RESTORATIVE URBAN FOREST

Designing a forest park for Amsterdam Sloterdijk
that contributes to reducing mental stress

MACHTELD ZINSMEISTER
Graduation report
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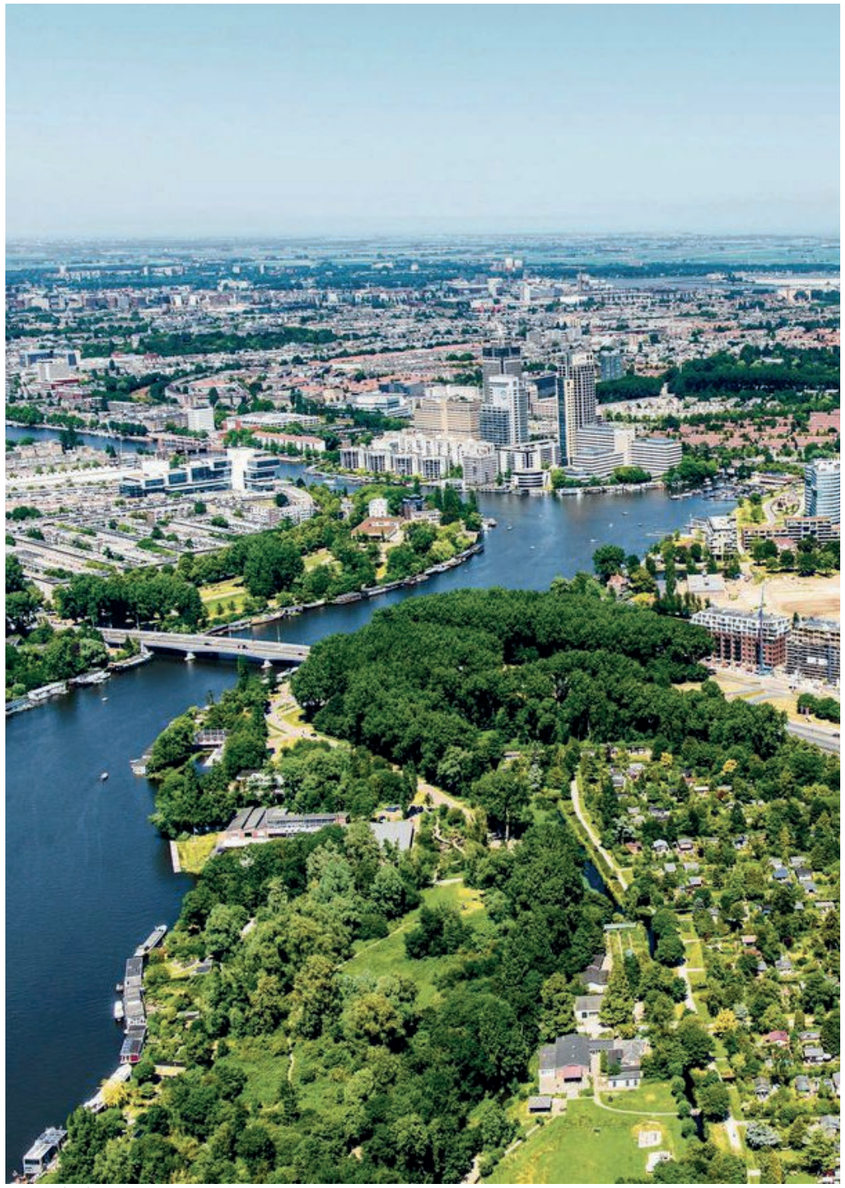

Amstelscheg (Swart, 2019)

Preface

Restorative Urban Forest is a graduation project within the Urban Forest Places lab, as part of the Flowscapes Graduation Studio of the Landscape Architecture master track at the Faculty of Architecture and The Built Environment at the TU Delft.

This thesis project focuses on the relationship between urban environments and the healing aspect of nature. Urban environments affect our body and state of mind, and are not always beneficial for our mental health. Landscape and urban design can do something about this. But the question is how?

This report presents a literature study, site research and a design proposal for a forest park for Amsterdam Sloterdijk that contributes to reducing mental stress.

The purpose of this project is to show how a potential forest park that contributes to reducing mental stress in an urban environment could look like, and to inspire landscape architects and urban planners to provide alternatives for how public green spaces can be designed in urban environments.

Keywords: *healing nature, urban forestry, urban development, densification, liveability, human behaviour.*

I would like to thank my mentors René van der Velde and Marco Lub for their great guidance, feedback and support.

I also would like to thank my fellow Urban Forest Places graduate students, for their support and inspiration.

And a special thanks to all my friends and family for their endless support and encouragement. Thank you Annemiek, Loes, Eileen, Emma, Georgia, Barsha and Marina for always being there for me.

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Rotterdam, July 2020

https://www.nrc.nl/nieuws/2019/09/19/zijn-de-beroemde-groene-scheggen-in-gevaar-a3973775

Abstract

This thesis project, as part of the urban forest places graduation lab, focuses on the relationship between urban environments and the healing aspects of nature. Urban environments affect our body and state of mind, and are not always beneficial for our mental health. Landscape and urban design can do something about this. But the question is how?

The city of Amsterdam is used as a location to investigate this. The city is surrounded with a diverse metropolitan landscape, which enters far into the city in the form of green wedges, also called the Scheggen.[1]

Amsterdam has a long history in investing in green spaces during urban expansions. Since the sixteenth century every period of growth has been accompanied by planned investment in green spaces. First by planting trees along the canals in the sixteenth century. Than by creating city parks in the nineteenth century. The existing green structure was planned during the General Expansion Plan in 1934, made by van Eesteren.[2]

The purpose of the General Expansion Plan was not only to expand urban development but also to create a balance between city and green space. Next to the more open and greener designs for new residential areas, the Scheggen were planned as green structure. This green structure ensures that every resident of Amsterdam can reach a green space within ten minutes, even from the heart of the city centre.[3]

Nowadays, the city of Amsterdam has to deal with the following problems. Firstly, the big pressure on the housing market, is forcing the city to densify as well as expand outside of its current urban borders, which makes the Scheggen vulnerable.[4]

Not only densification is a problem, but also the fact that nowadays more and more people suffer from mental health issues, such as stress, burn-outs, anxiety and depression. Of course we all need a little bit of stress, but if people cannot restore from too much stress for a prolonged period of time, their health will be negatively affected in many ways.

Additionally, the city also has to deal with a number of other complex issues, such as climate change issues and biodiversity loss.

This has led to the main research question: How can a forest park be designed in such a way that it contributes to reducing mental stress in an urban environment?

The findings from the literature study provided evidence that a forest park can contribute to reduce mental stress. Visiting or viewing a forest has a positive effect on people's mental health and recovering from stress, especially for people from urban environments.

The literature study, together with a thorough site research, formed the following design principles: (1) create a restorative environment, by using the sensorial aspects of nature, (2) increase public access to landscape, by overcoming barriers (3) create a connective landscape, by enhancing the ecological corridor (4) make use of the valuable cultural historical elements, (5) and integrate the housing development with the park design.

The result of this thesis is a design proposal for an urban forest park in the area of Sloterdijk, located in the west of the city of Amsterdam.

The project shows that the design proposal for a forest park not only contributes to reduce mental stress in an urban environment, but also increases biodiversity, and acts as a climate buffer by managing rainwater and cooling the environment.

