Water as a carrier for future values

a design for the longterm transition for the Benthuizer Noordpolder, the Netherlands

Master Thesis P5 Presentation
31 August 2022
Esmee Kuit 4566920

Algemeen Dagblad, December 18, 2021

Algemeen Dagblad, December 8, 2021

Algemeen Dagblad, October 29, 2021

Part 1 | Methodology

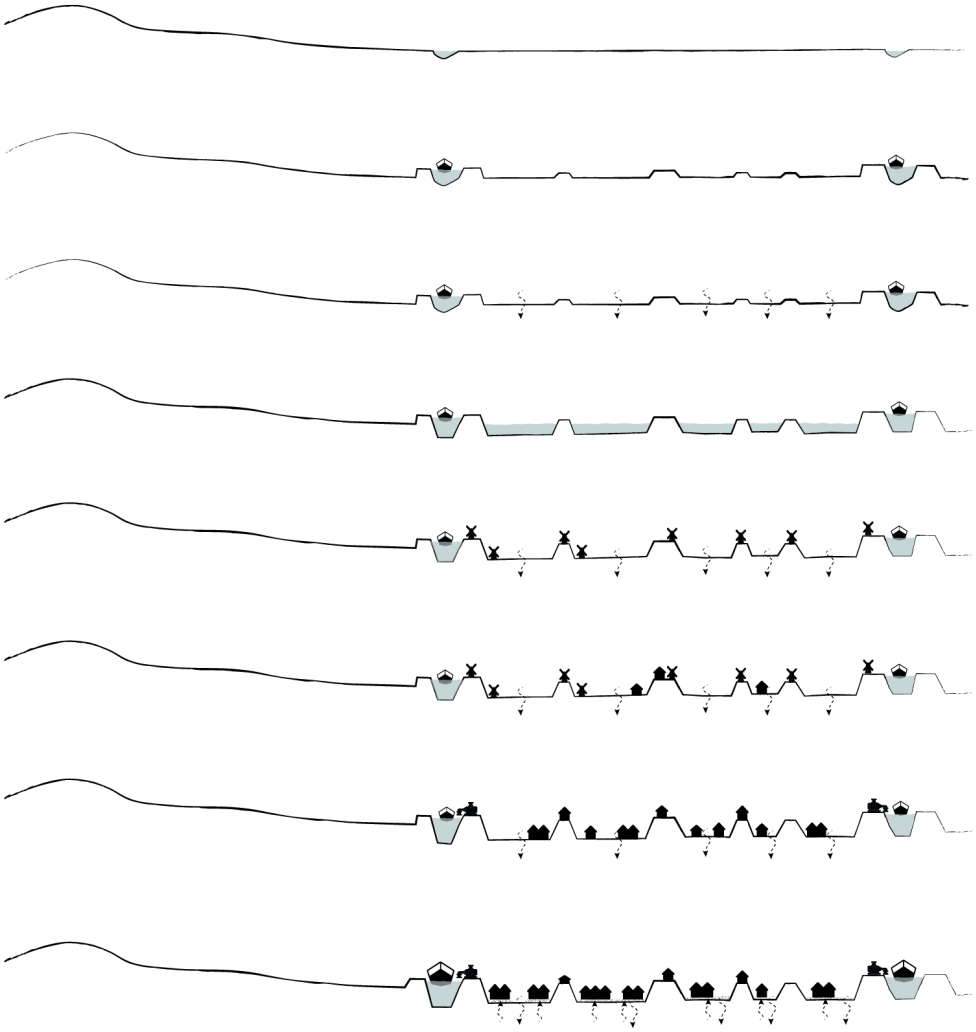
Overflowing issues

Deltaic transformation

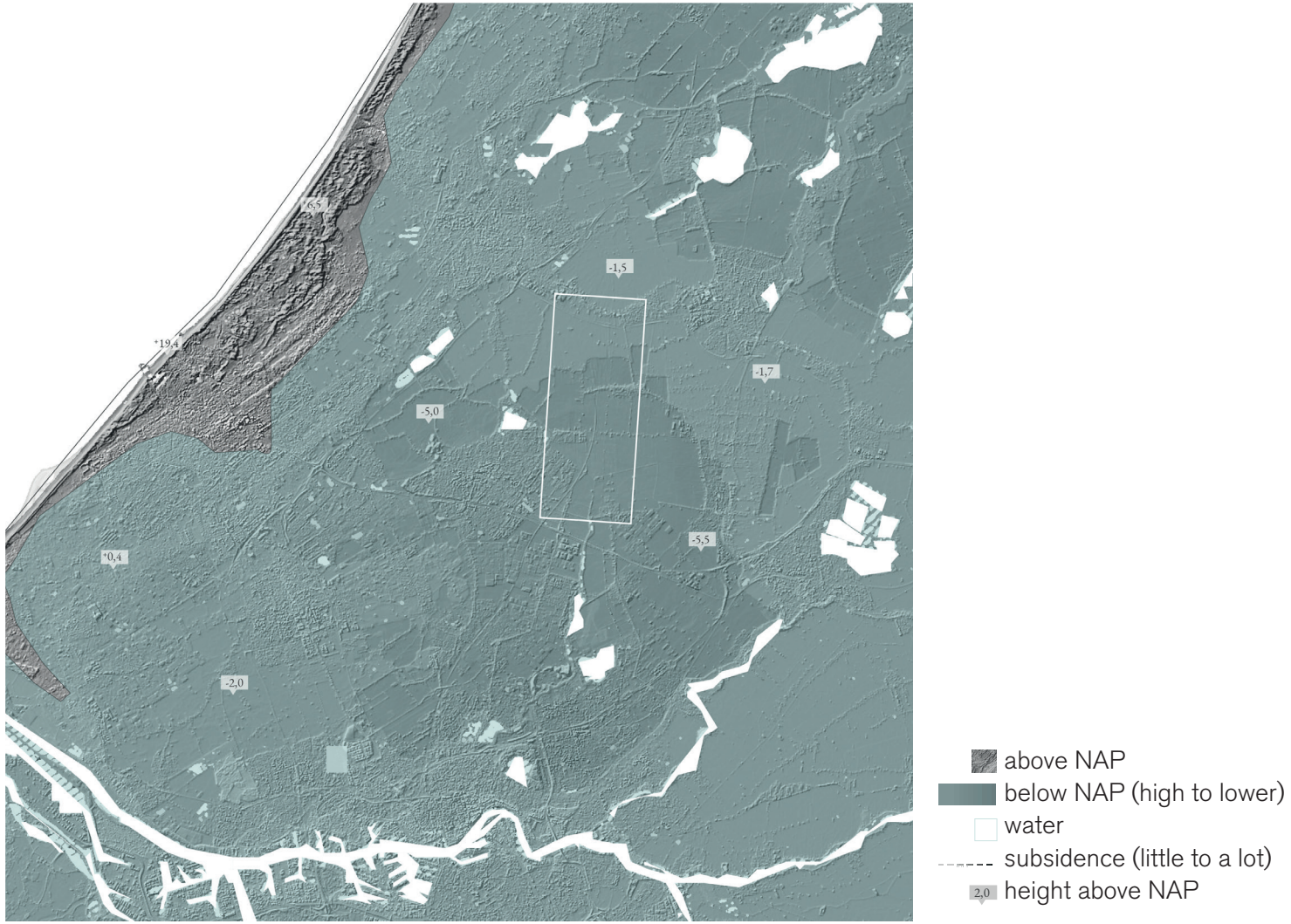
1500 bc *1200 bc* *800 ad* *1500 ad* *2000 ad*

source: Deltares (2021)

Deltaic transformation



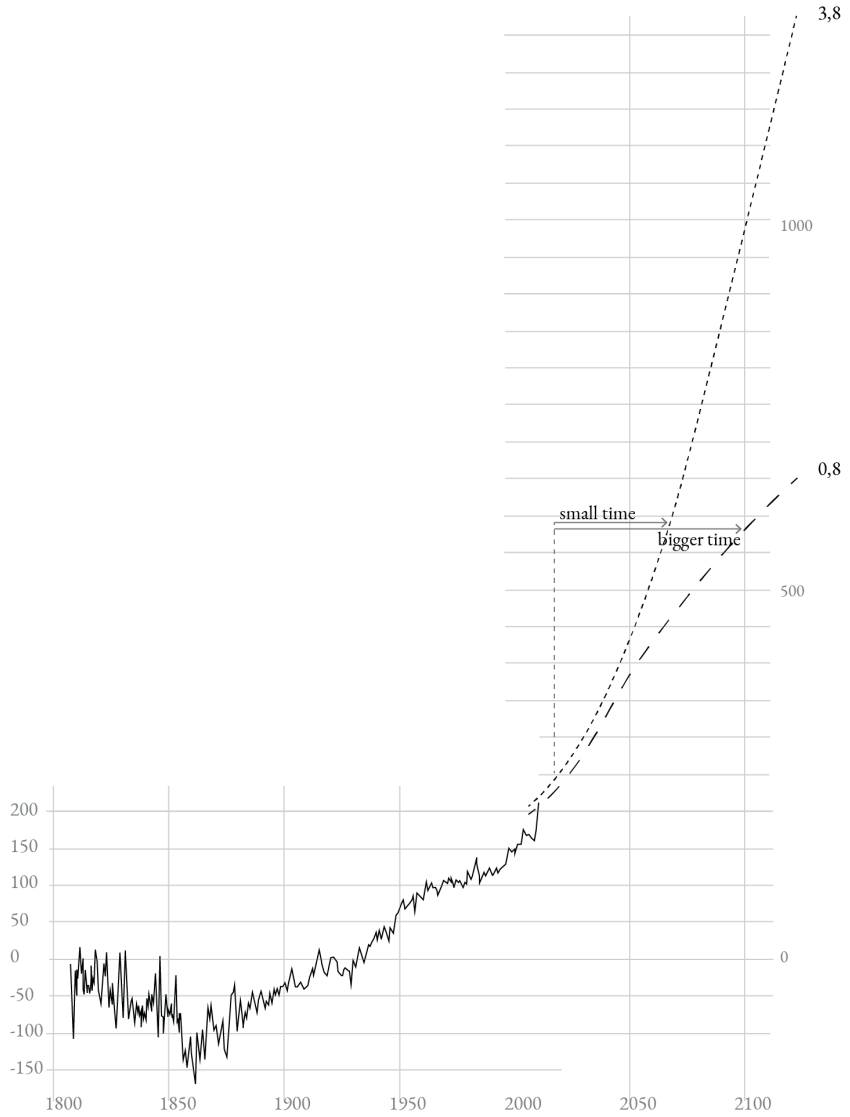
Subsidence



source: PDOK

Sea Level Rise

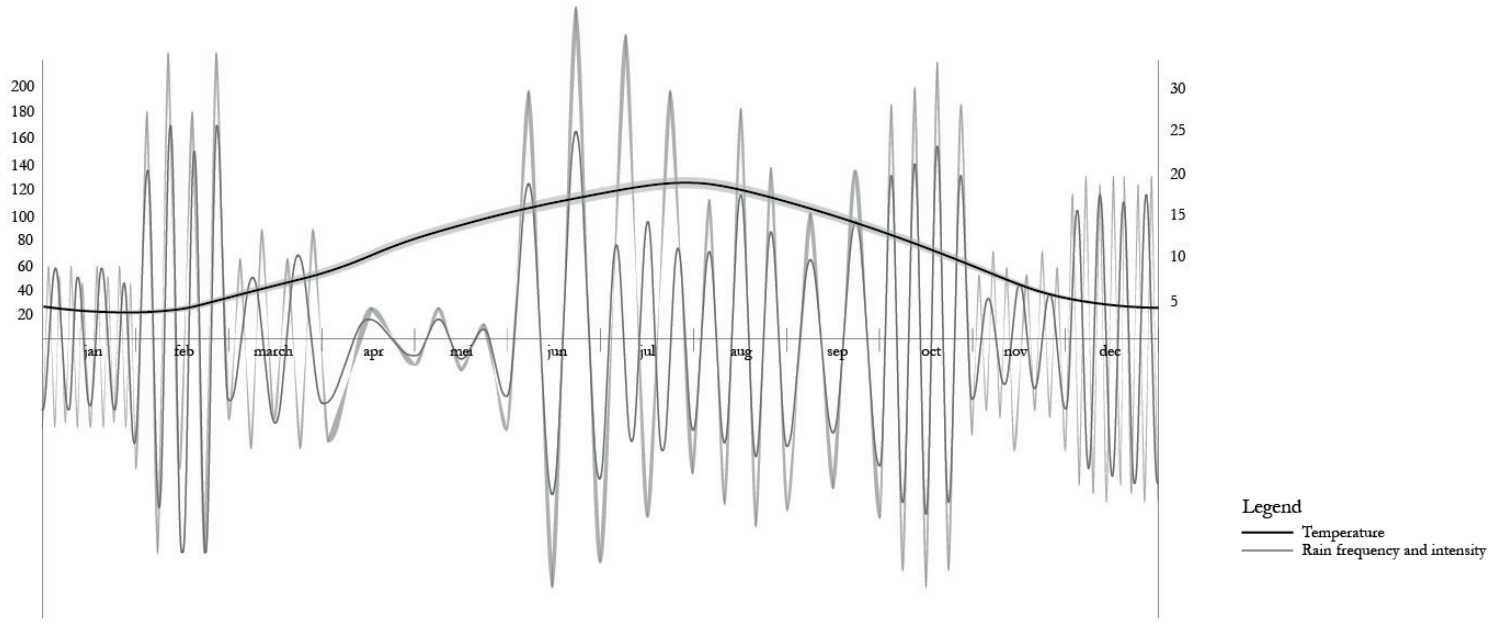
and lead times



source: IPCC

Extreme weather

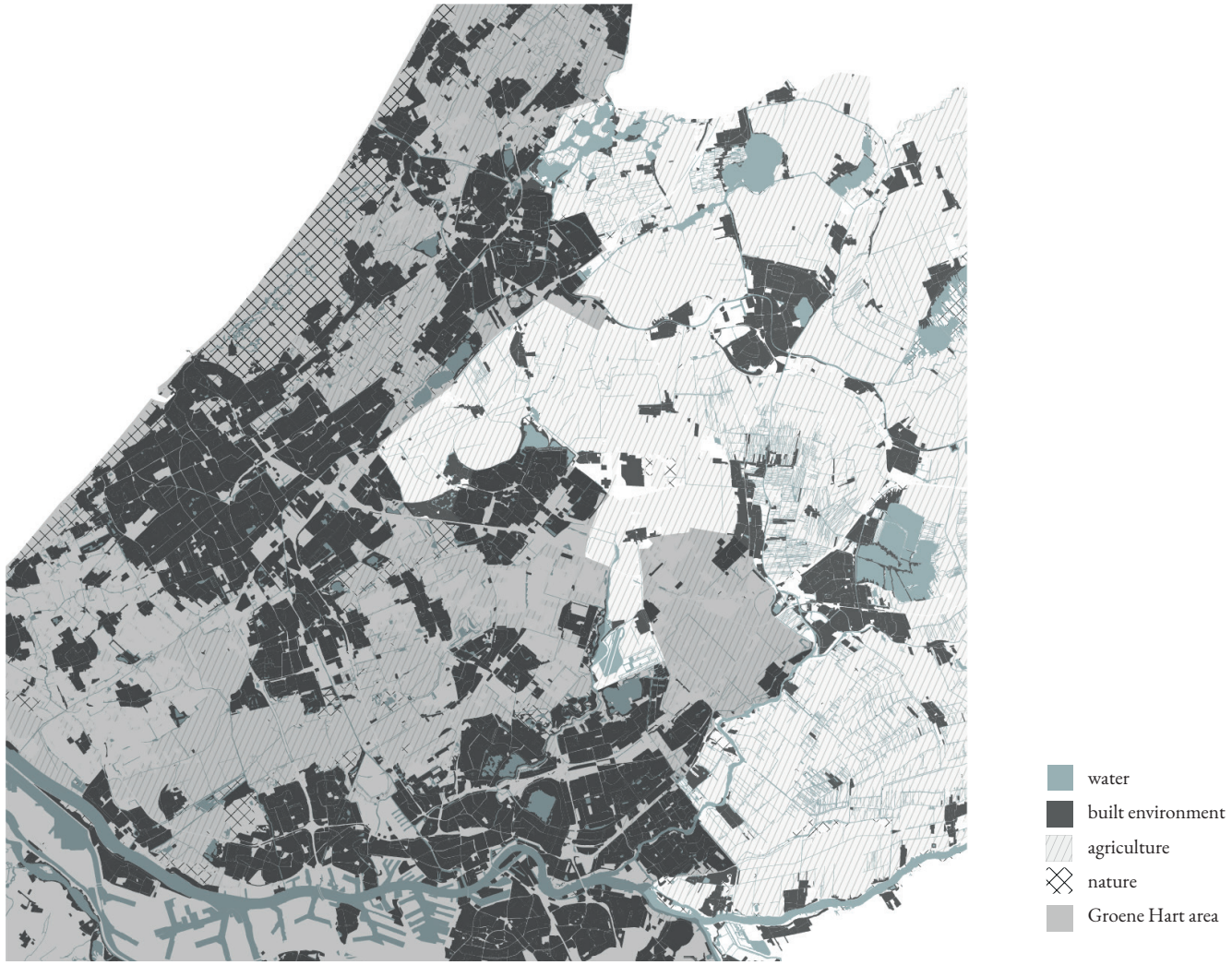
through rain and heat



source: KNMI

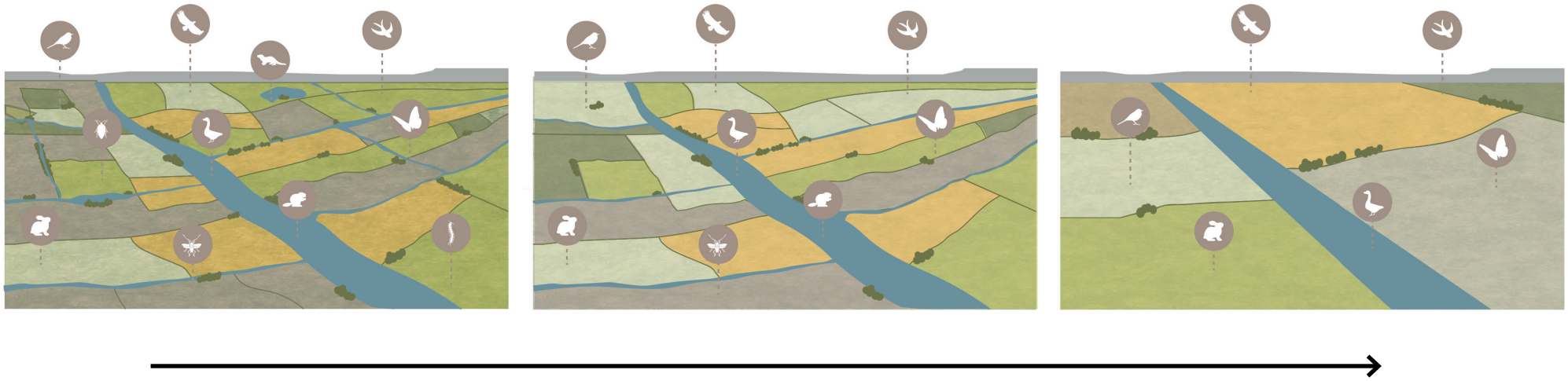
Pressure

on landscape

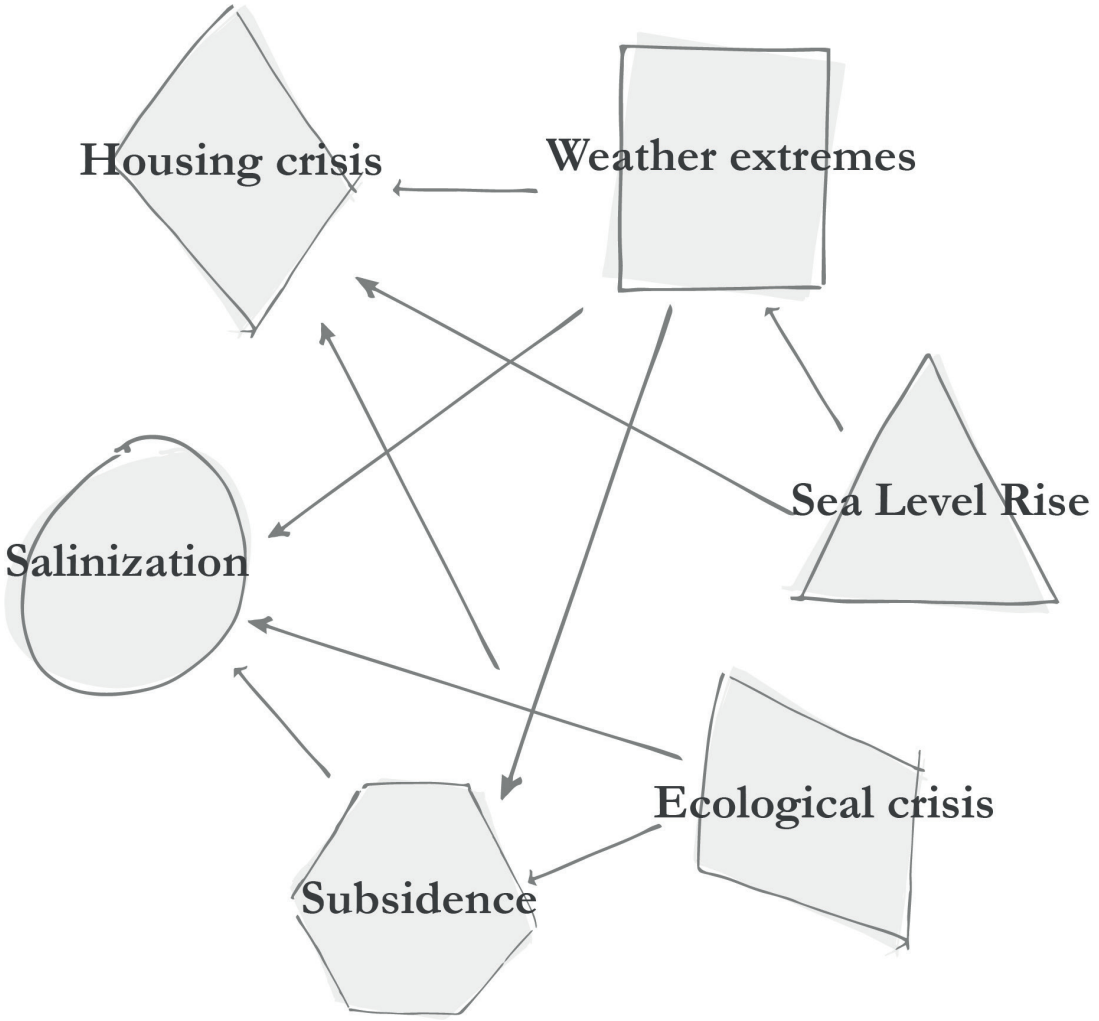


source: PDOK

Loss of nature



Interconnectedness



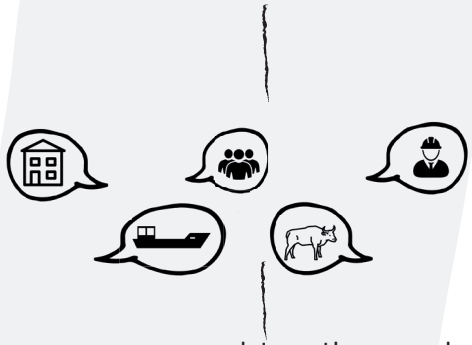
Transition to a more inclusive process

Knowledge gap:

Large-scale infrastructure project

‘can we add extra elements to extenuate the externalities of the interference?’

