

Liquid land

Regaining balance between agriculture and nature with historic inspiration

Master of Science in Architecture, Urbanism & Building Sciences
MSc Landscape Architecture 2023 - 2024
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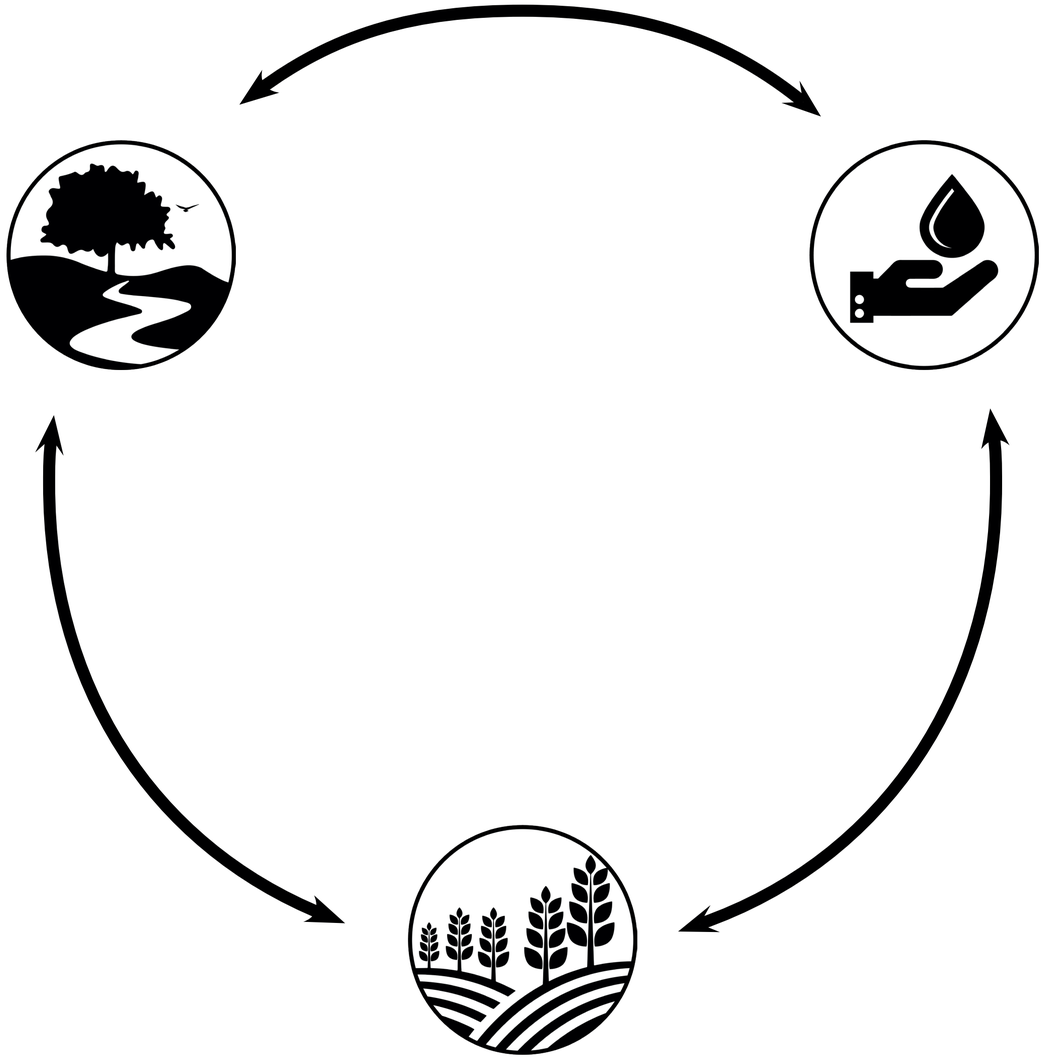
1. Introduction



Themes









Climate crisis







Droughts



+4.4 °C in 2100



+17% in 2100



-29% summer 2100

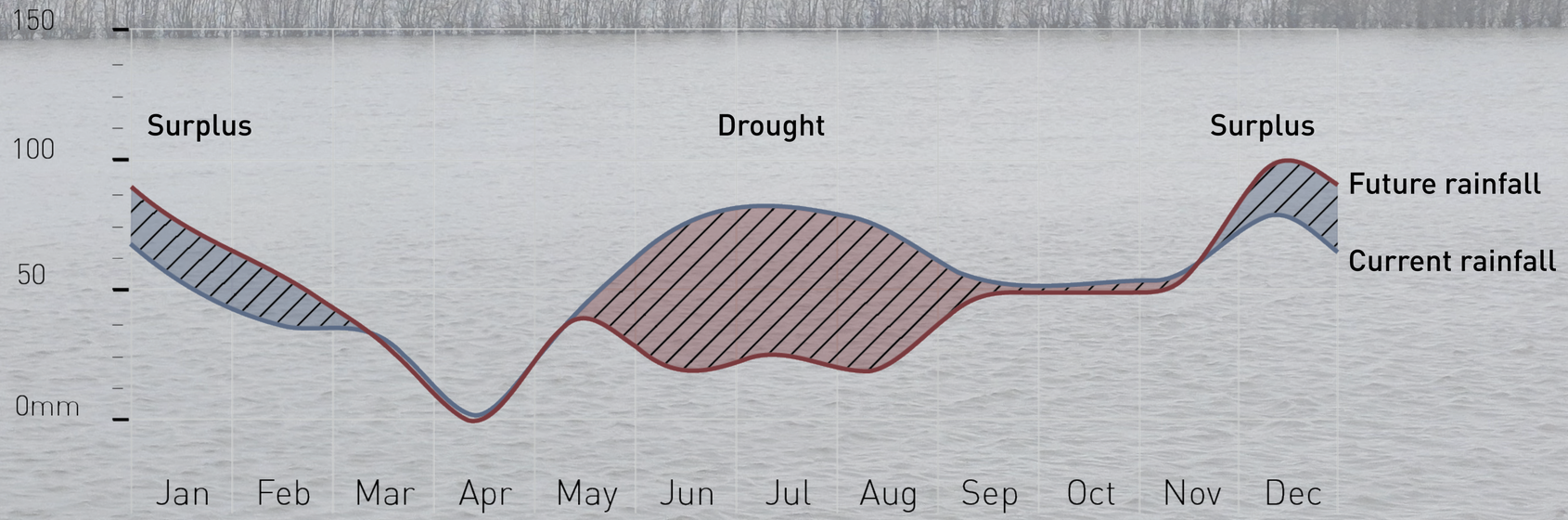
Author, 2024

Author, 2023; KNMI'23 klimaatscenarios, dryest predicted scenarios for 2100

Floodings

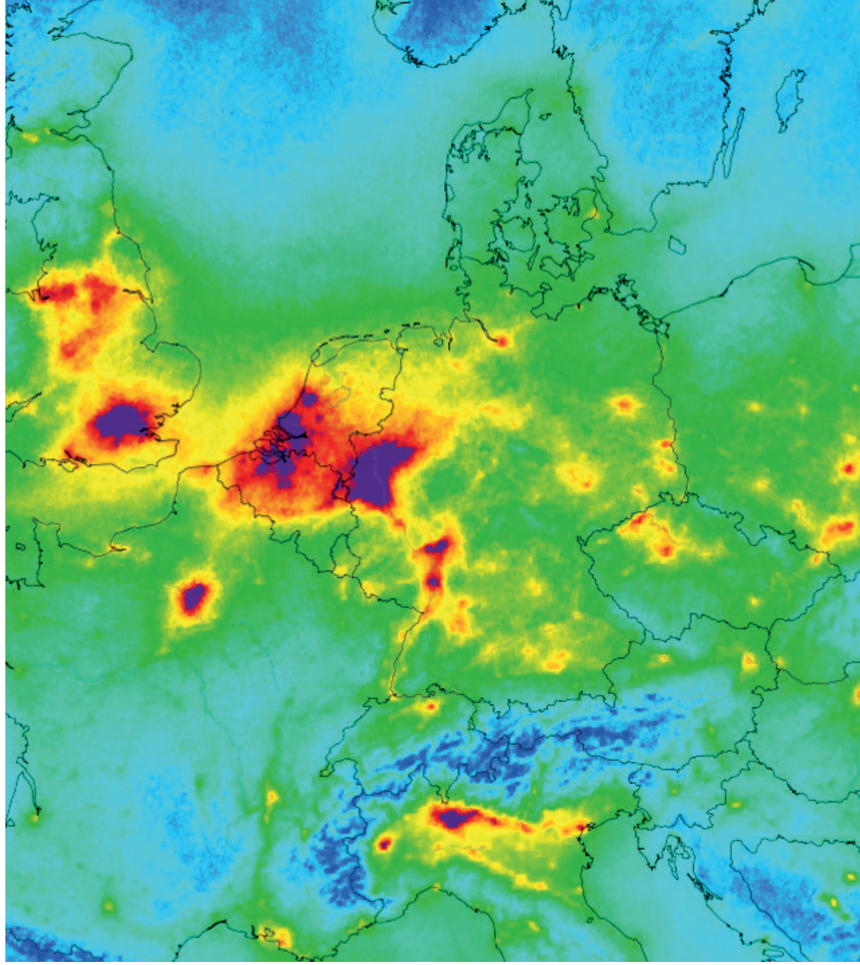


+14% in 2100



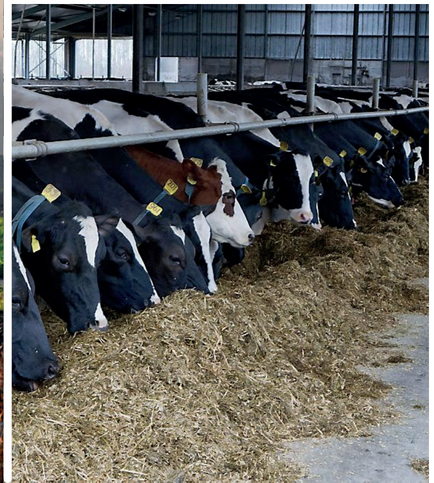
Author, 2023; KNMI'23 klimaatscenarios, dryest predicted scenarios for 2100

