Manual
of
Forest Design Strategies

For

Landscape Identity Enhancement
&
Drought Adaptation Improvement

within

Stedelijk Gebied Eindhoven

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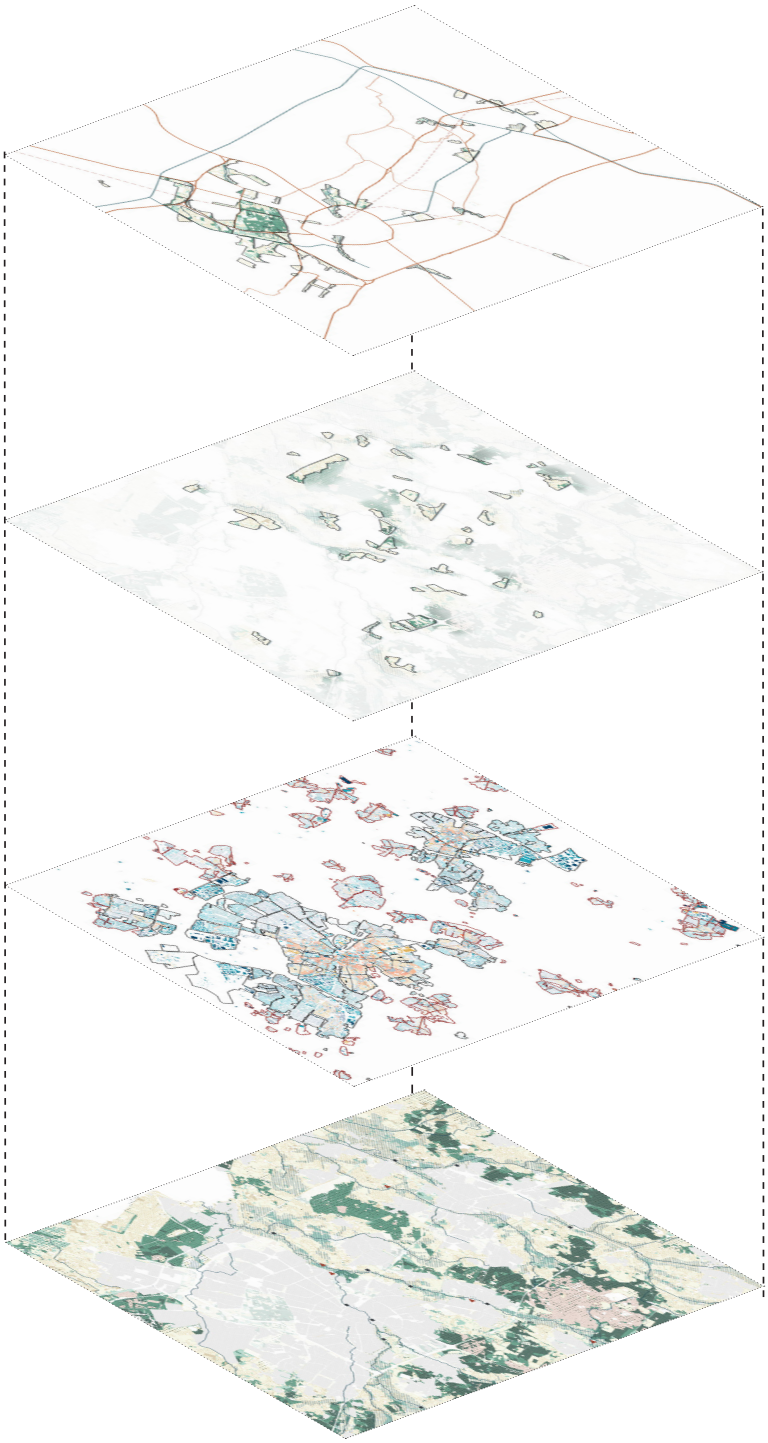

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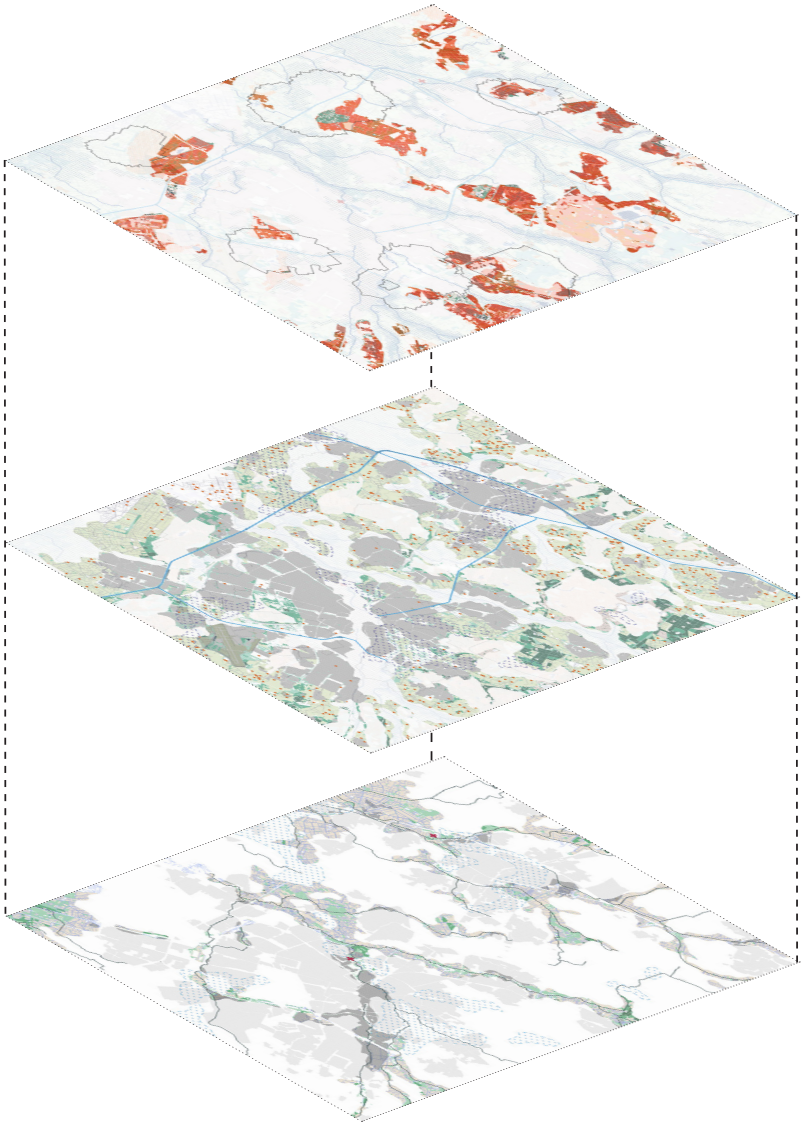


The Ridge

Too little infiltration and too much evaporation

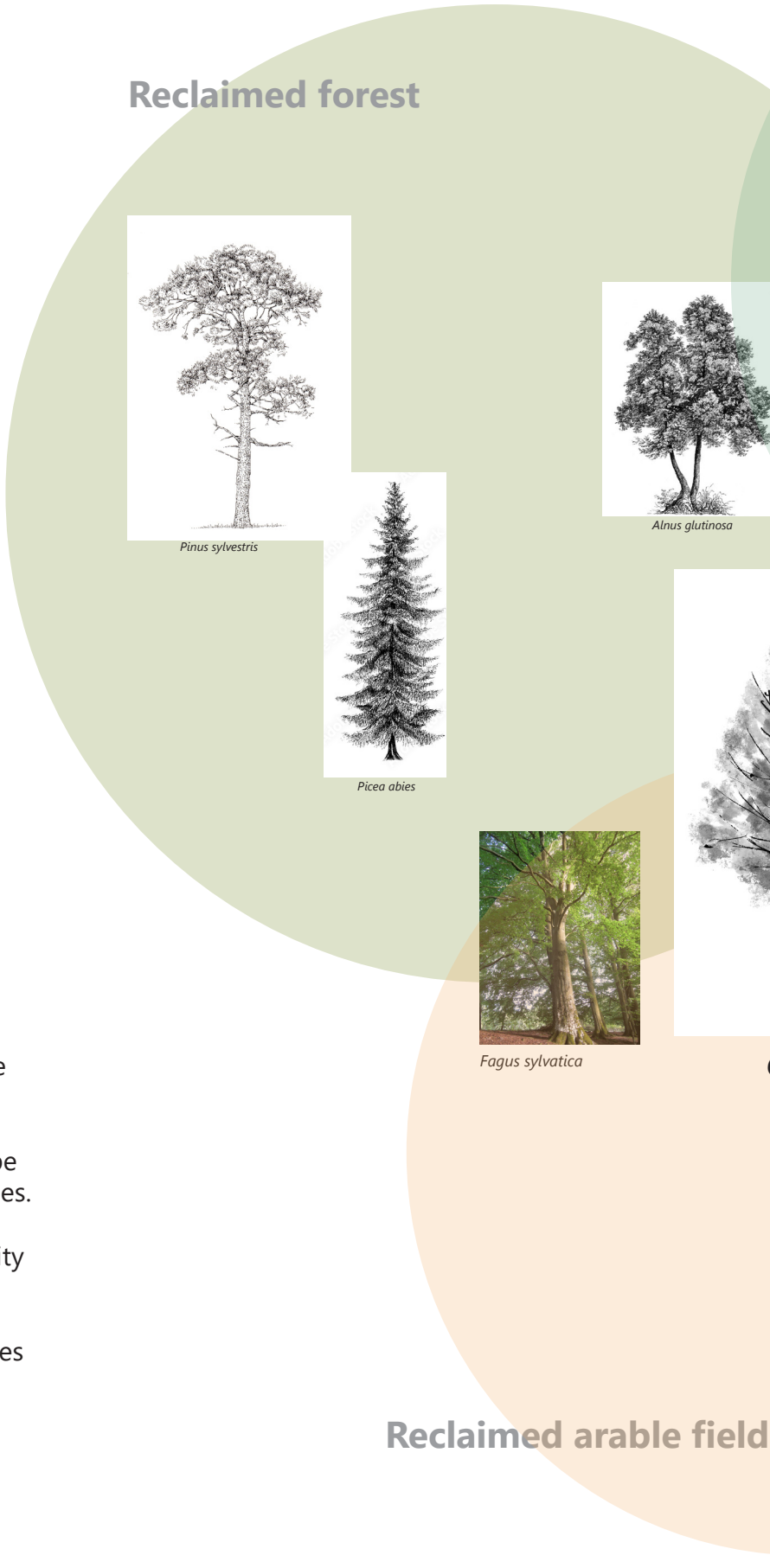
The Middleground

Too fast drainage and too much water use

The Valley

Too fast drainage and too little replenishment

The language of SGE forest



Species as vocabulary

Tree species are the smallest units that make up the SGE forest, or the 'vocabulary' of the tree language. Different tree species play an important role in the differences in landscape identity between different types of landscapes. The choice of specific tree species is particularly important in terms of the legibility of the landscape, especially at the level of historical continuity and spatial form. The ambiguity of the legibility of some landscapes is due to the wrong choice of tree species.

Streamvalley & Broek

Salix alba

Fraxinus excelsoir

Populus euramericana

Betula pendula

Carpinus betulus

Quercus robur

Quercus palustris

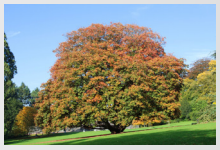
platanus hispanica

Ulmus hollandica

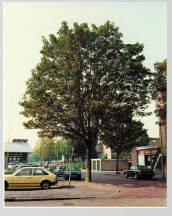
Tilia europaea

Tilia cordata

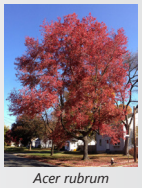
Robinia pseudoacacia



Acer pseudoplatanus



Acer platanoides



Acer rubrum

Fringe landscape

Urban patchwork

Spatial configuration as syntax of tree

The spatial configuration of trees, or syntax in the language of forest, is an aspect that directly affects the identity of a landscape, especially its spatial character; at the same time, different spatial configurations imply differences in the function of place use.

The syntax of trees in SGE can be classified into four categories, namely point, line, group and frame. Since the spatial configuration of trees varies with scale, the classification here is done at a resolution of 100 m x 100 m.

Point: Trees as points mark the space below the tree and emphasise the limited space around the tree, often identified as landmarks of some kind.

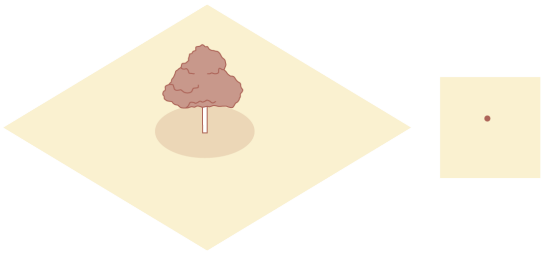
Line: trees as lines mark the space below them and divide the space on either side of the line. tree lines can extend indefinitely in space and form boundaries/visual guide lines/barriers/.... Tree lines are often highly recognisable and there is a rich variety of them in the SGE landscape.

Group: Trees as groups mark the space below them and can be recognised externally as a whole. groups thus have the property of aggregating space.

Frame: Trees as frames are an infill of 100m x 100m squares in various forms and are often not externally recognisable as a whole. Therefore, they mark the space under their canopy and distinguish between the space inside and outside the frame. Frames can be enclosed by lines or volumes and can contain other tree syntax. The arrangement and repetition of frames in space can create large forests. Frames are the most important tree syntax in SGE landscapes, which have a rich tradition of reclamation.

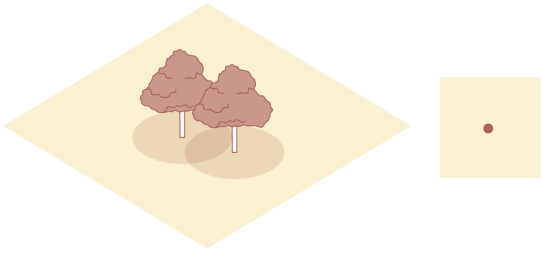
1. Point

1.1 Solitary



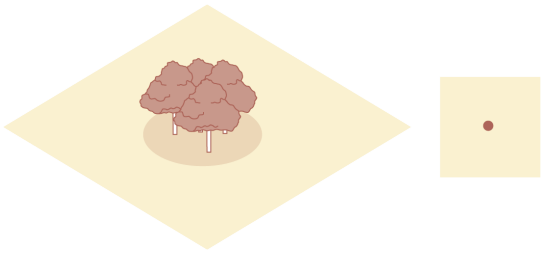
Spatial characteristics: Single tree, labelling/highlighting space under the tree.
Applications: As a landmark/memorial tree

1.2 Threshhold



Spatial characteristics: Two identical trees distinguish the space between inside and outside.
Applications: As an entrance to a neighbourhood/yard/farm

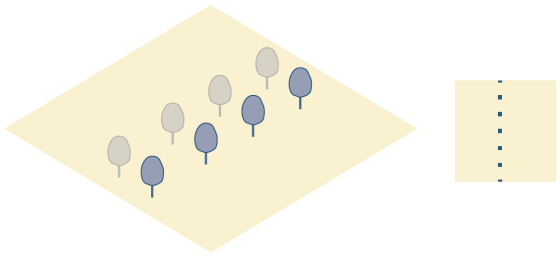
1.3 Pavilion



Spatial characteristics: A few close-growing trees mark the space beneath them
Applications: As landmark/memorial tree

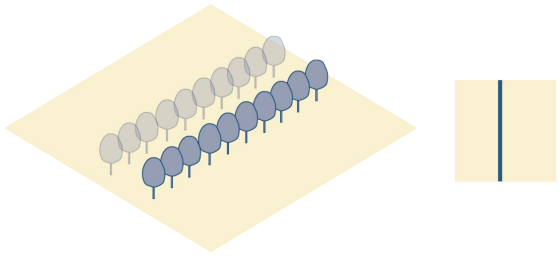
2. Line

2.1 Open row



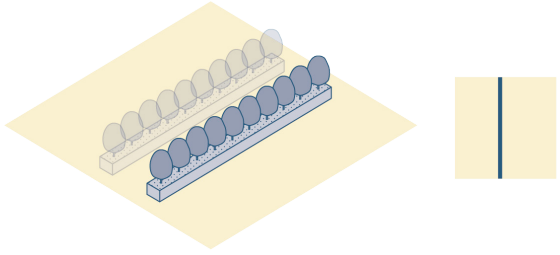
Spatial characteristics: Trees in rows, widely spaced, can be single or double rows, with less sense of guiding direction.High transparency
Applications: Presented as street trees in cities; appearing along roads in cultural landscapes.

2.2 Colonade



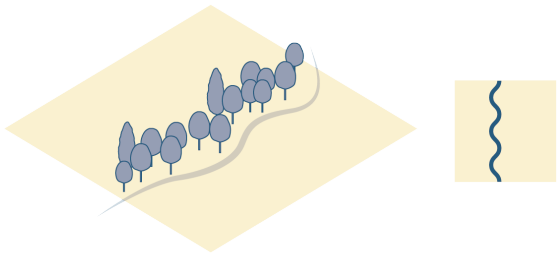
Spatial characteristics: Trees more closely spaced in rows that primarily define the space on either side, either single or double rows. Relatively transparent thresholds.
Applications: Presented as street trees in cities; appearing along roads in cultural landscapes.