[1] https://deamsterdamsescheggen.nl/
[2] Plan Amsterdam (2017)
[3] http://vaneesterenmuseum.nl/en/garden-cities/green/green-lungs/
[4] https://www.metropoolregioamsterdam.nl/about-mra/

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Picture taken at the Spaarnwoude forest park in autumn

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Introduction

The first chapter presents my fascination and site selection, that together with my problem statement leads to my research questions. The methodology elaborates how the research questions will be answered.

Fascination

Starting point for this thesis project was a fascination for the relationship between urban environments and the healing aspects of nature. Urban environments affect our body and state of mind, and are not always beneficial for our mental health. The effects people may experience such as overcrowded places, noise, heavy traffic, air pollution and a lack of contact with nature, all affect our mental health. Landscape and urban design can do something about this. But the question is how?

Site selection

The city of Amsterdam is used as a location to investigate this. The city is surrounded with a diverse metropolitan landscape, which enters far into the city in the form of green wedges, also called the Scheggen. This green structure diagram is similar to the Copenhagen's finger plan.[5]

Amsterdam has a long history in investing in green spaces during urban expansions. Since the sixteenth century every period of growth has been accompanied by planned investment in green spaces. First by planting trees along the canals in the sixteenth century. Than by creating city parks in the nineteenth century. The existing green structure was planned during the General Expansion Plan in 1934, made by van Eesteren.[6]

The purpose of the General Expansion Plan was not only to expand urban development but also to create a balance between city and green space. Next to the more open and greener designs for new residential areas, the Scheggen were planned as green structure. This green structure ensures that every resident of Amsterdam can reach a green space within ten minutes, even from the heart of the city centre. [7]

Van Eesteren already knew many years ago that green spaces were good for a healthy living environment for city residents. The healing aspects of green spaces nearby are becoming more important by the day. So the green structure in itself is good, and it is very important that this green structure is preserved, and that the green spaces within that structure will be qualitatively improved.

Problem statement

Nowadays, the city of Amsterdam has to deal with the following problems. Firstly, the big pressure on the housing market, is forcing the city to densify as well as expand outside of its current urban borders, which makes the Scheggen vulnerable.[8]

The majority of the world population lives in densely built urban environments. More and more people move towards the city and this trend will continue and intensify in the coming decades. By 2050, 70% of the world population is expected to live in an urban environment. On a global scale the green areas around cities disappear to make way for new neighbourhoods.

[5] van Loenen, S. (2015)
[6] Plan Amsterdam (2017), Structuurvisie Amsterdam 2040
[7] http://vaneesterenmuseum.nl/en/garden-cities/green/green-lungs/
[8] van der Vliet, P., & Maas, J. (2019)

This trend is also happening in Amsterdam. The city continues to grow, and expects a million inhabitants in 2034, which means that 75.000 new houses needs to build in the coming years.[9]

Not only densification is a problem, but also the fact that more and more people suffer from mental health issues, such as stress, burn-outs, anxiety and depression. Of course we all need a little bit of stress, but if people cannot restore from too much stress for a prolonged period of time, their health will be negatively affected in many ways.

Additionally, the city also has to deal with a number of other complex issues, such as climate change issues and biodiversity loss.

Research questions

The aim of this thesis project was to design a forest park in such a way that it contributes to reducing mental stress in an urban environment. To show how a potential restorative urban forest could look like, in the hope that it inspires landscape architects and urban planners to come up with alternatives for how public green spaces can be designed in urban environments to promote mental health.

Main research question:
How can a forest park be designed in such a way that it contributes to reducing mental stress in an urban environment?

Sub questions:
- *How can nature contribute to reducing stress?*
- *What spatial design principles can be used to design an urban forest park which contribute to reducing stress?*
- *How to apply these design principles to a site specific forest park design for Amsterdam Sloterdijk?*
- *To what extent can the findings of the research and design be applied to other places in the city?*

Relevance

Although the awareness of the importance of green spaces in cities is increasing, there is still little focus on urban forests. Countless designs of green spaces in cities can be found, namely every city park. But urban forests are still fairly new, hardly any design examples of urban forests can be found. Which makes this thesis interesting, it contributes to the development of knowledge about this specific subject.

[9] Freriks, K. (2019)

Methodology

The research methodology for this thesis project is carried out by three approaches: *literature study*, *site research* and *research-by-design*. The scheme on the following page shows the process subdivided into four main blocks, namely *introduction*, *theory*, *site research* and *research-by-design*.

The theoretical framework is based on several theories related to restorative environments and sustainable qualities of urban forests. The aim of the literature study, was to research the relation between healing aspects of nature and mental health, to get a better understanding how nature can be restorative, how forests and trees can contribute to reducing mental stress in urban environments, and to gain knowledge about what spatial design principles could be used to design restorative and sustainable urban forests.

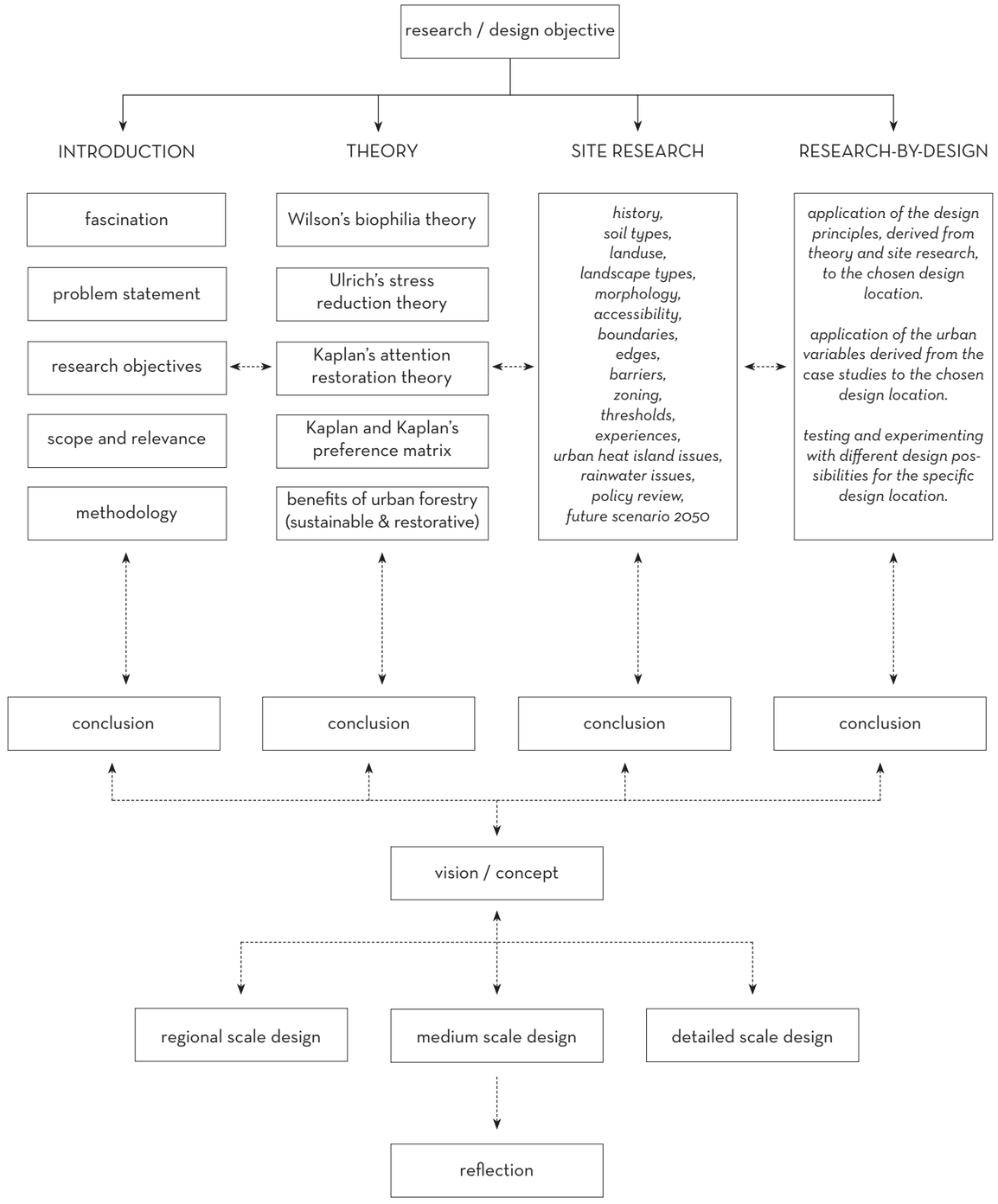
This literature review should provide an overview of what spatial design principles can be used to design restorative and sustainable urban forests.

