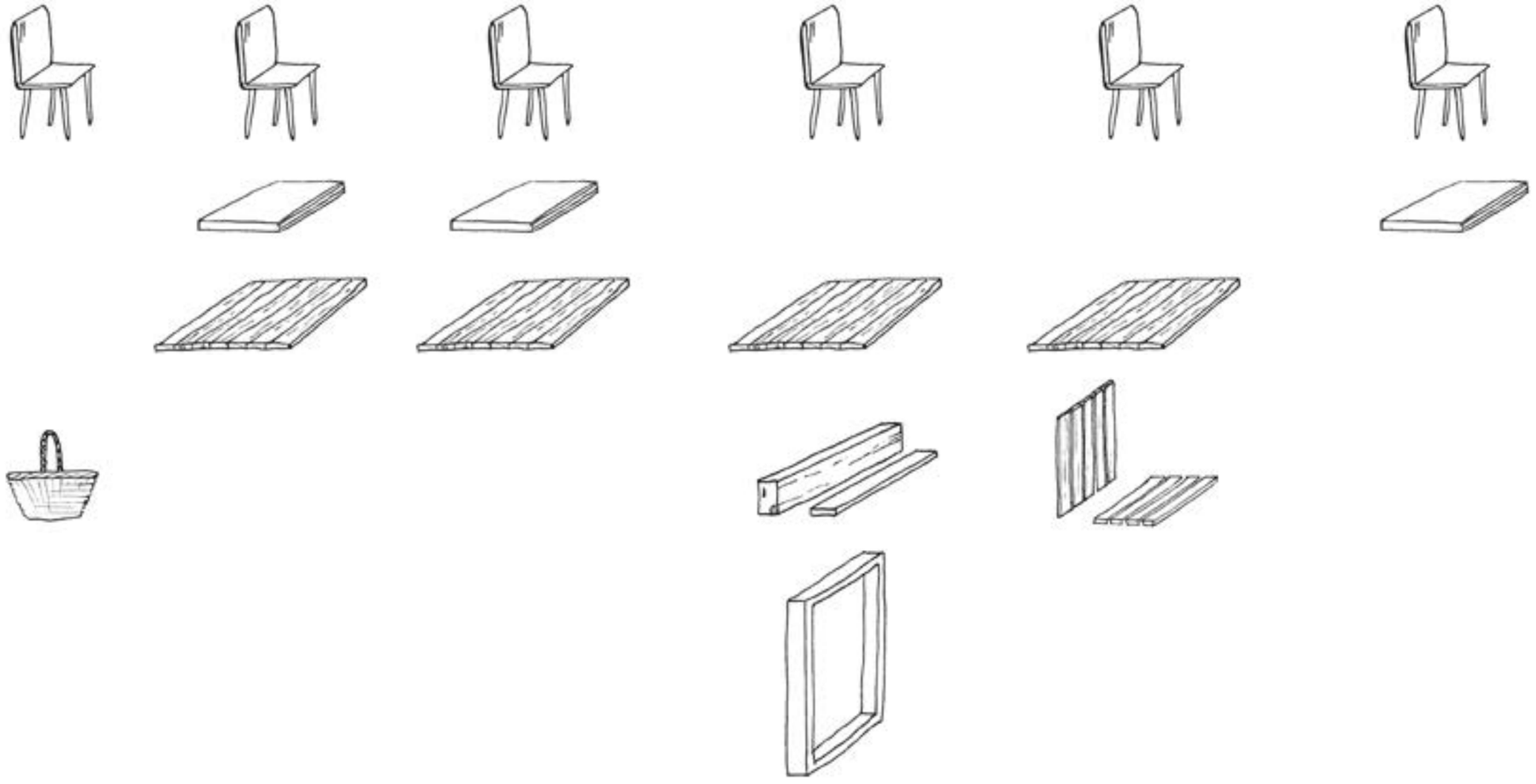
## Isometric Boerhaavewijk

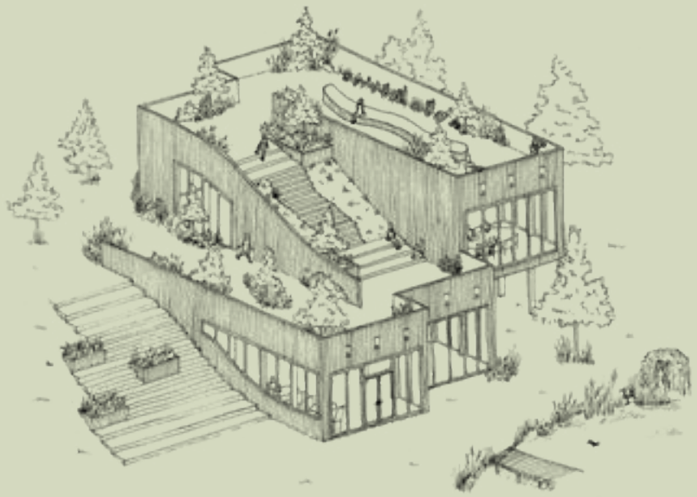


# Production of raw materials: biobased materials

## Species from the peat landscape



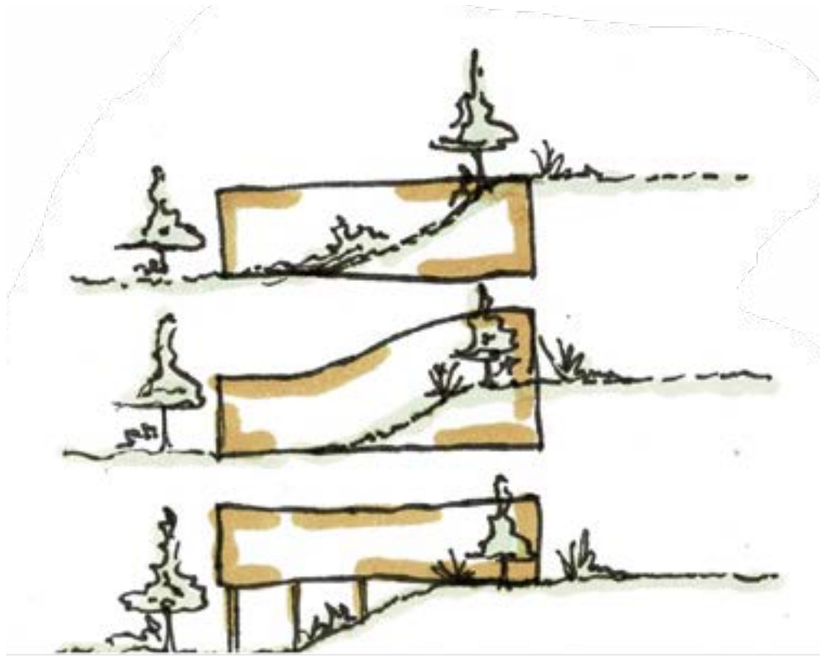





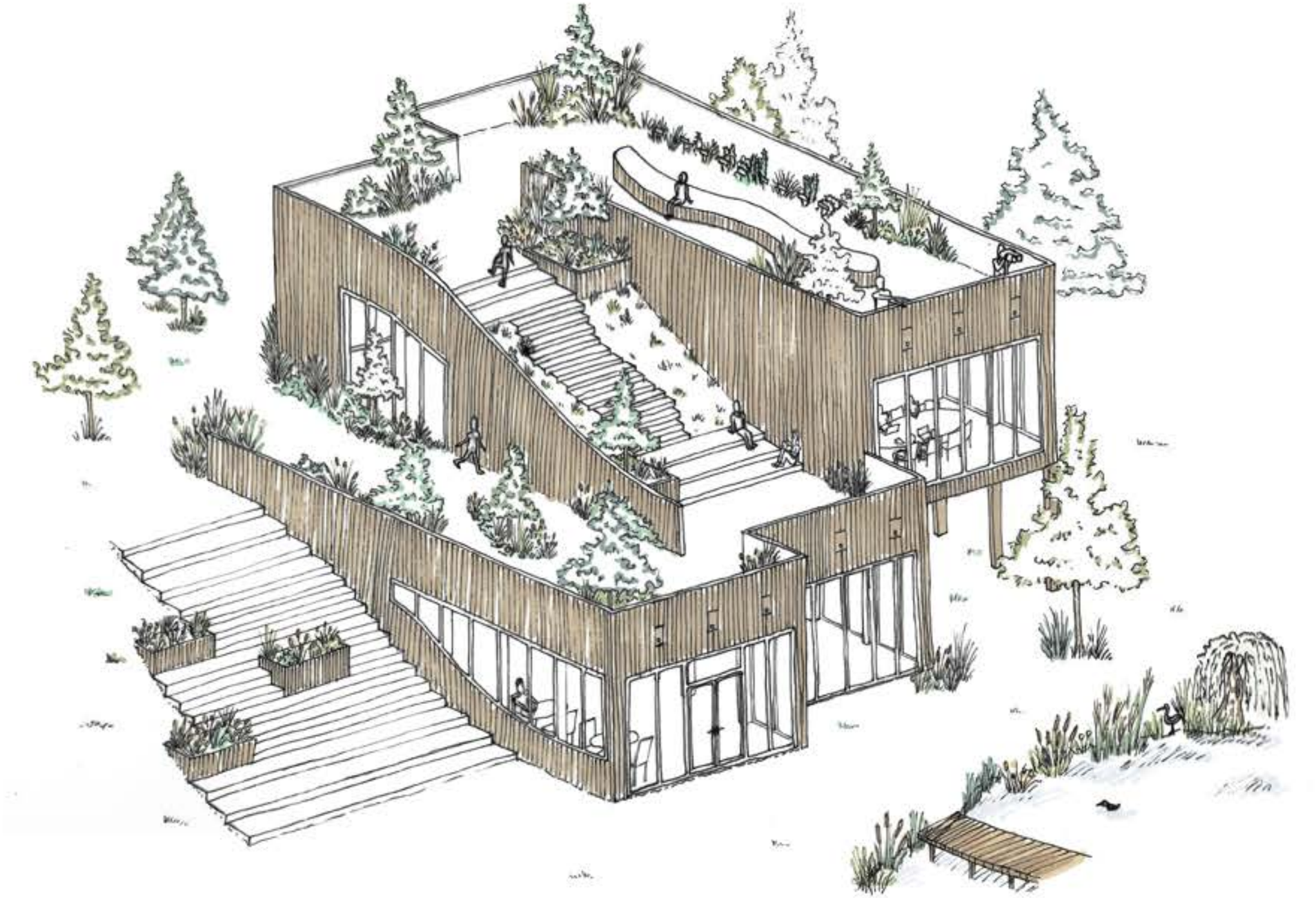
# DESIGN
# PAVILION

# Pavilion

## Ecosystem services



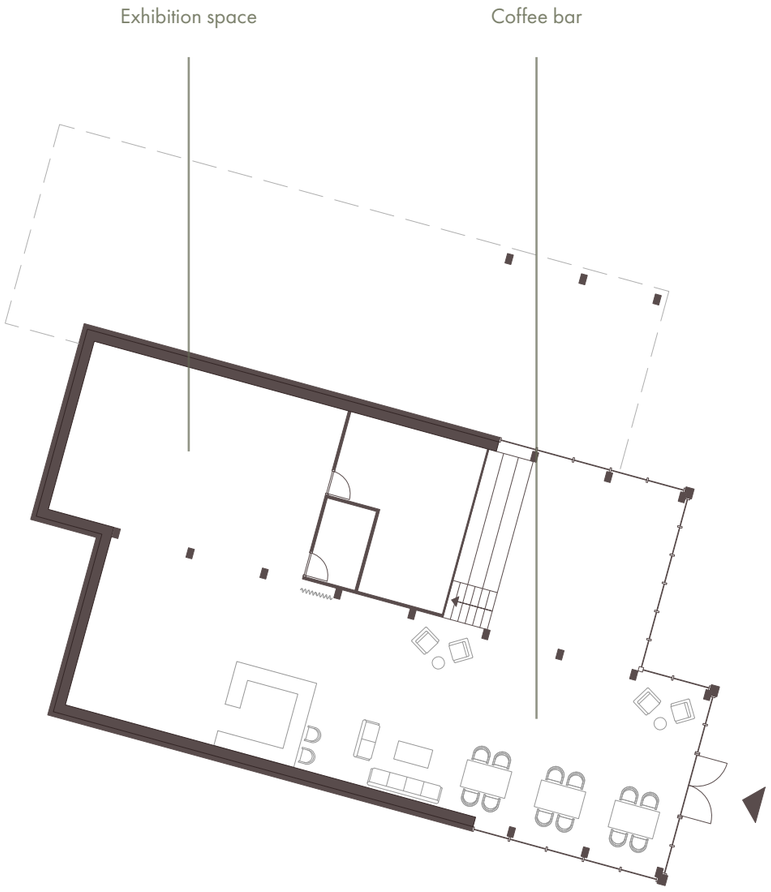
# Pavilion



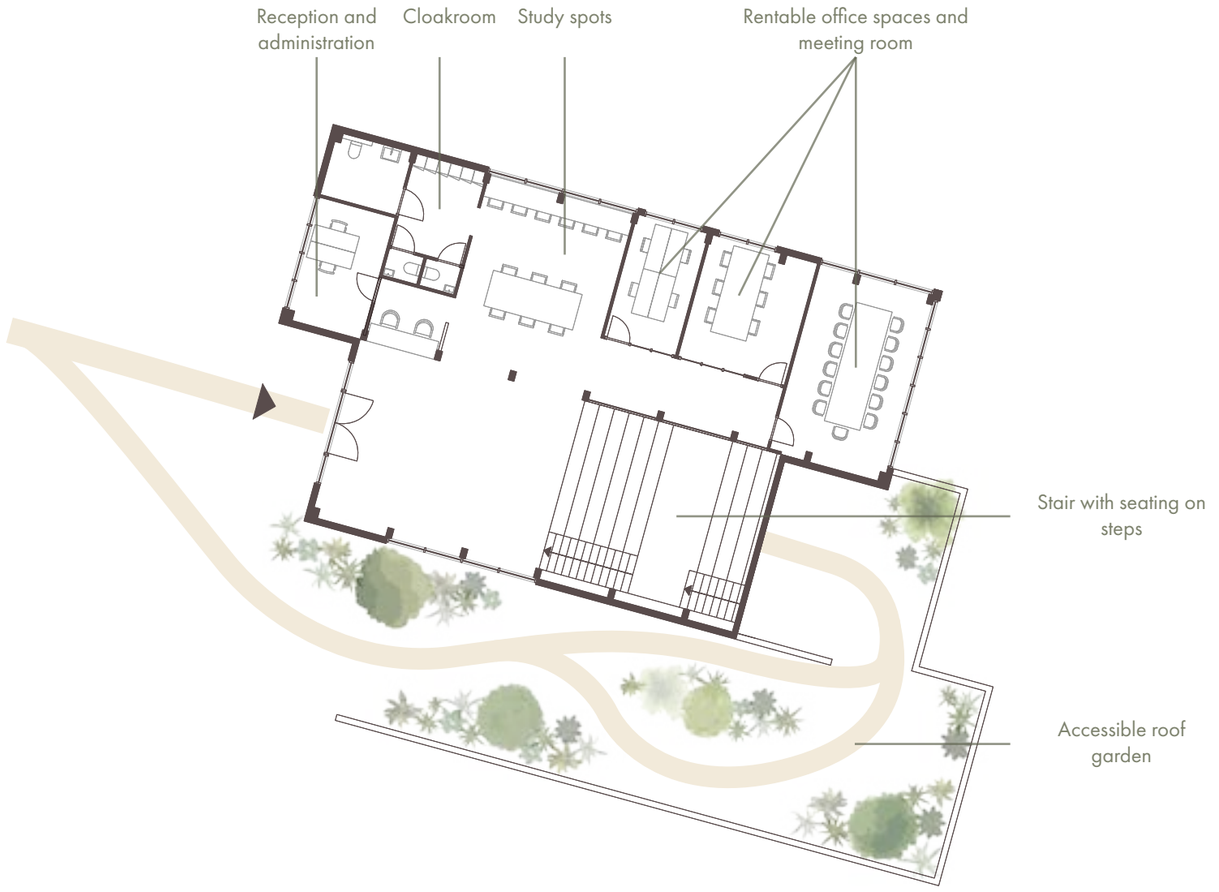
# Pavilion

## Floor plans

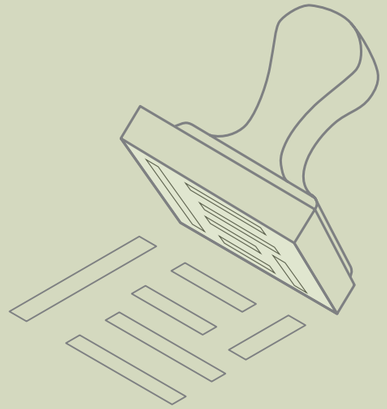
*1:200*