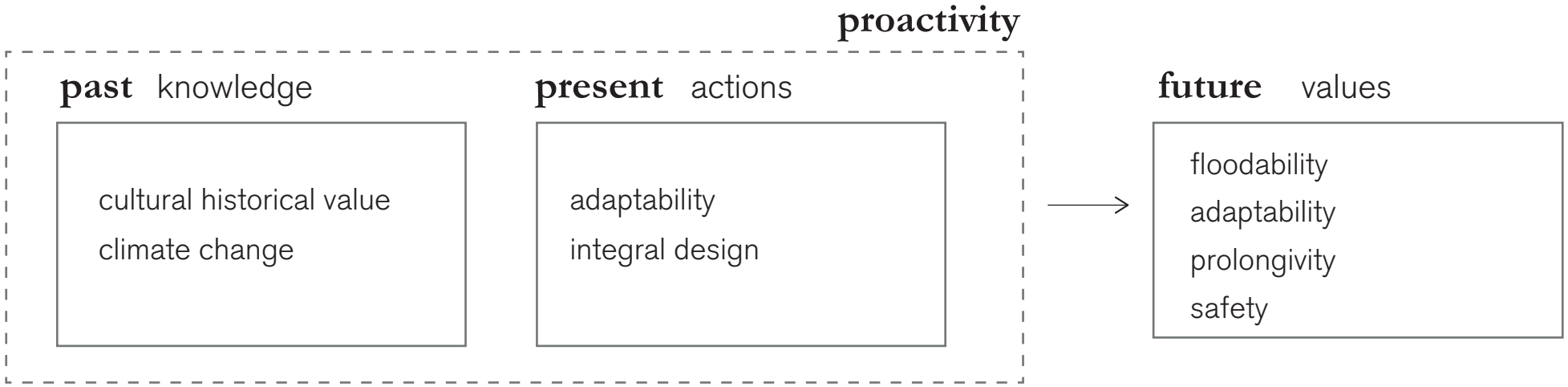
‘what does the area need?’



‘how can we combine these elements best to accomodate future uses?’

Transition to a more inclusive process

By taking a proactive stance



Feddes, F. (Ed.). (1999). Nota Belvedere. Beleidsnota over de relatie cultuurhistorie en ruimtelijke inrichting.

Jager, H. (2009). Toepassing van de gebiedsgerichte aanpak bij infrastructurele wegprojecten.

Puylaert, H., & Werksma, H. (H2Ruimte). (2011). Duurzame gebiedsontwikkeling: doe de tienkamp!

de Vries, J. (1978). Barges and Capitalism. Passenger Transportation in the Dutch Economy, 1632-1839.

Research question

How can the **territory-oriented approach** *support urban development with the aim of creating* **natural and cultural values** *in* **deep Dutch polders***?*

Hypothesis to this question is the creation of a waterway

Goals:

- connect Rijn and Rotte and Zoetermeer through
the implementation of a new waterway

- use of water to extenuate externalities
of the issues from the context

- add value to an otherwise unexperienceable landscape

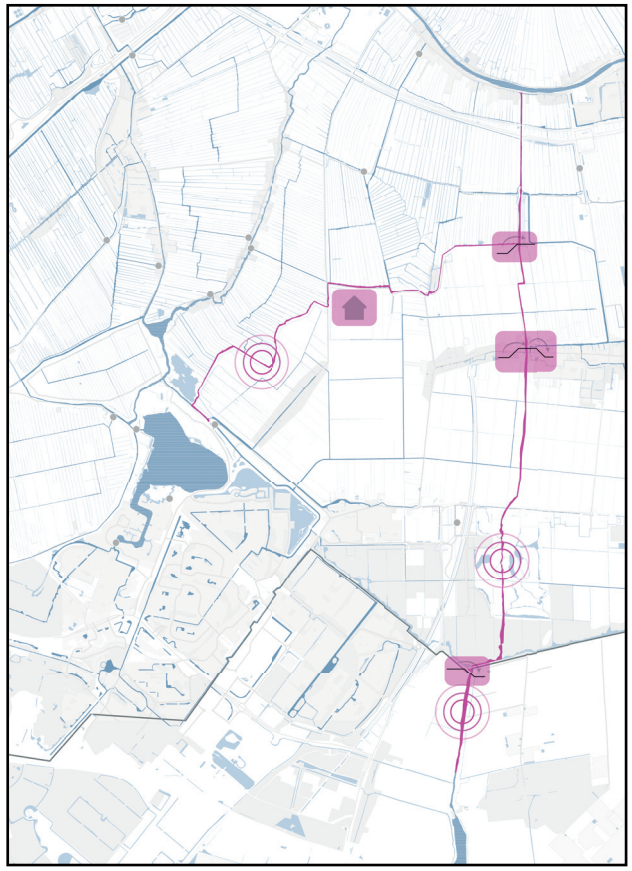
- use landcape transition as accelerator
for urban development

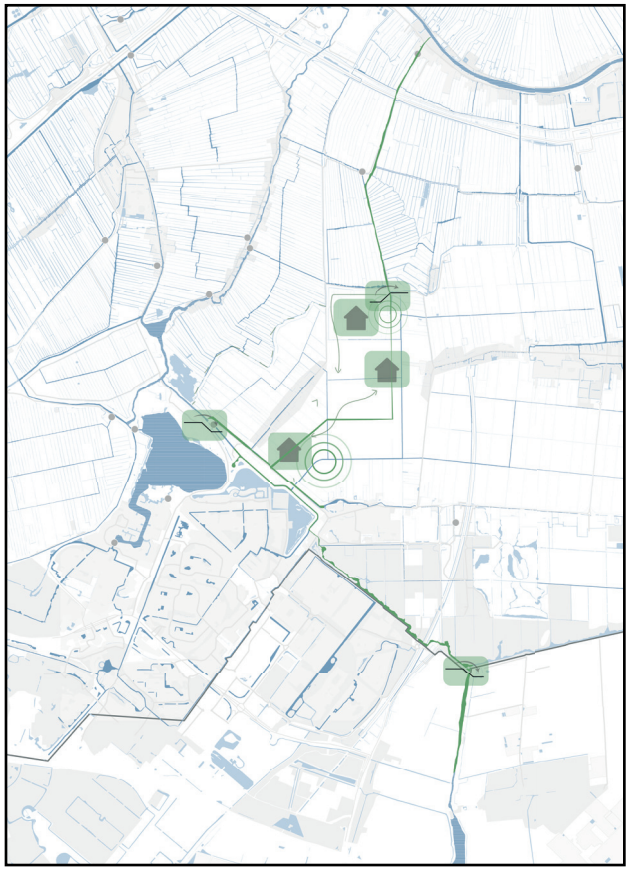
Part 2 | Analysis and site

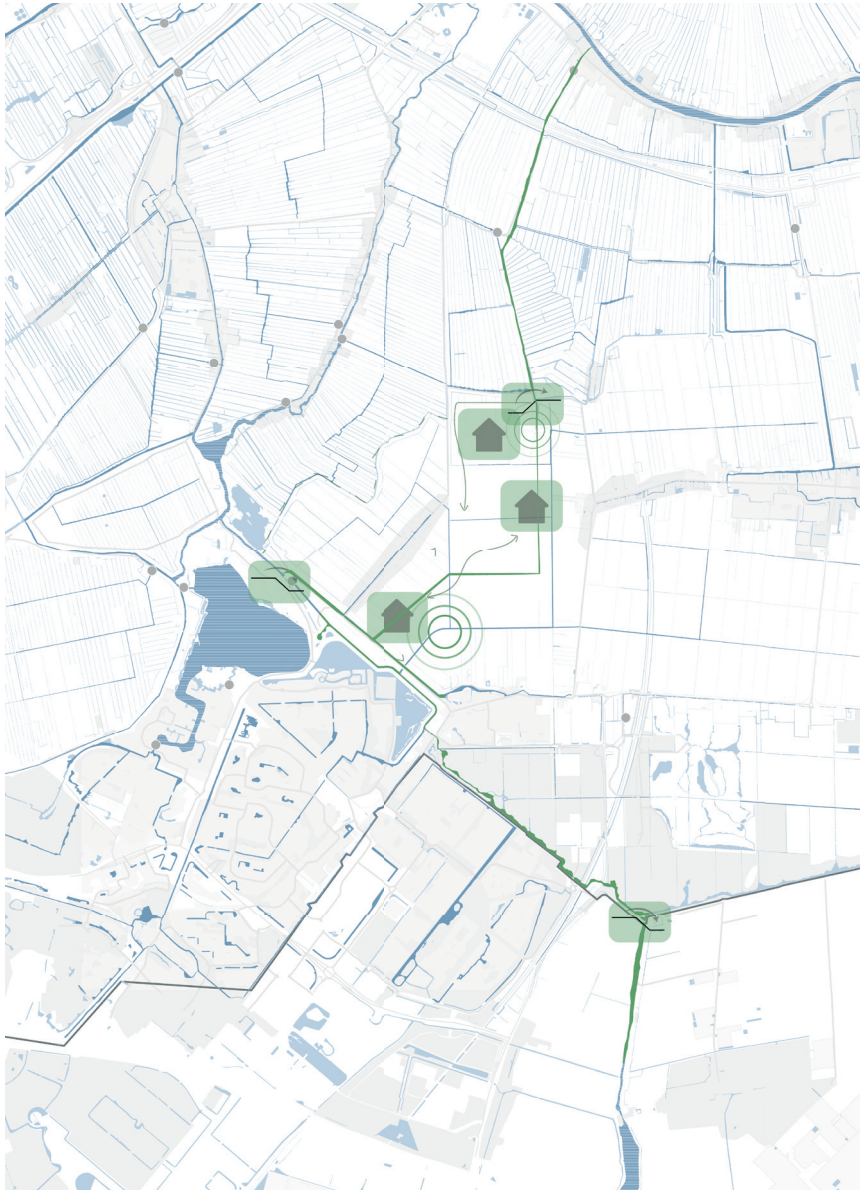
Water under the bridge

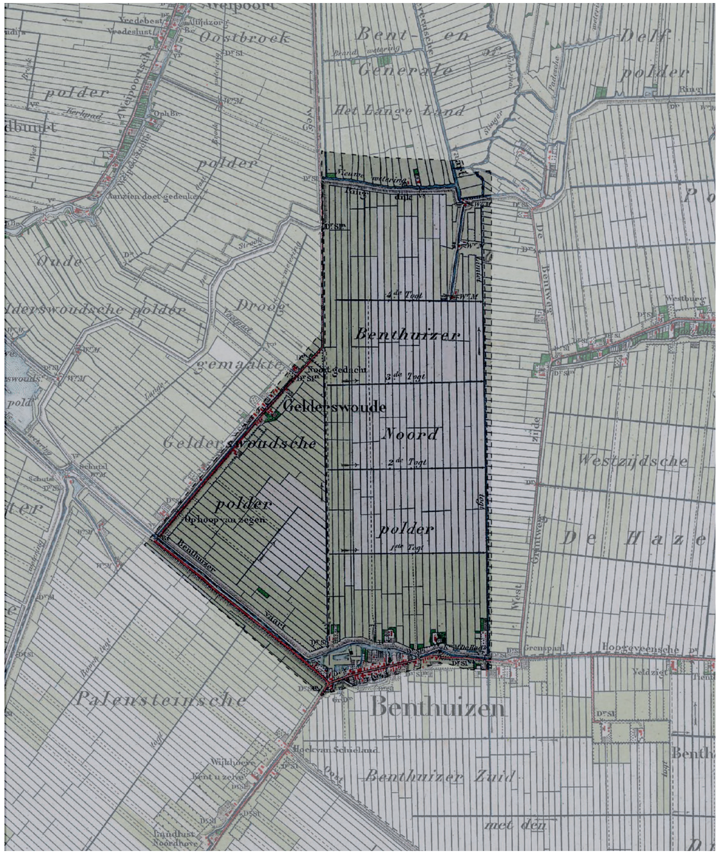
Hypothesis to this question is the creation of a waterway

Three options:



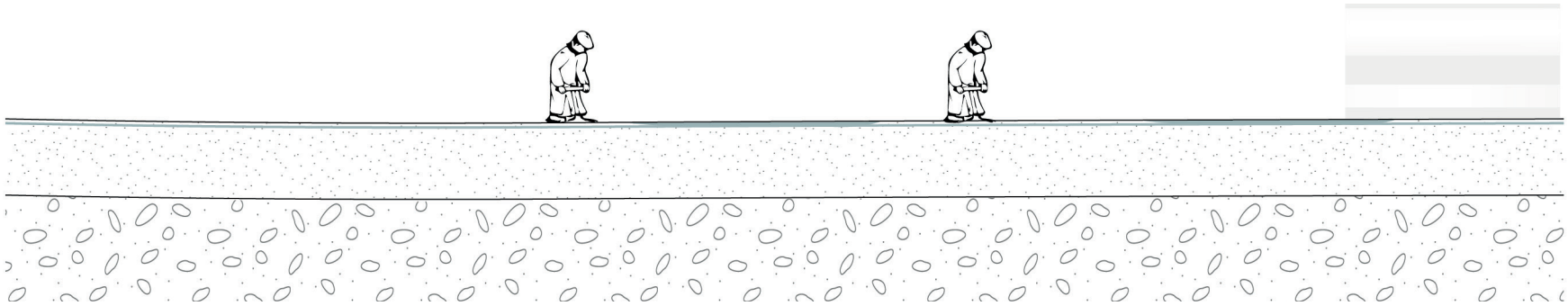




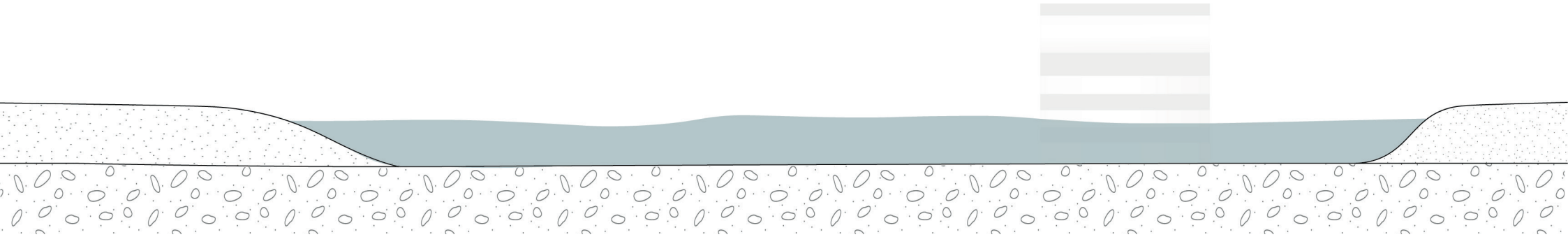

Benthuizer
Noord
polder
Gelderswoude
Westzijdsche
Benthuizen
Palensteinsche

0 1 km

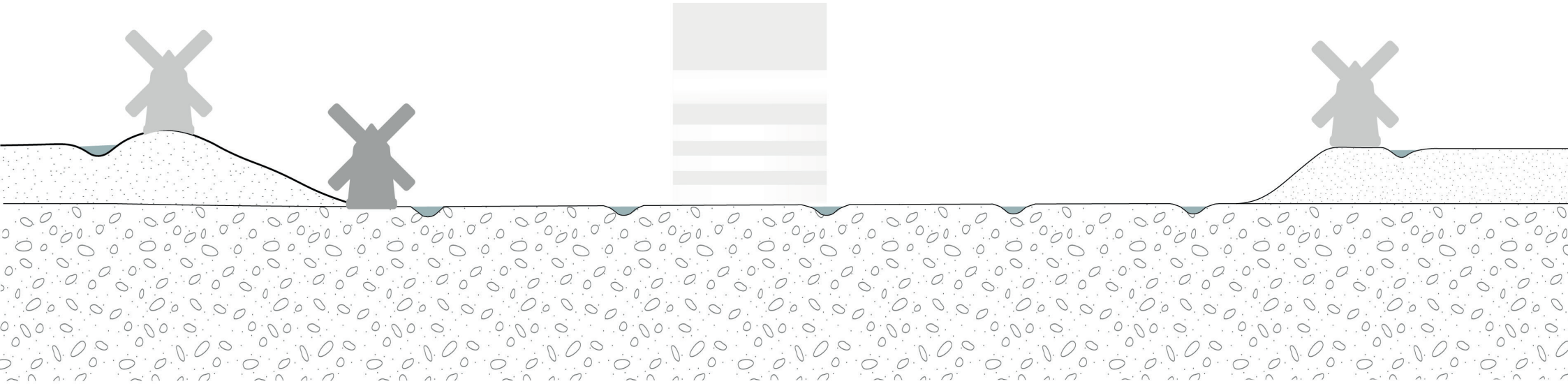
Landscape transition



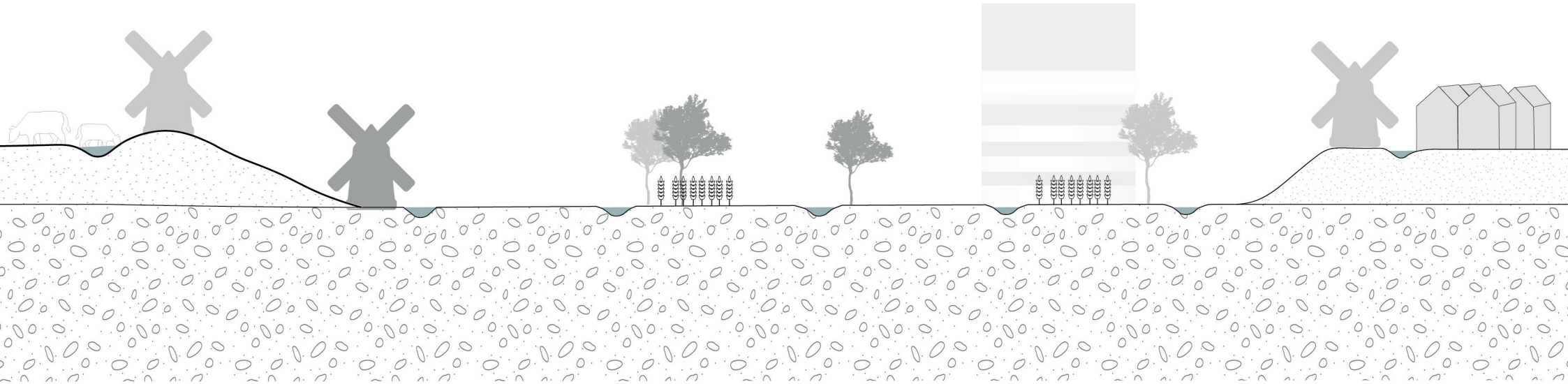
Landscape transition



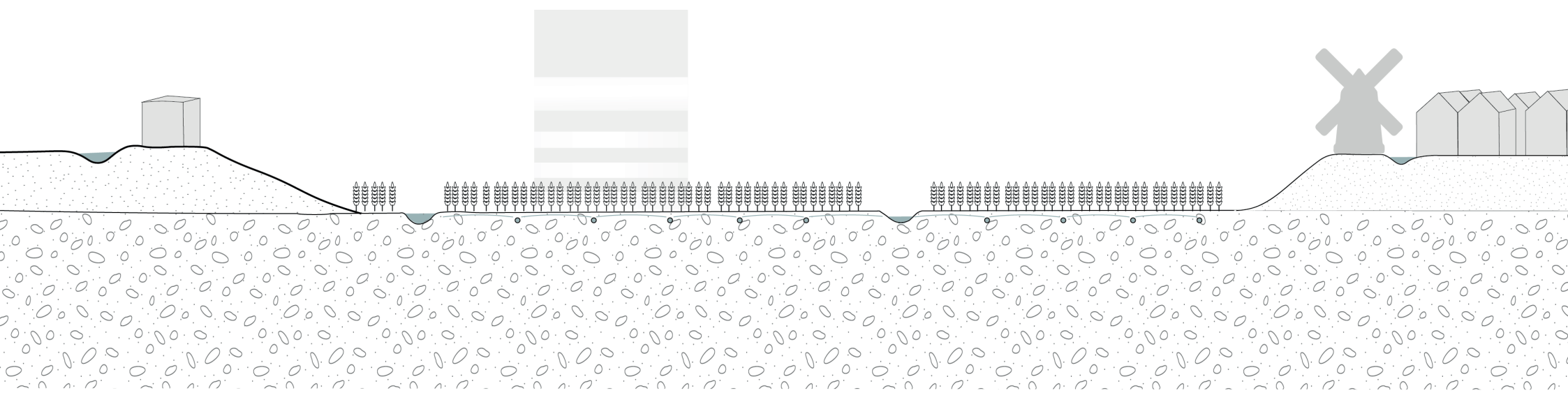
Landscape transition



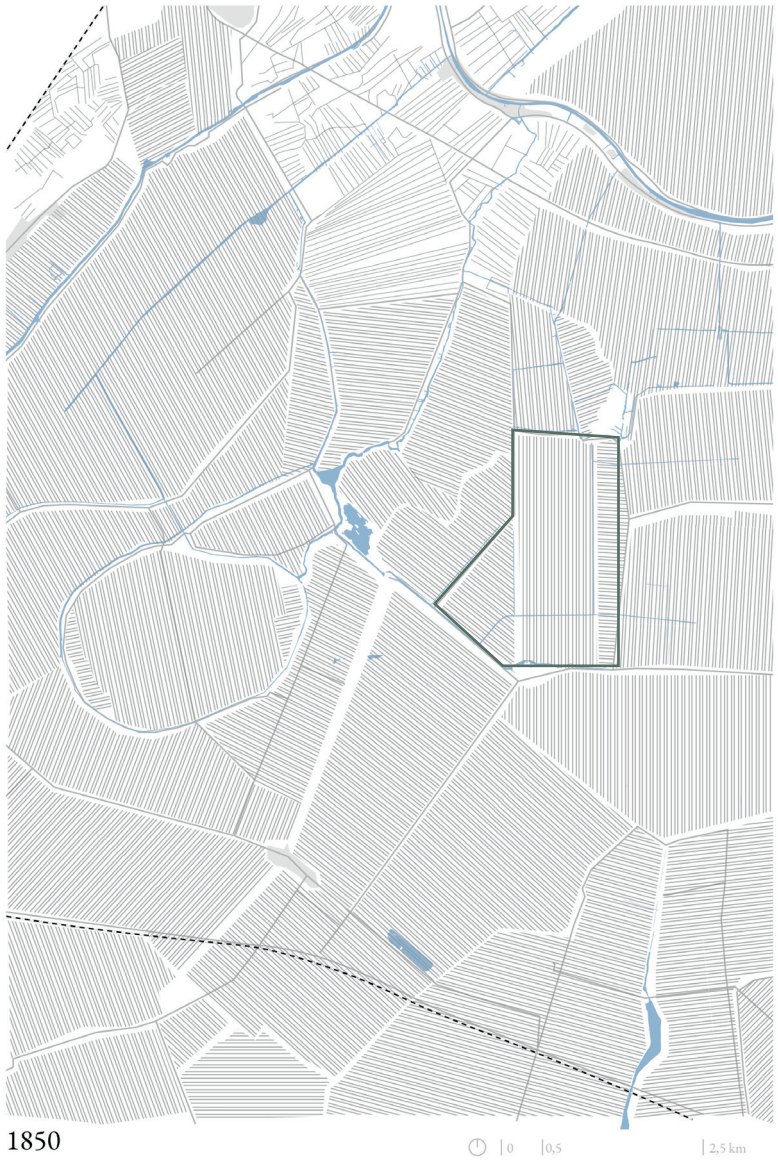
Landscape transition



Landscape transition



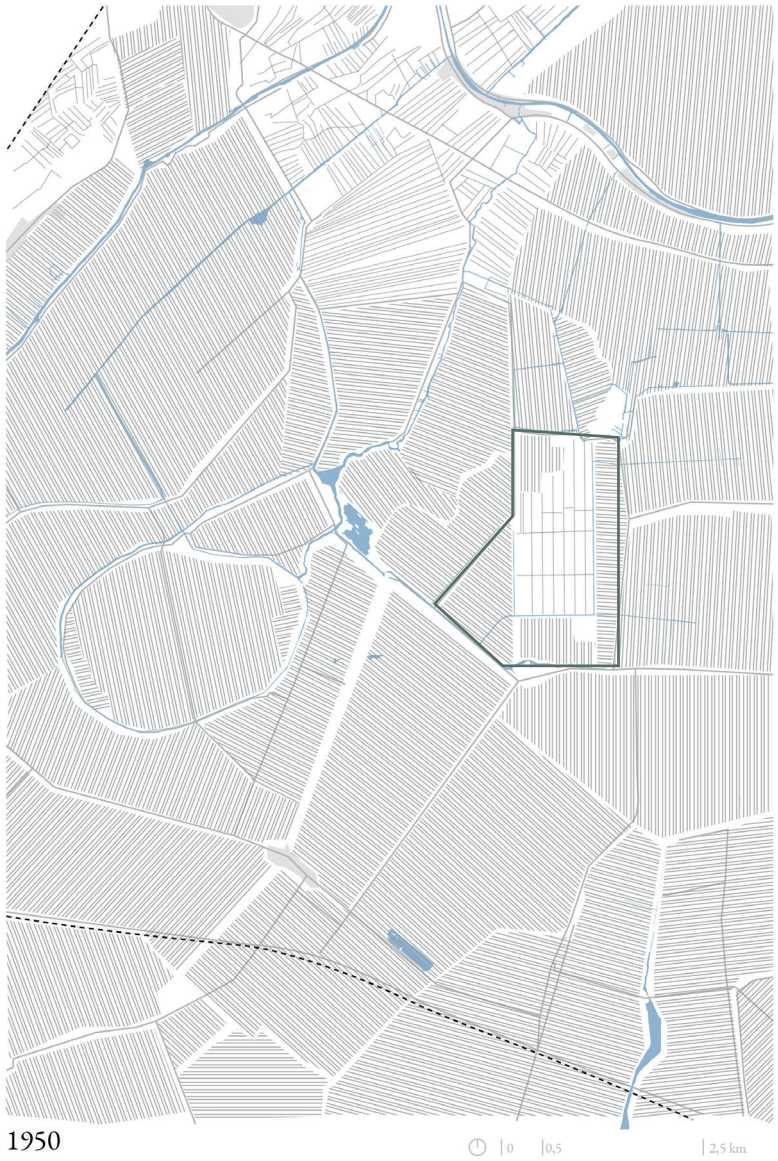
Landscape transition



1850

source: PDOK

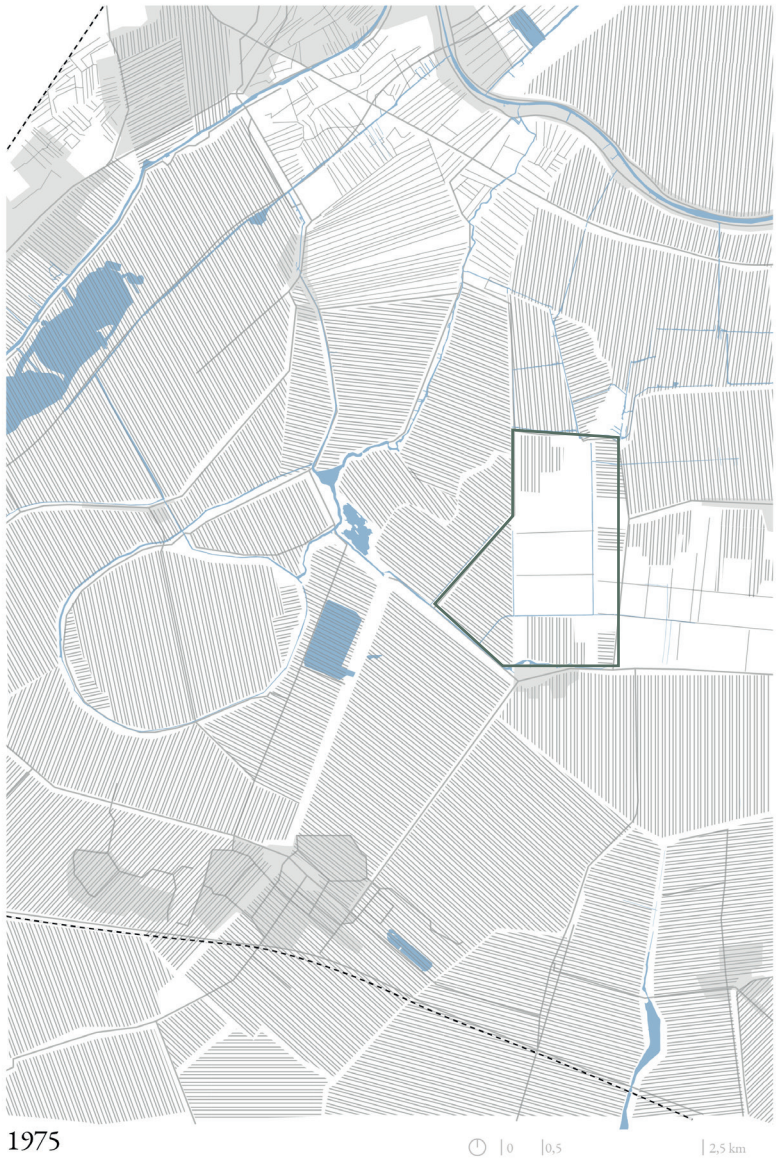
Landscape transition



1950

source: PDOK

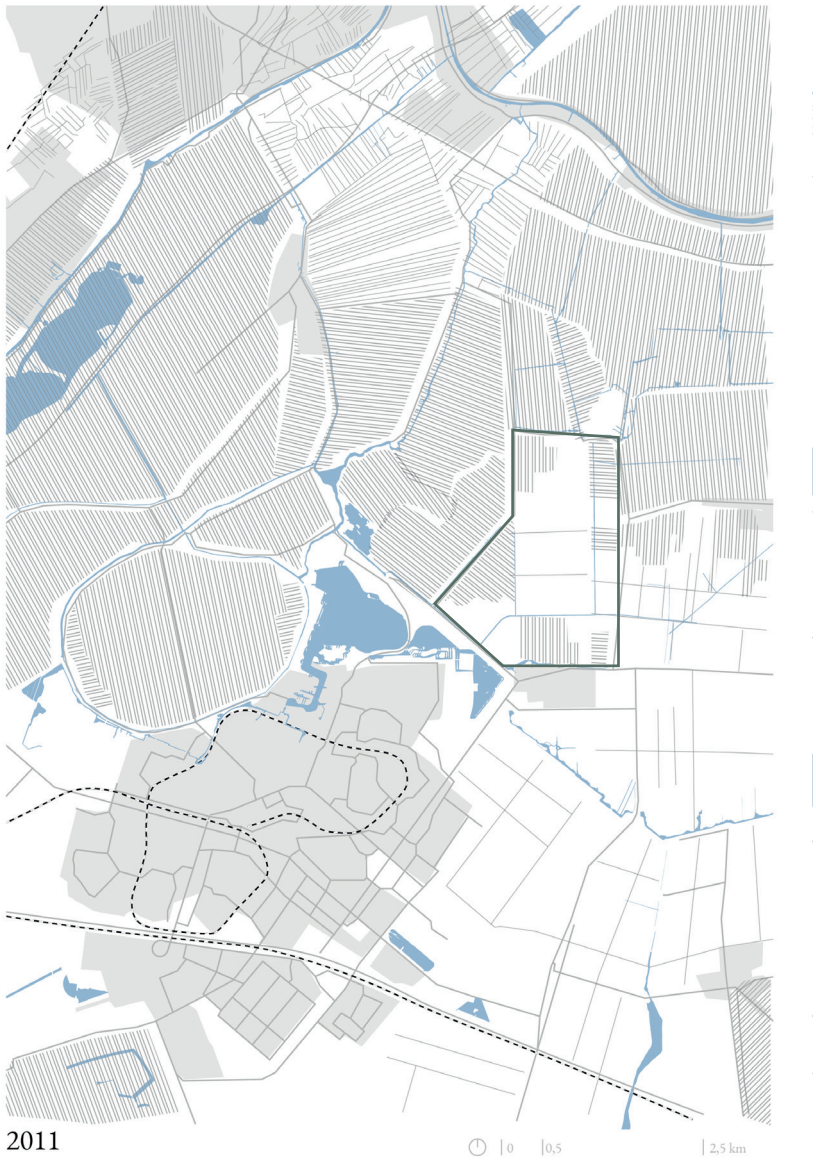
Landscape transition



1975

source: PDOK

Landscape transition



2011

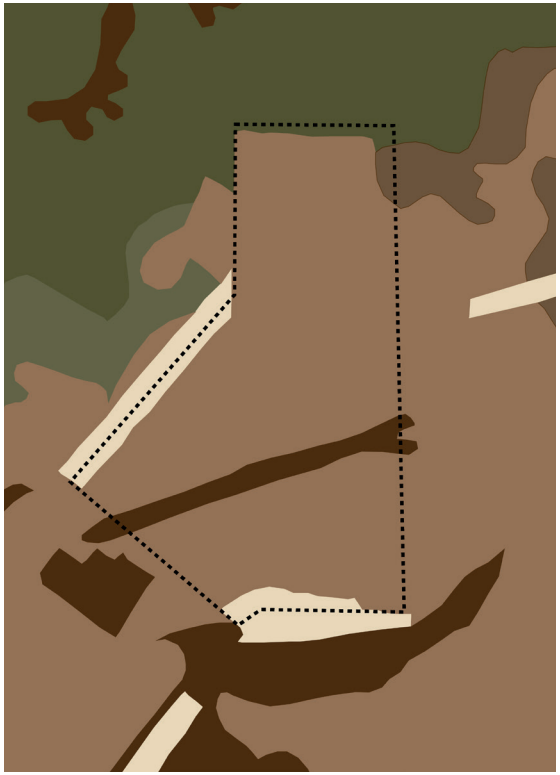
source: PDOK

Two landscapes:

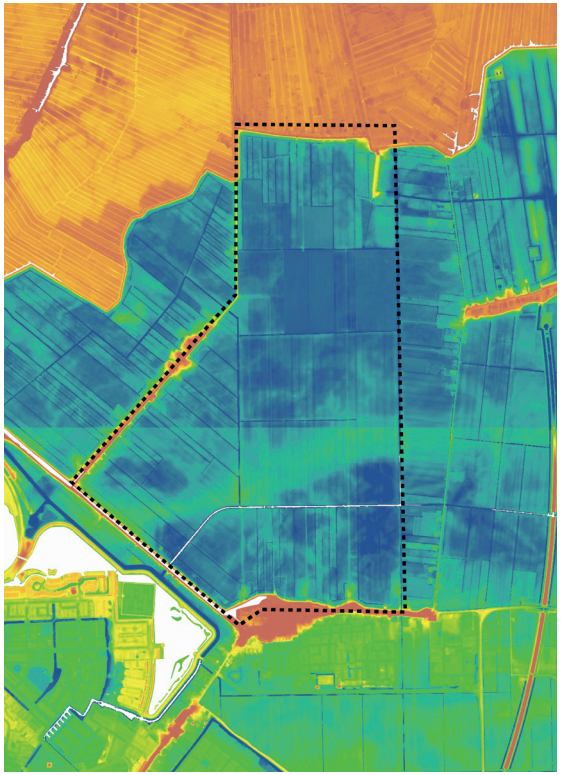
Higher peat meadow landscape

Lower arable agricultural landscape

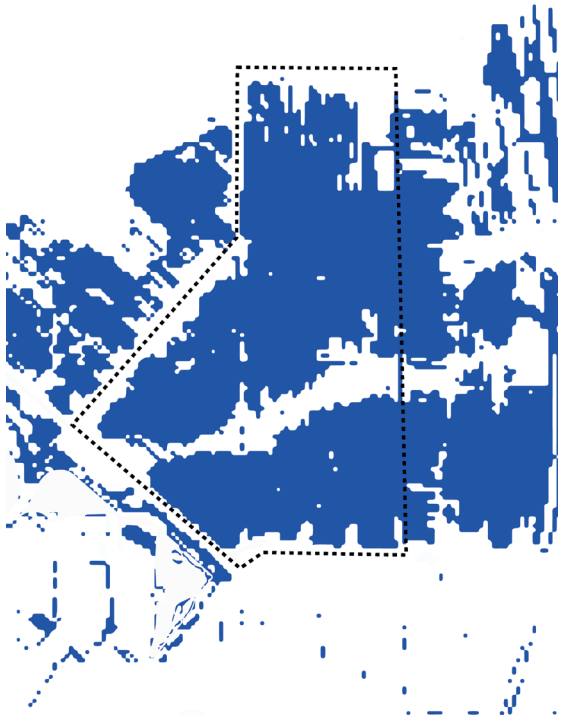
Soil distribution



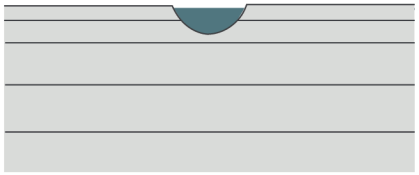
Height difference



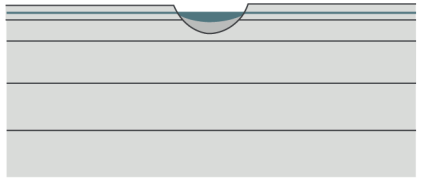
Flood Prone



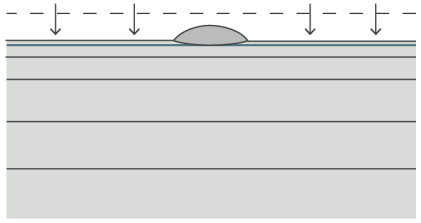
Creek



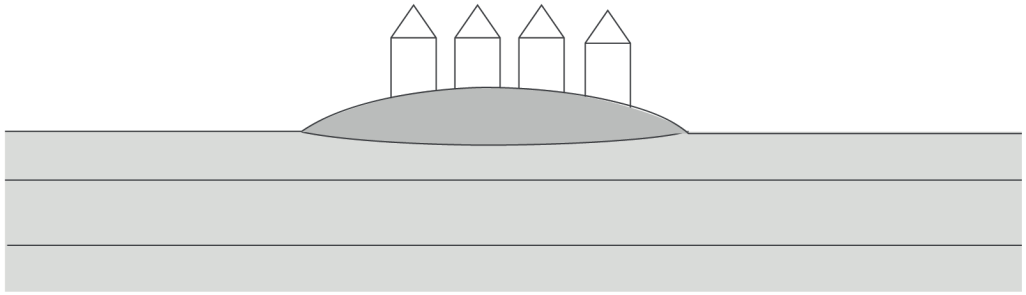
Decrease groundwater level



Creek ridge



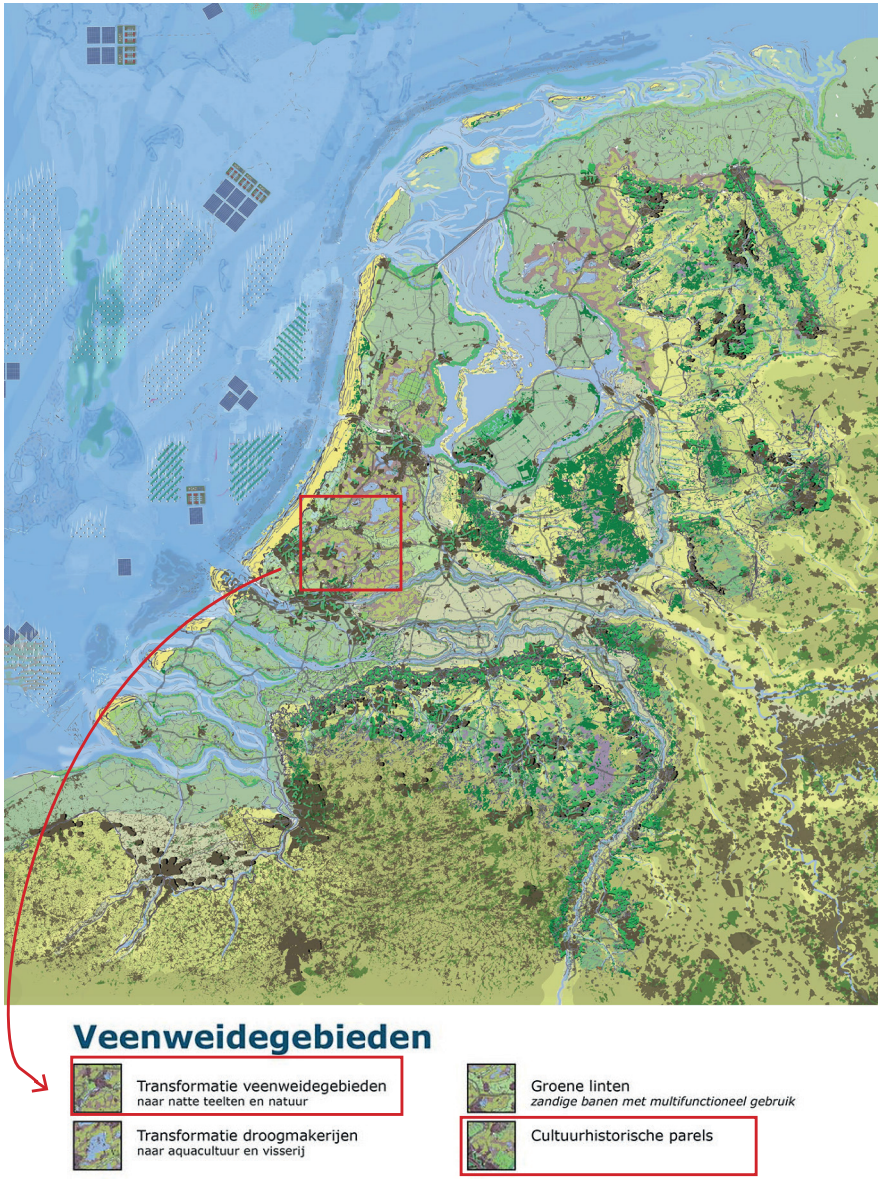
Safe living space



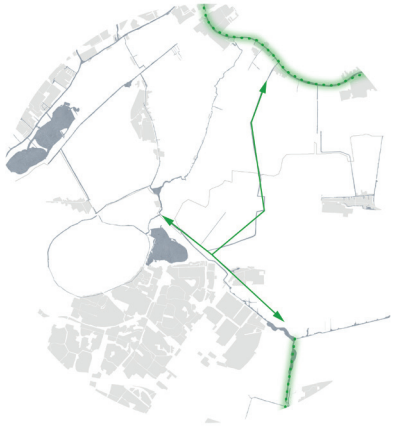
Part 3 | Vision and strategy

Uncharted waters

Scenario 2100



source: WUR



1 | Connection waterways

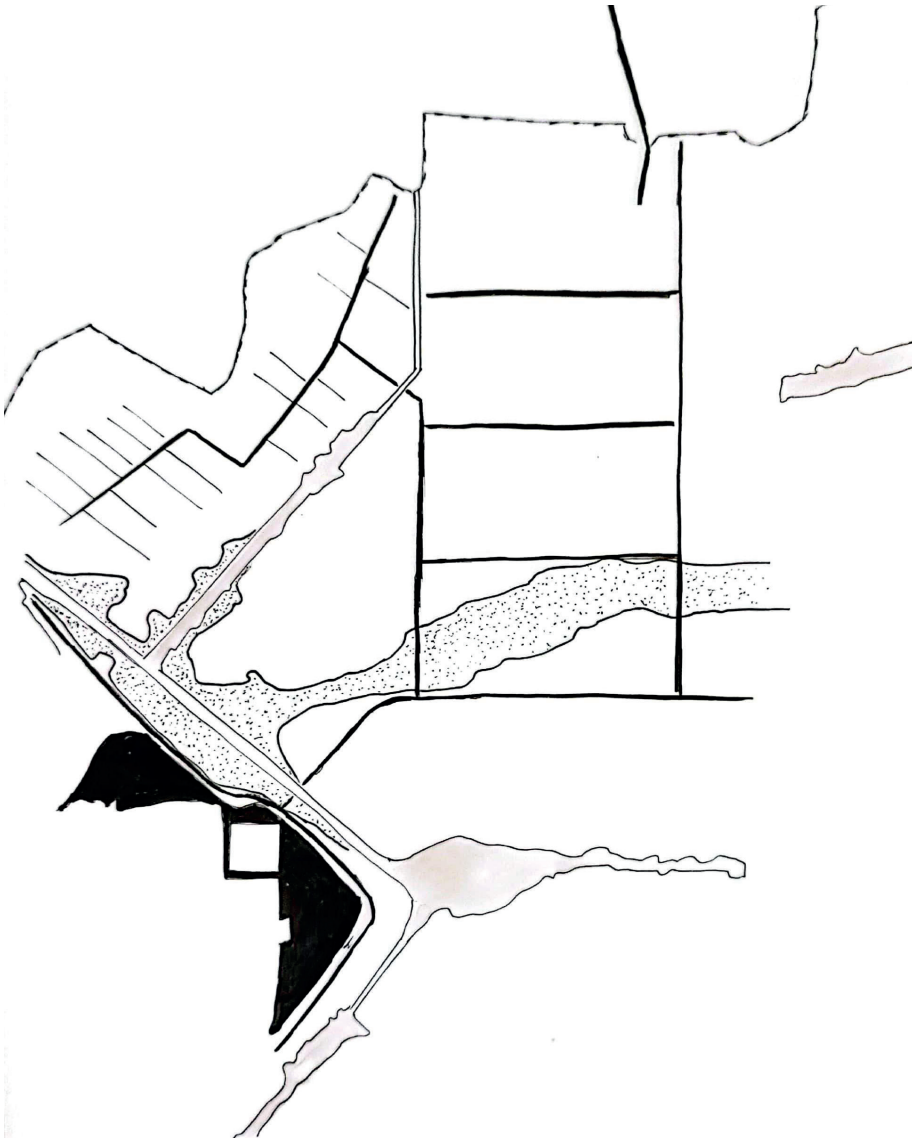
2 | Creek ridge as basis

3 | Reuse of soil

4 | Connection city landscape

5 | Safe space

Basic conditions

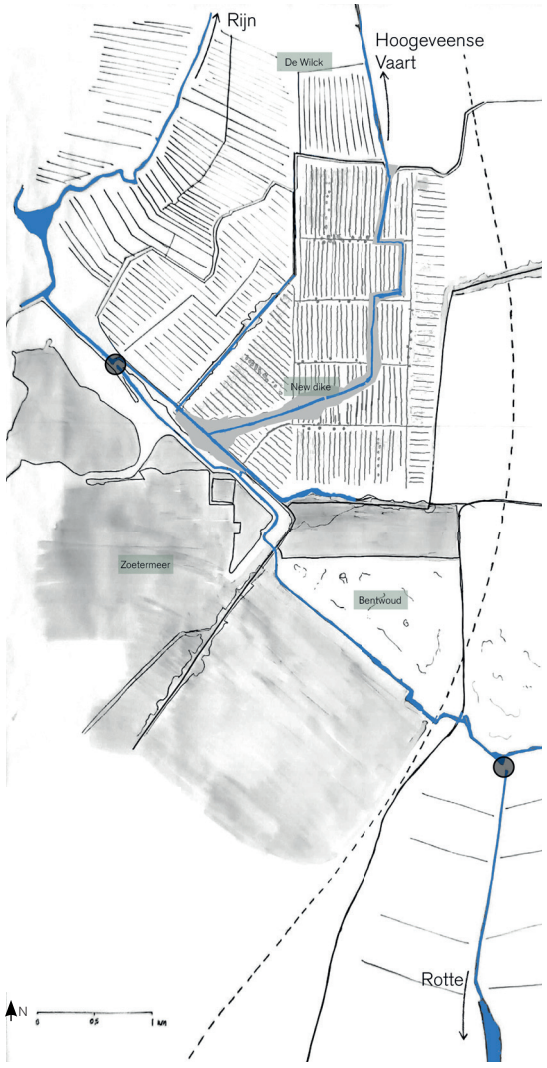


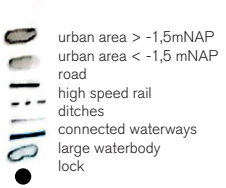
Water
Settlement
Height difference
Creek ridge