The process of site research and research-by-design consists of the following research methods: *desk analysis, fieldtrips, sensorial analysis, case studies, and design studies*.

For the site research, the spatial structure, history, context, as well as the ecological and social processes will be analysed, to form a multi layered understanding of the landscape of the site.

In combination with the theoretical framework, research-by-design, allows to explore different design possibilities. Research-by-design concerns study through design as a systematic exploration that reflect on itself in order to create and recreate new possibilities and design opportunities.

The use of these methods aim to conclude this project with a final design for a forest park for Amsterdam Sloterdijk. The reflection on the final design evaluates the completed research and design outcome.



Picture taken at the Lange Bretten nature reserve

02

Theoretical framework

This chapter presents a brief overview of the most important theories related to the research objective. These theories will be used as a guide for the design intervention.

Theoretical background

The objective of the literature study, presented in this chapter, was to explore the connection between nature and mental health. But first we need to understand what stress is.

According to the Cambridge dictionary, stress can be defined as a great worry caused by a difficult situation, or to feel worried and nervous.[10]

Stress can be defined as the body's response to any change that requires an adjustment or response. The body reacts to these changes with physical, mental, and emotional responses. You can experience stress from your environment, your body, and your thoughts.[11]

Stress is a normal part of life, and the human body is designed to experience stress and react to it. Stress can be positive, keeping us alert, motivated, and ready to avoid danger.[11]

However, when a person constantly faces challenges without relaxation, there can be times when stress becomes negative and too much to deal with. Prolonged stress can affect us both physically and emotionally. Today, stress is regarded as one of the most important factors related to mental health illness in modern society.[11]

We should be aware of the effects the built environment has on our mental health. The environmental features of urban living people may experience, such as crowding, noise, air pollution, traffic, and a lack of contact with nature, all affect our mental health.[12]

Halpern distinguished the direct and indirect influences of environment. The direct influences include noise levels and access to nature. The indirect influences concern the effect of environments on social support networks and the perception of feeling at home in a place.[12]

Although it is difficult to do something about the indirect influences, landscape and urban design can do something about the direct influences. But how?

To answer this question we first need to understand what the connection is between nature and health.

When city parks were first designed in the nineteenth century, city planners had a strongly believed in the potential health benefits that would result from them. The city planners hoped that parks would reduce diseases, crime, and social unrest as well as providing 'green lungs' for the city and areas for recreation. At this time, it was also believed that exposure to nature fostered psychological well-being, reduced stress associated with city life, and promoted physical health.[13] These assumptions were used to justify the creation of parks in cities, and the preservation of wilderness areas outside of cities for public use.[14]

[10] "Stress," n.d.
[11] Cleveland Clinic, n.d.
[12] Barton, H. (2017). *City of well-being, a radical guide to planning.*
[13] Ulrich, R. S. (1993). *Biophilia, Biophobia, and Natural Landscapes*
[14] Maller et al (2008). *Healthy parks, healthy people.*

Although current parks have not completely lost their connection with health, the emphasis is on their use as a location for recreation and sports. [5]

Aside from this, parks tend to be seen as optional features rather than as essential elements of urban areas. Moreover, there is a lack of awareness about opportunities for enhancing mental health provided by parks.[15]

Frederick Law Olmstead, a famous 19th century American landscape architect, already believed in the restorative quality of nature that works through unconscious processes to relax and ease tensions created by the artificial surroundings of urban life.[15]

Olmstead also believed that parks would improve health and extend the life expectancy of citizens. These ideas are now being confirmed by research in psychology and many other disciplines.[15]

Examples of how parks and nature can contribute to some of the components of health are shown in Table 1.

Parks and nature have a lot of potential to provide cities with healthy environments. We need a paradigm shift in public health. Instead of only focussing on the public health system, the focus also needs to shift to the environmental and social aspects of health. Because prevention is better than cure.

component of health	contribution of parks
physical	provide settings and infrastructure for sport and recreation (pick-nicking, walking, running, cycling, etc.)
mental	make nature available for restoration from mental fatigue
spiritual	preserve the natural environment for contemplation and reflection, invoke a sense of place
social	provide settings for people to enhance their social networks and personal relationships
environmental	preserve ecosystems and biodiversity, provide clean air and water, maintain ecosystem function, and promote human involvement in the natural environment

Table 1 Summary of the contribution of parks to human health and well-being

[15] Maller et al (2008). *Healthy parks, healthy people.*

Theories of restorative nature

In order to create these healthy environments, it is important to understand how and why humans relate to nature. There are a number of theories to explain, emerging from a variety of disciplines exploring the human relationship with nature. This section briefly evaluates some of these theories.

Wilson's Biophilia Hypothesis suggests that humans have an innate tendency or desire for a connection with nature and natural systems.[16]

The hypothesis is based on the statement that early in human history there was an evolutionary advantage in knowing about the natural world, particularly information concerning plants and animals, because this knowledge contributed to survival. Flowers, for example, are indicators of healthy plant growth, and a signal for the availability of resources in the future.[17]

Wilson believes that modern city dwellers still possess this innate tendency to associate with nature, and that it has the potential to give meaning to human life and development, and result in greater health and wellbeing.[18]

As Wilson states, human history began hundreds of thousands of years ago, and for the biggest part of our history we have lived completely involved with other organisms. Only in the very recent part of human history people started to think that they can flourish separately from the rest of the living world.[16]

Unfortunately, this could turn out to be our drawback. Reconnecting with the natural world, may be an effective way to reverse this trend and improve our health.

As mentioned before, the belief that contact with nature promotes mental health and reduces the stress of urban living was the guiding principle behind the first city parks. There are many ways that people come into contact with nature, such as viewing nature, and being in nature. This section briefly discusses these two types human-nature interactions.

Viewing nature

According to Kaplan, people prefer viewing natural landscapes rather than the built environment. Furthermore, simply viewing natural scenes can already have positive effects on human health.[19]

Kaplan also found that the well-being of urban residents improved when they were able to look out onto a more natural environment rather than a built environment. It improved even more if the residents could see a few trees.[19]

Having a view of natural environments, in particular forests, increases residents' neighbourhoods satisfaction. So it is essential to provide natural views for residents of high density neighbourhoods.

