



# Designing MRDH Metropolitan Park Structure

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## Graduation Report

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2

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Everything.



3

## Abstract

The Metropolitan Region Rotterdam-The Hague (MRDH) is a new geographic region and governance entity established in 2015. The OECD's report notes that, like many metropolitan regions, MRDH's discourse on spatial planning issues is limited by rivalry among guidelines from the traditional province-municipality administrative structure. Such a dilemma can lead to uncoordinated urban development trajectory and landscape fragmentation in the future metropolization process.

This project aims to develop a landscape-based metropolitan park structure (MPS) design framework to safeguard the essential landscape values for achieving sustainable urban transformation in MRDH. Based on the understanding and diagnosis of the MRDH complex urban system, the project carries out a targeted MPS design framework, which includes principles for MRDH's long-term visions and correspondent strategies for short-term interventions. It also encompasses a robust MPS network planning map and list of strategic locations with one local scale design as an example to elaborate how the framework contributes to sustainable urban transformation in multiscale. The MPS approach, differing from traditional metropolitan models, balances ecological preservation with urban development, promoting harmonious coexistence between humans and nature. By extending green spaces and promoting slow transportation through cultural and historical routes, the MPS fosters sustainable urban transformation. Overcoming traditional governance limitations, the MPS demonstrates a holistic approach to metropolitan spatial development, balancing socio-economic and ecological goals through ecosystem services.



# Content

## 01 Introduction

### Fascination

### Research Area

The Growth of Metropolitan Region  
Understanding - Landscape Fragmentation

### Problem Statement

### Research Objective & Questions

### Theoretical Background

Cannontation of Metropolitan Park Structure  
Landscape-based Regional Design  
Ecosystem Services

### Methodology

## 02 Understanding

### Values

Nature Conservation  
Water Management  
Cultural History  
Recreation  
Food Production  
Metropolitan Experience

### Challenges

Water Management  
Nature Conservation  
Cultural-historic Recreation

### Design Assignments

## 03 Application

### Case Study

Lingezeegen Park  
Rotte Landscape Park  
Midden-Delfland  
Emscher Park  
Rhein-Main Regional Park

### MPS Design Focus

Water and Climate Adaptation  
Biodiversity and Ecology  
Cultural-historic Recreation

### MPS Design Principles

Water ways as core structure for development  
Innundated land for seasonal water storage  
Agri-nature water circulation  
Wetland to enhance water adaptivity  
Heterogeneous stepping stone  
Sustainable agriculture  
Forest as connective structure  
Continuous green corridors  
Circular historic experience route  
Water-based experience route  
Water-based experience route  
Spots for representing landscape quality

## 04 Exploration

### MRDH MPS Vision -- Robust Green-Blue Framework Design Model

Water resilient basis to address climate challenges  
Connective green network for nature to thrive  
Diverse route networks for cultural-historic recreation  
Buffer Effect  
Strategic Projects

### Design Intervetion -- Metropolitan Park Duin Horst en Weide

Strategic Design Analysis  
Experience  
Landscape Development

## 05 Conclusions & Reflections

### MRDH MPS Ecosystem Services

Regulating services  
Provisioning services  
Conservation services  
Cultural services

### Discussions

Lessons learned  
Limitation  
Outlook







Source: [https://www.a16rotterdam.nl/nieuws/\\_2468280.aspx?t=beeld-Luchtfotos-april-2023](https://www.a16rotterdam.nl/nieuws/_2468280.aspx?t=beeld-Luchtfotos-april-2023)

## The Conflicted Metropolitan Landscape

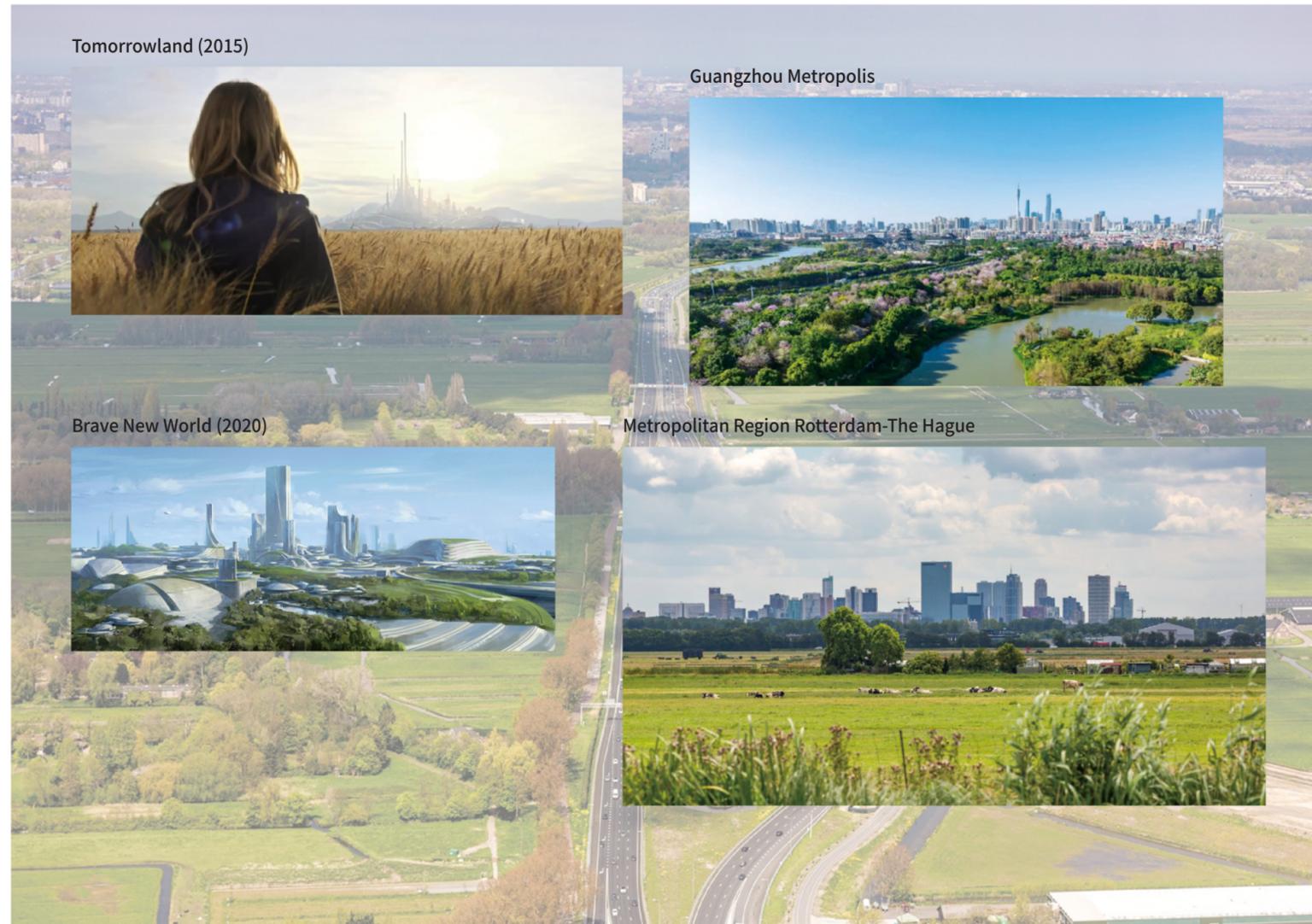
*"it has long been the fate of the rural landscape at the edge of the city to be the raw material for housing subdivisions, industrial estates, and mobile-home parks. [...] The changing scene at the edge and the placelessness that goes along with it has become a battleground between efforts to preserve rural land and the relentless forces of urbanisation"*

Nefs, M. (2022). Metropolitan Landscape: Definition, Mapping, and Governance. In R. Rocco, G. Bracken, C. Newton, & M. Dabrowski (Eds.), Teaching, Learning & Researching Spatial Planning (pp. 168-182). TU Delft OPEN Publishing

My fascination begins with a natural familiarity with the metropolis. As someone who was born and raised in a metropolis and has never been far from it, the hustle and bustle of the metropolis, the tall buildings, and the city parks are all spatial elements that I am accustomed to.

As a landscape architecture student, I never really understood what a metropolitan landscape was, and it was only after I began my honours programme that I gained a new understanding of the landscape with the definition of "metropolitan" - a vague and divisive concept - not only in the academic sense, but also in the sense that it is a place where people can live, work, and play. It is an ambiguous and divisive concept - not only in terms of its definition in academic studies, but also in terms of its spatial attributes, which are dynamically changing, always being passively transformed or overridden in response to urban development.

Yet the metropolitan landscape sustains much of the metropolis' vital natural ecosystems and provides opportunities for metropolitans to leave the concrete jungle and breathe in the natural environment again. It is also so diverse and integrated that it gives us the imagery of a metropolis - a vast expanse of land with green ribbons of forest in the distance and a city skyline of skyscrapers in the background - the natural environment of the metropolitan landscape and the modernity of the urban complex make the metropolis a promised land in the minds of many, and this vast metropolitan system seems to can fulfill your imagination from the city to nature, making it possible to reach two very different worlds in one day.



Source: [https://www.a16rotterdam.nl/nieuws/\\_2468280.aspx?t=beeld-Luchtfotos-april-2023](https://www.a16rotterdam.nl/nieuws/_2468280.aspx?t=beeld-Luchtfotos-april-2023);  
<https://trailersfromhell.com/tomorrowland/>; <https://jonmccoy.artstation.com/projects/kDBq5A>;

## The Metropolitan Image

Metropolitan landscapes play a crucial role in shaping the image of a metropolis. This concept is frequently illustrated in films and photographs, where metropolitan landscapes are often depicted as a blend of open grasslands, forests at the periphery, and skylines in the background. Such compositions highlight the contrast between natural and urban environments, presenting two vastly different worlds. For instance, in the 2015 film *Tomorrowland*, the protagonist first encounters a vast landscape of wheat fields upon touching a hologram badge, symbolizing vitality and abundance. This scenery positions the distant metropolis as a land of hope and promise.

Similar visual compositions can be observed in photographs of the Metropolitan Region of Rotterdam-The Hague. Here, photographers convey the livability and appeal of the metropolitan area through its landscapes, prompting viewers to imagine green spaces seamlessly extending into the city. This imagery suggests that residents can enjoy the healing and recreational benefits of greenery even within a densely populated urban environment. Such portrayals construct an image of the metropolis as a promised land, combining the convenience of urban amenities and the efficiency suggested by tall buildings with the accessibility of green spaces. This creates an idealized vision of a fast-paced yet livable and attractive metropolitan system.

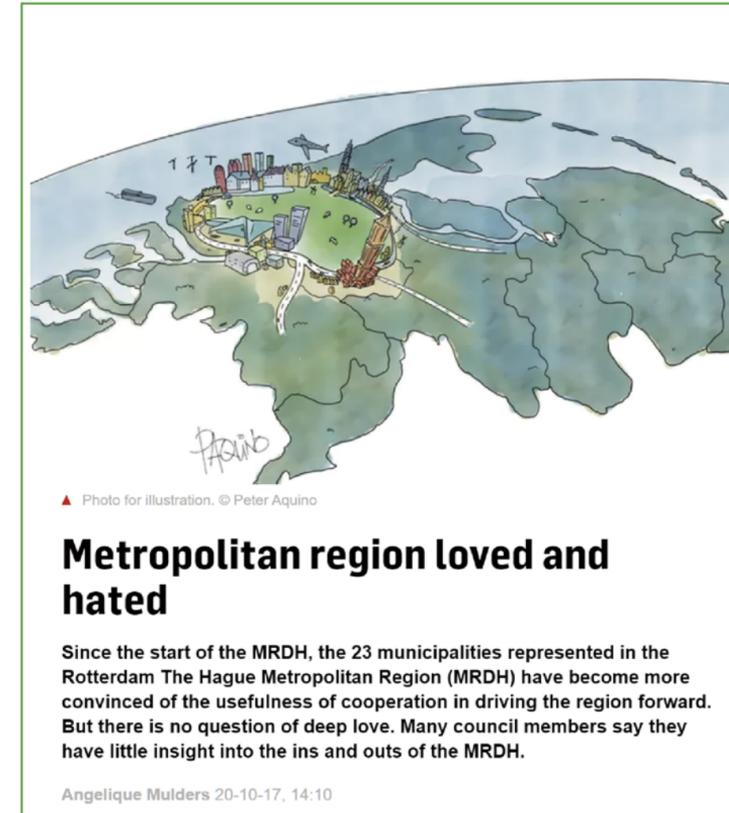
However, this harmonious and appealing metropolitan image raises questions about its reality. Are these portrayals accurate, or do potential obstacles exist that challenge the long-term sustainability of metropolitan qualities in a rapidly developing urban region?

# Research Area - Metropolitan Region Rotterdam-The Hague (MRDH)



Source: <https://mrdh.nl/>

## Economic and transportation-oriented metropolization.



Source: <https://www.ad.nl/den-haag/metropoolregio-geliefd-en-gehaat-a021adbd/?referrer=https%3A%2F%2Fwww.google.com%2F>

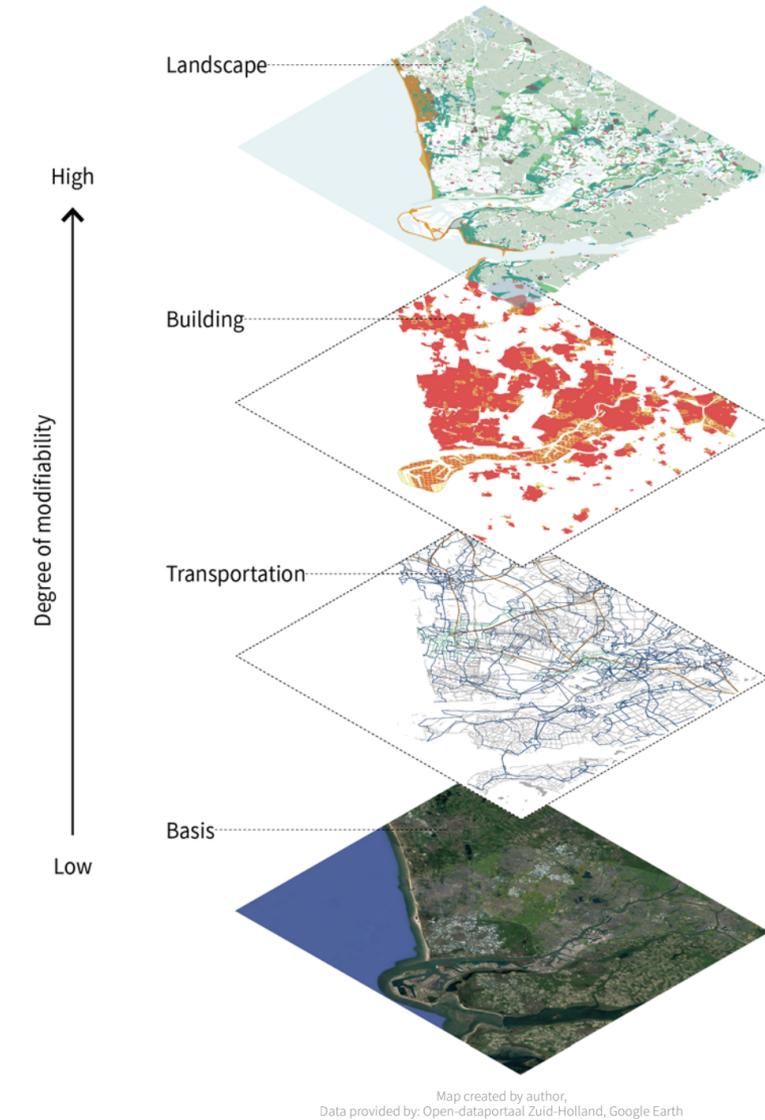
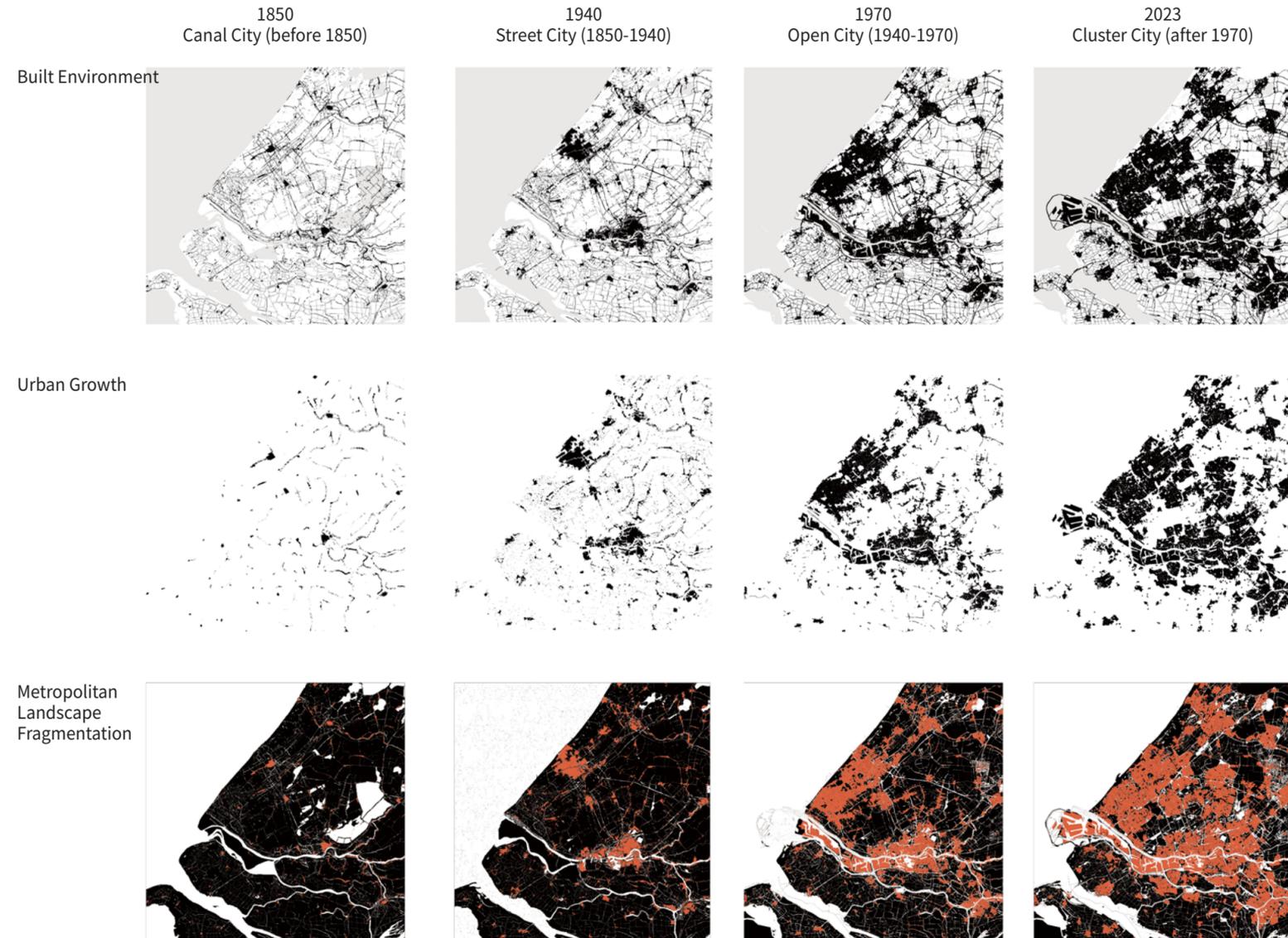
The research focuses on the Metropolitan Region Rotterdam-The Hague (MRDH), established in 2015 in the southern Netherlands, encompassing 21 cities, 2.4 million inhabitants, and 1.2 million jobs. Accounting for 13.5% of the Dutch population and contributing 15% to the GNP, the MRDH aims to revitalize the economy and enhance accessibility, positioning itself as a vibrant metropolitan area for living, working, and leisure (<https://mrdh.nl/wie-zijn-we>).

Initially envisioned to oversee spatial planning and natural resource management, the MRDH encountered challenges due to municipal reluctance to collaborate on these matters. This limitation in spatial planning discourse within metropolitan areas is a common issue observed by the OECD, often stemming from rivalry between traditional provincial and municipal administrative structures (OECD, 2016). Past experiences highlight that neglecting spatial planning discourse in metropolitan areas can lead to disjointed urban development trajectories and landscape fragmentation, jeopardizing sustainable metropolization (Nor et al., 2017).

Economic development in the MRDH relies on attracting a diverse workforce and enhancing quality of life, influenced by factors such as recreational spaces, access to nature, and environmental quality. Despite lacking a dedicated decision-making body for green open space discussions, the MRDH currently relies on provincial spatial planners for master planning and individual municipalities for implementation. However, experiences from other metropolitan regions emphasize the importance of metropolitan-scale green space planning in bridging the gap between regional planning and city-level implementation, thereby promoting sustainable spatial development (Santiago-Ramos & Hurtado-Rodríguez, 2022).

The MRDH's development objectives prioritize economically driven urban growth, emphasizing the crucial role of the metropolitan landscape as a foundation for sustainable urban development. Collaborative efforts among institutions at all levels are essential to recognize the potential for spatial coherence at the metropolitan scale, enabling unified action to advance the sustainable transformation of the MRDH.

# The Growth of Metropolitan Region



## Conventional Economic-driven Metropolitan Systems

We can foresee the future from history, and the historical development of MRDH serves as a cautionary tale for future urban development in the metropolitan region. According to Engel, the province of South Holland, where MRDH is located has been through four periods of urban development, namely “Canal City”, “Street City”, “Open City”, and “Cluster City”, with each of the various phases of urban development accompanied by the construction and expansion of denser buildings and infrastructures, as well as the clustering of cities due to the construction of roads and railroads (Engel, 2005). Thanks to the Rotterdam port, Green Port and two large cities The Hague and Rotterdam, the region grew significantly throughout decades into an ever- more complex metropolitan system, complex metropolitan system, a trajectory of economically oriented urban development.

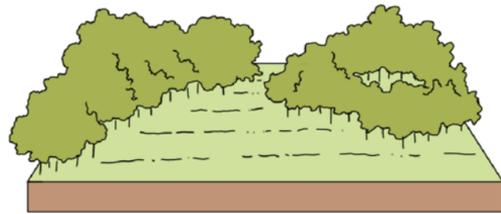
It is worth noting, however, that this rapid growth came at a sacrifice. As cities continue to expand, the metropolitan landscape is also getting more fragmented than ever under the demand for more built-up space for inhabiting more population to meet the economic development. In some places, such as The Hague-Westland and The Hague-Delft, the urban boundaries are blurring, and there is very little of the metropolitan landscape left in between.

The logic of the urban development is based on the degree of modifiability of different infrastructure, and landscape layer has been viewed as a blank canvas that could be changed easily. It is easy to understand that the benefit of this kind of urban development is that in the short term it enhances the ability of the metropolitan system to operate at high speed, with a network of transportation links connecting complexes to complexes to bring people to wherever they want to go in an efficient manner. Transportation is embedded in a near-permanent way in the metropolis, forming the most basic and least dynamic urban fabric, which then supports the buildings that grow around it as flesh and blood, like veins.

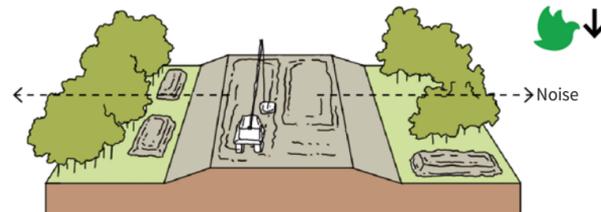
# A16 Highway & Land van Chabot



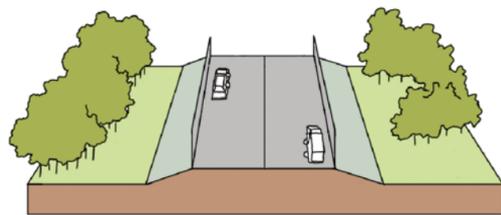
Before



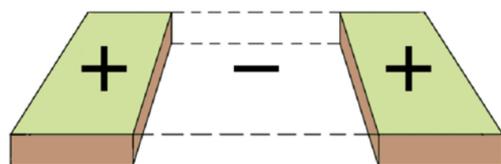
Construction



Finished



Soil growth capacity  
Water storage capacity



Drawn by author



Source: <https://www.a16rotterdam.nl/projectkaart/default.aspx>

It is conceivable that, once built, this hardened land will remain seemingly unchangeable, as if the only dynamic is the changing landscape pattern, which passively follows the rhythm of the city's construction as it disappears or merges into the city. However, looking back at the historical pattern of urban development from the present, such economy-oriented urban development has been sacrificed. This is most visually manifested in the reduction and fragmentation of the metropolitan landscape. This has occurred in the border areas where the metropolitan landscape meets the city, in enclaves where the metropolis has weighed urbanization and nature conservation, where, due to the specificity of its location, the attributes of the site have become blurred, where it seems that everything can happen, and which are the starting point for looking back at the urban growth years later, as we have examined before.

Here I use the example of the A16 highway project to show how the lands change, it is a process that constantly affects the landscape ecological quality in terms of biodiversity and soil capacity. This is a highway construction project that has been planned for a long time, the A16 will cross the river Rotte and the surrounding green spaces, including the landvanchabot, a monumental green space that has been preserved and is expected to be used in honor of the Dutch Impressionist painter Hendrik Chabot, whose home is located not far from this land, and in addition to that, the A16 will also cross the Lage Berge Bos Park. In its construction plan, the highway will cross from south to north and separate the landvanchabot at ground level and enter the underground tunnel completely before reaching the River Rotte, and the land in the Lage Berge Bos Park, which had been opened up by the highway construction, will be re-mulched and replanted with greenery. As a result of the construction, the original fox population of landvanchabot has disappeared and is not known to be recolonized, this was one of the few areas of land along the River Rotte that had not been extensively developed and retained almost wild woods, thus allowing this highly sensitive species to live quietly here, with the completion of the A16 it is conceivable that the noise that accompanies the road, and the potential for housing schemes, the likelihood of this species returning to the area is minimal.

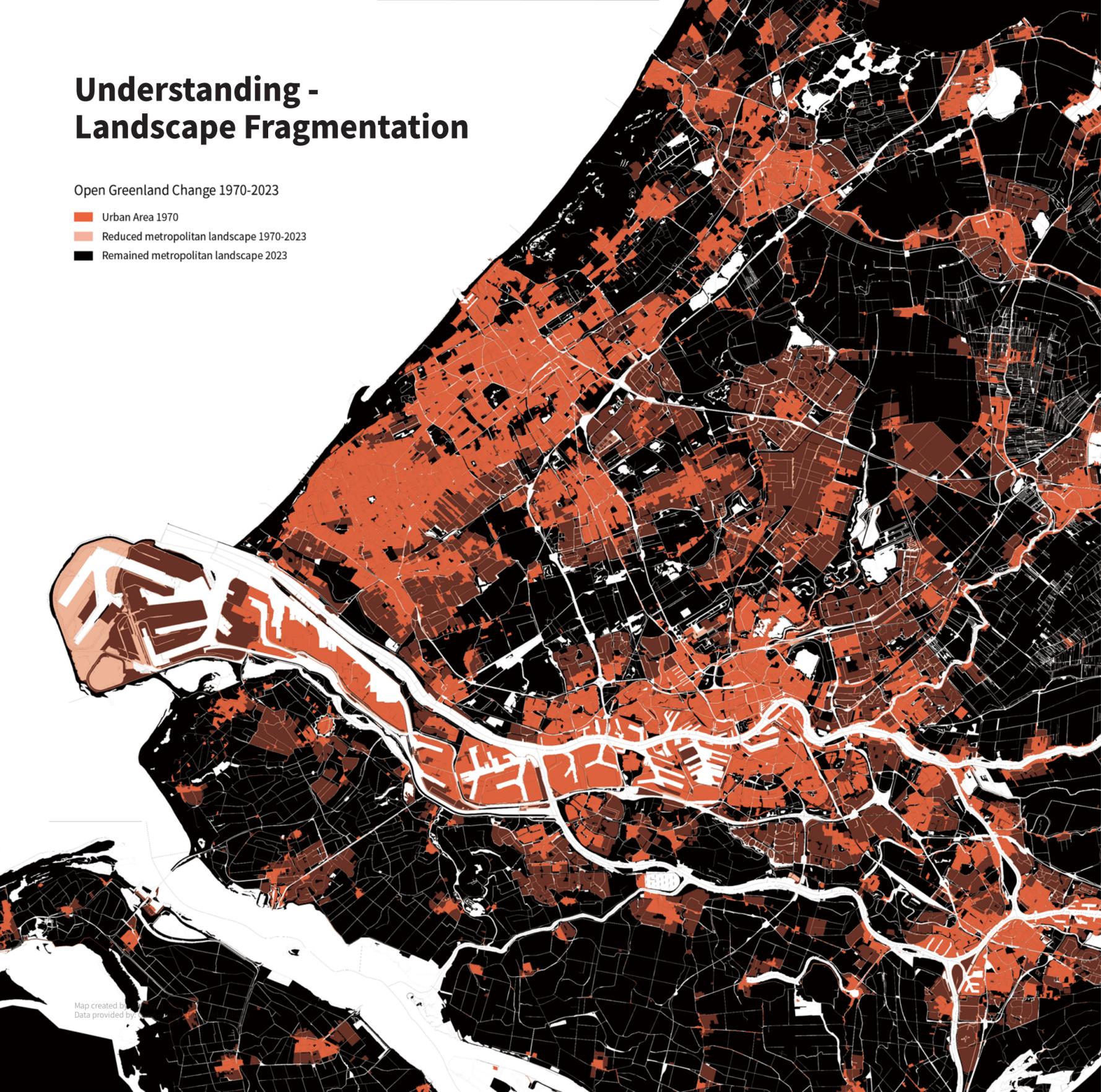
In addition to this, the A16 continues to influence the pattern of the metropolitan landscape on a larger scale, with its long route continuing to separate farmland to the north of the Lage Berge Bos Park, further fragmenting the landscape and potentially altering the future attributes of the surrounding area, such as being

converted to building land and extending the urban growth boundary. Here, it is interesting to see the differentiated development prospects resulting from the different green space attributes in the metropolitan landscape. Lage Berge Bos Park was able to be restored after the construction of the highway due to its recreational green space attributes, whereas landvanchabot and farmland, for example, are considered to be easily modifiable due to the lack of strong land attributes related to a particular urban life theme. Here, it is interesting to see the differentiation of development perspectives resulting from the different green space attributes in the metropolitan landscape. Lage Berge Bos Park was able to be restored after the construction of the highway due to its recreational green space attributes, whereas the landvanchabot and the farmland, which do not have strong land attributes related to a certain theme of urban life, are considered to be easily modifiable as a We know that this is not the case and that these green spaces are not useless; they are important biological habitats that provide ecosystem services to the metropolitan landscape, thus helping to mitigate the effects of climate change in the built-up areas of the metropolis, and continue to provide clean air, water, and other important resources for survival, thus enhancing the urban sustainability of the metropolitan region. However, as a result of a series of hardening impacts, the critical soil base of the metropolitan landscape will be damaged and the land will be sequestered beneath impermeable surfaces, directly contributing to a decline in permeability and biodiversity.

# Understanding - Landscape Fragmentation

Open Greenland Change 1970-2023

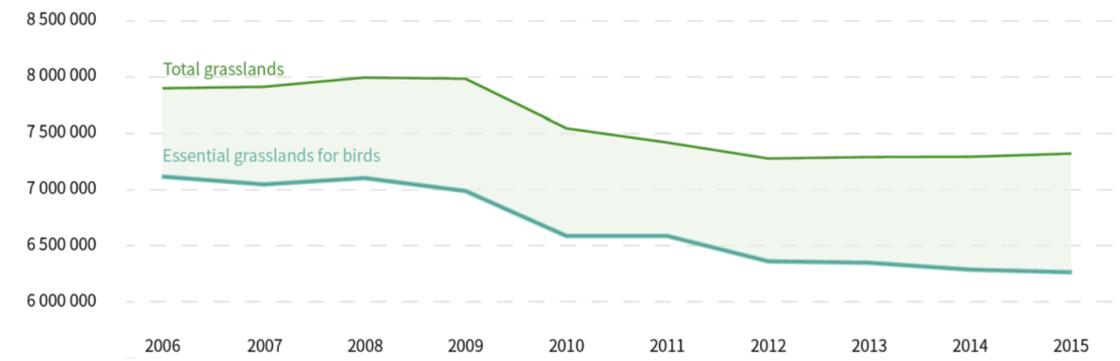
- Urban Area 1970
- Reduced metropolitan landscape 1970-2023
- Remained metropolitan landscape 2023



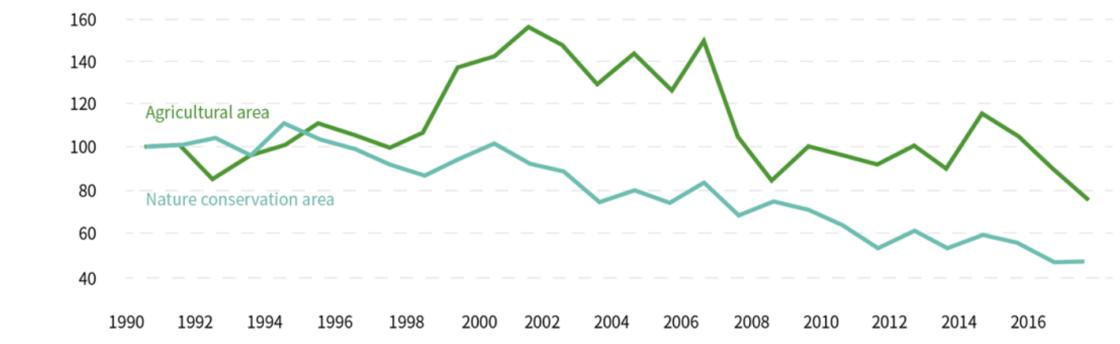
Map created by  
Data provided by



Total Grassland Area in South Holland (acre)



Grassland bird populations in South Holland



Source: Faunabeheerplan Zuid-Holland 2017 - 2023 Vos; Boerenlandvogels Zuid-Holland 2019-2027

# Understanding - Landscape Fragmentation



## Urban Growth Boundaries

Complex, fragmented land use, decreased green accessibility



Source: [https://www.a16rotterdam.nl/nieuws\\_/2576388.aspx](https://www.a16rotterdam.nl/nieuws_/2576388.aspx)

Urban agglomeration, disappearance of transitional metropolitan landscape



Source: <https://www.vhbinfra.nl/over-ons/nieuws/detail/a4-delft-schiedam-geopend>

Turning the back to the landscape



Source: GoogleMap

## Landscape Fragmentation

Decreased green accessibility



Source: [https://www.a16rotterdam.nl/nieuws\\_/2495414.aspx?t=nieuws-A13-richting-Den-Haag-dicht-van-14-tot-17-juli](https://www.a16rotterdam.nl/nieuws_/2495414.aspx?t=nieuws-A13-richting-Den-Haag-dicht-van-14-tot-17-juli)

Boundary effect on ecological connectivity



Source: GoogleMap

## Landscape Identity

Impact on spatial patterns



Source: [https://www.a16rotterdam.nl/nieuws\\_/2576388.aspx](https://www.a16rotterdam.nl/nieuws_/2576388.aspx)

## Urban Agglomeration and Metropolitan Landscape Under Pressure

The decline in biodiversity is a direct reflection of the negative consequences of urban growth, which is caused by the reduction of green spaces. Statistics from 2006 to 2015 show that the area of open grassland in South Holland has directly decreased by more than 6%, and green spaces, which are important for birds, have directly decreased by almost 14% (Faunabeheereenheid Zuid-Holland, 2017), adding insult to injury in the province of South Holland, which already has the lowest amount of green space per capita. The statistics on Dutch birds over the years show that the number of birds in the Netherlands decreased by almost a third between 1990 and 2010 and reflect the huge impact of the reduction of green spaces on birds which are central to the Dutch ecosystems (Faunabeheereenheid Zuid-Holland, 2017).