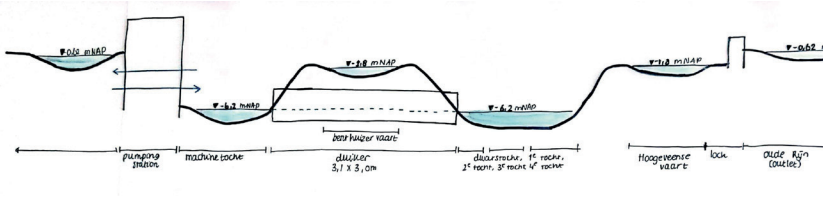
Part 4 | Design

Digging into the matter

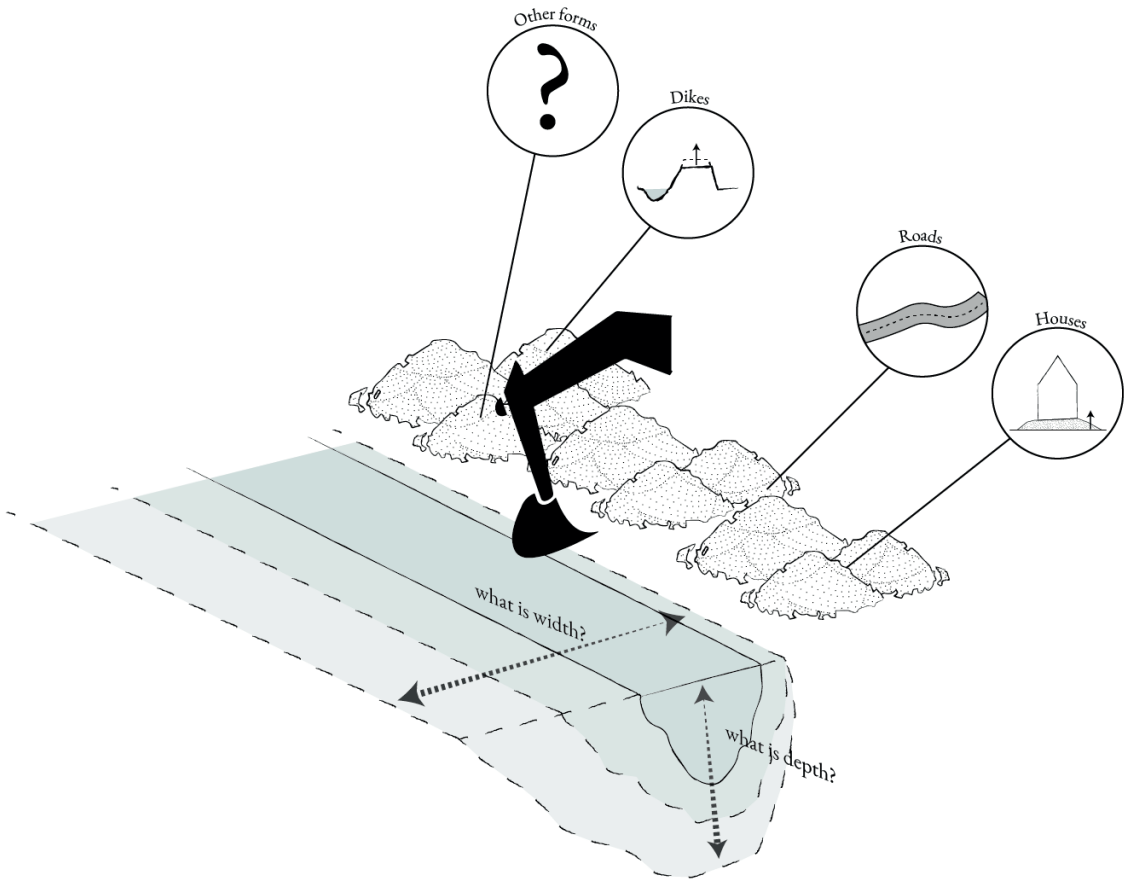
Dike creation







Dike creation

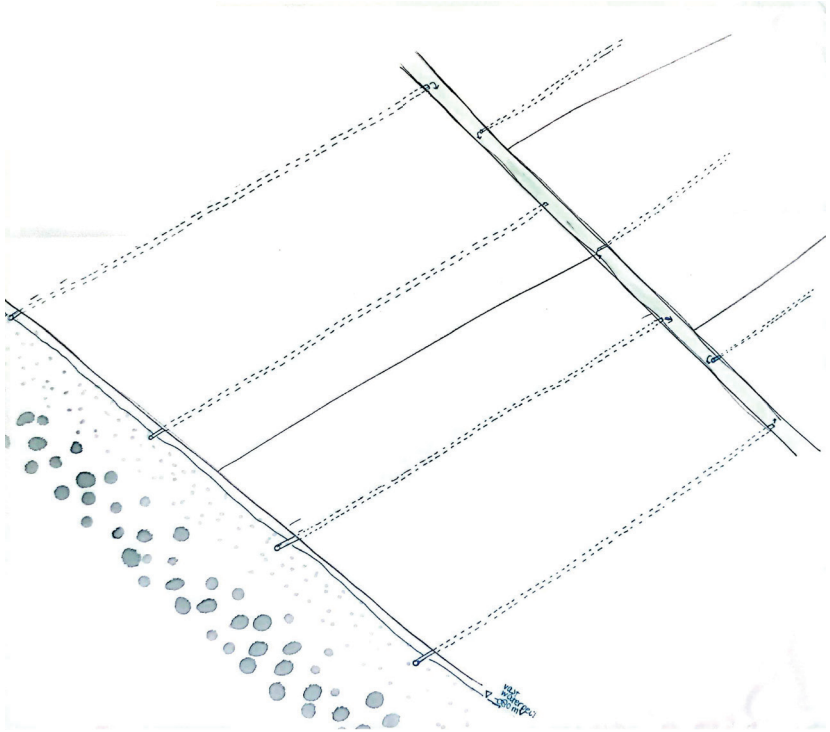


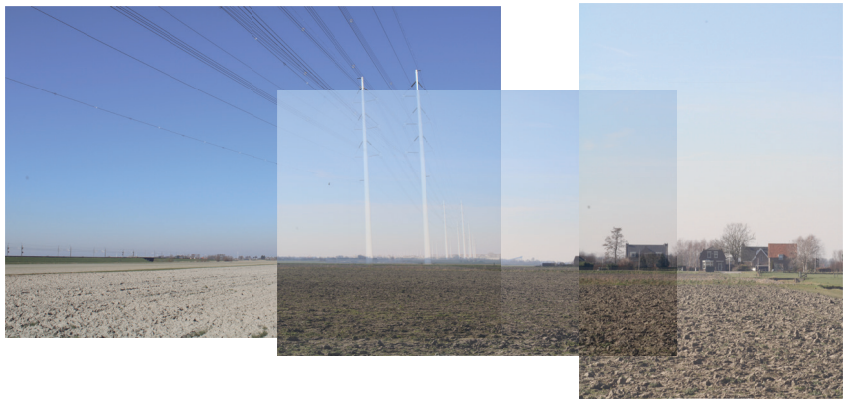
Design


Rijn
De Wilck
New dike
Zoetermeer
Bentwoud
urban area > -1,5mNAP
urban area < -1,5 mNAP
road
high speed rail
ditches
connected waterways
large waterbody
lock

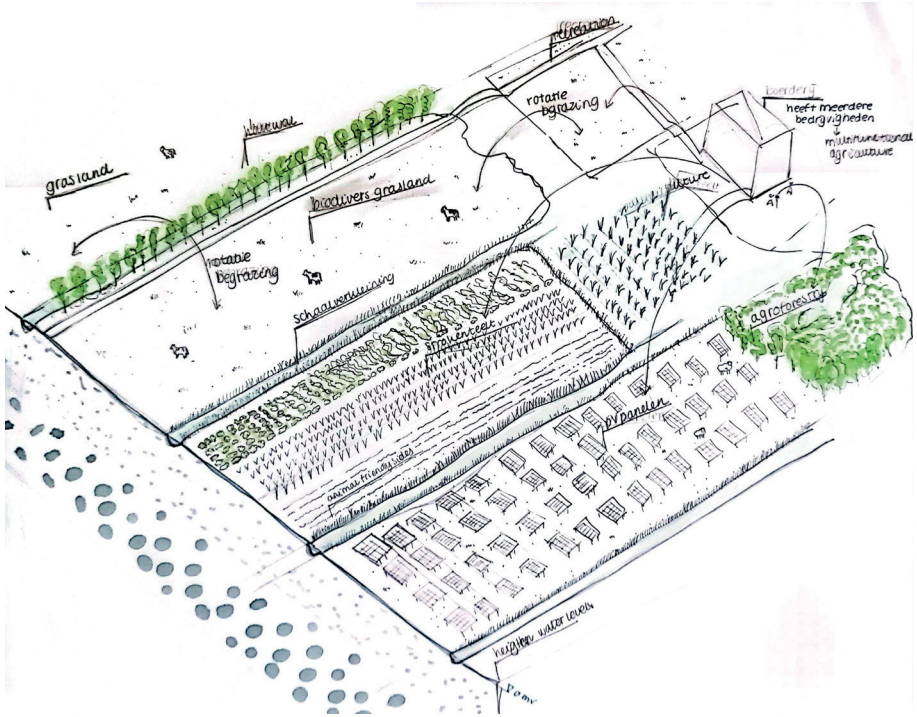
4.1 the landscape

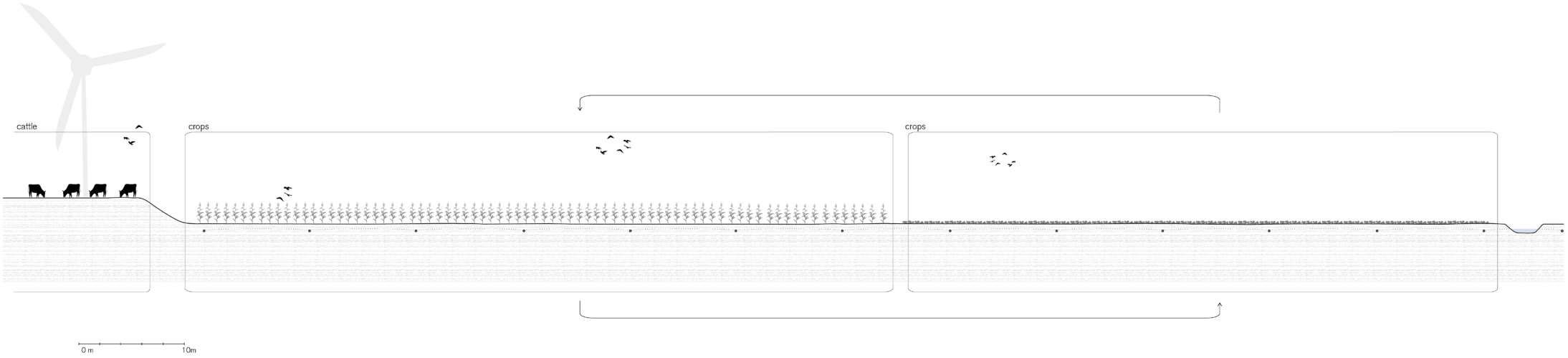
Agriculture

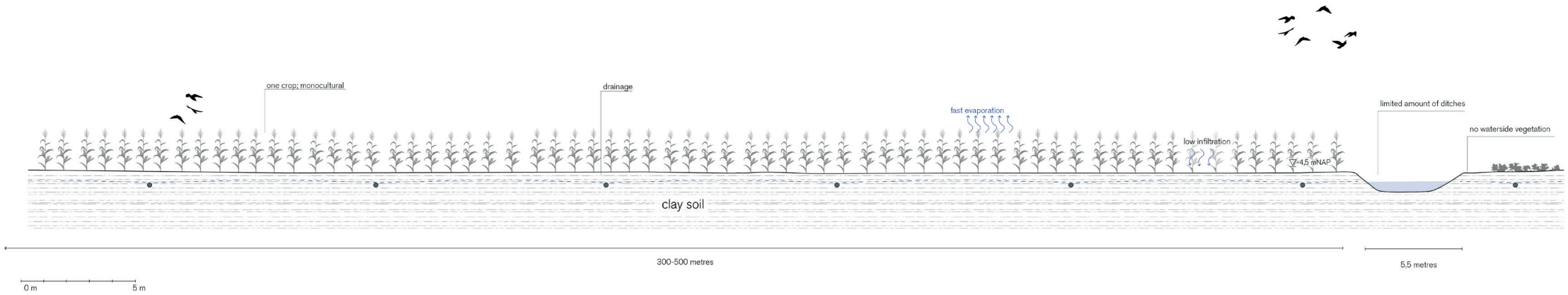


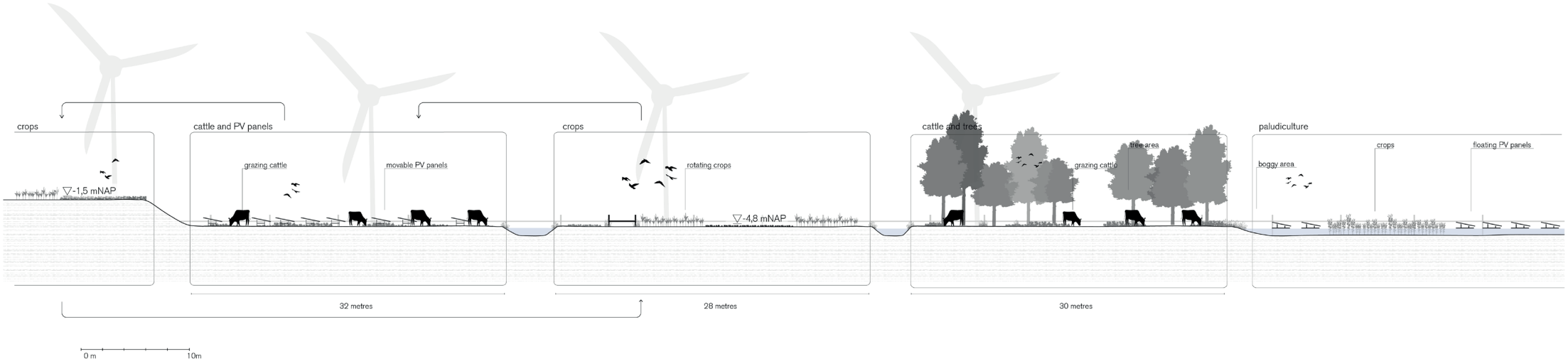


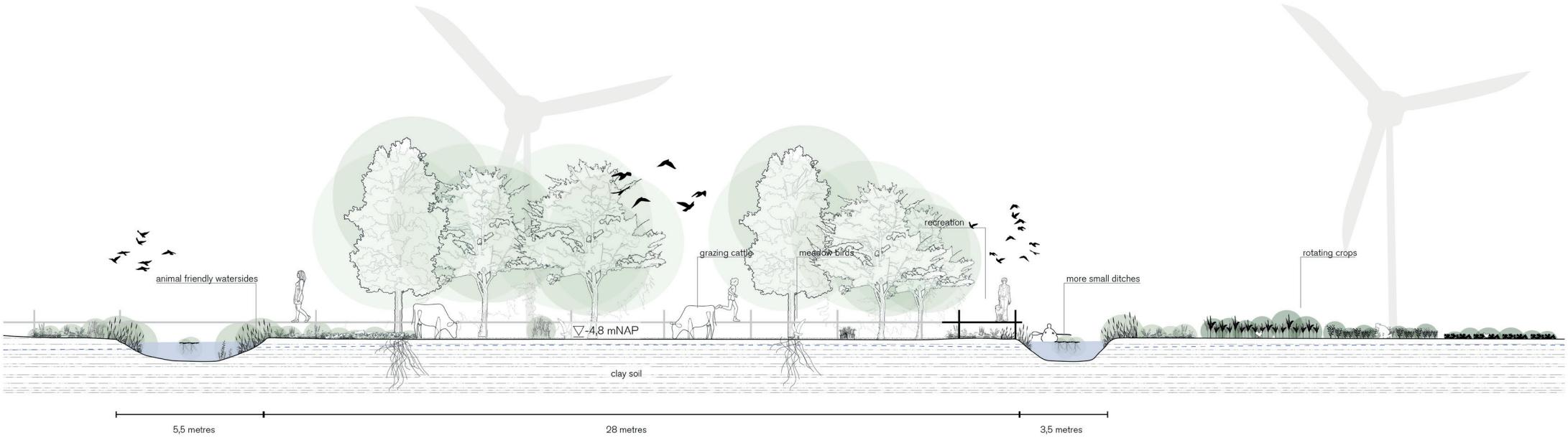
Agriculture

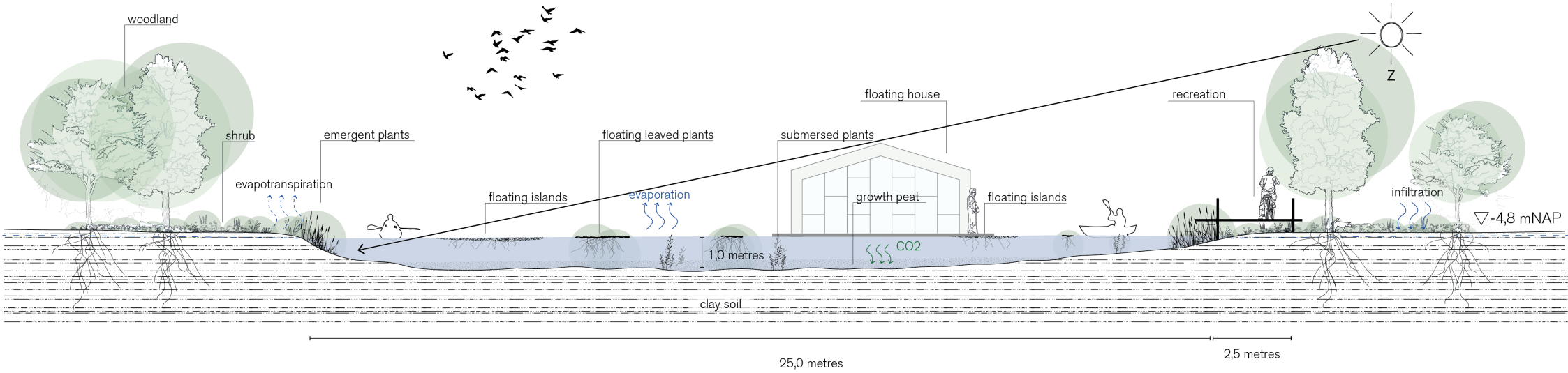


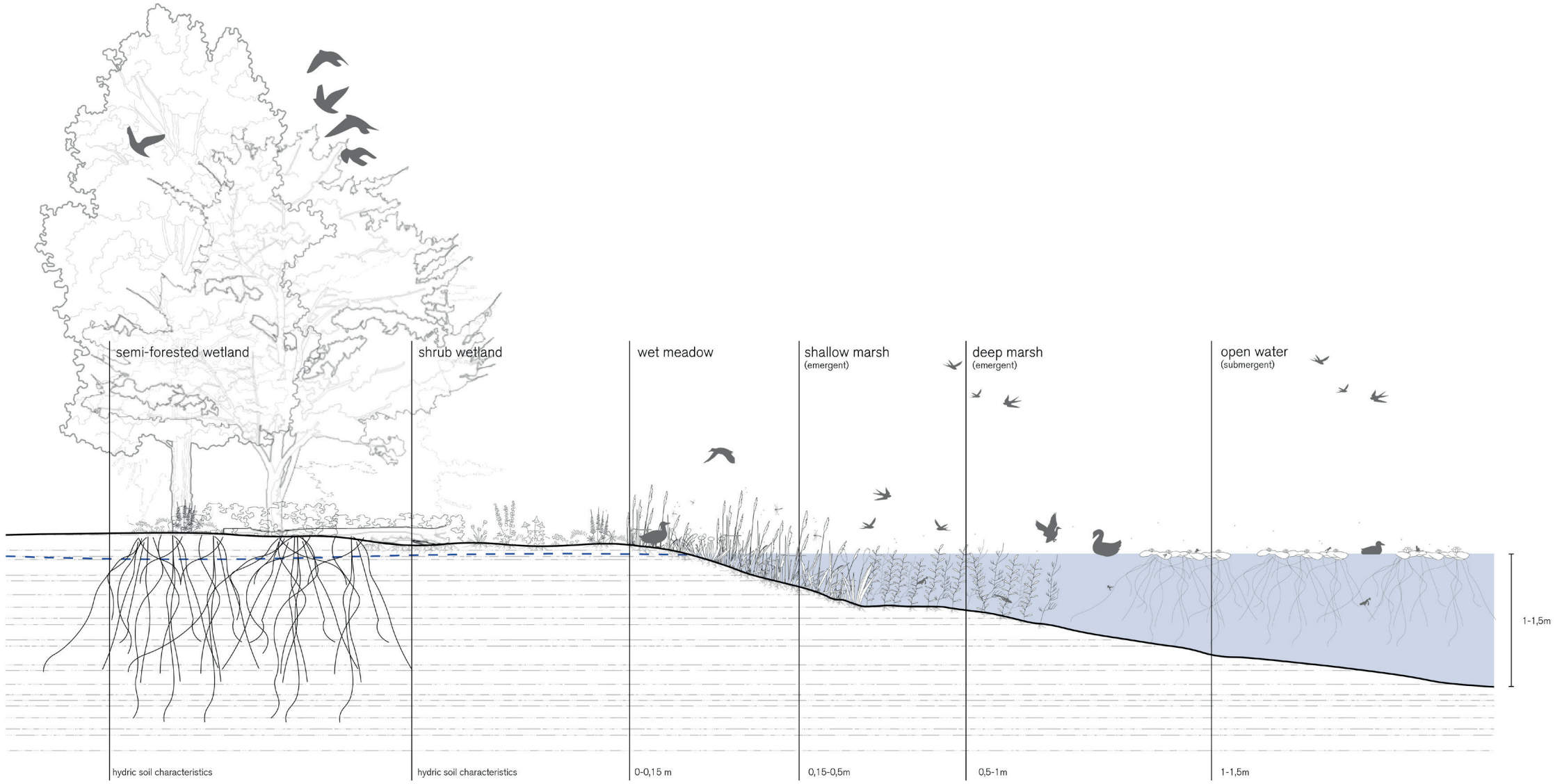

cattle
crops
crops
0 m
10m

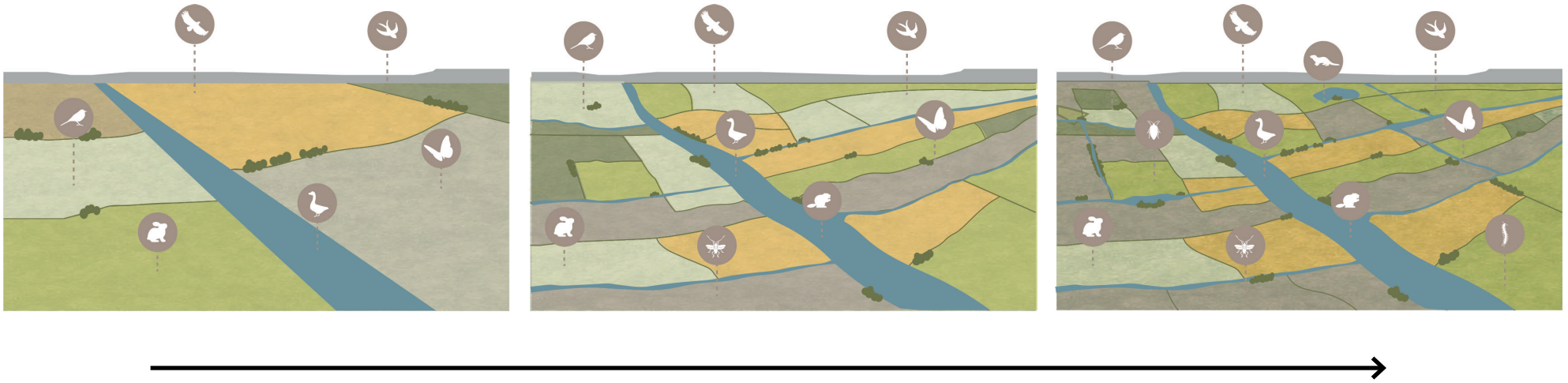

one crop; monocultural
drainage
fast evaporation
low infiltration
limited amount of ditches
no waterside vegetation
-4,5 mNAP
clay soil
300-500 metres
5,5 metres
0 m
5 m