[16] Wilson, E. (1984). *Biophilia*; Beatley, T. (2016). *Handbook of Biophilic City Planning and Design.*
[17] Beatley, T. (2016). *Handbook of Biophilic City Planning and Design.*
[18] Maller et al (2008). *Healthy parks, healthy people.*
[19] Kaplan, S. (1995). *The Restorative Benefits of Nature: Toward an Integrative Framework.*

The beneficial effects of viewing nature on psychological state, were also studied by Ulrich. He found that scenes of nature, particularly those depicting water, had a beneficial influence on the psychological state of people.[20]

Kaplan and Kaplan point out that observing or viewing nature is an important form of involvement with it. By looking out of a window lets the mind wander and provides an opportunity for reflection. It can even aid recovery from mental fatigue. 'Mental fatigue' can arise from extended periods of concentration or directed attention that eventually results in a worn-out mental state with symptoms such as increased irritability and a lack of concentration.[21]

Kaplan and Kaplan's Attention Restoration Theory suggests that contact with nature improves the ability to concentrate and helps the recovery from mental fatigue.[21]

Viewing nature is positive for health, particularly in terms of recovering from stress, improving concentration and productivity, and improving psychological state, especially for people living in high density environments.

Being in nature

Whether hiking in a large nature reserve or sitting in a local urban park, being in natural environments has many beneficial effects on health.

City life is dominated by mechanical time (punctuality, deadlines, etc), but our body and mind are dominated by biological time. Conflicts between the mechanical and biological time can lead to a variety of unpleasant symptoms such as irritability, restlessness, depression, insomnia, tension and headache. If these problems are unaddressed, they can grow into more serious diseases.[22]

The experience of being in nature can help in this case. In order to encourage people to be in nature, it is important to make urban green space accessible to everyone. Furthermore, urban green spaces should be created as beautiful places in cities.[22]

Restorative environments

The increasing complexity of the built environment is generally a source of many negative stress response patterns for the majority of people. The natural environment has restorative quality, especially for people who live in urban environments.[22]

[20] Ulrich, R. (1991). *Stress recovery during exposure to natural and urban environments.*
[21] Kaplan, R. and Kaplan, S. (2005). *Preference, restoration, and meaningful action in the context of nearby nature.*
[22] Maller et al (2008). *Healthy parks, healthy people.*

Kaplan and Kaplan have developed the notion of 'restorative environments' that improve recovery from mental fatigue.[23]

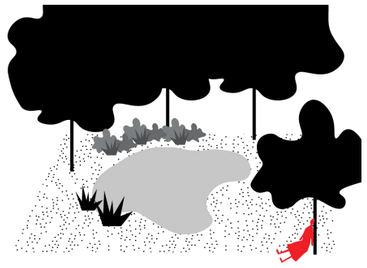
Restorative environments require four elements: fascination, being away, extent, and compatibility.[24]

The first is **fascination**, refers to aspects of the environment that attract and retain attention. For example, the seasonal changes in an natural environment.[24]

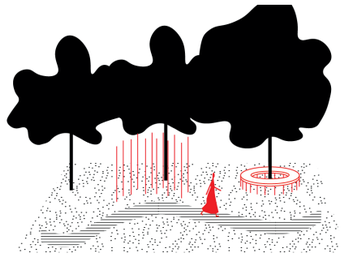
The second element is **being away**, which refers to providing a (temporary) escape from everyday life, it removes us from the source of our mental fatigue.[24]

The third element is **extent**, this means that the environment must be large enough to discover and explore. The environment must be rich and coherent. In such a way that it provides enough to see, experience, and think about, and which will form a distraction.[24]

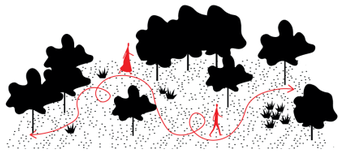
The final element is **compatibility**, there must be compatibility between the environment and preferences and desired goals of someone, which means that the environment has to match what someone is trying to do and what someone would like to do.[24]



fascination



being away



extent

compatibility

[23] Kaplan, S. (1995). *The Restorative Benefits of Nature: Toward an Integrative Framework.*
[24] Kaplan, R. and Kaplan, S. (1989); Hartig et al (1991)

Parks are ideal for restorative experiences because of their ability to provide the four elements described above. When comparing a walk in a park, a walk in an urban setting, and relaxing in a comfortable chair, Hartig found that mental fatigue was most successfully relieved by a walk in a park.[25]

Another very important theory on restorative environments is the **stress reduction theory** from Ulrich. This theory focuses on how natural environments can reduce stress, and is based on the belief that viewing or visiting natural environments after a stressful situation promotes recovery and relaxation. In particular exposure to natural environments containing trees, vegetation, water features, openness, depth and moderate complexity would have been, for many generations, beneficial to psychological well-being and offer restoration from the stress of everyday urban life.[26]

To this point we have discussed several theories concerning the human-nature relationship, and processes through which natural environments might provide health benefits. In the following section, we evaluate a theory concerning environmental preferences.

Studies on restorative environments are dominated by research focusing on the difference between urban and natural environments. Therefore, less is known about which specific qualities of the natural environment promote mental health. But we can say something about people's preferences of natural environments.[27]

[25] Hartig, T., Mang, M. and Evans, G. (1991). *Restorative effects of natural environment experiences.*
[26] Ulrich, R. (1991). *Stress recovery during exposure to natural and urban environments.*
[27] Stigsdotter, Corazon, Sidenius, Refshauge, & Grahn (2017). *Forest design for mental health promotion.*

According to Kaplan and Kaplan, people's preference of natural environments is based on the Preference Matrix. This theory identifies four landscape characteristics predicting people's landscape preference.[28]

Mystery refers to the ability of an environment to cause curiosity in people. It describes the quality of an environment that encourages people to discover more about a place. For instance a curve in the path, with a hidden focal point around the corner, suggest that there is more to discover. Mystery thus drives movement through the environment.

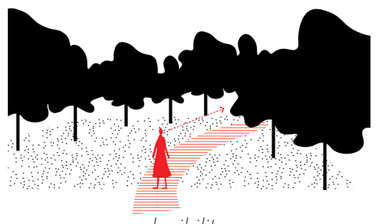
Legibility refers to how easy it is to find your way around the landscape, and the ability to orientate, navigate and move within the environment. It is connected with safety, the ability not to get lost and to explore with confidence.

Coherence refers to how easy it is to understand and make sense of an environment. The environment should have certain levels of repetition and order to understand the organization of the environment.

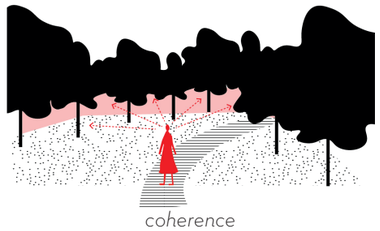
Complexity refers to the diversity and richness of elements within an environment, how much there is to see. It is the environment's ability to keep a person interested and not bored.

Mystery and complexity encourage to discover and explore, whereas coherence and legibility help to understand and make sense of the environment.