The economic-driven metropolisation increases landscape fragmentation in the metropolitan region. Unbalanced development in metropolitan regions and their surroundings arises from competition among independent municipalities for influence, investments, and residents, resulting in overall regional imbalance (Huang et al., 2021). Metropolisation stimulates land take and soil sealing, especially in metropolitan areas, resulting in high-intensity land use encroaching on ecological land, converting forest and grassland into agricultural and built-up land (Dadashpoor et al., 2019). In cities where land consumption was the highest, developed land was previously devoted to food production, which further shapes the incoherent structure and functions of the metropolitan landscape (Salvati et al., 2017).

In rapidly urbanizing areas, landscape patterns exhibit high fragmentation, directly affecting ecosystem service distribution and indirectly influencing ecological processes (Hao et al., 2017). In effect, fragmentation reduces connectivity and leads to the loss of green space and its coherent ecological functions, particularly dispersal corridors (Kong et al., 2010).

In general, metropolitan landscapes are subject to constant challenges from both urban and urban fringe areas; on the one hand, metropolitan urban areas form the core of the metropolitan region, but their overcrowded urban environments are insufficient to support sufficient supply of green space for all urban residents, who are also eager to re-enter nature for recreational activities. At the same time, MRDH needs a beautiful metropolitan landscape as a physical condition to attract more talented people to live and work in the metropolitan area; on the

other hand, increasing population means increasing housing and urban growth, and in the compact urban environment, MRDH has long had difficulty in finding more land in the city to build new housing, and can only target its development at the edge of the city, which is also the edge of the metropolitan landscape. It is foreseeable that this fringe area will be subjected to more impacts from hardening and that the metropolitan landscape will be further reduced. Metropolitan landscapes will therefore have to meet the challenges of urban sprawl, while at the same time meeting the growing demand for green space and enhancing the attractiveness of green spaces in a diminishing and fragmented land mass, while at the same time responding to the climate challenge by taking into account a range of tasks, such as biodiversity conservation, water management, food production, and so on.

Looking back at the development of MRDH, the metropolitan landscape is still challenged mainly by the treatment of boundaries and site attributes, with the further expansion of urban growth boundaries corresponding to the reduction of metropolitan landscape boundaries and the fragmentation of the landscape. Therefore, strong design thinking is needed to minimize the impact of urban sprawl on the metropolitan landscape, and to establish a strong site character that will better prevent and control urban growth in a controlled manner, thus balancing landscape values and urban development, and thus promoting the sustainability of urban development.

## Problem Statement

### The need to a holistic metropolitan landscape design solution

MRDH's discourse on **landscape planning** is limited by rivalry among guidelines from the province and municipalities. Such a dilemma can lead to **uncoordinated urban development trajectory and landscape fragmentation**, further challenges the region's capacity to address issues like climate change and biodiversity in the future metropolization process. Therefore, it is crucial to develop a landscape-based solutions for urban planners, e.g. **metropolitan park structure(MPS)** as th juncture of city and nature to guide sustainable urban development.

## Research Objective & Questions

To design a landscape-based MPS that safeguards the **essential landscape values** and guides **sustainable urban development** in MRDH.

### Understanding

What are the essential landscape values and challenges in MRDH?

### Exploration

What are the long-term visions and short-term interventions for MRDH?

### Application

What are the design principles and strategies to achieve a robust MPS?

### Reflection

What lessons can be gained specific for region or generic through design?

This graduation project aims to develop a landscape-based MPS design framework to safeguard the essential landscape values for achieving sustainable urban transformation in MRDH.

Based on the understanding and diagnosis of the MRDH complex urban system, the project carries out a targeted MPS design framework, which includes principles for MRDH' s long-term visions and correspondent strategies for short-term interventions. It also encompasses a robust MPS network planning map and list of strategic locations with one local scale design as an example to elaborate how the framework contributes to sustainable urban transformation in multiscale.



## What is metropolitan park structure?



Source: Natuurinclusief Nederland: natuur overal en voor iedereen, 2022

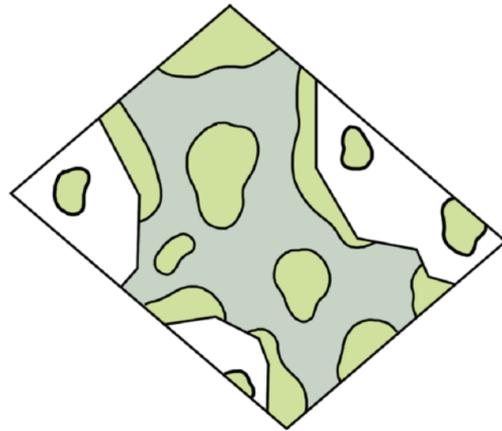
The metropolitan park structure (MPS) is conceived as a socio-ecological network operating at the metropolitan scale. It serves as an interface between the city and metropolitan area, strategically designed to integrate, safeguard, and enhance the essential metropolitan landscape resources and inherent values. The MPS endeavors to establish interconnected networks encompassing nature, agriculture, and urban domains to prevent the depletion of fundamental landscape assets induced by the economy-driven metropolisation process, thereby supporting sustainable urban development within the metropolitan context.

The successful implementation of MPS requires a landscape-first perspective. Nowadays, metropolitan planning should prioritize landscape as a fundamental layer in the metropolitan system, moving away from viewing the lands as empty blankets around buildings (Frampton, 1999). These areas will, over time, become embedded in cities. Acknowledging a priori that peri-urban land can increase the future quality of life in cities should encourage engagement in the planning of these areas. This perspective emphasizes using the landscape as both a structural element and a medium for rethinking the relationship between city and metropolitan area, ensuring that nature is seamlessly integrated into everyday environments. Furthermore, valuable landscape components can be preserved at the start of planning, leaving room for integrating diverse landscape elements into an interconnected open space structure that facilitates a broad spectrum of ecosystem services that benefit human and nonhuman lives (Santiago-Ramos & Hurtado-Rodriguez, 2022). With this wealth of resources, it will also be easier to design a long-term practical socio-ecological landscape design framework and to provide a solid foundation for implementing diverse strategic short-term interventions.

# What are the goals of MPS?



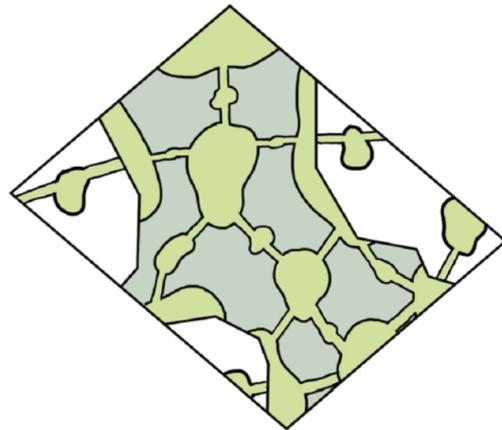
1. Landscape as basis



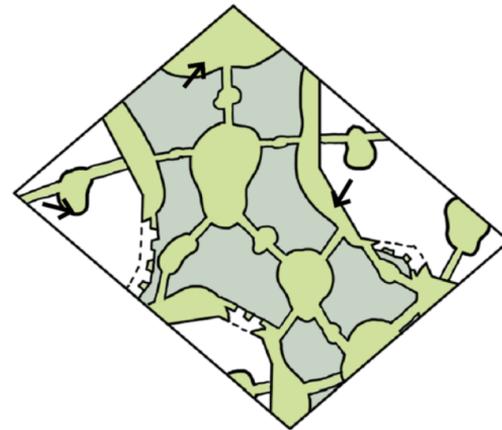
2. Identify essential landscape assets



3. Transform and Interconnect



4. Guide sustainable urban development



## Nature Conservation

Designing MPS with a focus on nature conservation involves efforts to safeguard biodiversity by protecting and enhancing natural habitats and corridors. This helps MPS mitigate the negative effects of urbanization and provide valuable ecosystem services for the metropolitan region and its surroundings. Achieving this necessitates a comprehensive understanding of the key species on the site and the strategic designs of habitats and corridors tailored to their behavioral patterns. Therefore, appropriate habitat restoration and rewilding methods can be implemented to enhance the ecological resilience of MPS and mitigate habitat fragmentation resulted from metropolisation.

## Water Management

This entails creating water-resilient areas that can reduce reliance on external water sources and promote water recycling on-site. Specifically, it involves understanding the site's topography and water levels to design wetlands, ponds, swales for flexible water storage, or widen existing waterways to capture rainwater or water from external areas. This helps ensure water supply without acquiring external sources even during drought periods. Integrating this principle with nature conservation design methods can also help filter water, protect aquatic ecosystems, and enhance biodiversity.

## Recreation Promotion

From our analysis of the previous case study, we can see that recreational space can serve as a powerful design tool on urban fringe. It fulfills the need for green spaces among metropolitan residents while helping to limit urban sprawl and maintain the integrity of MPS. It is a win-win design principle that can be implemented at the interface between city and MPS. For instance, designing recreational and aesthetic elements, such as open spaces, recreational facilities, and carefully curated vegetation on the urban fringe increase the area's appeal to urban residents. This not only promotes mental health and well-being but also strengthens the connection between urban dwellers and the natural environment to foster preservation on green space, encouraging urban planners to adopt more sustainable urban development practices, such as compact green city and urban regeneration initiatives.

## Cultural-Historic Preservation

Incorporating cultural and historical elements into MPS design acknowledges the region's rich heritage and adds to its unique land identity. By preserving and interpreting cultural-historic features like heritage sites, historic landmarks, archaeological discoveries, and distinctive landscapes, we celebrate the area's significant histories. Design strategies may include integrating cultural-historic features with route networks to make it more readable for visitors to explore and appreciate the diverse cultural values.

## Sustainable Agriculture

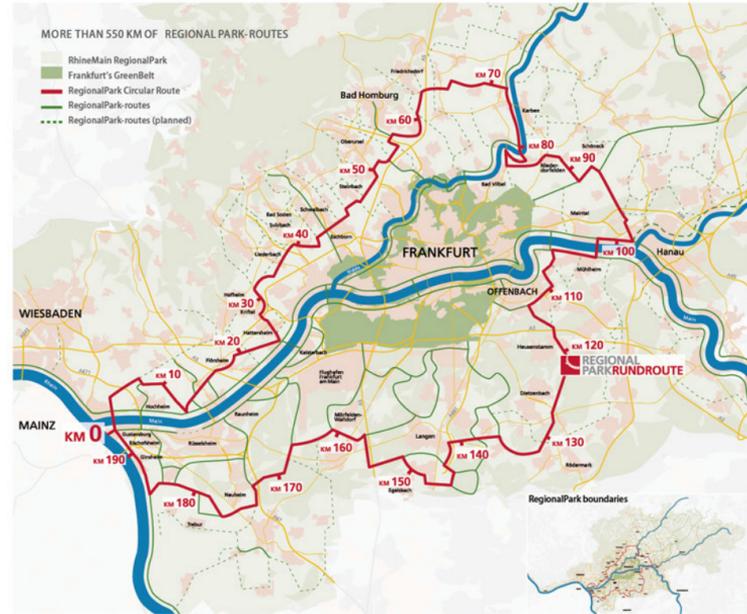
In MPS, large portion of land may be dedicated to farming. The topic of sustainable agriculture has been raised and promoted more often in recent years. Supporting such practice within MPS not only encourages local food production but also fosters environmental sustainability. This entails implementing methods like organic farming, agroforestry, and community gardening. One important aspect involves designing pollinator-friendly habitats within farmlands to promote agroecological access to the broader ecosystem in MPS. Such action boosts agricultural viability while providing crucial food sources for pollinators, thus establishing a sustainable agroecological cycle. By prioritizing practices that enhance soil health, biodiversity, and ecosystem services, they help mitigate the negative impacts associated with conventional agricultural activities.

## Slow Traffic and Public Transit

Focusing on pedestrian-friendly design and sustainable transportation options within MPS promotes active mobility and reduces dependence on private vehicles. This involves designing safe and accessible route networks for walking, cycling, boating and even horse riding, as well as incorporating public transit stops and various transportation modes. Integrating green corridors with traffic network encourages sustainable transportation choices and enhances air quality. By prioritizing slow traffic and public transit, MPS contributes to fostering healthier, more sustainable urban environment.



# MPS Practices - Rhein-Main Regional Park, Germany



The Rhein-Main Regional Park (Regionalpark RheinMain), established in 1995, serves as a green corridor network in the Frankfurt Rhine-Main region (Figure 1), integrating agriculture, forestry, recreation, and nature conservation areas (RegionalPark Ballungsraum RheinMain gGmbH n.d.). It aims to safeguard regional greenspaces, provide recreational opportunities, and guide development (Macdonald et al., 2021a, 2021b). Initiated with pilot projects in Flörsheim, Hattersheim, and Hochheim, the park has completed approximately 220 projects to date (Regionalpark Ballungsraum RheinMain gGmbH, n.d.; Krause, 2014).

The Frankfurt Rhine-Main region has experienced rapid demographic growth and is expected to accommodate more than 5.9 million inhabitants by 2030 (Regionalverband FrankfurtRheinMain, 2022). Due to peripheral development challenges and inter-municipal competition for labor, the region aims to contain development within its central places and along transportation corridors (Macdonald et al., 2021a). The establishment of the Rhein-Main Regional Park responded to the metropolitanisation trend by prioritizing landscape-based development within existing urban areas and expanding along transportation corridors to form robust landscape infrastructures (Macdonald et al., 2021a). Its strategic goals include landscape conservation, ecological sustainability, local recreation, regional identity, fostering alliances for open space, and enhancing the landscape's perception (Krause, 2014). It aims to connect and improve fragmented open spaces and contribute to the social dimension by providing

## Landscape as infrastructure to enhance accessibility



Polderr, source: <https://www.fietsen123.nl/route/de-duinen-van-meijendel>

## Recreational space for metropolitan promotion



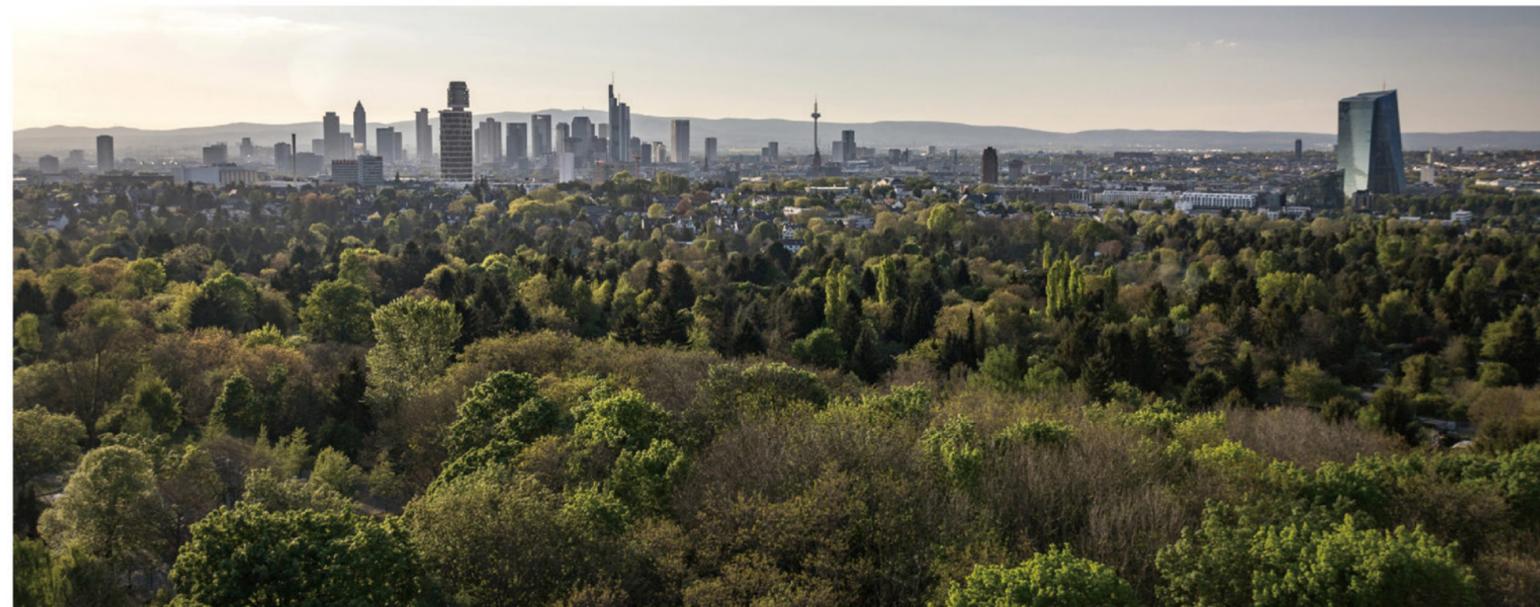
Polderr, source: <https://www.fietsen123.nl/route/de-duinen-van-meijendel>

recreational spaces (Henke, 2020; Nijhuis, 2007).

The park's main element is a green corridor, a 190 km circular route known as the RundRoute, connecting 35 municipalities and passing many realized projects (Krause, 2014). It was integrated with diverse spatial elements like nature reserves, gardens, river beaches, playgrounds, pocket parks, orchards, public art, wells, monuments, and lookout towers (Henke, 2018). They naturally invite visitors to read particular landscapes, including agricultural areas, "landscape islands," industrial heritage sites, historical gardens, and prehistoric sites (RegionalPark Ballungsraum RheinMain gGmbH n.d.). The spatial designs aim to raise environmental awareness among the general public and promote local recreation while preserving these open spaces against urban pressure (Gailing, 2005).

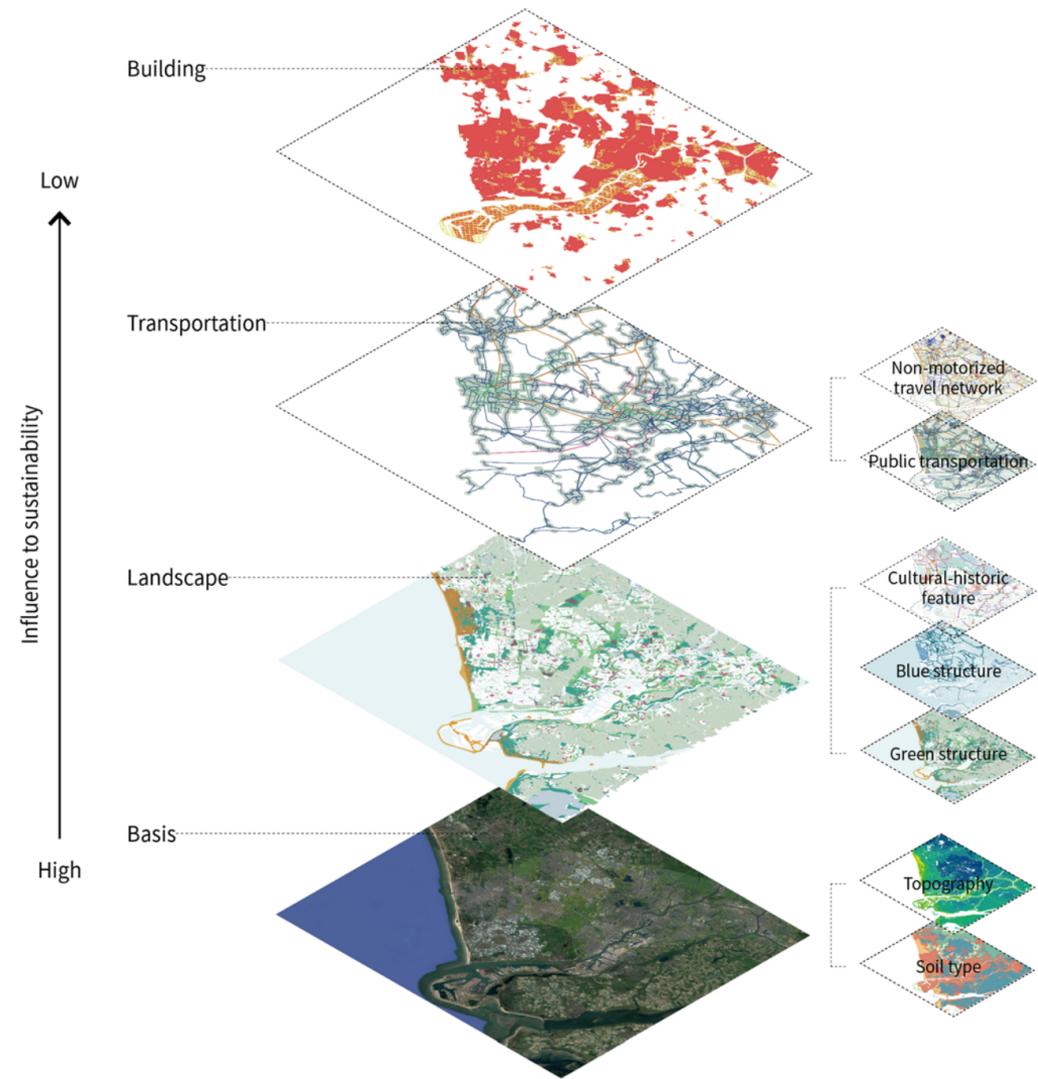
The Rhein-Main Regional Park serves as a landscape-based approach to nature conservation and agricultural practices in the region, aiming to preserve natural habitats, farmlands, and forests within the urban conurbation (RegionalPark Ballungsraum RheinMain gGmbH n.d.). One pilot project is the Weilbacher Kiesgruben, the successful practices of gravel quarrying and recultivation have created homes for creatures, which later guided new pit refilling and reforestation projects' integration into the existing park structure (Krause, 2014). Besides, the park is characterized by extensive agriculture and forestry practices. Rich soils and expansive forests form the foundation for productive land uses, such as forestry, cereal farming, vegetable cultivation, asparagus farming, and viticulture (RegionalPark Ballungsraum RheinMain gGmbH n.d.). From a socio-economic perspective, the park additionally serves as a planning tool for building a metropolitan identity to enhance the region's international competitiveness (Gailing, 2005). It promotes sustainable socio-ecological development by combining ecological protection with socio-economic use. It enhances social welfare by providing free green access to all. It acts as a soft locational factor for companies seeking to attract qualified staff and promotes a regional image of a work-life balance destination (Henke, 2020).

## Woodlands as green connection between city and metropolitan area



Polderr, source: <https://www.fietsen123.nl/route/de-duinen-van-meijendel>

# Landscape-based Solutions



Map created by author,  
Data provided by: Open-dataportaal Zuid-Holland, Google Earth

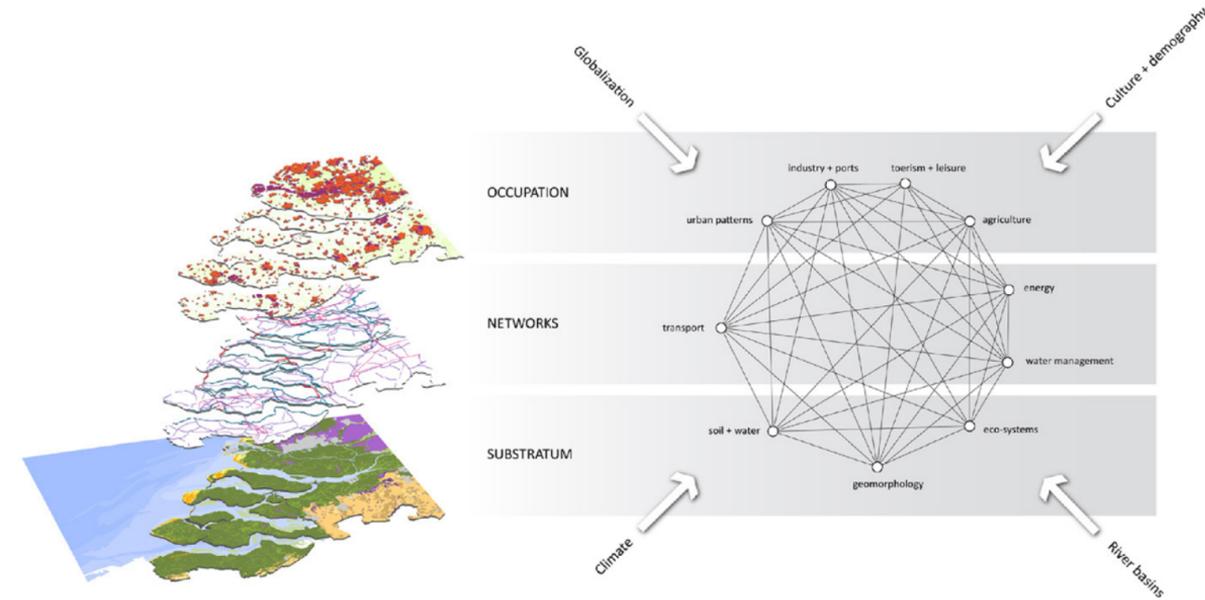
Economic-driven metropolisation causes landscape fragmentation in metropolitan regions due to municipal competition for influence, investments, and residents, leading to unbalanced development and decreased landscape connectivity. Metropolitan areas play a crucial role in urban development, spreading positive socio-ecological effects to both the region and surrounding areas. However, there is a need for an operational design framework for sustainable urban development in metropolitan regions. This study proposes MPS as a landscape-based approach to address landscape fragmentation and mitigate the impact of metropolisation on the natural environment through planning and design processes. The study aims to provide a comprehensive understanding of MPS, focusing on its components and design principles for long-term planning and short-term intervention. It reviews the historical development of MPS, analyzes its ecosystem services, examines three successful MPS examples, and outlines design components and principles to support sustainable urban transformation in metropolitan regions.

MPS represent a landscape-based approach to urban planning, originating from historical movements like the nineteenth-century parks movement in North America. Frederick Law Olmsted's Emerald Necklace in Boston pioneered a cross-municipal green space design to integrate nature conservation, recreation, and urban development within an interconnected park structure. In the twenty-first century, as global urbanization continues, MPS functions as a socio-ecological network at the metropolitan scale, bridging urban and suburban areas. It prioritizes a landscape-first perspective, seamlessly integrating nature into urban environments and preserving essential landscape assets while enhancing citizen well-being, attracting economic activities, and fostering environmental sustainability. The study employs Ecosystem Services (ESs) to evaluate the benefits of a healthy ecosystem safeguarded by MPS, enhancing landscape connectivity and multifunctionality to address complex metropolitan dynamics and contribute to a healthier, more equitable urban environment. Specific examples like Rhein-Main Regional Park, Midden-Delfland, and Lingezegen Park demonstrate the effectiveness of MPS in sustainable urban development by integrating nature conservation, recreation, cultural heritage preservation, and ecosystem services enhancement. The study summarizes vital components and design strategies to provide insights into successful implementation approaches. The design of MPS aims to enhance urban sustainability by preserving key landscape elements and their potential combined ESs. This includes conserving

soil, which influences landscape characteristics, and tailoring design methods accordingly. The green-blue structure, comprising green and aquatic spaces, facilitate species movement and influence urbanization patterns. Notably, peri-urban farmlands are still kept with great potential to be implemented with more sustainable agriculture design methods to offer multifunctional benefits. Cultural-historic features preserve the region's heritage, playing a vital role in creating stronger connections between land and human. The travel network integrates public transportation and recreational travel, which enhances accessibility while minimizing disruption to wildlife habitats with adequate design.

MPS design principles focus on nature conservation, water management, recreation promotion, cultural-historic feature preservation, sustainable agriculture, as well as slow traffic and public transit. Nature conservation focuses on safeguarding biodiversity by protecting and enhancing natural habitats and corridors. Water management incorporates water-resilient areas to reduce reliance on external water sources and promote on-site water recycling. Recreational space within MPS serves as a design tool to meet residents' green space needs while limiting urban sprawl. Preservation and interpretation of cultural-historic features celebrate the area's significant histories and enhance visitors' appreciation of diverse cultural values. Promoting slow traffic and public transit options within MPS promotes active mobility and reduces dependence on private vehicles.

# Theoretical Background



Understanding the urban landscape as a layered and complex system, source: Steffen Nijhuis

## Landscape-based Regional Design

Theory to understand and design complex urban landscape system.

Landscape-based regional design uses systems thinking and complexity theory to create comprehensive regional planning that addresses the complex relationships within urban landscapes (Nijhuis & Jauslin, 2015). It bases future development on physical landscape structures and natural processes, guiding spatial transformations. This approach supports urban development, biodiversity preservation, water resource management, leisure facilities, community building, cultural identity, and economic development (Neuman, 2000). By identifying optimal locations, functions, scales, and relationships, landscape-based regional design develops robust, resilient, and adaptive frameworks. These frameworks ensure coherent regional development (long-term strategy) while providing flexibility for local projects (short-term intervention).

As the guiding theory throughout the whole project, it offers an comprehensive and efficient design process that entails four fey steps: (1) diagnosis, (2) strategy making, (3) design explorations and (4) action perspective (Nijhuis, 2022). Additionally, this project also uses three mainly methods stem from the theory to achieve the research and design objectives of the project:

### Research through design

Research through design is vital for exploring adaptive principles and possible design solutions. Landscape-based regional design works from regional scale to local scale, and requires knowledge and digital information of the landscape's physical, biological, and cultural aspects. This method efficiently collects, identifies, and summarizes site information, continuously integrating it through visualization tools to support design process. The design results also highlight site study shortcomings allowing for improvement. This approach sharpens the focus and outcomes of the design, leading to a more accurate understanding of the challenges and the corresponding long-term and short-term solutions should be made.

### Understanding Landscape as a Long-Term Structure

The *longue durée* concept, depicting landscapes as long-term structures, is pivotal in comprehending them as evolving systems shaped by 'sequent occupance' (Sauer 1925; Whittlesey 1929). This evolution involves selecting, evaluating, preserving, and replacing structures, resulting in rich historical and typological variations (Bobic 1990). Analyzing the urban landscape's stratification and development unveils defining structures, patterns, and elements, forming

the landscape's physical basis (Vroom 2010). Understanding the historical traces is crucial for new transformations, adding new 'layers' and evolving through the 'erasure' and 'writing' of history. The landscape results from a selection process where some elements persist while others change.

### Layers Approach and Mapping

Unpacking the landscape into layers helps grasp different systems and their relationships (Nijhuis 2020). This layering is not static or hierarchical but consists of discrete layers that influence each other to varying degrees over time. One of the visualization of layers approach is through mapping, it unravels the complexity of metropolitan system in an understandable manner. Maps and mapping are crucial for studying landscapes and their development over time. They identify landscape structures, patterns, and related natural and cultural processes, as well as design challenges and opportunities (Nijhuis and Pouderoijen 2014). Visual representations like maps, sections, three-dimensional drawings, infographics, and scale models facilitate visual thinking and communication (Nijhuis 2013).

# Theoretical Background



The four main aspects in ecosystem services, source: MA 2005

## Ecosystem services

Theory to design and evaluate landscape values in metropolitan context.

Sustainable urban development should be guided by a planning vision that promotes the interconnection of green infrastructure with hinterland green spaces, intermodal transportation systems and mixed-use multifunctional landscapes (Karanikola et al., 2018; Silva et al., 2017). MPS has long been implemented to integrate green, blue, and grey infrastructures and dynamically adapt to future changes, which built environments are less capable of. Improving MPS quality enhances citizen perception and attracts economically beneficial activities, such as environmental-friendly tourism and sustainable leisure (Verdu-Vazquez et al., 2021). MPS indirectly complements and enhances the socio-ecological role of the metropolitan region within the discourse of economy-driven metropolisation. Therefore, interventions in MPS should protect, enhance, and regenerate ecosystem benefits and services that are vital to support sustainable urban development.