**Pavilion - level -1**




**Pavilion - level 0**



# DESIGN STAMP

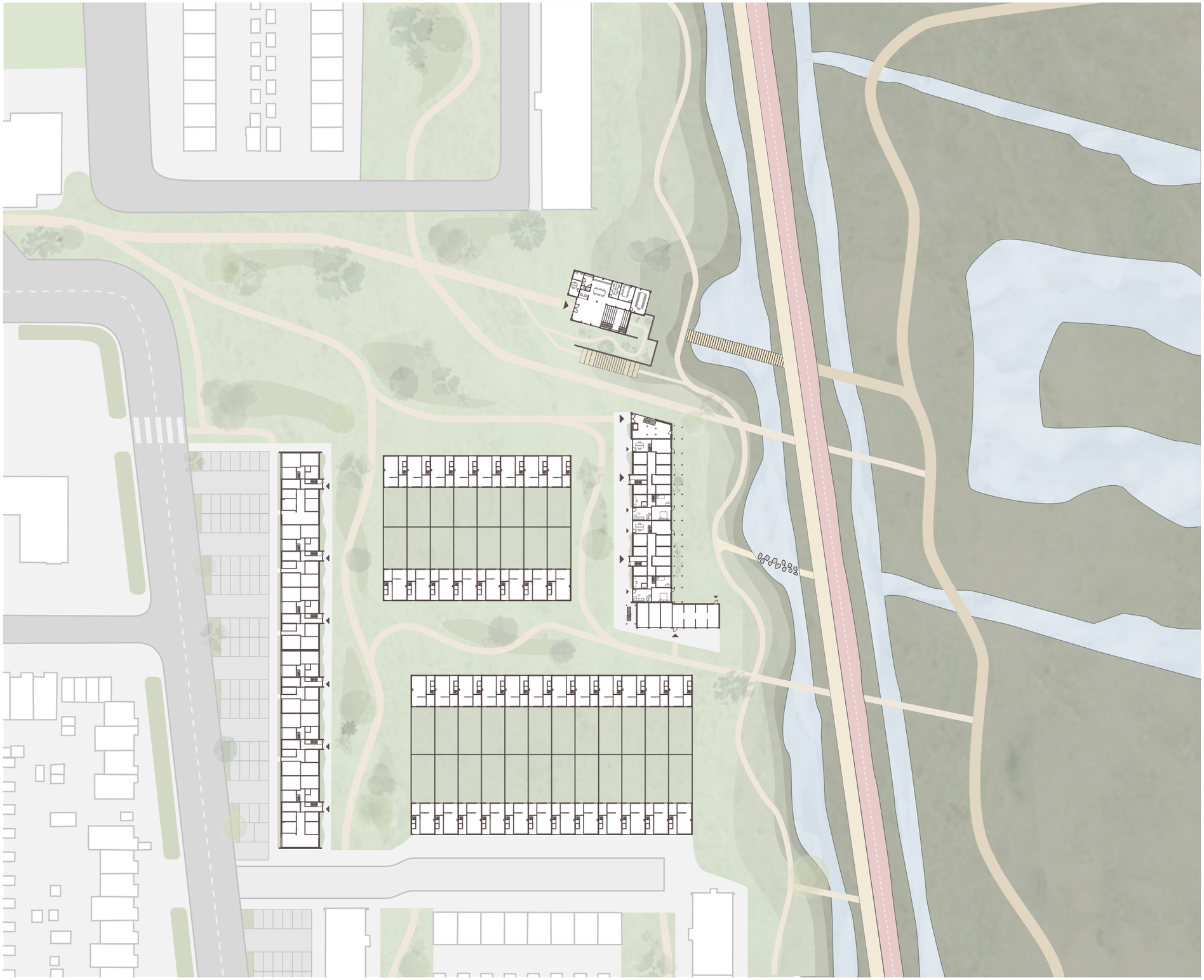
## Existing site

## Proposed project site

# Urban plan

## Stamp

*1:800*

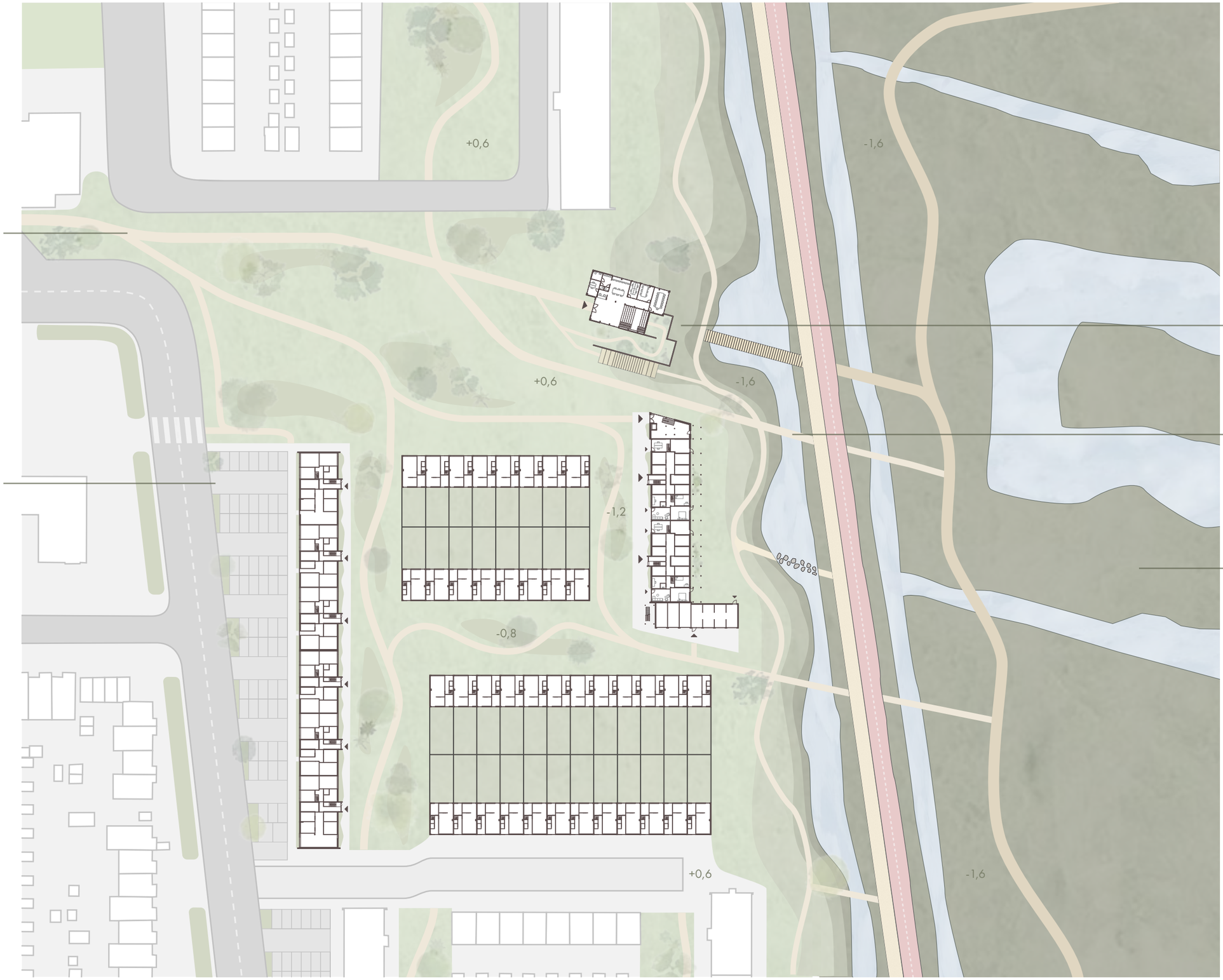


N

# Urban plan

## Stamp

*1:800*




Continuous ecological corridor

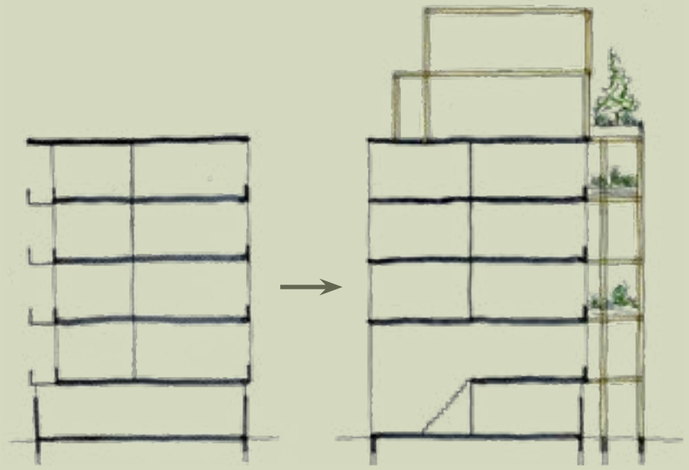
Parking moved towards main road

Pavilion responds to polder landstructure and height of the landscape

Clear access and connection to landscape

Recreational forrest and peat meadow landscape

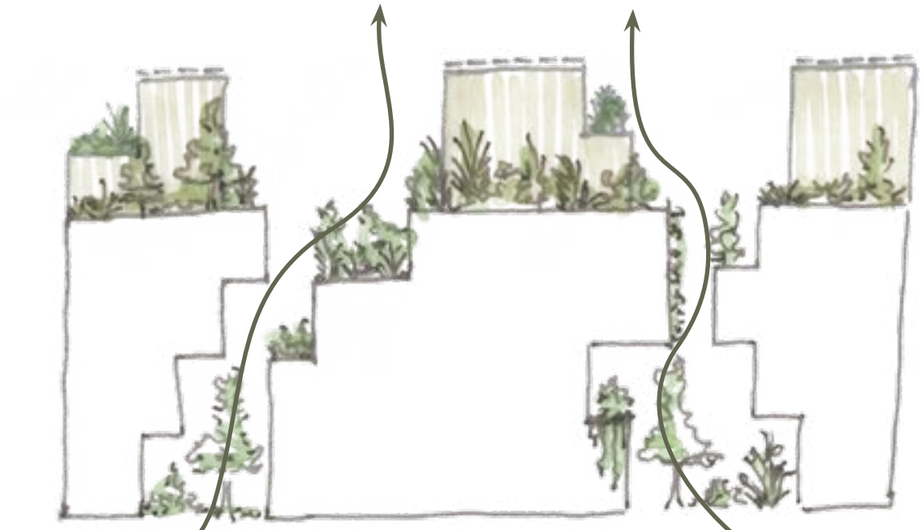
N



# DESIGN
# BUILDING

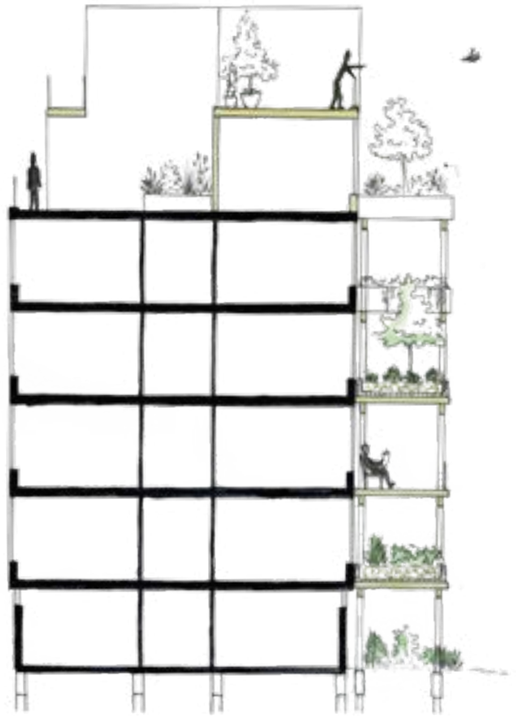