2.3 Tree wall



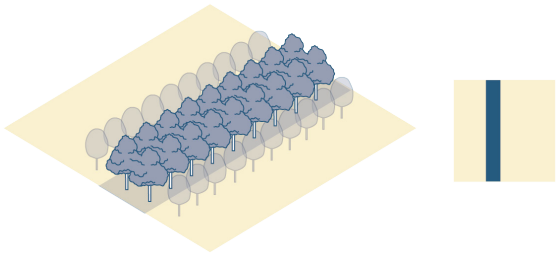
Spatial characteristics: The trees are more closely spaced in rows, with shrubs growing underneath them blocking the view and strongly differentiating the space between the two sides
Applications: Both sides of the highway; some residential boundaries.

2.4 Curtain



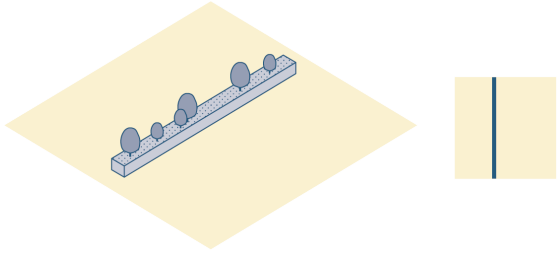
Spatial characteristics: Trees in rows, widely spaced, can be single or double rows, with less sense of guiding direction
Applications: Presented as street trees in cities; appearing along roads in cultural landscapes.

2.5 Arcade



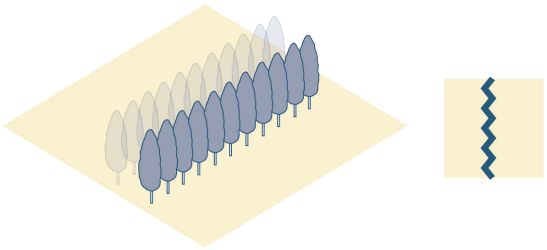
Spatial characteristics: Trees in rows, widely spaced, can be single or double rows, with less sense of guiding direction
Applications: Presented as street trees in cities; appearing along roads in cultural landscapes.

2.6 Hedge wall



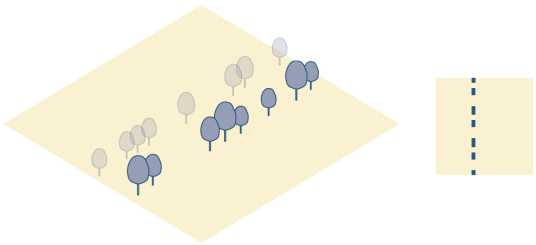
Spatial characteristics: Trees in rows, widely spaced, can be single or double rows, with less sense of guiding direction
Applications: Presented as street trees in cities; appearing along roads in cultural landscapes.

2.7 Screen



Spatial characteristics: Trees in rows, widely spaced, can be single or double rows, with less sense of guiding direction
Applications: Presented as street trees in cities; appearing along roads in cultural landscapes.

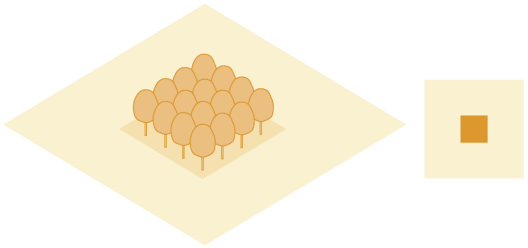
2.8 Dash line



Spatial characteristics: Trees in rows, widely spaced, can be single or double rows, with less sense of guiding direction
Applications: Presented as street trees in cities; appearing along roads in cultural landscapes.

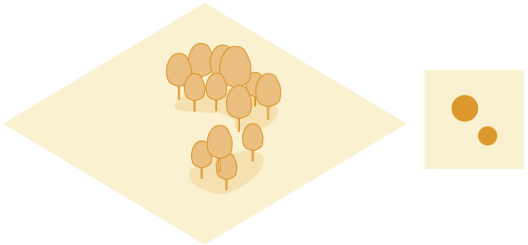
3. Group

3.1 Tree nursary



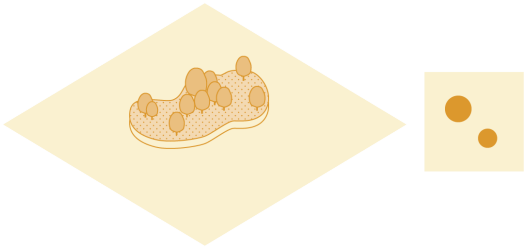
Spatial characteristics: The matrix of the same tree species is repeated with interconnected canopies and open views under the canopy. The space under the canopy is defined and the surrounding space is bounded by it.
Applications: Nurseries in cultural landscapes, tree line squares or neighbourhood event spaces in cities

3.2 Loose group



Spatial characteristics: The canopies of a variety of trees are connected and organically distributed, creating a continuous space under the canopy.
Applications: Common in parks and also in green spaces in urban patches as stemps

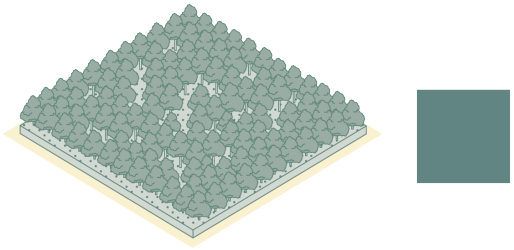
3.3 Clump



Spatial characteristics: Successive bushes limit the view, with a few trees dotted compactly in between. As an inaccessible whole.
Applications: Common background element in parks; common in stream valleys and broek landscapes, accompanied by watercourses.

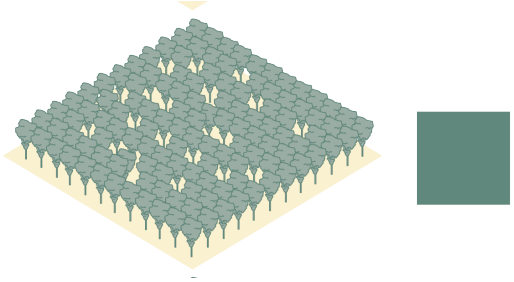
4. Frame

4.1 Multilayered dense volumn



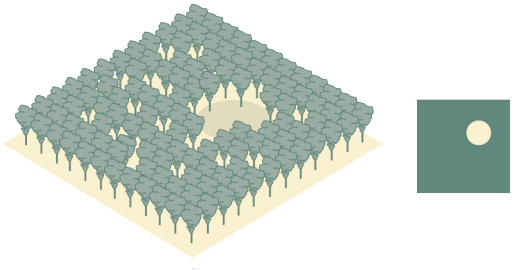
Spatial characteristics: Dense, continuous trees with intertwined canopies and undergrowth below make it closed and difficult to access.
Applications: Remnant woodland in urban areas; wet woodland in stream valleys and brook landscapes; few deciduous woodlands in reclaimed forests

4.2 High-ceiling dense volumn



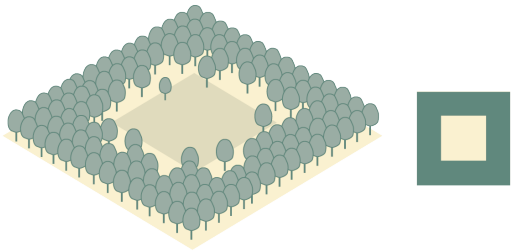
Spatial characteristics: Consists of continuous, tall, light-permeable trees (usually conifers) with limited undergrowth which opens up the space beneath the canopy.
Applications: Fir or pine forest on sand in The reclaimed forest complex

4.3 Clearing of dense volumn



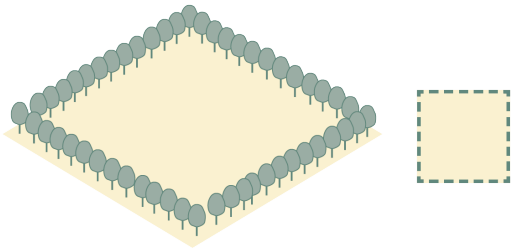
Spatial characteristics: A forest clearing in a dense framework of trees.
Applications: Remnants of heathland or bog in the reclaimed forest complex, or building sites in the forest, are also often present in the fringe landscape.

4.4 Room of dense volumn



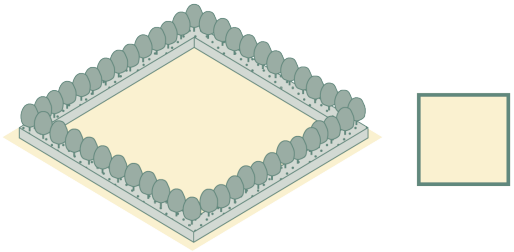
Spatial characteristics: The volume of trees of a certain thickness creates thresholds and internal spaces with a strong sense of enclosure.
Applications: Often found in fringe landscapes with a variety of internal functions

4.5 Transparent room



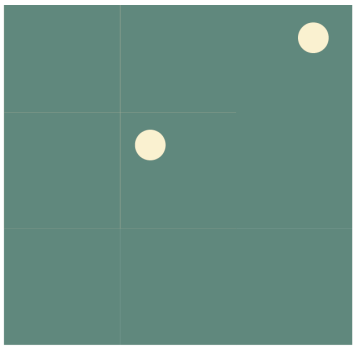
Spatial characteristics: A room enclosed by a single row of trees with a transparent barrier that divides and connects the inner and outer space.
Applications: In urban areas as communal space in residential areas; in cultural landscapes as traces of small reclaimed areas, this framework often marks the internal communal functions (e.g. community gardens and sports fields).

4.6 Closed room with tree wall

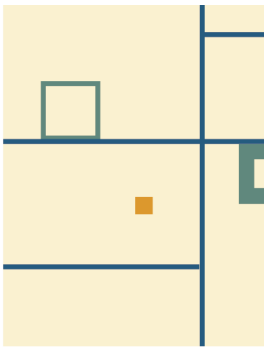


Spatial characteristics: A room enclosed by a single row of trees, with a continuous wall of shrubs underneath, dividing the inner and outer space.
Applications: As traces of small clearings in cultural landscapes, such enclosed frames often mark private territories or low-publicity functions (e.g., agricultural enterprises, warehouses, horse-training grounds, etc.), as do some cemeteries

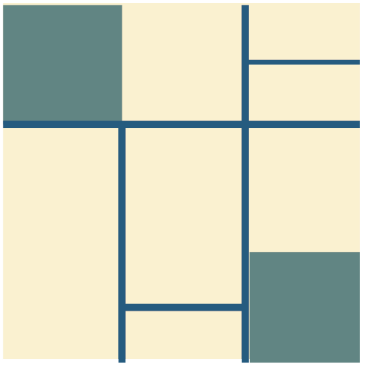
Combination of syntax as SGE forest pattern



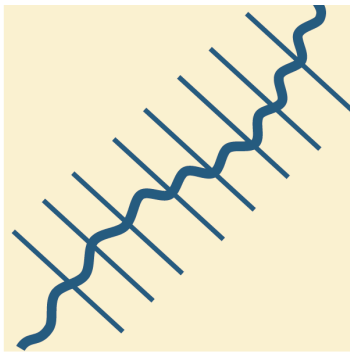
Forest pattern of the reclaimed forest



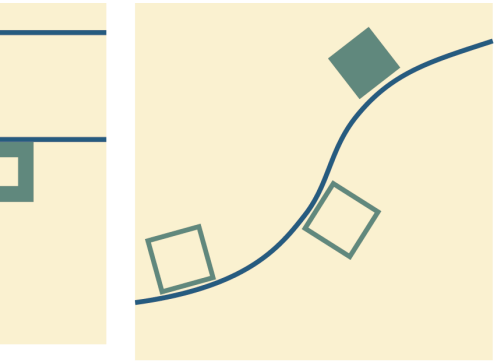
Forest pat



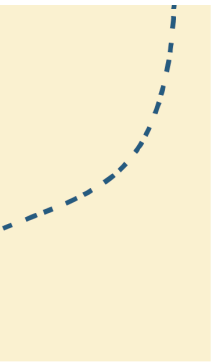
The combination of tree syntax forms forest patterns, which define and describe the SGE landscape from a forest perspective. The legibility of landscape identity is embedded in specific forest patterns, which form a holistic image of the landscape on a larger scale and reveal, to a considerable extent, the spatial patterns of social activities and management.Forest patterns are the starting point and the basis for the enhancement of landscape identity through forestry strategies, whether it is the design adaptation of existing forests or the planting of new forests.



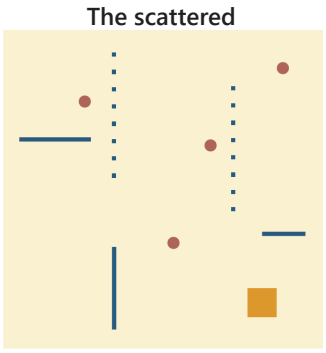
Forest patterns of Streamvalley and broel



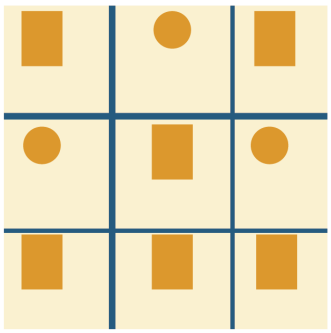
ttern of reclained arable field



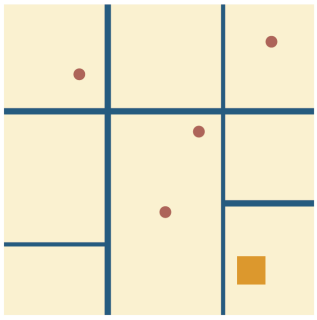
k landscape



The scattered

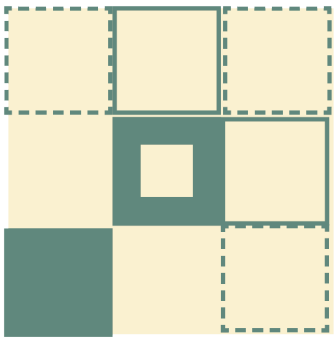


The stemps



The raster

Forest patterns of different urban patches

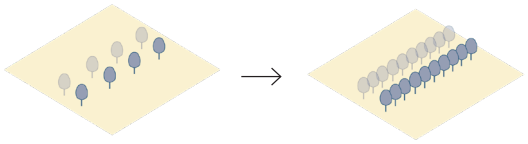


Forest pattern of the fringe landscape

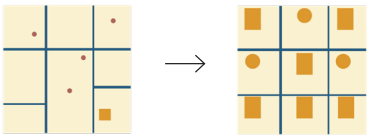
Design principles for Enhancing landscape identity

