FROM PATCHWORK TO MOSAIC

Establishing a Regional Landscape Park to combat fragmented landscapes

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MSc track Landscape Architecture
Thesis report

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ABSTRACT

We are living in a time period commonly referred to as the Anthropocene, with the rapid and disruptive reshaping of landscapes standing out as a key feature. This restructuring is evident in the Netherlands, where the landscape has shifted from a natural and connected system to a human-altered and fragmented one due to interventions in natural areas, either by removing or isolating them. The result is a patchwork of remaining greenspace scattered between buildings, infrastructure, industry, and agriculture, leading to lost ecological and social connections and posing serious challenges to biodiversity, climate resilience, and quality of life.

At the same time, urban regions are under growing pressure from the need for one million new homes in the coming years. One of the areas where this urbanisation will take place is the city triangle region in the IJsselvalley. With its unique location between the Veluwe and the IJssel river, this region represents both the vulnerability and potential of urban-rural transition zones. Its patchwork landscape reflects past disruptions, while its ambitious housing goals threaten to intensify the fragmentation of remaining open space.

In a time of dominance over nature, I propose a pro-active concept of a Regional Landscape Park to find a new balance by protecting as well as developing nature and landscape. Rather than living in opposition to nature, we must learn to cooperate with it. To avoid further degradation, we must rethink the development of urban regions and let the landscape guide our actions. This includes steering urbanisation toward a more harmonious relationship with the land.
The central question guiding this thesis is: how can a Regional Landscape Park in the Stedendriehoek area, situated between the Veluwe and the IJssel, be utilised to protect and develop nature and landscape, raise awareness, and guide urban growth? Focusing on the Stedendriehoek area, the study analyses the spatial concept of a Regional Landscape Park, assesses the current state of its components, and identifies design principles and strategies tailored to the IJsselvalley context.

The resulting proposal introduces the concept of a Mosaic Park, a dynamic spatial vision that embraces landscape diversity and invites people to move through distinct yet connected environments with shared spatial characteristics. The design is structured around three interconnected layers: ecology, climate adaptivity, and recreation and identity. It proposes a guiding framework to balance ecological, social, and economic values in future development. As urbanisation continues to pressure remaining greenspaces, this thesis presents the Regional Landscape Park as a landscape-centered strategy for designing more sustainable and connected ways of living.

MOSAIC:

"A COMBINATION OF MANY DIFFERENT PARTS FORMING ONE THING"

Cambridge Dictionary (n.d.-b)

GLOSSARY

NATURAL ENVIRONMENTS	"all that is created from nature, that surrounds human beings, where they live, and where they conduct their daily lives, work life, and actions, and from which they use elements, such as oil and various other resources, to create their own life, to support their and others' needs in order to provide as much welfare as possible in the specific area of our planet, where we live." (Lauesen, 2013, p. 1735)
BIODIVERSITY	"biological diversity among and within plant and animal species in an environment" (Dictionary, n.d-b)
ANTHROPOCENE	"noting or pertaining to a proposed epoch of the Quarternary Period, occurring in the present time, since mid-20th century, when human activity began to effect significant environmental consequences, specifically on ecosystems and climate" (Dictionary, n.d-a)
FRAGMENTATION	"Landscape fragmentation is the physical disintegration of continuous habitats into smaller units or patches, most often caused by urban or transport network expansion." (European Environment Agency, 2022)
PATCHWORK	"resembling a patchwork, especially in being makeshift, irregular, or improvised" (Dictionary.com, n.d.e) A patchwork landscape is defined by a lack of unity, where individual patches or areas are visually connected through clear seams, yet each maintains its own identity. Instead of forming a cohesive whole, these separate spaces are simply pieced together, resulting in a fragmented pattern across the landscape. As described by MacLeod and Ward, patchwork emerges when planning takes place without an overarching vision, leading to a landscape that is "increasingly fragmented... characterized by a patchwork-quilt of spaces that are physically proximate but institutionally estranged." In this context, a patchwork does not just describe physical fragmentation, but also highlights the absence of functional or institutional coherence between neighbouring areas (IBA Parkstad, 2023).
DOMINANCE	"having the authority to influence or control" and "high status in a social group ... that involves the tendency to take priority in access to limited resources, as food, mates, or space" (Dictionary, n.d-c)
EQUAL	"like or alike in quantity, degree, value, etc.; of the same rank, ability, merit, etc" (Dictionary, n.d-d)
CLIMATE ADAPTIVE	Adaptive means "having an ability to change to suit changing conditions" (Cambridge Dictionary, n.d.-a) In Landscape Architecture, climate adaptivity means that the design is prepared for climate change and can adjust to its effects. It involves creating spaces that are resilient and flexible, able to cope with challenges such as more extreme rainfall, droughts, rising temperatures, or other changing climatic conditions.
MOSAIC	"a combination of many different parts forming one thing" (Cambridge Dictionary, n.d.-b)

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PART 1

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THE PROBLEM

01

In this chapter, the problem at the heart of the thesis and its methodology are introduced. Next, the relevance of the research topic is discussed. The chapter concludes with a reading itinerary outlining the structure and main elements of the thesis.

PATCHWORK:

"... BEING MAKESHIFT, IRREGULAR, OR IMPROVISED"

Dictionary (n.d.-e)

"We have forgotten how to be good guests, how to walk lightly on the earth as its other creatures do."

—Barbara Ward (1914-1981), (Ward, 1972)

1.1 OUR DOMINANCE

Ever since I was little, I have loved nature. During my bachelors I have become aware of the worsening state of natural environments and biodiversity in the Netherlands (Lahr et al., 2005; IPO & LNV, 2023). Throughout these years, news about degrading natural environments has led to a growing motivation to change the tides. Historically, our interaction with the environment was more sustainable, respectful and cooperative, instead of living disconnected from nature or treating it as a resource to exploit. The past has been both a warning of what has been as well as an inspiration of what could be.

What has been

We are currently living in a time period referred to as 'the Anthropocene' with the rapid and disruptive reshaping of landscapes standing out as a key feature (Crutzen, 2000; Reid et al., 2005). Humans are currently altering living environments all over the world (Zalasiewicz et al., 2010; Forman, 1995; Sijmons 2022). In the Netherlands, the landscape has transformed from a once-connected natural landscape to a highly fragmented, human-altered one. Natural areas have been removed, isolated, or reshaped, resulting in a patchwork landscape of green spaces in between buildings, infrastructure, industry and intensive agriculture, often disconnected from each other socially and ecologically.

Although humans have long asserted dominance over nature (Drenthen, 2018), we must realise we are interconnected with the health of natural systems (Zalasiewicz et al., 2010). Our negative impact on ecosystems, climate, and biodiversity (Di Giulio, Holderegger & Tobias, 2009) has reached a scale that demands a fundamental shift in how we relate to nature. It is no longer viable to approach landscape design and spatial planning as separate from ecological systems. The quantity, accessibility, and spatial distribution of green areas play a crucial role in providing cultural ecosystem services in urban settings, such as those linked to recreation, health and well-being, and cultural values (Barbosa et al., 2007; Cook & Van Lier, 1994). Furthermore, fragmentation of habitats leads to disrupted species behaviours, altered ecological relationships, and declining biodiversity (Fischer & Lindenmayer, 2007).

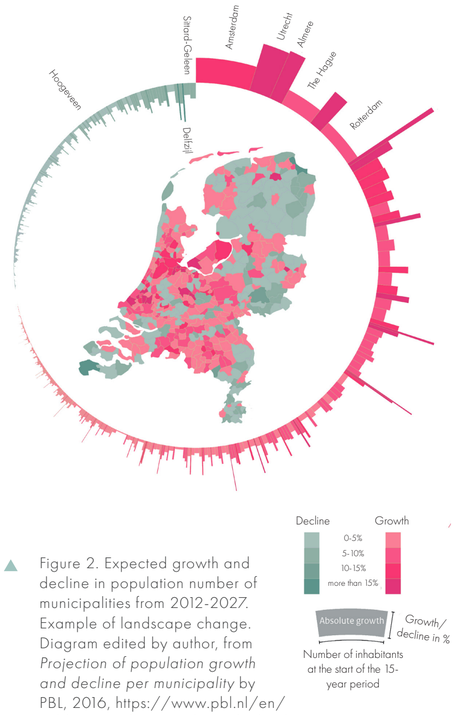
Acknowledging our impact compels us to limit further disruption of natural systems. The Anthropocene necessitates us to rethink how we live, not **regardless** of nature and landscape, but with nature and landscape as **an equal**. To achieve this, we must allow the landscape to guide how we plan, design, and live.



Figure 1. Anthropocene patterns. Example of landscape change. Photograph from *Aerial, Netherlands* by R. Skitterians and P. Skitterians, n.d., Pixabay, https://pixabay.com/photos/aerial-netherlands-europe-dutch-2165705/

1.2 PRESSURED URBAN REGIONS

Urban regions are becoming complex, as their rural areas are gaining an increasingly multifunctional character, where agricultural landuse, leisure and tourism, nature and landscape conservation and cultural history and housing are becoming more important (Nijhuis, 2007). In the Netherlands, housing has become an urgent topic, with a need for one million new homes in the coming years (Ministerie van Volkshuisvesting en Ruimtelijke Ordening, 2024). As municipalities grow and cities expand, rural cultural landscapes are gradually merging with urban areas. However, the remaining open spaces in urban regions are declining in both quality and coherence, suffering from reduced ecological function and aesthetic value (Gailing, 2007). Moreover, this ubanisation is threatening to worsen the loss and fragmentation of remaining greenspace (Nijhuis, 2024).



▲ Figure 2. Expected growth and decline in population number of municipalities from 2012-2027. Example of landscape change. Diagram edited by author, from *Projection of population growth and decline per municipality* by PBL, 2016, https://www.pbl.nl/en/publications/cities-in-the-netherlands



▲ Figure 3. Possible expansion of Apeldoorn. Image edited by author, from *Apeldoorn Drone Video | 4K UHD*, by Sanmia Drone, 2022, https://www.youtube.com/watch?v=67AfhXB_STI

City triangle region

This research focuses on part of the IJsselvalley, located in the city triangle region, 'Stedendriehoek' in Dutch, of Apeldoorn, Deventer and Zutphen in Gelderland, with currently almost 500.000 inhabitants (Rijksoverheid, 2024), see figures 6, 7 and 8. This region exists of the municipalities of Apeldoorn, Brummen, Epe, Heerde, Lochem, Voorst and Zutphen from the province Gelderland and the municipality of Deventer from the province Overijssel (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties et al., 2024). The site lies in between the two contrasting, but interconnected ecosystems of the Veluwe and IJssel. It is an example of the patchwork landscapes that can be found in the Netherlands due to past disruptive reshaping of the landscape, see figures 4 and 5. With the ambition to grow as a region, its remaining greenspace is facing the threat of an urbanisation with an ambitious expansion of 24.000 houses until 2030. The municipality of Apeldoorn will take up 51% of the task with 8.800 new houses (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties et al., n.d.). It is therefore a suitable site to research the concept of a Regional Landscape Park as a way to guide this urbanisation whilst putting the landscape central, ultimately enabling protection and development of nature and landscape and raising awareness of their importance.







▲ Figure 4. Direct and indirect results of our dominance. Heathland, forest and streams lost due to Anthropocene effects. Photographs from *Droogte* by Natuurmonumenten, n.d., https://www.natuurmonumenten.nl/standpunten/droogte

◀ Figure 5. Fragmented patchwork landscape. Loss and isolation of greenspace. Maps made by author using data provided by TOP10NL, Erfgoedatlas of RCE, Provincie Gelderland



Figure 6. Satellite image of the Netherlands with waterways and its border. Map made by author using data provided by ESRI Satellite, TOP10NL, PDOK

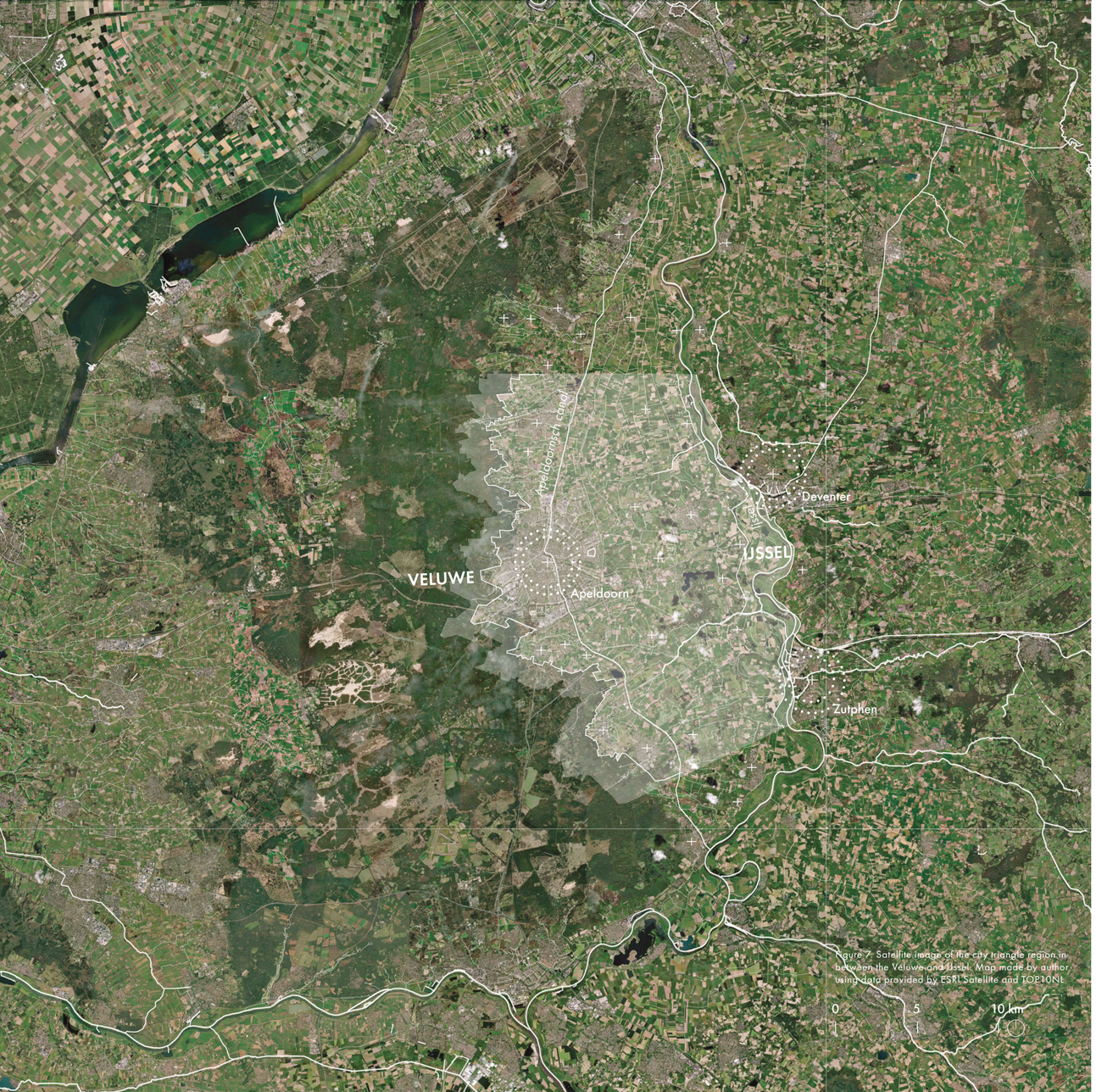
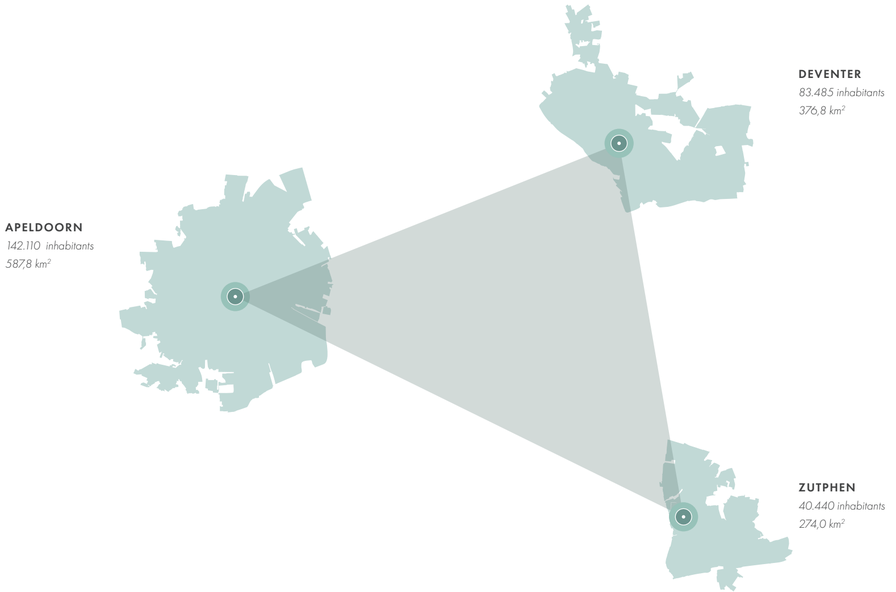


Figure 7. Satellite image of the city triangle region in between the Veluwe and Ijssel. Map made by author using data provided by ESRI Satellite and TOP10NL



▲ Figure 8. City triangle region. Cities with surface area and inhabitant numbers. Diagram made by author, based on AlleCijfers (n.d.-a), AlleCijfers (n.d.-b) and AlleCijfers (n.d.-c)

1.3 RELEVANCE

What should be

With the threats urbanisation brings in urban regions, it is imperative to research how landscape can guide sustainable development and actively steer urbanisation toward a more harmonious coexistence with the landscape. Landscape architecture as a profession has the potential to take on a leading role in these ambitions, by creating balanced experiential and multifunctional living environments that have room for both nature and humans. Therefore, the spatial concept of a Regional Landscape Park is explored in this thesis as a means of adopting a landscape-centered approach to living, one that reconnects people and nature, and fosters a more harmonious coexistence between humans and non-humans as was once common in the past. By investigating this spatial concept in the context of the city triangle region, the thesis aims to contribute not only to local spatial strategies but also to broader discussions on sustainable regional development and landscape-led living and planning in the Anthropocene.

1.4 METHODOLOGY

This thesis explores the Regional Landscape Park as a spatial concept that can enable landscape architecture to contribute to a renewed balance between humans and nature. It offers a guiding framework for the development of living environments affected by fragmentation and urbanisation. The main research question is as follows: how can a Regional Landscape Park in the Stedendriehoek area, situated between the Veluwe and IJssel, be utilized to protect and develop nature and landscape, raise awareness, and guide urban growth?

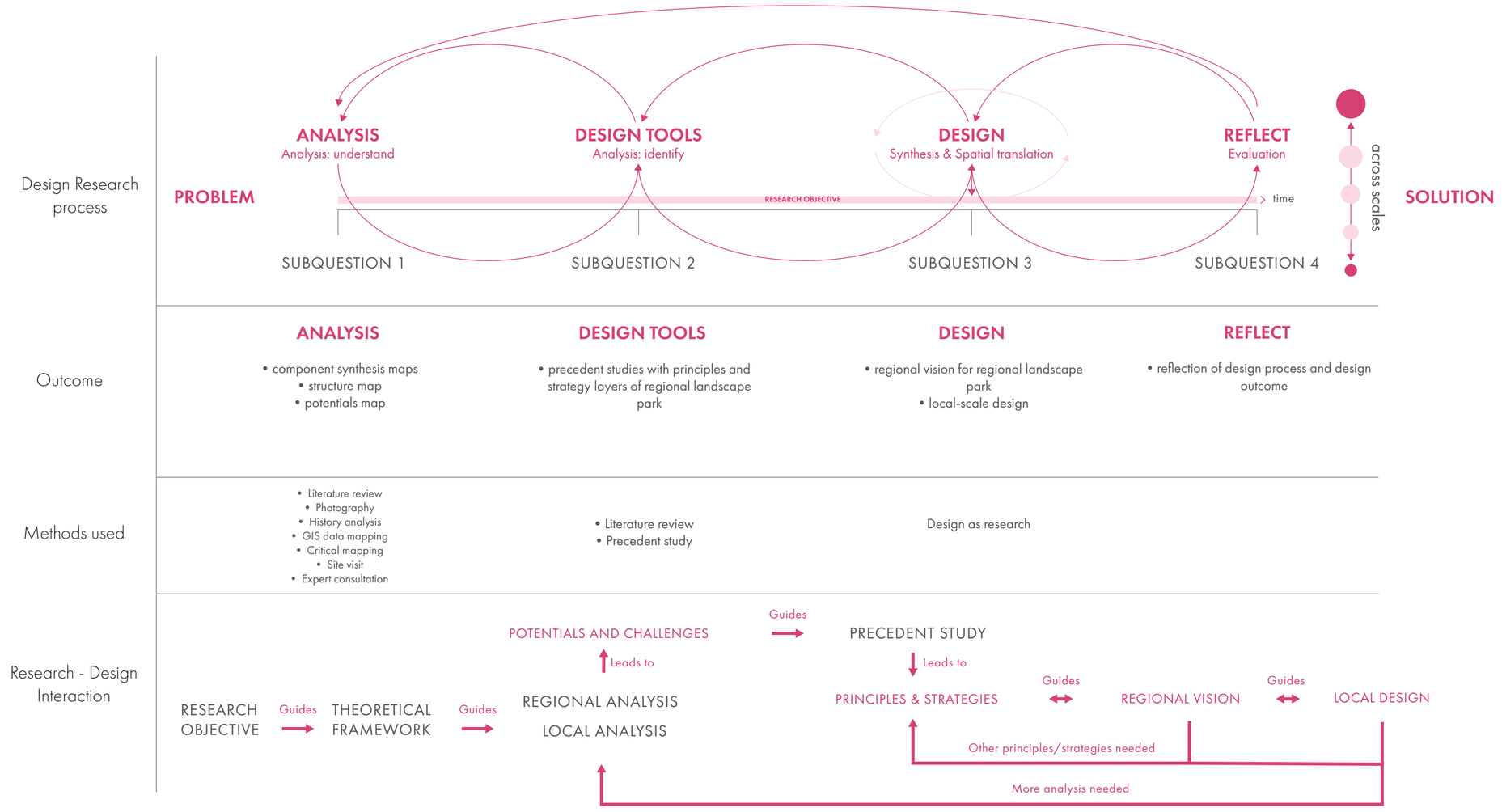
The research is structured around four sub-questions: to understand, to identify, to design, and to reflect, see figure 9. The thesis uses design as research and follows an iterative process of exploration and application, in which each step builds on and informs the other, see figure 10. Each design application reveals new insights or challenges that requires further investigation, leading to a deeper understanding. During this iterative process, working across multiple scales, from the eye-level experience to the regional context, is instrumental in understanding the broader spatial impact of the proposed design and ensures design decisions are informed by both broad contexts and specific site conditions.

How can a **Regional Landscape Park** in the **Stedendriehoek area**, situated between the **Veluwe and IJssel**, be utilized to **protect and develop nature and landscape, raise awareness, and guide urban growth**?

LANDSCAPE-BASED APPROACH

SUBQUESTION 1	SUBQUESTION 2	SUBQUESTION 3	SUBQUESTION 4
UNDERSTAND	IDENTIFY	DESIGN	REFLECT
What are the components of a Regional Landscape Park and what is the current state of those components in the landscape system of the Veluwe, Ijsselvalley and Ijssel?	What are design strategies and principles for the components of a Regional Landscape park?	How can we apply the design strategies and principles in city triangle region to create a Regional Landscape Park that protects and develops nature and landscape, increases awareness and guides urban growth?	What can we learn from this research?

▲ Figure 9. Four subquestions guide the research process.



▲ Figure 10. The process is iterative and throughout the scales.

1.5 READING ITINERARY

The second chapter elaborates on the methodology guiding this research thesis, discussing the relevant theories, the chosen method, and the overall research design.

The third chapter examines the current state and essential aspects of the Regional Landscape's components within the city triangle area. For each element, related challenges are addressed at the end of their respective sections. The chapter concludes with two maps highlighting the spatial structure and opportunities in the region.

In the fourth chapter, key precedents are analysed to extract design principles, followed by the development of a layered approach informed by theoretical foundations, identified challenges, and insights from these studies. This part closes with an overview of the design principles, organised into three strategy layers.

The fifth chapter introduces the primary users of the park, followed by the regional-scale proposal, which demonstrates the application of the three strategy layers throughout the city triangle. Following this, design envelops are shortly discussed with detailed elaborations on two of these design envelops, where the concept of the Regional Landscape Park is detailed in spatial terms. The chapter ends with the phasing strategy of the design envelops and a stakeholder analysis of a Regional Park organisation.

The thesis closes with a final chapter that presents the overall discussion and main conclusions.

THE SOLUTION CONCEPT

This chapter elaborates on the methodology guiding the research thesis by discussing relevant theories, the chosen method, and the research design.

02

2.1 THEORY

The Anthropocene urges us to rethink how we live, thus also how we should plan and design the our landscapes and infrastructures. To successfully apply and further develop the spatial concept of a Regional Landscape Park it is essential to define a theoretical lens, serving as a guidance for further steps in this research. To explore the potential of Regional Landscape Parks as spatial strategies, this chapter draws on two complementary theoretical perspectives: landscape-based regional design and the landscape as a long-term structure.

LANDSCAPE-BASED REGIONAL DESIGN

The first theoretical perspective that forms the foundation for this research is **landscape-based regional design**. The landscape-based regional design strategy sees the landscape as the basic condition for the physical shaping of regions. Because of this, the spatial development is based on an understanding of the landscape with its social-ecological processes (Nijhuis, 2022), and the natural and urban landscape physiology (Nijhuis, 2019). The natural landscape presents both opportunities and limitations for human use and should therefore guide how we intervene in and modify it (Nijhuis, 2022).

The landscape-based approach supports the idea that landscape not only has natural and physical features defining its character, but is mostly influenced by the collaboration of nature and culture. This creates a particular character and synergy of natural-cultural qualities to the landscape, which can also be called a biocultural landscape where there are biotic and cultural elements that are connected through historical/ecological interaction (Pungetti, 2012). This approach

therefore learns from landscape history and indigenous practices, using the already built up local and indigenous knowledge (Nijhuis, 2022).

Additionally, it aims to gain some control over how urbanisation takes place and built environments are shaped. Regional design can steer the process of planning and designing, guiding spatial developments and showing design is an integrating practice (Nijhuis, 2019), through robust landscape structures that form resilient and flexible frameworks that enable coherent development of the region (as a longterm strategy) and local projects (as short-term intervention). The regional design also guides urbanisation by looking at possibilities for sustainable development of a region, guiding it towards the best locations, scales, functions and inter-relationships. It aims to create and reconstruct living systems where biodiversity, cultural history, and multifunctionality shape urban landscapes that are inclusive both socially and ecologically, and sensitive to water dynamics (Nijhuis, 2022).

This strategy is multiscalar, integrative and transdisciplinary, focusing both on the effect of measures on a local scale as well as general scale and connecting experts, citizens and authorities.

In landscape-based regional design, three approaches can be recognized, each forming their own characteristic relationship between structure and process across different scales (Nijhuis, 2019):

Area Approach:
This approach enables a landscape mosaic, with long-term, sustainable conditions for 'low dynamic functions' (the network) and a large amount of land with 'high dynamic functions' (the mosaic).

Framework Approach:
The framework approach establishes durable and unified landscape networks with landscape structures that creates conditions that accommodates local developments, supports spatial development, and ensures the protection of resources and spatial coherence.

Corridor Approach:
This approach focuses on the development supporting landscape structures that carries urban and rural development, guiding, facilitating and creating conditions for urban development, whilst stimulating social and ecological interaction.

LANDSCAPE AS A LONG-TERM STRUCTURE

While landscape-based regional design provides a spatial and functional framework, it is equally important to understand the temporal and cultural depth of the landscape to inform thoughtful interventions. The concept of the landscape as a long-term structure, or longue durée, introduces this temporal dimension. Over time, landscapes undergo a process known as 'sequent occupance,' wherein successive groups inhabit the same area, each leaving distinct cultural imprints and modifications (Sauer 1925; Whittlesey 1929). Landscapes evolve as transformations based on possibilities and evaluation, resulting in patterns, structures and forms which are either preserved, developed or replaced through time. Some patterns, structures and forms that are not easily changed became robust and permanent and others disapear as they were more susceptible to change. Ultimately a layered landscape is created where asynchronous transformations caused physical traces of different time periods to align or conflict with each other, essentially carrying memories of different moments in time. Because of this the landscape has gained many meanings (Nijhuis, 2022). As such, it can be read as a biography and palimpsest, where each important activity influencing the formation of the landscape is revealed (Samuels 1979; Corboz 1983). The structure of the landscape together with its historical landscape patterns and elements can even characterise a landscape. One starting point of adding 'new layers' to this landscape is knowing the historical traces (Nijhuis, 2022). Understanding the historical depth and structural composition of a landscape allows designers to intervene with awareness, adding new 'layers' that respect and respond to what is already there.

Regional landscape parks require both spatial coordination and historical awareness. By combining the spatial logic of landscape-based regional design with the temporal awareness of long-term landscape structures, we can develop a more grounded and resilient framework for Regional Landscape Parks. When designing a regional landscape park, the landscape-based design strategy gives structure to the park, whilst the longue durée thinking will give meaning to it, being able to both guide sustainable development of the city triangle region whilst preserving the unique diverse identity.

The concept of the Regional Landscape Park emerges directly from the landscape-based regional design tradition. It translates the strategic, multiscalar thinking of this theory into a tangible spatial framework that can guide sustainable development. However, to use this concept as a basis for design, it is necessary to define what a Regional Landscape Park entails. Therefore, the next section outlines its spatial structure and guiding principles, which together with the case studies and challenges from the site analysis will be used to inform the layered design strategy applied in this thesis.

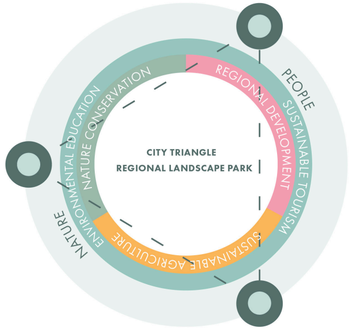
2.2 METHOD

THE SPATIAL CONCEPT OF A REGIONAL LANDSCAPE PARK

The spatial concept of Regional Landscape Parks can be an answer to the need for a landscape-centered approach whilst dealing with the increasing complexity of urban regions mentioned by Gailing (2007) and Nijhuis, (2007). Regional Landscape Parks are often also called Nature Parks, Landscape Parks or Regional parks or Regional Nature Parks in other European countries and literature. However, for readability, the term 'Regional Landscape Parks' will be used throughout this thesis to refer to refer to parks that are covered by the characteristics mentioned in this chapter.

Regional Landscape Parks change the perception of urban landscapes, ignoring the dichotomy of city and open space (Gailing, 2007). Therefore, the concept of Regional Landscape Parks can be seen as ambivalent, as it both brings together urban and rural as well as tries to separate them (Kühn, 2003). Nijhuis (2007) adds that the concept on one side incorporates urban and suburban factors in spatial planning and on the other acts to uphold the integrity of rural landscapes. Regional Landscape Parks can protect urban-regional open spaces by enhancing the value of the cultural landscape. This can be done by increasing accessibility of open space and connecting them, and by encouraging sustainable land use, ultimately making the landscape a well appreciated regional public resource offering places for cultural heritage, meeting, local qualities, recreation, and urban agriculture (Gailing, 2007).

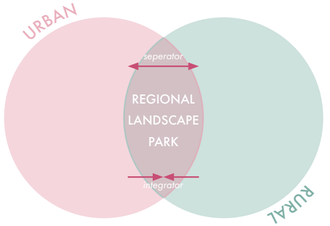
Regional Landscape Parks support spatial development by encouraging partnerships, cross-sector integration, and the sustainable enhancement of landscape values (Nijhuis, 2007). Regional landscape parks are able to combine conservation, farming, recreation and regional development, whilst also supporting sustainable tourism and environmental education (Köster et al., 2017). Regional Landscape Parks support spatial development by encouraging partnerships, cross-sector integration, and the sustainable enhancement of landscape values (Nijhuis, 2007). They are also able to combine conservation, farming, environmental education, recreation and regional development, whilst also supporting sustainable tourism and environmental education (Köster et al., 2017). Regional Parks work as a planning concept that ensures regional projects to be based on local qualities and uses (Nijhuis, 2007). Nijhuis (2007) observes that the interpretation of the concept is flexible and can differ per park.



▲ Figure 11. Components of a Regional Landscape Park, based on Nijhuis (2007) and Köster et al. (2017).

There are certain elements that are shared among them (European Community, 2001; Tress _et al_., 2003, in Nijhuis, 2007, p.2):

- Quality of the rural and urban landscape (attractive);
- Access to the countryside;
- Identity (spatial and cultural);
- Space for different lifestyles (multi-culture);
- Multifunctional areas;
- Attractive business locations;
- Private participation with a view to social embedment;
- Incentives for joint implementation.



▲ Figure 12. Ambivalence of a Regional Landscape Park: both a seperator and integrator of urban and rural, based on Kühn (2003).

Other mentioned elements in literature about the Regional Landscape Park concept are (Denkinger et al., 2017):

- Preservation of diversity of species and biotopes and Natura 2000 areas;
- Safeguarding characteristic cultural and natural landscapes;
- Protecting and developing regional identity, landscape and culture;
- Sustainable farming, forestry and water management;
- Sustainable rural area development;
- Sustainable tourism;
- Recreation and health;
- Environmental education and education for sustainable development;
- Climate change mitigation and adaptation.

While each regional park possesses unique characteristics, they often share the same spatial principles. In essence, regional parks can be viewed as structured systems composed of (Nijhuis, 2007):

1. Leisure routes or “open space networks” that link urban areas with rural landscapes (Ward-Thompson, 2002);

2. Nature and landscape parks that serve as counter-models to urbanised city areas (Kühn, 2003; Tummers & Tummers-Zuurmond, 1997);

3. Cultural-historical hotspots that encourage a recognition of regional identity and reflect a “cultural biography” of the area (Wolschke-Bulmahn, 2001; Rooijakkers, 1999).

Multifaceted

To conclude, the Regional Landscape Park is a multifaceted concept that can have location-specific characteristics and is thus flexible. However, based on gathered literature it can be concluded that it generally takes the following components into account: water, soil, height relationships, the accessibility of the landscape, natural systems, recreation, cultural history including farming activities and urbanisation.

2.3 RESEARCH DESIGN

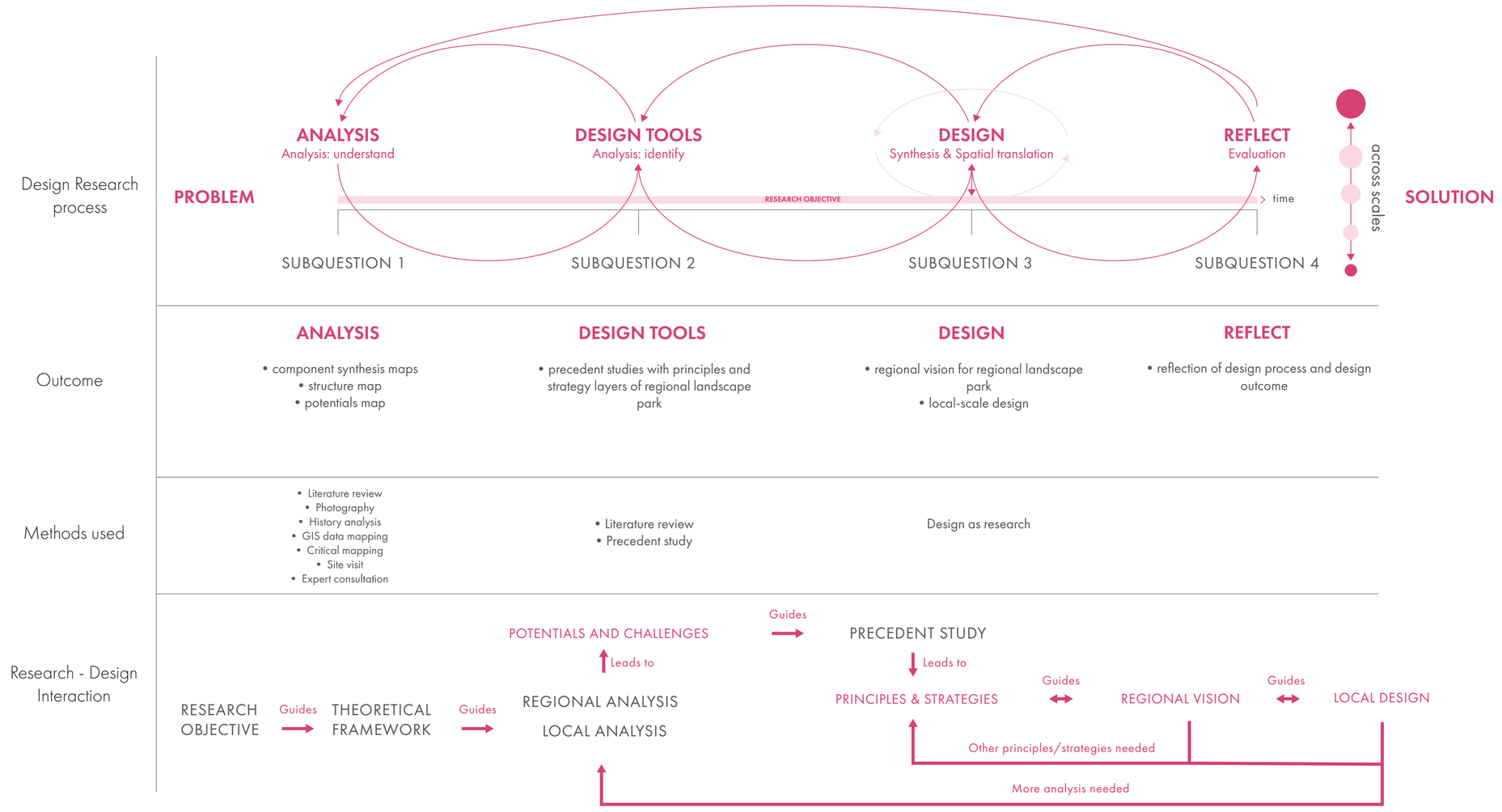
The first research phase involves an in-depth study of the Regional Landscape Park as a spatial concept to acquire a better understanding, supported by a review of landscape-based regional design and landscape as a long term structure theory.

This theory basis will provide park components that is then used to guide the analysis of the region. This includes the analysis of site-specific literature, historical maps, GIS datasets, and site visits documented through photography. An online consultation with Rob Nijman of Waterboard Vallei & Veluwe offered valuable insight into the regional water system, enhancing the understanding of local hydrological dynamics. Additionally, a method learned during the Drawing Time workshop provided a means to understand current unsustainable land uses and the ecology of streamvalleys. Spatial analysis and mapping were carried out using a range of data sources from provincial, national, and open-source providers. These include datasets from the Province of Gelderland, Routes op de Veluwe, Behoud van de Veluwse Sprengen en Beken Bekenstichting, Waterboard Vallei & Veluwe, Klimaateffectatlas, Wandelnet, AHN, CBS, and ESRI Satellite imagery, among others. Synthesis maps were created by overlaying the landscape layers to reveal spatial relationships, while critical mapping techniques were used to identify key challenges and opportunities within the study area.