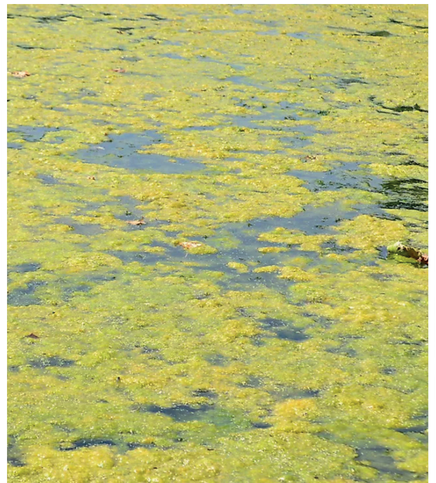






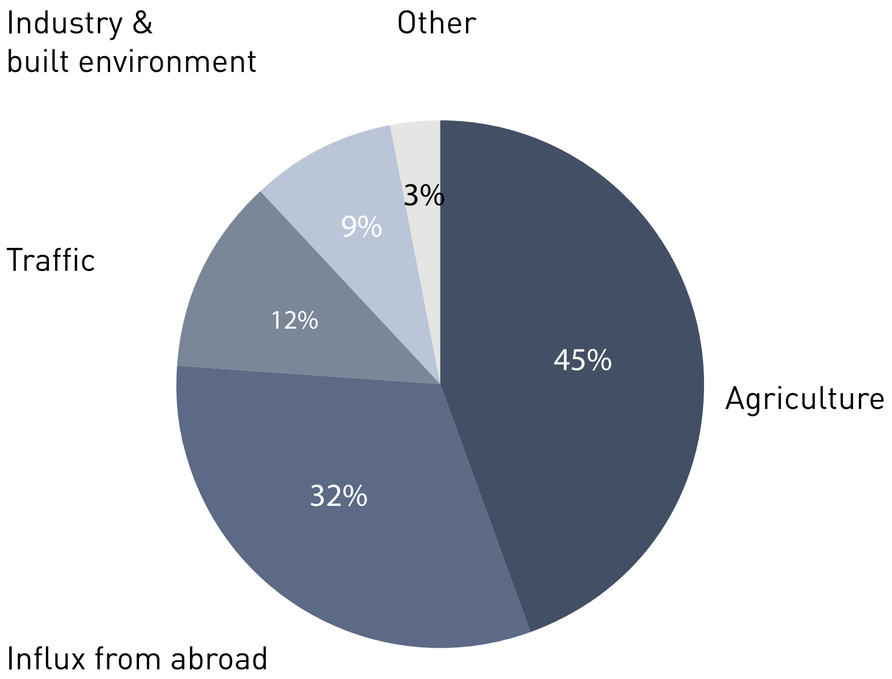
Agricultural crisis



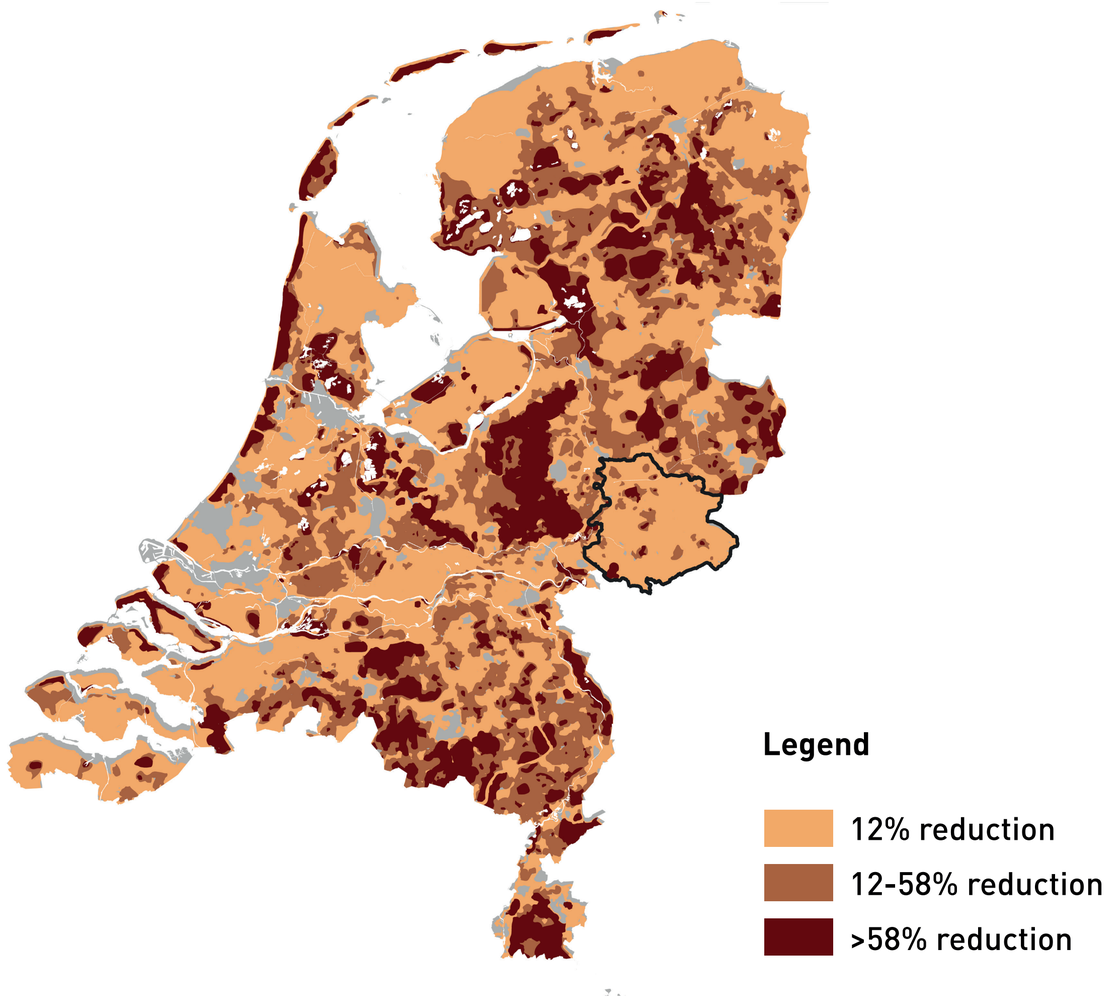




Increasing pollution



Increasing pollution



Changing wateruseage

+20% 2013-2019

Meinen, 2021; Globio MSA, 2020

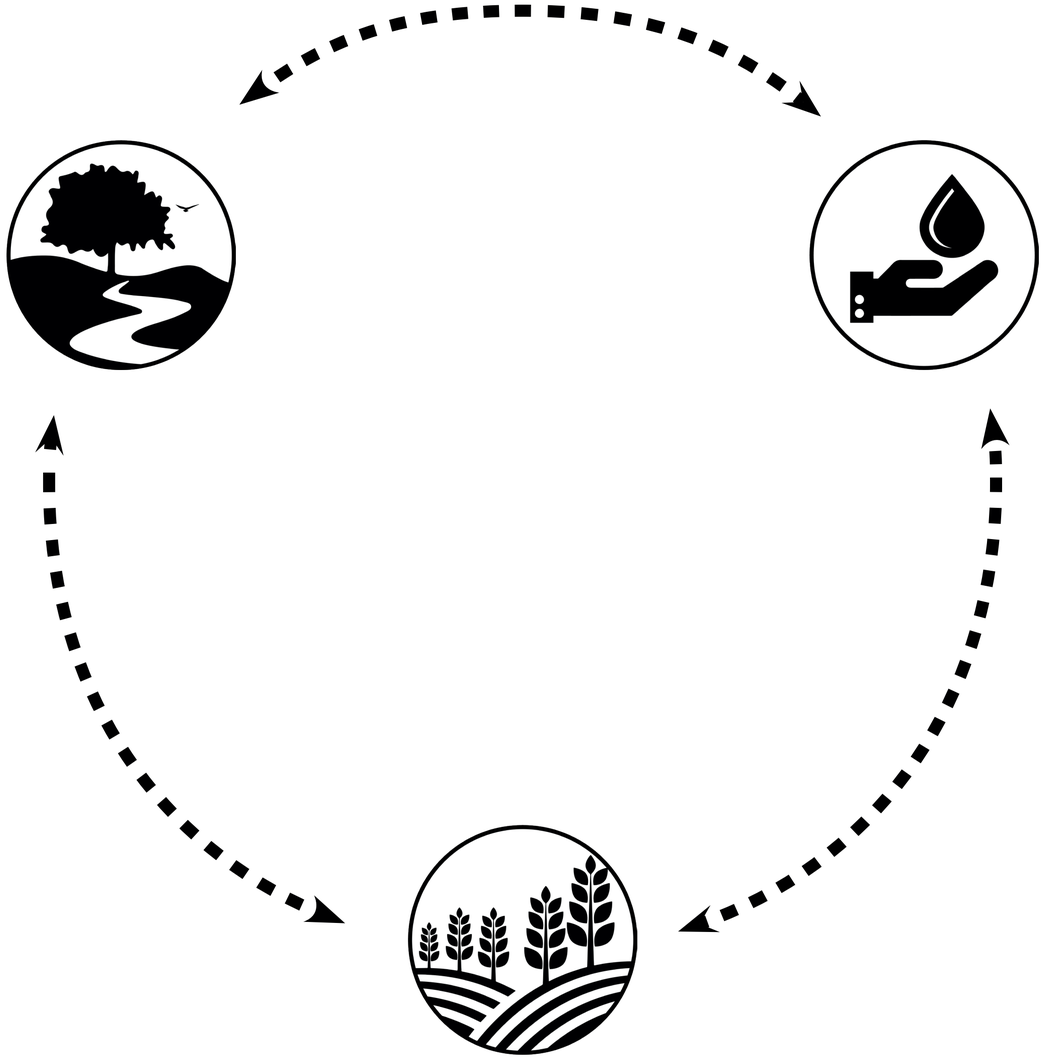
Ecological pressure



67% **Biodiversity loss since 1900**

Zandzee, 2021; Globio MSA, 2020

Missing connection



Research question

“How can landscape architecture help to reintegrate water management, nature, and agriculture in order to enhance climate resilience, increase biodiversity, and ensure a sustainable future for farmers?”

Sub research questions

SRQ1

Past

“How has the disbalance between water management, nature and agriculture developed?”

SRQ2

Present

“What design strategies can be employed in order to rebalance water management, nature and agriculture?”

SRQ3

Future

“How can the alternative strategies be implemented into the agricultural landscape?”

Design Analysis

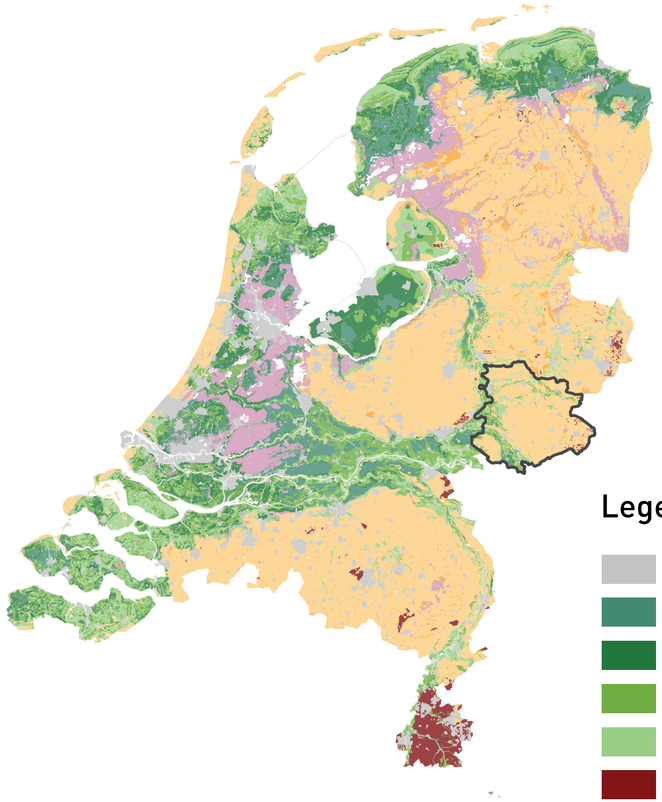
“How has the disbalance between water management, nature and agriculture developed?”





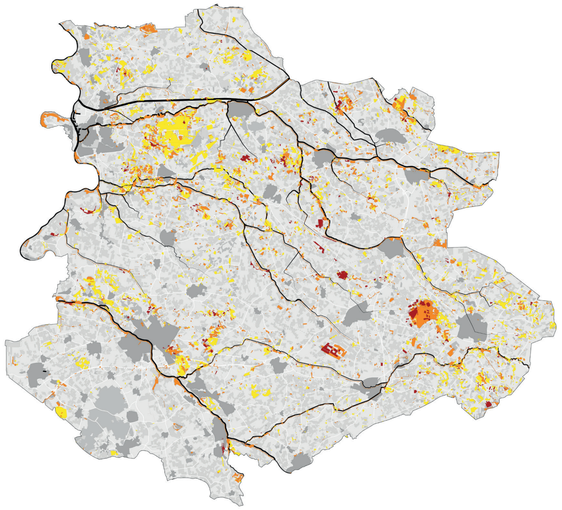
Achterhoek - Amplified problems

Soil conditions



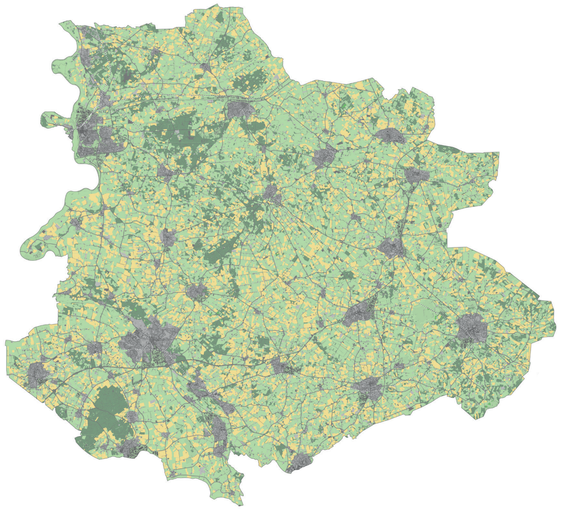
Legend
- Urban areas
- Heavy clay
- Light clay
- Heavy loam
- Light loam
- Löss
- Sand
- Marshy sand
- Peat