Over the past two decades, Ecosystem Services (ESs) have gained prominence in evaluating landscape design projects as a concept to describe the benefits humans obtain from ecosystems. They are increasingly recognized as a crucial bridge between the environment and society, playing a central role in conservation, resource management, and ecological and environmental economics (Wu, 2013). Santiago-Ramos and Hurtado-Rodriguez (2022) further analyzed the ESs of critical spaces in solid relation to MPS in a metropolitan context:

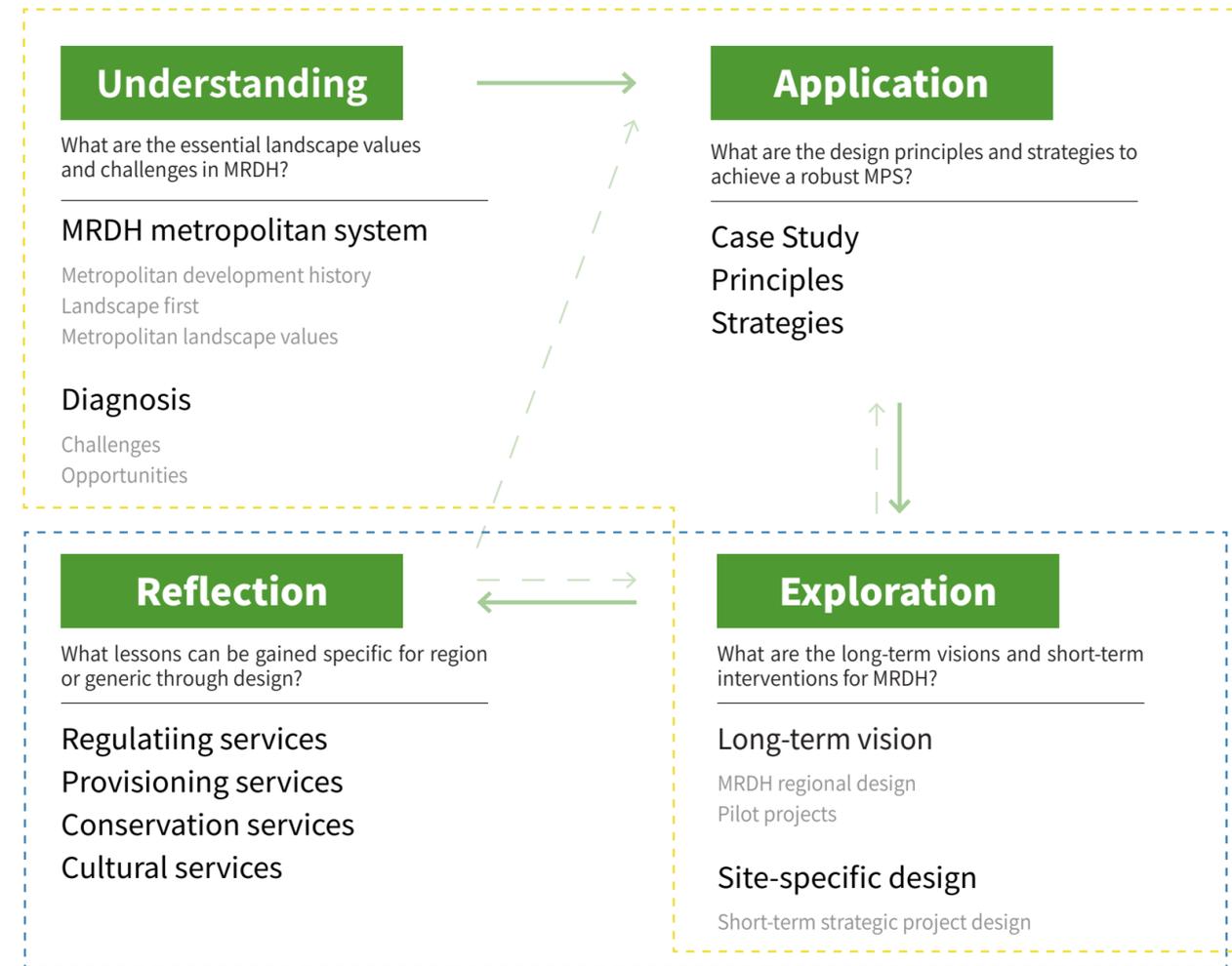
- *Regulating services that improve urban environmental conditions through reducing air pollution, the sustainable management of urban hydrological processes, the mitigation of the urban-heat-island effect, or the adaptation to climate change.*
- *Provisioning services linked to food production and primary sector production.*
- *Services related to the conservation of biodiversity and the protection of natural habitats in the face of urban sprawl and the fragmentation of open spaces.*
- *Services linked to social, cultural, and recreational benefits and the contribution to a healthier and more equitable urban environment for citizens.*

The analysis of ESs showcases the importance of designing a landscape-based approach on a metropolitan scale to comprehend the complex metropolitan systems as urban dynamics extend beyond traditional city limits. This implies that MPS design should enhance the landscape's connectivity and multifunctionality, which requires a strategic selection of the components that will ultimately form MPS as a socio-ecological network.

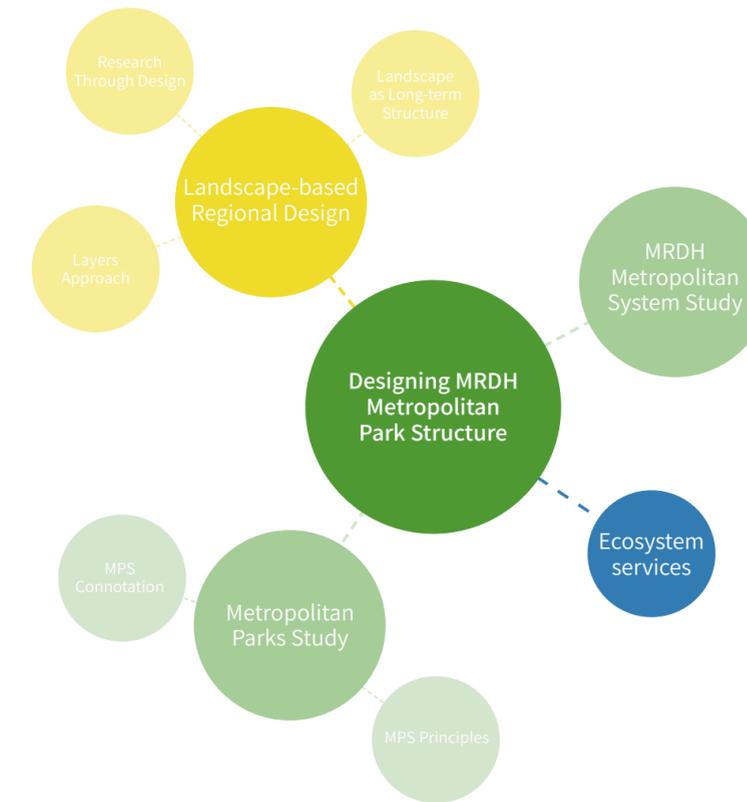
# Methodology



## Landscape-based Regional Design



## Ecosystem services



The structure of project stem from the mentioned four research questions and each chapter will answer one in specific. At this stage, I will mainly answer the first two questions and touch upon the exploration chapter to briefly explain the visions on the MRDH metropolitan park structure.

The methodology is divided into four parts, each addressing specific research questions:

1. **Understanding:** It involves researching the MRDH's natural and urban systems by examining its Green-blue structure, Transportation system, and Built environments using a layered approach. Additionally, studying its planning history facilitates the diagnosis of the region's current and future challenges, providing a holistic understanding of the region.
2. **Application:** Building on the understanding of the region and case studies of relevant projects, MPS design principles and strategies will be developed to address the burdens on MRDH's sustainable urban transformation.
3. **Exploration:** Given the MPS design principles and strategies, long-term visions (regional scale) including plan stages over time, and site-specific designs (local scale) encompassing a list of pilot projects with one short-term strategic project design will be developed to visualize how the design principles and strategies are spatially implemented.
4. **Evaluation:** An evaluation based on the four primary services from the theory of ecosystem services will be conducted to assess and reflect on the values of the MPS network in MRDH. It serves to further promote the importance of the role of a landscape-based perspective for urban planners working collaboratively at a common ground and scale to contribute to sustainable urban transformation.

Notably, each part is interrelated. Each part is developed from the former and, in turn, helps reflect and refine the preceding parts to realize a positive self-censorship in the MPS design framework.



MRDH Landscape Typologies 1:200 000

- River Clay Landscapes
- Marine Clay Landscapes
- Peat Bog Landscapes
- Coastal Dune Landscapes
- Complex Soil Landscapes
- Urban Core Area



0 5 10 15 km

Map created by author, Data provided by: Open-dataportaal Zuid-Holland

# Metropolitan Landscape Values



## Nature Conservation



Dune, source: <https://www.fietsen123.nl/route/de-duinen-van-meijendel>

## Recreation



Lage Bergse Bos, source: De Rotte.nl

## Water Management



Vlietland, source: <https://www.mirandawandelt.nl/recreatiegebied-vlietland/>

## Food Production



Polder, source: Google map

## Cultural History



Manor, source: geschiedenisvanzuidholland

## Metropolitan Experience



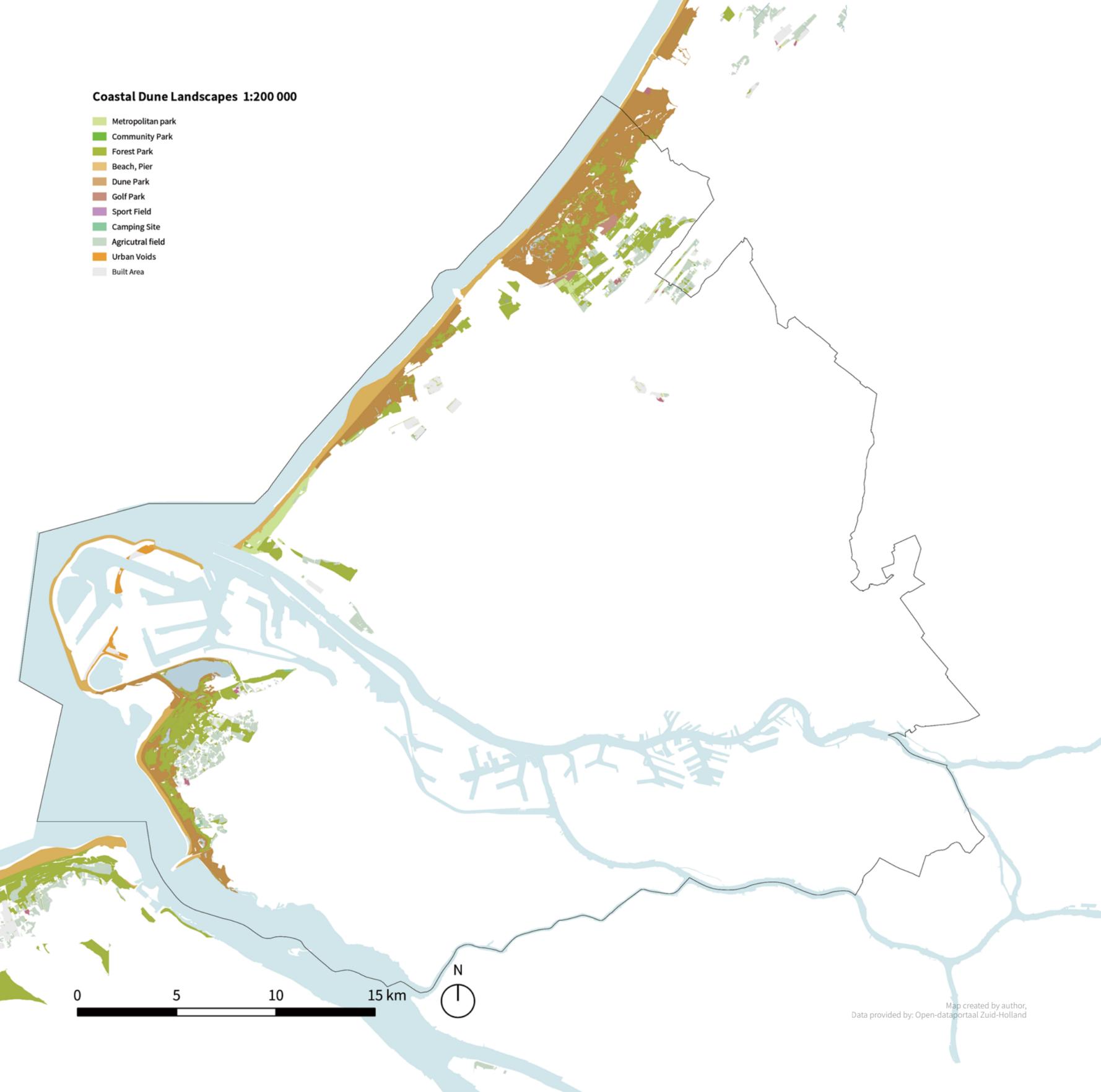
Midden-Delfland, source: <https://www.woneninrotterdam.nl/en/overschie/overschie/>

Metropolitan landscapes are special because of their diverse values, which include nature conservation, providing recreational opportunities, water management, food production, cultural history, and providing a metropolitan experience.

Nature conservation refers to the protection of important habitats, steppingstones, and ecological corridors in the metropolitan region and across the region to prevent the over-exploitation and destruction of important ecological resources that support many aspects of the metropolitan region, such as biodiversity, clean air, material flows, and pollination and organic growth of agricultural crops. Providing recreational opportunities means providing space for metropolitan residents to access green space and engage in a variety of recreational activities, thereby releasing the pressure on the supply of urban green space and promoting physical and mental health, which is rare in urban green space, as urban green space is often dispersed and confined to a certain area, and recreational green space in the metropolitan area is more expansive, and even connects to other land with recreational attributes to form a complete recreational system. Metropolitan areas have more expansive recreational green spaces, even connecting with other lands that also have recreational attributes to form complete recreational systems (e.g., rotte landscape parks), thus providing richer recreational opportunities. Water management in the metropolitan area prioritizes flood prevention, ensuring clean water supply, averting salinization, and maintaining stable support for ecosystems through a symbiotic relationship between water systems and green spaces.

Food production holds significant anthropocentric value within this framework, with farmland playing a crucial role in securing food supply and supporting the agrarian economy. Additionally, it serves as a reflection of unique cultural practices and traditions associated with land utilization in distinct cultural contexts. Cultural history embodies a distinct value within the metropolitan landscape, representing a narrative that can only be deciphered and appreciated. The inhabitants of MRDH have forged their own cultural identity and interactions with the landscape, shaping a landscape character that sets it apart from other metropolitan areas.

The metropolitan experience offers a uniquely immersive value, with each urban area presenting its own distinct contrast between vast natural expanses and towering urban skylines. This juxtaposition creates a striking experience, seamlessly transitioning from the bustling city streets enveloped by towering buildings to serene natural environments just moments away. Whether immersed in the hustle and bustle of city life or embracing the tranquility of nature, the metropolitan landscape offers a cosmopolitan pathway where these contrasting worlds converge, providing a harmonious balance between urban vibrancy and natural serenity.



# Metropolitan Landscape Typologies



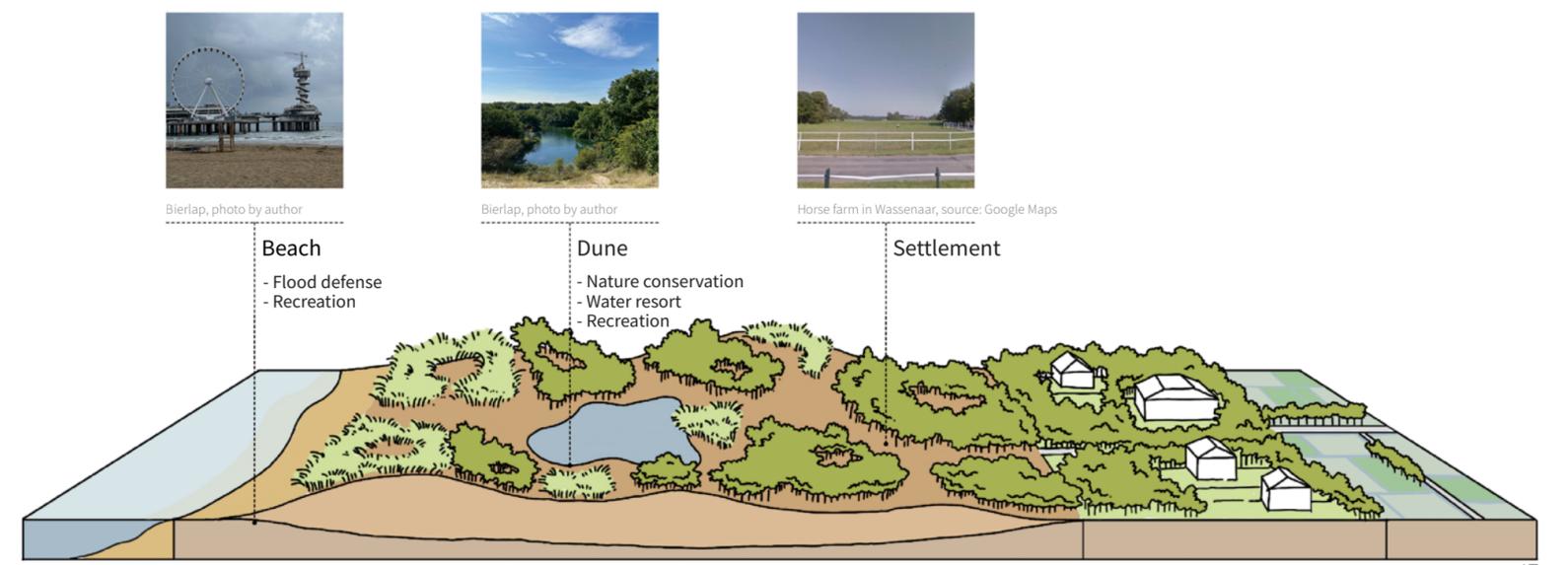
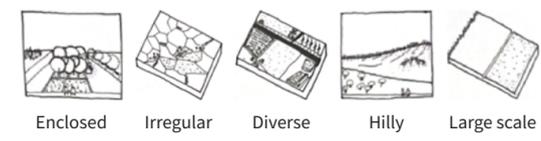
Meijendal, Source: <https://www.fietsen123.nl/route/de-duinen-van-meijendal>

## Coastal Dune Landscape

The coastal dune landscape represents a distinctive and unparalleled feature within the MRDH, characterized by its significance in nature conservation, freshwater provision, and recreational opportunities. Serving as host to national parks, this landscape is carefully preserved to uphold its ecological integrity and recreational appeal.

Its varied topography facilitates the formation of numerous water storage pockets, while the permeable sandy soil allows for rapid filtration and recharge of freshwater into the groundwater, serving as a vital resource for approximately 1.3 million inhabitants in the South Holland region. Furthermore, the presence of lakes amidst the arid dunes adds aesthetic richness to the landscape and enhances recreational opportunities. Moreover, the dune landscape provides elevated vantage points offering unobstructed views of the open dunes and even glimpses of the city skyline, making it a rare and cherished feature within the metropolitan area.

Considering its unique characteristics and multifaceted contributions, the dune landscape emerges as a distinctive socio-ecological design element within the MPS vision for the MRDH. Its integration into the MPS framework not only enhances the natural ecological value of the region but also enriches its cultural and recreational significance.





# Metropolitan Landscape Typologies

## Peat Bog Landscapes

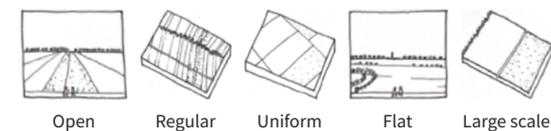


Midden Delfland, Source: <https://www.siebeswart.nl/image/100001JapYzdAyMo>

The peat bog landscape, reclaimed from rivers and lakes, features an abundance of water systems and is characterized by a diverse array of grass species and wet forests, providing an ideal habitat for numerous meadow bird species. Its fertile soil also renders it suitable for agriculture and food production. One of the most distinctive features of these landscapes is the traditional polder structure, characterized by drainage channels and waterways. While farming activities thrive in the polders, the resulting lower water levels contribute to subsidence, posing long-term challenges. Therefore, maintaining higher water levels can minimize potential soil subsidence processes while promoting biodiversity.

Initiatives to convert farmland into nature reserves and adopt more nature-inclusive farming practices are underway, exemplifying efforts to foster a more nature-inclusive future. Parks built atop peat bog landscapes feature wetlands, meadows, water retention areas, and moderate forest cover, enhancing biodiversity. The landscape's openness and extensive watercourses contribute to its spatial characteristics, while scattered cultural and historical features, such as windmills and old village houses, add to its visual appeal.

Given the sensitivity and value of these landscapes, there is a need for a balanced approach to their exploitation. However, they also offer opportunities for ecology, recreation, and unique experiences through subtle and moderate interventions. Their close proximity to urban areas further enhances their recreational value.



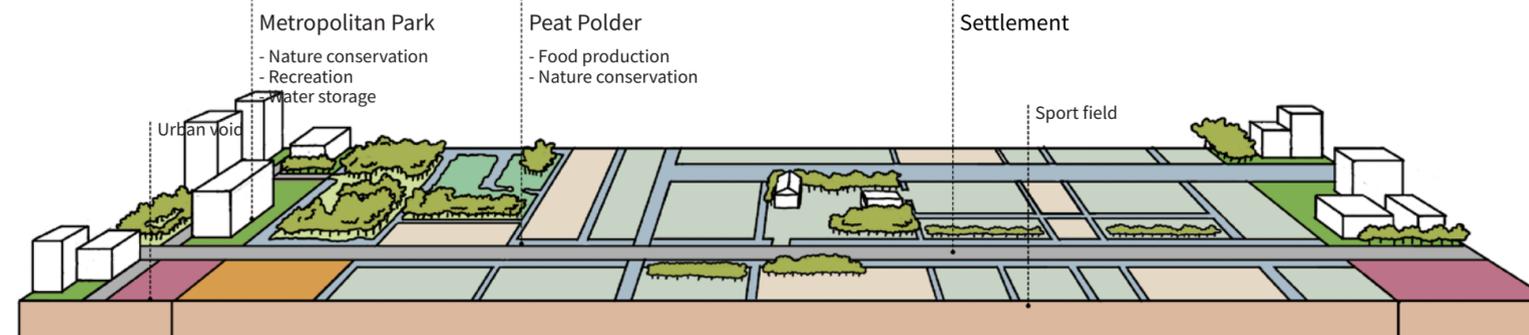
Hoge Berge Bos, Source: De Rotte



Midden-Delfland, Source: Midden-Delfland.net

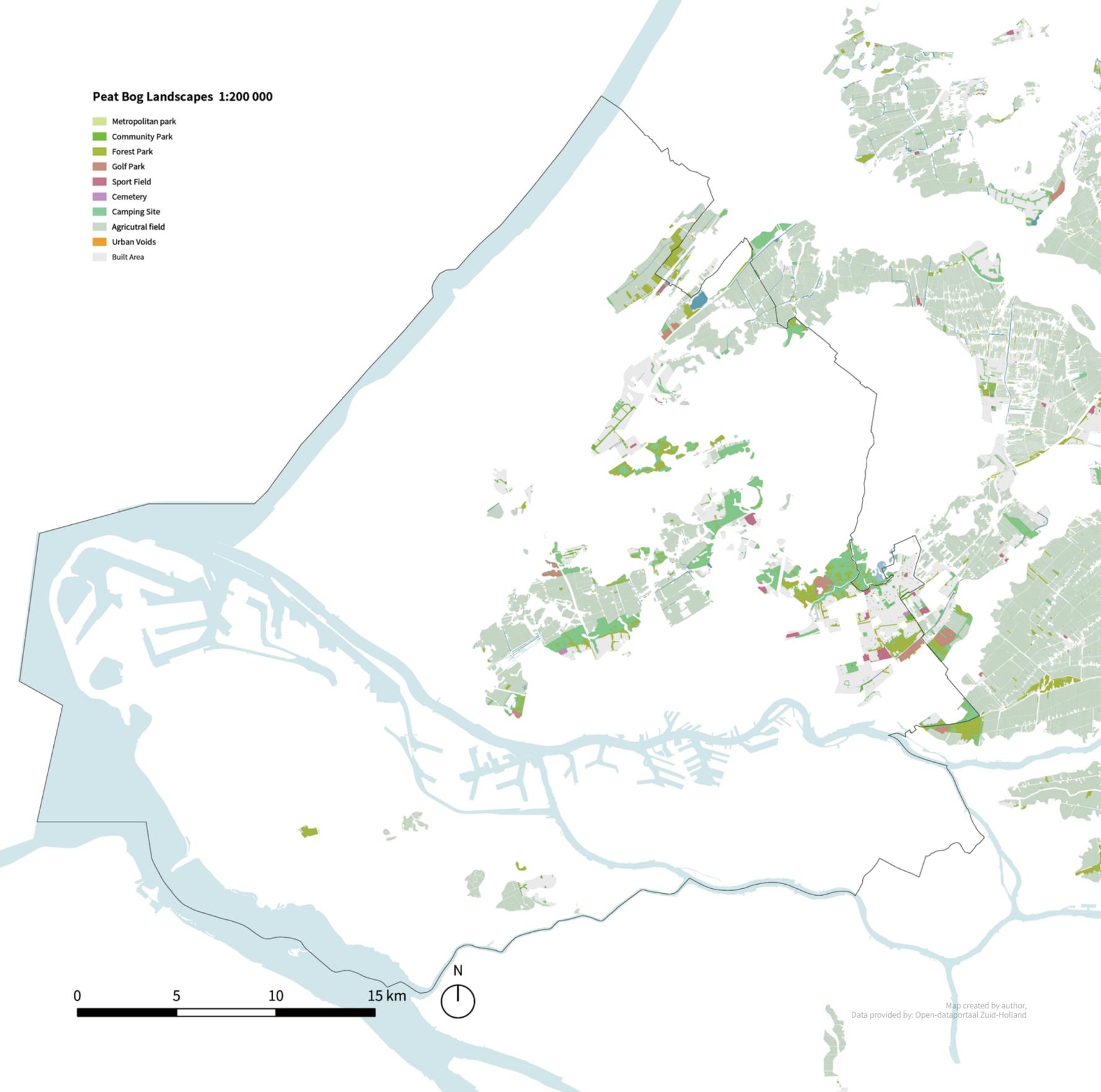


Urban fringe, Source: Google Maps

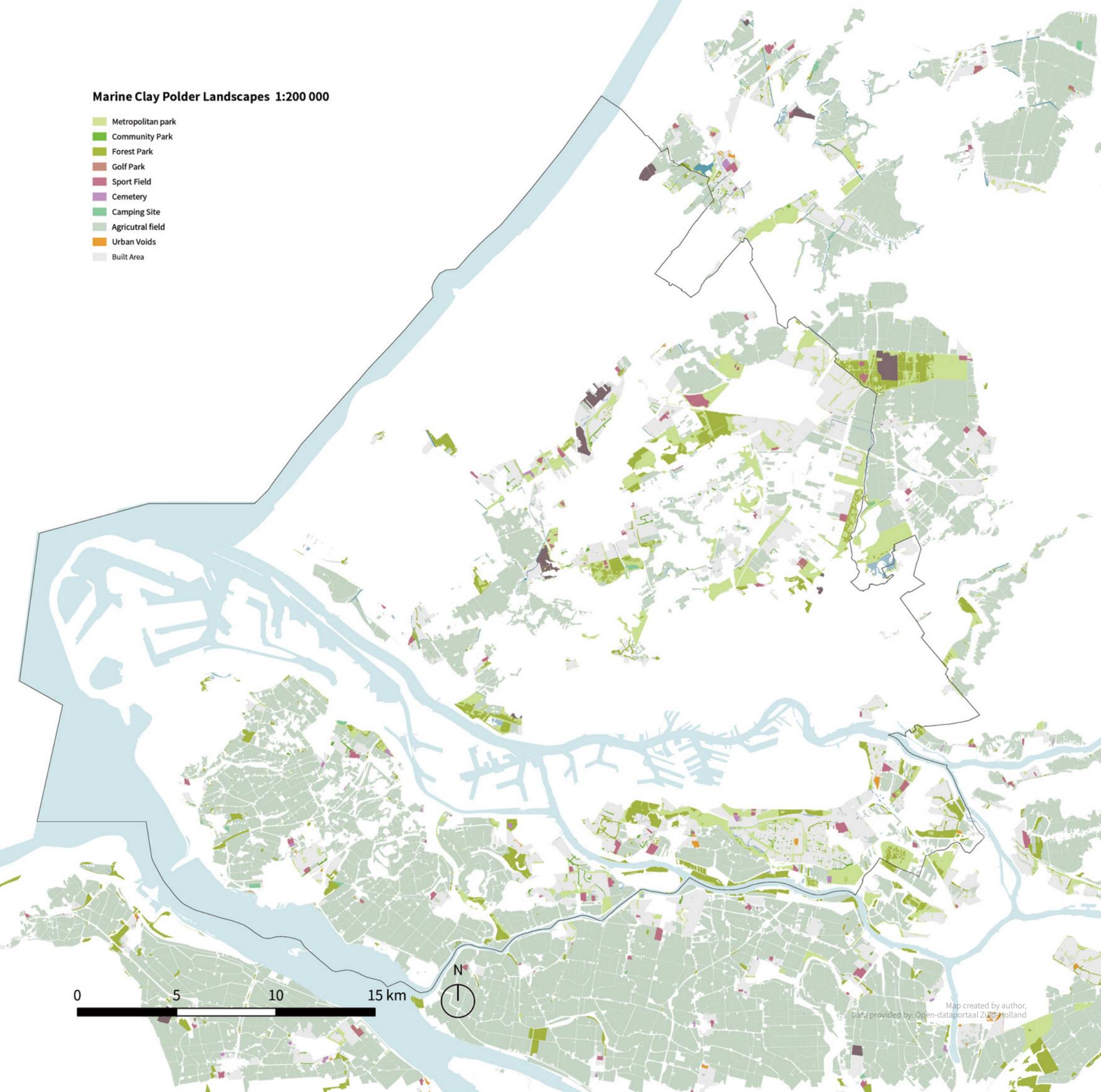


### Peat Bog Landscapes 1:200 000

- Metropolitan park
- Community Park
- Forest Park
- Golf Park
- Sport Field
- Cemetery
- Camping Site
- Agricultural field
- Urban Voids
- Built Area



Map created by author, Data provided by: Open-dataportaal Zuid-Holland



# Metropolitan Landscape Typologies

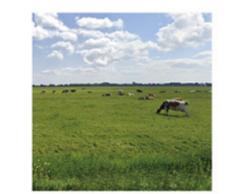
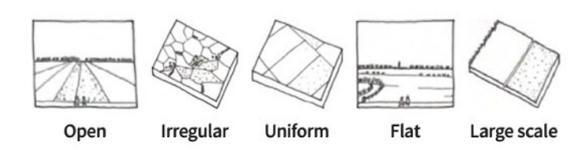


Polders between Vierpolders and Hellevoetsluis, Source: Google Earth

## Marine Clay Landscape

The Marine clay landscape, reclaimed land units in the delta area of the metropolitan region, has been intensively used for agriculture and hosts various open grassland species. It also provides space for multiple park programs.

This landscape is rich in cultural-historic features, including windmills and dykes, which symbolize the Dutch people's ingenuity in reclaiming land below sea level for development. Its openness and flatness are key spatial characteristics, reminiscent of the peat bog landscape. Moreover, the Marine clay landscape offers opportunities for nature-inclusive agriculture and highlights its cultural-historic heritage to attract metropolitan tourism, fostering a comprehensive approach to socio-ecological promotion. These inherent landscape features have great potentials to serve as venues for recreational, and socio-cultural activities and ecological improvement in the MPS design.



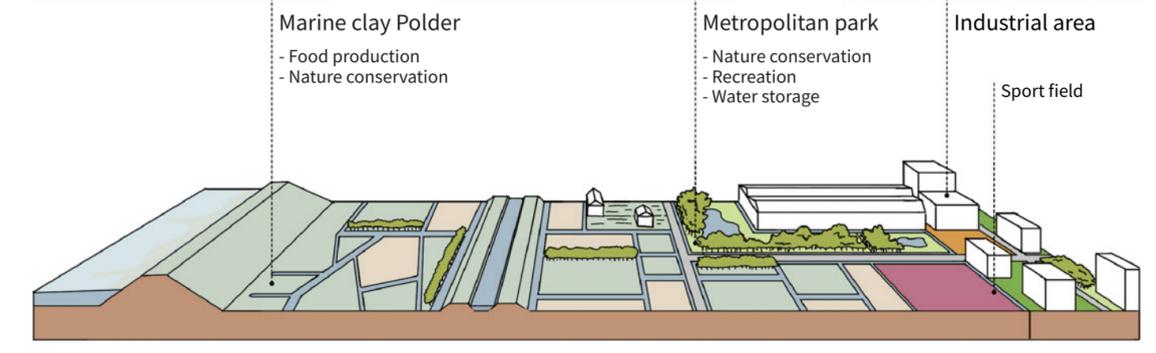
Rhoonse Grienden, Source: Google map



Rhoonse Grienden, Source: wandelnet



Greenhouses, source: rtlnieuws



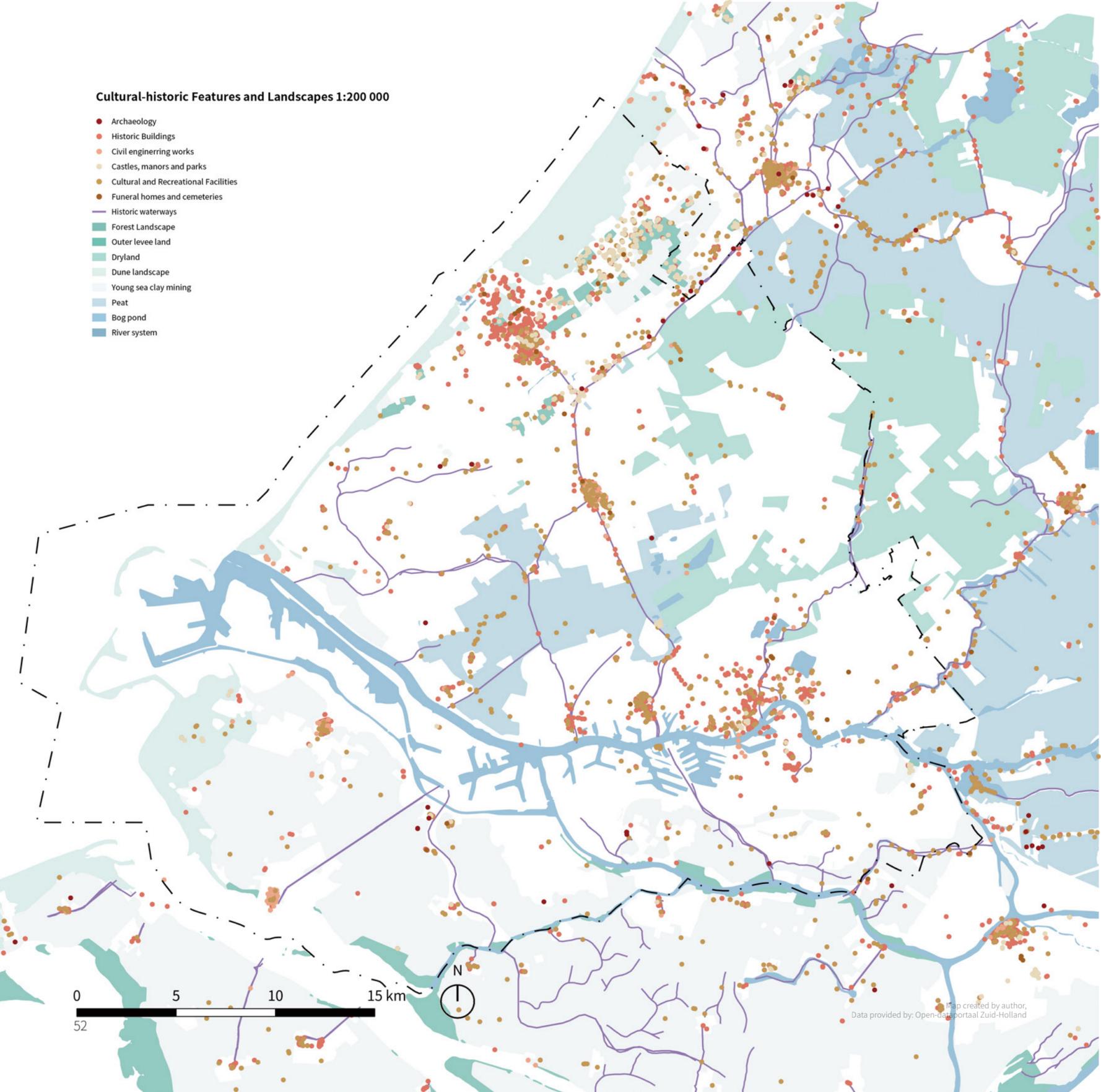


# Metropolian Landscape Typologies

## Cultural-historic Features

The distinguishing cultural-historic characteristics of the MRDH lies in its multifaceted landscape composition, setting it apart from other metropolitan areas. This cultural-historic landscape features can be dissected into points, lines, and surfaces, each offering unique insights into the region's history, cultural heritage, and geological features.