In the second research phase, literature together with precedent studies will gather a variety of implementations and elements of the concept which, together with challenges of the components will serve as a foundation for the formation of a personalised concept, identifying strategy layers to guide the project. Additionally, design principles will be gathered from the precedents.

A five-day workshop on Regional Landscape Parks in the Stedendriehoek region, organised by Prof. Dr. Ing. Steffen Nijhuis of the Landscape-based Urbanism graduation lab, will support the design development phase. Through collaborative design sessions and discussions with provincial and municipal representatives, the workshop will introduce insights into spatial opportunities and stakeholder priorities. A second site visit, guided by the municipality, will further deepen the contextual understanding.

Then, with the knowledge of the first research phase and additional research throughout the design process, the final design is developed on three scales. At the regional scale, a layered spatial strategy will illustrate how ecology, climate adaptivity, and recreation and identity are integrated to form the Regional Park. The main users of the regional landscape park will be taken into account when designing the ecology and recreation and identity layer. At the local scale, two strategic design envelops for sites with diverse landscape characteristics will demonstrate how these layers interact in practice, highlighting the multifunctionality, diversity and experience that lies at the core of the concept. A zoom in map, sections and eye-level collages will then elaborate even more on how this will be experienced from a human perspective. Lastly, the research will be discussed and concluded.



▲ Figure 13. The process is iterative and throughout the scales.

UNDERSTANDING

03

This chapter examines the current state and relevant aspects of the components of the Regional Landscape in the city triangle region. For each component, related challenges are discussed and the implications for the design are concluded at the end of each section. The chapter concludes with two maps that highlight the structure and opportunities of the region.

drought damage

water pollution

lack of connection

lack of habitats

biodiversity loss

lowering groundwater supply

peak water surplus

unsustainable agriculture

lowering waterlevels

3.1 WATER, SOIL, HEIGHT

The project location is situated in between the high and dry Veluwe and the low and wet IJssel. The formation of this landscape can be reduced to three processes. The first process is when land ice moved through the IJssel Valley during the penultimate ice age (200000 -130000 BC) pushing material to the sides, creating the Veluwe push moraine with height differences of almost 100 meters. The second one is when wind and water led to the formation of cover sand ridges, sand elevations and streamvalleys due to erosion during the last ice age (90000 - 10200 BC). The last one is the IJssel river. As the IJssel river has flowed freely through the area until a few centuries ago, flooding the area of the IJsselvalley. This has led to the formation of backswaps and natural levees. In the 14th century dikes were constructed that stopped a lot of the river dynamics, reducing it to only the floodplains (Gemeente Epe et al., 2009). Because of these processes, the area can now be divided into four different ecological zones (Gemeente Epe et al., 2009), see figure 18:

1. **The Veluwe** with its high parts of the moraine existing mostly out of forest and natural areas (Gemeente Epe et al., 2009);

2. **The flank of the Veluwe** with the lower parts of the moraine. Because it is the transition zone from low to high people started to live here. Villages, infrastructure, old arable fields, estate landscapes, cover sand ridges, (dug) streams with their streamvalleys, and heath cultivations can all be found here (Gemeente Epe et al., 2009);



Figure 14. Soil,water and height. Map is made using data provided by Top10NL, Provincie Gelderland, CBS, Alterra and AHN.

water pressure on dikes

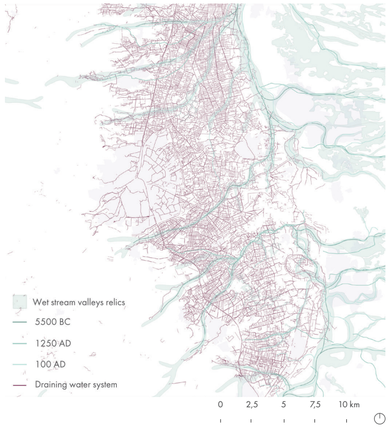
drainage system limit

lack of awareness

▲ Figure 15. List of ecology, water and identity challenges associated to this component.

3. **The valley** with in the north a relatively flat lower laying basin area which was formerly quite wet because of the floodings of the river and seepage from the moraines. Therefore, it is characterised by its dug canals that drain the area with cultivation ribbons (Gemeente Epe et al., 2009). The south side of the IJsselvalley lies a bit higher because of sand that was blown over this area, creating a sand cover landscape. Because of this it is also able to drain the water through the streams coming from the moraines towards the IJssel, which is not possible on the north side because of the height differences (Bleumink, & Neefjes, 2021);

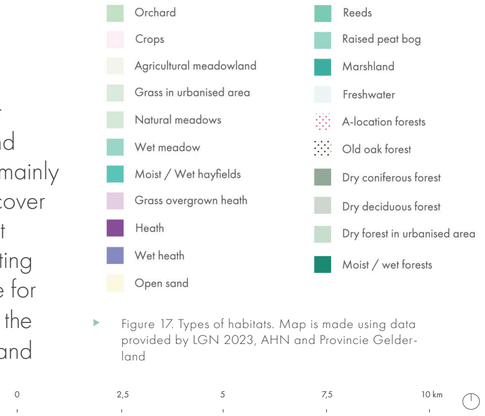
4. **The river landscape** with its river levee, which was attractive for early settlers because of its height. A dike goes through this part marking the outer- and innerdike area of the river IJssel. The floodplains of the river are areas where the river and its floods now has or has had an influence. This area is characterised by its small-scale elevation differences and farm fields, because flood risk makes it an unsuitable place to live (Gemeente Epe et al., 2009).



▲ Figure 16. Waterdrainage system in the area of the city triangle region. Blue lines and areas show the historic water structures, purple shows what people designed to drain faster. Map is made using data provided by Erfgoedatlas of the RCE, CBS and Waterboard Vallei & Veluwe.

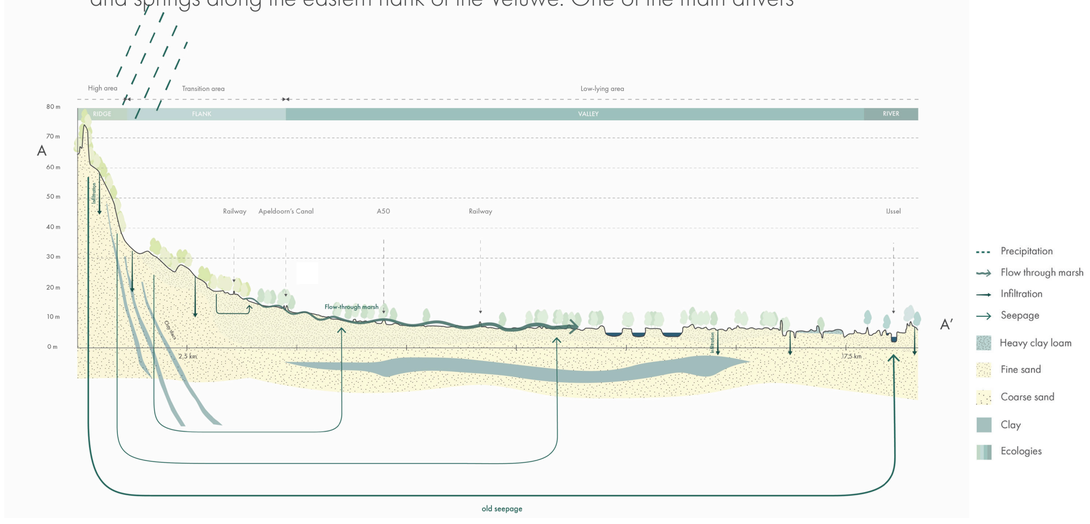
Ecology of the area: connected through water

Naturally, the differences in height together with the natural water system created different types of habitats. The Veluwe was dry and high with local wet areas, the IJsselvalley had a wet identity with mainly marshland with wet forests, wet heath and higher and drier sandcover areas, and the IJssel river area was formerly characterised by wet nature. As can be seen in figure 17, dry habitats are now dominating both the IJsselvalley and IJssel area because of artificial drainage for agricultural purposes. The water system between the Veluwe and the IJssel is complex. It is influenced by what happens underground, and



▲ Figure 17. Types of habitats. Map is made using data provided by LGN 2023, AHN and Provincie Gelderland

is naturally an interconnected system. As the subsurface layer was pushed during the penultimate ice age, it started sloping eastward toward the IJssel river. This includes the clay barriers in the subsurface, which sometimes are only a few centimeters thick, which now slope toward the Ijssel, dividing the large sand layer into compartments. These barriers have a north-south orientation, thus slow the west-east flow of groundwater due to their poorly permeable properties. North of Apeldoorn, the groundwater flow within the compartments is northward, while south of this point it flows southward. These clay barriers also contributed to the presence of numerous streams and springs along the eastern flank of the Veluwe. One of the main drivers



▲ Figure 18. Section of south side of the IJsselvalley. Potential connection between the four ecologies by natural waterflows, based on Klimaat Vallei & Veluwe (n.d.) and data provided by Klimaateffectatlas, AHN and BROloket.



▲ Figure 19. River nature.



Figure 20. Sand drift on the Veluwe.



Figure 21. Seepage line forest of Beekbergerwoud.

of the water system of this area is the groundwater storage under the Veluwe, which is fed by infiltration on the higher parts. This infiltration makes the formation of characteristic streams on the flank of the Veluwe possible. Over time, as rainwater infiltrates into the ground, it percolates through the permeable sand layers but gets trapped by the clay barriers below. A groundwater storage is formed and as the water builds up, hydraulic pressure is created. This pressure forces water to move laterally or upwards, depending on the topography and the permeability of the surrounding layers. When the pressure is high enough, water escapes to the surface, forming springs and feeding streams. The streams and springs originate high on the slope, at approximately 20 to 35 meters above NAP. In some cases, stream valleys cut through these clay barriers, which allows the groundwater to escape horizontally towards the IJssel (Klimaat Vallei en Veluwe, n.d.). Another effect of the infiltration in the high parts of the area, such as the Veluwe and higher sand ridges and river levees in the valley and river area, is the seepage that happens in the lower parts in between the Veluwe and IJssel. This is either deep seepage, which comes from the Veluwe, or local seepage which comes from coversand ridges and river levees. When the waterlevel of the IJssel is high, there is also local seepage from the IJssel (Gemeente Epe et al., 2009).

Loss of connection

The current way of using and managing water in the area is not sustainable. The natural water system is being disrupted due to a lack of water storage under the Veluwe, which can be seen as streams are drying up in longer periods of drought because of a lack of a constant groundwater flow, but also local floods in periods of heavy rainfall when water cannot infiltrate due to worsened soil conditions. There are

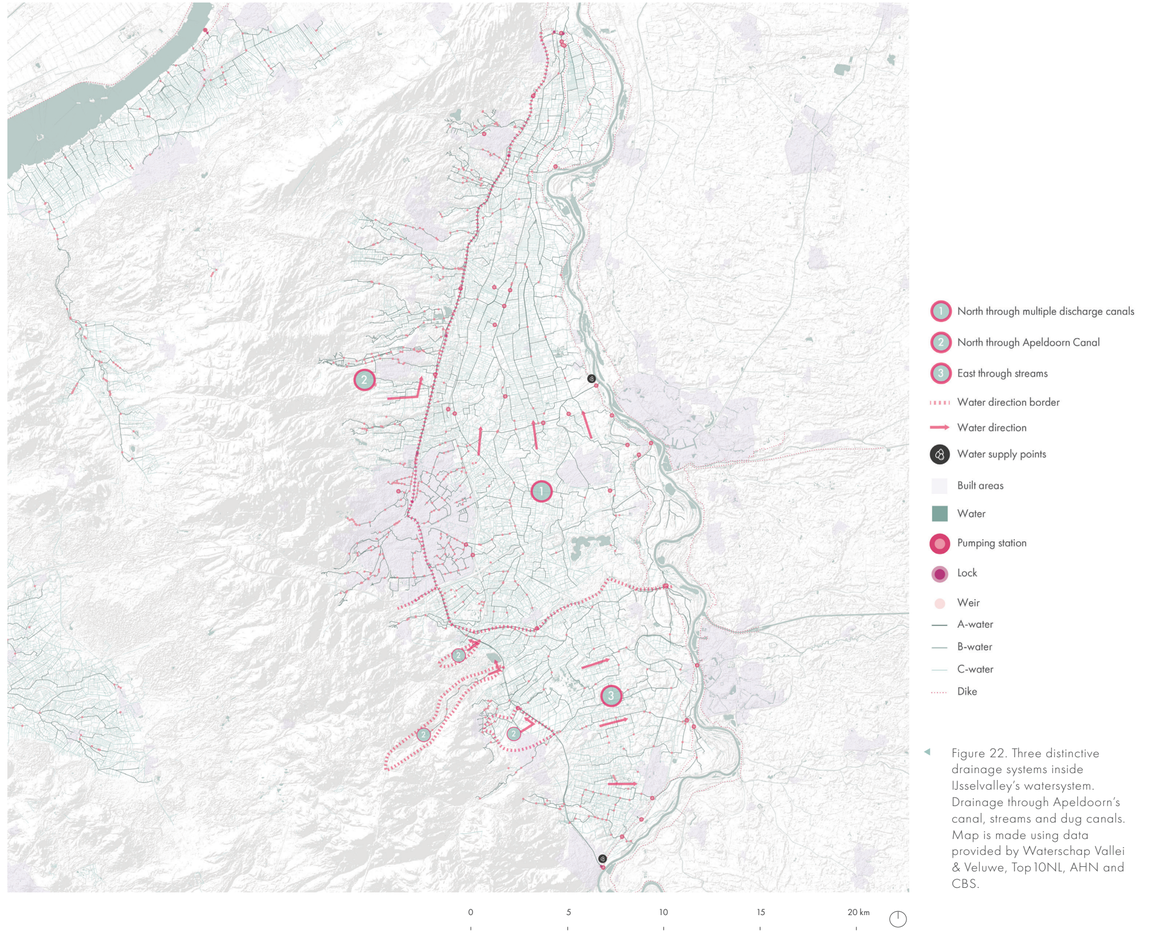


Figure 22. Three distinctive drainage systems inside IJsselvalley's watersystem. Drainage through Apeldoorn's canal, streams and dug canals. Map is made using data provided by Waterschap Vallei & Veluwe, Top10NL, AHN and CBS.





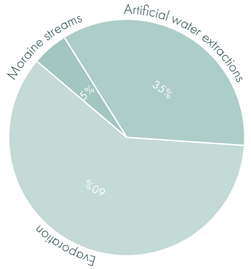




◀ Figures 23, 24, 25 and 26. Draining waterways in the city triangle region.

a few causes for this disruption, see figure 27. The first is evaporation, being responsible of 60% of the extraction of the groundwater storage. This sounds counterintuitive when taking into account that during the last 100 years precipitation increased with 27% from an average of 695 mm to 880 mm a year. However, the evaporation also increased, by a lot. Because the Veluwe has changed from being mostly heath and sand drifts 100 years ago to now mostly forested with trees, the area also evaporates way more water through the trees. A lot of those trees are coniferous, which block a lot of the precipitation to reach the ground as well. This ultimately causes the waterflow in the streams to decrease instead of increase, even though there is more rain. Because of climate change, strong fluctuations in precipitation cause even more vulnerability of the watersystem.

The second cause is artificial water extractions in the area, being responsible for approximately 35% of the extraction of groundwater storage. Clean water is being extracted for farmers to combat drought during drier periods in order to continue current agricultural practices, eventually losing it to the river, due to draining waterways. Water is quickly drained either north (north IJsselvalley) with dug canals such as the Grift and Apeldoorn's canal for the moraine streams and 'weteringen' such as the Nieuwe Wetering and Groote Wetering for the seepage and precipitation drainage or west (south IJsselvalley) via streams going underneath Apeldoorn's canal (Bleumink, & Neefjes, 2021), see figure 22. Ditches and streams are normalised and deepened and water levels are kept artificially low, as can be seen in



▲ Figure 27. Groundwater extractions, based on Cultuurland Advies (2020).

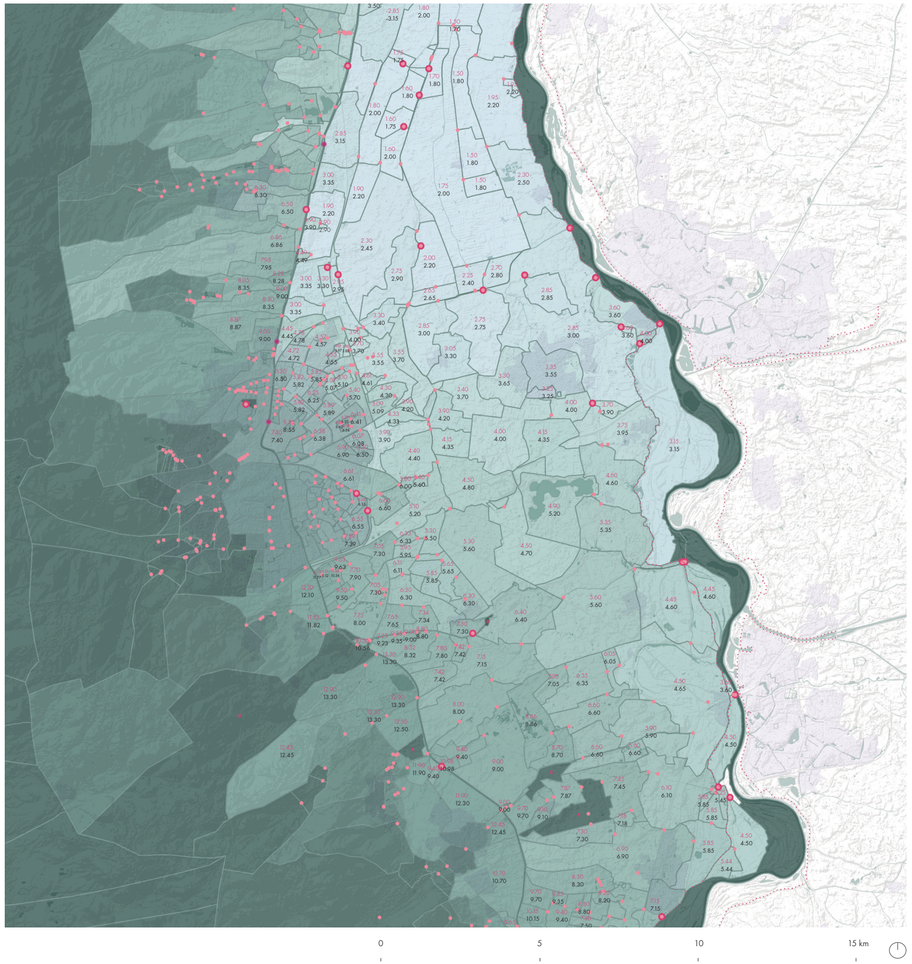


Figure 28. Management of water levels. Loss of wetness in the IJsselvalley. Map is made using data provided by Waterschap Vallei & Veluwe, Top10NL, AHN and CBS.

figures 23, 24, 25, 26, 28 and 29. Due to these farming practices and the current supporting water management, the former wetness of the IJsselvalley has been erased. Interestingly, one of the dug waterways is the Apeldoorn's canal, however because Apeldoorn's canal was dug at a height that was too high for the groundwater level to reach, it had to be connected to natural and dug streams Oude Beek, Zwaanspreng, Oosterhuizerspreng Kayersbeek, Vrijenbergerspreng, Veldhuizerspreng so it could be fed with water and thus usable for shipping (Scholten, 2017). Lastly, water is being extracted for drinking water by a company called Vitens. The last factor are the streams coming from the Veluwe, with an extraction of 5% of the groundwater storage due to both natural and dug springs letting out groundwater into the streams (Cultuurland Advies, 2020).

Challenges

The occuring related challenges of this component are ecology, water and identity related: there is drought damage in natural areas, water pollution, a lowering groundwater supply, peak water surplusses resulting in water nuisance, unsustainable agricultural practices, lowering water levels of the river and streams, water pressure on dikes, drainage system limit and a lack of awareness of the originally wet valley identity and negative impact of current agricultural landuse, see figure 15.

Design implications

These findings point to a need for restoration of the natural water and land logic of the region. Therefore, the design should restore the region its original wet identity and local ecology, which has been lost through decades of drainage and intensive land use. Infiltration can be improved on higher ground through the reintroduction of heathland

or mixed and deciduous forests. In the valley, water drainage should decrease by naturalising streams in the region and water can be stored through sponge areas. Where seepage returns, opportunities arise for wetland restoration and development and forms of wet compatible agriculture, such as wet production forests, paludiculture and herbal hayfields. These land uses help stabilise the water system while creating space for biodiversity and sustainable production. Urban areas too play a vital role in reconnecting with the water system by adding green corridors, water storage zones and permeable surfaces that allow rainwater to infiltrate. Together, these measures not only improve climate resilience and ecological function but also strengthen the landscape's structure and identity. In order to harmonize with the situation, the design should follow the original logic of the land and water, using it as the foundation for every spatial decision.



▶ Figure 29. Normalised streams in agricultural fields.

drought damage

water pollution

lack of connection

lack of habitats

biodiversity loss

experience of local identity

lack of awareness

Figure 30. List of recreation/identity challenges associated to this component.

3.2 CULTURAL HISTORY

Next to natural processes changing the way the Veluwe, IJsselvalley and IJssel looked, humans living and using the areas also left marks in the landscape, which are not all clearly visible anymore in the landscape. When settlers came to the area, they were mostly interested in areas suitable for both arable farming and horticulture, thus drier spots, and suitable places for grazing fields, thus wetter spots. Therefore, they gathered on locations where high and low areas were located close to each other. With both of these circumstances they could be a mixed company that was self-sustaining. From higher places the lower places were cultivated, and people built roads and farmhouses on the transition zone from high to low. The parcellation structures and plants often also changed on these transition zones. Because of these requirements, the first settlers chose to live on the Veluwe around 250000 - 120000 BC. Around 12000-9000 BC settlers started living on the coversand ridges and river levee (Gemeente Epe et al., 2009).

Since the early Middle Ages, people started to permanently live in the area and created estate landscapes both on the flanks as well as in attractive areas of the valley (Gemeente Epe et al., 2009). These estate landscapes are characterised by their country houses, historic castles and estates. Inside these estate landscapes one can find tree lanes, gardens, parks, production forests and agricultural land surrounding historic buildings (Nijhuis, Storm-Smeets, & Thissen, 2023). For the people living on the flanks, the streams have been playing a huge role in their daily lives. Around the 11th century, the flow of the streams together with watermills, allowed for industrial use and are currently important cultural historical elements in the flank area of the region. People dug 'sprengen', which are new

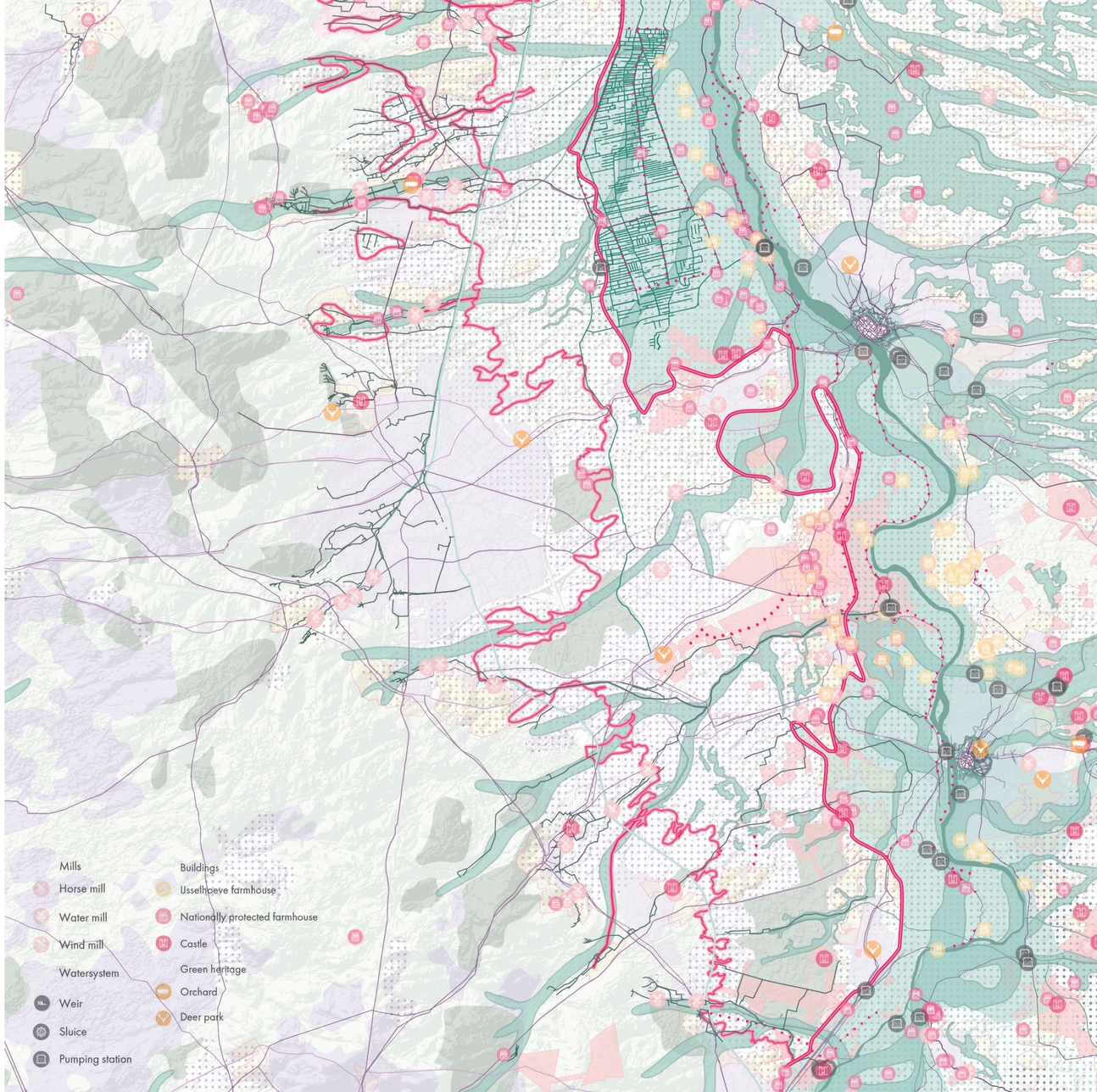


Figure 31. Cultural history. Map is made using data provided by Erfgoedatlas of RCE, Province Gelderland and CBS.



Figure 32. Seepage spring of a stream.



Figure 33. Stream on the Veluwe flank.



▲ Figure 34. Example of a paper mill, historically found on the flank of the Veluwe.



▲ Figure 35. Inside a paper mill.



artificial streams and altered streams in order to increase the effectivity of the flow of the water for oil- and grainmills, see figures 32 and 33. Most of the artificially dug streams were made during the 16th and 17th century for the paper industry of the Veluwe, see figures 34 and 35 (Gemeente Epe et al., 2009). Around 200 watermills were made in total. These mills were used for a variety of industries, leading to for example oak bark mills, corn mills, copper mills, groat mills, and laundry and bleaching mills to be built (Cultuurland Advies, 2020). Other characteristic cultural historical elements are results of cultivation, such as the 'es' or 'enk', see figure 36. Because the sandy soils of the region were too poor to use for arable farming farmers used the Dutch 'potstal' system, where heath sods were brought into sheep folds and then brought to the fields after they were saturated with manure. This caused raised fields called 'enken' or 'essen' to form. The cultivation process of the IJsselvalley increased with a steady growth until the 14th century. During this time the old cultivation patterns of Nijbroek were made in the lower area of the region and the area outside the river dike also got cultivated. After the Middle Ages historic farmhouses called 'IJsselhoeven' were built along the river levee, see figure 37. In the 19th century people started to also cultivate the highest poor and very dry heath and lower laying wet heath- and marshlands. On the higher grounds they planted trees and the lower wet areas were used for hay- and grass fields (Gemeente Epe et al., 2009).

The agricultural impact on the Veluwe

The heathlands and forests are considered valuable natural places. However, around 1800 in the Netherlands, there were little to no tall tree forests left on the sandy soils. They were either changed into heath or sanddrifts because of grazing and forest litter gathering or they were cultivated into arable land. On the Veluwe, the only forests that were left , the 'malebossen', still exist today. Malebossen were historically

◀ Figure 36. Loenense enk.



▲ Figure 37. Cultural historical IJsselhoeve building near Voorst.



▲ Figure 38. Orchard at Nijenbeek castle.

used for woodcutting, thus are believed to be around 1200 years old. Outside of these forests, up until 1900 there was mostly heath and sand drifts, see figure 39. The malebossen are all located on the richer sand soils of the moraine, as this is where the first farmers historically lived. When the farmers moved to the lower flanks, forests around the malebossen could grow back. A lot of the forests we see today on the Veluwe and in the IJsselvalley are actually production forests and managed forests, planted by humans for their own benefit, see figure 39.

Due to management of these forests, a rare forest type called the 'treeforest', 'boombos' in Dutch, was created. In contrast to the forests purely used for woodcutting, these had a different spatial experience. This is not to say, however, that none of the malebossen were also used partly for woodcutting. Back then it existed out of mostly oaks, however because of the dominant beech tree they decreased in numbers. The trees in the treeforest have bended trunks with low branches and high growing moss on the trunks. The form could be explained by the way the forest grew back then, as the oaks let through a lot of light and because of the cutting of the trees and agricultural use, the forest had much more open spaces in between. Therefore, they also grew sideways instead of only up. Additionally, the trees with straight trunks were harvested and the genetically curvy trees were left.

The biggest part of the forests on the Veluwe are now recognisable as wood cutting forests. On edges of agricultural fields, on agricultural fields and heathlands and in parts of the malebossen trees were grown for woodcutting. Oak trees were mainly used. Every ten to twelve years they were cut. The possible earnings with leather tanning in around 2860 was the main driver for planting trees for cutting. These woodcutting trees could have multifunctional use. They used the trees as dividers in between agriculture fields or as vegetation on earthen walls. After 1950, the wood cutting forests were transformed into 'spaartelgenbossen' where they let one tree shoot grow into a

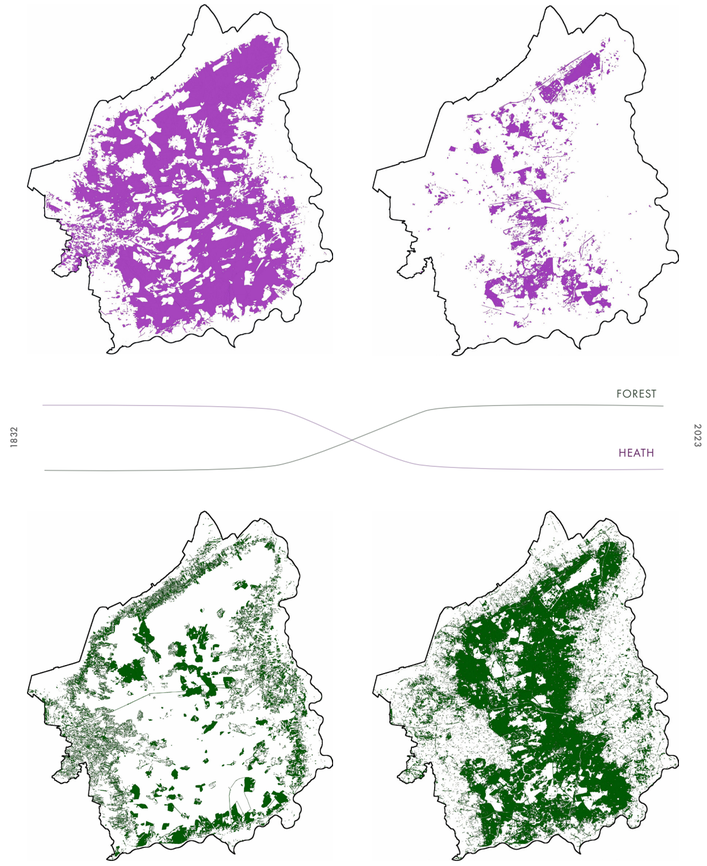


Figure 39. Change in surface area of heath and forest of 1832 and 2023. Diagrams from Bleumink, & Neefjes (2021).



▲ Figure 40. Cultural historical toll house on the dike of river IJssel.

mature tree. Lots of treeforests have been cut during the nineteenth and twentieth centuries (Bleumink, & Neefjes, 2021).

When soils became very nutrient poor, they still wanted to earn money with selling wood, leading to the planting of low demanding pine trees, like Scots pine (Wageningen University & Research, n.d.). On richer sand soils, other species could be planted, creating forests with Scots pine, Larch, Douglas, Spruce, Western Hemlock and American Oak (Van den Wijngaard, 1984). There are also private forests in the area, such as at castles from the Middle Ages. But also in the 17th and 18th century forests were planted for estates. These are namely located on the flanks of the moraine and in the valley. Formal French style from the 17th and 18th century alternates with the 19th century English landscape style. During the 19th and 20th centuries forests were planted on heathland for mining wood, leather tanning and burning wood. Ending 19th century and beginning of the 20th century agricultural fields were turned into forests for the more profitable sawing and polewood. Similarly, sanddrifts were controlled by planting forests and these forests were also used for woodcutting. Forests also started to grow spontaneously on heath and sanddrifts in the 20th century (Wageningen University & Research, n.d.). Even though these landscapes have resulted from agricultural practices, they have proved to be valuable for both flora and fauna.

A shift in agricultural practices

Over the past 50 years agricultural practices have changed significantly. Instead of providing meaningful and important habitats for arable field birds, meadow birds and insects (Natuurlijk Boeren, n.d.; Ecologische Autoriteit, 2024), they have become useless and even harming for flora and fauna (Lahr et al., 2005). Thus, expansion of these agricultural practices has caused a lack of habitat area and connection.



▲ Figure 41. Historic castle de Nijenbeek with river nature.

In the city triangle region, small-scale and extensive farming has shifted to large-scale, intensive farming as driven by the increase of mechanization. As parcel sizes expanded, the landscape diversity reduced, particularly through the loss of non-productive zones. Additionally, there has been a significant alteration of agricultural ecosystems with the increased use of agrochemicals such as fertilizers, herbicides, insecticides, and fungicides. The rise of maize cultivation and intensive livestock farming resulted in heavy nutrient loading on the sandy soils of this region. Traditional grazing fields experienced increasing grazing pressure, and became relatively weed-free with the introduction of broadleaf herbicides and the cultivation of fast-growing ryegrasses. An increase of parcel size, the increased intensity of agricultural practice and grazing, increasing mechanization, artificial instead of organic manure, pesticide and herbicide usage, heavy tillage, the loss of gradient-rich edges and wooded structures of and around agricultural fields and under-and above ground beneficial fauna-rich crops that do not need heavy tillage such as grasses and grains all contribute to a reduction of biodiversity in the agricultural areas (Lahr et al, 2005).

Challenges

The occuring related challenges of this component are ecology, recreation and identity related: because of our current landuse there is a lack of connection between habitats, lack of habitats, biodiversity loss, little experience of local identity and a lack of awareness of the wet identity of the area and the agricultural impact on the area. Addionally, there is more potential for the experiencing local identity supporting cultural elements and more attention could be brought to bringing awareness of the rich cultural history in the region, see figure 30.

Design implications

The City Triangle landscape has been shaped by a long history of human use, closely linked to variations in soil, water availability and elevation. The design should make use of this historic location-specific land-use logic, which are sometimes still found in different parts of the region, as it can offer a guiding structure for more sustainable and nature-inclusive land use practices. However, rather than just replicating former land uses, the design can respond more flexibly to soil and water conditions, while also drawing from historic examples. Land uses such as wet haymaking, agroforestry and bird-friendly grain cultivation can be reintroduced or increased, whilst also allowing for new practices such as paludiculture and new forms of urbanisation such as housing on poles, that aligns with landscape characteristics instead of disrupting them. Cultural historically valuable features, such as historic routes, adapted water streams and estate landscapes can support recreation and identity and increase historical awareness by using them in the recreational network. Additionally, wooded elements and gradient-rich edges of agricultural fields in the landscape can be reintroduced to support the ecology of the region. In doing so, the landscape can become both ecologically functional and culturally meaningful.



Figure 42. Castle Ter Horst at Loenen.



Figure 43. Tree lanes and mansion in estate landscape at Klarenbeek



Figure 44. Artificially heightened cultural stream in Klarenbeek

3.3 RECREATION

In the city triangle region, the natural and forested areas of the Veluwe are especially popular as holiday destinations, attracting many visitors. This can be seen in the number of campsites, holiday parks, recreational routes, holiday houses, and some visitorcentres that can be found in this area. However, this intensive recreation is pressuring the nature of the Veluwe, which is why the recreational activity is being moved towards the flanks of the Veluwe, even though these areas are already experiencing considerable pressure on living, working and transportation.