Legibility and imageability

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



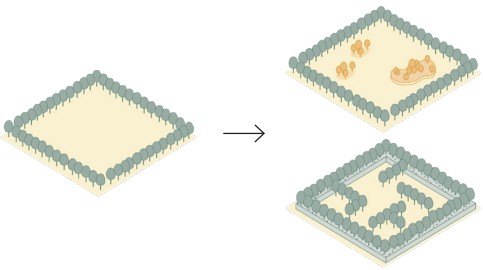
Modify/introduce tree syntax



Forest pattern transformation

Complexity and diversity

based on introducing/inventing tree syntax



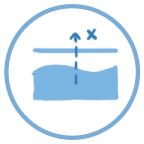
Invent new tree syntax

Spatial Coherence and Narrativity

Multi-functionality

Engagement in the time process

Accessibility



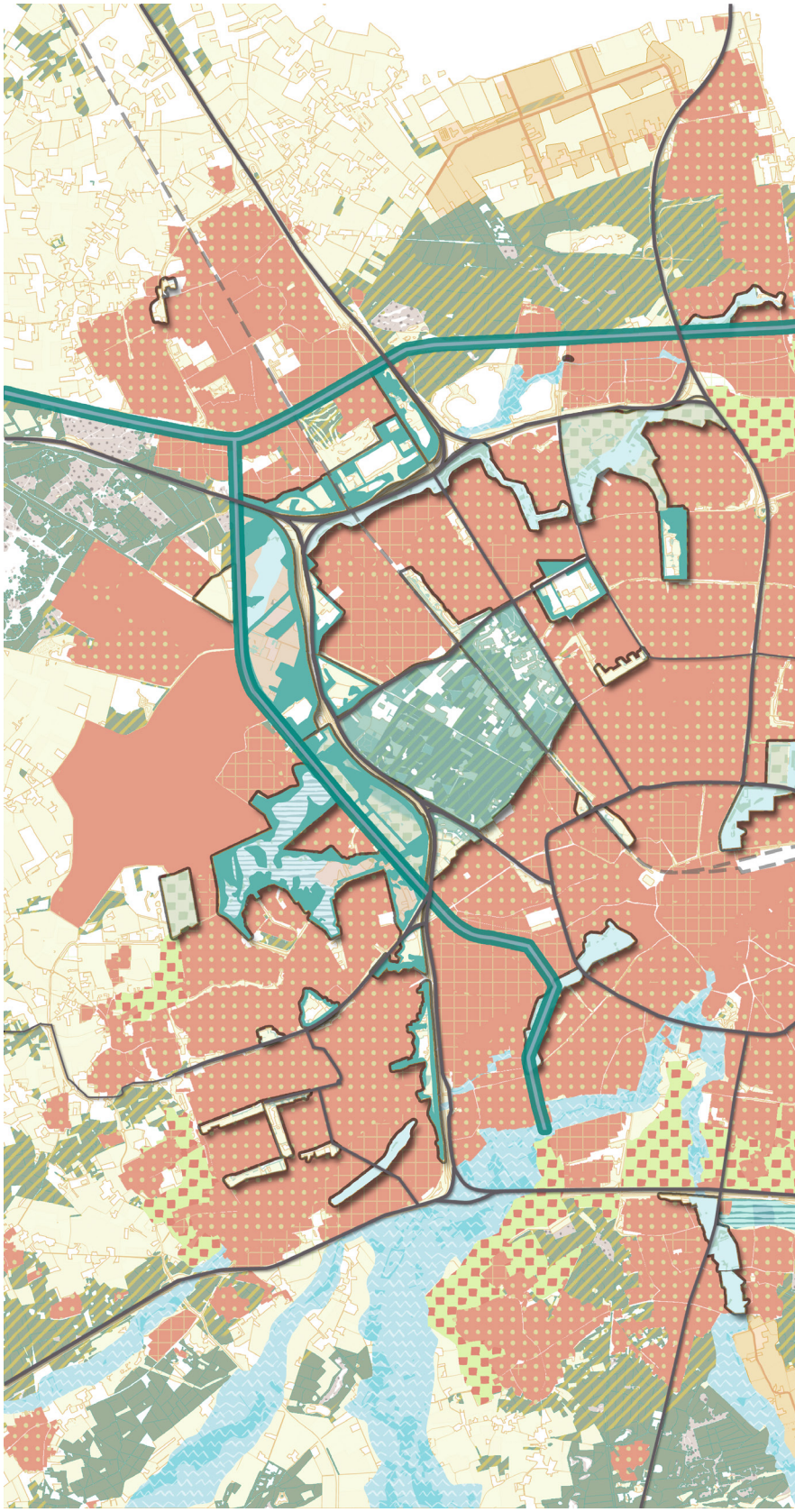
Minimize groundwater use

Retaining water

Storing water as alternative source

Replenishment of groundwater

Design strategies and regional vision for landscape identity enhancement



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

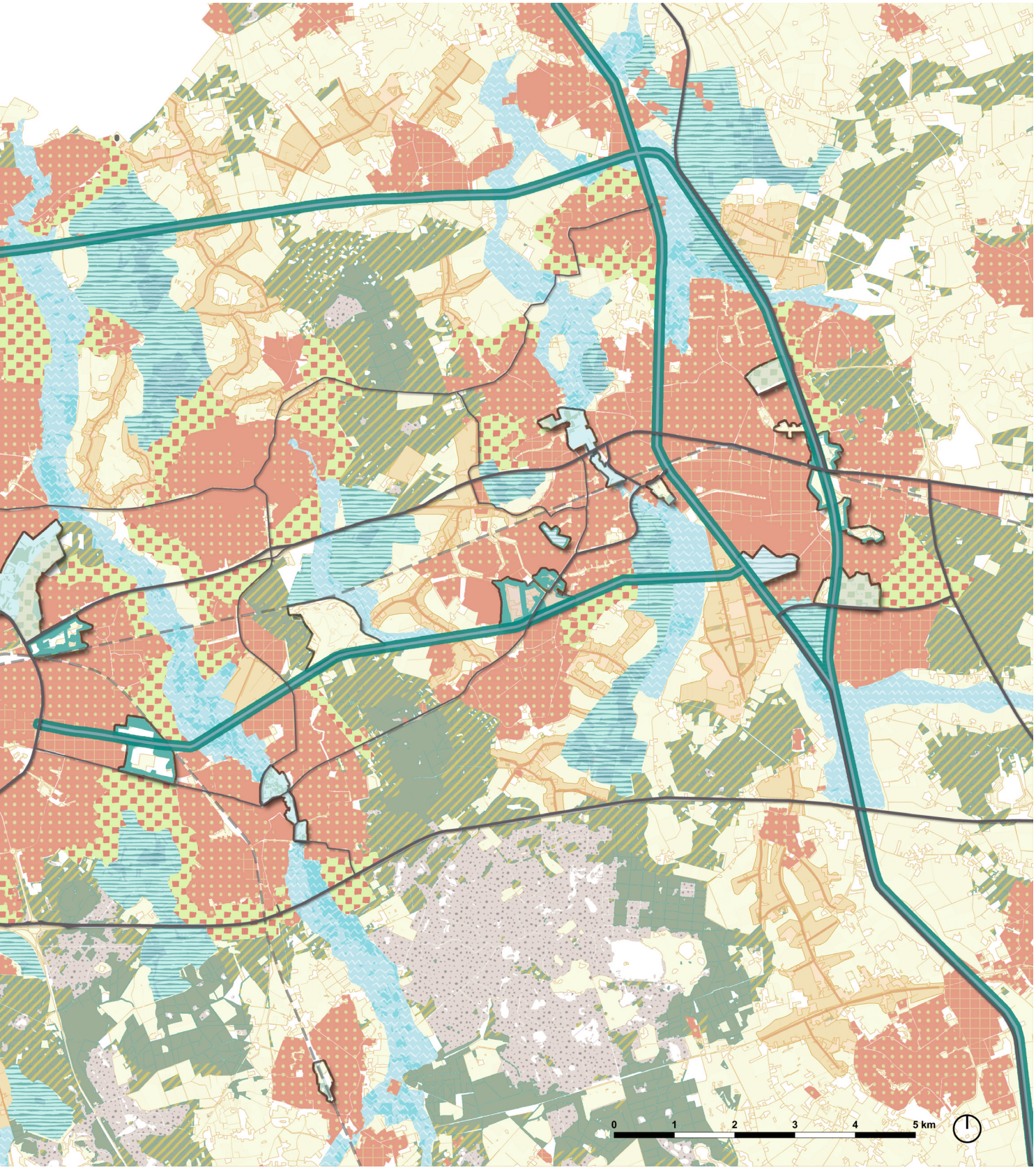
The fringe landscapes as transition zone

The void landscape

The canal as corridor connecting voids

A stream fragment

Various theatre voids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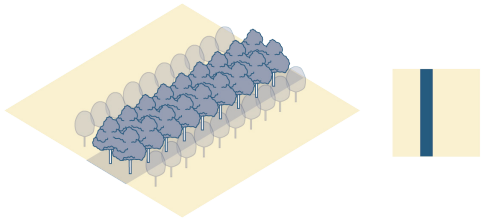
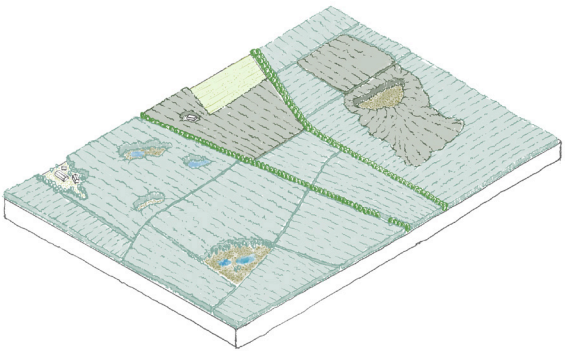
1
2
3
4
5 km

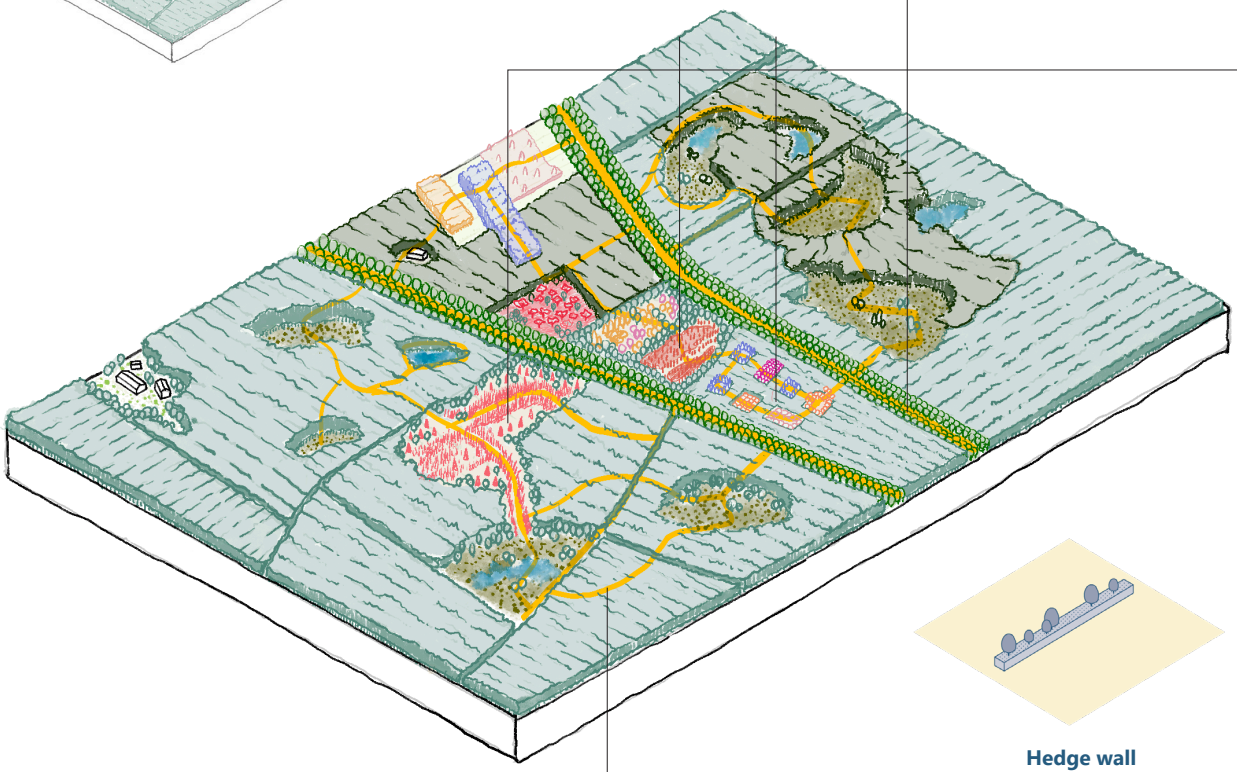
Strategies for the reclaimed forest complex

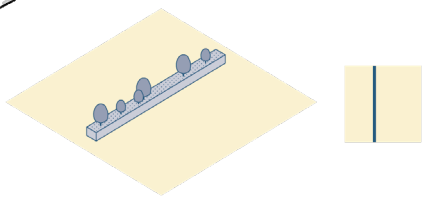


Arcade

The new Forest Boulevard as a carrying structure for recreation,and it enhances people's ability to navigate in the forest (legibility)

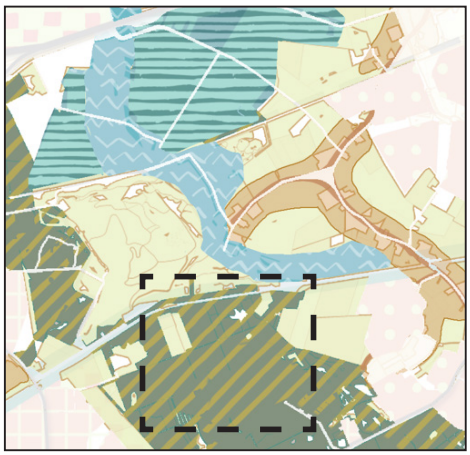


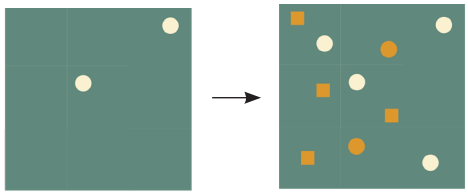




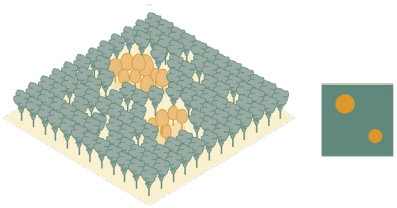
Hedge wall

The new route for forest experiencing



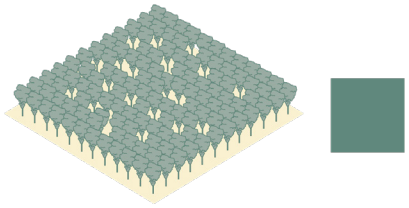


Transformation of forest pattern

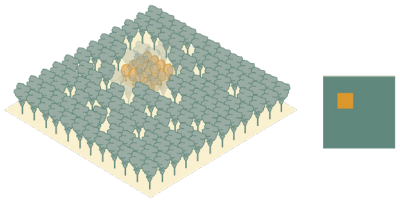


New communal space for resting and meeting

Planting - succession with limited maintenance



High-ceiling dense volumn

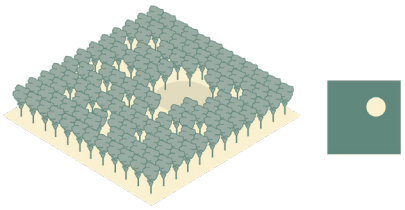


Foodforest
Natural-education

Planting - Continuous Maintenance

New space in the dense forest

Introducing diverse tree groups in high-ceilinged dense volumes, these forested spaces carry various functions such as socialising, resting, nature education, food forests, etc. They also imply different modes of management. They also imply different management modes.

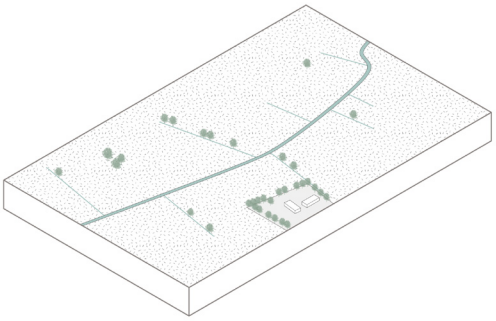


Heathland and bogs recovery
Natural-education

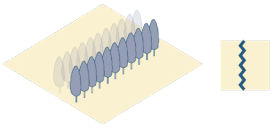
Felling - closed succession

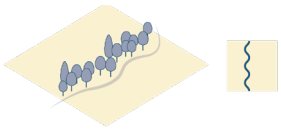
Fig.63 **Diverse experience moving through the dense forest**

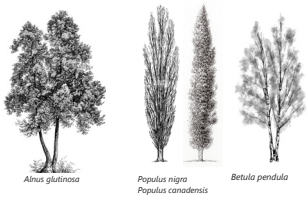
Strategies for the streamvalley



Enhance the landscape character of the stream by introducing a tree screen or tree curtain along the water course. Alder, black poplar and birch are long, lean, tall and softly textured, making them suitable species

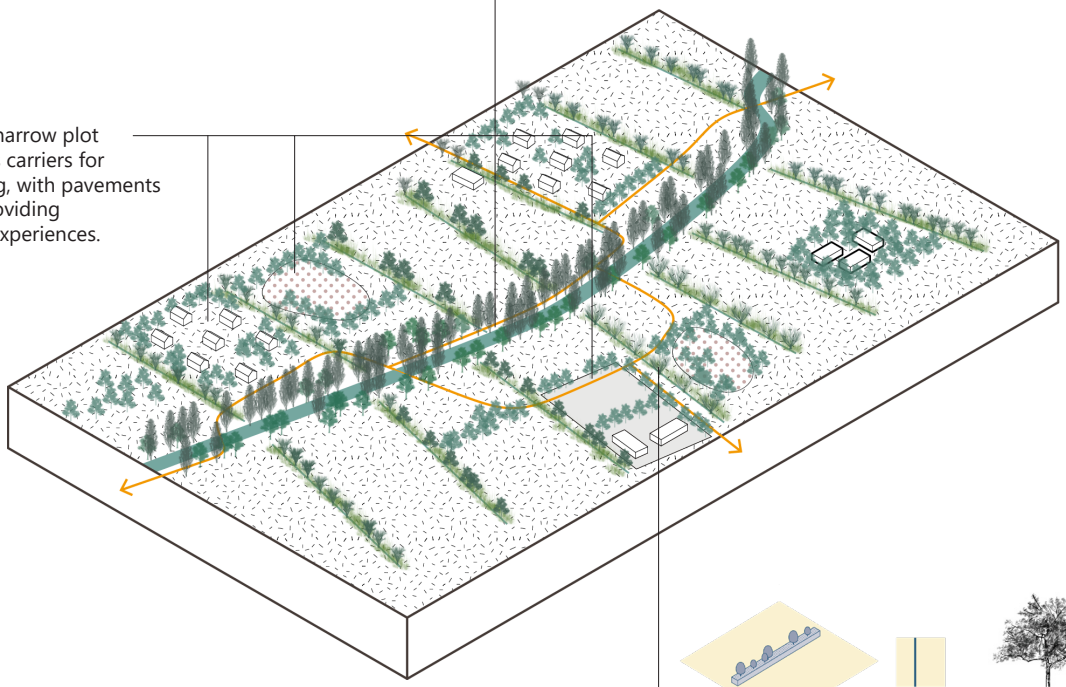


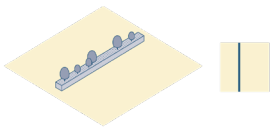


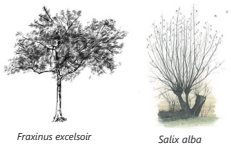


(Grey)Alder, black poplar and paper birch are long, lean, tall and softly textured, making them suitable species.

