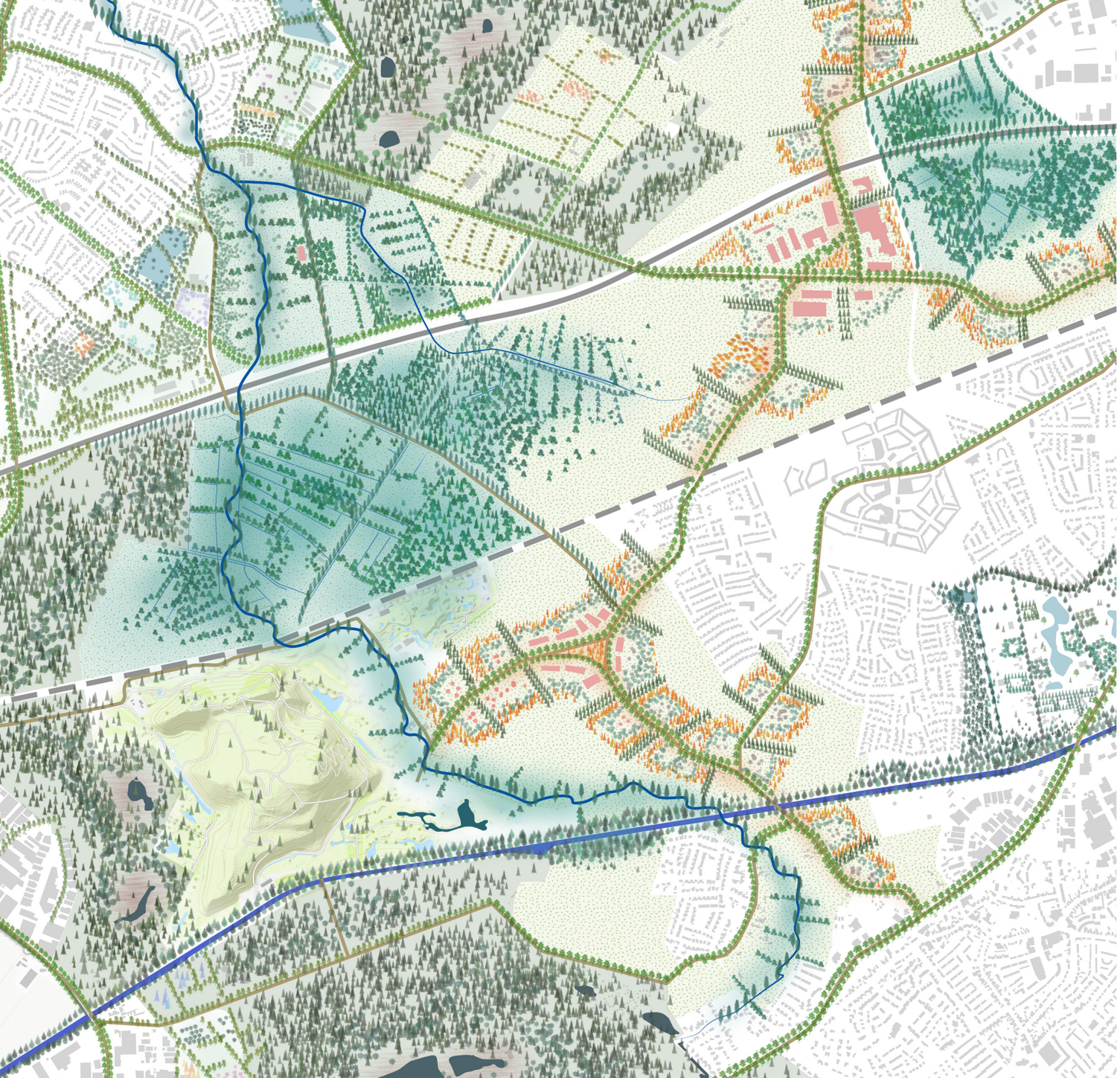


PATCHING UP THE METROPOLITAN CARPET WITH WOODS

An exploration on how a forest-based strategy can enhance the landscape identity and drought adaptation within Stedelijk Gebied Eindhoven

Xinyi WANG
P5 Presentation
2024.06.26

SGE *- A landscape losing identity*

ED.nl

Expats zoeken woonruimte rond Eindhoven

Geplaatst op 03 oktober 2013; Laatste update 09 september, 07:44;

Beschrijving

David Wilmot (uit Ierland) en zijn vriendin Kaitlin Mihalov (uit Amerika) in hun Eindhovense appartement. Volgens jonge expats is het steeds lastiger om betaalbare woonruimte te vinden. foto Irene Wouters

EINDHOVEN - Het wordt dringen op de woningmarkt voor internationale kenniswerkers in en rond Eindhoven. Op dit moment verblijven naar schatting maximaal dertigduizend hoogopgeleide buitenlandse werknemers in de regio.

Zowel bedrijven als huisvesters rekenen op een toename in het komende jaar. De Technische Universiteit Eindhoven (TU/e) haalde dit studiejaar zelfs het hoogste aantal internationals tot nu toe binnen: zo'n vijfhonderd. "We krijgen ze gehuisvest, maar het wordt moeilijker", aldus medewerker Willem van Hoorn.

De huisvesting van internationale kenniswerkers in en rond Eindhoven kan beter. Gezinnen met kinderen vinden doorgaans snel een woning in wijken of dorpen: zij gaan dicht

"...Streams grew clear and neat, so did the fields...
Some people left for the city, and more came, bringing more houses with them.
Everywhere became the same."

"...Municipal land policy, intensive agriculture, the Rhineland model and the extensive master plan.
We have four funerals, but where is the wedding?"

- *BrabantMosaic*, IABR 2014

SGE *- A landscape of thirst*

50 tot 60 miljard liter water: zo dorstig is de Brabantse natuur

30 oktober 2020 om 06:00 • Aangepast 2 november 2020 om 12:04

'Elke druppel telt'

Aanpak droogte: oproep tot mijden waterverspilling en sproeiverboden

22 juni 2023 13:31 • Aangepast 22 juni 2023 16:49

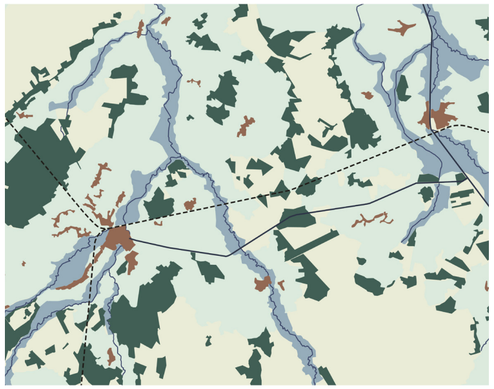
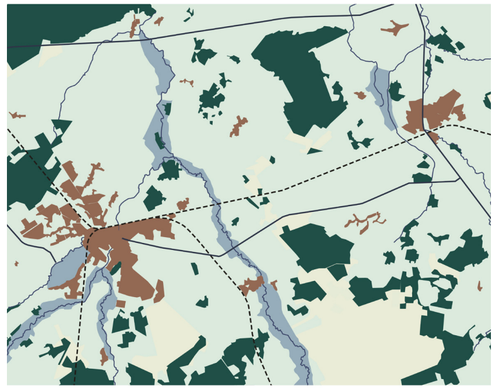
De verdroging is een taai probleem: regenwater vasthouden is lastiger dan het lijkt

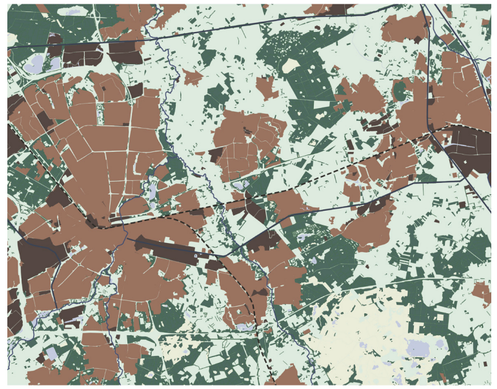
16 juni 2020 om 09:00 • Aangepast 22 juni 2020 om 15:54

"...extensive land reclamation, intensified agriculture, and urban expansion have turned the region's water system into what can be likened to a drying machine."

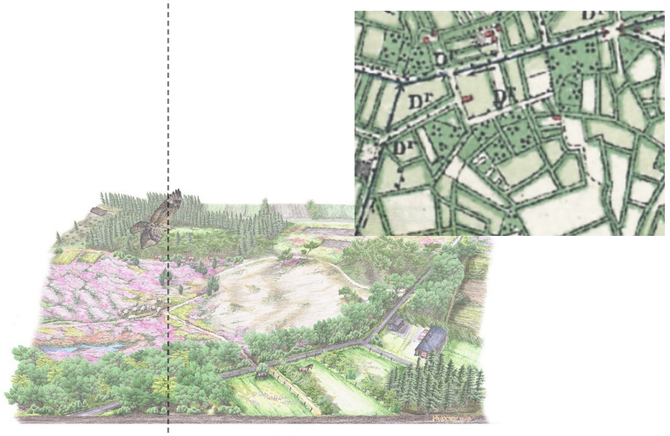
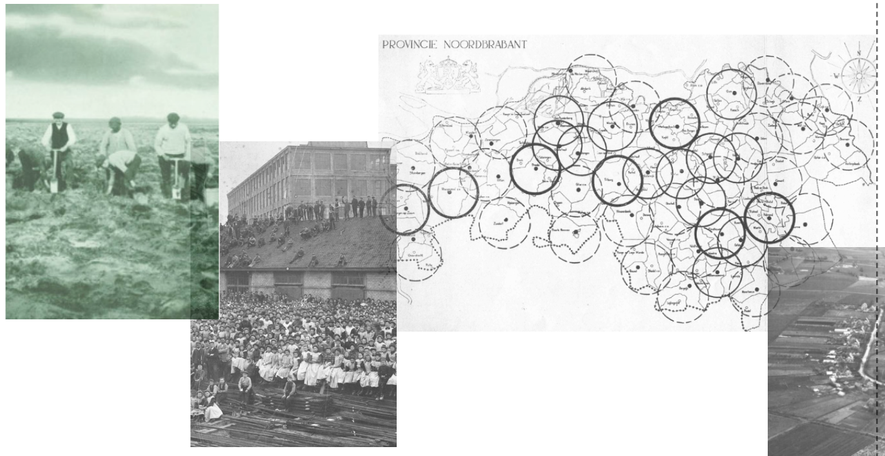
- Zonder Water, Geen Later. 2020

SGE *- A Speeded Up Metropolitan landscape*



1000AD 1900AD 1940AD 1970AD Now

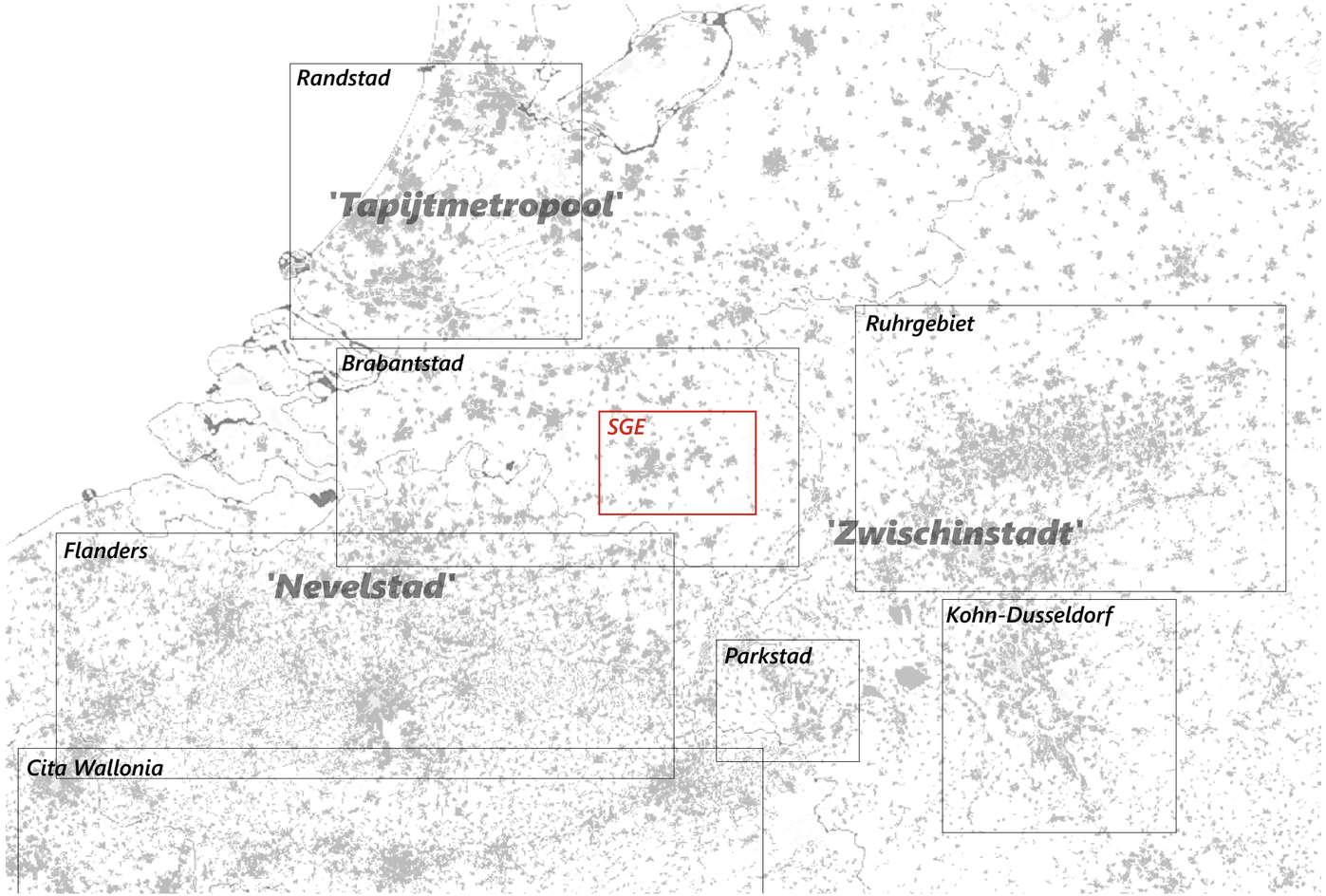
Reclamation from Middle age

Age of consolidation and urbanization

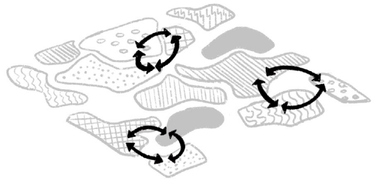
Age of Fragmentation

Lieshout
Son en Brugel
Aarle-Rixtel
Best
Stiphout
Helmond
Nuenen
Eindhoven
Mierlo
Veldhoven
Geldrop
Lierop
Aalst
Waarle
Heeze
0
1
2
3
4
5 km

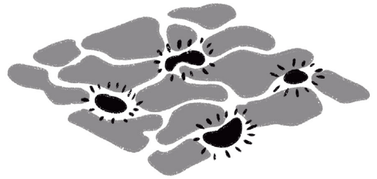
***SGE** as a dispersed territory*



Diversity within the Territory

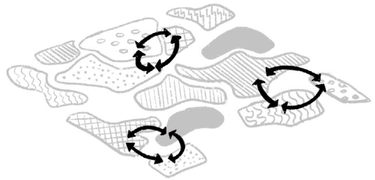


Coherence

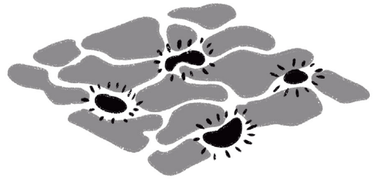


Narrative places in the territory

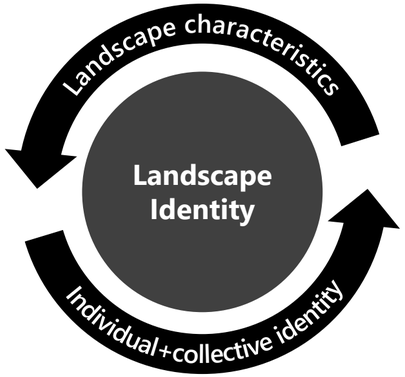
Diversity within the Territory

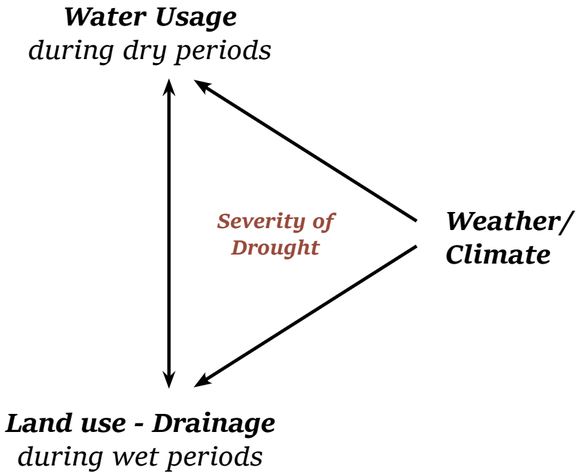


Coherence



Narrative places in the territory



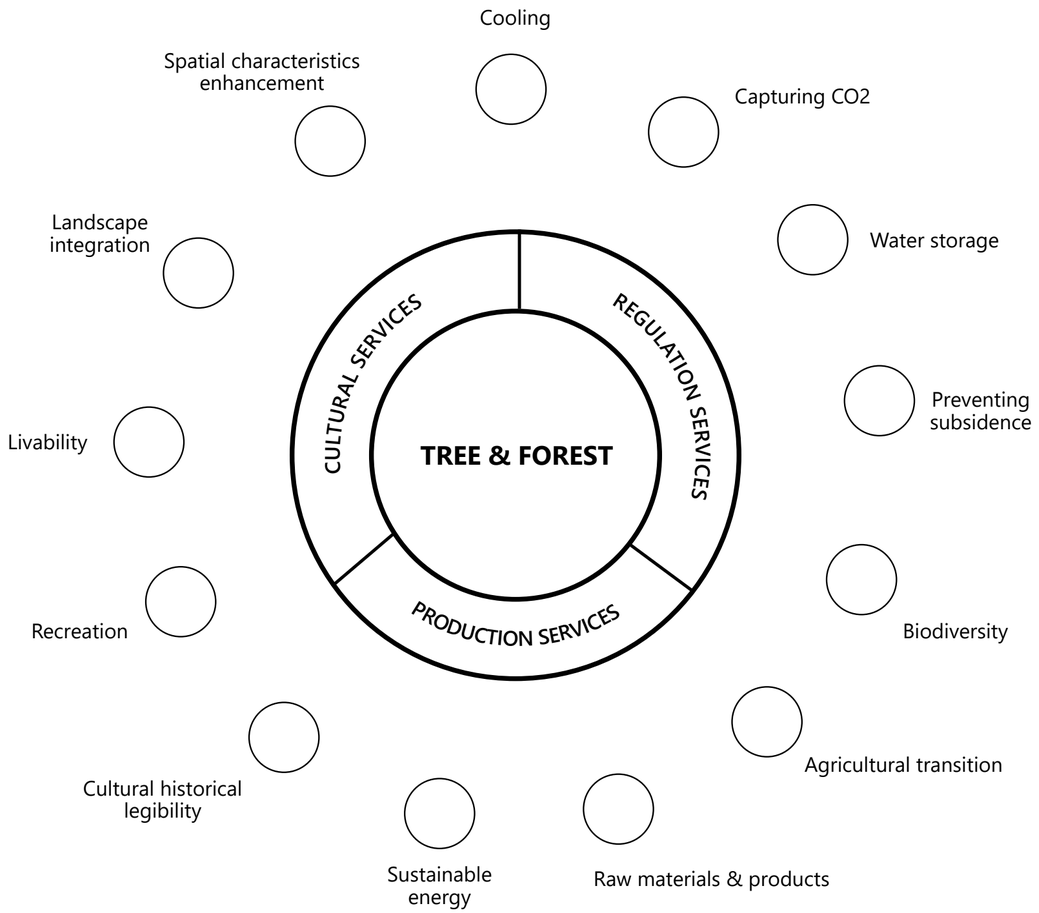


A metropolitan carpet...

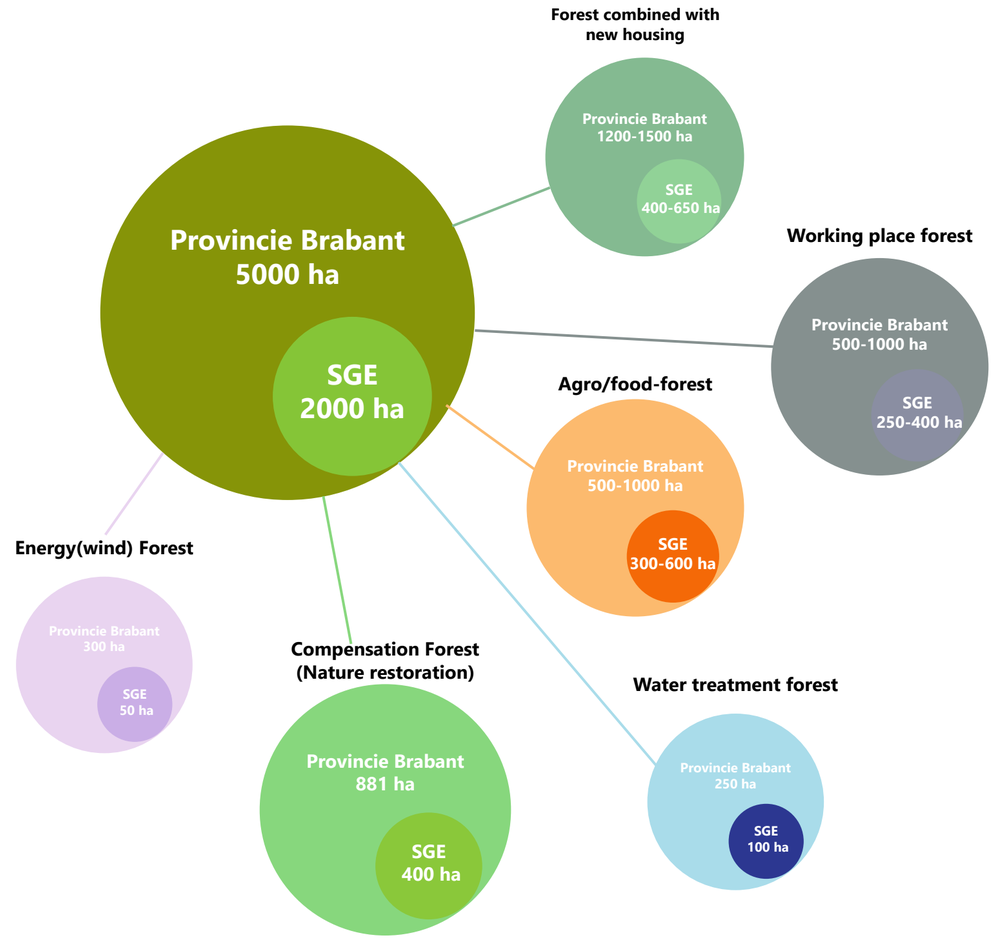
...of 37% (urban)forest

SGE - A landscape of forest

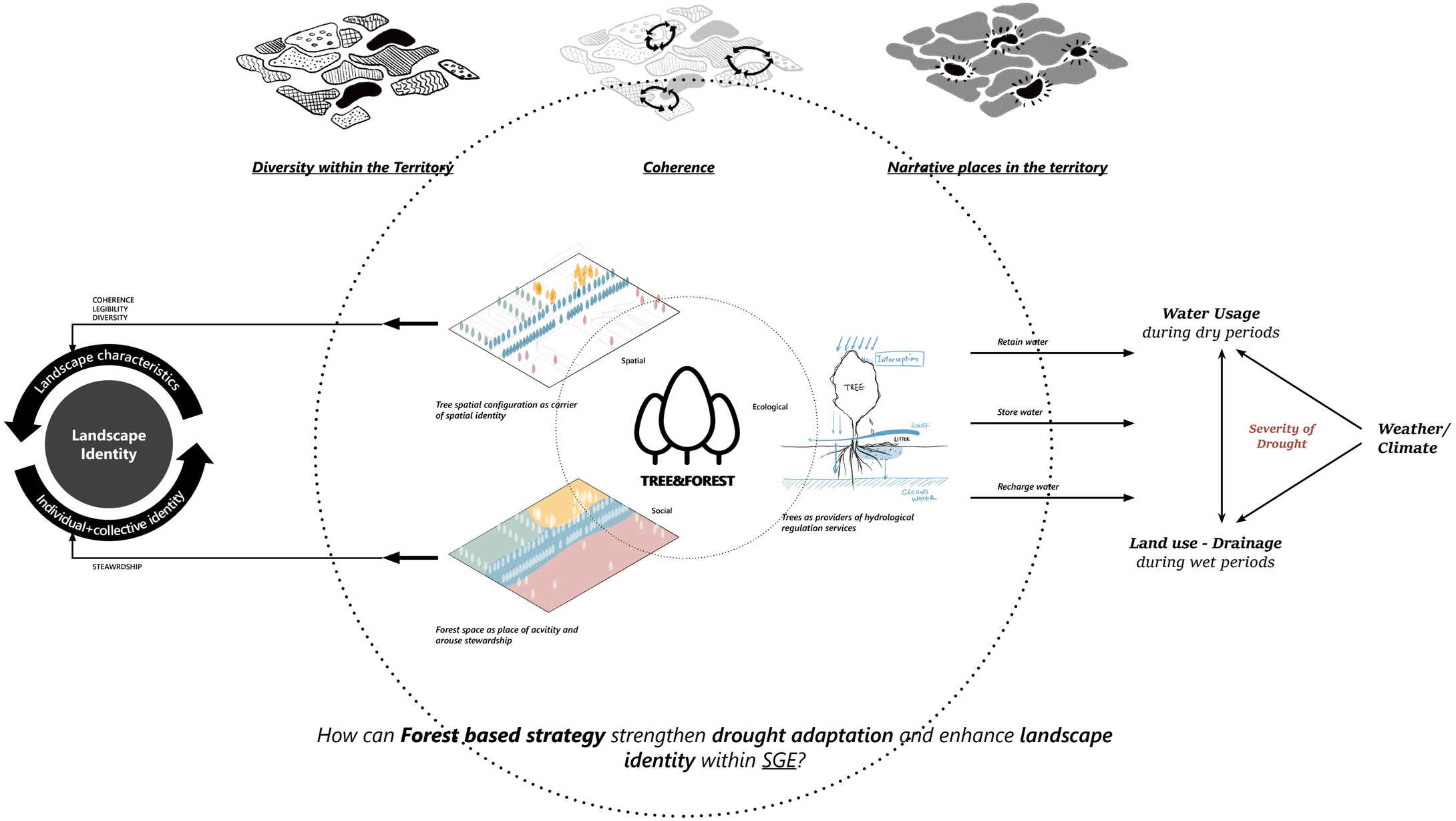
SGE *- A landscape to be afforestation*



Ecosystem services provided by forest and trees

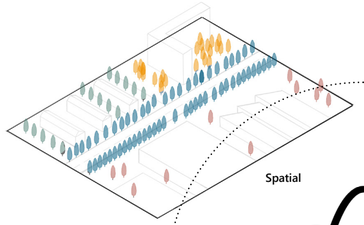


Ambitions of afforestation within NB and SGE



*How can **Forest based strategy** strengthen **drought adaptation** and enhance **landscape identity** within SGE?*