People living in cities are now realising their decreasing connections with the rural landscape and natural areas due to the growth of the cities. Moreover, in this growing process, the landscape surrounding the cities are losing their qualities. Therefore, projects are being realised to strengthen the landscape around cities and its recreational network and facilities. Another change has been that people like to recreate in the rural landscape and natural landscapes of the city triangle region. The current recreational networks are lacking, causing recreational use of local roads to cause conflicts. Governments are trying to keep road users out and promote walking or biking or use of public transport by introducing new transferia locations (Gemeente Epe et al., 2009).



recreation pressure Veluwe



IJsselvalley inaccesible



disconnection from agricultural practices

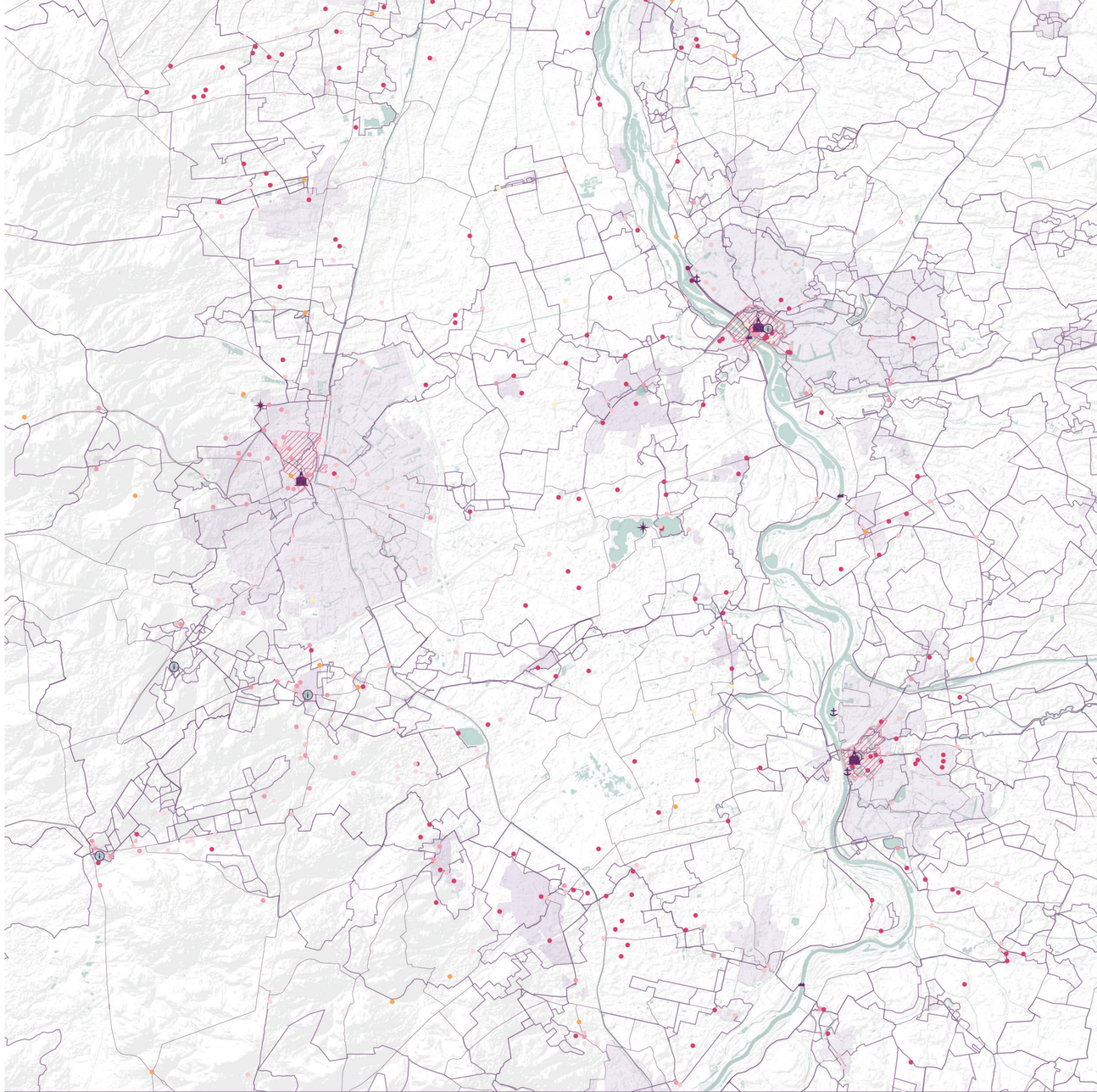


recreational demand

▲ Figure 45. List of ecology and recreation/ identity challenges associated to this component.

Challenges

The occuring related challenges of this component are ecology and recreation/identity related: the recreation pressure negatively impacts the flora and fauna of the Veluwe, the IJsselvalley has many inaccessible farming areas, people are disconnected from agricultural practices and there is a growing recreational demand from the urban areas, see figure 45.



▶ Figure 46. Recreation. Map is made using data provided by CBS, Erfgoedatlas of RCE, OSM, Wandelnet, AHN, TOP10NL, Routes op de Veluwe

Design implications

These findings call for high-quality alternatives outside the Veluwe's core nature zones to relieve pressure on vulnerable ecosystems. This can be done with an increase of recreational value in the rural landscape. A more integrated and robust recreational framework in the IJsselvalley and IJssel can simultaneously allow inhabitants of cities and villages to experience the rural and natural landscapes. By enhancing accessibility of agricultural, ecological and heritage areas with a recognisable recreational network, recreation can also support more awareness of the identity of this landscape. To regain connections with local farmers, the design should also allow people to interact with farmers and experience sustainable farming practices firsthand, also encouraging a sense of connection, understanding and support for nature-friendly agricultural practices found in this region.



▲ Figure 47. Historic roads on river dikes.



Figure 48. Rural landscape near Voorst. Photography by author.



Figure 49. City centre of Deventer. Photography by author.

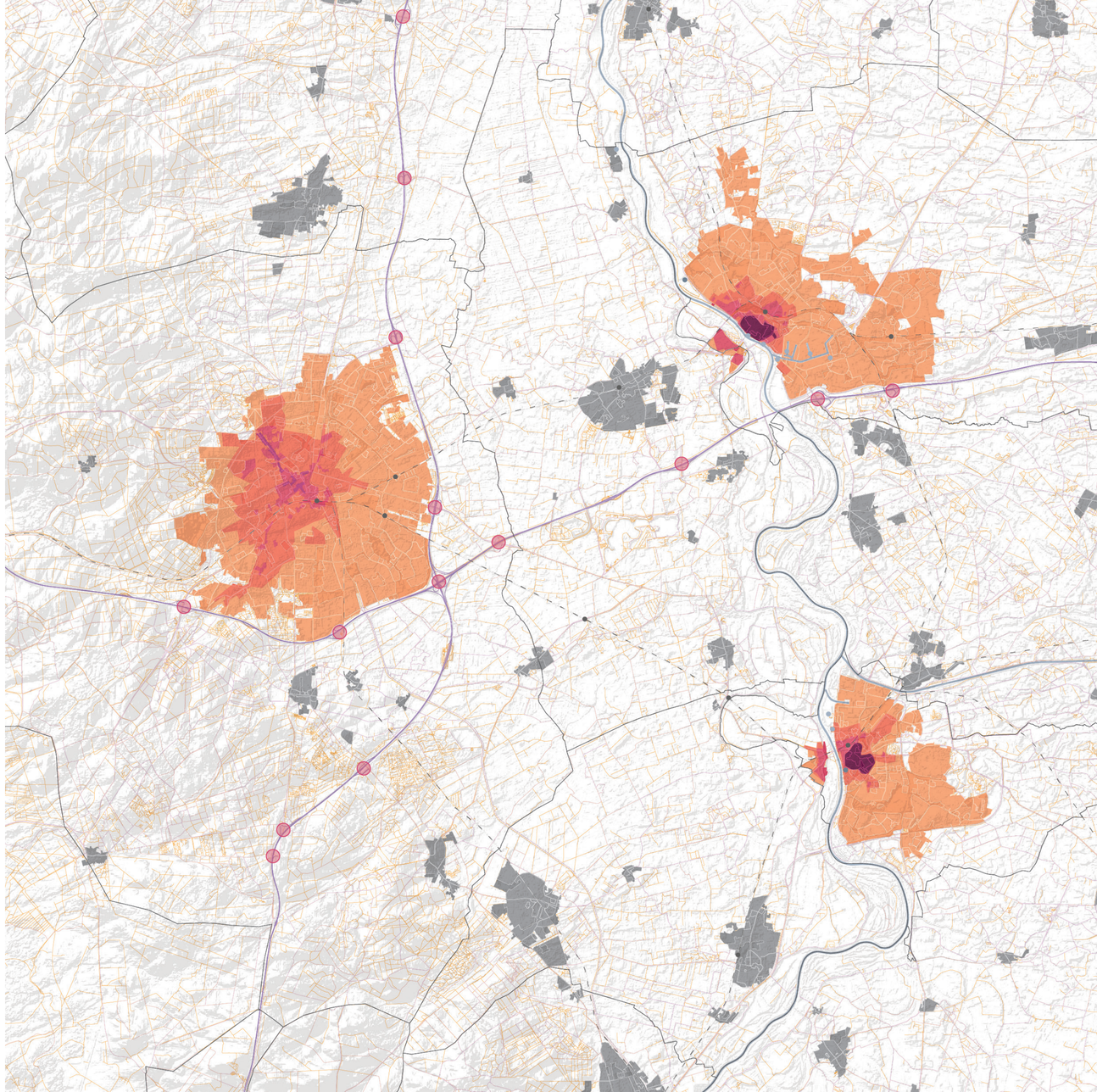
3.4 URBAN STRUCTURES

urbanisation pressure

▲ Figure 50. Ecology challenge associated to this component.

In between the three bigger city structures of Apeldoorn, Deventer and Zutphen the city triangle region has different types of urban settlements. In addition to the typical village structures, there are also houses and farmhouses built along higher lines in the landscape, creating ribbons in the landscape. After the second world war, the growth of inhabitants in the Netherlands has led the urban cores to grow with ribbon structures on the river levees and the flank of the Veluwe. For a long time this only happened on the higher and drier areas, but due to a lack of space for building houses, which is why houses are being built on the lower and wetter areas as well. When villages do expand, it mostly happens on the higher agricultural fields, causing a loss of the agricultural character of these areas. Recently, people also want to live more rural and with more land area, which is why rural areas are gaining more housing, especially on the flank of the Veluwe (Gemeente Epe et al., 2009).

Regarding the representation of city growth visible in figure 51, the contours of cities were delineated at intervals of 50 to 75 years, focusing on the expansion from the city center outward. Given the ambiguous nature of historical city edges and the gradual development of built-up areas, the delineation process prioritized denser, urban cores. However, buildings also emerged in peripheral regions, which are areas that were primarily agricultural at the time and not yet considered part of the urban fabric. Additionally, choices had to be made regarding what to include as city growth versus what to classify as the development of nearby villages. The resulting outlines, while approximate due to these complexities and limitations in historical records, aim to provide a meaningful visualization of the spatial dynamics of urban development, emphasizing the core growth of the city over time. Over time, the



▶ Figure 51. City structures. Map is made using data provided by TOP10NL, AHN, PDOK, OSM, RCE, CBS Bevolkingskernen and Province Gelderland.



▲ Figure 52. Deventer next to the river. Photography by author.



▲ Figure 53. Traintrack rails through the landscape. Photography by author.

form of the city changes in Zutphen and Deventer, as the Hanze cities' shapes change into more modern city shapes. Growth of the cities in between 1200-1850 and 1500-1850 are based on the contours given by the Atlas van de verstedelijking, because the map of 1850 is not clear enough to be able to extract a clear contour.

The structures urbanisation bring are apparent in the city triangle region. National highways in addition to smaller roads cross the Veluwe, IJsselvalley and IJssel. The profile of a road depends on its origin and the soil it is made on. Roads that came from being existing pathways tend to be curvy as they follow the dry and stable ground, such as roads on the sandy soil or on river levees. Roads that have been planned are most often times straight or straight with sometimes a curve. These can be found in the heath cultivations but it is also characteristic for old and modern national roads (Boogert, & Schalk, n.d.). Two railways connect the three cities.

Challenge

The occurring related challenge of this component is ecology related: urbanisation pressure and its associated structures such as roads are threatening to remove or fragment ecologically valuable areas in the region, see figure 50.

Design implications

This analysis points to an important design opportunity: to spread urbanisation over the smaller agglomerations and designated urban expansion areas, to prevent the urban expansions to negatively impact the rural landscape. Additionally, the role of infrastructure and ways of transport should be reconsidered. A lighter and more flexible form of regional mobility, such as a lightrail system, could improve access between urban areas and the wider landscape. Adding stops at key crossings with the recreational network would make the landscape more accessible while integrating infrastructure more subtly and sensitively into its surroundings. Additionally, self-driving cars can free up space inside cities for more housing and qualitative greenspace, but also can make space for greenery alongside infrastructural lines with more efficient road widths.

3.5 URBAN-LANDSCAPE INTERACTION

This analysis gives an insight in how the urban areas interact with the landscape. it can be concluded that city and town edges are ambiguous. It is hard to define where an urban area ends and the landscape begins. For this analysis, the density of the built areas are taken into account with choosing the edges. Both physical and visual interaction has been taken into account. Currently, urban edges are seldom actively interacting with the adjacent landscapes. Looking at the interaction map, it is clearly visible that only a small percentage of the city edges interact with the landscape by allowing people to enter it. This is because of private agricultural landuse, obstructive roads, dense vegetations, and fences to ward off wildlife from going out, or to ward off people from going in. The landscape is currently accessible with a few roads, however there is a clear lack of recreational entries into the landscape. As a pedestrian, it is sometimes harder to enter the surrounding landscapes than for bicycles, as most paths are bike paths, either directly next to the roads, or separated from the roads so that pedestrians possibly could make use of it, but walking on asphalt is most often times not the experience you want if you are recreating. This is where you see people trying to make walking paths themselves, in Dutch called 'olifantenpadjes'.

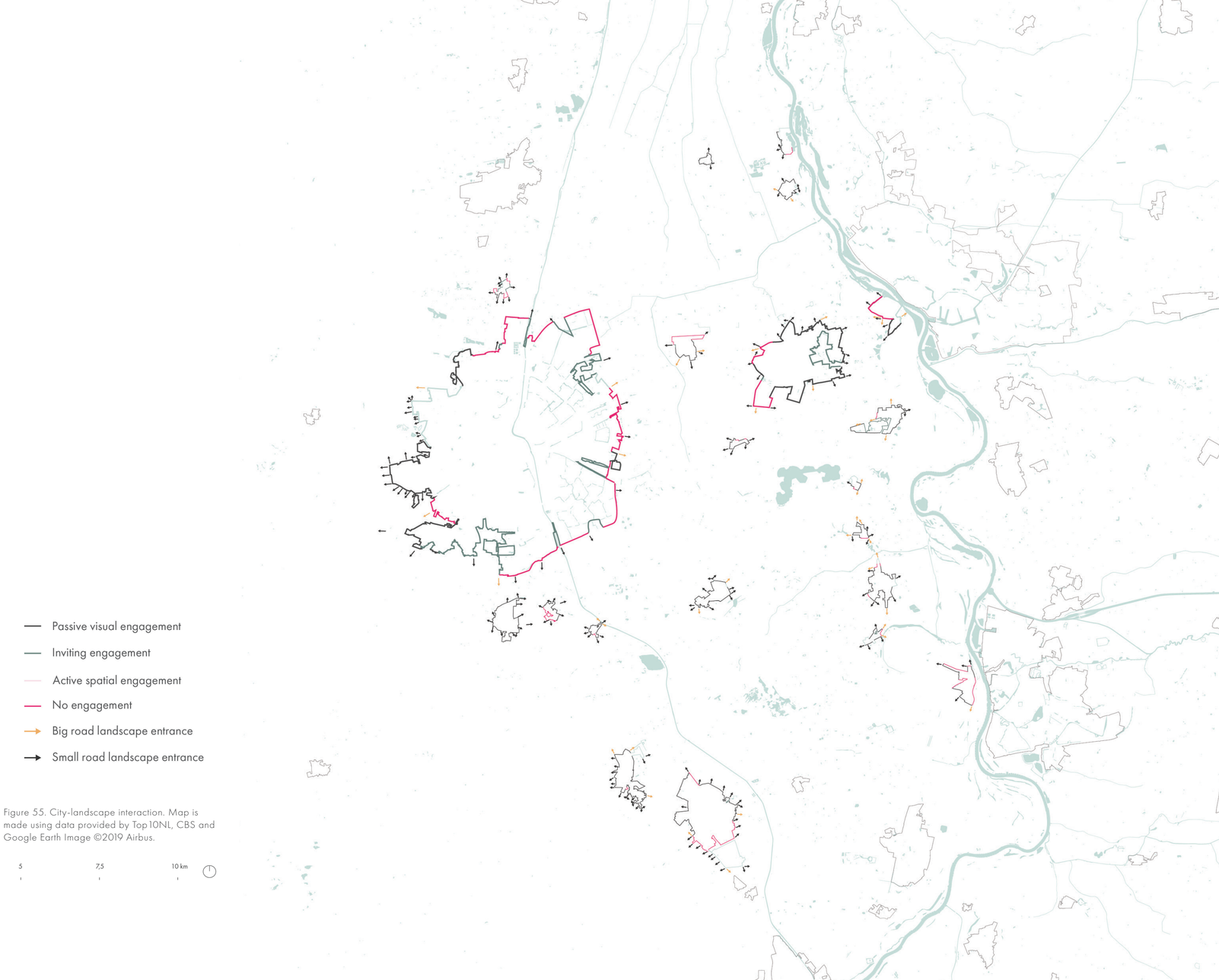


lacking urban-landscape interaction

▲ Figure 54. Recreation challenge associated to this component.

A lot of the edges of neighbourhoods have a passive visual engagement with the landscape, where the landscape can be seen but it has not been deliberately designed that way.

There are parts of the city and village edges that have no engagement with the adjacent landscape. This is for example due to an inward looking character of the buildings in for example industrial business areas. Roads that are heightened around Apeldoorn also occasionally block engagement with the landscape. For edges along adjacent cultural landscapes, trees and shrubs can block engagement.



▶ Figure 55. City-landscape interaction. Map is made using data provided by Top10NL, CBS and Google Earth Image ©2019 Airbus.

This is the case when the vegetated line is densely planted.

Furthermore, there are edges where there active spatial engagement with the landscape. For example, this occurs when the built city area blends well into the surrounding landscape. Elements that are characteristic for the spatial and sensorial experience of the adjacent landscapes can be used, such as shrubs and trees for the forested Veluwe and tree lines and meadows for the cultivated land. For instance, a densely built area can transition into a more open or vegetated built area, which helps blend into the adjacent landscape being either open cultivated land or forested land. Additionally, as a result of historical use of tree and shrub vegetation in between cultivated fields, a vegetated line could be a recognisable characteristic element, especially when those lines are still noticeable in the surrounding landscape. However, because these historic vegetation lines are currently not clearly visible in the cultivated landscape of the IJsselvalley, this type of edge has the potential to become an active spatial engagement if the rest of the landscape regains these characteristic landscape elements. Similar with these examples is the inviting engagement edges, where the built environment 'lets in' the landscape.

Challenge

The occuring related challenge of this component is identity and recreation related: a lacking urban-landscape interaction in the region, see figure 54.

Design implications

These findings call for a new urbanisation approach that rather than trying to form interactive edges truly interacts with the landscape. Future expansion should also respond to the surrounding landscape through connect with recreational routes that extend into the countryside.



▲ Figure 56. Fences make entering the surrounding landscape harder.

3.6 STRONG SPATIAL LOGIC

The structure map, see figure 57, shows the strong spatial logic of the landscape of the city triangle region. By synthesizing the most important elements found in the component analyses, the map summarizes how these form a structure that will form the basis of the park.

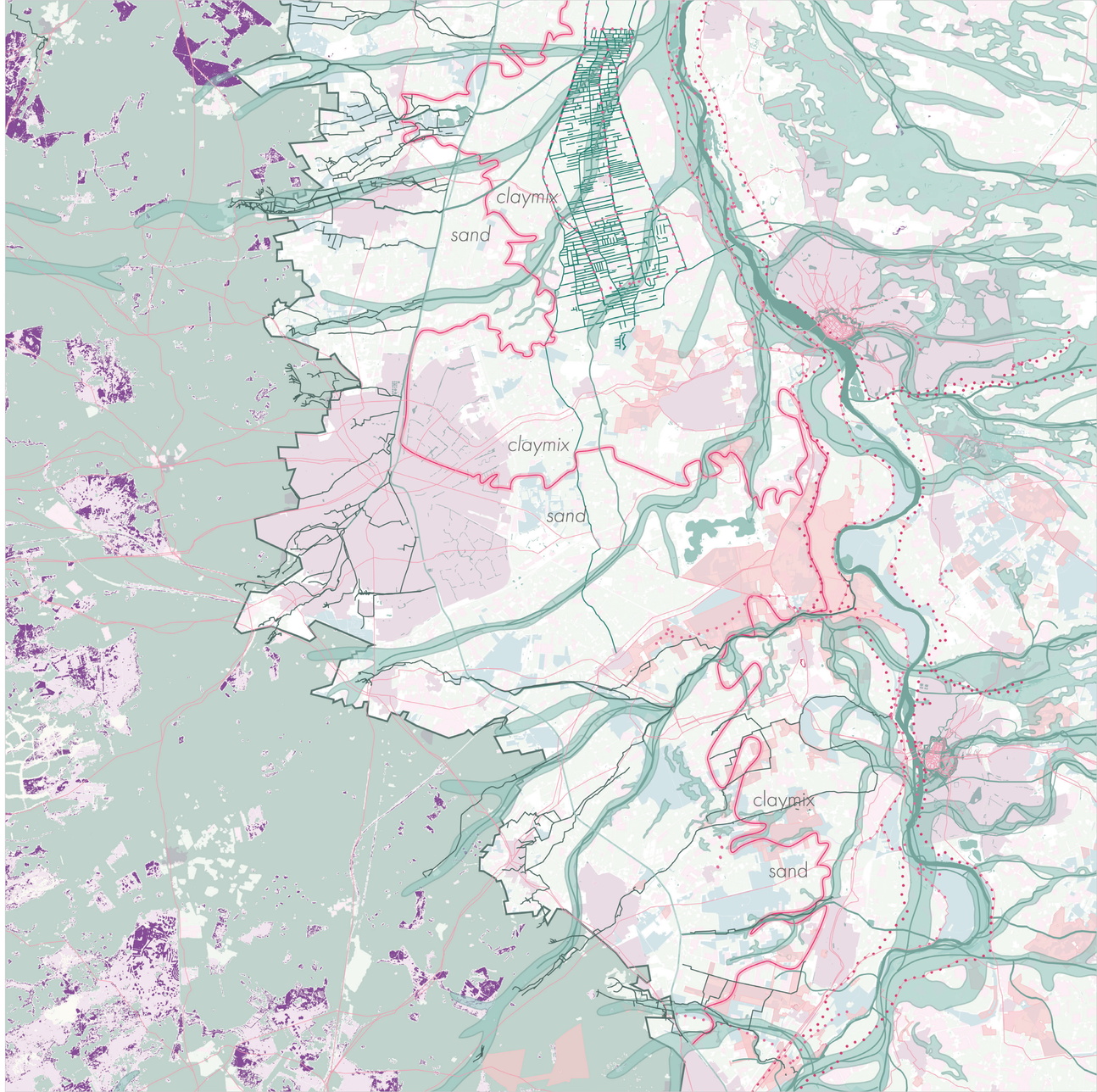


Figure 57. The main structures of the city triangle region reveal the strong spatial logic of the landscape. Map is made using data provided by LGN2023, Alterra, Erfgoedatlas of the RCE, CBS Bevolkingskernen, Province of Gelderland and TOP10NL.

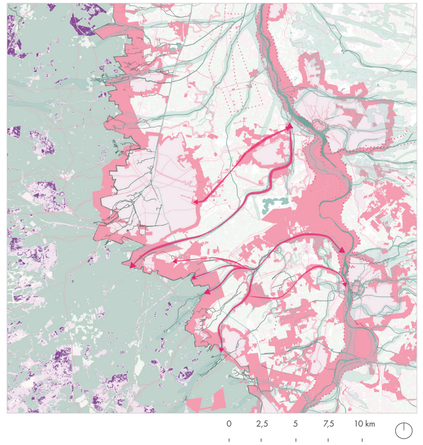
0 2,5 5 7,5 10 km

3.7 OPPORTUNITIES

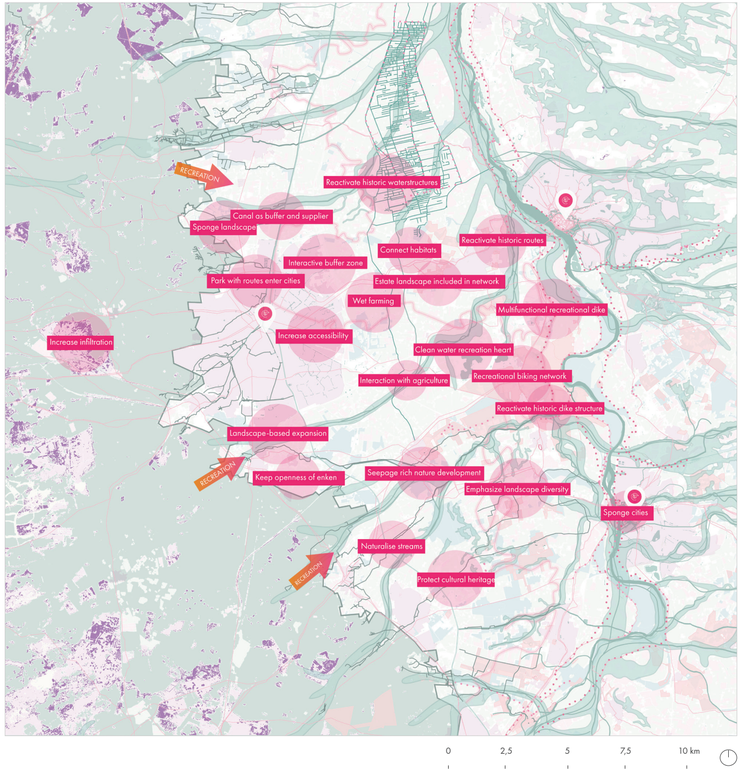
From combining the main structures and the research about the components and the challenges associated with them, several opportunities for this region could be derived.

A main opportunity is to connect the ecosystems of the Veluwe and IJssel ecologically and recreationally. Figure 58 shows how making use of the historic streamvalley structures, protected greenspaces together with prominent clusters of forest patches and existing cultural heritage structures can guide these connections. Another key opportunity is to steer urbanisation with multifunctional valuable green buffer zones where sustainable nature-inclusive agriculture, nature and recreation can be combined.

Furthermore, the landscape of the city triangle region offers opportunities to adress found challenges, see figure 59.



◂ Figure 58. Connecting Veluwe and IJssel. Map is made using data provided by LGN2023, TOP10NL, Province Gelderland and Erfgoedatlas of the RCE.



▴ Figure 59. Opportunities of the city triangle region. Map is made using data provided by LGN2023, Alterra, Erfgoedatlas of the RCE, CBS Bevolkingskernen, Province of Gelderland and TOP10NL.

Spatial foundation

These opportunities point to the need for an integrated spatial vision that works with the underlying structures of the landscape while responding to climate, biodiversity, urbanisation, and identity challenges.

A regional landscape park offers a strong framework for this vision. It provides a means to guide urban growth in harmony with landscape structure, while improving access to nature, clean water, and agricultural heritage. It allows for climate adaptive strategies such as water infiltration, buffering and reuse to be embedded into the landscape through natural stream flows, sponge flanks, and reduced evaporation on the Veluwe.

At the same time, the park approach enables layered land uses that support biodiversity and regional identity. This includes paludiculture in seepage zones, silvopasture in river plains, and reintroduction of historic trails and dike lines as part of the recreational structure. The park can also improve access into the landscape, using corten steel and wooden elements to create a recognisable and unified recreational framework throughout all sub landscapes.

In short, the regional landscape park becomes the spatial foundation to protect and develop nature and landscape, guide urbanisation, support sustainable agriculture, and reconnect people with the land they live in.

PART 2

IMAGINING THE UN-CONVENTIONAL

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OPERATIONALISING

04

This chapter analyses relevant precedents to derive key design principles. It continues with the development of a layered design approach, informed by the theoretical background presented earlier, the challenges associated with each component, and insights gained from the precedent studies. The chapter concludes by presenting the design principles, organised according to the three strategy layers.

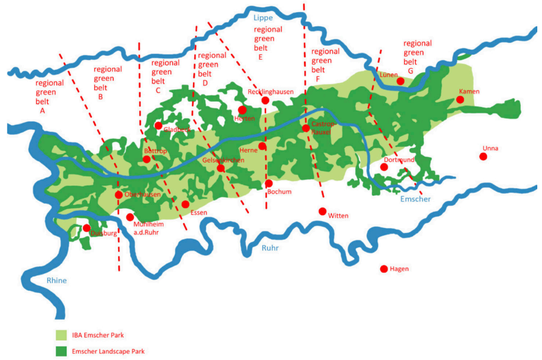
4.1 PRECEDENT STUDIES

In order to understand the diversity, gather park and climate adaptive design principles, and operationalize the concept four Regional Landscape parks of different sizes will be discussed.

EMSCHER REGIONAL PARK GERMANY

In Germany, in the northern Ruhr District, a former heavy populated, polluted and fragmented industrial region called the Emscher has been transformed into a Regional Landscape Park, covering 450 square kilometres stretching from the Rhine to Bönen. The park was a key pilot project in the International building Exhibition (IBA) Emscher Park in the 1990s. The goal was to establish a new regional identity redeveloping the region ecologically, economically and culturally with 117 urban development and landscape planning projects. The territory in between the cities of the Ruhrgebiet needed structuring, which the Regional Landscape Park could offer with its green spaces network (European Environment Agency, n.d.-b).

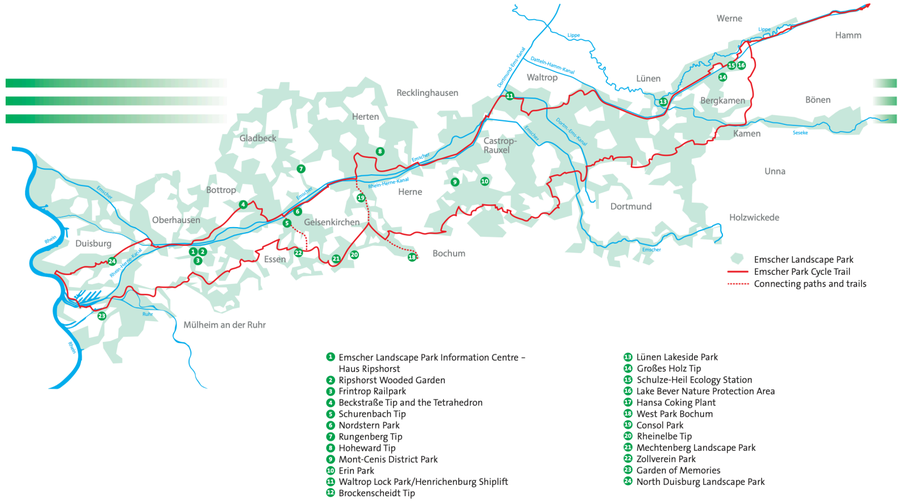
The area contains many historical traces of both the cultural



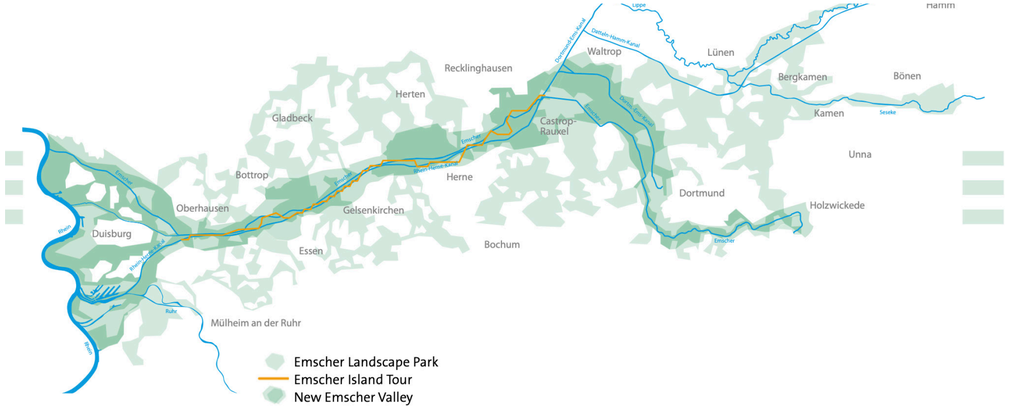
◂ Figure 60. Emscher Landscape Park with multiple corridors. Image from Yokohari et al. (2017)

▸ Figure 61. Cycle trail through Emscher Landscape Park and interesting parks inside Emscher Park. (Image by European Environment Agency (EEA), n.d.-a)

▸ Figure 62. Emscher Valley as west to east corridor. Image from European Environment Agency (EEA) (n.d.-a)



1. Emscher Landscape Park Information Centre – Haus Ripshorst
2. Ripshorst Wooded Garden
3. Frintrop Railpark
4. Beckstraße Tip and the Tetrahedron
5. Schurenbach Tip
6. Nordstern Park
7. Rungenberg Tip
8. Hoheward Tip
9. Mont-Cenis District Park
10. Erin Park
11. Waltrop Lock Park/Henrichenburg Shiplift
12. Brockenscheidt Tip
13. Lünen Lakeside Park
14. Großes Holz Tip
15. Schulze-Heil Ecology Station
16. Lake Bever Nature Protection Area
17. Hansa Coking Plant
18. West Park Bochum
19. Consol Park
20. Rheinelbe Tip
21. Mechtenberg Landscape Park
22. Zollverein Park
23. Garden of Memories
24. North Duisburg Landscape Park



landscape and the coal, iron and steel industry. Coal mining and heavy industry caused subsidence, pollution of both the soil and water and disruption of the river Emscher's drainage systems (Wustmans, 2016). Because of mining activites and subsidence, underground sewage could not be created, thus the Emscher river had been used until the 1990s as an open sewer (Urban Green-Blue Grids, n.d.).

The park exists out of seven north-south corridors connected with an east-west corridor called the "Emscher Valley" (European Environment Agency, n.d.-b). As the park enters into the urbanised areas, supported by new paths and tracks, it links towns and cities with each other and with the woodlands and agricultural areas further in the green corridors.

The former canalised riverbed of the Emscher river has been transformed into an ecological river valley, where nature development and recreation can take place, thus restoring natural processes. Additionally, the Emscher river now only drains clean rainwater and purified wastewater. Along the banks of the Emscher river, Rhine-Herne canal and Dortmund-Ems canal a new urban riverside landscape is being made with parks and areas for nature and art, with promenades and paths, tourist facilities and terraces and benches overlooking the water. The feeding streams of the Emscher were also open untreated wastewater courses and have been restored to their natural condition giving room to extended meadowlands and biotopes. Measures for infiltration, temporary storage and delayed outflow of water make the park a climate-adaptive place. Former industrial areas and buildings now give room to cultural, living, leisure and working activity. Art installations remind visitors of the local history (European Environment Agency, n.d.-a).

Together with the river and its side streams, the private industrial places form an inviting network of parks, gardens, landmarks such as art installations and panorama viewpoints linked by a cycling trail and

connecting paths and trails. A circular cycle trail of 230 kilometres has been made, whereas all new paths and trails together are 400 kilometres long. They run over old railway tracks, tranquil river banks, paths in woodlands, and quiet streets. There are bike renting stations where bikes can be rented and they can be returned at any station. Visitor centres inform visitors about the routes. At the Emscher Landscape park information center in Oberhausen guided tours by academics and educationalists are offered and information boards at different venues along the trail explain the flora and fauna. Footbridges are designed to resemble sculptures and go over motorways, railways and waterways. Two important themed trails of the park are called the Industrial Nature trail and the Industrial Heritage trail. The Industrial Nature trail links industrial heritage venues with signposts and 25 anchor points where visitors can start their journey. There are also 17 panorama points and 13 points with architecturally important housing settlements (European Environment Agency, n.d.-a). Agriculture is included in this park, with 37 percent of the park being farmland. This farmland is multifunctional with things like gastronomy, participatory initiatives and education and has direct marketing via farm shops, delivery services and market booths (Kemper, & Pölling, 2016).

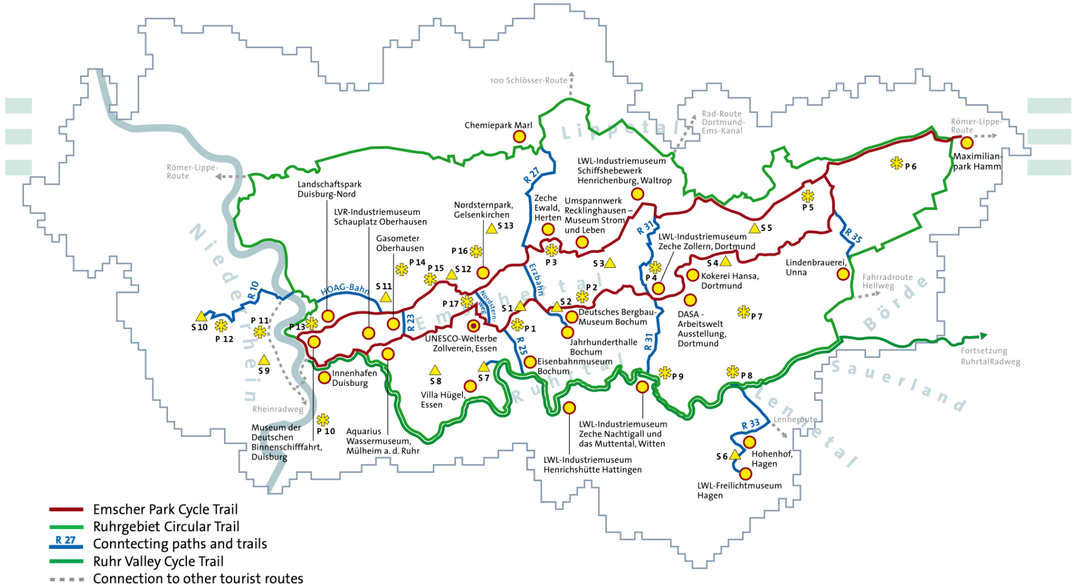


Figure 63. Important points on the trail routes. Image from European Environment Agency (EEA) (n.d.-a)

RHEIN-MAIN PARK GERMANY

In the Frankfurt Rhein-Main region, where built areas, open areas and areas with different urban functions are all equally present, a Regional Landscape Park of around 4500 square kilometres with 129 member-municipalities has been established. It has a population of around 3.7 million and has a strong economic image with their international airport, financial institutions and trade fairs. This urban region is experiencing heavy growth pressure. The Frankfurt greenbelt has been a way to counter the municipal development pressure with its spatial planning and nature conservation regulations and protection by its own constitution (Macdonald et al., 2021). The 8000-hectare protected greenbelt of 70-kilometres long facilitates recreation, protects

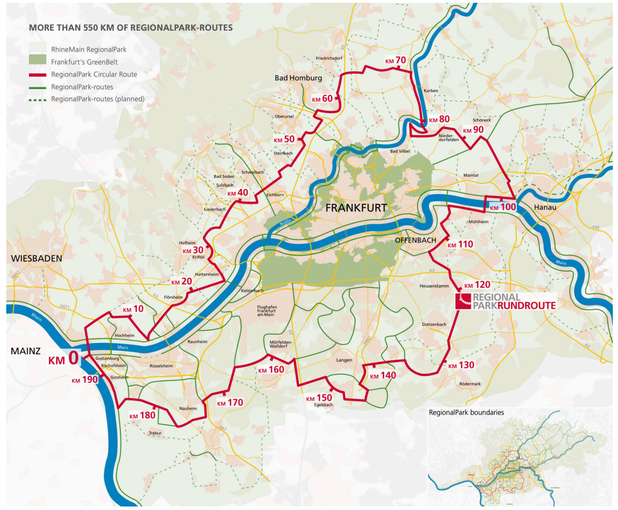


Figure 64. Rhein-main park. Image from Yokohari et al. (2017)

endangered species, conserves cultural landscapes and provides visitors and residents with fresh air (Wei, 2017). However, the green belt was considered insufficient to combat expansion. Thus, with as main goal to protect regional greenspaces, a Regional Park was established in 1994 (Macdonald et al., 2021). Other important goals of the park are to guide development and provide recreational spaces whilst balancing environmental protection, agricultural and forestry, and recreational usage. Together with the Frankfurt green belt, it could contribute to economic development and promoting regional identity (European Community, 2001).