Vulnerable nature



Legend
- Highly vulnerable
- Medium
- Low
- Urbanised areas

Agricultural monoculture



Legend
- Grasslands
- Crops
- Nature
- Urbanised area



Swart, 2019



Author, 2024



Author, 2024

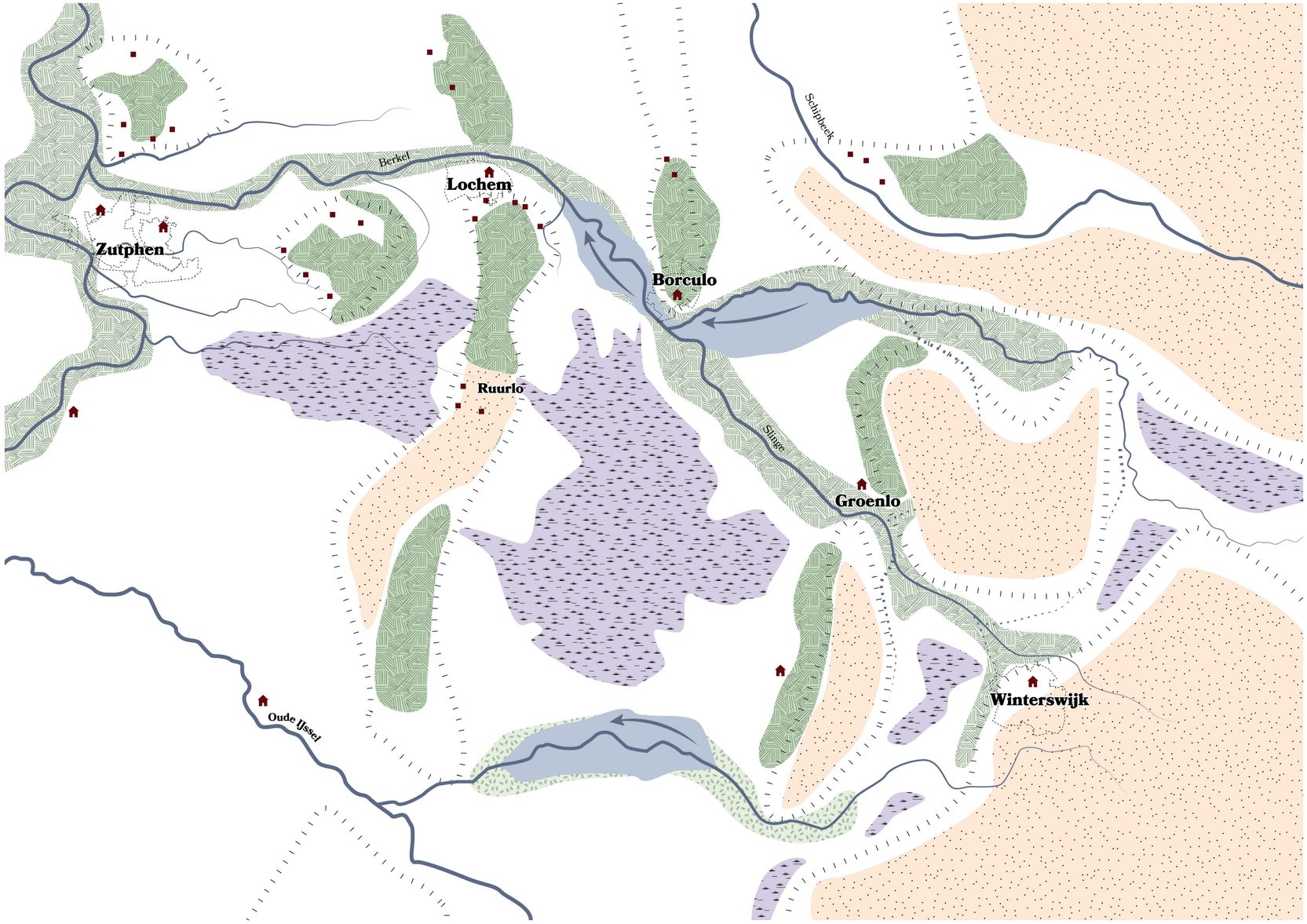


author, 2024

Analysis - Historic developments

Diversified Middle Ages



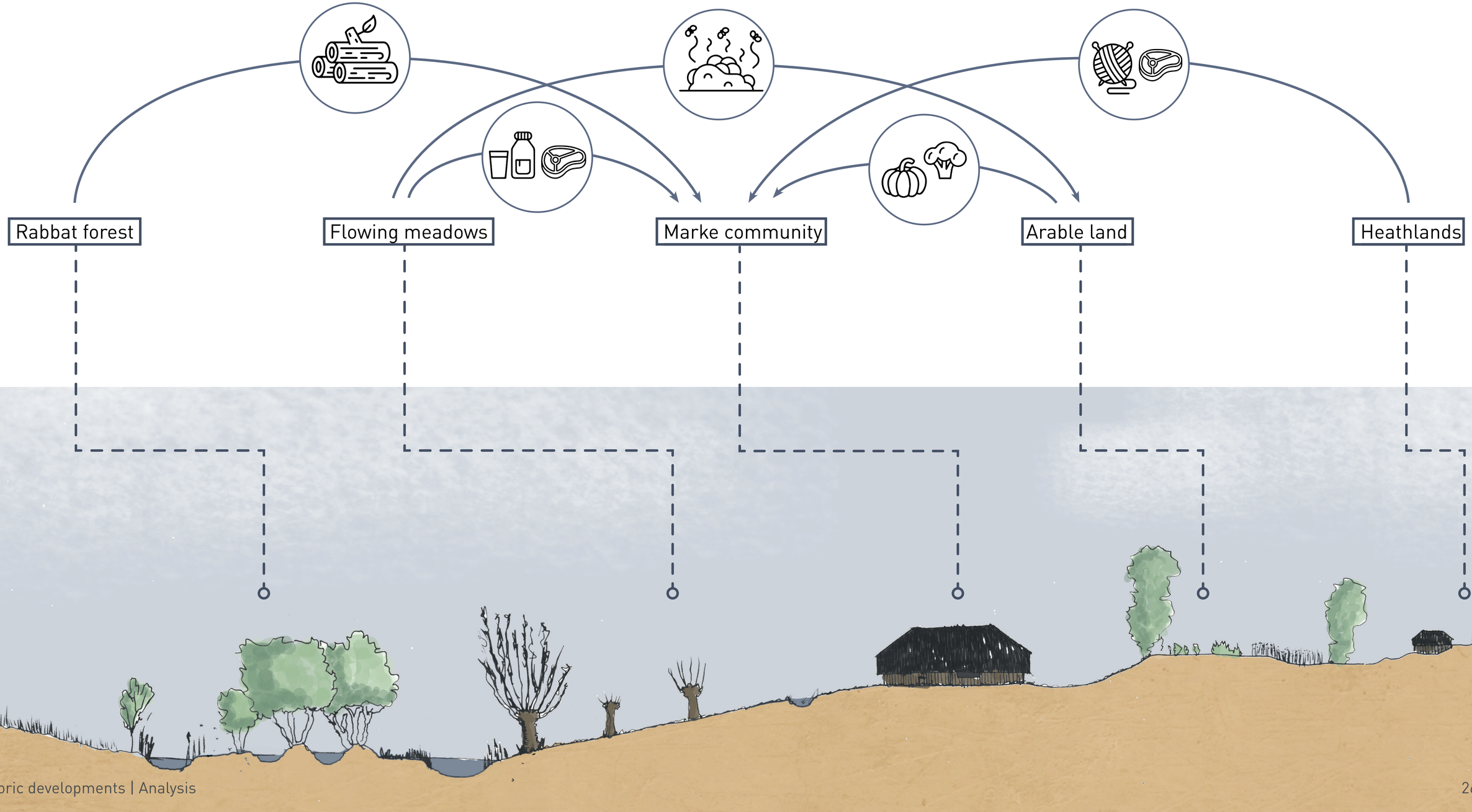


Legend

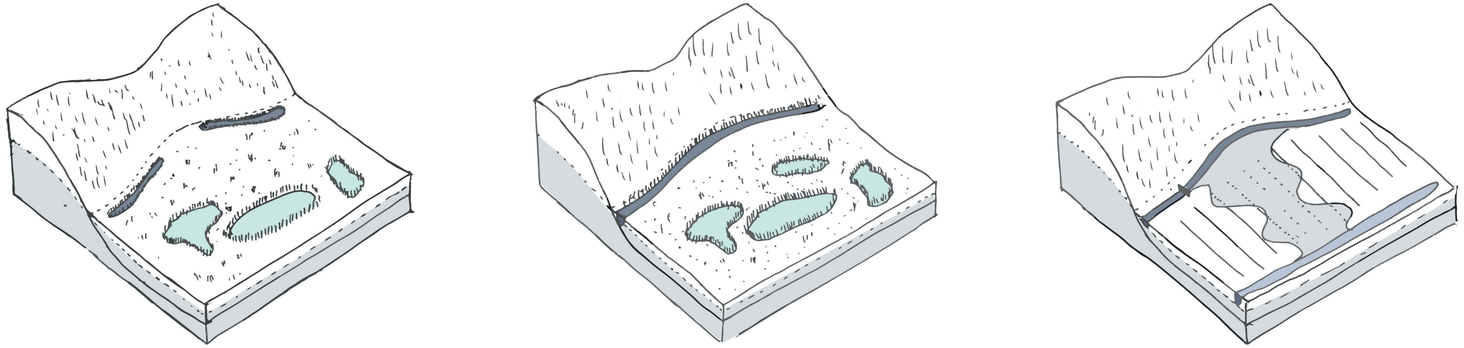
- Peat
- Sand
- Arable land
- Grassland
- Water
- Village/town
- Castle/estate

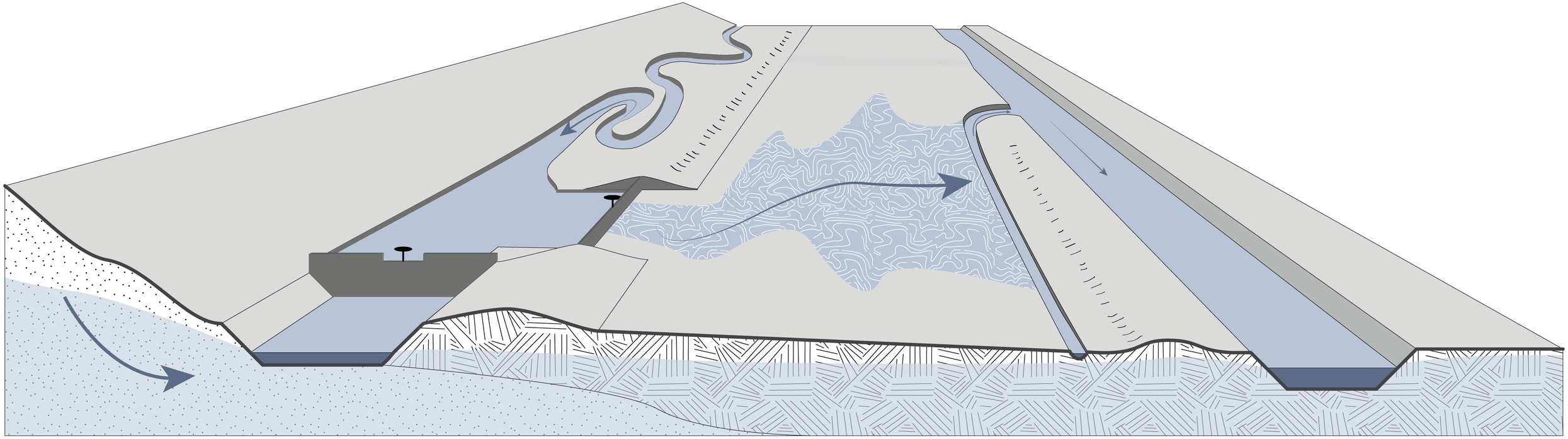
0 | 500 a.d. | 1000 | 1500 | 2.000 a.d.

Utilizing the gradients



Flowing meadows





Industrial revolution



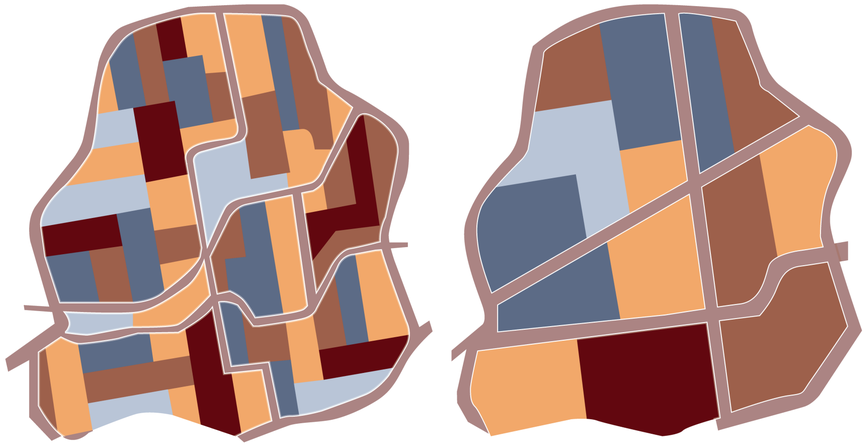


Legend

- Grassland
- Water
- Urban areas

0 | 500 a.d. | 1000 | 1500 | 2.000 a.d.

Land reallotment

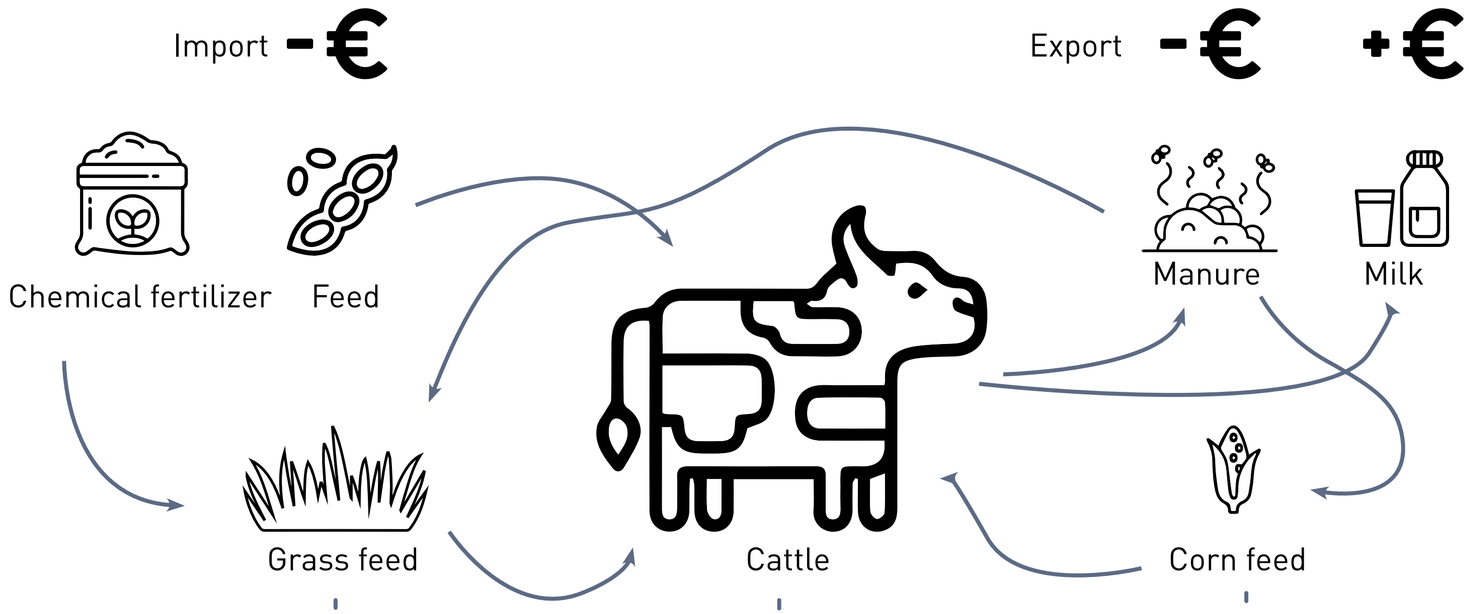


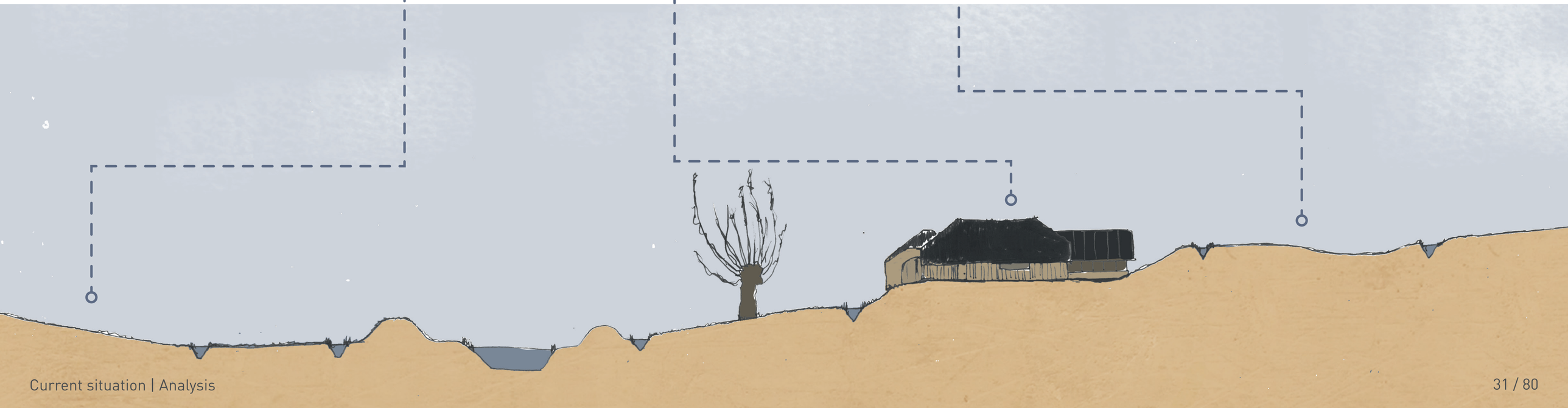


Analysis - current situation

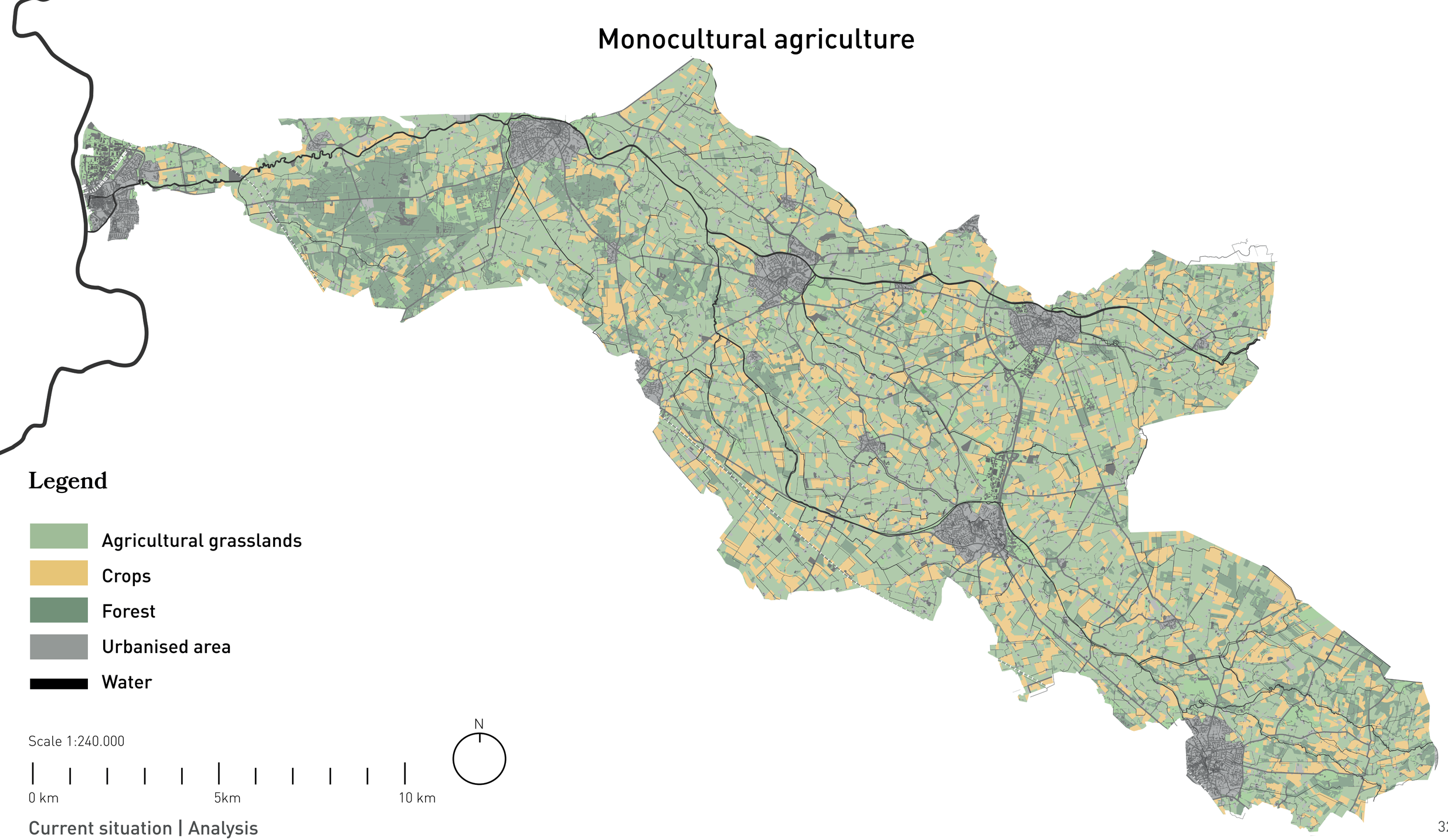
“What design strategies can be employed in order to rebalance water management, nature and agriculture?”