crops
cattle and PV panels
crops
cattle and trees
paludiculture
grazing cattle
movable PV panels
rotating crops
tree area
grazing cattle
boggy area
crops
floating PV panels
▽-1,5 mNAP
▽-4,8 mNAP
32 metres
28 metres
30 metres
0 m
10m


animal friendly watersides
grazing cattle
meadow birds
recreation
more small ditches
rotating crops
▽-4,8 mNAP
clay soil
5,5 metres
28 metres
3,5 metres

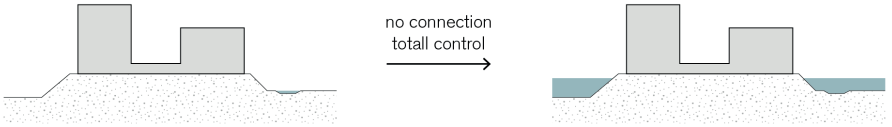

woodland
shrub
emergent plants
evapotranspiration
floating islands
floating leaved plants
evaporation
floating house
submersed plants
growth peat
floating islands
CO2
1,0 metres
recreation
N
infiltration
-4,8 mNAP
clay soil
25,0 metres
2,5 metres

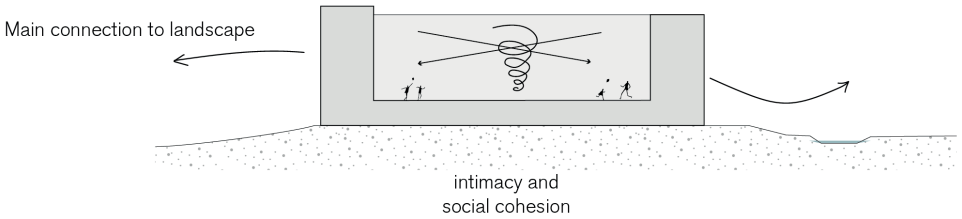

semi-forested wetland
shrub wetland
wet meadow
shallow marsh
(emergent)
deep marsh
(emergent)
open water
(submergent)
1-1,5m
hydric soil characteristics
hydric soil characteristics
0-0,15 m
0,15-0,5m
0,5-1m
1-1,5m

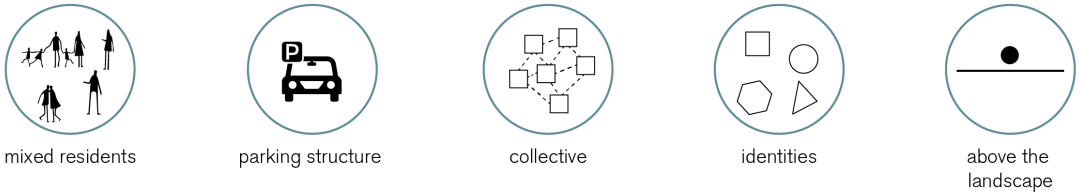


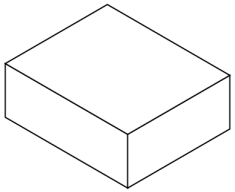
4.2 urban areas

Urban expansion

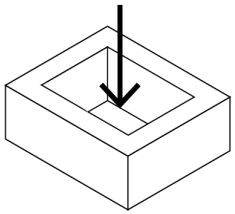




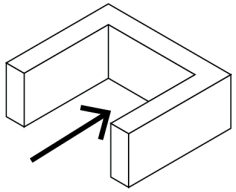




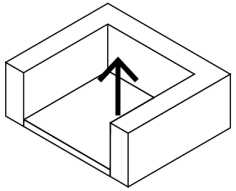
basic block



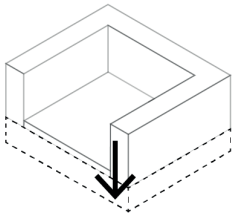
communal inside



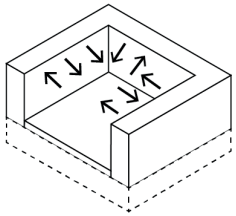
connection landscape



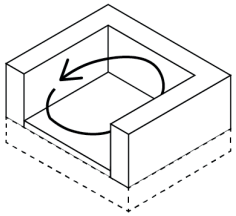
safe in case of high water



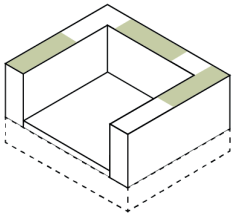
parking structure



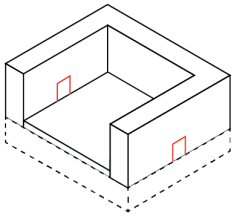
variation to bring back small scale



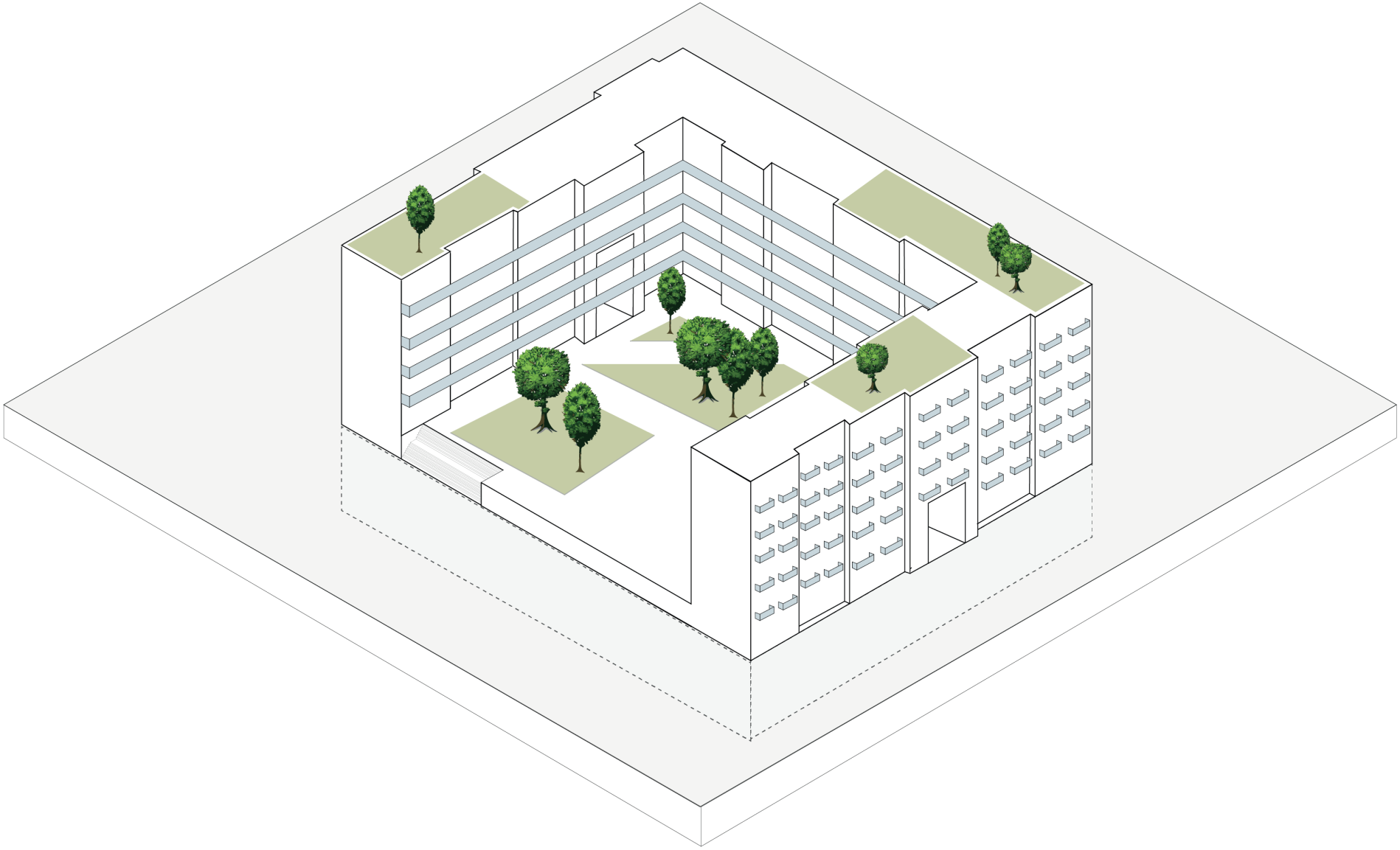
circulation inside block



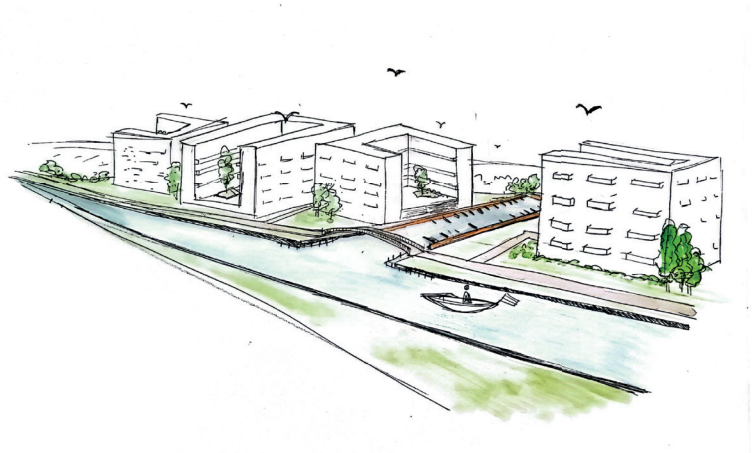
use of roofs



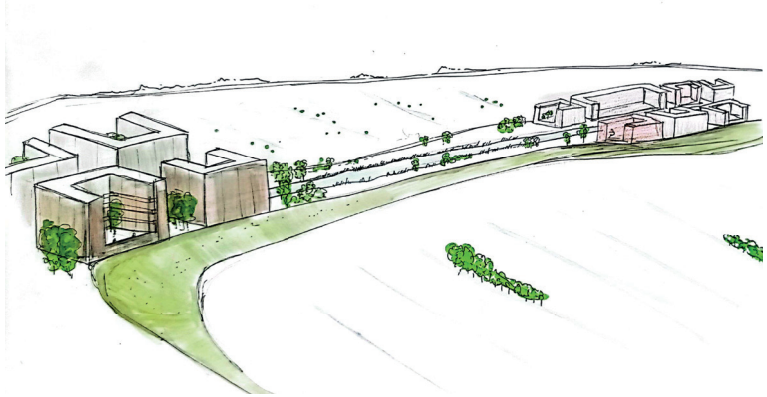
openings in facade



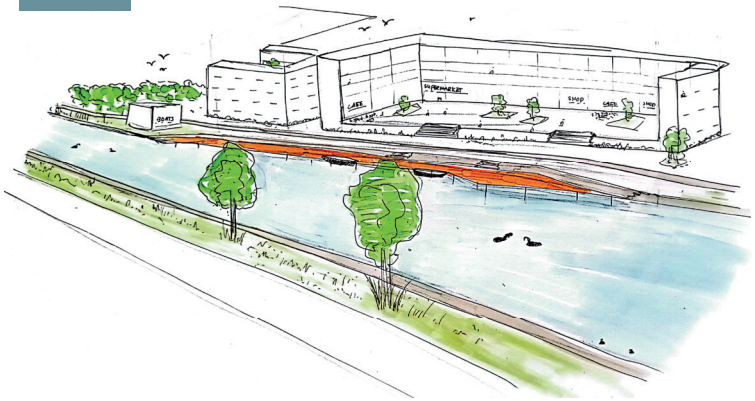
landscape



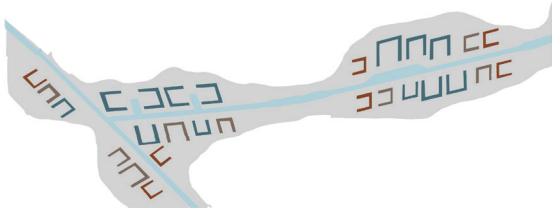
water

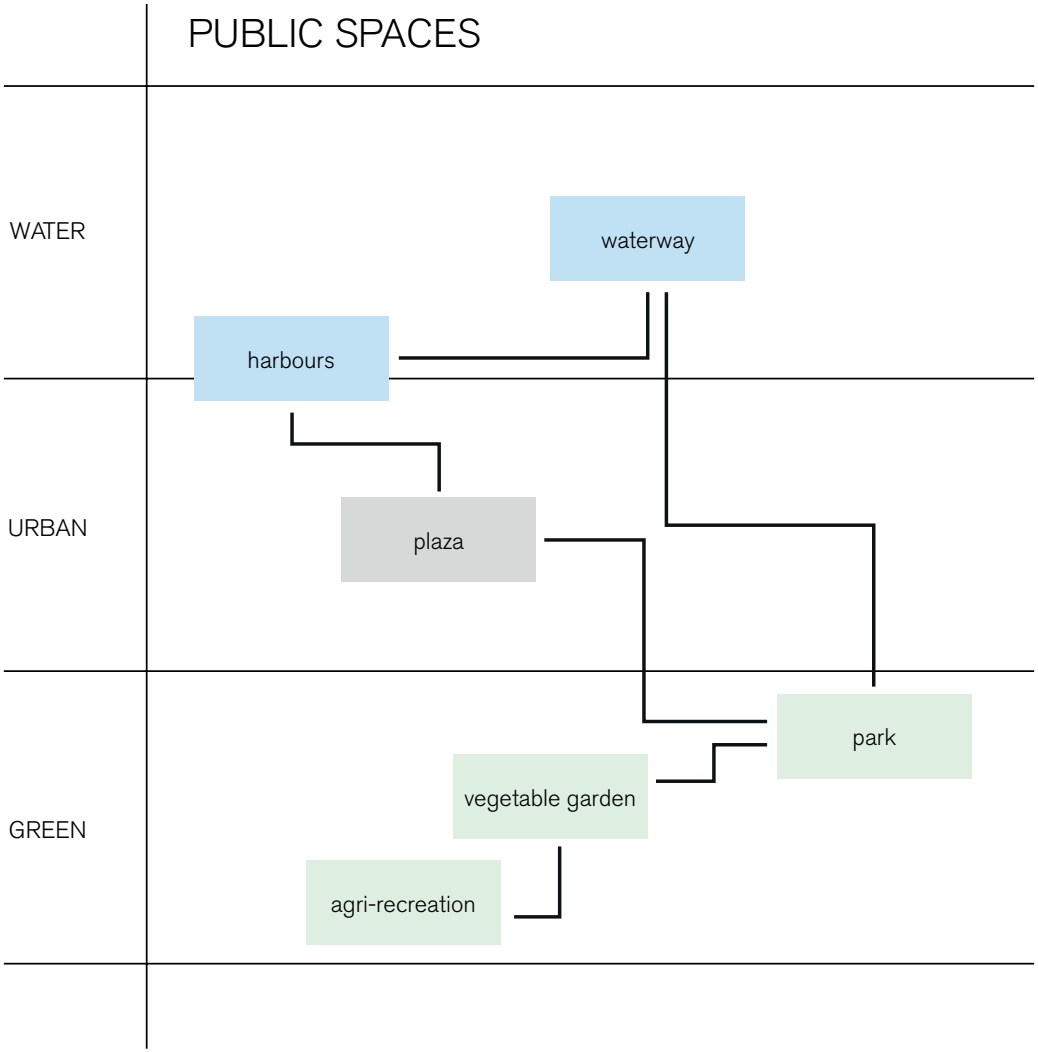


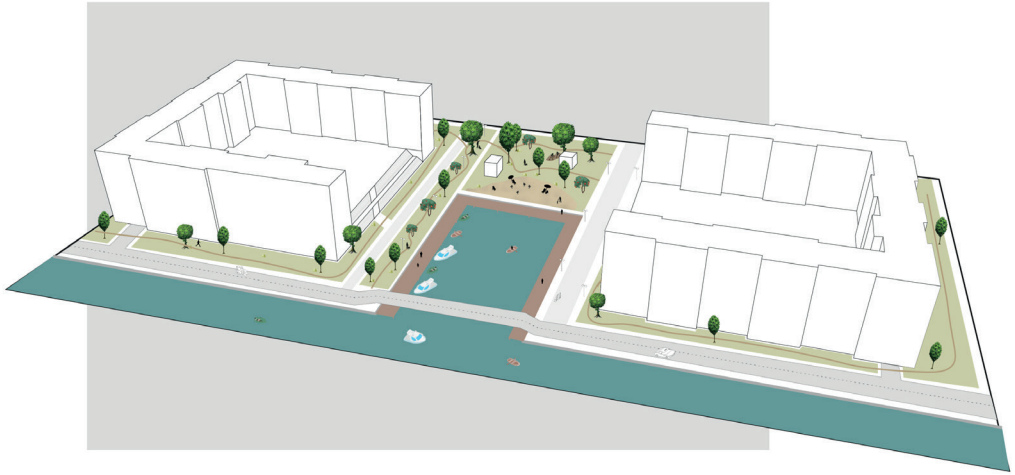
dike

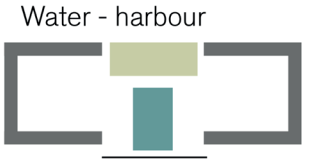


water

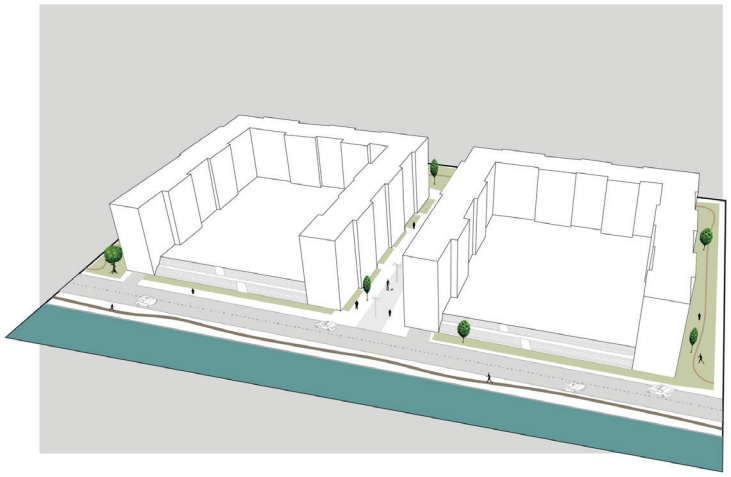


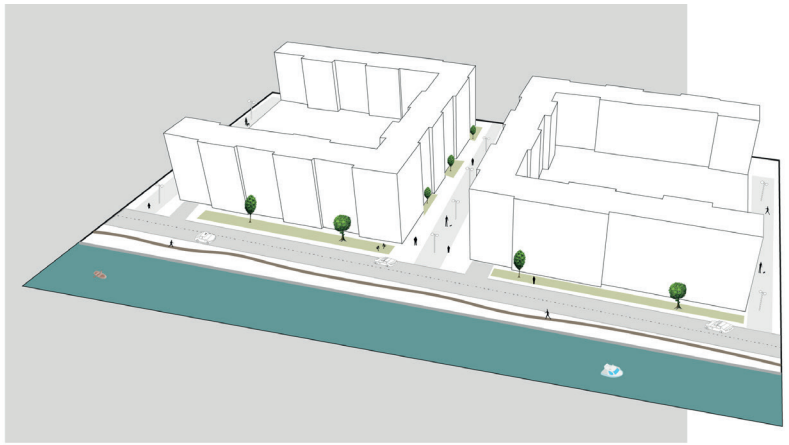

PUBLIC SPACES
WATER
URBAN
GREEN
waterway
harbours
plaza
park
vegetable garden
agri-recreation





