

**MSc THESES  
OVERVIEW  
LANDSCAPE  
ARCHITECTURE  
GROUP**

**2022-2024**

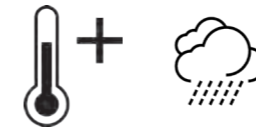
**September 2022 - August 2023**

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- Julia North
- Muyun Zhu
- Roy Italiaander
- Haoyu Yang
- Jana Bruijn
- Adriaan Moerdijk
- Anouk van Deursen
- Daan Laansma
- Noa Schouten
- Vincent Klaaskate
- Yves Gijzen
- Arend van der Kam
- Katharine Hovelmann
- Karlijn Kerstens
- Sander Keur
- Inge Mekkering
- Job Abbink
- kai van Reenen
- Leon Herrenauw
- Ludovic Henderson
- Minke van Asperen
- Yaro Berendsen
- RECHARGE: Adaptive reuse of military heritage for 21st c. water challenges.
- AKtivate! Design to promote unstructured physical activities for young adolescents in Kerkrade. Location: Kerkrade, the Netherlands
- Healing the 'green desert' through an updated casco approach. A 21st century update of the casco concept to address the nitrogen crisis. The Achterhoek region (NL) as a case study.
- 'Reset Venlo'. Enhancing biodiversity in Venlo through urban open space transformation. Venlo, the Netherlands
- Revealing narratives. Landscape narratives as translator between long-term visions and landscape design Frisian Lake area, Friesland, the Netherlands.
- The Sand Motor redesigned Enhancing the synergy between nature and recreation on eco-recreational coasts.
- Nature based Design Guidelines for the Camperduin Lagoon. Spatial Quality in Mega-nourishment Recreation Zones. Bergen, Netherlands
- (no posters) Re-packing. The integration of warehouse-clusters in the Dutch landscape.
- To salt-marsh. To actively engage in salt marshes' natural processes. Waddencoast, the Netherlands
- (emargo) A NEW HORIZON FOR SOLAR LANDSCAPE DESIGN. Learning from discrepancies between design in reality. Gelderland, The Netherlands.
- Agroecology in the Dutch Urban-Rural Fringes. Towards Design Guidelines, Oss, the Netherlands
- Spectres of Binckhorst. An inquiry into dark ecological park design principles for coexisting with pollution in the Anthropocene. Binckhorst, the Hague, Netherlands
- [Re]Activating Riverscapes. Spatial quality principles for resilient flood risk management in lowland river landscapes. Rijnstrangen, the Netherlands
- The Shift. Towards designing cooler urban microclimates with trees by incorporating the ecological shift. Arnhem, Netherlands
- Adapting Metropolitan Open Spaces to Climate Change. A cultural landscape perspective Midden-Delfland, the Netherlands
- Designing Amphibian Focused Urban Open Spaces. Wageningen, the Netherlands
- Predator in the City. Designing urban open space to adapt a stone marten population. Rotterdam, The Netherlands
- GIMME SHELTER. Exploring the role of shelterbelts in bridging the gap between nature and agriculture (The Netherlands)
- Human-Hedgehog Harmony. Design Strategies for Wildlife Coexistence in Dutch Urban Landscape. Kanaleneiland-Zuid, Utrecht, The Netherlands
- COMFORTABLE CORRIDORS. Creating comfortable multisensory cycle connections for cyclists riding through urban areas.
- Cool Down. Regional Urban Climate-Responsive Design Strategies for Urban Expansion.
- A Growing Community Space. Integrating urban agriculture to foster community building in Milton, Glasgow.

COORDINATES  
51 °15'45.17" N  
4 °37'19.51" O

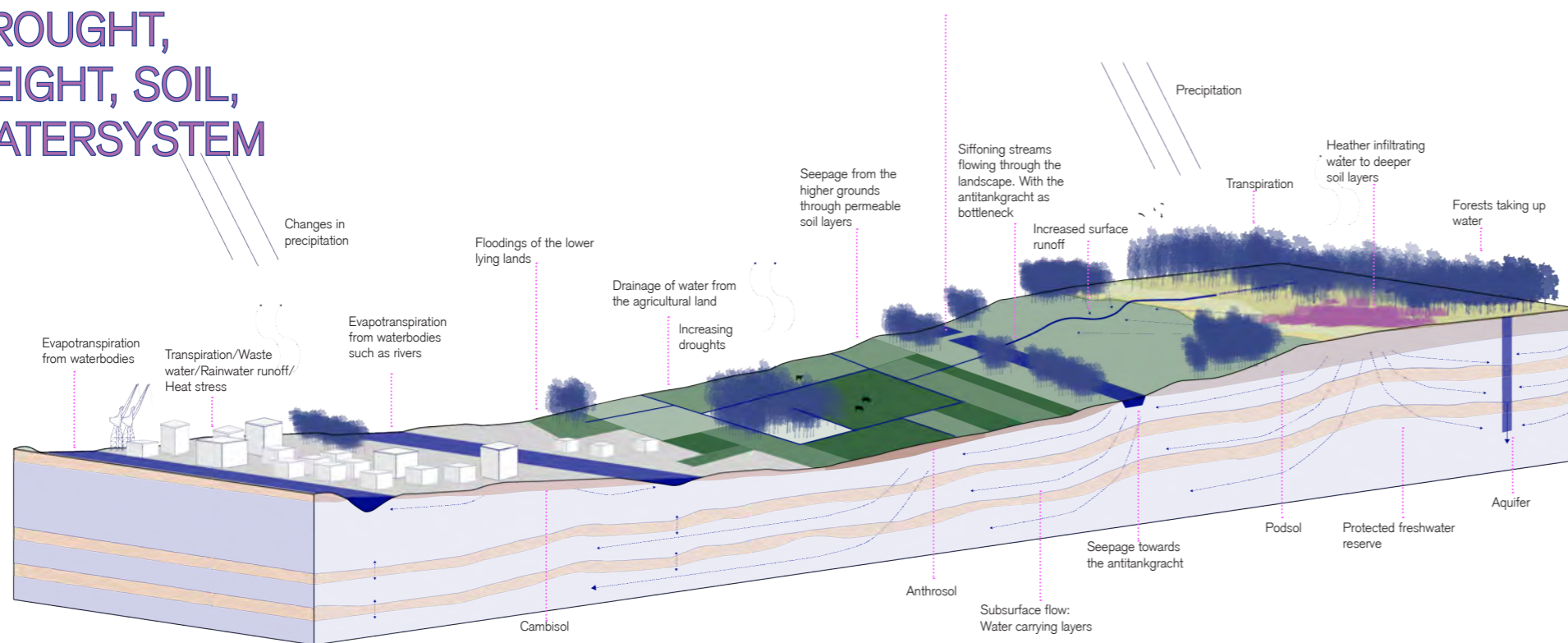


NETHERLANDS

BELGIUM

ANTWERP

## FLOODINGS, DROUGHT, HEIGHT, SOIL, WATERSYSTEM



This schematic crosssection indicates the link between the local topography, soil types, and occurrence of seepage, droughts and flooding. Plus the comparing crosssection of the historical and present situation.

**Julia Nöth**

Name supervisors: dr.ir. Christian Nolf  
prof.dr.ir. Martine van der Ploeg (Hydrology and Environmental Hydraulics Group)

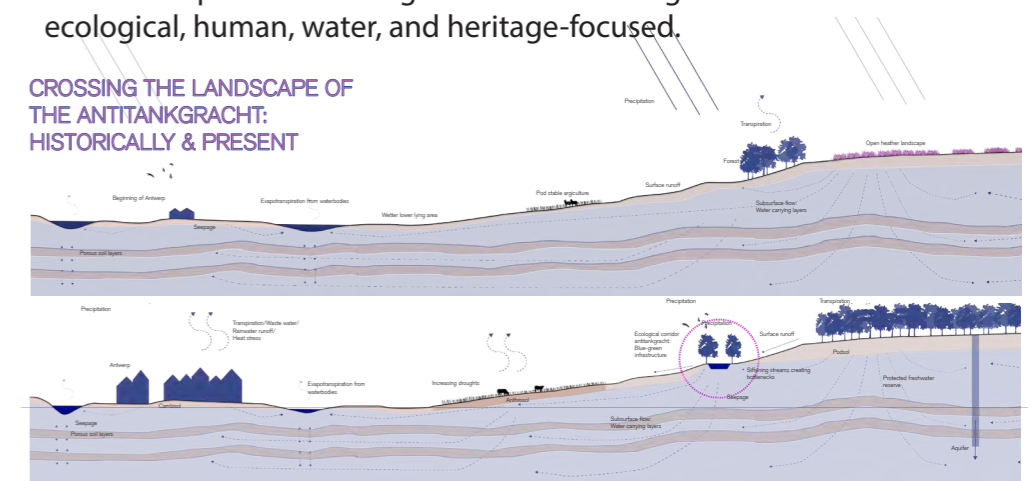
### RECHARGE:

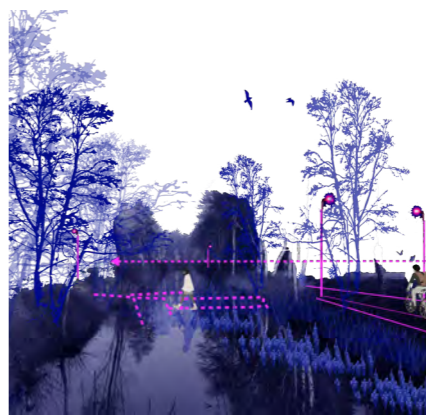
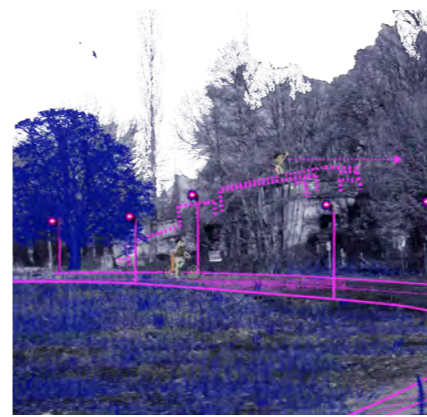
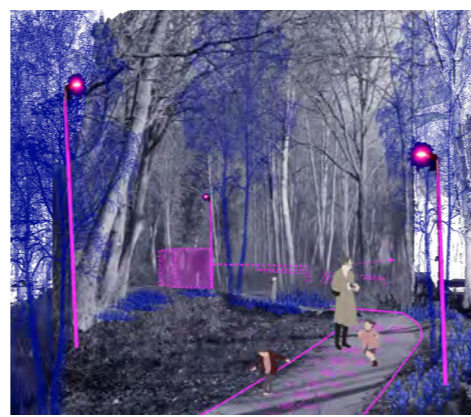
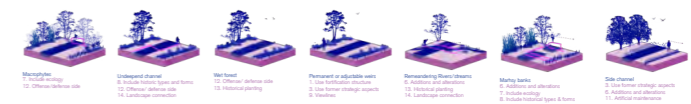
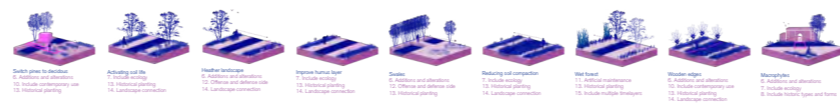
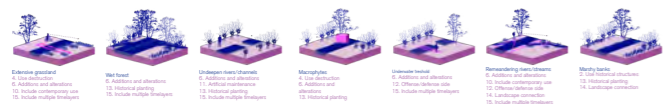
**Adaptive reuse of military heritage for 21st c. water challenges**

### Abstract

This design research investigated the adaption of heritage related to water stress and created an integrated solution on how to configure heritage while also solving water-related issues concerning drought and heavy precipitation. The research area is located within the province of Antwerp, an antitank ditch that stems from before the Second World War, filled with seepage water and now has to deal with droughts and flooding. Three different designs focused on the development of a strategy to enhance the variation in landscapes. Firstly the design for Stabroek focused on the development the wet landscape to tackle the flooding problems from the higher to lower parts of the landscape. A system of interconnected swales and retention areas is used to retrieve water during heavy rainfall periods, to strengthen these wetland vegetation is integrated into the design to improve water uptake and ecology. Viewing platforms, bridges, and raised walkways are implemented to incorporate the elements of the antitankgracht. The heather and forest landscape of Kalmhout design focus on solving drought issues in the long-term. The set of design interventions that are applied here rely mostly on vegetation patterns wherein the heritage aspect is guiding. By using soil enhancement to improve water retention in the forest and heather parts. Thirdly the land of Zoersel-Wijnegem focused on the development of the reconfiguration of one of the forts. Here the historical significance is highlighted through the use of viewpoints, interpretive forms and perspectives towards the landscape. By using combined strategies across the three landscape design, an environment is created that addresses flooding and drought whilst improving the functional and cultural landscape. This suggest the interrelatedness of design interventions within the landscape to combine the heritage structure with adaptive principles for future water-related challenges to adapt the existing military heritage. Through which the landscape can be configured to create design connections that are ecological, human, water, and heritage-focused.

### CROSSING THE LANDSCAPE OF THE ANTITANKGRACHT: HISTORICALLY & PRESENT

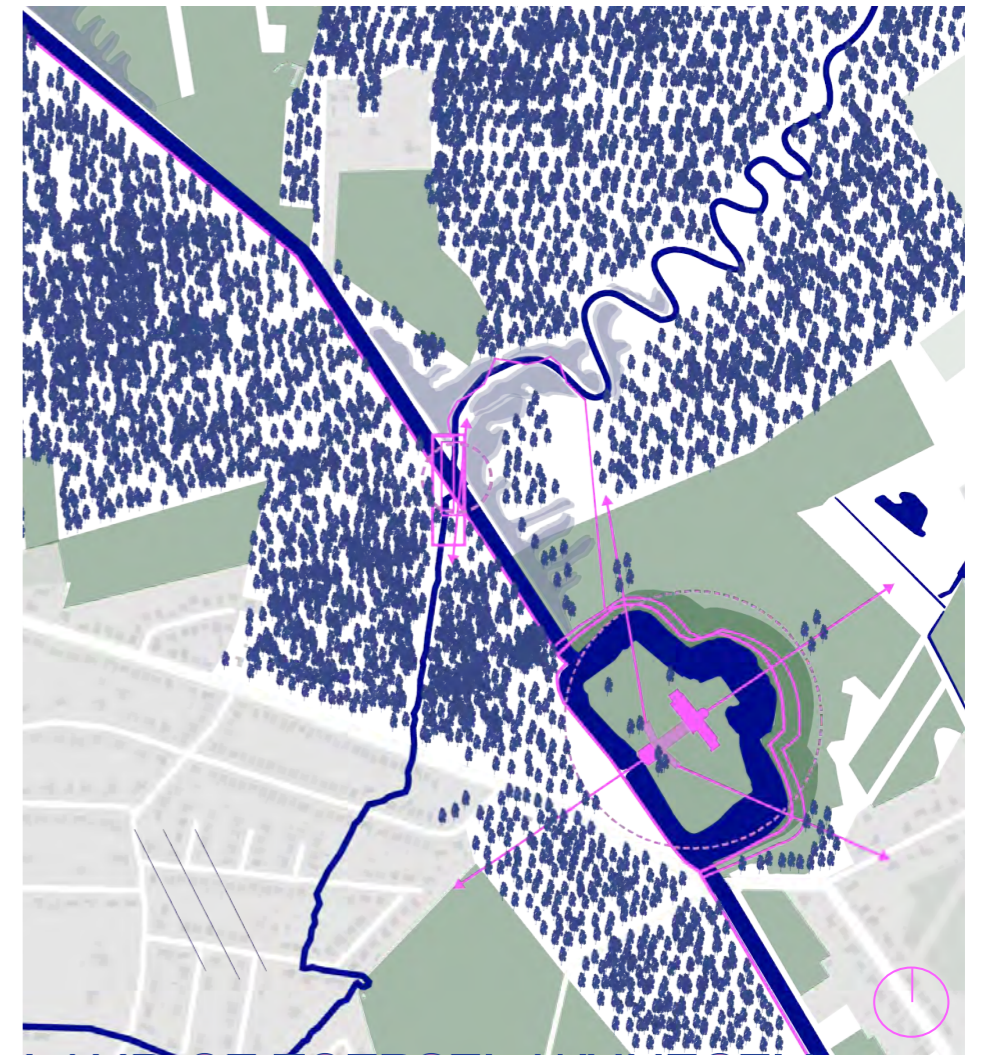




SCHELDT POLDERS



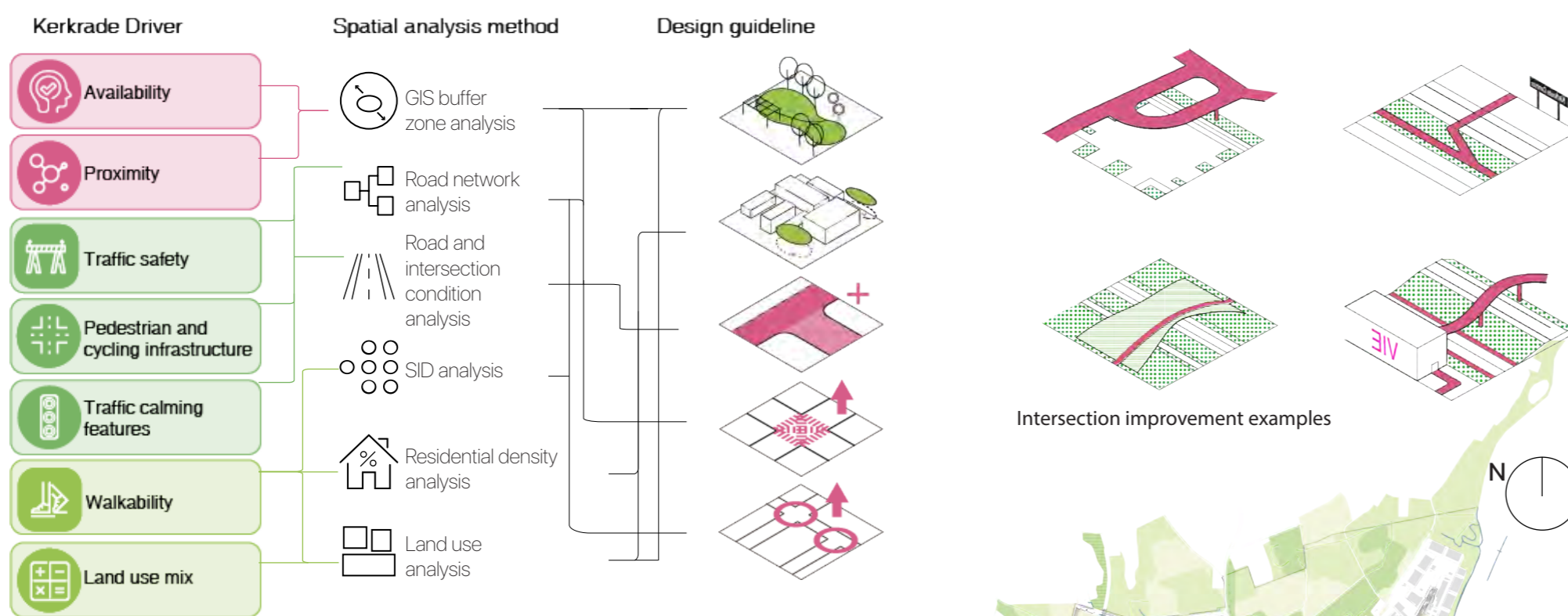
HEATHER- & FOREST LANDSCAPE  
KALMHOUT



LAND OF ZOERSEL-WIJNEGEM



The three design along the anttanlgracht, forming ecological, human, water and heritage-focused connections, with a summarizing crosssection.



Generation of design principles on Kerkrade city scale

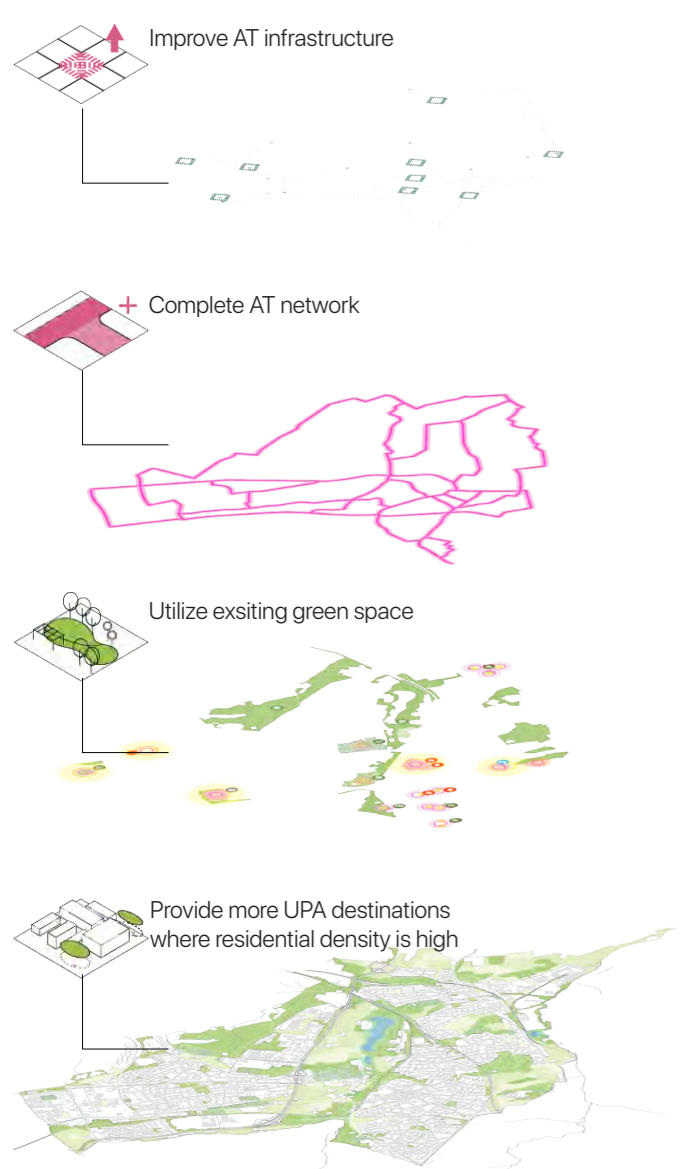
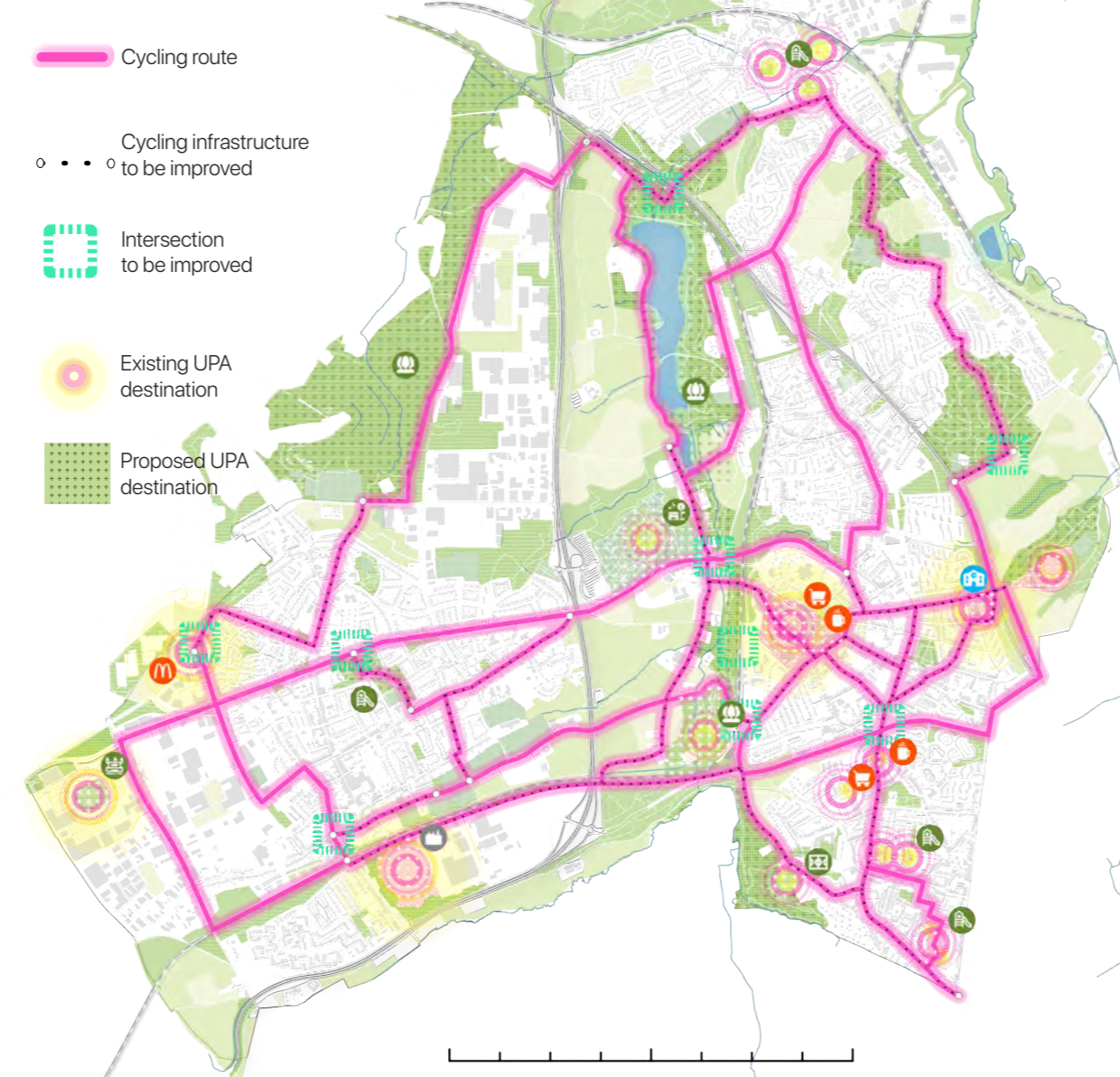


Illustration of how design principles are applied



UPA destination - AT network design vision on Kerkrade city scale

Intersection improvement examples

**Muyun Zhu**

Supervisors:  
 dr.ir.A (Agnès) Patuano  
 dr.ir. HW (Lenneke) Vaandrager (Health & Society Group)

**AKtivate!**

Design to promote unstructured physical activities for young adolescents in Kerkrade  
 Location: Kerkrade, the Netherlands

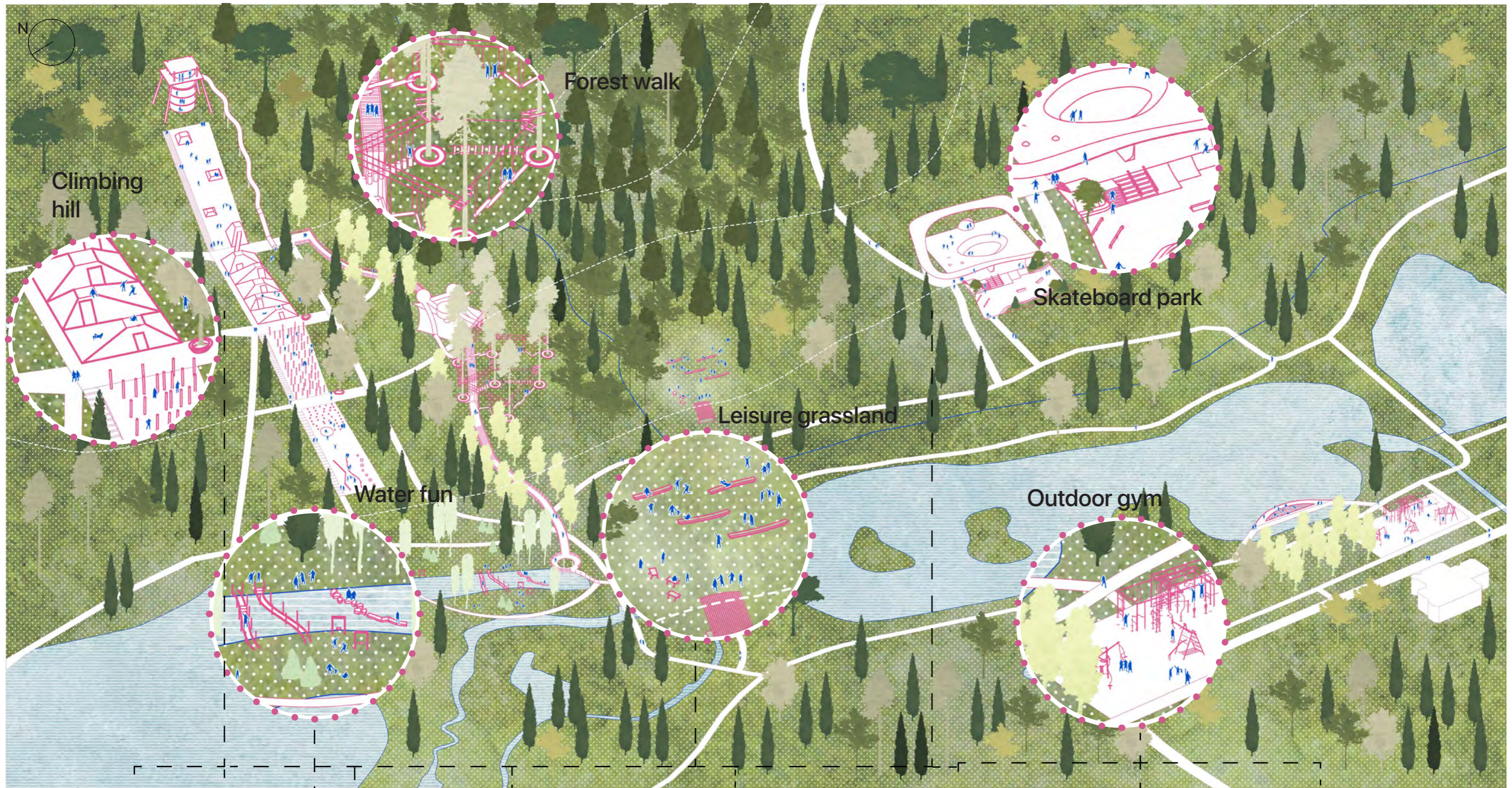
**Abstract**

Compared to other Dutch cities, Kerkrade's population is less healthy due to lack of physical activities. This issue is particularly evident among young adolescents (10-14 years old children).