The Forest Approach

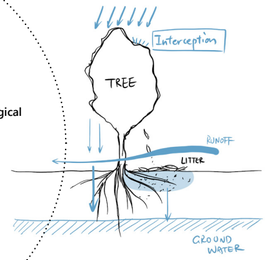


Spatial

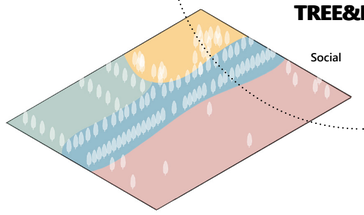
Tree spatial configuration as carrier of spatial identity

TREE&FOREST

Ecological



Trees as providers of hydrological regulation services



Social

Forest space as place of acvitity and arouse stewardship

*The tree language of SGE - **Species as vocabulary***

Streamvalley & Broek

Reclaimed forest

Fringe landscape

Reclaimed arable field

Urban patchwork

Salix alba

Pinus sylvestris

Alnus glutinosa

Fraxinus excelsoir

Populus euramericana

Quercus robur

Betula pendula

Carpinus betulus

Fagus sylvatica

Picea abies

Quercus palustris

platanus hispanica

Ulmus hollandica

Tilia europaea

Tilia cordata

Robinia pseudoacacia

Acer pseudoplatanus

Acer rubrum

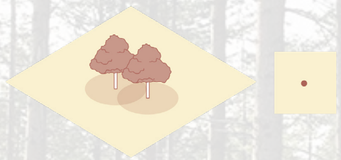
Acer platanoides

*The tree language of SGE - **spatial configuration as syntax***

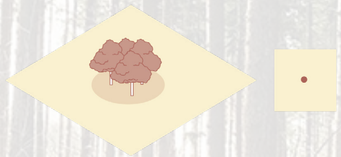
1. Point

1.1 Solitary

1.2 Threshhold



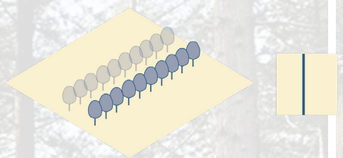
1.3 Pavilion



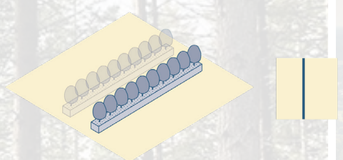
2. Line

2.1 Open row

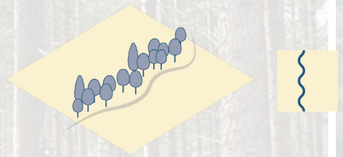
2.2 Colonade



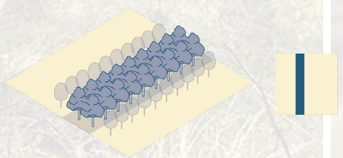
2.3 Tree wall



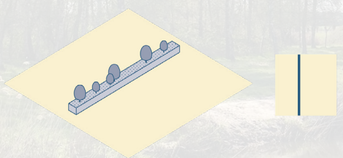
2.4 Curtain



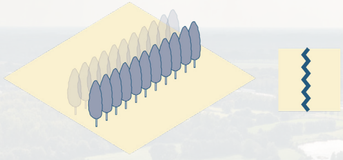
2.5 Arcade



2.6 Hedge wall



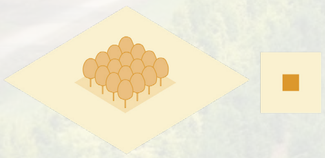
2.7 Screen



2.8 Dash line

3. Group

3.1 Tree nursary

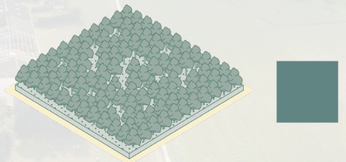


3.2 Loose group

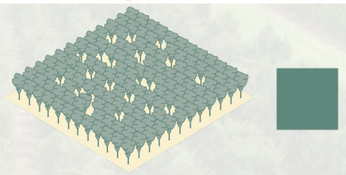
3.3 Clump

4. Frame

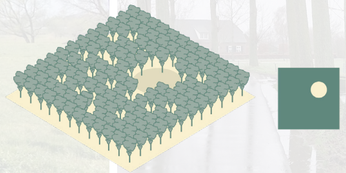
4.1 Multilayered dense volumn



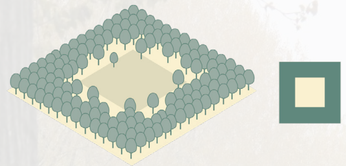
4.2 High-ceiling dense volumn



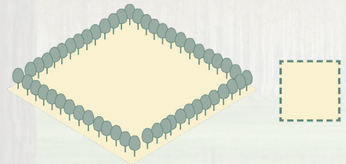
4.3 Clearing of dense volumn



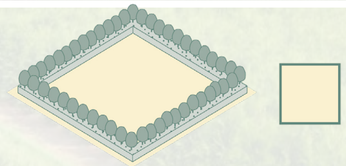
4.4 Room of dense volumn



4.5 Transparent room



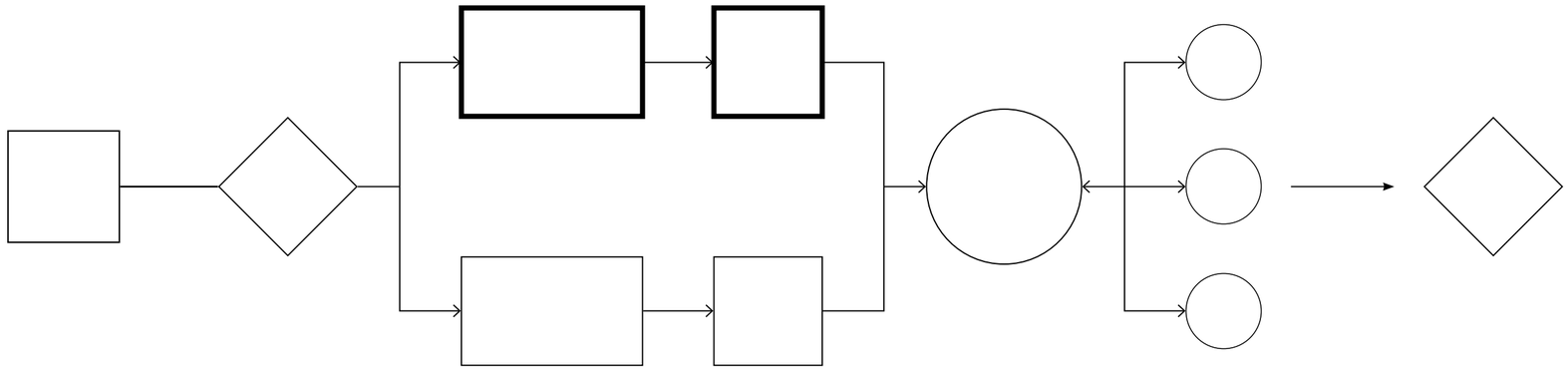
4.6 Closed room



SubRQ

What are the challenges and opportunities of enhancing ***landscape identity*** *within SGE from the lens of forest and forestry?*

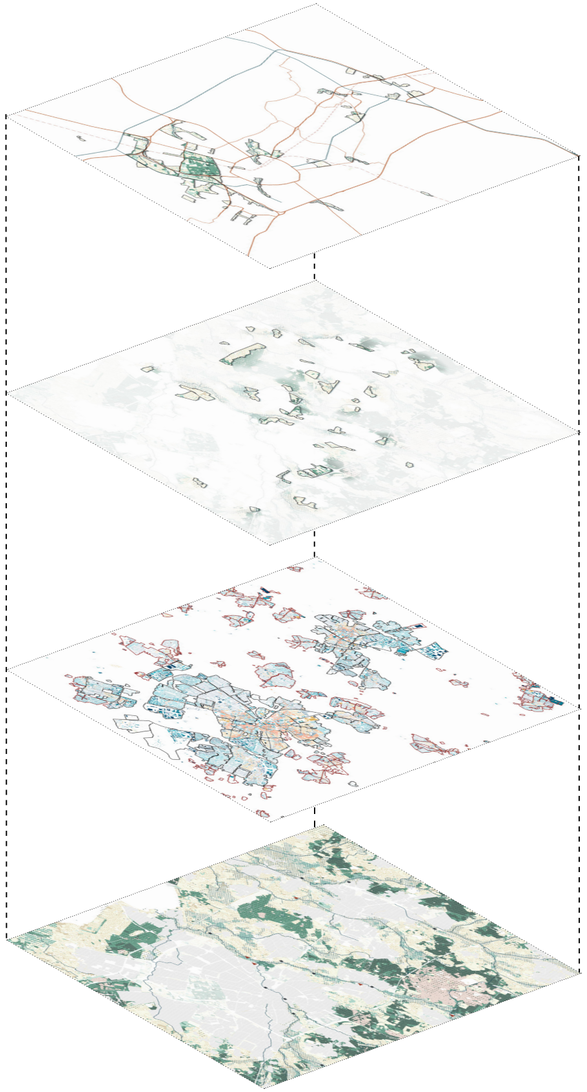
What kind of forest based strategy can enhance and reinvent the ***landscape identity*** *within SGE?*



Macro *Meso* *Micro*

Introduction Method **Analysis** **Design** Discussion

The components of SGE metropolitan landscape



The metropolitan void landscape

The "narrative places" of metropolitan landscape
Important for regional legibility

The fringe landscape

Transitional zone

Important for spatial coherence

The urbanization patches

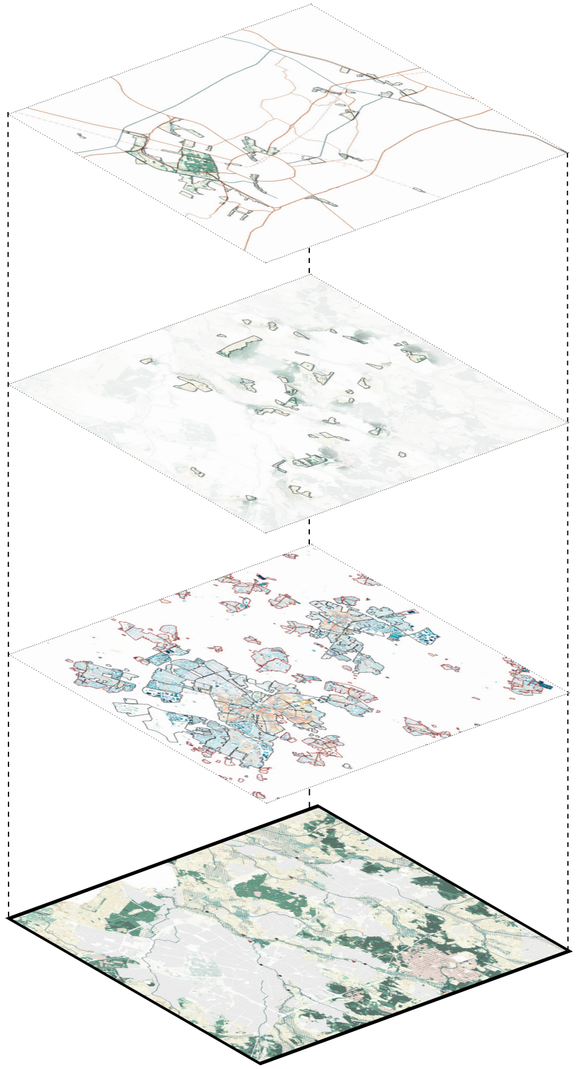
Diverse livability in new urban forest

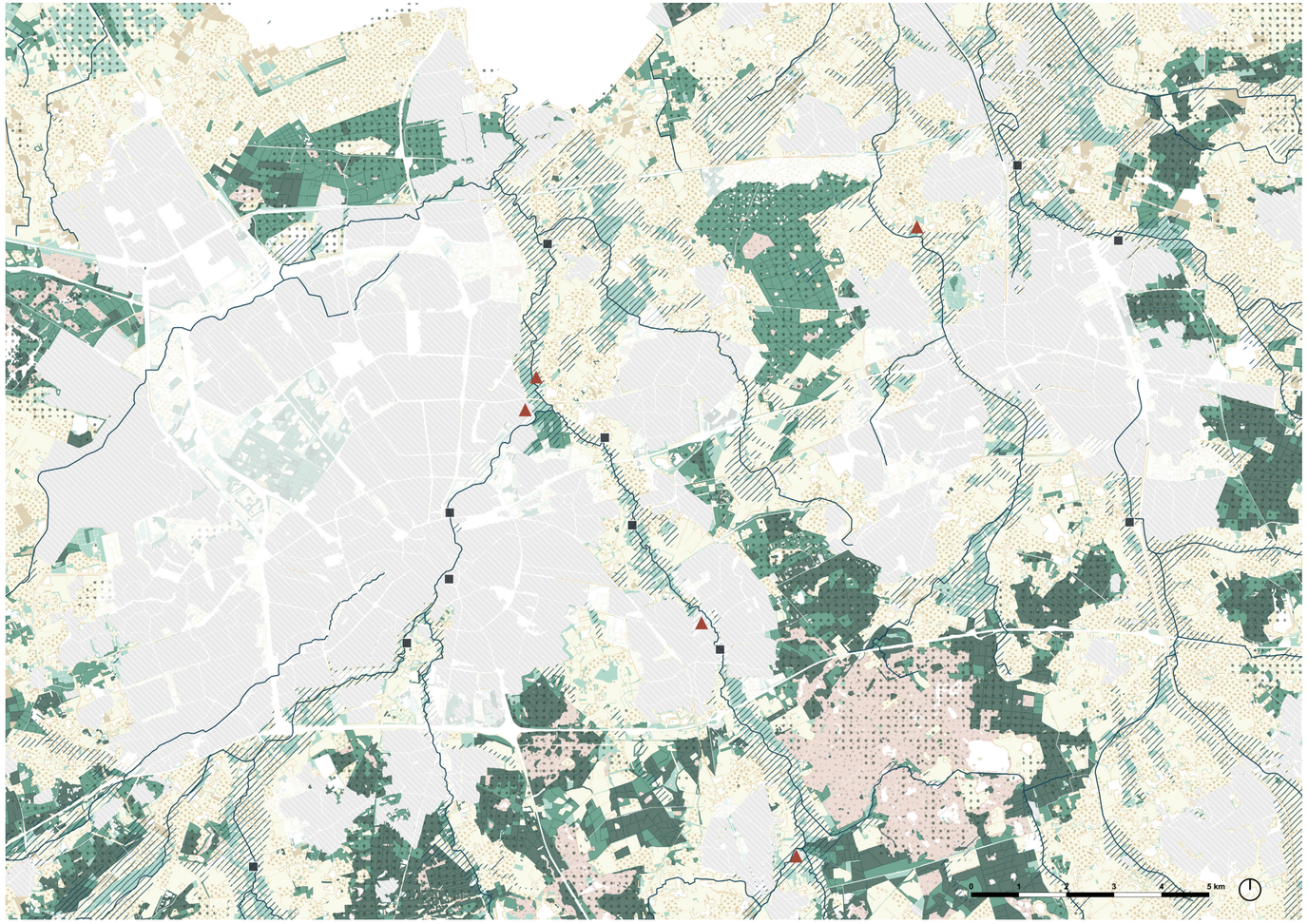
The reclaimed landscape

Historical continuity and cultural heritage under pressure

Protection and diversification with forest

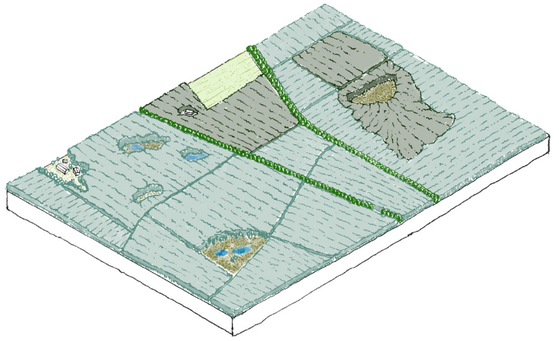
The reclaimed landscape

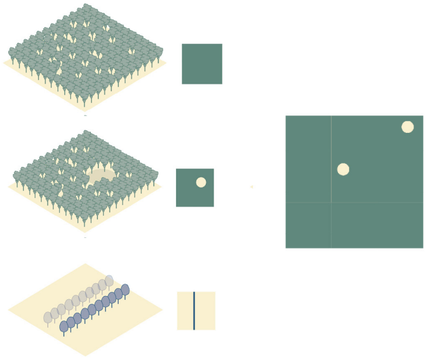




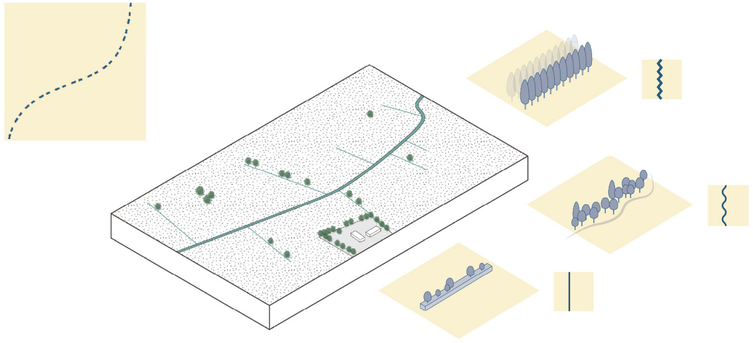
Coniferous forest
Mixed forest
Heathland
Arable field
Deciduous forest
Tree nursary
Grassland
Sand ridge
Streams
Stream valley
Urbanization patches