With the motto 'Making Sense of Landscape - A Landscape for the Senses', the Rhine-Main Regional Park was conceived to enrich the perceptual and recreational value of green spaces across the region by establishing a cohesive system of accessible open areas. In doing so, planners aspire to foster a sense of stewardship among residents, encouraging them to resist developments that may threaten the landscape (Gailing, 2007).

By turning the region into a Regional Landscape Park, it aims to provide accessibility to the countryside and connect, redesign and improve the open spaces in order to balance agriculture, recreation and nature (Nijhuis, 2007).

Using the Frankfurt green belt as a base, it connects green areas across the metropolitan region area as a green corridor network reaching to the Nature Park Hochtaunus with park-like paths and facilities (European Community, 2001). The park wants to develop a 500 kilometres-long system of park-like regional networks of cycling and pedestrian trails. Open space in densely populated areas and spaces where environmental problems were applicable were appointed as green spaces (Nijhuis, 2007). The networks of trails connect these green spaces with existing and developed tourist and leisure facilities,

parks, nature conservation areas, landmarks and cultural and historical elements (Nijhuis, 2007; Gailing, 2007). Efforts have concentrated on making the cultural landscape more accessible for tourism, enhancing its attractiveness, and supporting regional economies. The tourist facilities and attractions that highlight cultural and historical assets are found every hundred metres following the recreation routes. Rather than only adding more sport and recreational facilities, existing facilities are expanded to preserve open space (Nijhuis, 2007).

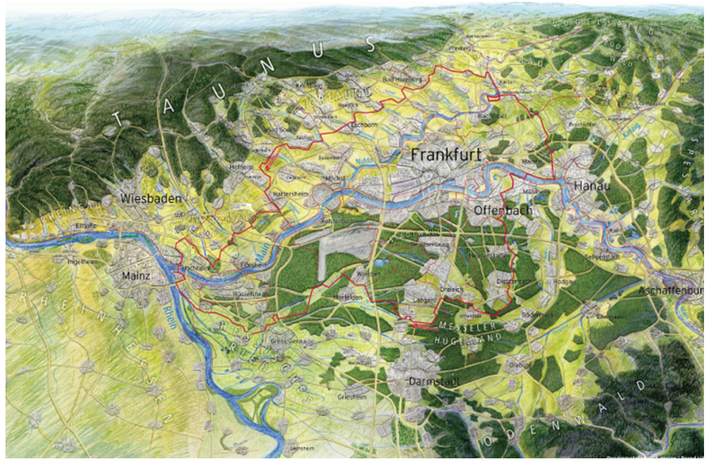


Figure 65. Rhe-in-Main park. Map from Hilpert (2011)

PARK LINGEZEGEN NETHERLANDS

The area in between Arnhem and Nijmegen is currently dealing with fragmentation due to infrastructure and growing urbanisation needs. Both Nijmegen and Arnhem have already expanded over the river. Urbanisation pressure is now threatening to take over the remaining in-between area of Nijmegen and Arnhem. To protect this landscape, a park called Lingezegen park was made, covering approximately 17 square kilometres. It is a green heart that provides the future inhabitants with walking and biking trails, sporting areas, art, culture, and nature. For obstacles like the railway, a biking bridge has been constructed that goes over it. The park includes new nature areas, a social hub with natural playground, nature education, café and petting zoo, pocketparks, a campsite, housing areas, event fields, picknic spots, farms, cultural historic traces, open-air classroom, a permacultural foodforest, vegetable gardens and sustainable agricultural land. In this project the recognisability and diversity of the various landscape types (the stream ridges, levees, and basins) are enhanced. In addition, the cohesion and continuity of spatially structuring elements are strengthened. The park also takes climate-adaptivity into account with 22 hectares collecting heavy rainwater (Gemeente Overbetuwe, 2013).

The park forms an ecological connection from north to south, between the Rijn and the Waal, and east to west with the Linge as a carrier. Two ambassador species were chosen to create two models guiding nature development of larger and smaller stepping stones and linear elements, that will ultimately be valuable for multiple species. This means that certain area surfaces and distances must be maintained in the development of the stepping stones. The first ambassador specie is the Purple Emperor butterfly, which needs moist, structure-rich deciduous



▲ Figure 66. Landscape types of the park. Image from Gemeente Overbetuwe (2013)

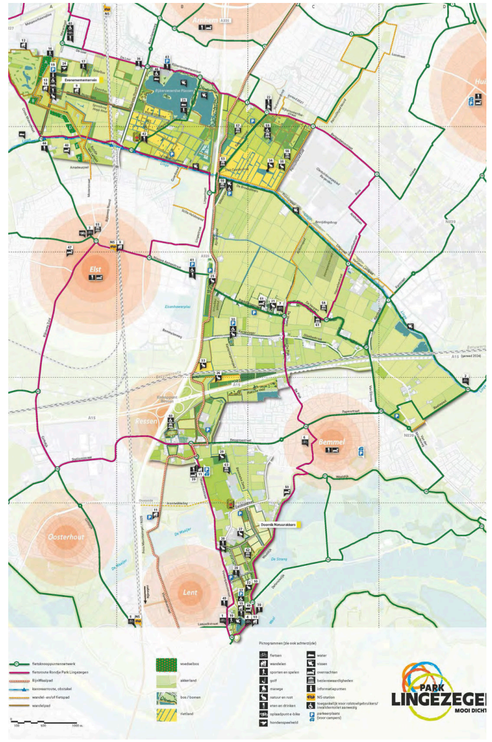
forest, and the second one the Sedge Warbler, which needs reed marsh. The Purple Emperor butterfly model helps organisms that need high quality forests that are moist, with highly varied compositions, structure-rich edges, and open spaces and ties together smaller isolated valuable forest patches. The Sedge Warbler helps reed bird species by decreasing the distance between breeding spots (Gemeente Overbetuwe, 2013).

The park includes several sub-areas, being (Gemeente Overbetuwe, 2013):

1. 'De Park'
The area consists of a small-scale and diverse mosaic of tree-lined avenues, woodland patches, and meadows. Densifying this relatively open landscape would enhance its appeal as a local destination for recreation and walking.

2. 'Het Waterrijk'
A structure of water, reedland, swamp, and forest defines the area, inspired by the historic landscape prior to the cultivation of the basin soils. Arranged in larger, alternating zones, these features create an engaging and ecologically rich setting for both biodiversity and human experience.

3. 'Het Landbouwland'
The wide, open scale and agricultural function of the basin zones continue to shape the identity of this part of the park. Defined by the linear elements of the Linge and the green structure of Breedlersestraat, the area is clearly outlined



▲ Figure 67. Recreation map of Park Lingezegen. Image from Park Lingezegen (2020)

and contrasts with the more intimate, enclosed landscapes that surround it. Agriculture can be combined with recreative activities such as sale of regional products, camping up to 25 spots or bed & breakfast.

4. 'De Buitens'
This area is transformed into a more fine-grained mosaic landscape. The open space between the ribbon developments gradually disappears, giving way to a spatial structure and atmosphere characterised by traditional and new farmsteads, newly established estates, orchards, pastures, and arable land.

5. 'De Woerdt'
A robust structure of forest, orchards and tree lanes define this part of the park.

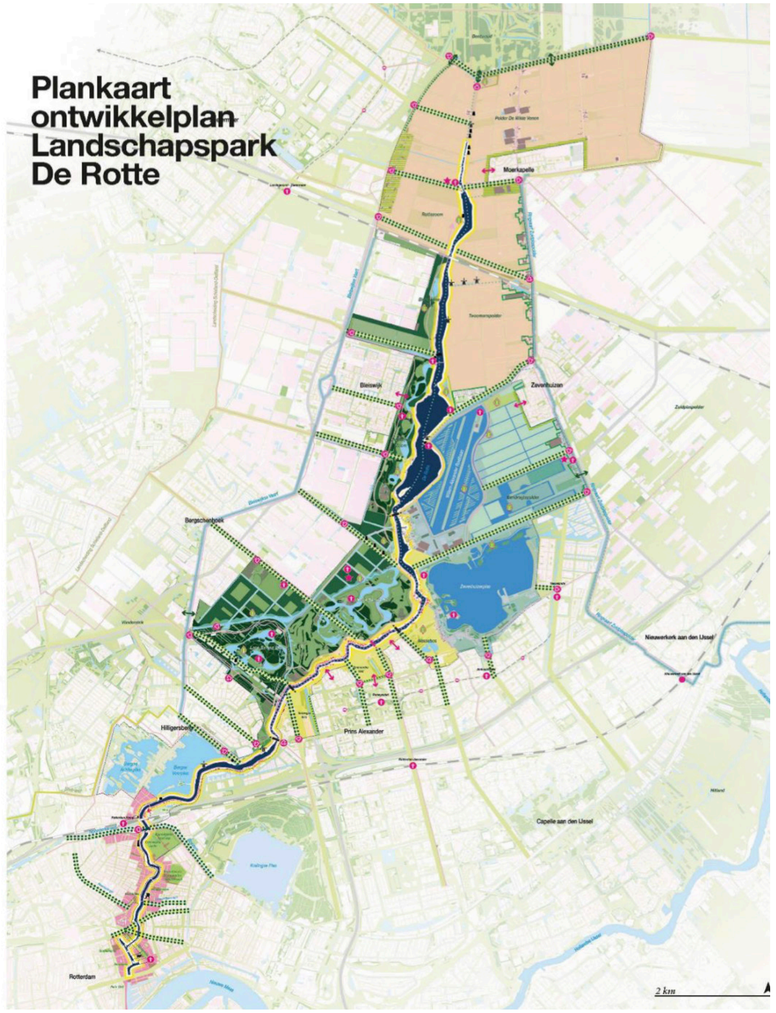
PARK DE ROTTE NETHERLANDS

In South-Holland a big green-blue area is formed by Nationaal Park Hollandse Duinen at the coast, through Westland, Midden Delfland, Groenzoom, Polder Schieveen, Bentwoud, Krimpenerwaard east to the National Landscape Groene Hart. This area is experiencing a comparable situation as the city triangle region. The in-between area of Zoetermeer, Rotterdam and Gouda are experiencing urbanisation pressure, with the growing municipalities of Lansingerland, Zuidplas en Waddinxveen (Rotteprogramma, 2021).

The landscape Park De Rotte makes use of a big ecological area called the Rottemeren, which is connected with the surroundings, see figure 68. In the west, it is connected through Vlinderstrik/Park de Polder/Triangelpark with Polder Schieveen and 'Bijzonder Provinciaal Landschap' of Midden Delfland. North of the Rottemeren, the traditional agricultural polders Tweemanspolder, Rottezoom and Polder Wilde Venen are seen as opportunities for migration towards Bentwoud and het Land van Wijk en Wouden. Towards the east the greenblue character of het Middengebied in the Zuidplaspolder/Krimpenerwaard helps the connection with Krimpenerwaard and other greenblue areas of National Landscape Groene Hart. Lastly, the Groenzoom between Lansingerland, Pijnacker-Nootdorp and Zoetermeer-Rokkeveen create an ecologically valuable connection between Midden-Delfland/Land van Wijk and Wouden/Bentwoud/Groene Hart (Rotteprogramma, 2021).



▲ Figure 68. Connections of Landscape Park Rotte. Image from Rotteprogramma (2021)

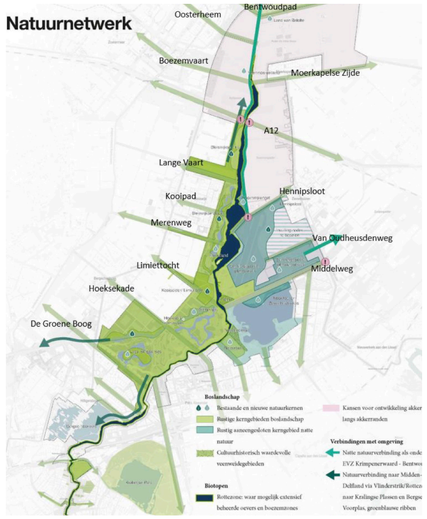


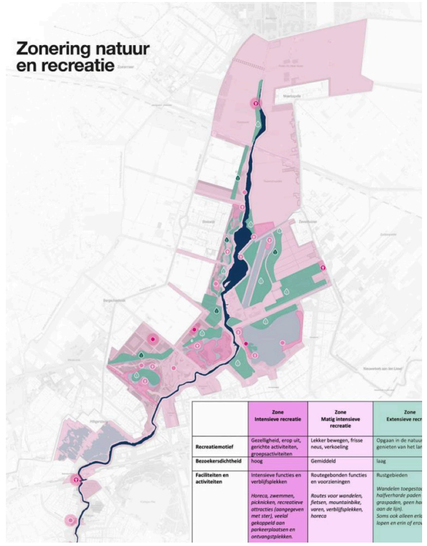
▲ Figure 69. Landscape park de Rotte. Image from Rotteprogramma (2021)

The Rotte serves as the backbone of the Landscape Park, linking various landscapes and subareas together. To maintain a natural and scenic image, as much natural and native planting are used, lanes with big trees are planted to use as connectors with the surroundings, verges are planted with herbs, in connecting structures extensive mowing takes place and banks are nature-friendly where possible (Rotteprogramma, 2021).

The park has the following four different types of landscapes (Rotteprogramma, 2021):

1. West - forest landscape (Hoge and Lage Bergse Bos, Hoekse Park and Bleiswijkse Zoom)with forests that have a healthy structure with core, mantle and fringe vegetation and open spaces (forest chambers/fields). Additionally, edges have more recreation and cores are quiet.
2. East - water landscape (Eendragtspolder en Zevenhuizerplas) with wet natural areas that are well connected with each other.





▶ Figures 70 and 71. Landscape types and recreation zones of the park. Images from Rotteprogramma (2021)

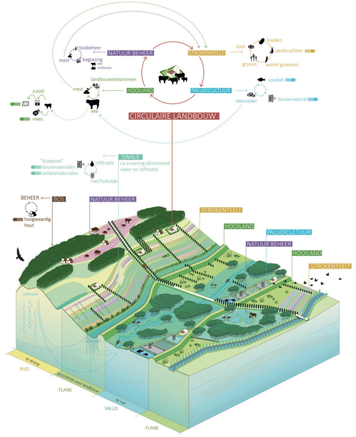
3. North - polder landscape (Rottezoom, Tweemanspolder en Polder Wilde Venen) with natural edges of fields with herbs and strips of perennial plants or shrubs for resting, hibernating or as food source when herbs are not flowering yet
4. South - city landscape where the river goes into the city

In order to balance recreational activity with ecological motives, the park has been divided into three zones with intensive, medium intensive and extensive recreational activity (Rotteprogramma, 2021). These activities include cycling, inline skating, road biking, walking, and boating with rowing boats, canoes, SUPs, and sloops (Gebiedsoverleg Rottemeren, 2022).

KLEINE NETE, FLANDERS

The common activity is to slow down the input of water in our watersystem, by draining and making surfaces impenetrable. At the same time, we increase the output of water by deepening waterways and straightening them, fastening the flow. What this design has done is change the area from a hyper efficient drainage machine into a sponge landscape, balancing the input and output of the water system.

Similar to the city triangle region, the area exists of higher moraine, valley flanks, and a valley with a river area where the Kleine Nete river and its sidestreams can flood. Therefore, the natural watercycle of this area matches the one of the city triangle region, where water infiltrates on the ridges feeding the streams that provide the Kleine Nete with water (Labo Ruimte & Vlaamse Overheid, 2023).



▲ Figure 72. Circular landscape-based agricultural system. Image from LAMA Landscape Architects (2023)

The project came up with six main water strategies (Labo Ruimte & Vlaamse Overheid, 2023):

1. Increase infiltration in the higher parts of the landscape, and stop draining in the lower parts of the landscape.

2. Function follows landscape logic, like during the 18th century.

Higher sand ridges are optimised as water infiltration landscapes. Coniferous forests are turned into deciduous forests and grazing results in new heath growth areas.

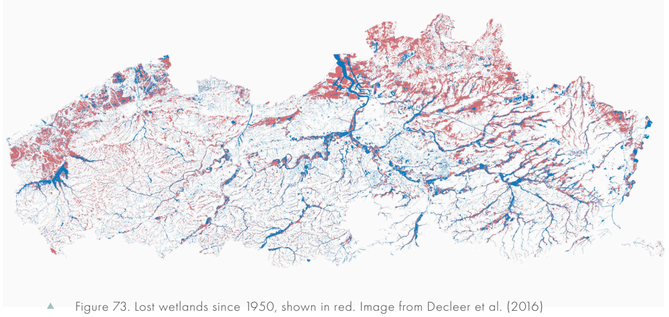
The valley flanks are suitable for smart landscape-based agricultural practices because of their height. Parallel to the slope strip cultivation can be used to grow potatoes, legumes, cabbages, root crops, and fruit crops. Infiltration ditches parallel to the height

"Drought is the legacy of a wet past"

— Vlaamse Overheid & Labo Ruimte (2023)

lines make sure down-hill flowing water can infiltrate.
A wide ditch at the valley border collects the relatively nutrient-rich water and filters it before it enters the valley. In this transitional zone, for example, reed or cattail can be cultivated for the production of biobased construction or insulation materials. If peat moss grows here, it can be used as a base for the production of potting soil. Areas that can not be used for food production can be turned into high ecological valuable places.
The valley will become a robust flow-through marshland with patches of wet forests, reed marsh, peat marsh, hayfields and paludicultural fields. The groundwater level increases with an estimated 60 centimetres. People and organisations affected by this are compensated. Sheep and double-purpose cows will graze sand ridges and valleys and hay and leftovers of the vegetable cultivation is used to feed cattle during winter.

3. Climate-robust sponge cities and villages
Surfaces of urban areas will become permeable and new green-blue networks are created where possible. Together with open



▲ Figure 73. Lost wetlands since 1950, shown in red. Image from Decleer et al. (2016)

wadi's, this strategy will not drain rainwater but infiltrate it in the streets. If needed, water is led to waterparks and -squares that provide infiltration areas.

4. Effluent as a new source
The flow of waste water is very stable, making the reuse of filtered waste water as a source for agricultural practices valuable during drier periods.

5. Sustainable drinking water extraction
Instead of always extracting from underground sources with drills, it is reduced to mainly summer times when the Albert canal is low. During winter time, water let in from the Maas into the Albert canal is used. On places where seepage and rewetting is not wanted, for example because of urbanised areas, small-scale water extractions can keep these places drier whilst being reused as for example drinking water.

6. Reuse of surplus of river water
The canal Dessel-Schoten lies on higher sandy soils and can be used to move the surplus of river water towards surrounding areas in order to infiltrate there.

This results in a masterplan with floodable meadows, natural forests, wet production forests, climate-robust sponge cities and villages, a canal with infiltration fields (with river water as source for fastened restoration of groundwater level), rewetted streamvalleys, agricultural clusters fed by effluent, drinking water extraction sites, paludiculture and strip cultivation areas.

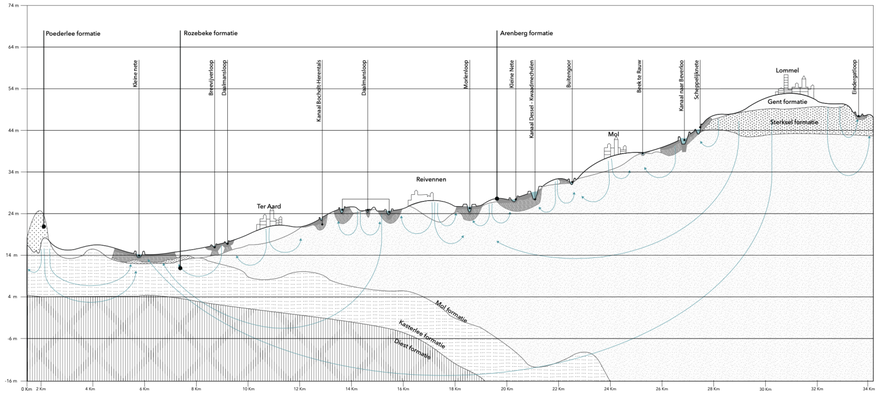


Figure 74. Geological section. Image from CLUSTER landschap & stedenbouw et al. (2021)



Figure 75. Masterplan. Image from LAMA Landscape architects (2023)

LESSONS LEARNED

Each of the following precedent studies has contributed to understanding how Regional Landscape Parks can address spatial, ecological, and social challenges. By analysing a range of parks in different contexts, various approaches to managing urbanisation pressure, restoring ecological systems, and strengthening regional identity could be explored. In addition, these cases offered insights into how Regional Landscape Parks can respond to the effects of climate change, particularly in relation to water management, biodiversity, agriculture, and the provision of space for recreation and tourism. These examples provided concrete strategies and design principles that informed the development of the Regional Landscape Park concept in the IJsselvalley.

The Emscher Park shows how green-blue infrastructure can help restructure a fragmented, post-industrial landscape. The transformation of the Emscher river from an open sewer into a more natural, ecological watercourse illustrates how water systems can be gradually restored in both functional and spatial terms. The integration of recreational, ecological, and cultural elements such as viewpoints, cycling routes, and references to industrial heritage, highlights how different functions can coexist and support regional character. This precedent enhanced understanding of how water restoration can contribute to spatial continuity and identity, and supported the inclusion of layered programs like cycling paths and small interventions that connect places and express the landscape's narrative.

Rhein-Main Park provides an example of how landscape can help manage urban growth and maintain continuity across a metropolitan region. By linking green spaces and creating accessible routes, the

park enhances the visibility and experience of the landscape, even in more densely built areas. The approach of combining recreation, nature, and agriculture informed the spatial organisation of open space in the IJsselvalley. It also demonstrated how spatial design can foster a sense of stewardship by strengthening people's connection to their surroundings through everyday use and recognition.

Park Lingezegen addresses similar challenges to those in the city triangle, such as urbanisation pressure and fragmentation. It demonstrates how biodiversity, climate adaptation, and recreation can be layered within the same landscape. Ecological zones designed for target species also serve as rainwater retention areas, while recreational paths and public spaces are carefully placed to follow or cross these zones without disrupting their function. As a result, natural processes, species habitats, and human use coexist within a single spatial structure, reinforcing each other rather than competing.
The use of ambassador species and the attention to soil and landscape types and their historic uses offered practical guidance for structuring ecological multifunctional connections in the IJsselvalley.
The sub-zones in Lingezegen, each with their own spatial character, served as inspiration for considering how different parts of the IJsselvalley can operate as a diverse but integrated landscape.

Park de Rotte shows how a regional landscape park can use a water system as its structural backbone. The Rotte river connects a variety of landscapes including forest, wetland, polder, and urban areas, creating continuity across a fragmented region under urbanisation pressure. Ecological quality is safeguarded through careful zoning, with areas of intensive, moderate, and extensive recreational use. Native planting, nature-friendly banks, and herb-rich verges support biodiversity while also shaping the visual identity of the park. The design balances ecological goals with recreational needs by guiding where and how

activities such as walking, boating, and cycling take place.
This example illustrated how a green and blue network can structure spatial connections, support biodiversity, and provide accessible public space simultaneously.

The Kleine Nete project focuses on restoring the natural functioning of the water system through landscape-based strategies. It shifts the focus from controlling water to slowing it down and allowing it to infiltrate. The spatial logic of ridges, flanks, and valleys in the Kleine Nete area closely resembles the structure of the IJsselvalley. This project demonstrated how land use can be adapted to local hydrological conditions, enabling the integration of agriculture, biodiversity, and water storage.

4.2 TOWARDS A LAYERED DESIGN APPROACH

The precedent studies have each shown that the spatial concept of Regional Landscape Parks is indeed flexible. However, they share the characteristics that they are protected areas that can guide regional development in a sustainable way by combining ecological, economical and social motives. The following themes are derived from the precedent studies: environmental education, landscape and nature conservation, accessibility, climate adaptivity, cultural-historical identity, housing development, sustainable agriculture, and leisure and tourism.

Considering these recurring themes, the theoretical framework of the Regional Landscape Park, and the main challenges identified for each component, three key strategy layers can be derived for the city triangle region. These layers will guide the design of the Regional Landscape Park in the next part of the thesis.

1. *Climate-adaptivity layer*
Restoring the water cycle of the Veluwe, IJsselvalley and IJssel and adding sponge capacity, creating more resilience to future climate challenges such as drought and peak precipitations.

2. *Ecology layer*
Creating robust connections between the Veluwe and IJssel existing of nature conservation areas supported by nature-friendly and -inclusive extensive agricultural functions, together forming a rich mosaic of habitats.

3. *Recreational/identity layer*
Through a recreational network the smaller agglomerations in the IJsselvalley are connected, enabling residents and visitors to enter and experience the diversity of the landscape. Urban growth is divided over the region, with small landscape-based expansions at agglomerations and landscape-based expansions north and south of Apeldoorn.



▲ Figure 76. Extracted Regional Landscape Park themes divided into three layers.

4.3 DESIGN PRINCIPLES

Derived design principles from the precedent studies can be divided over these three main Regional Landscape park layers.

CLIMATE ADAPTIVITY





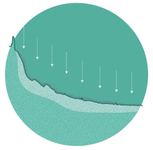
INFILTRATE & STORE SPONGE CITIES



INFILTRATE & STORE FLEXIBLE WATERLEVEL WETLANDS



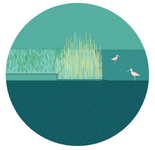
SLOW WATER DOWN BY NATURALISING STREAMS



SPONGE LANDSCAPE ON FLANKS



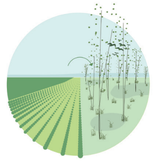
WATER INFILTRATION LANDSCAPES ON RIDGES



FUNCTION FOLLOWS LANDSCAPE LOGIC

ECOLOGY





AGRICULTURE TO NATURE DEVELOPMENT



ECOLOGY-SENSITIVE RECREATION PATHS



RECREATIONAL ACTIVITY ZONING



NATURE-EXLUSIVE AGRICULTURE TO NATURE-INCLUSIVE AGRICULTURE



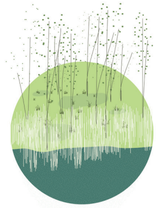
STEPPINGSTONES



CONNECTING FRAGMENTED GREEN



WOODLAND AS CONNECTOR



NATIVE LOCATION-SPECIFIC NATURE



PROTECTING EXISTING AND DEVELOPMENT OF NEW NATURE AND LANDSCAPE



WATER AS CONNECTOR

RECREATION & IDENTITY





THEMED TRAILS



AGRICULTURAL RECREATIONAL ACTIVITY



STRENGTHENING AND CONNECTING DIVERSE LANDSCAPE TYPES



RECOGNISABLE PARK ELEMENTS



REINTRODUCE HISTORIC LOCATION-SPECIFIC LANDUSES



ROUTE AND GREEN CONNECTION URBAN-RURAL



MAIN BIKE CONNECTING NETWORK WITH LOOPS



ACTIVATE HISTORIC ROUTES AND TRACES

THE FUTURE

This chapter begins by identifying the primary users of the park and their requirements. It then presents the regional-scale park design, illustrating how the three strategy layers are applied across the city triangle region. The chapter concludes with a focus on two design envelops, where the concept of the Regional Landscape Park is translated into a spatial design with elaborations on the park experience.

05

MOSAIC:

"A COMBINATION OF MANY DIFFERENT PARTS FORMING ONE THING"

Cambridge Dictionary (n.d.-b)

"Good stewardship of the environment is not just a personal responsibility, it is a public value... Our duty is to use the land well, and sometimes not to use it at all. This is our responsibility as citizens, but more than that, it is our calling as stewards of the earth."

—President George W. Bush (1946-), (Bush, 2001)

5.1 PARK USERS

Because the Regional Landscape Park is situated in a big area occupied by urban living areas, farmland and natural areas, it should be designed for both people and animals. Both groups have different needs, and the park brings them together in a way that works with the landscape. For the stakeholder group **animals**, ambassador species relevant for the landscape characteristics of the region have been chosen to create guidelines for the ecological layer of the park. Both the stakeholders farmers and urban villagers fall under **humans** and mainly guide the design of the recreational/identity layer.

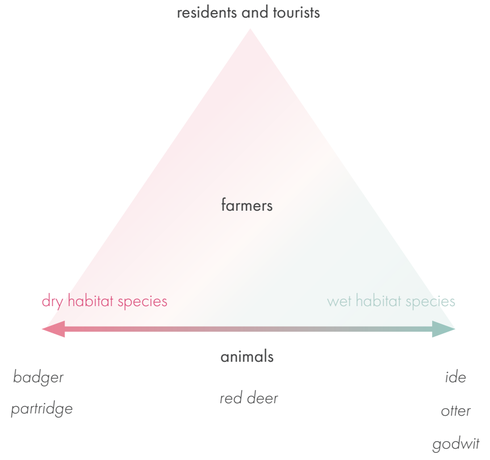


Figure 77. Users of the park.

HUMANS

Farmers

In order to change the current landuse into a more sustainable one that matches the Regional Landscape Park's ambitions, farmland has to be transformed into multifunctional and nature-inclusive wet agriculture, or into solely nature conservation areas or urban living areas. Therefore, it is important to take into account the farmers of this area, making it economically attractive to be a part the regional park.

Farmers are welcomed in the regional park by considering their incomes. This is supported by:

1. The new connections between farmland and urban areas offer a strategic advantage for farmers to diversify their income by offering educational experiences that attract visitors, such as farm tours and workshops. By combining this with lodging facilities, like bed-and-breakfasts, farmers can earn additional money with tourists and urban residents seeking a rural experience.
2. By attributing to environment friendly practices and offering ecosystem services with their land such as water purification and carbon sequestration, farmers can earn additional income through environmental service payments and gain subsidies and grants.
3. The implementation of multifunctional landuse can enhance profitability as it yields diverse products, e.g. timber, fruits and nuts, with agroforestry and silvopasture and food and biomass for bioenergy or raw materials with paludiculture, offering new market opportunities.
4. Through Park Centers and Park Farmers' Markets, farmers' produce is directly sold to tourists and residents in proximity to the park, increasing their profit margins. Moreover, local residents are engaged

and notified of a Park Community-Supported Agriculture (CSA) subscription of local produce, which can offer a steady additional income.

5. Collaborating with academic institutions like Wageningen University on sustainable practices stimulates innovation and potential funding.

Additionally, when their buildings are situated in low places of rewetted areas, those buildings are moved through Transfer of Development Rights to more suitable areas such as artificially created mounds, naturally higher areas and areas with managed water levels.

Residents and tourists

To increase the connection of residents to the region, a recreation network with recreational areas and facilities will be designed which allows them to bond with the region they live in through experience of and interaction with the diversity of landscapes of the city triangle region. This will also allow tourists to recreate in the region and lower the recreational pressure on the Veluwe. Some housing of the city triangle residents will be moved when situated in rewetted fields or fields that will be given another function. They will be offered new housing. New landscape-based urban developments will be designed where residents can live harmoniously with the landscape and will show tourists how healthy living areas can be created where the landscape is respected and worked with.

ANIMALS

The park focusses on adding to the existing ecological structure of the area, making migration easier and expanding their living areas. Nature conservation areas supported by nature-friendly and -inclusive extensive agricultural functions will form a rich mosaic of habitats.

Ambassador species were chosen suitable to the potential the landscape offered for ecological habitats, ultimately making these areas attractive for a range of other species. Each ambassador specie allows specific ecological connections to be either restored or reintroduced in the city triangle region.

Badger and partridge

The badger and partridge provide important design clues for drier farming areas, as both species make use of nature-friendly agricultural areas. The badger makes use of the wooded structures surrounding the fields (Elders, 2023) and the partridge the nature-friendly farming fields (Natuurlijk Boeren, n.d.).

Badgers need small-scale agricultural zones of 500 meters wide (100 meters for short distances), with a minimum of 5% of the surface area should be forest patches and linear wooded structures such as wooded banks, tree rows and small woodlands for cover and food provision, see figure 78. This zone should not be interrupted for more than one kilometre, however if it is there should be no infrastructure, dense built environments or water in the landscape. The most preferable wooded structure is layered structure-rich wooded banks of minimal 4 meters with a diversity in trees and shrubs species (Elders, 2023). These zones will also be attractive for other species common in this area, such as the little owl (STONE Steenuilenoverleg Nederland, n.d.), the pine marten, European polecat, weasel, whiskered bat, Bechstein's bat, Geoffroy's bat, brown long-eared bat, Daubenton's bat, noctule bat, and parti-coloured



▲ Figure 78. Landscape ecology model 'badger'. Image from Elders (2023)

bat. However, some species do have special requirements for these zones to work for them as well. For example, for the pine marten, the interrupted area should be shorter than a hundred metres. Additionally, for the bats the linear wooden structures should not be interrupted more than 10-20 metres, and there should be no lights in or near the interruption (Elders, 2023).

Farm birds like the partridge need safe breeding grounds, cover, summer food near the nest, and winter food. Cover and food in winter can be provided by a winter food field where cereal or other seed-carrying plants are not harvested or ploughed, but remain available until late winter.

Other fields can become birdfields, where strips of a perennial green fodder crop such as alfalfa on clayish soils or clover on sandy soils alternate with strips of natural fallow sown with grasses, cereals, and herbs. About seventy-five percent of the field is covered by alfalfa or clover, which can also be used as cattle feed. After the cereal harvest, the cut stems, or stubble, along with other harvest residues and spilled grain, are left on the land. Cereal is usually harvested early in the summer, around July or August. In this stubble, a variety of wild plants and weeds can develop, with some flowering and setting seed before the field is worked again. These layers of stems, seeds, and wildflowers attract birds by providing both food and shelter at a time when other resources are limited.

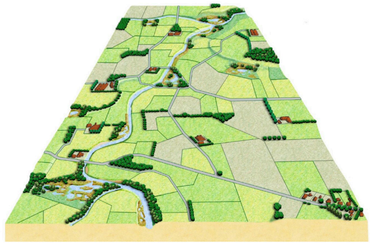
Perennial field margins offer further benefits. These are edges of the fields that are not mown, but are sown with mixtures of grasses, herbs, and cereals, left unfertilized and unsprayed. Birds use these margins for feeding and cover, and some even choose them as nesting sites. Research shows that partridges, for instance, make use of beetle banks for nesting, with the surrounding vegetation attracting insects that serve as vital food for their chicks. Raised banks also help protect nests from being washed out during heavy rains (Natuurlijk Boeren, n.d.).

Lastly, beetle banks are also beneficial to farm birds like the partridge. These are raised strips of arable land planted with rough, tussock-forming grasses and flowering herbs. This strip is situated either in the middle of a field or along its edge and typically measures about half a meter in height and two to three meters in width. Beetle banks originally were introduced in the early 1980s in England as an agricultural measure to provide overwintering habitat for beneficial insects such as ground beetles and spiders. Subsequently, these beetle banks were also found to have a positive effect on ground-nesting farmland birds, such as the partridge. They do present a greater risk of predation, especially when there are few other landscape elements nearby to offer shelter. Ground nests, like those of the partridge, are more easily found by predators such as foxes or birds of prey, who are drawn to these linear features. To help reduce this risk, beetle banks are best situated in the center of the field, away from the field's edge, and the distance can be adjusted based on the space needed for farm machinery. Planting a sufficiently wide wildflower strip alongside the beetle bank, with a minimum width of six meters, also provides extra cover and helps lower the risk of predation. The ecological effect of beetle banks can be enhanced even further by planting small clusters of shrubs every twenty to thirty meters. These shrub groups create additional nesting habitat and cover, while also supplying food through their berries and flowers. Suitable shrub species for this purpose include hawthorn (Crataegus monogyna), blackthorn (Prunus spinosa), dog rose (Rosa canina), spindle (Euonymus europaea), field rose (Rosa arvensis), and wild privet (Ligustrum vulgare). Such layered and varied field edges help provide a safe haven for birds and contribute to a richer biodiversity within the farming landscape (Boerennatuur, n.d.).

Ide, otter and godwit

The ide, otter and godwit give design clues for wetter areas of the region. The otter makes use of the densely vegetated banks and the ample cover of wet habitats such as marshy areas, with and without seepage. These areas are also important for other mammals such as the beaver, otter, northern vole, and water shrew (BIJ12, n.d.). The otter eats fish, like the ide, and other small animals and plays and hunts at night, making use of the clean water in flowing streams. These two ambassador need flowing streams that have narrow overgrown banks of three meters wide and wet stepping stone areas of around 0,01 km^2 every one kilometer, existing of marshy puddle zones and wooded areas covering a quarter of the bank length, see figure 79. The knots can be flood planes or side streams with open water grown with marsh plantings such as reed and bulrush and water plants. Pumping stations, weirs, locks, sluices, culverts, bridges, and bare sections of bankline will form barriers, thus should be avoided. Designing these ecological water structures, will benefit the whole waterbound species range from a mayfly to a kingfisher (Elders, 2023).

Meadow birds like the godwit also need a wet habitat. They make use of open wet grasslands where they can find enough food, are safe from disturbance, and where chicks have the opportunity to thrive. Moist, flower-rich, and insect-rich grasslands are especially important, as young chicks rely on these areas for their food supply. In these grasslands, mowing is postponed until later in the season, allowing chicks the time they need to grow and develop in safety (Natuurlijk Boeren, n.d.).



▲ Figure 79. Landscape ecology model 'ide'. Image from Elders (2023)

Red deer

The region also has the potential to allow the Red Deer (Cervus elaphus), which now lives in the Veluwe, to migrate to wet mineral rich areas of the IJssel ecosystem to find food. To be able to migrate, the deer makes use of both drier forested areas and wet areas (ARK Rewilding Nederland, n.d.-a). However, to strengthen the possibility of a deer making use of a corridor to the IJssel, human use should be limited. Therefore a corridor focussed solely on this ambassador is preferable (Groot Bruinderink, 2006).

Because of the long distance between the Veluwe and IJssel, the corridor has to exist of 'connectors' (migration zones) and 'knots' (temporal stays). The knots should offer the deer the possibility of staying and resting, therefore should primarily exist of ecosystem types that provide cover and shelter. Deer mainly follow guiding landscape elements, such as streamvalleys and forests along water. Migration zones can strongly differ in size. Whether the deer actually use the corridor depends on (Groot Bruinderink, 2006):

- the nature of the connected ecosystem types;
- the length and width of the connection;
- the design of the connection;
- the shared use by humans.

Generally red deer do not migrate more than around 5 kilometres. However, in times of disturbance, dispersal, food shortages, or during the breeding season, they can cover distances of up to 50 kilometers within just a few days. Groot Bruinderink et al. (2005) states that the ecological value of a corridor is less about its width alone and more about the variety of habitats it contains. Designing corridors along natural landscape features like rivers, which include multiple habitat types, can greatly enhance biodiversity and ecological robustness. The knots need to have a minimum of 50 hectare (Groot Bruinderink et al., 2005).