place for boats, place to swim, small park





Urban

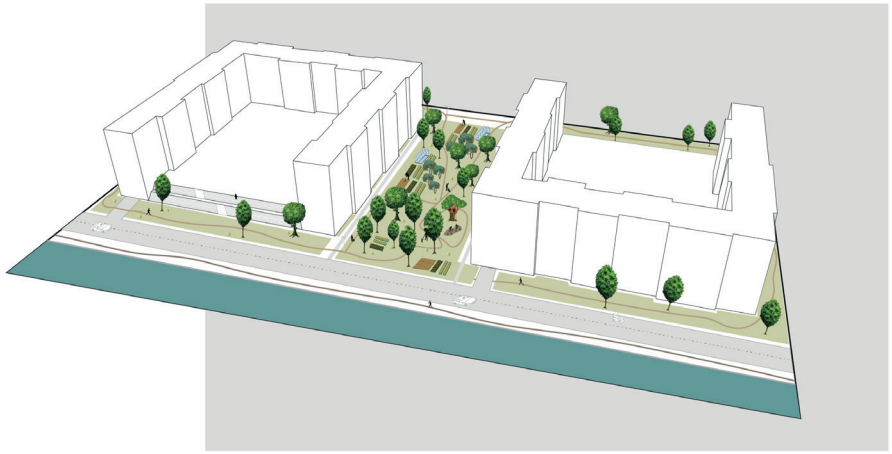
20 m

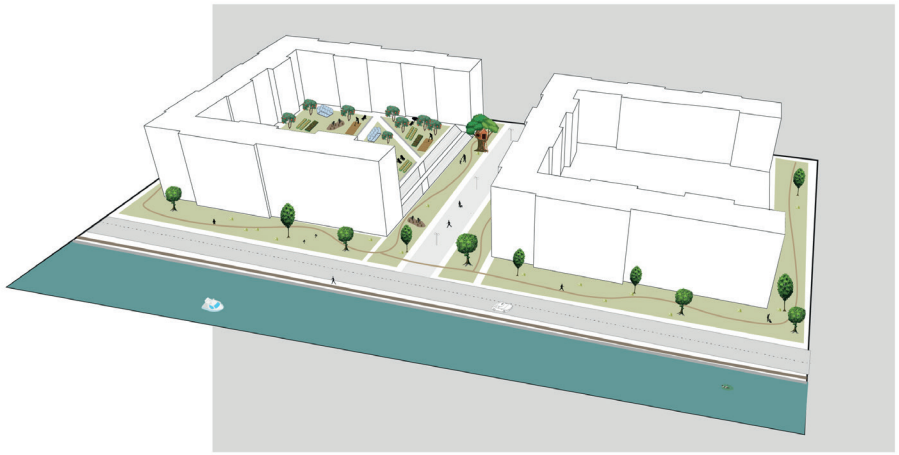
city street, adjacent gardens

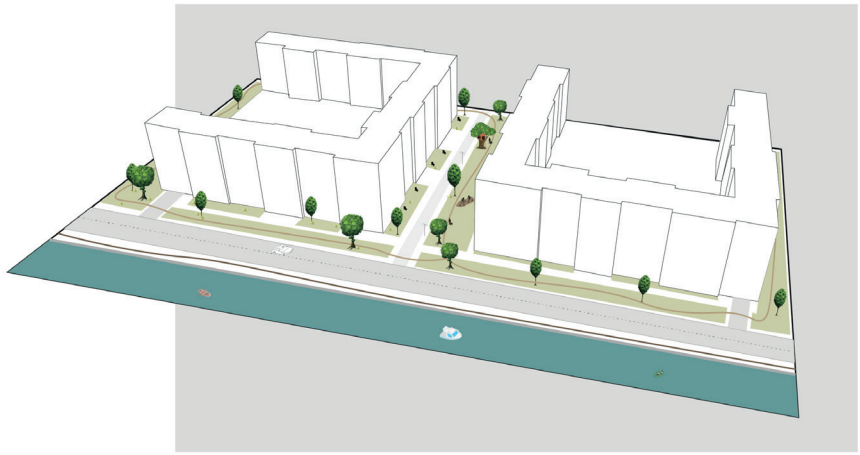
Urban

20 m

city street, adjacent gardens



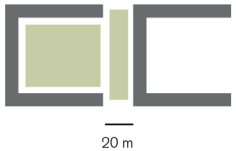




Green - park

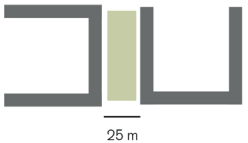
vegetable gardens, playground, pedestrian path

Green - communal



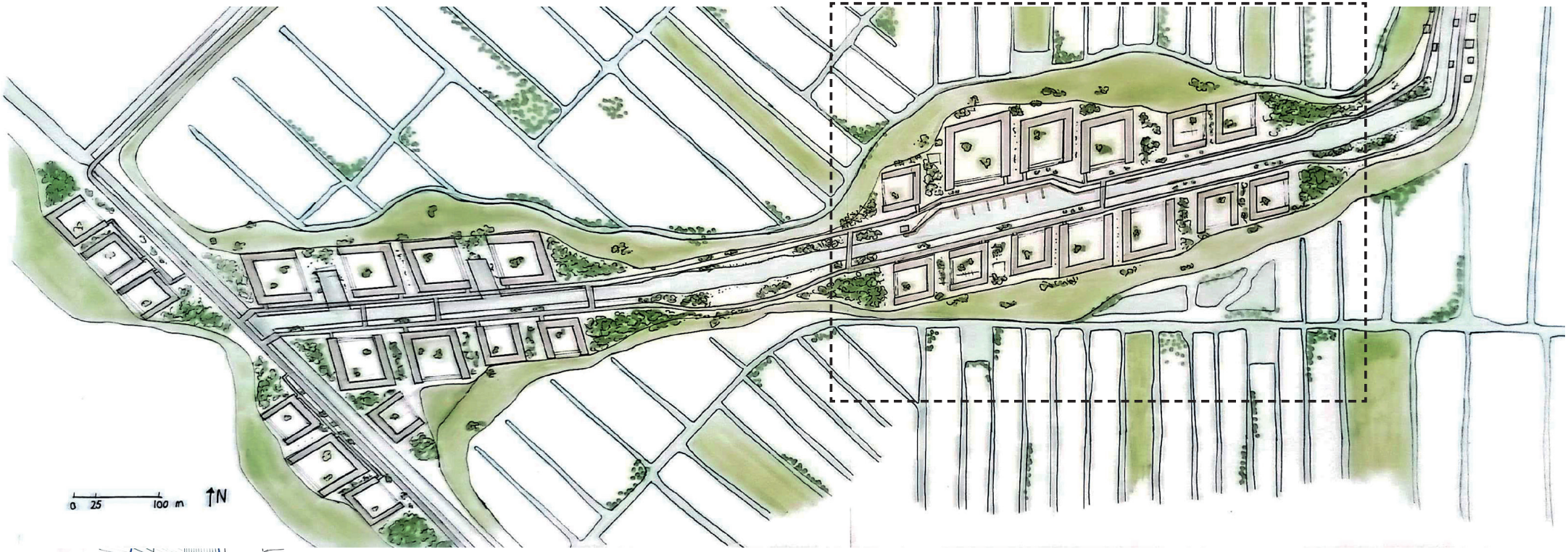
communal gardens, pedestrian paths

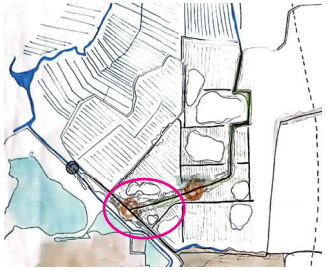
Green - street



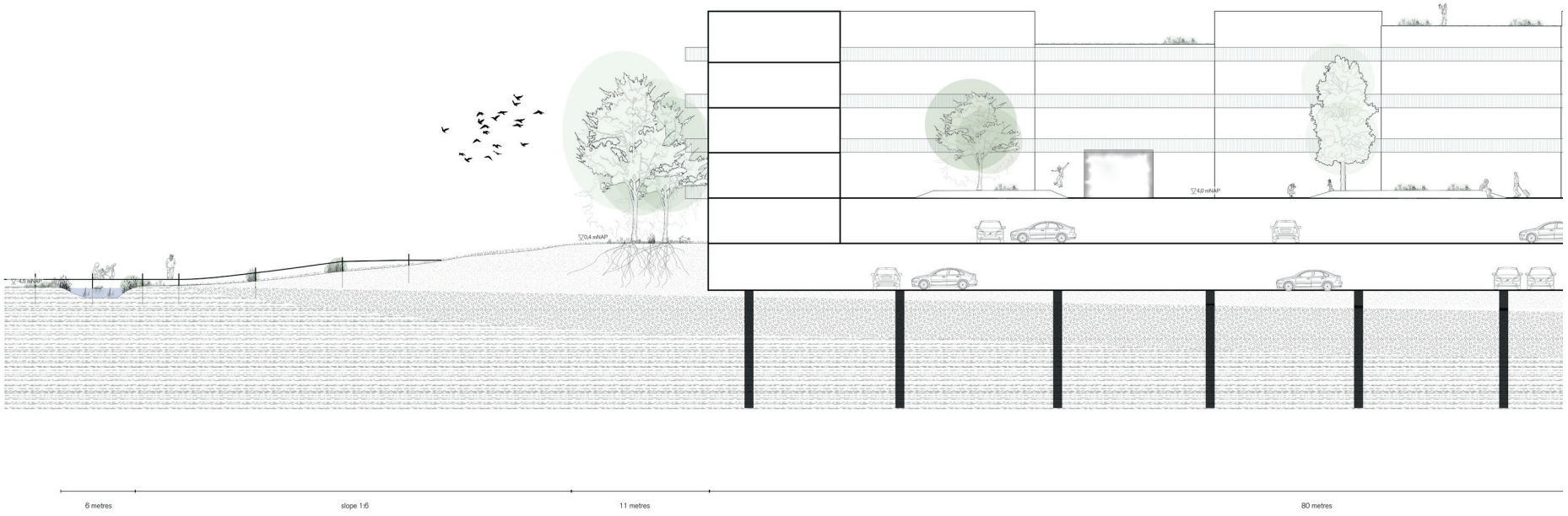
communal gardens, pedestrian paths

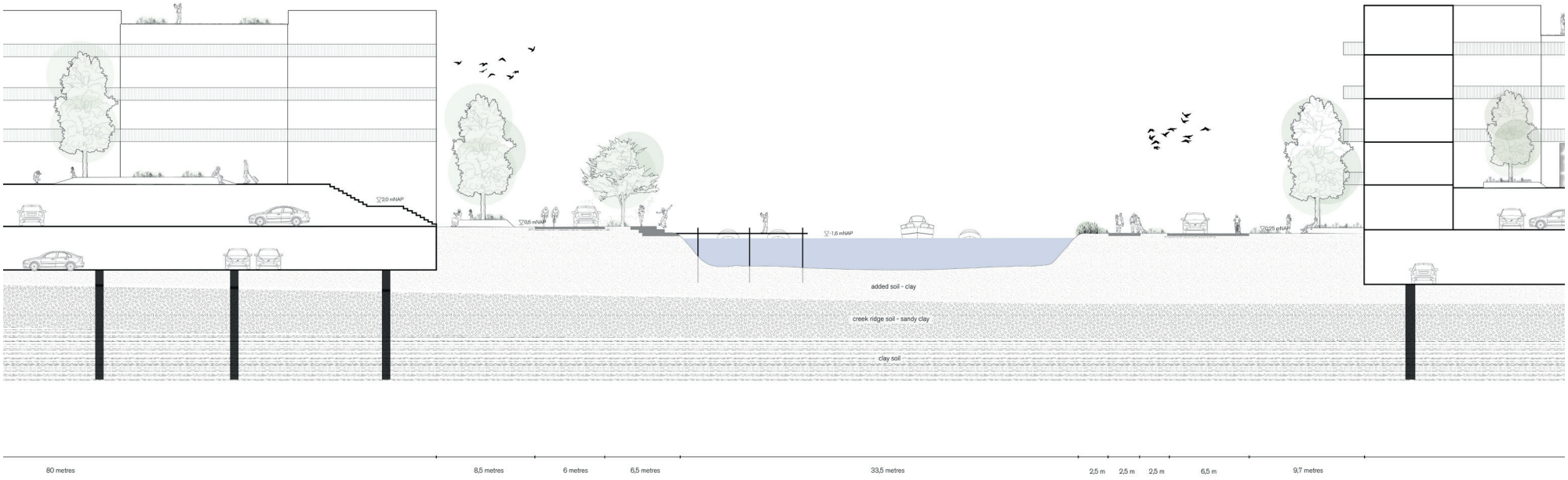
Urban expansion

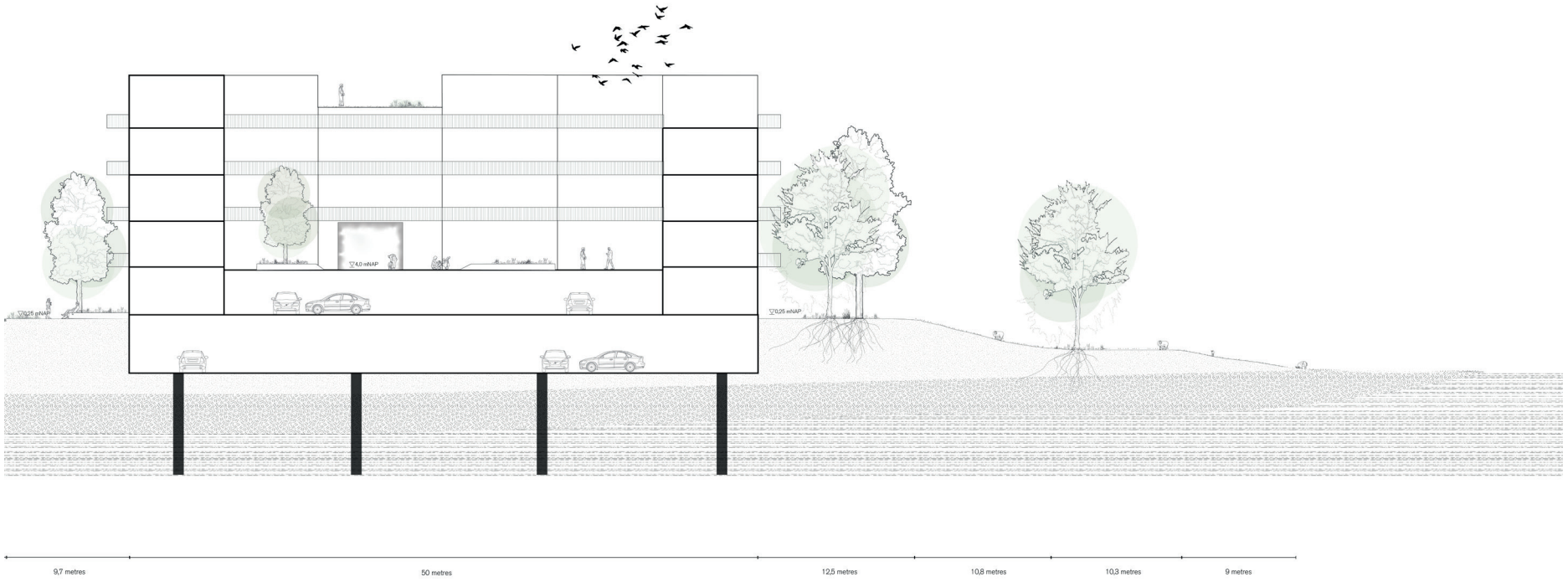


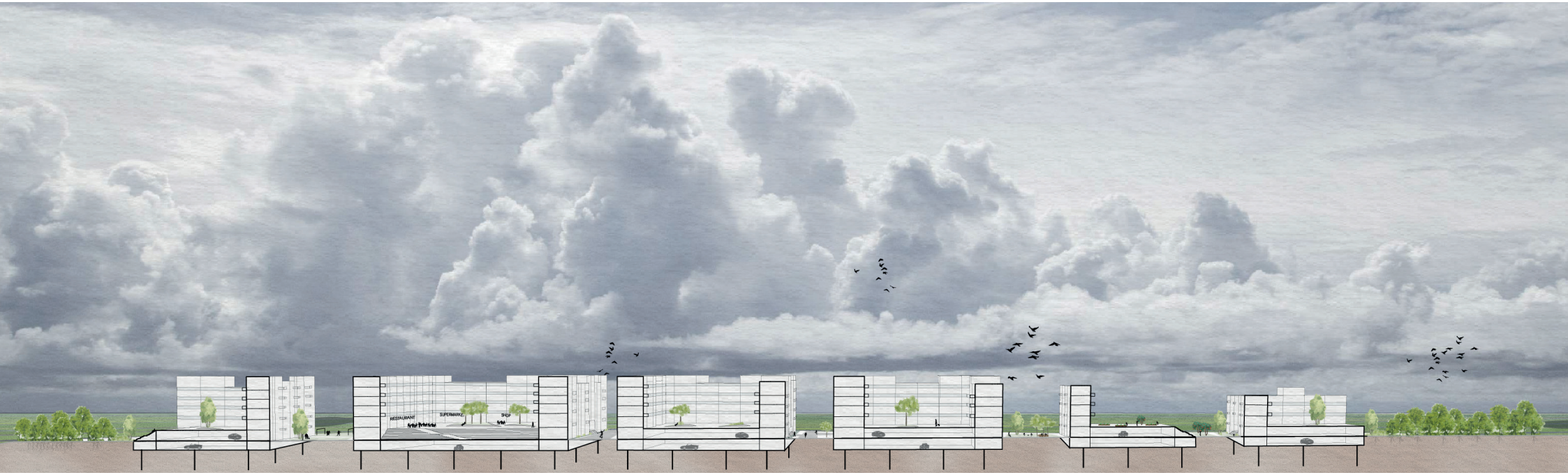


Urban expansion

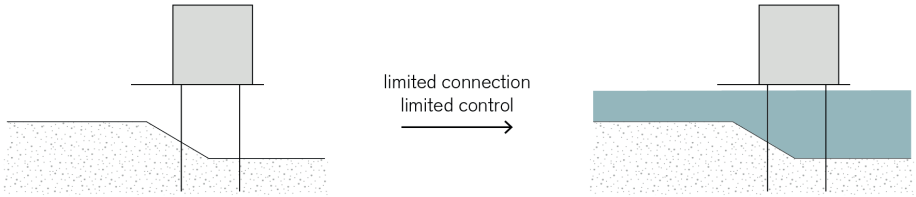

▽4.5 mNAP
▽0.4 mNAP
▽4.0 mNAP
6 metres
slope 1:6
11 metres
80 metres

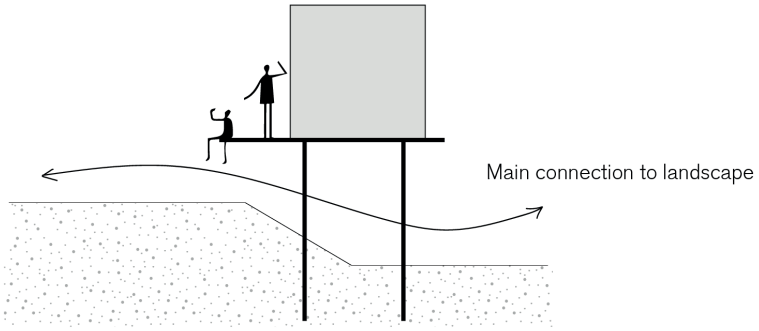

▽2,0 mNAP
▽0,6 mNAP
▽-1,8 mNAP
▽0,25 gNAP
added soil - clay
creek ridge soil - sandy clay
clay soil
80 metres
8,5 metres
6 metres
6,5 metres
33,5 metres
2,5 m
2,5 m
2,5 m
6,5 m
9,7 metres

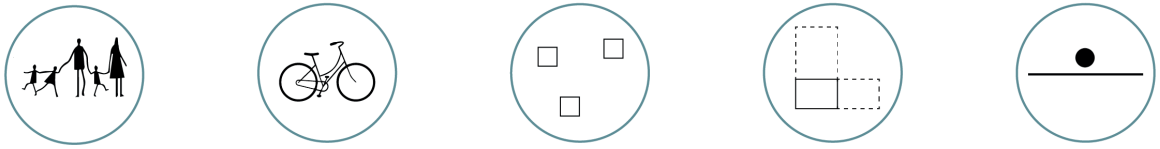

▽4.0 mNAP
▽0.25 mNAP
▽0.25 mNAP
9,7 metres
50 metres
12,5 metres
10,8 metres
10,3 metres
9 metres