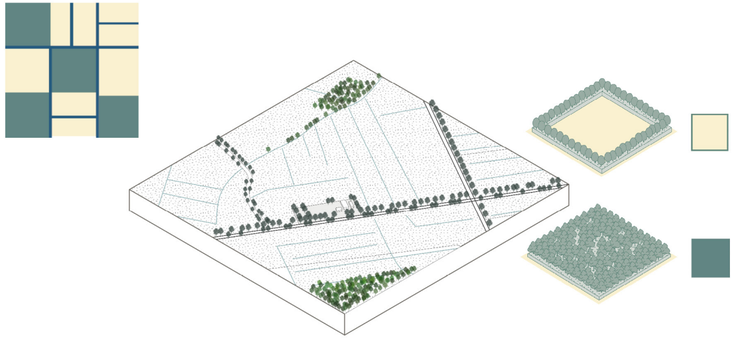
The reclaimed forest complex



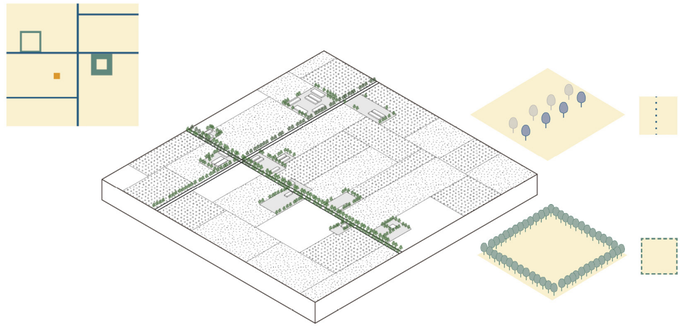


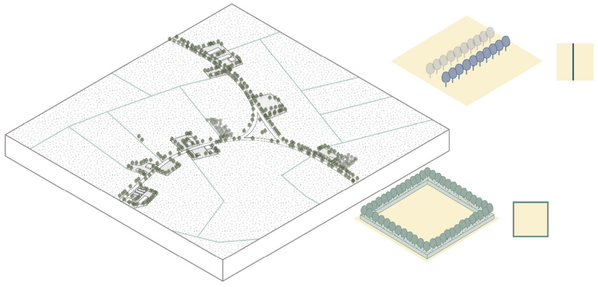
The StreamValley and Broek landscape



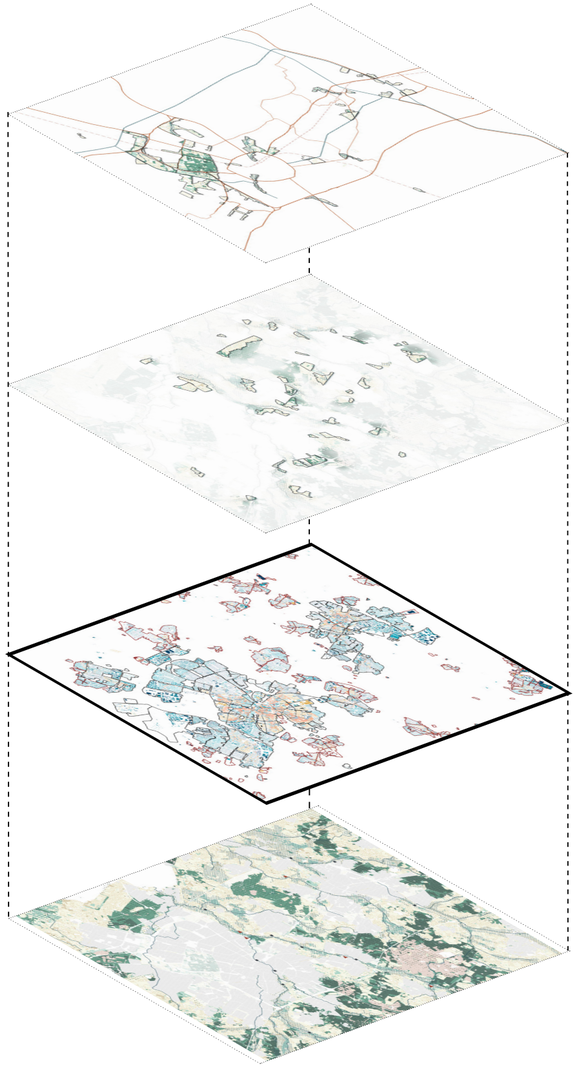


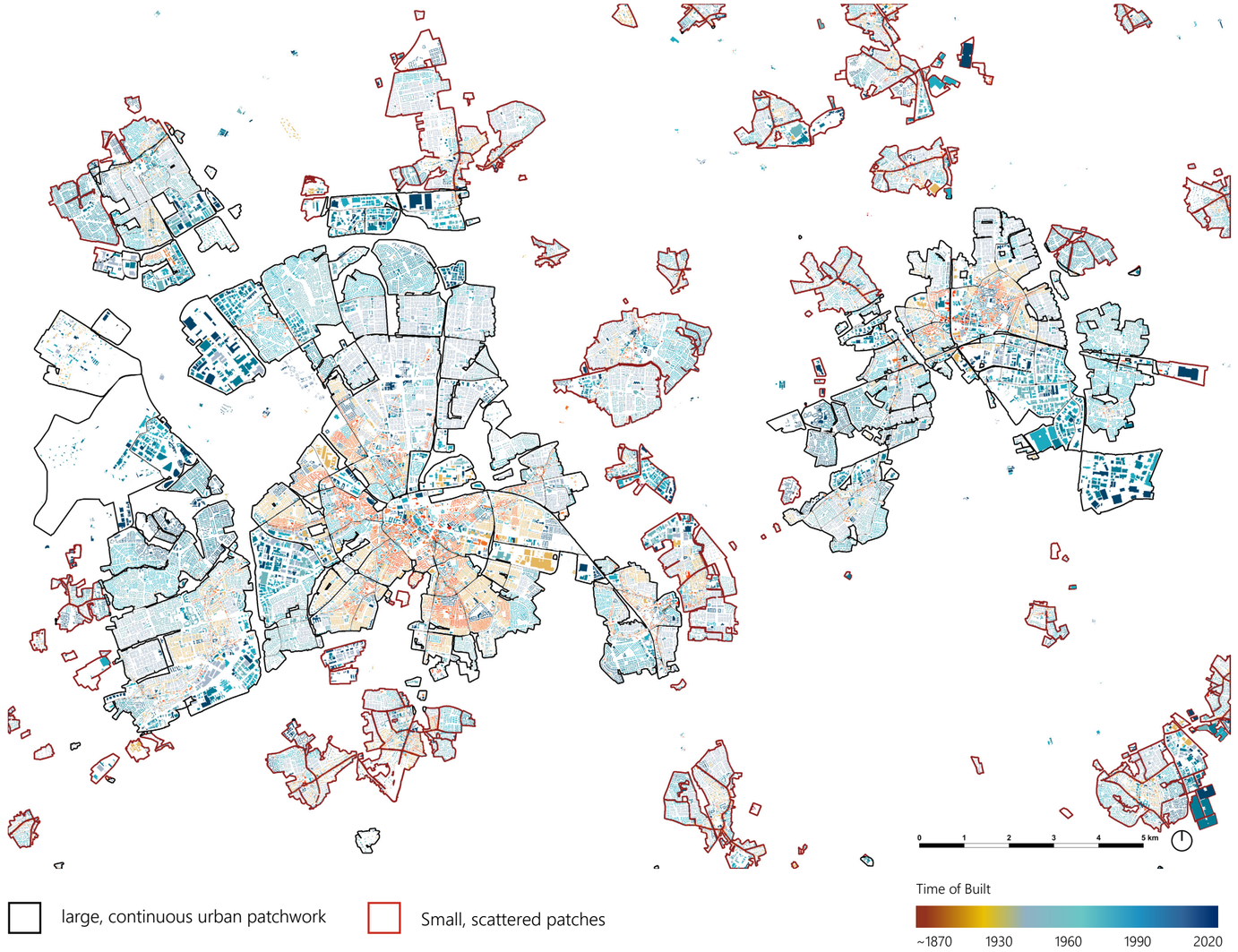
The reclaimed arable fields



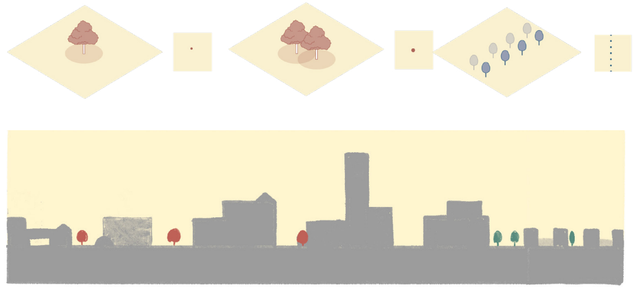


The urbanization patches

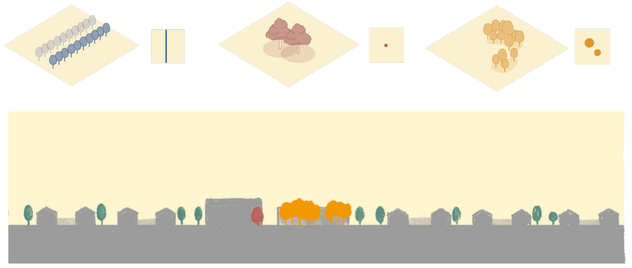


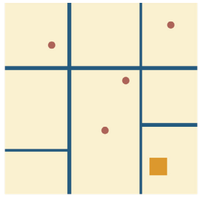


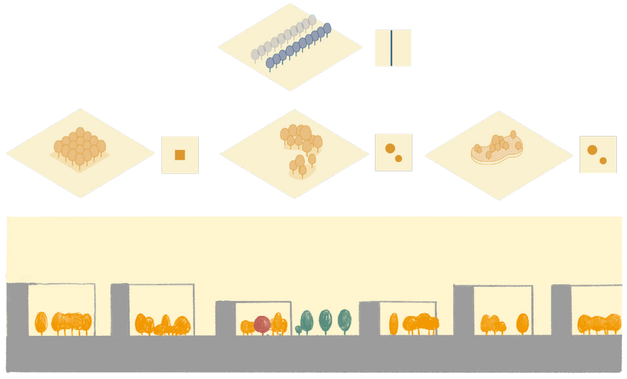
1. The scattered forest

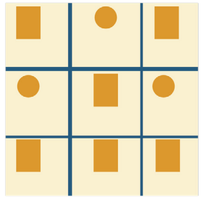


2. The raster forest



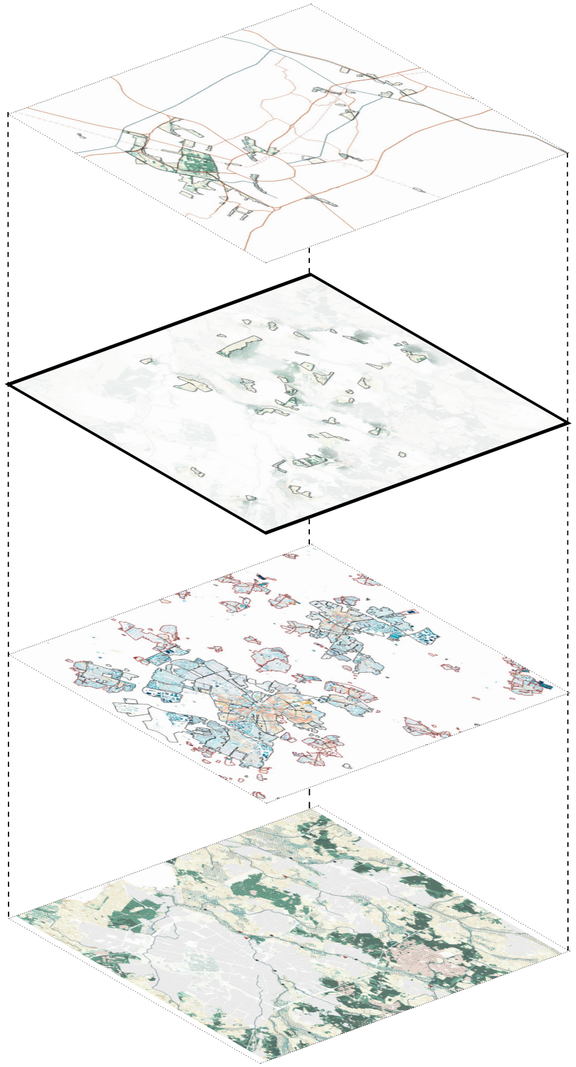


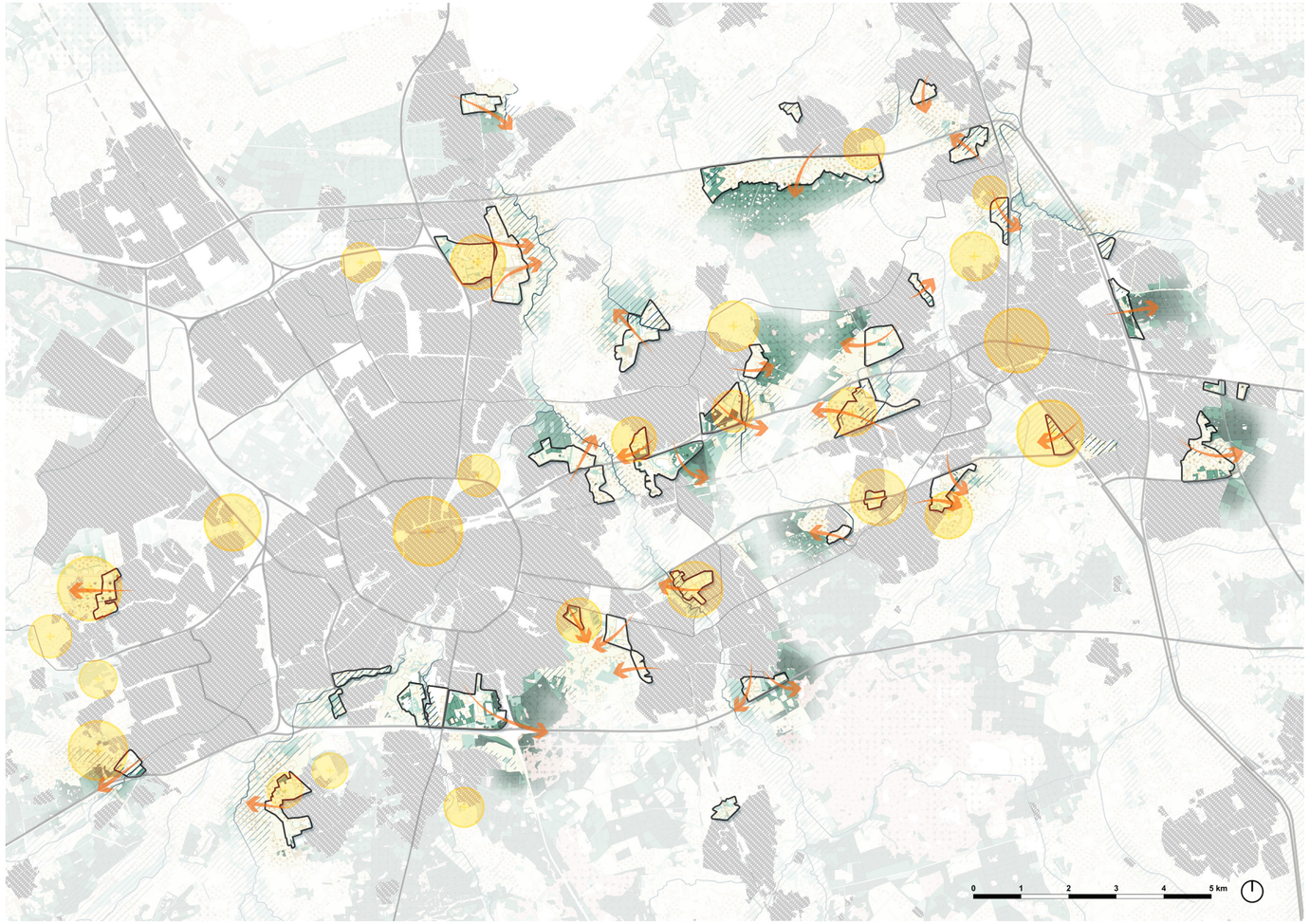




3. The stemps forest

The fringe landscape



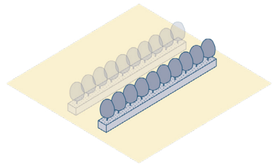


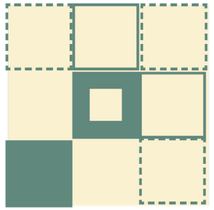
The fringe landscape

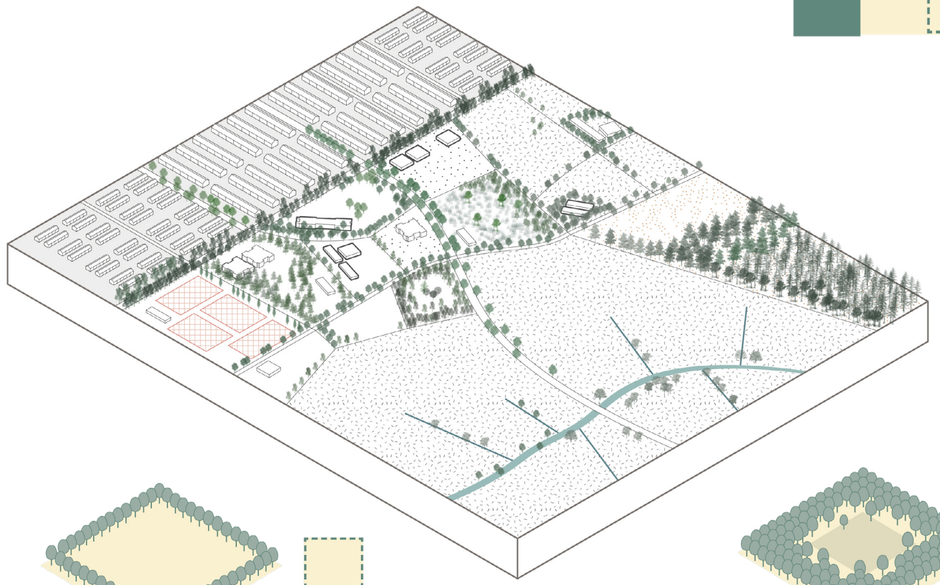
From urban patches to cultural landscape

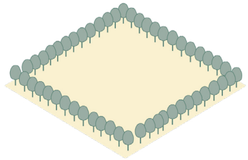
Housing assignment

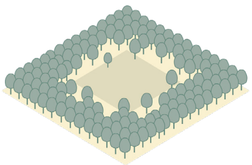
Dierenhandel K.Kouwenh
Eksterlaan 4 Liesho
Tel. 0499-423101
GSM. 06-12516454

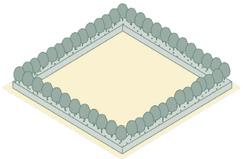




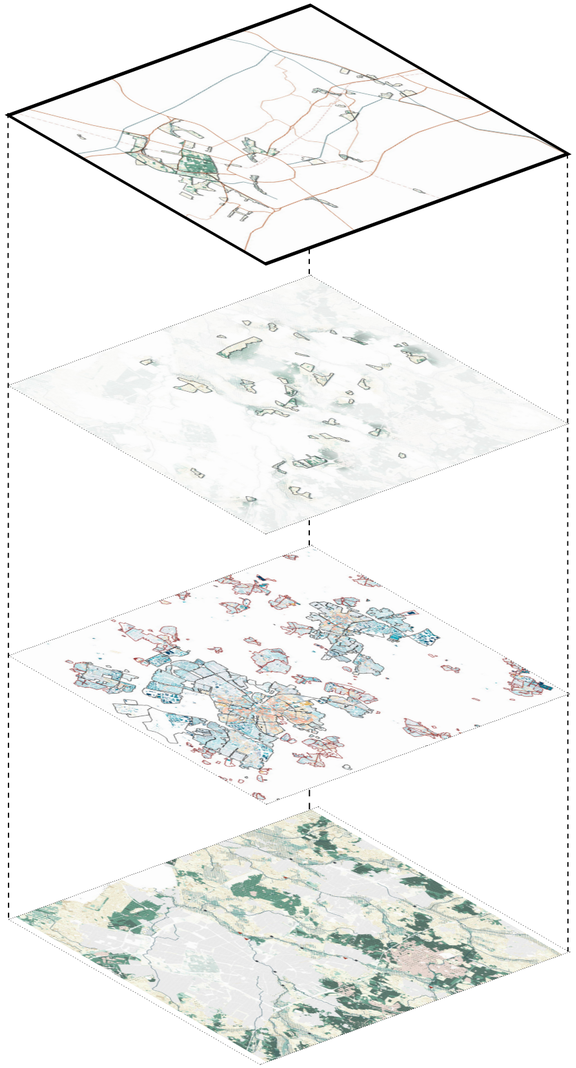


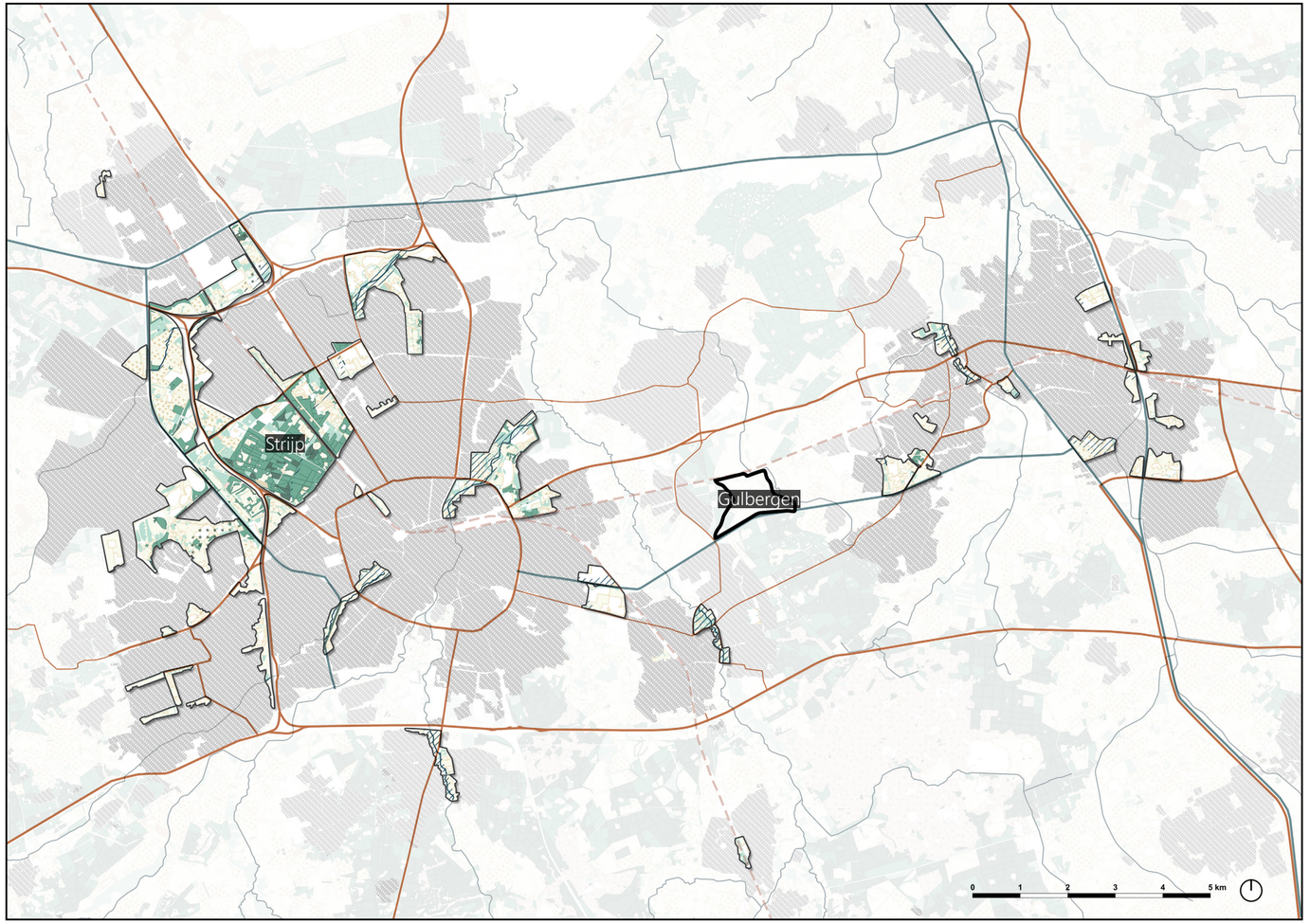


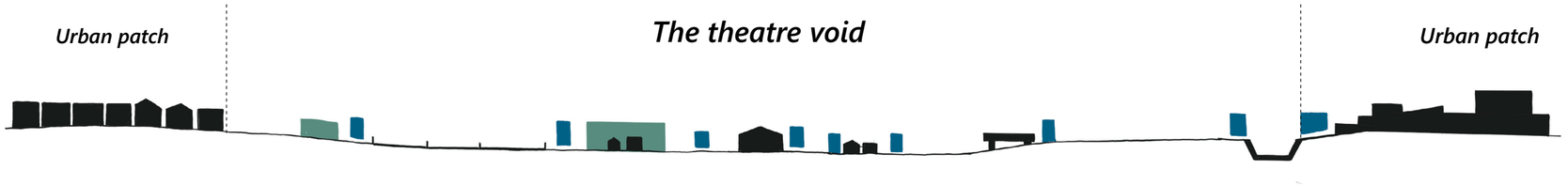




The void landscape



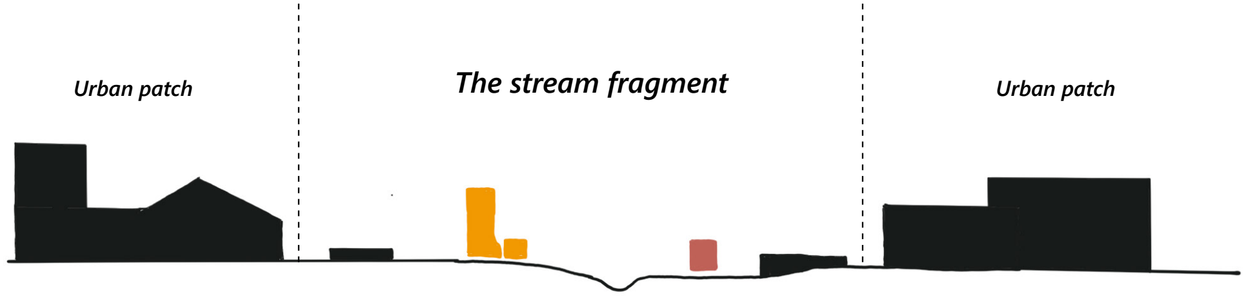




There is a lack of transition or clear boundaries with the urban patches.

Inside the void there are buildings with various functions, with lines as the predominant tree syntax, resulting in a homogenous and unrecognisable space

The canal as a mobile experiential device does not create enough of a connection with the void



Lack of transition or clear boundaries with urban patches

The linear space of the stream is not emphasised and is hidden in the open space

Design principles for Enhancing landscape identity

Spatial Coherence and Narrativity

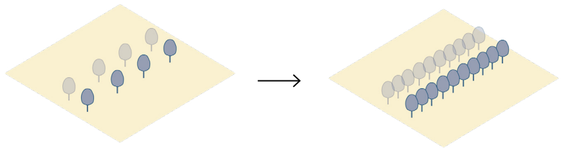
Multi-functionality

Engagement in the time process

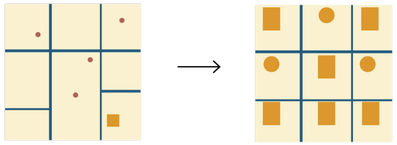
Accessibility

Legibility and imageability

based on introducing/modifying tree syntax and transformation of forest pattern



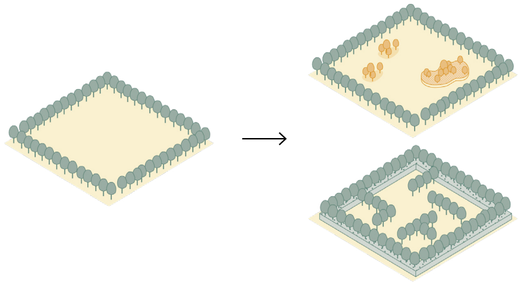
Modify/introduce tree syntax



Forest pattern transformation

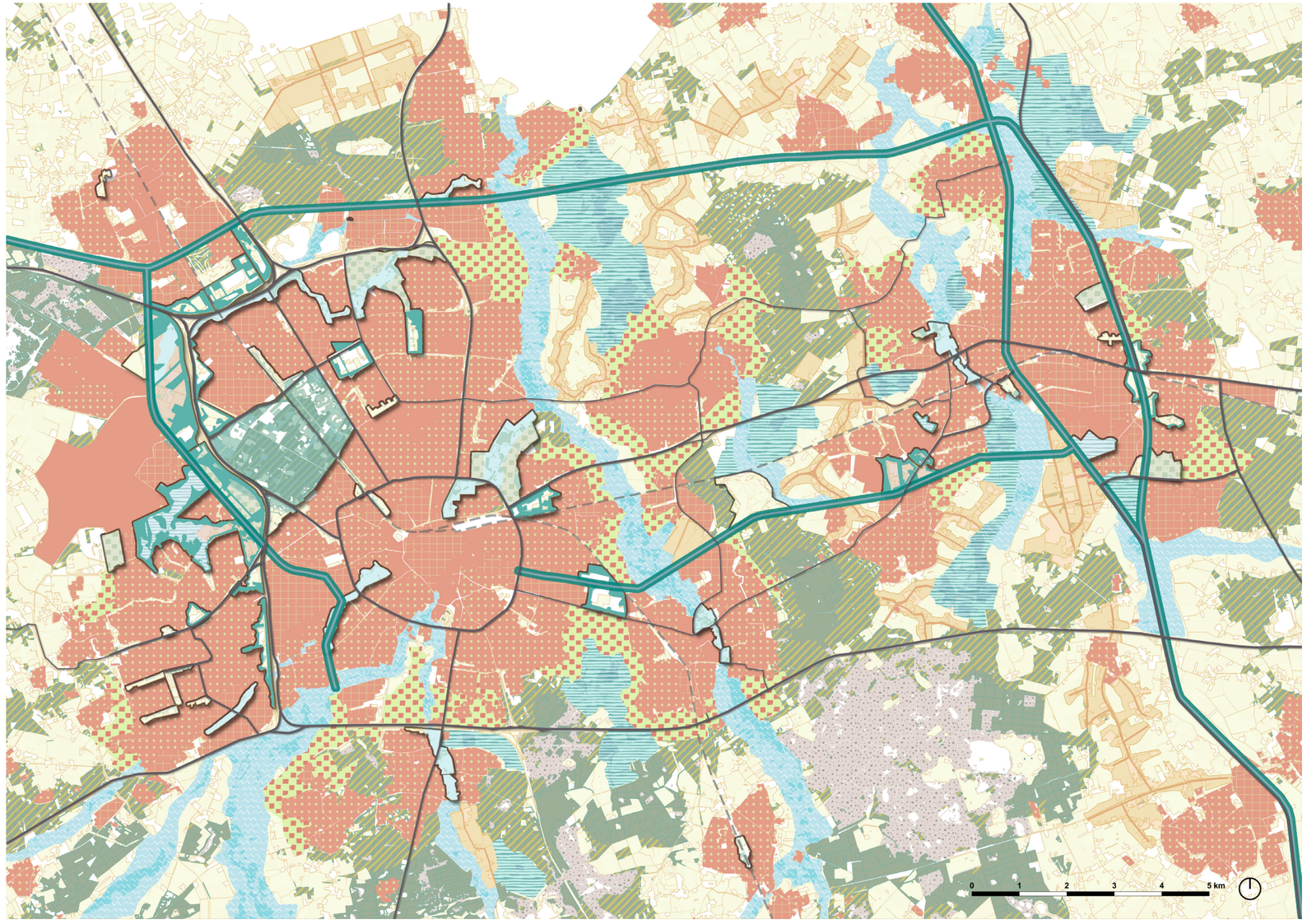
Complexity and diversity

based on introducing/inventing tree syntax



Invent new tree syntax

*Regional vision for landscape identity enhancement - **A new forest territory***