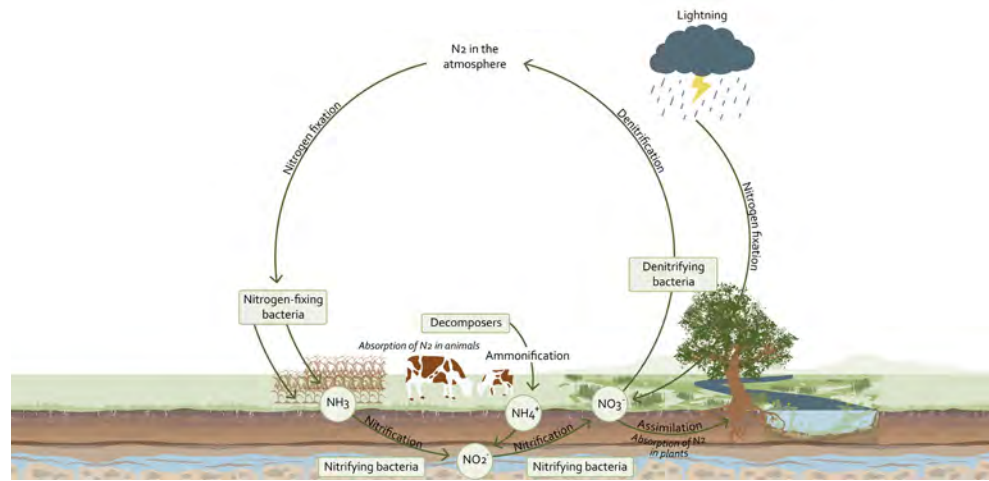
Supported by affordance theory stating that affordance, i.e., the functional attributes of the environment can be directly perceived by people and thus change people's behavior, this thesis attempts to design an outdoor environment for Kerkrade that provides more affordance to young adolescents' unstructured physical activity (UPA) behavior with the instructions of salutogenic design principles.

The research first investigates Kerkrade's affordance, i.e., environmental drivers and barriers for young adolescents to conduct UPA by a literature study, which concludes the general drivers and barriers, and by a workshop with local young adolescents, which decides whether the general drivers and barriers can be applied to the Kerkrade context. Based on the findings, the research continues to conduct spatial analysis to explore design solutions to optimize Kerkrade's affordance to young adolescents' UPA, formulating design guidelines on different scales. During the design iterations, city-scaled design visions and site designs are developed and tested by scientific evaluation methods and a questionnaire with local young adolescents respectively, finding that incorporating Kerkrade's coal mining heritage and natural landscape in UPA destination design can better afford young adolescents' UPA.

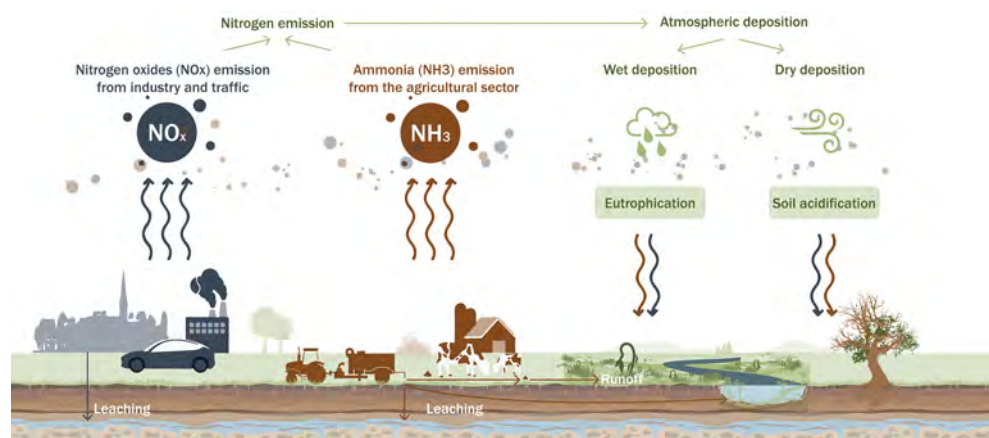
This thesis translates scientific research and findings into evidence-based, cross-scaled design products that promote an active and healthier lifestyle for young adolescents in Kerkrade. It is an endeavor by the field of landscape architecture to address health inequality among vulnerable populations like young adolescents, also an attempt to bridge landscape design and health promotion.



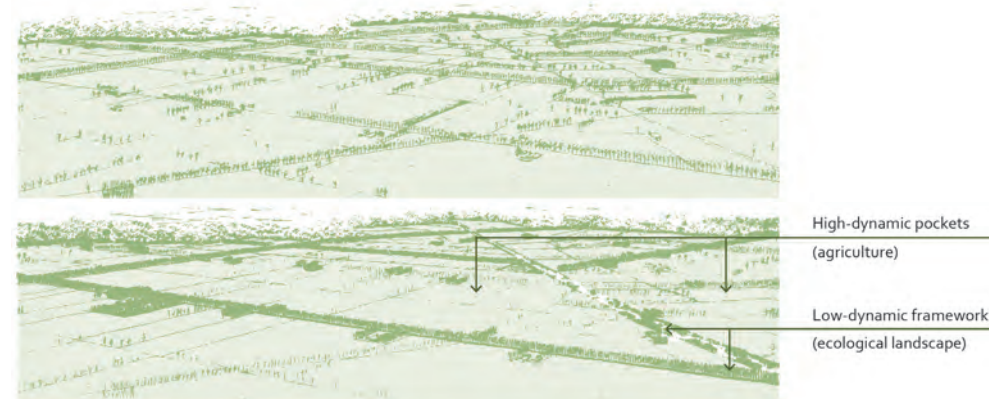
UPA destination (Anstelvallei) design with illustration of how site design guidelines are applied



Currently at too many levels and scales nitrogen is entering the N-cycle. Hence, the cycle gets overloaded.



Depending on the source, nitrogen is entering vulnerable areas via atmospheric deposition or directly via leaching. As a result eutrophication and acidification can occur.



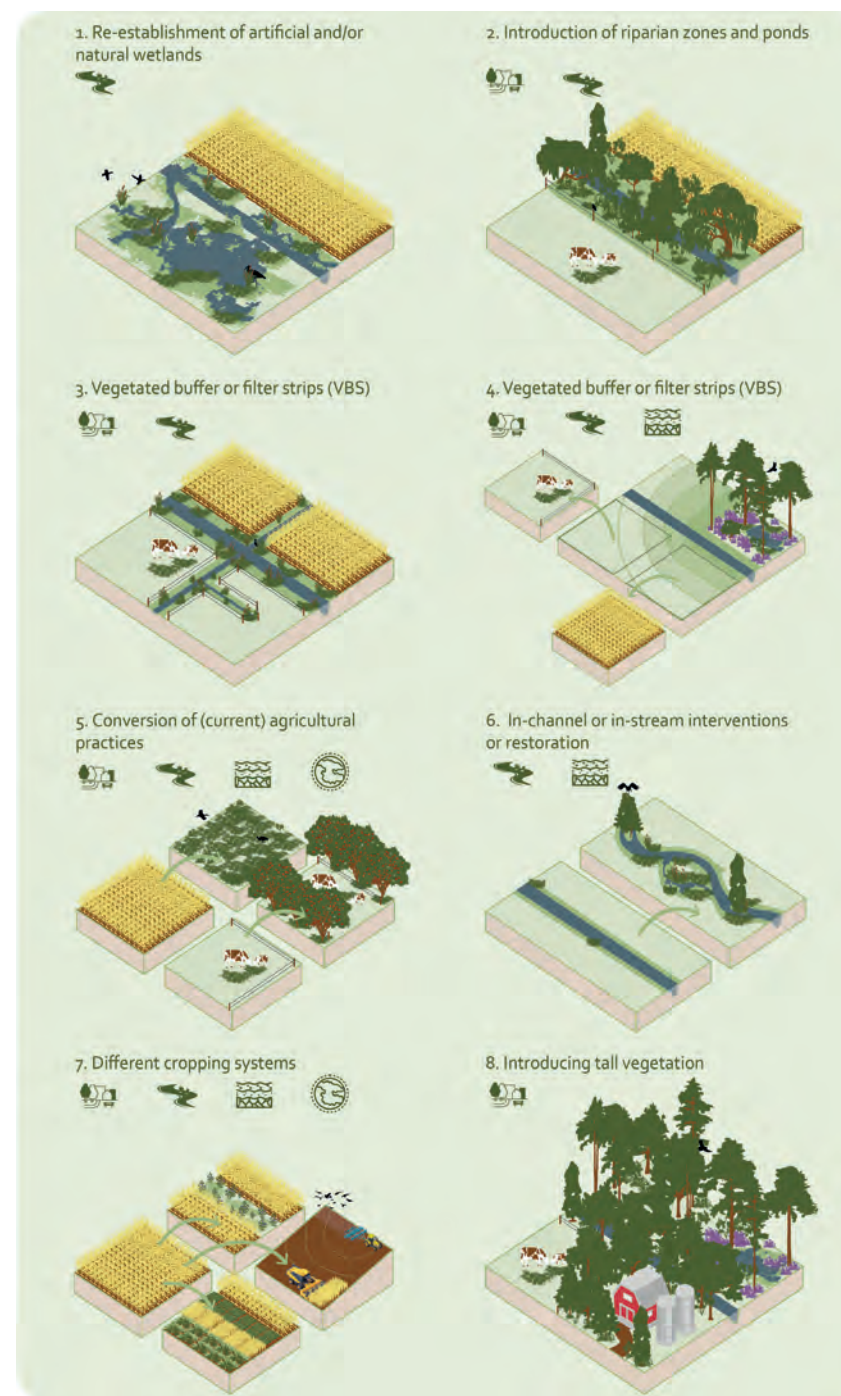
The concept, needed to address degrading ecology (top) in agricultural landscapes and introduced two systems 1) a low-dynamic framework and 2) high-dynamic plots.

Four guidelines			
1	Increased attention towards landscape and climatic conditions	3	More collaboration between the two dynamics
2	Addressing nitrogen on several fronts	4	High-dynamic landscape needs to become more integrate

A literature study on the critiques on the concept showed a variety of critiques. However, four themes emerged that focused on nitrogen. These were formulated as guidelines.

Nr. Intervention	Frequency	Findings	Configuration	Location	Addresses N in:	Ambient air	Water	Soil	Stratosphere
1. Re-establishment of artificial and/or constructed wetlands	54	Wetlands are able to treat wastewater, to provide habitat for wildlife, and to control non-point source (NPS) runoff, especially from rural (agricultural) plots.	Planes and lines	Hydric soils, along streams and rivers in catchment					
2. Introduction of riparian zones and/or ponds	44	Riparian (buffer) zones is a zone of vegetation adjacent to streams, rivers, or wetlands.	Lines	Adjacent to streams					
3. Vegetated filter or buffer strip (VBS)	35	VBS is an area of either planted or indigenous vegetation situated between a potential pollutant source area and a surface-waterbody.	Lines	Plot edges					
4. Creating distance between N-source and receptor (buffer zones)	35	Buffer zones, also referred as low-emissions zones, are often considered to create a "safe" distance between N-source and receptor to protect sensitive nature.	Planes and lines	Between N-source and (sensitive) receptor					
5. Conversion of farming practices	49	Converting conventional farming to for instance organic farming reduces excess nitrogen.	Planes	Catchment					
6. In-channel or in-stream interventions or restoration	49	Interventions like creating meander bends, widening channels, optimizing bank grading and creating two-stage ditches increase contact time with denitrifiers.	Planes and lines	Between N-source and (sensitive) receptor					
7. Different cropping systems	45	Different cropping systems like intercropping, catch crop, crop rotation and introducing strip or contour cropping can reduce nitrogen.	Planes	Plots					
8. Tall vegetation	23	Vegetation like woodland and tree belts are known to uptake excess nitrogen from air by capturing nitrogen.	Planes	Catchment					

A literature study of a hundred papers showed eight most frequent applied interventions that are applicable in addressing N in: 1) ambient air, 2) water, 3) soil and 4) stratosphere.



Overview of the eight interventions and their applicability in addressing excess nitrogen deposition in the four sources.

## Roy Italiaander

Supervisor: Seth Wilberding MLA LEED-AP

Examiners: dr.ir. A (Agnès) Patuano and prof. dr. MM (Martha) Bakker (LUP)

## Healing the 'green desert' through an updated casco approach

A 21st century update of the casco concept to address the nitrogen crisis. The Achterhoek region (NL) as a case study.

### Abstract

All living things require nitrogen, the most plentiful atmospheric element, to survive. However, excess nitrogen presents challenges to ecosystems in increased nutrient loading. As a result of adhering to EU biodiversity standards and given that the Netherlands identified the reduction of nitrogen in agricultural systems as a solution to addressing this issue, design approaches have become important in addressing these challenges. One renowned Dutch design approach, the casco concept, was a method developed in the 1980s for a Dutch sandy-soil landscape, the Achterhoek, to address conflicts between agricultural and ecological systems. However, while widely used in Dutch spatial design at the time, this concept did not explicitly address nitrogen-related challenges and has also faded from current design discourse and application. In response, this thesis updates the casco concept to better address nitrogen-related challenges. After reviewing the literature on the nitrogen cycle and the casco concept, applicable spatial interventions were identified to help address these challenges. The researcher then used the original Achterhoek study area to test applicability of an updated casco strategy in addressing the nitrogen problem. Based on two rounds of expert interviews, the researcher updated the casco concept for the Achterhoek by incorporating additional spatial interventions to reduce excessive nitrogen deposition, resulting in an updated casco plan for the Dutch Pleistocene landscape of the Achterhoek.

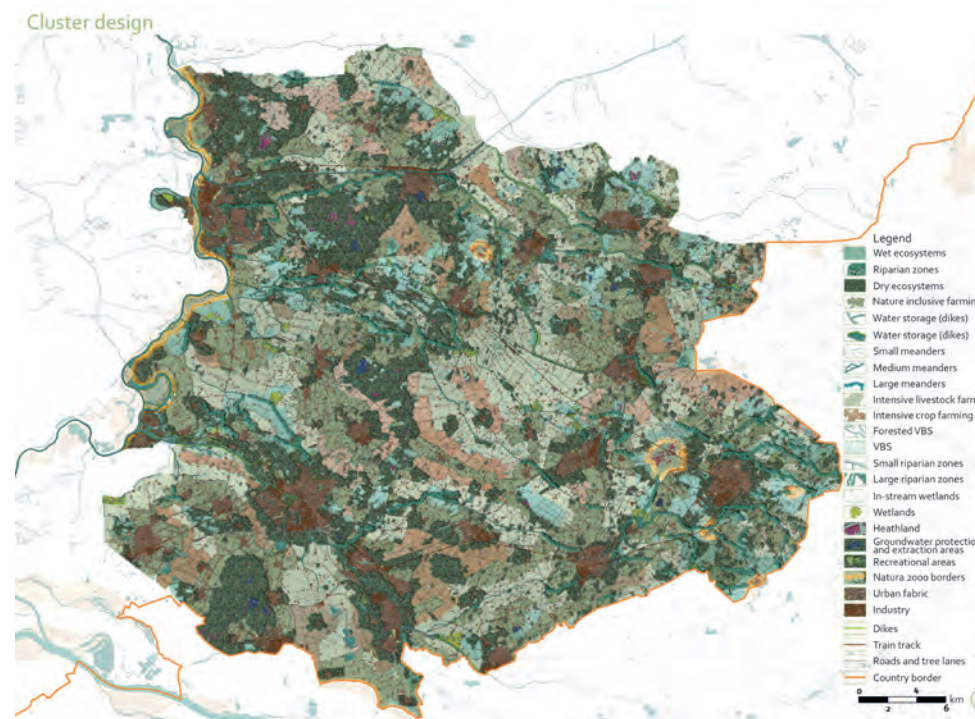


The Achterhoek region is chosen because it is an agricultural landscape, it holds Natura 2000 areas and it was used by the casco authors back in 1988 as a study area.





The basis of the network design is a very common design framework 'networks'. This design focusses on the strenght of connecting habitats.



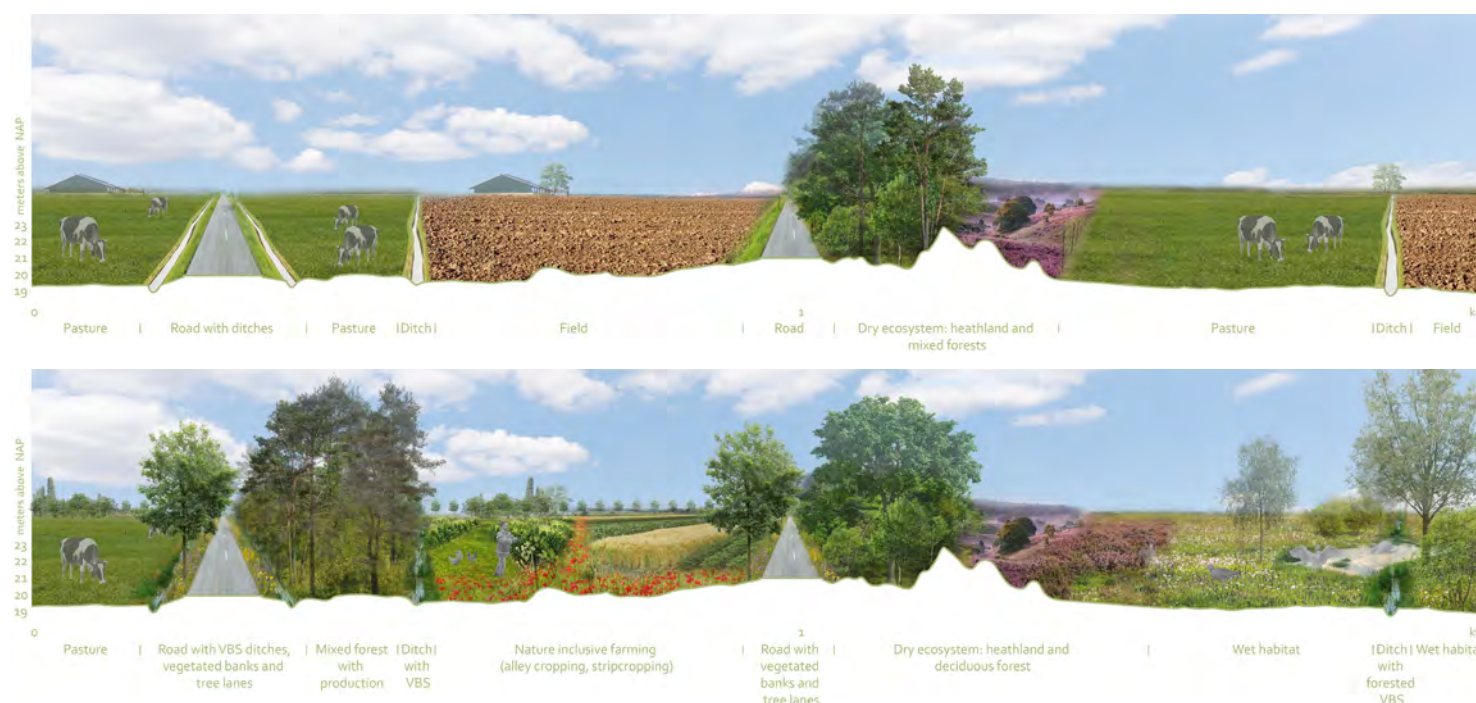
The basis for the second design is another common design framework 'clusters'. This design focusses on the strenght of grouping functions.



After the first round of qualitative interviews the feedback was assessed and another design was made, using the strenghts of both presented designs.

Eight guidelines			
1	Increased attention towards landscape and climatic conditions	5	More space for water(buffering) in the casco design
2	Addressing nitrogen on several fronts	6	The need for a micro network
3	More collaboration between the two dynamics	7	The content of the framework becomes more important
4	High-dynamic landscape needs to become more integrated	8	Gradient of applicable interventions

Based on two rounds of qualitative interviews eight guidelines could be formulated and used to update the casco concept to be applicable in addressing nitrogen in the Dutch Pleistocene sandy region of the Achterhoek.



The integrated casco design shows that based on the eight interventions and guidelines a multifunctional agricultural landscape can be established that offers space and possibility for both ecology and agriculture. Existing (top) versus proposed (bottom).



Research through design resulted in an integrated casco design for the Achterhoek, focussing on enhancing the balance between agriculture and ecology.

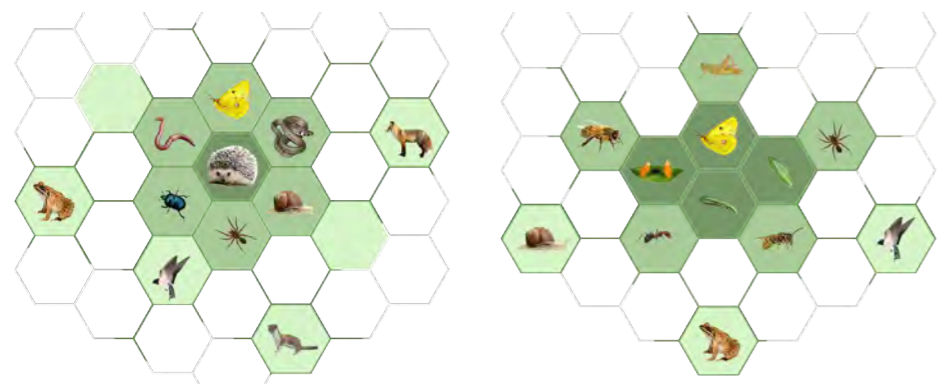
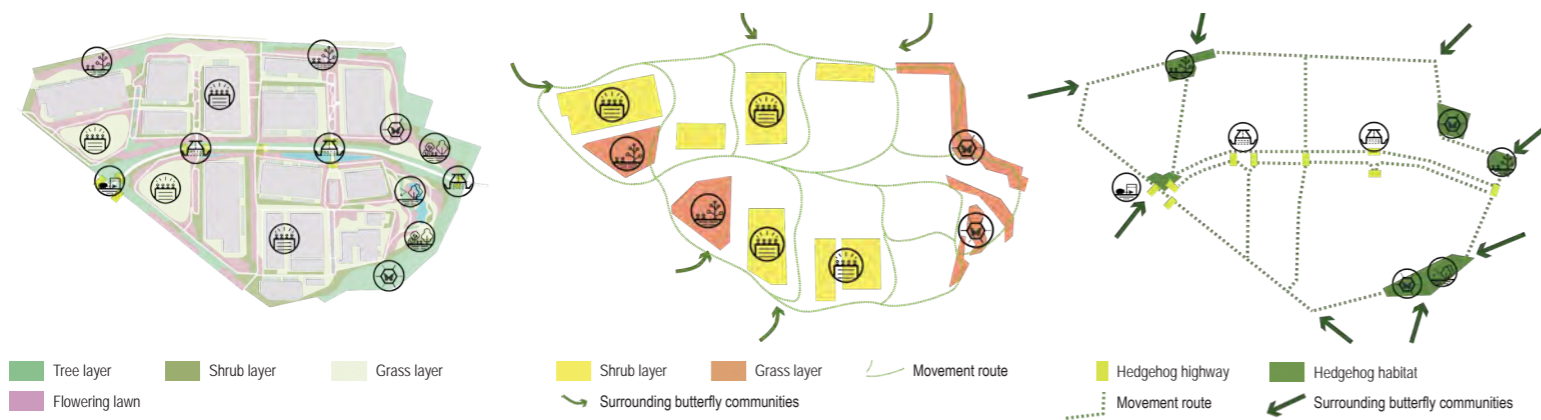


Figure 1. Relationship web of hedgehogs and butterflies



Figure 2. Plant requirements of butterflies



■ Tree layer    ■ Shrub layer    ■ Grass layer    ■ Shrub layer    ■ Grass layer    → Movement route  
■ Flowering lawn    → Surrounding butterfly communities    → Hedgehog highway    → Hedgehog habitat  
→ Movement route    → Surrounding butterfly communities



**Haoyu Yang**

Supervisors: Homero Marconi Penteado

**'Reset Venlo'**

**- enhancing biodiversity in Venlo through urban open space transformation**

Venlo, the Netherlands

**Abstract**

With the continuous expansion of cities, the living space left for wildlife is gradually limited. Land use changes accelerate the loss and fragmentation of natural habitats, which have consistent negative effects on urban biodiversity. However, as a mosaic of mixed and small-scale habitats, highly urbanized regions still have great potential for biodiversity preservation and urban ecosystem enhancement. Urban open space becomes an important element affecting urban biodiversity by offering ecological opportunities to the urban fabric.

This thesis aims to propose landscape interventions that transform urban open space to enhance biodiversity in Venlo. Four specific sites are selected to represent the urban areas. Several design guidelines regarding hedgehogs and butterflies across multiple scales are made. The ultimate goal is to employ biodiverse landscape design guidelines as a means to create suitable habitats with abundant living spaces and convenient access to food resources and contribute to local biodiversity enhancement in Venlo.