RESTAURANT
SUPERMARKET
SHOP

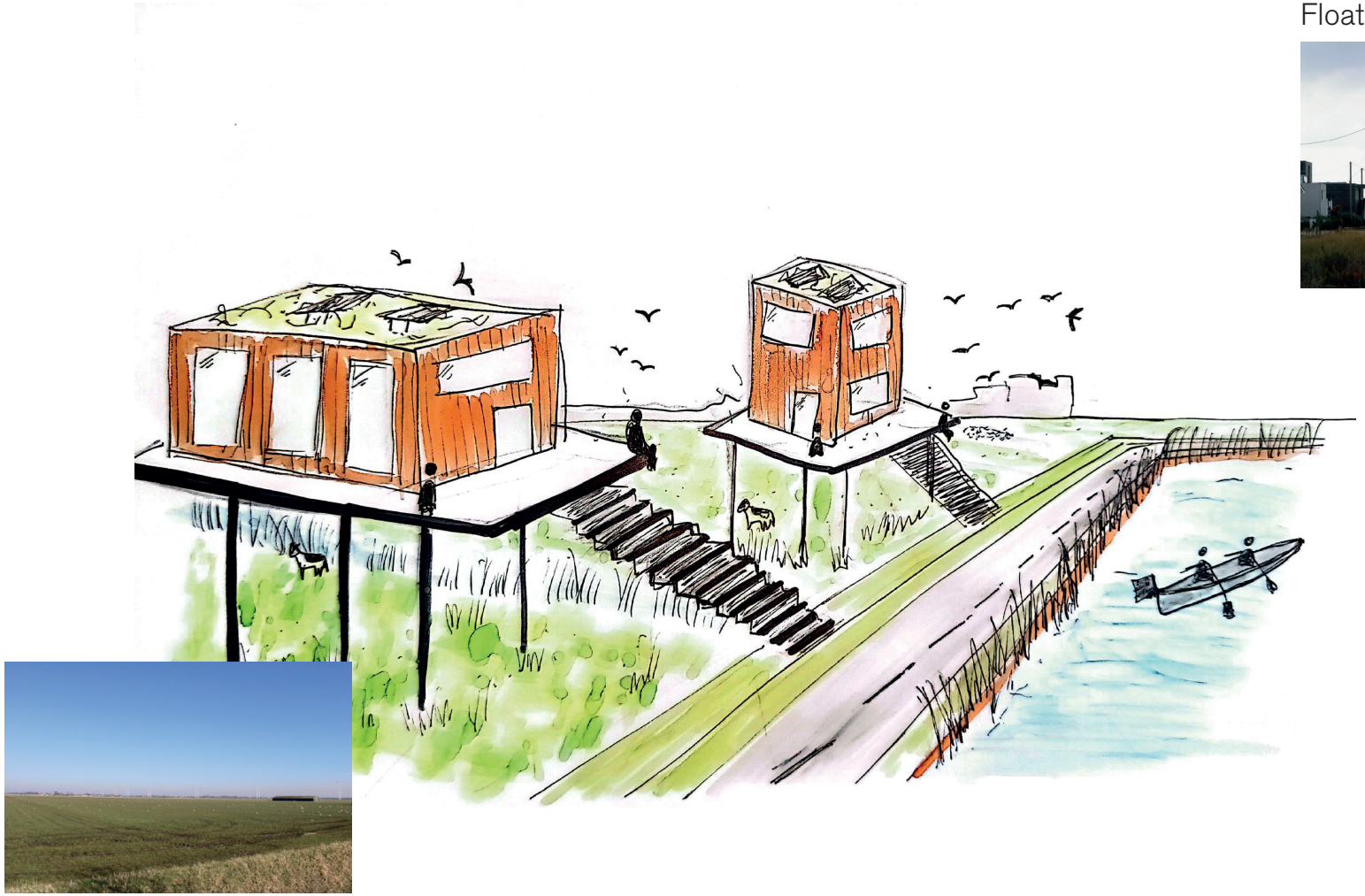
Houses on poles







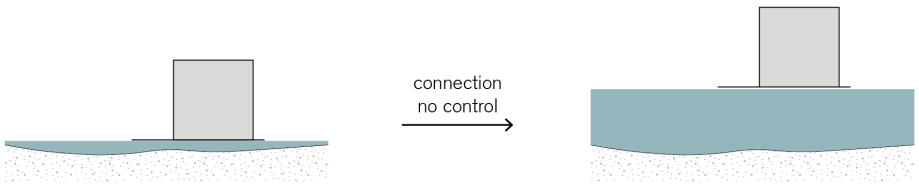
Houses on poles

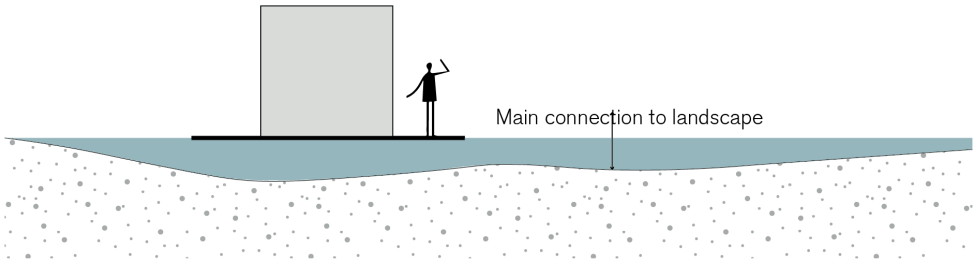


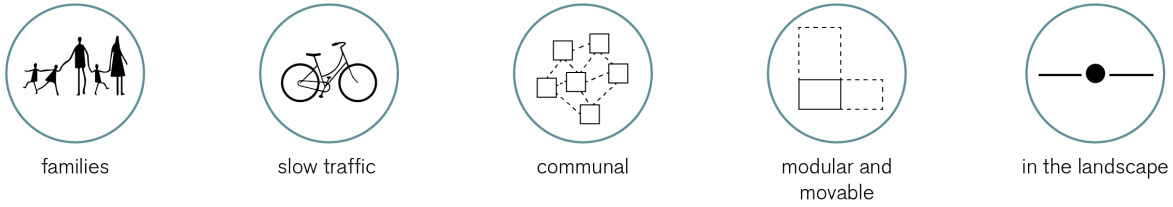
Floating houses

Photo by Hélène Binet

Floating homes







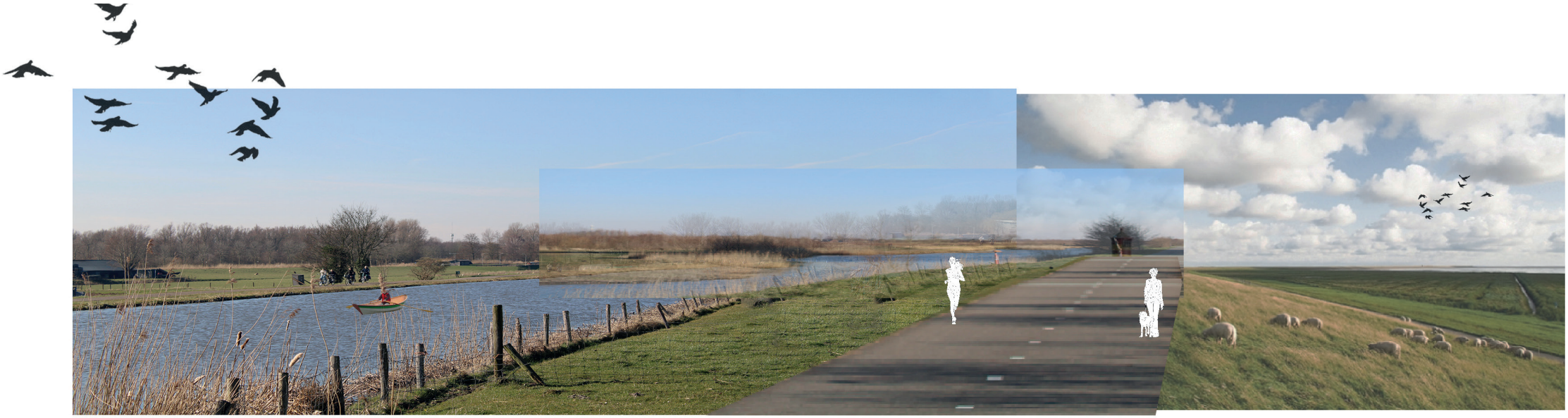
Floating homes

Floating infrastrucuture

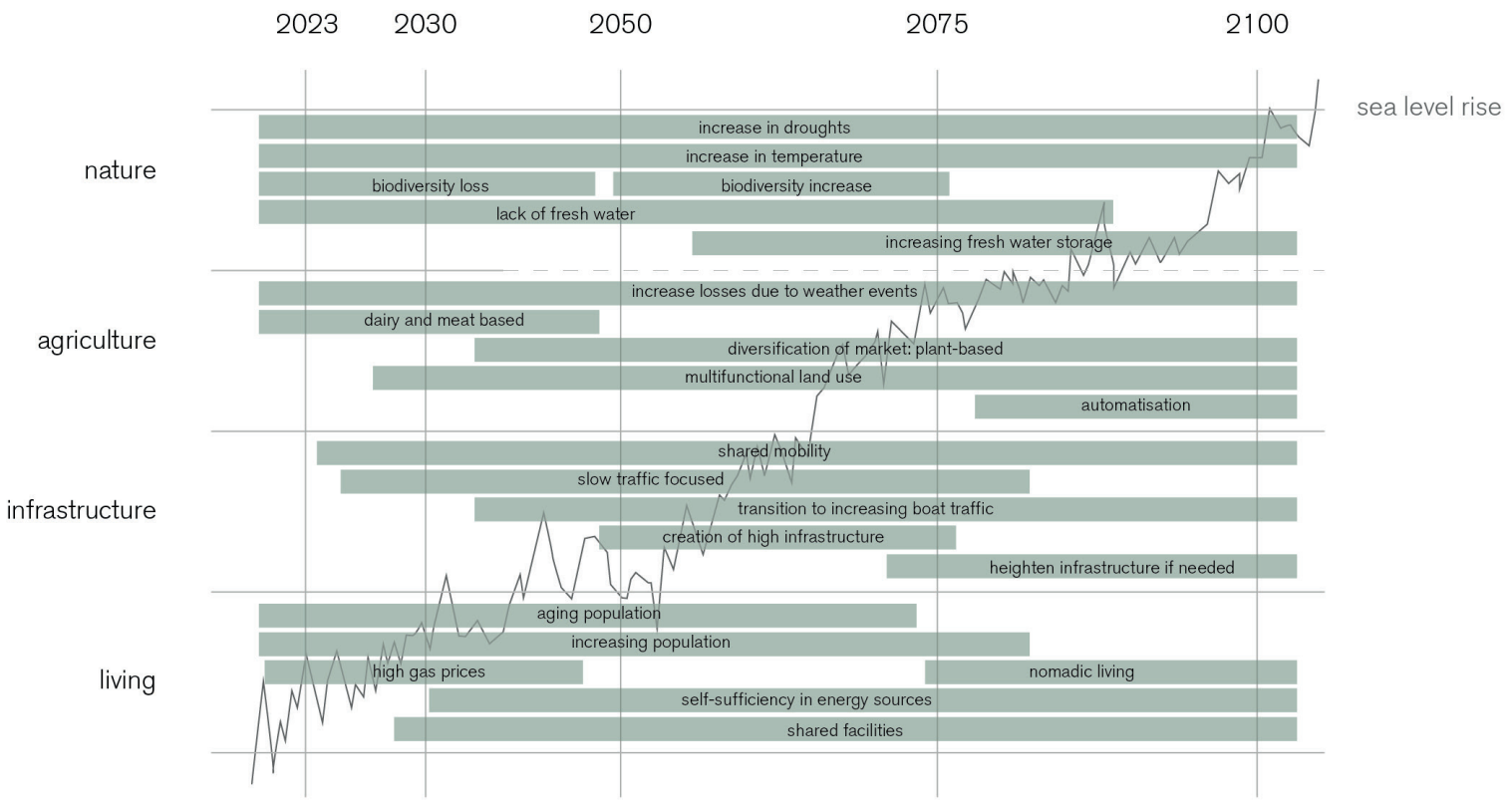
Image: Ali Fard and Ghazal Jafari

Floating houses

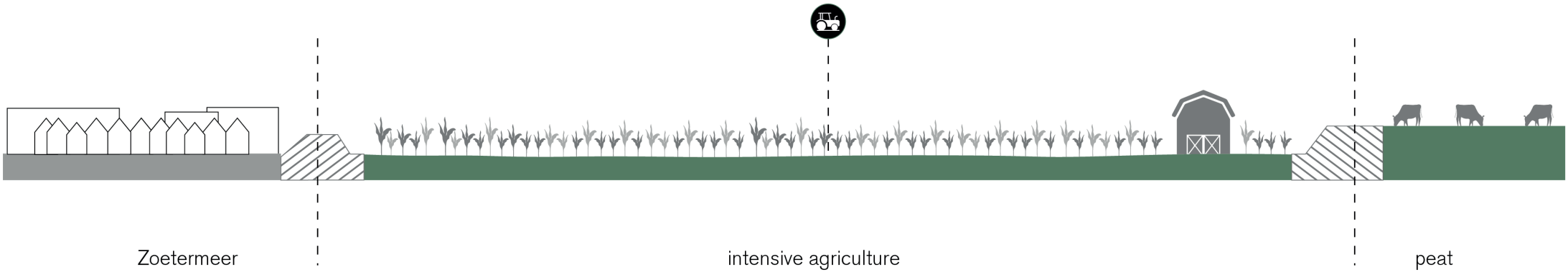
Image: Floating Home



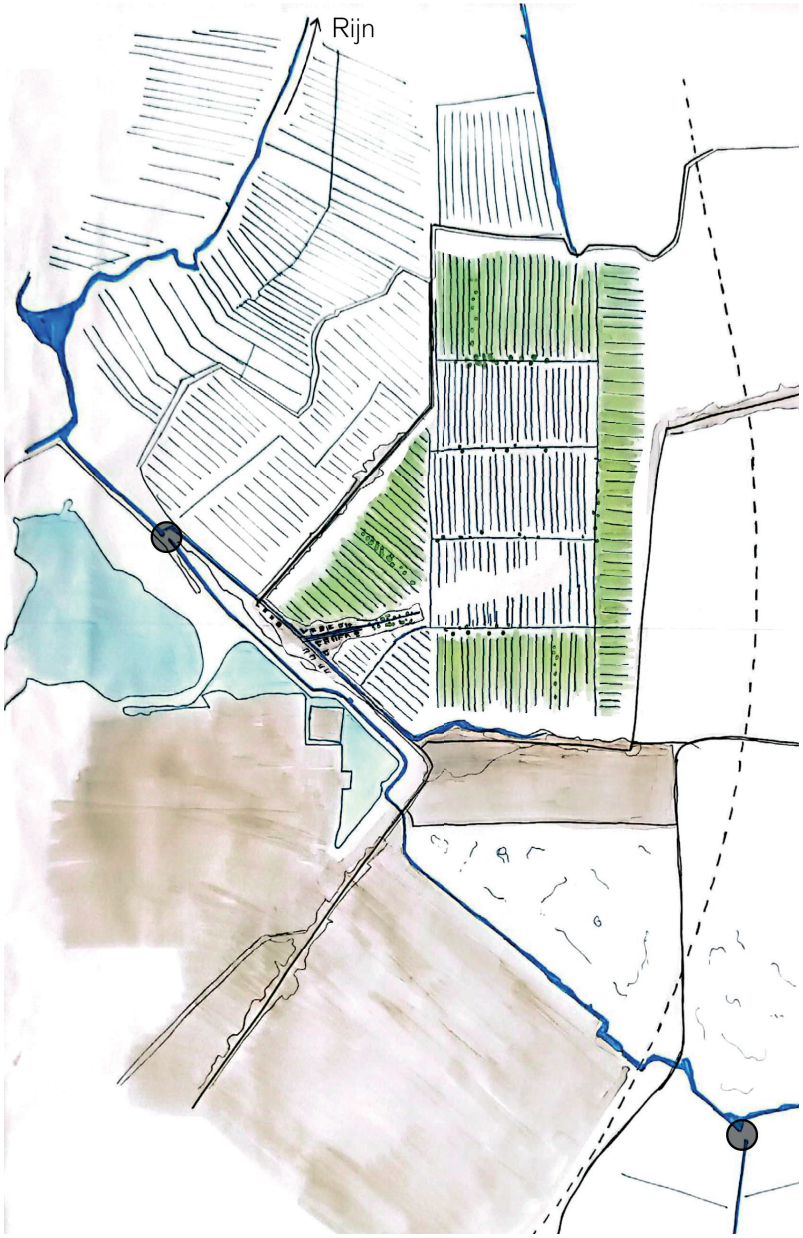
4.3 design for a transition


2023
2030
2050
2075
2100
sea level rise
nature
increase in droughts
increase in temperature
biodiversity loss
biodiversity increase
lack of fresh water
increasing fresh water storage
agriculture
increase losses due to weather events
dairy and meat based
diversification of market: plant-based
multifunctional land use
automatisation
infrastructure
shared mobility
slow traffic focused
transition to increasing boat traffic
creation of high infrastructure
heighten infrastructure if needed
living
aging population
increasing population
high gas prices
nomadic living
self-sufficiency in energy sources
shared facilities

Current landscape


Zoetermeer
intensive agriculture
peat

Landscape in 2023

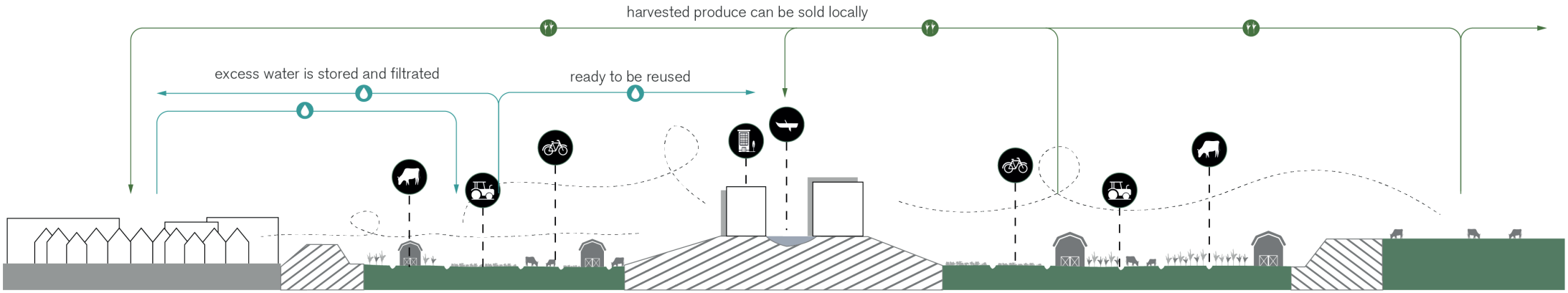


Soil Balance

Needed

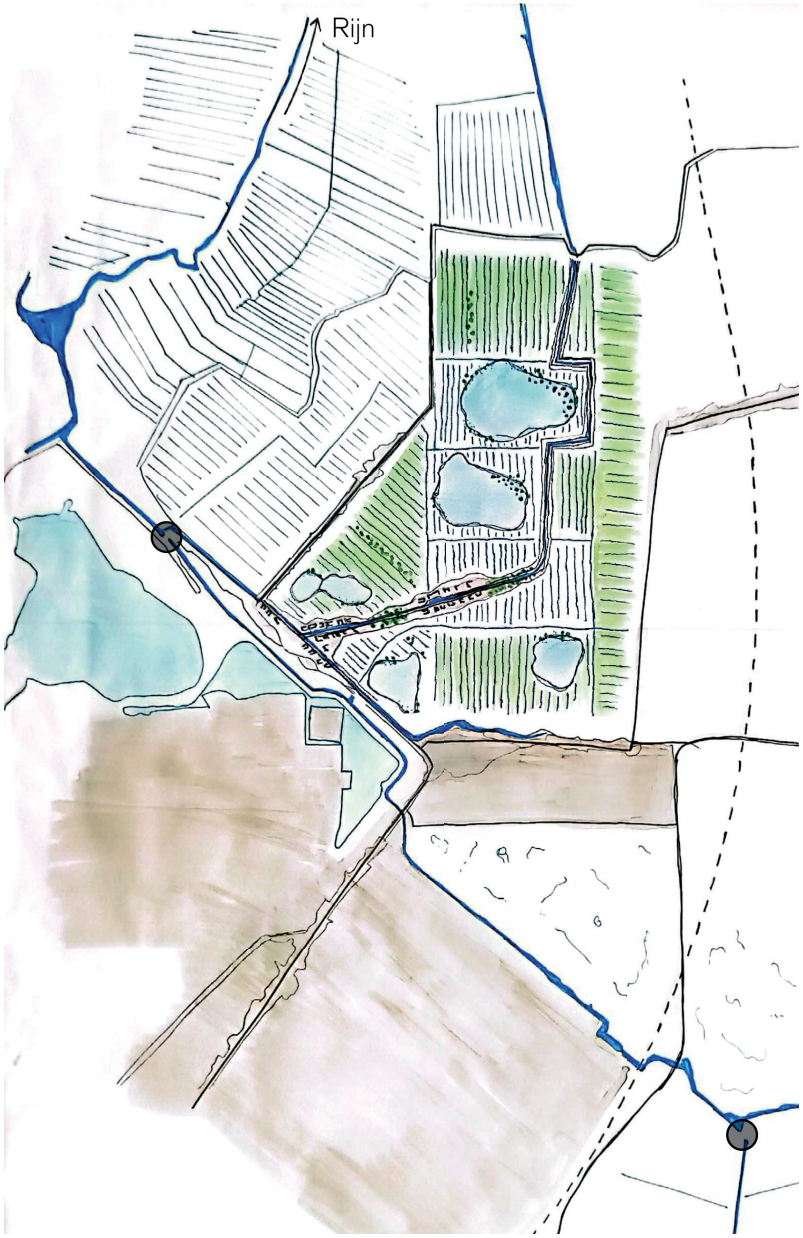
227.500 m^3

urban area > -1,5mNAP
urban area < -1,5 mNAP
road
high speed rail
ditches
connected waterways
large waterbody
lock



Zoetermeer | extensive agriculture | dike body with residential area | extensive agriculture | peat

Landscape in 2030

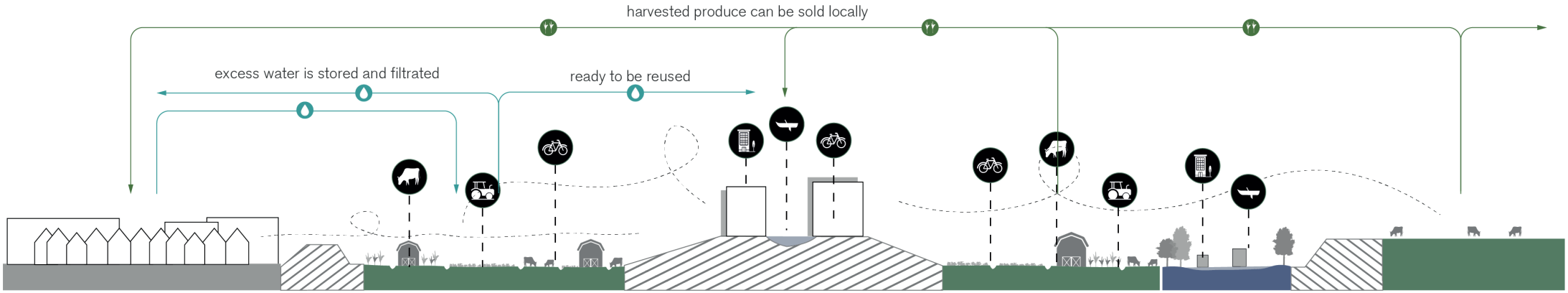


Soil Balance

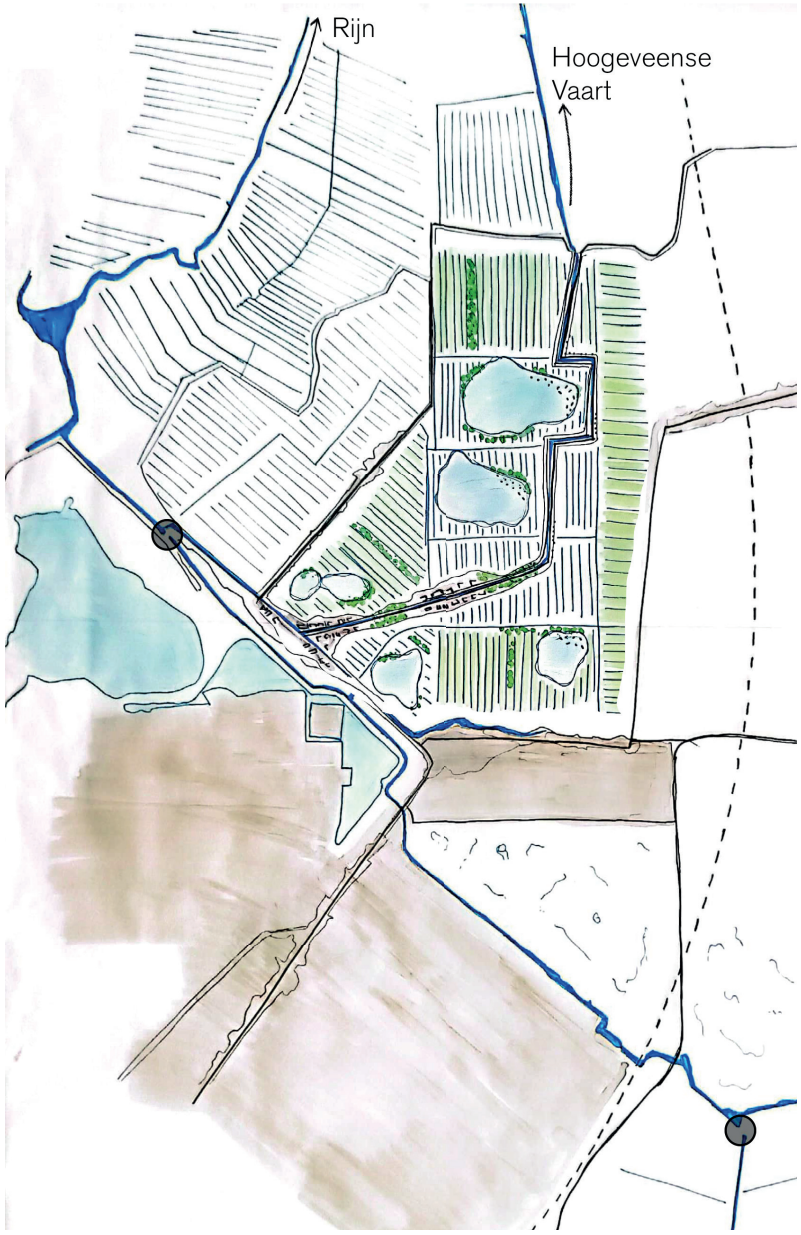
Needed

325.000 m^3

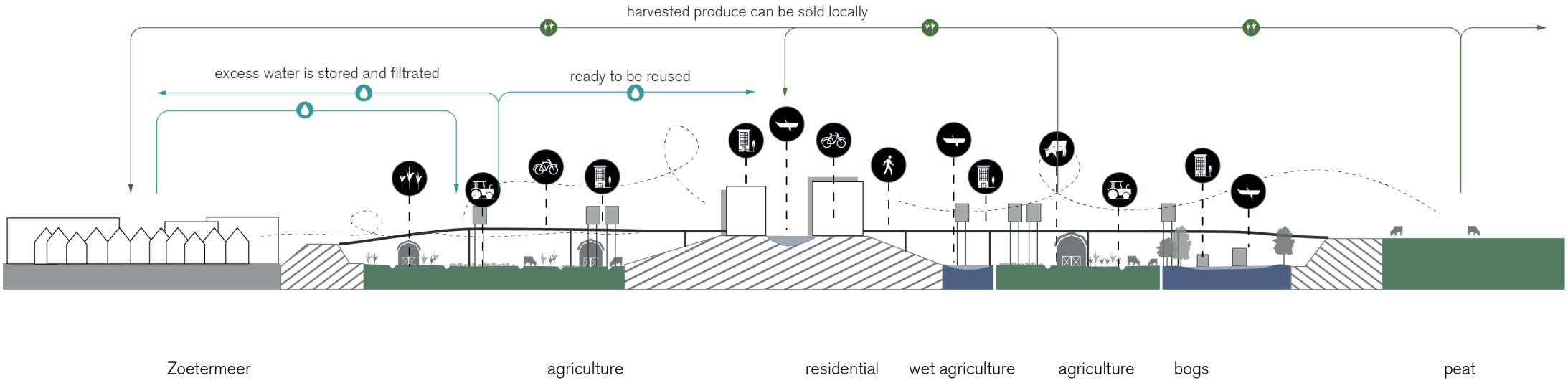
urban area > -1,5mNAP
urban area < -1,5 mNAP
road
high speed rail
ditches
connected waterways
large waterbody
lock


harvested produce can be sold locally
excess water is stored and filtrated
ready to be reused
Zoetermeer
extensive agriculture
residential
extensive agriculture
bogs
peat