The reclaimed lanscape

More diversified reclaimed forests

Forest necklace on the agricultural land

More readable and diversified broek landscape

More readable and experienceable stream valley

The urbanization patches

Transformation to the new stemps forest

Transformation to the new raster forest

The fringe landscape

The fringe landscapes as transition zone

The void landscape

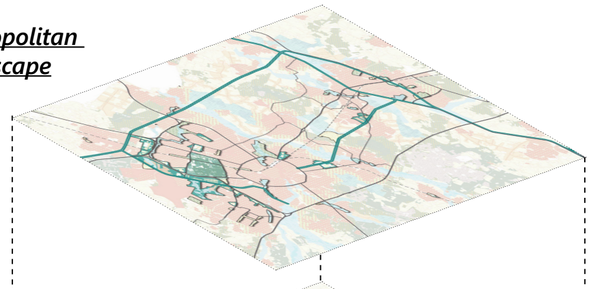
The canal as corridor connecting voids

A stream fragment

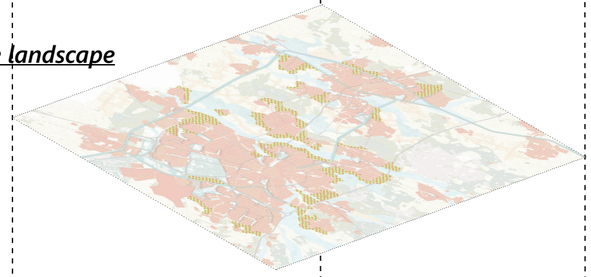
Various theatre voids

*Design strategies for landscape identity enhancement - **A new forest toolbox***

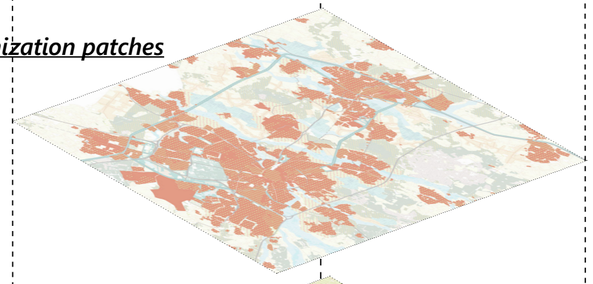
The metropolitan void landscape



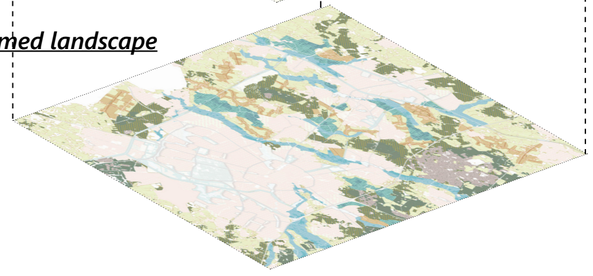
The fringe landscape

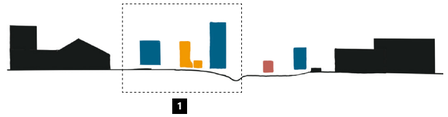


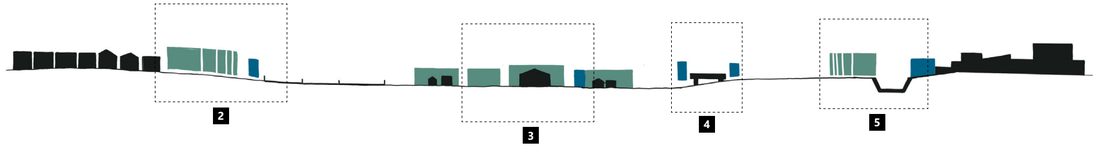
The urbanization patches

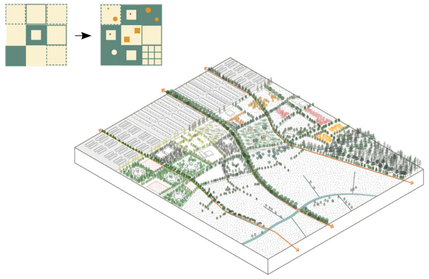


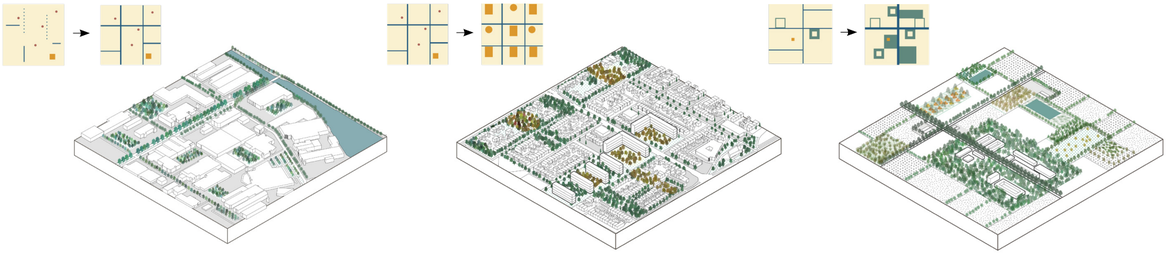
The reclaimed landscape

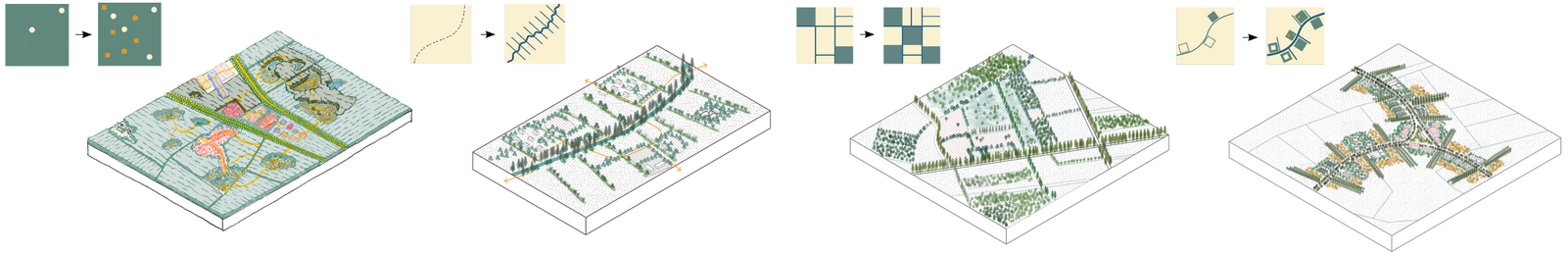








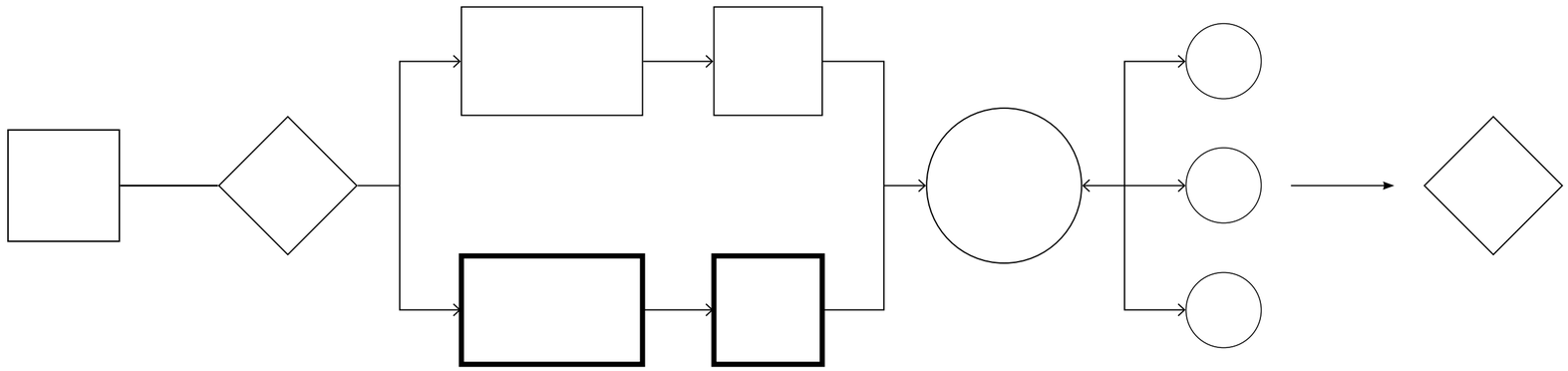




SubRQ

What are the challenges and opportunities of strengthening ***drought-adaptation*** *within SGE from the lens of forest and forestry?*

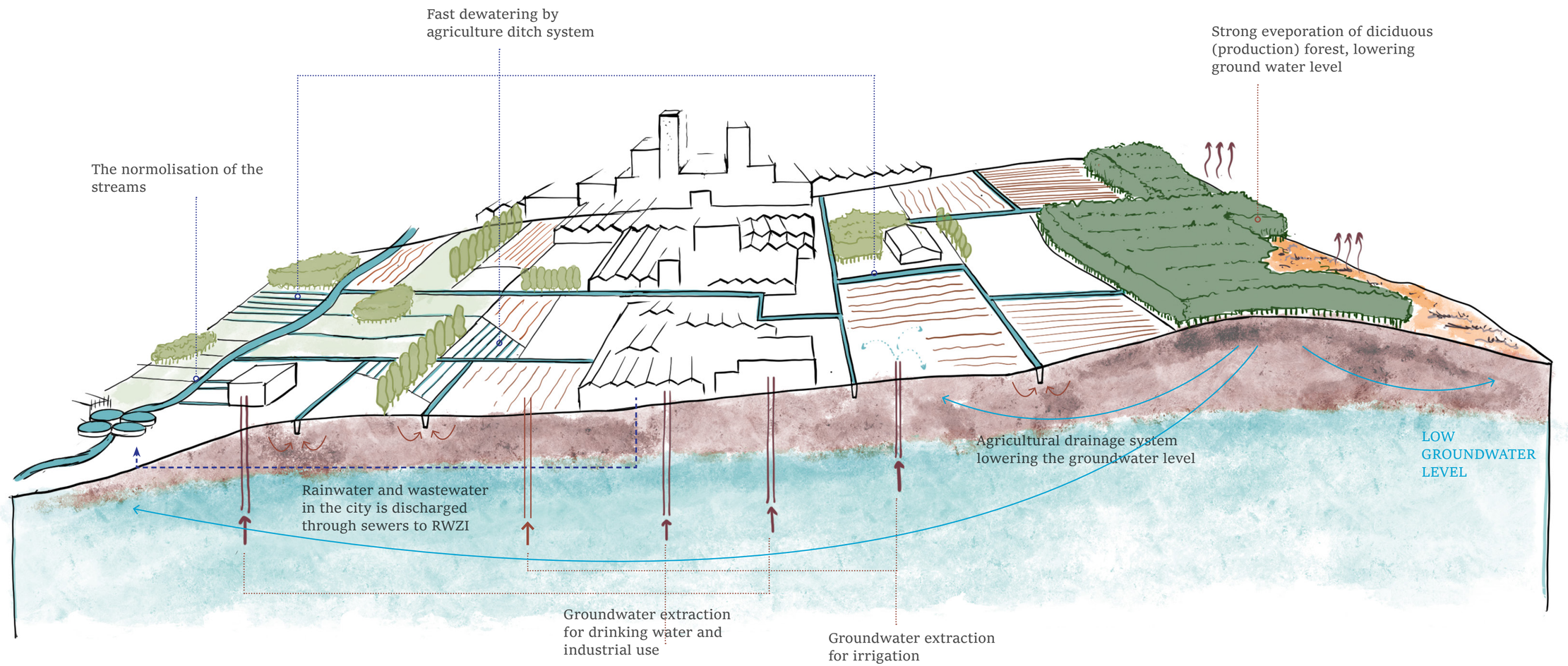
What kind of forest based strategy can strengthen the ***drought-adaptation*** *within SGE?*



Macro *Meso* *Micro*

Introduction Method **Analysis** **Design** Discussion

The components of SGE (ground)water system



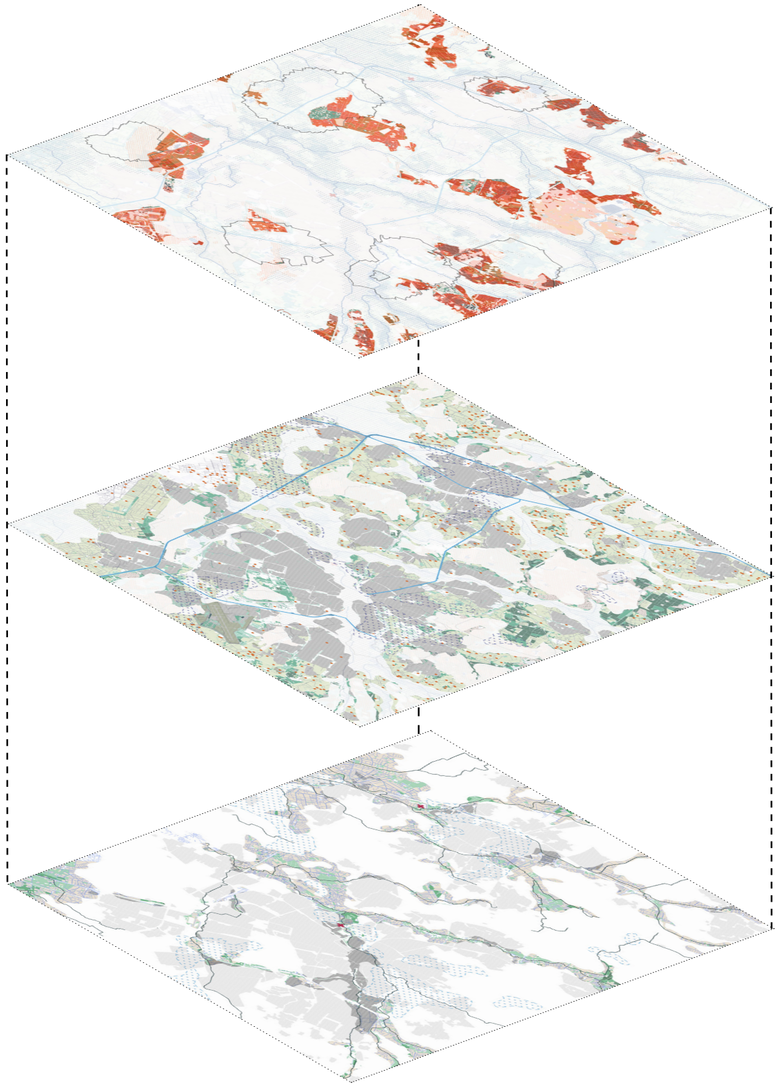
The Valley ***The Middleground*** ***The Ridge***

The components of SGE (ground)water system

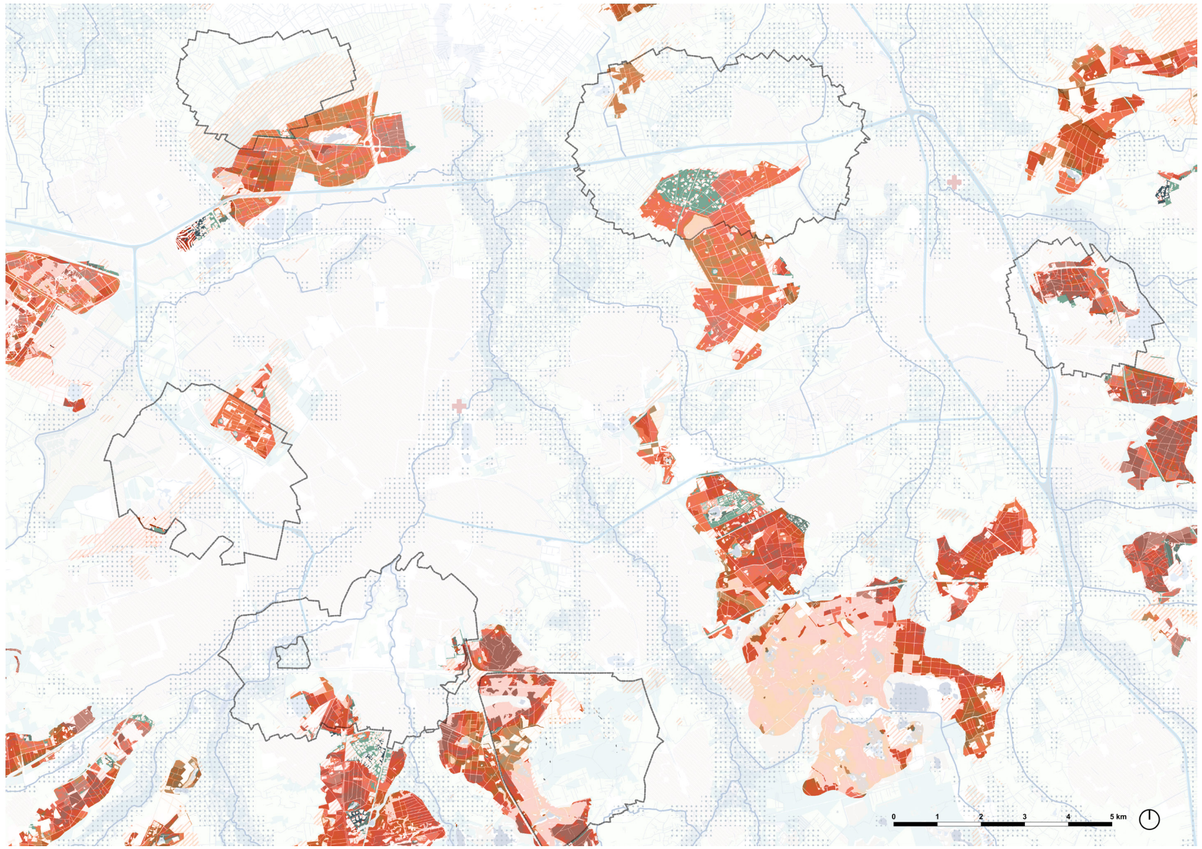
The Ridge

The Middleground

The Valley



*(Ground) Water system - **The ridge***



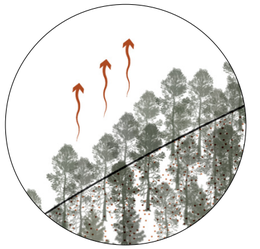
Coniferous forest

Mixed forest

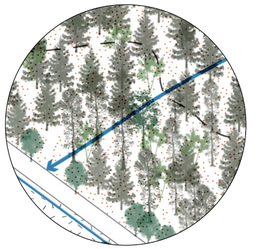
Heathland

Groundwater protection area

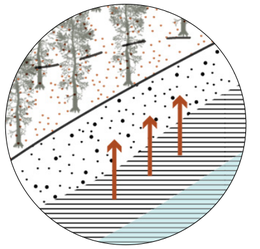
Severity of forest drought
(measured by lowest spring groundwater level)



High evaporation

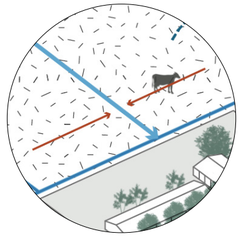


Rapid drainage

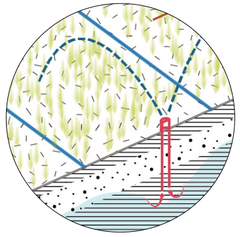


High transpiration

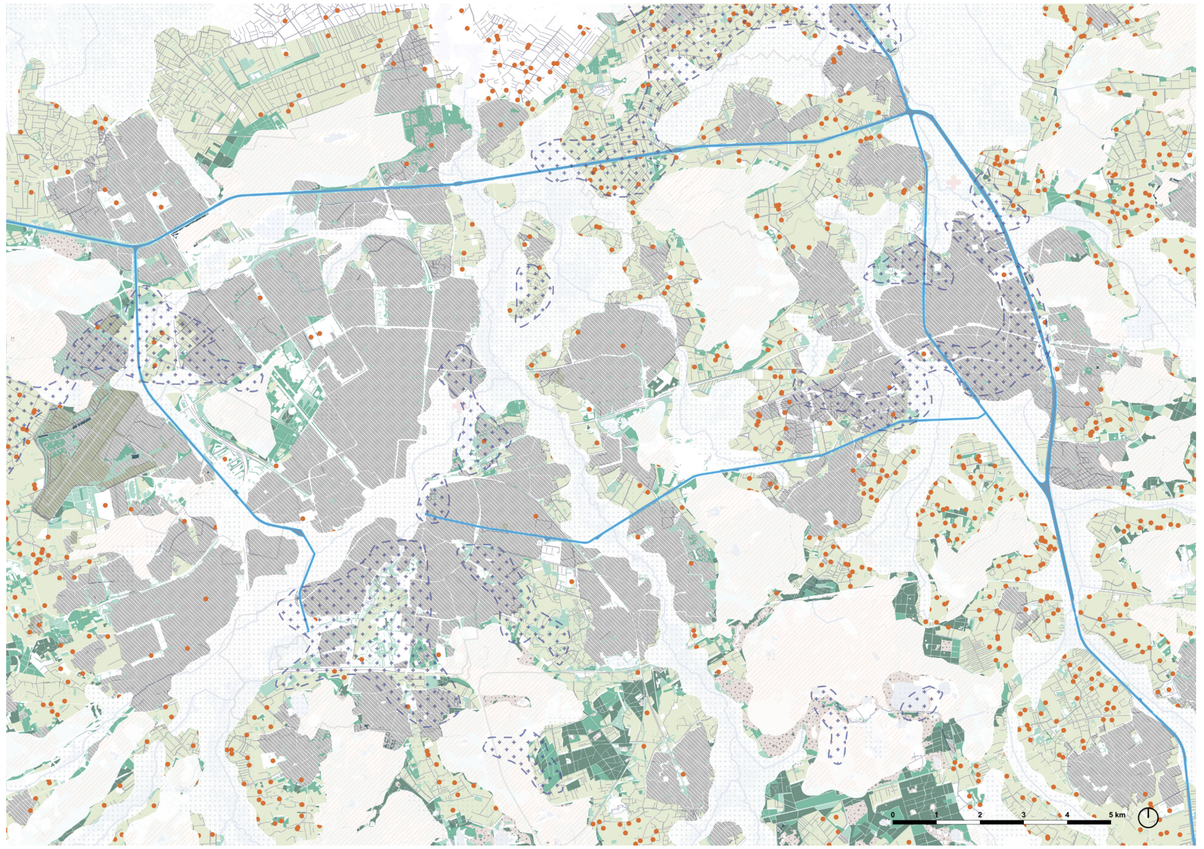
*(Ground) Water system - **The middleground***



Rapid drainage|Pollution

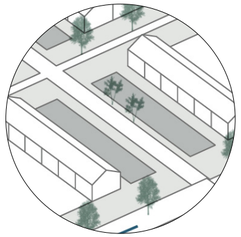


Groundwater extraction

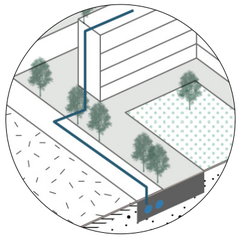


Urbanization area
Agricultural landuse
Coniferous forest
Ditches
Deciduous forest
Lost seepage area
Mixed forest
Water extraction point

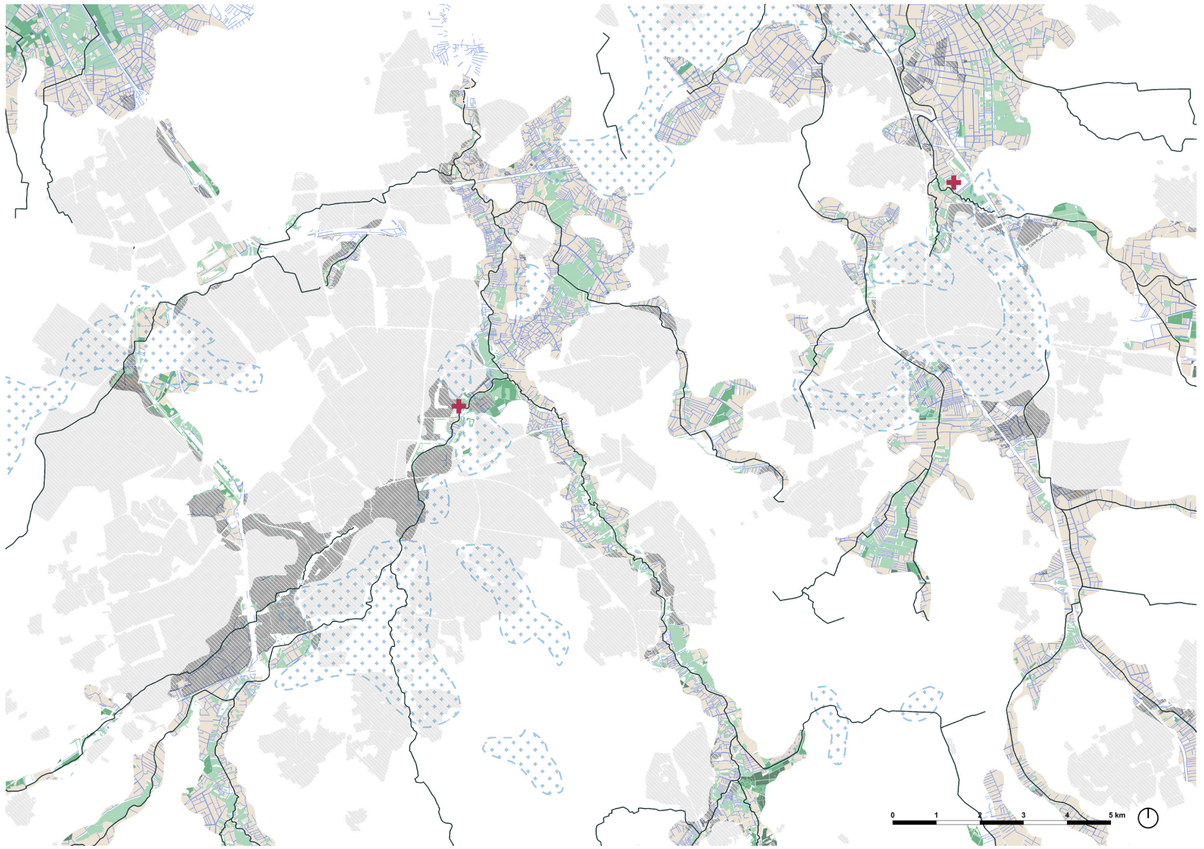
High evaporation

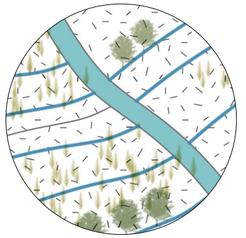


Rapid drainage

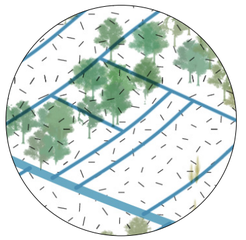


*(Ground) Water system - **The valley***





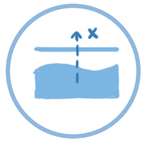
Rapid drainage



Rapid drainage|
Little seepage

Mixed forest
Agricultural landuse
Streams
Historic seepage area
Deciduous forest
Urbanization area
RWZI
Ditches