# Concept

## Connecting greenery



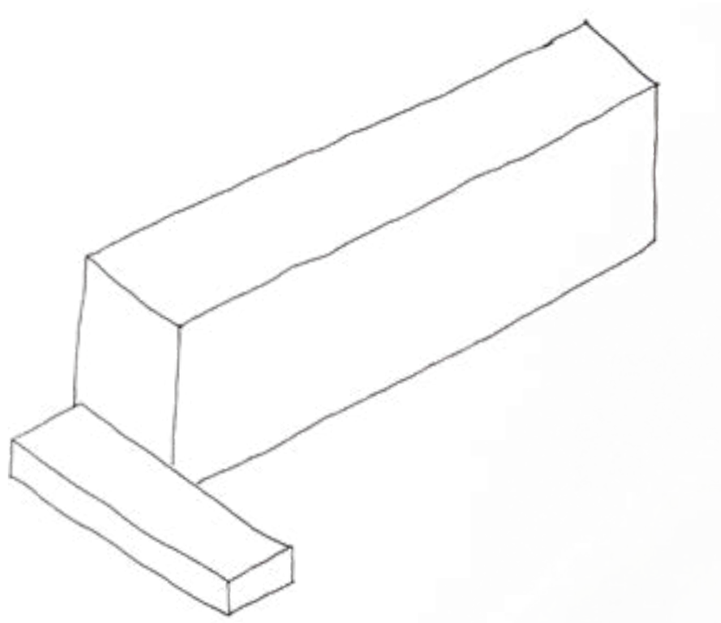
## Concept

### Greenery on multiple levels



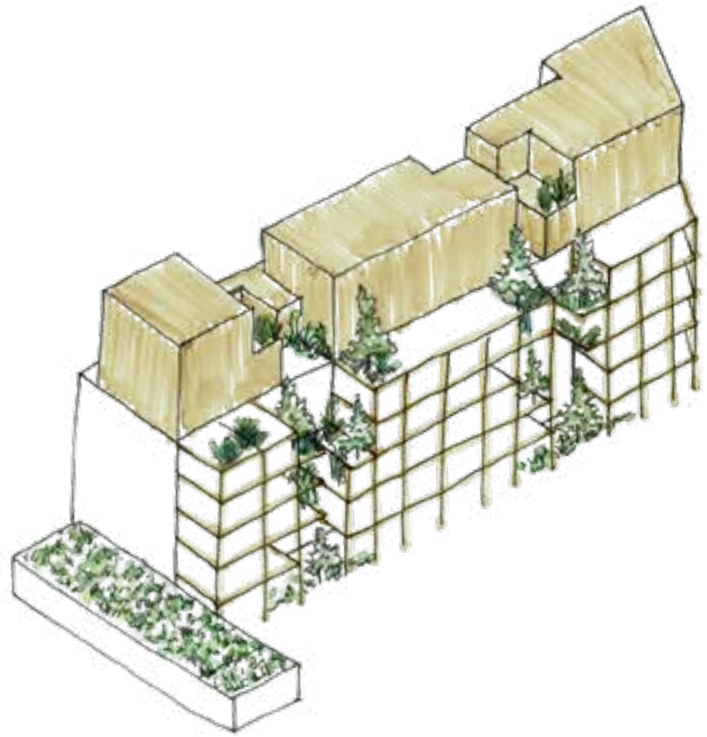
# Concept

## Existing situation



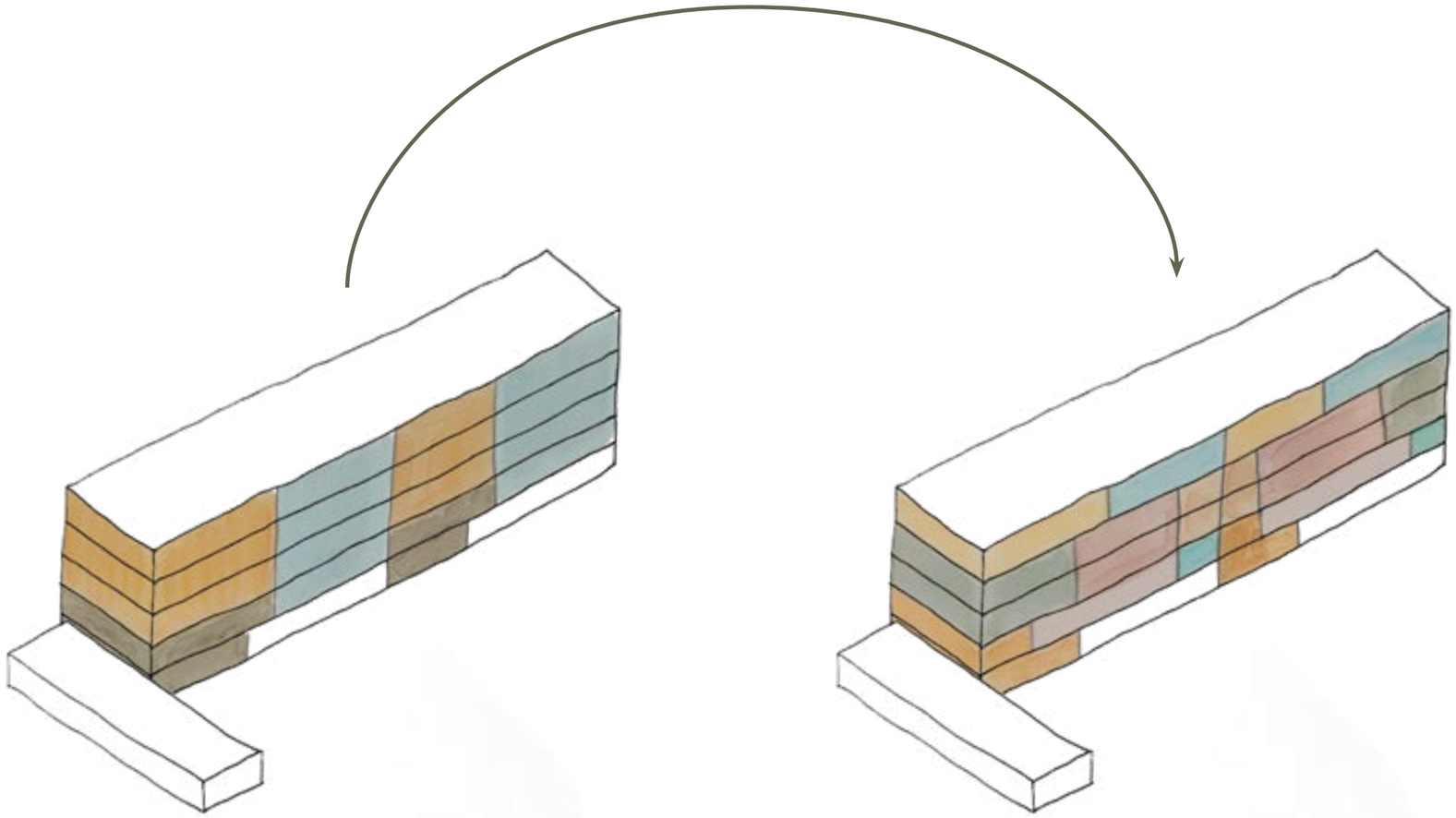
## Concept

### Additional floors and outdoor spaces



## Concept

### Diversification of appartments



# Ground floor

## Existing and new floor plan

*1:200*


### Apartment type

- Loft - 1-bedroom apartment
- Loft - 3-bedroom apartment
- 7-bedroom apartment - 2 floors
- Storage
- Transition spaces