Design implications

For animals, the park should help restore space to live and move through the region. Many species, like the red deer, otter, badger, and partridge, need safe routes, food, water, and shelter. By reconnecting forests, stream valleys and wet areas, and by adding more nature-friendly farming, these species can return and thrive. The design uses these animals as ambassadors to guide where and how new ecological zones should be created. Quiet corridors, wooded edges, wetlands, and flower-rich meadows all help provide the right conditions—not only for the chosen species, but for many others too. The park's design follows the logic of the landscape: where water flows, where soil stays wet or dry, and where people already live and work. This makes it possible to create a strong, adaptive structure that supports nature, farming, and daily life together.

For people, the park responds to the needs of both farmers and local residents. For farmers, it is important that the design of the Regional Landscape Park takes into account both their economic position and their role in shaping the landscape. Since parts of the area may shift from intensive agriculture to wetter land uses or nature development, the park should offer realistic alternatives that make it attractive for farmers to stay and take part. This means creating opportunities for new forms of land use that combine production with ecological value, such as paludiculture, wet hay meadows, agroforestry or nature-friendly grazing.

Because these land uses are extensive, the design should also consider ways to support farmers financially. This could include payments for ecosystem services, such as water purification, biodiversity, and carbon storage, as well as access to grants or subsidies for sustainable practices. To make farming more profitable in the park context, it may be useful to strengthen direct connections between farmers and nearby residents or visitors. Farmers could, for example, sell their products at local markets, offer vegetable subscriptions, or provide small-scale services like tours or workshops. These forms of diversification can help maintain income while also raising awareness about sustainable farming.

When farms are located in areas that may become wetter due to rewetting or nature development, the design should explore options to relocate farm buildings to more suitable places, such as higher grounds, artificial mounds, or managed water zones. This allows farmers to stay active in the area while adapting to new landscape conditions.

By addressing these needs in the design phase, the Regional Landscape Park can become a place where farming and nature support each other, and where farmers are valued as essential partners in the long-term development of the landscape.

For residents, the park should create space to enjoy the landscape in daily life. A better walking and cycling network, places to play and meet, and new forms of housing that respect the land can help people feel part of the landscape. Community hubs, local markets, and access to nature close to towns and villages can be interventions that play a role in reconnecting people to their surroundings and to each other.

5.2 CITY TRIANGLE MOSAIC PARK

The City Triangle Mosaic park is designed with careful spatial analysis of the landscape, resulting in three responding strategic layers: a climate adaptivity layer, an ecology layer and a recreation and identity layer. For these layers, clusters of landscape characteristics is used as a basis for the plan, shown in figure 80, with each cluster type having its own colour. These clusters will be elaborated on in the recreation and identity layer. The characteristic diversity of the landscape of this region is celebrated in a mosaic-like structure, formed by the interaction of these three layers. Together they show how landscape can be the basis of a regional development. The park is able to restore the relationship between people and nature by allowing the inhabitants and visitors of the region to experience the landscape, welcoming the original wetness of the landscape and what it offers, and sharing our landscape with non-humans. The park is bordered by a reintroduced streamvalley in the North, a cultural heritage stream in the south and the Veluwe and IJssel ecosystems.

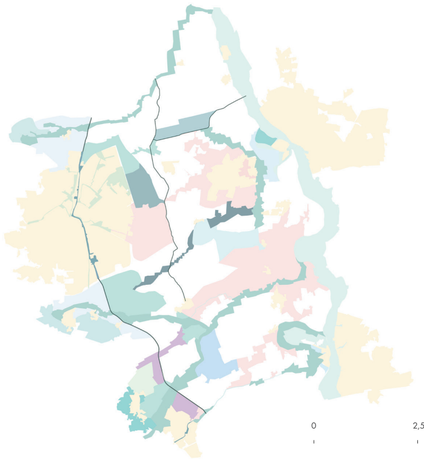
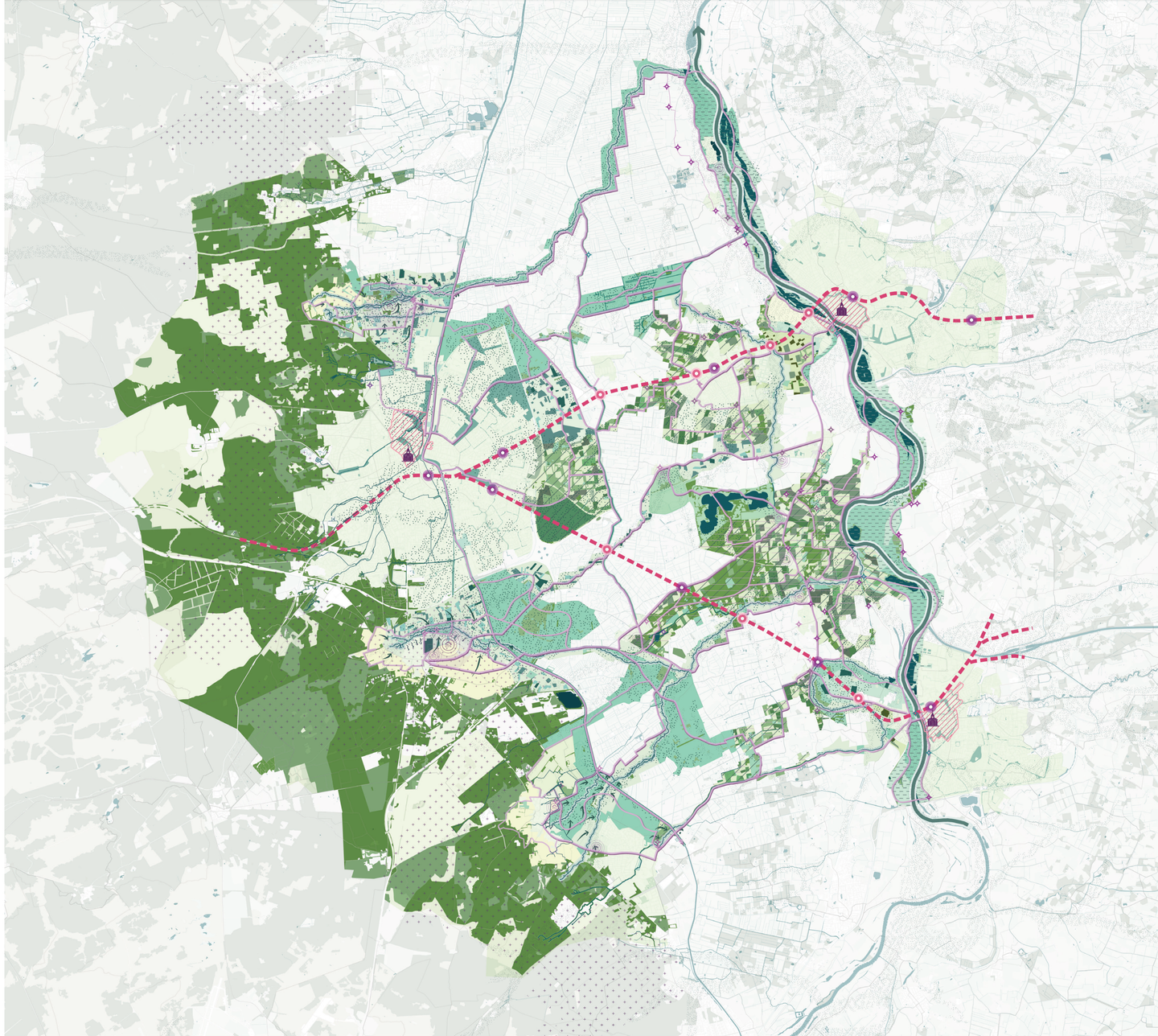
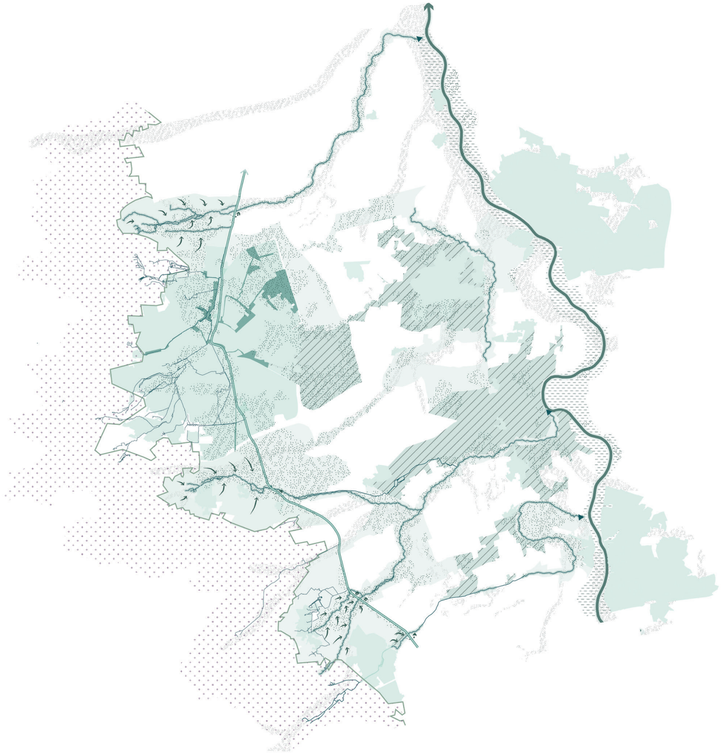


Figure 80. Clusters of landscape characteristics as a base.

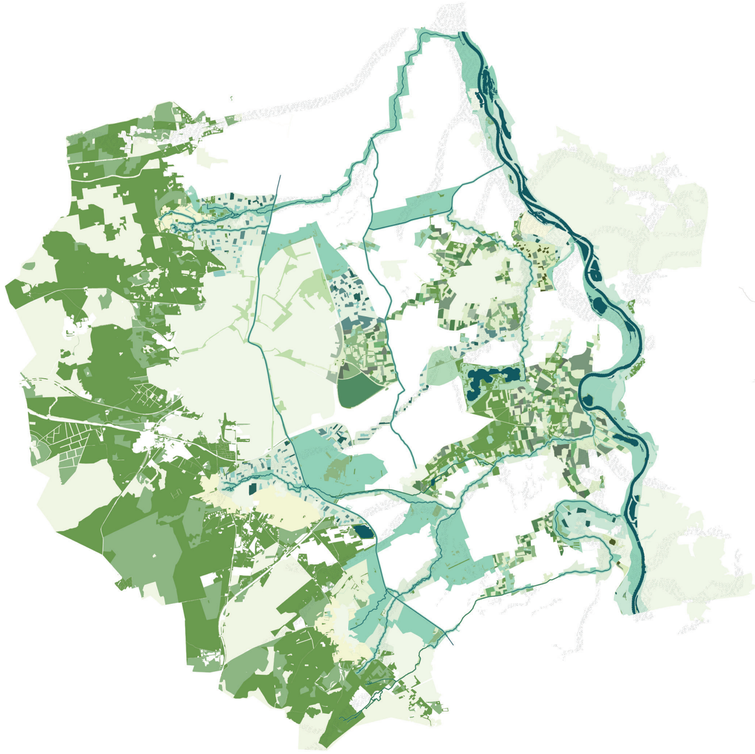
Figure 81. City Triangle Mosaic park.



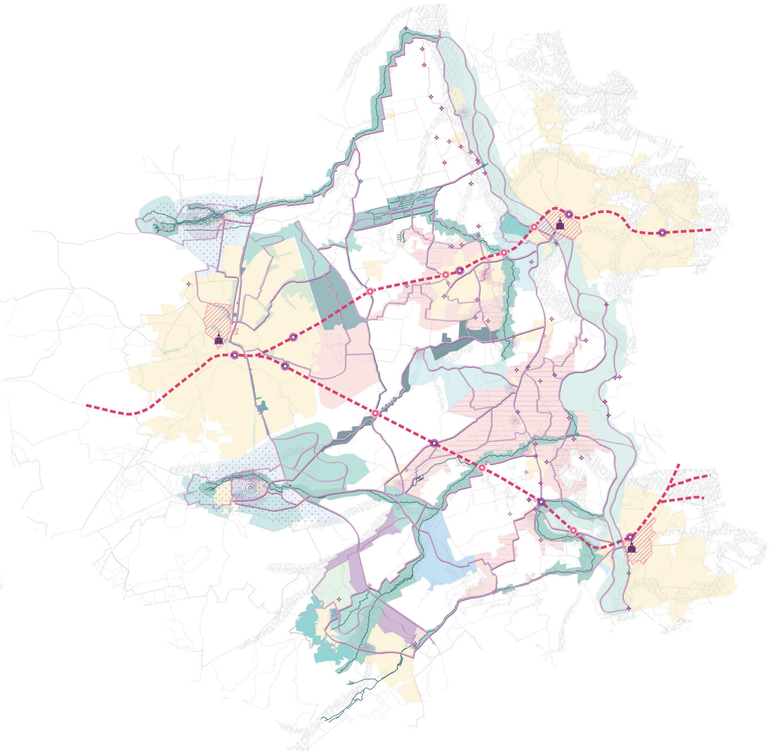
CLIMATE-ADAPTIVITY



ECOLOGY



RECREATION/IDENTITY

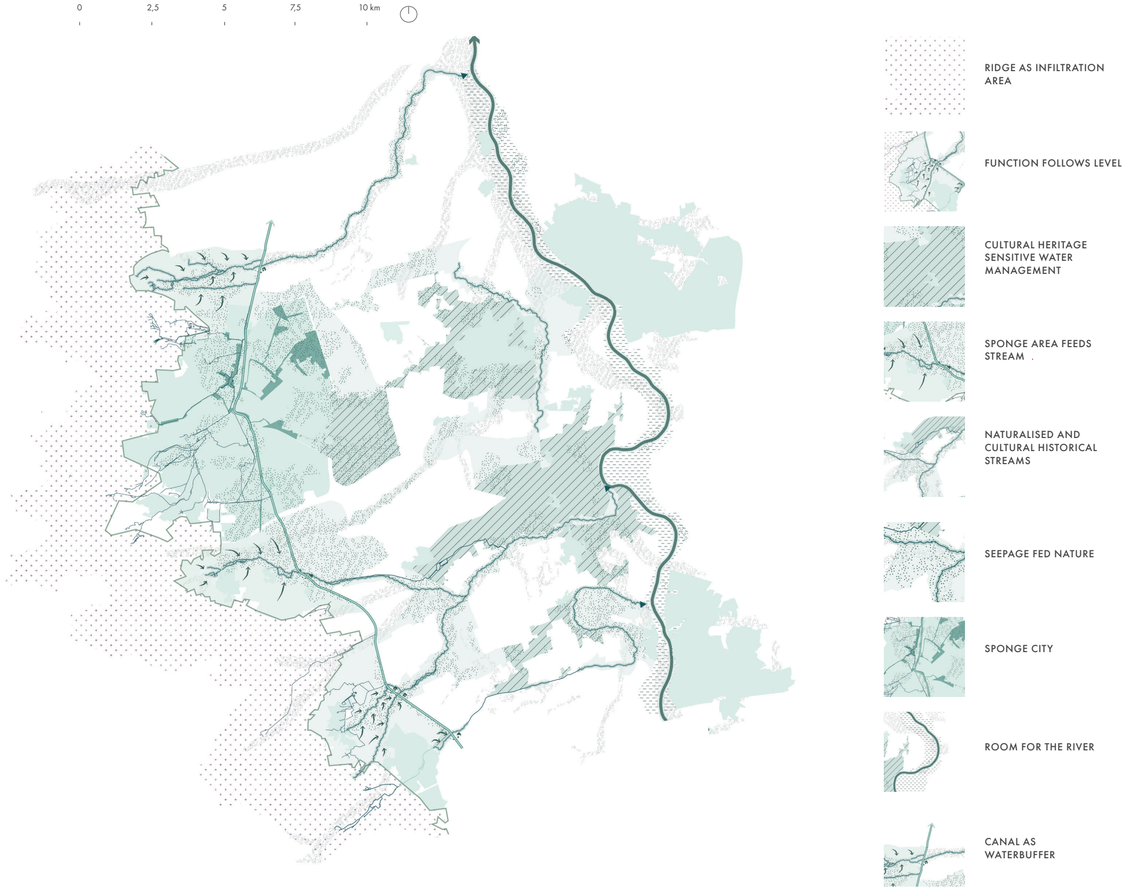


▲ Figure 82. Three strategic layers of the Mosaic park.

0 2,5 5 7,5 10 km

CLIMATE-ADAPTIVITY

WATER AS THE BASIS

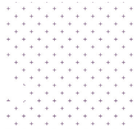


Water is crucial for the climate resilience of this region. With climate change causing more intense and unpredictable fluctuations in the supply of river water and precipitation, the amount of water related problems in the region will rise. The hydrological cycle of the region is heavily dependent on the water storage reserves of the Veluwe for seepage, but it is also an important source of fresh water supply, especially during droughts. Therefore water is the organising principle and main driver of this strategy layer.

This design changes the hydrological system of the valley, preventing water nuisance whilst solving the threatening lack of freshwater supply. The restored water cycle will also tackle other climate-related problems, such as heat stress due to rising temperatures, as flowing water can help cool down living environments.

This strategy layer consists out of four sub-strategies:

1. Restore water flow of connecting streams from source to the river;
2. Going back to a wet valley with sponge capacity;
3. Using restored seepage for valuable nature development;
4. Safeguard cultural heritage in estate landscapes.



Ridge as infiltration area

By increasing infiltration possibilities on the ridges of the moraine, the storage is increased. This is possible with design interventions like changing coniferous forests into mixed forests and heath landscape to reduce evaporation and allow more infiltration surface.



Function follows level

Use of land in the region should also minimise spillage and pollution, therefore the former wetness of the landscape is reintroduced by allowing flexible water levels in the park. Land use such as agriculture and urban development will follow the water level.



Cultural heritage sensitive water management

Due to the vulnerability of cultural historical elements of the estate landscape, water management in these areas will be more sensitive, meaning that water levels will be adapted to the possibilities and limitations of the area in order to safeguard cultural heritage.



Sponge areas feed streams

The water flow of streams are restored by introducing sponge flank landscape that can hold the water. This in combination with more water storage increasing seepage in the area, water will continue to flow in the streams even during droughts. These sponge areas also reduce water runoff from the moraines.



Naturalised and cultural historical streams

Streams are naturalised in places where this does not conflict with valuable cultural historical image of the streams. This is done to be able to stop the streams from quickly draining the water, creating marshland landscapes where water is slowly flowing, thus is being kept in the valley for a longer time.



Seepage fed nature

As a result of restored seepage flows underground, seepage fed nature areas can be developed where people can experience the effect seepage water has on vegetation.



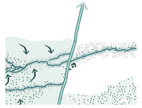
Sponge city

In order to tackle heat stress problems in the cities Apeldoorn, Deventer and Zutphen green-blue structures are added that aid in lowering the temperatures. Additionally, hard surfaces are made permeable to deal with heavy precipitations and wadis catch precipitation and allow it to infiltrate. Rooftops are used to catch rainwater, which can be reused and stored for use in drier periods.



Room for the river

The streams continue to feed the river during droughts, supporting the water dependent nature of the river. The floodplains of the IJssel river give space to the river water in times of high amounts of precipitation.



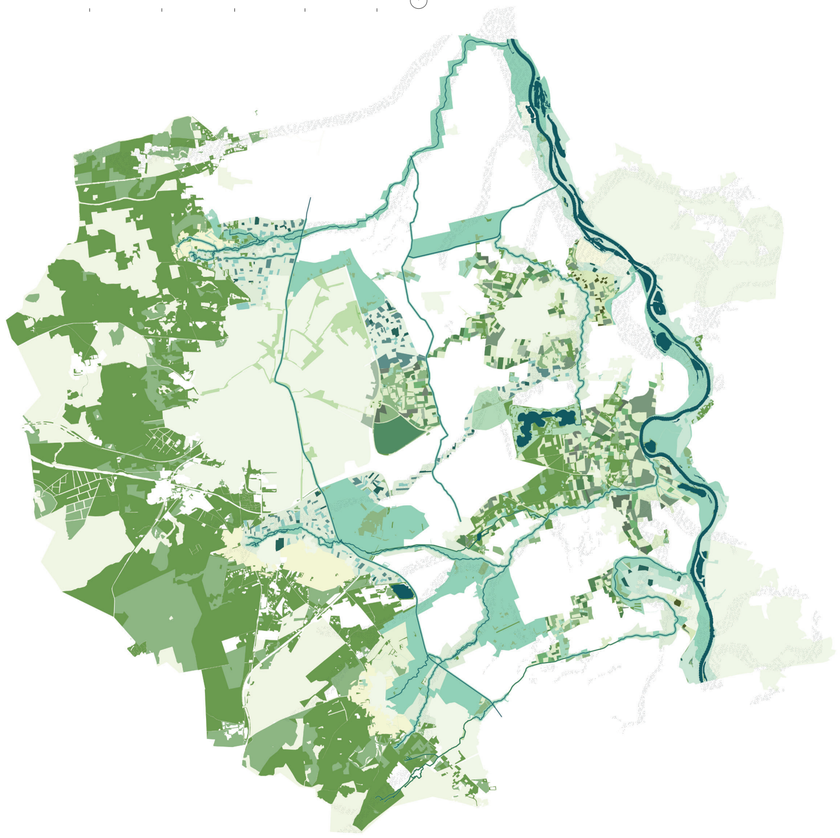
Canal as waterbuffer

Water can be temporarily stored inside the canal during wetter periods in order to be used during droughts.

ECOLOGY

A COLLABORATION BETWEEN
AGRICULTURE AND NATURE

0 2,5 5 7,5 10 km





RIVER LEVEE WITH BIRDFIELDS, HIGH-STEM ORCHARDS AND FOOD AND PRODUCTION FORESTS



WET MEADOWLAND NATURE CONSERVATION AREA



MORAINE HEATH AND FOREST



OPEN ENK WITH FLOWER-RICH GRAIN FIELDS



STREAMVALLEY NATURE CONSERVATION CORRIDOR



COVERSAND LANDSCAPE WITH BIRDFIELDS, GRAZING FIELDS AND AGROFORESTRY



WET FLOWER-RICH HAYFIELDS, AGROFORESTRY AND PALUDICULTURE



WET HAYFIELDS AND NATURE CONSERVATION AREAS CONNECTED THROUGH NATURALISED STREAMS



SEEPAGE-FED WET NATURE DEVELOPMENT



GREEN-BLUE CITY PARK STRUCTURES



RIVER NATURE DEVELOPMENT



FORMER RIVER FLOODPLAIN WITH WET GRAZING AND SILVOPASTURE

In order to strengthen the ecology of this region, multiple ambassadors discussed in the previous chapter are used to guide this layer. Nature-inclusive agriculture together with newly developed and already existing nature conservation areas and naturalised streams form a robust greenblue connecting framework between the Veluwe and the IJssel. The farming practices are based on the new water situations found in the landscape, resulting in the following possibilities: wet and dry agroforestry, clover and afalfa farmbird fields, grain fields, wet and dry production forests, livestock grazing fields, paludiculture and hayfields. The decision of which farming practices are introduced are also dependent on what matches the shared characteristics of certain areas, which are further explained under the recreation and identity layer. The connectivity of the landscape is ensured by ecocorridors where ecological connections pass barriers like roads and highways. Additionally, landscape elements such as treerows, wooded embanksments and hedgerows are reintroduced in the whole region.

This layer has the following sub-strategies:

1. Protect valuable potential and existing habitats from urbanisation pressure;

2. Restore connections between the Veluwe and IJssel for ambassador species;

3. Include existing protected nature areas into the ecological park structure;

4. Develop new nature conservation areas based on the ambassador species, allowing only extensive or minimal recreation;

5. Introduce new and reintroduce former nature-inclusive agricultural practices important for key ambassador species as an ecological basis working together with the nature conservation areas.



River levee with birdfields, high-stem orchards and food and production forests

For this river levee landscape, bird fields are introduced where afalfa is alternated with strips of cereals, grasses and herbs providing cover during nesting and in winter times and seeds for the ambassador specie partridge. Additionally these fields attract insects and pollinators and no pesticides are used. The afalfa and grains can be harvested late june to early july so the partridge can nest and complete its first brood. Additionally, insects and chicks have been able to forage in the strips. The harvest is then stored for winter and used as food for cattle or as manure, or it can be sold. Historically high-stem orchards and small production forests of willows, alders, common ash and hazel are common on river levees, which is why these are increased and food forests are introduced to this area. The high-stem orchards are also combined with grazing of livestock, which is a form of agroforestry called silvopasture.



Wet meadowland nature conservation area

This area is a nature conservation area with short-vegetated open wet meadowlands for meadowbirds like the ambassador specie godwit. This specie builds their nests on the ground, hidden in hay meadows. The area will be closed off for visitors during the nesting period of mid March to mid June. During this period the Galloway cattle are also removed from this area.



Moraine heath and forest

The dry heath and forests of the Veluwe are used for shelter and resting during the day by red deer. Especially the forest edges and heathlands are attractive grazing areas for red deer. The red deer also shows rutting behaviour in the heath fields in autumn. Badgers use the forests to build burrows in close proximity to forage for insects, small mammals and berries in the heathland.



Open enk with flower-rich grain fields

These flower-rich grain fields provide coverage for nesting of the partridge from April to June, after which their chicks use the insect rich habitat to eat. The seeds of the harvested grains give food during late summer and autumn and during winter stubble and rough vegetation provide shelter. By leaving unharvested patches, the partridge has food during the winter.



Streamvalley nature conservation corridor

This streamvalley corridor is purely nature conservation with minimal disturbance from visitors in order to invite the ambassador specie red deer to make use of the area to go to better foraging ground the river floodplain provides in early spring. Riparian woods and meadows provide cover and food access.



Coversand landscape with birdfields, grazing fields and agroforestry

The higher coversand areas of the estate landscapes were historically used for different agricultural practices such as production forests, grazing fields and arable farming. Therefore, birdfields and arable farming fields with beetle banks are introduced in order to provide suitable habitats for the partridge. Open grazing fields are maintained, providing foraging grounds for the badger, the amount of production forests are increased and agroforestry is introduced with food forests, high-stem orchards and silvopasture. The forested areas provide visual cover from predators and are suitable for their burrow systems to live in, raise young and shelter from weather.



Wet flower-rich hayfields, agroforestry and paludiculture

In these areas wet hayfields are used by godwits and are harvested. This landscape is also used for nature-inclusive wet agroforestry and paludiculture. For example, the wet hayfields, agroforestry and paludiculture areas can be used by otters to migrate and birds can use wet paludiculture fields with for example reedbeds and agroforestry fields.



Wet hayfields and nature conservation areas connected through naturalised streams

The streamvalleys create blue connectors from the Veluwe to the IJssel, connecting smaller wet nature conservation areas with big nature conservation areas as stepping stones for the ide and otter to use. With the climate adaptive layer restoring natural water flows and the removal of weirs in the streams, the ide can use it again as its habitat and the otter has a rich feeding ground. The streams are accompanied by rough vegetation and trees, providing the otter with cover whilst resting and hunting, protection from disturbances and denning sites. The adjacent hayfields are an inviting place for the godwit to forage and find cover, whilst also nesting. The hay can be harvested by mid to late June after the chicks are hatched and raised. By leaving parts of the area unmown, it can support delayed hatchings and late broods, as well as provide insects and other food sources and cover later into the season.



Seepage-fed wet nature development

Areas are developed into seepage-fed natural conservation places important for species like the ambassador specie otter as these are stable, high-quality aquatic habitats with the specific conditions otters need to hunt, hide, move, and reproduce.



Green-blue city park structures

These green-blue structures inside the city provide a connection with habitats outside of the city and increase biodiversity as it supports pollinators, songbirds, hedgehogs, bats and amphibians to move through the city. By continuing the canal with supporting green through the whole city it connects habitats along the flanks for waterbound species.



River nature development

The design gives room for more nature development along the river, providing together with the grazing of Galloway cattle and Konik horses ideal habitats benefitting the otter with cover and food, the ide with spawning areas, godwit with breeding and feeding grounds and red deer with foraging area.

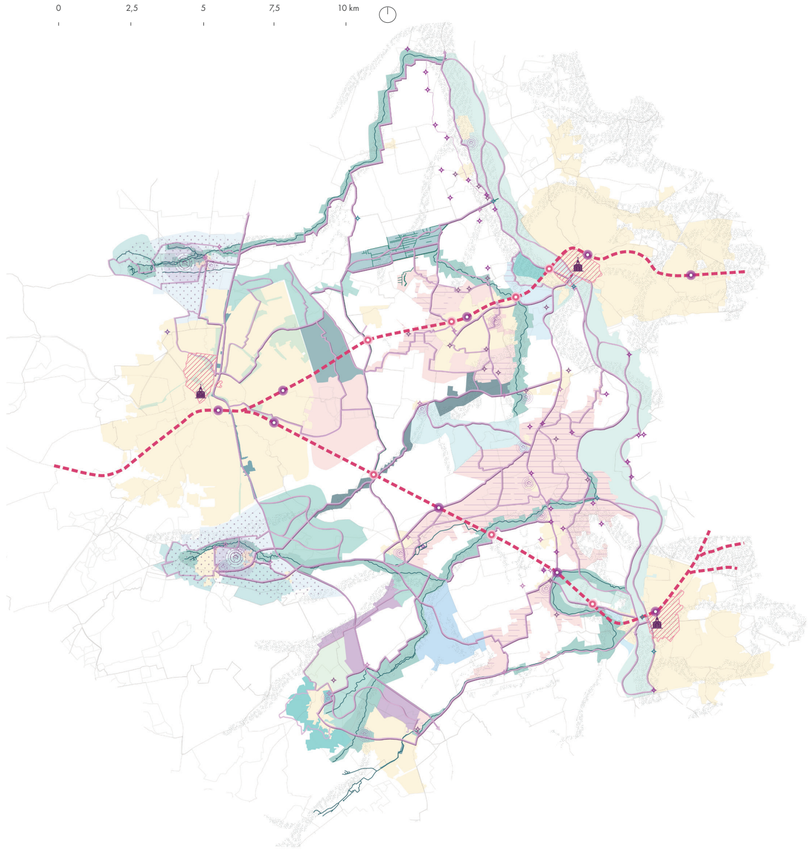


Former river floodplain with wet grazing and silvopasture

These former floodplain areas are characterised by their diversity and large-scale image. Grazing and haymaking is characteristic for these areas, so wet grazing fields and hayfields are introduced as main landuse types. Several small wet production forests historically occured in this landscape. Therefore, wet silvopasture with willow trees are reintroduced, making the area a corridor and habitat for otters and godwits.

RECREATION AND IDENTITY

EXPERIENCING DIVERSITY





DIVERSITY OF SHARED LANDSCAPE CHARACTERISTICS



MULTIFUNCTIONAL LANDSCAPE-BASED URBAN EXPANSION OF APELDOORN



RECREATION NETWORK CONNECTING CITIES, AGGLOMERATIONS AND LANDSCAPE-BASED DEVELOPMENTS



PARK INSIDE THE CITY



RECREATIONAL HEART



EDUCATIONAL EXPERIMENTAL FARMING AREA



NATURE CONSERVATION RECREATION



REACTIVATING HISTORIC ROUTES AND CONNECTING CULTURAL HISTORICAL FEATURES



OPEN LANDSCAPE SHOWING HISTORIC PATTERNS



PRESERVE CULTURAL HISTORICAL RAISED STREAMS



LIGHTRAIL WITH PARK STOPS

Recreation and identity are essential in shaping a meaningful landscape experience. In a region where cultural history, spatial diversity, and growing urban pressure intersect, the park strengthens the bond between people and place. This strategy guides future urban development in a way that reinforces regional identity while placing the landscape at the centre.

By integrating new, multifunctional urban expansions into the landscape along the edges of Apeldoorn and in surrounding agglomerations, the design ensures that growth supports and enhances the region's distinctive qualities. At the same time, the park provides space for recreation, encounter, and education by improving accessibility, reactivating cultural-historical structures, and celebrating spatial diversity. The result is a landscape that is not only used, but also recognised, understood, and valued by its inhabitants and visitors.

This strategy layer consists of six sub-strategies:

1. Celebrate the diversity of regional landscape characteristics through recognisable clusters;

2. Integrate landscape-based, multifunctional urban expansions along the northern and southern urban edges of Apeldoorn and at agglomerations;

3. Establish a recreational network connecting cities, agglomerations, and their landscape-based developments;

4. Strengthen the presence of the park inside the city through green and recreational structures;

5. Combine heritage and experience by reactivating historic routes and exhibiting cultural features;

6. Safeguard nature conservation through guided recreation and seasonal access management.



Diversity of shared landscape characteristics

The park celebrates the rich diversity of landscape characteristics found in the city triangle region by identifying, emphasising, and strengthening them. To support this, distinct clusters of landscape types have been defined. These clusters are further illustrated through photo collections on the following pages.

Estate landscape

PRODUCTION FORESTS





1

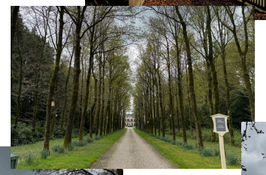
ESTATE HOUSES

INDUSTRY



GARDENS





TREE LANES



OPEN FIELDS INSIDE FORESTS

River floodplains

ALLUVIAL FORESTS



5



2



3

IRREGULAR CHARACTER

GALLOWAY CATTLE AND KONIK HORSES



6

BUILDINGS ON MOUNDS

GRAZING FIELDS



2



4

IRREGULAR BLOCK PARCELATION

LARGE-SCALE LANDSCAPE



2



2

Low wetland



REED



8

PUDDLES

9

GRASSES



7

RAINWATER DEPENDENT

Recreational heart

RESTAURANTS ON THE WATER



14

HOLIDAY PARK HOUSING



13



12

PICTURESQUE ENGLISH LANDSCAPE STYLE PARK



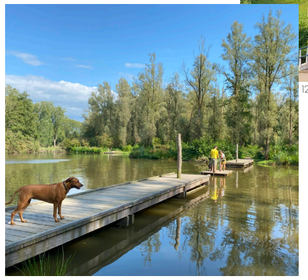
10



11



14

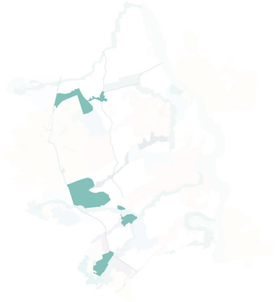


12

RECREATIONAL GARBAGE HILL

DOG WALKING

Seepage wetland





ORANGE TINTED WATER



WET ALDER FOREST



SEEPAGE PLANTING

High wetland



GRAZING GALLOWAYS AND KONIK HORSES



16



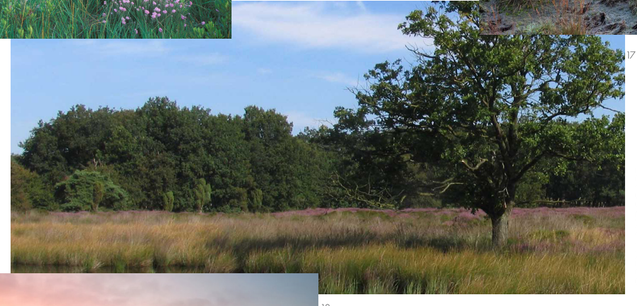
15

BELL HEATHER, COMMON HEATHER, BOG ROSEMARY, CROWBERRY



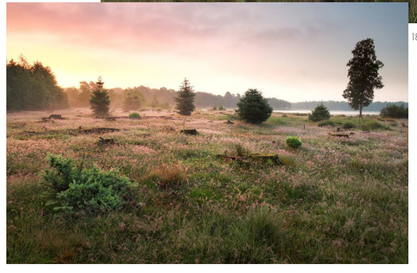
18

OPEN WATER



17

OPEN LANDSCAPE



18

Naturalised streamvalley



WET FORESTS

19



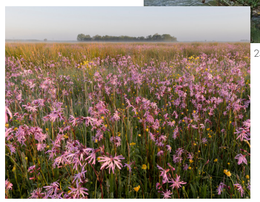
19



20

ROUGH VEGETATION ALONG WATER

CURVY STREAM



23

HAYFIELDS

DAMS



22



21

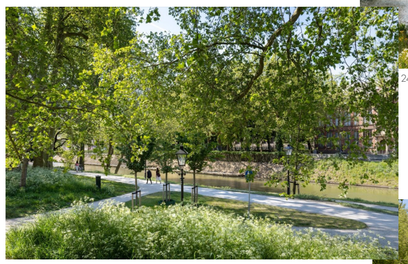
WOOD IN WATER

Urban waterpark



24

RECREATION ALONG AND IN CANAL





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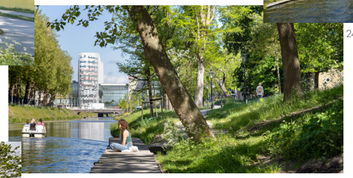


24

VEGETATED SHORES



25

RESURFACING OF STREAMS

Cultural historical stream



Coullissen flank



Wet landscape-based flank living



29

MULTIFUNCTIONAL PLOTS



30

HEIGHTENED HOUSING



31

FLOATING HOUSING



32

HOUSING ON MOUNDS

Enk landscape-based flank living



33

RYE, OATS AND BUCKWHEAT

MULTIFUNCTIONAL PLOTS



34

PRESERVE OPEN LANDSCAPE

Nature conservation meadow

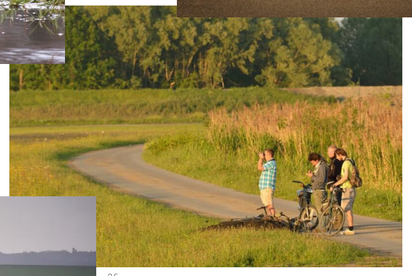


36

MEADOW/BIRDS



38



37

PUDDLES

BIRDSPOTTING



35

OPEN



39

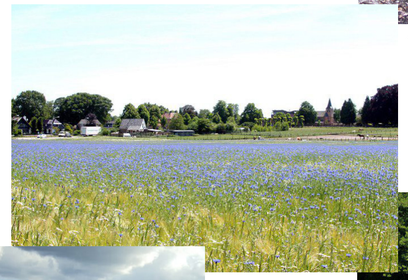
Enken landscape



40

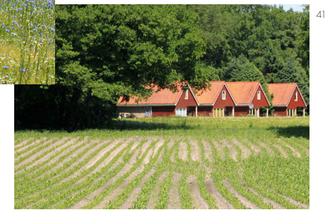
ENK EMBANKMENTS

CORNFLOWERS



41

OPENNESS



41



42

SLOPING ROUNDED FIELDS

RYE, OATS AND BUCKWHEAT

Cultural waterways



HISTORIC BRIDGES



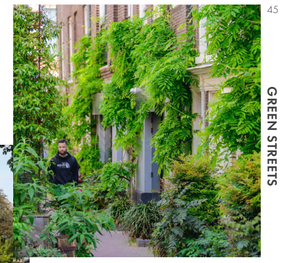


DUG WATERWAYS



CANALISED

Urban living and parks



45

GREEN STREETS

CLIMATE PARKS



44



CLIMATE-ADAPTIVE

44

COOLING DOWN



43

MEETING PLACES



44



46

River levee


50

HIGH-STEM ORCHARDS


47

PRODUCTION FORESTS


49


48

SILVOPASTURE


48

HEDGEROWS

Educational productive landscapes


60

STRUCTURED FIELD PLOTS

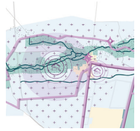

63


61

EXPERIMENTAL FARMING


62

EDUCATION



Multifunctional landscape-based urban expansion of Apeldoorn

Urban development is guided by stimulating densification of the cities Apeldoorn, Deventer and Zutphen, whilst allowing for additional landscape sensitive urban expansion in the flanks of the Veluwe on the north and south borders of Apeldoorn. These expansion areas are multifunctional, combining new landscape-based housing typologies with other forms of land use. Examples include housing integrated with wet nature development, grain farming on the historic essen, and forms of wet agriculture.