Design principles for Strengthening drought adaptation



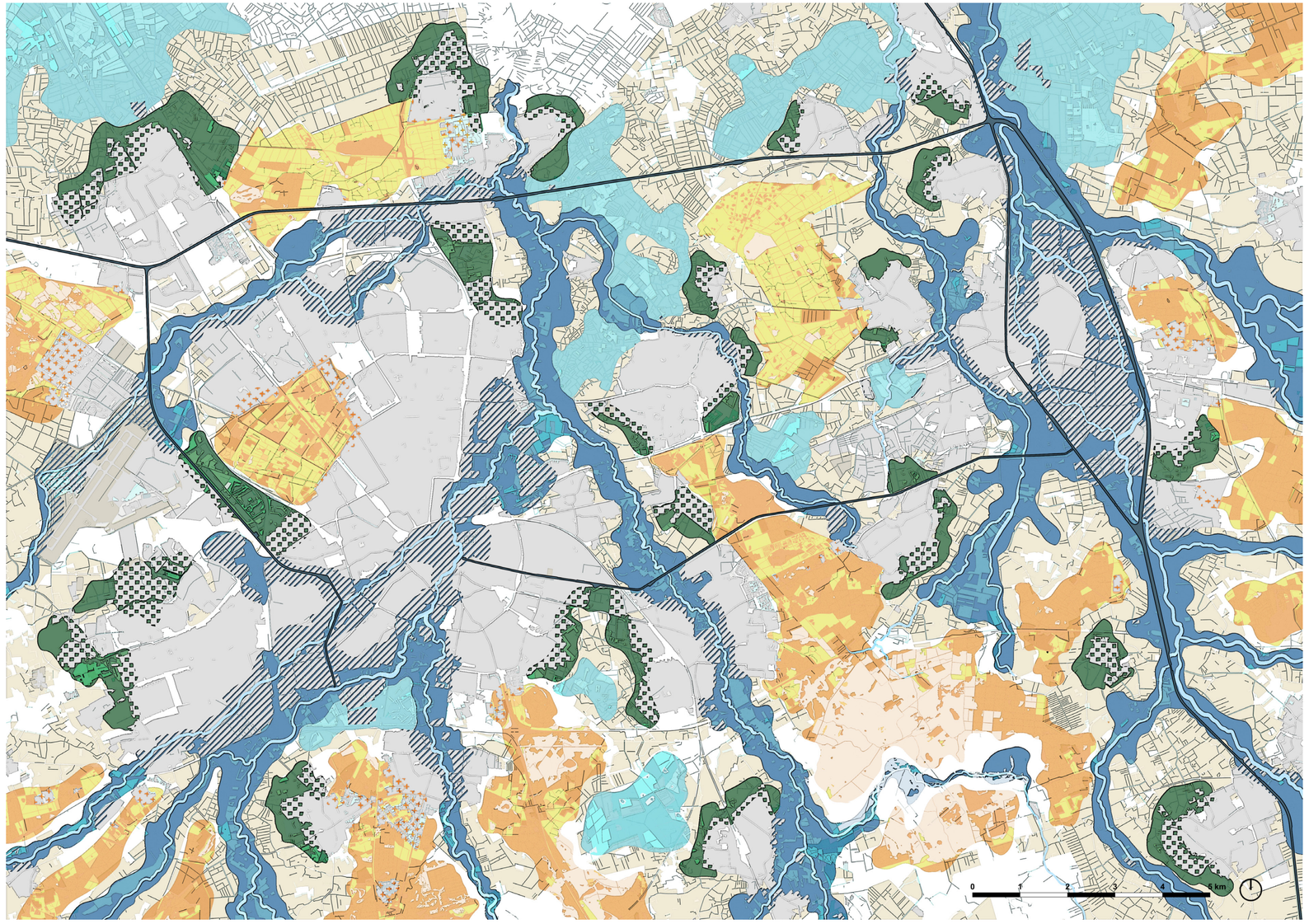
1. Minimize groundwater use

2. Retaining water

3. Storing water as alternative source

4. Replenishment of groundwater

*Regional vision for drought adaptation - **A resilient new water machine***



The ridge

Enhanced infiltration and interception of runoff in coniferous forests

Retention of water in urban areas as infiltration zones

The middleground

Disconnection of stormwater and sewerage systems at the urban fringe

Precision/alternative agriculture with water storage space

Forest reservoirs on the urban fringe for water purification and delivery

Canals as a source of dry-season water recharge

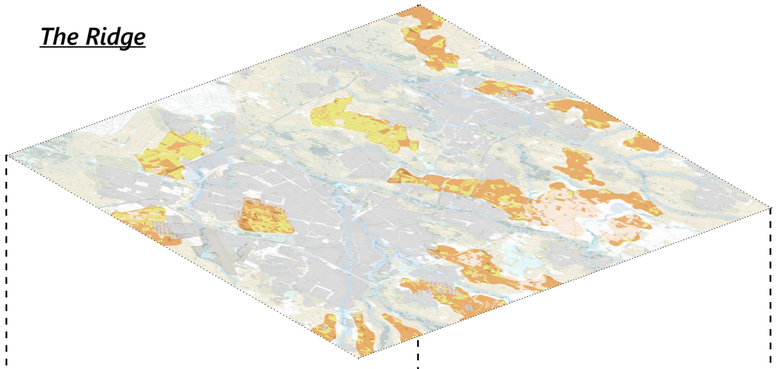
The valley

Restoration of seepages and floodable forests in stream valleys and broeks

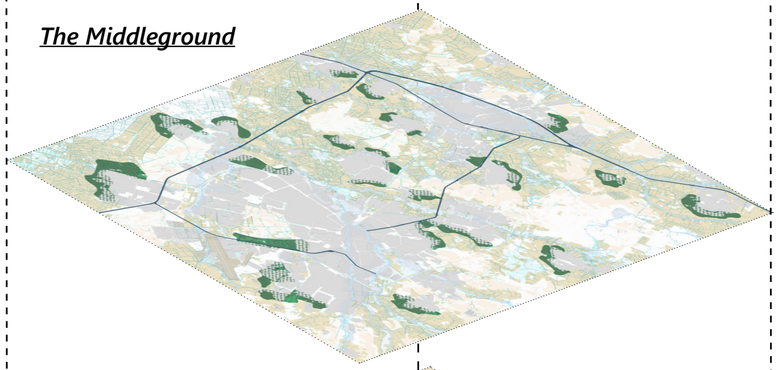
Floodable measures to restore seepage in urban area

*Design strategies for drought adaptation - **A new forest toolbox***

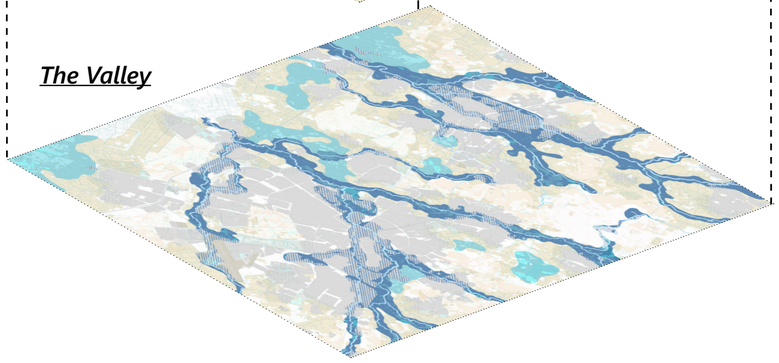
The Ridge

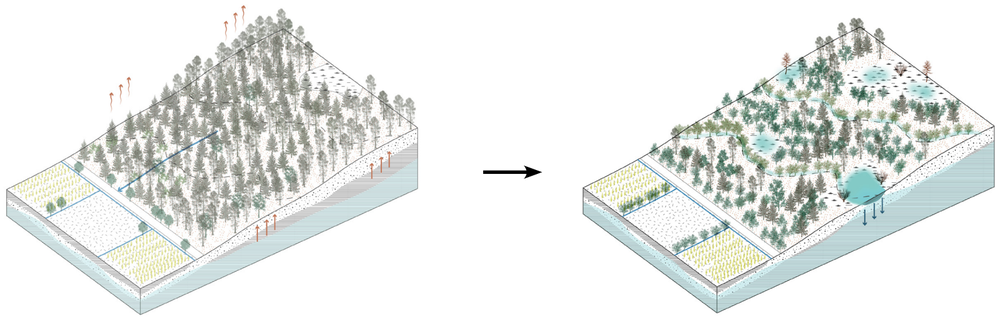


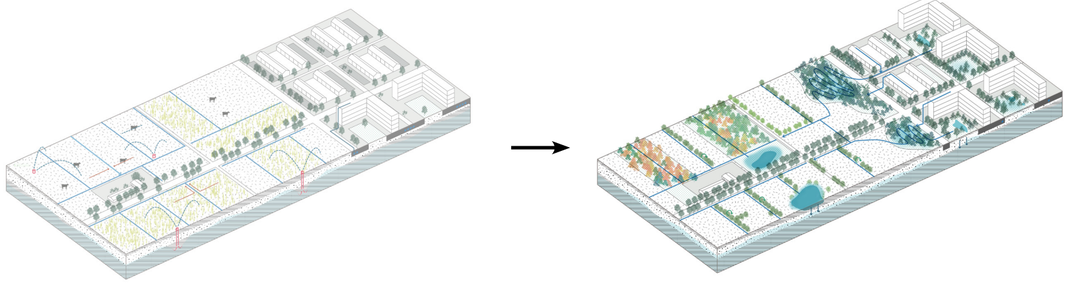
The Middleground

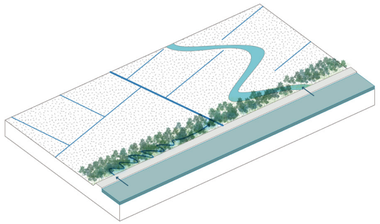


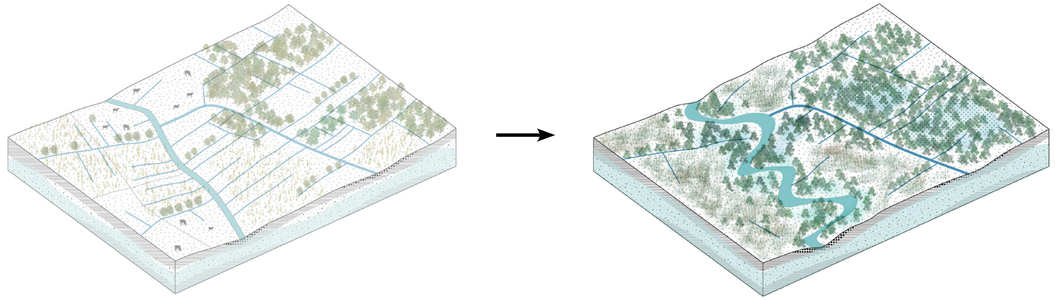
The Valley



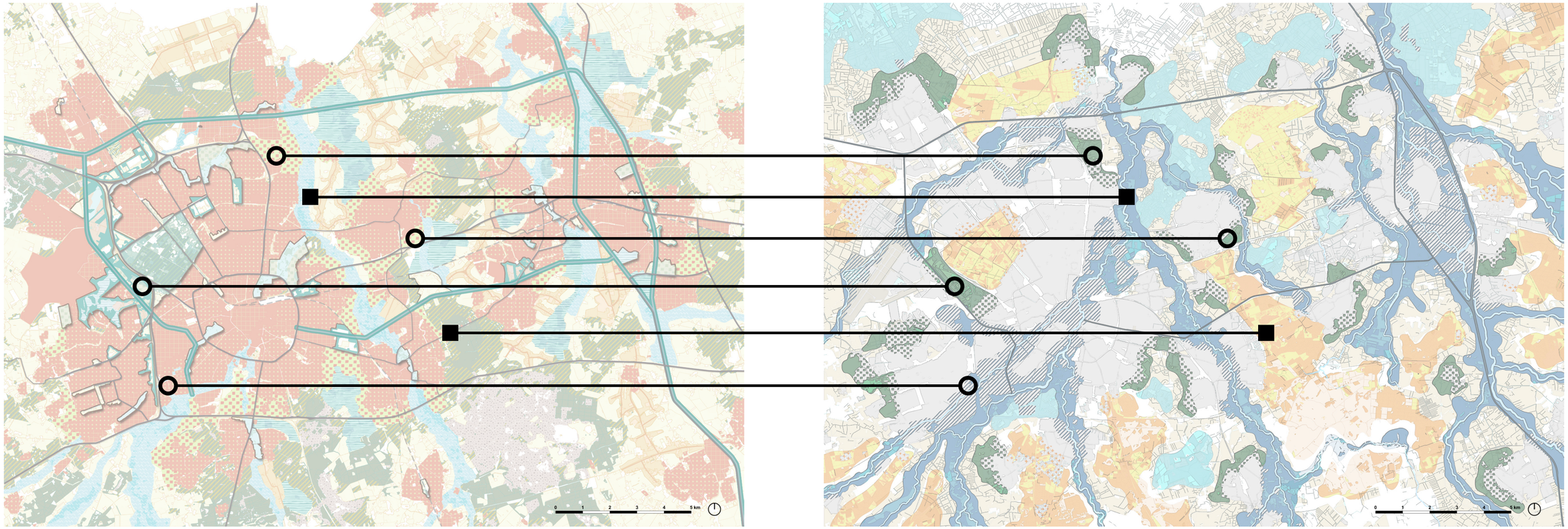








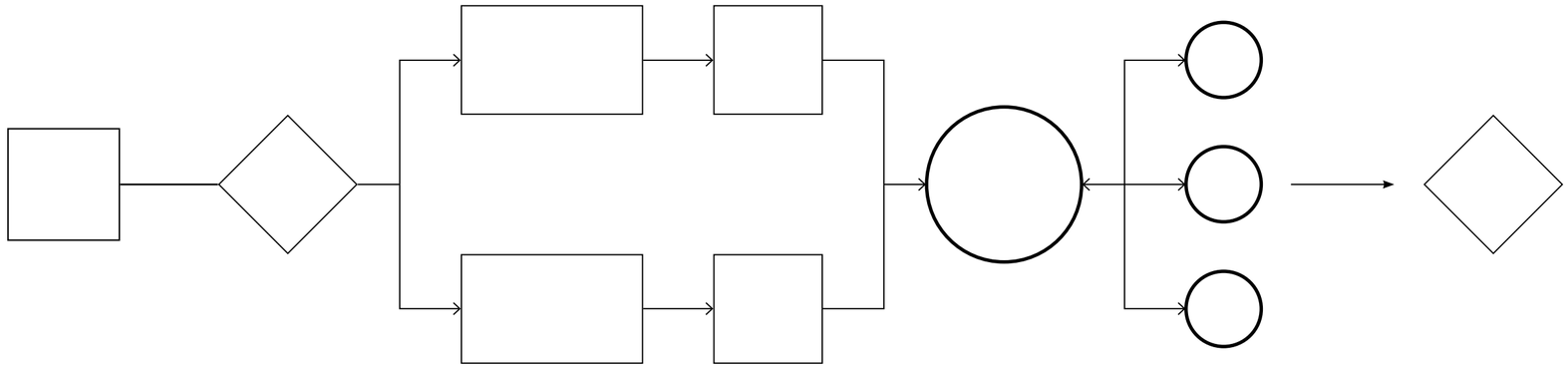
Synergies and conflicts



The two visions are synergistic in some places, but conflicting in others. This is also reflected in the design principles and spatial strategies. A few examples of synergy and conflict are shown here and will be the starting point for local scale transformation later.

SubRQ

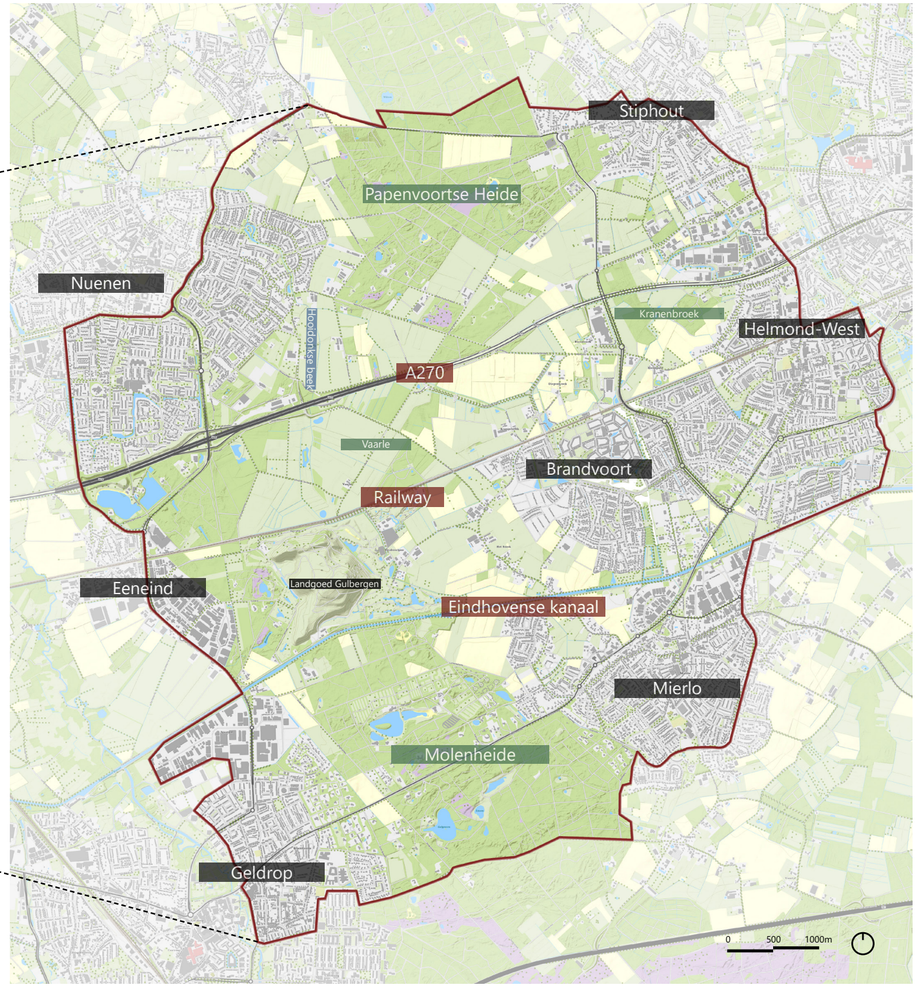
How can forest strategies spatially integrated in design transformation for cases of local scale?



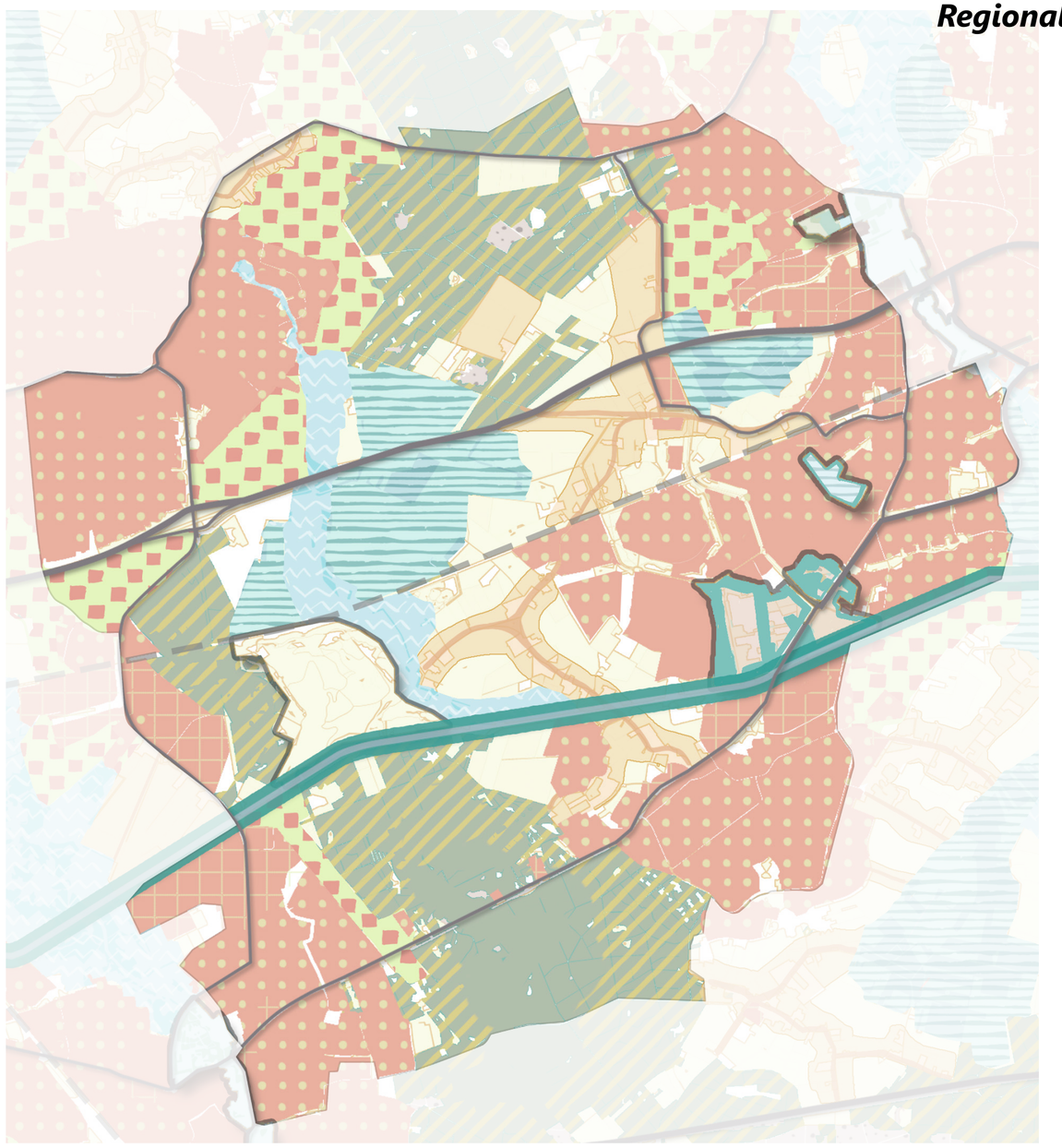
Macro ***Meso*** ***Micro***

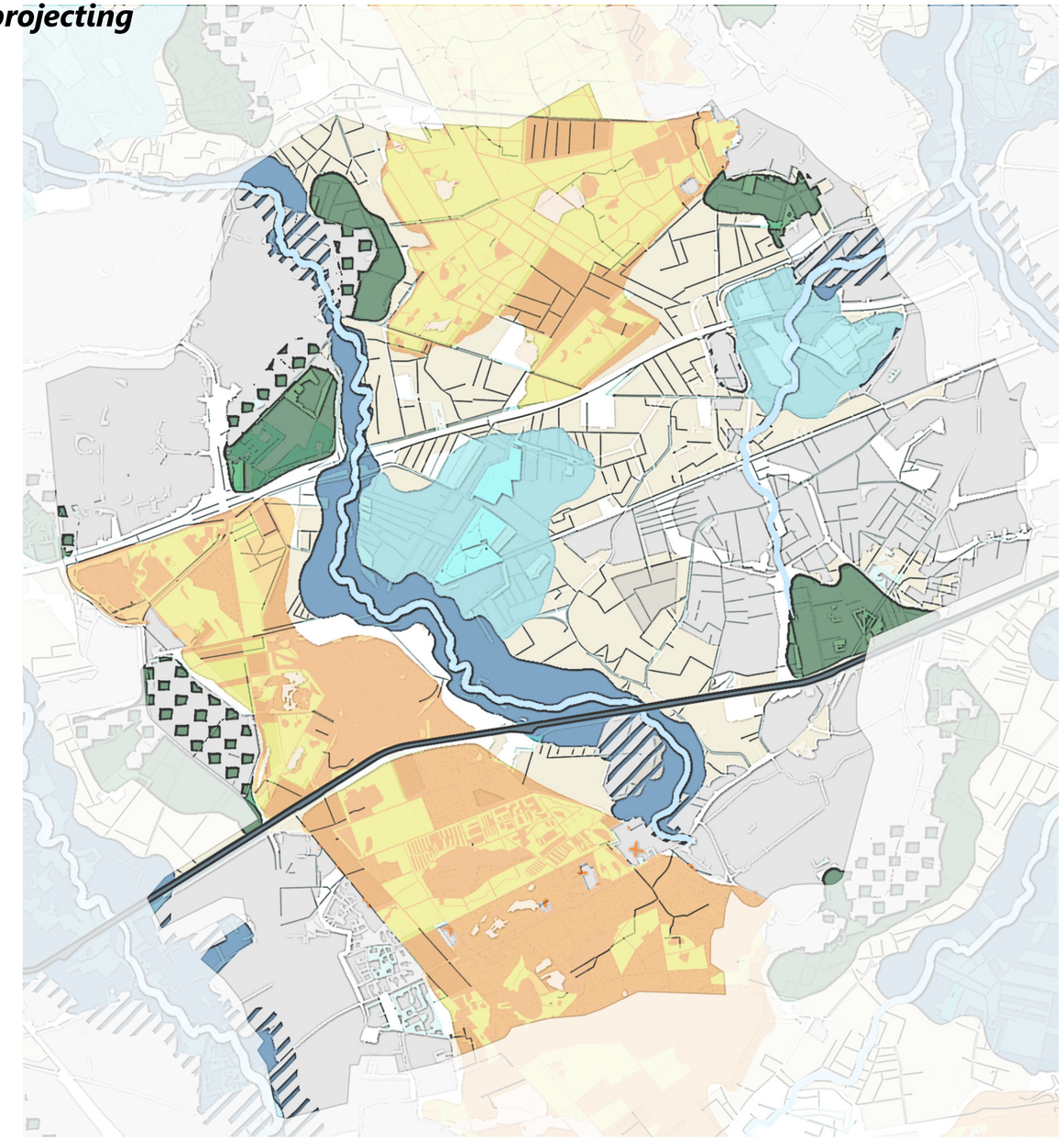
Introduction Method Analysis **Design** Discussion

The choice of the case area

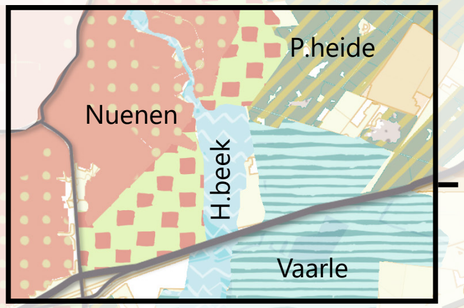


Regional vision projecting





Local design explorations on the fringe of Nuenen



Diverse and comprehensive:
Containing almost all landscape types, the design solution for enhanced landscape identity is expected to have high transferability. It also contains the three components of the (underground) water system.