Current agricultural system





Monocultural agriculture

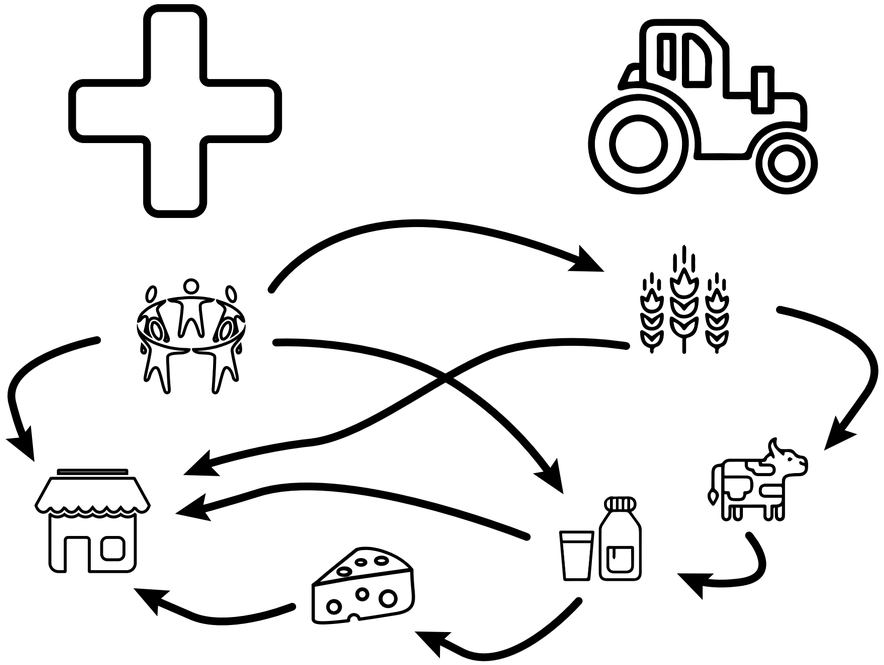




Current situation | Analysis

Author, 2024

Case studies: Communal agriculture



Case studies: Flowing meadows









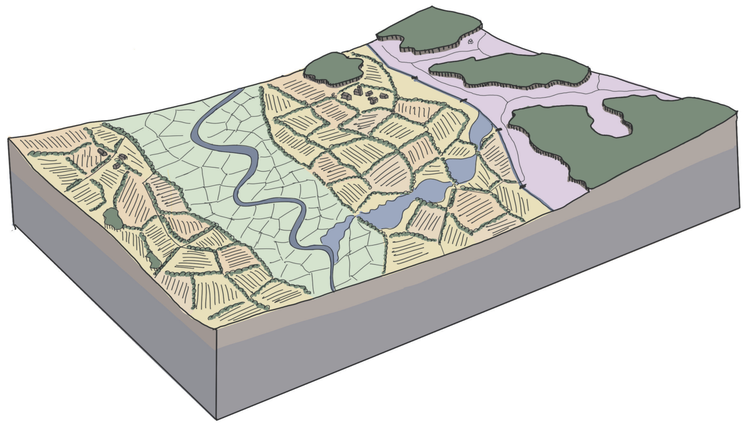


Case studies | Analysis

Author, 2024

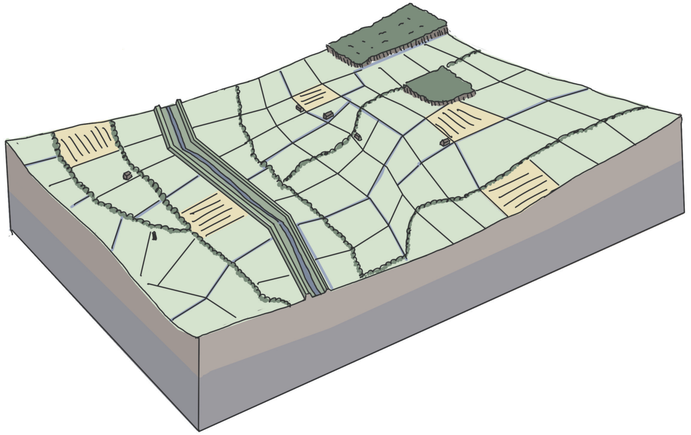
Conclusions

Past



+ Mixed landuse
+ Biodoverse landscape
+ Communal approach
+ Integrated elements
– Poverty

Present



+ Efficient
+ High production
– Monoculture
– Polluting

Future

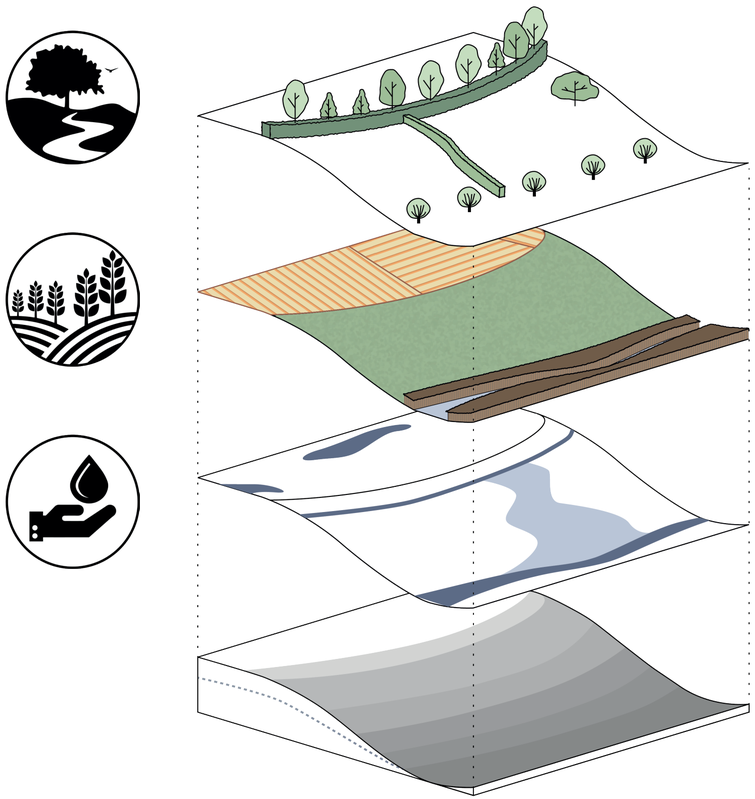


+ Efficient
+ High production
+ Mixed landuse
+ Communal Approach
+ Integrated elements

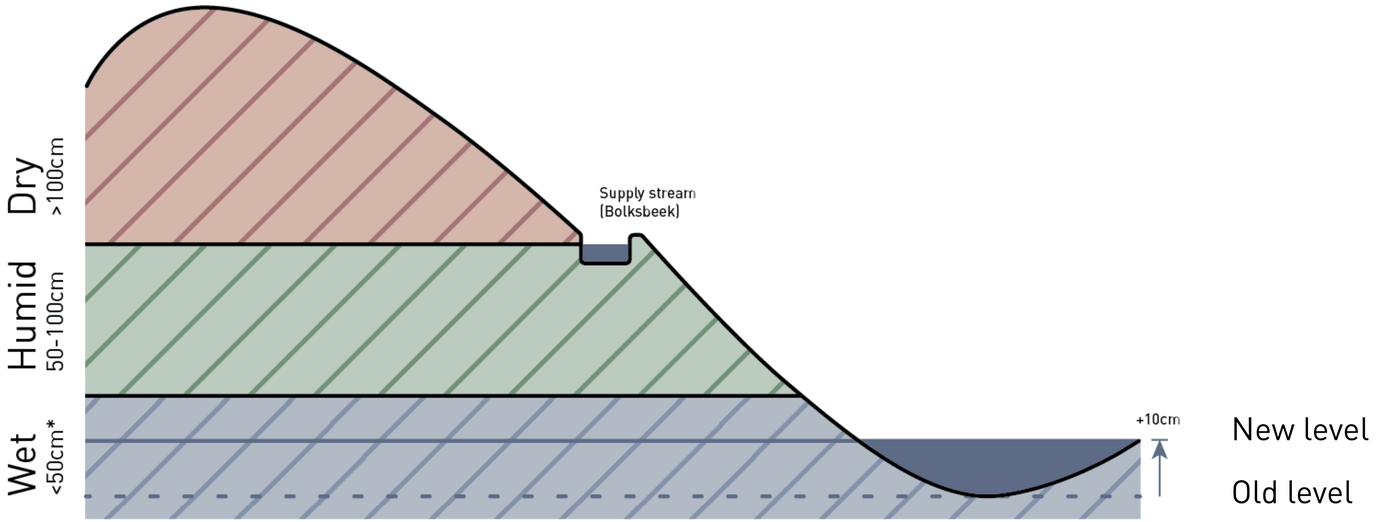
Design implementations

“How can the alternative strategies be implemented into the agricultural landscape?”