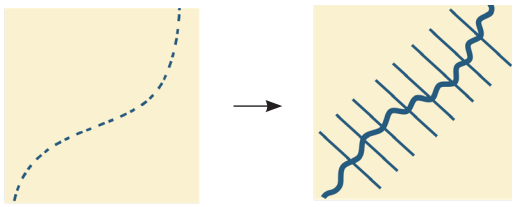
Formed/restored narrow plot structures serve as carriers for stream valley living, with pavements and bike paths providing connections and experiences.





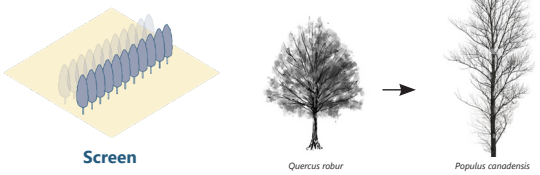


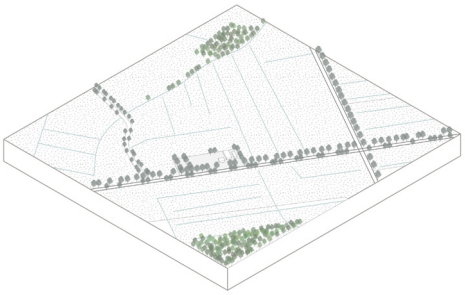
The ribbon structure perpendicular to the watercourse is emphasised/restored by a hedge wall of ash or willow and shrubs

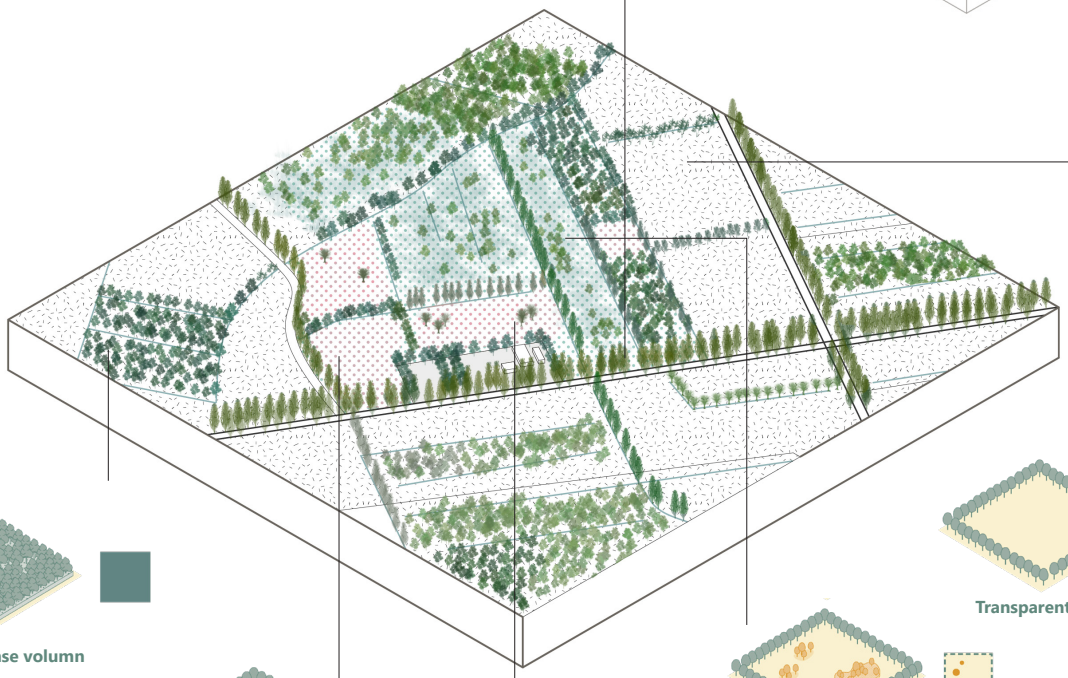


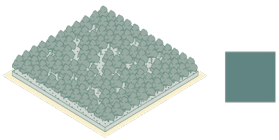
Transformation of forest pattern

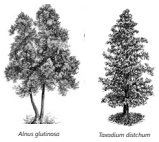
Emphasis on roads and watercourses as linear structures in the stream valley, poplars form screen as syntax applicable to wet conditions and historical continuity, oaks need to be replaced in some places.

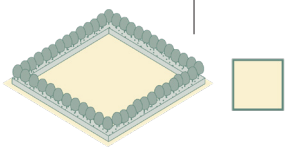


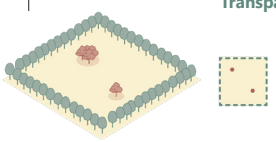


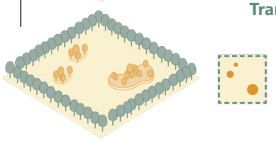


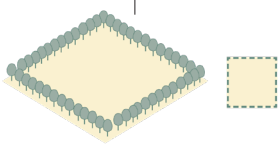




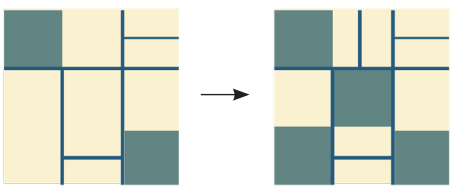






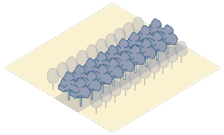


Broek's notable room structures are retained or restored, with dense floodable woodland alternating with transparent or enclosed rooms, staggered as natural nurturing areas and recreational spaces.



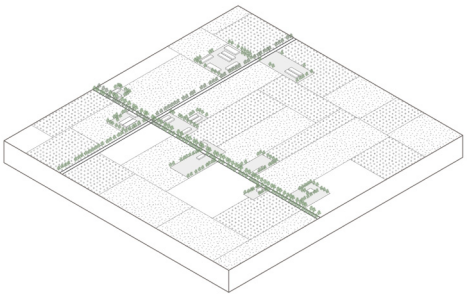
Transformation of forest pattern

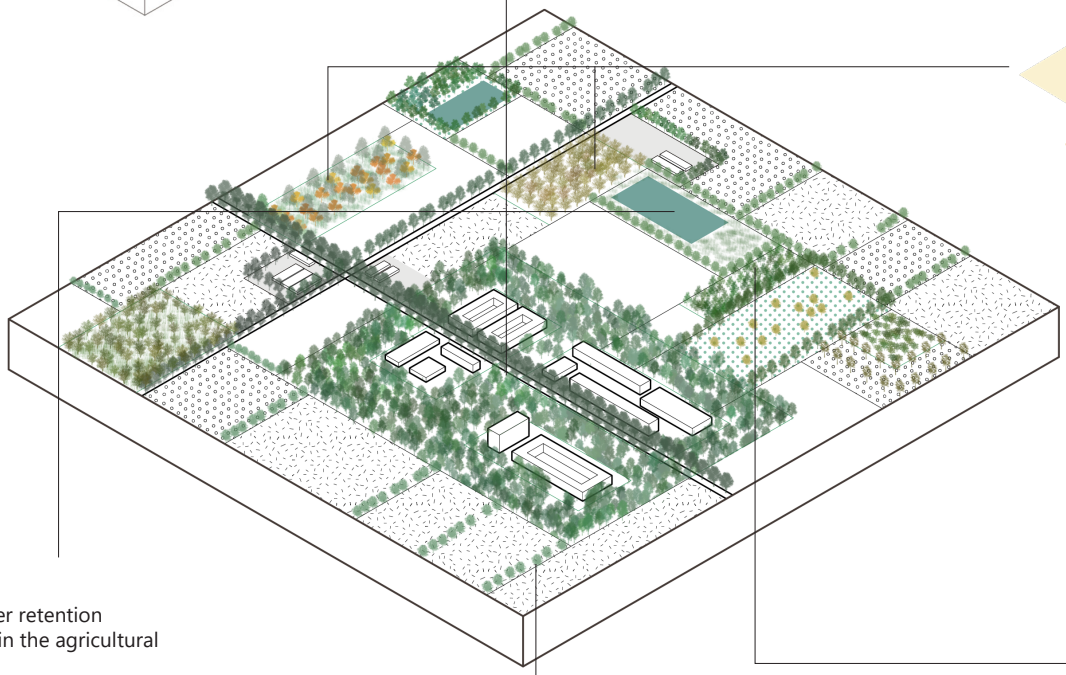
Strategies for the Reclaimed arable field(jonge ontginning)



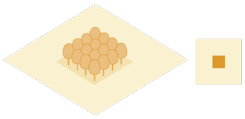
Quercus robur

Emphasis on roads and waterc
the reclaimded arable filed by
boulevard of oak or lime trees





Water retention
within the agricultural
land



Tree nursary

Loose

Parrotia persica

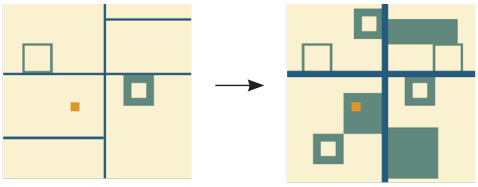
Castenea sativa

Malus domestica

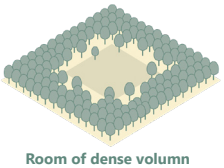
Colourful, food-produc
variety of groups, distri
room as foodforest or a
creating a seasonal lan

Fagus sylvatica

Trees suitable for tim
tree nurseries and se
further form rich woo

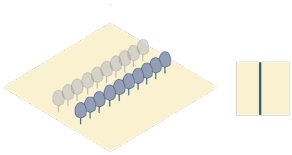


Transformation of forest pattern



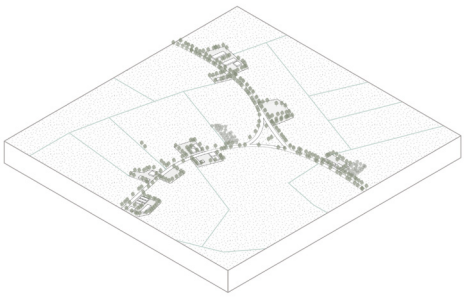
Room of dense volumn

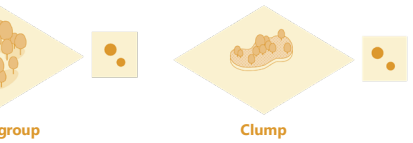
New housing or work
forest living rooms m
birch trees.



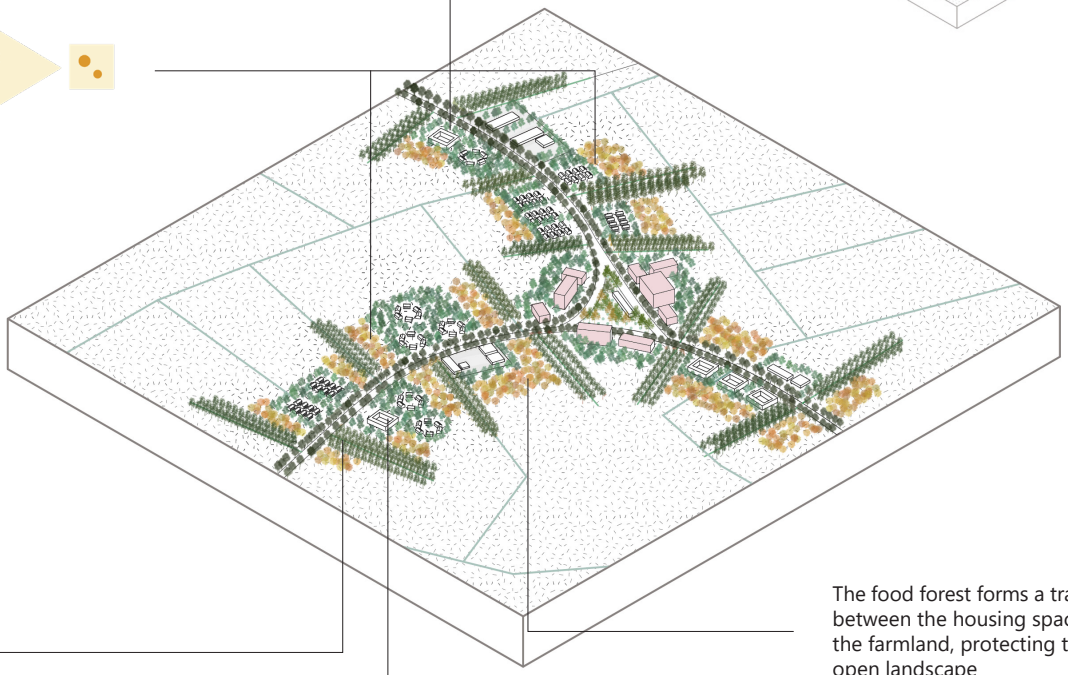
Tilia cordata

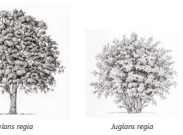
courses as linear structures in
introducing and cultivating
s.





group Clump





Juglans regia

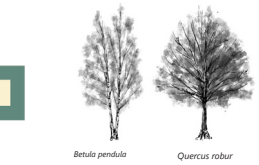
Ilex aquifolium *Cornus mas*

ing fruit trees form a
buted around the living
as alternative agriculture,
dscape.

The food forest forms a transition between the housing space and the farmland, protecting the open landscape

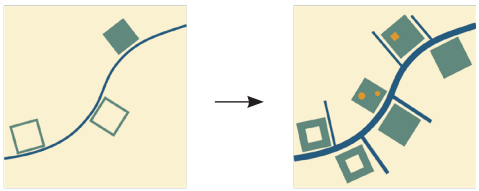
Fagus sylvatica

ber production form
rve as nurse trees that
odlands.



Betula pendula *Quercus robur*

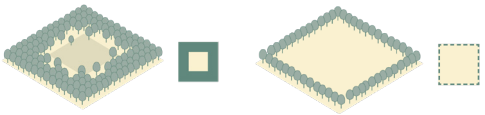
xplaces are embedded in
ade up mainly of oak or

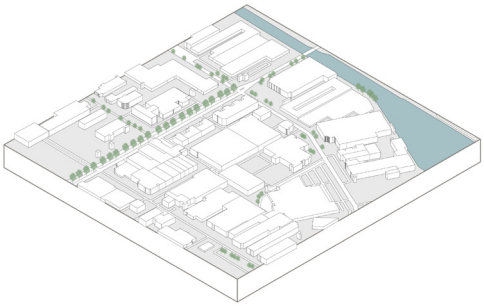


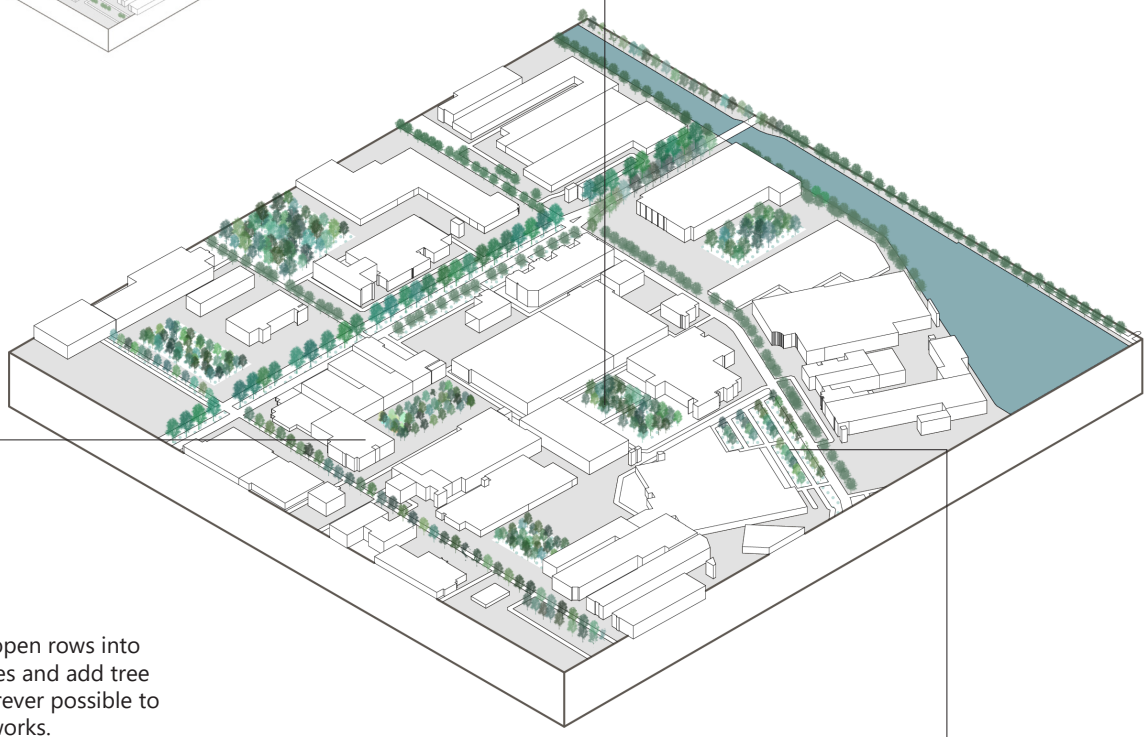
Transformation of forest pattern

Strategies for Urban patches as scattered forest

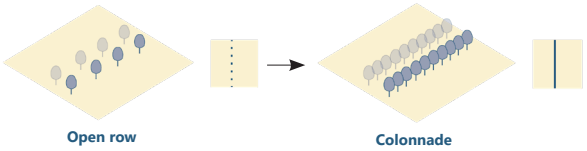
In industrial areas, the use of frames to replace vacant or abandoned industrial land serves as ecological restoration, cooling and air purification, and as a basis for further forestation.