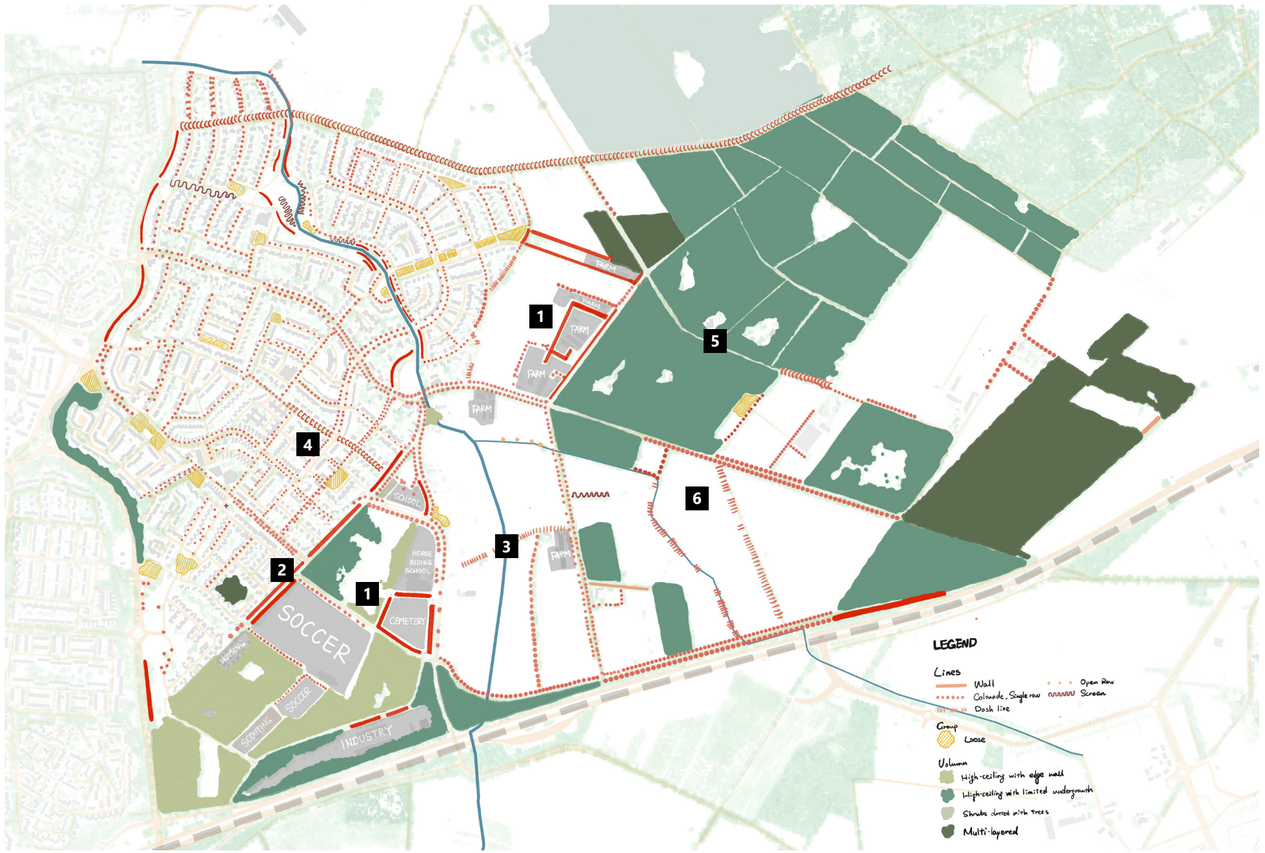
Significant drought challenges:
The Hooidonksebeek as the most important stream in the case area, its fragment at the edge of the Nuenen connects the city and the vaarlese broek in the centre as an ecological core area.

The challenge of spatial coherence:
Being in an urban-landscape interface area, the fringe landscape connects the Nuenen and the eastern side of the landscape, allowing for testing of the fringe landscape forestry strategy and extending it to the other urban-landscape interface areas of the case area.

The challenge of integrating transport infrastructure:
exploring how the existing road structure can better create spatial experiences and the relationship with the A270.

Gemeente Nuenen
Papenvoortseheide
Hooidonksebeek
A270
0
200
400m
Google Earth

Spatial analysis based on tree syntax



0 200 400m

LEGEND

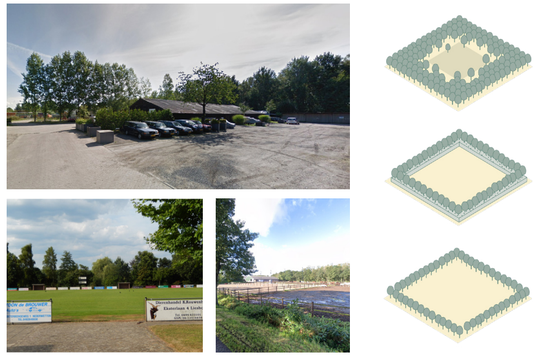
Lines

- Tree wall
- Colonnade
- Open row
- Dash line
- Screen/curtain
- Arcade

Groups

Frames

- Multilayered volumn
- High-ceiling with limited
- High-ceiling with edge wall
- Shrubscape with scattered trees



1 Fringe tree 'rooms' with various function

4 Nuenen-Oost as raster forest

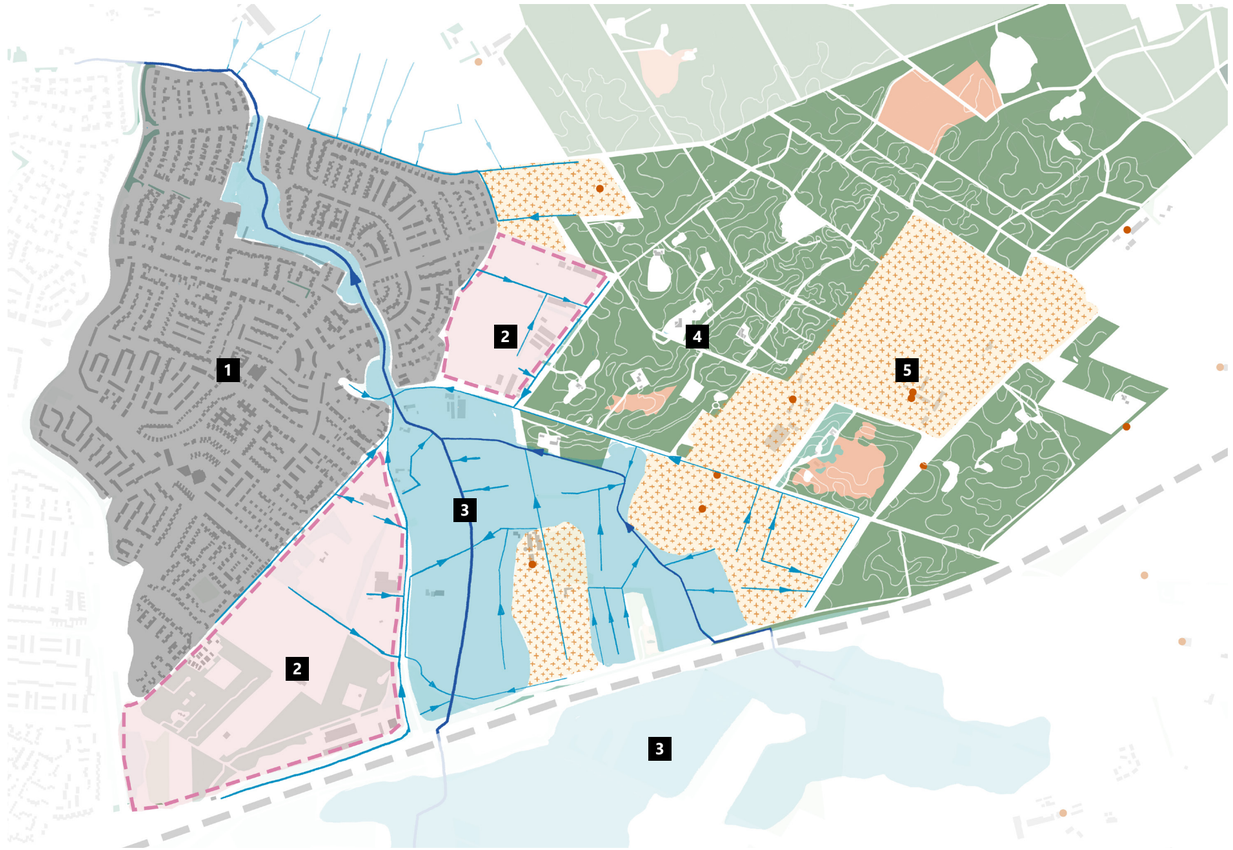
2 Tree wall as barrier on the fringe

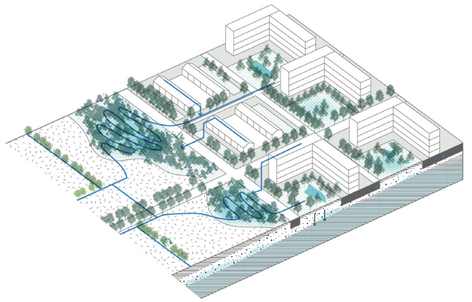
5 Papenvoortse Heide as monogenous high dense forest

3 Consolidated land and hidden Hooidonkse beek

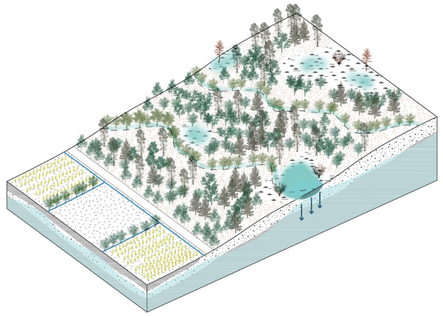
6 Normalised former broek rooms as farmland

Water system analysis



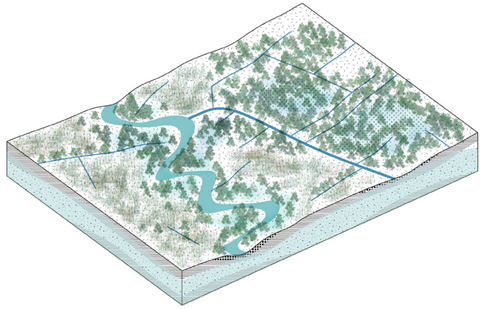


1 **Nuenen-East (Middleground)**
Drainage to urban sewage system

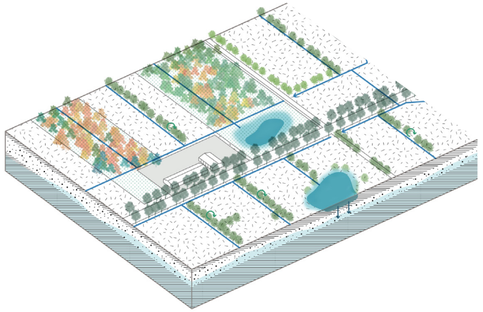


4 **Papenvoortse Heide (Ridge)**
Catch the runoff
Strengthen infiltration

2 **East Fringe (Middleground)**
Opportunity of forest resevoir



3 **Hooidonkse beek (Valley)**
Stream buffer forest
Strengthen seepage



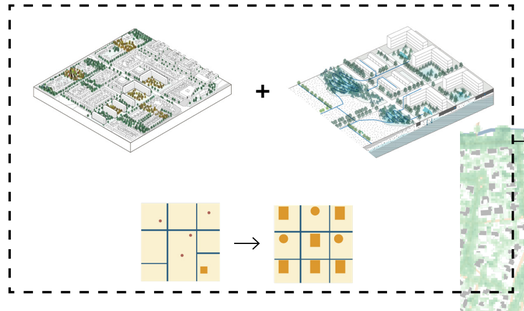
5 **Farms and meadows (Middleground)**
Reduce extraction
Alternative resource

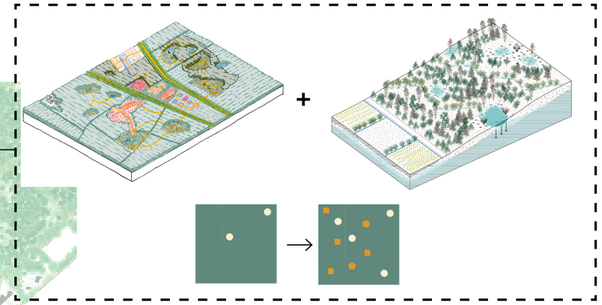
LEGEND

- Stream course
- Main ditches
- Groundwater Extraction
- Middleground - urbanization area
- Middleground - urban fringe
- The valley
- Middleground - Agriculture
- The ridge - Dry forest
- The ridge - Heathland

0 200 400m

Integrated application of strategies and transformation of forest patterns

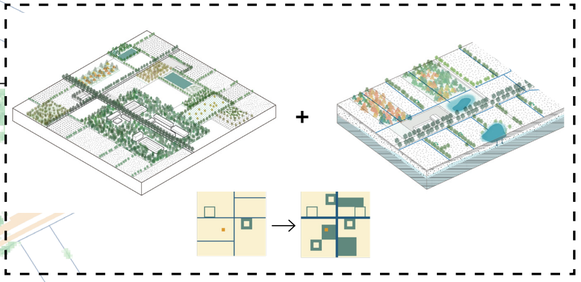




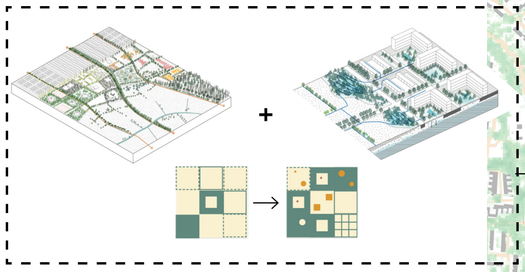
Nuenen-East fringe

Reclaimed forest complex of Papenvoortseheide

Arable field of Papenvoortseheide



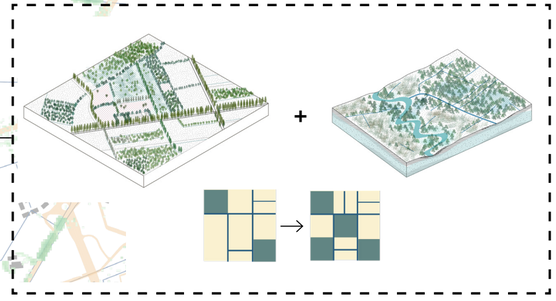
Nuenen-East

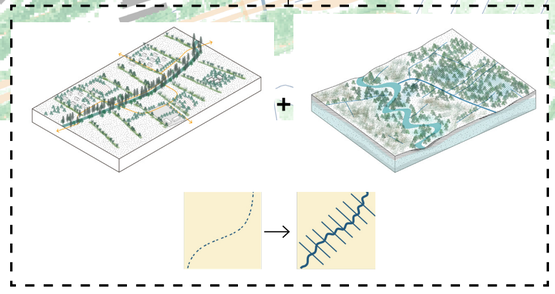


Valley of Hooidonkse beek

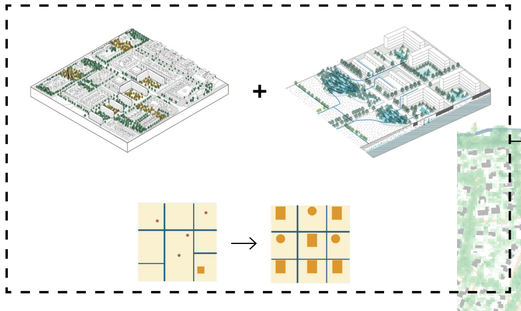
Prinsche broek

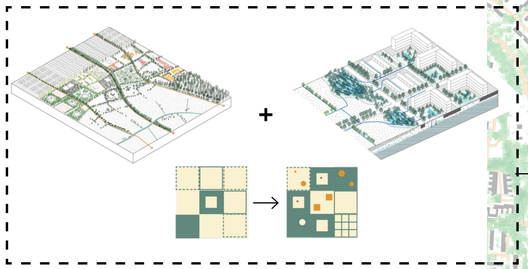
Nuenen-East fringe

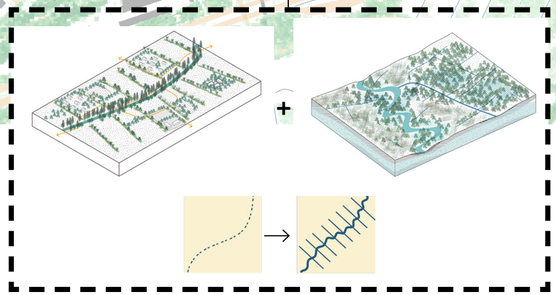


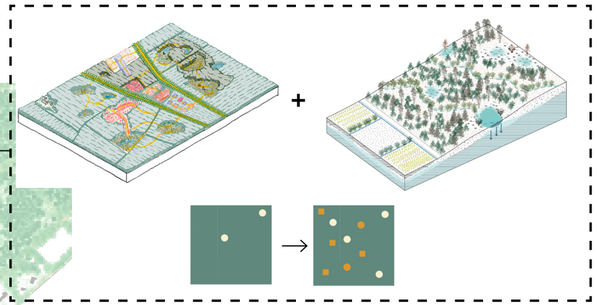


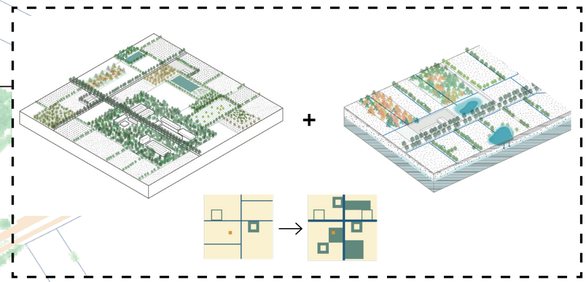
Integrated application of strategies and transformation of forest patterns

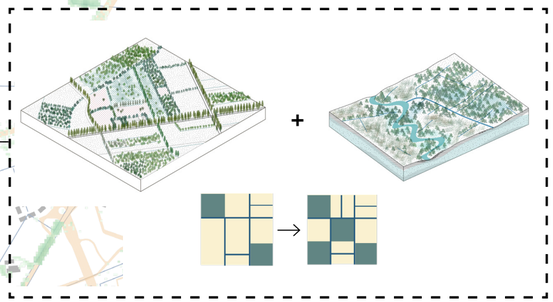


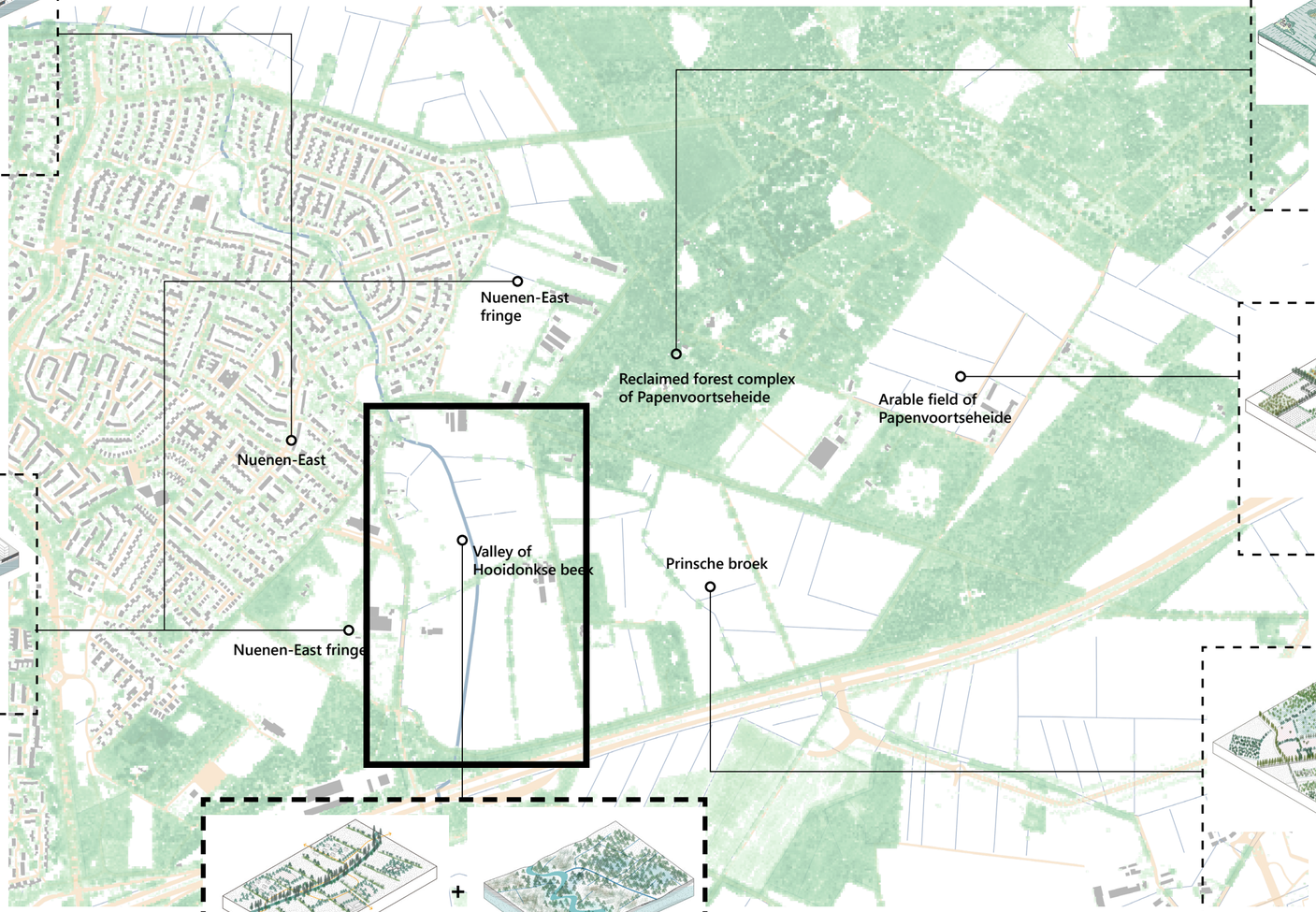


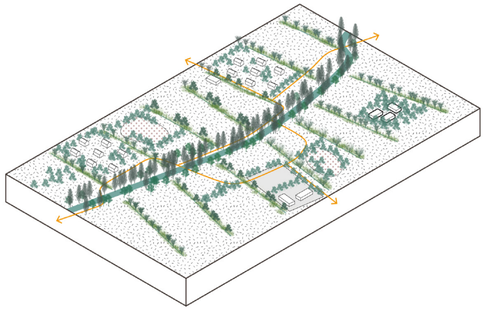












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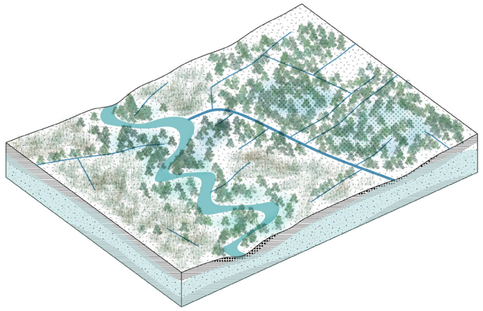
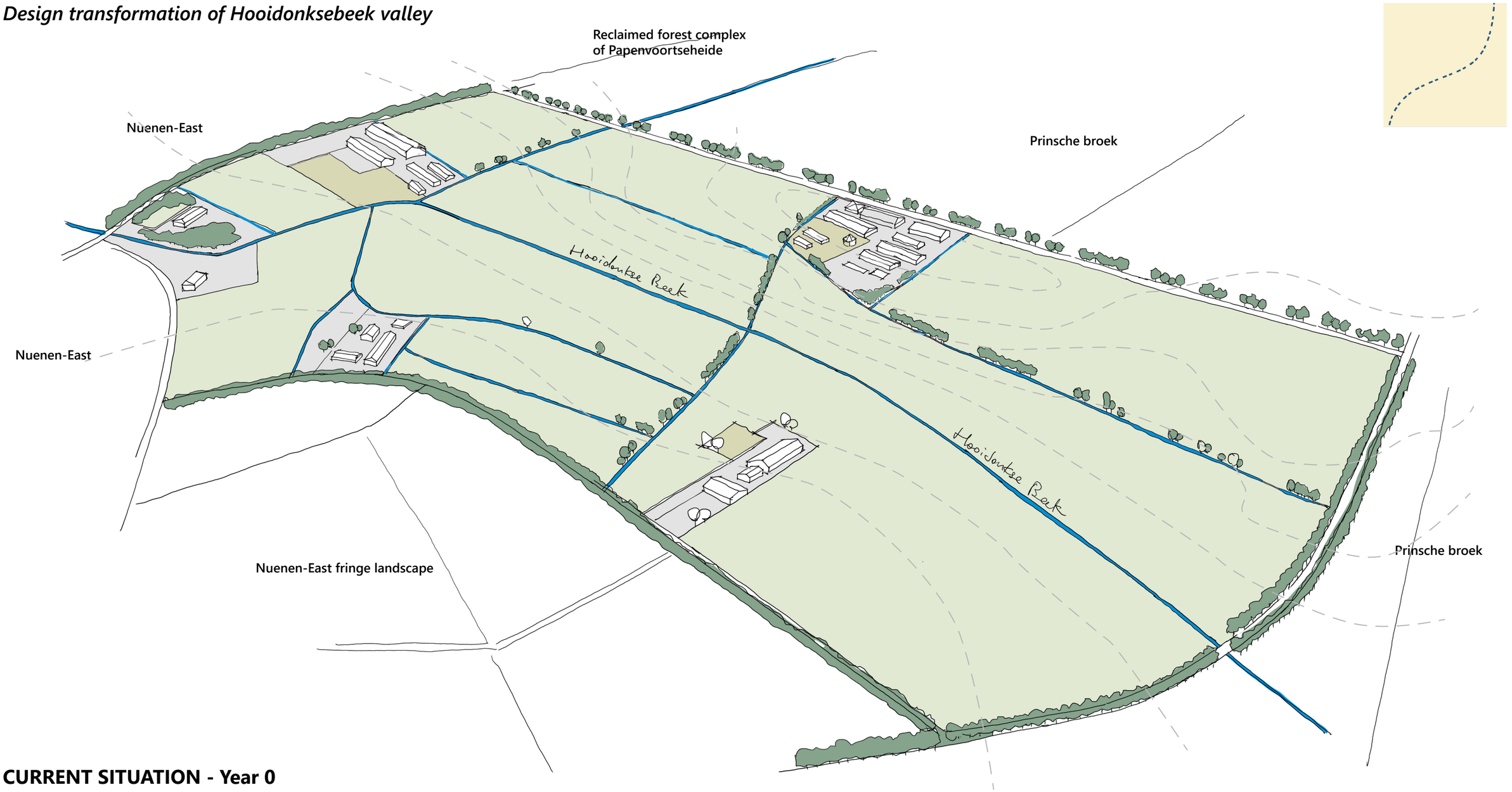


