P5 | 26.01.23

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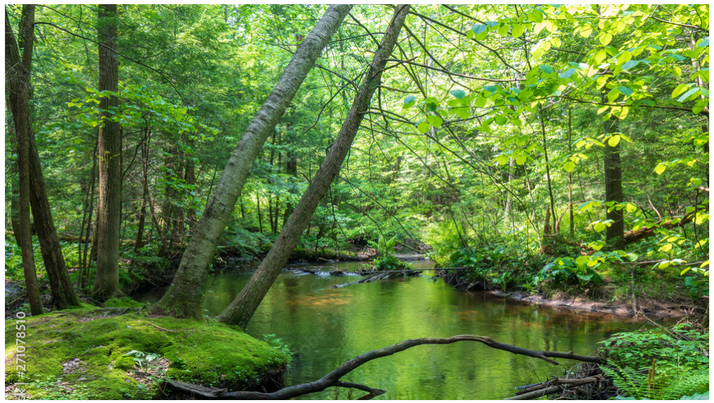
First mentor: Nico Tillie
Second mentor: Mo Smits
Examinator: Pierijn van der Putt

BUILDING A PRODUCTIVE, FUTURE PROOF LANDSCAPE

exploring a potential landscape in the watershed of brook ‘De Dommel’ which:

moves towards a **future proof water system** by 2050

provides **local, natural materials** for the future building program



CONTEXT

CONTEXT

Urban ecology & ecocities lab in collaboration with State Forestry

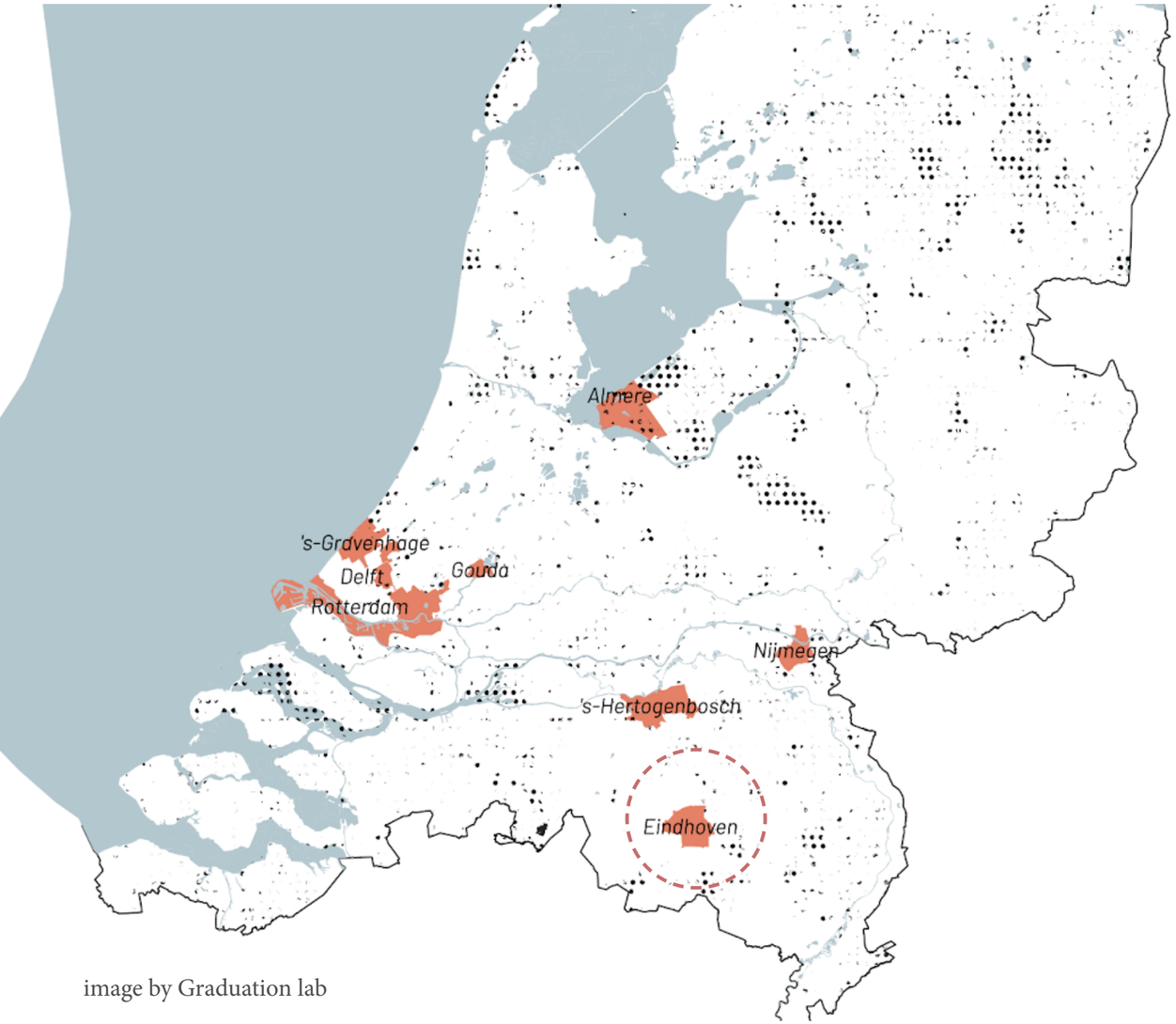


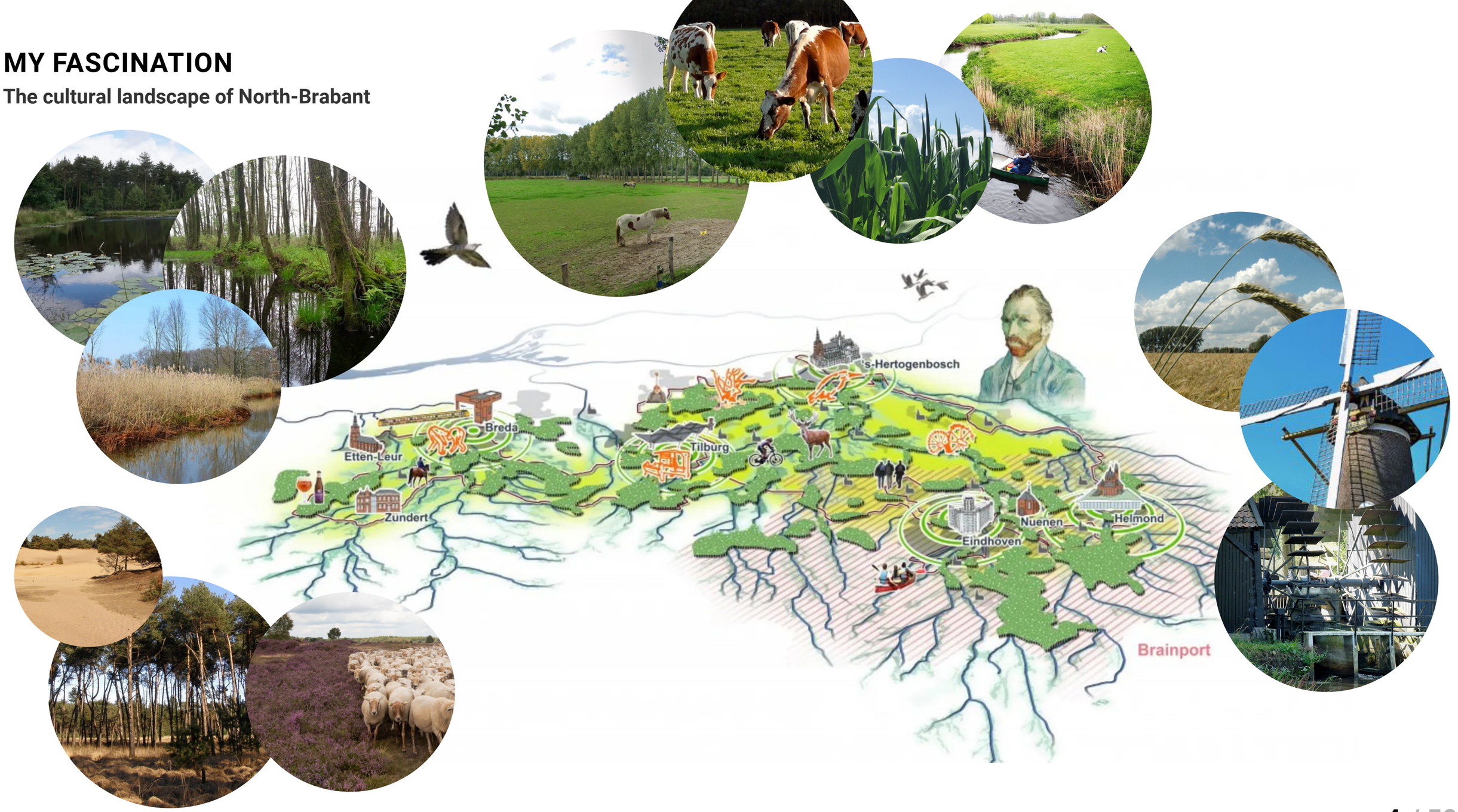
image by Graduation lab

staatsbosbeheer

https://www.staatsbosbeheer.nl/Over-Staatsbosbeheer/Dossiers/groene-metropool

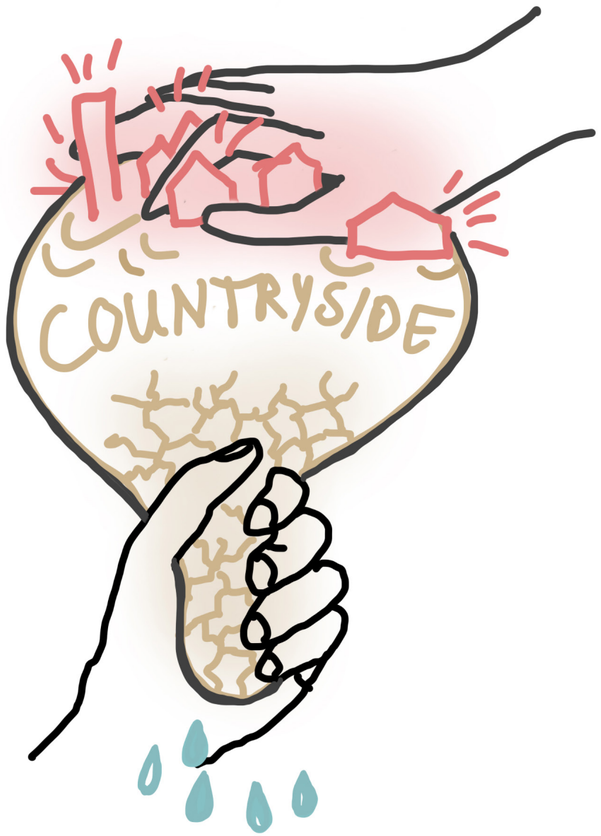
MY FASCINATION

The cultural landscape of North-Brabant



PROBLEM FIELD

housing assignment



drought

HOUSING ASSIGNMENT

Short term & long term demand

Current expansion

2040: + 154.000 houses

2100: + ... houses

DROUGHT

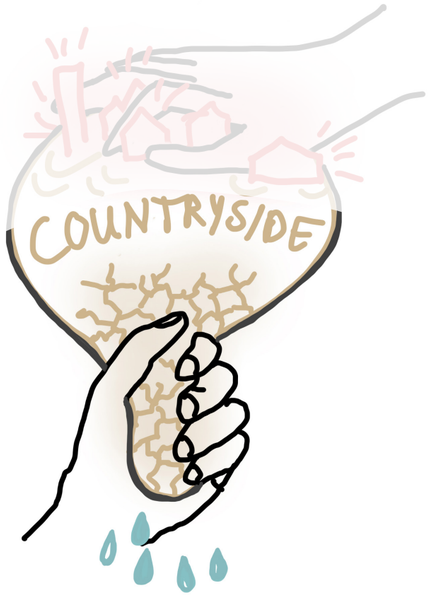
Consequences

agriculture

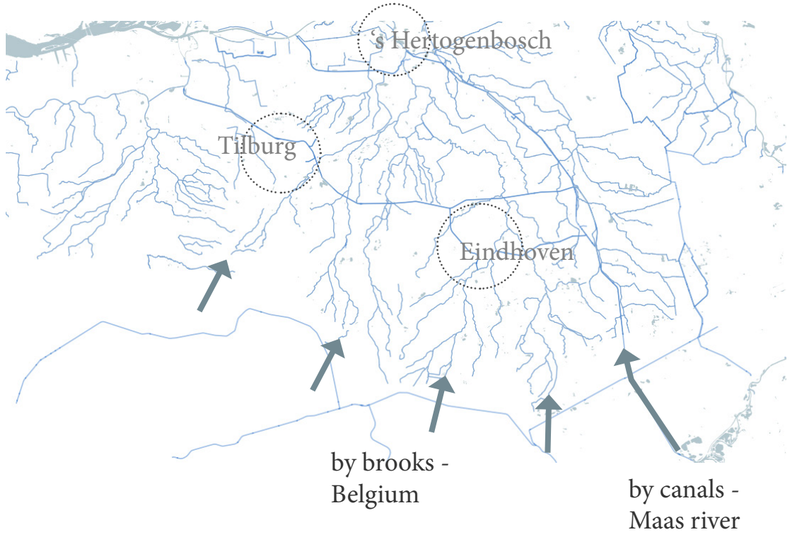
nature

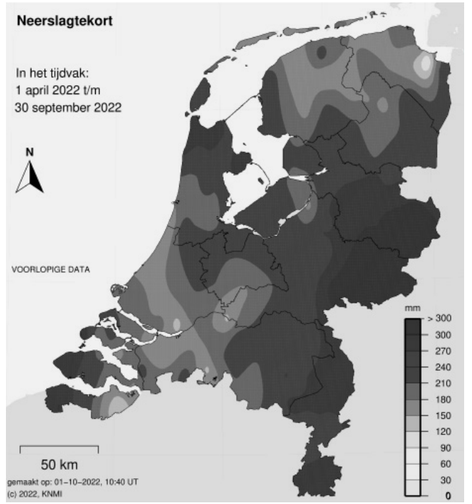
DROUGHT

Vulnerability to drought



limited water supply & storage





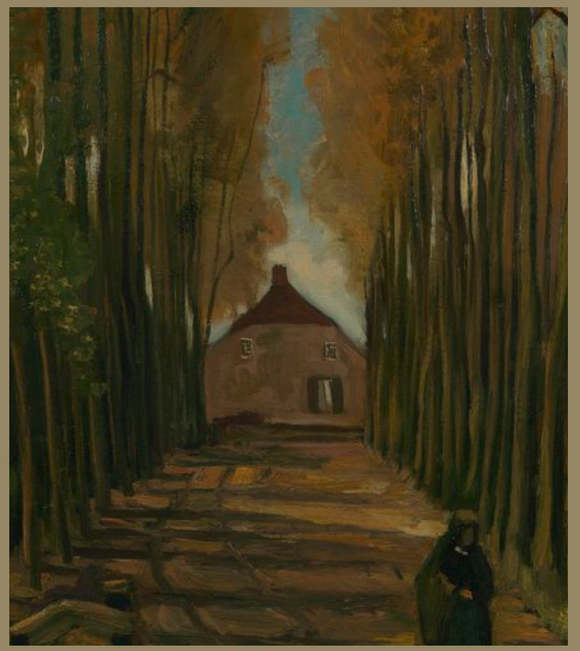
knmi, 2022