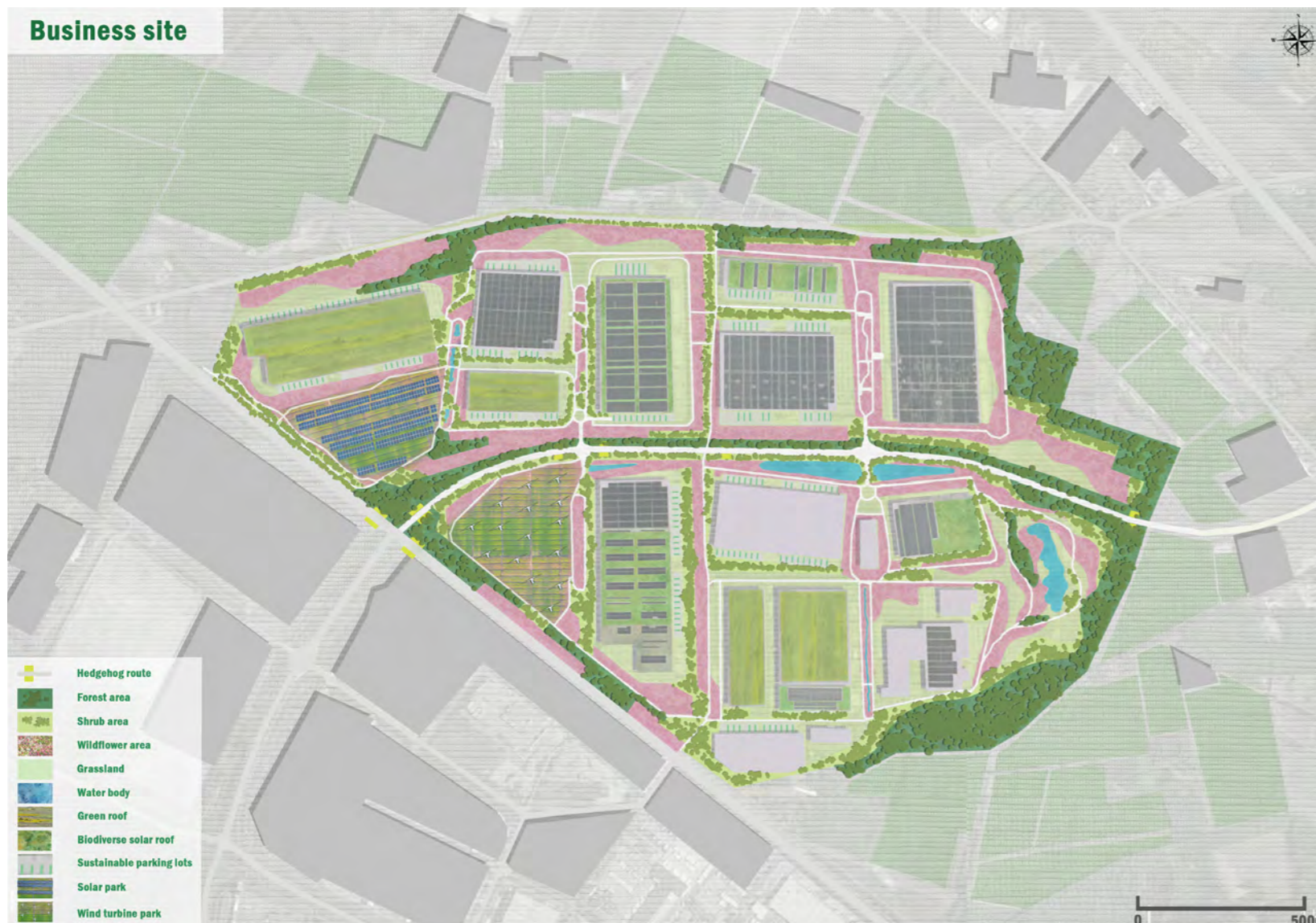


Figure 3. Masterplan of business site

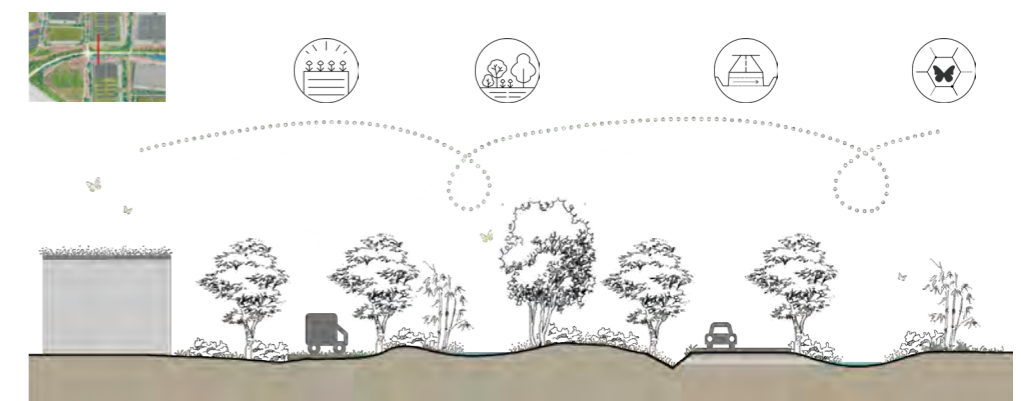


Figure 4 & 5. Perspective and section of business site

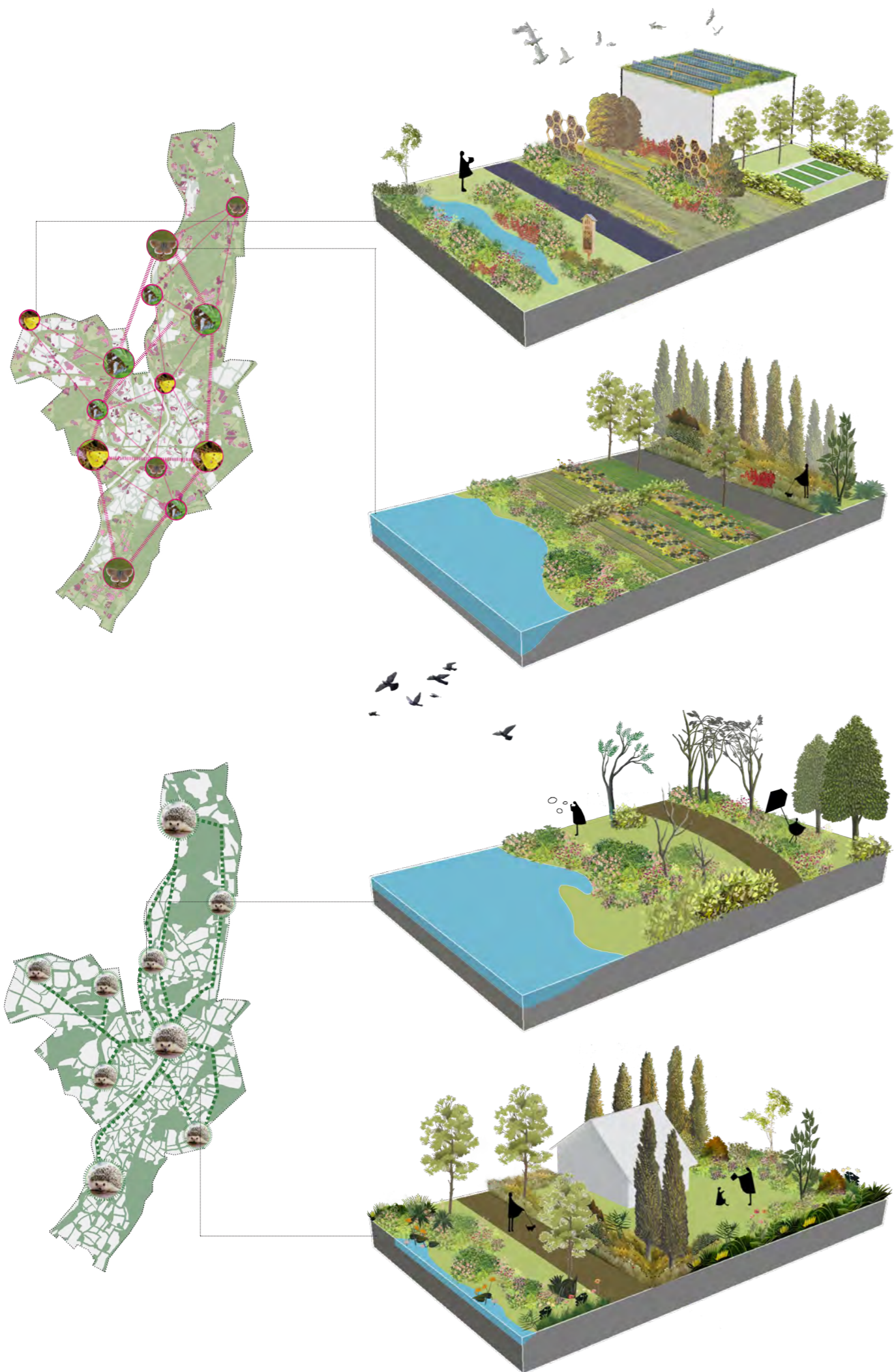


Figure 6 & 7. Habitat networks in urban design

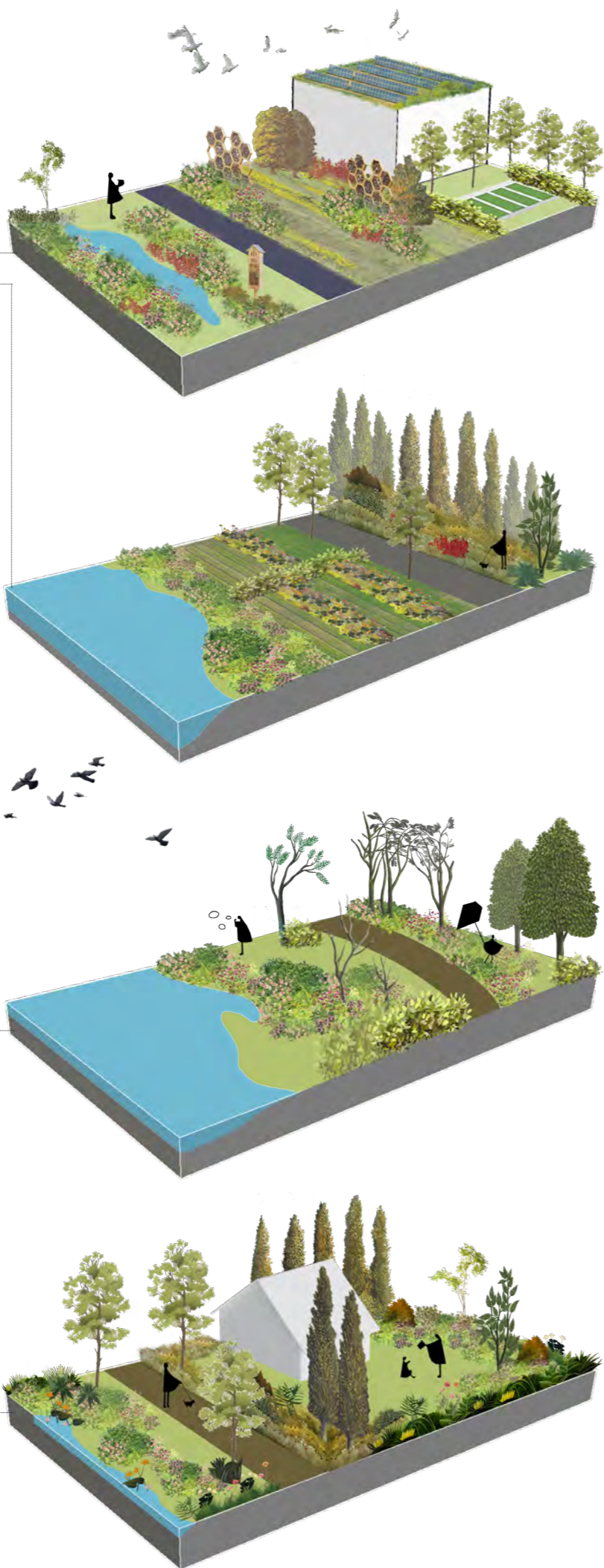


Figure 8. Detailed diagrams in urban design

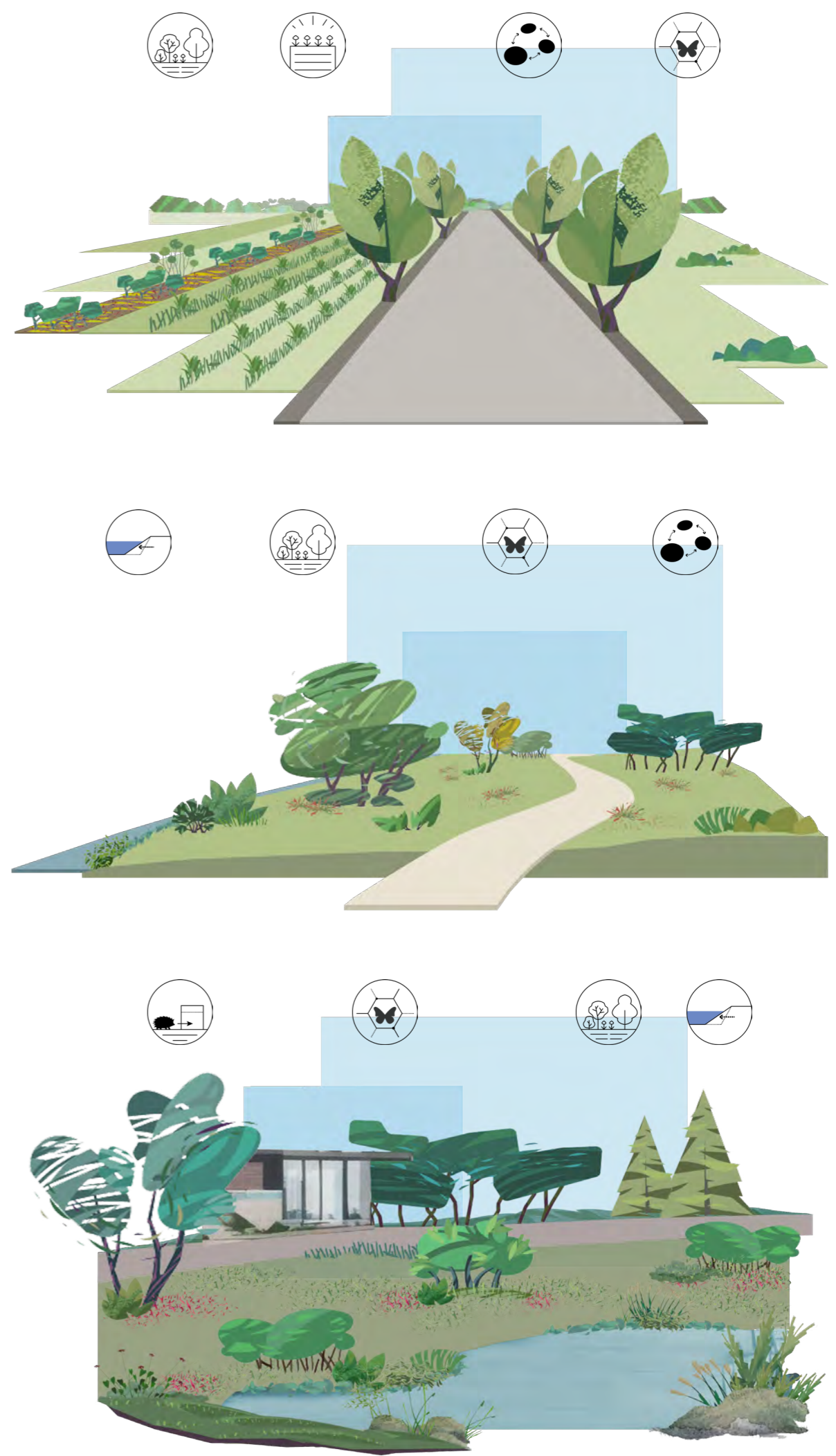
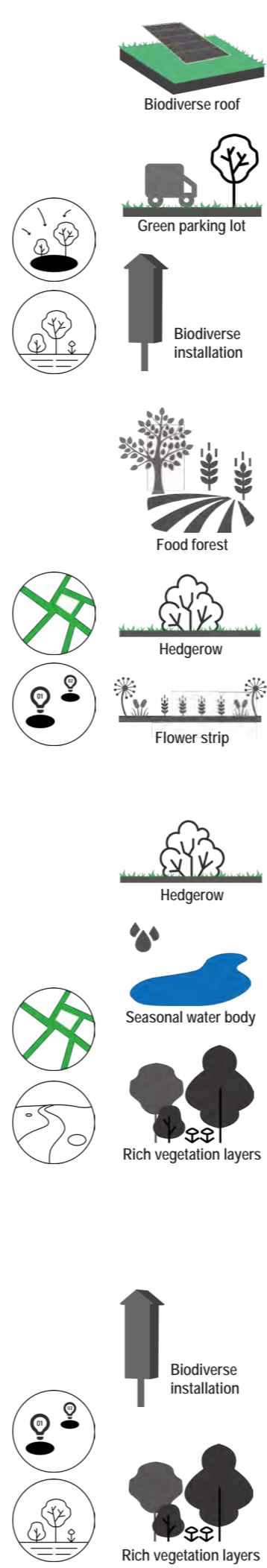
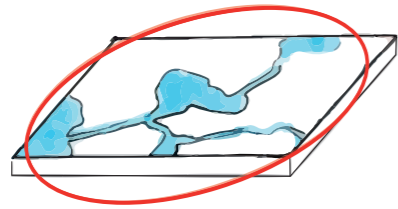


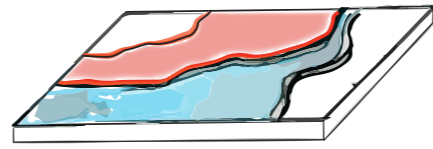
Figure 9. Perspectives of chosen sites



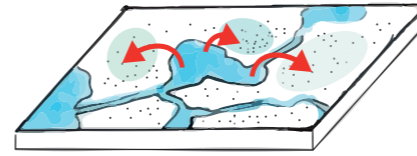
Dynamic water system



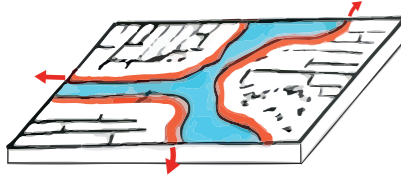
Enlarge boezem



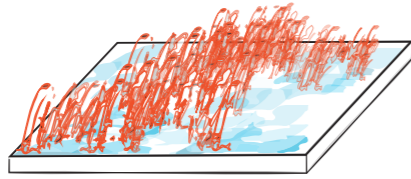
Water retention along high water systems



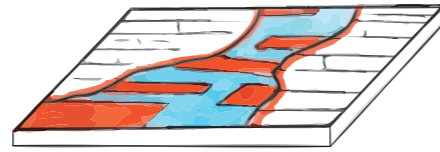
Soil - water relationship



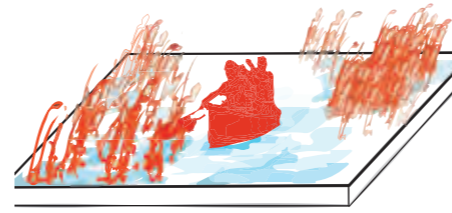
Water is connection



Waterlogged nature



Waterlogged agriculture



Waterlogged recreation

Long-term principles from long-term guidelines proposing solutions to climate related challenges in the future



Pier while sailing you can reach places that are usually unaccessible



Kirsten the horizon with little villages with church towers, some farms here and there, and cows



Hylke The most important event of the year is the Bike - Elfstedentocht.

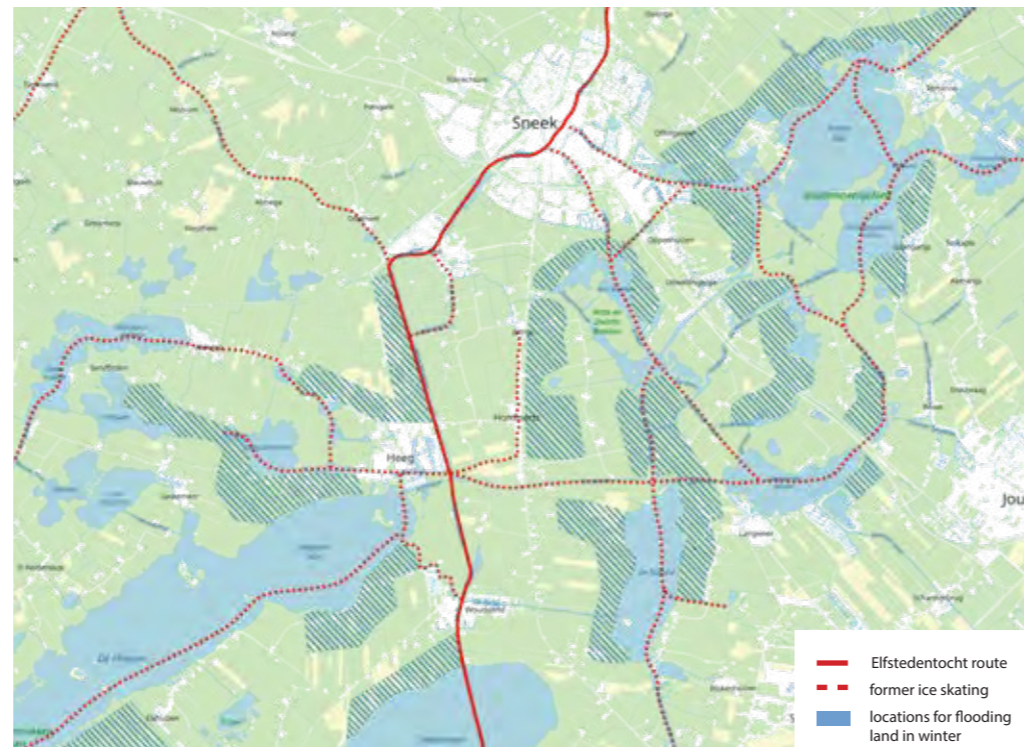


Jan The function has always determined the shape of the landscape.



Age searching bird eggs while walking through the diverse meadows...

photographs: local inhabitants as respondents



The narrative of ice skating and the Elfstedentocht is told by the respondents and revealed from literature. This map shows a concept of how climate resilience can be combined with this landscape narrative.

Jana Bruijn

Dipl. Ing. MA Sanda Lenzholzer (examiner)

Lisanne Struckman Msc. (supervisor)

### Revealing narratives

landscape narratives as translator between long-term visions and landscape design

Frisian Lake area, Friesland, the Netherlands

### Abstract

The soil subsidence in Dutch peat meadow landscapes in combination with the climate change challenges of the future brings the problem of soil subsidence to the next level. Climate change exacerbates peat oxidation, posing a threat to the existence of these landscapes. Long-term visions propose solutions to these challenges, emphasizing the need for radical transformation. The problem is that the landscape innovations proposed by these visions often lack consideration for human aspects and local values and are therefore too abstract to implement directly into a landscape design. Therefore, this research bridges the gap between abstract long-term visions and concrete landscape designs by using landscape narratives to reveal missing local human aspects and values. Landscape narratives capture local values, cultural backgrounds, and everyday connections with the landscape, providing insight into the human dimension often overlooked in long-term planning. From the Frisian Lake area, there are landscape narratives revealed by reviewing literature and poetry and through in-depth interviews with local landscape users. In a research-through-design, it is tested whether the obtained landscape narratives are a suitable tool to bridge the gap to a landscape design. Through explorative and interactive design phases there is searched for forms that the landscape narratives can give to the long-term visions in a landscape design. It turns out that landscape narratives are a suitable tool to fill in the missing human aspects and local values in long-term visions. This research shows that the quality of landscape narratives is dependent on their method of extraction. Ultimately, this quality of the landscape narrative determines how successful a landscape narrative can be in enabling the translation of long-term visions into a landscape design. This design is inspired by the landscape narrative of the Elfstedentocht. It combines future climate resilience with the increased chance of maintaining the tradition of ice skating in Friesland.

Settings



water bodies  
 Friese boezem  
 route  
 village  
 bridge

Events



seasonality  
 view over landscape  
 ice skating  
 route through different landscapes

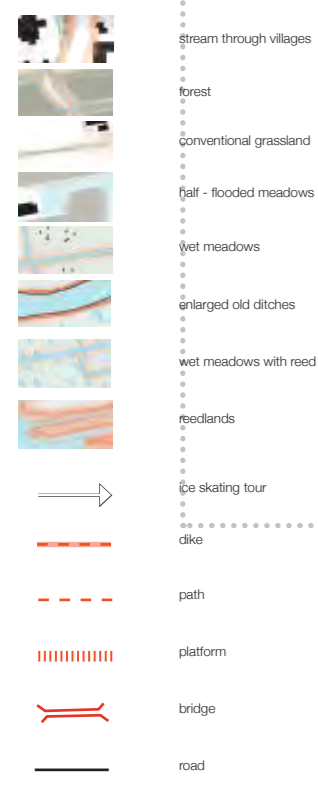
Characters



all the people -  
 from toddler to elderly

Icons: elements from landscape  
 narrative to design with

Legend



koek en zopie

Hot soup and tea: 'koek en zopie' is sold on the ice by local inhabitants



Walking through the landscape and cheering to the ice skaters



To skate around Hommerts, one has to climb over the dike to reach the stream through Hommerts.

Masterplan for Elfstedentocht in the area of polder Hommerts



Preliminary design concept to investigate the synergy between kitesurfing and nature



Preliminary design concept to investigate the synergy between bird watching and nature

**Adriaan Moerdijk**

Name supervisors: Yuting Tai & Christian Nolf

### **The Sand Motor** *redesigned*

Enhancing the synergy between nature and recreation on eco-recreational coasts

#### **Abstract**

The Dutch coast faces increasing challenges from sea level rise, pushing for a reevaluation of conventional “hard” coastal engineering methods. Projects like the Sand Motor and Hondsbossche Dunes exemplify a shift towards ‘Building with Nature’ solutions. These projects, referred to in this thesis as ‘eco-recreational’ coasts, facilitate not only coastal defense but also recreation and nature development. However, there is a tension between nature development and recreation on these types of coasts. Uncontrolled recreational activities pose threats to the habitat of target species like the Beach plover and Marram grass, essential components of coastal ecosystems. The regulation of recreation related to nature development on these coasts is still understudied. The Sand Motor, serving as a case study, highlights the intricate relationship between recreation and nature development. To collect information on the synergy between nature and recreation on eco-recreational coasts, a literature study was carried out. This was used to create the general design principles. Subsequently, reference projects were examined and a site analysis, complemented by an interview, was conducted on the landscape, target species and recreation types of the Sand Motor which includes essential target species and recreation types. As a result, integrated design guidelines were developed, which could be applied to the study area. A preliminary design was created, aiming to enhance the synergy between nature and recreation on the Sand Motor. This design was evaluated by experts with a multicriteria analysis. Their feedback and further practical insights are incorporated to enhance the design further. This research contributes to the body of knowledge about eco-recreational coasts. It bridges the gap between science and practice with the ‘research through design’ method which links practical knowledge with scientific research. Consequently, this research contributes to the acknowledgement of eco-recreational coasts, by showing it’s potential for both nature and recreation.



Birds-eye view artist impression of the final design of the Sand Motor 5 years after construction





**Anouk van Deursen**

Supervisor: Dr. Yuting Tai

Supervisor: Dr. Ir. Rudi van Etteger, MA.

Supervisor: Reinier Schrijvershof MSc.

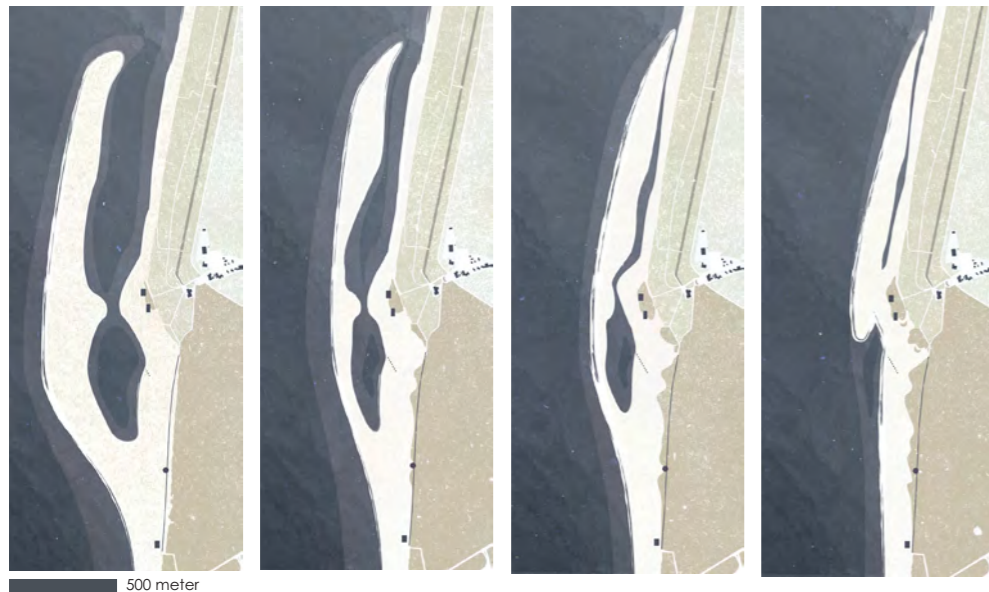
**Nature based Design Guidelines for the Camperduin Lagoon**

Spatial Quality in Mega-nourishment Recreation Zones Bergen, Netherlands

**Abstract**

This thesis examines the design, management, and maintenance of recreation zones in mega-nourishment, focusing on the case of the Camperduin Lagoon in the Hondsbossche Dunes mega-nourishment project. Coastal ecosystems, particularly sandy beaches and dunes, serve as crucial natural barriers against flooding and support diverse biodiversity. However, these ecosystems face significant climate change and urbanization pressure, leading to coastal squeeze. Mega-nourishment, a Building with Nature solution, emerges as a promising approach to address coastal squeeze and accommodate growing recreational demands. Incorporating natural dynamics in coastal design requires reconsidering maintenance and management. The Camperduin Lagoon exemplifies the integration of coastal defense with recreation. However, it presents challenges in maintenance and management due to its dynamic nature and evolving human interactions.

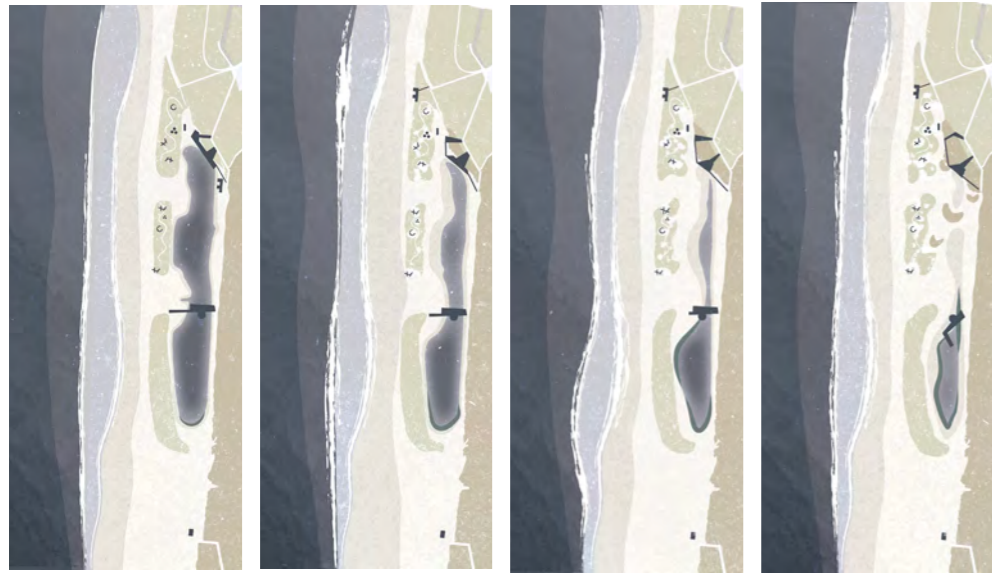
Using a theoretical framework that focuses on spatial quality and a research-through-design approach, this thesis explores alternative nature-based designs and management strategies for the Camperduin Lagoon area. Theoretical knowledge from literature studies, thematic analysis results, and knowledge obtained from design are integrated into spatial design guidelines for Camperduin. From the guidelines, principles have been derived that centre on the design, management, and maintenance of mega-nourishment through the distribution of sand by human and natural processes. This involves creating landforms and integrating the subsequent cultivation of a coastal defence landscape with recreation benefits through spatial quality-enhancing interventions. Overall, this research contributes to the understanding of how mega-nourishment projects can harmonize human activities with natural dynamics while promoting coastal resilience and enhancing spatial quality.



Design explorations: Concept spit with two basins, a raised path and a beach pole play structure.