Points within the MRDH landscape represent clusters of historic structures such as windmills, manor houses, and local museums. These landmarks serve as tangible remnants of past human activity, reflecting the ways in which inhabitants have interacted with and shaped the surrounding land over time. Meanwhile, lines in the landscape consist of historic waterways and sea defenses, such as seawalls and levees, which not only demonstrate human interventions but also provide clues about historical land use practices and perceptions of the landscape. Surfaces refer to various landscape types that shapes the specific spatial characteristics of the land they exist. For instance, dune landscapes and marine clay landscapes exhibit distinct geological characteristics, influencing the development and presentation of the built environment. The juxtaposition of these landscape types underscores the diverse geological and cultural influences that have contributed to the MRDH's landscape heterogeneity.



Map created by author, Data provided by: Open-data portaal Zuid-Holland

Civil Engineering Work



De Prinsmolen, Source: ookditsderotte.nl

Cultural and Recreational Facility



Atlantikwall Museum, Source: geschiedenisvanzuidholland

Levee



Hoek V. Holland, Source: opentoptroulocatieroute

Dike



Noordzeeweg, Source: Google map

Historic Waterway



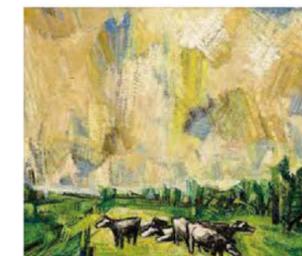
River Rotte, Photo by Author

Castle, Manor and Park



Voorburg, Source: geschiedenisvanzuidholland

Painting



Lentelandschap, Source: Chabot Museum

Dunes



Bierlap, Source: photo by author



## What aspects should MPS contribute to for achieving **sustainable urban development** in MRDH?



### Water and Climate Adaptation

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#### Climate change

- Fresh water storage
- Ground water storage
- Drought-prone



### Ecology and Biodiversity

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#### Biodiversity

- Food source
- Human disturbance
- Corridor quality
- Connectivity



### Cultural-historic Value

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#### Recreation

- Cultural-historic expression
- Green accessibility



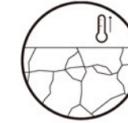
### Water Management Challenges 1:200 000

- 0-10 mm
- 10-20 mm
- 20-30 mm
- 30-40 mm
- >40 mm
- Salt water intrusion
- Boezem
- Lake



Map created by author.  
Data provided by: Open-dataportaal Zuid-Holland

## Challenges



### Extended heat & drought

- Extended hot weather duration and higher fresh water demand.
- Less precipitation in dry season.



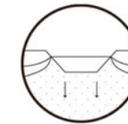
Subsidence →



Salinization →

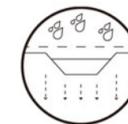


Eutrophication



### Reduced groundwater storage

- Decreased permeable land.
- Lowered groundwater table due to subsidence.

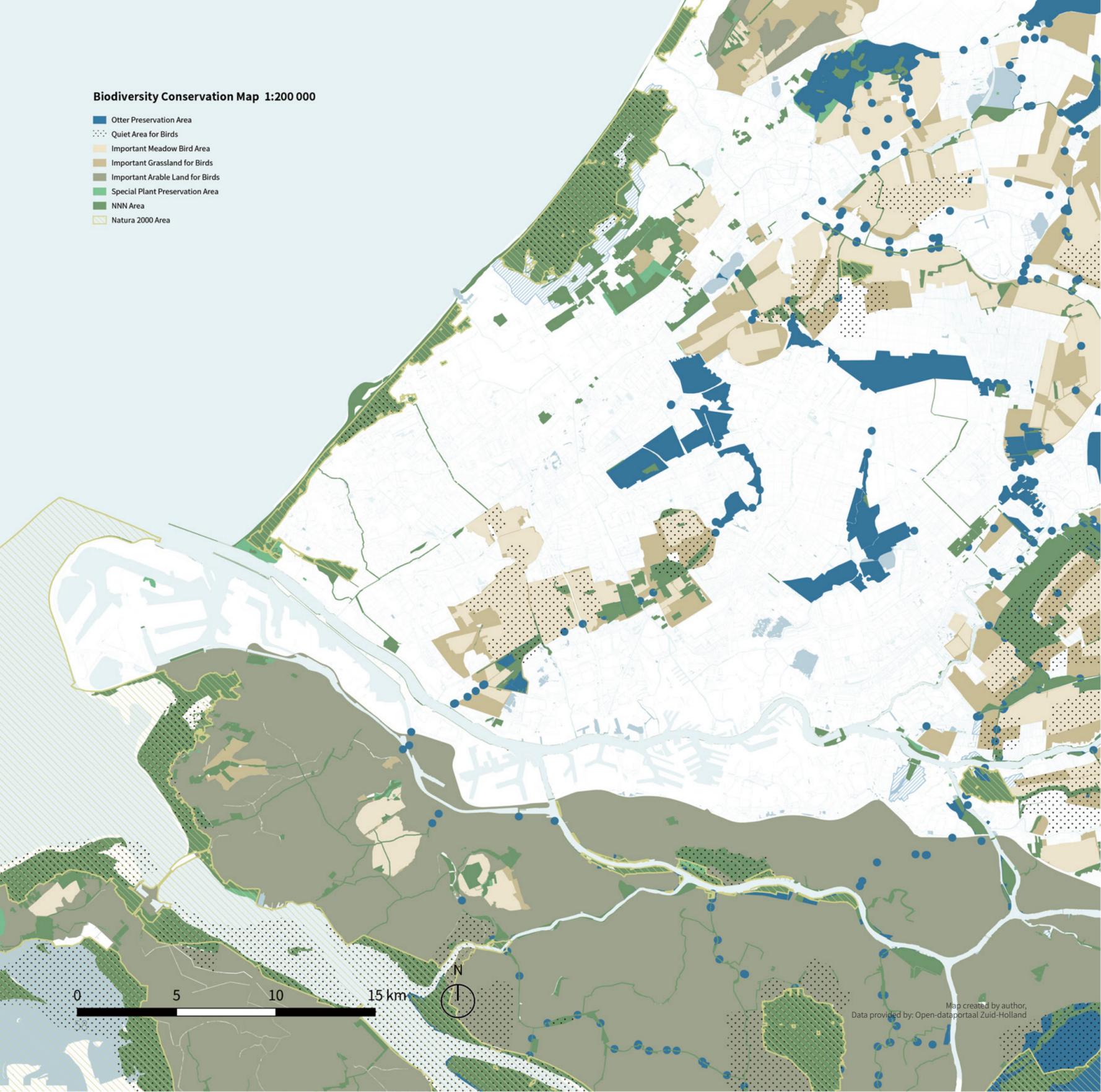


### Demand on more water retention

- Increased precipitation.
- Incompatible area for temporal water retention.

## Water Management

Challenges in water management arise mainly from the effects of climate change, as summers become longer, warmer and with less rainfall, the land on which water depends such as the polder will be the first to be affected due to increased water demand and the lowering of the water table, the relationship between water and land is very complex, and in the event of a lowering of the water table and subsidence of the soil, this will not be resolved by recharging the soil with water alone, as the peak of the soil layer will be less permeable in the process of soil subsidence. process, the permeability of the soil will be reduced and the peak of the water table will be fixed at a lower level. Therefore, flexible strategies for freshwater storage and circulation are particularly important.



# Challenges



## Extended heat & drought

- Irreversible damage to drought-prone wetland.



## Habitat fragmentation

- Isolated habitats lacking connections.
- Lacking diverse stepping stones to build up connections.
- Incompatible food source.



## Human disturbance

- Increasing human visit.
- Noise from recreational activities and transportation.
- Incompatible vegetation abundance for sheltering.

# Nature Conservation

Nature conservation is a central concern of MPS as it directly reflects the quality of the metropolitan landscape. There are three main challenges to building a sound ecological conservation network in the MPS today, the first still comes from the impacts of rising temperatures and drought due to climate change, with its irreversible damage mainly to drought-sensitive wetlands, which is closely related to the challenges of water management, rather than each challenge being a separate topic that is unrelated to each other.

The second challenge is ecological connectivity. Ecological corridors and steppingstones are important ecological structures that support the movement of important species across multiple habitats within the MRDH, but nowadays, due to urban development, a number of terrestrial and aquatic natural habitats located at urban boundaries have been isolated, and there is a lack of strong ecological connectivity to reconnect them to the complete ecological network. In addition, the quality of ecological corridors and steppingstones is also a concern, as a diverse and inclusive ecological structure will better support the flora and fauna of the MRDH, thus ensuring that the ecosystem services of the MPS will continue to support sustainable urban development in the metropolitan region. The third challenge stems from the increasing human disturbance, as the number of visits and recreational activities in nature reserves in metropolitan landscapes is increasing, and how to balance human recreational activities with the normal life of the species will be an additional consideration in the design of the MPS.



## Challenges



### Slow Traffic Accessibility

- low connectivity between recreational greenlands.
- Demand for diverse travel routes and modes to alleviate current travel pressure.



### Metropolitan Experience

- Clear image to increase metropolitan landscape attractiveness



### Increasing Demand on Recreation

- Increasing need to more open space supply

## Cultural-historic Value

Currently, MRDH has a relatively extensive public transportation and recreation network, but lacks a well-defined thread that guides metropolitan residents or visitors to the city to appreciate the uniqueness of the metropolitan landscape. This major challenge reflects the need for the MPS design to sift through the many travel options and routes available in the MRDH to organize a complete presentation of the MRDH's unique metropolitan cultural and historical character through landscape and cultural-historical character routes and landscape narrative routes. In addition, this also provides a good entry point to use the MPS as a landscape amenity that integrates mobility to enhance green accessibility and connect cultural and historical features to create a natural-cultural experiential landscape.



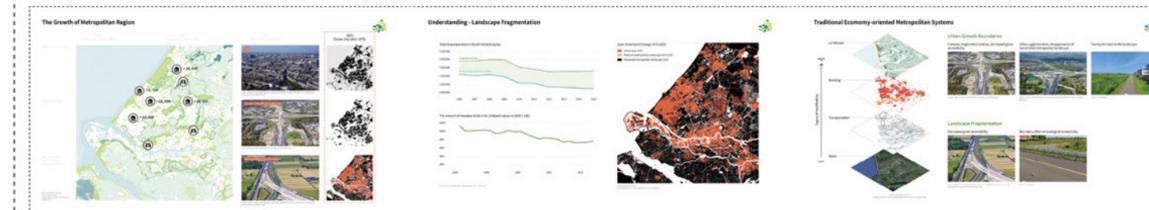
# Design Assignments

## MPS Design Assignments 1:200 000

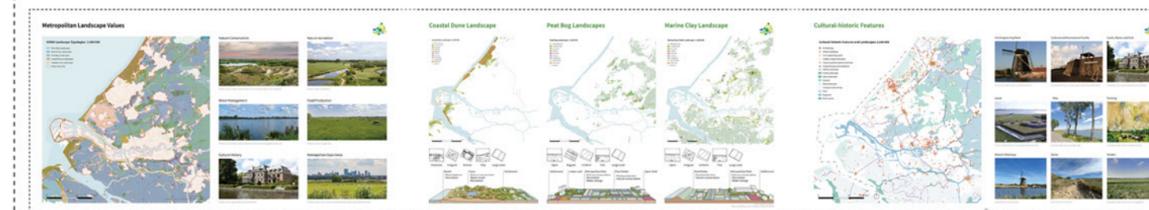
- Boezem structure for MPS
- Waterscape enhancement
- Inlets of salinized area
- Strengthening city-nature transition
- Strengthening ecological connection
- Recreation network



### Metropolitan system



### Metropolitan landscape values



### Metropolitan landscape challenges



The identified challenges highlight specific issues arising from the dual pressures of climate change and urban development that will impact the functionality of metropolitan landscapes in the long term, thereby hindering their expected contribution to urban sustainability in metropolitan areas. These challenges are interrelated and cannot be addressed in isolation. For example, extended periods of heat and drought not only strain water systems but also create ripple effects on aquatic ecosystems. Similarly, the increased demand for nature-based recreation must be managed carefully to minimize disturbances to natural habitats caused by heightened human activity.

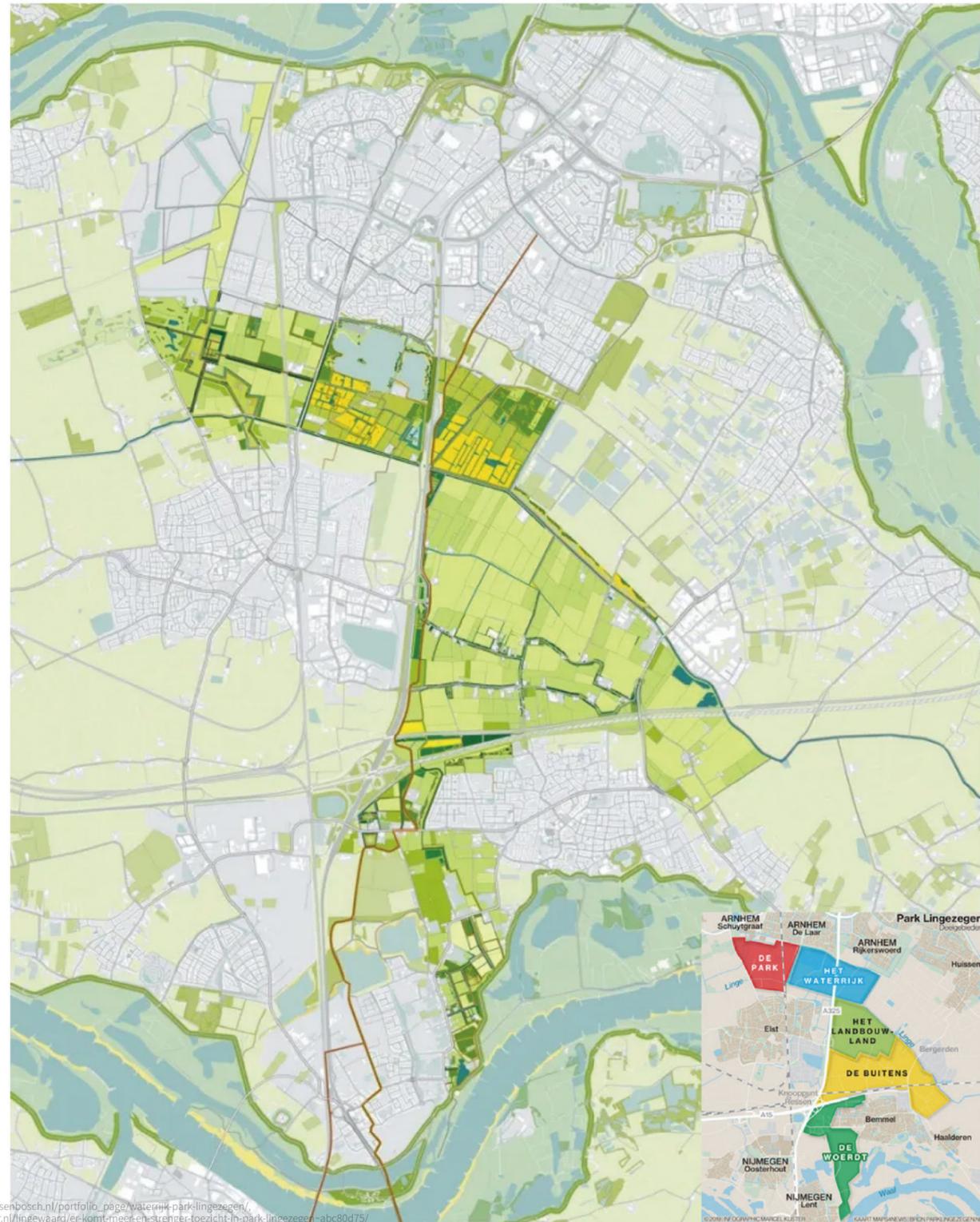
landscape values. This integration indicates that efforts should be directed towards the forthcoming MPS design. The map is not only indicative for the project itself but also serves as a visual and textual tool that can be interpreted by experts from various fields, allowing for diverse perspectives to inform the design outcome. It functions as a stage-by-stage representation of the MRDH's analysis and conclusions from a landscape perspective, clearly identifying the shortcomings of the current metropolitan landscape in promoting urban sustainability. This approach guides landscape architects and professionals from other disciplines to engage in an interdisciplinary effort to enhance the spatial qualities and values of the MRDH's metropolitan landscape.

In summary, the design assignment map integrates these challenges with the study of the metropolitan system, focusing on metropolitan patterns and





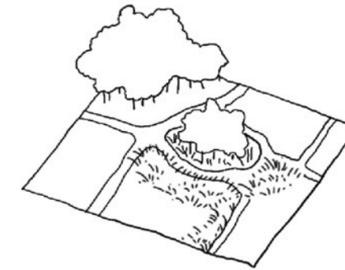
# Case Study



Innundable land for seasonal water storage



Heterogeneous stepping stone



Circular historic experience route



## Park Lingezegen, the Netherlands

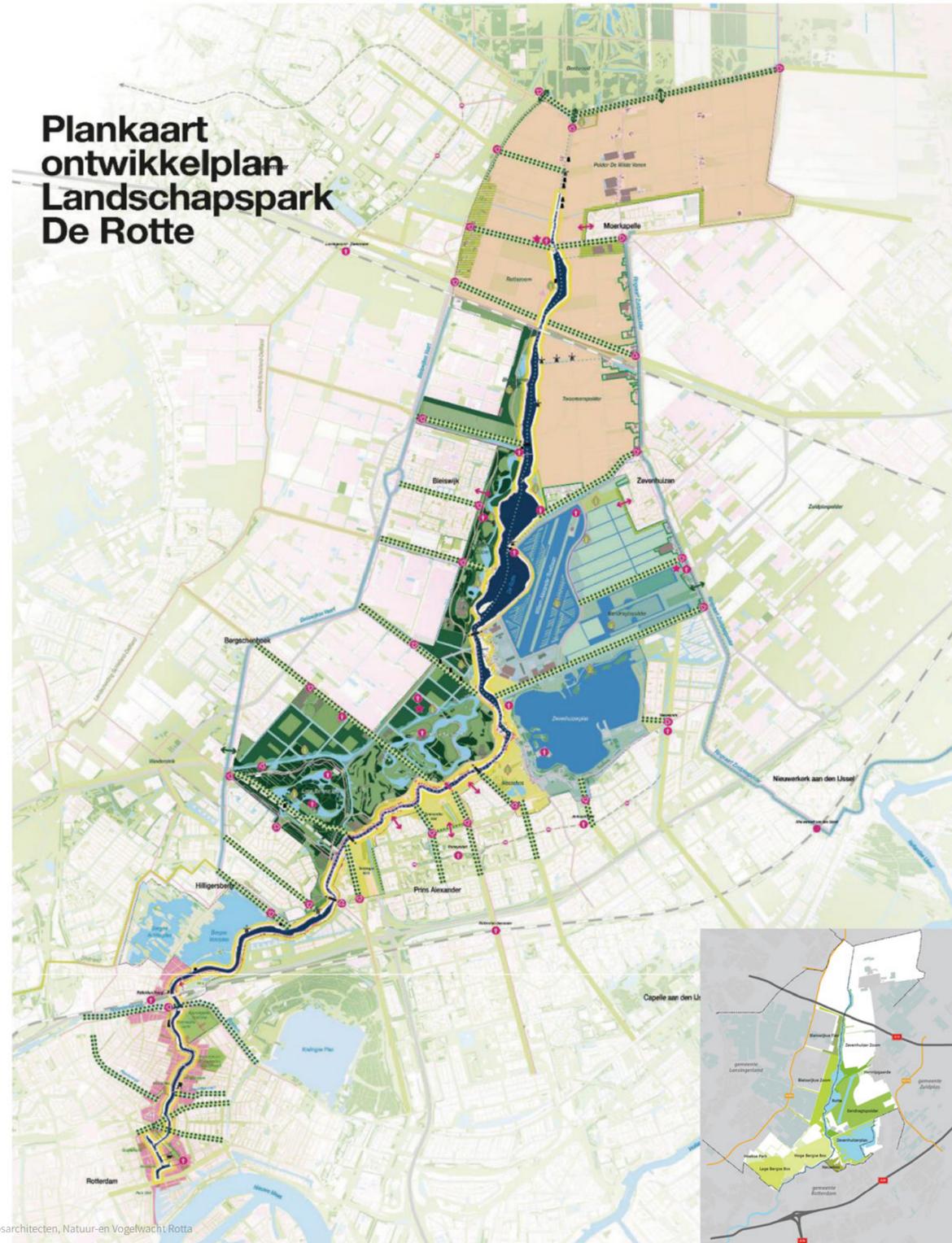
Lingezegen Park (Park Lingezegen) spans 1500 ha in the Green Metropolitan Region Arnhem-Nijmegen. The park is designed to serve various land use objectives to promote sustainable urban development in the metropolitan area, including water retention, nature conservation, sustainable agriculture and agroforestry, slow traffic network, and recreation (van der Meulen et al., 2021; van der Meulen & Stobbelaar, 2024). As an essential landscape-based spatial approach to contribute to the region's sustainable development under climate change, further urbanization of this metropolitan park structure is deemed incompatible, excluding Lingezegen Park from the housing search area in the regional plan (Gemeente Overbetuwe, 2013).

Lingezegen Park encompasses multifunctional sections dedicated to nature conservation, water management, recreation and agriculture. The park establishes connectivity with existing nature reserves in the metropolitan area, bridging the gap between prestigious areas. Situated in the Waal and Lower Rhine floodplain, the park facilitates the rewilding and widening of the canalized Linge River to address flood and drought challenges associated with climate change. Diverse natural spaces, including open water, marshes, reedbeds, wetlands, and wet forests established along the new river channel, can enhance riparian habitats' spatial qualities and water quality. The transformation strategy "first retention, then storage, and finally discharge" for the Linge River preserves the current channel while gradually widening it to create nature-friendly embankments that can sustainably manage water flow to maintain a dynamic balance, allowing the river to adapt to seasonal variations with minimal human intervention (Gemeente Lingewaard & Gemeente Overbetuwe, 2011).

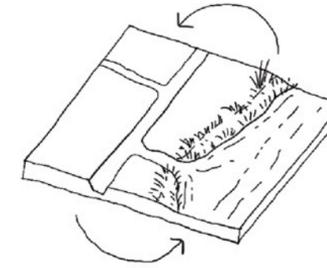
Another key objective of the park is to serve as a high-quality recreational metropolitan area for the region to address population growth while enhancing accessibility and attractiveness. Lingezegen Park will establish a network of recreational routes, primarily consisting of cycle paths and footpaths combined with amenities like information boards and picnic sites. Motor traffic will be rerouted to the park's periphery. Moreover, the recreational network will highlight the cultural and historical features of the park's landscape spatial characteristics that humans can exclusively read, it opens a gate to explore monuments such as the defence embankment, chapel, old country house, Lime Tree, and old settlement that were the results of human interactions with the landscapes (Gemeente Overbetuwe, 2013).



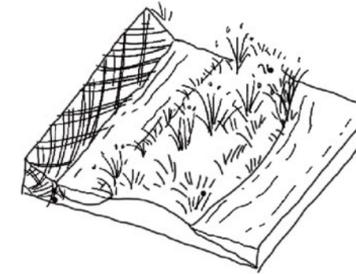
# Case Study



Agri-nature water circulation



Diverse embankments for diverse species



Water-based experience route



## Landschapspark de Rotte, the Netherlands

Rotte Landscape Park (Landschapspark de Rotte) serves as a metropolitan park running alongside the Rotte River, facilitating the connection between Rotterdam's natural ecology and the surrounding metropolitan landscape. Its primary objective is to establish a continuous blue-green corridor along the Rotte, promoting biodiversity conservation and enhancement in South Holland. The park is structured into four distinct landscape types (Natuur- en Vogelwacht Rotta n.d):

- The western portion features a forested landscape, comprising Hoge en Lage Bergse Bos, Hoekse Park, and Bleiswijkse Zoom. This area aims to develop a robust vertical landscape structure, transitioning into a wet forested landscape encompassing woodland, swampy grassland, meadows, and lakes. By connecting with the Bentwoud River eco-region to the west, this section facilitates the migration of ground and water-related animal species, as well as insects, butterflies, and bees.

- Located east of the River Rotte, the water features include Eendragtspolder and Zevenhuizerplas. These wetlands are preserved to maintain their natural character, with plans for extension to create an east-west wetland connection, enhancing connectivity with surrounding ecological areas. Opportunities exist to utilize the impoundment for recreational purposes, such as developing canoe routes to augment the area's recreational appeal.

- The northern section comprises polder landscapes, including Rottezoom, Tweemanspolder, and Polder Wilde Venen, preserving the Netherlands' unique open agricultural landscape. Efforts are underway to preserve and enhance the cultural and historical aspects of these landscapes, while exploring landscape-inclusive agricultural practices such as circular farming and multifunctional agriculture.

- The Inner City Rotte, situated in the southern part of the park, focuses on integrating green spaces with the urban fringe. This area supports urban-natural foraging and habitat for various species, contributing to the city's biodiversity.

Through these distinct landscape zones, Rotte Landscape Park aims to foster ecological connectivity, preserve cultural heritage, and promote sustainable agriculture while enhancing recreational opportunities and biodiversity within the metropolitan region.

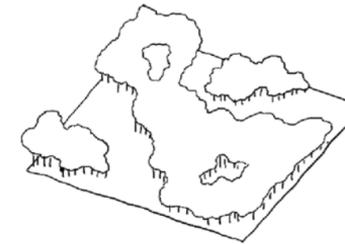


# Case Study

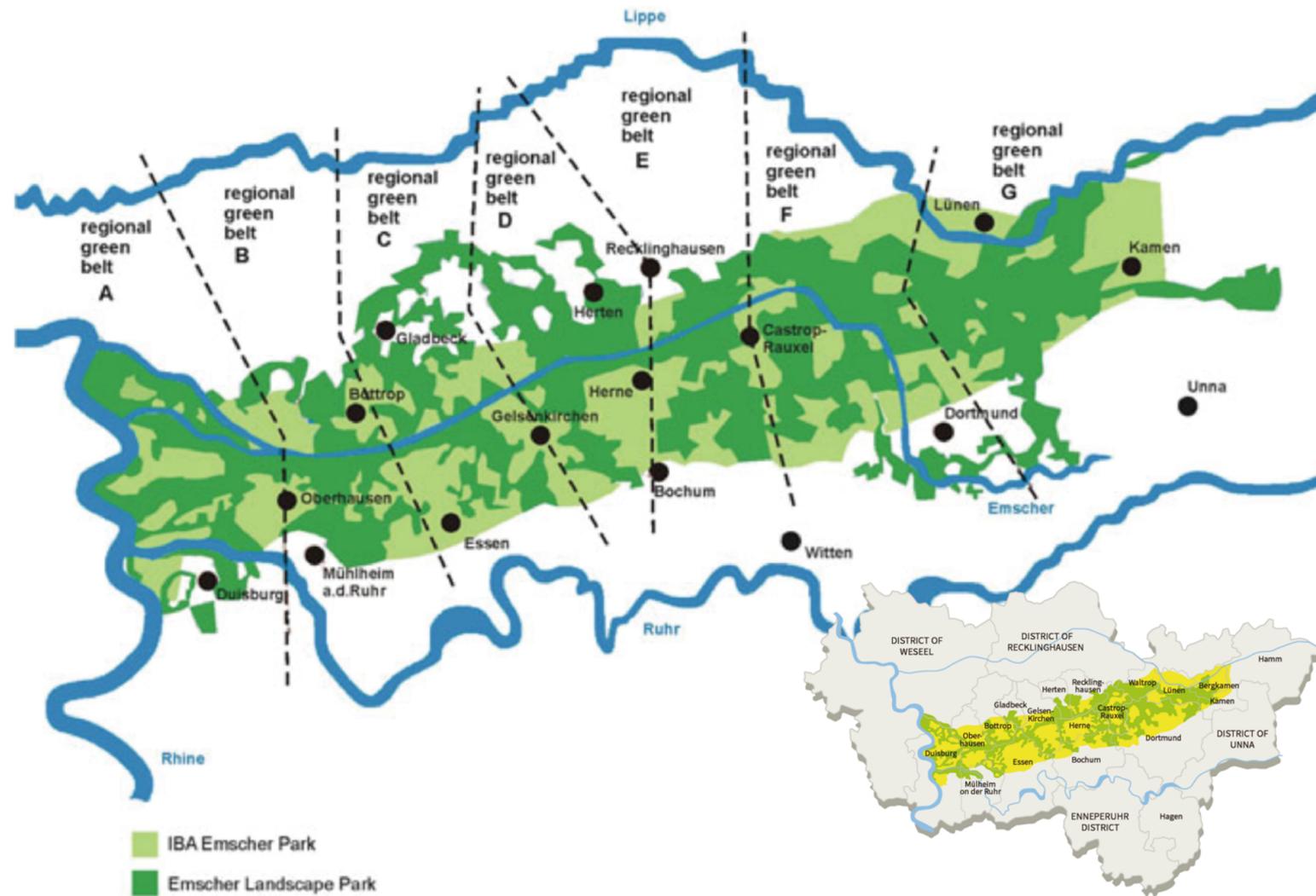
River as core structure for development



Forest as connective structure



Landscape art for stressing local feature



## Emscher Park, Germany

The central feature of the Emscher Landscape Park is its regional green corridor, consisting of seven individual north-south corridors connected to the new east-west corridor known as the "Emscher Valley." This comprehensive park system holds European significance and aims to revitalize the Emscher River System, serving as its backbone. The park is designed to fulfill five primary objectives: (1) Preservation of remaining landscape remnants. (2) Connectivity of isolated areas within the agglomeration. (3) Conversion of separate areas into parkland. (4) Long-term regional and local project agreements. (5) Permanent management of new open spaces through a regional park association.

Historically, the Emscher River was plagued by pollution and neglect, functioning as an open sewer. However, the park's redevelopment seeks to transform it into an attractive parkland stretching from its source to the River Rhine. This revitalization effort involves redesigning waterways and opening previously inaccessible areas to the public. New promenades and pathways alongside redesigned waterways, adorned with typical bankside vegetation and amenities like benches and terraces, will enhance the area's appeal to hikers and cyclists. Additionally, tourist facilities along the canals will be developed to further attract visitors. Over time, the river system will rely solely on spring water, rainwater, and purified wastewater. Expanding leaching areas will improve the region's natural water balance, creating space for extended meadowlands and biotopes.

Ultimately, the new Emscher Valley will serve as the green basis of the Ruhr Metropolitan Area, alongside the Rhine-Herne canal and the river Emscher. It will provide significant impetus for both metropolitan and urban transformation projects in the coming years.

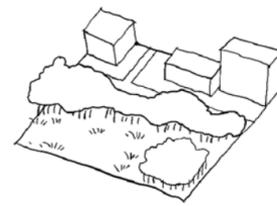
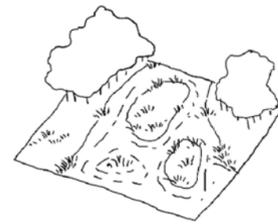
# Case Study



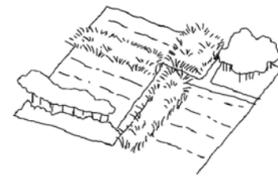
Source: Gemeente Midden-Delfland

## Midden-Delfland, the Netherlands

Wetland to enhance water adaptivity    Woodlands as city-nature buffer

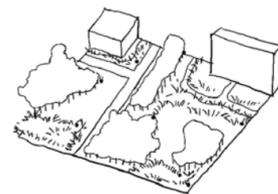


Sustainable agriculture



## Rhein-Main Regional Park, Germany

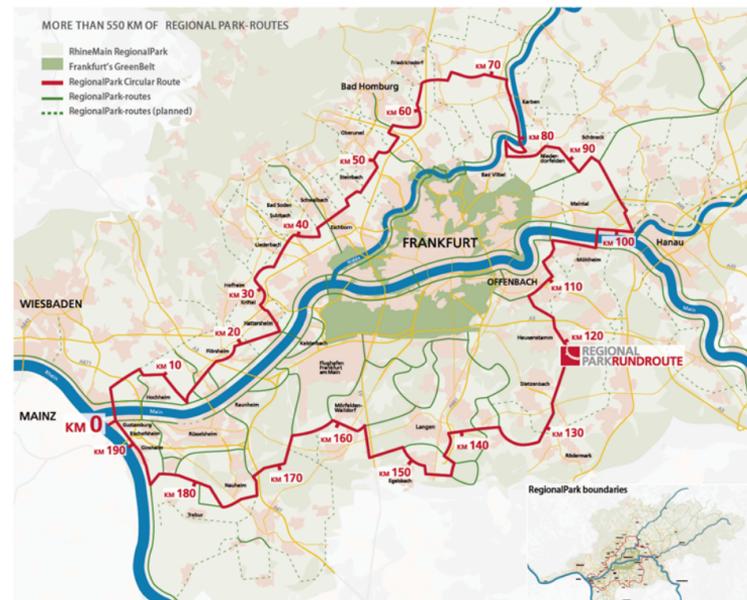
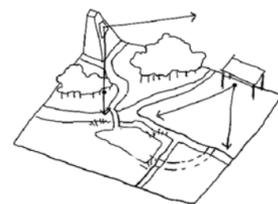
Continuous green corridors



View points and site-specific landmarks



Spots for representing landscape quality



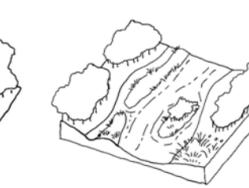
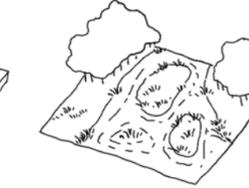
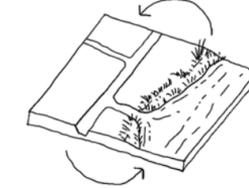
Source: <https://www.regionalpark-rheinmain.de/>

# MPS Principles



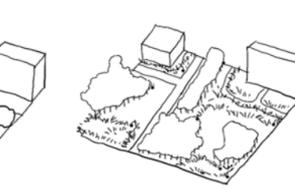
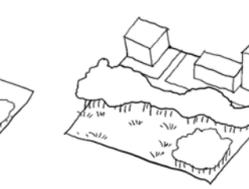
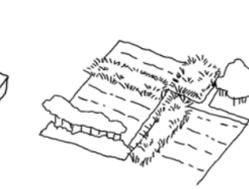
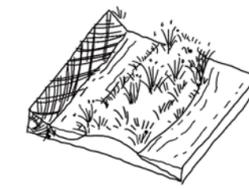
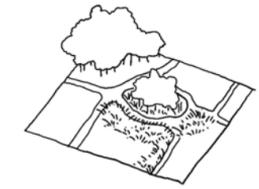
## Water and Climate Adaptation

Inundated land for seasonal water storage    Agri-nature water circulation    Wetland to enhance water adaptivity    Water ways as core structure for development



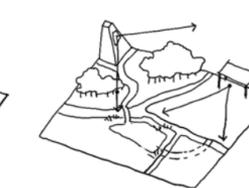
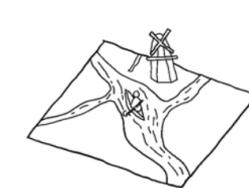
## Biodiversity and Ecology

Heterogeneous stepping stone    Diverse embankments for diverse species    Sustainable agriculture    Forest as connective structure    Woodlands as city-nature buffer    Continuous green corridors



## Recreation and Cultural-history

Circular historic experience route    Water-based experience route    Spots for representing landscape quality    Landscape art for stressing local feature    View points and site-specific landmarks



## 04 Exploration

What are the long-term visions and short-term interventions for MRDH?