# First floor

## Existing and new floor plan

*1:200*

Existing situation

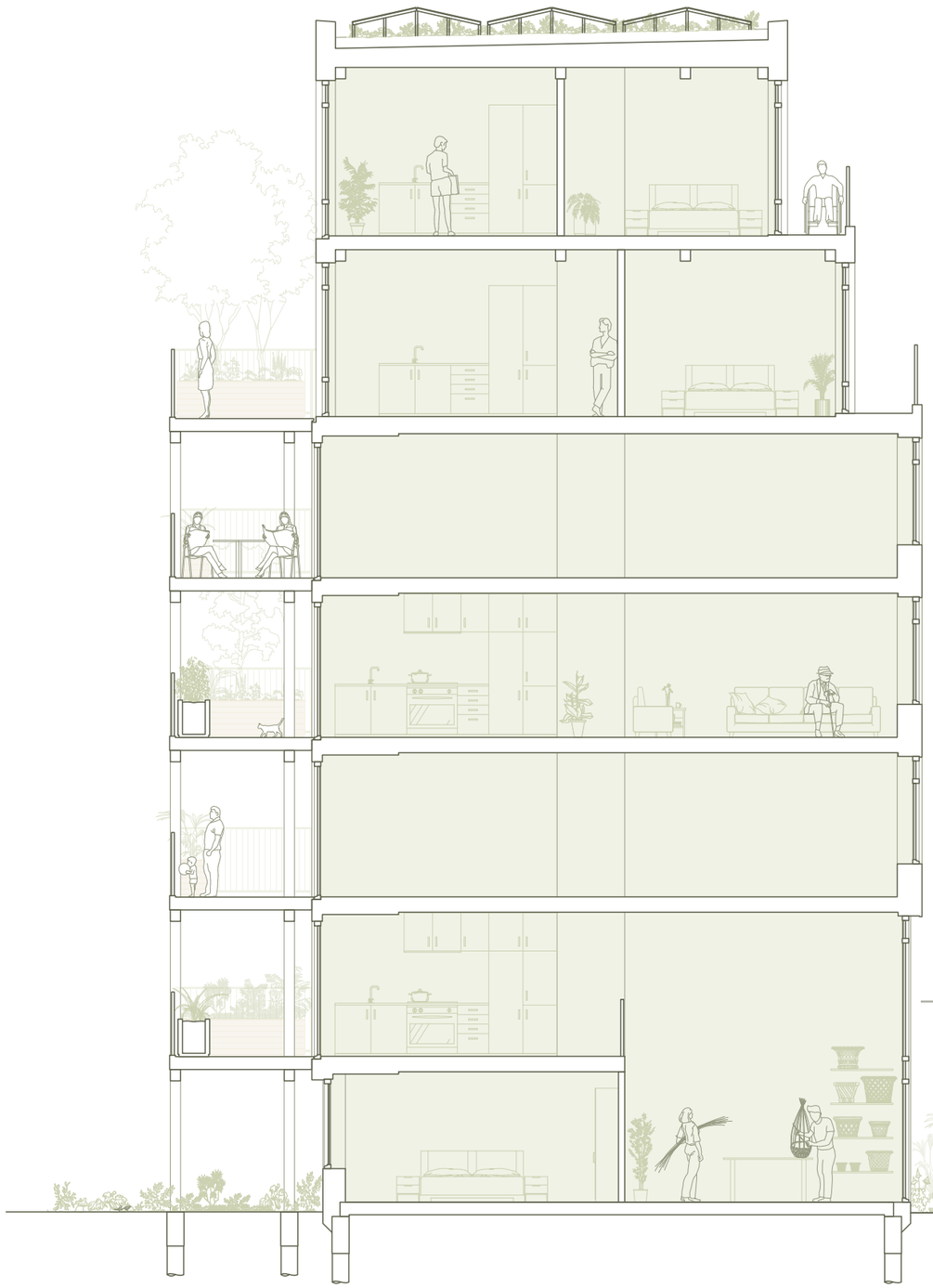

### Apartment type

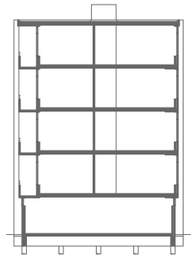
- Loft - 1-bedroom apartment
- Loft - 3-bedroom apartment
- 2-bedroom apartment
- 4-bedroom apartment
- 7-bedroom apartment - 2 floors
- Storage
- Transition spaces

# Loft apartments

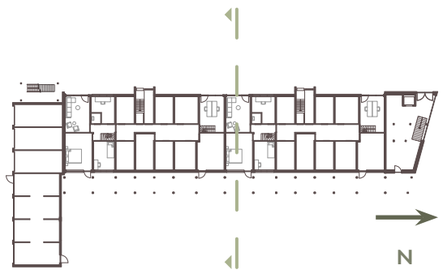
## Section

*1:100*



Existing section



## Impression

# Second & third floor

## Existing and new floor plan

*1:200*

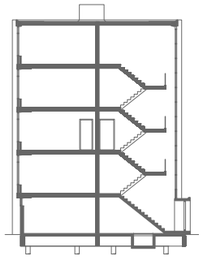

### Apartment type

- 1-bedroom apartment
- 2-bedroom apartment
- 3-bedroom apartment
- 4-bedroom apartment
- Storage
- Transition spaces

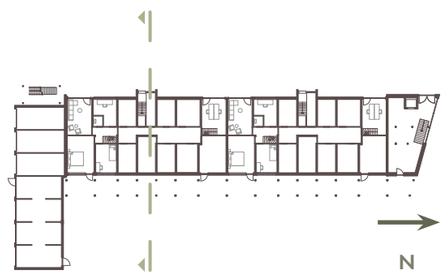
# Access

## Section

*1:100*



Existing section

# Fourth floor

## Existing and new floor plan

*1:200*

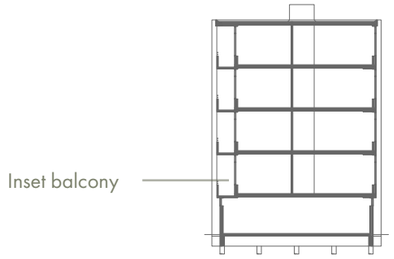

### Apartment type

- 3-bedroom apartment
- 4-bedroom apartment
- 3-bedroom apartment
- 4-bedroom apartment
- Storage
- Transition spaces

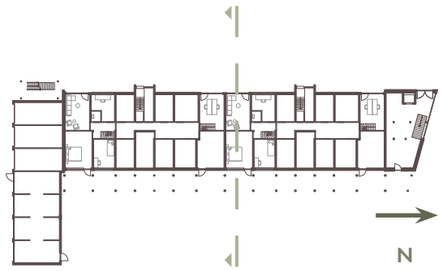
# Outdoor spaces

## Section

*1:100*


**Existing section**



# Floor plans

## Variation within existing portico flat

Existing situation

2x

135 m²

New situation

2x

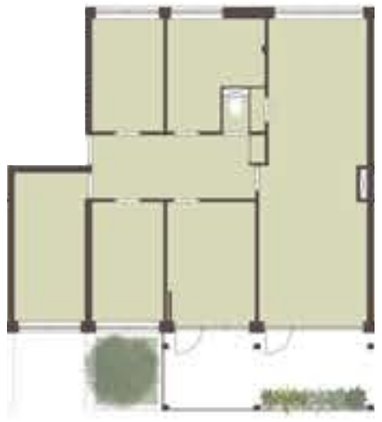
60 m²

2x

100 m²

8x

90 m²



2x

95 m²

2x

85 m²

4x

75 m²

6x

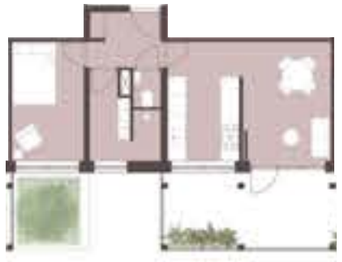
80 m²

4x

50 m²

2x

50 m²



4x

40 m²

# Top-up

## Floor plans

*1:200*


### Apartment type

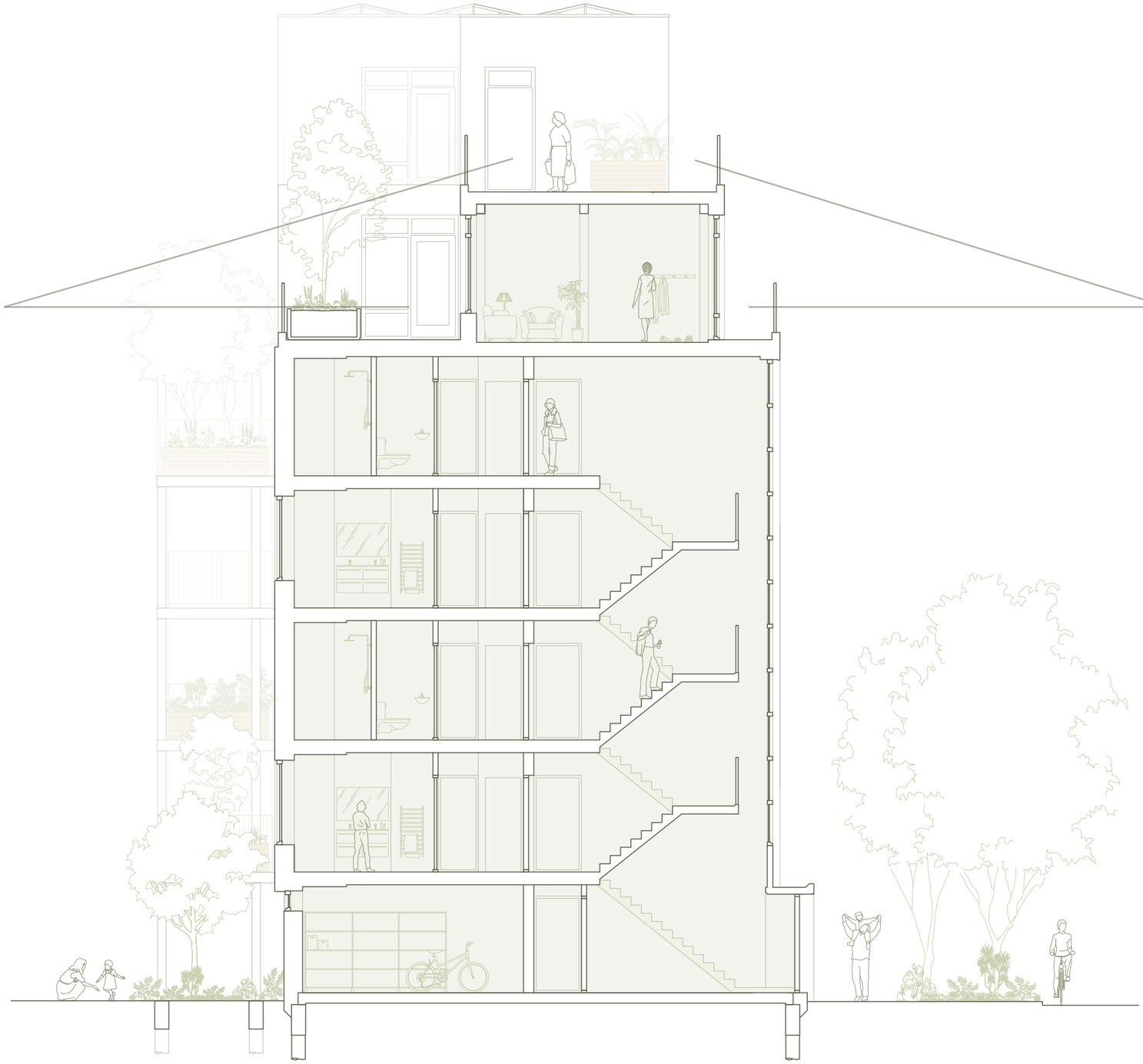
- 1-bedroom apartment
- 2-bedroom apartment
- Storage
- Transition spaces