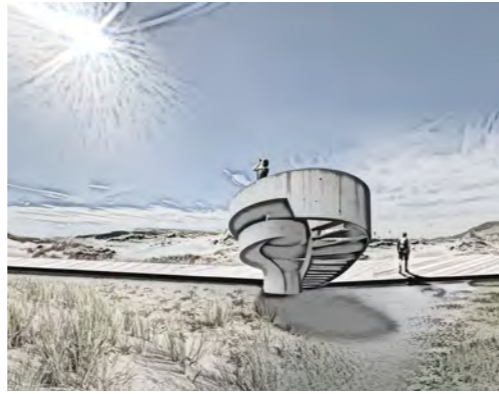
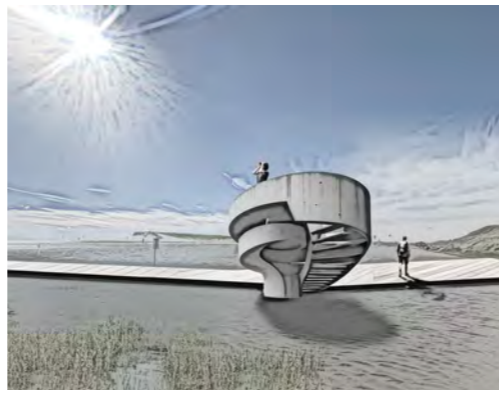




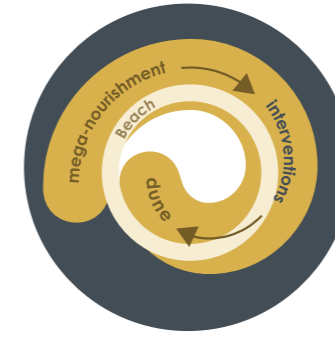


200 meter

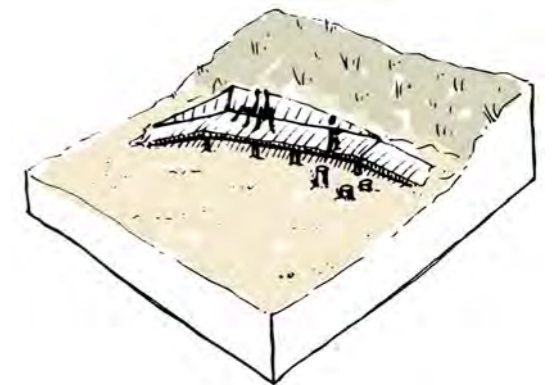
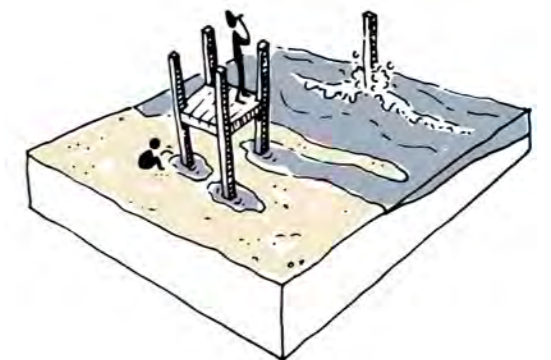
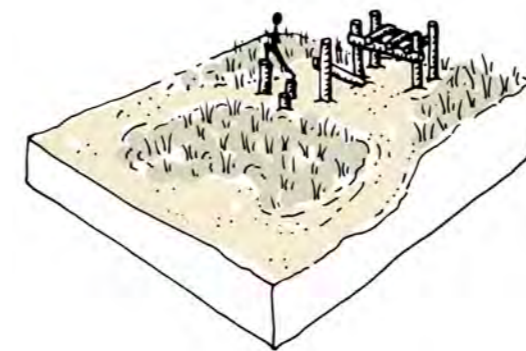
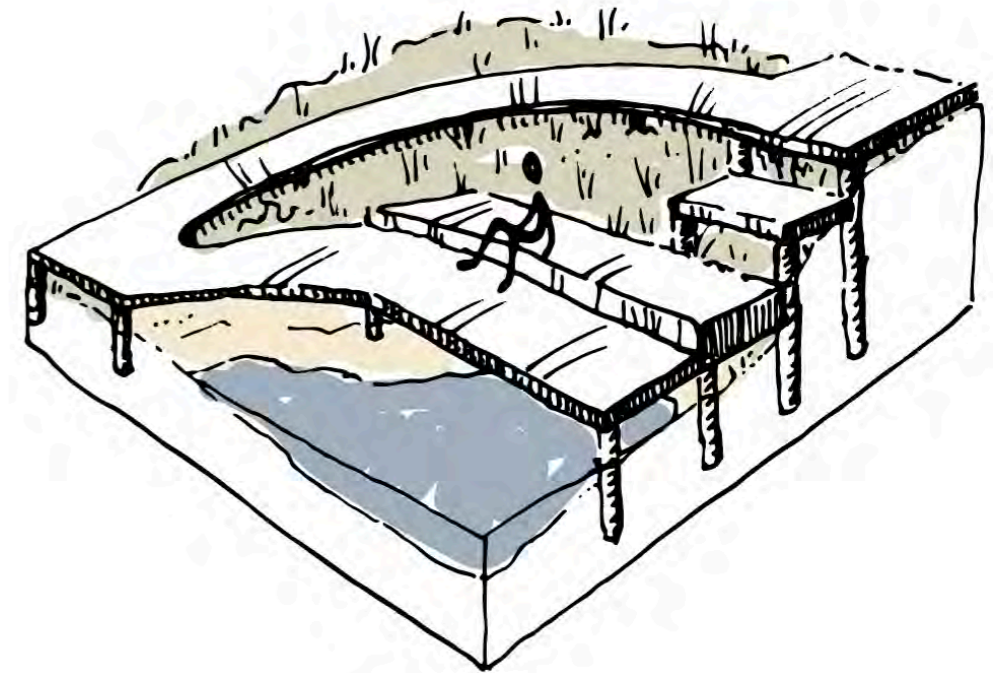
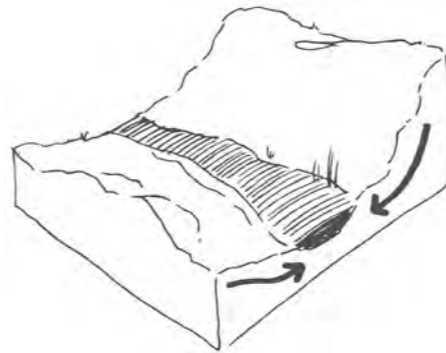
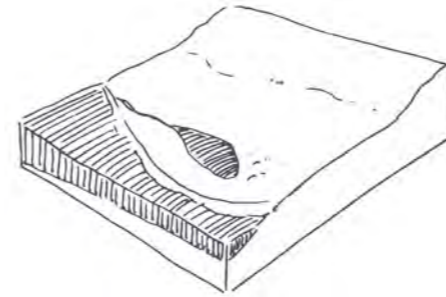
Design explorations: Concept with wet dune valley and dune development, with play structures, raised stairs with seating and viewpoint with platform.



Design guideline diagram



Design guideline illustrations.



# to salt-marsh

(verb)

This design research delves into applying local, low-tech traditional ecological knowledge (lo-TEK) to engage communities in nature-based solutions (NBS) for outerdyke salt marshes along the Wadden Sea Coast. The study explores the intricate relationship between natural systems and human interaction in the Wadden Sea landscape. Using ethnographic research methods, it examines the landscape's transitions over time, focusing on how natural dynamics, human interventions, and climate change consequences. Current NBS often overlook community involvement, presenting an opportunity to reintegrate the local landscape community as ambassadors for preserving salt marshes. Investigating community perspectives on natural processes and climate uncertainties, the study promotes a more equitable relationship between humans and nature through the lo-TEK approach. By fostering dialogue and shared understanding within the landscape community, the research advocates for landscape ambassadors who actively shape regenerative processes. Through practical interventions and artistic expressions, the study empowers individuals to contribute to discussions on the future of coastal ecosystems amidst climate change.

to actively engage in salt marshes' natural processes

**Noa Schouten**  
Supervisor: dr.ir. R (Rudi) van Etteger

**To salt-marsh**  
To actively engage in salt marshes' natural processes  
Waddencoast, the Netherlands



# NBS

engineering with  
ecological knowledge

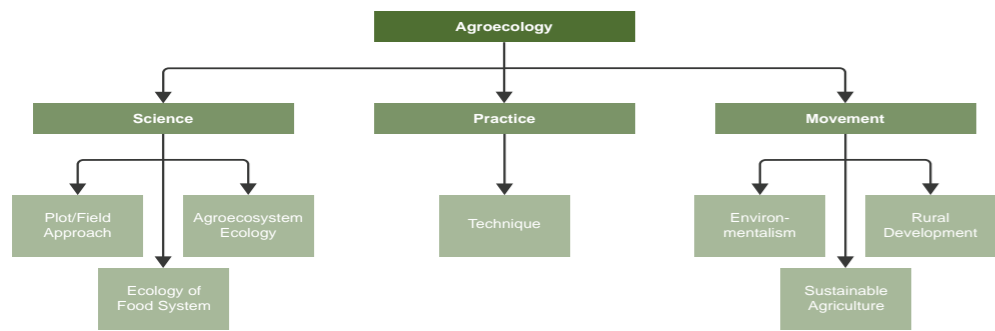
**lo-TEK**  
mythology  
local and low-tech  
traditional ecological knowledge

**Zwaan Miedema** is a ceramist  
who makes urns out of wadden clay  
facilitating to spread ashes of loved  
ones out in the salt marshes

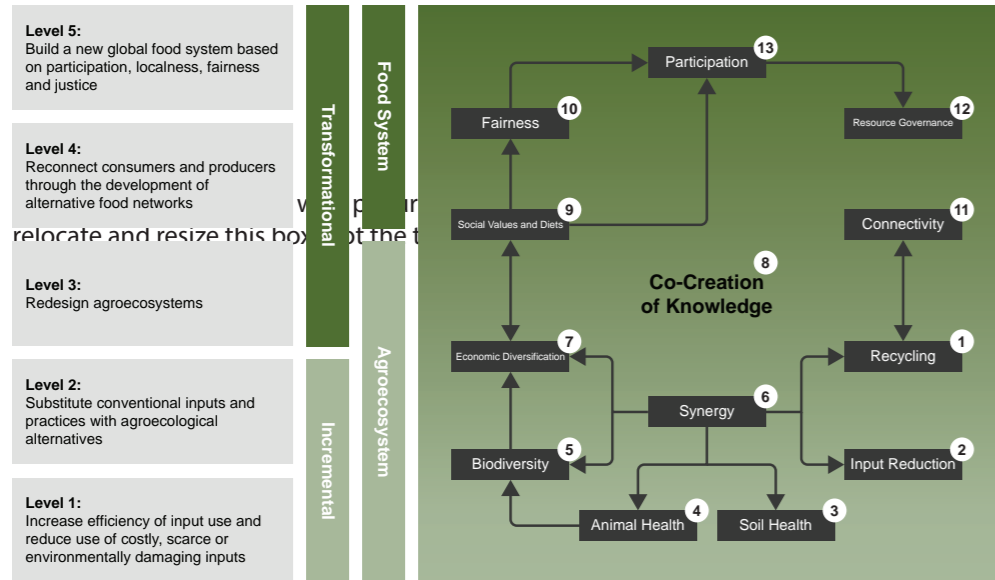
a deeper engagement is not possible  
human and salt marsh are evolving together



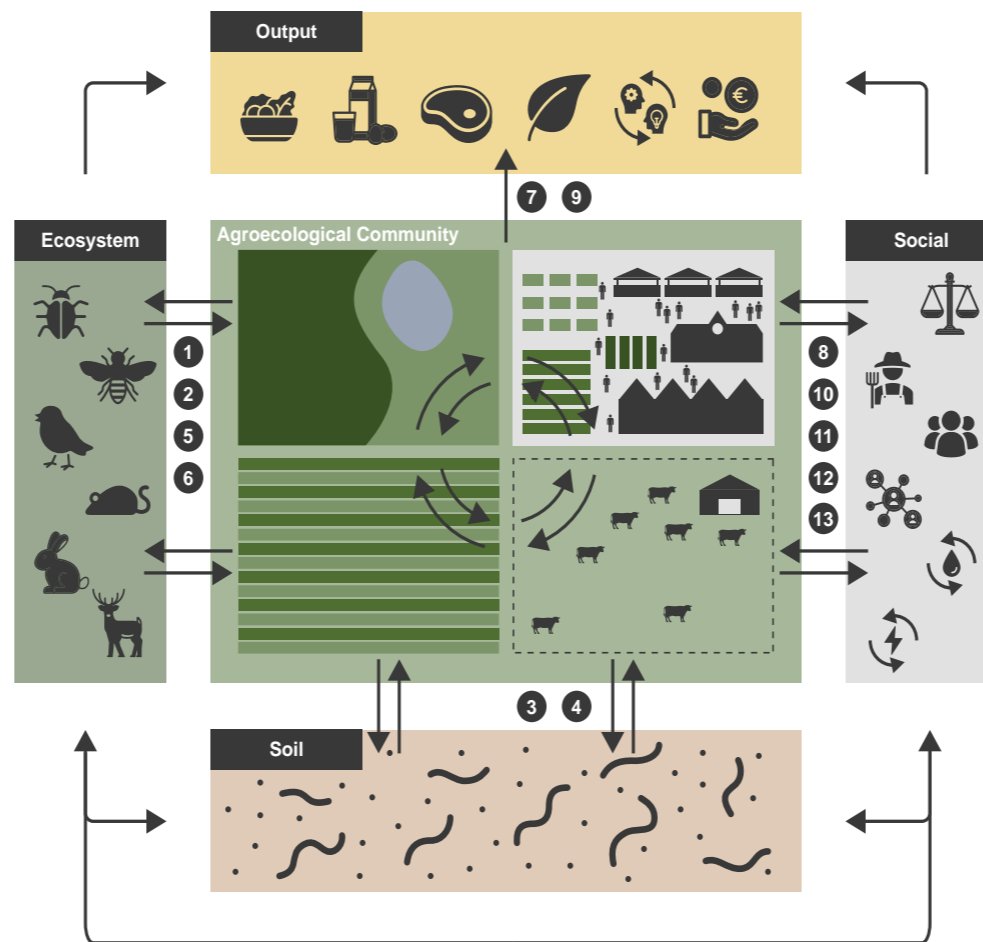
*Schouten*  
2024



Diversity of Current Types of Meanings of Agroecology



Our Current Understanding of Agroecology



Spatial Diagram for an Agroecological Urbanism

**Yves Gijzen**

Name supervisors: Christian Nolf, Marjolein Derks, Homero Marconi Penteado

**Agroecology in the Dutch Urban-Rural Fringes**

Towards Design Guidelines, Oss, the Netherlands

**Abstract**

This thesis arises from a confluence of two spatial challenges, addressing new models of agriculture in a paradigm shift towards more sustainable practices as well as rapid city-expansion projects amidst a housing crisis. Currently, agroecology, a burgeoning method of sustainable agriculture that applies ecological principles in farming and is rooted in rural knowledge, lacks substantial research on upscaling into (peri-) urban areas, and thus, there is a gap in knowledge pertaining to the employment of agroecology as a tool to shape new models of urbanisation. The objective of this thesis is to investigate the best possible spatial configuration and subsequent integration of agroecological functions in the Dutch urban-rural fringes.

The methods used to conduct the research include research for design, research on design, and research through design, respectively. Experts in the interrelated fields of agroecology and spatial design have been consulted in the research through design phase in order to determine the most suitable spatial configuration of agroecological and urban functions out of four design alternatives that has, in turn, been used as the basis for the final design from which design guidelines were derived. The conclusions of this thesis have been drawn from answering the sub- and main research questions. The sub-research questions brought about key spatial principles on effective agroecology and applicable models of (peri-)urban agriculture. Consequently, these findings have been taken into consideration during the design process, giving rise to a list of design guidelines for designers to apply in city-expansion projects. From here, the thesis argues that an effective integration of agroecological functions in the Dutch urban-rural fringe is possible through adequate design. This thesis contributes to the generation of new knowledge for the design of an agroecological urbanism, specifically in the Dutch urban-rural fringe, taking Amsteleind in the city of Oss as a case study.

Models of (Peri-) Urban Agriculture	Agroecological Principles												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Backyard Gardens	Green	Green	Yellow	Orange	Yellow	Green	Orange	Orange	Green	Yellow	Orange	Orange	Yellow
Rooftop Gardens	Green	Green	Red	Red	Orange	Yellow	Orange	Yellow	Green	Yellow	Orange	Yellow	Green
Guerrilla (Tactical) Gardens	Green	Green	Green	Red	Yellow	Yellow	Orange	Yellow	Green	Yellow	Yellow	Yellow	Green
Hydroponics	Orange	Yellow	Red	Red	Red	Orange	Green	Yellow	Orange	Red	Red	Orange	Orange
Aquaponics	Green	Green	Red	Red	Red	Orange	Green	Yellow	Orange	Red	Red	Orange	Orange
Vertical Farming	Yellow	Green	Red	Red	Red	Orange	Green	Yellow	Orange	Red	Red	Orange	Orange
Urban Pollinator Gardens	Green	Green	Yellow	Green	Green	Green	Red	Green	Yellow	Orange	Green	Yellow	Green
Urban Greenhouses	Green	Green	Orange	Red	Orange	Yellow	Yellow	Green	Yellow	Orange	Green	Yellow	Green
Urban Livestock Farming	Green	Green	Green	Orange	Orange	Green	Green	Green	Green	Yellow	Green	Yellow	Green
Food Forests	Green	Green	Green	Yellow	Green	Green	Yellow	Green	Green	Yellow	Green	Yellow	Green
Orchards	Green	Yellow	Yellow	Orange	Yellow	Green	Yellow	Yellow	Green	Yellow	Green	Yellow	Green
Community Gardens	Green	Green	Green	Yellow	Green	Green	Yellow	Green	Green	Yellow	Green	Yellow	Green
Agroforestry	Green	Green	Green	Yellow	Green	Green	Yellow	Green	Green	Yellow	Green	Yellow	Green
Market Gardens	Green	Green	Green	Orange	Yellow	Green	Green	Green	Green	Yellow	Green	Yellow	Green
Agroparks	Yellow	Green	Orange	Yellow	Green	Green	Green	Green	Green	Yellow	Green	Yellow	Green
Peri-Urban Horticulture	Green	Green	Green	Orange	Yellow	Green	Green	Green	Green	Yellow	Green	Yellow	Green
Livestock Farming	Green	Orange	Green	Green	Orange	Green	Green	Green	Green	Yellow	Orange	Orange	Yellow

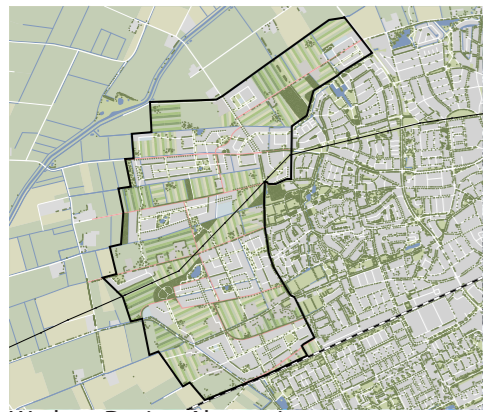
Agricultural Models aligned with the 10 Agroecological Principles



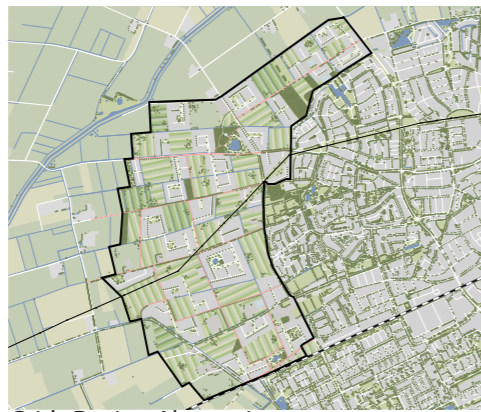
Farm of the Future, Lelystad



Agroecology in the Urban-Rural Fringes



Wedges Design Alternative



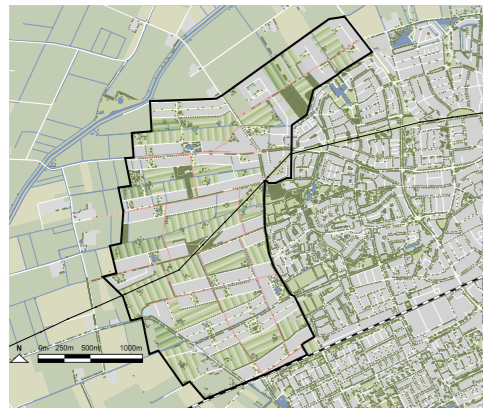
Grids Design Alternative



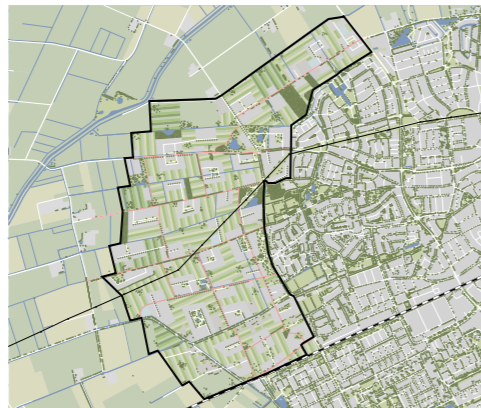
Cross-Section and Visualisation of Wedges



Cross-Section and Visualisation of Grids



Linear Design Alternative



Cells Design Alternative



Cross-Section and Visualisation of Linear



Cross-Section and Visualisation of Cells



Visualisation of Mid/High-Rise Section



Visualisation of Low-Rise Section



Final Design



Final Design: Mid/High-Rise Section



Final Design: Low-Rise Section



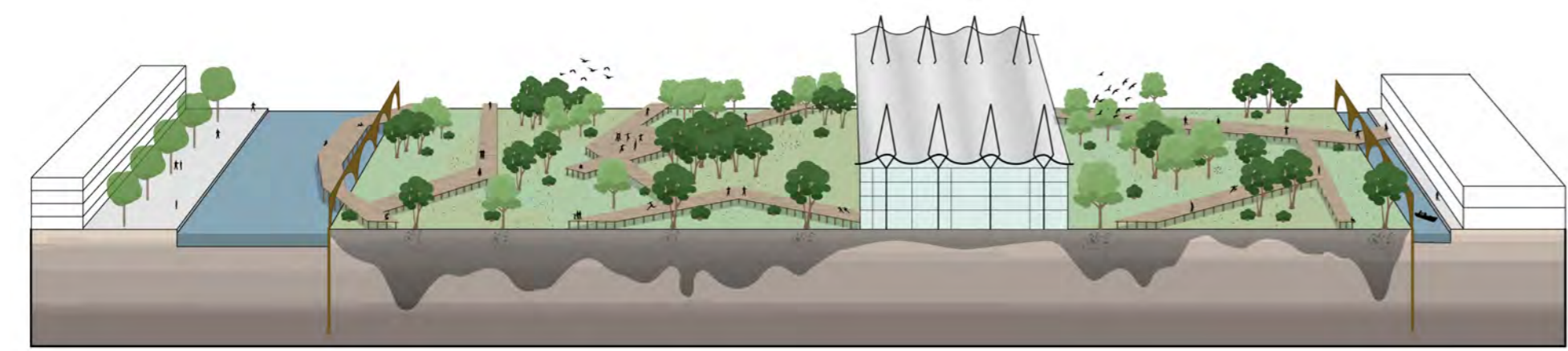
Final design of the Binckhorst park

**Arend van der Kam**  
 Name supervisors:  
 i.r. Seth Wilberding  
 dr.ir. Clemens Driessen (Cultural Geography Group)

**Spectres of Binckhorst**  
 An inquiry into dark ecological park design principles for coexisting with pollution in the Anthropocene.  
 Binckhorst, the Hague, Netherlands

**Abstract**  
 The concept of the Anthropocene, proposed by Crutzen and Stoermer in 2000, designates a new geological era characterised by significant human influences on Earth's systems. Traditional conceptions of nature are being challenged, with dark ecology emerging as a philosophical perspective that recognises the complexity and interconnectedness of ecological systems, including pollution, as opposed to traditional romanticised conceptions of nature. Dark ecology, underused in landscape architecture, has the potential to guide landscape architects towards alternative frameworks when designing urban parks within the Anthropocene, bridging the gap between theoretical discourse and practical application.

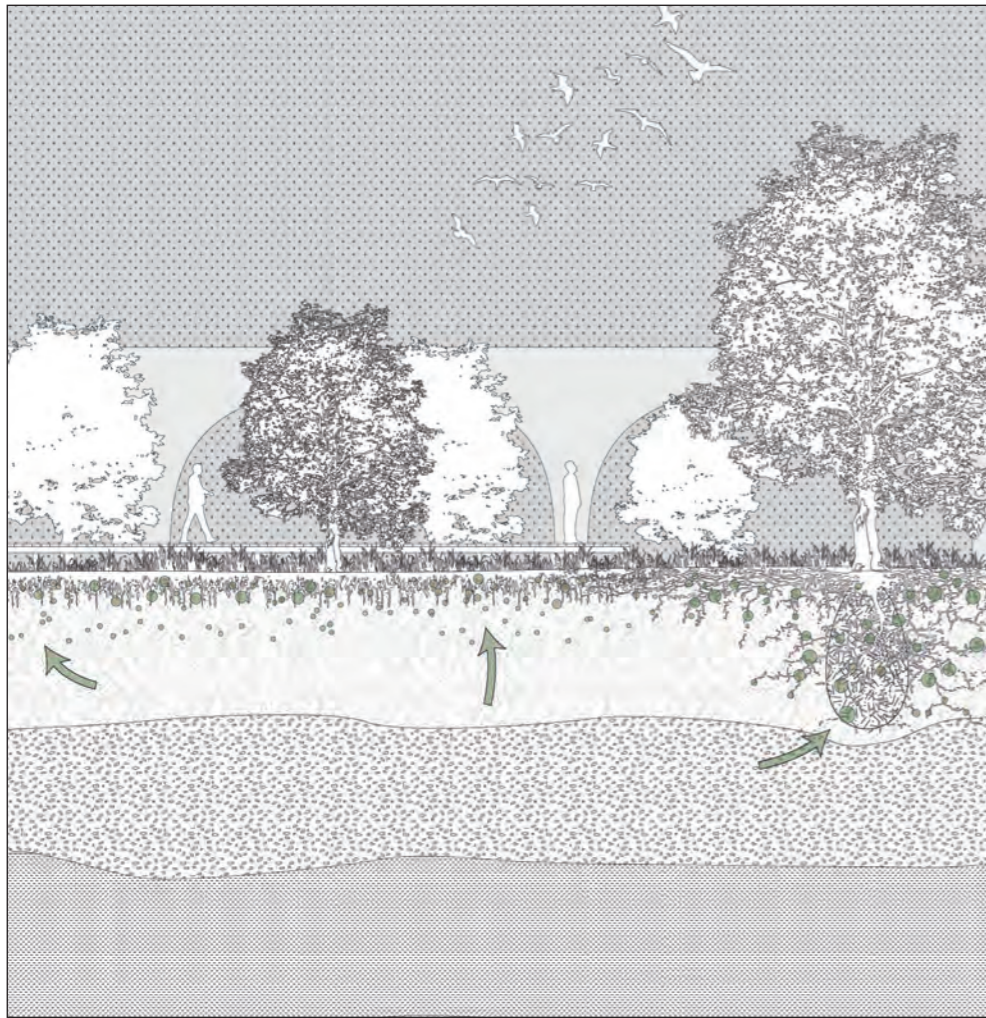
This thesis explores the potential of dark ecology in the design of an urban park in the Binckhorst by distilling key themes outlined by the municipality of The Hague for a park on heavily contaminated soil, and integrating them with dark ecology principles to construct integrated design principles. These were then translated into two concept designs, which were refined into a final design based on expert evaluation. The research shows that dark ecology challenges idealised notions of nature and advocates acceptance of environmental damage caused by human activities. The final park design aims to change visitors' perceptions by fostering a deeper understanding of the interconnectedness between humans and the environment in the Anthropocene, highlighting the importance of addressing pollution in urban landscapes and offering a fundamental transformation in the design of green spaces.



Abstract section of Concept A. Parts of this concept design was later integrated into the final design



With these Burial pods (source: Citelli & Bretzel, n.d.) it is possible to be buried in the park. To the pod a phytostabilization tree species (*Quercus ilex*) is connected.



Section of the Phytostabilization fields and burial pods



Section of the Ruble paths that will create micro climates for spontaneous vegetation



With seed bombs the visitors of the park can spread the vegetation.




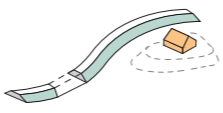


Phytostabilization fields will lock the soil contamination. Trees will be visible and grow as signs from the past with the burial pods.