### Long-term Vision

MRDH MPS vision map  
Strategic projects

### Short-term Intervention

The urban boundaries  
Urban scale design  
Local scale Design





**To design a robust landscape based MPS that safeguards the essential landscape values and guide sustainable urban development in MRDH.**



# MRDH MPS Vision

**Water resilient basis to address climate challenges**

**Connective green network for nature to thrive**

**Diverse recreative routes to access Cultural-historic features in the landscapes**

## Robust Green-blue framework design model

The overarching idea of long-term vision for the MPS entails designing a resilient green-blue framework for the metropolitan region. This involves establishing a water-resilient basis to address climate challenges, creating a connected green network to support biodiversity, and planning diverse recreational routes that showcase cultural-historic landscape features. The goal is to develop an interconnected metropolitan park structure that safeguards key assets of the metropolitan region while enhancing its adaptability and resilience to climate change. By protecting core landscape resources from depletion and fragmentation due to urban sprawl, safeguarding robust basis for MRDH sustainable urban development.

At its core, the vision seeks to establish an interconnected metropolitan park structure. This involves integrating various parks, green corridors, and recreational spaces into a unified system that spans the entire MRDH region. Such an interconnected structure not only enhances accessibility to nature within urban environments but also supports ecological resilience by creating larger, contiguous areas of greenery that can buffer against urbanization pressures and climate impacts.

A critical goal of the MPS is to safeguard core landscape resources from depletion and fragmentation caused by urban sprawl. This involves strategic land-use planning that prioritizes conservation of natural habitats, agricultural lands, and culturally significant landscapes. By preserving these essential assets, the MPS aims to maintain ecological integrity, protect biodiversity, and ensure that future generations can continue to benefit from the environmental, social, and economic services provided by these landscapes.

In summary, the MPS's long-term vision for MRDH revolves around integrating sustainable water management, biodiversity conservation, and cultural-historic preservation into the fabric of urban development. By creating a resilient green-blue framework and interconnected park structure, the vision aims to enhance the region's adaptability to climate change while promoting sustainable urban growth and improving overall quality of life for its residents.





# MRDH MPS Vision



**Strategy 1**  
Use boezem system as powerful backbone for fresh water management.



**Strategy 2**  
Develop more open space for water storage to mitigate flood and drought.



**Strategy 3**  
Raise water levels and develop reservoirs in certain snalinization-prone spaces.



## Water resilient basis to address climate challenges

The MRDH has a very robust boezem network and frames the backbone of the MRDH water system, maintaining the water resiliency of the metropolitan area. Utilizing its connectivity and stabilizing effect on the overall water system, this expansive water network connects the urban area to the metropolitan area and the city to the city, and at the same time, such a stabilized water system is better able to regulate the surrounding green spaces and other sub-water systems. Therefore, it will also be the foundation of the MPS, which cannot be constructed without the support of the water system, which is also close to the core of the MRDH, which is facing climate problems related to water, integrating the boezem system into the MPS and constructing a more water-resilient and climate-adaptive blue-green structure.

The efforts entail creating water-resilient areas that can reduce reliance on external water sources and promote water recycling on-site. Specifically, it involves understanding the site's topography and water levels to design wetlands, ponds, swales for flexible water storage, or widen existing waterways to capture rainwater or water from external areas. This helps ensure water supply without acquiring external sources even during drought periods. Integrating this principle with nature conservation design methods can also help filter water, protect aquatic ecosystems, and enhance biodiversity.



- Boezem
- Green connection
- Metropolitan park
- Polders
- Salt water adaptation

# MRDH MPS Vision



**Strategy 1**  
Develop green spaces along boezem system to enhance ecological connectivity for aquatic habitats.



**Strategy 2**  
Integrate nature conservation areas into park structure to promote socio-ecological benefits



**Strategy 3**  
Promote nature-inclusive or circular agriculture to improve agricultural ecology



## Connective green network for nature to thrive

The creation of a green structure for the MPS is based on a fourfold rationale, firstly, to create green spaces around the boezem, which will help to better create a more resilient and adjustable blue-green structure around the boezem, secondly, to enhance the connectivity of existing ecologically protected areas to ensure that stepping stones and ecological corridors important for key species are not destroyed by urban sprawl, and thirdly, to incorporate the existing recreational greenspace and recreational green space, a category of land with concentrated uses that are relevant to the lives of metropolitan residents, will help to build a sense of belonging and identity between the MP and metropolitan residents and provide some control over the trajectory of urban development, and fourthly, various types of farmland that both secure food production and represent the unique cultural character of the metropolitan landscape, and that also serve as a home for many of the open grassland or meadow birds, and connecting them to the MPS will help advance naturally inclusive agriculture as well as protect agroecology and eliminate agricultural dis-ESSs.

Designing MPS with a focus on nature conservation involves efforts to safeguard biodiversity by protecting and enhancing natural habitats and corridors. This helps MPS mitigate the negative effects of urbanization and provide valuable ecosystem services for the metropolitan region and its surroundings. Achieving this necessitates a comprehensive understanding of the key species on the site and the strategic designs of habitats and corridors tailored to their behavioral patterns. Therefore, appropriate habitat restoration and rewilding methods can be implemented to enhance the ecological resilience of MPS and mitigate habitat fragmentation resulted from metropolisation.



# MRDH MPS Vision

- Boezem
- Green connection
- Metropolitan park
- Polders
- Salt water adaptation
- Recreational biking system
- Recreational boating system



## Strategy 1

Develop high connective recreational route networks among MPS



## Strategy 2

Recreational areas as cores for strengthening metropolitan experience



## Diverse recreational routes to experience cultural-historic landscape features

Supporting the accessibility of the MPS will be important for the development of a diverse travel network that will provide unimpeded access to the metropolitan parks for both metropolitan residents and visitors, who will be able to travel arounds and visit different landscapes and scattered cultural and historical features through a carefully screened travel network. At the same time, the MPS will be more deeply integrated into the metropolitan fabric as a landscaped amenity, thus better connecting it to other urban green spaces and green amenities, and contributing to a stronger blue-green network in the metropolis.

The MPS travel network mainly refers to two types of infrastructures considered more sustainable and environmentally friendly: public transportation networks such as train lines, tram lines, and subways, and recreational travel networks like bike lanes, footpaths, or hiking trails and boating networks. The design of the travel network, on the one hand, comes along with the design of recreational spaces to generate a coherent and accessible system (Contin, 2021); on the other hand, it is combined with planting designs to prevent sensitive wildlife habitats from being disturbed from human activities as a road-guiding strategy, especially during mating season (Krijgsveld & Klaassen, 2022).

To create sustainable spatial patterns, the planning of infrastructures ought to be accompanied by planning their green and blue counterpoints (Schrijnen, 2000). Infrastructure clearly impacts the long-term development of urban patterns and the conditions for green functions and activities. By coupling the planning of infrastructure to the development of MPS, it remains and improves continuity to the experience of the multifaceted metropolitan landscapes and serves as the backbones of green corridors across the metropolitan region as “ventilation corridors” (Lukaszkiwicz et al., 2021).

Map created by author, Data provided by: Open-dataportaal Zuid-Holland

# MRDH MPS Vision



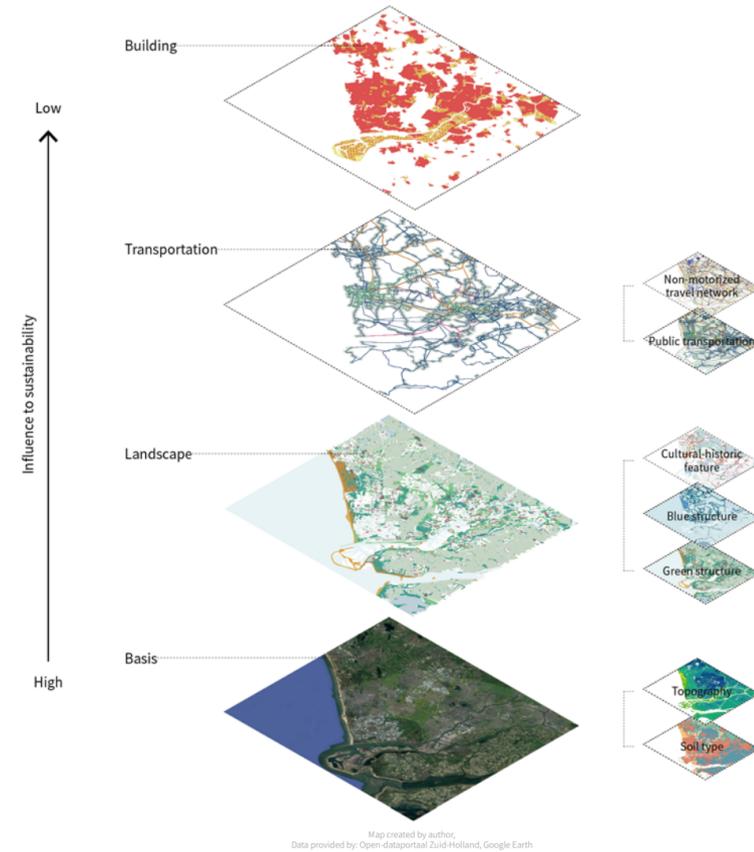
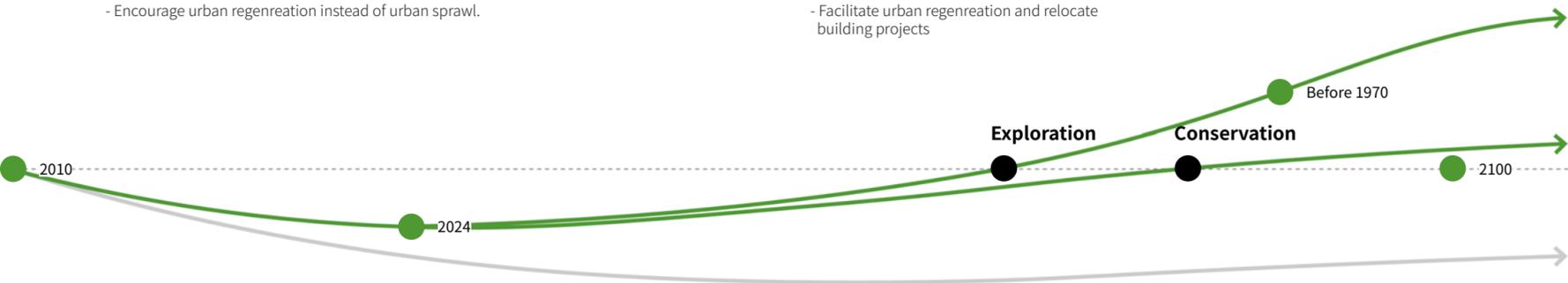
## Conservation: MPS as basis

- Preserve and enhance current MPS.
- Promote sustainable, nature-inclusive agriculture.
- Keep on with the current urban development plan with more landscape-based approach.
- Encourage urban regeneration instead of urban sprawl.



## Exploration: MPS as leading structure

- Expand and enhance MPS.
- Promote sustainable, nature-inclusive agriculture.
- Release more harden land for landacpe development to address issues raised by climate change.
- Facilitate urban regeneration and relocate building projects



## Towards sustainable urban development

Revisiting the concept of urban development, this vision, integrated with the built environment, will provide a landscape-based development framework for the Metropolitan Region Rotterdam The Hague (MRDH). This framework facilitates the sustainable urban development of the metropolitan area by preserving and enhancing its landscape. Sustainable urban development in MRDH, within the context of this project, necessitates increased focus on and effort towards emphasizing the protection and enhancement of the metropolitan landscape. This involves integrating the Metropolitan Park System (MPS) into slow traffic and recreational networks, as well as planning urban development with greater respect for the landscape context.

Furthermore, this vision remains adaptable to different future scenarios and perspectives, allowing urban planners to dynamically adjust the direction of current and future urban development based on evolving needs and circumstances. This approach supports the moderate development of compact cities while cautiously extending into metropolitan areas. It also enables the bold re-purposing of underutilized spaces, such as greenhouses, industrial sites, and vacant office buildings, to enhance the MPS. This flexibility ensures that urban development remains responsive and sustainable, effectively balancing built environment needs with landscape preservation and enhancement.



## Strategic Projects

### Short-term Intervention: Metropolitan Park Duin Horst en Weide



Source: <https://zoetermeer.nieuws.nl/cultuur/1957/duin-horst-en-weide/>



# Short-term Intervention

## "Barcode Landscape"

The landscape sequence of "Dune, Horst, and Meadow" delineates a series of diverse and distinctive landscapes that extend parallel to the coast. This sequence encompasses dune landscapes, beach ridges with country estates, farms, country houses, and villages, interspersed with open beach plains and extensive depressions in the peat meadow zone and reclaimed land. Each zone within this landscape sequence possesses its own unique combination of landform, cultural history, landscape, and ecological values, resulting in a varied and contrast-rich environment. This continuum of landscapes, reflecting the subsoil and various periods of genesis, forms a distinctive barcode of the region and stands as a unique feature within the Netherlands.

Despite its exceptional qualities, the Duin Horst & Weide landscape faces mounting pressure. The buffer zone policy implemented to safeguard its integrity has struggled to deter gradual small-scale urbanization and infrastructure fragmentation. Furthermore, evolving social dynamics necessitate a spatial response to address the area's challenges (H+N+S Landschapsarchitecten, 2014).

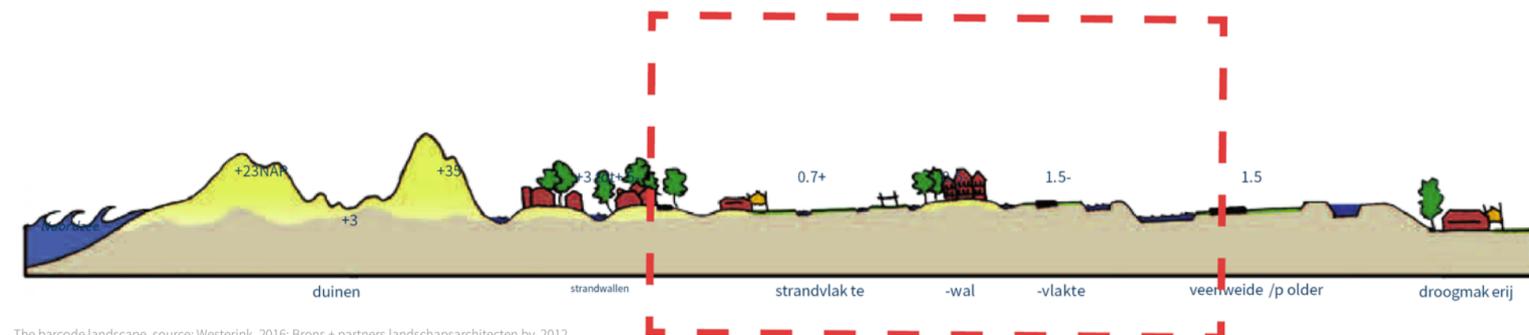
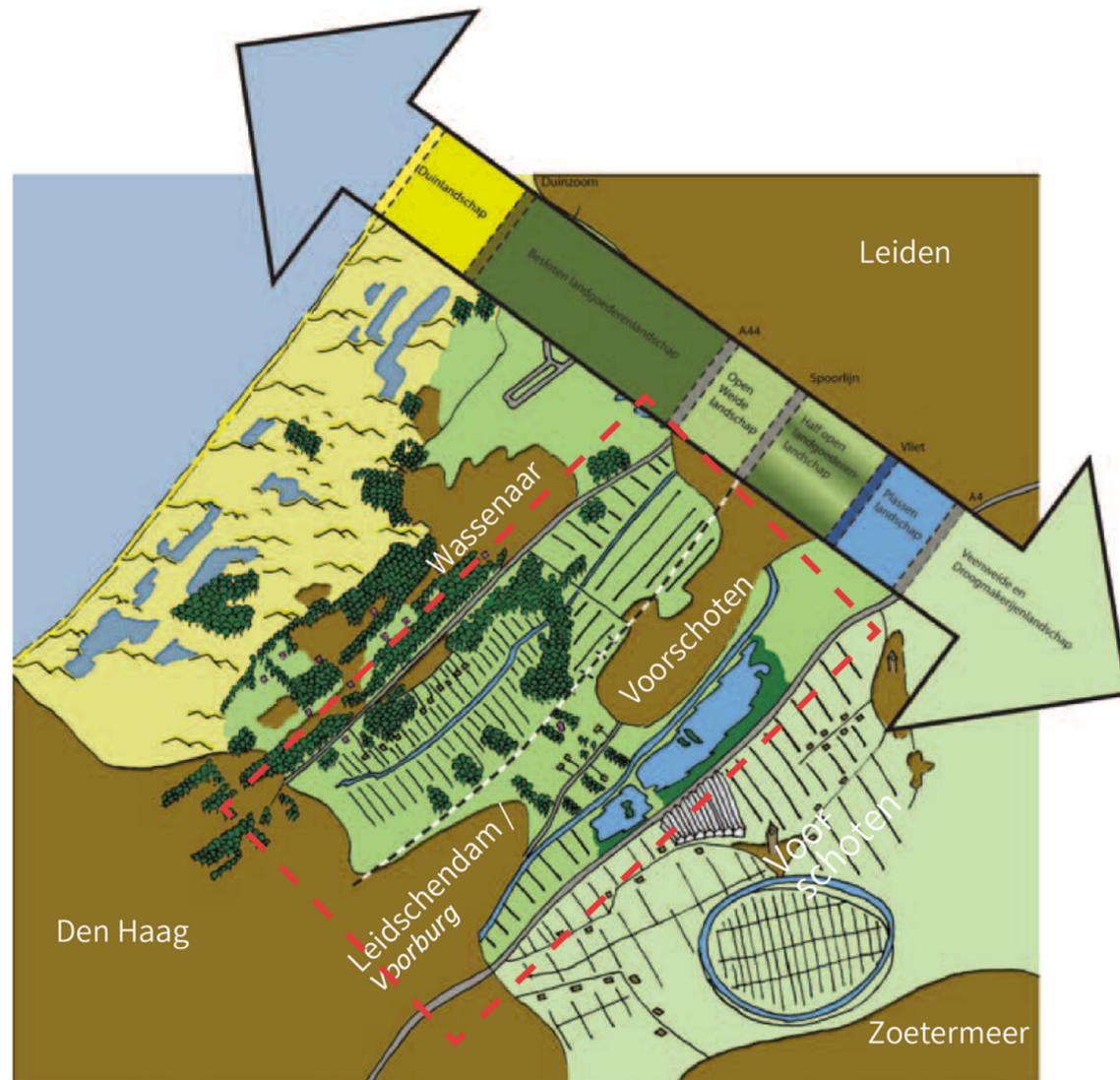
Situated between Leiden, The Hague, and Zoetermeer, Duin Horst & Weide occupies a significant position as a large and diverse green space within one of the most densely populated regions of the Netherlands. Designated as a national buffer zone in 1958 to mitigate potential conflicts between the development of Leiden and The Hague, the area prioritizes the preservation of its green, agricultural, and historical values. It represents one of the few remaining examples of this traditional landscape gradient in the country.

Connectivity lies at the heart of the Duin, Horst en Weide concept, both ecologically and for recreational purposes. The area aims to offer urban residents the opportunity to traverse a sequence of green landscapes, encompassing cultural heritage, nature, and agriculture, as they cycle "from Zoetermeer to the sea" (H+N+S Landschapsarchitecten, 2014). To achieve this, the area must be made accessible to city dwellers, with a focus on developing amenities for recreation, including signposted routes, overnight facilities, cultural heritage activities, and water-based recreation opportunities.

However, the area currently suffers from inadequate recreational links and connections to the city, rendering it underutilized and dysfunctional. As part of a larger urban fabric, the area's metropolitan scale focuses on harmonizing the

development of Leiden and The Hague while upholding its green, agricultural, and historical values.

In recent years, there has been a perceptible shift in the perception of Duin Horst & Weide, transitioning from a mere buffer to an integral green area within the urbanized landscape. There is growing recognition of its potential for green development and the emergence of initiatives aimed at leveraging its green assets, exemplified by projects like the Duivenvoorde corridor, where greenhouse horticulture is yielding to housing and green spaces.



The barcode landscape, source: Westerink, 2016; Brons + partners landschapsarchitecten bv, 2012



# Dune



# The Hague



# The green cross road



# Leiden



# Vlietland



# Marine clay polders



Polder, source: <https://www.mirandawandelt.nl/recreatiegebied->

The barcode landscape, source: <https://www.fietsen123.nl/route/de-duinen-van-meijndel/>; <https://www.cbs.nl/nl-nl/corporate/2018/44/den-haag-bouwt-smart-city-ambitie-verder-uit/>; <https://zoetermeer.nieuws.nl/cultuur/1957/duin-horst-en-weide/>; <https://www.nationaalparkhollandseduinen.nl/bundel/rolstoelvriendelijke-wandelpaden/>; <https://www.in12uur.nl/de-hoogtepunten-van-leiden/>; GoogleMap



# Short-term Intervention

## Knitted Landscapes

The landscape of Duin Horst en Weide has been shaped by a combination of natural processes, primarily water and wind, and human activities spanning approximately 12,000 years. Along the coast, significant deposits of clay and sand have accumulated, giving rise to high, narrow sand barriers that stretch parallel to the coastline in a north-south direction. Enclosed landscapes of trees characterize these sand barriers, with lower beach plains nestled between the higher beach ridges, where thick layers of peat have formed over millennia. Since around 1000 AD, efforts to reclaim the peat for agricultural purposes have been underway, facilitated by a drainage system comprising numerous parallel watercourses that traverse the landscape in a northeastern direction, serving as a key spatial structural element.

The expansive beach plain creates vast, open spaces with a uniform distribution of land, contrasting sharply with the densely populated, heavily forested, and elevated beach ridges. At the northern boundary of the area, the dunes, beach ridges, and beach plains meet the banks of the Old Rhine. Waterways and roads generally align north-south along the entire coastline, running parallel to the sand barriers. Conversely, to the east of the sand barriers and beach plain landscape lies the reclaimed land and peat meadow landscape of the Greenheart area. Substantial changes have occurred in the landscape, particularly with the formation of Vlietland and the Vogelplas.

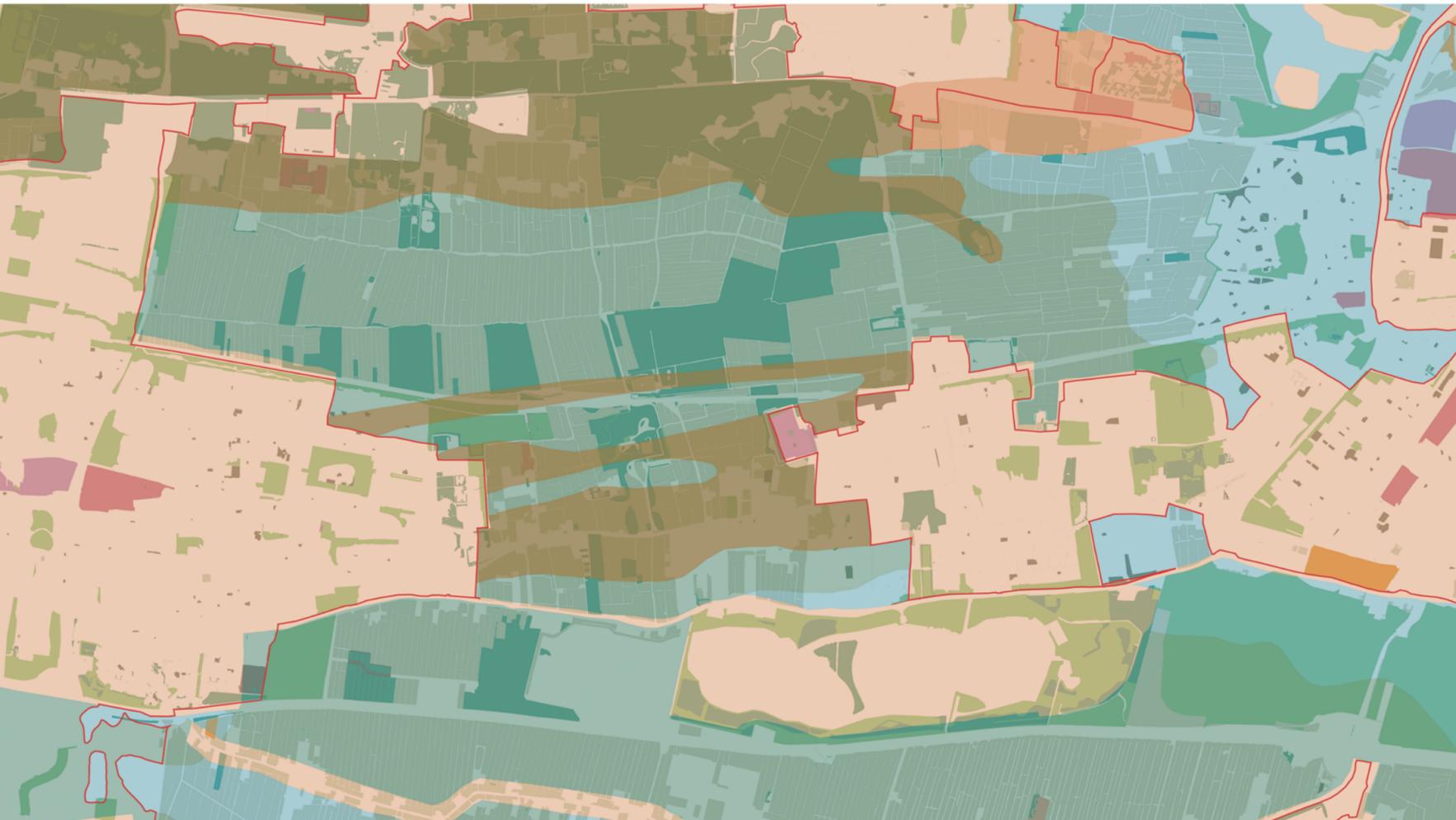
The presence of the A4 highway intersects the polder and demarcates the regional profile boundary. Within the treaty areas of Duinhorst and Weide, a diverse landscape subsoil has emerged as a result of natural processes and human interventions. Here, two distinct landscapes converge: the Dutch coastal landscape and the peat bog/dry marsh landscape. Centuries of drainage patterns and the absence of urbanization have largely shaped the character of the area. The River Vliet serves as a juncture between the beach plain and the landscape of reclaimed land and peat meadows, with the Amsterdam-Hague railroad line and the River Vliet running parallel to the coastline. The orientation of the infrastructure thus mirrors that of the landscape, underscoring the interconnectedness between natural and human-made elements within the region.

Over the past decades, Duin Horst & Weide has experienced a surprisingly low rate of urbanization, offering outdoor enthusiasts a diverse range of landscapes to explore. A coalition advocating for the preservation of open landscapes has been instrumental in safeguarding much of this area against urban development, leveraging national laws aimed at conserving nature and cultural heritage. Predominantly characterized by meadows, open grasslands, and forests, the selected area has remained relatively untouched by urban encroachment (Aalbers et al., 2009).

However, recent decades have witnessed a significant increase in urbanization pressure on Duin Horst & Weide, blurring the traditional boundaries between city and countryside and giving rise to metropolitan landscapes (Westerink et al., 2012). The establishment of the national buffer zone in 1958 played a crucial role in maintaining open spaces between cities and shielding them from large-scale development. Even today, the buffer zone continues to serve as a protective barrier, preserving the unique qualities of the metropolitan landscape and mitigating the adverse effects of urbanization in the region.

The urbanization pressure on Duin, Horst en Weide is particularly pronounced and escalating, primarily originating from the north, notably the town of Leiden outside The Hague Region. Proposed infrastructure projects, such as the construction of new roads, sand excavation activities, and the expansion of the A4 motorway, pose additional threats to the area, potentially exacerbating fragmentation. Furthermore, scattered residential and storage developments along the Leidschendam-Voorschoten axis further contribute to the fragmentation of the already narrow Duivenvoorde corridor (Brons + partners landschapsarchitecten bv, 2012).

In summary, the place concept of DHW attributes a predominantly urban significance to the metropolitan area, characterized by a multifaceted discourse that intertwines considerations of cultural heritage, ecology, and recreation.



Landscape Typologies 1:25 000

- River Clay Landscapes
- Marine Clay Landscapes
- Peat Bog Landscapes
- Coastal Dune Landscapes
- Complex Soil Landscapes
- Urban Core Area



# Open Space Structure



## Landscape Features



Duivenvoorde, Source: kasteelduivenvoorde.nl  
Duivenvoordse en Veenzijdse Polder, photo by author  
Vlietland, photo by author



Kasteel Duivenvoorde



Landgoed Ter Horst



Eikenhorst



De Horsten



Historic Waterway



Zuidwijksemolen



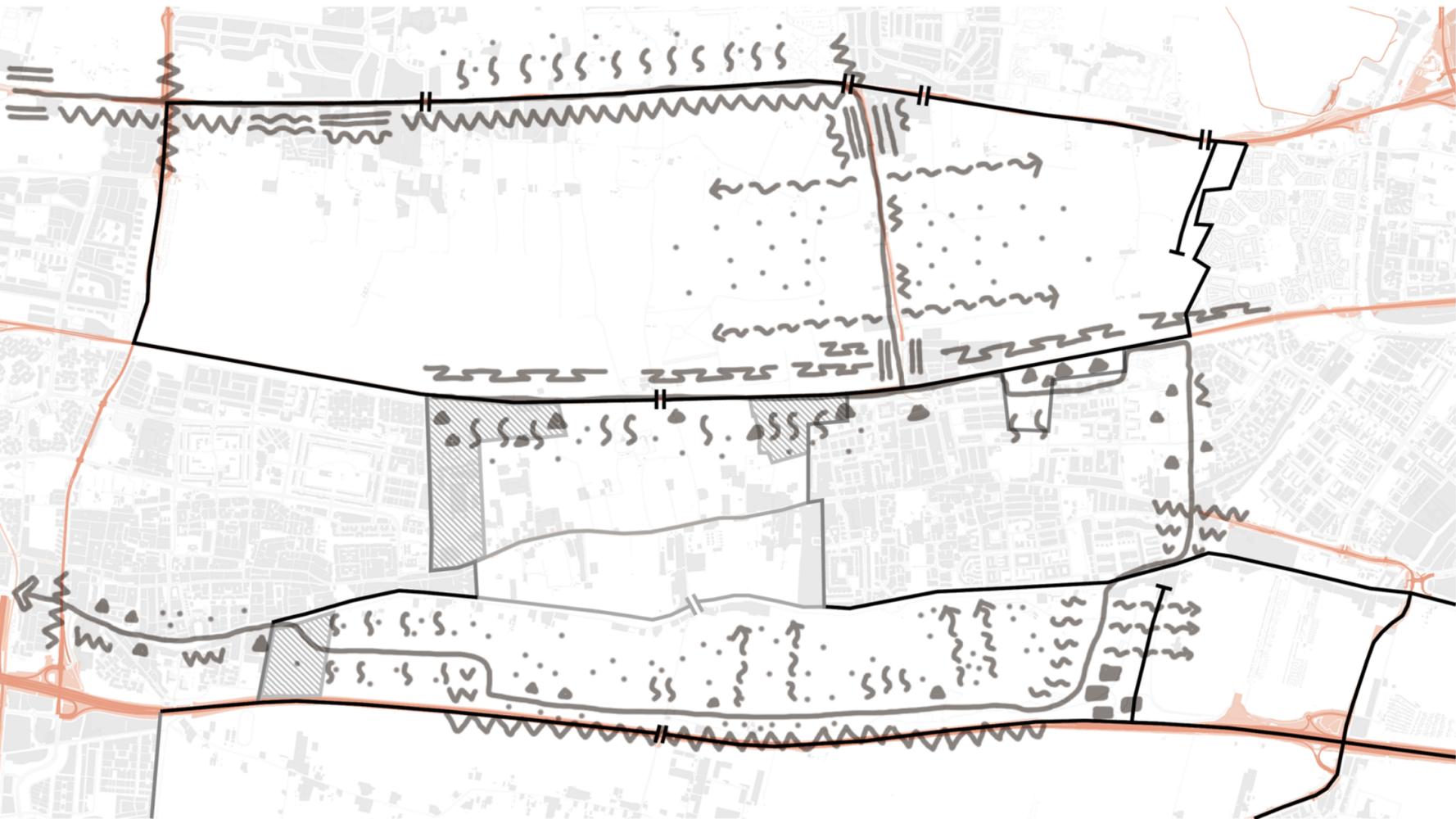
Knipmolen



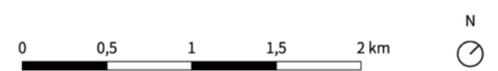
Vliet



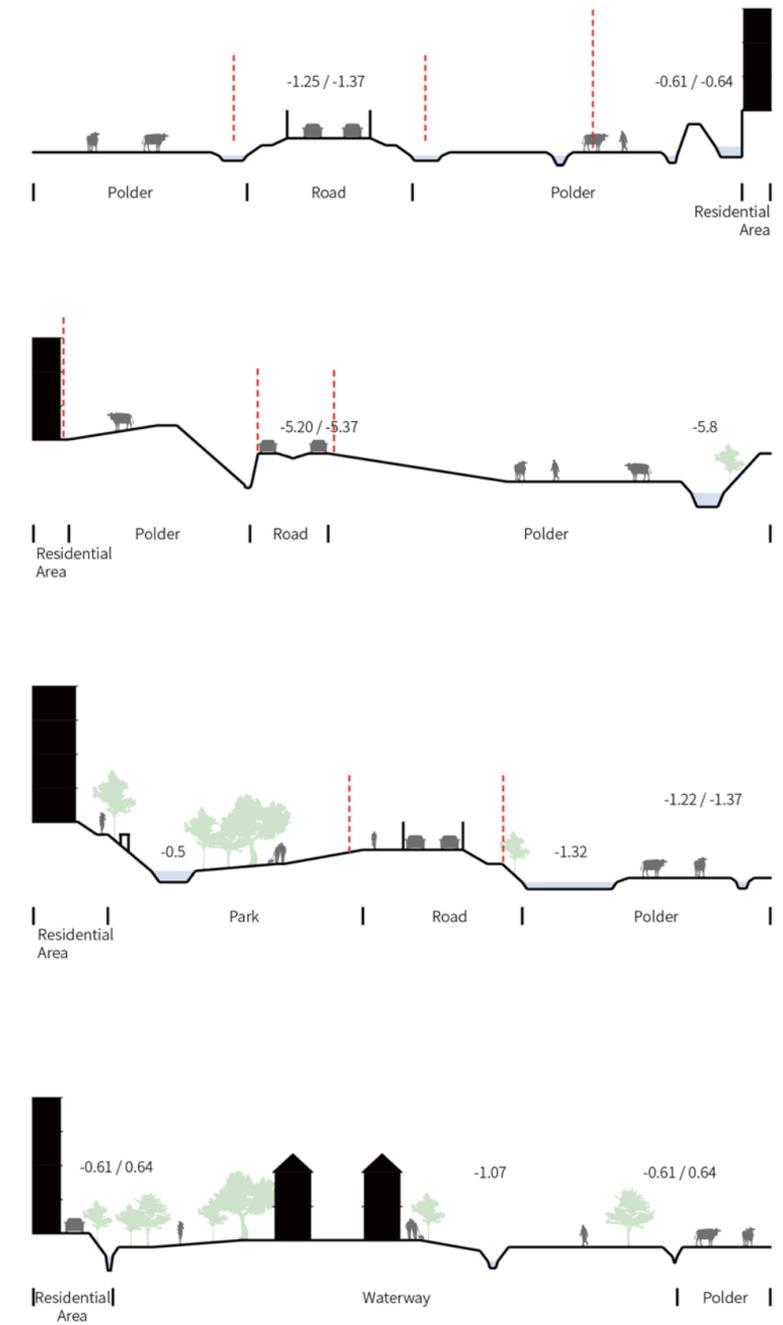
# Urban Boundaries



- Sound Perception Map 1:25 000**
- Main transportation roads
  - Soft fringe
  - Mild fringe for animal crossing
  - Hard Built fringe with limited accessibility
  - Inaccessible fringe
  - Bird
  - ▲ Human
  - Construction
  - 🌳 Tree
  - 🌀 Wind
  - ww Car
  - = Partition
  - ~ Soften car sound
  - T Train