Recreation network connecting cities, agglomerations and landscape-based developments

In the city triangle region, the smaller agglomerations have designated areas for small-scale, multifunctional, landscape-based urban expansion. A regional cycling network connects the three cities with these agglomerations and their landscape-oriented developments, forming part of an educational and recreational route through the region's highlights.



Park inside the city

The park interacts with the city by reaching into it with both green structures as well as recreational routes, making connections with the historical city center and its facilities possible.



Recreational heart

The garbage belt is transformed into a English landscape style park with the hill as an outlook place allowing view lines into the valley. Together with the Bussloo lake it is the recreational heart of the park, an inviting place clearly visible from passing travellers on the A1. New water-related recreational facilities and holiday parks are introduced here, such as floating holiday housing and restaurants and waterbikes.



Educational experimental farming area

Two areas within the park are dedicated to experimental farming combined with education. Here, farmers can collaborate with research institutions such as Wageningen University & Research to explore and trial both new and existing paludiculture crops. Examples include Sphagnum moss, herbal hay species, wildflower hay, seed harvesting, and cranberry cultivation. These areas not only support innovation in climate-adaptive agriculture, but also offer educational facilities for visitors to learn about wet farming and its ecological benefits.



Nature conservation recreation

The regional recreational network passes through several nature conservation areas, improving both accessibility and awareness of these valuable landscapes. However, the accessibility of additional recreational loops connected to the network depends on the level of disturbance they cause to the conservation areas. Carefully timed seasonal closures are introduced where necessary to avoid disrupting the breeding period.



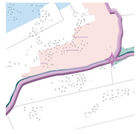
Reactivating historic routes and connecting cultural historical features

Parts of historic routes are reactivated within the regional network, with cultural-historical features connected to them and explained through park-specific signage made of wood and corten steel. These elements stimulate greater awareness and education about the rich cultural history of the region.



Open landscape showing historic patterns

The design preserves the openness of the landscape to reveal the historic medieval cultivation patterns that shaped this area. Today, it serves as an ecological refuge for meadow birds and is only accessible to visitors outside the breeding season. However, the main cycling route remains open year-round, offering an ideal birdwatching location enhanced by a dedicated viewing facility.



Preserve cultural historical raised streams

Due to the important role raised streams have played in the region's rich water-related industrial history, they are included in the park and preserved in their current state to highlight their historical connection with the mills on the valley flanks and in the valley. As with other cultural-historical elements, this heritage is explained through information panels placed along the streams.



Lightrail with park stops

The accessibility of the park is further strengthened by the change from a railway into a more flexible lightrail. New stops are added at crossings with the regional cycling network, to allow visitors to efficiently go from one spot in the park to another spot. It also makes it easy to cut biking travel time between cities.

5.3 PROJECT ENVELOPS

Several crucial projects have been chosen that showcase the value of the coherence between the different elements, together making it a Regional Landscape Park.

Project 1

In this project envelop, a quiet recreation route will allow visitors to experience a new green-blue wildlife corridor for the red deer, giving the possibility to spot one in their natural habitat from the edge of the corridor. The corridor will reintroduce natural water retention and buffering capacity into the landscape and connect with a new river nature conservation area along the river. A new landscape-based living area is introduced on mounds behind the dike and becomes part of the recreational routing.



Project 2

This project envelop integrates multiple functions in a landscape-centered design. The ecological, naturalized stream valley with seepage-fed sponge nature provides resilience against climate change while supporting biodiversity. It forms the backbone for new and traditional ecological farming systems that blend seamlessly with the higher and drier, as well as the lower and wetter, areas on the flank. An urban wadi park corridor connects with the biking network, linking the city to the countryside and inviting people to explore and appreciate the landscape. Additional local-scale walking routes enhance the accessibility of the landscape. The plan also includes special landscape-based multifunctional living environments that follow existing roads and landscape structures, ensuring that residents live in harmony with the landscape and its ecology while benefiting from sustainable and innovative farming and recreation opportunities.



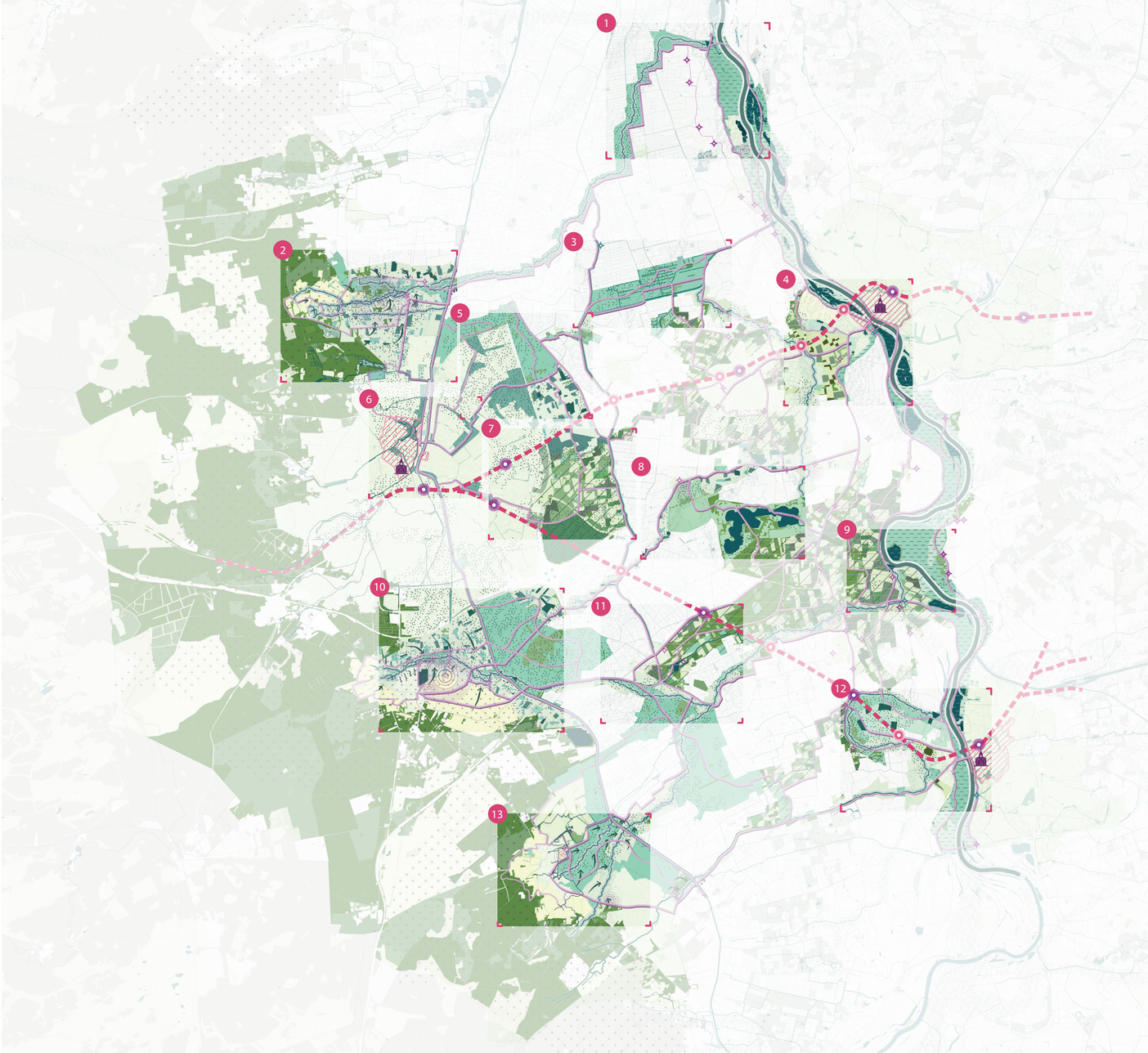


Figure 83. Design envelops of the park.

Project 3

The third project envelop combines ecological seepage nature conservation with eco-tourism and cultural historical recreation. An open meadow landscape is created as a habitat for meadow birds while preserving medieval historical cultivation patterns. Ecologically-sensitive bike routes allow people to experience the landscape without disturbing its ecological values. The design ensures both recreational and ecological connections with a cultural heritage area and the open water of Bussloo Lake, achieved through carefully planned biking routes and the restoration of a wet ecological stream valley. This enables visitors to appreciate the region's cultural and ecological richness. New and old types of ecological landscape-based farming are interwoven with cultural historical water management connections, preserving the identity and heritage of the area.



Project 4

This project envelop entails highly urbanised areas of the city Deventer with ecological river nature development and nature-friendly extensive grazing fields, higher and lower location- specific new and old types of interactive ecological landscape-based farming areas and a restored ecological streamvalley connection linking smaller nature conservation sponge capacity areas. The landscape and its farming practices and cultural historical and cultural water management features are made accessible for urban residents and tourists with a recreational biking network, a bike ferry to the city, a lightrail with added stops at cross-over points of the biking network and local walking routes.



Project 5

In this project envelop the park creates a transition from highly urbanised areas to the rural landscape through climate-adaptive urban wadi park corridors, transitioning into a new seepage nature conservation area and experimental wet farming practices surrounding the city of Apeldoorn.



Biking lanes and new pedestrian paths invite residents and visitors to get away from the hassle of the city and connect with local nature-inclusive farmers. It also includes a connection towards the city of Deventer.

Project 6

The sixth project envelop covers the cultural historic city centre of Apeldoorn with the canal park and connecting urban wadi park corridors. Biking lanes and walking paths ensure that residents are able to move through the city park structures whilst enjoying water and greenery, making the rural landscape and nearby recreational facilities more accessible.



Project 7

This project envelop entails a slightly higher coversand park area on the city edge, with a focus on the experience of diverse new and traditional estate landscape farming practices, such as birdfields, grazing fields and agroforestry. It also includes a production forest business park area and a connection to the Twello estate landscape area. Nearby lightrail stops, biking lanes and pedestrian paths make it accessible for both residents and tourists.



Project 8

This project envelop features a transformation of a waste treatment hill together with the Bussloo lake area into a vibrant, ecological English landscape-style hub. It also includes a new landscape-based urban expansion of Wilp-Achterhoek. The design integrates recreational routes and facilities, making it an attractive place to explore. The hub is connected with corridors that showcase new types of ecological, educational, landscape-based farming practices, with experiential farming pilot projects that connect agriculture and education. Recreational connections link this area to nearby recreational cultural heritage areas. This area blends nature, recreation, and learning into a dynamic, multifunctional landscape.



Project 9

This project envelop combines restored ecological river, stream valley nature conservation areas with sponge nature and cultural history with new and old ecological farming practices, supporting both climate resilience and biodiversity. The river nature development minimizes recreational activity to allow dynamic water systems and native habitats to thrive. Extensive river grazing areas alternate with small wood production forests, contributing to a varied and sustainable landscape. A recreational cultural heritage area highlights the region's historical significance while integrating both new and traditional forms of farming, offering visitors a unique opportunity to engage with its past and connect with local farmers. Landscape experience routes connect the cultural heritage sites in the river and estate areas, enabling visitors to explore and appreciate the rich interplay of nature and history throughout the landscape.



Project 10

In this project envelop a restored ecological, naturalized stream valley with seepage-fed sponge nature provides resilience against climate change while supporting biodiversity. New and traditional ecological farming systems are introduced that adapt to the water conditions. It connects with a pedestrian-focused urban wadi park corridor and canal park entering the city. Additionally, local-scale walking routes together with biking lanes introduce cultural heritage features and the new special landscape-based multifunctional living environment that follow existing roads and landscape structures. A big seepage-fed nature conservation area is restored and expanded and is used as a recreational area for the city and town residents, expansion residents as well as visitors.



Project 11

The eleventh project envelop features a lightrail with a dedicated station, ensuring sustainable and accessible connections to the surrounding region. A recreational cultural heritage area invites visitors to explore the rich history of the landscape, complemented by the preserved cultural heritage stream that protects the area's historical character. Ecological, naturalized stream valleys with sponge nature, along with seepage-activated and non-seepage sponge nature conservation areas, support climate resilience and biodiversity. The plan also includes agglomeration expansion through special landscape-based multifunctional living environments, where people can live in harmony with nature and farming. Landscape experience routes connect the agglomerations, expansion areas, nature conservation zones, and cultural heritage sites with recreational facilities and interactive farming opportunities, offering visitors and residents opportunities to explore and experience the interplay between nature, history, and new ways of living.



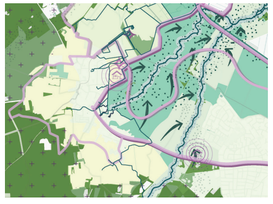
Project 12

This project entails highly urbanised areas of the city Zwolle with ecological river nature development and nature-friendly extensive grazing fields, higher and lower location- specific new and old types of interactive ecological landscape-based farming areas and a restored ecological streamvalley connection linking smaller nature conservation sponge capacity areas. The landscape and its farming practices and cultural historical and cultural water management features are made accessible for urban residents and tourists with a recreational biking network, a bike ferry to the city, a lightrail with added stops at cross-over points of the biking network and local walking routes.



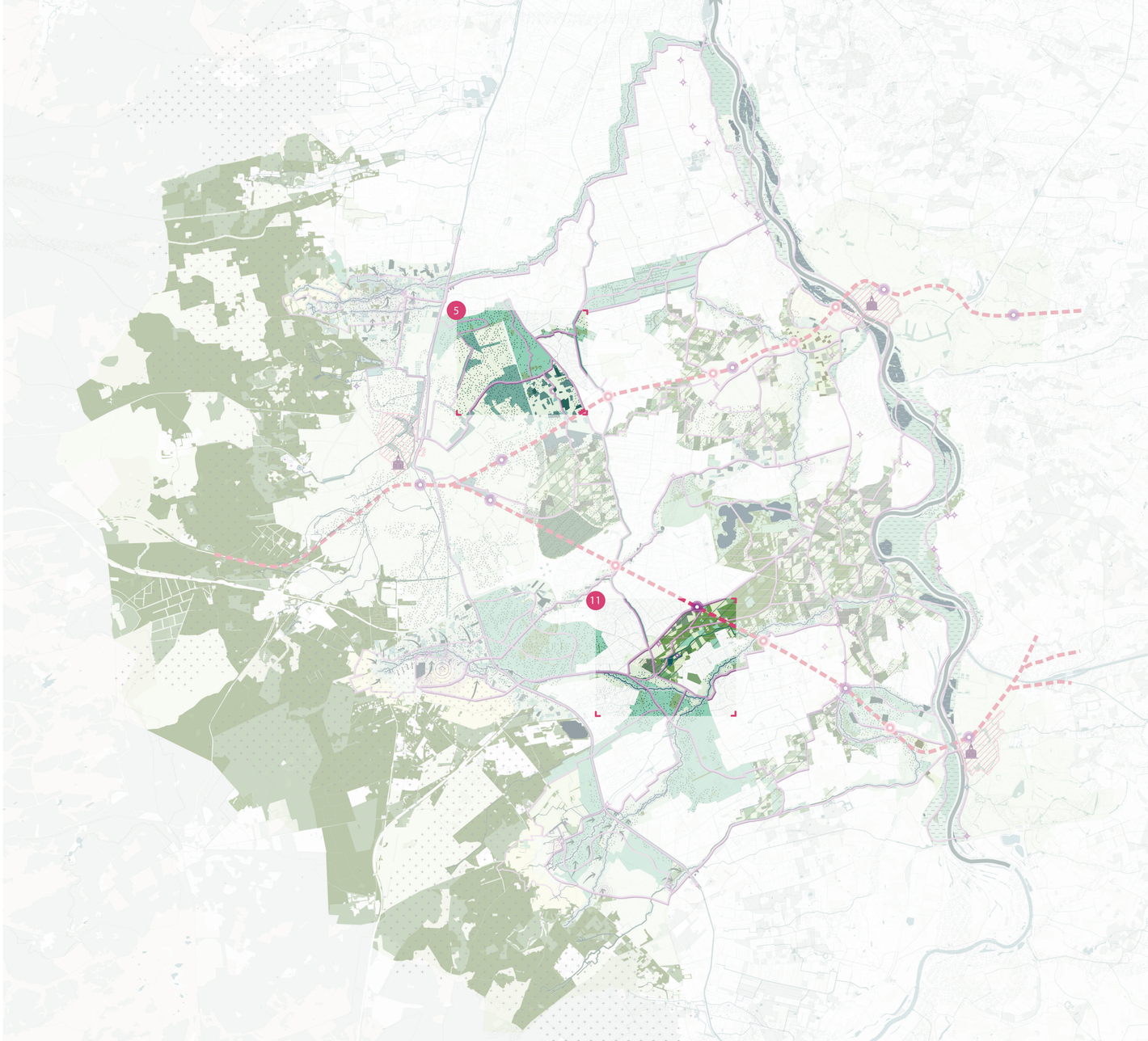
Project 13

This last project focuses on the restoration of seepage-activated sponge nature conservation areas and the development of an ecological, naturalized stream valley with sponge nature, which both enhance climate resilience and support biodiversity. The design also includes the restoration of the historic coulissen landscape, preserving the region's unique cultural heritage. New and old types of ecological landscape-based farming are



interwoven across both higher and lower areas, integrating sustainable land use with the landscape's natural features. Landscape experience routes connect cultural heritage sites, inviting visitors to explore and appreciate the region's rich history. A recreational canal enhances access to the water, offering opportunities for recreation and relaxation. The plan also includes agglomeration expansions with special landscape-based multifunctional living environments, where residents can live in harmony with nature and the region's cultural identity.

Design envelops 5 and 11 have been chosen to elaborate further because of their landscape complexity and their relationship with either an agglomeration expansion or a highly urbanised city environment. These elaborations will show how the park is implemented on a local scale and what the experience of the park is like.



PROJECT ENVELOP KLARENBEEK

The project envelop surrounding Klarenbeek is chosen to show how the park is implemented on a local scale and how it the phasing of the park would work. It is an area inside the park where you can find many diverse landscape characteristics. The envelop is designed according to the three main park layers.

- ALDER FOREST SEEPAGE WETLAND
- PRODUCTION FOREST
- BIRD- AND GRAZING FIELDS
- CULTURAL HERITAGE STREAM
- RESIDENT COMMUNITY HUB
- WET HEATH LANDSCAPE
- LIVING ON MOUNDS
- SPORTS AREA
- INTERACTION WITH FARMERS ALONG ROUTES
- NATURALISED STREAMVALLEY WITH STEPPING STONE AREA
- ESTATE MANSION AREA
- PUBLIC COMMUNITY HUB
- NEW LANDSCAPE-BASED LIVING AREA
- DIKE ROUTE ALONG STREAMVALLEY AND HAYFIELDS
- HAYFIELDS
- RAILWAY WITH STATION

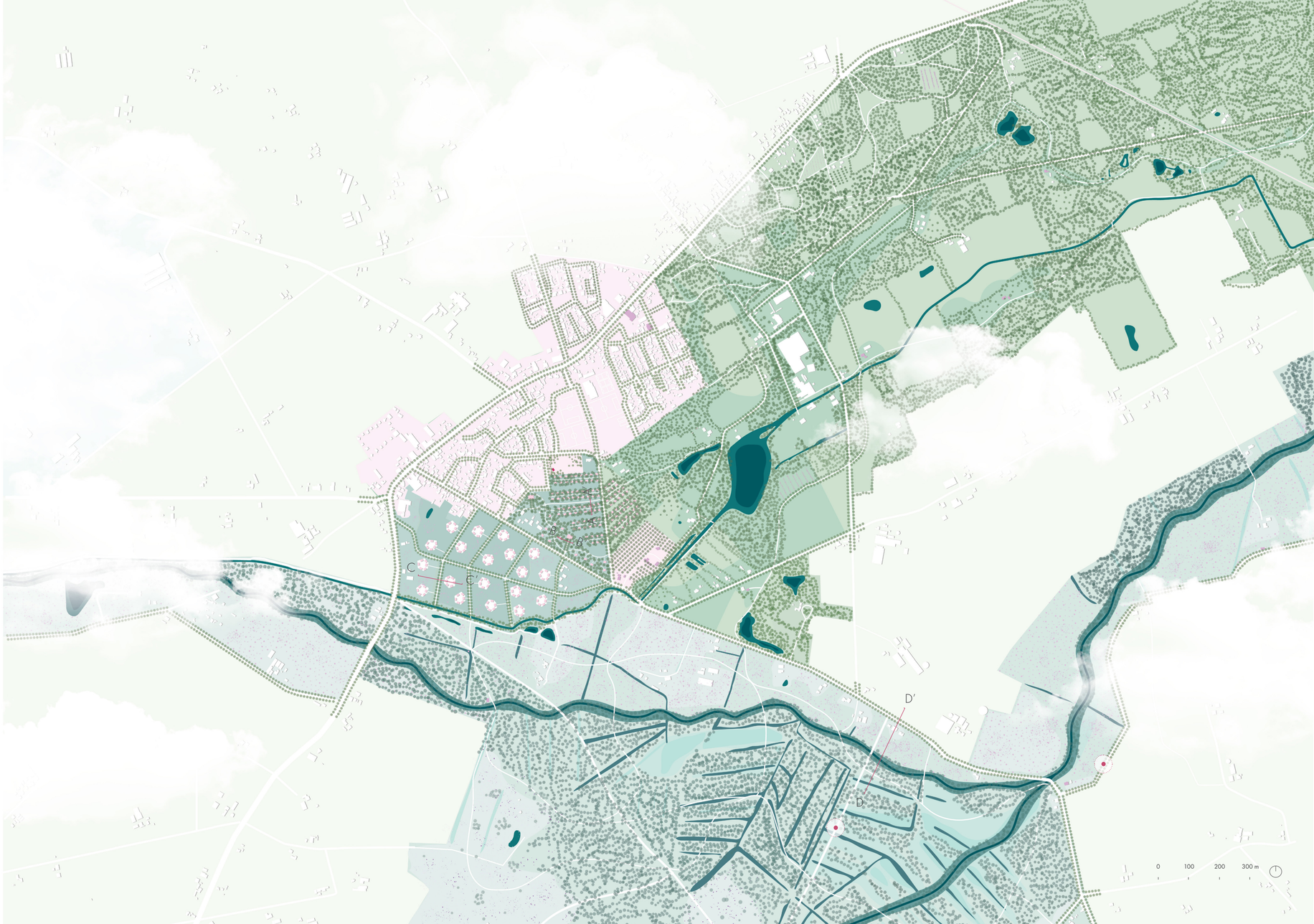


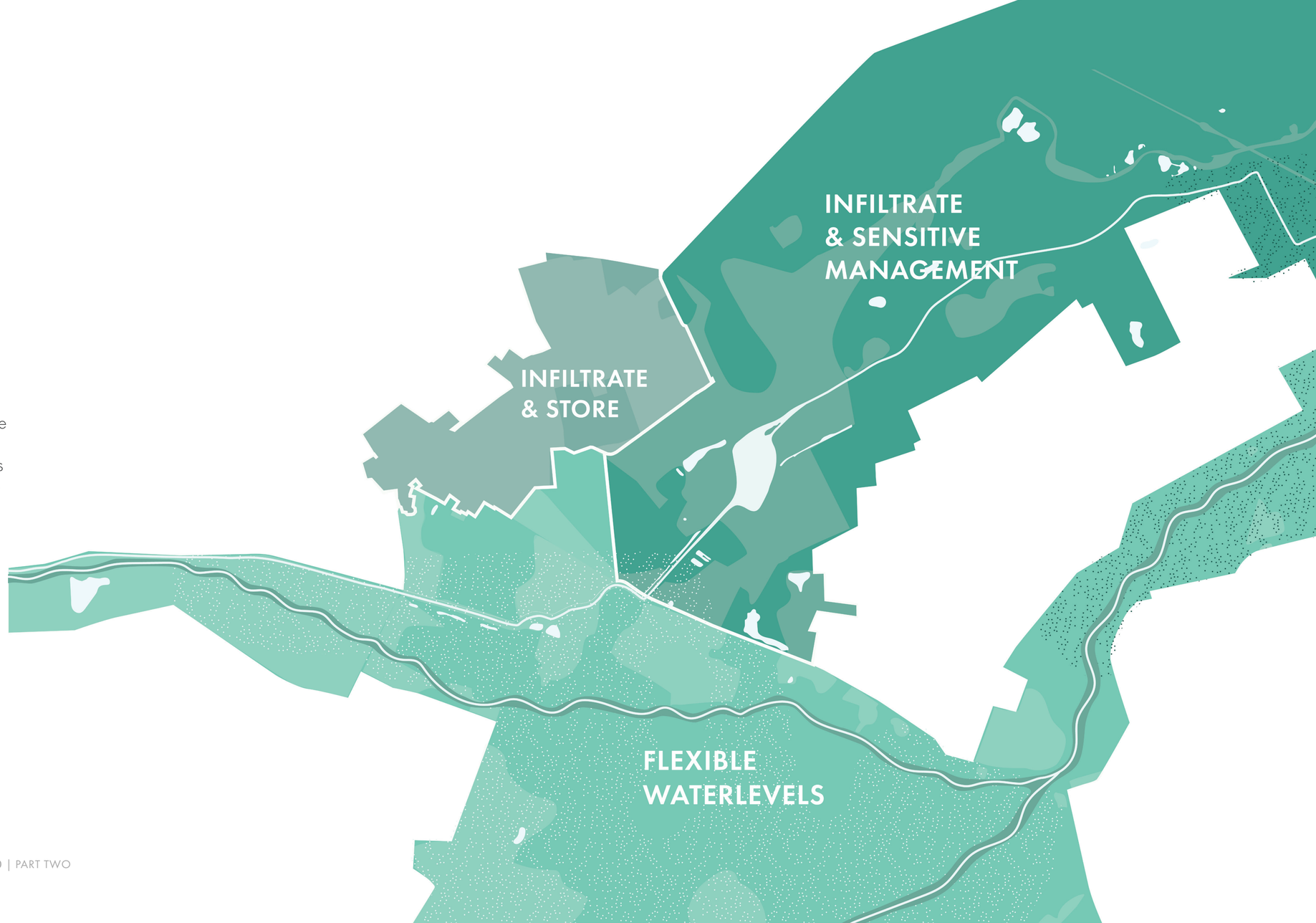
Figure 84. Design of the Mosaic Park.

- EXPERIENCE COLLAGE
- SECTION

CLIMATE-ADAPTIVITY

WATER AS THE BASIS

The climate-adaptive layer on this scale also responds directly to the logic of the landscape, following the logic of the regional scale layer. Wetland clusters are designed with flexible water levels that allow for seasonal flooding and wetter conditions, helping to store water in wetter periods and buffer drought in drier times. Land functions are arranged according to this logic: wet areas are used for wet ecology, agriculture, and forms of water-inclusive living, while drier zones support dry-land farming, drier nature types, and housing on higher ground. Tree planting across the area helps to cool the environment, improving comfort during hotter periods. As drinking water will become more scarce in the future because of climate-change, careful handling of the water that comes with precipitation is needed. However, there will also be water nuisance due to stormwater runoff. To deal with both these situations, water is made more visible in daily life, increasing awareness and interest for urban water management. This is done by adding bioswales. Added greenery will increase infiltration in the streets, water nuisance. The estate landscape area is naturally on higher coversand ridges, making it a drier area. However, cultural heritage elements within the estate landscape area are safeguarded through sensitive water level management, ensuring their protection.



▸ Figure 85. Climate-adaptive layer.

ECOLOGY

A COLLABORATION BETWEEN
AGRICULTURE AND NATURE

The ecological layer builds on the landscape's logic and earlier mentioned clusters of characteristics to support biodiversity and species mobility. Estate landscapes are combined with birdfields, grazing fields, and agroforestry systems that provide suitable habitat for species like the badger and partridge. Wetlands and streams form essential habitats and corridors for otters, ides, and godwits. In lower areas without seepage, open wetlands are made accessible through raised walking and biking paths and boardwalks, while higher seepage zones include both open and forested wetlands with similar elevated paths and boardwalks to guide visitors through sensitive environments. Stream valleys are naturalised with rough forested edges and hayfields, enhancing their ecological function. In contrast, cultural historical streams are preserved in their normalised form and kept mostly open with some tree plantings and surrounding extensive grazing fields to preserve its cultural heritage value. Tree lanes with species such as alder, ash, birch, and maple are added along roads to increase ecological connectivity. Around agricultural fields, landscape elements like wooded edges with hedges and trees further improve movement opportunities for various species.



▸ Figure 86. Ecology layer.

RECREATION AND IDENTITY

EXPERIENCING DIVERSITY

Finally, the recreation and identity layer respond to the former discussed layers.

Visitors can arrive to this area from many directions:

1. the northwest side, from the regional bike route network;

2. the northside, from the lightrail station or from the regional bike route network;

3. the eastside from a cultural history walking route along the old dike, the regional bike route network loop, or the regional bike route network itself;

4. the southside from the regional bike route network loop or the regional bike route network itself;

5. the westside, from the regional bike route network.

Bike-hike points allow visitors to change from biking to walking and a bike rental point to change from walking to biking. Themed walking and biking loops guide visitors and residents through the landscape while offering opportunities to interact with it. Routes are designed around specific usages

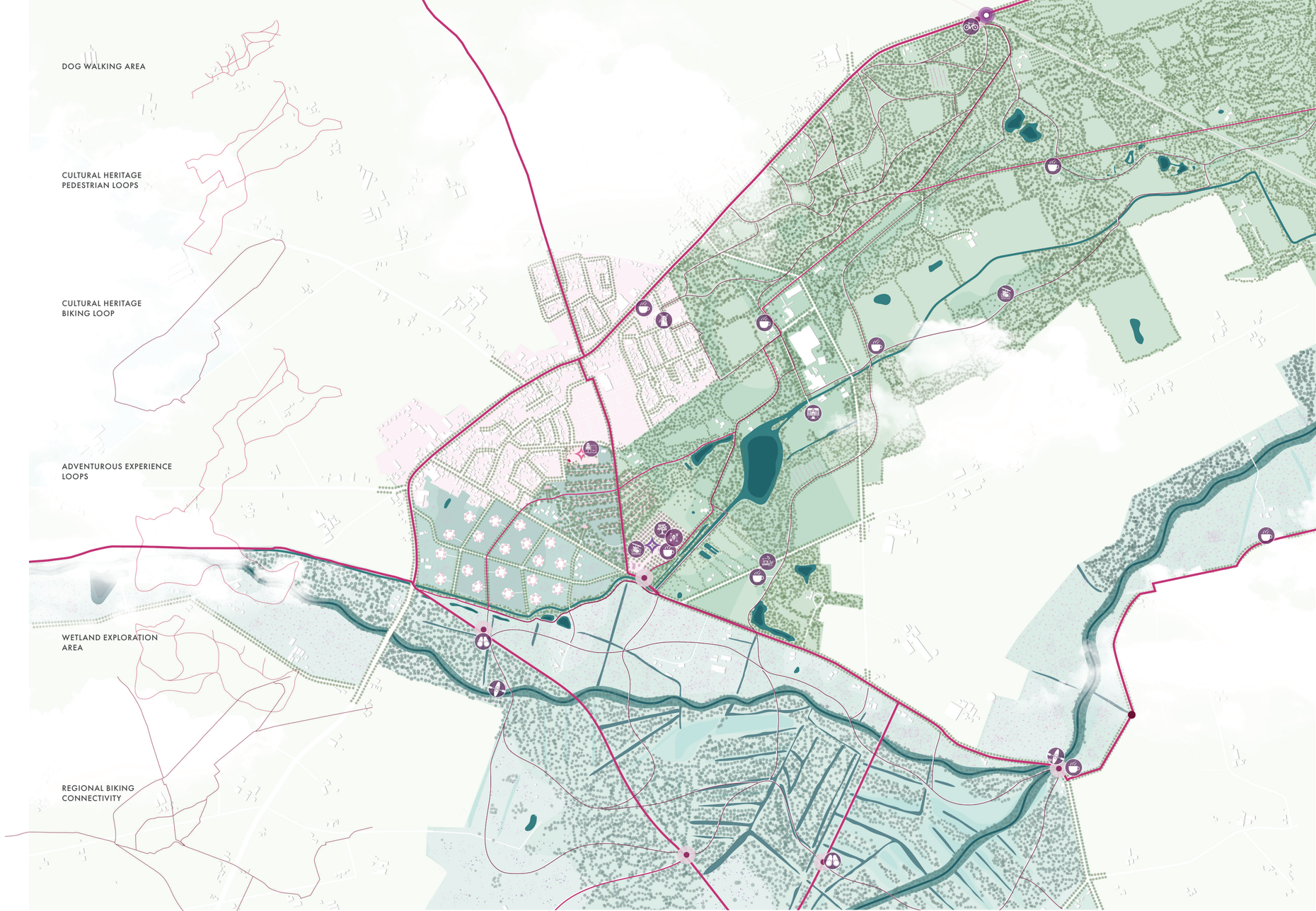


▸ Figure 87. Recreation and identity layer with pedestrian and cycling network.

and experiences, such as dog walking paths, cultural heritage routes, and adventure experience trails. Along these routes, educational and recreational facilities and activities are available that encourage exploration and interaction with the park's characteristic landscape ecological areas and agricultural land uses. These include for example a marked weir along a route, corten steel panels providing information, and birdwatching houses, cafés, a canoe and bike rental point, fruit picking at farms, and guided food forest tours. This variety makes the network accessible and attractive for both short visits and longer stays, while connecting different areas of the park. Both longer loops and shorter loops are designed to suit multiple target groups, see figure 88.

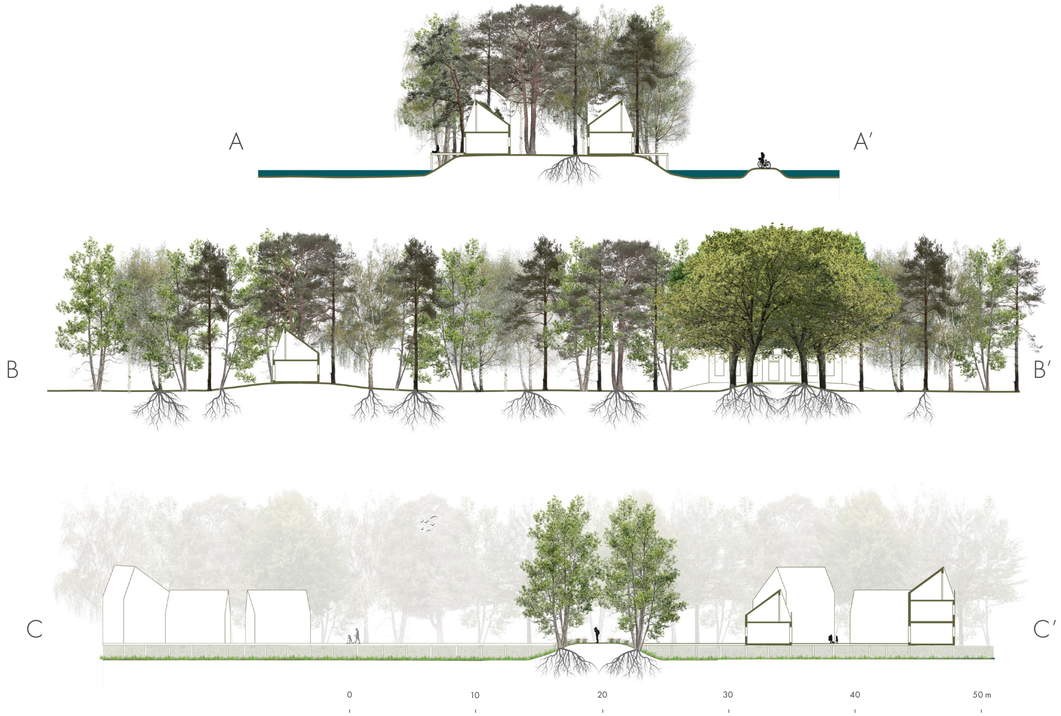
Klarenbeek will be able to grow with landscape-based urban developments, one following the estate landscape characteristics and one following the seepage wetland characteristics.

The designed architecture of Studio Marco Vermeulen is used as an example of housing in these landscape-based urban areas and is used for visualising the



- Figure 88. Recreational network layers.
- Figure 89. Recreation and identity layer embedded in the design.

landscape-based living environments in sections, see figure 90.
The estate landscape characteristics will be production forested areas with in the lower naturally wetter area new groove forest (*rabatbossen*; ridges planted with lines of trees with water surrounding them) streets. The higher area will have housing on slightly raised mounds and new estate house-inspired apartment buildings with their own small entrance lanes. In the wetland area, housing will be combined with hayfields in smaller, raised community platforms attached to higher dikes. The homes and communities are self-sustaining with solar panels for energy and private and shared wastewater treatments.



Two social community hubs are introduced in the urbanised area, one more private for local residents and one more public, where also tourists can meet local farmers and inhabitants.

The private community hub is a park with a calm area with a picnic meadow with shaded and sunny spots and a local community garden with gardenesque features as wel as a busier area with a natural playground, a local community garden with gardenesque features, a wooden house with an outside kitchen where people can organize dinners or parties and a firepit where locals can meet. The playground is hilly and has water, wooden elements like tree stumps, willow tunnels, balance beams, and logs. The local school can make use of it for as an outdoor classroom. Events like community strengthening activities can be held at the wooden house and outside kitchen, for example village dinners, small festivals, Halloween, Christmas and New Year's celebrations and clothing and garden plant swap markets. It is also a meeting spot for people to go on organised village biking and walking laps together.

The Park community hub is a big orchard with a farmers market square with a weekly market promoting park produce and crafts. It also has rentable shops and workshop areas where shopkeepers, bakeries and artisans can rent space. A cozy café with outdoor and indoor space allows residents and visitors to mingle. A playground for children makes this social hub familyfriendly. An information and learning pavillion provides information about the Regional Landscape Park and shows the local walking and cycling routes and its cycling connections with the other areas of the region. It also provides information on exhibitions and tours organised by farmers and nature enthousiasts in the area.

◂ Figure 90. Sections A-A′, B-B′ and C-C′. Landscape based living.