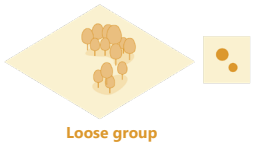


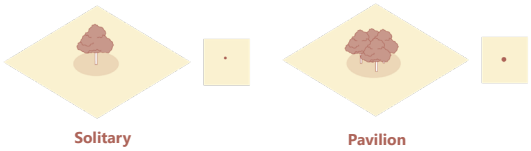


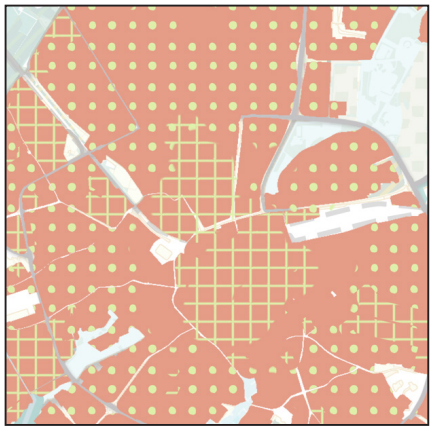
Improve open rows into colonnades and add tree lines wherever possible to form networks.

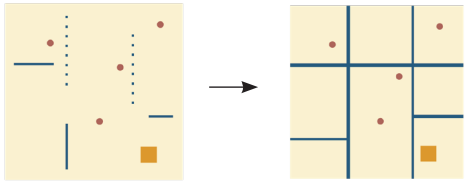


Add points and small groups wherever possible to hard surfaces that can be transformed, especially in dense central urban areas.





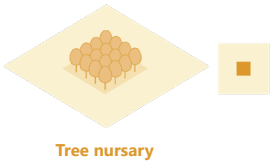


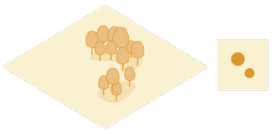


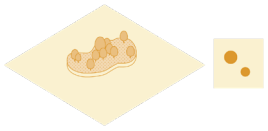
Transformation of forest pattern

Strategies for Urban patches as raster forest

The newly formed tree groups act as communal woodland, hosting a variety of recreational and productive functions, such as children's play woodland, community gardens or urban farming, encouraging deeper participation by residents.

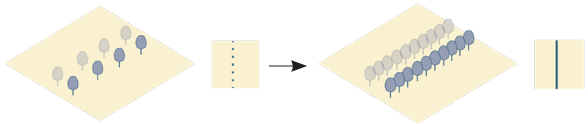


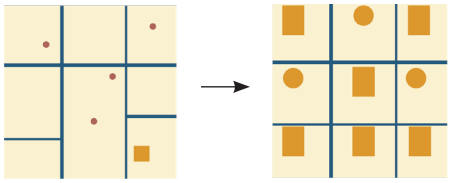




Improve open rows into colonnades and add tree lines wherever possible to form networks.

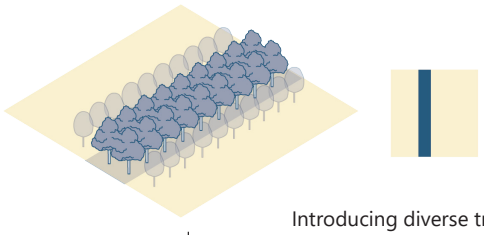
Make space for new tree groups by demolishing older houses to create a stamp-like layout.

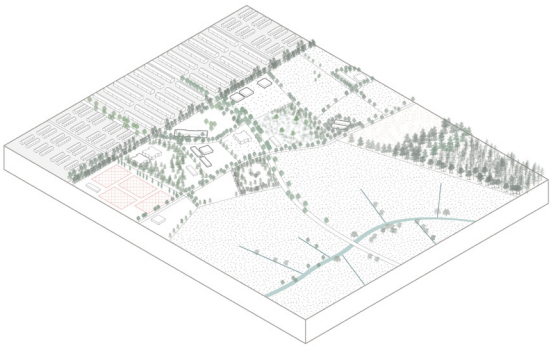




Transformation of forest pattern

Strategies for the Fringe landscape

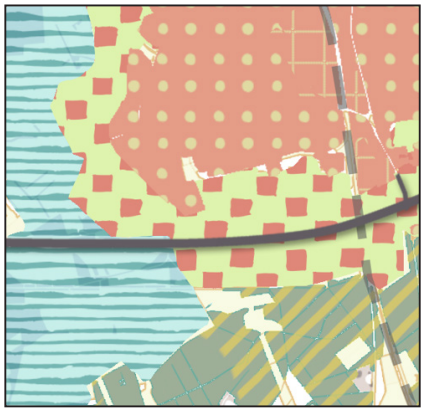


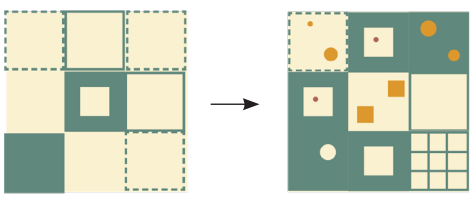


Introducing diverse tree groups in high-ceilinged dense volumes, these forested spaces carry various functions such as socialising, resting, nature education, food forests, etc. They also imply different modes of management. They also imply different management modes.

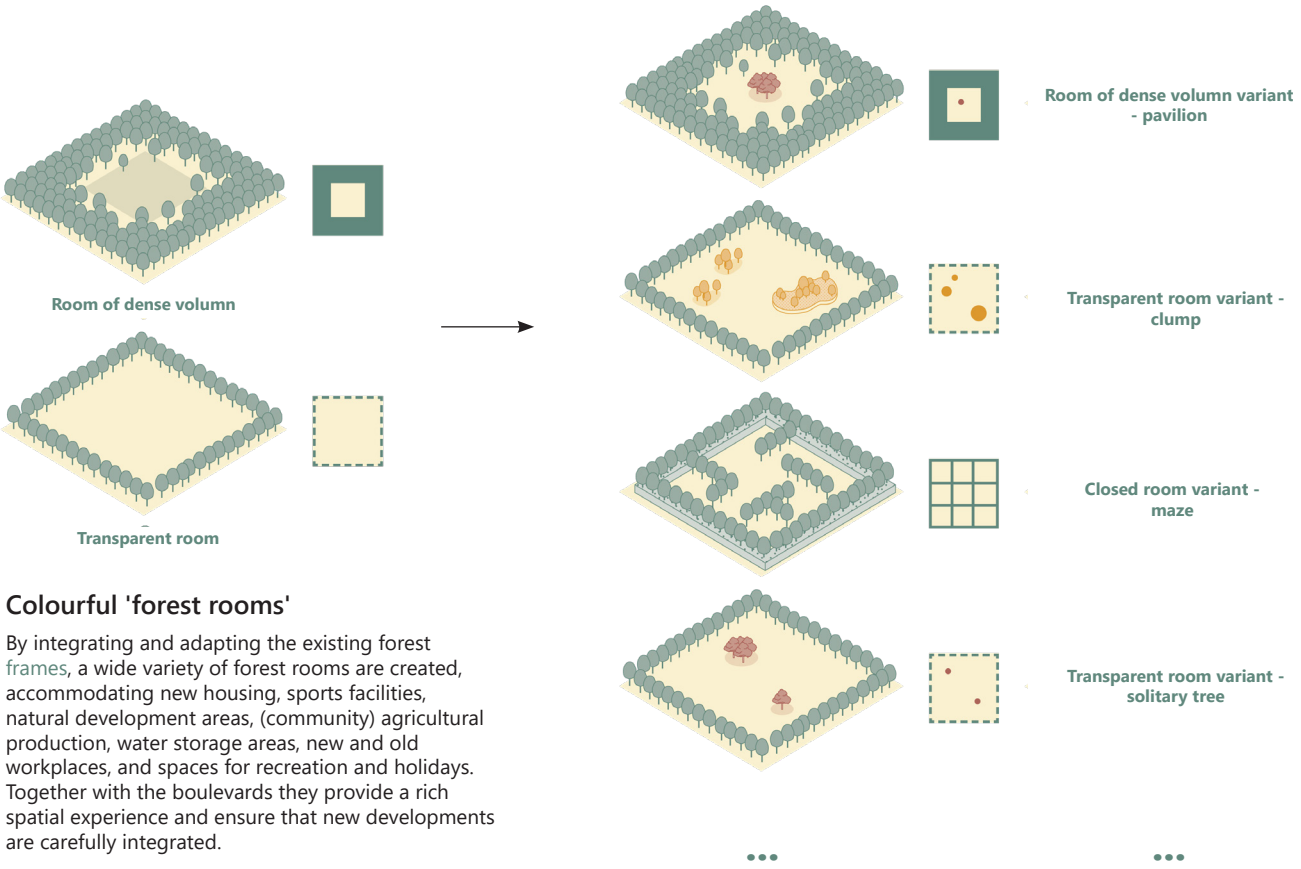
By removing and making transparent the current barriers, the space at the edge becomes more porous and accessible.

Extensive secondary roads and hedgerow paths provide a fine-grained recreational network.





Transformation of forest pattern



Colourful 'forest rooms'

By integrating and adapting the existing forest frames, a wide variety of forest rooms are created, accommodating new housing, sports facilities, natural development areas, (community) agricultural production, water storage areas, new and old workplaces, and spaces for recreation and holidays. Together with the boulevards they provide a rich spatial experience and ensure that new developments are carefully integrated.

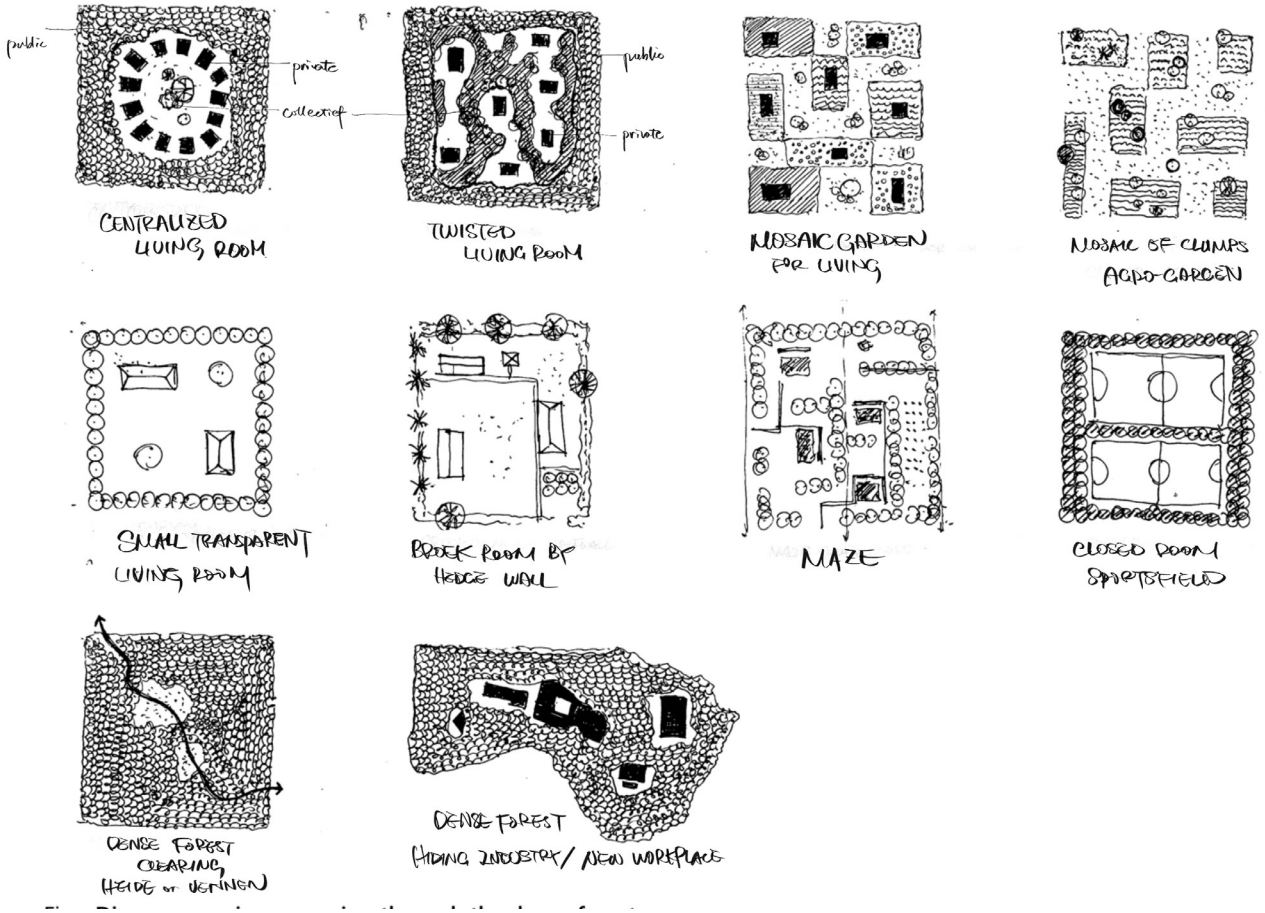
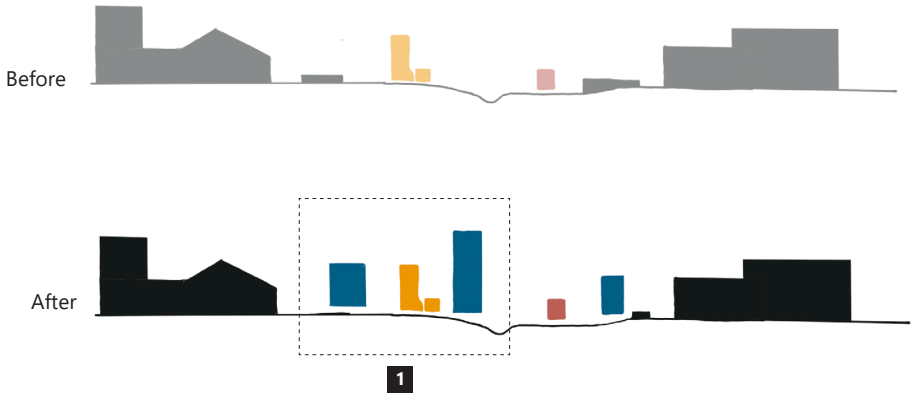


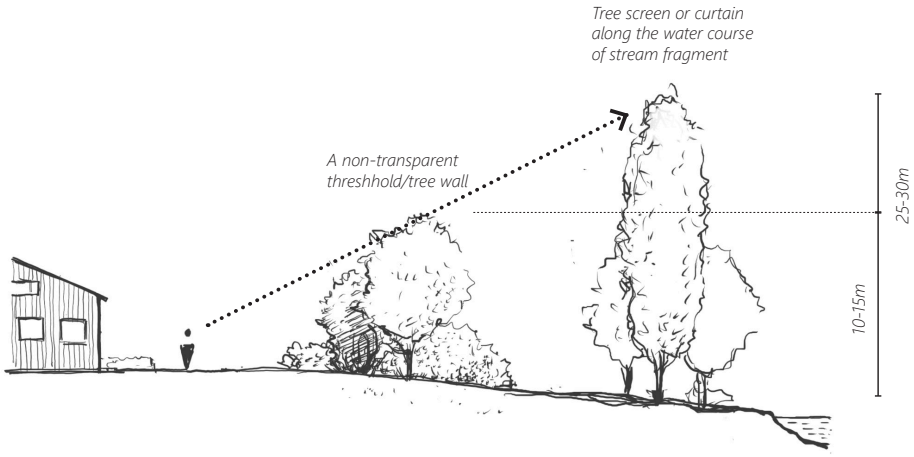
Fig.64 **Some experiments - forest rooms that carry different functions**

Spatial strategies for Void landscape

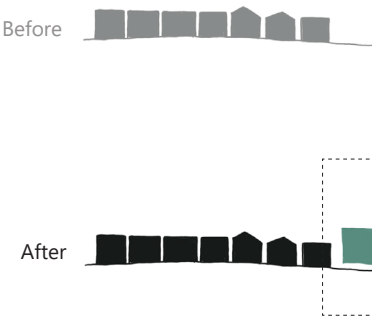
Transformation of a stream fragment

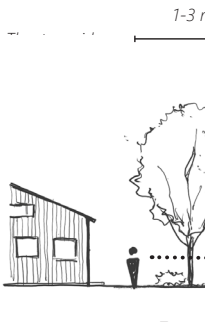


1

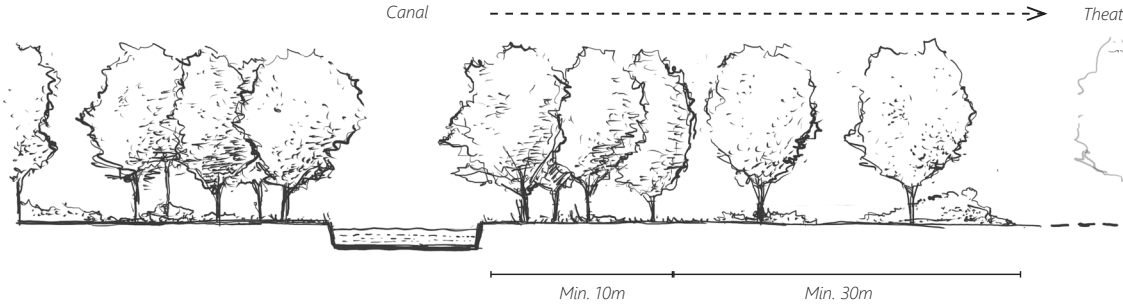


1 Provide impermeable tree thresholds between stream segments and urban patch boundaries to emphasise contrast and create visual delay. The height of the threshold should be high enough to allow people on the boundary of the patch to see the SCREEN along the watercourse and to draw people through the opening into the fragment.