Map created by author,  
Data provided by: Open-dataportaal Zuid-Holland  
98



## Built Infrastructure and Noise

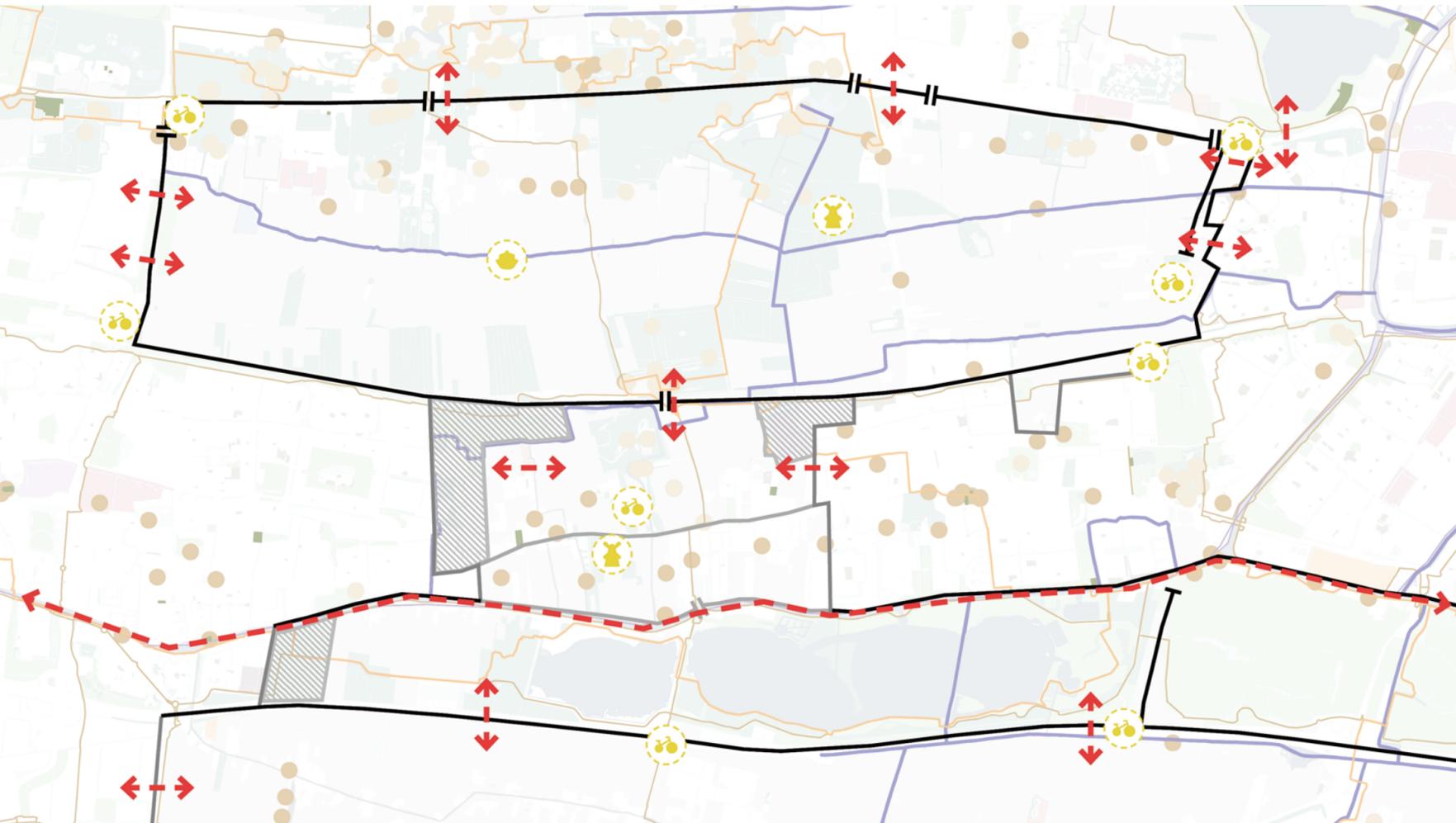
The barcode landscape is not only because of the variations in the landscape types but also because of the separation by highways and other facilities, and its boundaries have been shaped by the city, where the barrier effect is obvious. Currently, the main barriers in the area come from three sources: the highway, the buildings, and the river. The highway to the west, the transcontinental railroad and the N44 to the east form four distinct zones (wassenaar, polder, duivenvoord and polder), while the surrounding urban areas of The Hague, Leiden, (and two other cities) shape the north-south boundaries, except for the dunes-polder connections in a west-east direction. The canalization of river Vliet also imposes some limitations on the connection between duivenvoord and vlietland to a certain extent, and its canalization creates some inconvenience for the passage of animals.

Another unseen effect of the barrier effect is noise. The roads and railroads that pass through this area are important connections between the southwestern and northwestern parts of the Netherlands, and the amount of daily vehicular traffic, and the road noise they generate, is significant and disrupts the peaceful quality of the environment and creates a barrier for animals to pass through and live in the area.

The next section details the challenges of barrier effects in designing an MPS for the DHW area based on the three areas of concern for an MPS.



# Boundary Effects



**Cultural-historic Features and Recreational Routes 1:25 000**

— Footpath route	■ Culture and leisure	▨ Soft fringe
— Biking route	● Castles, manors and parks	— Mild fringe for animal crossing
— Boating route	● Cultural and Recreational Facilities	— Hard Built fringe with limited accessibility
— Historic waterways		— Inaccessible fringe



Map created by author,  
Data provided by: Open-dataportaal Zuid-Holland

## Cultural-historic Feature Accessibility

The area is dominated by estates, windmills, historic rivers, vlietland and various recreational sites such as horse and butterfly farms and campgrounds. The greatest challenge to recreation continues to be the barrier effect of the city and the highway, the continuous highway does not provide many safe access points through the site, the routes are relatively single and the guidance within the site is relatively sparse, which is unattractive and unambiguous for such a large area, accessibility to individual historic features is also relatively limited and there are only two travel routes in the west-east direction with a lack of options to explore, the north-south travel route is limited and there is a lack of options to explore, and the north-south travel route is limited.

Currently, there are only two tourist routes in the west-east direction, and there is a lack of options to explore, and there is a lack of tourist routes in the north-south direction, as if the two major cities have turned this area to their own backsides, and there is not much willingness to positively orient the space towards this area. Therefore, there is a need for more tourist routes and the creation of entrances to increase the cultural and historical visibility, accessibility, and attractiveness of the area as an important recreational green space in the neighborhood.

Castle, manor and park      Cultural and recreational facility



Duivenvoorde,  
Source: kasteelduivenvoorde.nl



Knipmolen,  
Source: openmonumentendag.nl

Historic waterway



Vliet, Source: Google ap

Culture and leisure



Vlinders aan de Vliet,  
Source: vlindersaandevliet.nl/

Inaccessibility

- Limited and unclear entrances to the area
- Few clear-guided routes among local cultural-historic features.

Weak local characteristics (nature, cultural-history)

Potential accessibility enhancement



# Boundary Effects



**Key Species Distribution Map 1:200 000**

- Mustela Distribution
- Pollinator Distribution
- - - Potential Connection
- NNN Area



Map created by author, Data provided by: Open-dataportaal Zuid-Holland  
102

## Mustela



Mustela *Erminea* Source: inaturalist.org

- - - Lack of corridors
- A Traffic barriers
- - - Human disturbance

## Pollinator



Heath butterfly, Source: zuid-holland.nl

- - - Lack of corridors
- A Traffic barriers



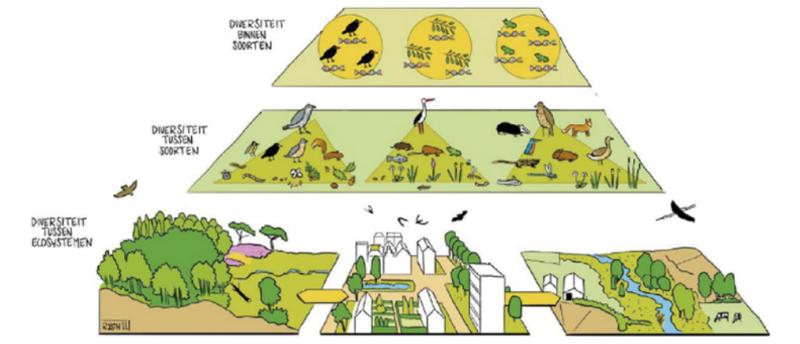
Sand bumblebee, Source: zuid-holland.nl

## Bird



bluethroat, Source: zuid-holland.nl

# Ecological Habitat & Corridor



The current ecological problems in the region are centered on the lack of support for safe passage of keystone species. There are three main types of keystone species in the region, all of which are sensitive to human activity and habitat quality.

Terrestrial mammals, led by the sable family, are still primarily challenged by the barrier effect of the highway and the lack of ecological corridors to support passage through them, as well as the large areas of unsheltered polder on the site, which are sensitive to intensive farmland, which prevents them from moving and staying safely on the site. Pollinators, mainly butterflies, and bees, are mainly lacking in nectar plants, and the highway and urban compartmentalization has disrupted their foraging paths. Bats and birds are also important species in the area, with the division into forest birds and bats being relatively unaffected by the barrier effect, but forest birds as well as bats lack relatively continuous wooded areas in the area to guide them through as well as to stay. For grassland birds, this is one of the few living areas in the vicinity, but the relatively homogenous water system may lack food sources. The establishment of corresponding ecosystems is important for the region and even for trans-regional ecosystems, as the ecosystems they establish as keystone species will help other species with related habits to thrive, thus supporting the integrity of their ecological structure and maintaining ecosystems in a stable and balanced manner.

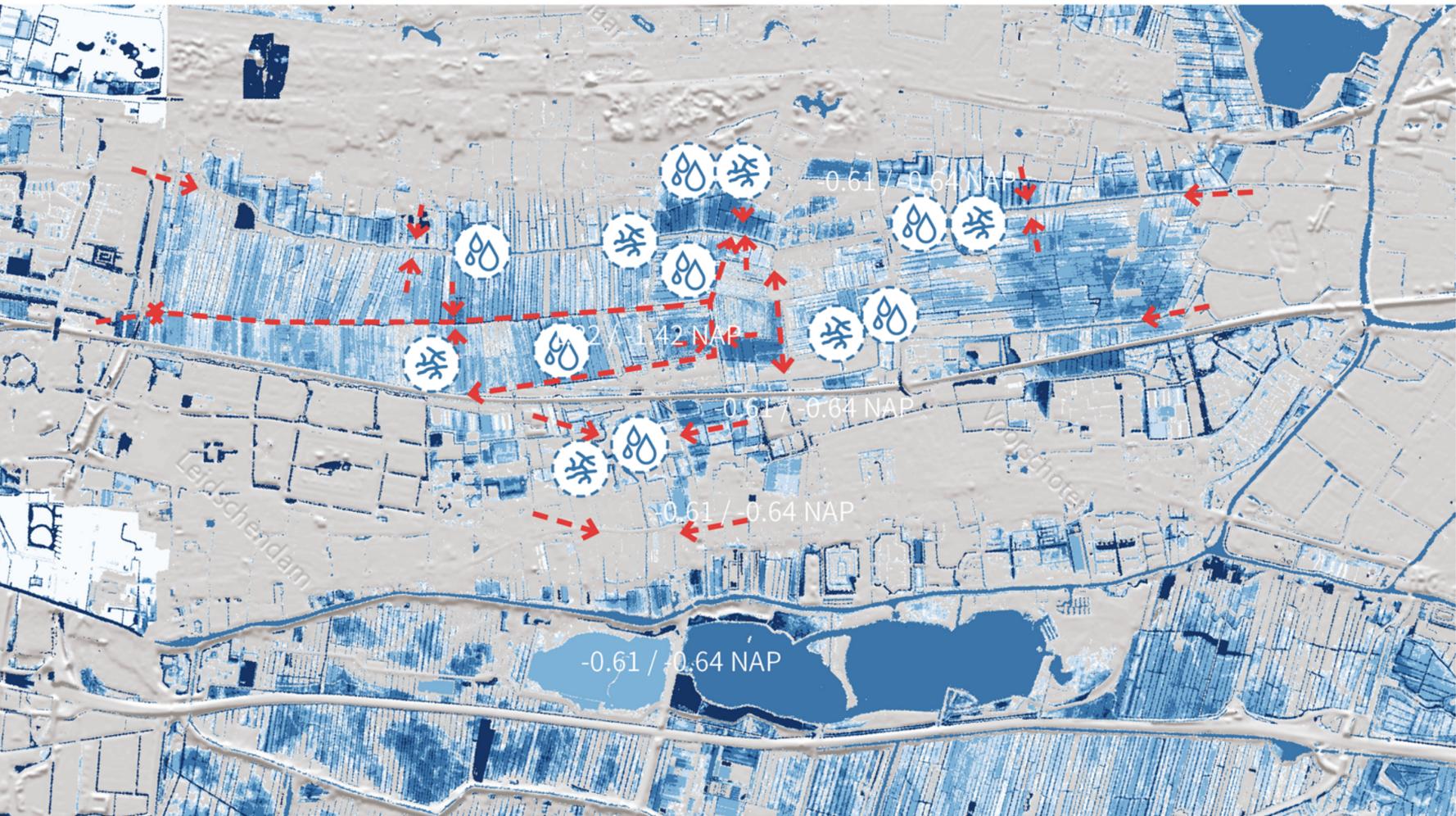
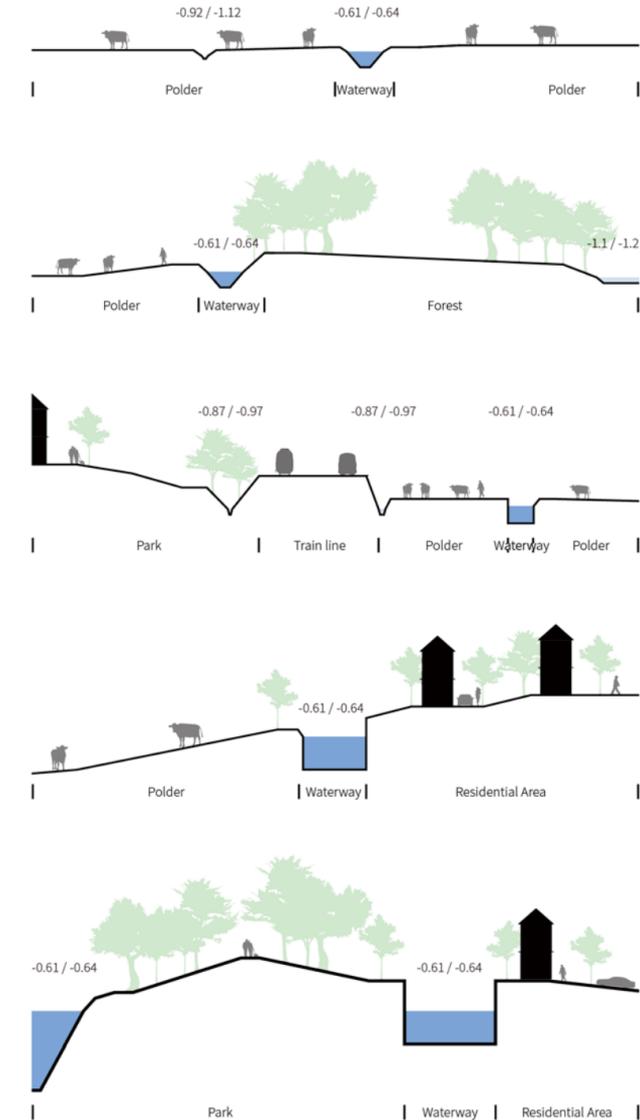


# Boundary Effects

## Waterway Logging

The area has a connected boezem network which is maintained throughout the year at around NAP-0.60m, the highest water level in the region. This has the advantage of providing a steady supply of water from the boezem to other areas during the dry season through natural elevation differences, however, during the wet season, especially during heavy rainfall, the area is challenged by a fair amount of flooding, which reflects the inadequacy of the current water system in coping with rainfall.

The area is located at the lowest point of the perimeter, which means that a portion of the rainfall from the surrounding urban areas will flow to the area for dissipation, and the over-saturated boezem system with its lack of water level changes will not be able to quickly transfer the rainfall dispersed around the area at this point in time, which makes water logging a problem for all the polder locations. Therefore, it is necessary to establish a more resilient blue network based on the current water system, such as adding more water storage space to focus on dissipating large flooding problems, and reusing it during the dry season to alleviate the pressure on the boezem system and the surrounding water supply.



Flooding (150mm / 48hrs) 1:25 000

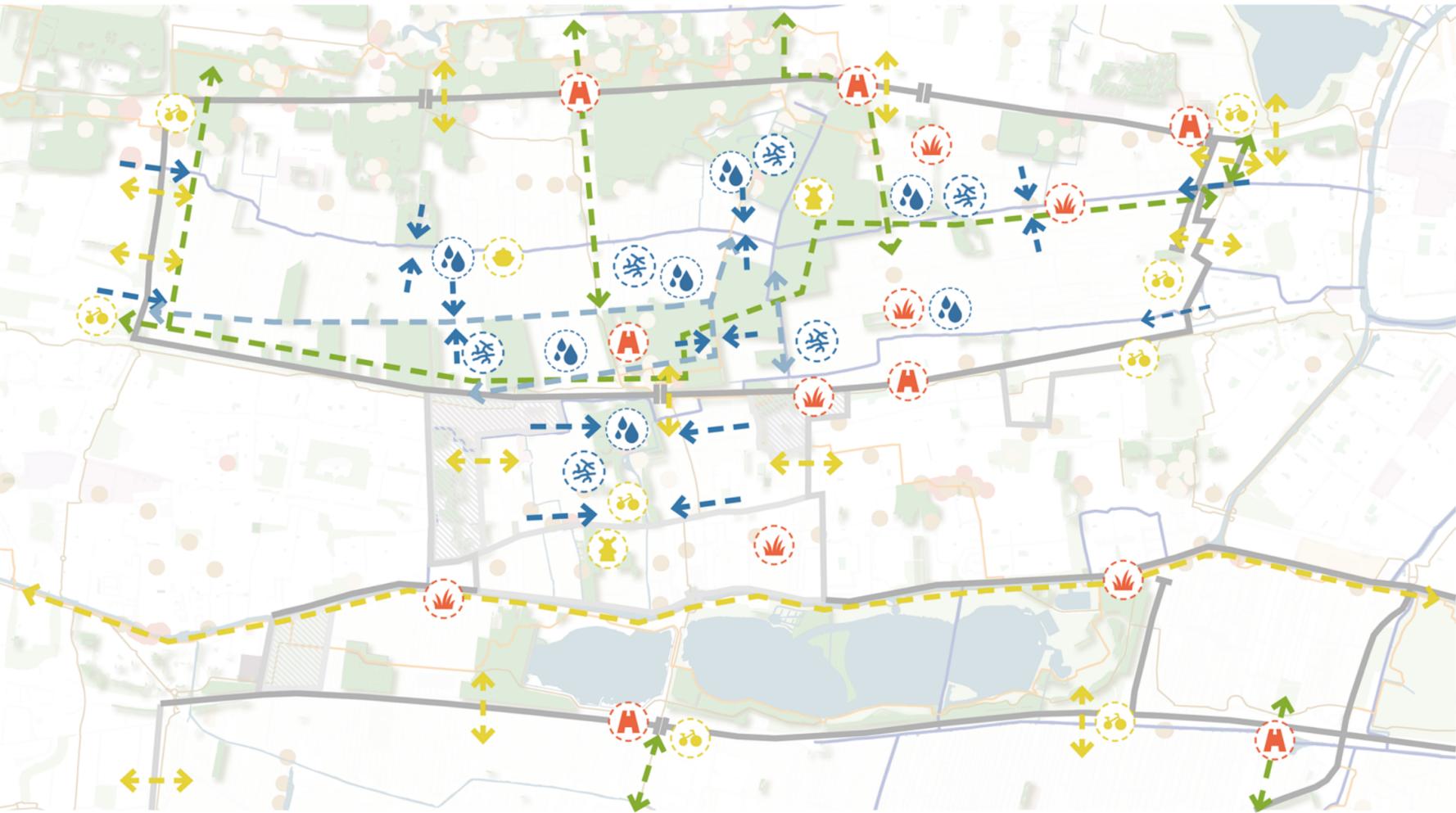
- < 0.05 m
- 0.05 - 0.15 m
- 0.15 - 0.3 m
- 0.3 - 0.5 m
- > 0.5 m

- Potential water retention area
- Potential wetland area
- Enhancing water storage capacity
- Potential wetland connection

Map created by author, Data provided by: Open-dataportaal Zuid-Holland 104



# Design Assignment



Open Space Structure 1:25 000

- |                    |                                      |                                              |
|--------------------|--------------------------------------|----------------------------------------------|
| Metropolitan park  | Culture and leisure                  | Boating route                                |
| Forest Park        | Castles, manors and parks            | Soft fringe                                  |
| Sport Field        | Cultural and Recreational Facilities | Mild fringe for animal crossing              |
| Cemetery           | Footpath route                       | Hard Built fringe with limited accessibility |
| Agricultural field | Biking route                         | Inaccessible fringe                          |
| Urban Voids        |                                      |                                              |



## Water Management

- Increase wetland area
- Increase water retention area
- Enhance potential wetland connection
- Enhance water storage capacity

## Nature Conservation

- Improve ecological corridor quality for key species
- Enhance road-crossing safety
- Reduce human disturbance
- Enhance ecological connections

## Cultural-historic Recreation

- Improve accessibility
  - Set up clear entrances to the area
  - Set up clear-guided routes among local cultural-historic features.
- Improve local characteristics (nature, cultural-history)
- Strengthen accessibility of recreational route networks

# Masterplan - Metropolitan Park Duin Horst en Weide



# Metropolitan Park Duin Horst en Weide



## Interconnected Metropolitan Landscape Corridors

The core idea is to enhance the green connectivity of the park to its surroundings, to allow the city's green amenities to naturally connect to the thematic areas of the park, and to rely on the expansion of the existing water system, to enhance the green spaces around the water system, to install wetlands, to improve the overall water storage capacity and resilience, and to create multiple natural connections from south to north and west to east, to allow for the movement of keystone species and their livelihoods, as well as to incorporate existing cultural and historical features and amenities. Design a richer network of recreational routes and entrances to enhance accessibility and recreation on both internal and external sites.

To implement this vision, short-term interventions are focused on one selected area within the Duin, Horst en Weide (DHW), which was once designated as a buffer zone. This area serves as a microcosm of the MPS's approaches to addressing the analyzed challenges and design objectives. Key challenges in the context of DHW include the barrier effect created by urban and road infrastructure, with climatic issues further increasing the effect. Accordingly, interventions aim to mitigate this barrier effect by enhancing connectivity both within and outside the area.

The design strategies in the Duin, Horst en Weide area align with the three pillars of the MPS: water system connectivity, ecological enhancement, and integration of blue-green spaces with cultural and historical features. These interventions seek to strengthen the water storage capacity and circulation, improve ecological connectivity, and integrate diverse recreational spaces and routes. By enhancing the composite value of the metropolitan landscape while conserving its important assets, this approach ensures the metropolitan sustainability for the area and the region.

# Metropolitan Park Structure Stretching from Polder to Sea, and City to City



# Cultural-historic Recreation

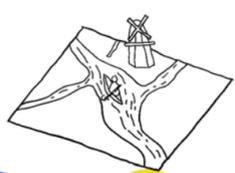
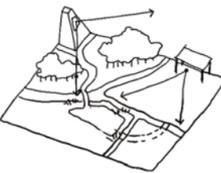


Spots for representing landscape quality

View points and site-specific landmarks

Circular historic experience route

Water-based experience route



Kasteel Duivenvoorde



Eikenhorst



De Horsten



Landgoed Ter Horst



Historic Waterway



Zuidwijksemolen



Knipmolen



Boat Rental



Vliet



Boat Rental



Voorschoten

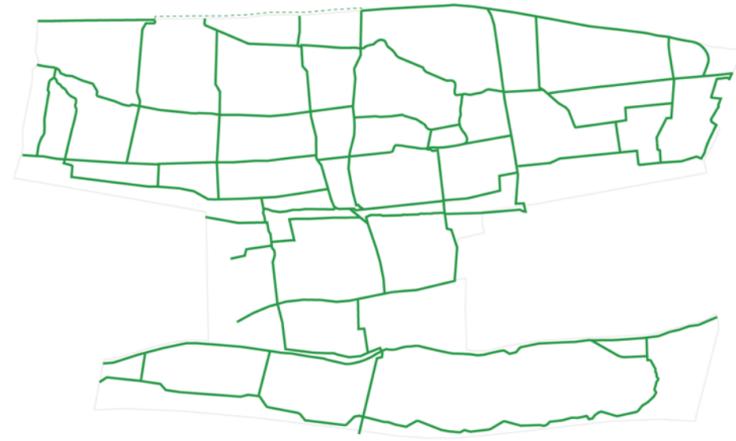
# Cultural-historic Recreation



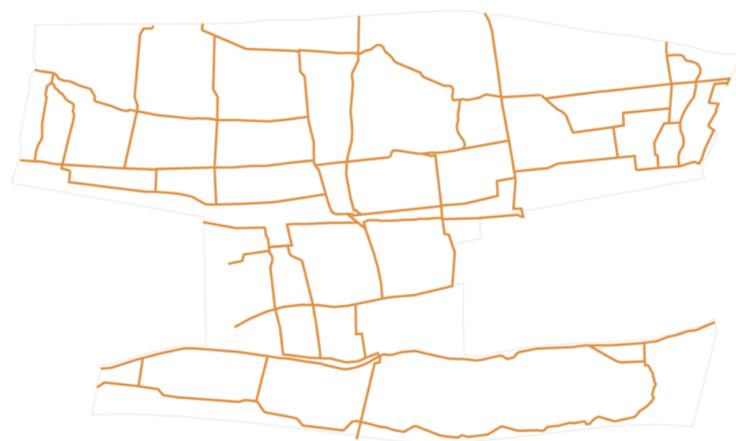
Hiking Route



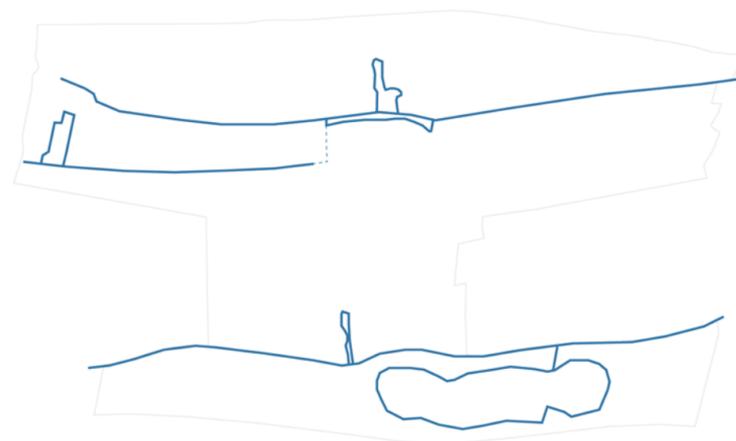
Biking Route



Bridle Route

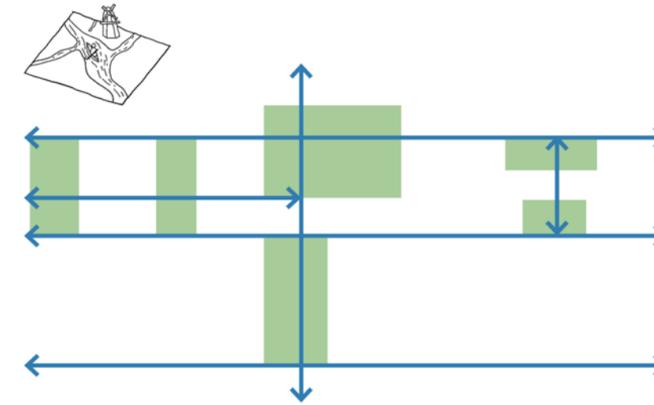


Boating Route



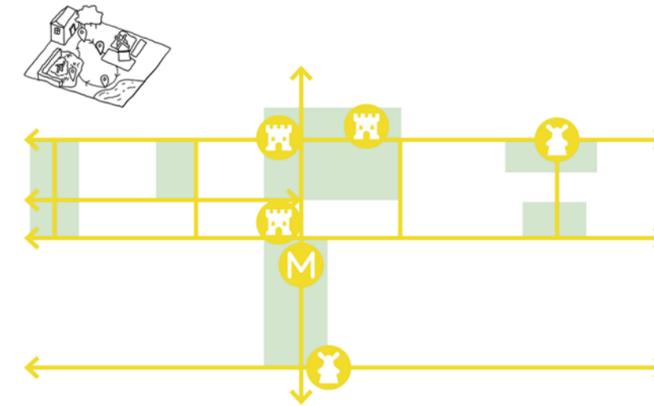
## Way guiding and way finding

Water-based experience route



Water structure and wetlands as way guiding infrastructure

Circular historic experience route



Landmarks as way finding elements, road structure as connecting infrastructure

## Recreational Route Networks

The cultural and historical character of the park is an important aspect in enhancing the attractiveness of the park to the neighborhood and the appreciation of the park's cultural history. In order to achieve this goal, the park will improve connectivity by adding a network of recreational routes that provide easy access to the outside and new entrances with new attractions, designing a diverse network of highly connected recreational routes that connect to different attractions and designing storytelling routes that take visitors deeper into the site's culture and history, as well as using the crown jewels of history as landmarks that make it easier to locate and find your way around the large park. The crown jewels of history will also serve as landmarks for visitors to orient themselves and find their way around the large park.

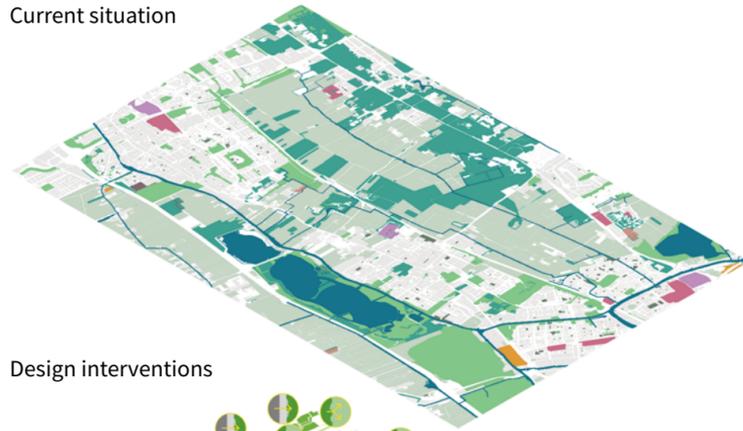
The design logic underlying the park's diverse recreational routes is twofold. First, the park utilizes water structures and wetlands as guiding infrastructure. The water structures are directional and serve as primary guides, while the wetlands interspersed among them control the tempo of the tour. Wetland recreational elements, distinct from the water structures, encourage visitors to slow down, attract short stays, and provide markers for the tour's progress.

Second, the park employs landmarks, such as scattered cultural-historic features, as wayfinding elements. A well-directed pathway structure is designed to connect these landmarks, with secondary pathways looping through small areas to enrich the travel experience. This design ensures that cultural-historic features are experienced within their broader landscape context, enhancing the overall visitor experience.

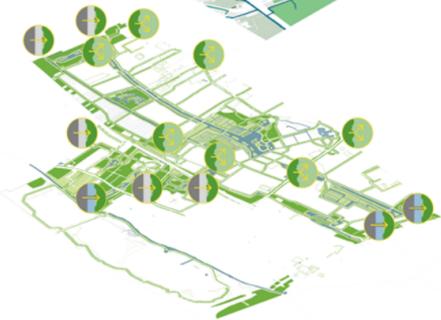
# Cultural-historic Recreation



Current situation



Design interventions



Design vision



## Accessibility and Attractiveness

In addition to the cultural and historical aspects, the recreational character of the site is also an important factor in this regard. The park will be enhanced with attractive recreational green spaces close to the urban edge, which will have the benefit of allowing visitors to travel shorter distances from the city to the recreational areas and directing them to deeper parts of the park for exploration. Another enhancement is the increase in the area of recreational green space in the west-east direction, which consists mainly of large wetlands and sparse grasslands, to enhance the ornamental qualities of the area while maintaining the ecological and water management objectives, and a network of connected routes to better guide visitors through and manage the exploration paths without unduly interfering with the normal life of the animals in the area.