The strategy of landscape identity enhancement in the stream valley require the spatial structure of ditch ribbons, and the stream itself become an appealing element or the landmark to attract people's visiting through the new experience route. The functions such as housing, playground, allotment garden and other recreational spaces are settled in along the stream

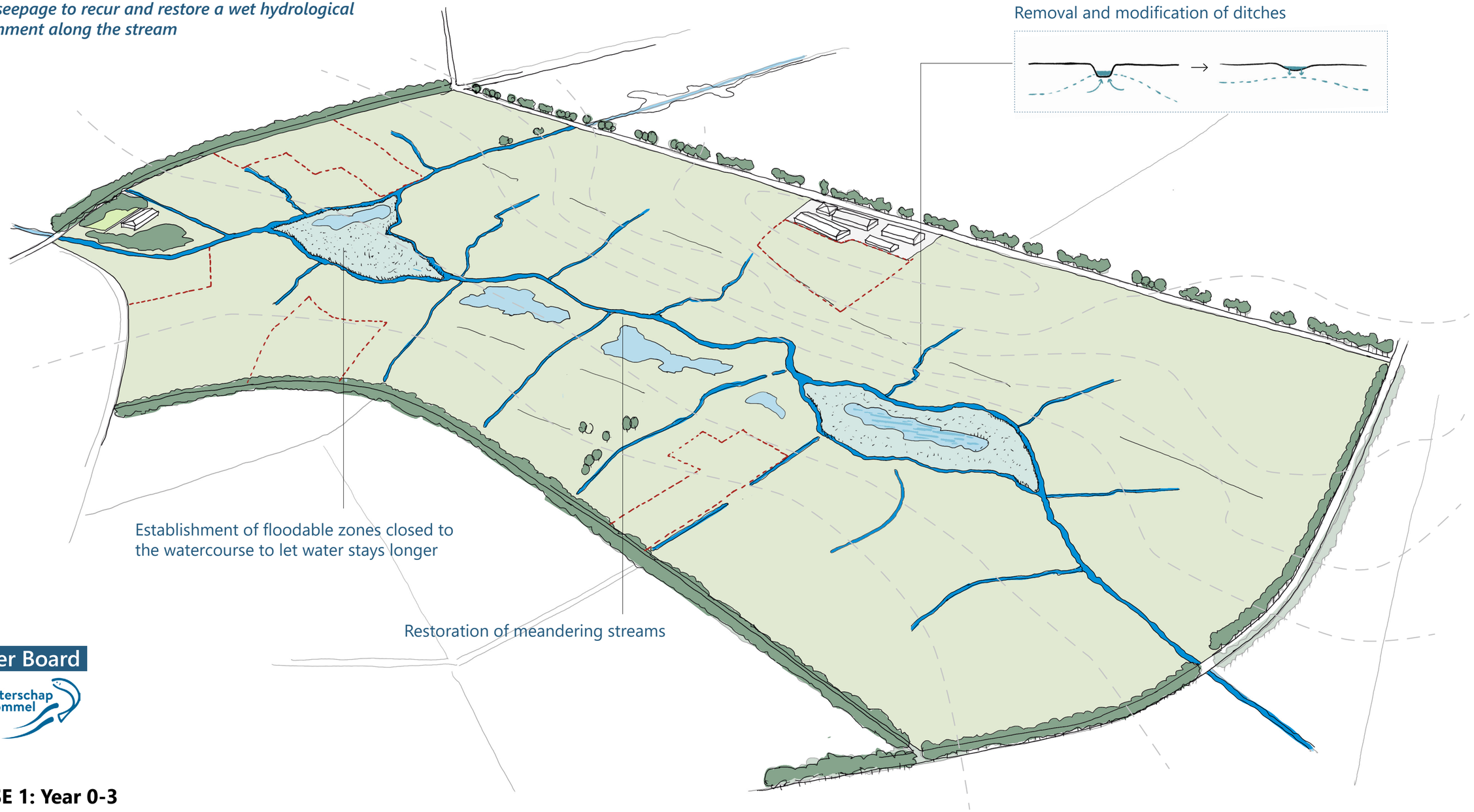
However, in the drought adaptation strategy, the stream need much more spaces for flowing and meandering. thus require less ditches, which hide its structure as a cultural landscape; and a more natural bank and flooding zone have conflicts with the function arrangement in the plots.

Design transformation of Hooidonksebeek valley



CURRENT SITUATION - Year 0

Allow seepage to recur and restore a wet hydrological environment along the stream

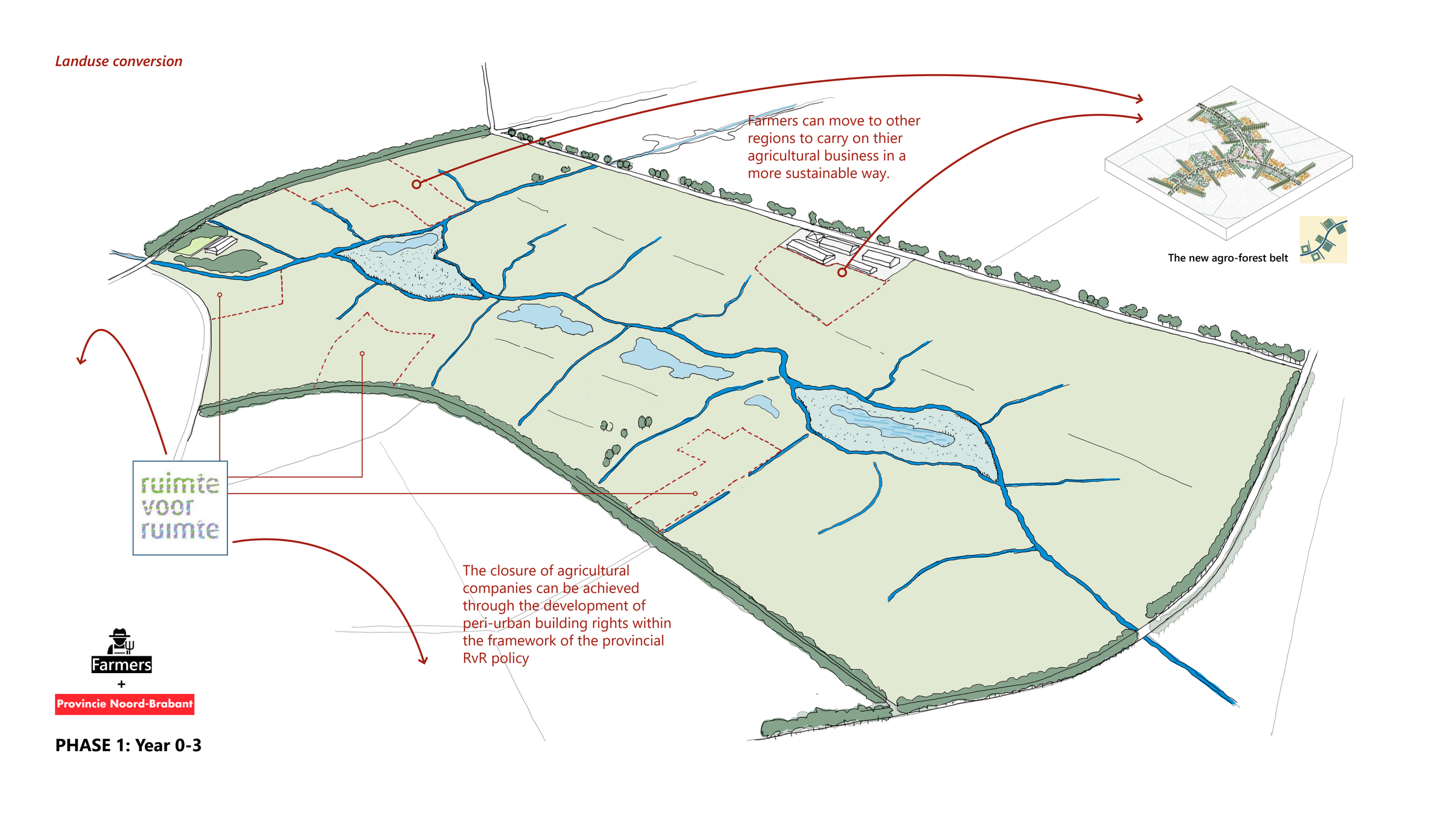


Water Board

Waterschap De Dommel

PHASE 1: Year 0-3

Landuse conversion

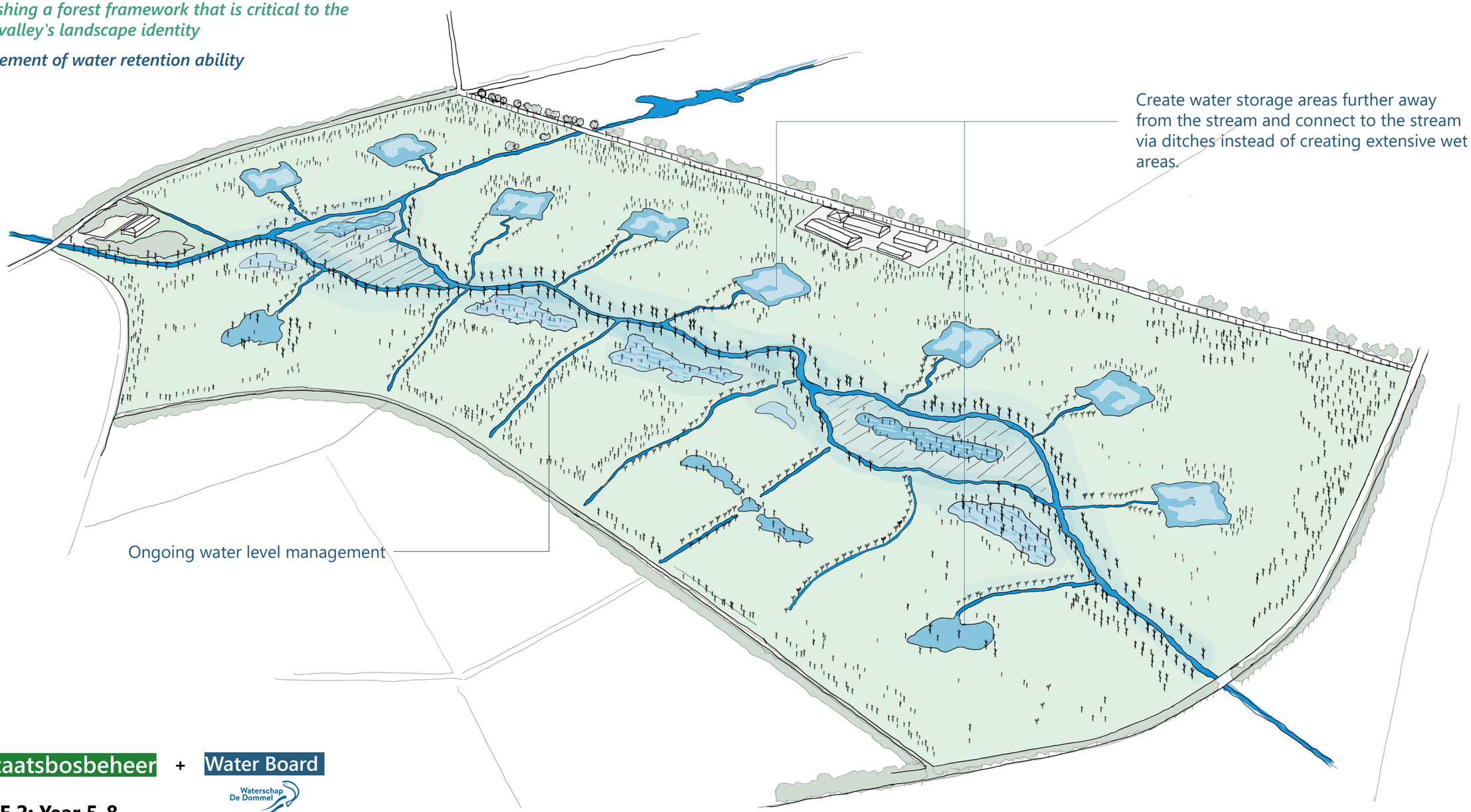


Farmers
+
Provincie Noord-Brabant

PHASE 1: Year 0-3

Establishing a forest framework that is critical to the streamvalley's landscape identity

Improvement of water retention ability



Staatsbosbeheer + Water Board

Waterschap De Dommel

PHASE 2: Year 5-8

Establishing a forest framework that is critical to the streamvalley's landscape identity

Improvement of water retention ability

Planting hedge wall along the ditches.

Hedge wall

Screen

Curtain

Planting screen and curtain along the main water course.

Multilayered dense volumn

The dense forest frame is planted along the boundary.

Room of dense volumn

Closed room with tree walls

Transparent room

On the flatter and more urban side, room-like frames have been planted to form the spatial basis for future developments in the stream valley.

In the steeper east bank, the openness of meadow are kept with small groups and single trees.

Staatsbosbeheer + Water Board

Waterschap De Dommel

PHASE 2: Year 5-8

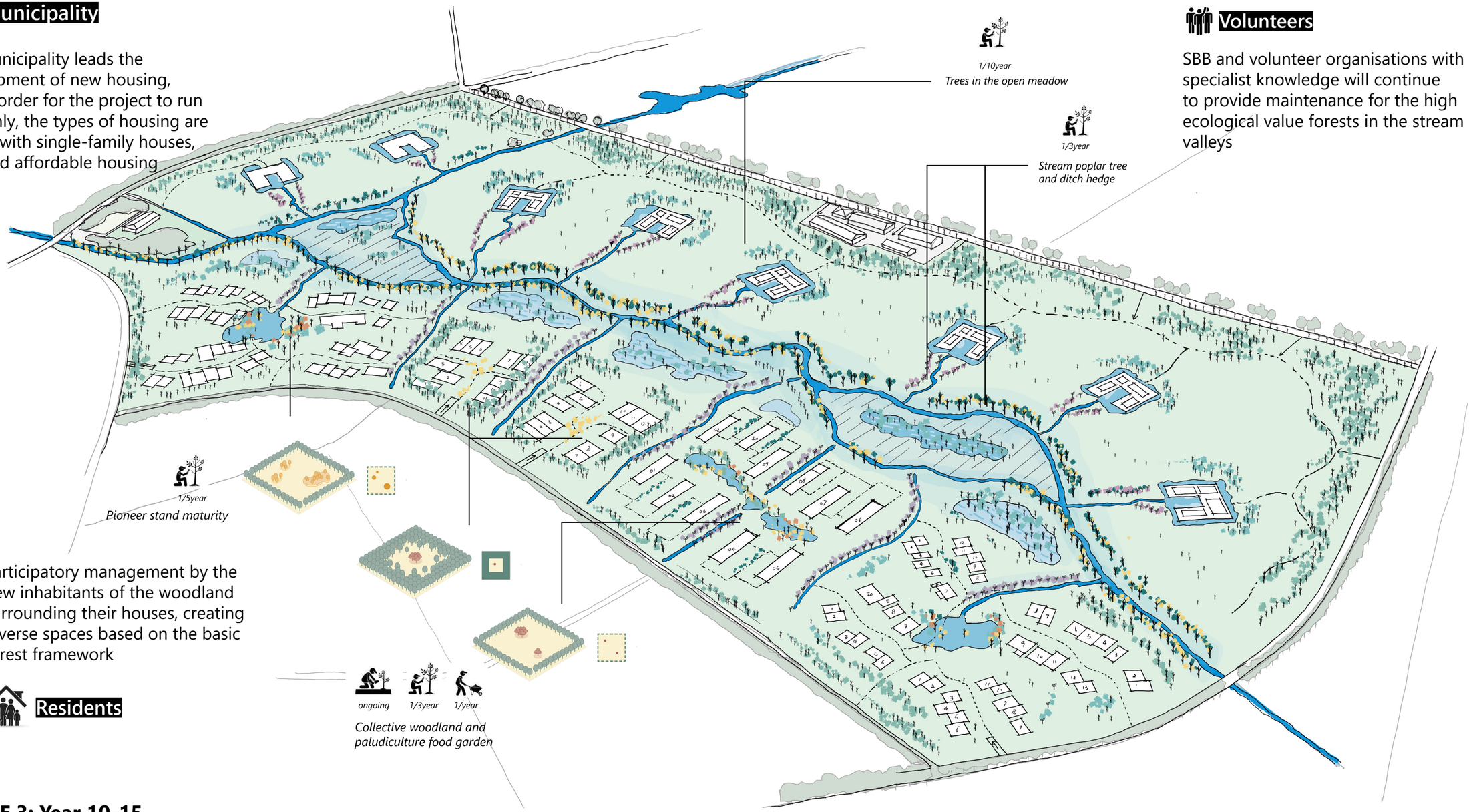
Municipality

The municipality leads the development of new housing, and in order for the project to run smoothly, the types of housing are mixed, with single-family houses, flats and affordable housing

Staatsbosbeheer

Volunteers

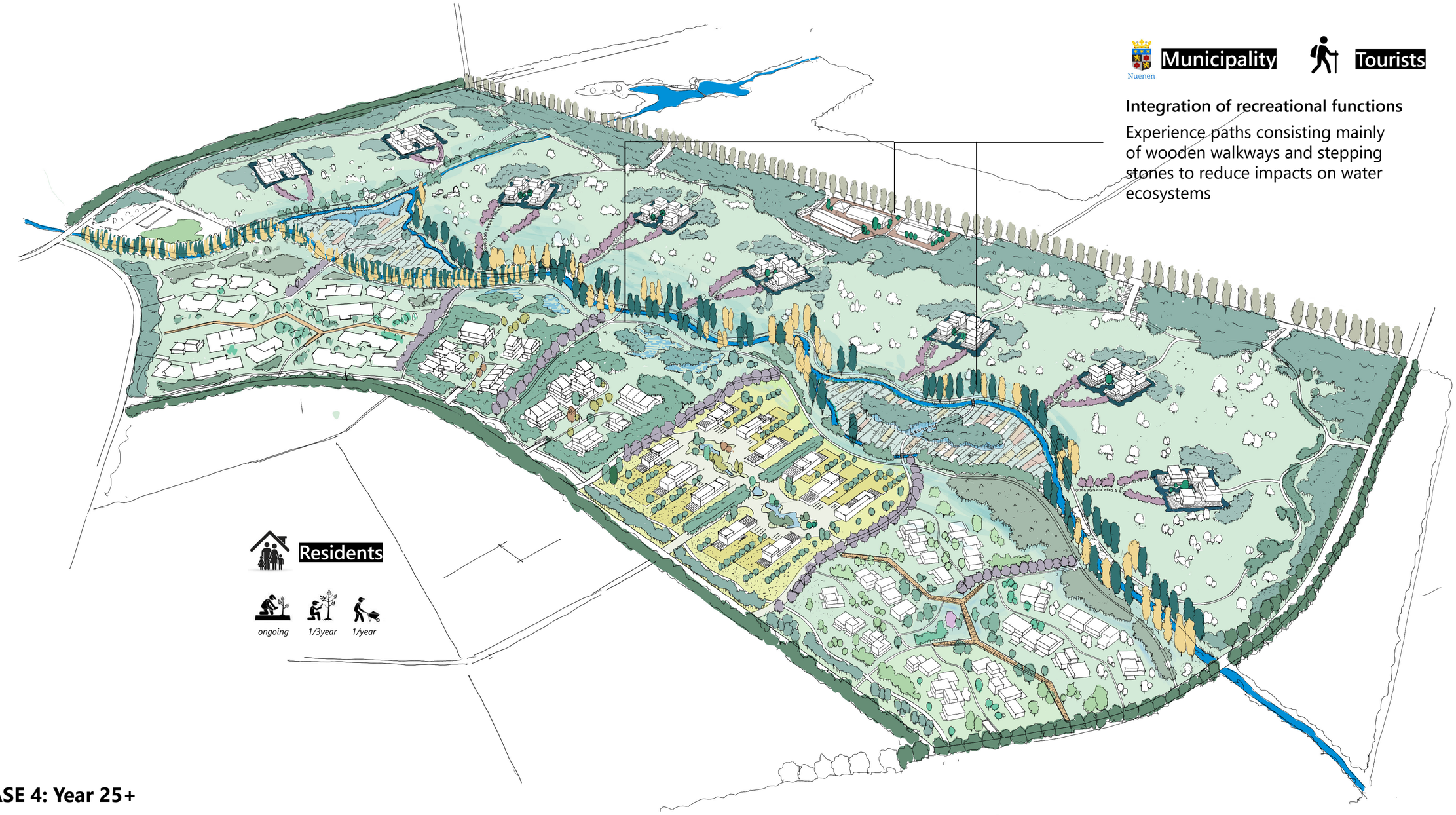
SBB and volunteer organisations with specialist knowledge will continue to provide maintenance for the high ecological value forests in the stream valleys



Participatory management by the new inhabitants of the woodland surrounding their houses, creating diverse spaces based on the basic forest framework