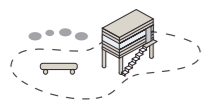



After several decades a Burial forest will be growing in the Binckhorst park, offering a 'Hauntological' protection

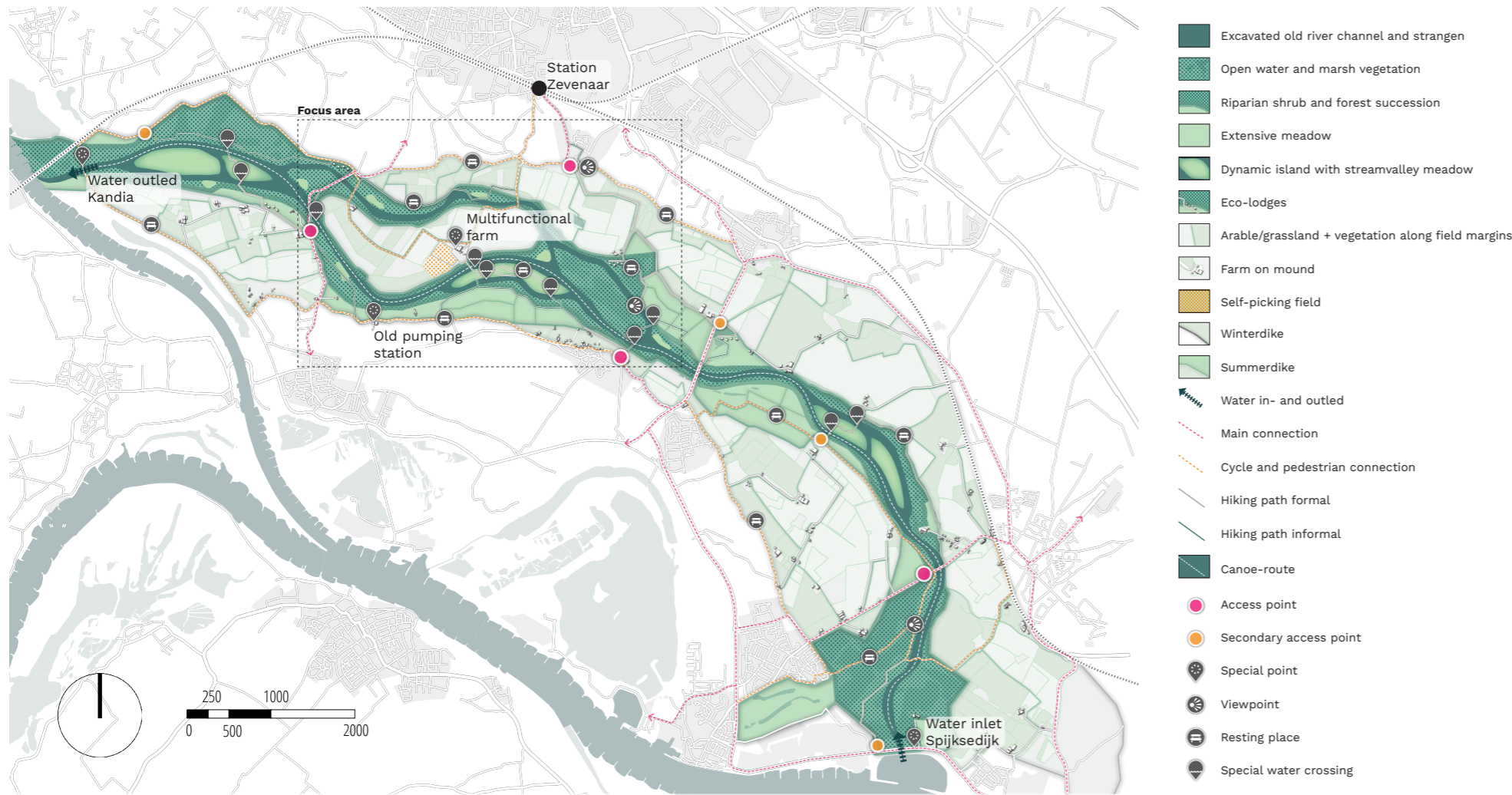
**Design principles related to river system & primary land use**

- 1.  Use the system characteristics of the river landscape as a starting point for further design choices
- 2.  Make use of natural landscape processes to support human and ecosystem needs
- 3.  Ensure ecological connections within the area and connect to surrounding nature network
- 4.  Strengthen characteristic features of the landscape and emphasize (historical) landscape structures

**Design principles related to secondary land use & infrastructure**

- 5.  Combine land uses that strengthen each other and balance competing land uses within the landscape
- 6.  Develop a hierarchical infrastructure network connected to the surrounding landscape
- 7.  Create physical and visual connections between landscape units
- 8.  Ensure a natural appearing landscape through a certain degree of informality
- 9.  Use identity forming and robust materials and furniture
- 10.  Create places to rest within the landscape and to get close to water

The result of the thesis: 10 spatial design principles to sustain or enhance SQ within resilient FRM projects. The principles were developed based on a reference project analysis, using the SQ framework and revised by conducting an iterative process of designing and testing



Spatial integration of the design principles: XL-scale landscape design for a resilient FRM intervention in the Rijnstrangen



Location of the case study area in the Dutch river landscape

**Katharine Hövelmann**

dr.ir. R (Rudi) van Etteger MA

MJH (Michiel) Bakx MSc

**[Re]Activating Riverscapes**

Spatial quality principles for resilient flood risk management in lowland river landscapes

Rijnstrangen, the Netherlands

**Abstract**

Extreme precipitation and sea level rise as a consequence of climate change lead to increased flood risk in densely populated delta regions like the Netherlands. In recent years, there has been a shift in the Netherlands from traditional resistance strategies in flood risk management (FRM) to resilience strategies, that focus on giving the water more space. These strategies involve large spatial interventions to enable controlled flooding of specific areas along rivers. Integrating the concept of spatial quality (SQ) in the development of resilient FRM projects, creates an opportunity to address needs and desires of the people living in these landscapes. However, in practice the implementation of SQ often remains an implicit political goal. This thesis contributes to the acquisition of knowledge concerning the effective practical implementation of SQ within resilient FRM projects, by using a framework for the SQ of water landscapes to develop design principles. The research is conducted combining retrospective and prospective methods within a single unit case study in the Rijnstrangen. Within the retrospective part, the SQ framework was used to (1) identify current spatial qualities, problems, potentials and challenges of the case study area and (2) develop initial design principles from a reference project analysis to sustain or enhance SQ. The prospective part consisted of the spatial integration of the design principles by conducting an iterative process of designing and testing. The result of this research is a collection of 10 spatial design principles that are relevant to support the effective implementation of SQ within resilient FRM projects.

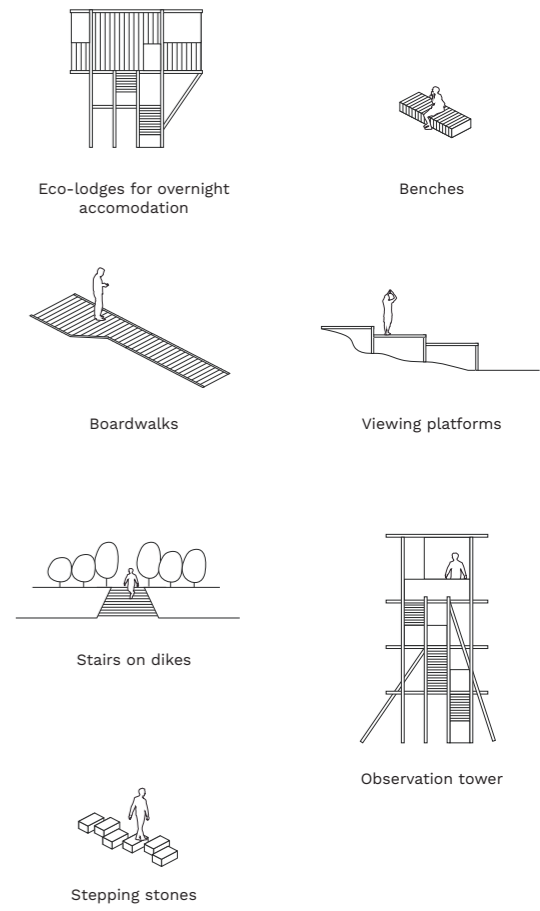
**Keywords:** Climate change adaptation, lowland river landscapes, resilient flood risk management, spatial quality, Rijnstrangen, case study





L-scale design of the focus area

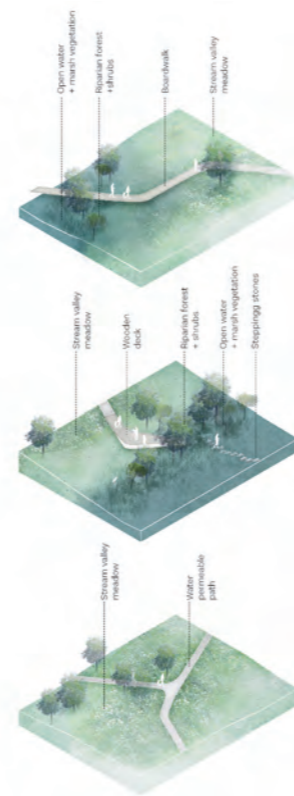
- Excavated channel + strangen
- Open water + marsh vegetation
- Extensive meadow within floodplain
- Stream valley meadow on island
- Arable + grassland with accompanying shrubs + trees
- Existing trees + shrubs
- Tree + shrub succession
- Winterdike
- Summerdike
- Formal path
- Informal path
- Main connection
- Secondary cycling connection
- Canoe route
- Access point
- Special (historical) location
- Observation point
- Resting place
- Special water crossing



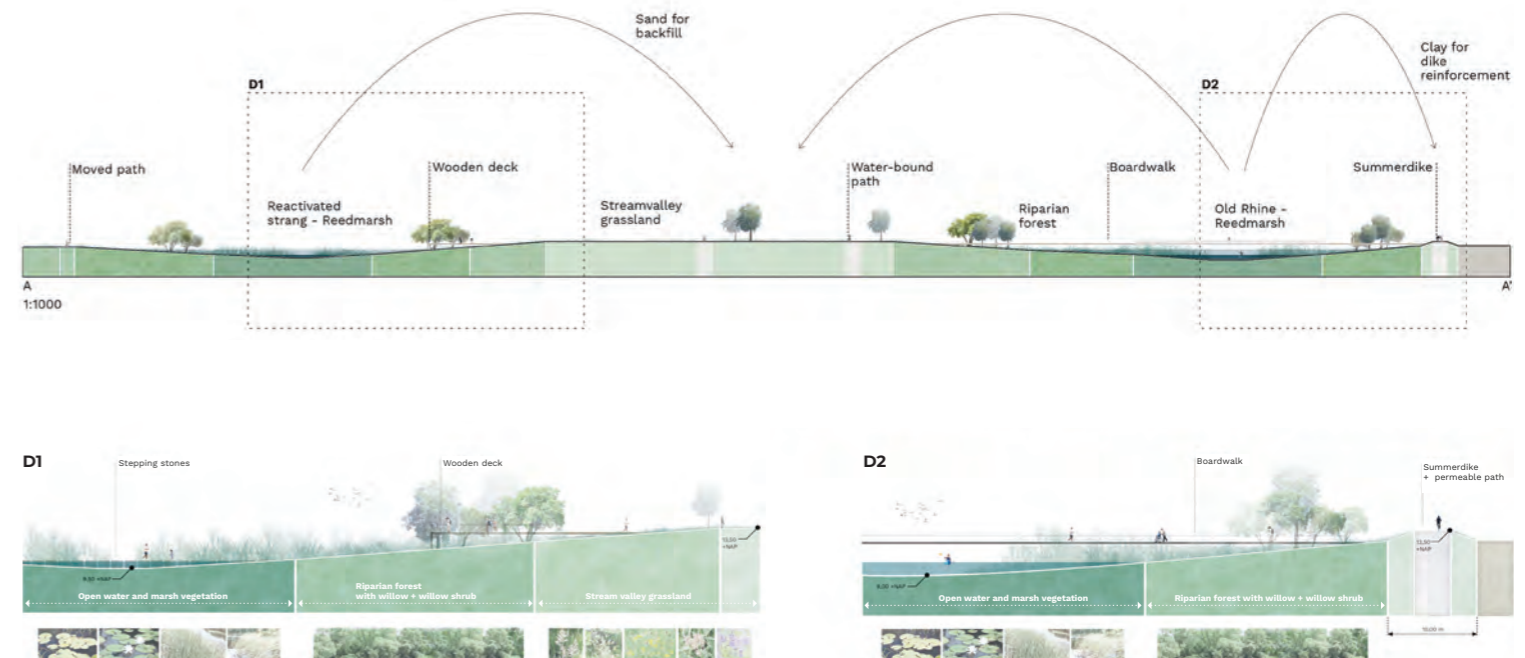
Elements and furniture to increase the experienceability of the river landscape



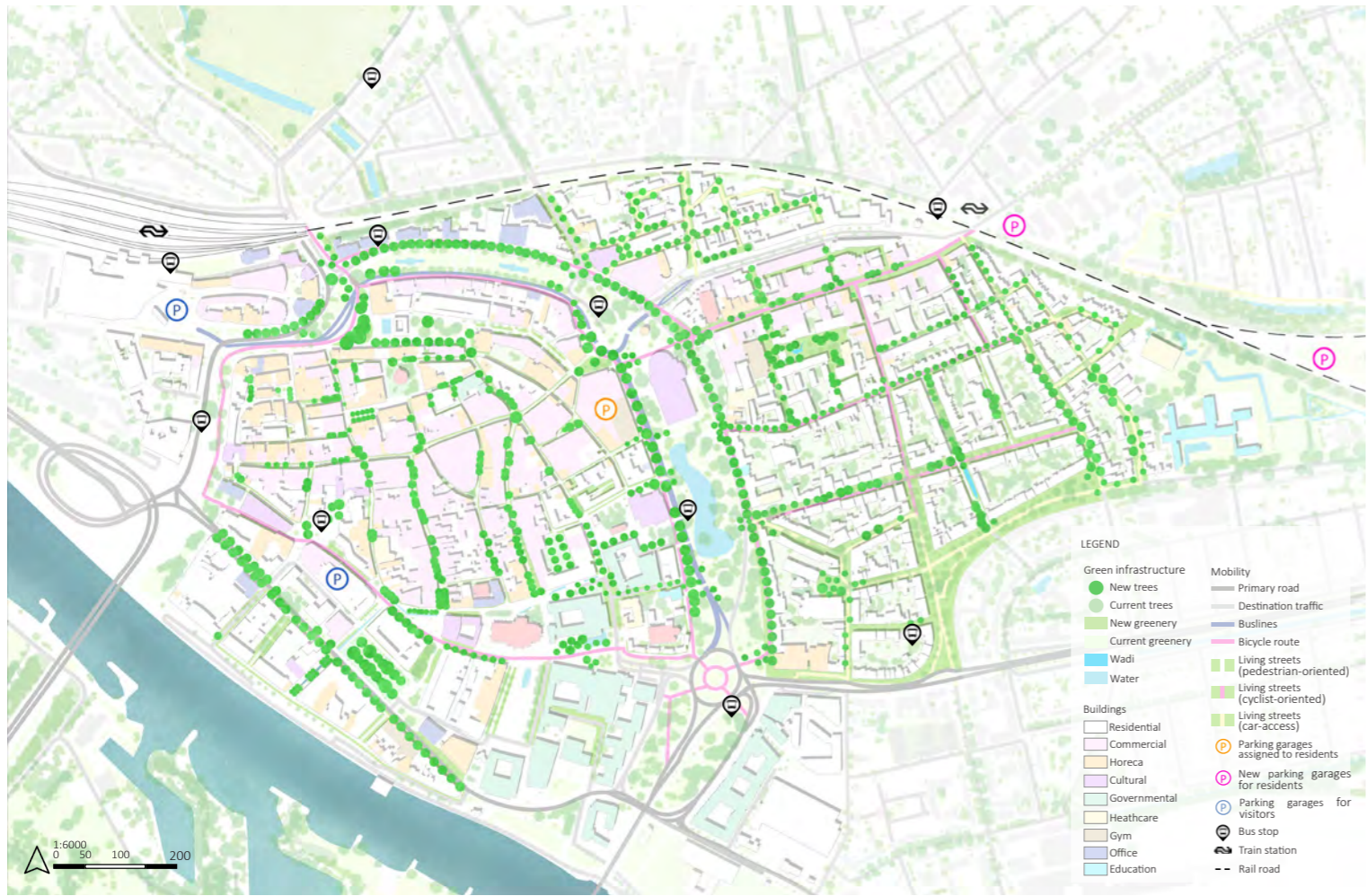
M - scale design: zoom-in on the dynamic island



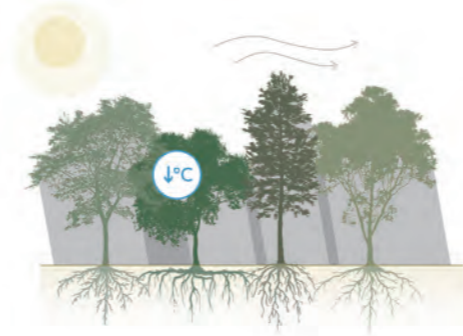
Isometries of dynamic island



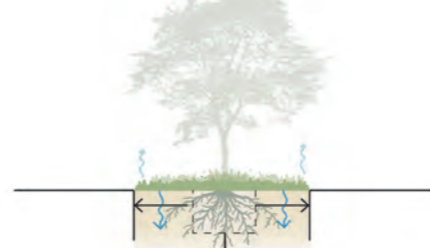
Sections of dynamic island



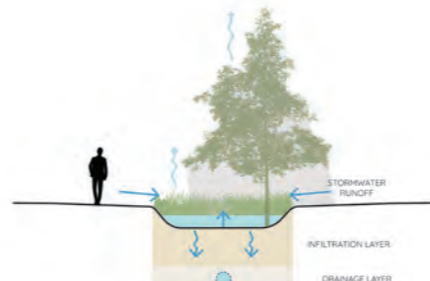
The Masterplan for Arnhem aimed to enhance the urban microclimate and urban tree resilience through various spatial interventions. The urban canopy cover grew by 25% and liveability significantly improved by reducing car traffic and prioritizing living streets.



NEAR CONTINUOUS CANOPY COVERS



PLANT TREES IN LARGE SOIL PITS



BIOSWALES INCLUDING TREES

The 3 best spatial interventions out of 11.

**Karlijn Kerstens**

Name supervisors: Sjoerd Brandsma and Solen Le Clec'h (ESA)

**The Shift**

Towards designing cooler urban microclimates with trees by incorporating the ecological shift. Arnhem, Netherlands

**Abstract**

Adapting cities to climate change, particularly rising temperatures and Urban Heat Islands (UHI), is crucial. Climate-Responsive urban Design (CRD) aims to create cooler, resilient urban environments using urban trees for shade and evapotranspiration. However, climate change threatens trees' health, as shifting climate zones push them beyond their comfort zones, risking native species' extinction. This thesis explores design solutions for cooler urban microclimates, while incorporating the ecological shift by focusing on climate-resilient tree species and spatial interventions.

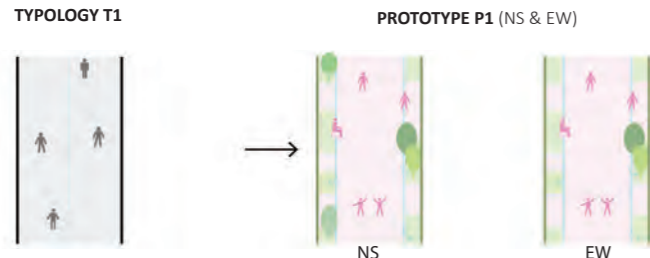
Applied to Arnhem's city center and Spijkerviertel, the study examines alternative tree species and spatial interventions, tested for cooling effects, tree resilience, and feasibility. Findings show that continuous canopy covers, large soil pits, and local water cycle strategies significantly enhance urban tree resilience and cooling. Redefining street layouts to prioritize trees over cars mitigates heat stress and improves livability. This research bridges theoretical design principles and practical implementation, offering actionable CRD recommendations. It emphasizes the importance of tree-friendly street networks and demonstrates effective strategies to enhance urban tree resilience and create cooler urban microclimates, addressing the ecological shift induced by climate change.



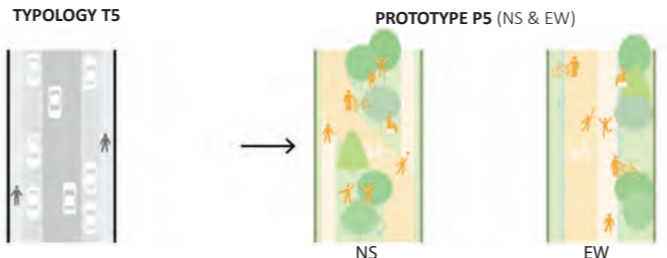
COMMERCIAL AREA: Narrow streets NS



RESIDENTIAL AREA: Medium streets NS



TYPOLOGY T1      PROTOTYPE P1 (NS & EW)

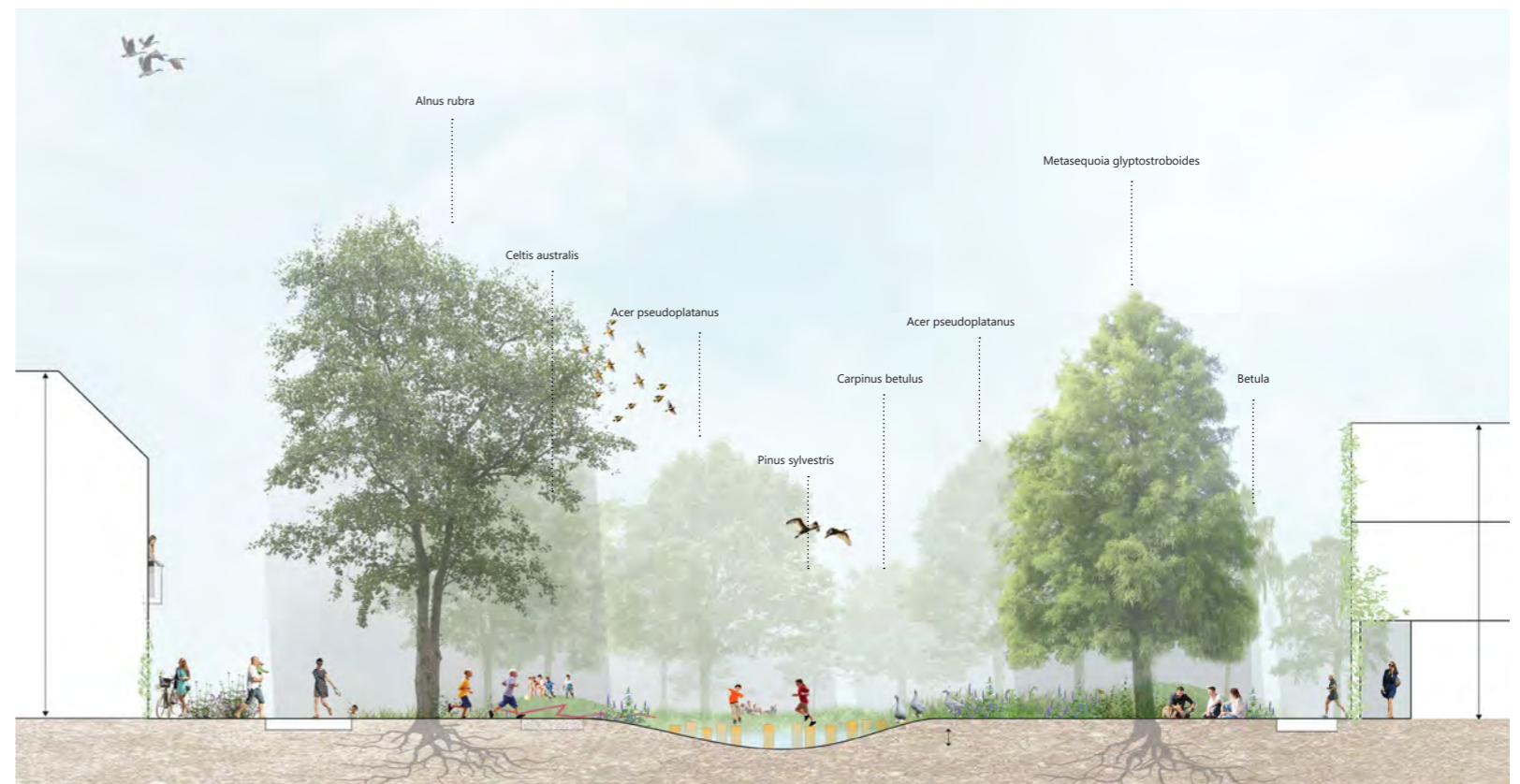


TYPOLOGY T5      PROTOTYPE P5 (NS & EW)

Design prototypes are based on urban function and typology resulting in 7 prototypes each featuring North-South & East-West oriented designs.

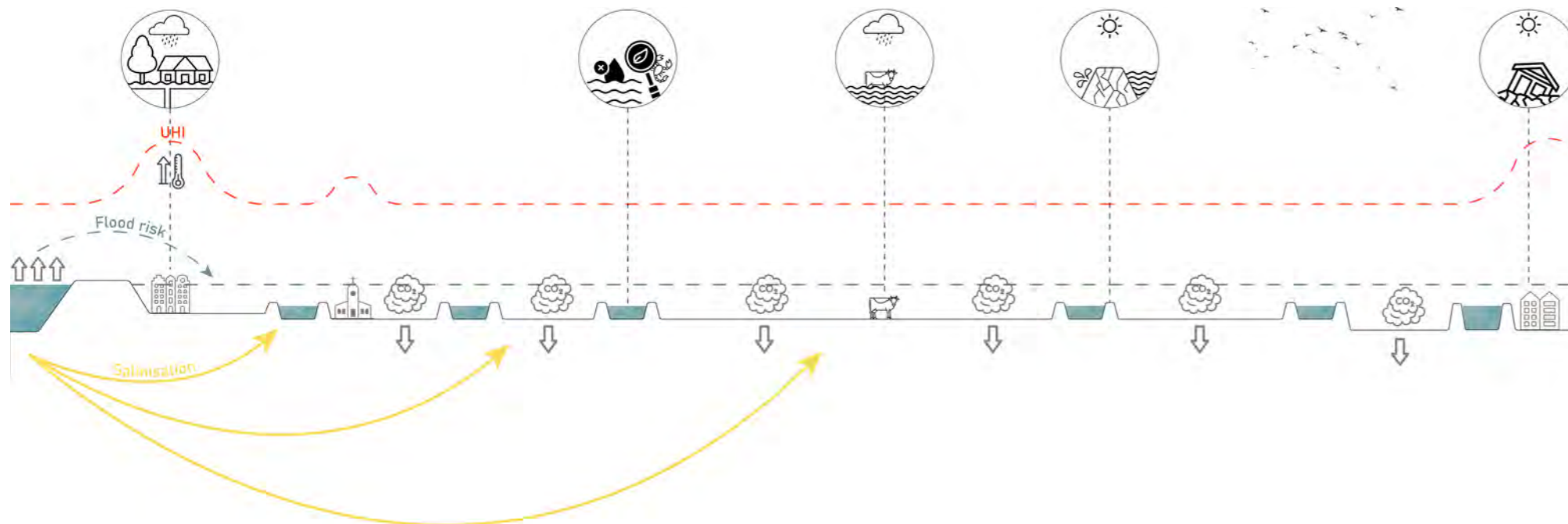
MOST IMPORTANT CRITERIA FOR CLIMATE-RESILIENT TREE SPECIES

- Best cooling effects
  - Withstands drought
  - Withstands floods
  - Withstands extreme heat
- } ● Climate-resilience





Spatial overview of the landscape values of Midden-Delfland



Overview of the climate challenges in Midden-Delfland

**Sander Keur**

Supervisor: Christian Nolf (LAR)

Co-supervisor: Roy van beek (GEO)

## Adapting Metropolitan Open Spaces to Climate Change

A cultural landscape perspective

Midden-Delfland, the Netherlands

### Abstract

This thesis explores the adaptation of metropolitan open spaces to climate change from a cultural landscape perspective, using Midden-Delfland as a case study. The primary objective is to develop design guidelines that address climate challenges while preserving and enhancing cultural landscapes through an iterative, pragmatic research through design (RTD) approach. This involves “maintenance through development,” focusing on the dynamic evolution and revitalisation of cultural landscapes rather than static preservation.

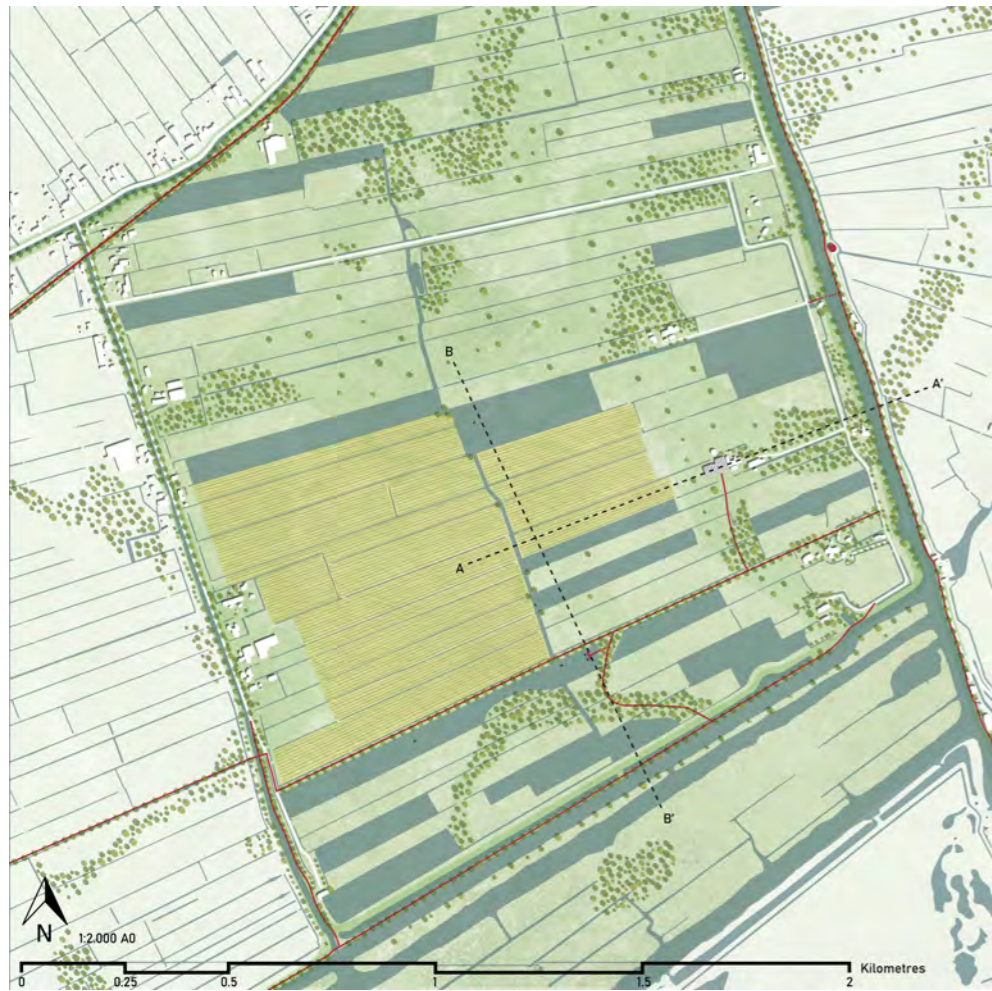
Key landscape values in Midden-Delfland are identified through a mixed-method approach, including qualitative interviews and a quantitative survey. This user-perceived value approach, uncommon in integrating cultural landscapes and climate change, complements methods such as landscape biography, landscape character assessment, and iconography. It offers a holistic understanding that integrates cultural landscapes with socio-environmental relevance.