In Metropolitan Park DHW, three approaches are employed to emphasize the spatial qualities of the entrances, each tailored to a different urban fabric and landscape experience. The first type of entrance, situated adjacent to dense built environments, utilizes vertical planting structures, such as shrubs and trees, to create a contrast between the urban area and nature. Tree rows are designed along both sides of the roadway to guide visitors' movement and sight lines toward a park landmark, enhancing the park's visibility and attractiveness.

The second type of entrance is located at a bridge connection, which inherently guides visitors into a new area. Trees planted on both sides at the end of the bridge create an undergrowth space framed by tree crowns and trunks, enhancing the psychological sense of passage. In the distance, floral meadows and isolated tall trees, along with a translucent space enclosed by a column of trees, augment the ornamental and recreational appeal of the park's edge.

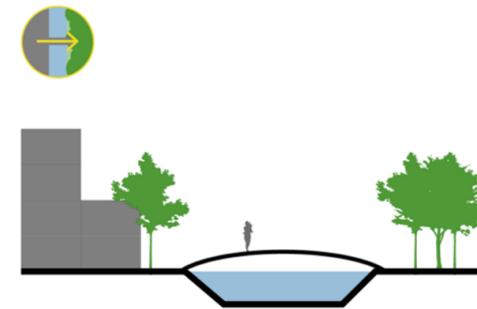
The third type of entrance offers flexibility in its location. It can be positioned at the park's edge, such as the entrance adjacent to the Wassenaarse bos, extending the forest's continuity. Alternatively, it can be placed between open meadows and (semi-)enclosed woodland spaces within the park, highlighting the contrast between different spatial qualities. Regardless of the location, the core design principle is to maintain the continuity of the entrance view. The planting design should narrow sightlines to create a compact spatial experience while keeping the sightlines within the "passage" formed by vertical plant structures, allowing views of the open space beyond. This design not only suggests spatial change but also enriches the spatial experience upon crossing the entrance.



Contrast between built-ups and nature



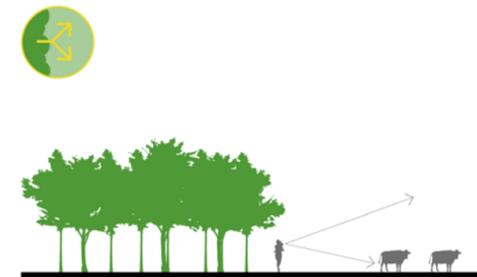
- Selectively pruning low branches  
1x / year
- Selectively pruning overgrown parts  
1x / year
- Planting perennial nectar plants



Going through actual gates



- Selectively pruning low branches  
1x / year
- Rotational mowing  
2x / year
- Spreading flower seeds  
1x / year



Contrast between enclosure and openness



- Selectively pruning low branches  
1x / year
- Animal grazing or rotational mowing  
2x / year

# Cultural-historic Recreation



## Spatial Experience



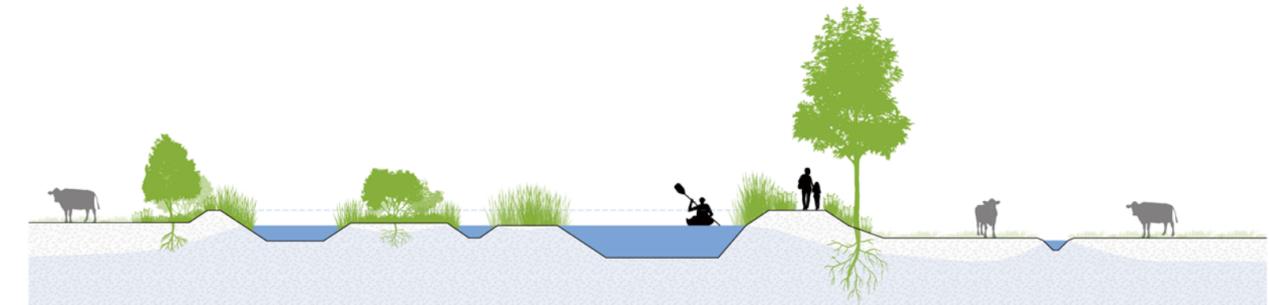
Another design initiative is to show three different spatial qualities in the park through appropriate sightline design. The first spatial type is the open grass landscape, where the texture and boundaries of the open grass are strengthened through appropriate planting design to guide visitors to appreciate the openness of the park.

The second is the sparse forested grassland dominated by wetlands, which is a half-open and half-enclosed spatial structure highlighting the main ecological environment of the MPS as well as the main core of the design of the water system, which is the most dynamic and changing environment. Such a spatial

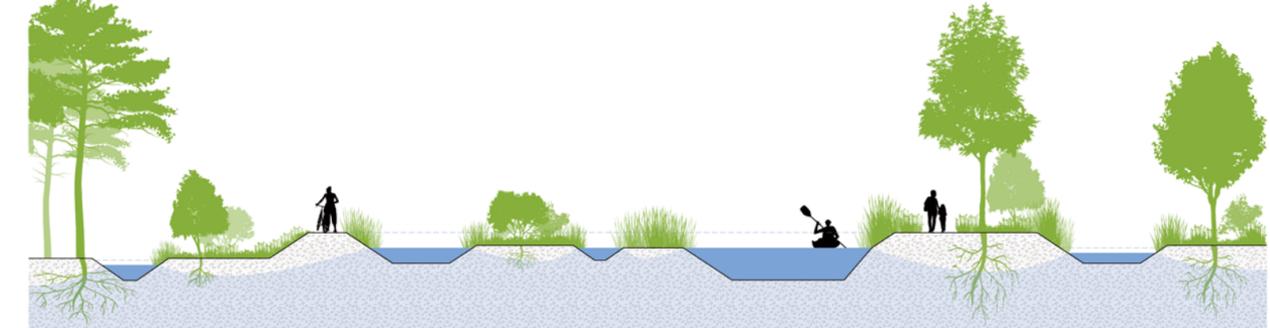
structure emphasizes the core of the MPS ecological environment and water system design, and is the most dynamic environment, where the surrounding landscape, from the plants to the water bodies, changes with the change of seasons, and this type of space has the richest landscape elements.

The third is the forest space, which is a type of completely surrounded space, with a very sedentary experience, and with the first two types of visual characteristics and touring experience that is very different. Through these three types of spaces, the park is expected to create a rich and differentiated visitor experience and to demonstrate the different qualities of the park in different seasons.

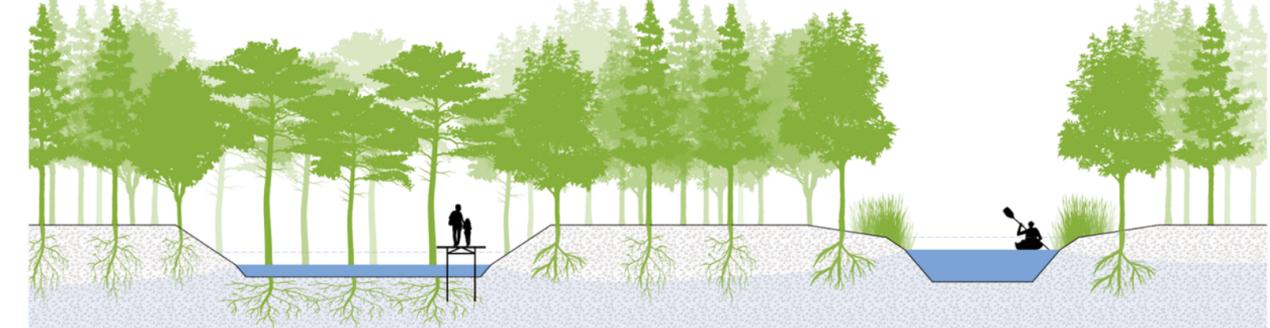
Open space - polders



Semi-open space - wetlands



Enclosed space - forest



# Green Transitions



Metropolitan Park DHW serves dual functions within the metropolitan area: it acts as a green buffer between urban centers, enhancing biodiversity and protecting natural habitats, and it provides urban residents with opportunities for nature recreation and contact. This dual purpose fosters a sense of belonging and emotional connection between residents and the landscape, achieved primarily through enhancing their park experience. The park leverages its main waterway and the recreational routes and diverse spaces along it, connecting seamlessly to the surrounding city's green infrastructure, thereby facilitating an unobstructed green transition. The routes depicted in the diagram illustrate how city dwellers can easily transition from urban environments into the park and along the waterways, experiencing various landscapes and cultural-

historic features that highlight the qualities of the surrounding spaces. For instance, the windmill symbolizes the open grassy spaces typical of the Netherlands, setting the tone for this section of the park. Its strategic location is vital for both biodiversity and water storage capacity. By maintaining the openness of this area and designing it as a wetland suitable for water storage and a recreational space for lodging, the park maximizes the composite value of the landscape and enriches the visitor experience.

# From Openness to Enclosure



Another route exemplifies the park's role as a recreational space, demonstrating a rhythmic transition from the open grassland experience of the polder to the enclosed woodland experience of the dune forest, and vice versa. This route is carefully designed to vary the spatial experience even within similar types of enclosures. The comparative sense of scale provided by different spatial structures in each section enhances this variation. For example, the open water in the lake area offers broader sightlines and distances compared to the open water within the park's main watercourse, due to its proximity to the more open polder. This design strategy ultimately guides visitors through a gradual transition to the more enclosed dune forest further away.

# Biodiversity and Ecology

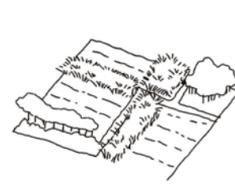
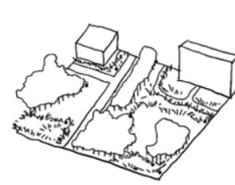
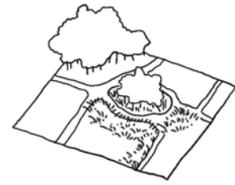
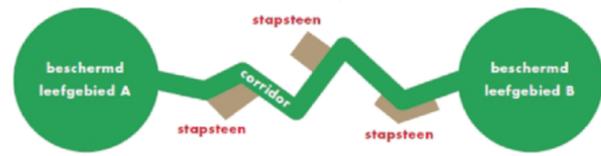


Connective corridor-stepping stone structure

Heterogeneous stepping stones

Forest as connective structure

Continuous green corridors



# Biodiversity and Ecology



## Meadow Bird



Luscinia svecica

### Indicative species



## Bird, bat (forest)



Bird, bat (forest)

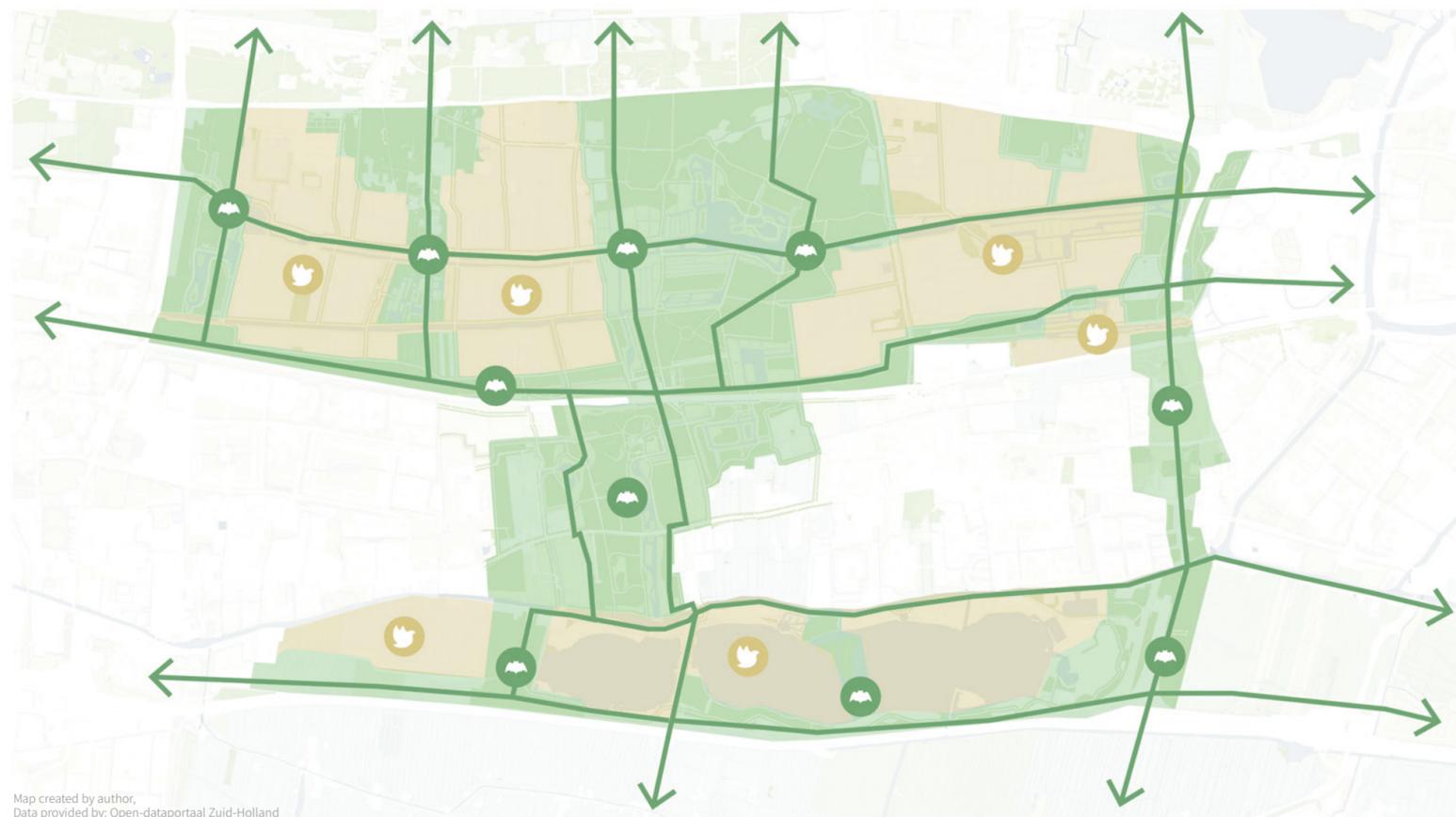
### Indicative species



Habitat enhancement for meadow birds focuses on increasing the vertical plant structure of specific habitats as separation from surrounding green spaces to safeguard incubation and chick survival. The decline in meadow birds is due to the declining open grassland areas, intensive agricultural disturbance, and threats from predators. Designing islands with vertical planting structures separated by water channels will create ideal living conditions for meadow birds that are free from both terrestrial and aerial predators.

Ecological design for forest birds and bats focuses on the creation of continuous aerial corridors to guide passage and provide roosts. Through multiple uninterrupted forest corridors and stepping stones that traverse all directions, forest birds and bats will find it easier to orient themselves in the open areas, thus guiding their movement in the designated direction, and the small intersecting areas of open grassland will also be conducive to foraging by bats and to their use as a surface between roosts and foraging areas.

Source: naturomonumenten.nl; ravon.nl; waarneming.nl; zoogdierveniging.nl



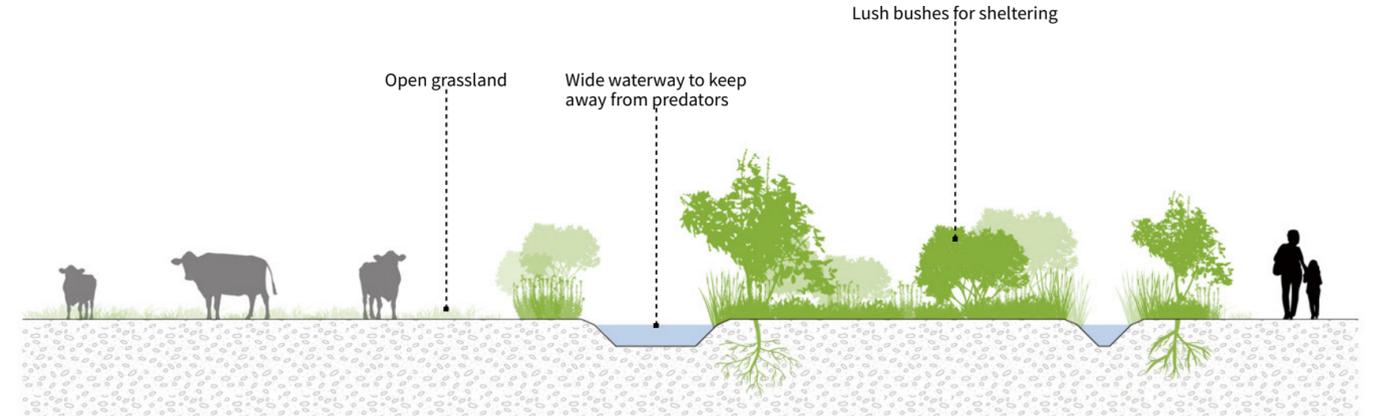
Map created by author, Data provided by: Open-dataportaal Zuid-Holland 128

## Targeted Habitat, Stepping stone and Corridor for Meadow Bird

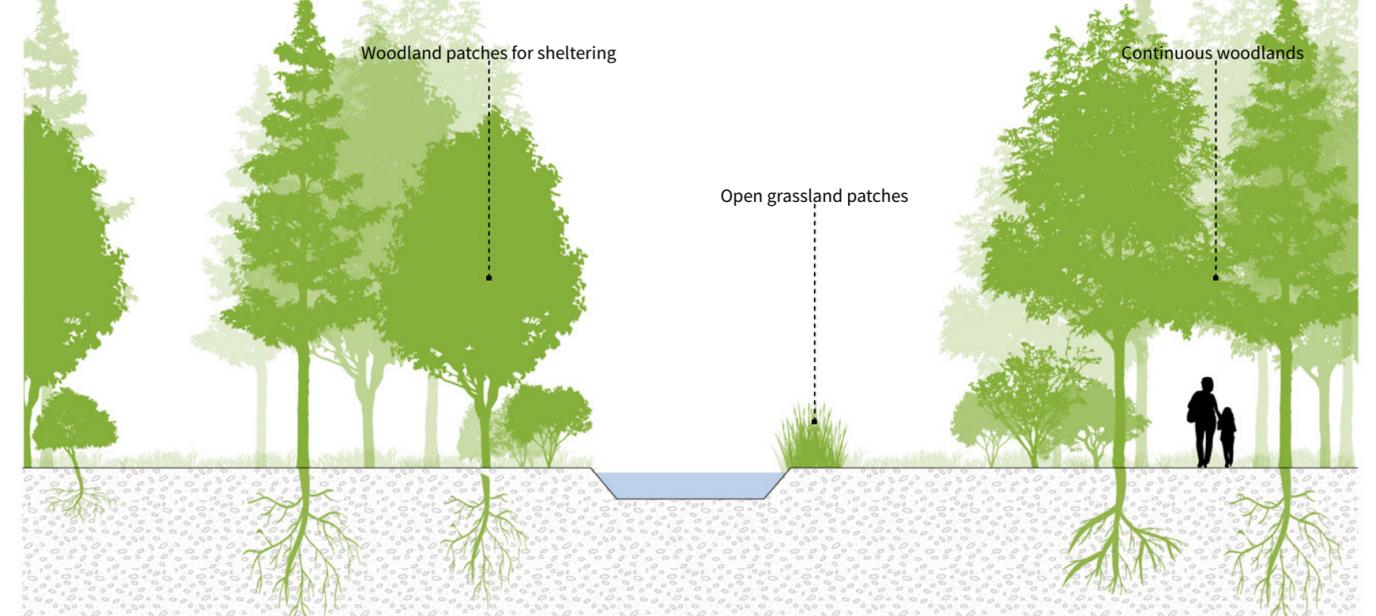
### Trees



### Shrubs & herbs



## Targeted Habitat, stepping stone and corridor for Forest Bird and Bat

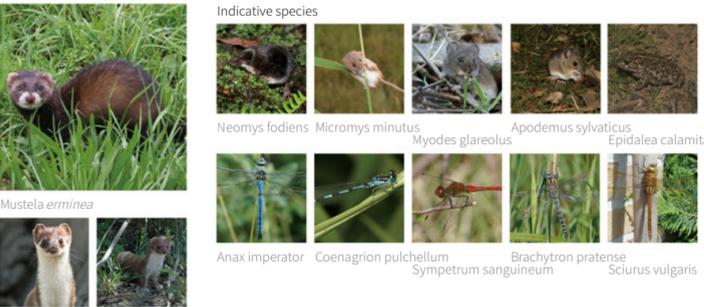




# Biodiversity and Ecology



## Stoat



Indicative species

*Neomys fodiens*   *Micromys minutus*   *Apodemus sylvaticus*  
*Myodes glareolus*   *Epidalea calamita*  
*Anax imperator*   *Coenagrion pulchellum*   *Brachytron pratense*  
*Sympetrum sanguineum*   *Sciurus vulgaris*

Source: natuurmonumenten.nl; ravon.nl; waarneming.nl; zoogdierveniging.nl

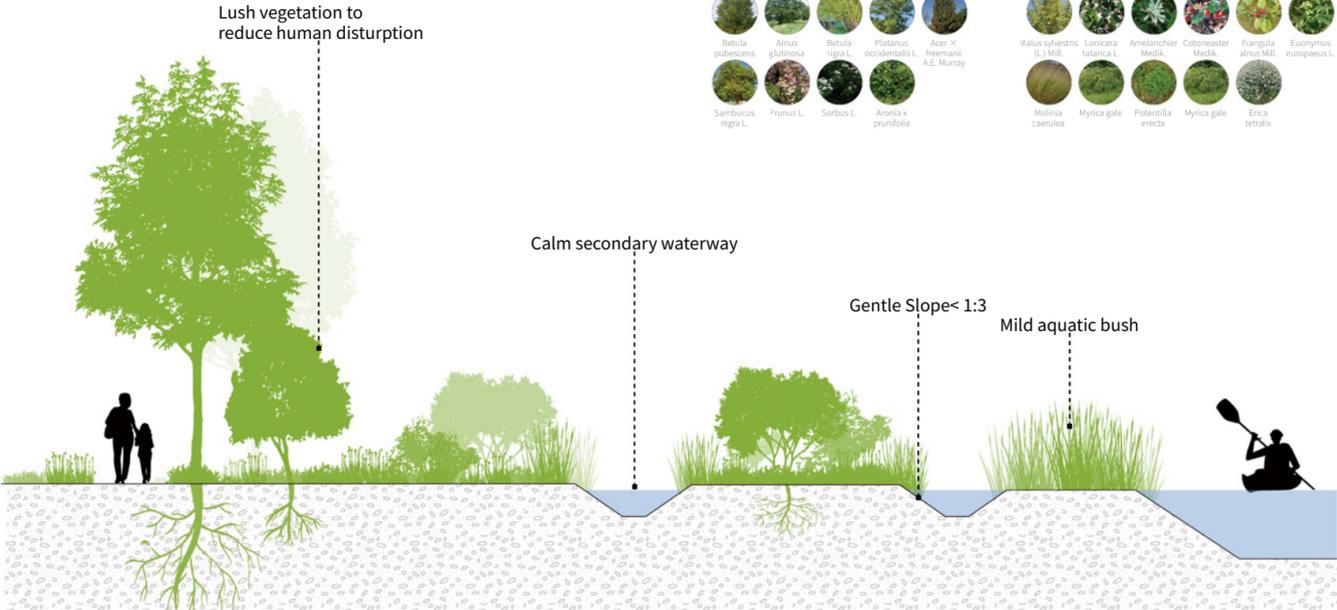
Roads, wide watercourses and steep banks near watercourses are problematic for Sableidae, and these unsheltered sites do not allow them to move without feeling safe. In addition, the species is sensitive to landscapes with high recreational pressure, lack of vegetation, and intensive agricultural use. They prefer wetlands on either side of major river branches that are relatively free from intensive human disturbance and have a richer plant structure to help them hide and forage, so the design of the park's wetlands focuses on adding shrubs while maintaining openness, and adding denser plantings and some trees close to the sidewalks to ensure that the wetland openness experience is not compromised too much. cover for the marten family. The same design measures were applied to the sides of the agricultural fields to increase cover at the edges of the open meadows by adding some vertical planting structure to mitigate the disturbance of this species by intensive agriculture.

## Distribution Map



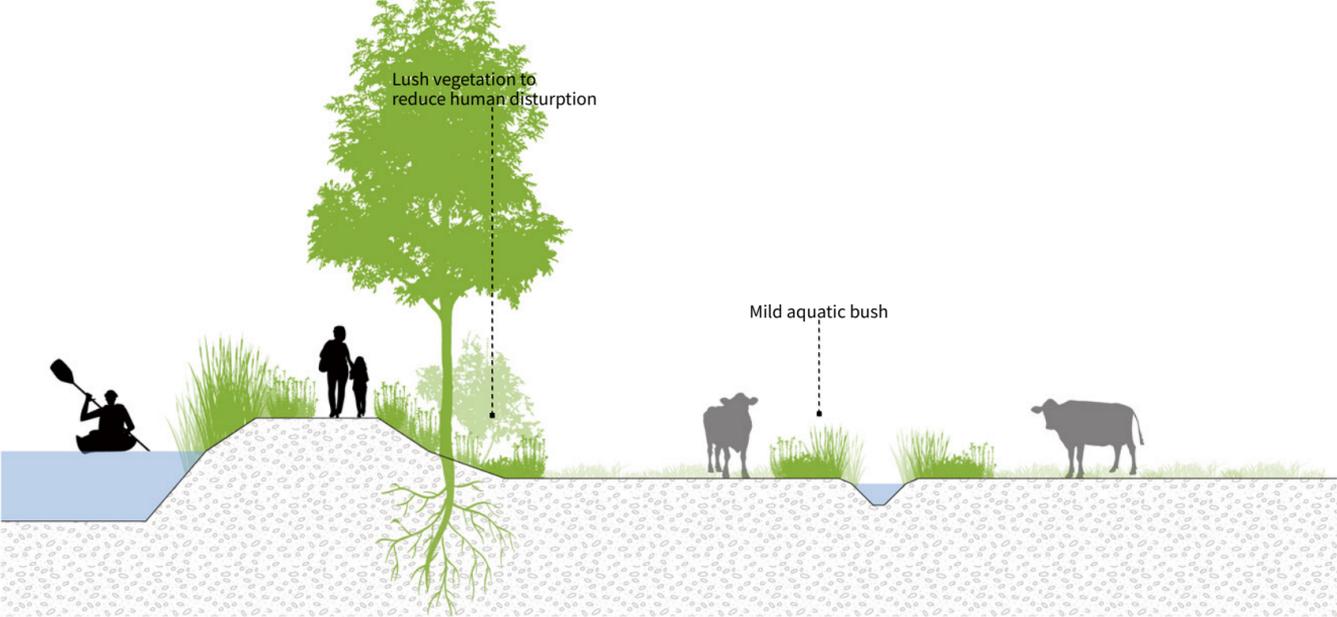
Map created by author, Data provided by: Open-dataportaal Zuid-Holland

## Targeted Habitat



- |                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Trees</b><br><br><i>Betula pubescens</i> <i>Alnus glutinosa</i> <i>Betula pendula</i> <i>Platanus occidentalis</i> <i>Acer x freemanii</i> A.E. Murray<br><i>Sambucus nigra</i> L. <i>Prunus</i> L. <i>Sorbus</i> L. <i>Aronia x prunifolia</i> | <b>Shrubs &amp; herbs</b><br><br><i>Malus sylvestris</i> (M. 1348) <i>Lonicera tatarica</i> L. <i>Amelanchier</i> <i>Cotoneaster</i> <i>Frangula alnus</i> Mill. <i>Euonymus europaeus</i> L.<br><i>Molinia caerulea</i> <i>Myrica gale</i> <i>Potentilla erecta</i> <i>Myrica gale</i> <i>Erica tetralix</i> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Targeted Stepping Stone, Corridor





# Biodiversity and Ecology



## Pollinator

**Indicative species**

*Ochlodes sylvanus*  
*Coenonympha pamphilus*

*Bombus soroensis*

*Simosyrphus grandicornis*

*Thymelicus lineola*

*Bombus veteranus*

*Anthocharis cardamines*  
*Thymelicus lineola*

*Aricia agestis*  
*Lasiommata megera*

Source: bestuivers.nl; natuurmonumenten.nl; ravon.nl; waarneming.nl; zoogdiervereniging.nl

## Distribution



Map created by author, Data provided by: Open-dataportaal Zuid-Holland

## Targeted Stepping Stone, Corridor

**Trees**

- Alnus glutinosa*
- Parrotia persica*
- Prunus padus*
- Heptacodium micranthoides* Rehder
- Aesculus indica* Comus mas L.

**Shrubs & Herbs**

- Aster L.*
- Lythrum salicaria*
- Eranthis*
- Maackia amurensis*
- Ornithogalum*
- Teucrium aureocandidum*
- Scilla L.*
- Stratiotes aloides*
- Verbascum dumulosum*
- Valeriana officinalis*

**Vertical vegetation structure**

Nectar plant ribbon along polder waterways

Nectar plant bed along carways



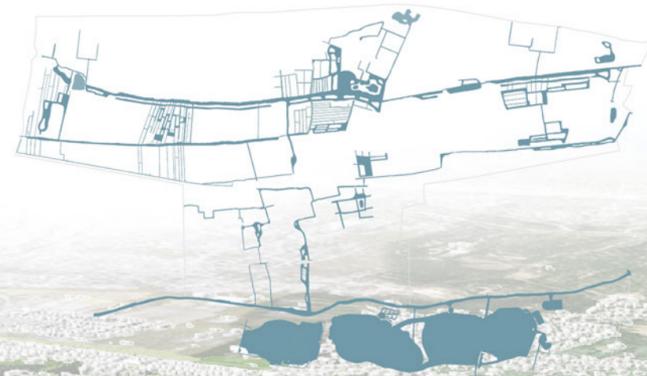
# Water and Climate Adaptation



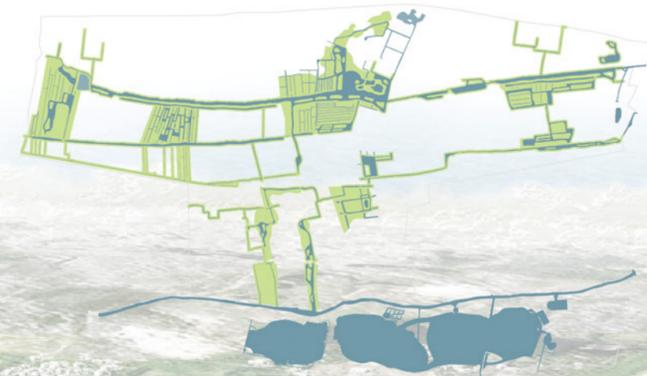
1. Widen existing water way to enhance water storage capacity



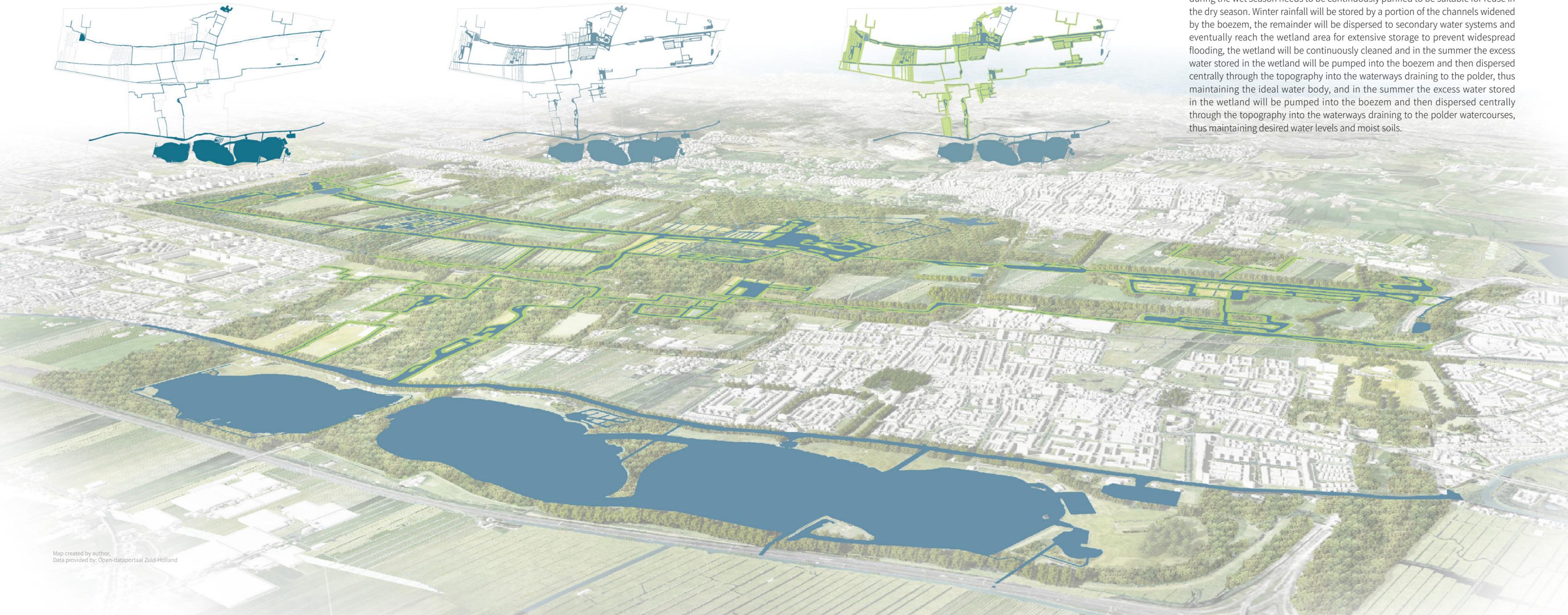
1. Increase water retention area to reduce pressure on main waterways to adapt to extreme weather events.



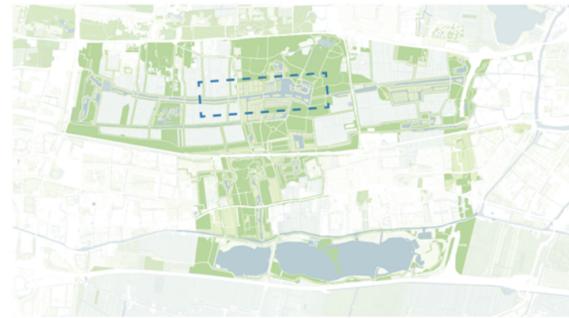
3. Develop wetlands among water systems to sustain water quality and increase floodability.