CAREFUL BALANCE

The park includes nature and landscape development, increases climate-adaptivity of the area provides accessibility of the landscape which will stimulate emotional connections with the area and increase awareness of the importance of landscape and nature. The design section, see figure 91, shows how recreation, climate adaptivity and ecology come together in an area with nature-inclusive farming, seepage-fed and streamvalley nature conservation areas and bike-friendly and pedestrian-friendly ecology-sensitive recreational routing. Seepage-fed nature wetlands are developed on the left, with a naturalised, widened streamvalley at the border. In the middle you can see the nature-inclusive hayfields and homes on artificial mounds on the right. A widened road with diverse tree specie lanes makes more room for biking tourists and residents and connects this location ecologically and recreationally with other areas in the park. The farming areas outside the park will become pesticide-free. In the section on the right grazing animals are visible in biodiverse grassy herb fields with connecting landscape elements.

▸ Figure 91. Section D-D'. A collaboration of the three layers.

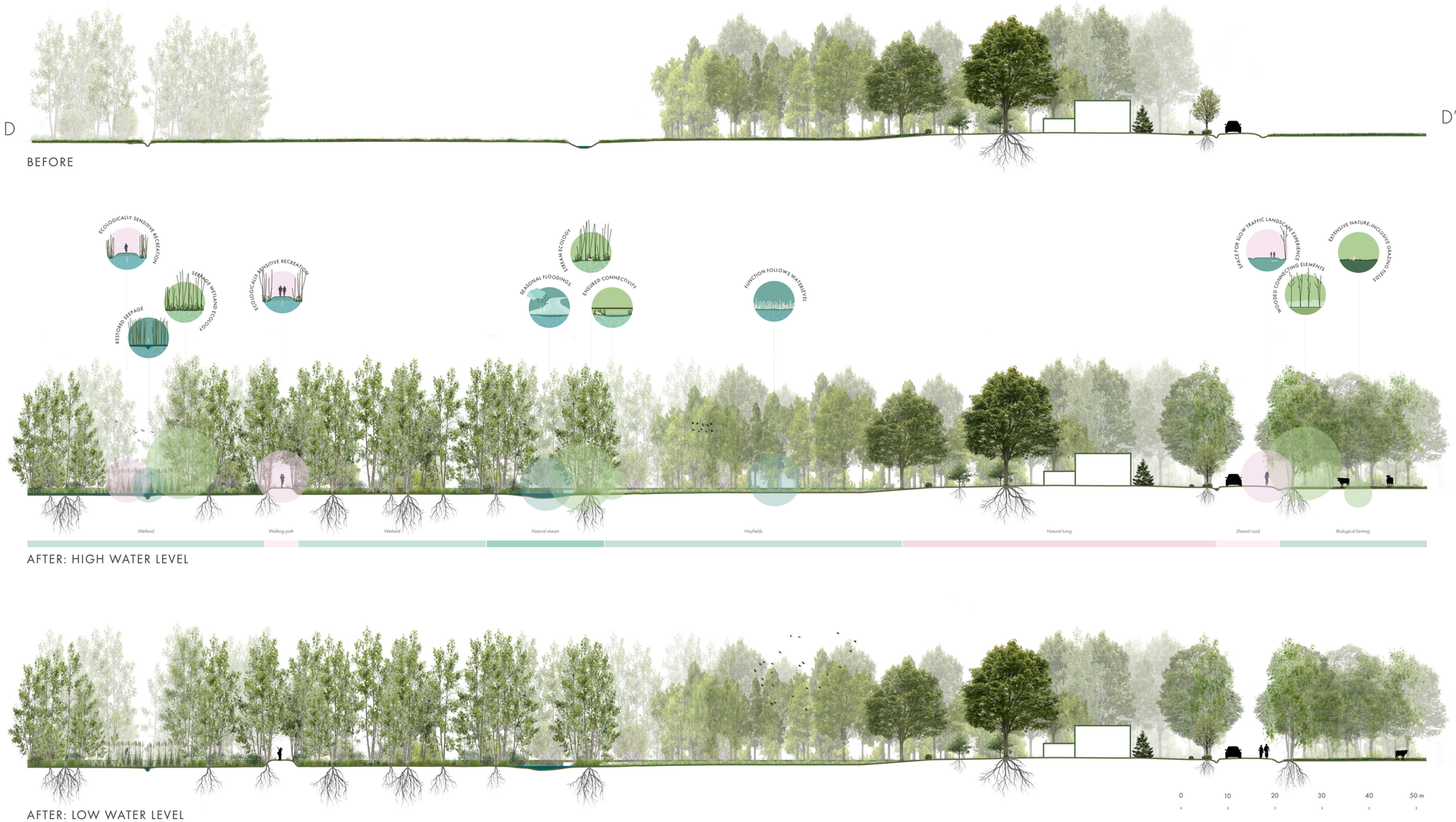




Figure 92. Heightened path through seepage wetland.



Figure 94. Dike path through seepage wetland.



Figure 93. Dike path along streamvalley and hayfields.

PROJECT ENVELOP APELDOORN

Another interesting project envelop is at the city edge of Apeldoorn, where the park enters the city. An experiential nature conservation and farming area around the city invites residents and visitors to connect with the landscape, bringing them closer to both local farmers and fauna. This envelop is, like the Klarenbeek project envelop, designed according to the three main park layers.

- EDGE CLIMATE PARK
- NEIGHBOURHOOD CLIMATE PARK
- EDGE CLIMATE PARK
- ECOPARK-DUCT
- GROOVE ORCHARD
- PRODUCTION FOREST
- CRANBERRY PALUDICULTURE
- HAYFIELDS
- BIOLOGICAL URBAN FARMING
- URBAN FARMING GARDENS
- WETLAND CONSERVATION AREA
- NATURAL STREAM
- WET FOOD FOREST
- GREEN CANAL CONNECTION
- HAYFIELDS AND CONSERVATION PARKS
- SPORTS AREA



Figure 95. Design of the Mosaic Park.

EXPERIENCE COLLAGE

SECTION

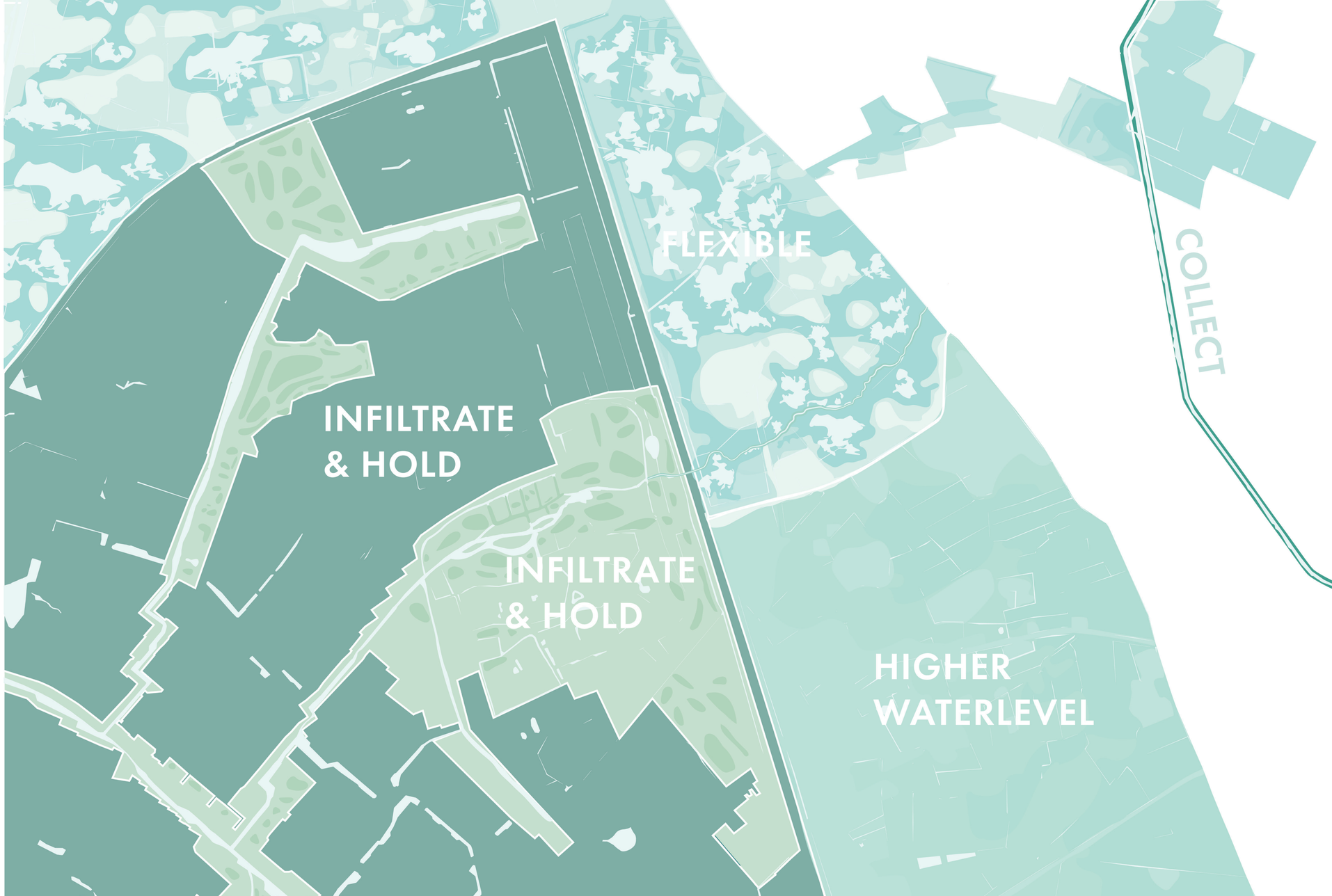
CLIMATE-ADAPTIVITY

WATER AS THE BASIS

This layer follows the logic of the landscape regarding the climate-adaptivity. Water is made more visible in the streets, increasing awareness and interest for urban water management. This is done by adding open gutters and sunken channels in the urban streets. These will lead water to infiltrating and water-capturing wadis inside a new connected climate park and corridors throughout the city, instead of overloading the sewage system and losing this precious water source. Rainwater is also captured on roofs and reused as process water, replacing drinking water by 'other' water for purposes that do not require drinking water quality. Infiltration is increased with bioswales and semi-permeable pavements. To lessen the increasing local temperatures, more surface water is realised with a minimal depth of 1,5 meters. Additionally, slopes of waterways are widened so that it can capture more water during peak rainfall.

A new wetland nature conservation park will be activated by stopping drainage and increased seepage flows. Water can be stored here and reused in drier periods. Housing is currently already situated on higher areas, however when needed owners can get a new living place with a transfer of development rights.

In the farming area and new types of wet farming such as hayfields, wet grazing, wet groove orchards and reed and cranberry cultivation will take place, depending on the water conditions of the fields.



▸ Figure 96. Climate adaptivity in the area.

ECOLOGY

A COLLABORATION BETWEEN AGRICULTURE AND NATURE

Inside the city, blue-green connections are made supported by trees. More use of bridges, above-ground water connections and increased herbal and shrub vegetation allow animals to continue their movements inside the city. Differing heights of the landscape will create gradients from dry to wet, also depending on weather conditions, increasing habitat diversity. Herbal flowers will attract pollinators. The corridor provides an ecological green-blue connection towards the wetlands outside the city.

Farming practices inside and outside the city will be biological and nature-friendly, thus is part of the ecological functioning of the area. Mostly the godwit will make use of this area, by going into the hayfields. The beaver will primarily make use of the nature conservation areas with its marshy water-rich lands.



▸ Figure 97. Ecology in the area.

RECREATION AND IDENTITY

EXPERIENCING DIVERSITY

The recreation and identity layer responds to the climate adaptivity and ecology layers.

The city will have a continuous biking route through the new climate adaptive corridors and parks, connecting residents and visitors with both the city centre and its canal park and the ecological farming and wetland areas outside the city. Bike-hike points allow people to change from biking to hiking to explore a hiking loop.

An extensive walking path network make it easier for residents to enjoy the cooling greenery and invites them to move through the city and explore outside of the city. Pedestrian paths are connected with park-like streets that enter the residential areas.

There are multiple recreational points such as landscape experience camping sites, biological farm product restaurants, biological farmers market, sports area, cafés, bike renting places, urban farming gardens, event venue sites and natural playgrounds. The density of the pedestrian network is increased in more urbanised areas.



Figure 98. Recreation and identity in the area.



Figure 99. Recreation and identity in the area.

TRANSITION URBAN-PARK

An example of a transition from an urban living area in Apeldoorn to the park gives an impression of how the park would function in everyday life. Streets connected to the park are connected with the greenery, allowing for more infiltration into the ground. Trees give shade to residents and together with shrubs shelter to animals. Herbal wild flowers add colour to the urban living environments, whilst attracting insects. Playful path connections to the main park paths are added from the front of houses at the park-edge. Some of these paths connect into the rest of the wadi park where residents can stroll through this flower- and treerich natural park area. Stepping stones give children and adults, the opportunity to playfully cross waterways and stairs and platforms make the water more accessible for residents to sit at the waterside. Sitting edges are made of stone at the edges of paths to also accommodate elderly residents enjoying the park. Information boards give playful education for young visitors.



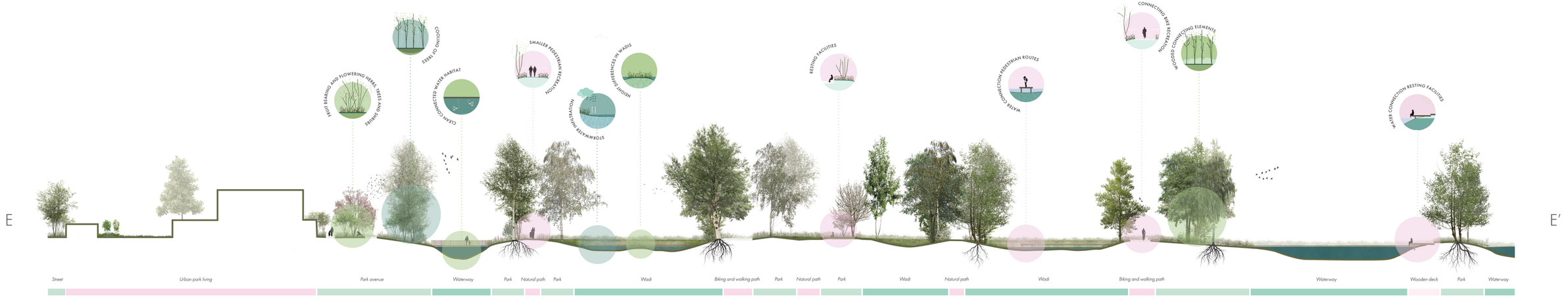
Figure 100. Zoom in location of a transition.





▲ Figure 101. Transition from urban edge to park.

The design section, see figure 102, shows how recreation, climate adaptivity and ecology come together in this area with green infiltration streets, a climate-adaptive wadi park with different heights, a park avenue to connect the urban neighbourhood to the park, bike-friendly and pedestrian-friendly recreational routing and resting facilities both near the water and on higher parts of the park. One the left can be seen that there is a visual relationship with the water and connection is increased by adding bridges. Natural smaller paths give a sense of closer connection to the greenery.The park then transitions into an area with lower wadi's and mounds to create a diversity of habitats for fauna. Wooden boardwalks playfully invites visitors to see changing water levels from close-up. Wider paved biking and walking paths with stone benches allow bikers to pass through the park and elderly to take a stroll whilst being able to rest. On the right side of the park another area with waterways is visible, where a wooden deck brings visitors closer to the water. Fruit bearing and flowering trees and shrubs together with herbal flowers provide food for insects and animals. Trees also give cooling shade and evaporation and are connecting elements for bats and birds.



▲ Figure 102. Transition from urban edge to park.





Figure 103. Climate-adaptive water park.





Figure 104. Bridge in the climate-adaptive water park.

5.4 PHASING

The phasing of implementation across the regional park is guided by the specific physical and hydrological characteristics. Rather than applying a uniform sequence, each sub-area, see figures 105 and 106, follows its own landscape logic, depending on ground height, soil type, moisture regime, and intended land use. Phasing can start simultaneously in different sub-areas to make more efficient use of resources and seasonal timing. Generally speaking, hydrology and landscape comes first, then the rest is adapted to this. At the same time, the strategy promotes parallel execution across multiple zones, allowing early successes, flexible financing, and distributed community involvement. Combining zones with fast-track potential (e.g., dry sites ready for tree planting) with zones that require extensive earthworks enables an adaptive rollout while maintaining coherence across the park.

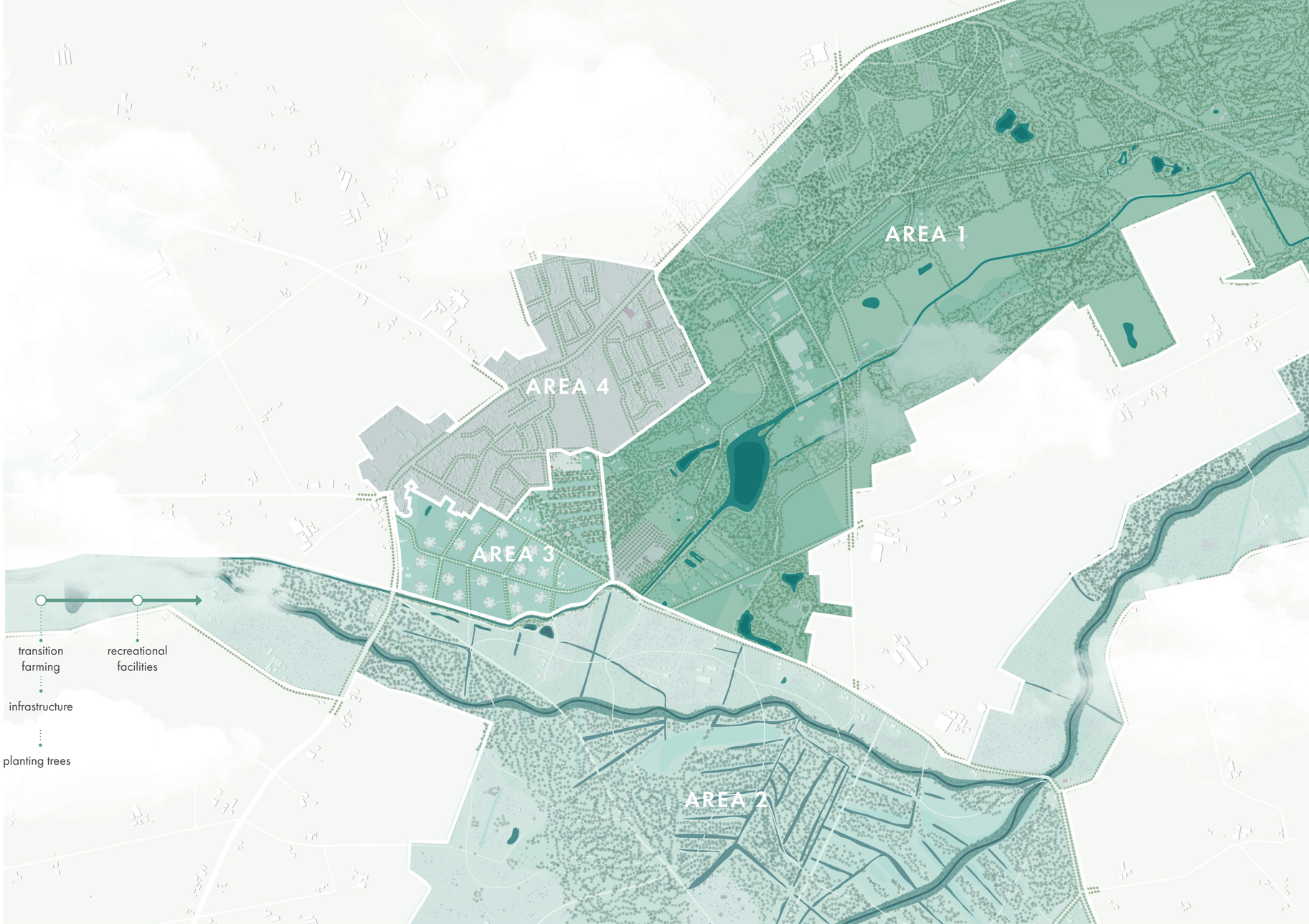
DESIGN ENVELOP KLARENBEEK

AREA 1 - ESTATE LANDSCAPE

Area1 exists of dry coversand ridges and will change into an ecologically-valuable estate landscape with nature-inclusive farming practices.

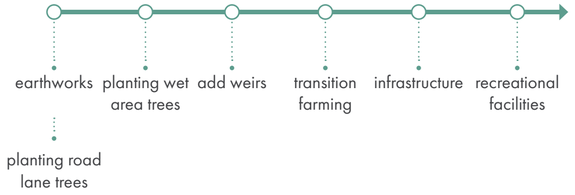
Phase 1: Start transition of nature-inclusive farming practices, adding infrastructure, and planting trees alongside roads

Phase 2: Add recreational facilities



▸ Figure 105. Areas with their own phasing logic.

AREA 2 - STREAM VALLEY AND WETLAND



Area 2 will go from drained grazing fields and nature conservation area to a seepage wetland with naturalised streamvalleys and hayfields.

Phase 1: Earthworks for stream meanders and higher path bases and start tree planting along roads

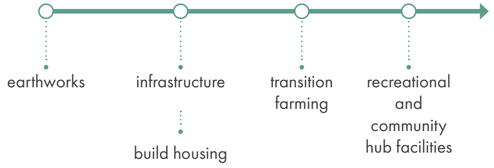
Phase 2: Plant trees in wet areas, add weirs to stop drainage and start tree planting to initiate wet forest

Phase 3: Start transition into wet hayfield farming

Phase 4: Add infrastructure

Phase 5: Add recreational facilities

AREA 3 - STREAM VALLEY AND WETLAND



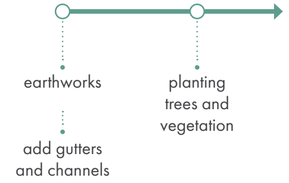
Area 3 will go from farming fields to a new landscape-based urban living area with rabatbos lanes with housing on top in wetland, mounds on a slightly elevated area but still soggy soils, and hayfields with raised wooded platforms with housing on the platforms and dikes to access them. The area will also have two community hub places.

Phase 1: Earthworks for groove and mounds

Phase 2: Add infrastructure and housing

Phase 3: Start transition into wet nature-inclusive farming and add recreational facilities and community hub facilities

AREA 4 - URBAN AREA



Area 4 is the urban residents area with conventional housing. This area will stay drained but streets must become more permeable and trees are added.

Phase 1: Start earthworks to make streets more permeable with green and add above-ground drainage gutters and sunken channels

Phase 2: Plant trees and vegetation

DESIGN ENVELOP APELDOORN

AREA 1 - WET AGRICULTURE TRANSITION

Area 1 transforms former drained farmland into a variety of wet-adapted land uses

Phase 1: Start earthworks of grooves and mounds and planting of trees alongside roads

Phase 2: Start on infrastructure through and alongside fields and start to add weirs to stop drainage and rewet

Phase 3: Start change of farming and add recreational spots

AREA 2 - URBAN BLUE-GREEN PARKS

This area exists of green-blue corridors and inner-city parks with water and climate-adaptive wadis. It also includes a sporting, biological farming, and urban farming garden area.

Phase 1: Start earthworks to create wadi-like depressions and raised zones and new waterways, add sporting facilities and new urban farming area and start planting trees here

Phase 2: Start on main infrastructure of bike and walking routes and planting the rest of the trees and vegetation in wadi areas

Phase 3: Add additional paths and recreational facilities.



Figure 106. Areas with their own phasing logic.

AREA 3 - WETLAND

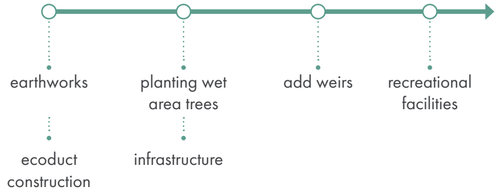
This former agricultural farming area with wetland nature conservation changes into a wetland area with protected nature zones and hayfield agriculture.

Phase 1: Start earthworks to create high and low areas and start construction on ecoduct

Phase 2: Add elevated infrastructure for recreational routing and start tree planting to initiate wet forest

Phase 3: Add weirs to stop drainage and rewet

Phase 4: Add recreational facilities



AREA 4 - GREEN-BLUE CONNECTION

This area exists of a drainage waterway and becomes a connective corridor.

Phase 1: Start earthworks to reshape water edges with gentle slopes and natural profiles

Phase 2: Plant trees and vegetation

Phase 3: Add infrastructure of shared bike/ pedestrian path

Phase 4: Add recreational facilities

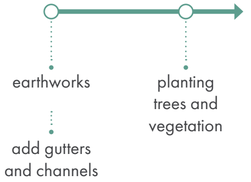


AREA 5 - URBAN AREA

Urban areas become more permeable and gain greenery.

Phase 1: Start earthworks to make streets more permeable with green and add above-ground drainage gutters and sunken channels

Phase 2: Plant trees and vegetation



5.5 REGIONAL LANDSCAPE PARK ORGANISATION

To bring the designed Regional Landscape Park into realisation, it is essential to establish an official Regional Landscape Park organisation with a clear mandate. As can be seen in figure 108, the proposed Regional Landscape Park covers an area with a wide range of landowners, from public institutions to private estates. This diversity of ownership means that cooperation is not only desirable but crucial to achieving a coherent and effective implementation of the park's vision.

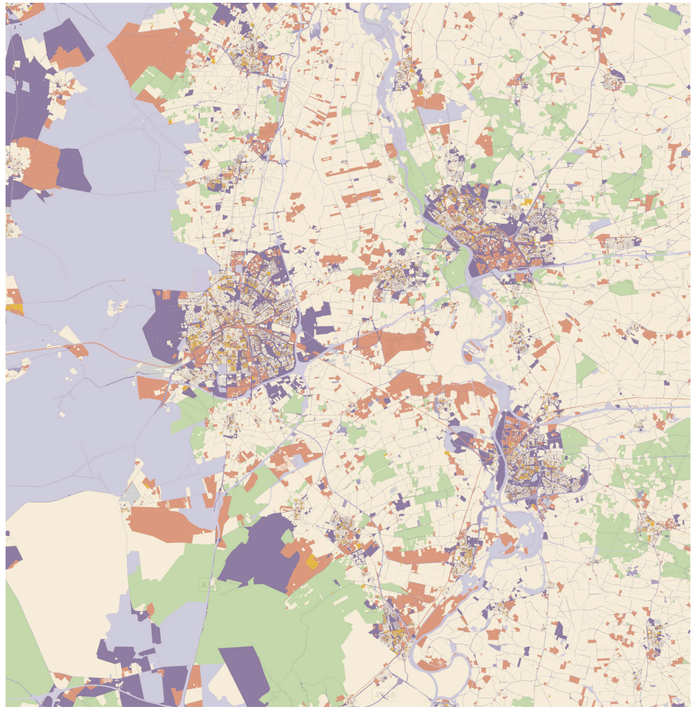
The park area spans predominantly across the Province of Gelderland, but also includes parts of the Province of Overijssel. It encompasses the municipalities of Epe, Olst-Wijhe, Apeldoorn, Voorst, Deventer, Lochem, Brummen, and Zutphen. The presence of multiple administrative layers, including provinces, municipalities, and waterboards, necessitates a governance structure that can bridge these levels and facilitate coordinated action.

A Regional Landscape Park organisation with mandate can serve as this bridge. It would have the authority to align interests, facilitate agreements, and steer investments in line with the park's long-term vision. Involving waterboards such as Vallei & Veluwe, Drents Overijsselse Delta, and Rijn & IJssel is vital, as they manage the water system and related nature, which are key components of the landscape's ecological functioning.

Moreover, the engagement of public land management organisations such as Rijkswaterstaat, Staatsbosbeheer, Dienst Domeinen, and the Ministry of Defence is essential for integrating land use, infrastructure, and nature management goals. Private landowners, including estate



▲ Figure 107. Municipalities. Map is made using data provided by PDOK.



▲ Figure 108. Land ownership 2020. Map from Planbureau voor de Leefomgeving (2020).

managers, and public organisations like Natuurmonumenten, Geldersch Landschap en Kasteelen (GLK), and Stichting Landschapsbeheer Gelderland (SLG) also play important roles in maintaining the region's landscape quality and biodiversity.

In addition to these stakeholders, farmers are essential partners in the Regional Landscape Park. As stewards of the land, they play a vital role in shaping the landscape's ecological and cultural values. A Regional Landscape Park organisation with mandate should actively engage farmers in the park's development and management by forming farmer advisory groups or working groups within the organisation to ensure their voices are included in decision-making and design processes. It should promote agri-environment schemes that provide financial incentives and subsidies for sustainable land management, rewarding farmers for enhancing biodiversity, water management, and landscape quality. Offering training and knowledge exchange, such as workshops, demonstration projects, and farm walks that showcase best practices in nature-inclusive farming, water management, and landscape stewardship, would further support farmers. Integrating agricultural heritage by acknowledging and celebrating the historical role of farmers in shaping the region's landscape, incorporating their stories and heritage into the park's identity, is also important. Supporting market access and diversification helps farmers diversify their income streams by promoting short supply chains, local product branding, such as "Park produce," and agri-tourism linked to the landscape's unique identity. Finally, developing joint projects that demonstrate the synergy between agricultural production and landscape restoration, such as buffer strips, flower-rich field margins, and water retention measures, ensures that farmers remain active contributors to the park's success.

With collaboration and the provision of an overarching framework, the Regional Landscape Park organisation with mandate can transform the park from a design concept into a reality.

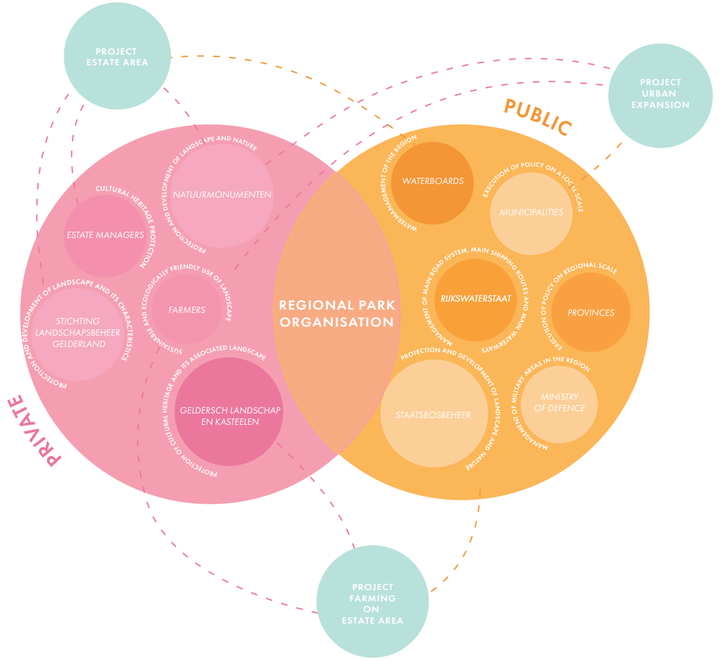


Figure 109. The regional park organisation will work together with both public as well as private partners.

WRAPPING UP

06

In this final chapter, the discussion and conclusion are presented.

6.1 DISCUSSION

In this research project, a spatial landscape architectural concept of a Regional Landscape Park is introduced to the city triangle region, structured around ecological, climate-adaptive, and recreational layers, informed by thorough contextual and historical research.

Ethical consideration

At the foundation of this thesis lies a pressing ethical question: how long can society afford to treat the natural world as merely a backdrop to human life? The Anthropocene compels us to confront the consequences of neglecting a deep interdependence with natural systems. This research is grounded in the conviction that landscapes should be approached as equal partners, shaping and directing the way environments are designed and inhabited.

A central ambition of the design is to restore a more equitable relationship between people and the landscape. This perspective aligns with an environmental ethical framework, which recognises the inherent worth of ecosystems and non-human life beyond their utility for humans. For example, rather than viewing agriculture and ecology as mutually exclusive, this project seeks common ground by facilitating partnerships between farmers, communities, and nature through shared stewardship and voluntary transitions toward nature-inclusive practices. Economic incentives, such as payments for ecosystem services, are considered as practical instruments to support these transitions.

The Regional Landscape Park serves both as a spatial and ethical framework, providing structure while foregrounding important values. Throughout the process, the project navigates complex tensions between economic interests, societal needs, and ecological integrity, striving for a design guided by fairness, honesty, and resilience. While the design cannot resolve every conflict, it aspires to demonstrate how an inclusive, landscape-driven approach can move society toward a future where people, landscape, and nature coexist in a truly integrated way.

Implementable and inspiring

While the design and research are tailored to the Stedendriehoek region, the insights and strategies have broader relevance. The layered framework of the Regional Landscape Park, combining ecology, climate adaptivity, and recreation and identity, offers a versatile structure that can inspire and inform the spatial development of other urbanised or urbanising regions facing similar challenges. On a practical level, the strategies and principles can be utilised by provincial governments, municipalities, water authorities, and other key actors as they work to implement climate-resilient, biodiversity-friendly, and sustainable development objectives. For future applicability to other regions, it would be helpful if more principles are gathered and modified. The design approach and methods outlined in this research can support the drafting of regional vision documents, landscape frameworks, or policy recommendations. Additionally, the thesis contributes to a broader understanding of landscape-led urbanisation strategies. This thesis underlines the central role that landscape architecture can play in steering urbanisation, particularly in transitional landscapes at the interface of urban and rural life. Ultimately, this work contributes to the expanding discourse that frames the landscape as an active, structuring, and inherently meaningful participant in the formation of future living environments.

Reading to writing

The research process was structured as an iterative cycle of understanding, identifying, designing, and reflecting, providing clarity throughout changing stages of focus. Each step was guided by the spatial logic of the landscape.

The project used key theoretical frameworks such as landscape-based regional design and the landscape as a long-term structure, to form the foundation of the research and design approach. These theories enabled a view of the landscape not just as a static background or resource, but as a guiding and evolving system capable of shaping urbanisation in more resilient and meaningful ways. The spatial concept of the Regional Landscape Park was explored as a strategy synthesising these theoretical lenses, which ultimately helped to derive general components that could guide the regional analysis.

During the region analysis of these components, both regional scale relationships and local specificities were considered, such as cultural-historical elements and valuable ecological places in the region. This, together with the availability of a rich variety of datasets ensured an ample base for a deep understanding of the region. Additionally, with the gather information, challenges and opportunities related to the components could be derived, and a structure map could be made.

Relying solely on spatial and digital data proved insufficient for understanding the experiential quality and atmosphere of the landscape. To overcome this, three days of fieldwork were conducted, with observations and important elements of the landscape documented through photographs. Unfortunately, one of the historic mills at Eerbeek was being restored during my field visit and the other, which is a historic papermill, was closed. Therefore, the paper mill was visited later on seperately, in order to include it in the analysis. Even though many cultural elements were known to me as a Dutch person, these visits proved invaluable for assessing the feel and accessibility of the area and understanding what cultural historical elements such as estate landscapes, 'sprengen', raised streams and water mills truly encompassed. However, further fieldwork during wetter seasons would have provided a more complete understanding of seasonal landscape dynamics, particularly in areas prone to flooding or with high ecological variability.

Furthermore, a challenge during this project was gaining accurate insight into the hydrological dynamics of the area. The local water situation is influenced by a complex interplay of geological, ecological, and human factors, making it difficult to determine precise conditions. Additionally, because of a lacking familiarity with the natural water dynamics in the Netherlands, it proved challenging to understand what was natural and what was human-influenced. To address this, multiple sources such as historical, height and soil maps, data from the BRO loket, and insights from an expert consultation with and provided sections of streams in the zoom-in location provided by Waterboard Vallei & Veluwe were combined to form the most informed interpretation and predictions possible.

Lastly, the third field visit proved crucial for identifying missing information, as signage for routes such as 'Klompenpaden' revealed routes not captured in digital datasets. Since different route types (such as walking, cycling, and canoeing) are managed by various organisations, comprehensive data is difficult to access. This challenge was mitigated earlier in the research by reaching out to the team behind the Routedatabank, who collect routing data across networks. However, because these lacking routes in the dataset were discovered late in the design process, unfortunately due to the limiting time they could not be included in the recreation map. Despite having tried to contact possible owners of the dataset, they could not be retrieved in time.

Although these challenges posed certain limitations, the integrated use of theory, spatial data, and field-based insights enabled a comprehensive understanding of the Stedendriehoek region. With this understanding, a structural map and an opportunity and challenges analysis map could be created. With future research into the wishes of local residents, the design can be improved into an even more locally embedded park.

The research process then proceeded with precedent studies. To ensure the approach was grounded in practice, existing Regional Landscape Parks such as the Rhein-Main and Emscher examples were analysed. These cases provided insight into recurring themes and design principles. The recurring themes, the theoretical framework of the Regional Landscape Park, and the main challenges identified for each component were subsequently translated into the three main layers of the Regional Landscape Park: ecology, climate adaptivity, and recreation and identity.

In addition, the design plan of the Dander Valley was studied, given its similar water management context. This reference informed strategies to restore the water cycle in the project area through spatial interventions. The Dander Valley case offered valuable design principles for landscape-based climate adaptation, which were integrated into the climate-adaptive layer of the park.

The extensive research into the current state of the region's components and its history ensured that the design principles could then be applied in a context-sensitive way to both the regional and zoom-in design locations. However, by defining who the main park users are and what their needs are, their needs could be verwerkt worden in the design of the relevant layers. The needs of farmers and urban residents had implications for the recreational/identity layer, and the needs of the animals for the ecological layer. Unfortunately, when researching the

preferences of the red deer specie, not enough information could be found about the connectors between the knots to ensure a working corridor. Therefore, future research could further examine the design of the corridor for the red deer, to guarantee that it better suits the requirements of the specie.

During designing, the same strategy layers were applied at multiple levels, ensuring coherence and continuity between macro and micro interventions. Regional reading informed the overall structure and direction, while site-specific design provided spatial and material form to these ambitions, ensuring that landscape interventions respond directly to local conditions such as soil types, water tables, vegetation patterns, and human use. However, for the zoom-in locations, greater input from experts on local ecology and water management would have allowed for even more realistic visualisations of site potentials.

Interdisciplinary topic

The Regional Landscape Park considers larger systems such as ecological connections and restoration of the regional water cycle, as well as local, spatial interventions and their mutual influences. Processes are also considered, as the framework is designed to be a future-proof, long-term carrier for landscape development while enabling and facilitating both short-term and future developments. The Regional Landscape Park also prioritises experience and palimpsest. Research into historical local qualities, uses, and older patterns in the landscape enables reactivation. Ultimately, these themes are brought together in the ambition to let people experience the landscape with its processes, palimpsest, and scale continuum.