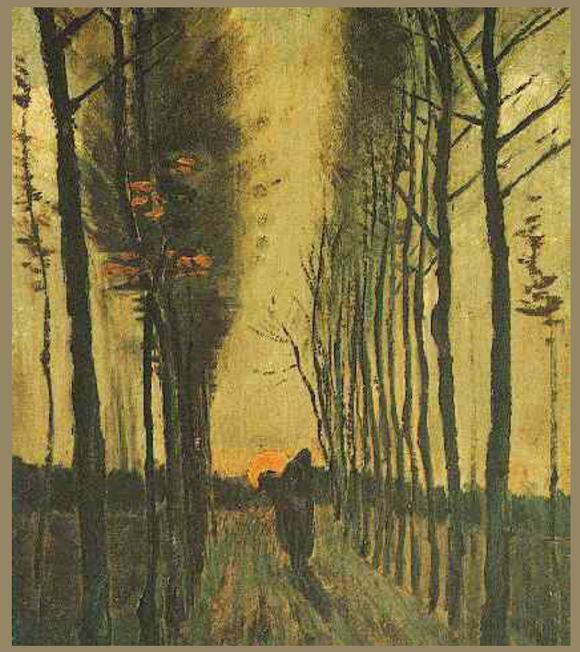
precipitation shortage

sandy soil

MY FASCINATION

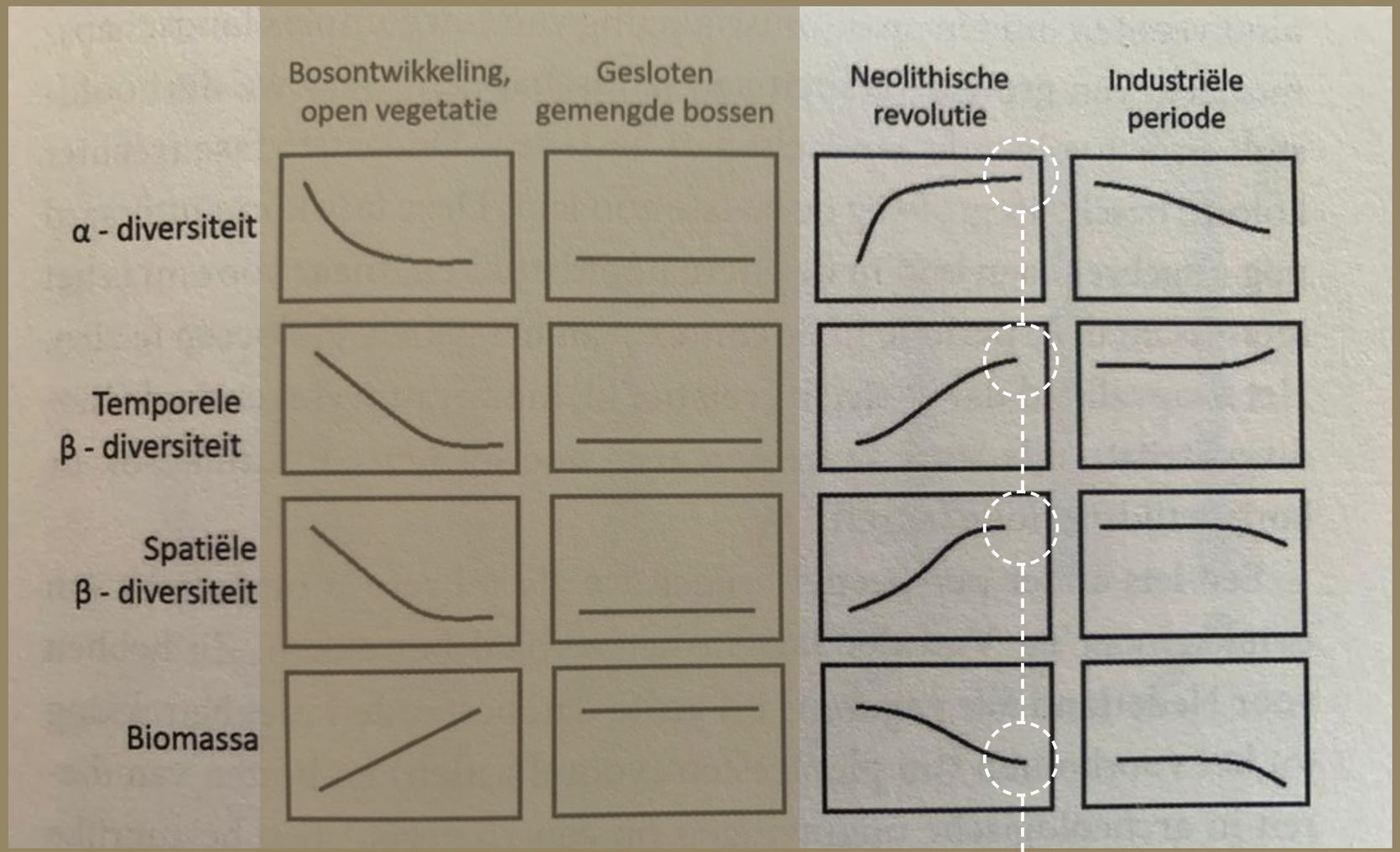
Inspiration by Van Gogh



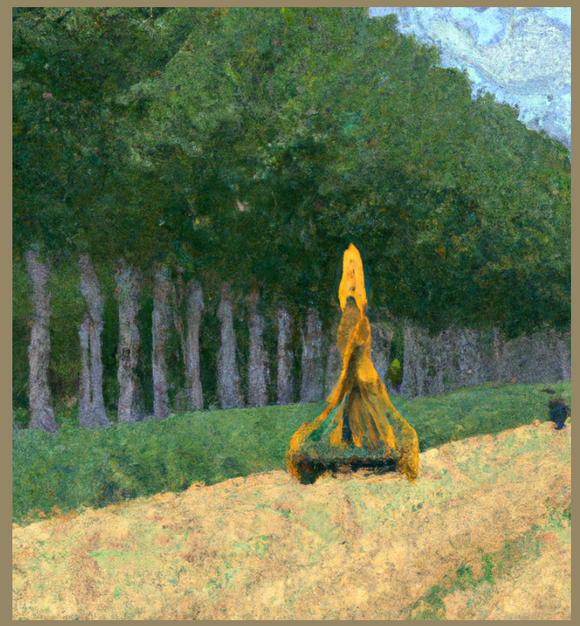


MY FASCINATION

Beneficial influence of historical civilization on nature

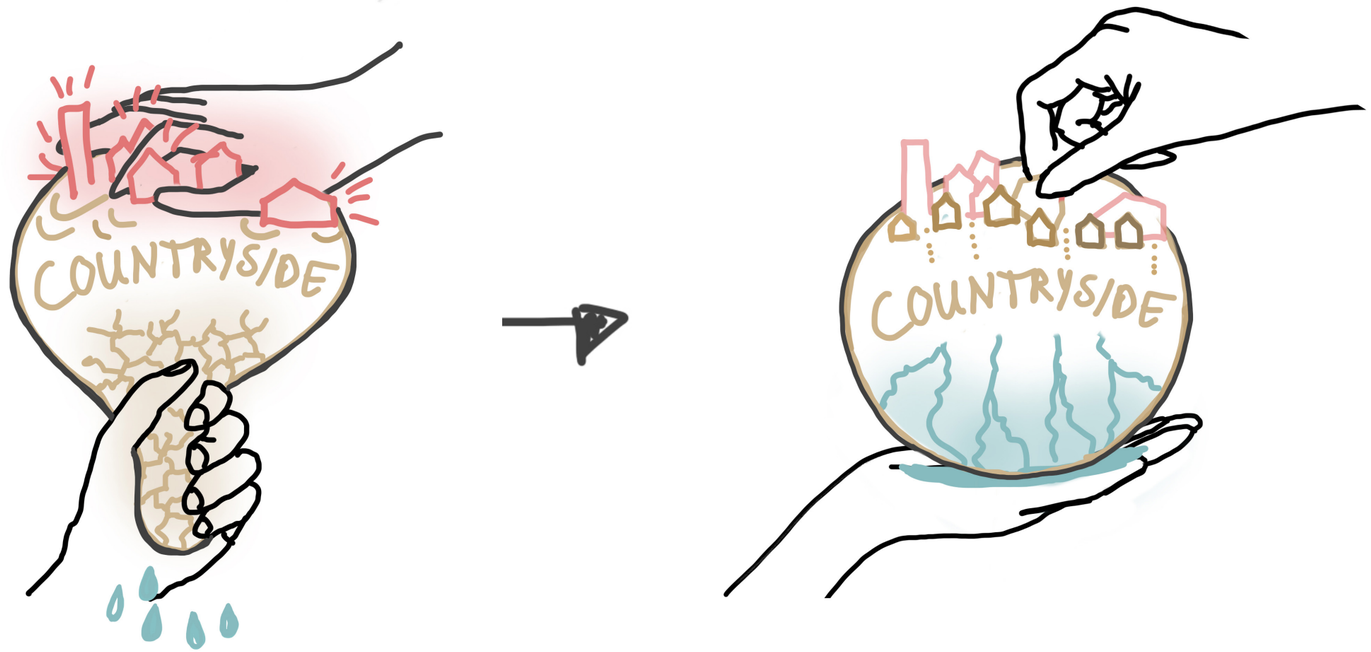


Restoring the local connection. Houses that integrate instead of invade..



CONCLUDING PROBLEM STATEMENT

A spatial framework is lacking for the watershed of the Dommel as part of North-Brabant to move towards a future proof water system that simultaneously provides local, natural construction materials for the future building program.

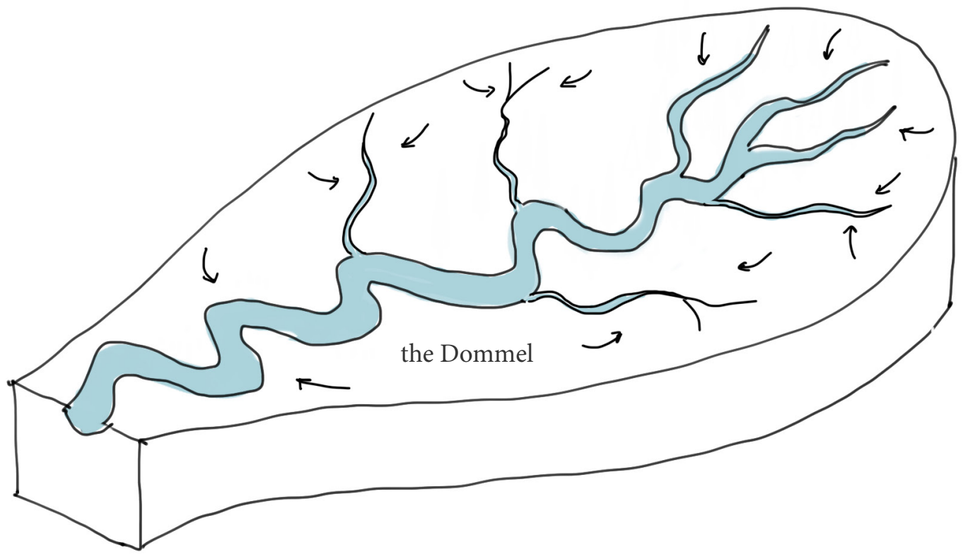


DEFINITIONS

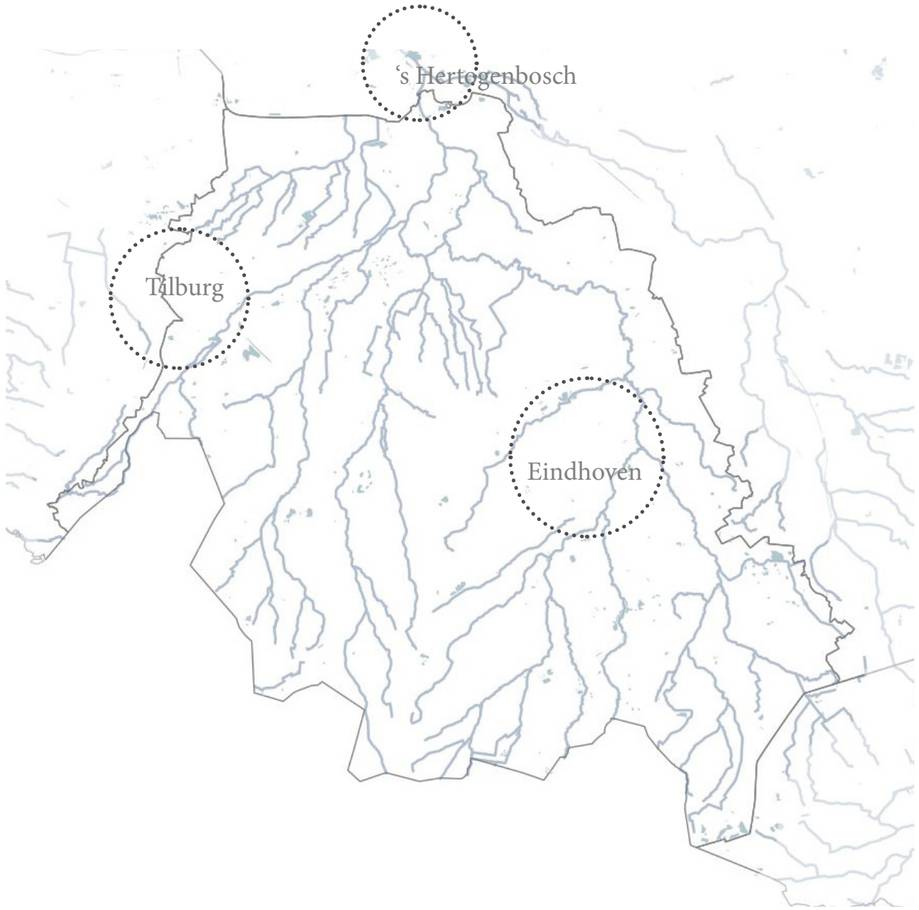
of key aspect

Drainage basin = watershed

The whole area that is drained by the Dommel



Contours of the Dommel watershed



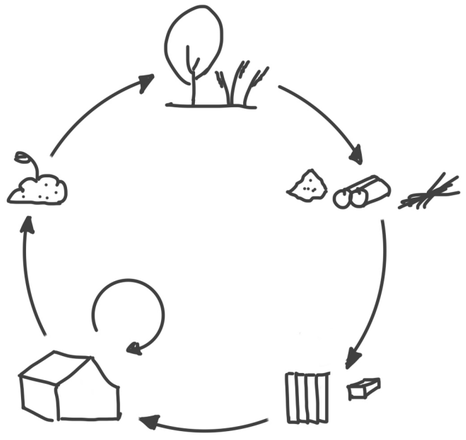
DEFINITIONS

of key strategies

Local, natural building materials (by Bouwtuin) =

- Trees
- Grass & fibers
- Earth, stone & shells
- Algae and fungi

Can be composted at the end of lifespan

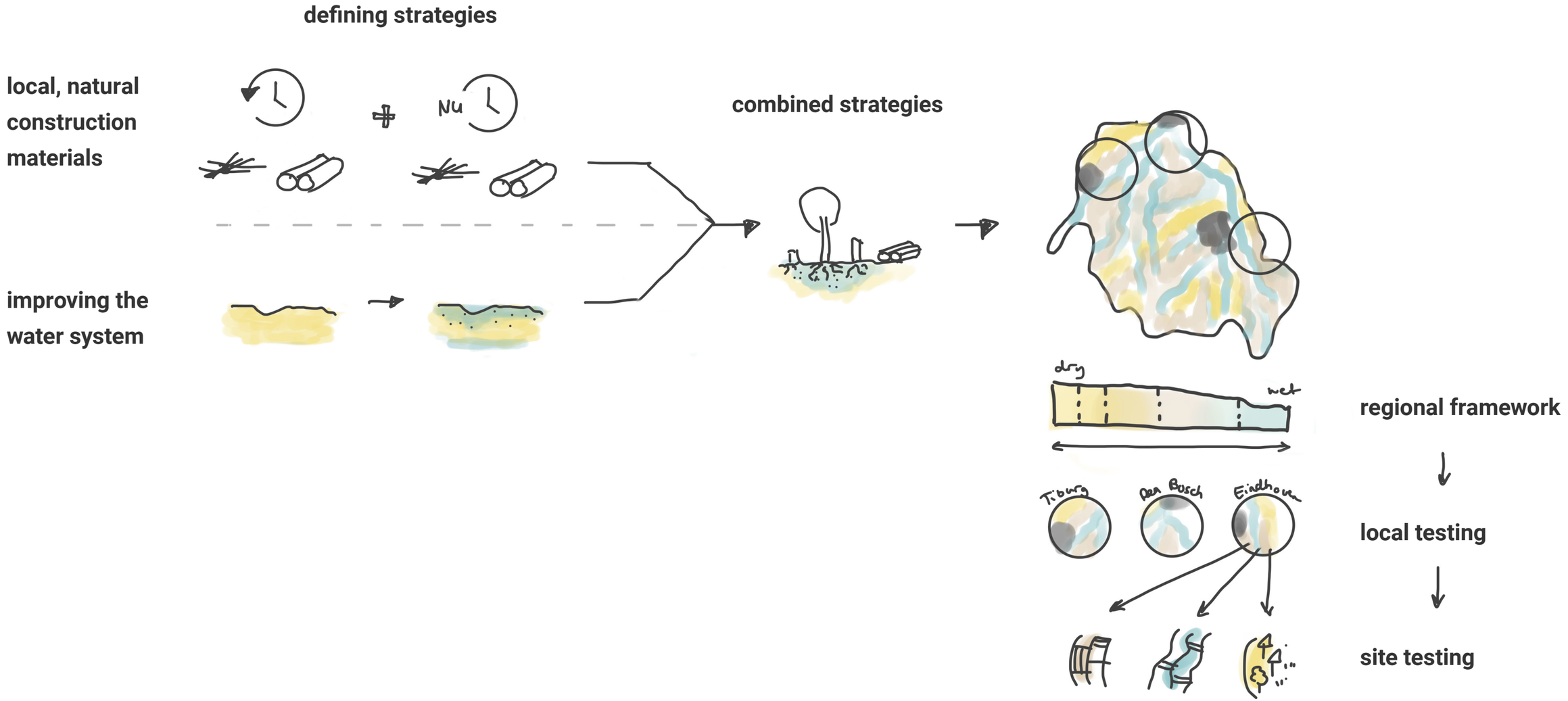


Future proof water system (by Waterboard De Dommel)=

- Groundwater recharge and extraction are balanced
- Groundwater level shows a positive trend