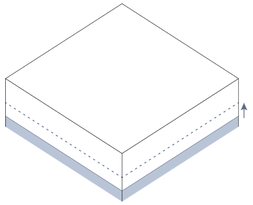
Concept - A soil-based approach



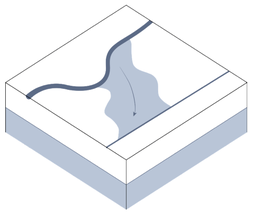
Concept - humidity levels



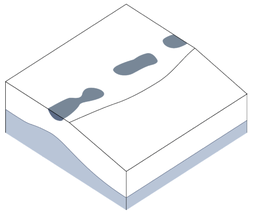
Concept - Design principles



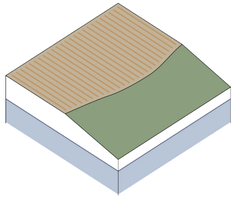
Raising water levels



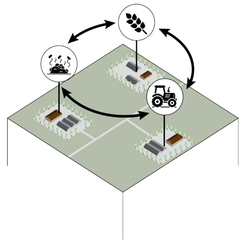
Increasing infiltration



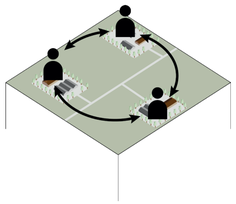
Increasing retention



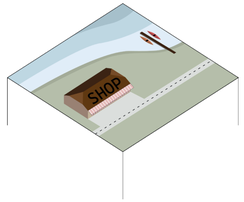
Adjust landuse



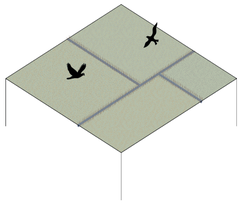
Local cooperation



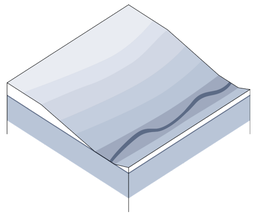
Communal Marken



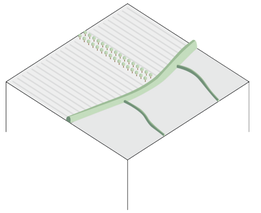
Diversification



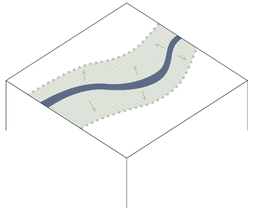
Nature inclusivity



Humidity-based planting

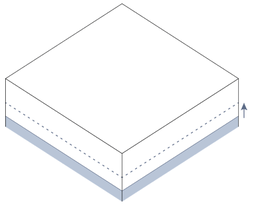


New cultural elements

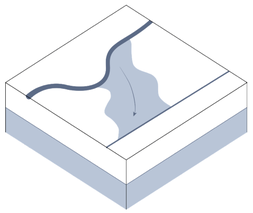


Ecological bufferzones

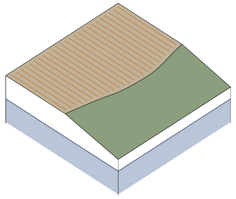
Concept - Design principles



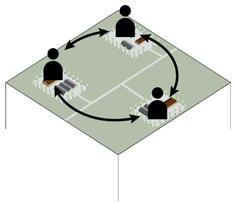
Raising water levels



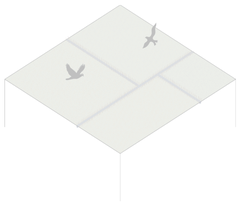
Increasing infiltration

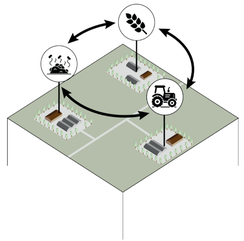


Adjust landuse



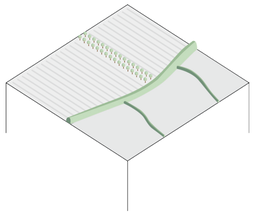
Communal Marken





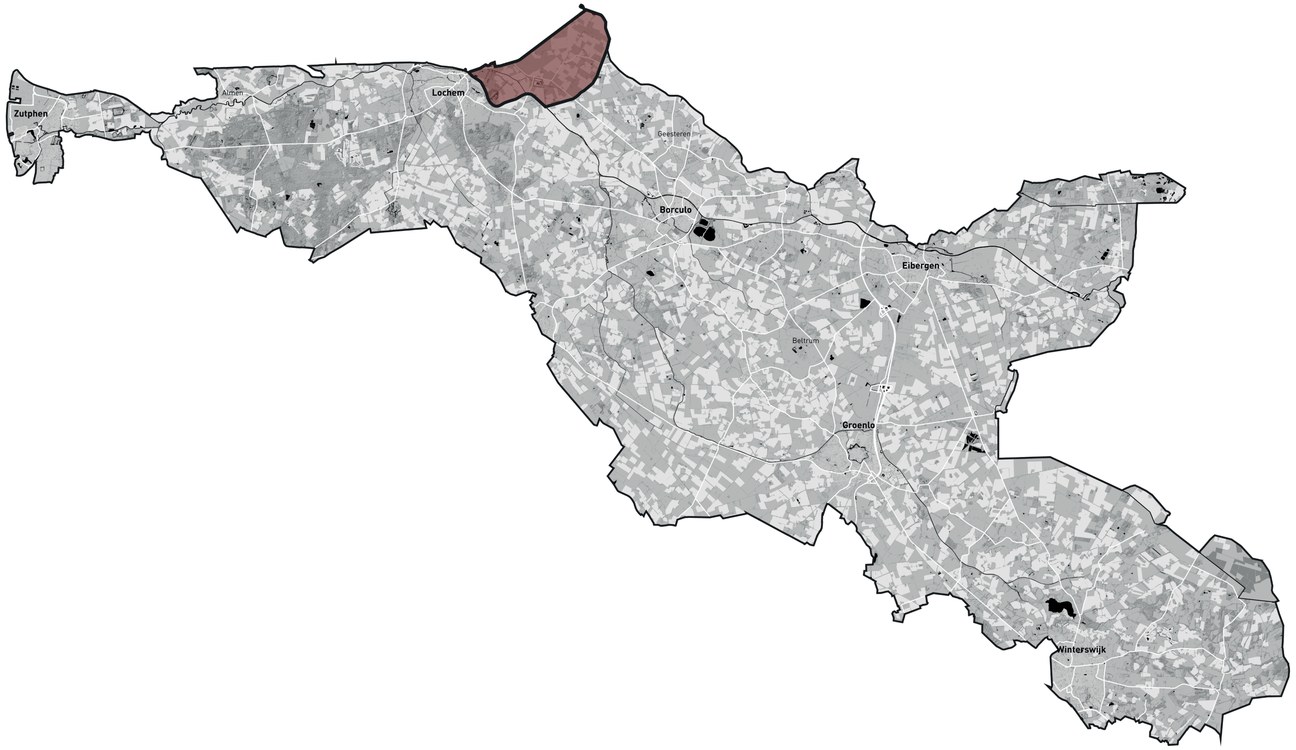
Local cooperation





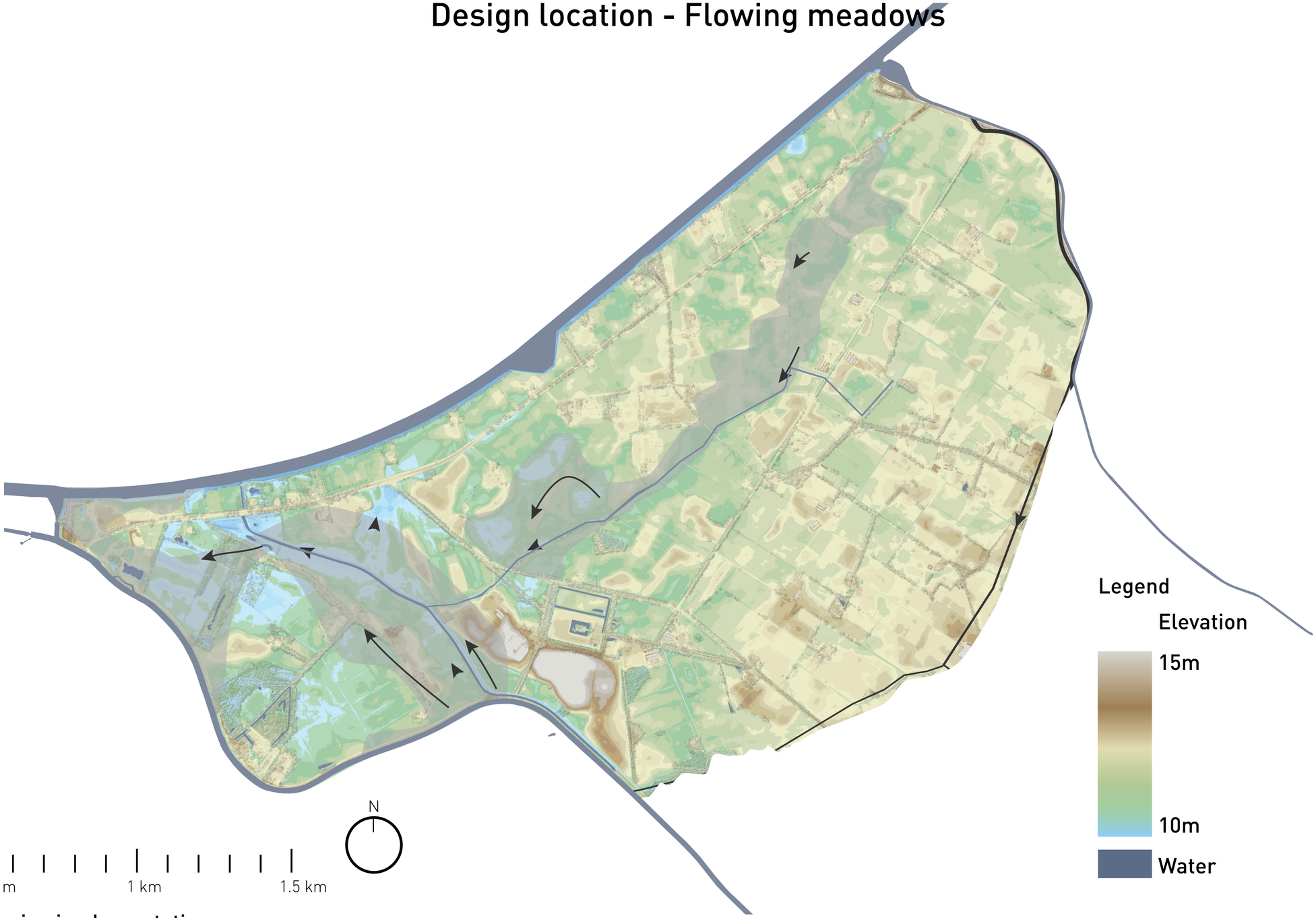
New cultural elements

Design location - Nettelhorst

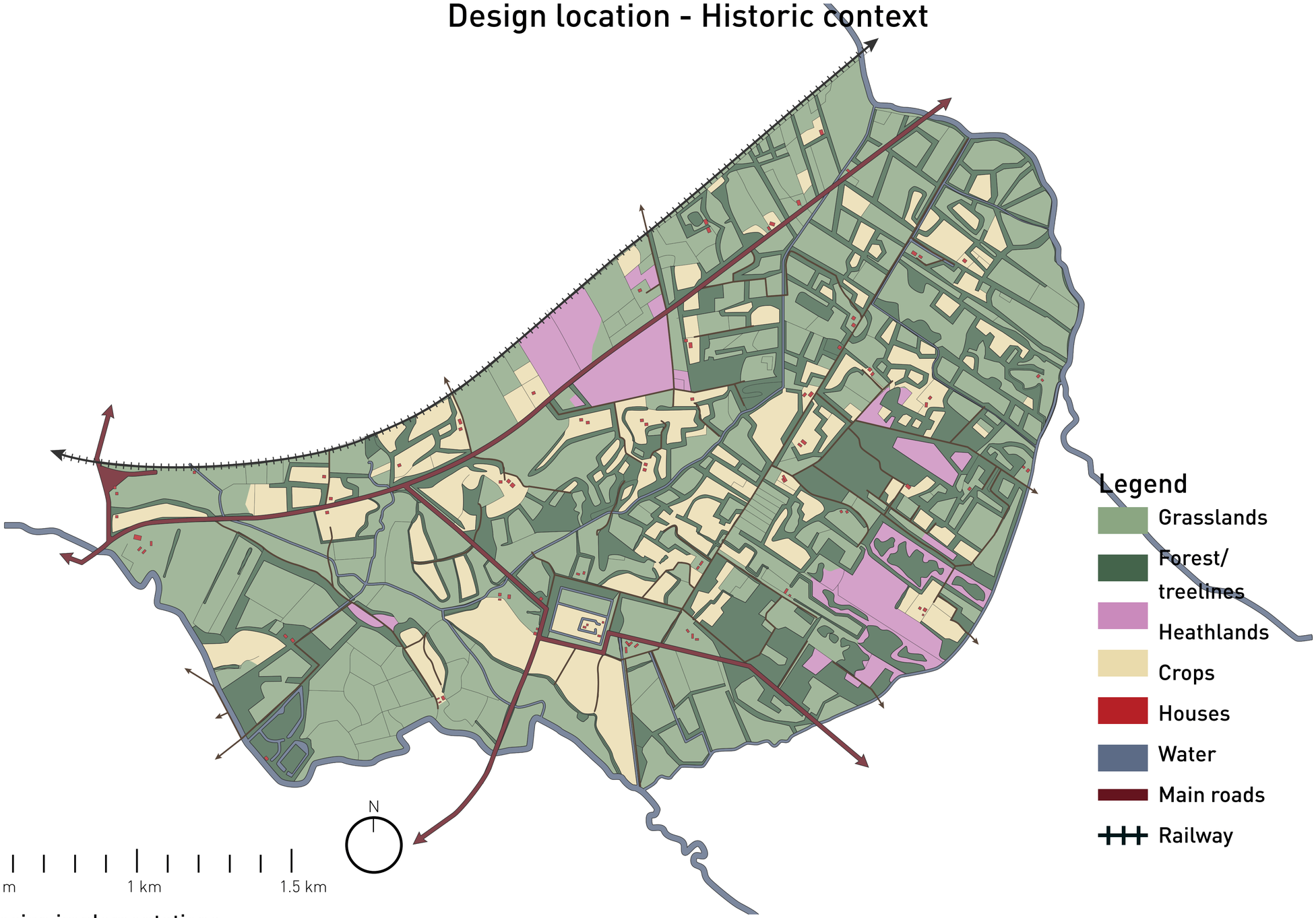




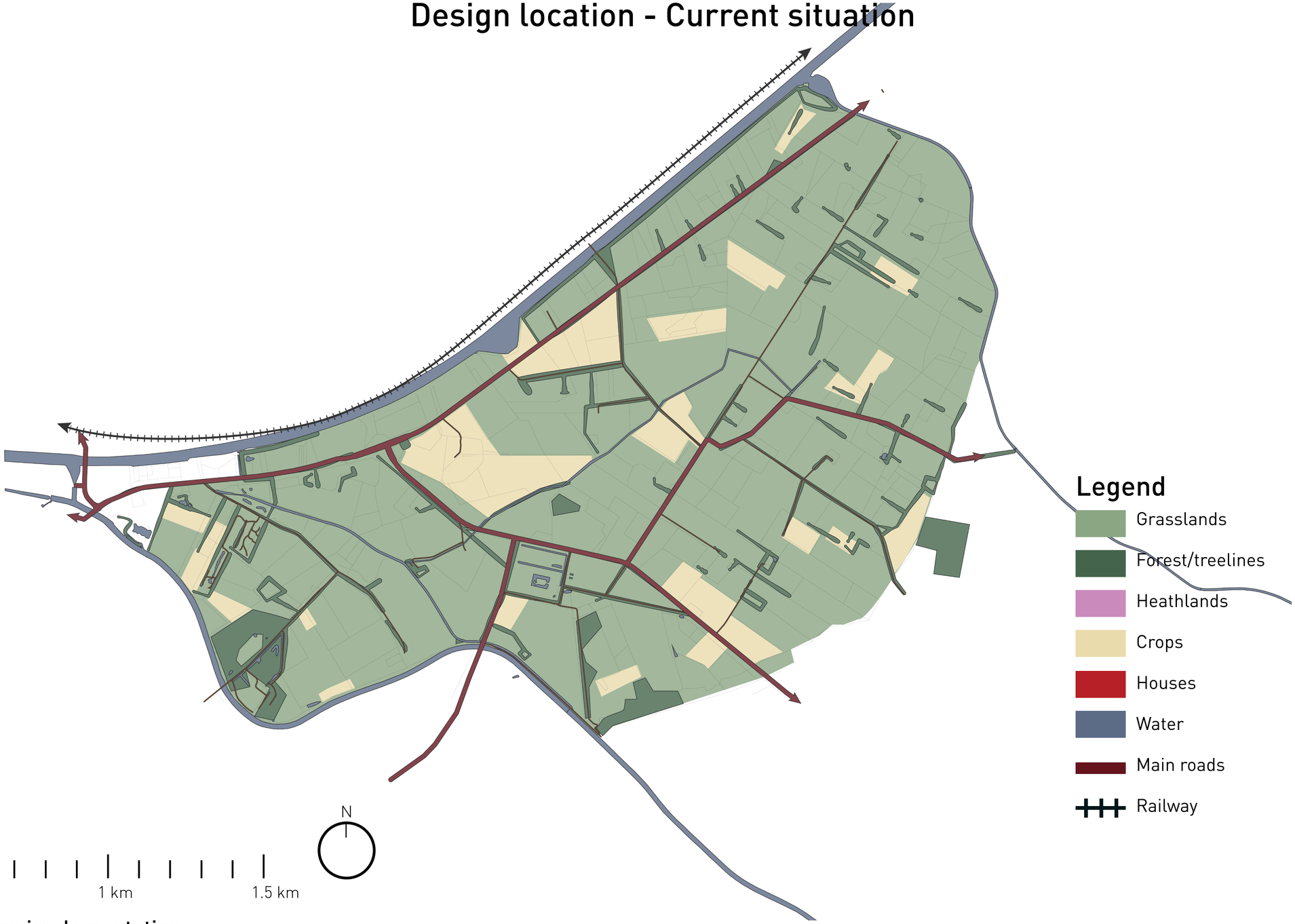
Design location - Flowing meadows



Design location - Historic context



Design location - Current situation





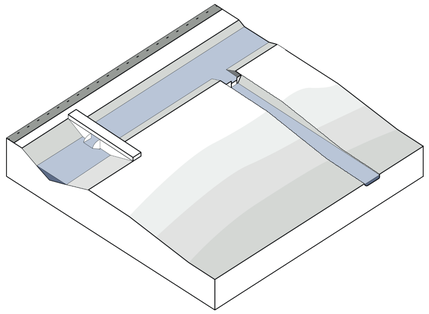
Author, 2024

Design context | Design implementations

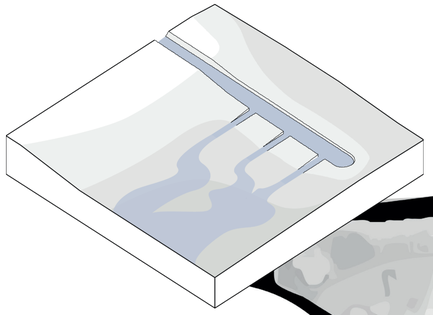
Vision Nettelhorst



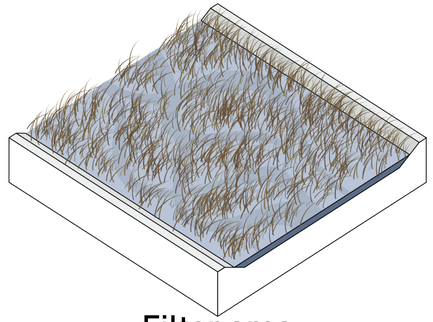
Vision - Water



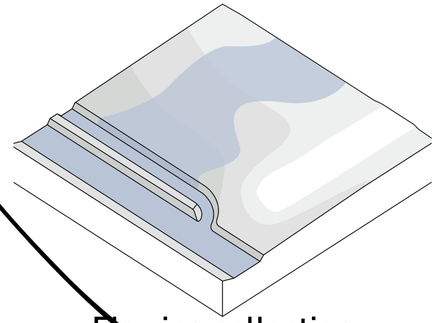
Flowing distribution



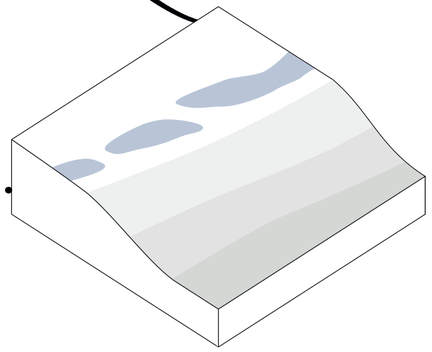
Flowing meadow



Filter area



Flowing collection



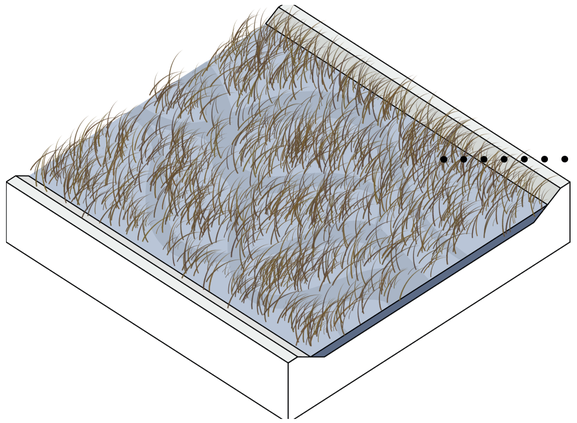
Retention wadis

Scale 1:30.000

0 km 500 m 1 km 1.5 km

N

Water vision - Filters

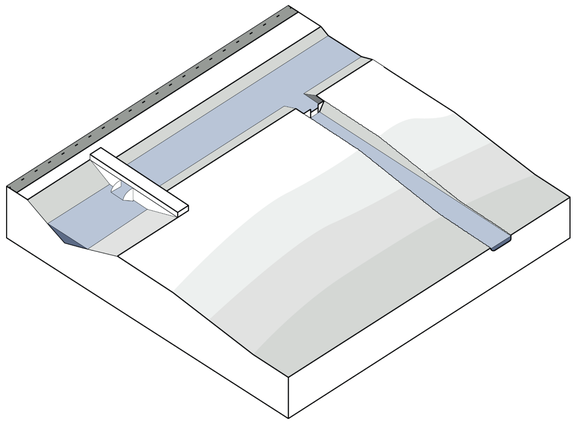


Scale 1:30.000

0 km 500 m 1 km 1.5 km

N

Water vision - Flowing distribution

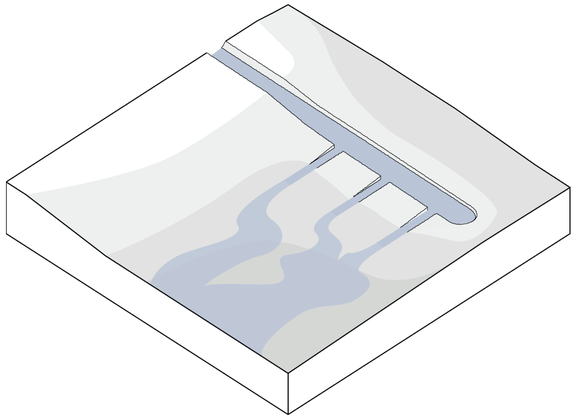