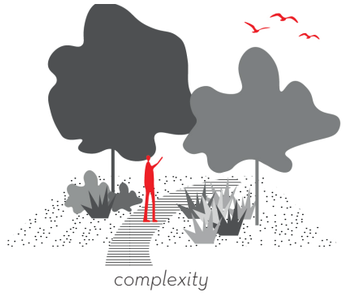
mystery



legibility



coherence



complexity

[28] Kaplan, R. and Kaplan, S. (2005). *Preference, restoration, and meaningful action in the context of nearby nature.*

When we perceive an environment there is a balance between does this environment makes sense? Is it understandable? Is it coherent? Can I grasp it? Is it legible when I move around? Everyone is looking for this balance, we all need a certain kind of challenge and at the same time be at ease in every environment we perceive.[28]

This preference matrix is a universal model for everyone, yet we are all biased and we all have different needs in the same environment.

Theories of urban forests

Now that we have discussed several theories concerning the human-nature relationship, processes through which natural environments might provide health benefits and a theory concerning people's preference of natural environments, it is time to shift the focus specifically to the role of urban forests in health promoting environments.

Before we look at the specific relation between urban forests and health promoting environments, we need to understand what urban forests are and how they developed over time, to see if and how society and urban forests are linked to each other.

Cities have used trees for reasons ranging from sources of food and fuel to their aesthetic and emotional values. Over time we see a strong relationship between society and urban forests.[29]

In early time forests were used as hunting reserves by the nobility and as commons providing food and fuel wood for local communities. During the Middle Ages, cities had some trees in the private gardens of the 'ruling classes', but they were primarily planted for functional purposes such as fruit.[29]

During the sixteenth century, the Renaissance villas in Italy had walled gardens, tree lined paths for walking, and often 'wilder' woods. The concept of tree lined paths moved to cities all over Europe. In some cities tree lined lanes were planted as public promenades, for instance on top of the fortifications. In Amsterdam trees were planted along canals and their adjacent streets.[29]

During the industrialisation in the nineteenth century, the city walls were removed and often replaced by parks and promenades. More public parks were built in cities, called city parks. Another common aspect of city parks were sport activities. At that time parks symbolised nature, health and well-being as a reaction to industrialization.[29]

Nowadays recreation remains a primary objective for creating urban forests, but other functions such as biodiversity, water management, enhancing the landscape and creating attractive environments to improve the quality of life in cities are important as well.[30]

Because we are living in the Anthropocene, an era in which human activities have started to have a significant global impact on the geology and ecosystems of the earth, we need green spaces which provide a wide range of essential benefits to urban societies.[29]

[29] Ferrini, F., Konijnendijk van den Bosch, C., and Fini, A. (2017). *Routledge Handbook of Urban Forestry.*
[30] Konijnendijk, C. (2005). *Urban forests and trees.*

Urban trees and urban forests can cool cities, mitigate air and water pollution, and help cities in dealing with extreme weather events. Furthermore, they can provide cities with food, while also form biotopes for flora and fauna and therefore increase biodiversity. Moreover, forests can help reducing our stress levels and encouraging us to be more physically active.[30]

Urban trees and forests are also very important for mental and physical health and well-being. Being situated closest to where most people live, urban trees and forests can provide people of urbanized areas with the opportunity to recover from daily stress.[31]

However, little research has been done specifically focused on the restorative effect of forest and woodland environments. Further research is necessary, to provide evidence on the benefits of visiting forests and to contribute to our understanding of how restorative quality may vary in different types of forests, at different times of the year, and with different techniques of maintenance.

Urban forests can also contribute to an attractive green cityscape, and represents itself as a positive, nature-oriented city. Indirectly, they can even enhance economic development. At a local scale, trees contribute to the quality of living and working environments and their benefits might be reflected in property values. Listed below are a couple of benefits of urban trees and forests.[32]

- SOCIAL BENEFITS
  Recreation opportunities, improvement of residential and work environments, impacts on physical and mental health, cultural and historical values of green spaces.

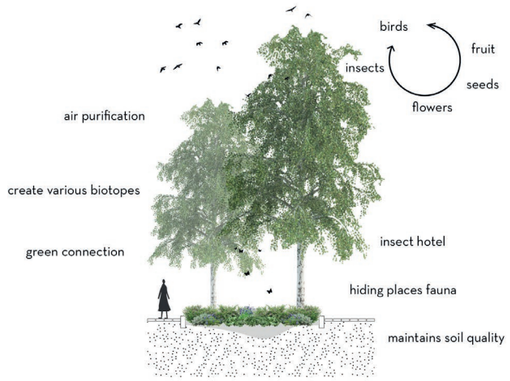
- AESTHETIC BENEFITS
  Landscape variation through different colours, textures, forms and densities of plants, growth of trees, seasonal dynamics and experiencing nature, defining open space, framing and screening views, landscaping buildings.

- CLIMATIC BENEFITS
  Cooling, wind control, impacts on urban climate through temperature and humidity control, air pollution reduction, sound control, flood prevention and erosion control.

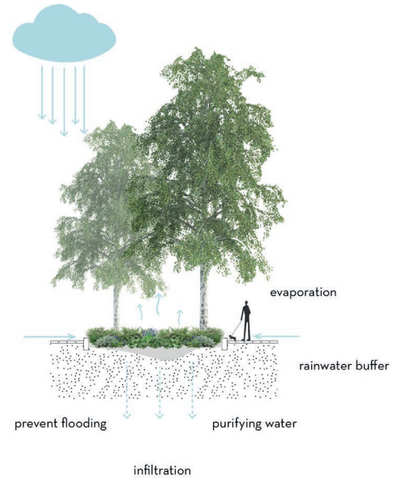
- ECOLOGICAL BENEFITS
  Biotopes for flora and fauna in urban environments.

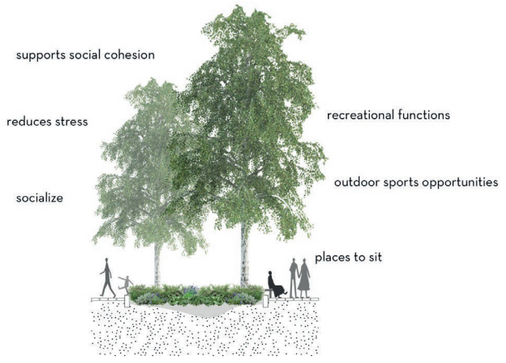
- ECONOMIC BENEFITS
  Increased property values, tourism.

As a designer we change the landscape from its current state to one which better meets society's needs. The spatial layout of trees, their composition and structure, interact with people, how they perceive or make use of them and also affect physical and ecological functioning such as shelter, shade and habitat provision.[32]

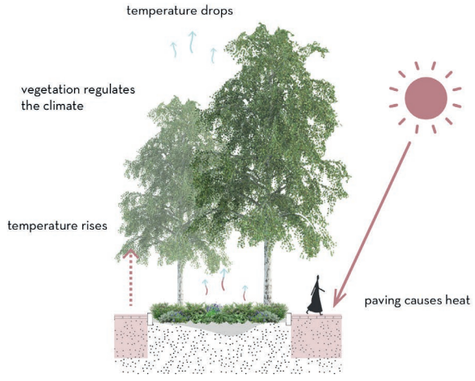


ECOLOGICAL BENEFITS





SOCIAL BENEFITS



CLIMATIC BENEFITS

[31] van den Berg, A., Hartig, T. and Staats, H. (2007); Nilsson, K. et al (2011).
[32] Konijnendijk, C. (2005). *Urban forests and trees.*

Conclusions

This chapter presented a brief overview of the most important theories related to this research objective. The goal of this literature study was to explore the connection between restorative nature and mental health, and what role urban forests could play in this, and what other benefits urban forests may have, other than providing cities a health promoting natural environment.