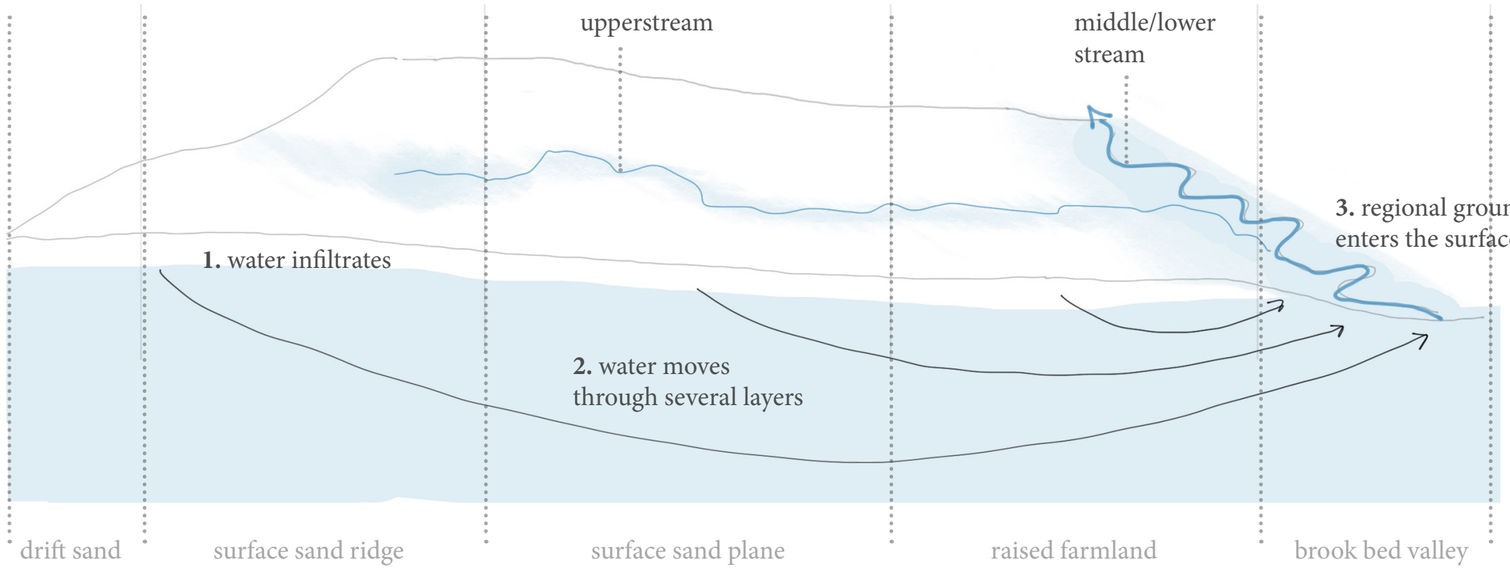
METHOD

overview of steps taken

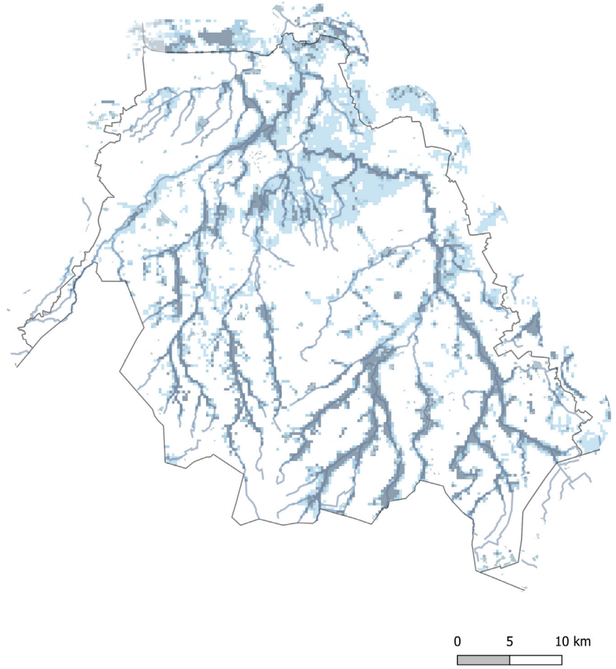


CURRENT WATERSYSTEM

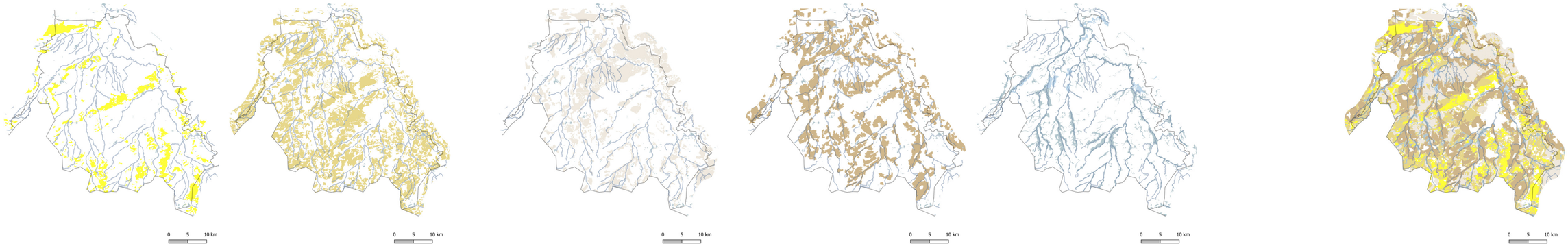
Natural system



seepage

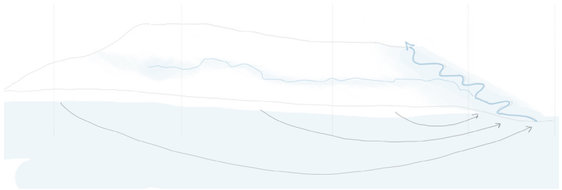


geomorfology



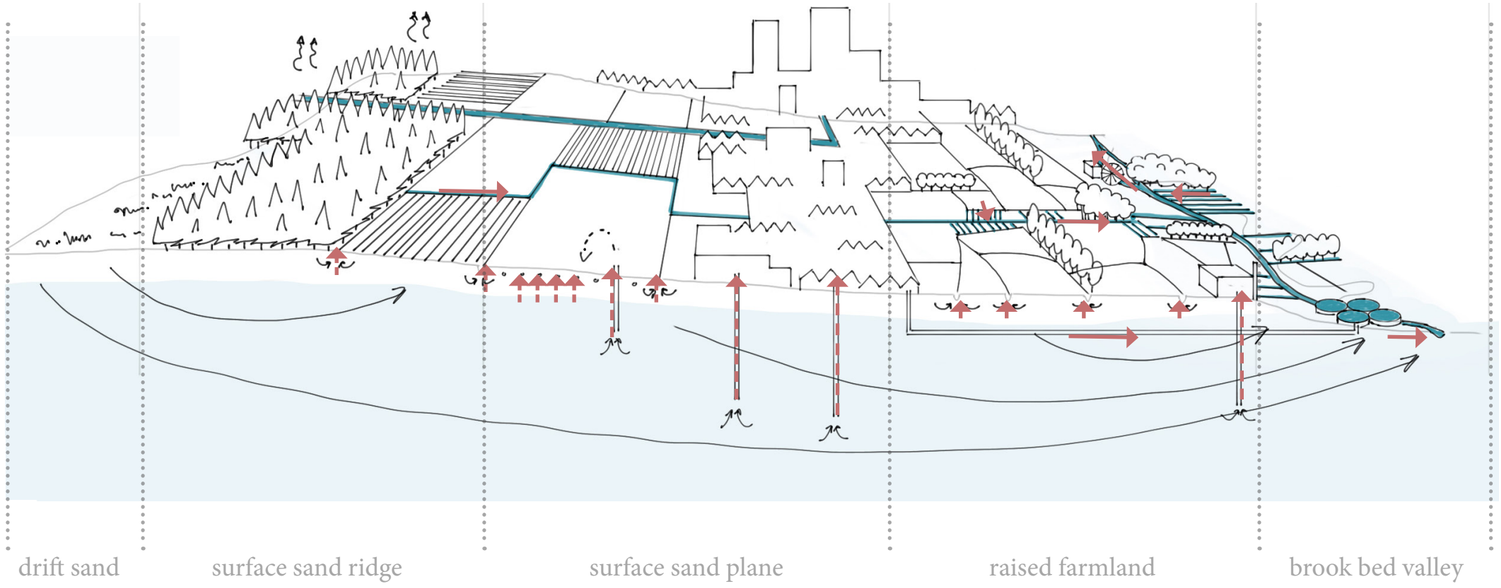
CURRENT WATERSYSTEM

Influenced by todays landuse

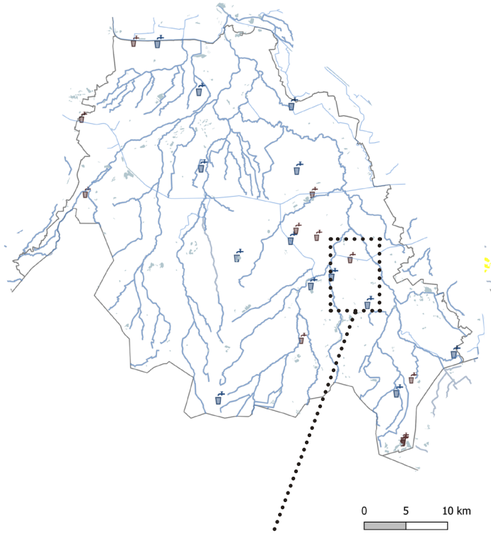


discharge of surface water

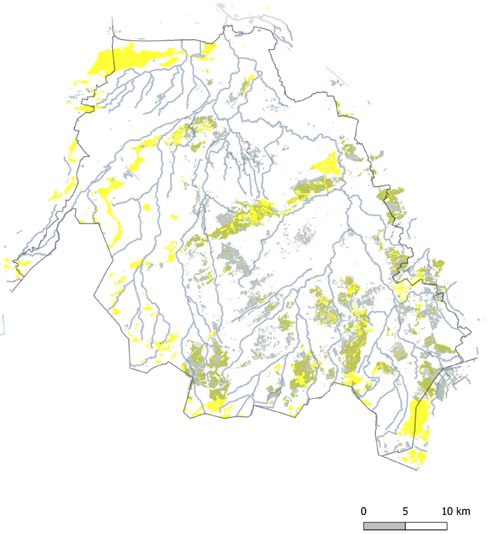
groundwater extraction



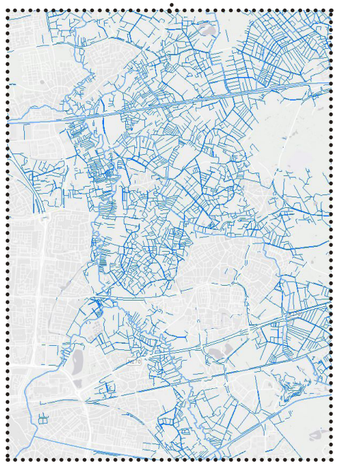
large extractions



pine & mixed forest



discharge



HISTORICAL USE OF LOCAL, NATURAL MATERIALS

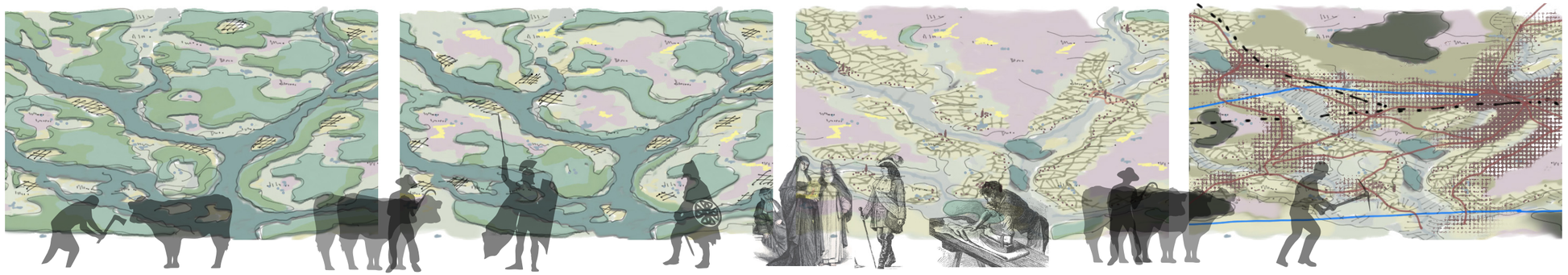
Dominant material use

earth

trees

fibers

main landscape elements



forests, grassland & small settlements | forests, larger grassland & small settlements | heathland, grassland, arable lands | large settlements, new forest