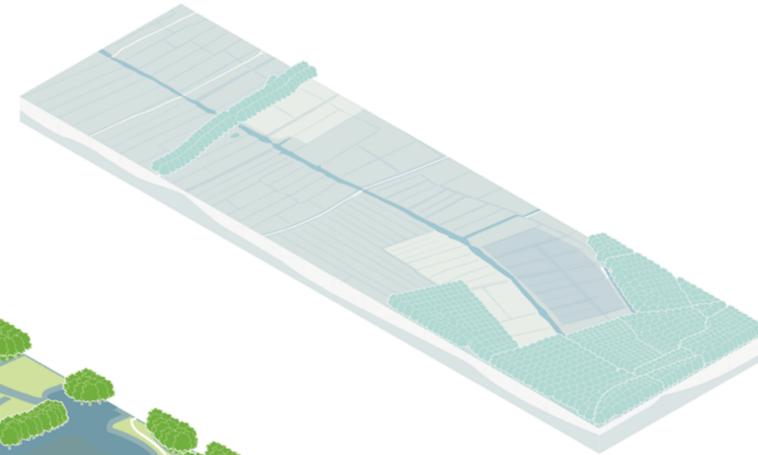
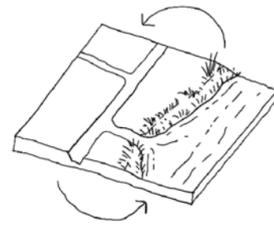
In addition to increasing the storage capacity of the site's water system, another focus is on designing a water system that can be recycled, so that rainwater stored during the wet season needs to be continuously purified to be suitable for reuse in the dry season. Winter rainfall will be stored by a portion of the channels widened by the boezem, the remainder will be dispersed to secondary water systems and eventually reach the wetland area for extensive storage to prevent widespread flooding, the wetland will be continuously cleaned and in the summer the excess water stored in the wetland will be pumped into the boezem and then dispersed centrally through the topography into the waterways draining to the polder, thus maintaining the ideal water body, and in the summer the excess water stored in the wetland will be pumped into the boezem and then dispersed centrally through the topography into the waterways draining to the polder watercourses, thus maintaining desired water levels and moist soils.



# Water and Climate Adaptation



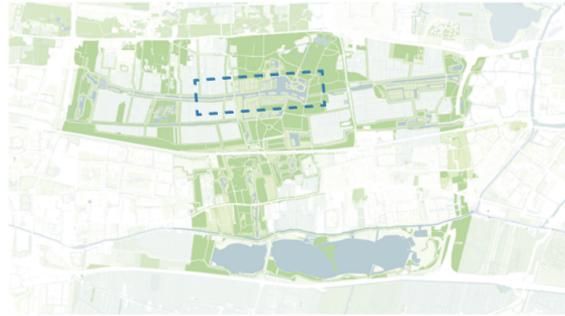
Agri-nature water circulation



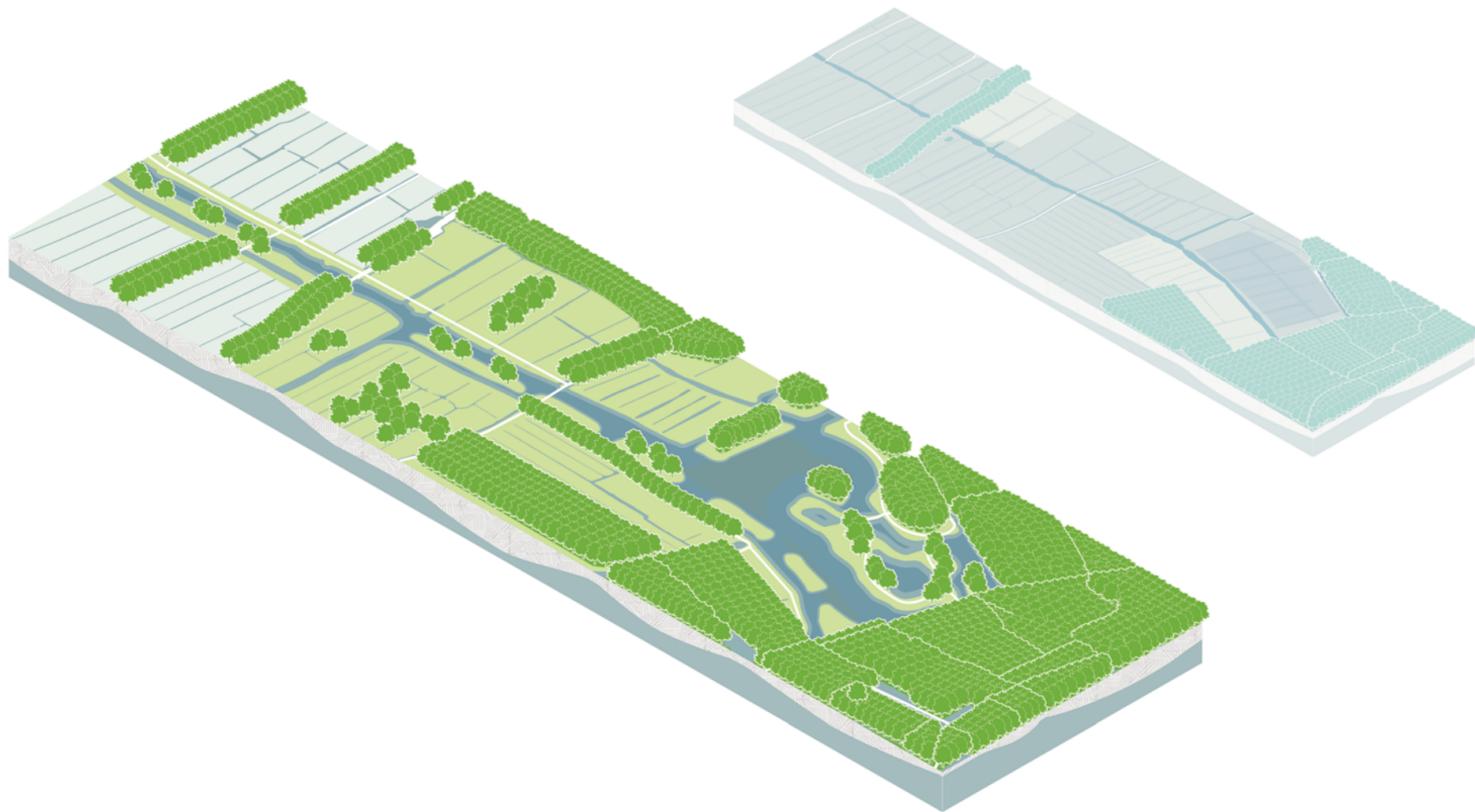
Water Distribution & Circulation Map

- Water Distribution
- Water Circulation
- Main Waterway
- Secondary Waterway
- Wetland

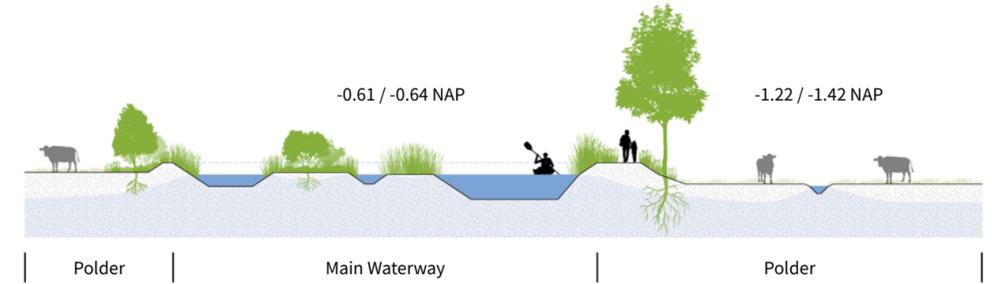
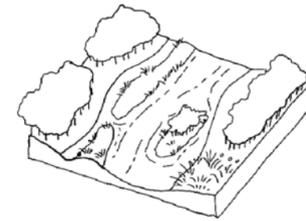
# Water and Climate Adaptation



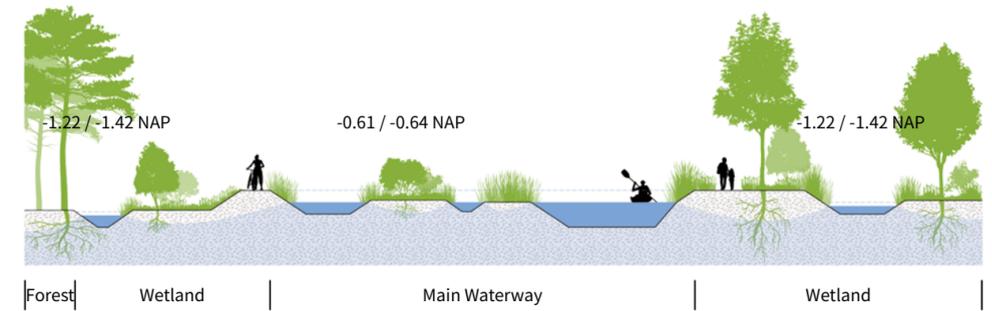
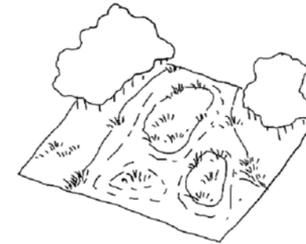
Shown here is a comparison of the transformation of one of the core areas of the park, where, in addition to increasing the area of storable water and creating wetlands to continuously purify the water, the most important thing is the dynamic adjustment of the boezem water level to re-increase its floating range, which is achieved by raising the height of the existing embankment. This combination of design initiatives has resulted in the site becoming more water resilient and self-sufficient throughout the year.



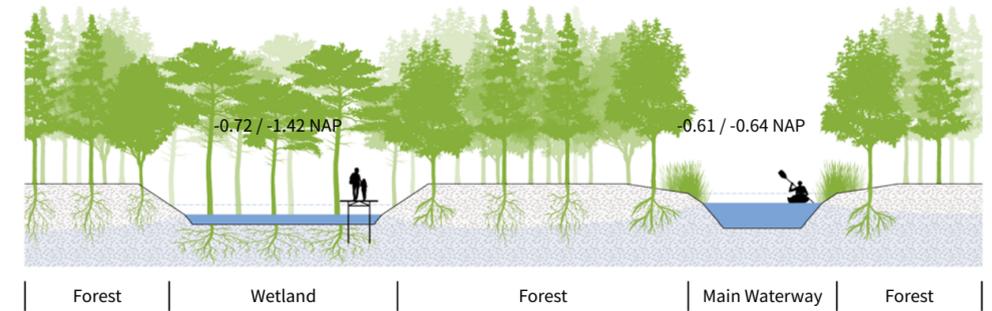
Water ways as core structure for development



Wetland to enhance water adaptivity



Innundated land for seasonal water storage





# Vision Development



2030



2035



2050



2100



- Build up animal-crossing facilities.
- Increase nectar plant species along route networks.

- Introduce aquatic plants and fruit bushes for wetlands.
- Introduce trees in new recreational areas.

- Build up more woodlands along traffic lines as sound buffer.
- Enhance connectivity of the tree-based habitats by complementing the tree corridors and stepping stones.

- Promote nature-inclusive agriculture to realize the full ecological structure of the metropolitan park

- Strengthen the identifiability of the existing route networks.
- Enhance the spatial characteristics of the existing entrances.

- Develop recreational areas.
- Increase recreational routes for new recreational areas.

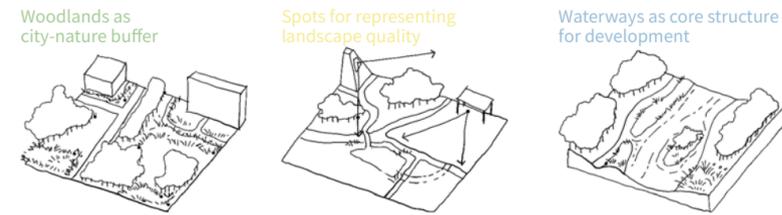
- Develop diverse route choices for different experiential themes.

Sustainable agriculture



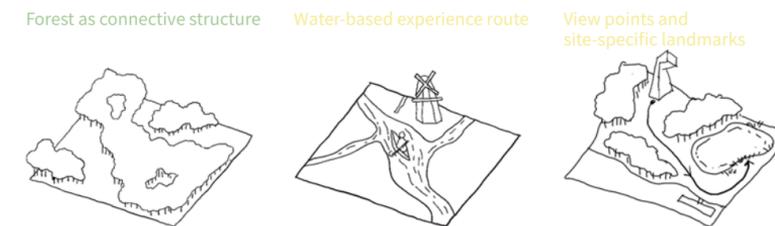
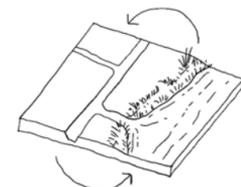
- Widen main water structure.
- Construct water bypasses along main water structure.
- Develop inundable spaces.

- Develop wetland for water storage.
- Expand water network for future woodlands.
- Complete full water networks by realizing water circulation.



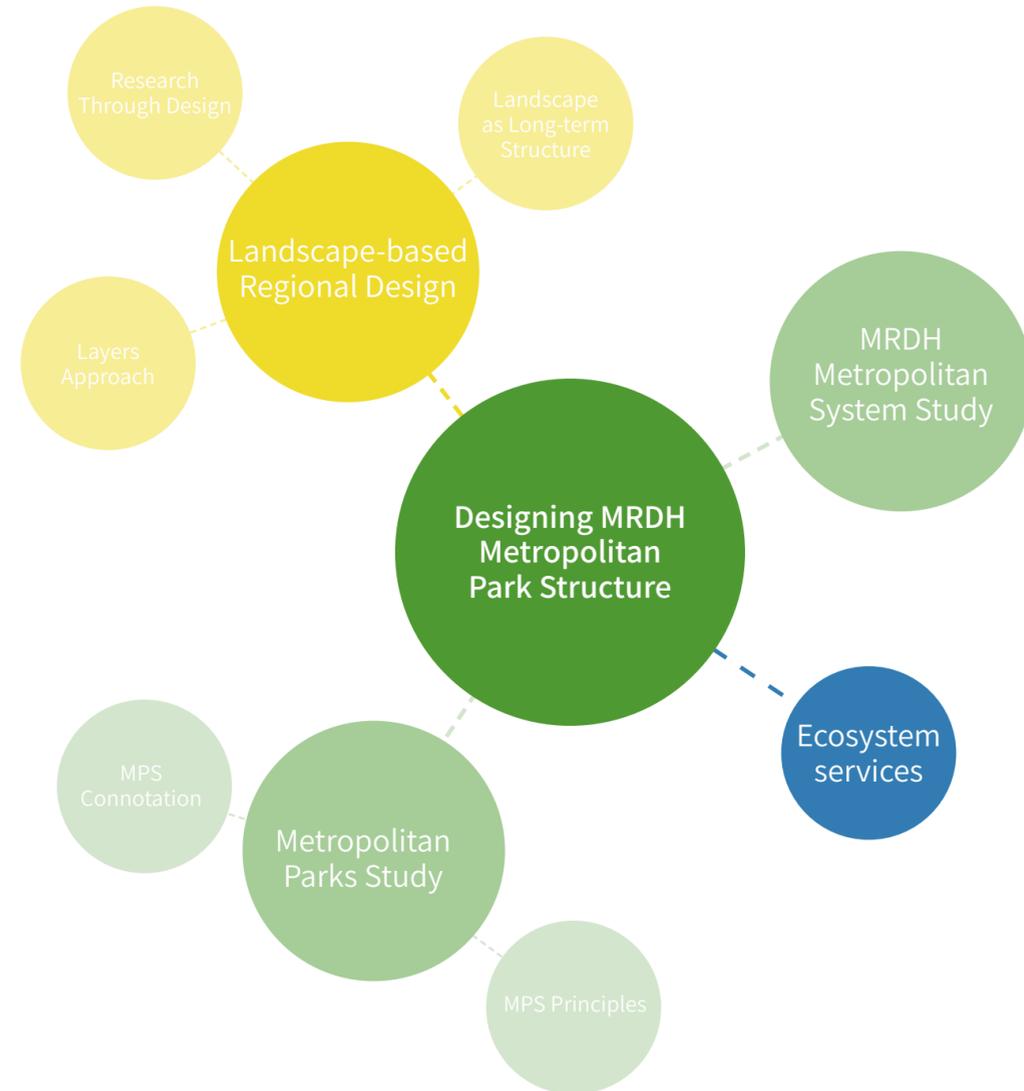
Inundated land for seasonal water storage

Wetland to enhance water adaptativity

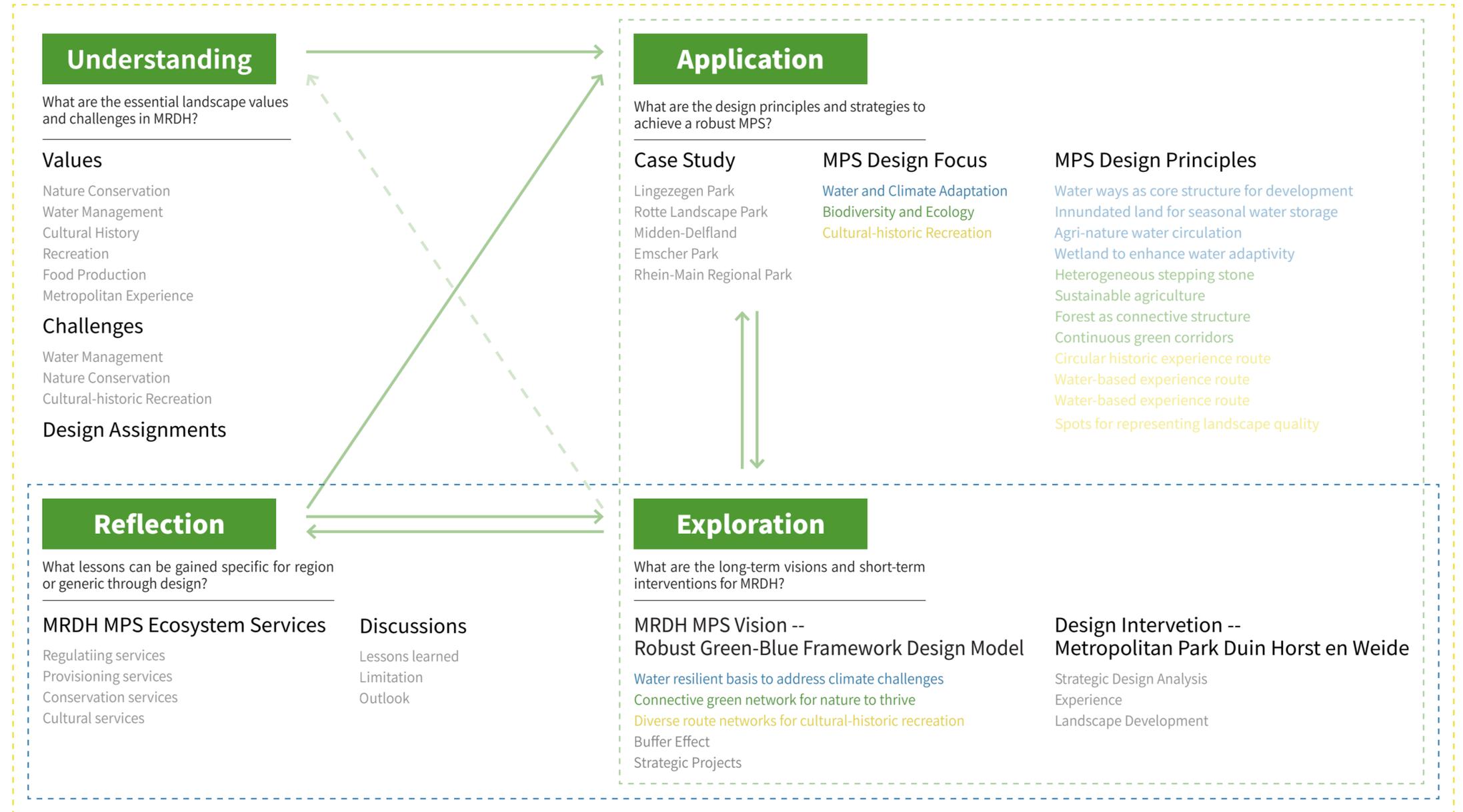




# Conclusions & Reflections



## Landscape-based Regional Design



Ecosystem services

Metropolitan Parks Study

# Conclusions

RQ1: What are the essential landscape values and challenges in MRDH?

The essential values of metropolitan landscapes in MRDH are represented in complementing the densely built-up urban areas and mitigating the negative impacts of urban development while providing essential functions in nature conservation, recreation, water management, food production, cultural history, and the metropolitan experience. These landscapes play a crucial role in ensuring the region's adaptability to future demographic shifts and climate change, enhancing its resilience in the face of evolving urban development challenges. The diversity of landscape typologies and cultural-historical features contribute to the natural, recreational, cultural, and historical richness of the MRDH, setting it apart from other metropolitan areas globally. From a landscape architectural perspective, preserving the value of metropolitan landscapes is essential for fostering sustainable urban development in the MRDH.

To achieve landscape-based sustainable urban development, the MPS must address three overarching long-term challenges: water management, nature conservation, and cultural-historical recreation. Water management challenges stem from climate change-induced factors such as extended periods of heat and drought, declining groundwater levels, and increased water storage demands, which threaten the resilience and equilibrium of existing water systems. Nature conservation challenges arise from irreversible damage to drought-sensitive wetlands, habitat fragmentation, and heightened human disturbance due to urban sprawl. Cultural-historical recreation challenges include improving accessibility to cultural-historical features, enhancing the metropolitan experience, and managing increased recreational demands on green spaces.

These three challenges are interconnected and cannot be addressed in isolation. Extended periods of heat and drought, for instance, not only strain water systems but also have ripple effects on aquatic ecosystems. Similarly, the surge in demand for nature-based recreation must be carefully managed to minimize disturbances to natural habitats caused by heightened human activities. To effectively tackle these intertwined challenges, the MPS requires a series of holistic and integrated design approaches. By balancing conservation efforts, water management strategies, and cultural and recreational considerations, MPS can bolster the resilience of metropolitan landscapes against urban sprawl and climate change. This comprehensive approach is essential for promoting sustainable urban development in the long term and taking effects in the short-term interventions.

RQ2: What are the design principles and strategies to achieve a robust MPS?

The design strategies of the MPS align with specific challenges, including water and climate adaptation, biodiversity and ecology, as well as recreation and cultural history. These strategies are mirrored in various projects, such as Lingezege Park, Rotte Landscape Park, and Midden-Delfland in the Netherlands, as well as Emscher Park and Rhein-Main Regional Park in Germany. These projects offer valuable insights into managing urban growth and enhancing the value of metropolitan landscapes. Drawing from the experiences gained in these projects, the MPS aims to integrate long-term visions and short-term interventions to address the evolving needs of metropolitan regions. By incorporating lessons learned from these initiatives, the MPS endeavors to create sustainable solutions that effectively balance urban development with environmental conservation and cultural preservation.

RQ3: What are the long-term visions and short-term interventions for MPRDH?

The overarching idea of long-term vision for the MPS entails designing a resilient green-blue framework for the metropolitan region. This involves establishing a water-resilient basis to address climate challenges, creating a connected green network to support biodiversity, and planning diverse recreational routes that showcase cultural-historic landscape features. The goal is to develop an interconnected metropolitan park structure that safeguards key assets of the metropolitan region while enhancing its adaptability and resilience to climate change. By protecting core landscape resources from depletion and fragmentation due to urban sprawl, safeguarding robust basis for MRDH sustainable urban development.

To implement this vision, short-term interventions are focused on one selected area within the Duin, Horst en Weide (DHW), which was once designated as a buffer zone. This area serves as a microcosm of the MPS's approaches to addressing the analyzed challenges and design objectives. Key challenges in the context of DHW include the barrier effect created by urban and road infrastructure, with climatic issues further increasing the effect. Accordingly, interventions aim to mitigate this barrier effect by enhancing connectivity both within and outside the area.

The design strategies in the Duin, Horst en Weide area align with the three pillars of the MPS: water system connectivity, ecological enhancement, and integration

of blue-green spaces with cultural and historical features. These interventions seek to strengthen the water storage capacity and circulation, improve ecological connectivity, and integrate diverse recreational spaces and routes. By enhancing the composite value of the metropolitan landscape while conserving its important assets, this approach ensures the metropolitan sustainability for the area and the region.

RQ4: What lessons can be gained specific for region or generic through design?

Metropolitan landscapes provide a strong ecological foundation for urban development, offering unique values that complement the limitations of densely built-up areas, enhancing their impact and attractiveness. Achieving landscape-based sustainable urban development requires recognizing these unique values and creating a bridge for urban planners from various fields to understand the benefits of metropolitan landscapes. Ecosystem services provide this bridge by offering a socio-ecological context aligned with MPRD's goals. The MPS aims to bring socio-ecological benefits through:

- Regulating Services: Enhancing water systems to be more resilient to hydrological processes and climate change.
- Provisioning Services: Promoting sustainable agriculture, connecting agroecology to larger networks, reducing agricultural vulnerability to climate change, and ensuring food production.
- Conservation Services: Designing resilient water systems and complete ecological networks to protect critical habitats from urban development, enhancing biodiversity.
- Cultural Services: Integrating nature with cultural history, recreation, and sustainable transportation, preserving the character and context of landscapes, and safeguarding the metropolitan recreational experience.

MPS approaches for MRDH differs from traditional metropolitan development models by focusing on balancing ecological preservation and urban development to achieve harmonious coexistence between humans and nature. This vision extends green spaces from urban doorsteps into the broader metropolitan landscape, where diverse flora and fauna can be encountered in parks and green patches. Slow transportation guides residents through the cultural and historical features of MRDH and experiences new agriculture. Achieving such ideal scenario requires changing urban planners' perceptions and collaboration among various

stakeholders. The spatial planning of MRDH is currently limited by the traditional province-municipality governance structure, leading to imbalanced management and implementation. Historical urban development studies show that this imbalance causes landscape fragmentation, reduced biodiversity, and lack of climate resilience. MPS demonstrates a holistic, landscape-based approach to address these issues on a metropolitan scale, contributing to sustainable urban development through ecosystem services. It showcases the potential for integrating metropolitan spatial development and transforming the traditional development model into one that balances socio-economic and ecological goals.



# Reflections

Relation between my graduation project topic, Flowscape Studio, and LA MSc track?

The topic 'Designing MRDH Metropolitan Park Structure' follows the theme of Flowscape studio as well as incorporating much of what has been learned over the past two years in the LA MSc track. The “flow” part of the theme refers to time and multifaceted factors that influence the dynamic of landscapes and the context they are embedded in, the “scape” part has strong connection with the material realm including the actual space and experience it creates. Designing MRDH Metropolitan Structure focusing on designing a robust green-blue framework that is visioned to profoundly contribute to sustainable urban development by using an integrating approach to enhance the three interrelated aspect that are crucial to the future MRDH spatial development: water management, nature conservation and cultural-historic recreation. To do so, the project started by understanding the historical development of the metropolitan region to better understand its urban trajectory and what it did to the metropolitan landscape, so that to know how the current situation is shaped by the history and how it will go in the future with the diagnosis of the challenges.

The design outcomes also think in time and process to cooperate with the metropolitan dynamics, the MRDH metropolitan park structure is a long-term vision to guide MRDH towards a more sustainable future in a landscape-first basis. It enhances the visibility of the Metropolis within the Metropolitan System from an ecological-social perspective and applies a landscape-based approach to protect and enhance the values of the Metropolitan Landscape that are relevant to the sustainable urban development of the MRDH. The MPS does not treat each value and challenge as a separate object; rather, each factor interacts with each other, and resilient water management can only support the development of its nature conservation, and a well-functioning blue-green network can provide a better Metropolitan experience for cultural and historic recreation, thereby increasing the recognition of the Metropolis by its residents and their participation in the protection of this precious landscape property. A well-functioning blue-green network provides a better metropolitan experience for cultural and historical recreation, thus increasing metropolitan residents' recognition of the metropolitan landscape and their participation in the preservation of this rare landscape property and influencing the metropolitan region toward socio-economic-ecological balanced urban development. The short-term interventions detail how MPS realizes the vision of MPS at the urban scale and in specific spatial

contexts, using the knowledge of the Dutch polder and water system learned in the first year, the knowledge of dealing with urban texture and boundaries in urban landscapes, as well as the use of different spatial structures and mobility designs to emphasize the different spatial characteristics of the site. The project is a concentrated expression of the past work in LJK. The project is a distillation of the different ways of reading and designing sites learned in the LA track and presents the MPS design process and results in a systematic way through different theoretical knowledge.

Metropolitan Park Study, Landscape-based Regional Design, and Ecosystem Services.

The theoretical framework and case studies of Metropolitan Parks provide the foundation for this project, the process involves understanding the definition, role, and components of a metropolitan park, and employing landscape-based regional design methods. These methods range from understanding the metropolitan system and identifying key challenges to the landscape, to developing design strategies and principles based on case studies. The process combines these insights with long-term visions and short-term interventions for MRDH. It is a research-through-design process, where different design phases are continually verified for compatibility, refining the overall design thinking. Ecosystem Services offer a clear, categorized theoretical approach, enabling communication among urban planners from various backgrounds. This approach highlights the significance and contribution of the MPS to MRDH's sustainable urban development and provides an opportunity to put forward metropolitan-lead spatial governance structure MPS.

Method and approach

Layers approach and mapping

It is a combined system learning and visualization method for understanding metropolitan system layer by layer, a powerful tool for unraveling the traditional economy-oriented urban development by the degree of modifiability and dynamic and providing insights into the building up a more sustainable landscape-first urban development system that focus more on socio-economic aspects.

Research through design

This project is an evident-based design that is coherent to the research on

metropolitan park structure as a landscape-based approach to sustainable urban development. At the same time, it is also a design project to validate the feasibility of the study and to provide clarity and direction to fill in the gaps in practice. In addition, it is also a design project to collect, identify, and summarize information about the site, and through the continuous use of visualization tools to integrate the information and provide a basis for the design of the MPS, the results of the design also point out the shortcomings of the site study, which can be used to complement or modify the design ideas. This has helped to sharpen the focus and outcomes of the MPS design process, resulting in a deeper and more accurate understanding of the challenges facing MRDH and the corresponding long-term and short-term solutions.

Case Study

This project uses case studies in explaining the meaning and practice of MPS and exploring design strategies and principles. The available case studies clearly provide a viable design approach, which helps to better enhance the operationalization of the project and the feasibility of the design principles, which in turn helps to advance the design of MPS longterm vision as well as short-term interventions.

Lessons learned

Learn from the past

The landscape and the metropolitan region in which it is situated are the result of layers and layers of transformations from different periods, so it is important to understand its history in order to truly understand its complex system. the historical development of the metropolitan region can reveal the logic of its urban development, which provides an entry point to understand its development patterns and a glimpse of its future trajectory, and provides inspiration to explore design solutions that are applicable to the MRDH context. The historical development of the metropolitan region can reveal the logic of its urban development, thus providing an entry point to understand its development pattern and to explore its future development trajectory, and to identify the shortcomings of the current urban development and the common ground that is relevant to the design objectives, which can provide inspiration for exploring the design solutions applicable to the context of MRDH. Case study is also an important way to learn from the past, as different case studies can always inspire different aspects of the design objectives, and at the same time, we can also find

commonalities among many cases and apply them to our own designs. These two methods of learning from the past give direction to MPS's design ideas and ensure that the results are actionable and contextualized.

Understand the dynamic nature of metropolitan system and think in time

The Metropolitan System consists of many interacting subsystems, and although the dynamics of the different subsystems are different, what is the same is that there are always interconnections between them, those are spaces that can be designed to continually experiment with the possibilities of sustainable development of the metropolis, and in recognizing this, I have come to the realization that the most dynamic part of the Metropolitan System lies at the boundary where the densely built-up areas of the city meet the metropolitan landscape, which is the key spots that will influence the future development of the city. Such junctures also fit well with the connotation of the MPS as an urban-natural interface, and thus the project begins at this theoretical and on-site conditions. The dynamics of the landscape are not only influenced by other metropolitan subsystems, but also by climatic and internal changes, which is important for the design of MRDH's MPS, as the results of the design will not be achieved overnight, but rather, it will be necessary to anticipate the urban development in advance as well as to identify the locations that need to be transformed in order to ensure that in the long term, the desired effects of the design will be realized in the future. This requires allowing space for the landscape to develop and for other subsystems to be operationalized to dynamically achieve sustainable urban development.

Play with research and design process

As mentioned earlier, research and design are mutually fulfilling; it is not a linear process, but rather a cycle of mutual validation and improvement. Therefore, in the design process of the project, design is more of a tool than an outcome, it is used to validate whether the previous understanding of the metropolitan system, the application of theories, and the strategies and principles derived from the case studies can work together to serve to answer the research questions. In the process, research deficiencies can be identified, and research goals can be corrected to be more relevant to the topic, thus refining the design.

Limitation

This project presents the spatial design aspects of MPS for sustainable urban



# Reflections

development, with a relatively brief elaboration of landscape governance, which is reflected in the detailed analysis of the roles that stakeholders need to play at different stages of the MPS development process. A detailed study of this section would better enhance the feasibility of the Vision map of the MPS and thus more accurately propose more specific steps for landscape governance. In addition to this, as an international student living and studying in the Netherlands for a short period of time, my understanding of Dutch culture, especially the local culture, was not as in-depth as that of the local Dutch students, which provided difficulties during the site research, and this could only be made up by communicating with the Dutch students and teachers around me. It is hard not to recognize that if it were not for the glass ceiling of language, the project would have been more in-depth in its site research and could have resulted in a more locally inspired design. Finally, there is not much research on landscape-based metropolitan development, which is now more at the conceptual research-design stage, and more relevant research could better complement this knowledge.

## Outlook

### Extending Applicability

This is an ambitious project, but it would have been better if more interdisciplinary communications had been involved to recognize the project's shortcomings and enhancements, for example, with experts in water management and local residents, which would have allowed for more bottom-up perspectives to be added, and more awareness of what is relevant to the land to be involved. The successful application of landscape strategies and principles has a great deal of credits to be given to detailed site analysis, as well as theory and case studies, which have been well verified in short-term interventions and past experiences, but if it can be practiced in other strategic locations, it may be possible to further validate the applicability of landscape principles and make corrections. The application of the landscape principles can be further verified and modified.

### Thinking bigger

Currently MRDH consists of several sites that are temporarily sequestered beneath the built-up surface, such as greenhouses and vacant factory areas, which could potentially be removed and provided with more green space to achieve a more diverse range of functions. The vision for the project could also take the landscape-based perspective further by thinking about the impediments to sustainable urban development on the site in terms of hydrology, nature conservation, recreational opportunities, etc., and provide a bold plan for their removal and corresponding design solutions.



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