Scale 1:30.000

0 km 500 m 1 km 1.5 km

N

Water vision - Flowing meadows

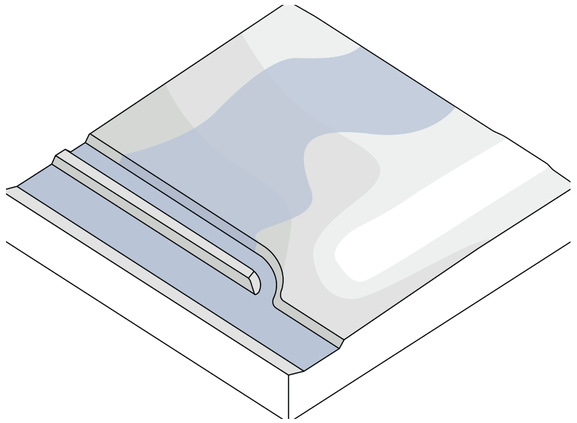


Scale 1:30.000

0 km 500 m 1 km 1.5 km

N

Water vision - Flowing collection

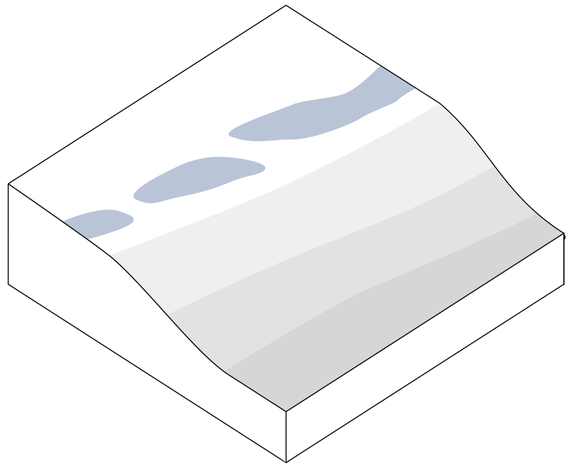


Scale 1:30.000

0 km 500 m 1 km 1.5 km

N

Water vision - Retending wadis

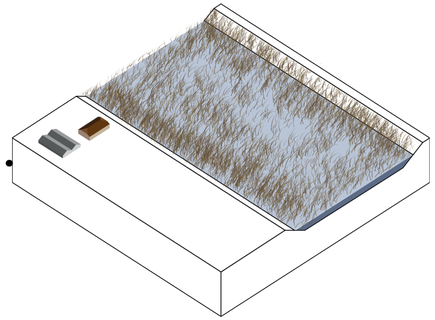


Scale 1:30.000

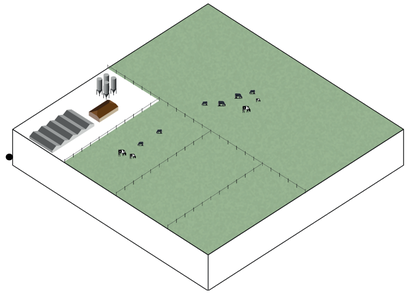
0 km 500 m 1 km 1.5 km

N

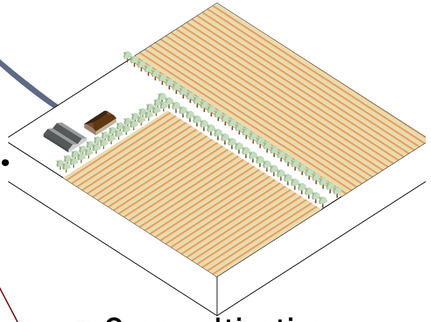
Agricultural transformation



Paludiculture



Dairy farming



Crop cultivation

Sustainable farming

Diversification

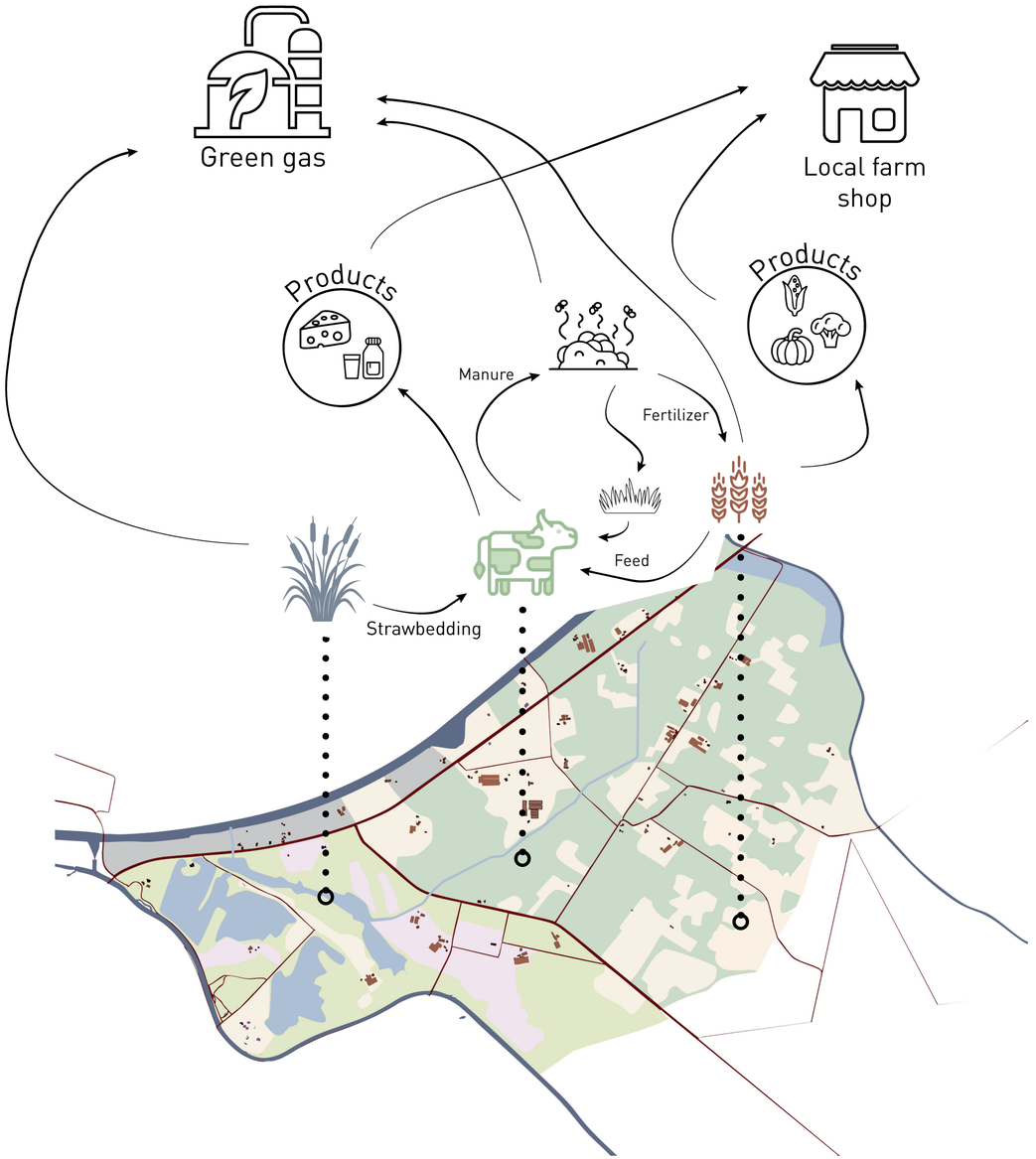
Restaurant/ cafe

Energyproduction

Tourism

Healthcare

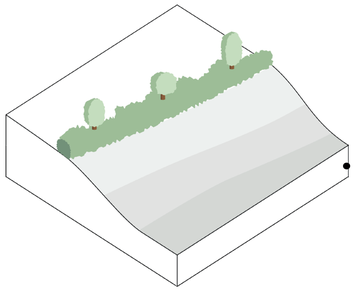
Cooperation



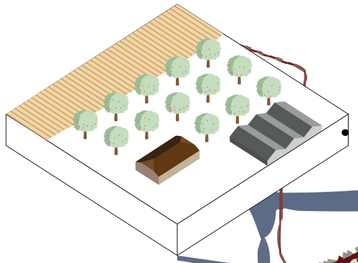
Shared landcare



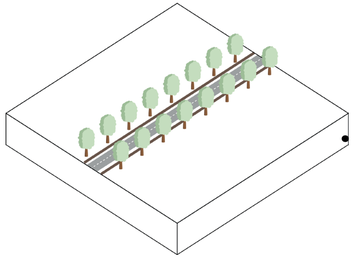
Reconstructured Nature



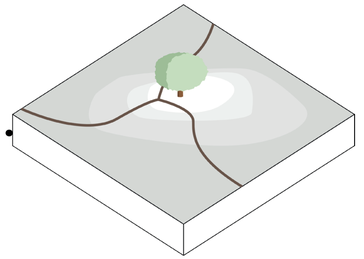
Wooded hedges



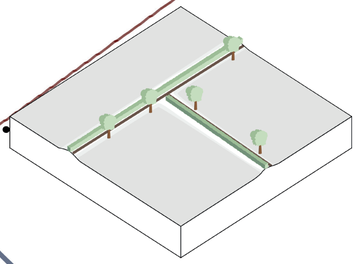
Orchards



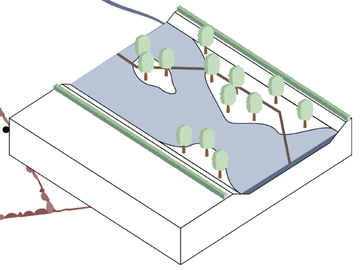
Linear trees



Singular trees



Low hedges

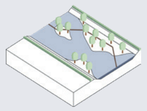


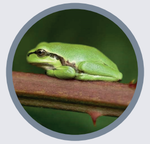
Wet typologies

Nature - Biodiversity

AREA CHARACTERISTICS | **TARGET SPECIES** | **LATIN NAME** | **ENGLISH NAME** | **PLANTING TYPE** | **HEIGHT** | **GROWTH RATE** | **NATIVE** | **PRODUCTIVE PERIOD** (J F M A M J J A S O N D)

WET





Tree frog



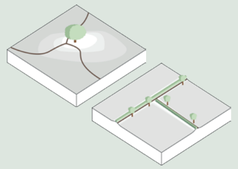
Crested newt



Purple heron

Alnus incana	Grey alder	Tree	M	▶	✗
Alnus glutinosa	Black alder	Tree	L	▶▶▶	✓
Crataegus monogyna	Hawthorn	Shrub	S	▶▶	✓
Magnolia virginiana	Sweetbay magnolia	Tree	S	▶▶	✗
Prunus padus	Bird cherry	Tree	M	▶▶▶	✓
Salix alba	White willow	Tree	L	▶▶▶	✓
Salix babylonica	Weeping willow	Tree	M	▶▶	✗
Salix fragilis	Crack willow	Tree	M	▶▶▶	✓
Taxodium distichum	Bald cyprus	Tree	L	▶▶	✗

HUMID





Partridge



Corncrake



Yellow-hammer

Carpinus betulus	Hornbeam	Tree/Shrub	M	▶▶	✓
Corylus avellana	Hasel	Shrub	S	▶▶▶	✓
Crataegus monogyna	Hawthorn	Shrub	S	▶▶	✓
Fagus sylvatica 'atropunicea'	Red beech	Tree	L	▶▶	✗
Prunus avium	Sweet cherry	Tree	L	▶▶	✓
Prunus spinosa	Blackthorn	Shrub	S	▶▶▶	✓
Quercus robur	Summer oak	Tree	L	▶	✓
Tilia cordata	Small-leaved linden	Tree	L	▶▶▶	✓