Because of its multifaceted character, the Regional Landscape Park topic is interdisciplinary. For example, central to the park's design

is the consideration of new harmonious landscape-based urban developments added to the north and south sides of Apeldoorn and the existing agglomerations of the city triangle region. These developments are guided by a resilient and adaptive spatial landscape architectural framework of multifunctional greenspaces that include combinations of agriculture, nature development, and recreation. Another overlap is found with the Architectural track. The Regional Landscape Park concept regards historic buildings as valuable cultural-historical components of the park. This encourages protection of the Dutch architectural identity and the historical architectural style of old farmhouses, estates, and mills. Additionally, when functionality is lost and there is potential for multifunctionality, these buildings are given recreational functions that need careful integration with existing architecture, requiring careful management from the Management in the Built Environment track. Conclusively, this graduation topic relates not only to central themes of the Landscape Architectural track but also to the broader design challenges of the master programme MSc AUBS.

Findings

This thesis set out to explore the spatial concept of a Regional Landscape Park in the city triangle region as a strategy for shifting from a dominant relationship with nature toward a more harmonious coexistence, one in which the landscape guides our actions and ways of living while supporting sustainable urbanisation. Central to this exploration is the main research question: how can a Regional Landscape Park in the Stedendriehoek area, situated between the Veluwe and the IJssel, be utilised to protect and develop nature and landscape, raise awareness, and guide urban growth? The following sections address this question by responding to four sub-questions that structure the findings and conclusions of this research.

What are the components of a Regional Landscape Park and what is the current state of those components in the landscape system of the Veluwe, IJsselvalley and IJssel?

The city triangle region is defined by its unique position between the high, sandy moraine of the Veluwe and the low, wet IJsselvalley. Historically, the area had a distinctly wet character, shaped by seepage from the moraine and frequent flooding from the IJssel river. However, agricultural expansion and artificial drainage have obscured this wet identity, resulting in lowered groundwater levels, increased drought damage in natural areas, water pollution, and a reduction in the region's characteristic habitats. Contemporary water management struggles to balance agricultural needs, flood prevention, and nature conservation, leading to both drought visible in occasional low river and stream water levels and water surpluses as well as mounting pressure on the dike and drainage systems.
Centuries of human intervention have left a rich cultural and historical imprint on the landscape, visible in its estate landscapes, stream valleys, settlement, and cultivation patterns. Despite this, much of the region's cultural heritage and local identity remain underappreciated or disconnected from everyday experience. Urbanisation, land use intensification, and the expansion of large-scale agriculture have further contributed to habitat loss, biodiversity decline, and a lack of meaningful connection to the landscape's history.

Recreation in the city triangle is largely focused on the Veluwe and IJssel, but increasing urbanisation and a renewed interest in rural experiences have heightened recreational pressures. The Veluwe faces challenges from overuse, threatening its ecological balance, while the IJsselvalley suffers from limited public access with lacking recreational infrastructures and. The result is a growing need for better connected networks and more sustainable recreation that harmonises with both

agricultural practices and the natural environment.

The urbanisation of the city triangle region, defined by Apeldoorn, Deventer, and Zutphen, has historically evolved from compact village centers and ribbon shaped settlements along higher landscape lines, expanding over time to include lower, wetter areas due to housing pressures. This shift has resulted in the gradual transformation of agricultural fields and a more dispersed rural living preference, especially on the Veluwe flank. City growth patterns, mapped at regular intervals, reveal the changing shapes and densities of urban cores, with boundaries that remain somewhat approximate due to the complex nature of historical development. The spatial structure of the region is further defined by a network of roads and railways, where curving routes often follow natural landscape features, and planned routes create straighter connections between urban centers. These evolving urban and infrastructural patterns highlight the ongoing tension between expansion, landscape and nature protection, and the need for careful spatial planning.

The analysis of urban edges in the city triangle region reveals that boundaries between urban areas and the surrounding landscape are often ambiguous, with few locations offering meaningful physical or visual interaction. Access to the landscape is limited by private land use, infrastructure, and barriers such as dense vegetation or fencing, resulting in scarce recreational entry points and mostly passive visual connections. Pedestrian access is particularly limited, as most available paths cater to cyclists or vehicles, leading to informal footpaths being created by walkers. In many cases, city and village edges turn inward or are obstructed, further reducing engagement with adjacent landscapes. However, there are examples where urban areas blend more actively with the landscape, especially when design incorporates local characteristic elements. Overall, a key challenge remains the lack

of city landscape interaction and insufficient opportunities for recreation at the urban edge.

What are design strategies and principles for the components of a Regional Landscape Park?

Precedent studies of other Regional Landscape Parks, as well as a reference project dealing with similar water management challenges, provided a foundation for developing the design principles and design strategy in this thesis. These case studies reveal that the spatial concept of a Regional Landscape Park is inherently flexible and can be tailored to different contexts. Yet, they consistently share certain core characteristics: they are multifunctional, protected landscapes that serve as frameworks for sustainable regional development by integrating ecological, economic, and social objectives.

Regional Landscape Parks demonstrate a unique capacity to bridge the interests of people and nature. Through thoughtful planning, they can offer a pathway toward a more sustainable, respectful, and cooperative relationship with the natural environment, one in which both human and ecological needs can be met. From the precedent studies, several recurring themes emerged, including environmental education, landscape and nature conservation, accessibility, climate adaptivity, cultural-historical identity, housing development, sustainable agriculture, and opportunities for leisure and tourism.

Building on these recurring themes, the theoretical framework of the Regional Landscape Park, and the main challenges identified for each component, three key strategy layers are proposed for the city triangle region. These layers form the backbone of the design approach developed in this thesis:

1. *Ecological layer*
Establishing robust ecological connections between the Veluwe and the IJssel, encompassing both protected nature reserves and nature-inclusive extensive agriculture, together creating a mosaic of diverse habitats.

2. *Climate-adaptive layer*
Restoring and reinforcing the water cycle of the Veluwe, IJsselvalley, and IJssel, thereby increasing the region's resilience to future climate challenges such as drought and extreme precipitation.

3. *Recreational and identity layer*
Developing an interconnected recreational network that links smaller settlements within the IJsselvalley and provides access to the landscape's diversity. Urban growth is guided by landscape-based principles, with new development focused on small-scale expansions at existing agglomerations and landscape-led growth north and south of Apeldoorn.

How can we apply the design strategies and principles in city triangle region to create a Regional Landscape Park that protects and develops nature and landscape, increases awareness and guides urban growth?

Applying the derived design strategies and principles in the city triangle region involves an integrative and layered approach that fully embraces the diversity of the landscape. The Regional Landscape Park is envisioned as a living framework where ecological connections, climate adaptation measures, and recreational and identity values are not only protected, but also developed and made tangible for visitors and inhabitants alike. The design is centred around three main types of users: farmers, urban villagers, and fauna. For fauna, the concept is based on ambassador species, focusing on the badger in the drier, small-scale agricultural and woody areas of the landscape, the ide for the flowing water structures, the black-tailed godwit for open agricultural land, the partridge for arable farming areas, and the otter as a key species for marshland and seepage nature conservation areas.

The park design deliberately focuses on fostering meaningful interaction with the landscape, whether by experiencing the seasonal dynamics of wetter periods in the lower lying natural and agricultural areas, picking fruit in orchards, enjoying refreshments in orchard gardens, or taking part in guided tours that reveal the richness of food forests and the ecological vitality of flower rich hayfields. Careful spatial zoning ensures that each area's capacity for recreation is respected, with zones designated according to their resilience and sensitivity. This allows for both vibrant, accessible destinations and quieter, protected natural spaces.

New urban developments are not imposed on the landscape, but are carefully integrated through landscape based expansions and multifunctional green spaces. Restored water systems, nature inclusive agricultural practices, and enhanced recreational infrastructure serve to reconnect fragmented habitats, support biodiversity, and provide accessible and immersive landscape experiences. In this way, the Regional Landscape Park becomes both a framework for protecting and enhancing ecological and cultural values and a catalyst for more resilient, adaptive, and sustainable urban growth in the city triangle region, where the everyday experience of nature and landscape is both valued and accessible.

What can we learn from this research?

The key lesson emerging from this research is the value of a landscape-centered approach for future spatial development. Integrating ecological, climate-adaptive, and recreational layers within a Regional Landscape Park framework enables a more nuanced and resilient response to the complex challenges of urbanisation and environmental change. By approaching landscapes as equal partners and combining site-specific knowledge, theory, and practical precedent, the research demonstrates that spatial planning can foster meaningful connections between people and nature, balance diverse interests, and inspire a broader shift toward sustainable, adaptive living environments. Ultimately, this project highlights the crucial role that landscape architecture can play, not only in local spatial development, but also in shaping the broader discourse and practice of sustainable urbanisation.

Limitations

In practice, the development of a design involves a collaborative process in which plans are created together with others. Stakeholder engagement is essential to incorporate more direct input from local communities, policymakers, and ecologists. In this research, specialist knowledge was not included to the full extent it could have been. Nonetheless, a reliable outcome was achieved by applying validation mechanisms such as consulting experts, conducting source-based research, reviewing relevant literature, and using design principles derived from precedent studies. However, the design has not been subjected to a peer review process. Ideally, this should be done through methods such as surveys, interviews, or workshops, which would help refine the proposal and ensure it aligns more closely with local needs and expectations.

6.2 CONCLUSION

This thesis explores the spatial concept of a Regional Landscape Park as a landscape centered approach to living, one that reconnects people with nature and fosters a more harmonious coexistence between humans and nonhumans, as was once common in the past. In response to growing urbanisation pressure, it shows how landscape architecture can guide spatial development while strengthening ecological systems, cultural continuity, and climate resilience.

By translating thorough regional analysis into three design layers: ecology, climate adaptivity, and recreation and identity, the park becomes both a spatial and ethical framework. It protects and develops landscape and nature, encourages shared stewardship, and restores the experiential and cultural ties between communities and their environment.

The Regional Landscape Park provides a practical, flexible structure for sustainable regional planning. While designed for the City Triangle region, the insights and principles are transferable to other urbanising landscapes. The thesis also contributes academically by positioning the landscape not as a passive backdrop, but as an active, structuring force capable of guiding urbanisation through a long term, inclusive and adaptive design approach.



Figure 110. Bird-eye view on the City Triangle Mosaic Park.

6.3 REFERENCES

AlleCijfers. (n.d.-a). *Woonplaats Deventer*. AlleCijfers.nl. https://allecijfers.nl/woonplaats/deventer/

AlleCijfers. (n.d.-b). *Woonplaats Zutphen*. AlleCijfers.nl. https://allecijfers.nl/woonplaats/zutphen/

AlleCijfers. (n.d.-c). *Woonplaats Apeldoorn*. AlleCijfers.nl. https://allecijfers.nl/woonplaats/apeldoorn/

ARK Rewilding Nederland. (n.d.-a). Edelhert. Retrieved February 17, 2025, from https://arkrewilding.nl/diersoorten/edelhert

Barbosa, O., Tratalos, J. A., Armsworth, P. R., Davies, R. G., Fuller, R. A., Johnson, P., & Gaston, K. J. (2007). Who benefits from access to green space? A case study from Sheffield, UK. *Landscape and Urban planning, 83*(2-3), 187-195.

BIJ12. (n.d.). *N05-01 Moeras*. https://www.bij12.nl/onderwerp/natuursubsidies/index-natuur-en-landschap/natuurtypen/n05-moerassen/n05-01-moeras/

Bleumink, H., & Neefjes, J. (2021). De Veluwe. *Landschapsbiografie van Nederlands grootste natuurgebied*. Blauwdruk. Wageningen.

Boerennatuur. (n.d.). Keverbanken: Wat, waarom en hoe? https://www.boerennatuur.be/keverbanken-wat-waarom-en-hoe/

Boogert, D. A., & Schalk, J. (n.d.). *Inrichting in vorm*. Dienst Landinrichting en Beheer Landbouwgronden.

Bush, G. W. (2001, May 30). *Remarks by the President at Sequoia National Park: Giant Forest Museum, Sequoia National Park, California* [Speech transcript]. The White House, Office of the Press Secretary. https://georgewbush-whitehouse.archives.gov/news/releases/2001/05/20010530-1.html

Cambridge Dictionary. (n.d.-a). Adaptive. In Cambridge Dictionary. Retrieved April 28, 2025, from https://dictionary.cambridge.org/dictionary/english/adaptive

Cambridge Dictionary. (n.d.-b). Mosaic. In Cambridge Dictionary. Retrieved January, 3, 2025 from https://dictionary.cambridge.org/dictionary/english/mosaic?q=MOSAIC

CLUSTER landschap & stedenbouw, SWECO België, Universiteit Antwerpen (2021). De Droge Delta. Ruimtelijke hefbomen in de strijd tegen waterschaarste.

Cook, E. A., & Van Lier, H. N. (1994). Landscape planning and ecological networks: an introduction. In *Landscape planning and ecological networks, 6F* (pp. 1-11). Elsevier.

Corboz, A. (1983). The land as palimpsest. *Diogenes, 31*(121), 12-34.

Crutzen, P. & Stoermer, E. (2000, May). The Anthropocene. *Global Change News Latter*, The International Geosphere–Biosphere Programme (IGBP) (41st edition), 17-18

Cultuurland Advies. (2020). *Toekomst voor het sprengenbekenlandschap: nieuw zicht op functies*. Stichting tot Behoud van de Veluwse Sprengen en Beken.

Decleer, K., Wouters, J., Jacobs, S., Staes, J., Spanhove, T., Meire, P., & van Diggelen, R. (2016). Mapping wetland loss and restoration potential in Flanders (Belgium) an ecosystem service perspective. *Ecology and Society, 21*(4).

Denkinger, K., Köster, U., Liesen, J., Risthaus, K., Ritchie, C. (2017). *Living Landscapes*. Verband Deutscher Naturparke e.V.. https://www.european-parks.org/downloads/living-landscapes.pdf#page=13

Di Giulio, M., Holderegger, R., & Tobias, S. (2009). Effects of habitat and landscape fragmentation on humans and biodiversity in densely populated landscapes. *Journal of environmental management*, 90(10), 2959-2968.

Dictionary.com. (n.d-a). Anthropocene. In Dictionary.com. Retrieved April 29, 2025, from https://www.dictionary.com/browse/anthropocene

Dictionary.com. (n.d-b). Biodiversity. In Dictionary.com. Retrieved April 29, 2025, from https://www.dictionary.com/browse/biodiversity

Dictionary.com. (n.d-c). Dominance. In Dictionary.com online dictionary. Retrieved April 29, 2025, from https://www.dictionary.com/browse/dominance

Dictionary.com. (n.d-d). Equal. In Dictionary.com online dictionary. Retrieved April 29, 2025, from https://www.dictionary.com/browse/equal

Dictionary.com. (n.d-e). Patchwork. In Dictionary.com dictionary. Retrieved April 29, 2025, from https://www.dictionary.com/browse/patchwork

Drenthen, M. (2018). *Natuur in mensenland. Essays over ons nieuwe cultuurlandschappen*. Zeist: KNNV Uitgeverij.

Ecologische Autoriteit. (2024, November 11). *Biodiversity in the agricultural landscape*. Retrieved February 20, 2025, from https://www.ecologischeautoriteit.nl/actueel/nieuws/biodiversiteit-in-het-agrarische-landschap.

Elders, V. G. (2023). Advies modellen ecologische verbindingszones, Provincie Gelderland (Rapport 2023.38). Zoogdiervereniging. https://www.zoogdiervereniging.nl/~zoogdier/sites/default/files/2024-04/2023.38_advies_modellen_ecologische_verbindingszones_provincie_gelderland_definitief.pdf

European Community. (2001). *New methods of socially compatible development of urban landscapes: Final report of the Interreg IIC project "New urban landscapes"*. European Community. https://www.academia.edu/37008736/new_methods_of_socially_compatible_development_of_urban_landscapes

European Environment Agency. (2022, June 29). Landscape fragmentation pressure in Europe. In European Environment Agency. Retrieved April 29, 2025, from https://www.eea.europa.eu/en/analysis/indicators/landscape-fragmentation-pressure-in-europe

European Environment Agency (EEA). (n.d.-a). *A flood and heat proof green Emscher valley, Germany*. Climate-ADAPT. https://climate-adapt.eea.europa.eu/en/metadata/case-studies/a-flood-and-heat-proof-green-emscher-valley-germany/11305605.pdf/@@download/file

European Environment Agency (EEA). (n.d.-b). *The Emscher restoration story*. Climate-ADAPT. https://climate-adapt.eea.europa.eu/en/mission/solutions/mission-stories/the-emscher-restoration-story19

Fischer, J., & Lindenmayer, D. B. (2007). Landscape modification and habitat fragmentation: a synthesis. *_Global ecology and biogeography*, 16(3), 265-280.

Forman, R. T. (1995). *Land Mosaics: The Ecology of Landscapes and Regions* (Vol. 652). Cambridge University Press.

Gailing, L. (2007). Regional parks: Development strategies and intermunicipal cooperation for the urban landscape. *German Journal of Urban Studies*, 46(1), 68-84.

Gebiedsoverleg Rottemeren. (2022). *Vergaderstukken 2022* [Meeting documents]. https://rottemeren.mett.nl/vergaderingen/vergaderstukken+2022/HandlerDownloadFiles.ashx?idnv=2372405

Gemeente Epe, Gemeente Heerde, & Gemeente Voorst. (2009). *Landschapsontwikkelingsplan van Veluwe tot IJssel: Inspraakversie augustus 2009*

Gemeente Overbetuwe. (2013, June 19). *Bestemmingsplan Park Lingezegen*. Retrieved April 19, 2025, from https://www.planviewer.nl/imro/files/NL.IMRO.1734.0020BUITparklingez-ONHE/t_NL.IMRO.1734.0020BUITparklingez-ONHE_index.pdf

Groot Bruinderink, G. W. T. A. (2006). Robuuste ecologische verbindingen tussen de Veluwe en het Ketelwald: kansen voor nieuwe leefgebieden van edelherten. *Natuurhistorisch Maandblad, 95*(5), 111-115.

Groot Bruinderink, G. W. T. A., Lammertsma, D. R., Kuiters, A. T., Griffioen, A. J., & Kuipers, H. (2005). *Edelherten in de Gelderse Poort: Haalbaarheidsstudie* (Alterra-rapport 1153). Alterra, Wageningen UR. https://edepot.wur.nl/42673

Hermans, M. (2023). Patchwork IBA Parkstad [Sneak Preview]. nai010 uitgevers. https://mcusercontent.com/bed560cc8c4d1217a15d227a4/files/d43c849e-5c1b-fd9f-192c-8ce5f17876b4/Sneak_Preview_NL_Patchwork_IBA_Parkstad.01.pdf

Hilpert, B. (2011). *Regional park panorama* [Map]. https://www.unit-design.ch/en/projekte/regionalpark-rhein-main-panorama.php

IPO & LNV. (2023). *Negende Voortgangsrapportage Natuur*. Gloedcommunicatie. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/136422/White-Paper-Caring-for-our-future-reforming-care-and-support-PDF-1580K.pdf

Kemper, D., & Pölling, B. (2016, November). Chapter Eighteen Twenty-five Years of the Emscher Regional Landscape Park: Evaluation and Perspectives. In *Agriculture in an Urbanizing Society Volume One: Proceedings of the Sixth AESOP Conference on Sustainable Food Planning* (p. 405). Cambridge Scholars Publishing.

Klimaat Vallei & Veluwe (n.d.). *Grondwatersysteem van de Veluwe*. Retrieved March 28, from https://klimaatvalleienveluwe.nl/wp-content/uploads/2023/10/Grondwatersysteem-van-de-Veluwe.pdf

Kobussen, M. (2013, April 3). *Enkwal in het Loenense bos weer te herkennen*. https://www.regiobodeonline.nl/2013/04/03-04-2013-13-08-loenen-enkwal-in-het-loenense-bos-weer-te-herkennen/

Köster, U., Denkinger, K., Liesen, J., Risthaus, K., & Ritchie, C. (2017). *Landscapes: Europe's nature, regional, and landscape parks – Model regions for the sustainable development of rural areas*. Verband Deutscher Naturparke e. V. (VDN). https://www.european-parks.org/downloads/living-landscapes.pdf

Kühn, M. 2003. Greenbelt and Greenheart, separating and integrating landscape in European city regions. *Landscape and Urban Planning*, 64; 19-27.

Labo Ruimte, & Vlaamse Overheid. (2023). *De Droge Delta*. Departement Omgeving, Vlaamse Overheid. https://www.vlaamsbouwmeester.be/sites/default/files/2024-10/LABO_RUIMTE_Publicatie%20De%20Droge%20Delta_web.pdf

Lahr, J., Jagers op Akkerhuis, G. A. J. M., Booij, C. J. H., Lammertsma, D. R., & van der Pol, J. J. C. (2005). *Bepaling van het belang van het agrarisch gebied voor de biodiversiteit in Nederland: Een haalbaarheidsstudie* (Alterra-rapport 1139). Wageningen: Alterra, Wageningen UR. https://edepot.wur.nl/35332

LAMA Landscape architects. (2023). *Labo Ruimte "De Droge Delta"*. http://www.la-maland.eu/projects/labo-ruimte-de-droge-delta/

Lauesen, L. M. (2013). Natural environment. In Idowu, S. O., Capaldi, N., Zu, L., & Gupta, A. D. (Eds.), Encyclopedia of corporate social responsibility. Springer. https://doi-org.tudelft.idm.oclc.org/10.1007/978-3-642-28036-8_368

Macdonald, S., Monstadt, J., & Friendly, A. (2021). From the Frankfurt greenbelt to the

Regionalpark RheinMain: An institutional perspective on regional greenbelt governance. *European Planning Studies, 29*(1), 142–162. https://doi.org/10.1080/09654313.2020.1724268

Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, Provincie Gelderland, & Regio Stedendriehoek. (n.d.). Regionale woondeal 2022-2030: Regio Stedendriehoek Provincie Gelderland. In *media.gelderland.nl*. Regio Stedendriehoek. https://media.gelderland.nl/TG_270223_Regio_Stedendriehoek_Woondeal_70ee12e760.pdf

Ministerie van Volkshuisvesting en Ruimtelijke Ordening. (2024). Kerncijfers woningbouw. https://datawonen.nl/mosaic/dashboard/kerncijfers-woningbouw.

Natuurlijk Boeren. (n.d.). Vogelbeheer. https://www.natuurlijkboeren.nl/vogelbeheer

Natuurmonumenten. (n.d.-a). *Droogte* [Photograph]. https://www.natuurmonumenten.nl/standpunten/droogte

Nijhuis, S., & de Vries, J. (2019). Design as research in landscape architecture. *Landscape journal, 38*(1-2), 87-103.

Nijhuis, S. (2024). *Landscape Logic*. Jap Sam Books.

Nijhuis, S. (2022) Landscape-Based Urbanism: Cultivating Urban Landscapes Through Design. In: Roggema, R. (eds) *Design for Regenerative Cities and Landscapes. Contemporary Urban Design Thinking*, 249–277, Springer Nature. https://doi.org/10.1007/978-3-030-97023-9_11

Nijhuis, S. (2007). Regional parks in metropolitan planning. In *The European tradition in urbanism and its future* (pp. 12-18). IFoU.

Park Lingezegen. (2020). *Recreatiekaart 2020* [Map]. https://parklingezegen.nl/wp-content/uploads/2020/06/Downloadversie-Recreatiekaart-2020-Park-Lingezegen-voor-en-achterzijde.pdf

PBL. (2016, 30 May). *Projection of population growth and decline per municipality.* https://www.pbl.nl/en/publications/cities-in-the-netherlands

Planbureau voor de Leefomgeving. (2020). Grondeigendom 2020 [Map]. Atlas Regio. https://themasites.pbl.nl/atlas-regio/kaarten/index.php?config=2a60372e-6812-4e14-b228-c90805a6eea9&activeTools=layercollection%2Csearch%2Cinfo%2Cbookmark%2Cmeasure%2Cdraw&activateOnStart=layercollection&use=piwiksectorcode&gm-x=149412.7786078207&gm-y=467389.8893039105&gm-z=4&gm-b=1595921285002%2Ctrue%2C1%3B1647261241752%2Ctrue%2C0.8

Post, M. (2025). *Vreugderijkerwaard* [Photograph]. Natuurgebied in Beeld. https://www.natuurgebiedinbeeld.nl/natuurgebied/overijssel/ijsselvallei/vreugderijkerwaard/

Pungetti, G. (2012). Sacred species and sites: dichotomies, concepts and new directions in biocultural diversity conservation. *Sacred species and sites: advances in biocultural conservation*, 13-27.

Reid, W. V., Mooney, H. A., Cropper, A., Capistrano, D., Carpenter, S. R., Chopra, K., Dasgupta, P., Dietz, T., Duraiappah, A. K., Hassan, R., Kasperson, R., Leemans, R., May, R. M., McMichael, A. J., Pingali, P., Samper, C., Scholes, R., Watson, R. T., Zakri, A. H., … Zurek, M. B. (2005). *Ecosystems and human well-being—Synthesis: A report of the Millennium Ecosystem Assessment*. Island Press.

Rijksoverheid. (2024, November 12). *Start verstedelijkingsstrategie in Stedendriehoek, Twente en Limburg-Centraal* [*Start of urbanization strategy in Stedendriehoek, Twente, and Central Limburg*]. Rijksoverheid. https://www.rijksoverheid.nl/actueel/nieuws/2024/11/12/start-verstedelijkingsstrategie-in-stedendriehoek-twente-en-limburg-centraal

Rooijakkers, G. 1999. Het leven van alledag benoemen. Cultureel erfgoed tussen ondernemerschap en nieuwe technologie. *Boekmancahier*, 41; 275-290.

Rotteprogramma. (2021, August). *Workshop 5 Notitie Rottemeren – Ecologisch kruispunt van de Zuidelijke Randstad*. https://derotte.nl/wp-content/uploads/2021/08/Workshop-5-Notitie-Rottemeren-–-Ecologisch-Kruispunt-van-de-Zuidelijke-Randstad.pdf

Samuels, M. S. (1979). The biography of landscape: cause and culpability. *The interpretation of ordinary landscapes*, 51, 88.

Sanmia Drone. (2022, October 11). *Drone Video | 4K UHD*, [Video]. YouTube. https://www.youtube.com/watch?v=67AfhXB_STI

Sauer, C. (2008). The morphology of landscape. In *The cultural geography reader* (pp. 108-116). Routledge.

Scholten, R. (2017). *Geschiedenis van het Apeldoorns Kanaal. Verleden, heden en toekomst van een koninklijke waterweg*. Uitgeverij Gelderland, Epe.

Sijmons, D. (2022, March 28). Het debatklimaat in de ontwerpwereld. Archined.Nl. https://www.archined.nl/2022/03/het-debatklimaat-in-de-ontwerpwereld/

Skitterians, R., & Skitterians, P. (n.d.). *Aerial, Netherlands* [Photograph]. Pixabay. https://pixabay.com/photos/aerial-netherlands-europe-dutch-2165705/

STONE Steenuilenoverleg Nederland. (n.d.). Leefgebied. Retrieved March 15, 2025, from https://www.steenuil.nl/steenuil/leefgebied

Storms-Smeets, E. A. C., Nijhuis, S., & Thissen, P. (2023). *Resilient estate landscapes Gelderland.: Past, present, future*. Jap Sam Books.

Tress, G., B. Tress, B. Harms, P. Smeets, A. van der Valk (eds). 2003. *Planning Metropolitan Landscapes - Concepts, Demands, Approaches*. Wageningen, Alterra. Delta series 4.

Tummers, L.J.M., J.M. Tummers-Zuurmond. 1997. *Het Land in de Stad. De stedebouw van de grote Agglomeratie*. Bussum, Uitgeverij THOTH.

Urban Green-Blue Grids. (n.d.). *Landscape Park Duisburg-Nord*. https://urbangreenbluegrids.com/projects/landscape-park-duisburg-nord/
Wageningen University & Research. (n.d.). *Ecologie en gebruik van bossen*. Wageningen University & Research. Retrieved from https://biomassmurder.org/docs/1983-00-00-wageningen-university-and-research-ecologie-en-gebruik-van-bossen-dutch.pdf

Ward, B. (2003). Only one Earth, Stockholm 1972. In E. Fearn & D. Hulme (Eds.), Evidence for hope (1st ed., p. 7). Routledge. https://doi.org/10.4324/9781849771276
Ward-Thompson, C. 2002. Greenbelt and Greenheart separating and integrating landscape in European city regions. *Landscape and Urban Planning*, 60; 59-72.

Wei, L. (2017). *Multifunctionality of urban green space –an analytical framework and the case studyof Greenbelt in Frankfurt am Main, Germany* (Doctoral dissertation). Technische Universität Darmstadt, Darmstadt.

Whittlesey, D. (1929). Sequent occupance. *Annals of the association of American Geographers, 19*(3), 162-165.

Wolschke-Bulmahn, J. 2001. *Places of Commemoration. Search for identity and landscape design*. Washington, Dumbarton Oaks Trustees for Harvard University. Dumbarton Oaks Colloquium on the History of Landscape Architecture vol. XXIX

Wustmans, A. (2016). *Culture, landscape, transformation: From the limits of the open sewer to the New Emscher Valley*. Environment & Society Portal, Arcadia, 2016(18). Rachel Carson Center for Environment and Society. https://www.environmentandsociety.

org/arcadia/culture-landscape-transformation-limits-open-sewer-new-emscher-valley

Yokohari, M., Murakami, A., Hara, Y., & Tsuchiya, K. (Eds.). (2017). *Sustainable landscape planning in selected urban regions.* Springer Japan. https://link-springer-com.tudelft.idm.oclc.org/book/10.1007/978-4-431-56445-4

Zalasiewicz*, J., Williams, M., Steffen, W., & Crutzen, P. (2010). The new world of the Anthropocene.

Photo collections

[1] Photograph from estate house, by Bezoek Voorst. (n.d.), https://www.bezoekvoorst.nl

[2] Photographs from Vreugderijkerwaard, by Post, 2025, https://www.natuurgebiedin-beeld.nl/natuurgebied/overijssel/ijsselvallei/vreugderijkerwaard/

[3] Photographs from Bijzondere vegetatie op de dijk by Hier in Salland, 2019, https://hierinsalland.nl/ivn-hou-rekening-met-de-bijzondere-vegetatie-op-de-dijk/

[4] Photograph from Millingerwaard by J. Kaptein, n.d., https://www.nationalgeographic.nl/fotografie/2018/09/in-beeld-de-millingerwaard-uniek-natuurgebied-in-nederland

[5] Photograph from Millingerwaard by K3Delta, 2023, https://www.k3.nl/sites/default/files/2023-12/Projectboek%20Millingerwaard.pdf

[6] Photograph from Millingerwaard by ARK Rewilding Nederland, n.d.-b, https://arkrewilding.nl/millingerwaard

[7] Photographs from Moeras, OBN Natuurkennis, n.d.-b, https://natuurkennis.nl/beheer-typen/n06-voedselarme-venen-en-vochtige-heiden/n06-03-hoogveen/

[8] Photograph from Hoogveen, Ecopedia, n.d., https://www.ecopedia.be/natuurstreef-beeld/natuurstreefbeeld-aangetast-hoogveen-waar-herstel-nog-mogelijk-7120

[9] Photograph from rietmoeras, Het Zeeuwse Landschap, n.d., https://www.hetzeeuwse-landschap.nl/natuurgebieden/bruintjeskreek

[10] Photograph from Bergse Bossen, F. Cornelissen, n.d., https://www.zuidhollandsland-schap.nl/routes/wandelroute/bergse-bossen

[11] Photograph from Bergse Bossen, Zuid-Hollands Landschap, n.d., https://www.zuidhol-landslandschap.nl/routes/wandelroute/bergse-bossen

[12] Photographs from Lansingerland Lage Bergse Bos, HOSPER, n.d., https://www.hosper.nl/landschap-en-recreatiegebied/lansingerland-rotterdam-lage-bergse-bos/

[13] Photograph from Drijvende hut in Oise, Bijzonder huisje, n.d., https://bijzonderhuisje.nl/huisje-huren/drijvende-hut-in-oise/

[14] Photographs from Village Flottant de Pressac, Sandaya, n.d., https://www.sandaya.nl/onze-campings/village-flottant-de-pressac#diaporama

[15] Photograph from Wet heathland with cross-leaved heath, by Ecopedia, n.d., https://www.ecopedia.be/natuurstreefbeeld/natuurstreefbeeld-vochtige-tot-natte-heide-4010

[16] Photograph from Wet heathland, by Henckel, n.d., https://www.natura2000.nl/gebie-den/drenthe/dwingelderveld

[17] Photograph from Dwingelderveld, by Staatsbosbeheer, n.d., https://www.staatsbosbe-heer.nl/uit-in-de-natuur/locaties/dwingelderveld

[18] Photograph from Dwingelderveld, by Wiers, n.d., https://www.holland.com/global/tourism/getting-around/interests/natural-areas/dwingelderveld

[19] Photograph from Groenlose Slinge in de buurt van Borculo, Waterschap Rijn en IJssel, n.d., https://www.wrij.nl/sm/natuurlijke-beek-grevengracht

[20] Photographs from Meanderende beken, ARK Rewilding Nederland, n.d., https://arkrewilding.nl/natuurlijke-processen/meanderende-beken

[21] Photograph from Bomen in de beek, ARK Rewilding Nederland, n.d., https://arkrewilding.nl/natuurlijke-processen/bomen-de-beek

[22] Photograph from Dam bever, Natuurmonumenten, n.d., https://www.natuurmonumenten.nl/natuurgebieden/mentink/natuurbeheer/droogte-aanpak-achterhoek

[23] Photograph from Veld met koekoeksbloemen, by BNN VARA, n.d., https://www.bnnvara.nl/vroegevogels/artikelen/vroege-vogels-toont-de-veerkracht-van-de-natuur-in-hooiland

[24] Photographs from Catharijnesingel, OKRA Landschapsarchitecten, n.d., https://landezine.com/catharijnesingel-by-okra/

[25] Photograph from City Park, gemeente Nieuwegein, n.d., https://city-nieuwegein.nl/projecten/city-park/

[26] Photograph from Landhek Velhorst, Natuurmonumenten, n.d., https://www.natuurmonumenten.nl/natuurgebieden/achterhoek

[27] Photograph from Aalten Bredevoort, V. Wassink, n.d., https://www.wandel.nl/routes/wandelen-door-de-mooiste-coulisselandschappen/

[28] Photograph from Coulissenlandschap, Eenoog, n.d., https://www.flickr.com/photos/eenoog/6050599736

[29] Image from Het Hart van de Purmer, Studio Marco Vermeulen, n.d.-b., https://marcovermeulen.eu/nl/projecten/het+hart+van+de+purmer

[30] Image from Bouwen boven de bodem, Studio Marco Vermeulen, n.d.-a, https://marcovermeulen.eu/nl/projecten/bouwen+boven+de+bodem

[31] Image from Floating neighbourhoods, CommonCity, n.d., https://www.commoncity.nl/projects/blog-post-title-three-hakmb-pwf7w-8zy8f-zlp4d

[32] Image from ReGen Villages Oosterwold, Except, n.d., https://except.eco/projects/regen-villages-oosterwold/

[33] Image from Bouwen boven de bodem, Studio Marco Vermeulen, n.d.-a, https://marcovermeulen.eu/nl/projecten/bouwen+boven+de+bodem

[34] Image from ReGen Villages Oosterwold, Except, n.d., https://except.eco/projects/regen-villages-oosterwold/

[35] Photograph from De drie kraanvogels in het Gruttoveld, J. Van Wijk, n.d., https://www.flevo-landschap.nl/nieuws/kraanvogels-in-gruttoveld

[36] Photograph from Grutto in Beltrumse veld, R. Kamphuis, n.d., https://www.gelderlander.nl/achterhoek/waarom-weidevogels-niet-beschermd-worden-tegen-windmolens-deze-vogels-zijn-geen-wespendief~addcc20b/

[37] Photograph from Weidevogels spotten, Y. Adams, n.d., https://www.regionalelandschappen.be/projecten/weidevogels#:~:text=Weidevogels%20zijn%20een%20gevarieerde%20groep,nesten%20van%20weidevogels%20extra%20kwetsbaar.

[38] Photograph from Vogelkijkhut Roode Weel, Brabantse wal, n.d., https://www.vvvbrabantsewal.nl/locaties/4133288916/vogelkijkhut-roode-weel\

[39] Photograph from Extensief begrazen, Sanfurd, n.d., https://www.sanfurd.nl/index.php/over-ons/weidevogels/

[40] Photograph from Enkwal in het Loenense bos weer te herkennen, M. Kobussen, 2013, https://www.regiobodeonline.nl/2013/04/03-04-2013-13-08-loenen-enkwal-in-het-loenense-bos-weer-te-herkennen/

[41] Photograph from Loenense enk, n.d., https://loenenopdeveluwe.info/bezoekers/natuur-en-recreatie/loenense-enk/

[42] Photograph from Loenense enk bloeiende akker, Natuurmonumenten, n.d., https://www.natuurmonumenten.nl/route/rondom-loenen

[43] Photograph from Stadspark, Loos van Vliet Atelier, n.d., https://loosvanvliet.nl/nl/project/212/city-park-hoofddorp

[44] Photographs from Grønningen-Bispeparken, SLA, n.d., https://landezine.com/gronningen-bispeparken-by-sla/

[45] Photograph from Secret Village, Blooming Buildings, n.d., https://landezine.com/secret-village-by-blooming-buildings/

[46] Photograph from Climate-adaptive revitalisation, OKRA Landschapsarchitecten, n.d., https://www.okra.nl/project/grotestraat-streetscape-nijverdal/

[47] Photograph from Hoogstamboomgaard Windesheim, G. Sleurink, n.d., https://www.landschapoverijssel.nl/erfgoed/hoogstam-boomgaard

[48] Photographs from Hoogstamboomgaard, Boomgaardenstichting, n.d., https://www.boomgaardenstichting.be/index.php/over-ons/boomgaardprojecten

[49] Photograph from Geriefhoutbosje met afgezet, ofwel afgezaagd hakhout, Gemeente Beuningen, n.d., https://mijngelderland.nl/inhoud/routes/cultuurhistorie-in-het-land-van-maas-en-waal/geriefhoutbosje#!#customCarouselDetail

[50] Photograph from Geriefhoutbosje, PlanBoom, n.d., https://planboom.nl/wp-content/uploads/2022/11/Plan-Boom-Factsheet-Geriefhoutbosje.pdf

[60] Photograph from Infrastructure of paludiculture field in Neukalen, L. Lenz, 2023 June 10, https://commons.m.wikimedia.org/wiki/File:Infrastructure_of_paludiculture_field_in_Neukalen_2023-06-10_17.jpg

[61] Photograph from Infrastructure of paludiculture field in Neukalen, L. Lenz, 2023 June 10, https://commons.m.wikimedia.org/wiki/File:Infrastructure_of_paludiculture_field_in_Neukalen_2023-06-10_10.jpg

[62] Photograph from Mechanical harvesting of peat mosses on the field trial near Oldenburg, G. Gaudig, n.d., https://biooekonomie.de/en/news/first-results-peat-moss-paludiculture

[63] Photograph from Cranberry fields, J. Flaming, n.d., https://www.ordinary-adventures.com/2019/11/inside-the-washington-cranberry-bog/