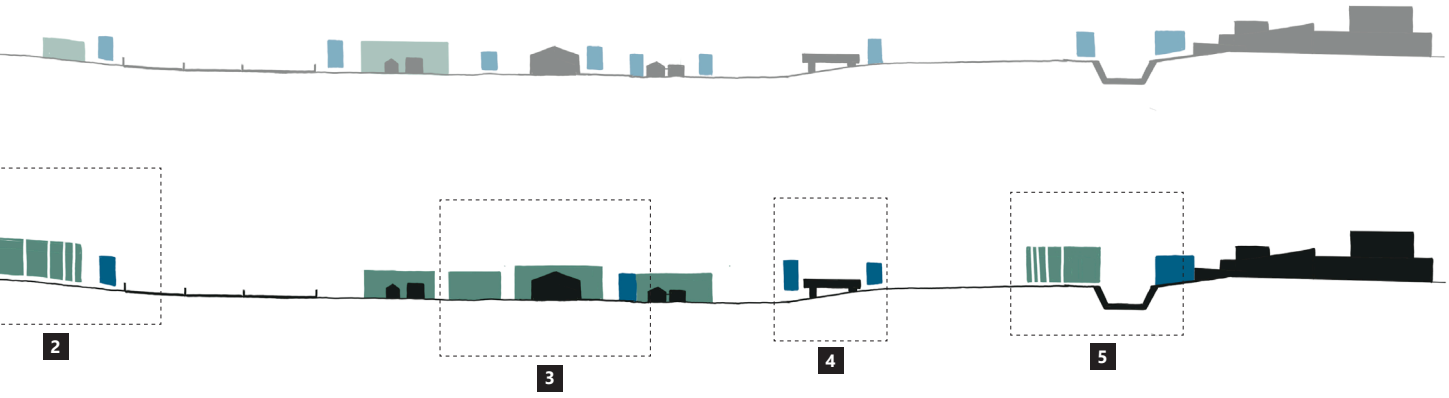


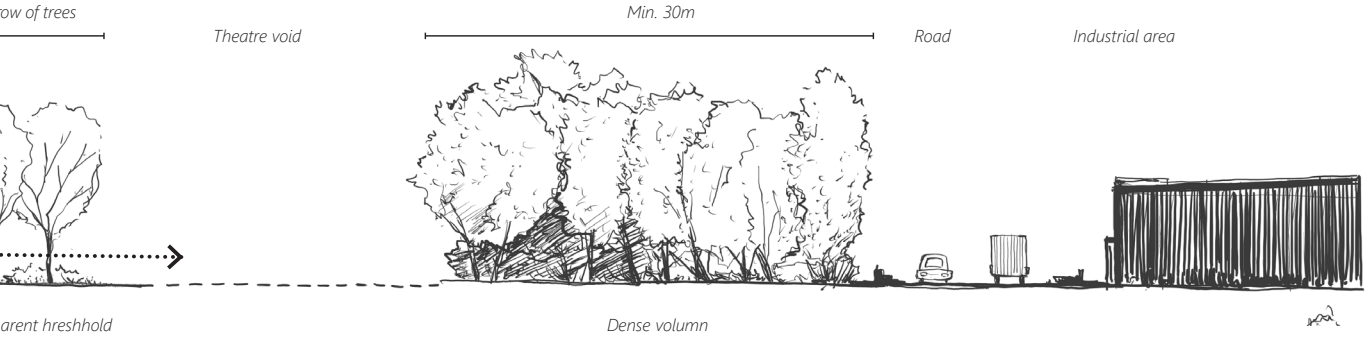
2 In order to enha
of enclosure as
impermeable vo



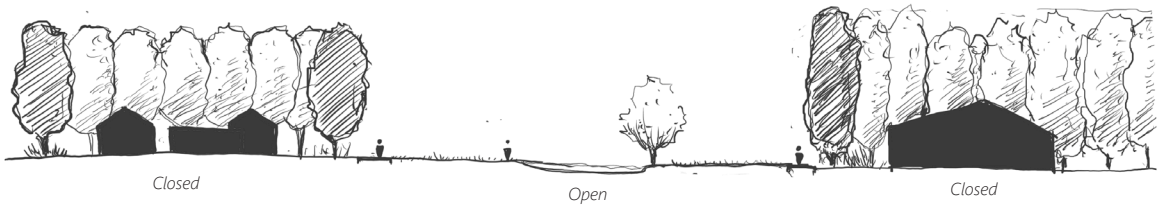
5 To enhance the character of the canal as a mobile experiential installation, the boulevard along the waterway should be reinfo
a width of 15m. less dense woodland strips as a transition from the canal to the theatre void should be provided with a width
30m in order to shape the sense of gradual entry into the void.

Transformation of a theatre void



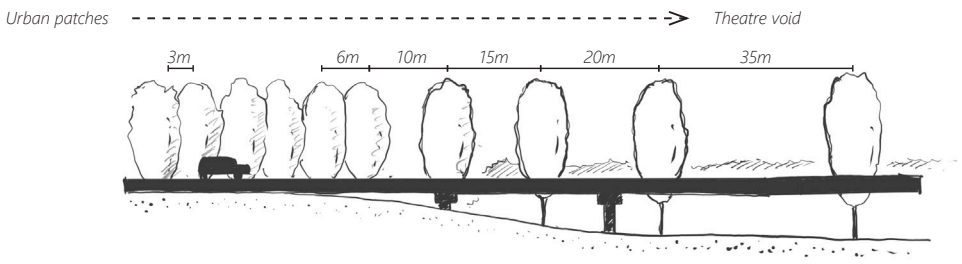


ance the heterogeneity of the theatre void as a narrative site, it is necessary to have tree thresholds of a certain width at its borders to enhance the sense a theatre. A more transparent barrier consisting of a few rows of trees could be placed at the boundaries of residential areas, while a sufficiently wide and olume is necessary at the boundaries of infrastructural and industrial areas.



re void

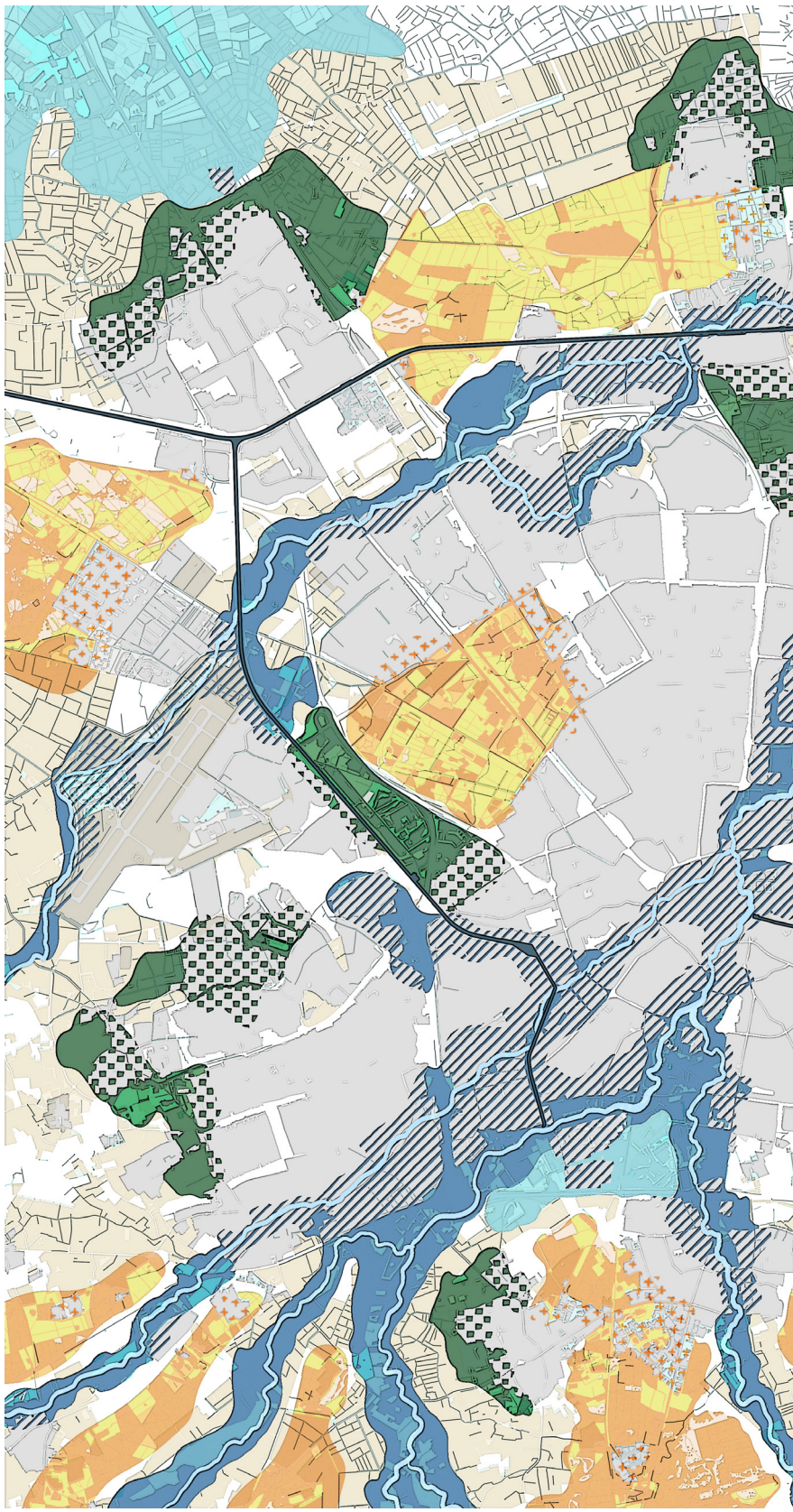
3 Inside the void, the confined and open spaces should be strongly contrasted in order to emphasise the qualities of the theatre as a viewpoint to the sky. Some of the tree lines need to be removed and replaced by closed forest rooms and to emphasize open spaces with scattered tree points.



rced with
of at least

4 The transport infrastructure, as a linear corridor connecting the void, needs to be reinforced with tree lines on both sides, and in order to create the feeling of entering the theatre void rather than walking straight through it, the spacing of the trees on both sides can be gradually increased to create a decelerating experience as one enters the void.

Design strategies and regional vision for drought adaptation



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

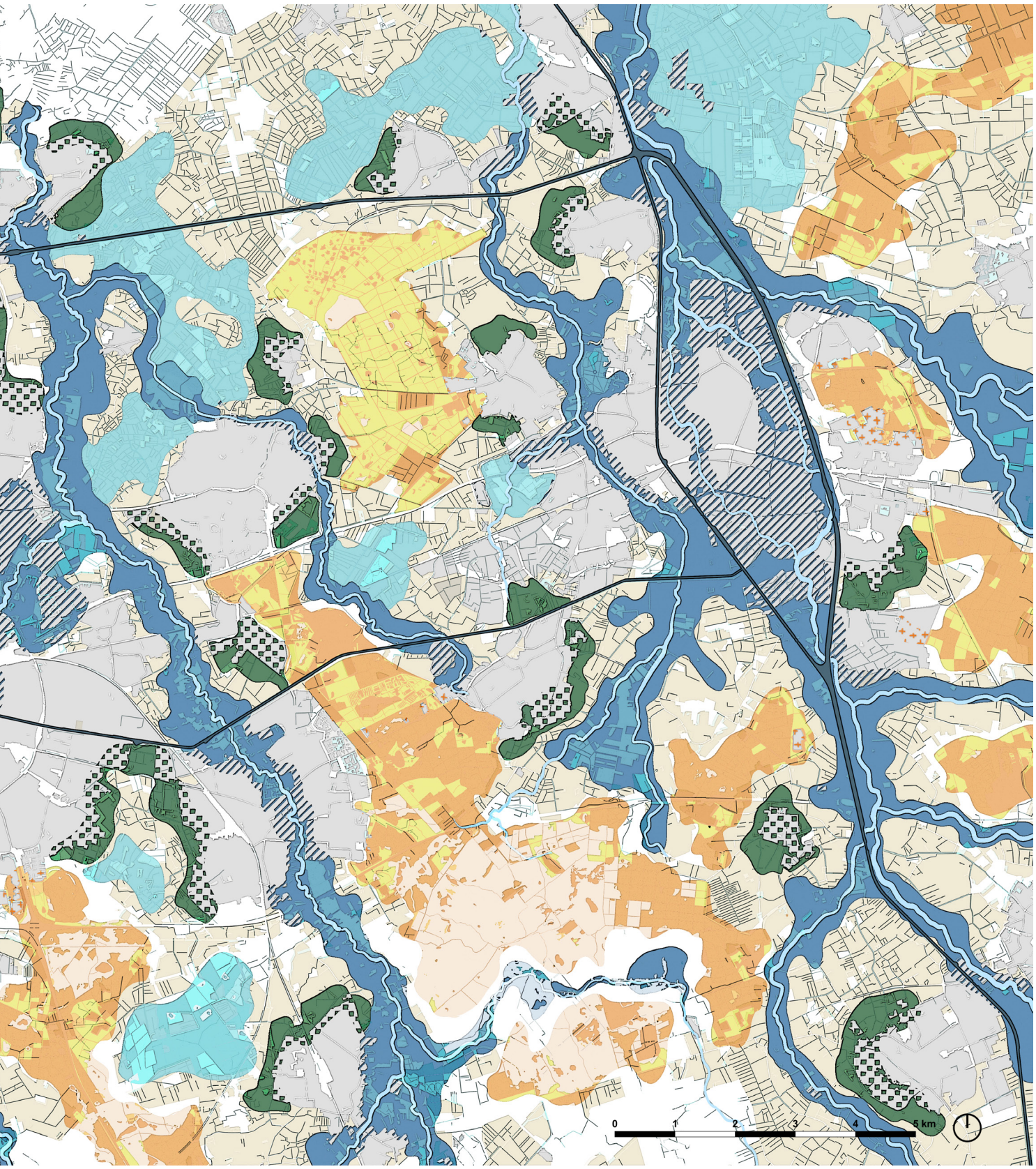
Forest reservoirs on the urban fringe for water purification and delivery

Canals as a source of dry-season water recharge

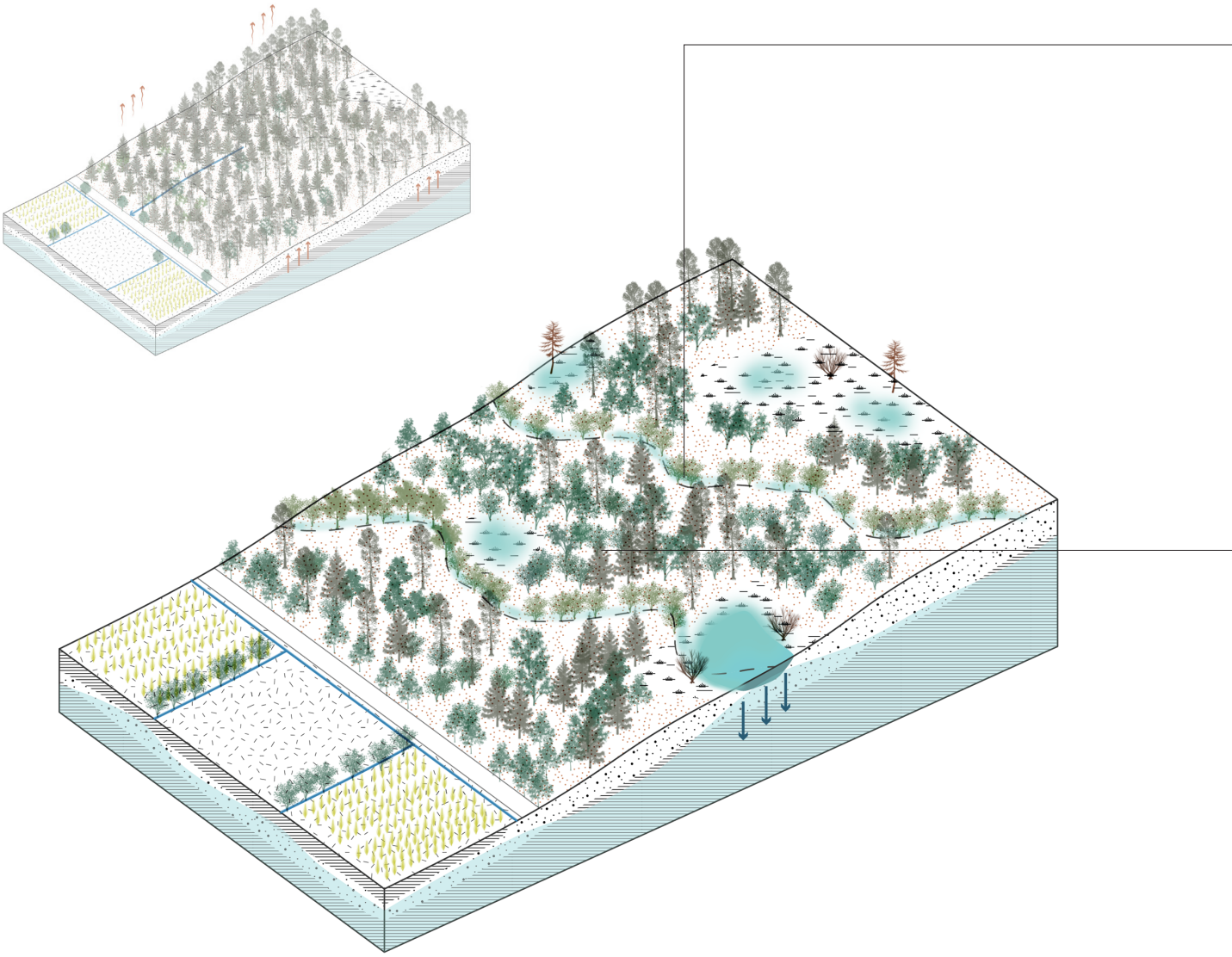
The valley

Restoration of seepages and floodable forests in stream valleys and broeks

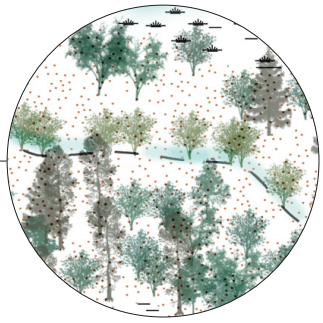
Floodable measures to restore seepage in urban area