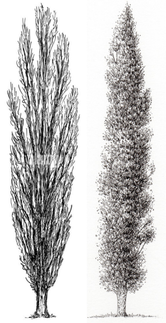
Residents

PHASE 3: Year 10-15



PHASE 4: Year 25+

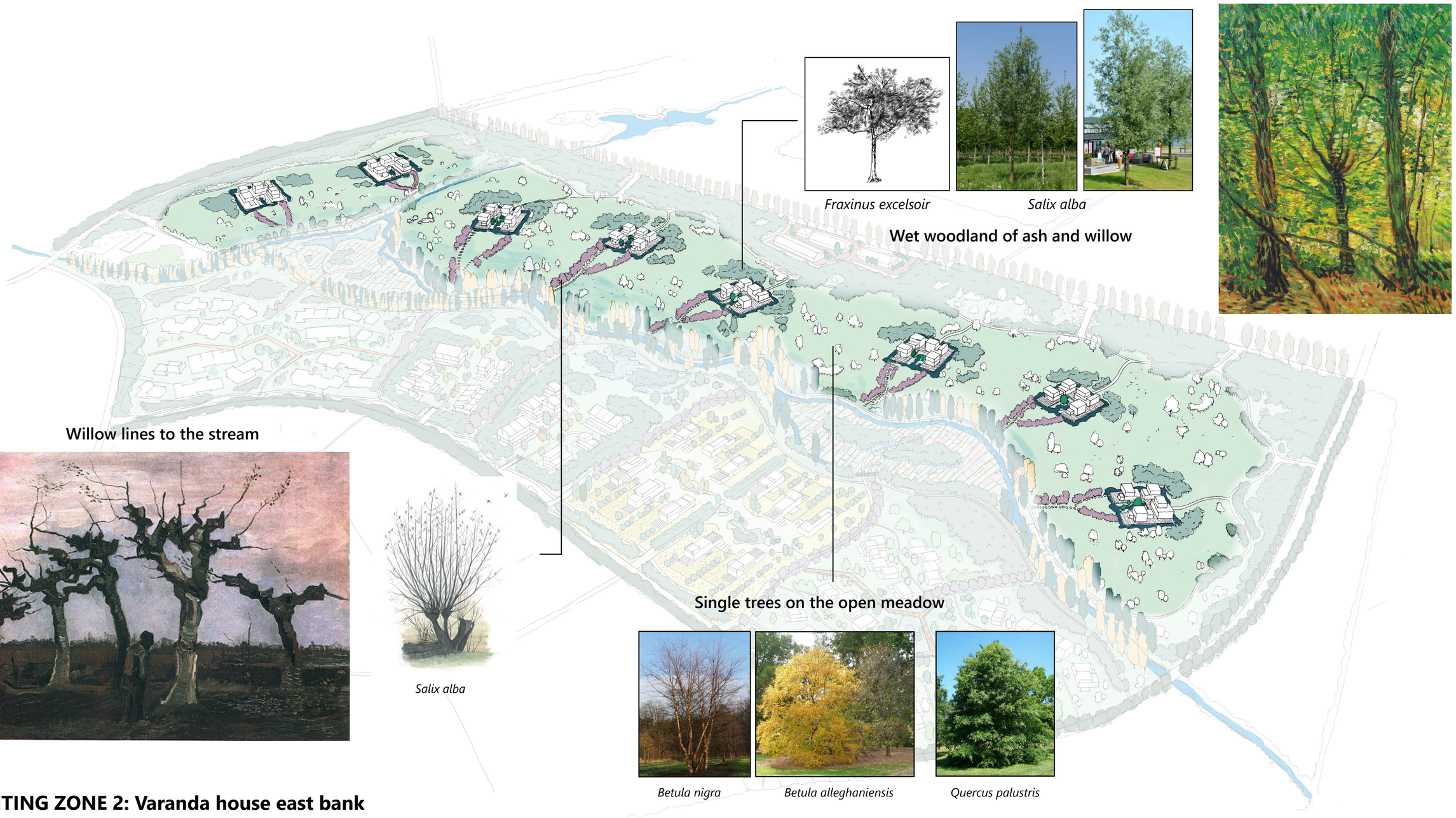
Alnus glutinosa



Populus nigra
Populus canadensis

Taxodium distchum

PLANTING ZONE 1: Riparian zone of the stream



Fraxinus excelsoir

Salix alba

Wet woodland of ash and willow

Willow lines to the stream

Salix alba

Single trees on the open meadow

Betula nigra

Betula alleghaniensis

Quercus palustris

PLANTING ZONE 2: Varanda house east bank

Betula pendula

Quercus palustris

Public woodland as frame of rooms

Betula lenta

Acer saccharinum

Black beech

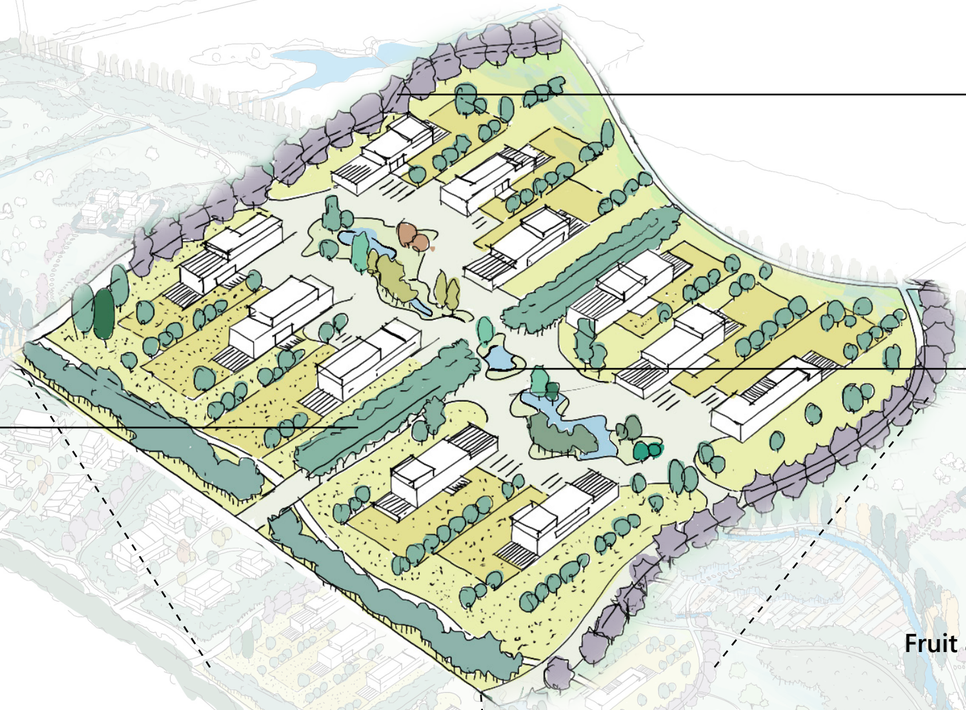
Collective woodland in between

PLANTING ZONE 3: Stream living - closed room

The spatial matephor of the narrow agricultural plots

Alnus incana

Alnus incana



Fruit and colorful trees in public food woodland

Castenea sativa

Malus domestica

Prunus domestica

Ilex aquifolium

Cornus mas

Parrotia persica

Juglans regia

Juglans regia

PLANTING ZONE 4: Stream living - strip

PLANTING ZONE 5: Stream living - Flowing

Masterplan 1:3000 (in ±30 years)

Stemp forest in urban patch

Collectively managed forest in residential area as communal space and rainwater storage

Stream valley

A legible and meandering stream zone and new scheme of forest-living

Broek landscape

Seasonal Inundable dense forest with water level management

Broek landscape

Vacation house in the broek as recreational destination

Colissen agriculture landscape

Wooded bank and hedge walls in the arable field

Fringe landscape

Allotment garden, food-forest and firework site in the tree rooms

Fringe landscape

Carr forest as resevoir for rainwater storage and purification

Fringe landscape

Prepared dense forest rooms for industry and new workplace

Reclaimed forest complex

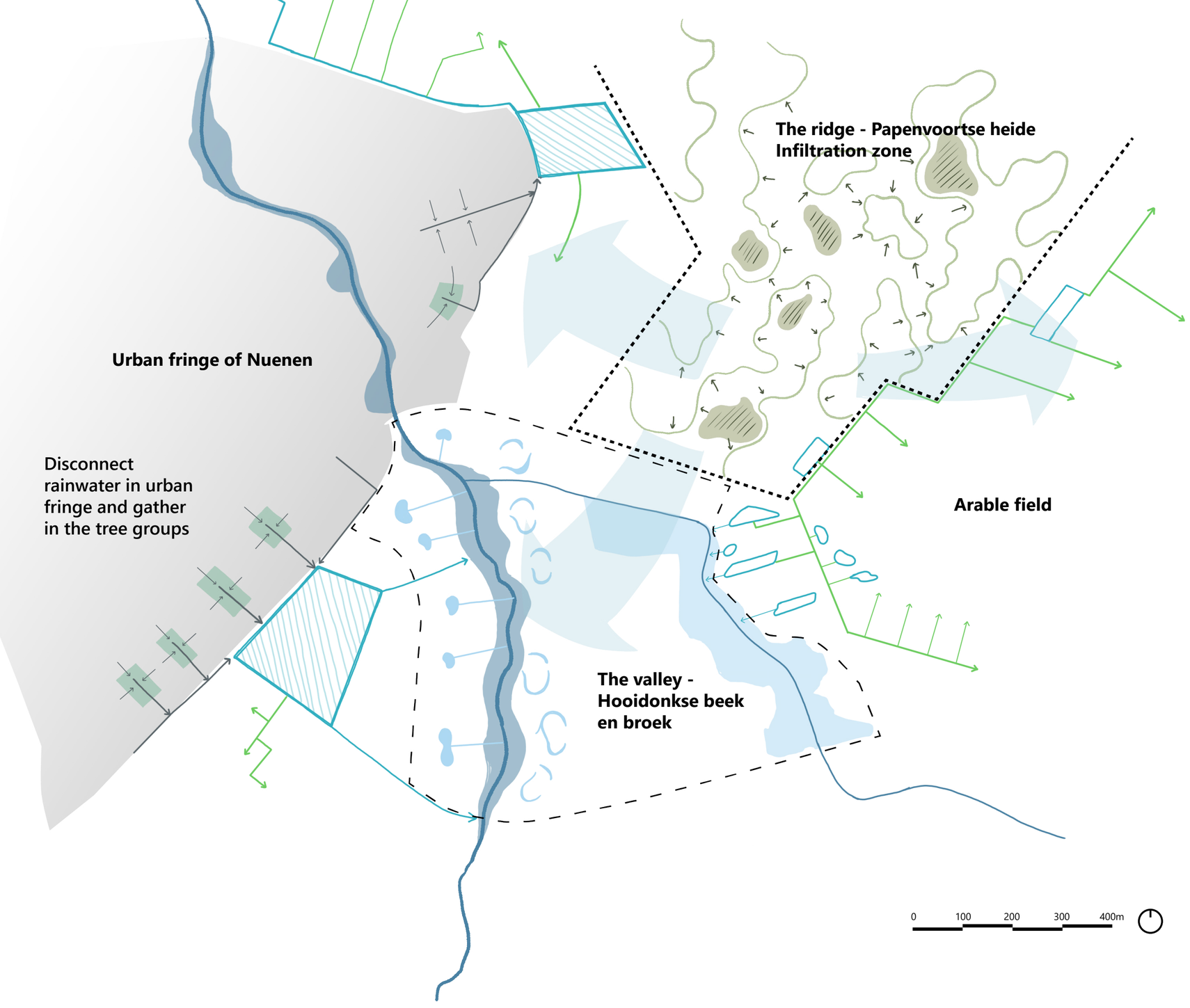
Recovery of heathland and fen in coniferous forest, with wooded banks and woodwalk

Reclaimed forest complex

Agro-forest lab and camping site in the coniferous forest

0 100 200 300 400m

1. *Forest resevoir Manege*
2. *RKSV sportspark living Nuenen*
3. *Forest campus Nuenen-East*
4. *General public cemetery*
5. *Beekwoonkamer Hooidonk*
6. *Hooidonksepark*
7. *Beekfortwoning Hooidonk*
8. *Visitor center Prinscheweide*
9. *Vacation houses*
10. *Nature education center Papenvoortseheide*
11. *Agroforest lab Papenvoortseheide*
12. *Camping center Papenvoortseheide*
13. *Forest resevoir*
14. *Urban farming center*



Drought adaptation system

Forest resevoir

Usual Flooding zone of stream
(level 1 - 15.5 NAP)

Inundation zone of broek
(level 1 - 15.0~15.5 NAP)

Pond along the stream

- Retaining in extreme rainfall events
(level 2 - 16.3 ~17.0 NAP)

- Recharge water in dry season

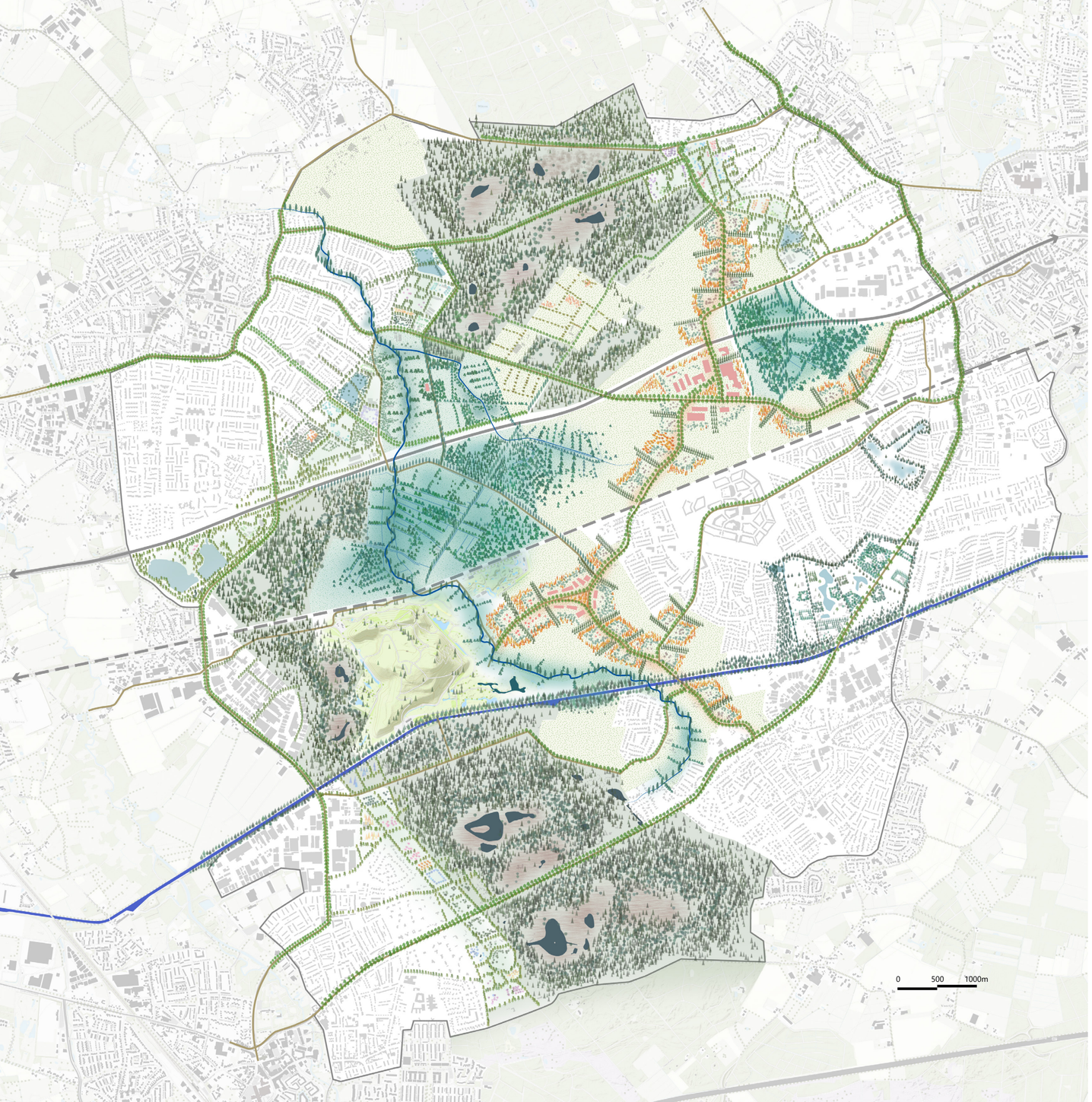
Forest resevoir on urban fringe

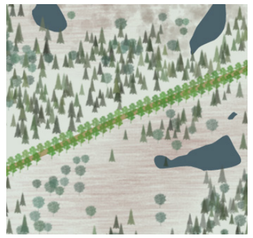
Water storage in arable field

Water charge for stream

Water charge for agricultural use

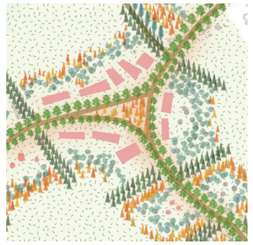
Case area - strategic plan





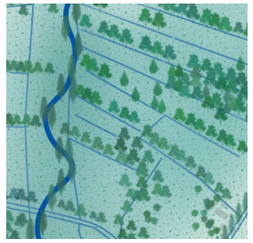
Reclaimed forest

Hydrological/ecological core zone



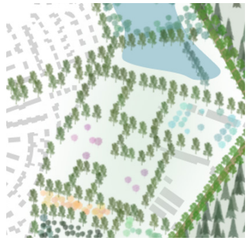
Arable field - New kampen forest

Housing
Agro/food-forest
New workplace
Water storage

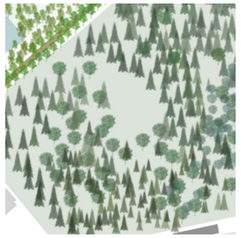


Stream-broek forest

Hydrological/ecological zore zone

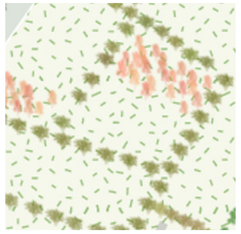


Fringe landscape - forest rooms



Reclaimed forest

Recreation/participation zone

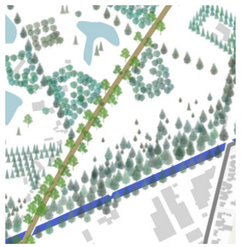


Arable field - Coulissen forest

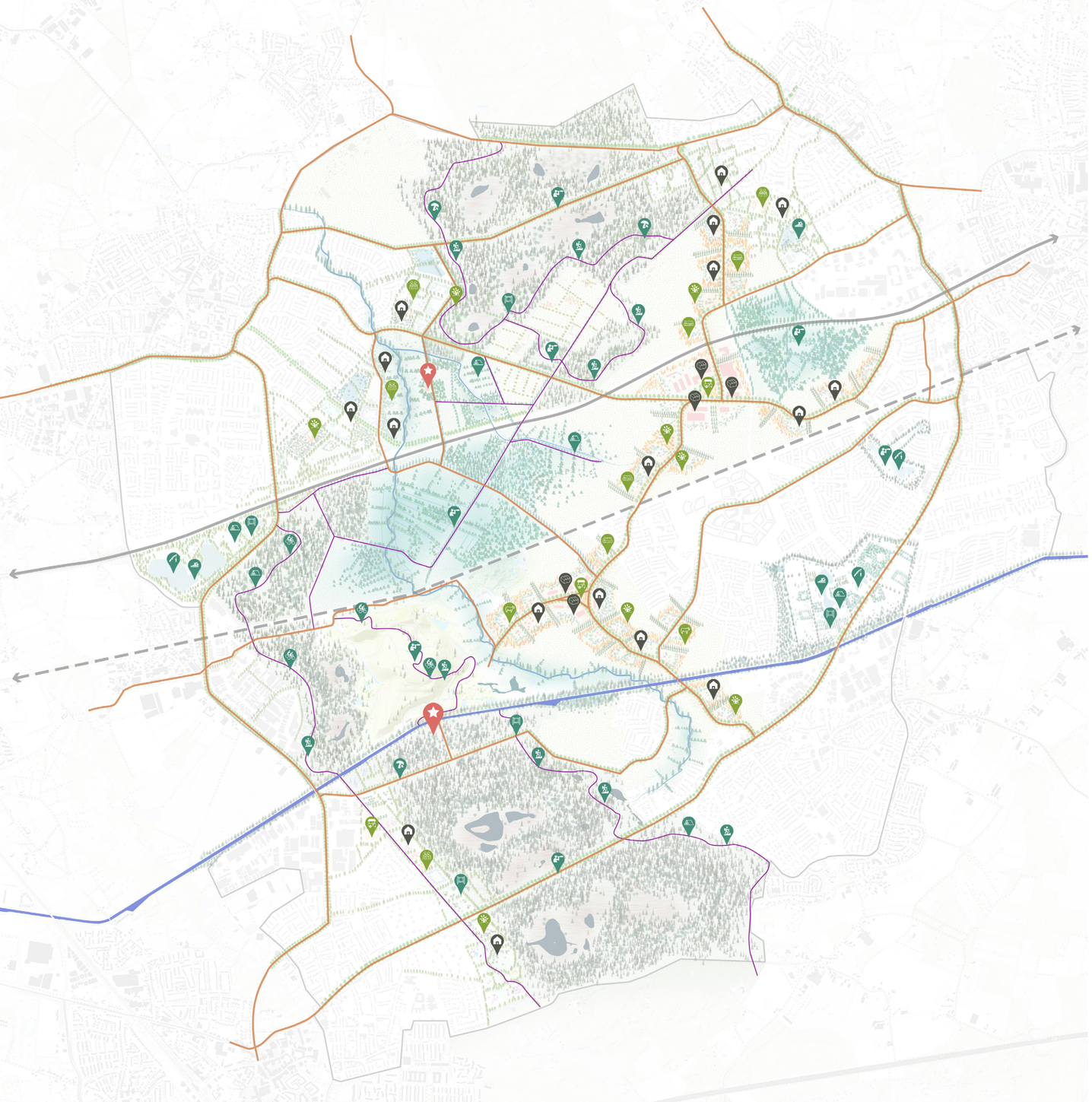
Alternative agriculture
Hedgerow landscape restoration
Water storage

Stream-broek forest

Recreation/participation zone
Housing



Forest theatre and canal forest



Case area - function and engagement

Main roads

Major Recreational Paths/Bikeways

New visitor center

Production and co-management in forest

Timber forest

Food forest

Allotment garden

Livestocking forest

Outdoor food market

Recreation in forest

Bird watching

Camping

Organic fishing

Hiking

Cycling

Mushroom picking

Forest playground

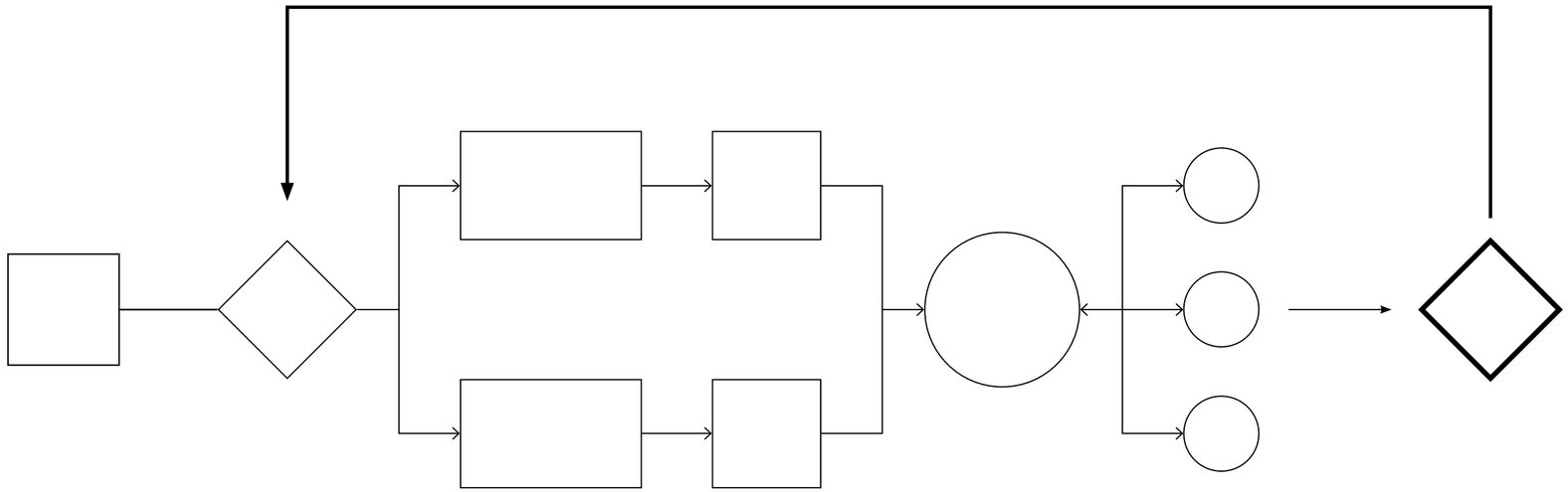
Swimming

Observation point

Living in forest

New collective housing

New workplace



Introduction Method Analysis Design **Discussion**

Reflection *- The two parallel perspective and new principles*

Spatial perspective

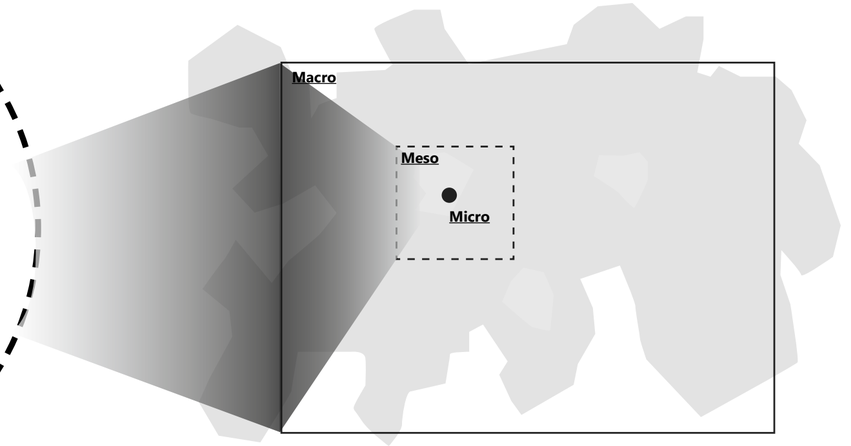
*1. Creating spatial separation/ thresholds through tree syntax when conflicts occur

*2. Temporal separation: step-by-step in the time process when conflicts occur

*3. Optimisation of hydrological conditions takes priority over forest-based enhancement of landscape identity

Forest based strategies

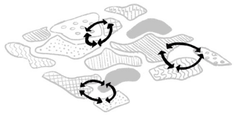
Bio-physiological perspective



Reflection on the forest approach - *Tree language through scales*

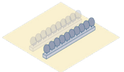
Diversity within the Territory

Narrative places in the territory



Coherence

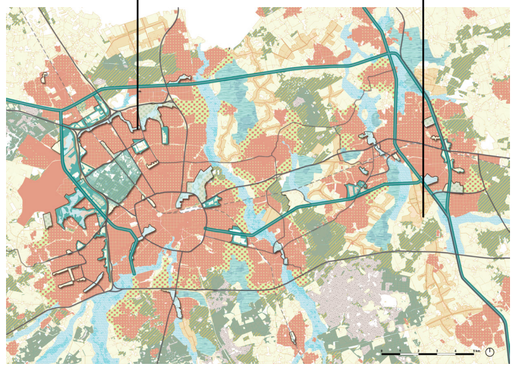
Pattern

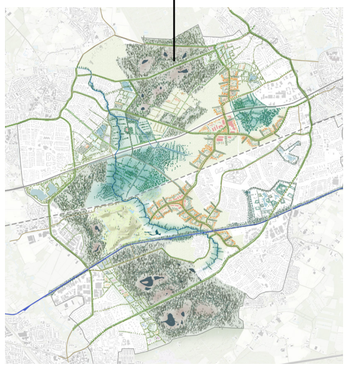


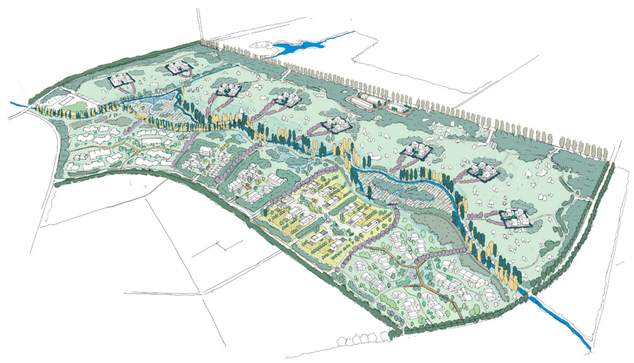
Syntax

Vocabulary

Urban area?







XL **L** **M** **S**

Transferability

Limitation:
Cultural-historical background

Limitation:
Richness of forest resoureces

Limitation:
Relevance of other objectives to spatiality
(the starting point)