DRY



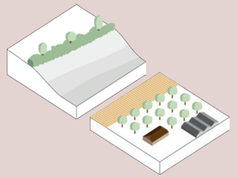
Little owl



Kestrel



Subterranean vole





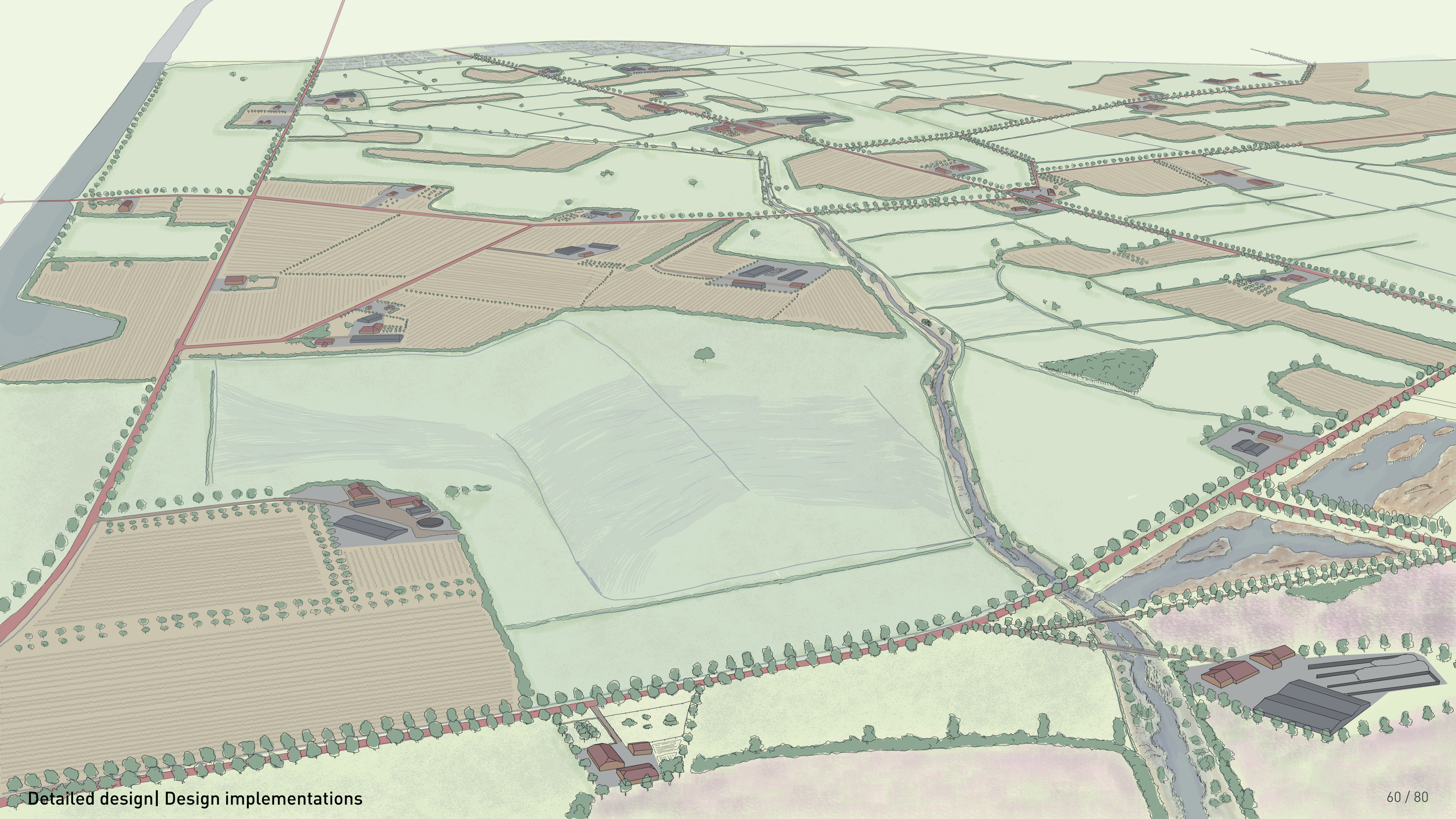
Garlic toad

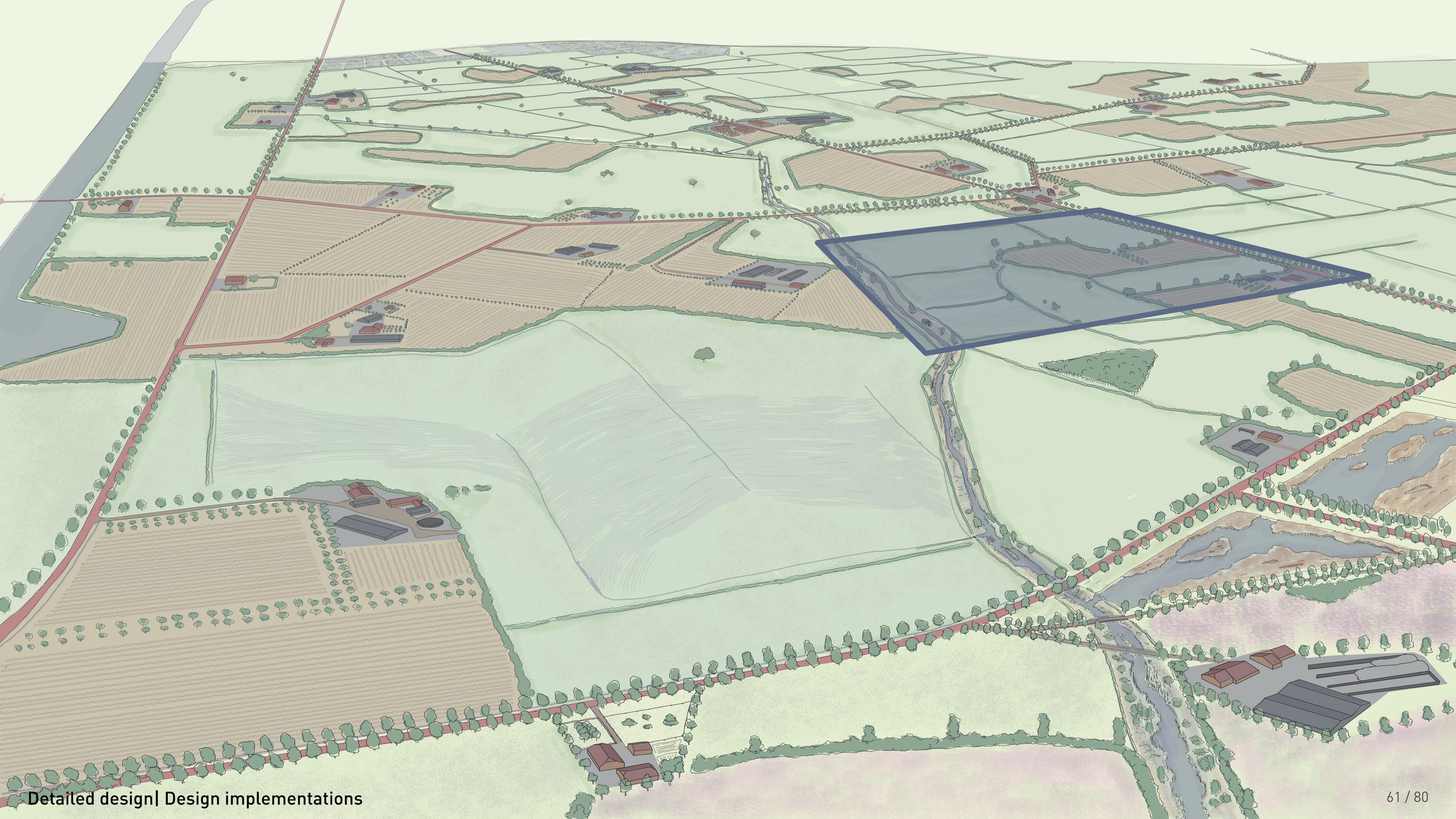
Acer campestre	Field maple	Tree	M	▶	✓
Betula pendula	Silver birch	Tree	L	▶▶▶	✓
Corylus avellana	Hasel	Shrub	S	▶▶▶	✓
Frangula alnus	Alder buckthorn	Shrub	S	▶▶	✓
Malus domestica 'Elstar'	Apple	Tree	S	▶▶	✓
Populus nigra 'Italica"	Lombardy poplar	Tree	M	▶▶	✗
Prunus avium	Sweet cherry	Tree	M	▶▶	✓
Prunus domestica	Plum	Tree	S	▶▶	✗
Pyrus communis 'Charneux'	Pear	Tree	S	▶▶	✓
Quercus petraea	Sessile oak	Tree	L	▶	✓
Sorbus aucuparia	Rowan	Tree	S	▶▶	✓

Vision | Design implementations



Detailed design| Design implementations









Author, 2024

The Nettelhorster Laak - summer



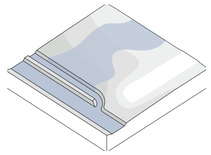
Tree frog



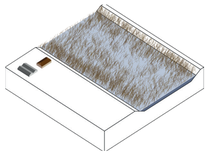
Crested newt



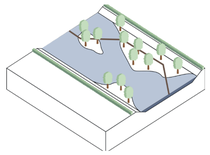
Purple heron



Flowing collection



Paludiculture



Wet nature typologies

Prunus padus

Taxodium distichum

Salix babylonica

The Nettelhorster Laak - winter



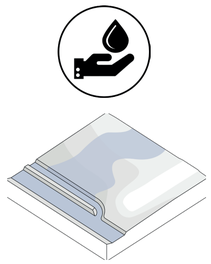
Tree frog



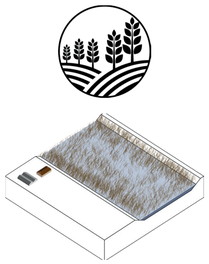
Crested newt



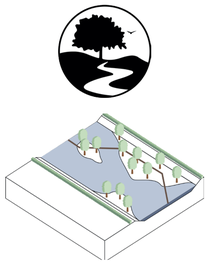
Purple heron



Flowing collection



Paludiculture



Wet nature typologies

Prunus padus

Taxodium distichum

Salix babylonica





Author, 2024

Flowing meadow - summer


Crested newt


Purple heron


Partridge

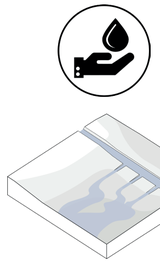

Little owl

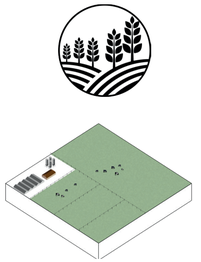

Corncrake

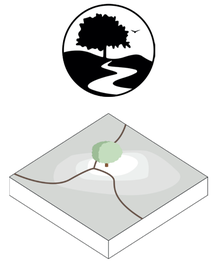

Yellow-hammer

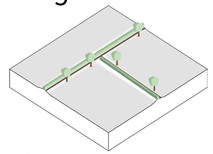

Kestrel

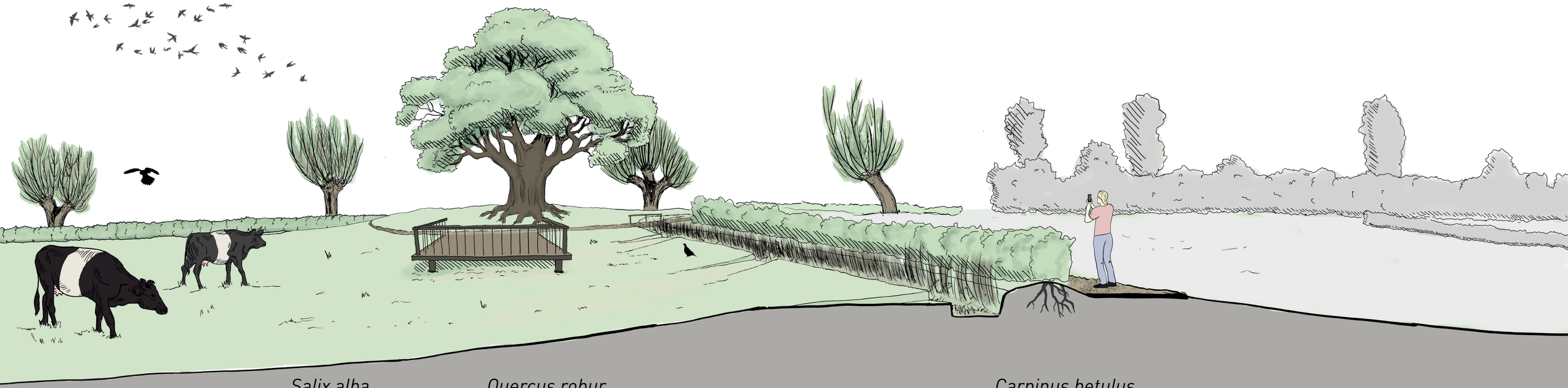

Subteranean vole


Flowing meadow


Dairy farming


Singular trees


Low hedges



Flowing meadow - winter


Crested newt


Purple heron


Partridge

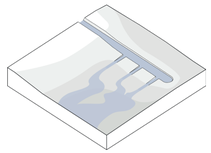

Little owl

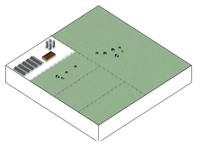

Corncrake

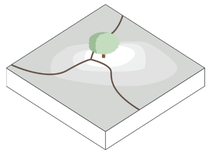

Yellow-hammer

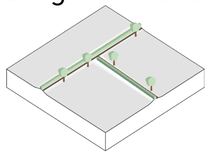

Kestrel

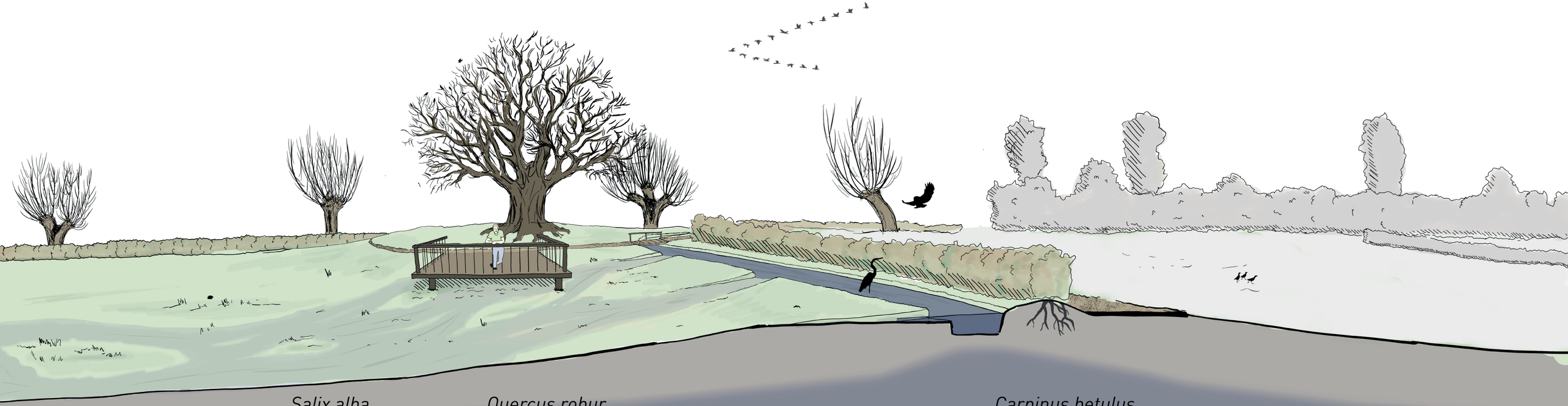

Subteranean vole


Flowing meadow


Dairy farming


Singular trees


Low hedges







Transition zone


Partridge


Little owl

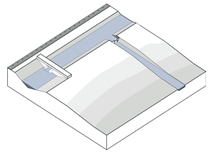

Kestrel

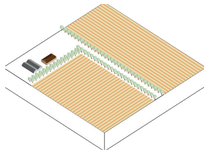

Garlic toad

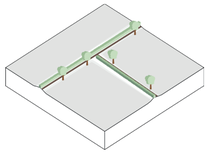

Corncrake

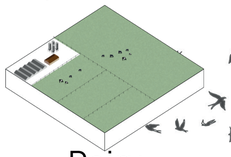

Yellow-hammer

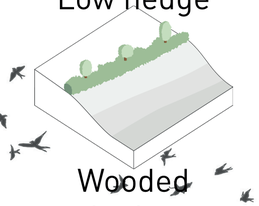

Subteranean vole



Flowing distribution



Crop cultivation



Low hedge


Dairy farming


Wooded hedge



Salix alba

Quercus petraea

Sorbus aucuparia

Populus nigra 'Italica'