The evidence from recent research demonstrates clearly that there are many and varied health effects to be derived from contact with nature, and that, in urban environments in particular, experiencing nature through parks may in fact be a vital component of human health.

Parks and nature are currently undervalued as a means of enhancing and maintaining health. Although there is awareness of the health benefits of sport and recreation, other health benefits based on contact with nature are unknown or unused. But parks and nature should be recognized for the essential role they play in preserving, maintaining, and promoting the health of the humans, as well as their environment. They have a lot of potential to provide cities with healthy environments. So we need a paradigm shift in public health. Instead of only focussing on the public health system, the focus also needs to shift to the environmental and social aspects of health. Because prevention is better than cure.

Moreover, urban forest parks could function as a catalyst for the integration of environment, society, and health by promoting an ecological approach to human health and well-being based on contact with nature.

Next to that, urban trees and urban forests can cool cities, mitigate air and water pollution, and help cities in dealing with extreme weather events. Furthermore, they can provide cities with food, while also form biotopes for flora and fauna and therefore increase biodiversity. Moreover, forests can help reducing our stress levels and encouraging us to be more physically active.

If we look at the role of urban forests in health promoting environments, we can conclude that urban trees and forests are very important for mental and physical health and well-being. Being situated closest to where most people live, urban trees and forests can provide people of urbanized areas with the opportunity to recover from daily stress.

However, little research has been done specifically focused on the restorative effect of forest and woodland environments. Further research is necessary, to provide evidence on the benefits of visiting forests and to contribute to our understanding of how restorative quality may vary in different types of forests, at different times of the year, and with different techniques of maintenance.

From the theoretical framework we can conclude that introducing more accessible public green into our living environment would make it possible for people to easily connect with nature on a daily basis and thereby reduce their stress.

The most useful theories from the theoretical framework were the Attention Restoration theory from Kaplan and Kaplan, the Stress Reduction Theory from Ulrich, and the Preference Matrix from Kaplan and Kaplan. These theories have led to several design principles, which can be used for the research-by-design process.

Moreover, the sensorial aspects of the urban forest park are very important for the final design intervention. The park should provide sensorial experiences for its visitors, such as watching the movement of the trees, listen to the birds, watching the movement of water, feel the wind, feel the sun, or be aware of a change in weather and change of seasons, smell the flowers, and be actively aware of what is happening around them.

Map of the urban fabric of Amsterdam

03

Site Research

This chapter presents the results of the site research on different scales of the city of Amsterdam and its Scheggen.

Amsterdam's green structure

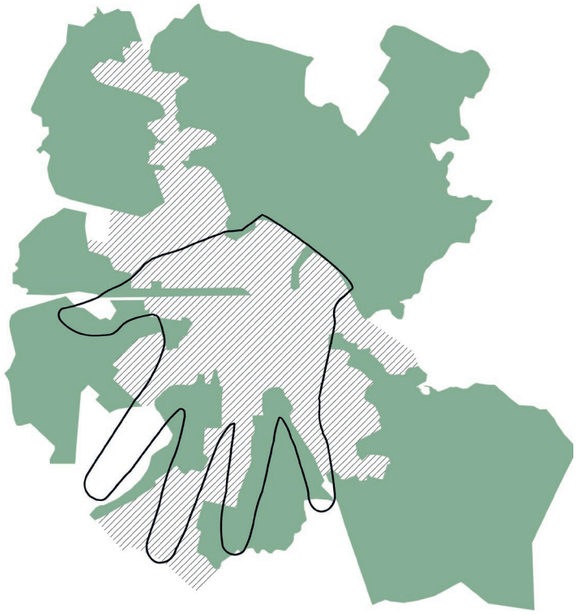
Amsterdam is the capital of the Netherlands and is located in the province of Noord-Holland, situated along the IJ river where it found its origin in the 13th Century.

The city has an interesting green structure. The city is like the palm of a hand with fingers attached to it, the surrounding landscape enters far into the city in the form of green wedges, also called the Scheggen. From anywhere in the city the Scheggen are within a fifteen minute bike ride.

This city diagram is characteristic for the modern, planned cities of the 20th Century. The main purpose of the 'wedge' is to separate the 'fingers' of a radially planned city. In theory the wedge can be extended indefinitely without losing its unique role in the urban pattern. Although this city diagram is quite unique in the world, it is compartive to the Copenhagen's finger plan.[33]

Location of Amsterdam

Plan of Amsterdam



Amsterdam's Green Structure

Copenhagen's Finger Plan

[33] Babalis, D. (2005). *Ecopolis : sustainable planning and design principles. Firenze*, Italy : Alinea.

Historical development of Amsterdam

Amsterdam has a tradition of planning green infrastructure together with urban planning. Since the 16th century every period of growth in the city has been accompanied by planned investment in green spaces, so every period has left its own green heritage to future generations.

Between 1588 and 1700 Amsterdam had its first Golden Age. This period is best known for the development of the canal district. In the canal district, trees were planted along all the canals for 'fresh air and beautification'. This period marks the start of Amsterdam's tradition as a City of Trees.[34]

Between 1870 and 1930 Amsterdam had its second Golden Age. The rapid population growth together with new developments in public health largely determined the creation of new green facilities. Walking parks became an essential part of new residential developments. During this period parks like Vondelpark, Sarphatipark, Westerpark and Oosterpark were created. [34]

The General Expansion Plan from 1934 not only intended to expand urban development, but also to achieve a good balance between the city and the green. For the first time green and blue spaces were used on a large scale to structure the city. The urban planners were aware that building all these houses needed to go hand in hand with developing a green infrastructure.[35]

In addition to the design of the new residential areas, the lobes and green 'wedges' structure is an important aspect of this plan. The city expanded like fingers attached to the palm of a hand in the surrounding rural landscapes. The surrounding green landscapes are wedged between these urban areas, and extend deep into the urban area. From anywhere in the city these green landscapes are within a fifteen minute bike ride.[35]

They play an increasingly important role in providing green facilities for Amsterdam's growing population.

To make people more aware of the importance of the Scheggen for the growing city and its inhabitants, the Scheggen need a new identity and function. The existing landscapes need to be more attractive and better suited for people to restore and recreate in nature.

Historical green space and surrounding landscape development of Amsterdam

[34] Rutte, R. and Abrahamse, J. (2014). Atlas van de Verstedelijking: 1000 jaar ruimtelijke ontwikkeling. Bussum: Uitgeverij THOTH
[35] Speet, B. (2010). Historische Atlas van Amsterdam: Van veendorp tot hoofdstad. Amsterdam: SUN.

Structural Vision 2040

This paragraph discusses the most important elements of the Structural Vision 2040 from the municipality of Amsterdam for this thesis project.