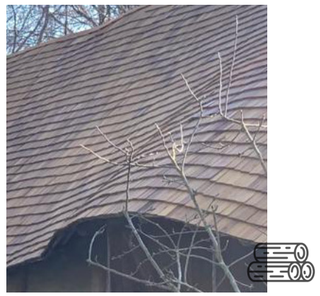
first settlements — now

frame / body

branches + loam + straw

roof & facade

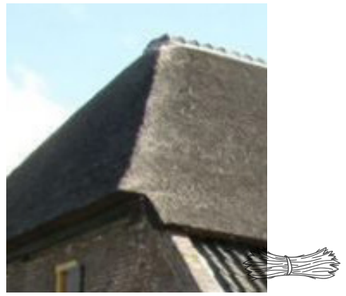
straw



wooden slats

wooden planks

sods

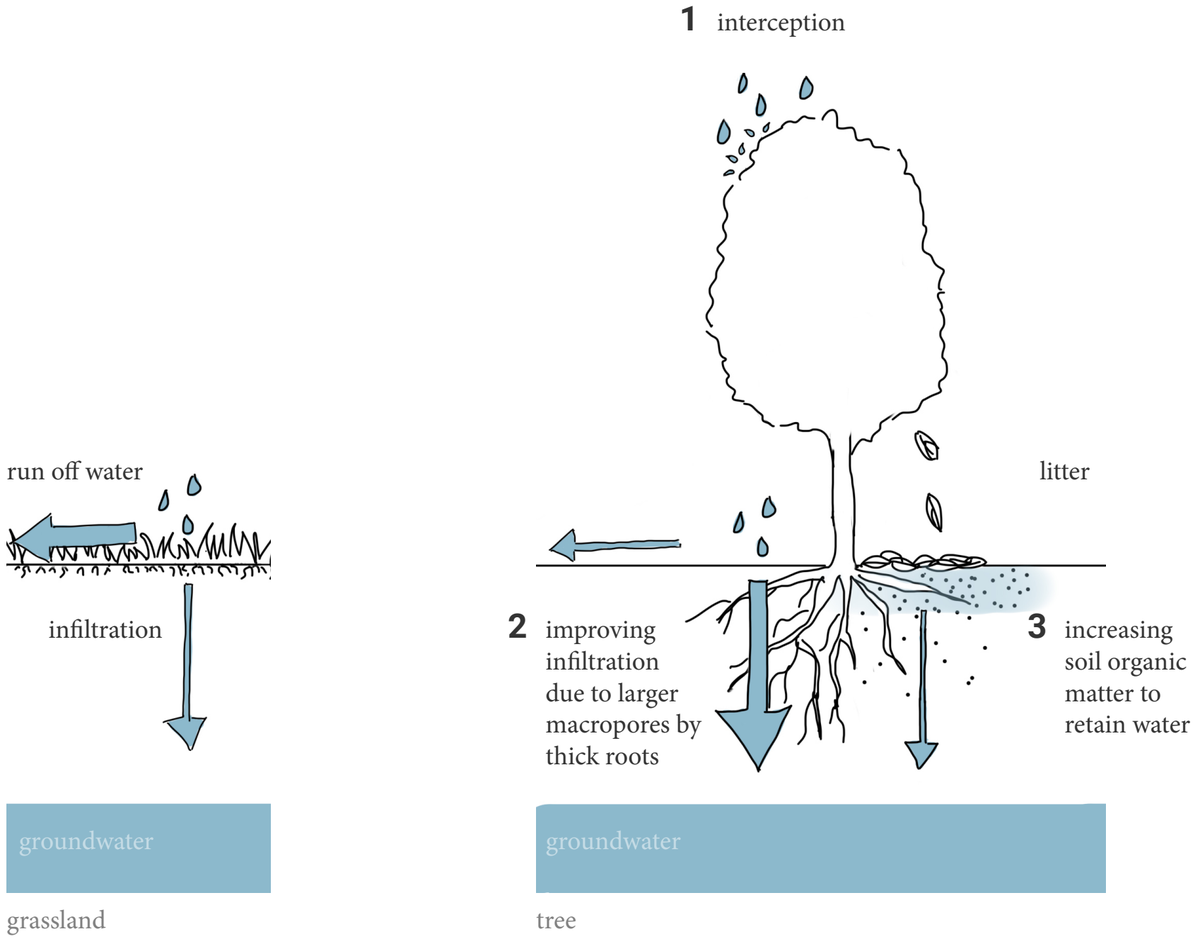


reed

wooden planks

TREES

Strategies



TREES

Main potentials

short term local use

frame

CLT

facade /roof

facade /roof

(isolation) board

long(er) term local use

current production forests

Suitable trees for increasing litter*

Suitable trees for improving infiltration in wet zones

Oak tree - Quercus robur

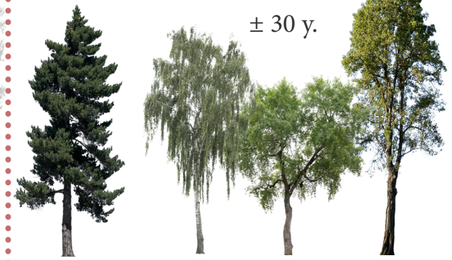
Scots pine - Pinus sylvestris

± 60 y.

± 50 y.

± 30 y.

± 30 y.



Douglas fir - Pseudotsuga menziesii

Birch - Betula pendula

Aspen - Populus tremula

Poplar - Populus x canadensis

Black alder - Alnus glutinosa

Willow - Salix alba

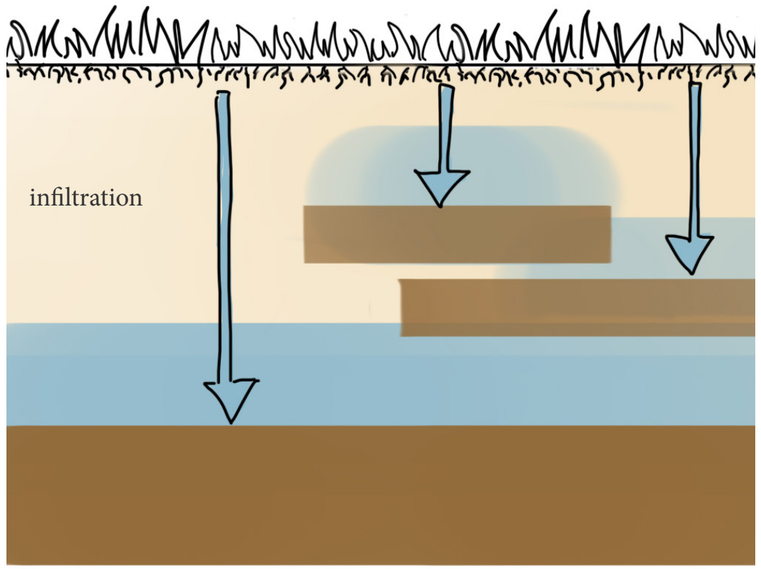
dry

wet

*according to Bosgroep Zuid Nederland

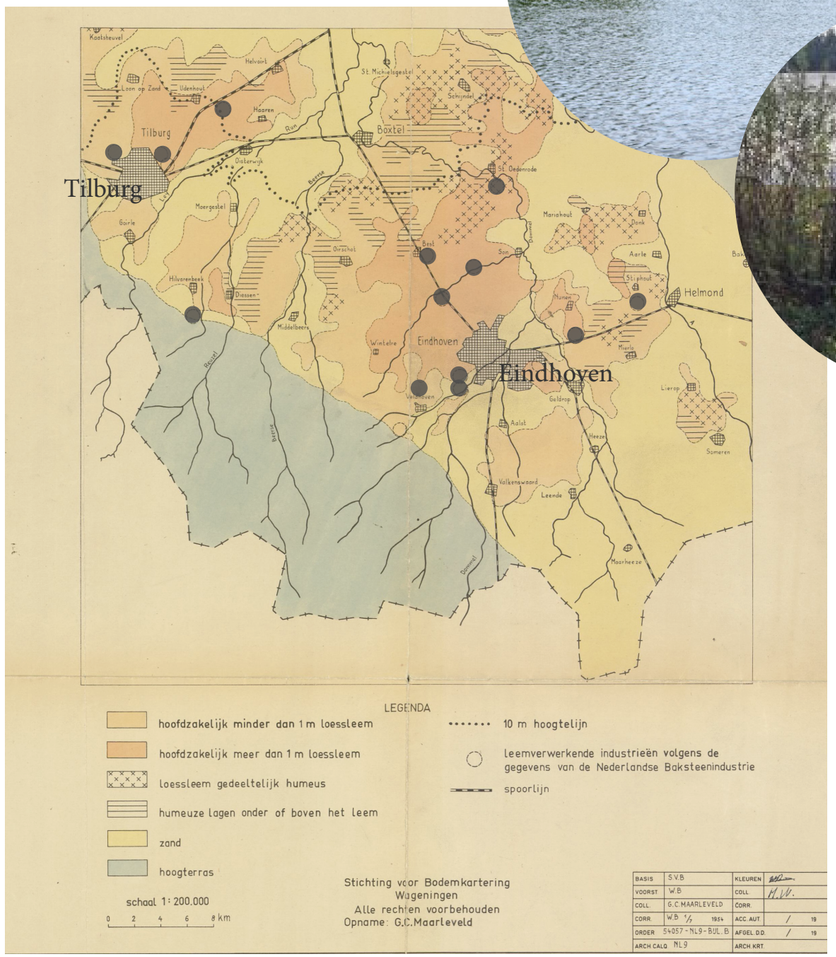
EARTH

Strategies



EARTH

Potentials



loam in top layer, WUR

- former brick factory

loam mortar

pressed loam stones

FIBERS

Potentials

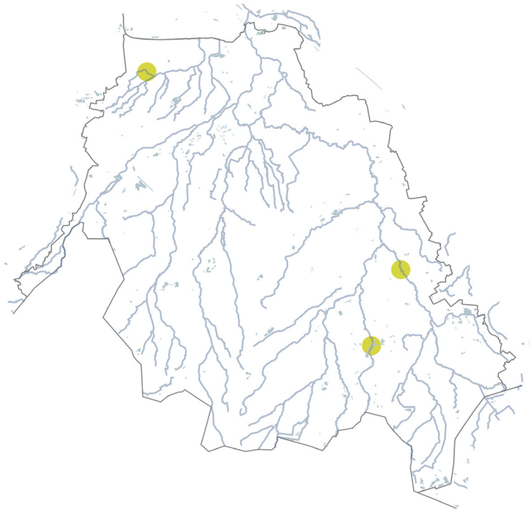
straw - isolation

facade /roof

wool - isolation

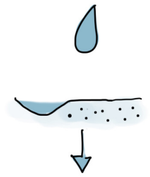
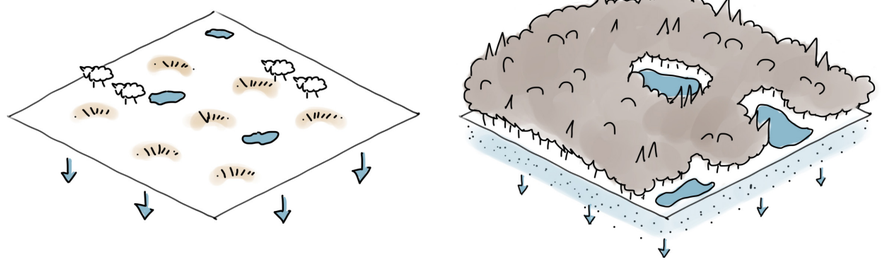
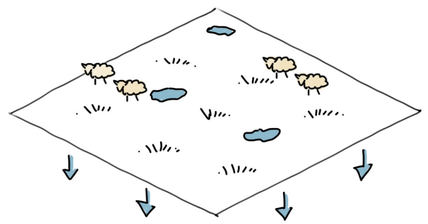
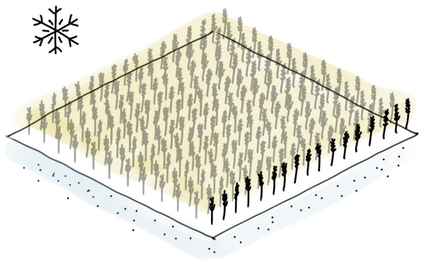
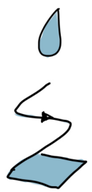
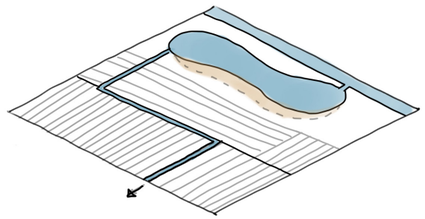
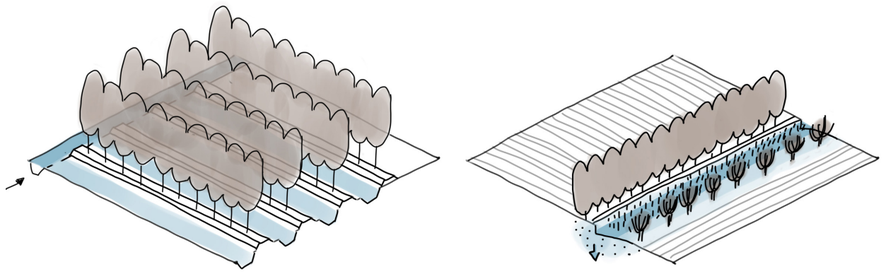
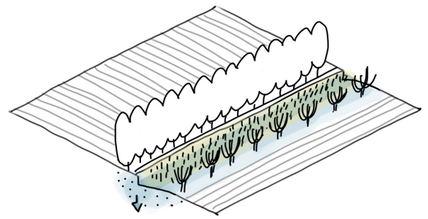
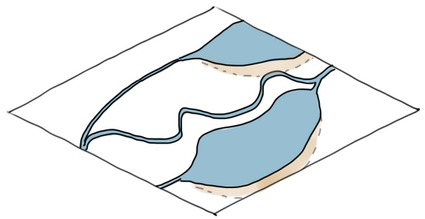
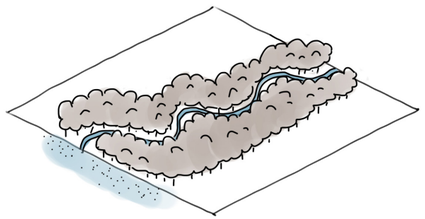
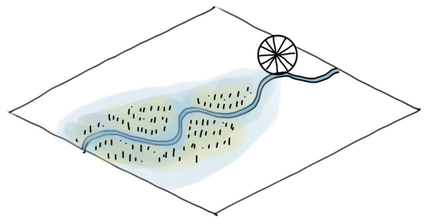
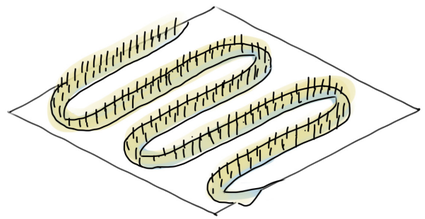
current agricultural fields

current reed fields



COMBINED STRATEGIES

Title

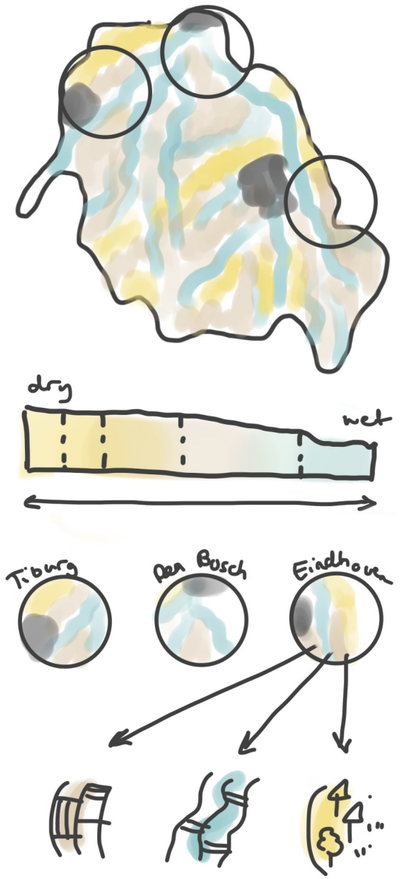
	earth	timber	fibers	
retaining of water				
buffering of water				
delayed drainage				

REGIONAL FRAMEWORK

local, natural construction materials

improving the water system

joint strategies



regional framework

↓

local testing

↓

site testing

DESIGN OBJECTIVES & HIERARCY

Regional program

the Dommel watershed

By Van Gogh national park:

- robust, connected and resilient nature areas
- attractive agricultural landscapes
- climate-robust brook valleys
- visibility and readability of the Brabant brook landscape
- perspectives for farmers and sustainable (food) production for a future-proof agriculture
- strong connection between producers and consumers (city-country)
- city and countryside structurally connected and developed in conjunction
- Nature and landscape to the heart of the city and village
- Development of nature experience and sustainable (cultural) tourism
- Recreational value for both residents and visitors
- Experience of accessible nature, landscape and heritage
- Education and recreation connected

Supplemented by strategy from theory:

- generate a nature/culture intertwined, productive landscape
- blue infrastructure at the basis