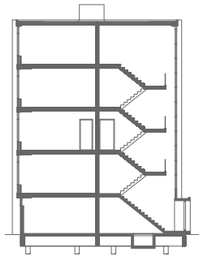
N

# Access

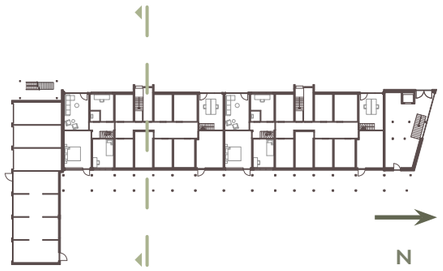
## Section

*1:100*



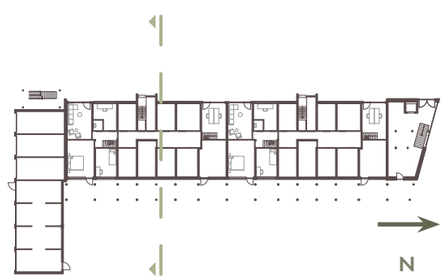
Existing section



# Technical design

## Section

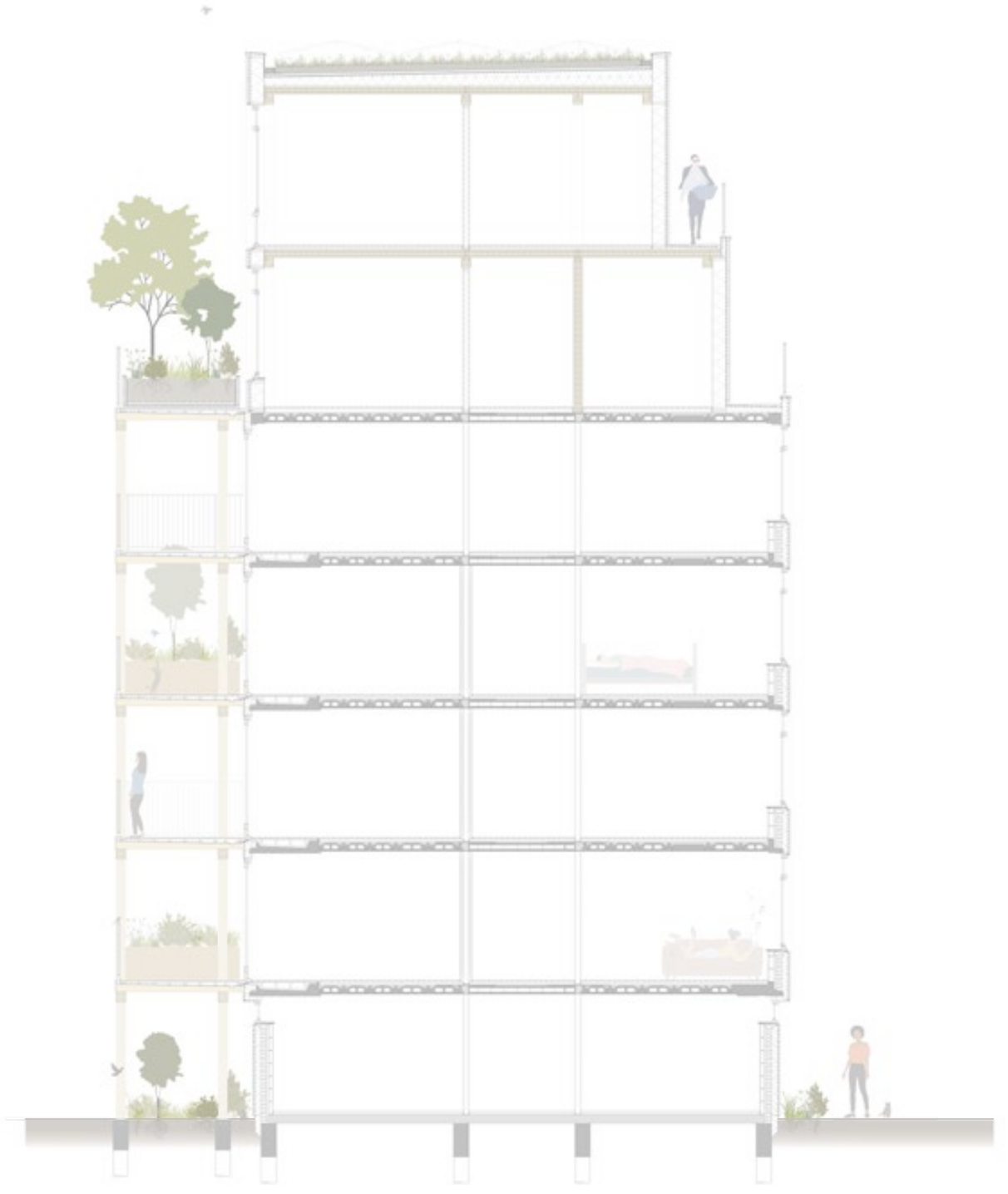
*1:20 (rescaled to 1:100)*

# Technical design

## Facade

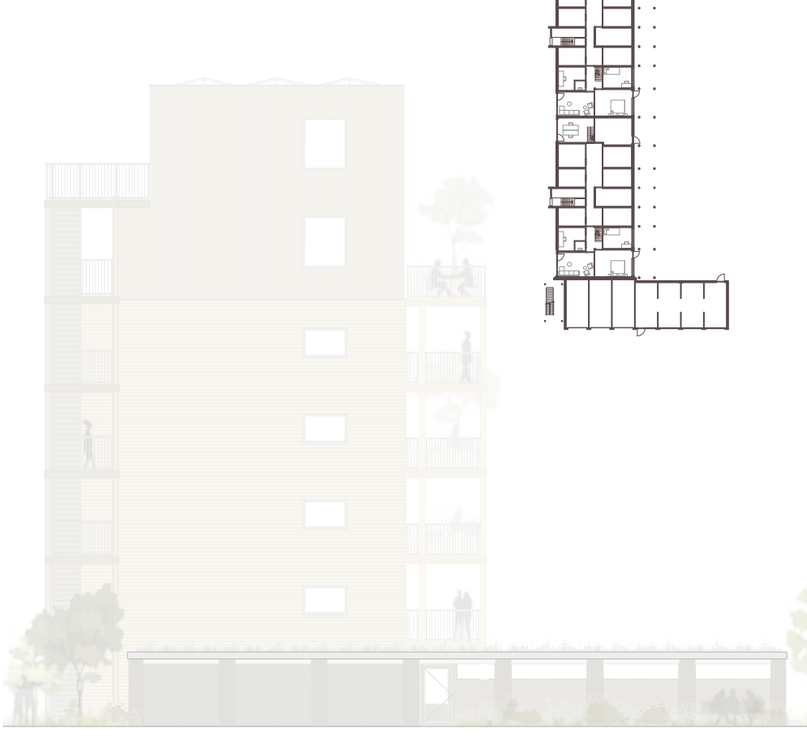
*1:20 (rescaled to 1:100)*



# Facade

## East elevation

*1:200*






East elevation

South elevation





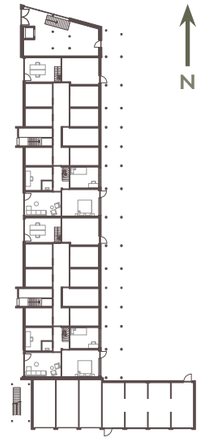
West elevation

North elevation

# Facade

## East elevation

*1:200*




East elevation



South elevation



West elevation



North elevation

# Facade

## Elevations

*1:200*

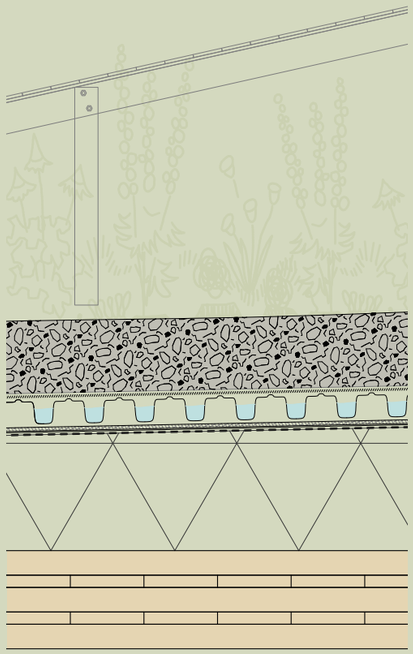
East elevation

South elevation

West elevation




North elevation

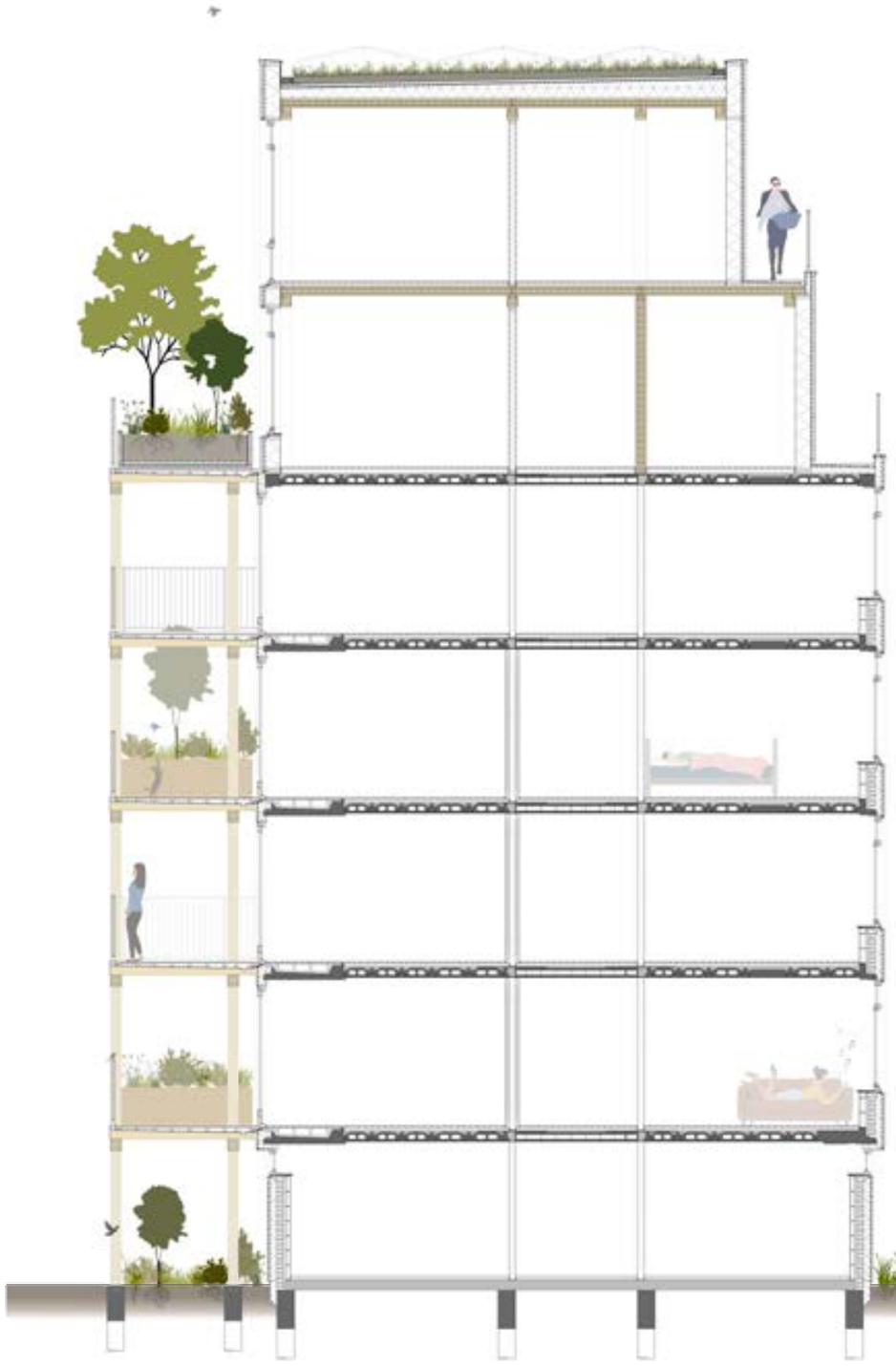


# TECHNICAL AND ECOLOGICAL ELABORATION

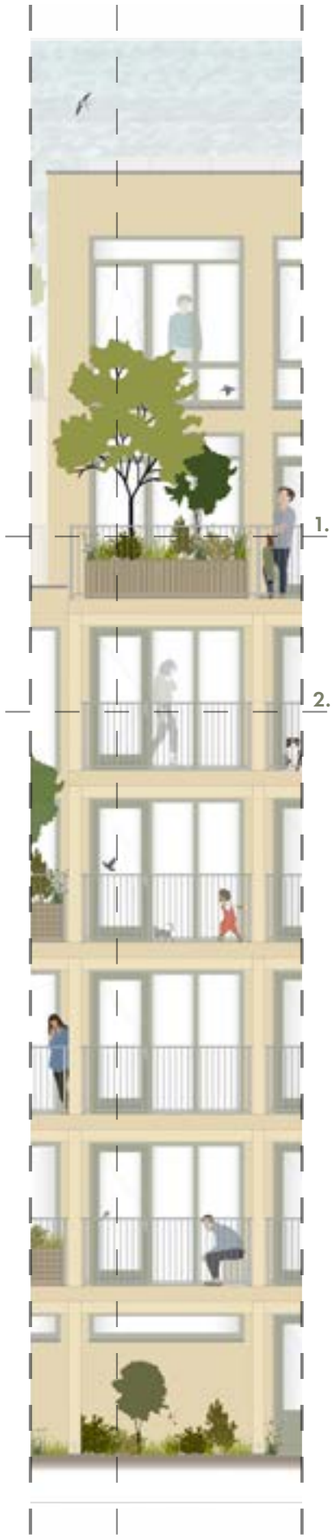
# Technical design

## Facade

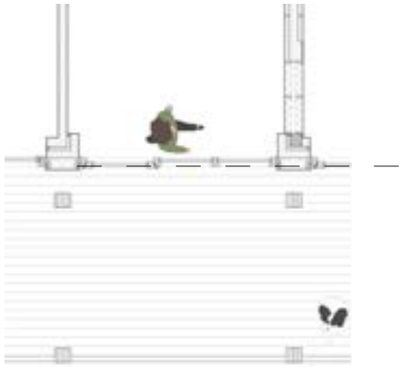
*1:20 (rescaled to 1:100)*



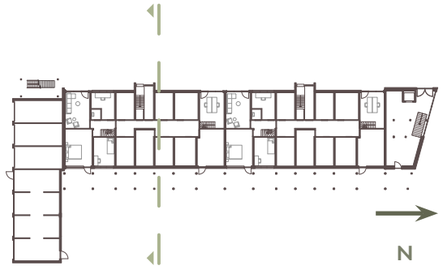
Vertical section




!. Horizontal section top-up