Significant climate challenges for low-lying metropolitan areas like Midden-Delfland include precipitation, floods, salinisation, droughts, soil subsidence, and heat. These challenges threaten the cultural landscape, necessitating spatial transformations. Identifying synergies between landscape values and climate actions, the study develops a matrix to inform integrated design guidelines, applied to design alternatives in two sites: Duifpolder (rural) and Schiedam Kethel (urban-rural). The designs are tested and refined through an iterative process involving expert assessments.

The final design proposals present a framework for metropolitan open spaces facing similar challenges. The thesis concludes that integrating user-perceived landscape values with climate challenges through an iterative design process can adapt metropolitan open spaces, ensuring resilience and cultural continuity for future generations.



Impression of the peat meadows of Midden-Delfland

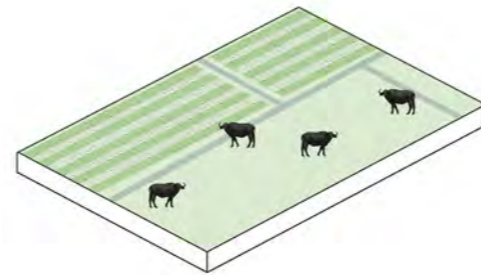


Masterplan "Cultural Resilience" - Duifpolder (rural)

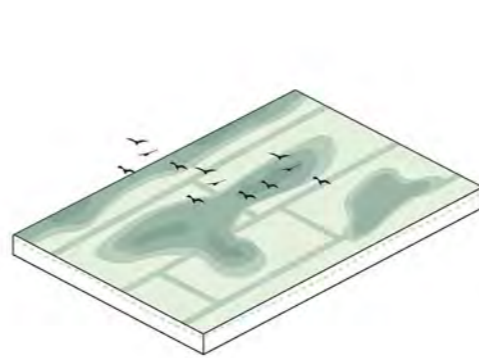
Legend



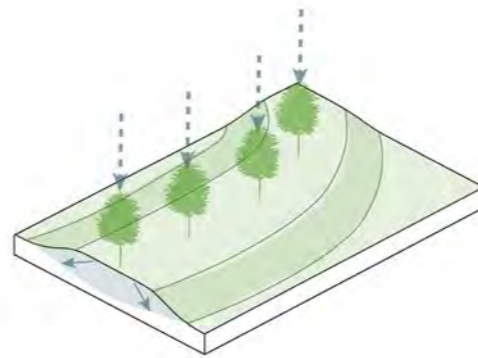
Impression "Cultural Resilience" - Duifpolder (rural)



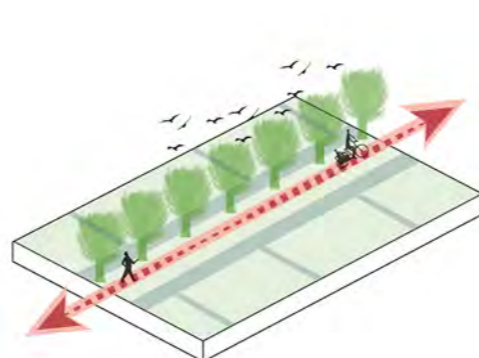
A | Regenerative agricultural practices



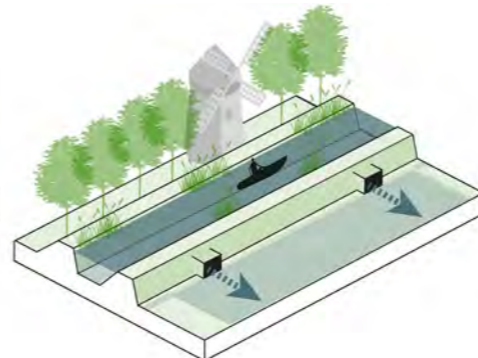
B | Restored wetland meadows



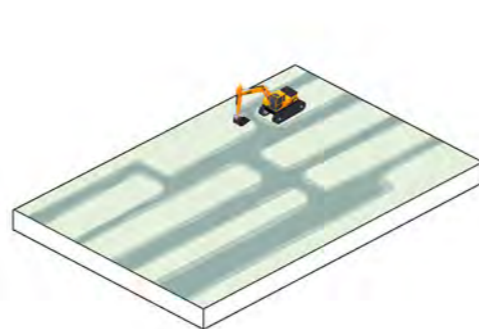
C | Revitalised creek ridges



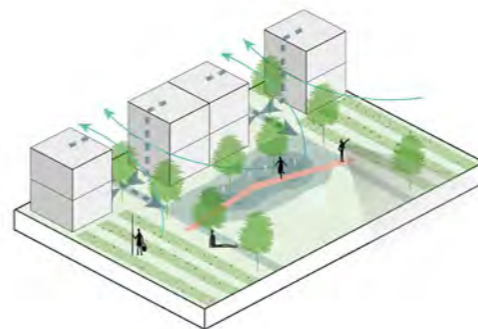
D | Historic greenways



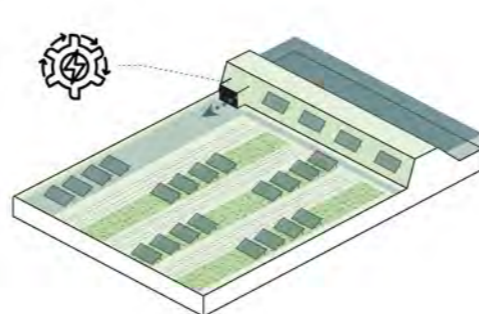
E | Robust boezem canals



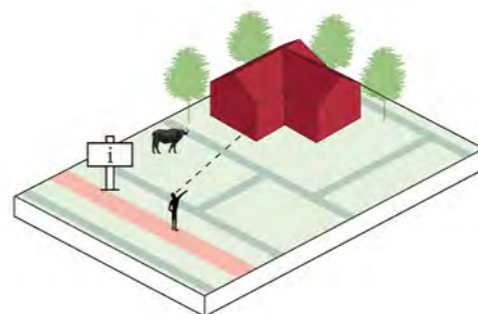
F | Polder-based freshwater storage



G | Holistic urban-rural fringes



H | Integrated energy production



I | Agrarian knowledge hub



Masterplan "Cultural Resilience" - Schiedam Kethel (urban-rural fringe)

Legend



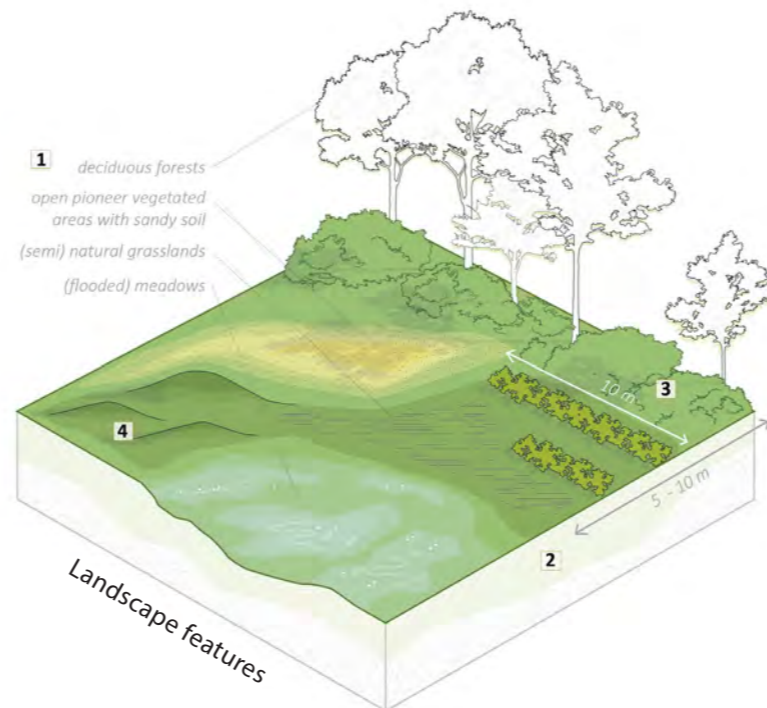
Impression "Cultural Resilience" - Schiedam Kethel (urban-rural fringe)



Masterplan de Heeg 1:5000 with locations of the cross section, visual and the site design

### TERRESTRIAL HABITAT

CODE	Guideline
LF 1	Provide a variety of landscape types for amphibians to forage and hibernate
LF 2	Create graded forest edges of mantle fringe vegetation
LF 3	Implement small landscape elements to forage, disperse and hibernate
LF 4	Create hilly terrains for the Yellow-bellied toad and Common midwife toad to hibernate in winter and forage
CODE	Criteria
LF 1	- (Semi) natural grasslands - (Flooded) meadows - Deciduous forests - Open pioneer vegetated areas with sandy soil
LF 2	Edge of 5-10 m wide
LF 3	Shrubs, hedges, bushes, tree lines, thickets and hedgerows. Tree line: width of 10 m Hedgerow: width of 10 m
LF 4	South (East) exposition



Design guidelines landscape features: one of the five visual representations of the design guidelines created for the key elements landscape features, shelter space, aquatic habitat, migration and protection measures

### Inge Mekkering

Name supervisors: dr. H (Homero) Marconi Penteado & dr. ALD (Fons) van der Plas (PEN)

### Designing Amphibian Focused Urban Open Spaces

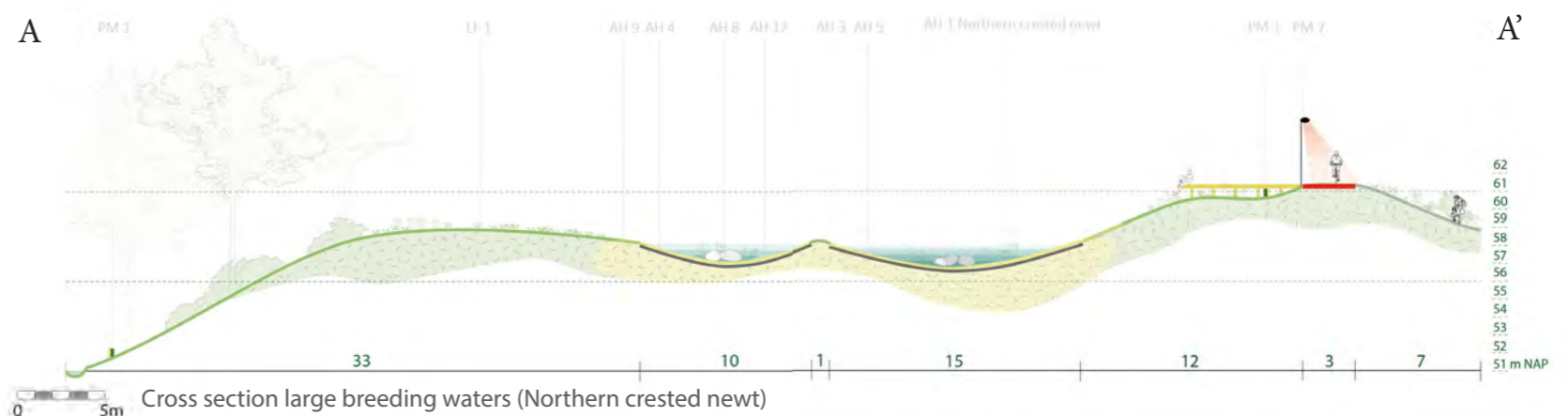
Wageningen, the Netherlands

### Abstract

Eight out of sixteen native amphibian species in the Netherlands are listed as endangered. This decline is caused by many factors including urbanization. It has many negative impacts on wildlife including habitat fragmentation and loss, which significantly impacts biodiversity. As the Dutch population grows and cities expand, the pressure on natural habitats for amphibians increases. Therefore, identifying havens for amphibians that could face adverse impacts from urbanization is crucial.

Urban open spaces can potentially serve as pockets of biodiversity conservation within predominantly unsuitable habitats. These spaces often have both terrestrial and aquatic habitats in close proximity, which is what amphibians need in order to fulfil their natural lifecycle. The challenges posed by the urbanization of natural habitats can potentially be alleviated by creating urban open spaces that meet the needs of amphibians. This study aimed to identify suitable urban open spaces and explore how they can be (re)designed to meet amphibian habitat requirements. The neighbourhood of De Heeg in Maastricht was selected as a study area to test whether urban open spaces can be made suitable for amphibians. Expert reviews on design alternatives for De Heeg, based on the created guidelines, demonstrated that urban open spaces can indeed be (re)designed to create suitable habitats for amphibians.

This thesis outcome provides a long list of design guidelines and criteria on how to design urban open spaces that enhance amphibian populations as well as a list of urban open space types that are or can be made suitable by applying these guidelines to. This research urges urban planners and designers to rethink their strategies by integrating wildlife into urban environments as segregating urban and natural landscapes perpetuates habitat loss and is impractical in the Netherlands. Designing cities that support both human and ecological needs is crucial for sustainability and liveability.





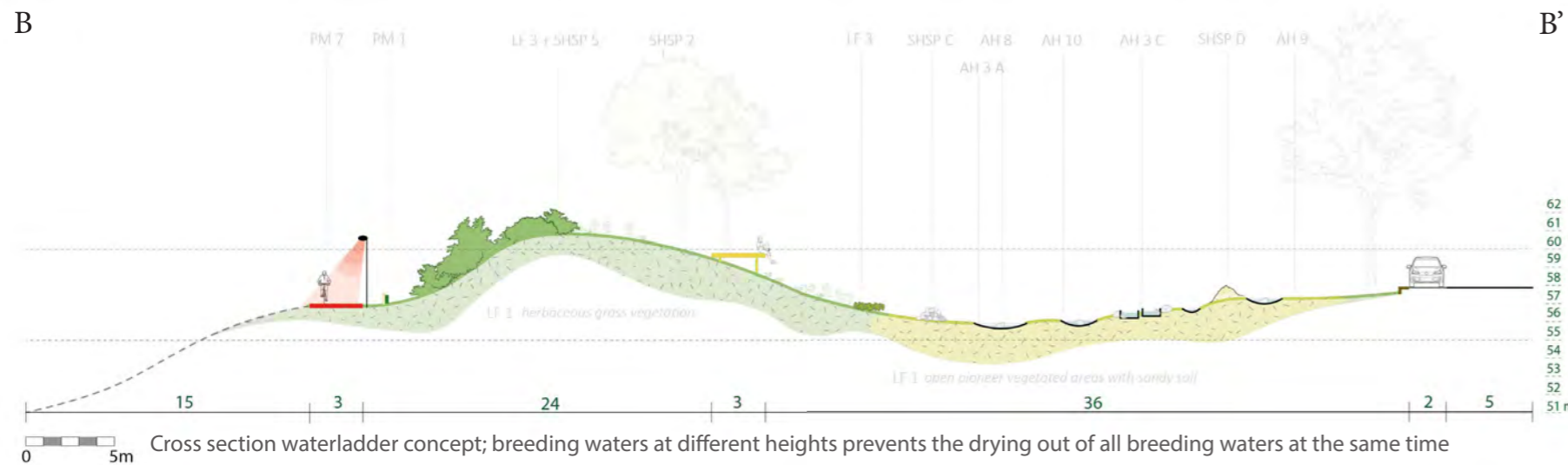
1 Atmospheric visual large breeding waters daytime; During the day humans can walk over the boardwalks and look over at the pools, while amphibians have free dispersal opportunities



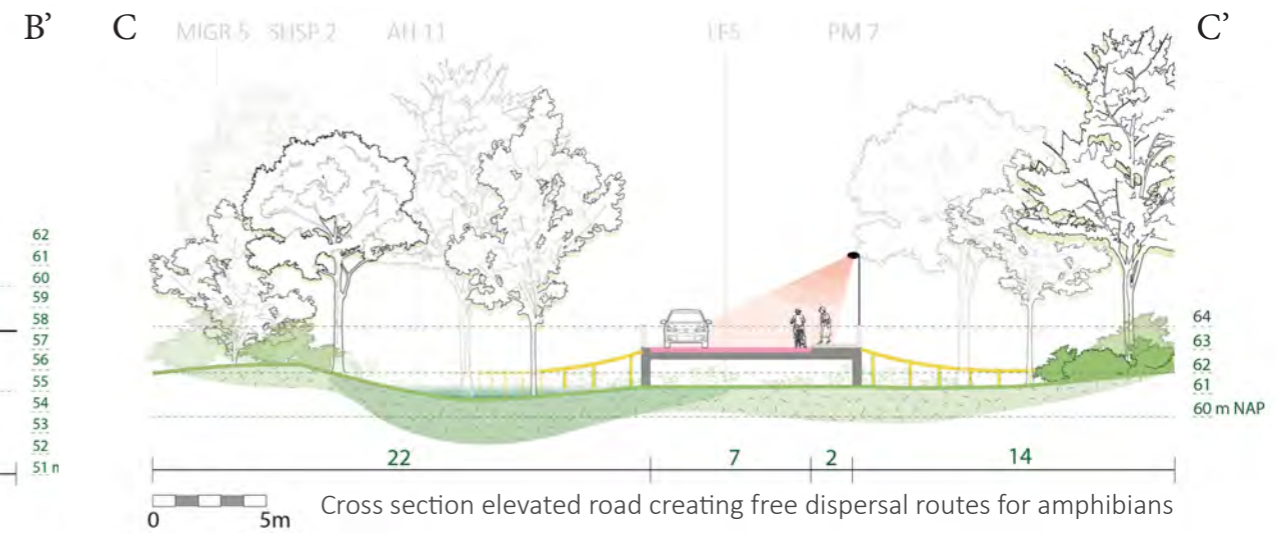
2 Visual water side regulated street; it eliminates the need for curbs and drainage pits, which pose as barriers in the landscape for amphibians. The road is slightly sloped higher toward the middle, rainwater will flow towards the lowest point, into the green area next to the sidewalk



Site design masterplan de Heeg 1:1000 with locations of the cross sections and visuals



Cross section waterladder concept; breeding waters at different heights prevents the drying out of all breeding waters at the same time



Cross section elevated road creating free dispersal routes for amphibians



### **Job Abbink**

First supervisor: Homero Marconi Penteadó

Second supervisor: Lysanne Snijders (BHE)

Examiner: Seth Wilberding

### **Predator in the City**

Designing urban open space to adapt a stone marten population.

Rotterdam, The Netherlands

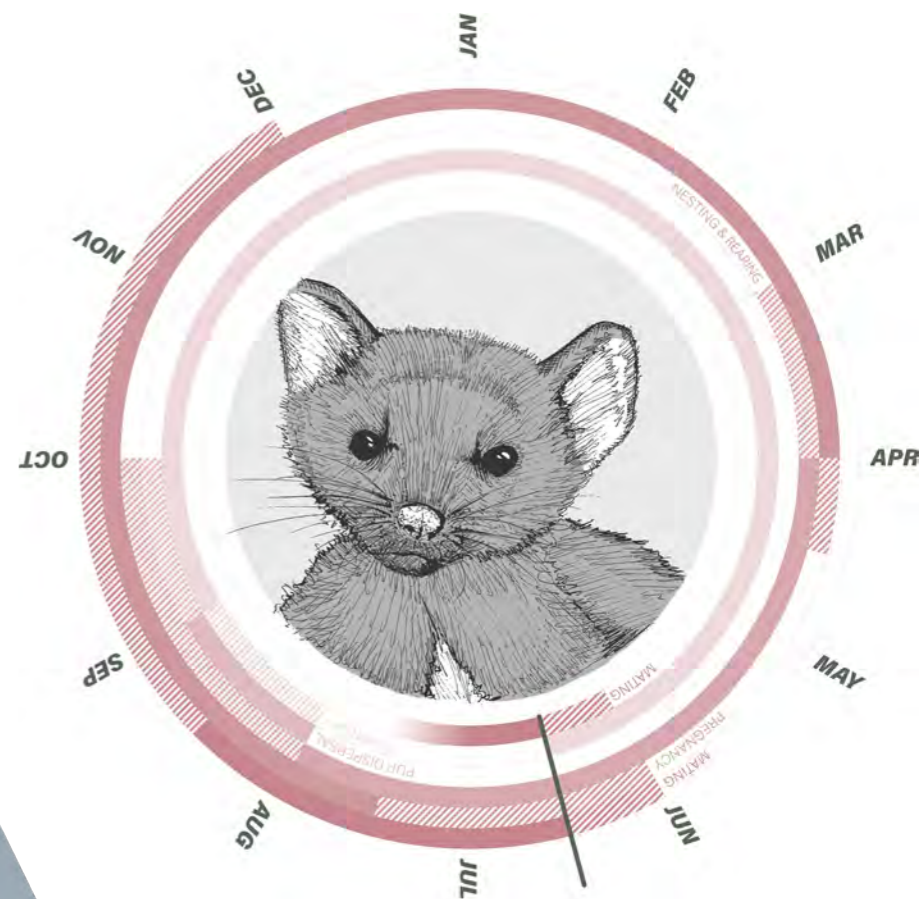
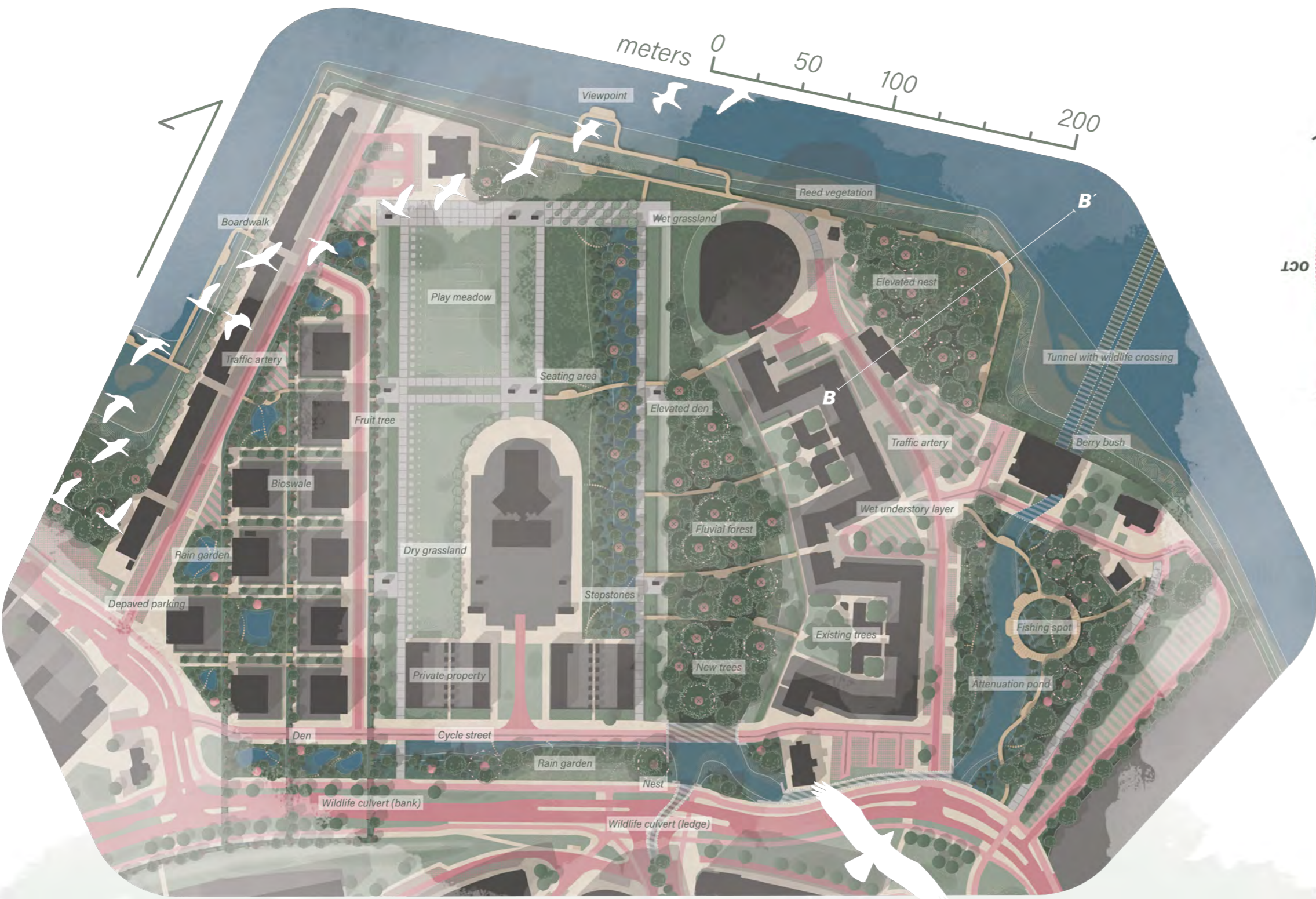
### **Abstract**

Rapid urbanization is causing biodiversity decline through habitat loss and fragmentation. Urban environments create new ecosystems where wildlife coexists with humans, but anthropogenic influences disrupt food webs, leading to an increase in pest species. A solution lies in natural predators, and this thesis explores adapting urban open spaces to support one such predator: the stone marten.

The primary objective is to develop design principles, guidelines, and criteria for a marten-aided design. It assesses the habitat requirements of martens based on their life history and seasonal needs, addressing the controversial human-marten relationship and the potential for increased predation on the widespread brown rat. These design components are integrated into an open space system framework aimed at sustaining a stable marten population. Urban Green Infrastructure typologies and characteristics are analyzed to connect ecological research with landscape design. Through an iterative 'Research through Design' process, these directives are applied to Rotterdam, a Dutch city where both the solution (marten) and the problem (rat) coexist. City-scale design alternatives for an ecological marten network have been created and evaluated by experts, park-scale designs aim at establishing marten habitats.

Supporting a stable stone marten population requires meeting all aspects of their life history within a designated territory, thereby limiting food and shelter for pests to increase predation pressure. Urban greenery should be ecologically and socially divided to accommodate human-marten coexistence, using low-quality habitat dividers. The available space is crucial for integrating martens and other predators into the city. This work assesses the extent to which our built environment must be reevaluated to enhance animal liveability. Although species-specific, the proposed design interventions also benefit other ecosystem services, improving urban environments for both humans and animals.