RESULTING FRAMEWORK

blue infrastructure

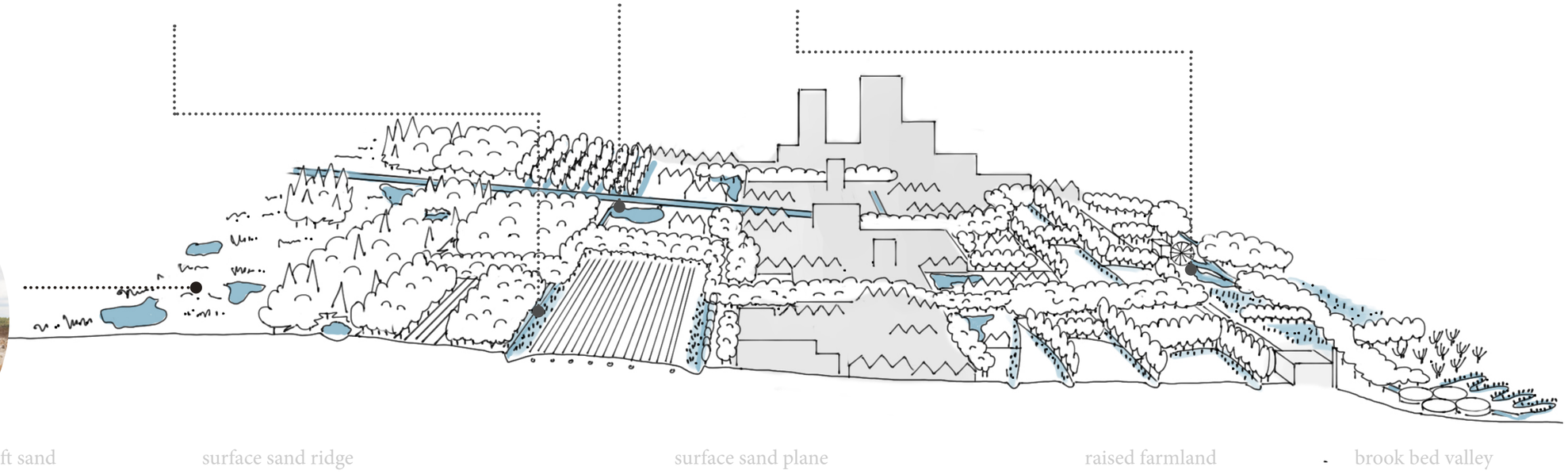
‘sponge’ forests

countryside wadi’s

loam water basins

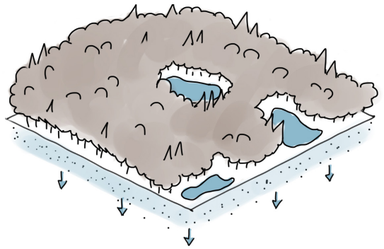
brook valleys as sponge

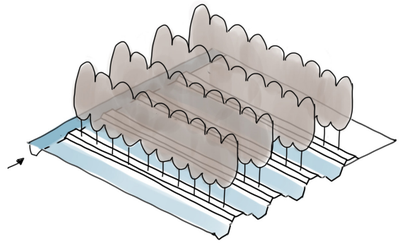
main infiltration zones

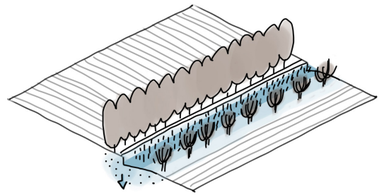


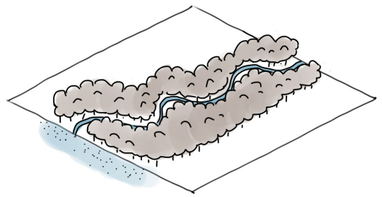
RESULTING FRAMEWORK

robust nature network - forest



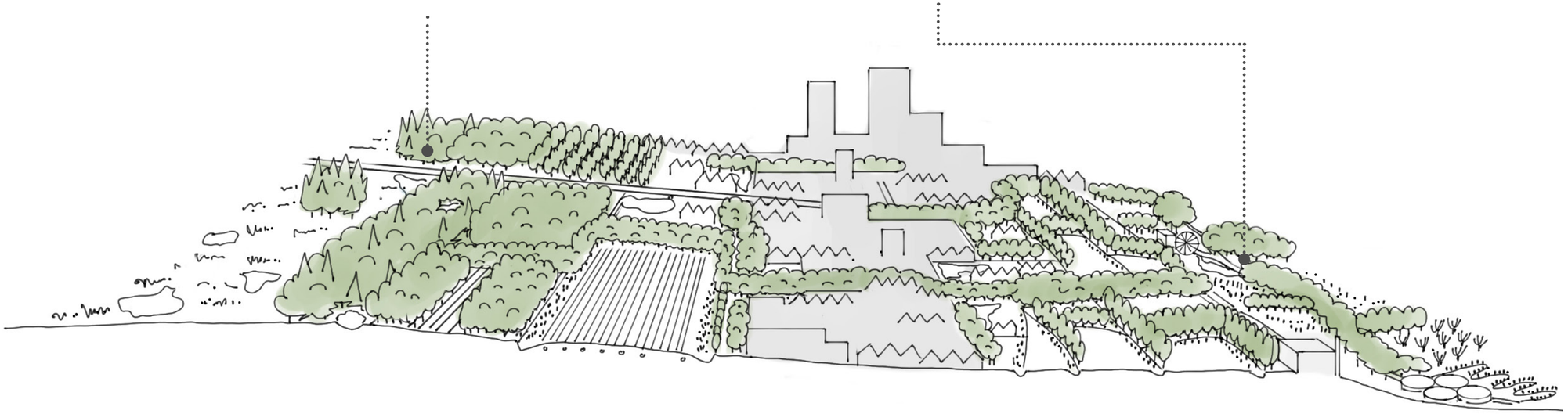






dry mixed production forest

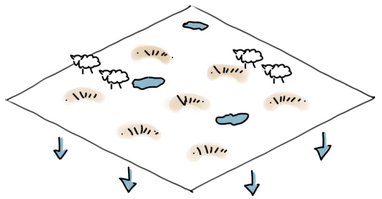
wet mixed production forest

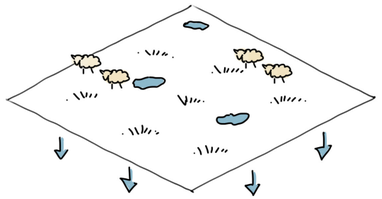


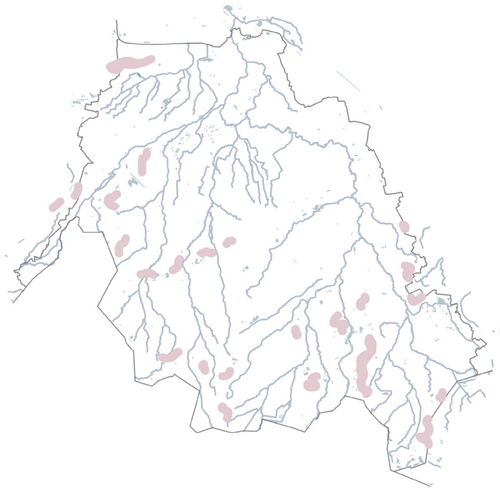
drift sand surface sand ridge surface sand plane raised farmland brook bed valley

RESULTING FRAMEWORK

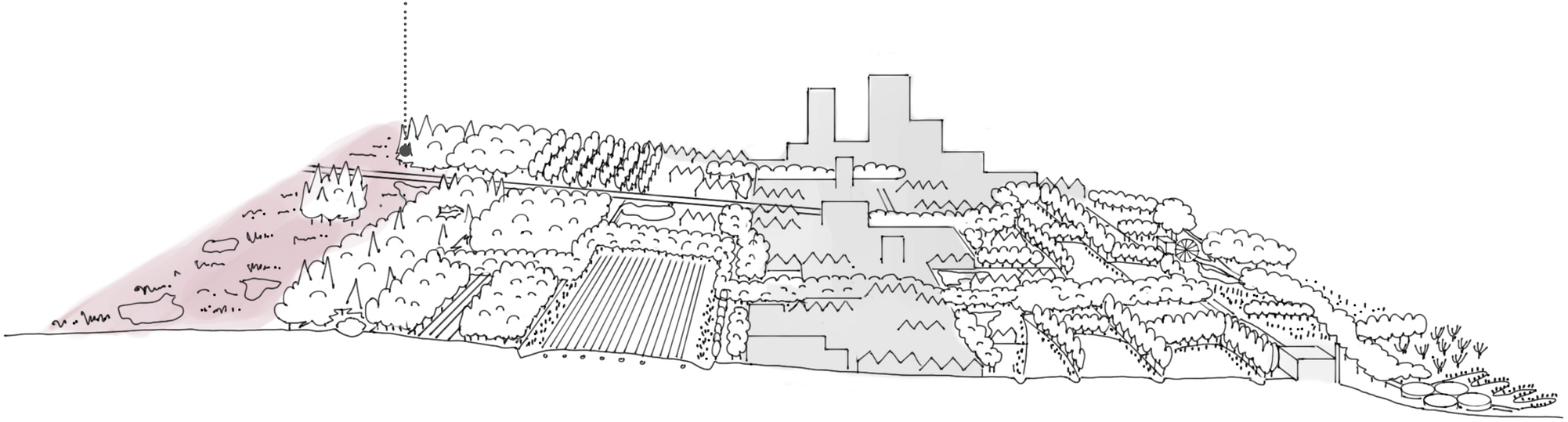
robust nature network - heath







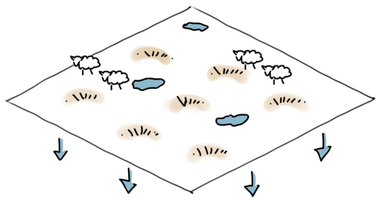
heathland/grassland

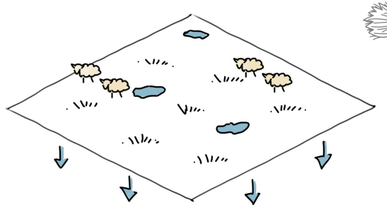


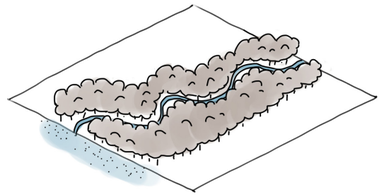
drift sand surface sand ridge surface sand plane raised farmland brook bed valley

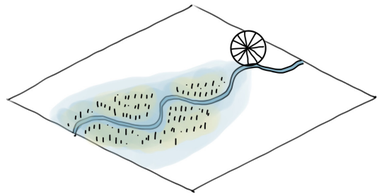
RESULTING FRAMEWORK

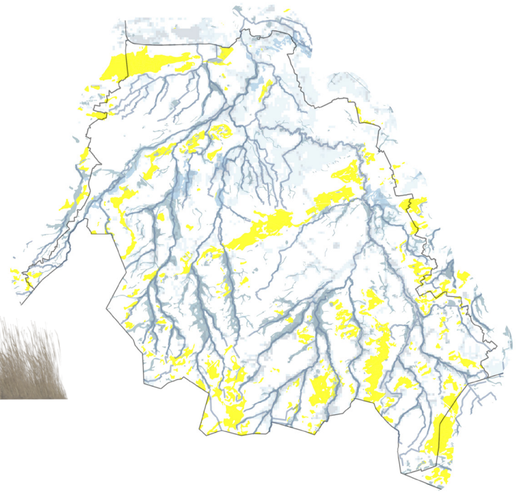
readability brook landscape







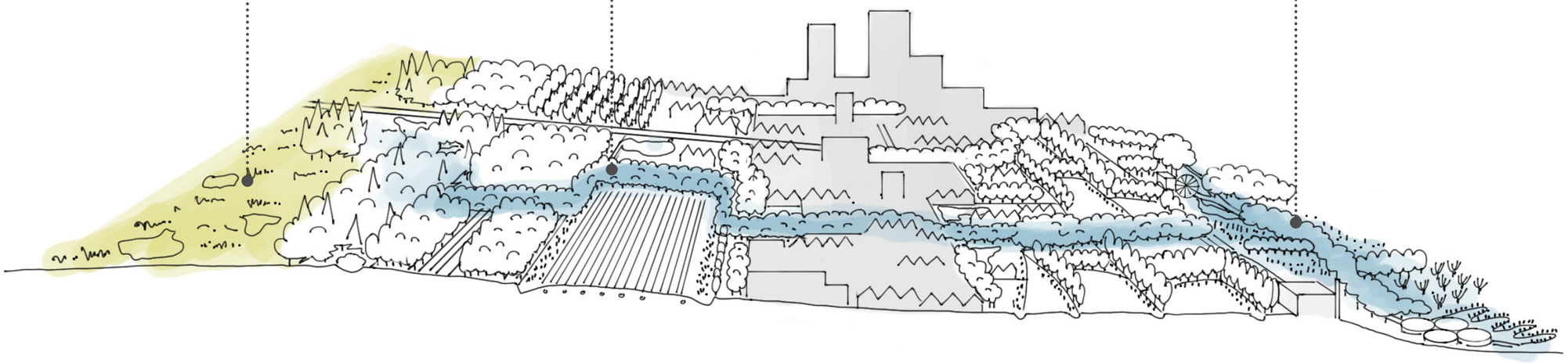




dry zone

upper stream, wet zone

lower stream, wet zone



drift sand

surface sand ridge

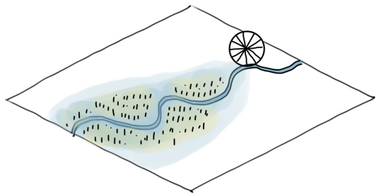
surface sand plane

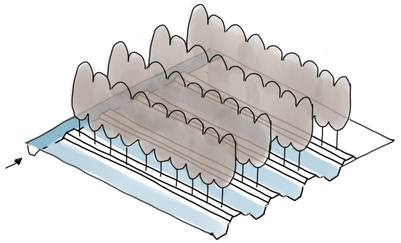
raised farmland

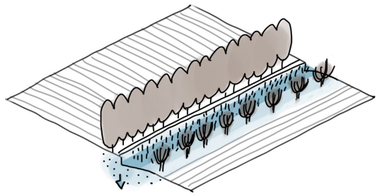
brook bed valley

RESULTING FRAMEWORK

experience of heritage

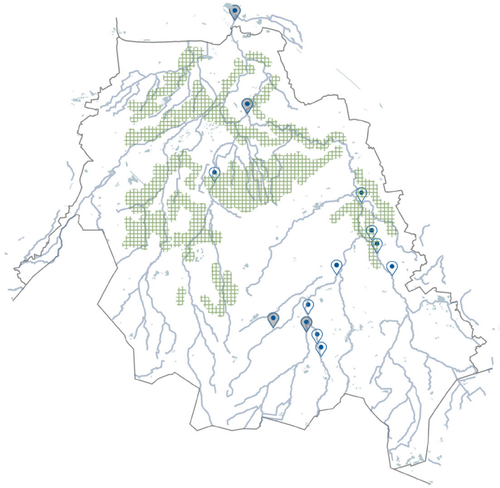


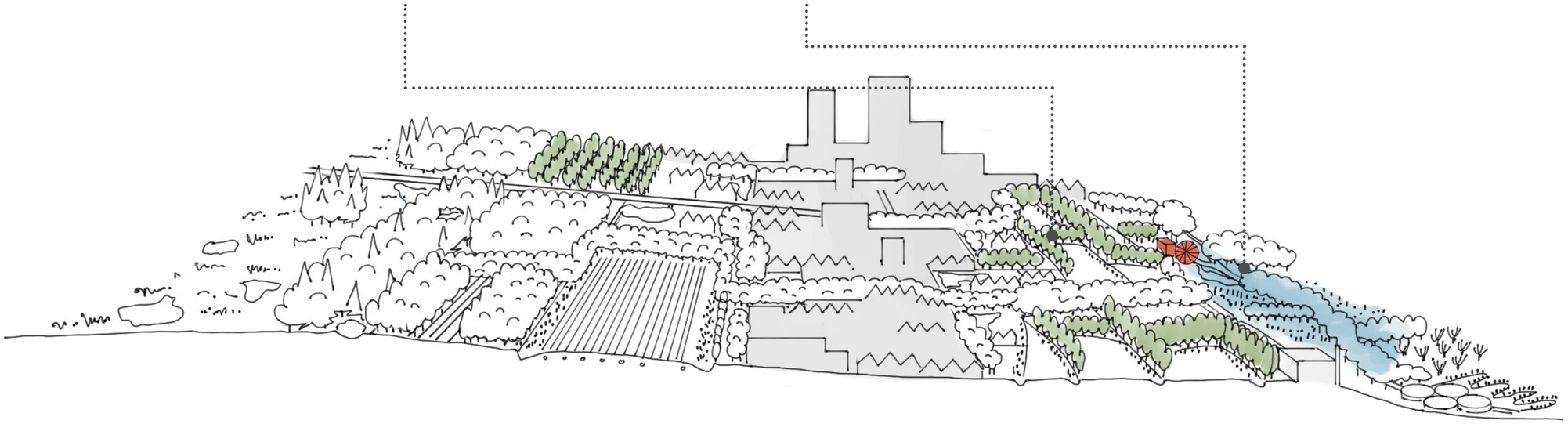




poplar landscape

water mill biotope

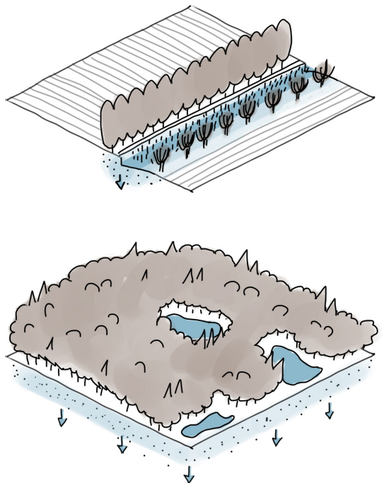




drift sand | surface sand ridge | surface sand plane | raised farmland | brook bed valley