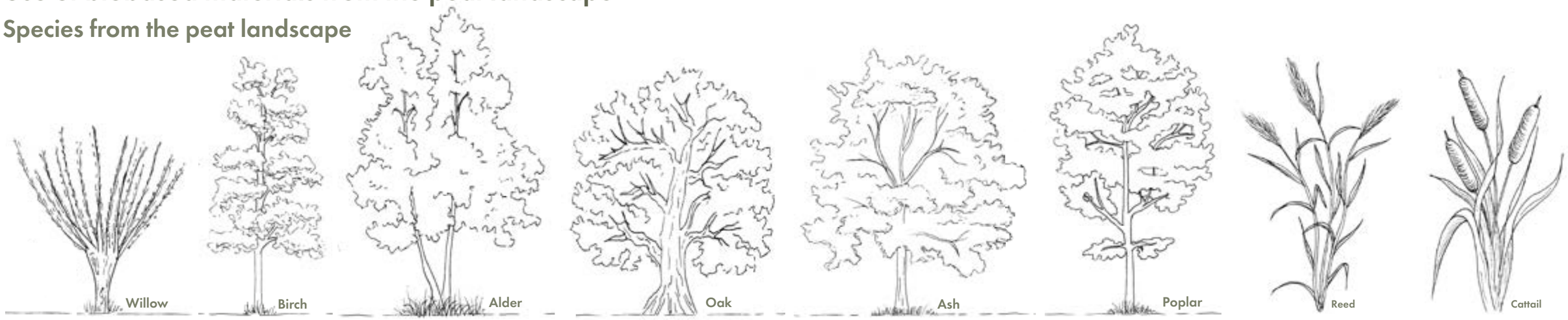


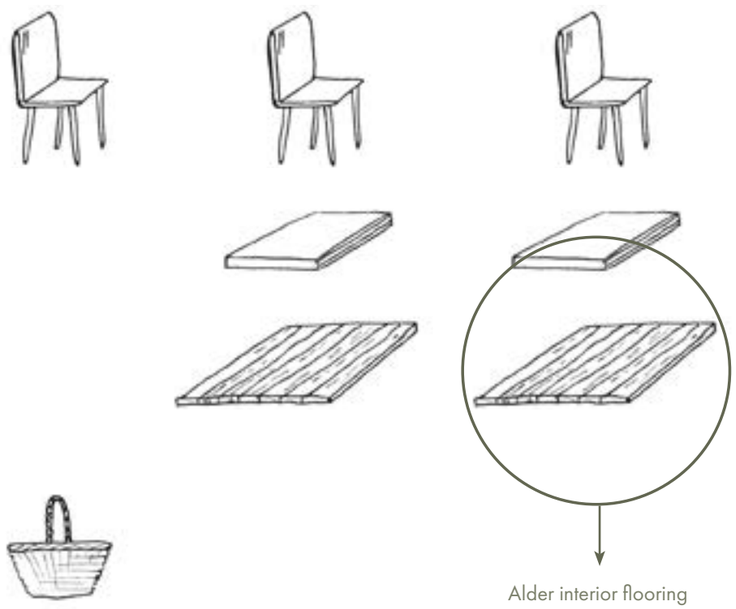
2. Horizontal section renovation



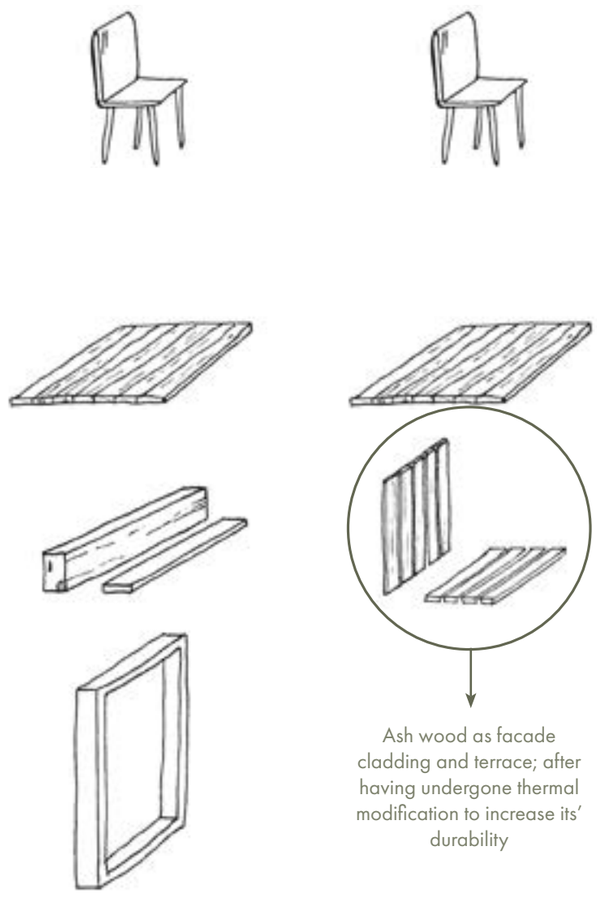
# Use of biobased materials from the peat landscape

## Species from the peat landscape

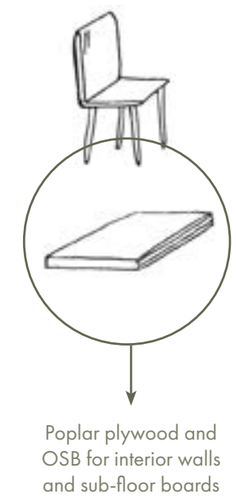


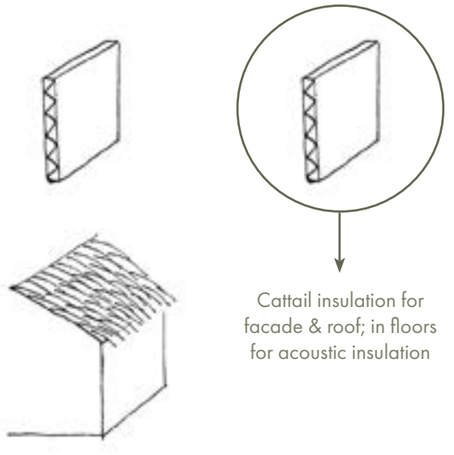
Alder interior flooring



Ash wood as facade cladding and terrace; after having undergone thermal modification to increase its' durability



Poplar plywood and OSB for interior walls and sub-floor boards



Cattail insulation for facade & roof; in floors for acoustic insulation

3 years

30 - 50 years

20 - 30 years

50 - 70 years

30 - 50 years

10 - 15 years

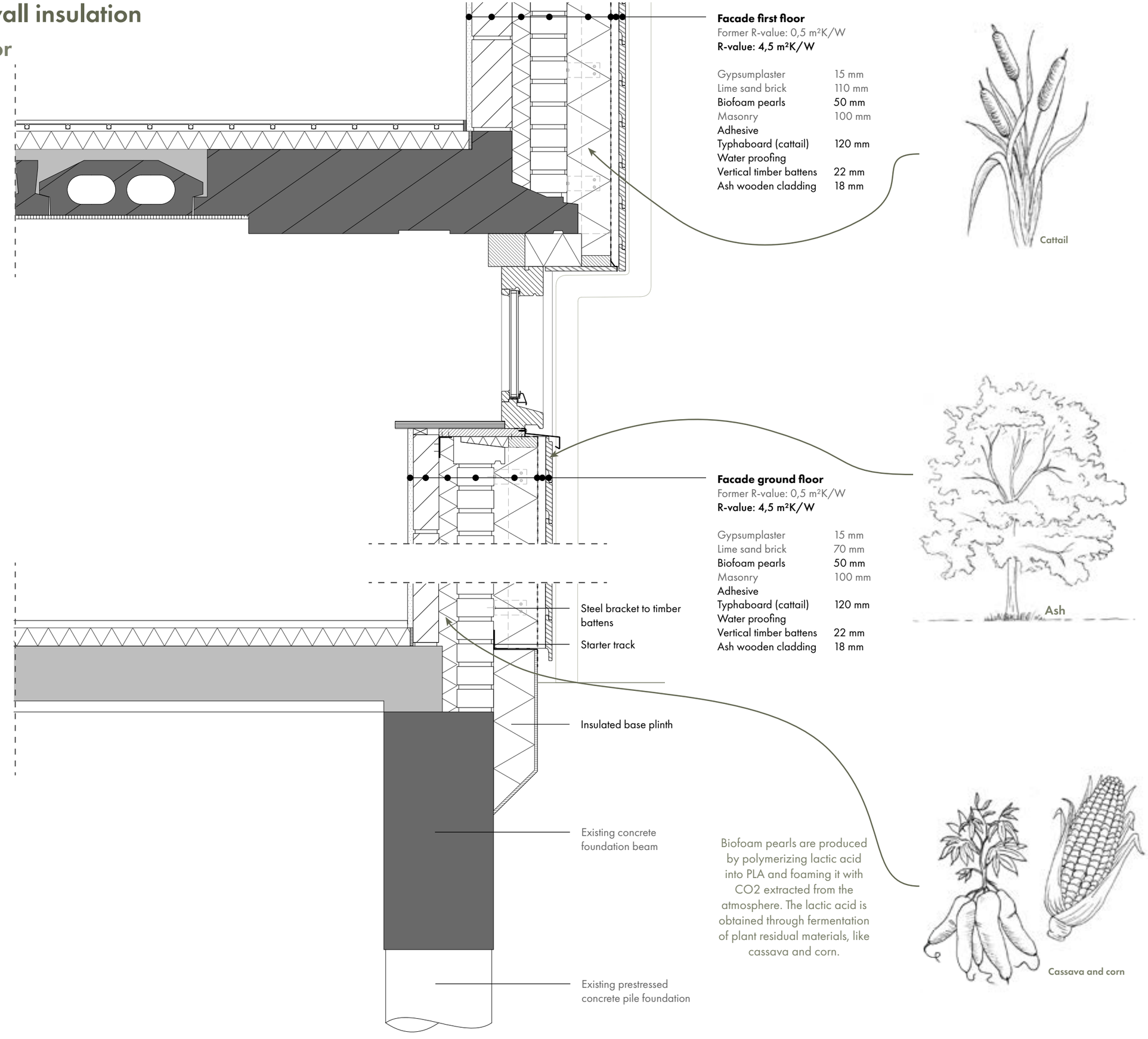
1 year

1 year

# Application of external wall insulation

## Detail foundation & first floor

*1:5 (rescaled to 1:10)*



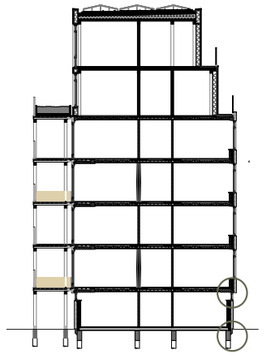


Cattail


Ash

Biofoam pearls are produced by polymerizing lactic acid into PLA and foaming it with CO2 extracted from the atmosphere. The lactic acid is obtained through fermentation of plant residual materials, like cassava and corn.