Amsterdam is expecting an additional 100.000 to 150.000 inhabitants by 2040, which means that the city needs to built an additional 70.000 new dwellings.[36]

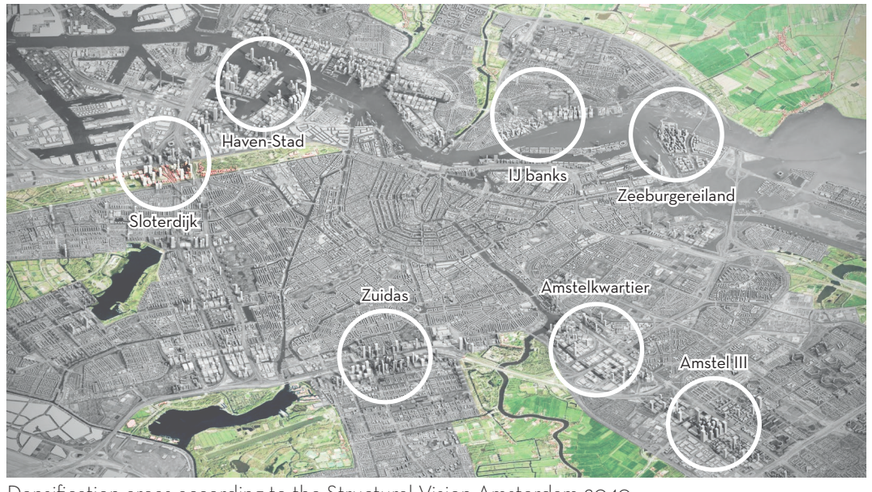
The ambition of the Structural Vision is to keep the Scheggen of Amsterdam green, improve their accessibility and make them more attractive for recreational use.[36]

In order to preserve the structure of the Scheggen, the municipality decided to densify certain parts of the city, and transform various mono functional business parks into areas with a mix of residential and business functions, such as the Harbour-City project.

In case of densification, it is crucial to have a good integration of the ecological and the densification assignment. For such a dense area, it is essential that nature development takes an important role in the design process.

Parks and nature are currently undervalued as a means of enhancing and maintaining health, but they have a lot of potential to provide cities with healthy environments. They could even function as a catalyst for the integration of environment, society, and health by promoting an ecological approach to human health and well-being based on contact with nature.

To provide Amsterdam with healthy environments, it is necessary to rethink certain areas of the city. The city should merge the living and the park areas, in order to create a healthy city.



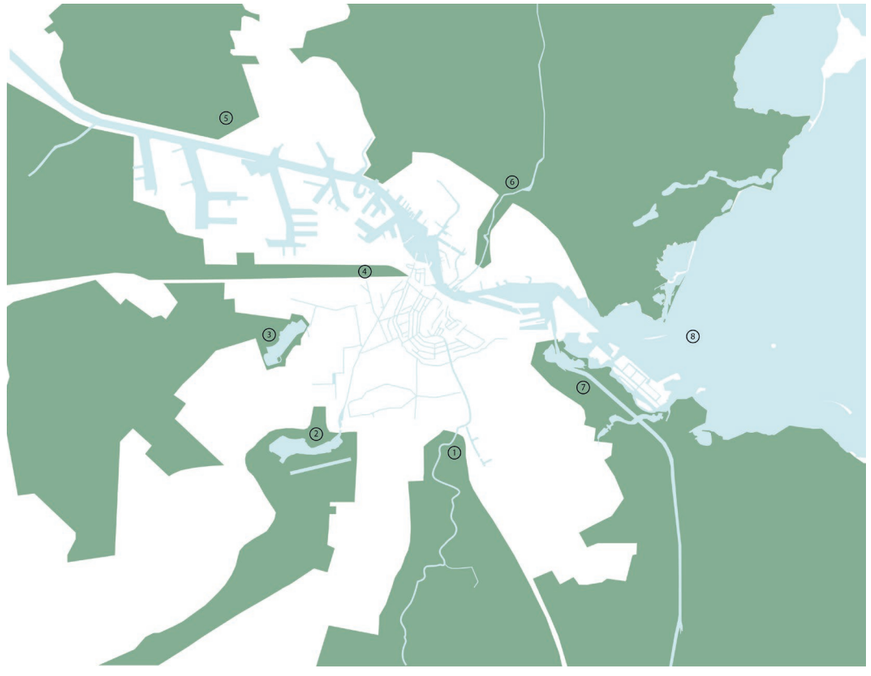
Densification areas according to the Structural Vision Amsterdam 2040

Analysis of the Scheggen

In order to create a vision for the Scheggen of Amsterdam, it is crucial to analyse the Scheggen separately from each other. This part presents the desk analysis of the Scheggen, and creates an overview of all the eight Scheggen of Amsterdam.

For each of the Scheggen the following aspects have been analysed: the edges of the Scheggen, the big infrastructural lines going through them, the land use (forests, meadows, agrarian land, allotment gardens, cemeteries, sports parks, and golf courses), and water structures.

Subsequently, all of them were evaluated one by one, based on the following five themes: socio-cultural, environmental, ecological, functional, and densification, which will be further explained below.



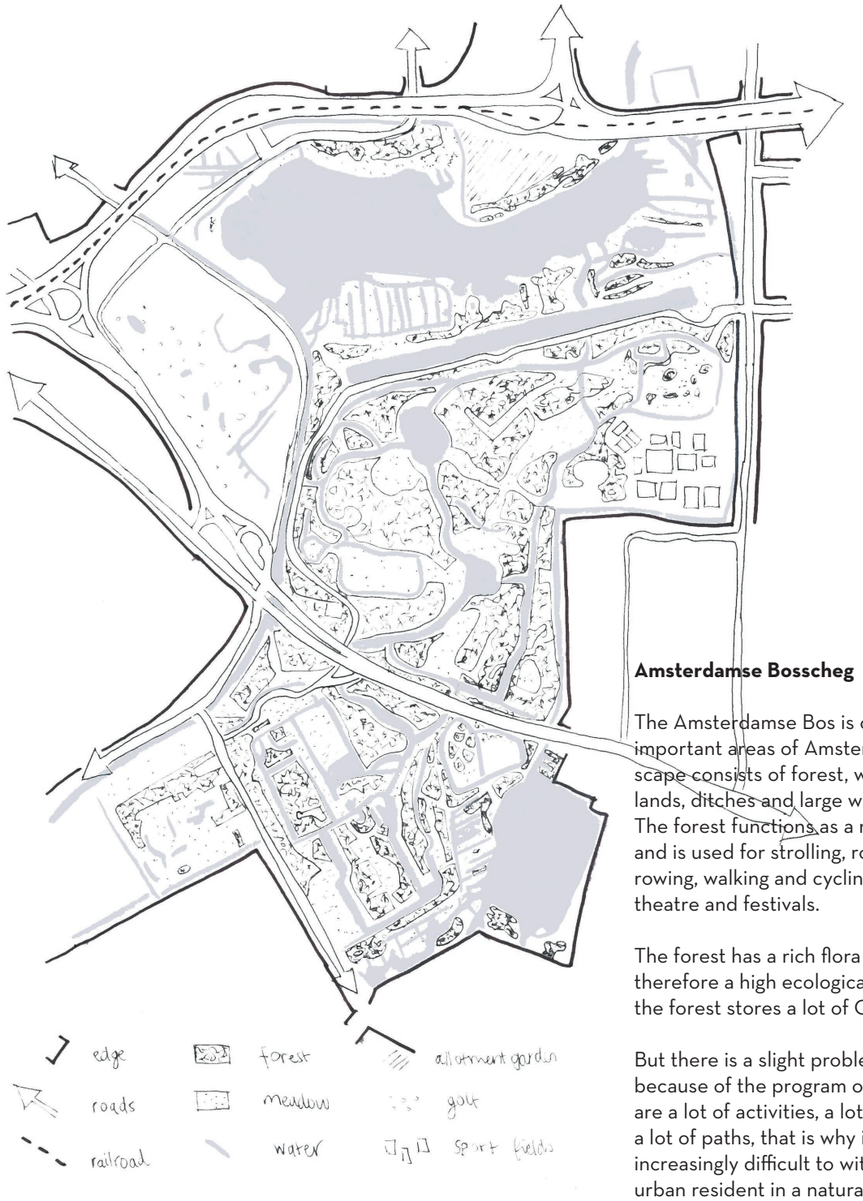
[36] Gemeente Amsterdam (2011). Structural Vision Amsterdam 2040. Amsterdam: Gemeente Amsterdam, Dienst Ruimtelijke Ordening.