RESULTING FRAMEWORK

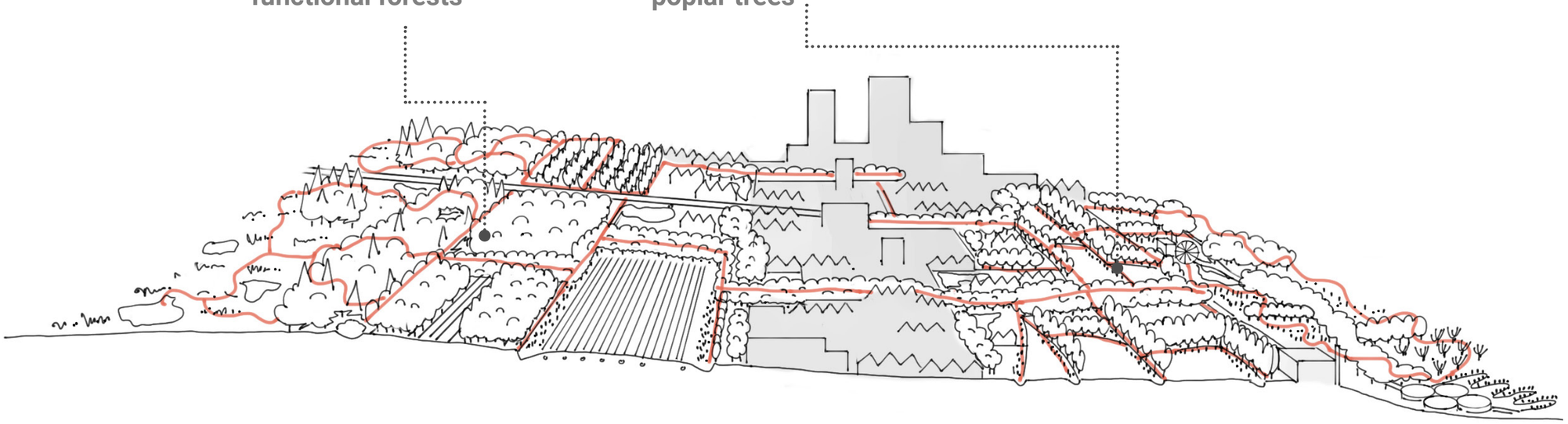
accessible countryside



recreation in multi-functional forests

walking paths along poplar trees

commonal use groves



drift sand surface sand ridge surface sand plane raised farmland brook bed valley

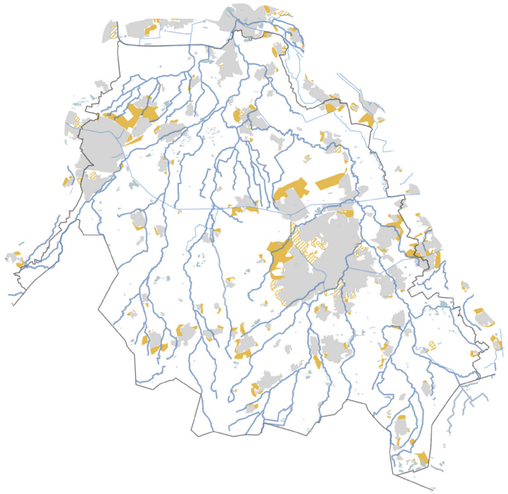
RESULTING FRAMEWORK

city and countryside developed in conjunction

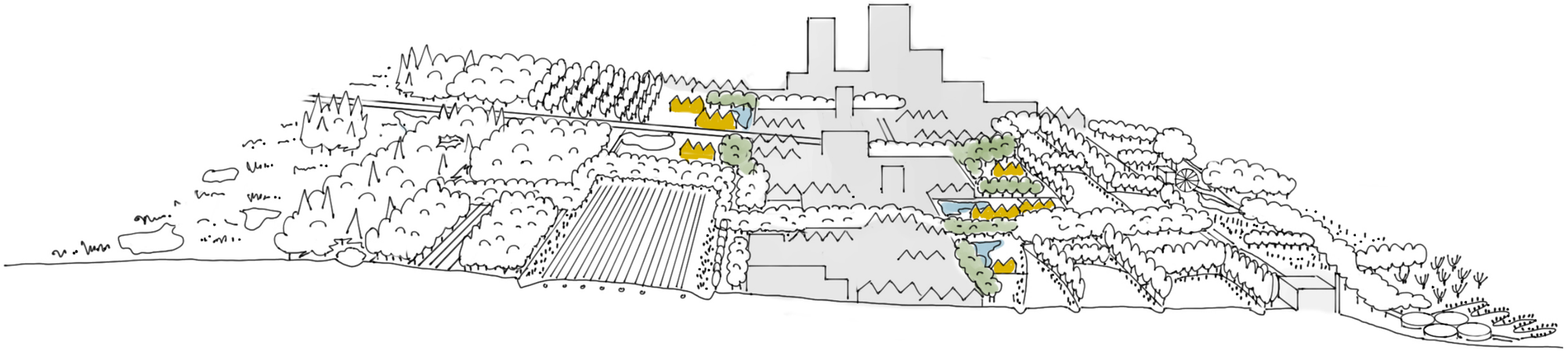
agricultural edge

wet edge by loam excavation

wet edge



dry edge

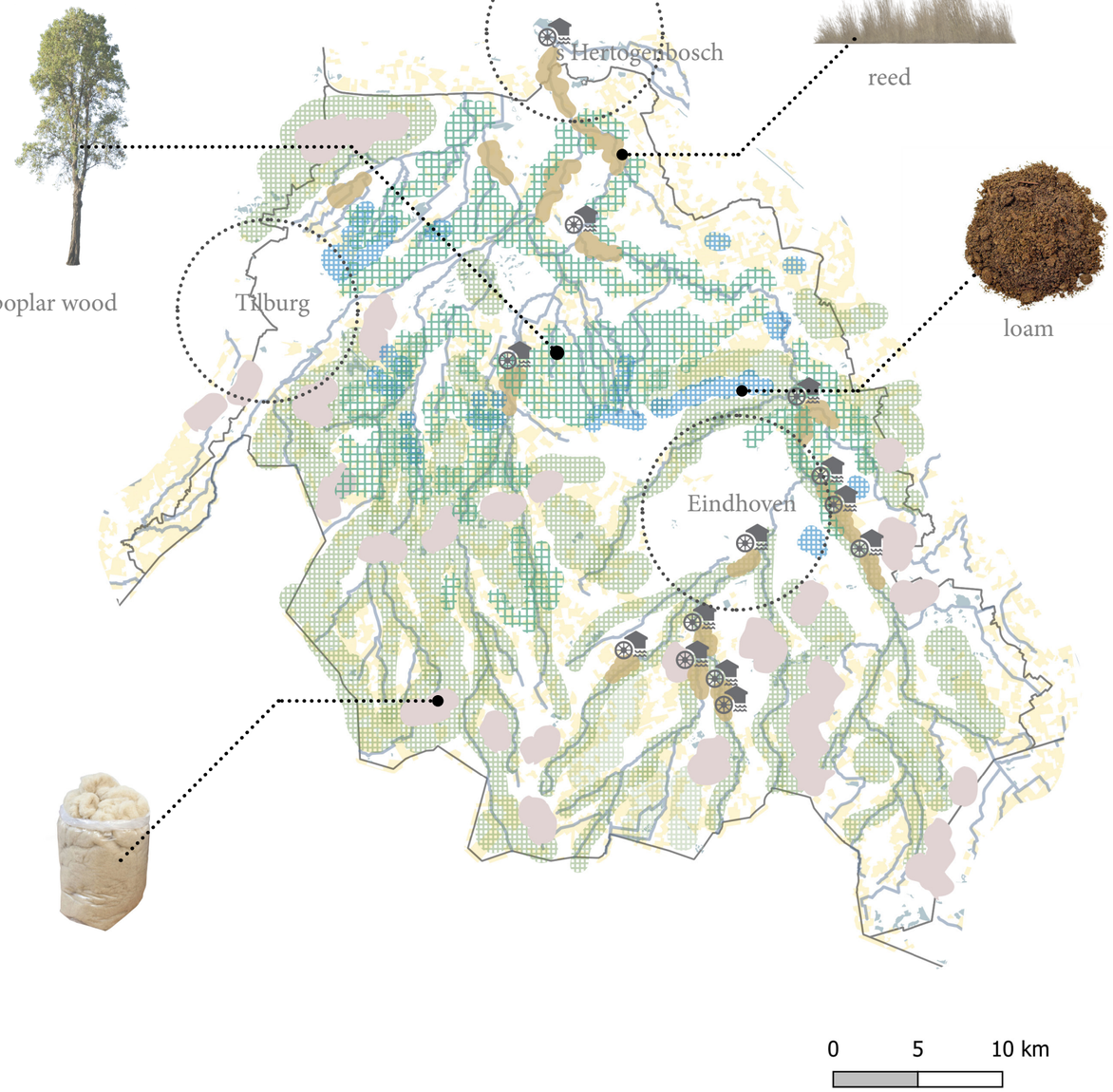


drift sand surface sand ridge surface sand plane raised farmland brook bed valley

IMPRESSION OF CITY EDGE

OVERVIEW

A new productive landscape



TIMING

availability over time

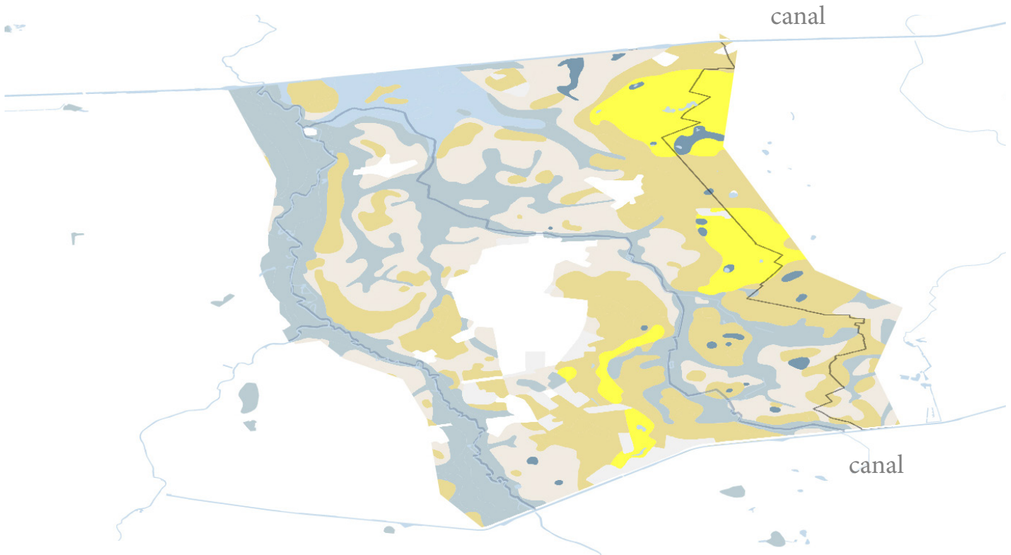
by cultivation

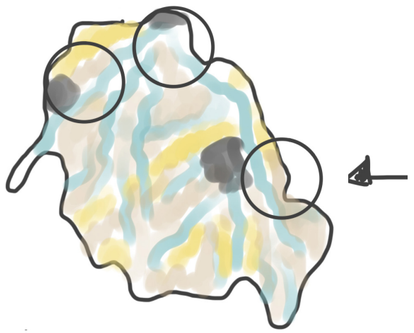
- increasing reed swamps
- logging of pine
- planting of additional poplar (amongst other species)
- winter grains
- wool by increasing grazing sheep
- excavating loam for water bassins