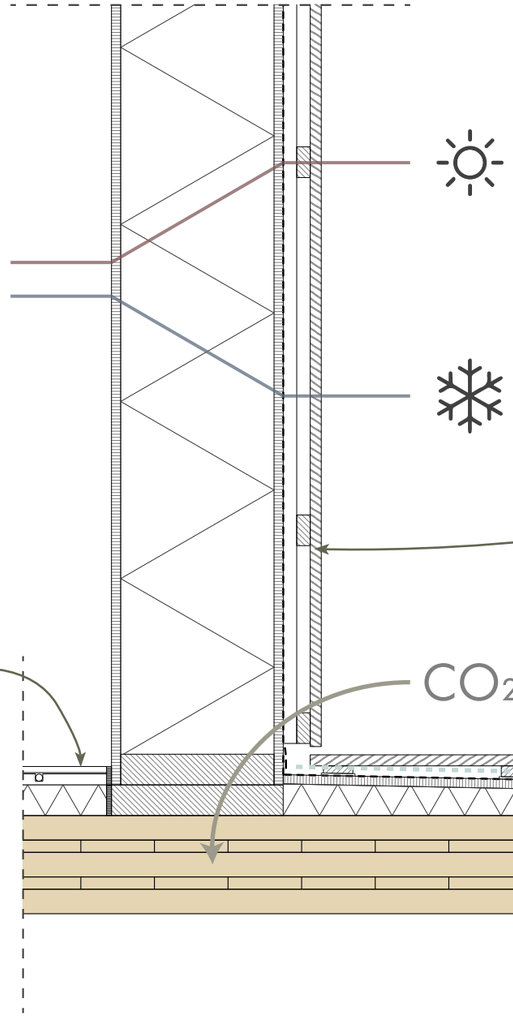

Cassava and corn



# Facade top-up

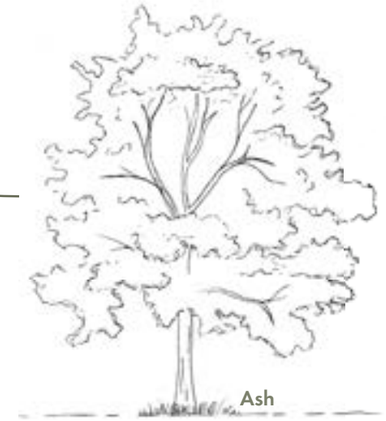
## Detail sixth floor

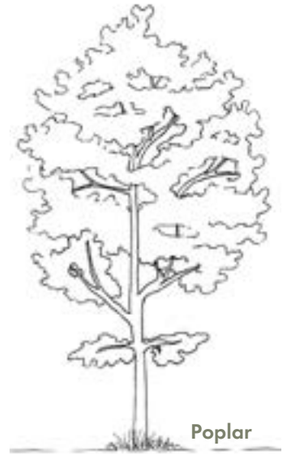
*1:5 (rescaled to 1:10)*


Biobased materials possess termperature and moisture-regulating properties and therefore create a more stable and pleasant indoor climate

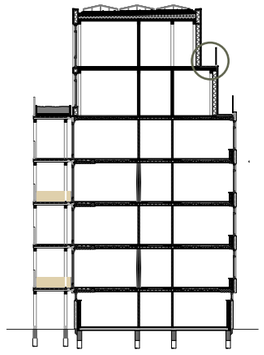
Carbon Sequestration: Biobased materials store carbon dioxide absorbed during their growth, helping to lower the overall carbon footprint of the top-up




**Facade top-up**
**R-value: 6,0 m²K/W**

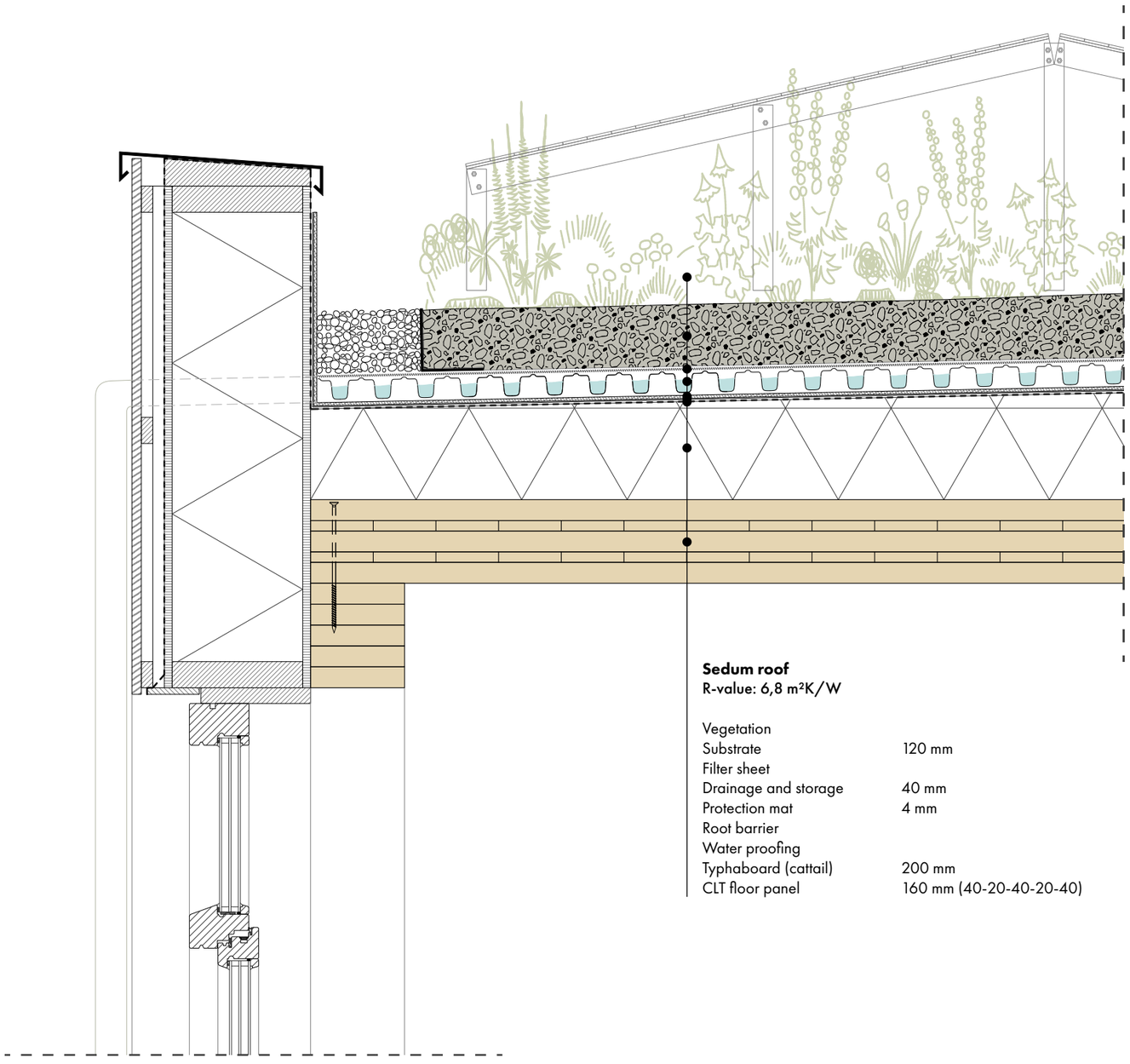
| | |
|---|---|
| OSB panel (poplar) | 15 mm |
| Typhaboard (cattail) | 250 mm |
| OSB panel (poplar) | 15 mm |
| Water proofing | |
| Vertical timber battens | 22 mm |
| Horizontal timber battens | 22 mm |
| Ash wooden cladding | 18 mm |



# Roof top-up

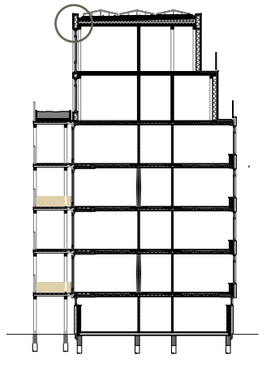
## Detail roof

*1:5 (rescaled to 1:10)*



**Sedum roof**
**R-value: 6,8 m²K/W**

| | |
|---|---|
| Vegetation | |
| Substrate | 120 mm |
| Filter sheet | |
| Drainage and storage | 40 mm |
| Protection mat | 4 mm |
| Root barrier | |
| Water proofing | |
| Typhaboard (cattail) | 200 mm |
| CLT floor panel | 160 mm (40-20-40-20-40) |



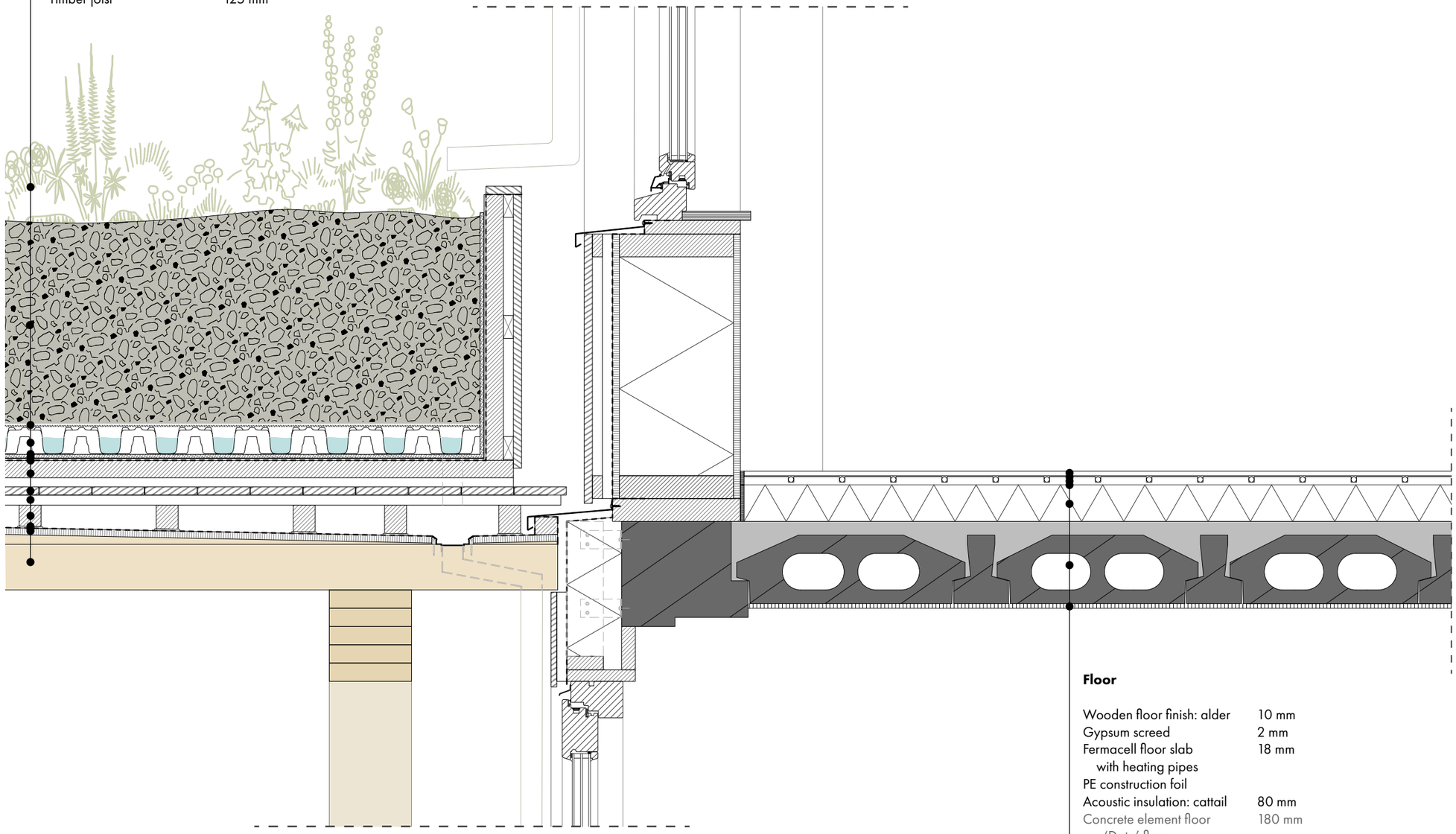
# Balconies & vegetation

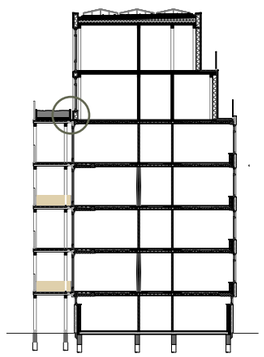
## Detail fifth floor

*1:5 (rescaled to 1:10)*

**Balcony with planter**

| | |
|---|---|
| Vegetation | |
| Substrate | 500 mm |
| Filter sheet | |
| Drainage and storage | 60 mm |
| Protection mat | 4 mm |
| Root barrier | |
| Water proofing | |
| Timber planter box | 58 mm |
| Ash wood terrace | 18 mm |
| Timber floor battens | 22 mm |
| in both directions | 40 mm |
| Isolation pad | |
| Water proofing | |
| Multiplex decking | 22 mm |
| Timber joist | 125 mm |