0
1
2
3
4
5 km

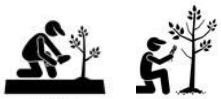
Strategies for the Ridge



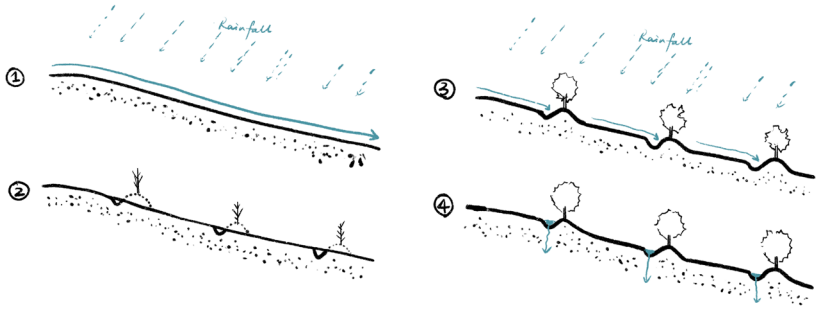
Hydrologically protection zone setting and limited visiting

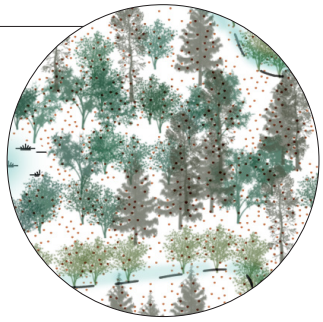


Wooded banks

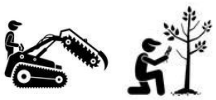


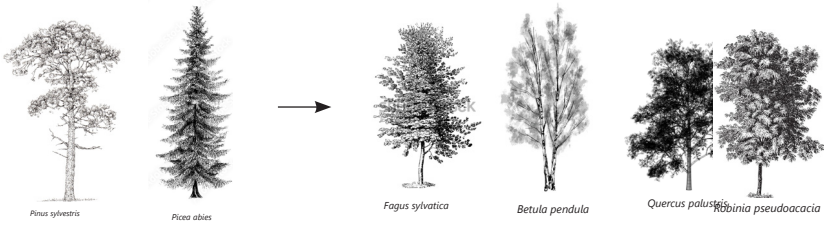
In conjunction with the thinning of coniferous forests, wooded banks have been introduced to capture runoff. wooded banks are located on slopes and extend along the contour lines, with a width of approximately 10 m. They consist of raised soils together with ditches, and the species usually chosen are Crataegus, Prunus spinosa and Sambucus nigra. The area on either side of the wooded bank needs to be kept open and this requires regular pruning and maintenance.

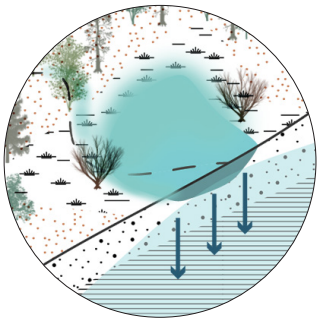




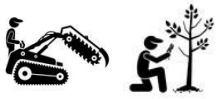
Species altering from coniferous to deciduous tree



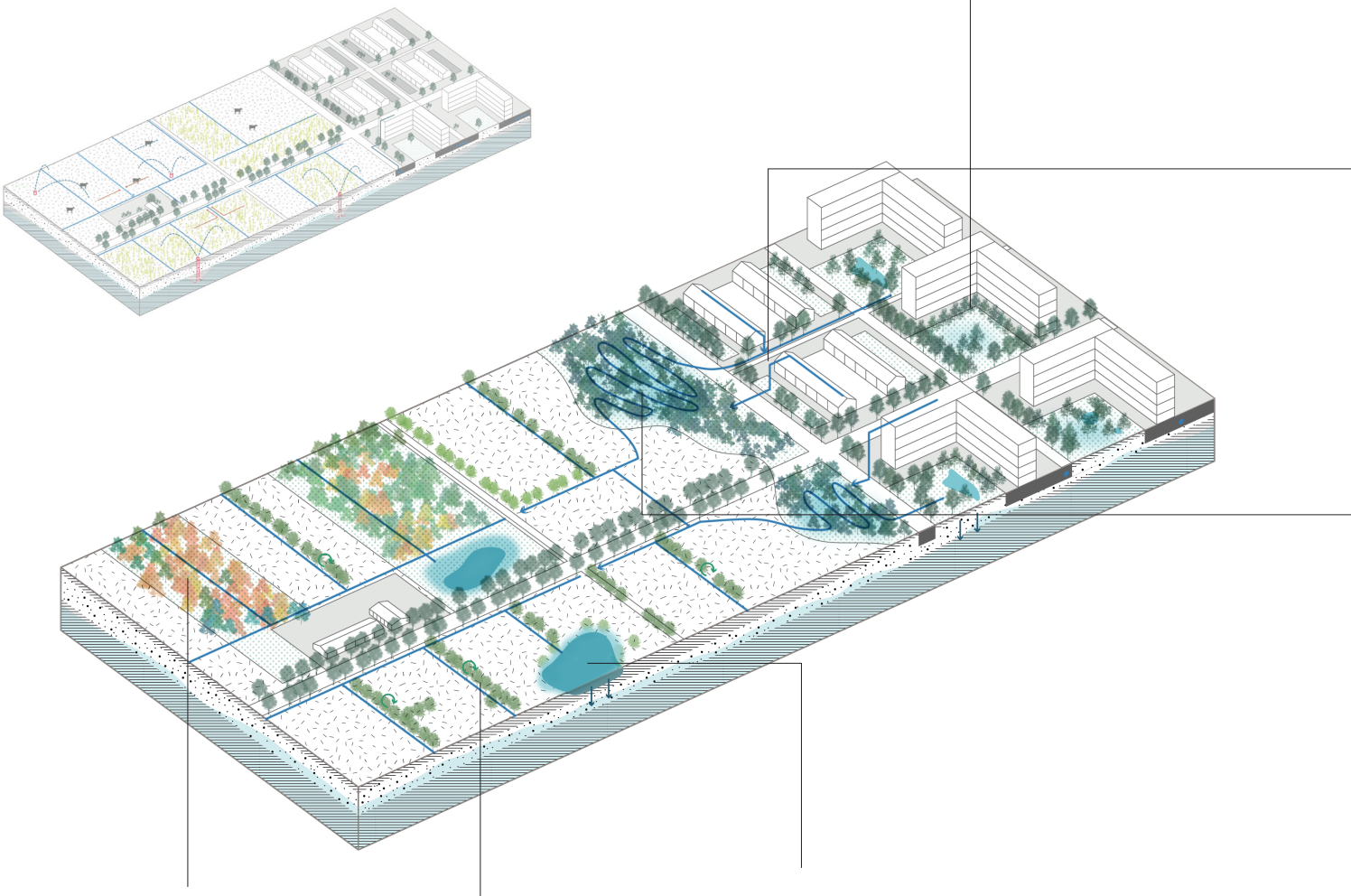




Remove the ditches where possible;
Recovery of heathland and bogs by thinning



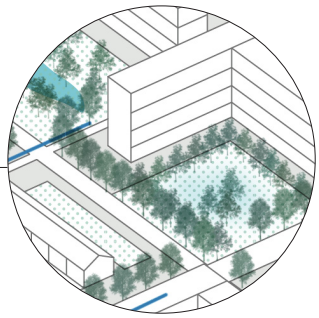
Strategies for the Middleground



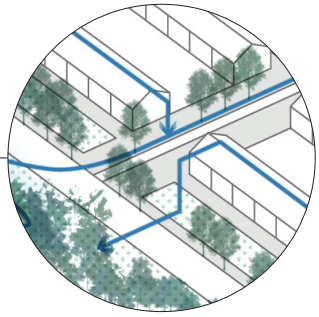
Alternative/precision agriculture
to save water

Water storage in arable field

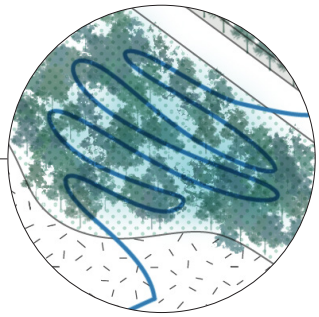
Tree bufferzone along the ditches to purify
the drained water and mitigate pollution



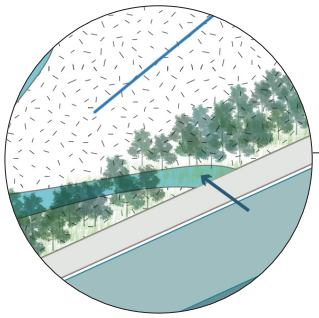
More spaces for water storage and infiltration in the urban area



Disconnecting rainwater to sewage system on the urban fringe

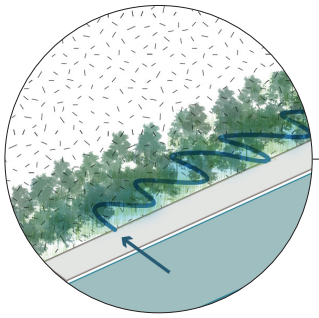


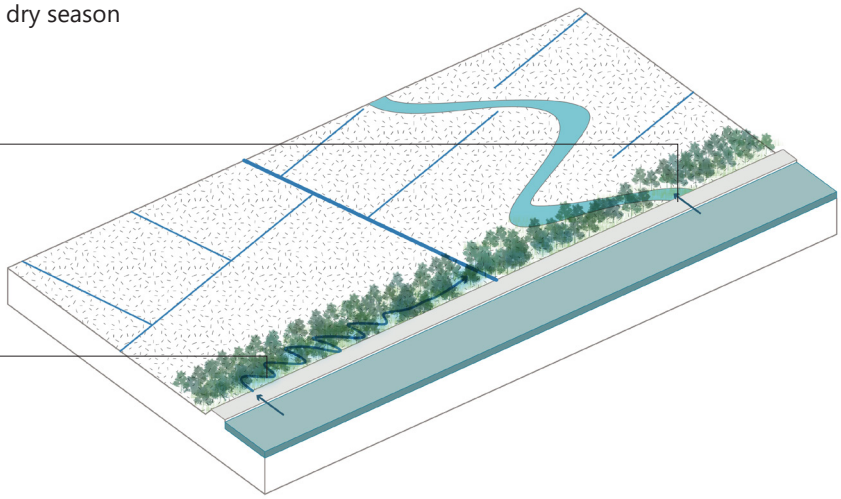
Forest resevoir on the fringe for purification and as alternative resourece



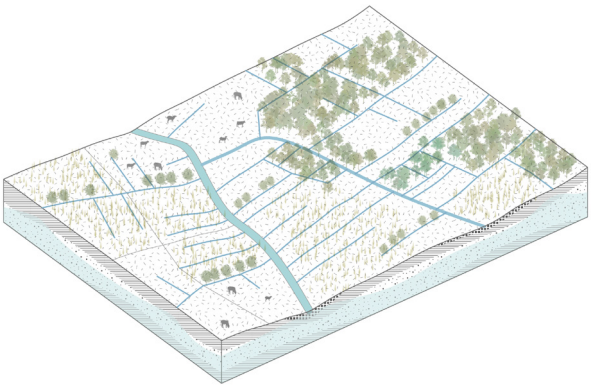
Canal as alternative resource

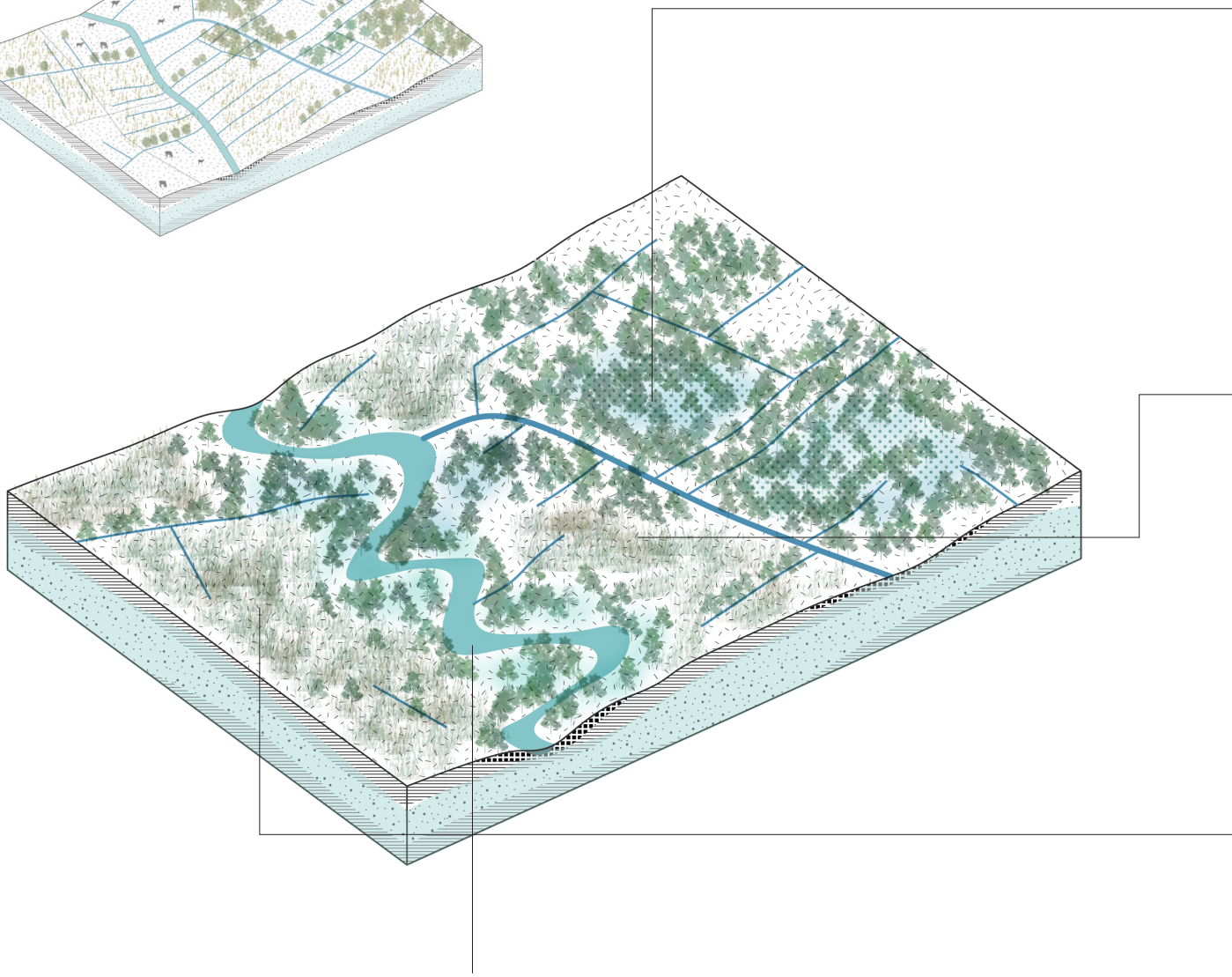
Canal serve recharge water for agricultural use and stream in dry season