LOCAL SITE

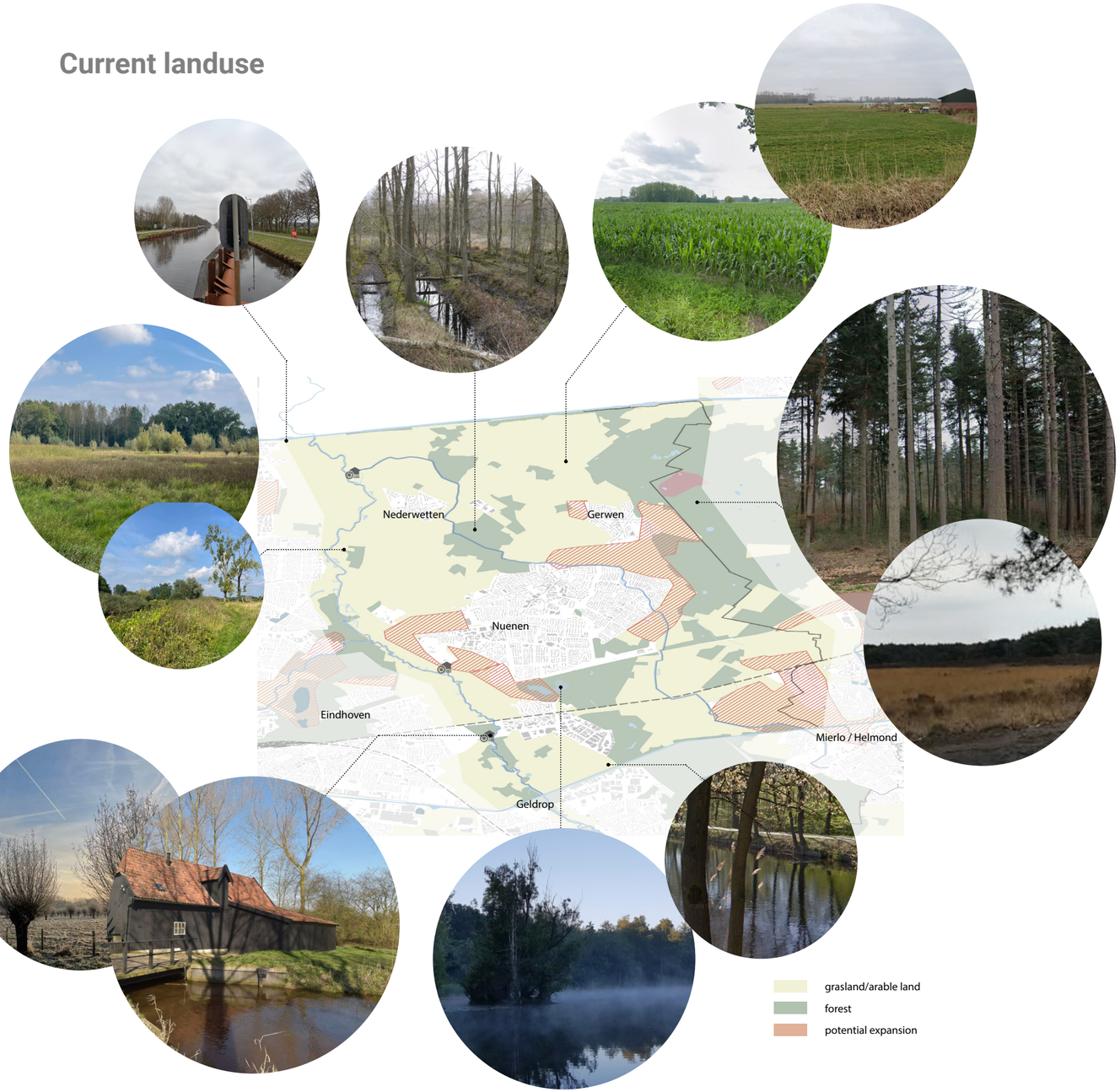
Countryside east of Eindhoven

Geomorphology



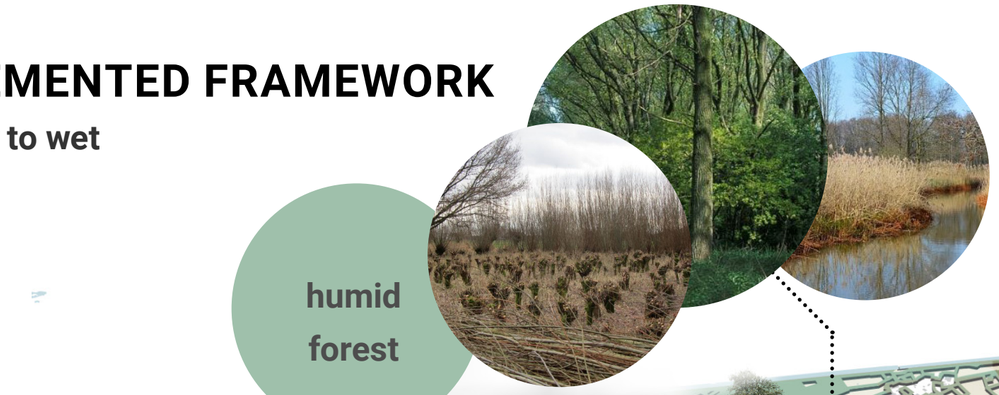


Current landuse



IMPLEMENTED FRAMEWORK

From dry to wet

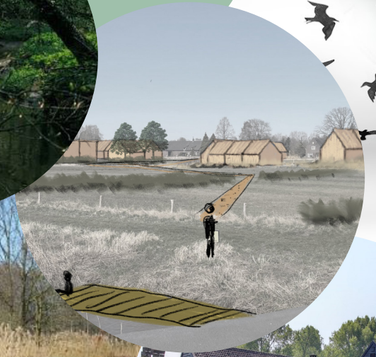


humid forest

poplar lanes and forests

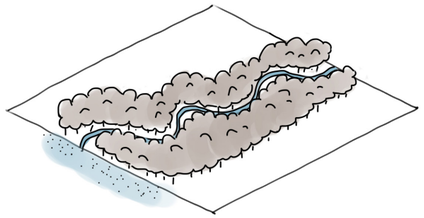
mixed dry forest & heath/grassland

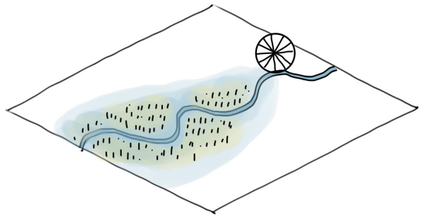
wet brook bed

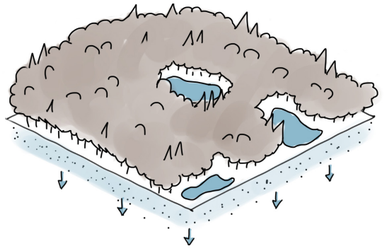


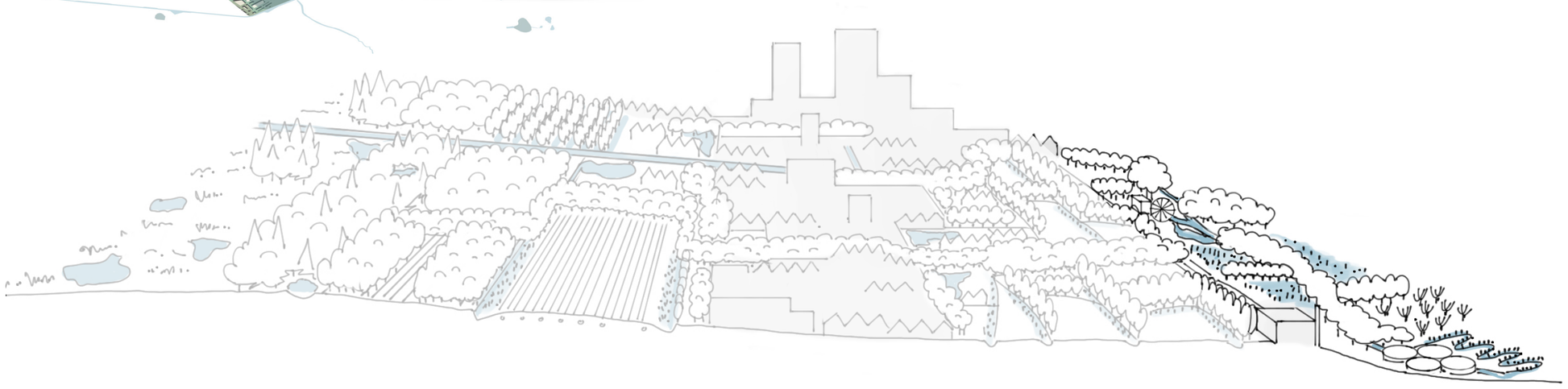
loam excavation

SITE 1: BROOK VALLEY BED





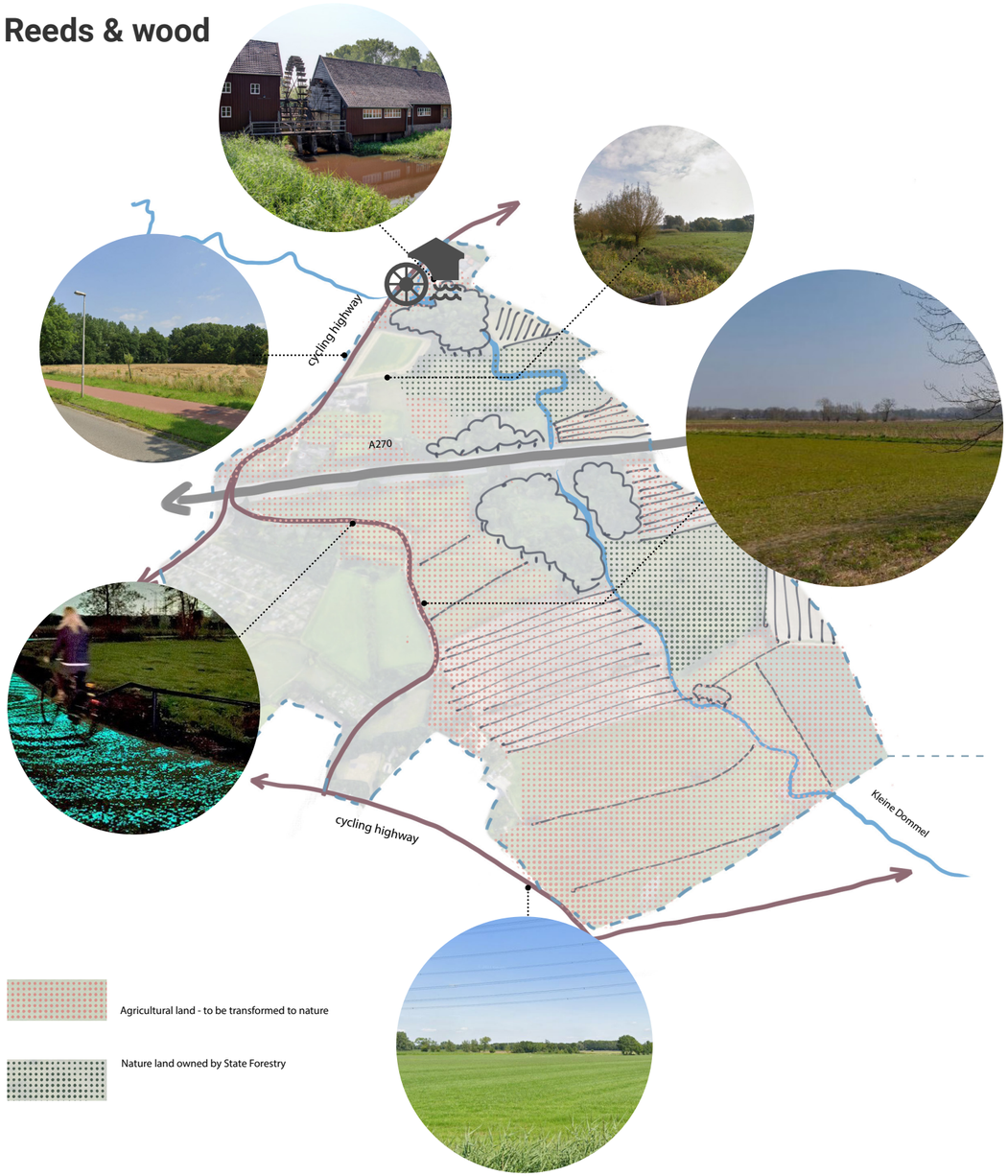




brook bed valley

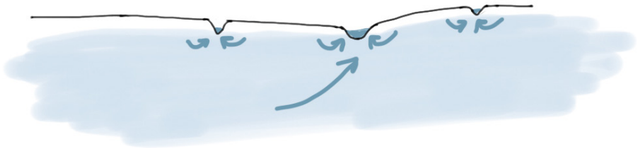
SITE 1: CURRENT & PROJECTED LANDSCAPE

Reeds & wood

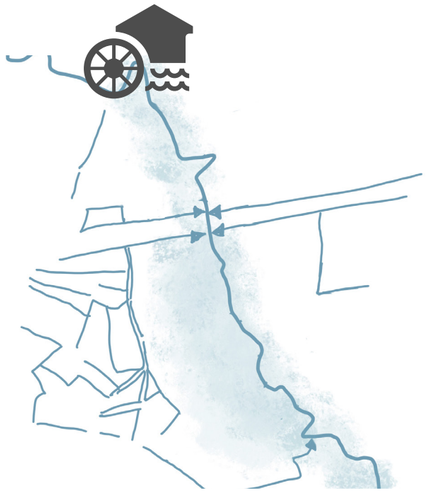


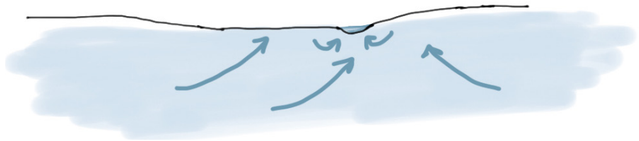
WATER SYSTEM

now

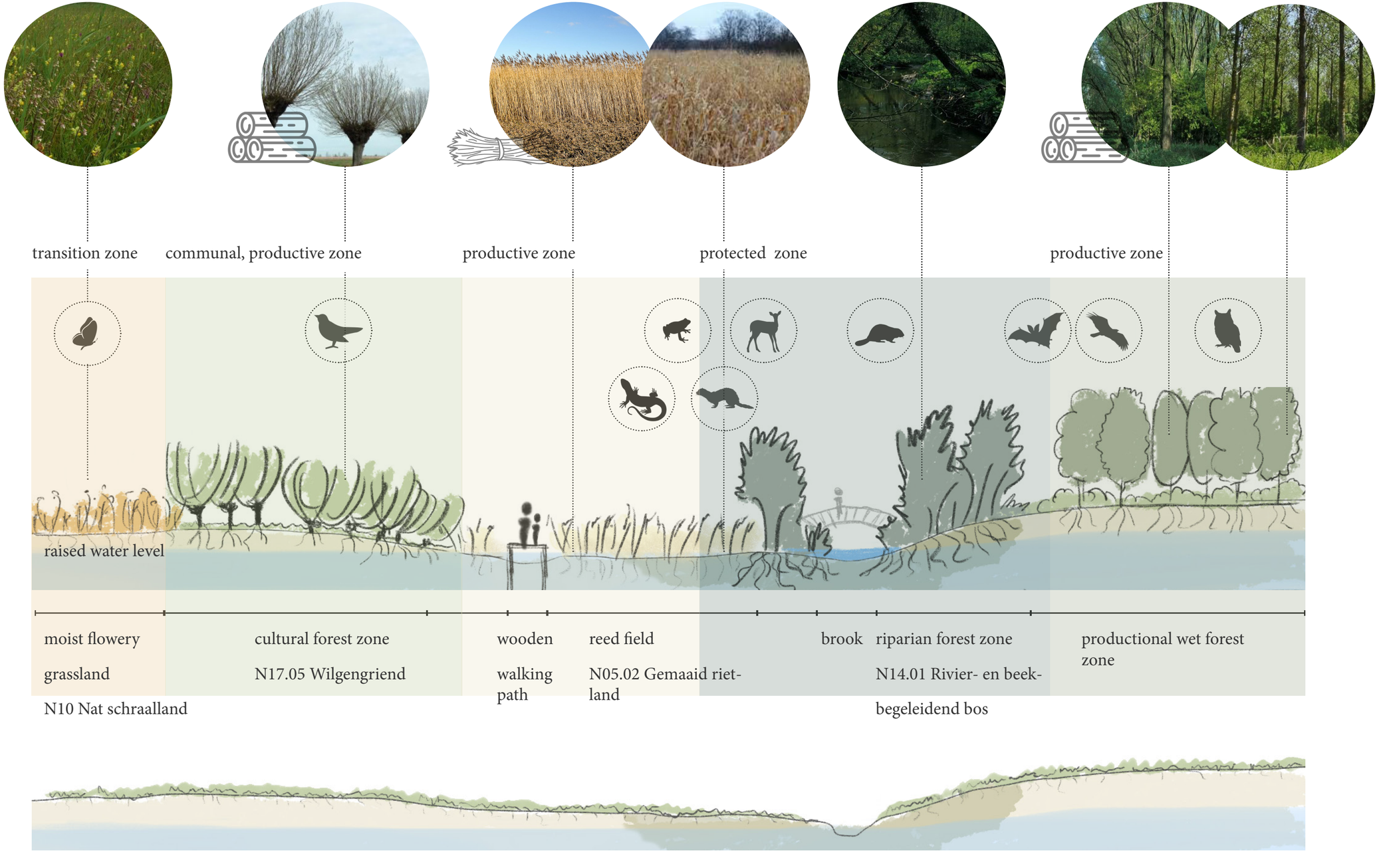


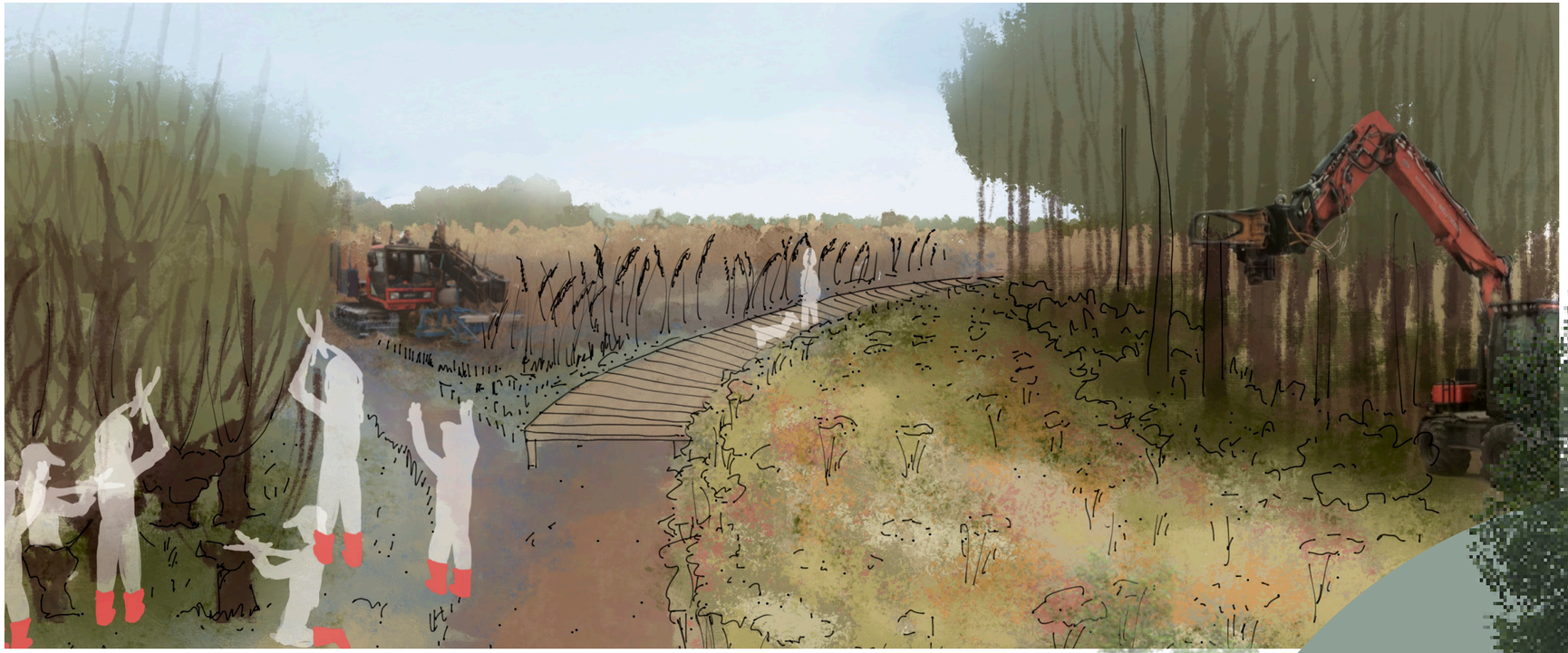
adapted
water system

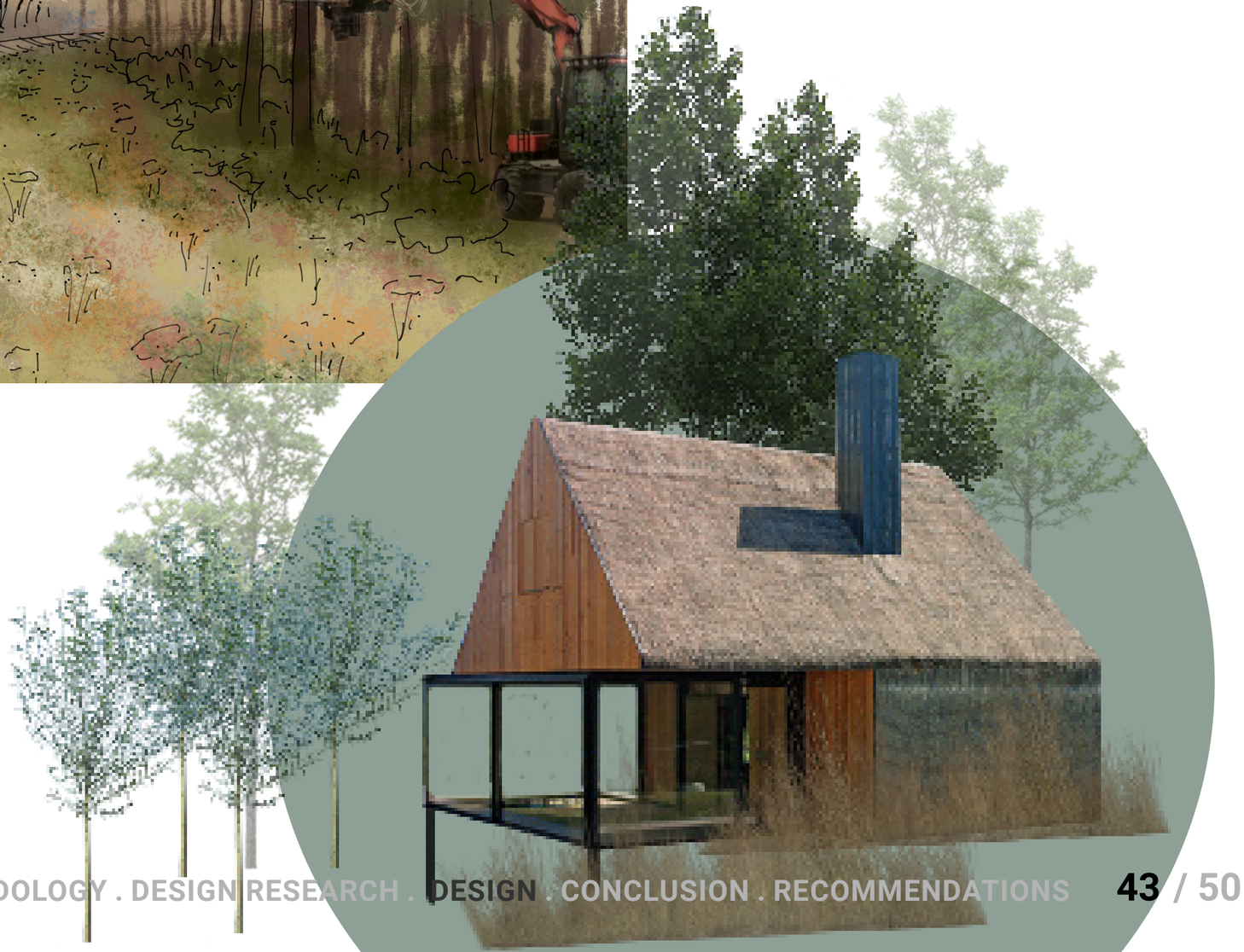




ZONES


transition zone
communal, productive zone
productive zone
protected zone
productive zone
raised water level