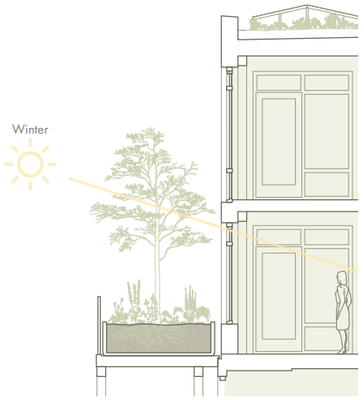
**Floor**

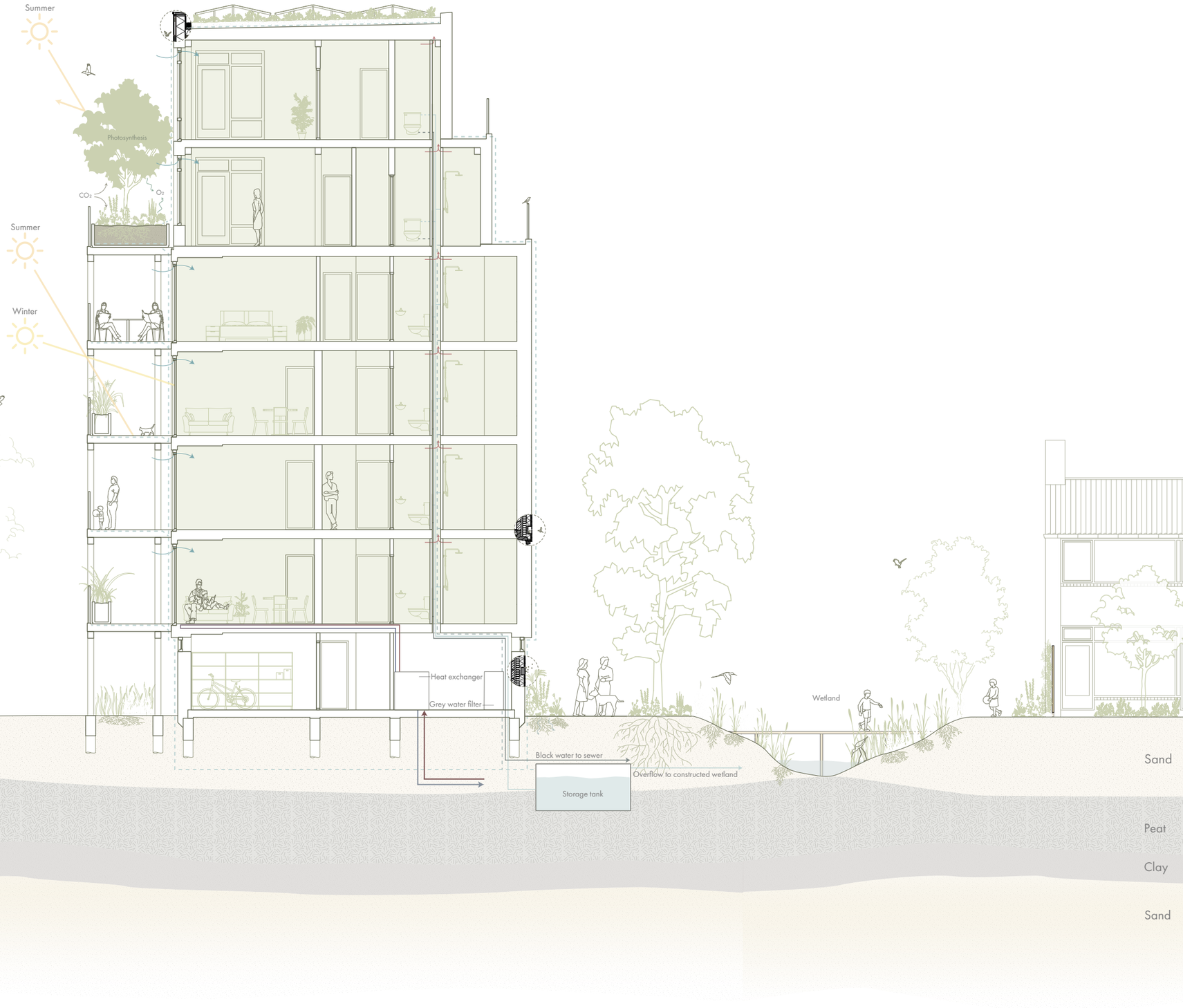
| | |
|---|---|
| Wooden floor finish: alder | 10 mm |
| Gypsum screed | 2 mm |
| Fermacell floor slab | 18 mm |
| with heating pipes | |
| PE construction foil | |
| Acoustic insulation: cattail | 80 mm |
| Concrete element floor | 180 mm |
| - 'Dato' floor | |
| Gypsumplaster | 10 mm |

# Climate & ecology

## Section

*1:50 (rescaled)*

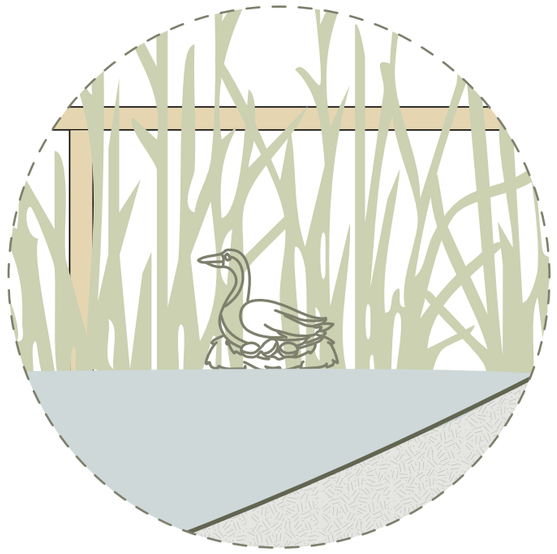


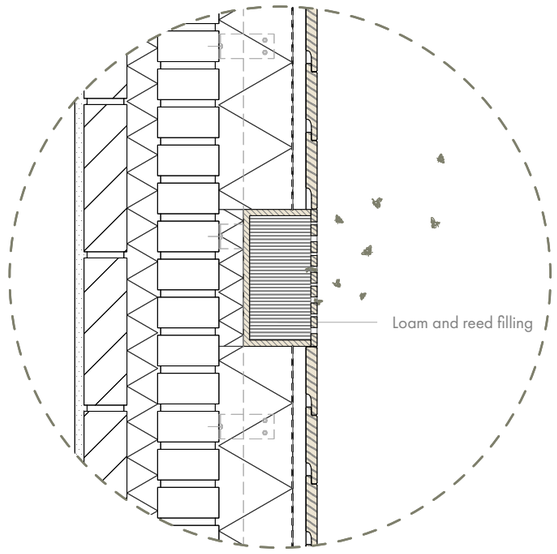
# Provision of habitats

## Nesting facilities

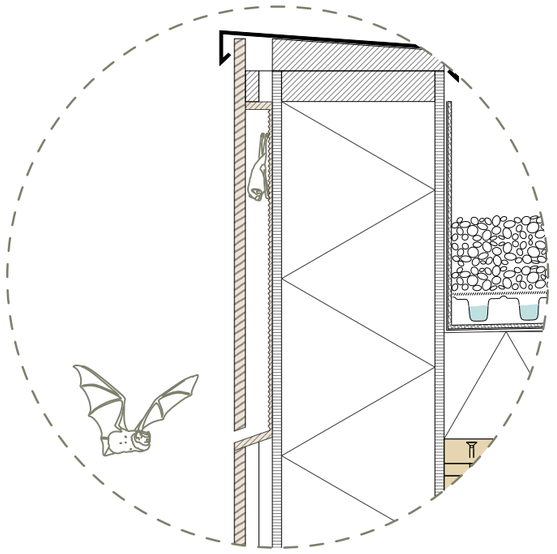
*1:5 (rescaled to 1:10)*



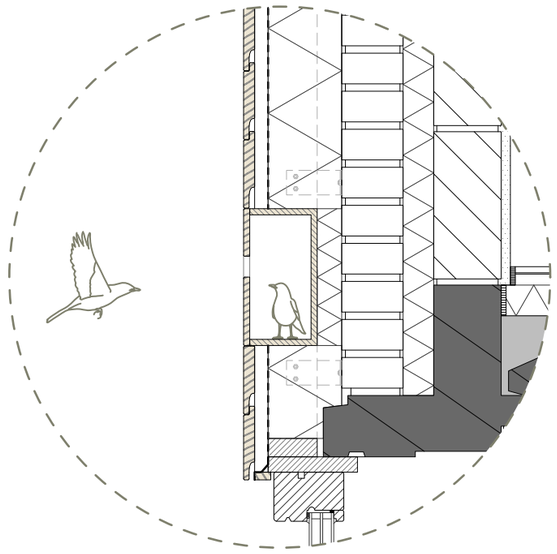
In the extended peat landscape




Insect boxes integrated in facade



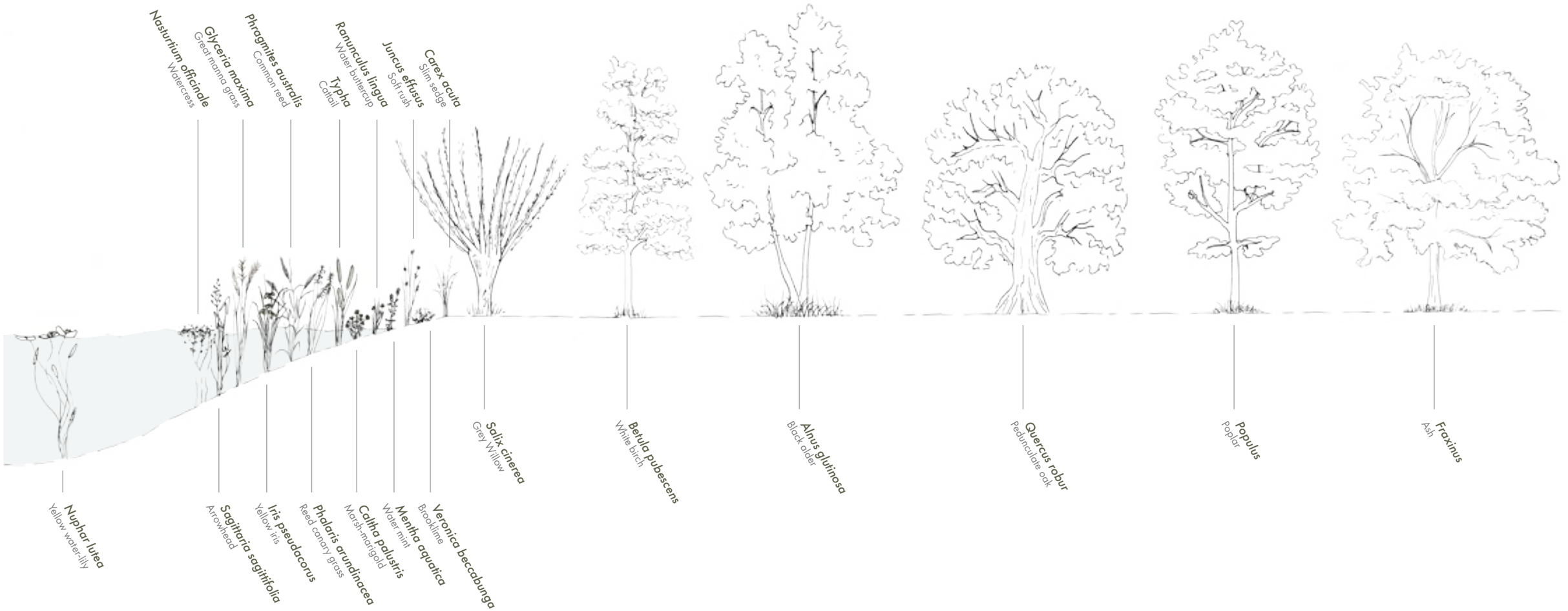
Nestboxes bats



Nestboxes birds

# Vegetation

## Species from the peat meadow landscape



## Impression