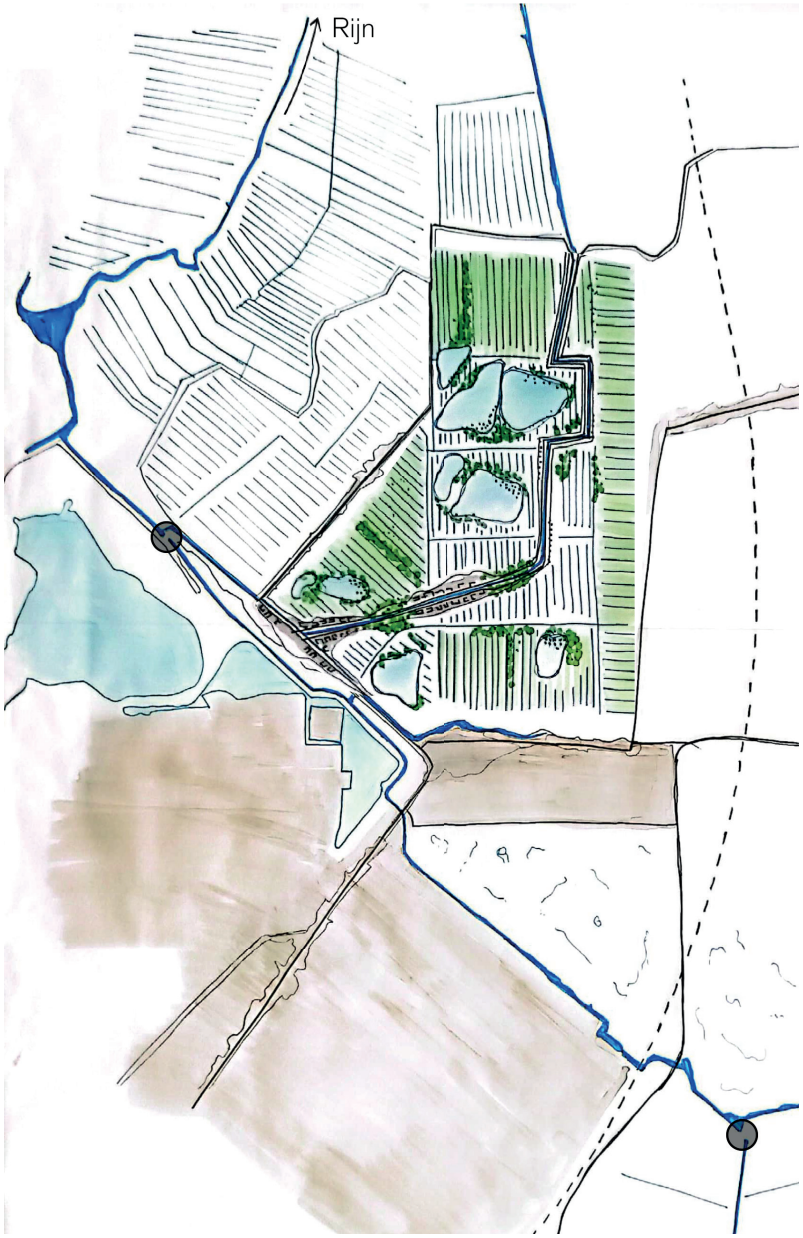
Landscape in 2050

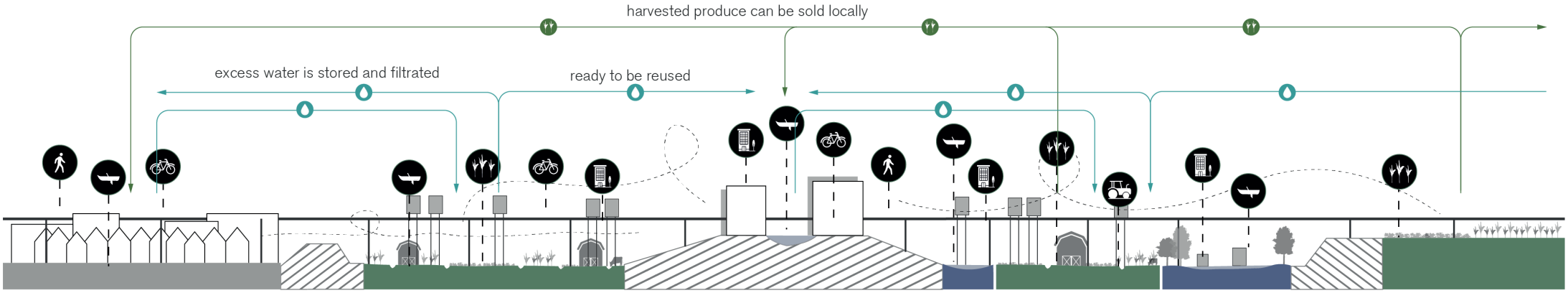


urban area > -1,5mNAP
urban area < -1,5 mNAP
road
high speed rail
ditches
connected waterways
large waterbody
lock

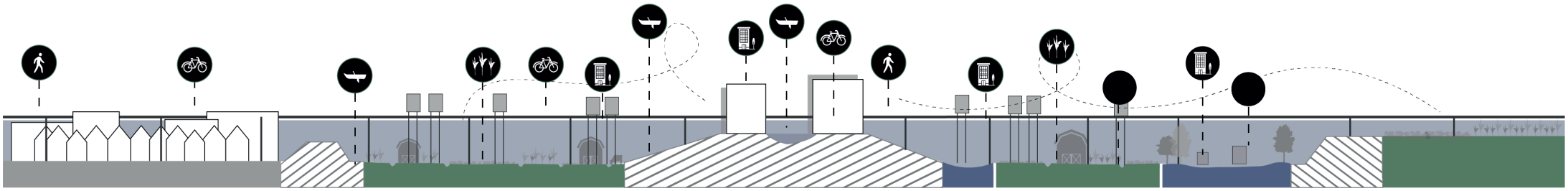

harvested produce can be sold locally
excess water is stored and filtrated
ready to be reused
Zoetermeer
agriculture
residential
wet agriculture
agriculture
bogs
peat

Landscape in 2075




harvested produce can be sold locally
excess water is stored and filtrated
ready to be reused
Zoetermeer
agriculture
residential
wet agriculture
agriculture
bogs
peat

Landscape in 2100

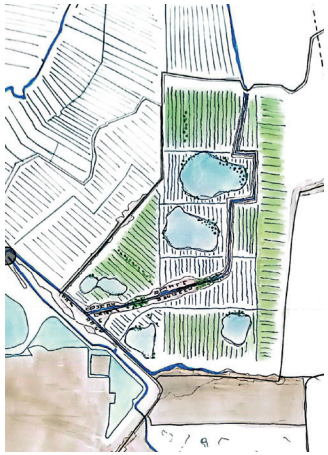


Zoetermeer agriculture residential wet agriculture agriculture bogs peat

Landscape in 2100

2022

2023



2030

2050

2075

2100

Conclusion

Added values

Time + investment = future value

de Vries, J. (1978). Barges and Capitalism. Passenger Transportation in the Dutch Economy, 1632-1839.

Cultural history + investment = future value

Feddes, F. (Ed.). (1999). Nota Belvedere. Beleidsnota over de relatie cultuurhistorie en ruimtelijke inrichting.

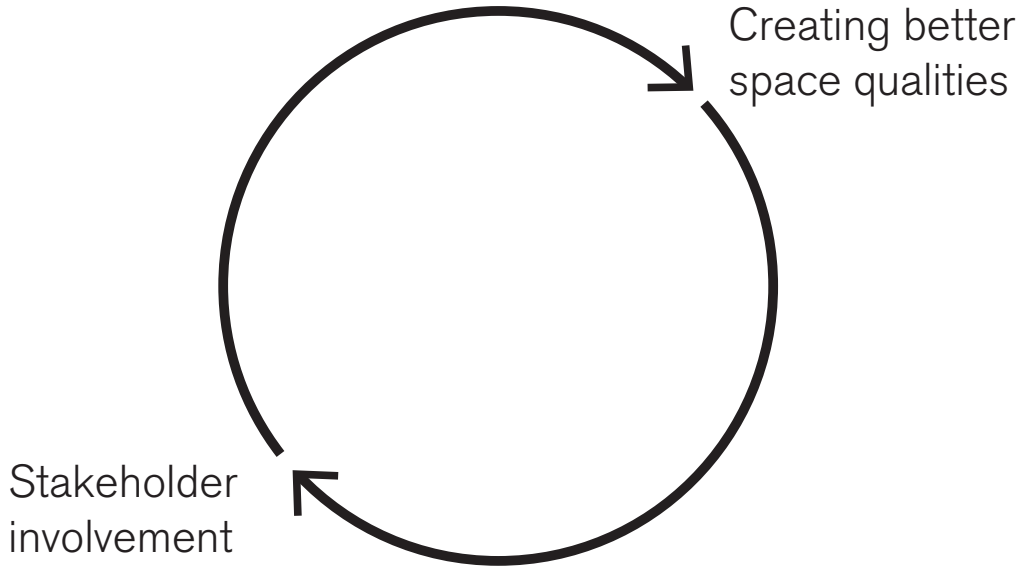
Integral design + investment = future value

Jager, H. (2009). Toepassing van de gebiedsgerichte aanpak bij infrastructurele wegprojecten.

Adaptation + investment = future value

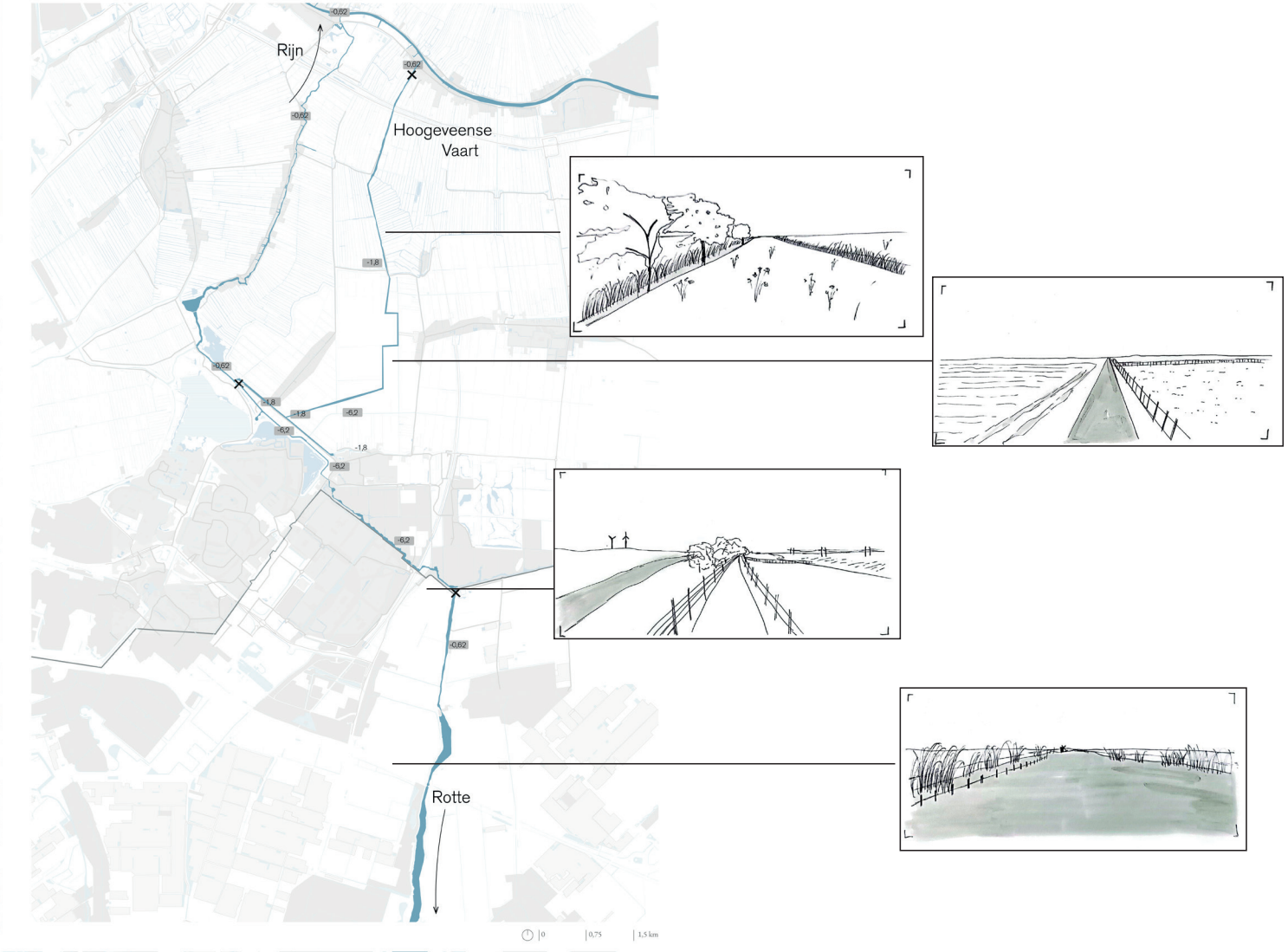
Haasnoot, M., Diermanse, F., Kwadijk, J., de Winter, R., & Winter, G. (2019). Strategieën voor adaptatie aan hoge en versnelde zeespiegelstijging. Een verkenning. Deltares rapport 11203724-004.

Added values



(Carmona, 2019)

Waterway connection



Limitations

- no monetary value calculated

- societal discussion/resistance

Conclusion

- territory-oriented approach

- new way of living

- dealing with climate change

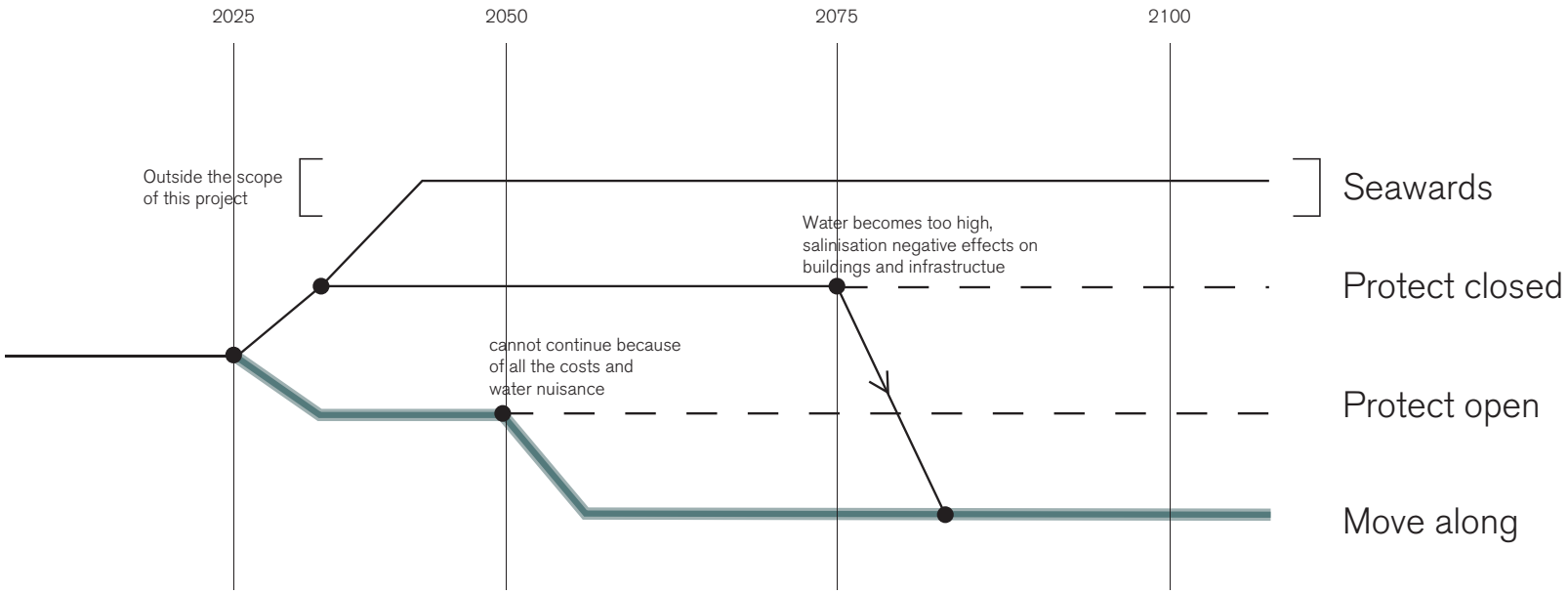
- area has value beyond its current uses

Reflection

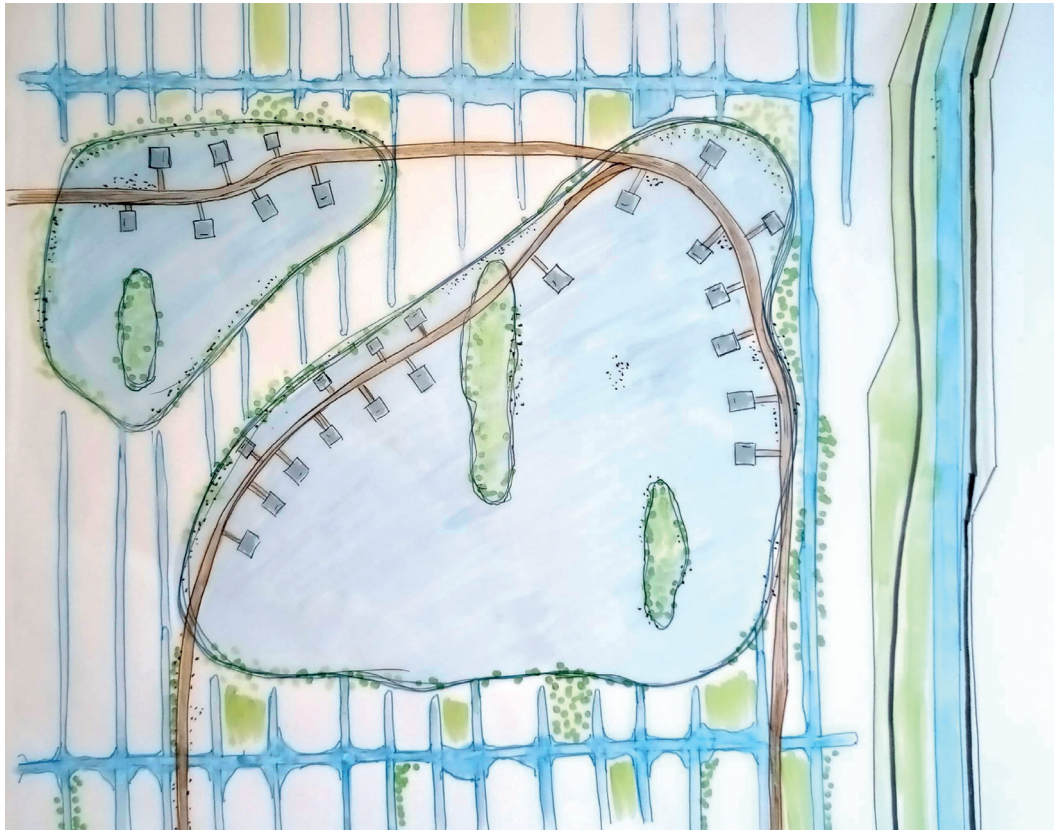
- start design process earlier

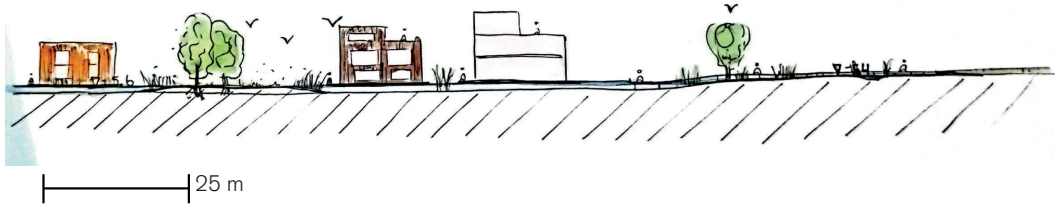
thank you

Adaptation pathways



Floating homes





Houses on poles