moist flowery grassland N10 Nat schraalland
cultural forest zone N17.05 Wilgengriend
wooden walking path
reed field N05.02 Gemaaid rietland
brook
riparian forest zone N14.01 Rivier- en beekbegeleidend bos
productional wet forest zone

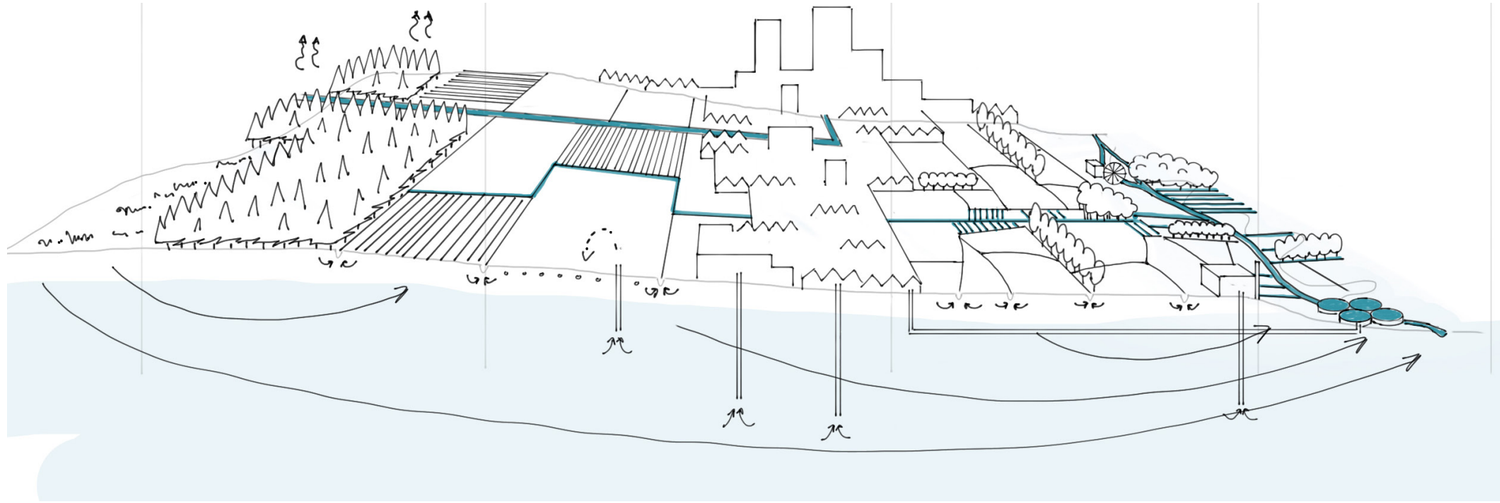


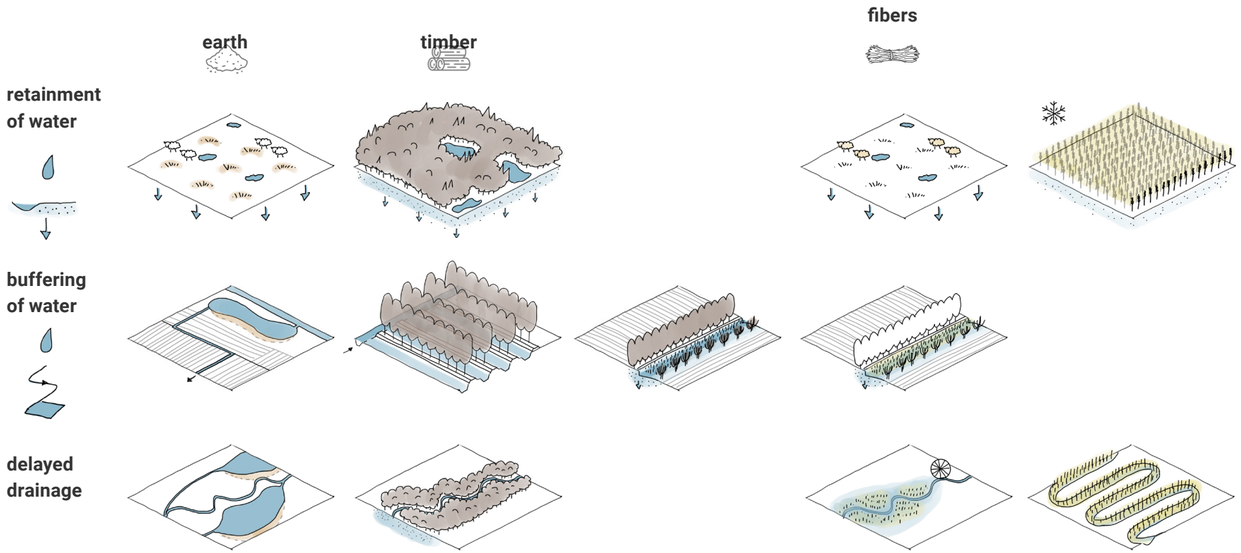


CONCLUSION

STRATEGIES

key findings

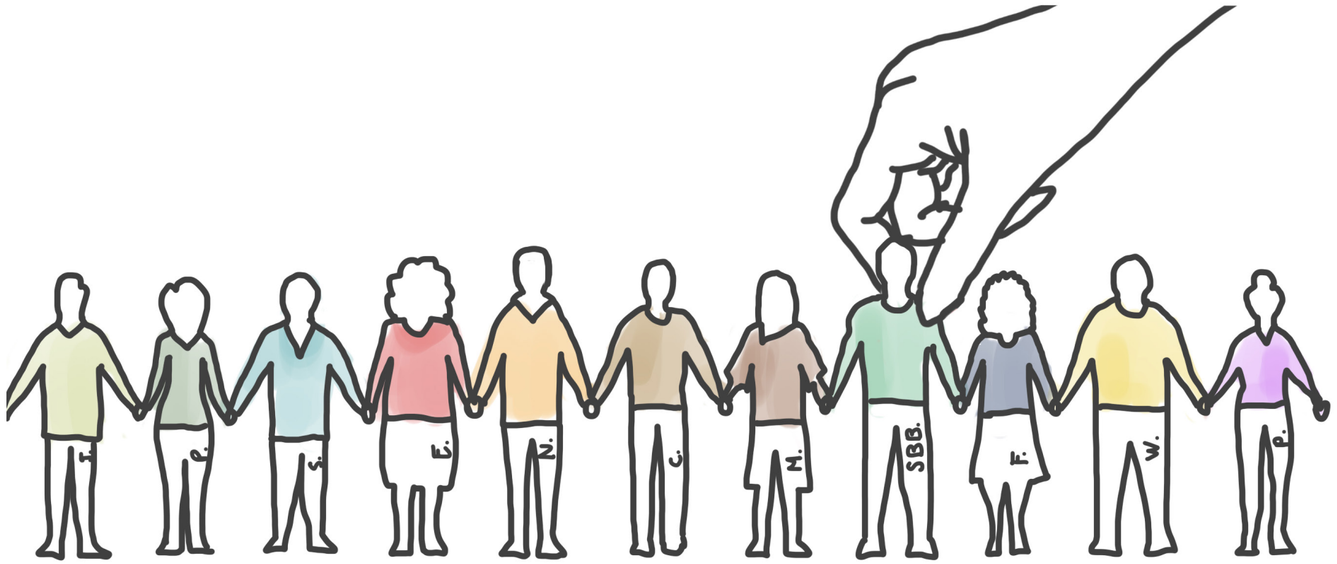




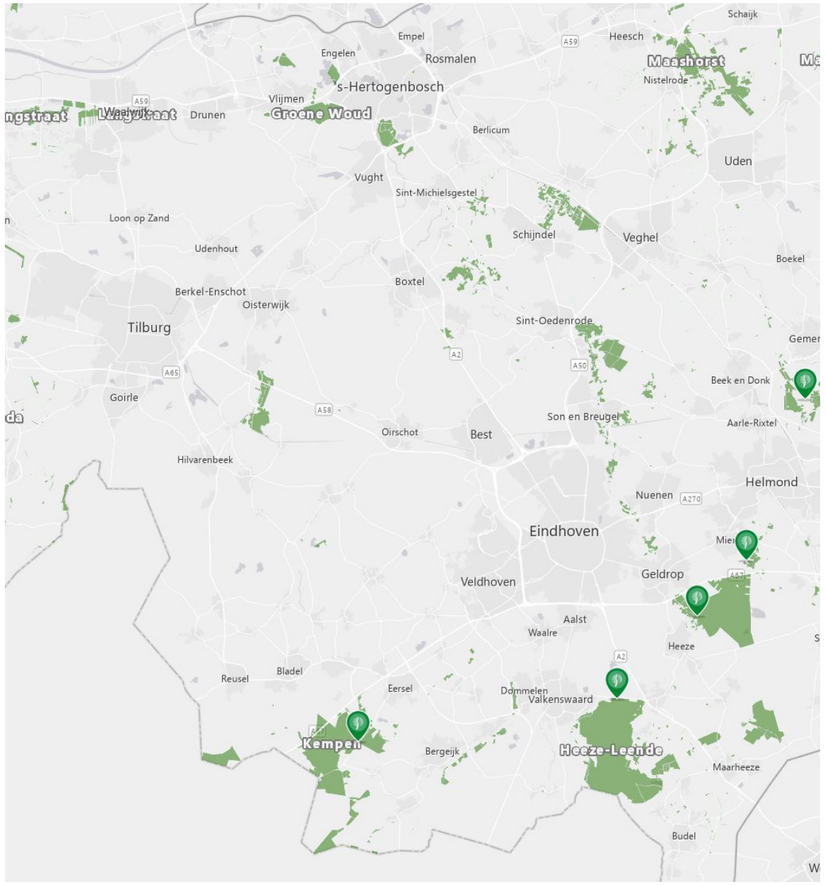
VALUES OF STRATEGY

Landscape outcome

RECOMMENDATIONS



STATE FORESTRY



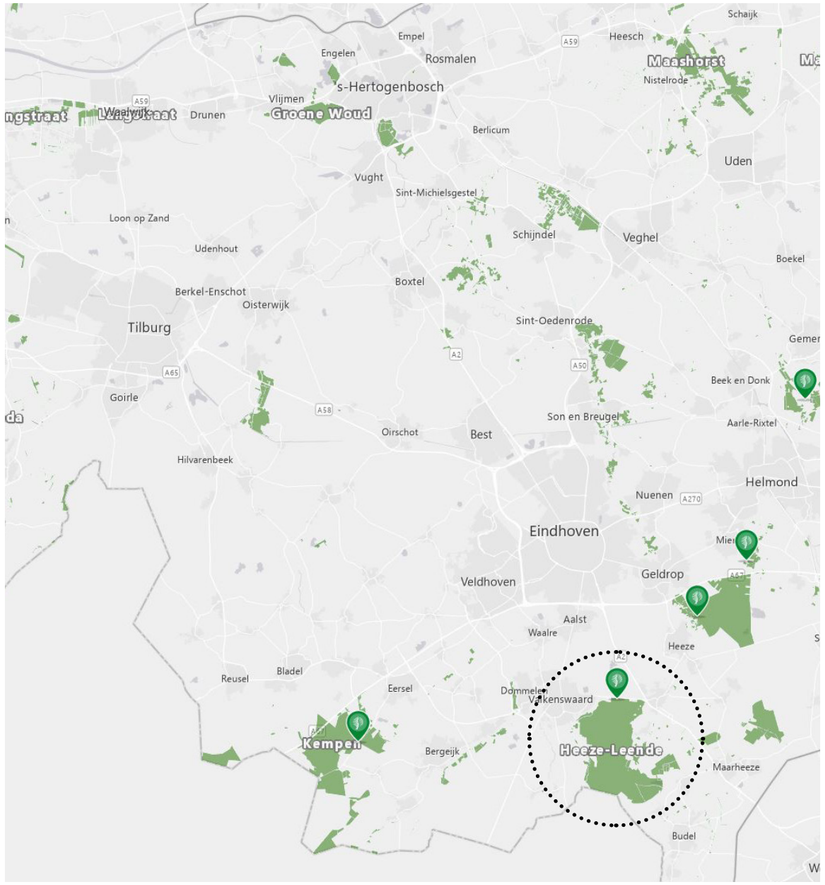
State Forestry properties

Collaborate locally

Planting strategy

POTENTIAL OUTPUT

by Leenderbos of State Forestry



State Forestry properties

6000 m3 per year
(scots pine)

Timber frame

Calculation:

- small house (56 m2 gross)
- 3000 m3 quality beam wood
- 5 m3 wood per house

± 600 houses

CLT

Calculation:

- large house (120 - 150 m2)
- 1500 m3 quality wood for CLT & timber frame
- 60 m3 wood per house

± 25 houses

Restoring the local connection. Houses that integrate instead of invade..