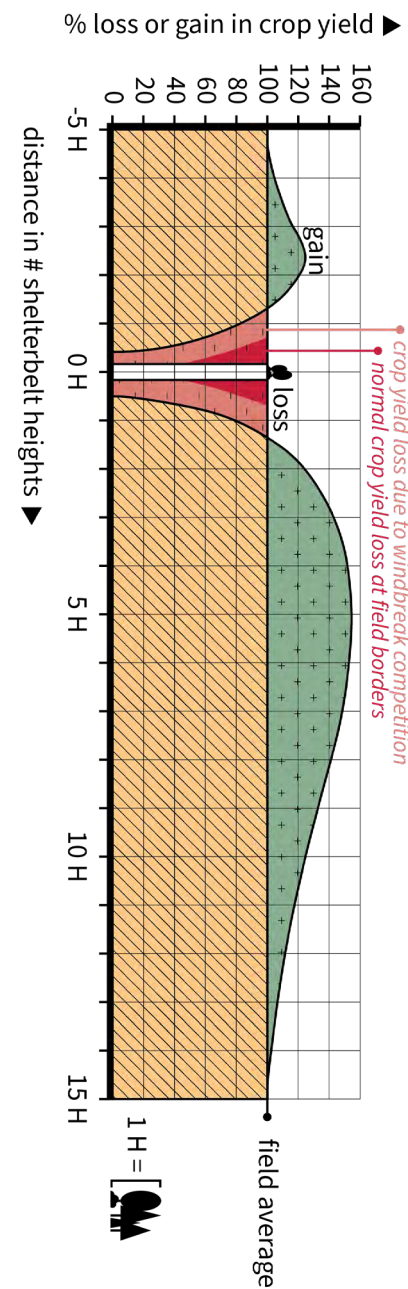


Top right: Life history diagram of the stone marten  
 Top left: Park-scale redesign alternative 2  
 Bottom: Crosssection of marten territory within design

- 
- 
- 1 Eurasian hobby *Falco subbuteo*
  - 2 Osprey *Pandion haliaetus*
  - 3 Barred grass snake *Natrix helvetica*
  - 4 Eurasian otter *Lutra lutra*



# GIMME SHELTER



Average effect of shelterbelts on crop yield in the U.S.A.  
(Brandle et al., 2022, Osorio et al., 2019; Caborn, 1965; Stoeckler, 1962)

**Kai van Reenen**

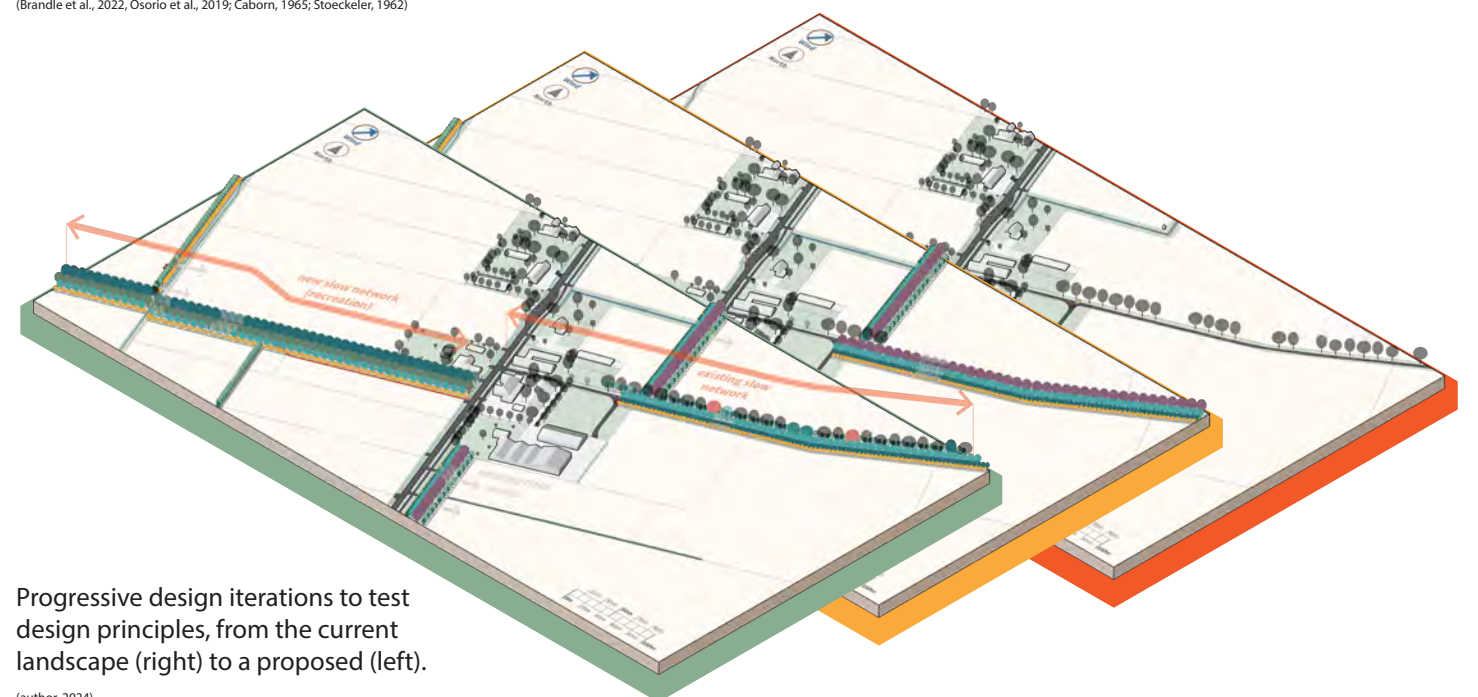
Name supervisors: SH (Sjoerd) Brandsma MSc

## GIMME SHELTER

Exploring the role of shelterbelts in bridging the gap between nature and agriculture (The Netherlands)

### Abstract

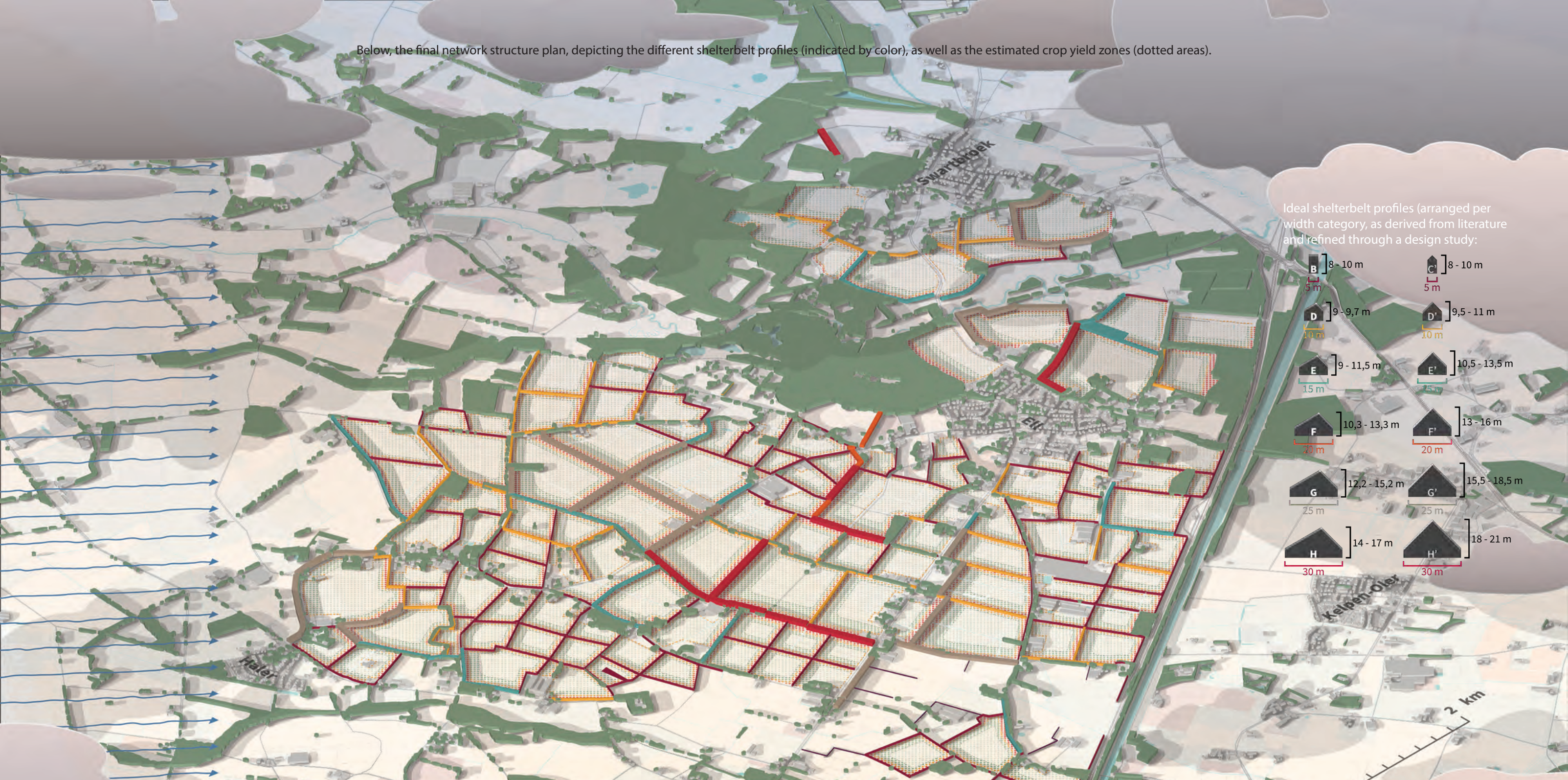
This thesis entails the design of a regional shelterbelt network aimed at enhancing both agricultural productivity and ecological connectivity. It focuses on creating a system that not only protects and improves crop yields by mitigating wind and improving microclimate conditions but also supports biodiversity by establishing ecological corridors that connect habitats across the landscape. The results of this are the identification of 41 design principles for the implementation of shelterbelts, with an emphasis on the microclimate performance for cropland agriculture, and performance for ecological networks. In addition, an exemplary regional structure plan, as well as 2 detailed designs display the applicability of the principles, as tested (through Research Through Design) for the sandy soils of mid-west Limburg (in the Netherlands). Adherence to these principles form the basis for an answer to the main research question: "How can a shelterbelt be designed in a way that contributes to cropland microclimate and ecological networks in Dutch agricultural landscapes?"



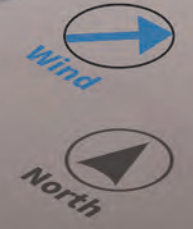
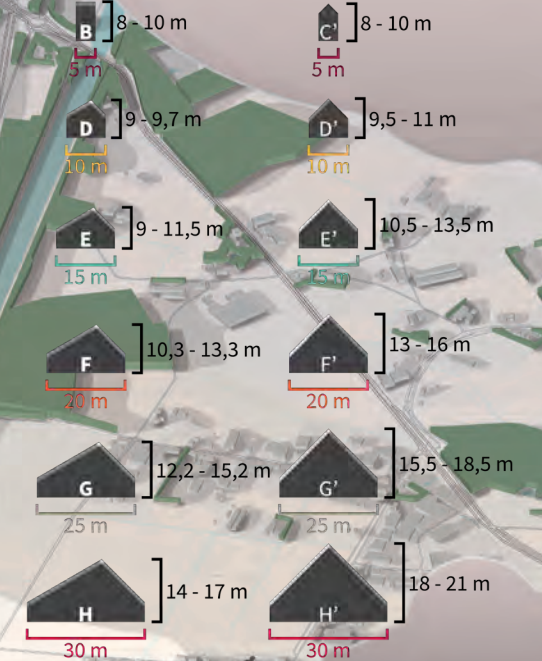
Progressive design iterations to test design principles, from the current landscape (right) to a proposed (left).

(author, 2024)

Below, the final network structure plan, depicting the different shelterbelt profiles (indicated by color), as well as the estimated crop yield zones (dotted areas).



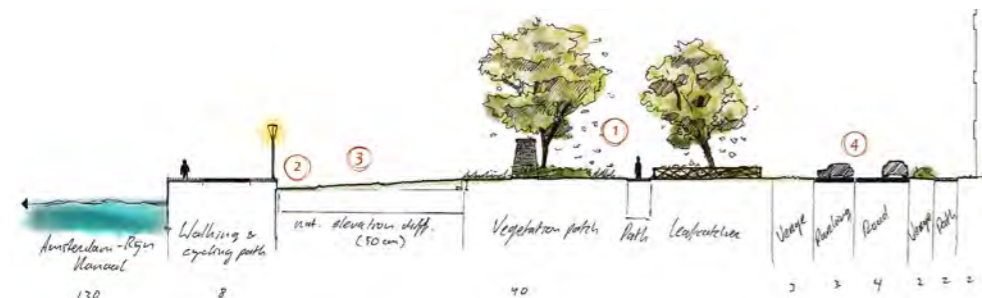
Ideal shelterbelt profiles (arranged per width category, as derived from literature and refined through a design study:



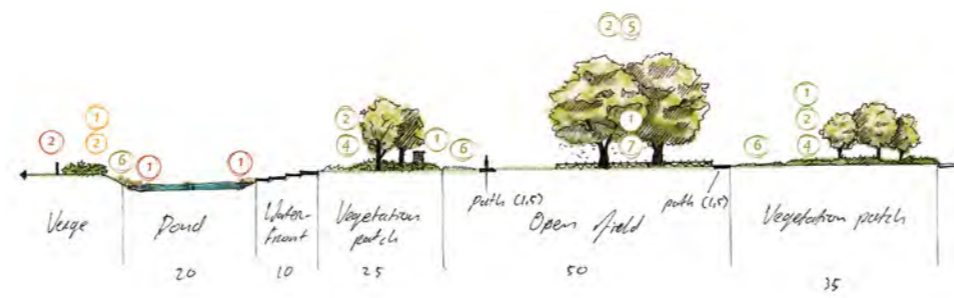
Catalogue of the final design principles for shelterbelt design:



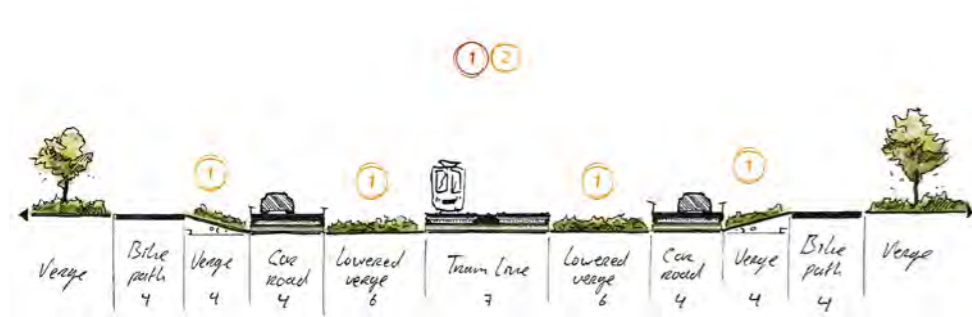
The new neighbourhood has become a mosaic of habitat zones with a variety of dense and leaf containing vegetation and balance between open and sheltered spaces. The various patch and edge habitats are interconnected by continuous corridors, and supporting the different life activities of the hedgehog throughout the year.



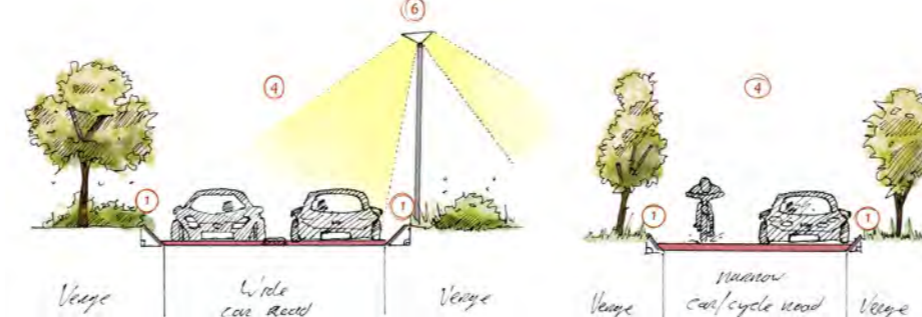
[1] A mosaic of open and sheltered spaces near the canal creates an area with varied greenery for nesting and foraging, simultaneously directing movement patterns.



[2] The park, previously covered by mowed grass lanes, now contains a vast abundance of vegetation that corresponds to the life activities of the hedgehog.



[3] An elevated passage under the broad car roads suggests a new approach on how to counter habitat fragmentation and interconnect habitat spaces for the hedgehog.



Cross section of a road that supports regular car traffic (left) and a road for one-way traffic (right) in the study area.

## Leon Herrenauw

Name supervisors: Homero Marconi Pentead, Clemens Driessen (GEO)

## Human-Hedgehog Harmony

Design Strategies for Wildlife Coexistence in Dutch Urban Landscape  
(Study area: Kanaleneiland-Zuid, Utrecht, The Netherlands)

### Abstract

As natural habitats in the Netherlands deteriorate due to factors like nitrogen deposition and intensified land use, wildlife is increasingly migrating to urban areas. Cities now provide crucial habitats for various species, but this shift leads to conflicts with humans, as urban spaces are not designed for wildlife. The growing presence of wildlife in cities highlights the need to rethink urban design to better accommodate these species while preserving natural elements. This design study focused on the West European hedgehog, whose population has sharply declined in recent decades, highlighting the broader issue of wildlife migration. The research aimed to create design strategies for Dutch cities to support hedgehog conservation. By analysing the species' habitat needs and evaluating urban open spaces, the study developed a framework of design guidelines. These guidelines were tested in Utrecht, where a residential area was redesigned to meet the hedgehog's life activities and habitat requirements. Although it was found that effective protection requires significant spatial changes and a new perspective on urban nature, this study showed that the design guidelines can benefit both people and other wildlife. The study recommends further research on urban transformations to support wildlife conservation and explores the role of citizens in these efforts.



"Egel Cathedrals" are new habitat structures built with tiles and bricks found locally and are a monumental statement to reshape the city into an urban-ecological landscape.



Detailed design: the pocket spaces near the apartment buildings present an interweaving of UOSs, integrating human and hedgehog habitat



A 3D visualisation captures the aesthetic aspect of the pocket park and notes the applied design guidelines in the detailed design.



Walking bridges enable crossing points across the small canals near the study area, providing interconnectivity for both hedgehogs and residents to the rest of the city.

LEGEND

- New tree
- Existing tree
- Shrubbery
- Herb/flower patch
- Garden
- Car road
- Walking path
- Building

	DESIGN GUIDELINES	DESIGN CRITERIA
Home ranges should include multiple nesting places	1 Provide places for nesting, resting, hibernation and breeding	One hectare (ha) must have at least 5 sheltered hedgehog habitats Nesting places must support territorial boundaries (1,8–2,5 ha) For winter and nesting, (one of) the following elements must be provided: cavity under tree roots; heaps of organic matter (branches, leaves); staple of stones; hedgehog house
	2 Invest in high-quality patch habitats at non-occupied UOSs	Vegetational transition must be soft for unrestricted movement
Patch habitats are useful for various life activities	3 Provide edge habitats at occupied UOSs	Edges require straight vegetational boundaries to prevent dispersion within said space Vegetation must be native
	4 Create areas with dense and leaf-containing vegetation for nesting	One hectare (ha) must contain at least 50 m <sup>2</sup> of shrubbery Extensive green maintenance is required*
Edge habitats are useful for nesting, shelter and movement	5 Create areas with varied greenery for foraging; grass fields; low dense vegetation; park forest with undergrowth; green gardens	One hectare (ha) must contain min. 100m <sup>2</sup> of grass fields Grass field must be surrounded by dense shrubbery
	6 Provide insect-attracting vegetation	Vegetation must include plants rich in nectar
Different vegetation elements enhances life activities	7 Maintain organic litter from vegetation for nesting and foraging	Extensive green maintenance is required*

Complete list of definitive design guidelines and criteria for hedgehog habitats.

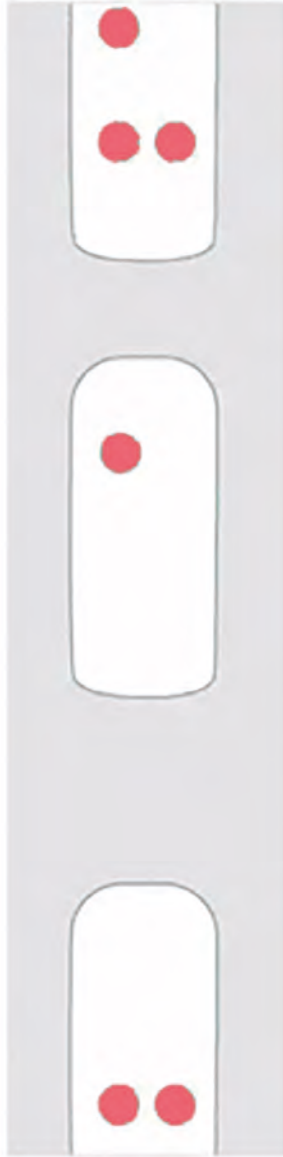
	DESIGN GUIDELINES	DESIGN CRITERIA
Long, linear and structure-rich elements have a leading effect on movement	1 Include shrubbery in corridors	Corridors must contain shrubs for min. 50% Shrubbery must be min. 75 cm high Corridor gaps must be max. 20 m long
	2 Create uninterrupted corridors (if gaps are shorter than 20 m)	Corridors must be min. 2 m wide Corridors require straight vegetational boundaries Stepping stones must be min. 10 m <sup>2</sup> Gap between stepping stones must be max. 10 m long
Hedgehogs try to avoid conspecifics	3 Create stepping stones (if gaps are longer than 20 m)	Corridors must be min. 2 m wide Corridors require straight vegetational boundaries
	4 Provide multiple travelling routes	Corridors must include interspecific distancing (min.: 20 m) Routes must support min. travel distances
Gardens are favourable places for hedgehogs	5 Interconnect gardens for travelling routes	Fence gates must be 15x75 cm (APPENDIX III) Residents must be activated and coordinated*

Complete list of definitive design guidelines and criteria for corridors.

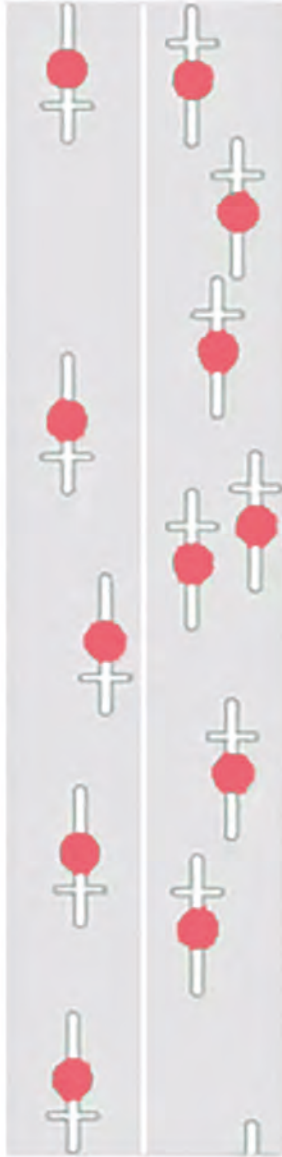
	DESIGN GUIDELINES	DESIGN CRITERIA
Barriers (i.e., infrastructure and water bodies) are prime causes of hedgehog mortality	1 Create barrier passages near habitats of great quality	Interventions must comply with requirements (APPENDIX III)
	2 Place steep fences/walls to guide and block movement	Walls must have a min. height of 50 cm Vegetation must be placed outside range of roads (min.: 100 m)
Hedgehogs avoid areas with noise and artificial lighting	3 Introduce buffer zones near barriers of high risk/mortality	Vegetational edges near barriers must be straight
	4 Improve road accessibility for wildlife	Driving speed must be max. 30 km/h Traffic density must be reduced
	5 Utilise areas with minimal noise production	Nest and shelter spaces must be distanced from noise-producing sources
	6 Diminish sources of artificial light	Decrease of artificial light must not clash with human functionality

Complete list of definitive design guidelines and criteria for spatial barriers.

## CAR LANE



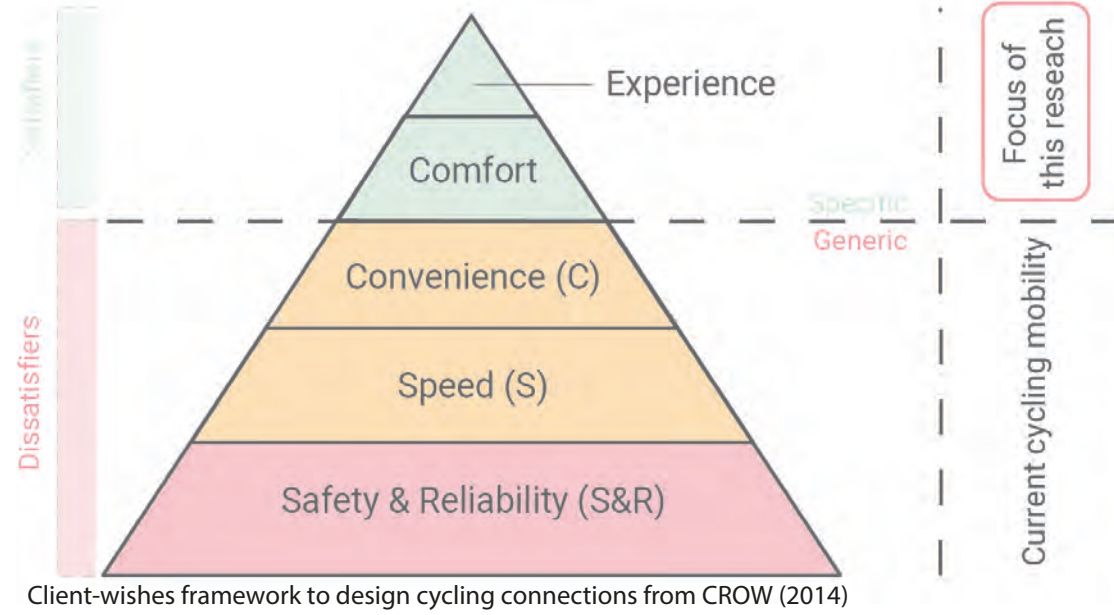
## BIKE LANE



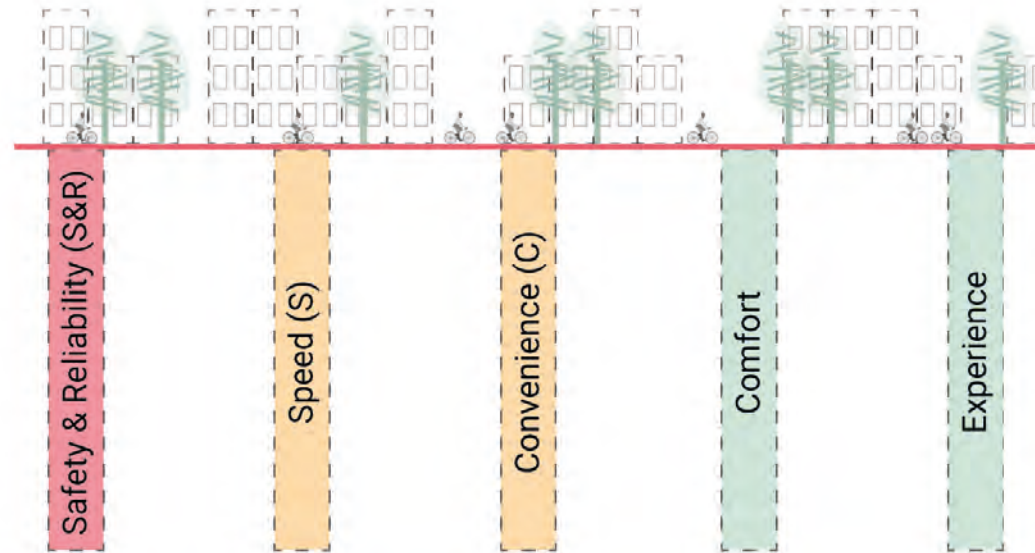
600 -  
1,600  
people  
per hour

Ccomparison between cars and bikes

7,500  
people  
per hour



Client-wishes framework to design cycling connections from CROW (2014)



New proposed framework to design cycling connections

Factor	Physical activity	Commuting	Mental health	Air quality & SMOG
Effect	<ul style="list-style-type: none"> <li>+ being in shape</li> <li>+ lower mortality rate</li> <li>+ lower morbidity</li> <li>+ healthy life expectancy</li> </ul>	<ul style="list-style-type: none"> <li>+ cardiovascular benefits</li> </ul>	<ul style="list-style-type: none"> <li>+ dysfunctional stress</li> <li>+ anxiety</li> <li>+ clinical depression</li> <li>+ personality disorders</li> <li>+ .....</li> </ul>	<ul style="list-style-type: none"> <li>+ asthma</li> <li>+ prevent long disease</li> <li>+ .....</li> </ul>

Cycling benefits

## Ludovic Henderson

First supervisor: Christian Nolf

Second supervisor: Marleen Bekker (HSO)

Examinor: Sjoerd Brandsma

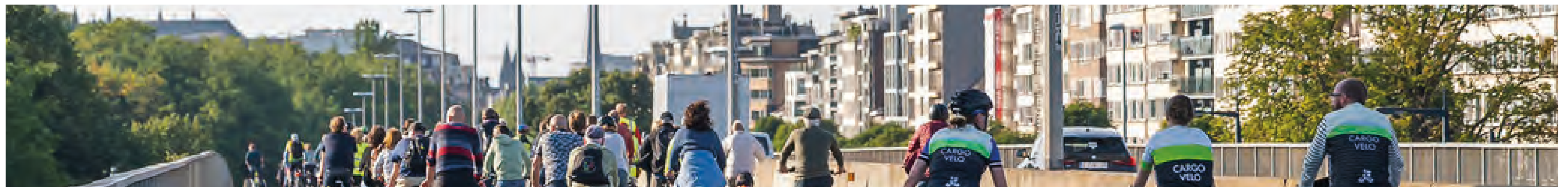
## COMFORTABLE CORRIDORS

Creating comfortable multisensory cycle connections for cyclists riding through urban areas

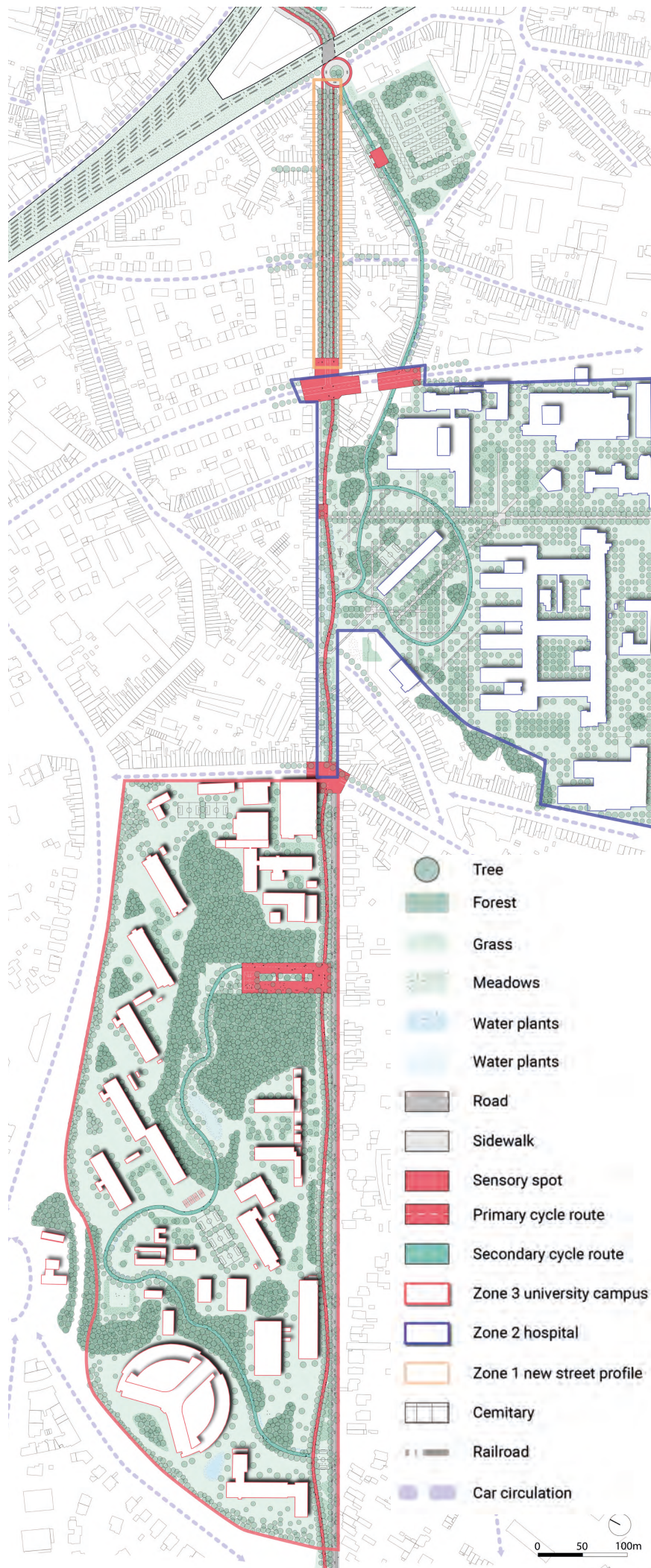
## Abstract

Current cycling infrastructure is being designed with a focus on functionality, creating routes that are safe & secure, fast and convenient to arrive at a destination. However, to create comfortable cycling connections through urban areas, cycling infrastructure should aim at addressing the satisfiers (comfort and experience) and dissatisfiers (safety and security, speed and convenience) described within the client-wish model of CROW (2014). This thesis investigates how urban cycling connections can be redesigned, creating comfort through the use of multisensory design. The result of this thesis will be design principles that combine the satisfiers and dissatisfiers of cycling mobility. These principles were tested using a case study along the Green Climate Axes project in Ghent (Belgium) through participatory data gathering, including a focus group, personal observations and expert interviews to measure and test the sensory experience along the cycle connections in the urban area of Ghent.