Transitionzone


Partridge


Little owl

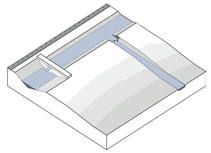

Kestrel

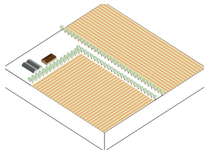

Garlic toad

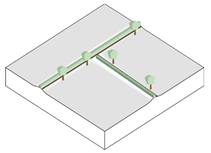

Corncrake

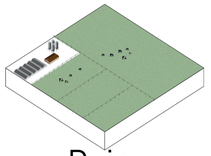

Yellow-hammer

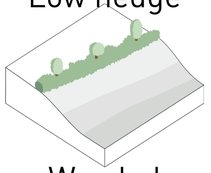

Subteranean vole



Flowing distribution



Crop cultivation



Low hedge


Dairy farming


Wooded hedge



Salix alba

Quercus petraea

Sorbus aucuparia

Populus nigra 'Italica'





The farmyard



Little owl



Garlic toad

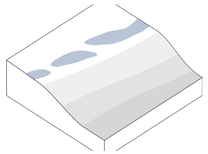


Kestrel



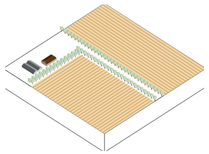
Subterranean vole





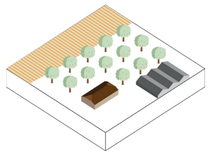
Retention wadis



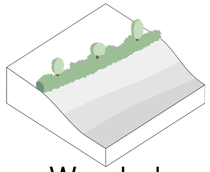


Crop cultivation

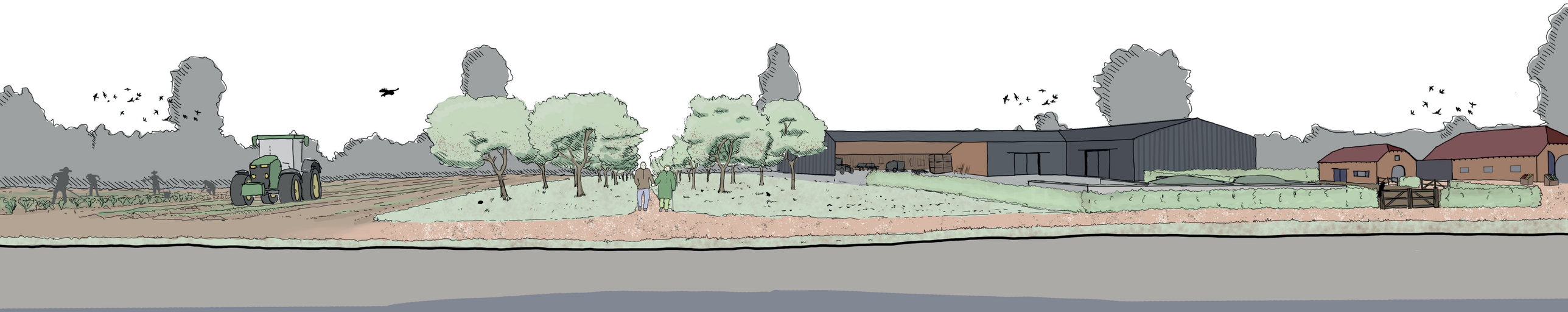




Orchards



Wooded hedge



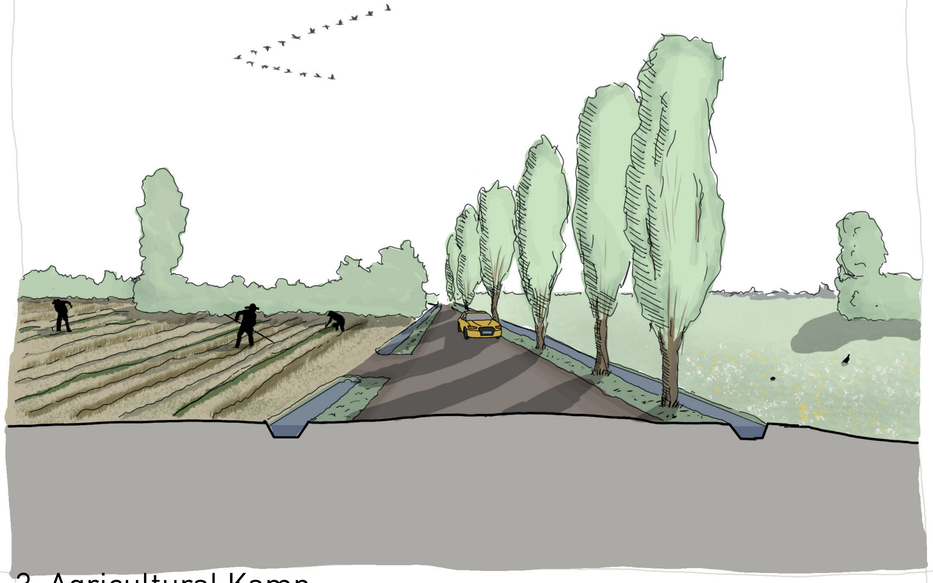
Crossing the gradients



1. Enclosed farmyard



2. Open meadow

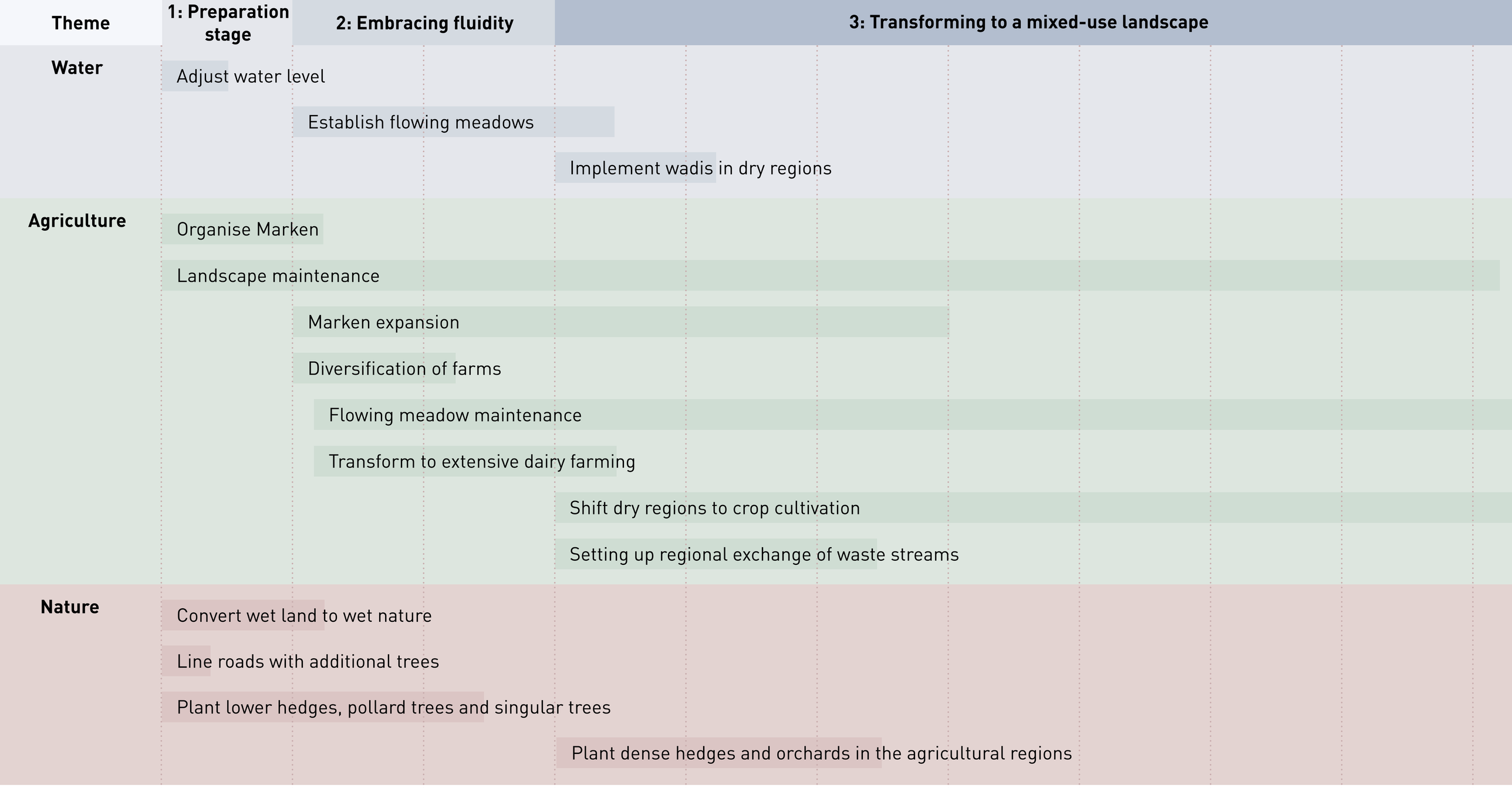


3. Agricultural Kamp

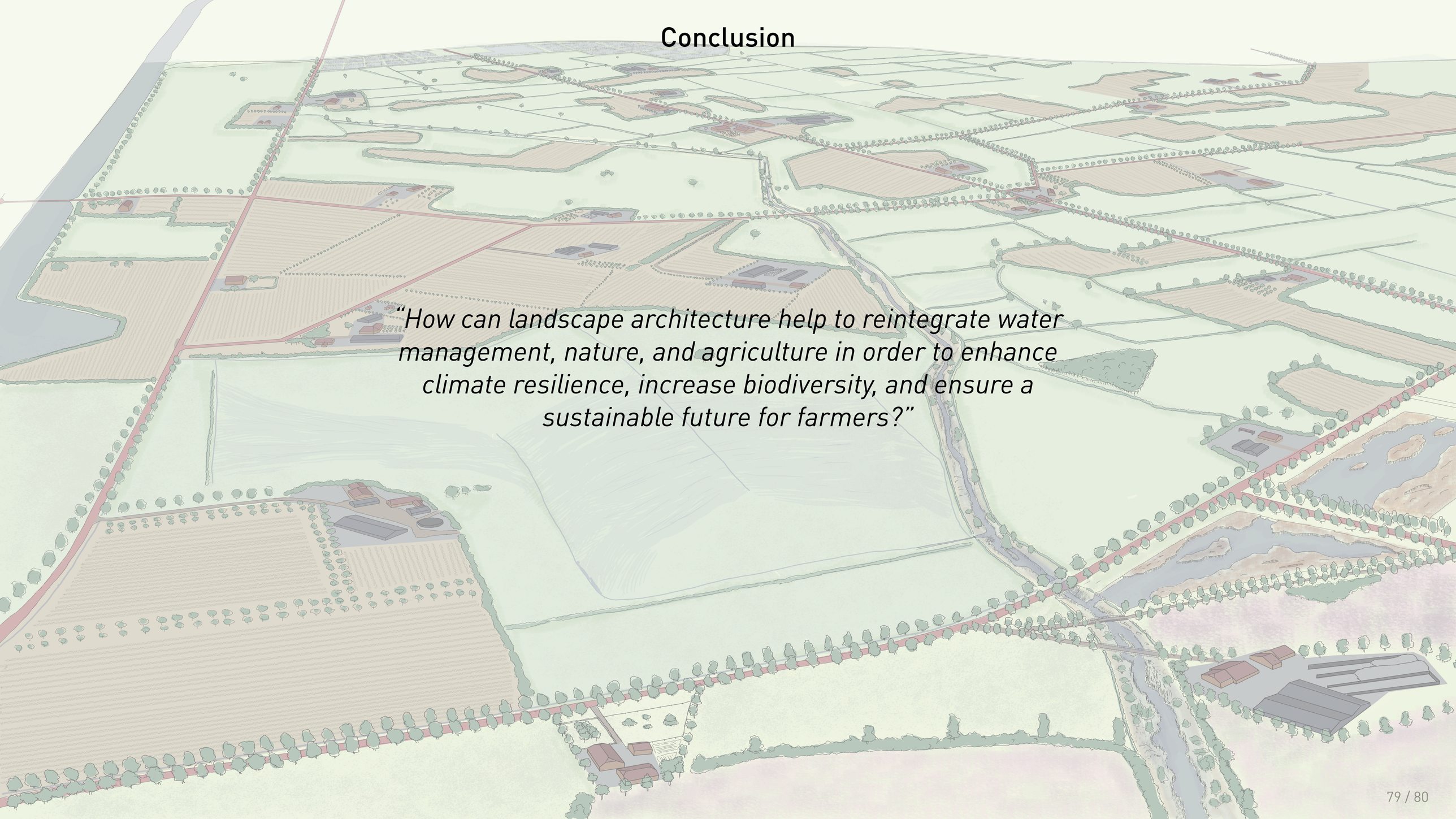


4. Flowing distribution




Theme
1: Preparation stage
2: Embracing fluidity
3: Transforming to a mixed-use landscape
Water
Adjust water level
Establish flowing meadows
Implement wadis in dry regions
Agriculture
Organise Marken
Landscape maintenance
Marken expansion
Diversification of farms
Flowing meadow maintenance
Transform to extensive dairy farming
Shift dry regions to crop cultivation
Setting up regional exchange of waste streams
Nature
Convert wet land to wet nature
Line roads with additional trees
Plant lower hedges, pollard trees and singular trees
Plant dense hedges and orchards in the agricultural regions
Year 0
5
10
15
20
25
30
35
40
45
50

Conclusion



“How can landscape architecture help to reintegrate water management, nature, and agriculture in order to enhance climate resilience, increase biodiversity, and ensure a sustainable future for farmers?”


Thank you