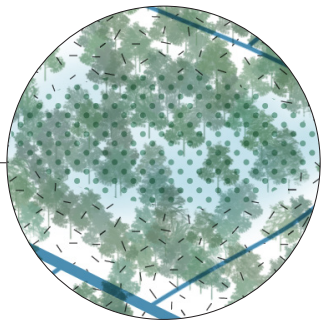


Strategies for the Valley

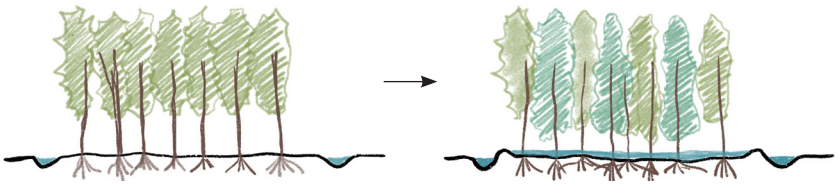


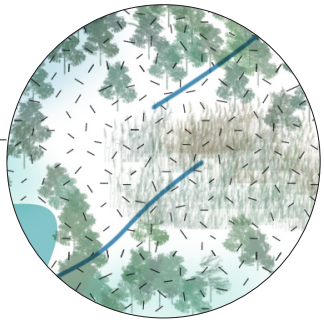


Meandering stream and flooding zone to retain water

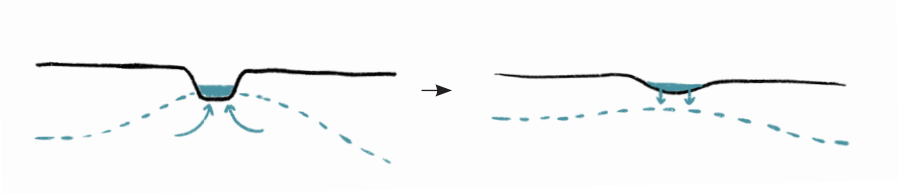


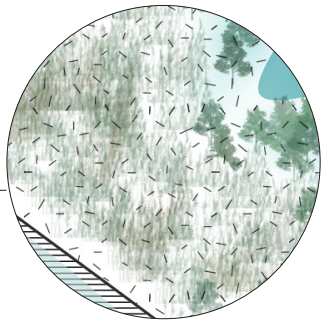
Inundble forest for recovery of seepage



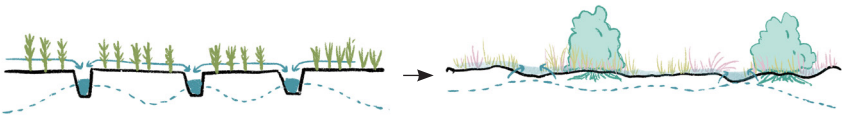


Remove ditches where possible, widen and the ditches and reduced depth of ditches



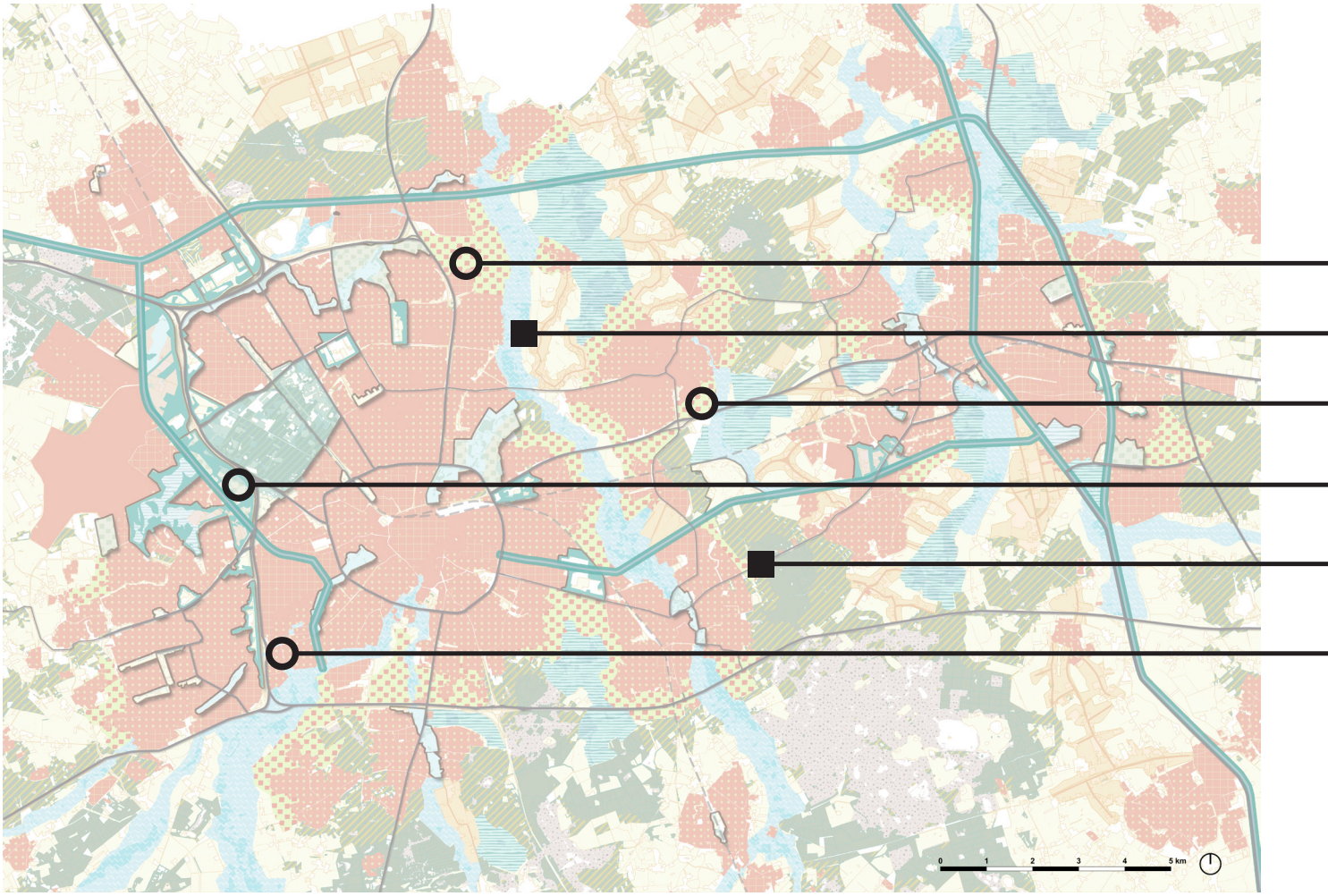


Alternative agriculture
paludiculture along the stream and in broek



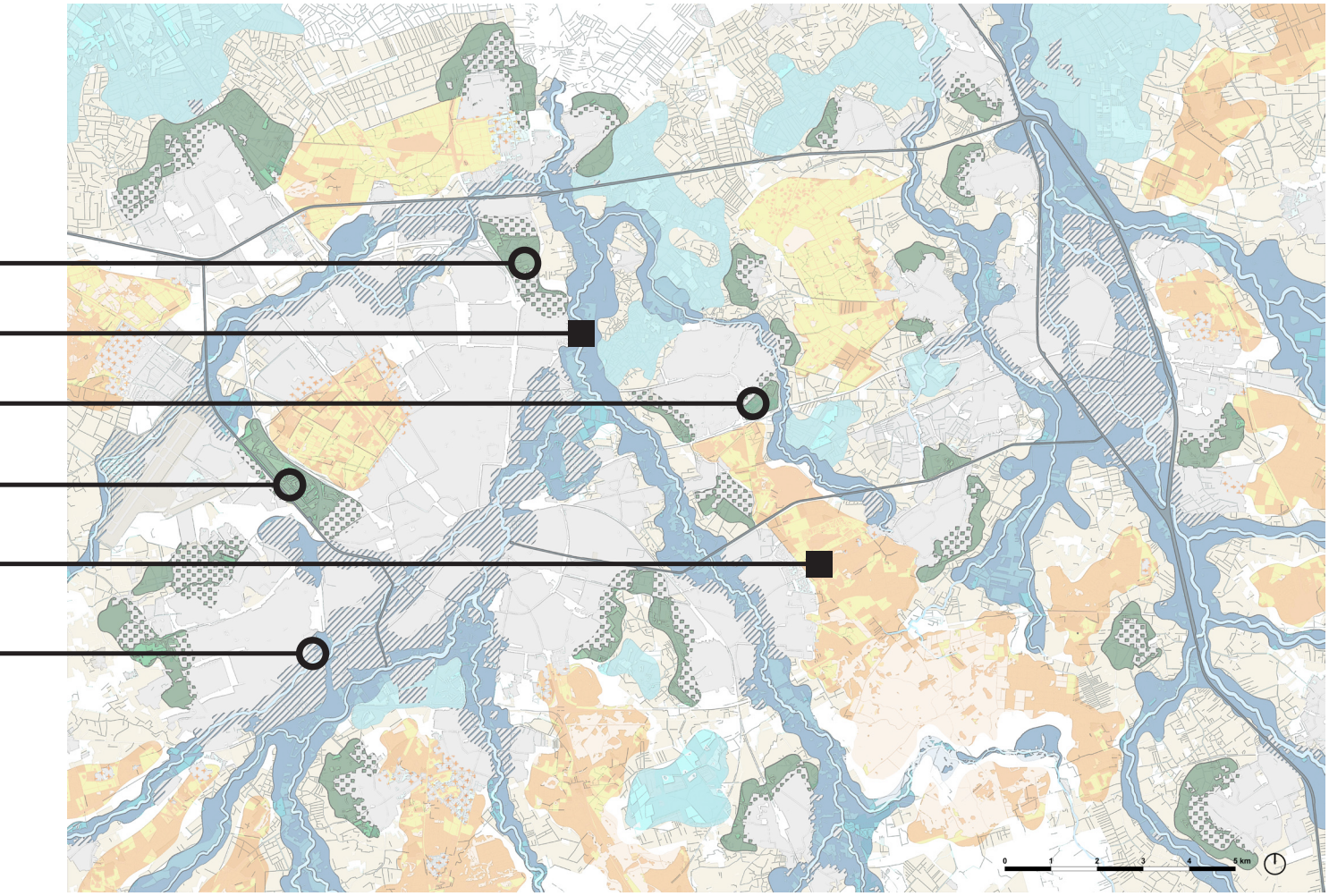
Synergies and conflicts

Afforestation vision for landscape identity enhancement



The two visions are synergistic in so
This is also reflected in the design
few examples of synergy and confl
starting point for local scale transfo

Afforestation vision for drought adaptation

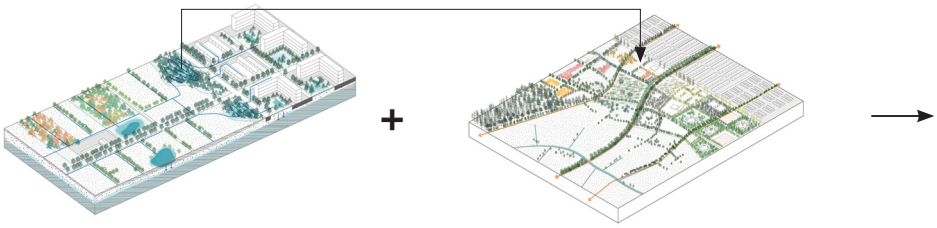


me places, but conflicting in others.
principles and spatial strategies. A
lict are shown here and will be the
ormation later.

Example of Synergies

Strategy for the middleground

Strategy for fringe landscape

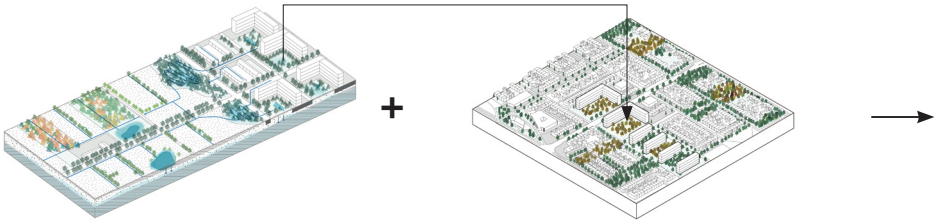


Forest rooms with integrated water storage and water purification functions; a network of recreational spaces with added ecological layers.

1 The reservoir on the interface of urban and rural can be integrate into the forest rooms in the fringe landscape

Strategy for the middleground

Strategies for Urban patches as raster forest

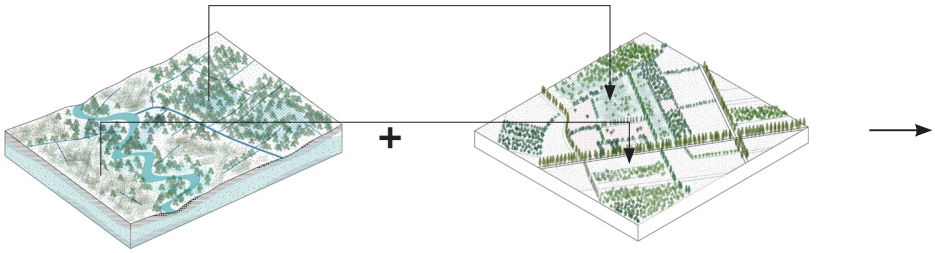


Urban forest spaces integrating water storage and infiltration, more diverse tree groups.

2 More infiltration space in the city could be combined with the creation of the communal spaces in the urban patches

Strategy for the valley

Strategy for the broek landscape

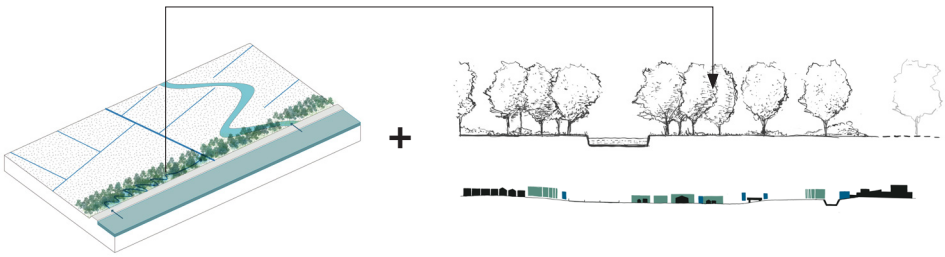


The broek landscape with participatory practices for water level management and alternative agricultural functions.

3 The recovery of seepage and paludiculture zone in the valley of the watersystem can be well integrated in the room structure preserved or created in the broek landscape, which enriches the functionality and the spatial experience.

Strategy for the middleground

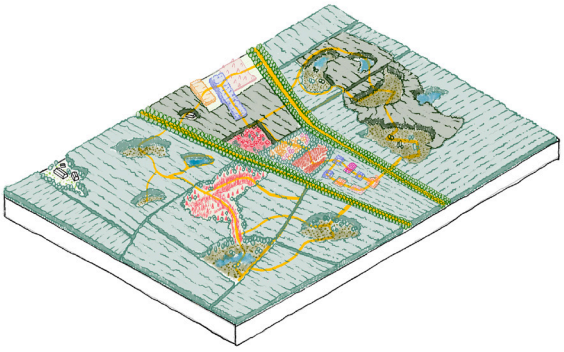
Strategy for the void landscape



The water purification function opens up more possibilities for spatial experiences in the boulevards and transitional woodlands along the canals.

4 The water purification and supplyment from the canal in the dry season, could be combined with the spatial proposal of infrastructure corridor in the Void landscape

Example of Conflicts



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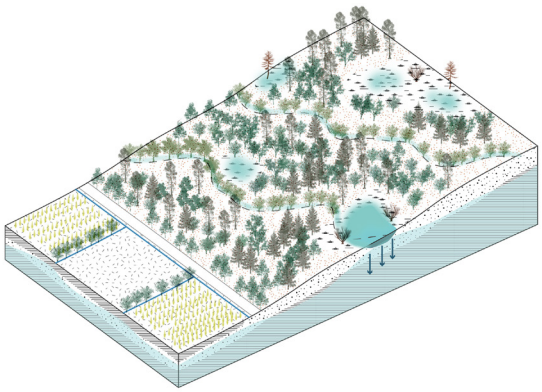
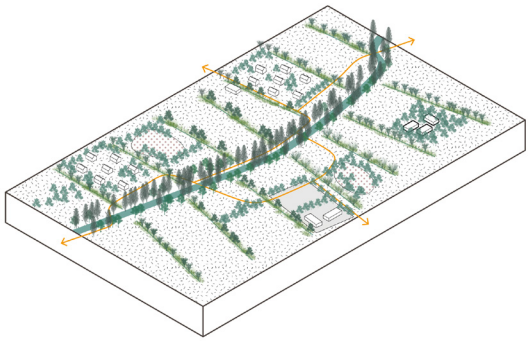


1 The strategy of landscape identity enhancement in the reclaimed forest create diverse spaces in the existing coniferous woodland, and recreation activities could be enriched by these communal spaces and the new boulevard, which make it a vital area with many visitors

However, in the drought adaptation strategy, the reclaimed forest area need to focus on recover more heathland and swamps, and limit visiting for a undisturbed infiltration process and for the better water quality.



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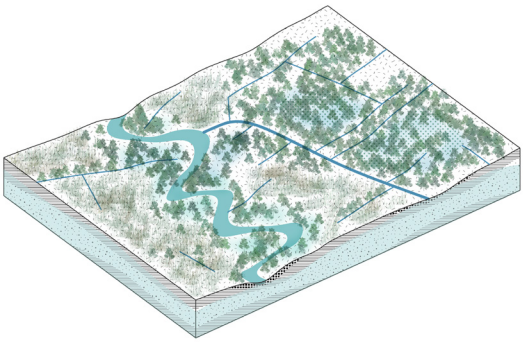

2 The strategy of landscape identity enhancement in the stream valley require the spatial structure of ditch ribbons, and the stream itself become an appealing element or the landmark to attract people's visiting through the new experience route. The functions such as housing, playground, allotment garden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