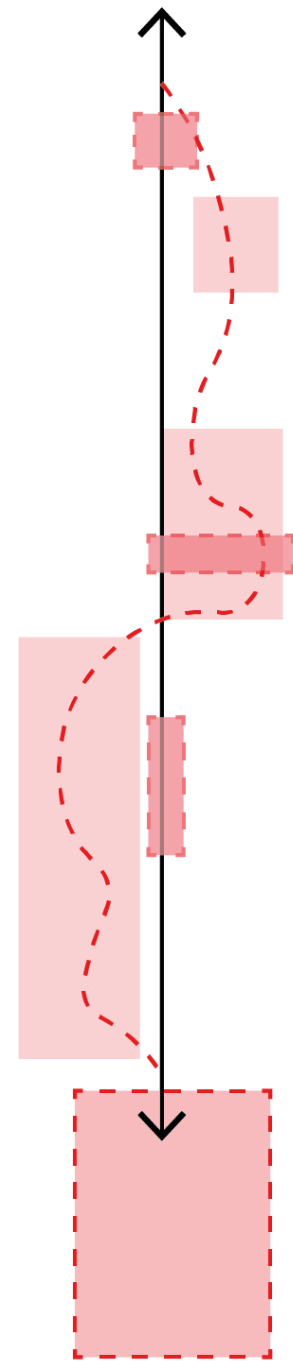
The research showed that by focusing on visual, auditory, tactile, thermal, kinetic, and olfactory experiences, multisensory design can introduce various forms of stimulation to improve cyclists' comfort in urban areas. These findings are displayed within a final design for one of the cycling connections along the GKA project in Ghent, Belgium. Ultimately, this research advocates for a shift in mobility planning by prioritizing human experience through multisensory design, creating more comfortable and enjoyable experiences for cyclists in urban areas while transitioning into the carbon free transport era.



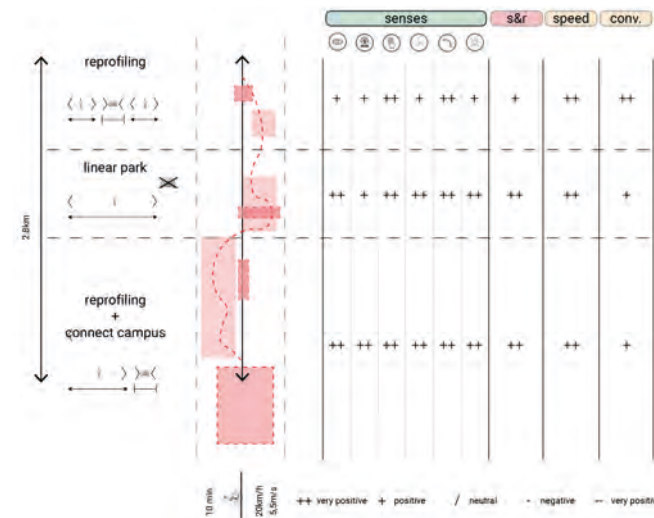
Cycling congres Ghent



Final design case study



Design concept



Scoring of the final design



Case location in Ghent



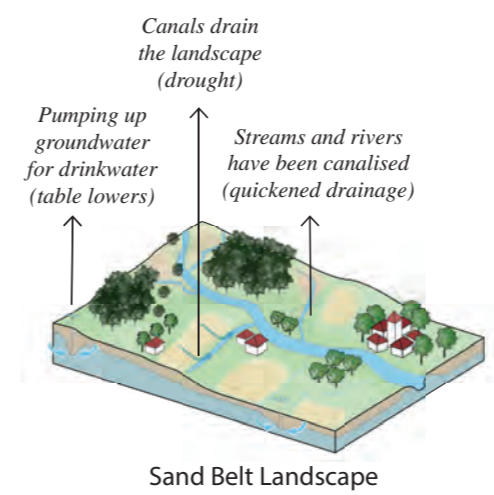
Visualisation showing a multisensory comfortable cycle connection



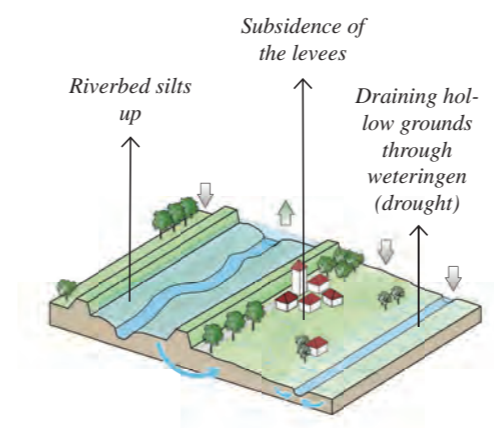
Section showing the different senses being stimulated



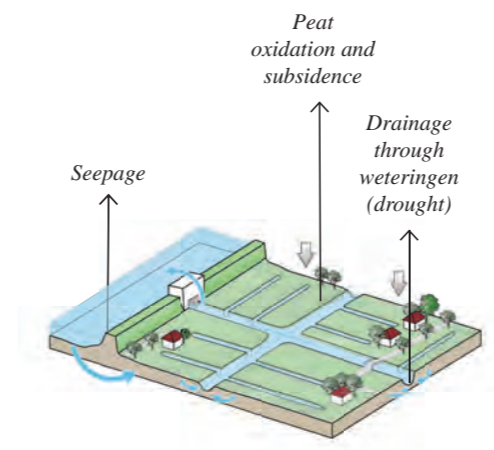
Strategy for urban climate-responsive expansions in Zwolle, showing where to expand and what interventions are needed in the landscape to cool the city and the expansions.



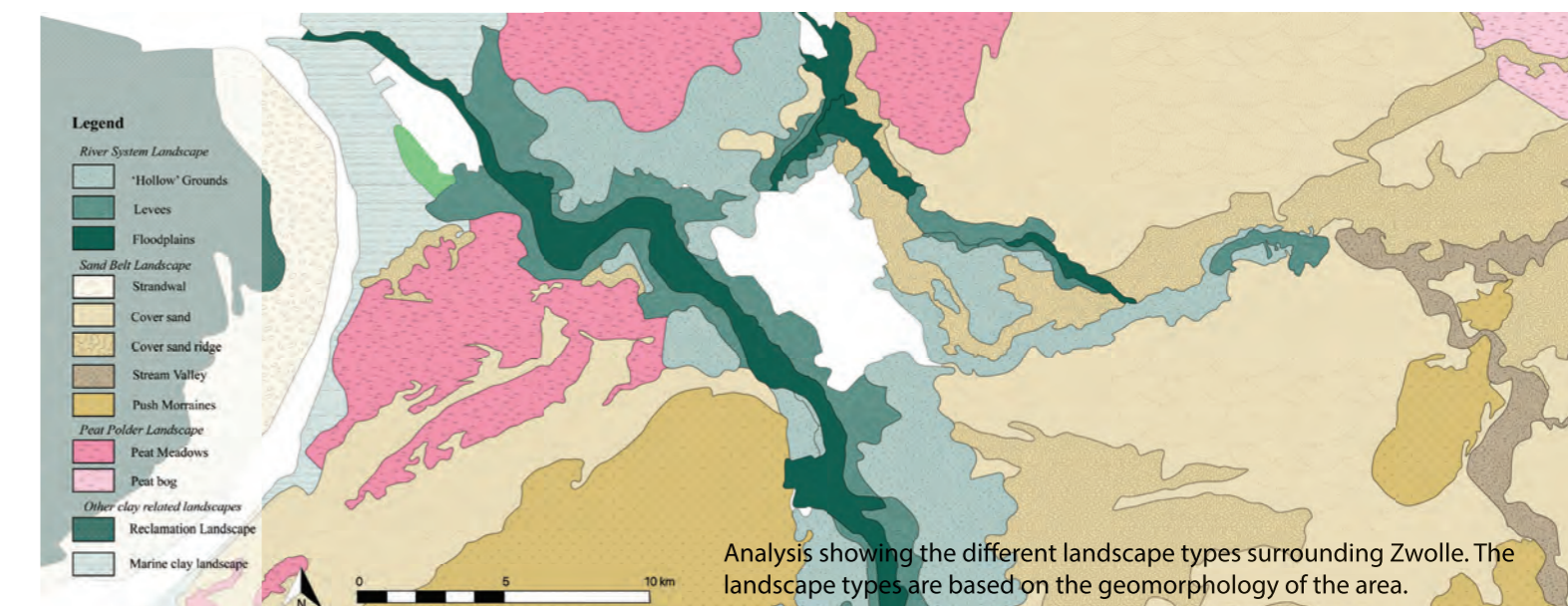
Sand Belt Landscape



River System Landscape



Peat Polder Landscape



Analysis showing the different landscape types surrounding Zwolle. The landscape types are based on the geomorphology of the area.

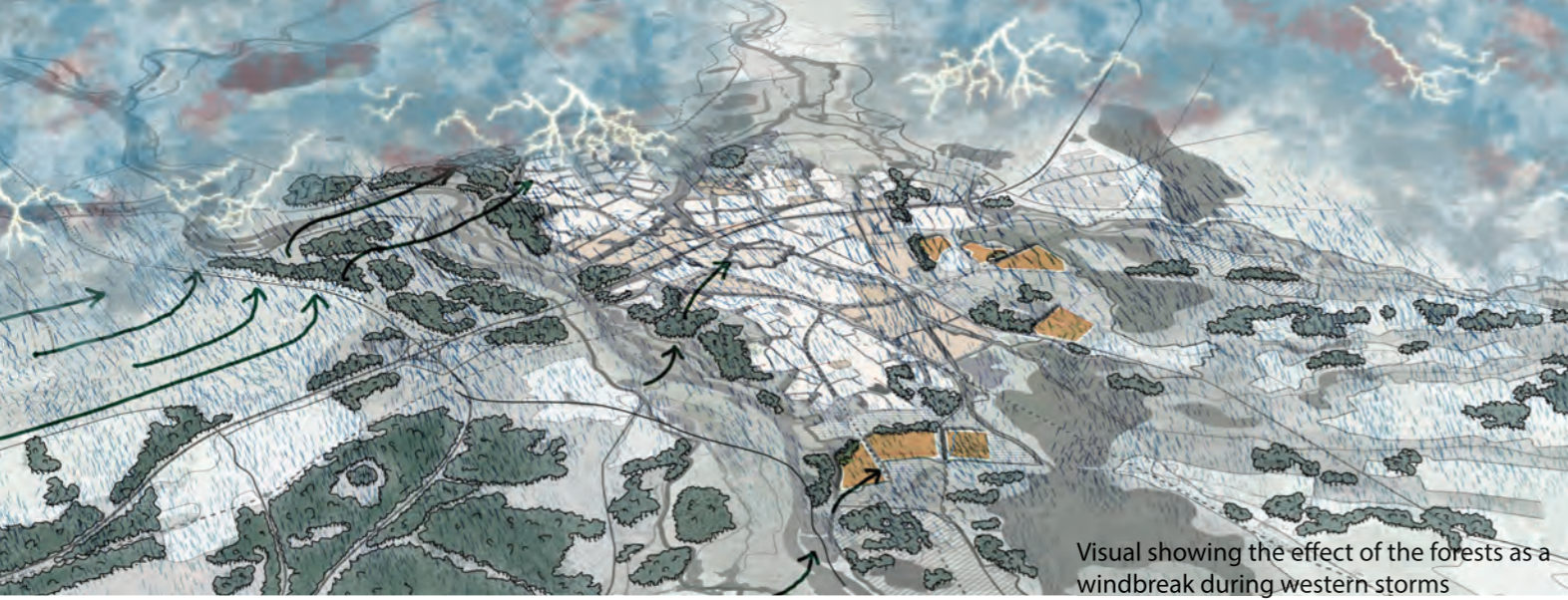
**Minke van Asperen**  
 Sjoerd Brandsma  
 Gert-Jan Steeneveld (MAQ)  
 Christian Nolf

**Cool Down**  
 Regional Urban Climate-Responsive Design Strategies for Urban Expansion

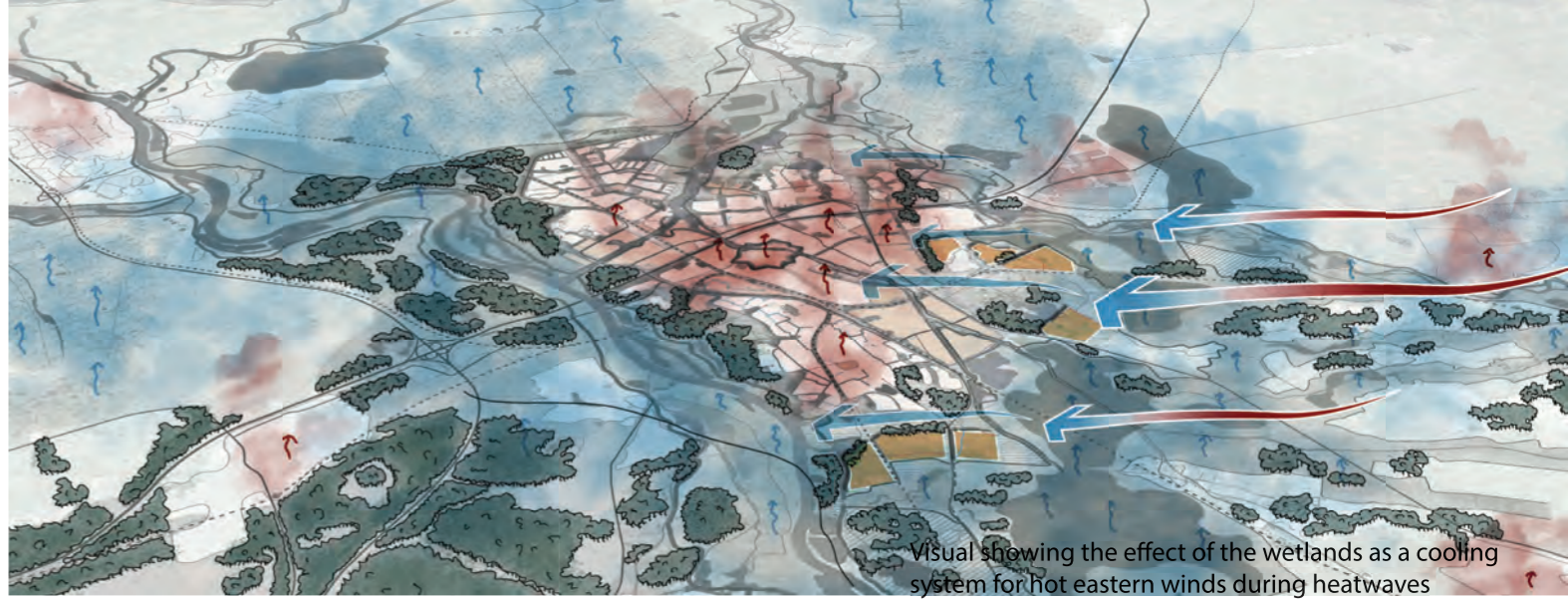
**Abstract**  
 Urban climate-responsive design strategies have been applied on the scale of the microclimate. The regional scale, however, is uncharted territory. This thesis explores expanding cities through the application of urban climate-responsive design strategies on a regional scale, focusing on the landscape of Zwolle, Netherlands. The research aims to understand how different regional landscape types relate to urban climate-responsive design strategies for them to cool effectively.

The study is structured into two phases: research for design (1) and research through design (2). The first phase involves a literature review, site analysis, and weather data analysis to identify effective urban climate-responsive design strategies and understand the climatic impacts on various landscape types in Zwolle. The second phase tests these strategies through iterative design processes to further develop criteria for urban expansion. The findings highlight the importance of green and blue infrastructures, urban form, and the dedicated approach to mitigating urban heat and enhancing thermal comfort. The thesis concludes with a strategy showing the regional scale urban climate-responsive strategies applied to expand Zwolle sustainably.





Visual showing the effect of the forests as a windbreak during western storms



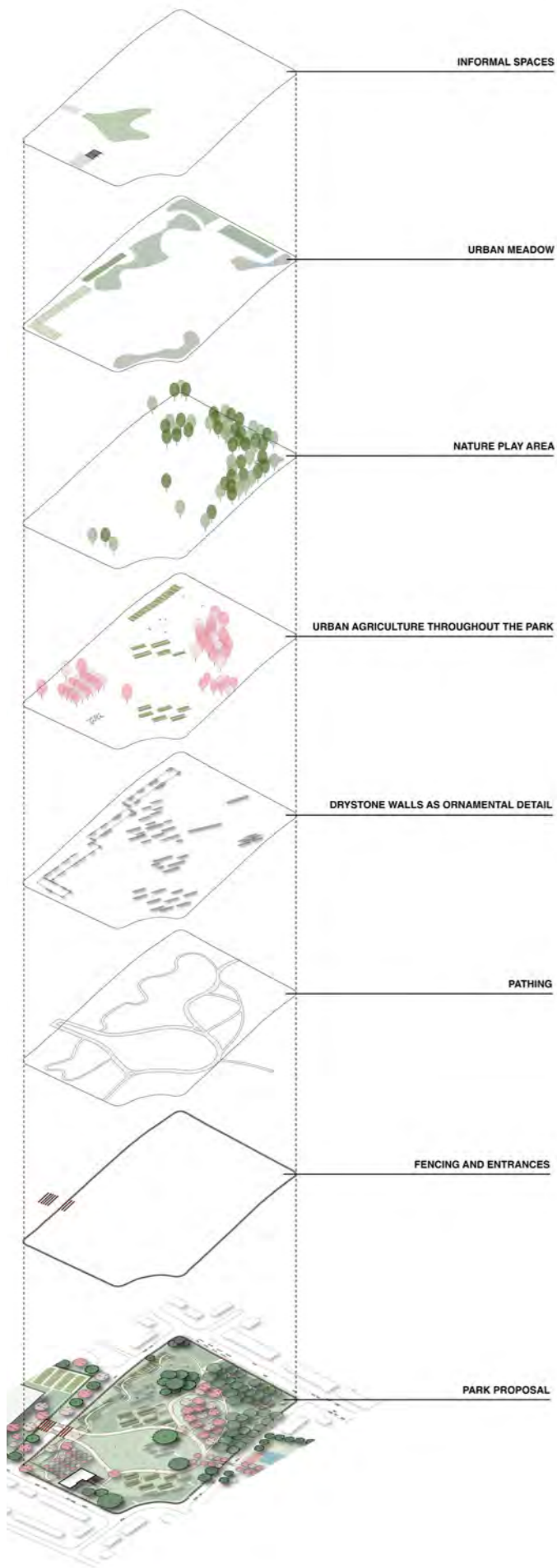
Visual showing the effect of the wetlands as a cooling system for hot eastern winds during heatwaves



0 5 10 20 Meter



Axonometric of the park



Masterplan



**Yaro Berendsen**  
 Seth Wilberding  
 Lenneke Vaandrager

### A Growing Community Space

Integrating urban agriculture to foster community building in Milton, Glasgow.

#### Abstract

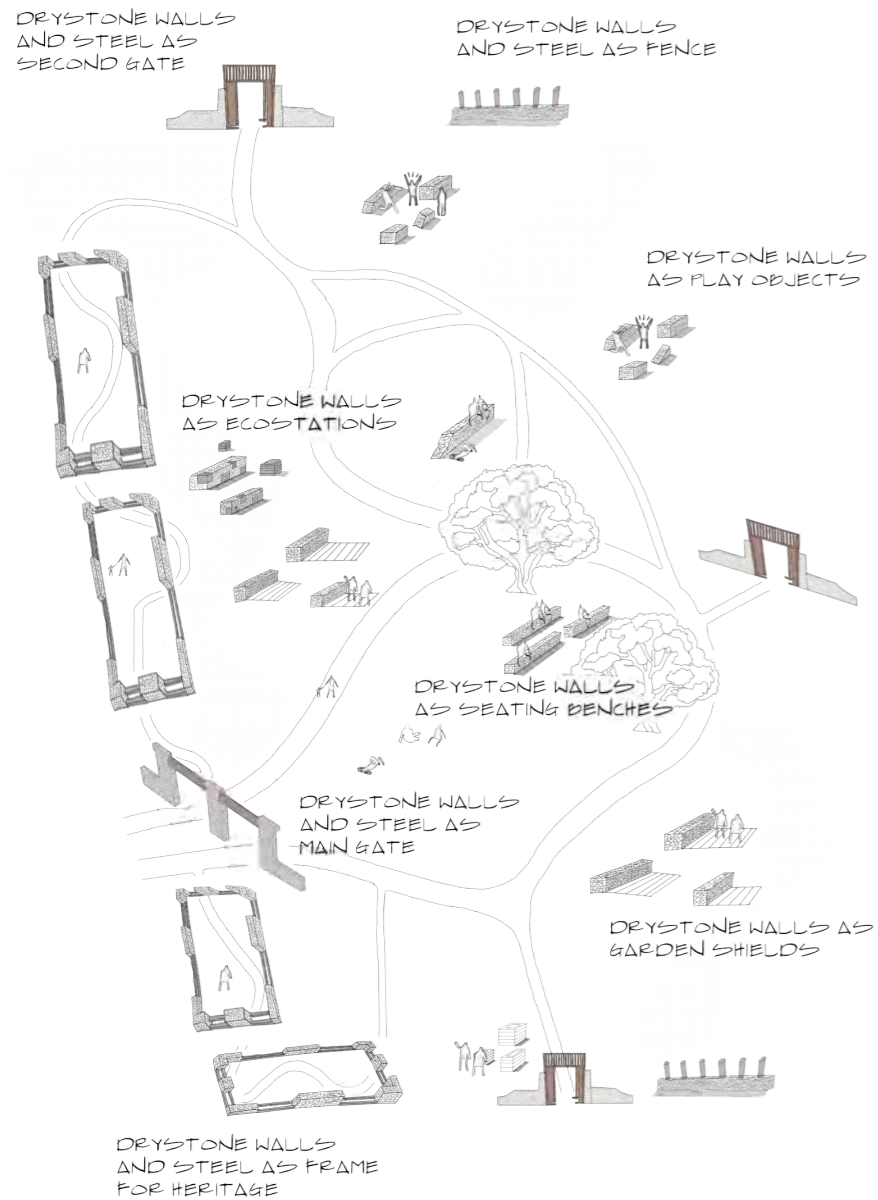
In Glasgow, deprived neighbourhoods like Milton experience social and health challenges, further compounded by limited access to quality open spaces. This thesis explores the design of an urban agriculture park as a tool to foster community building in Milton. Urban agriculture offers a pathway to repurpose vacant land, improve social interactions, and foster community building.

By examining various types of urban agriculture, the research identifies specific spatial features that enhance or foster community building in urban areas. This formed the development and testing of concept designs, eventually leading to a unique design for urban agriculture in a park form, tailored to Milton, Glasgow. The design process led to the creation of twenty-five specific design guidelines functioning as a framework for urban agriculture design. These design guidelines emphasise adaptive design for long-term engagement, inclusive and accessible spaces, contextual relevance and integration creating inviting and safe environments, sustainable and durable design, and empowerment through community ownership.

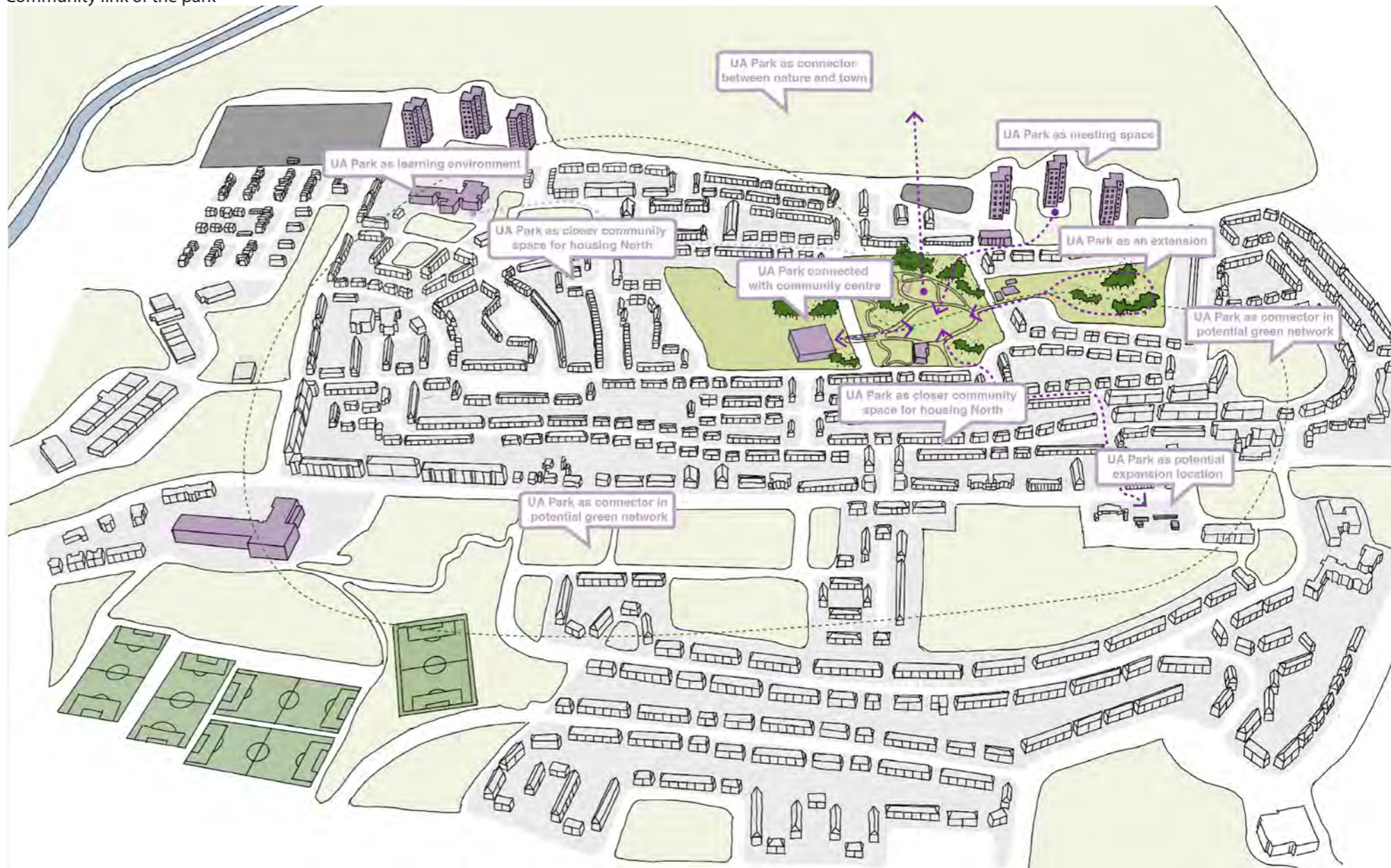
The research demonstrates that urban agriculture designs can enhance the aesthetic and functional quality of urban spaces while promoting community building and interaction among residents. Through expert assessments and site-specific design evaluations, the research refined these guidelines into a comprehensive framework for fostering community building through urban agriculture.

The thesis concludes that urban agriculture, particularly when integrated into park designs, serves not only as a means of food production but also as a catalyst for social cohesion and community building. By advocating for the integration of urban agriculture into urban planning and policymaking, this study aims to create more inclusive and resilient communities in urban environments. By providing design guidelines and emphasising the importance of local context and communities, this study aims to inform urban design and policymaking, promoting more inclusive and resilient designs for communities in urban areas.

Ornamental detail



Community link of the park



Urban meadows



Heritage frames



Community gardens