Amstelscheg

Amstelscheg

The Amstelscheg is characterized by an open peat meadow landscape with panoramic views, farms and grassland. The Amstel winds through the area. You will also find historic windmills and the Defence Line of Amsterdam on the south side, after which the polder area merges into the Green Heart. The area is intensively used for recreation.

Amsterdamse Bosscheg



Amsterdamse Bosscheg

The Amsterdamse Bos is one of the most important areas of Amsterdam. The landscape consists of forest, wetlands, reedlands, ditches and large water features. The forest functions as a recreation area and is used for strolling, roller skating, rowing, walking and cycling, and even theatre and festivals.

The forest has a rich flora and fauna, and therefore a high ecological value. And the forest stores a lot of CO_2.

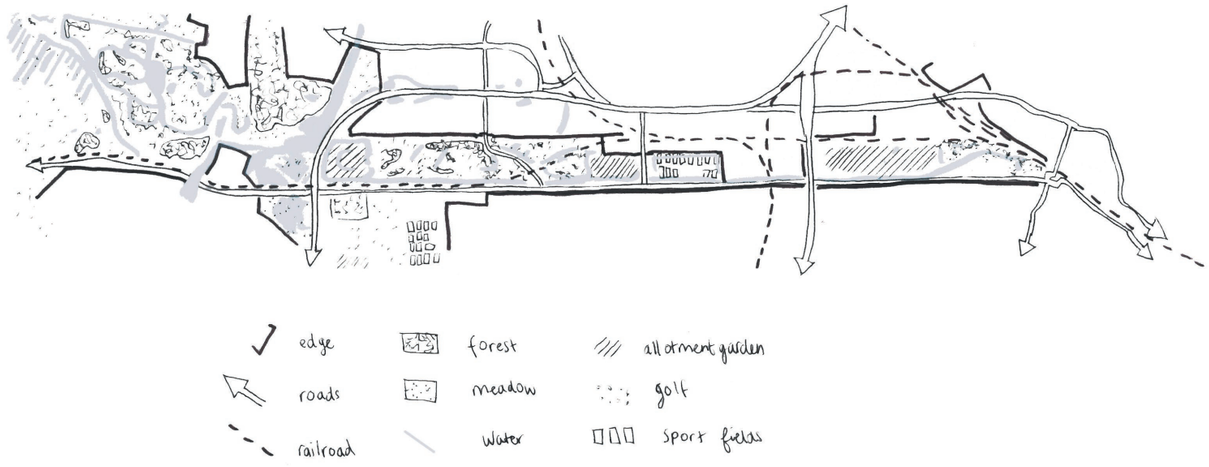
But there is a slight problem, mainly because of the program overload. There are a lot of activities, a lot of restaurants, a lot of paths, that is why it is becoming increasingly difficult to withdraw as an urban resident in a natural environment where you can relax and unwind.

Sloterscheg

Sloterscheg

The landscape of the Sloterscheg is characterized by a polder landscape, which has been used for food production for centuries. It consists of fertile clay soil, urban agriculture, urban horticulture, large-scale agricultural land and distribution centres at Schiphol. The Sloterscheg consists of two completely different worlds. The Gardens of West form a small-scale landscape close to the city, and the Haarlemmermeerpolder is all about large-scale agriculture.

Brettenscheg



Brettenscheg

The Brettenscheg is located between Haarlem and Amsterdam, with the harbour area on the north side and the Western Garden Cities on the south side. The area was originally intended for allotment gardens, sports parks and parks in the General Expansion Plan.

In the 1960s parts of the Brettenscheg were raised with sand from the dunes to expand the harbour area, but due to the oil crisis this was never completed. After that the Brettenscheg was for a long time a neglected and deserted area. Nature has overgrown this pieces of land, and created a wilderness.

Nowadays, the landscape of the Brettenscheg is very fragmented, it is intersected by highways, railways, industrial areas, and infrastructure connecting the harbour with Schiphol and IJmuiden. As a result, there is little unity. In addition, the Brettenscheg is between a number of large planned construction projects, such as Haven-Stad and Sloterdijk and Geuzenveld-Slotermeer.

Zaansescheg

Zaansescheg

The Zaansescheg is characterized as a wide landscape between the Zaan region and IJmond. It is an open and spacious landscape with grasslands, agricultural peat areas, water and reed. A typical Dutch landscape of dikes, ditches, ribbons and paths, that also includes villages. The landscape is easily accessible for walkers and cyclists.

Waterlandscheg

Waterlandscheg

Waterlandscheg consists of a typical Dutch landscape with reclaimed land, peat polders, peat meadow landscape, small ditches and dikes, historic villages and a lot of water. Spatially the Waterlandscheg is not really distinguishable as a scheg. In use, it is one of the most important recreation areas of Amsterdam.

Diemerscheg

Diemerscheg

The landscape of the Diemerscheg consists of peat meadows, parks and nature reserves such as the Diemerbos. The landscape of the Diemerscheg is fragmented caused by the many intersections of railways, metro lines, and traffic roads. Infrastructure, industrial areas, sports parks and horse meadows, peat meadows, parks and nature reserves alternate. Therefore, the landscape has no clear identity.

But the Diemerscheg has a lot of ecological quality, it forms the landscape transition between the higher sandy soils of the IJsselmeer and the wetlands on the low peat soils of the Green Heart. This makes the Diemerscheg an important flight route for migrating birds.

The area also has recreational functions, there are various routes for walkers and cyclists.

Ijmeerscheg

IJmeerscheg

The IJmeerscheg consists of a freshwater area with beaches and walking routes. The Markermeer and the IJmeer connect important water areas in The Netherlands and are vital freshwater areas for migrating birds. The lake also has a recreational function.

Evaluation of the scheggen

As we have seen in the previous overview, all the Scheggen have their own characteristics and challenges. Which means that each scheg requires its own specific solution.

This part is a description of the evaluation of the Scheggen according to the following five themes: socio-cultural, environmental, ecological, functional, and densification.

The socio-cultural theme indicates to what extent the scheg is currently an attractive, accessible, restorative place.

The environmental theme indicates to what extent the scheg currently contributes to climate adaptation.

The ecological theme indicates how much ecological value the scheg currently has.

The functional theme indicates how many different functions the scheg currently has.

The densification theme indicates to what extent the municipality of Amsterdam sees the potential to densify in or along each of the scheggen.

Based on the previous analysis and this evaluation of the scheggen, the Brettenscheg emerges as an interesting location for my design intervention.

The Brettenscheg has the most potential to reach people from the city of Amsterdam. It enters the city the furthest of all Scheggen, so gives the highest chance to reach and reconnect them with nature.

But the landscape is very fragmented, because highways, railways and industrial areas intersect the area. In addition, the Brettenscheg is between a number of large planned construction projects. So the biggest challenge is to integrate these developments with the green structure, and improve its quality.

Amstelscheg

Amsterdamse Bosscheg

Sloterscheg

Brettenscheg

Zaansescheg

Waterlandscheg

IJmeerscheg

Diemerscheg

socio-cultural

environmental

ecological

functional

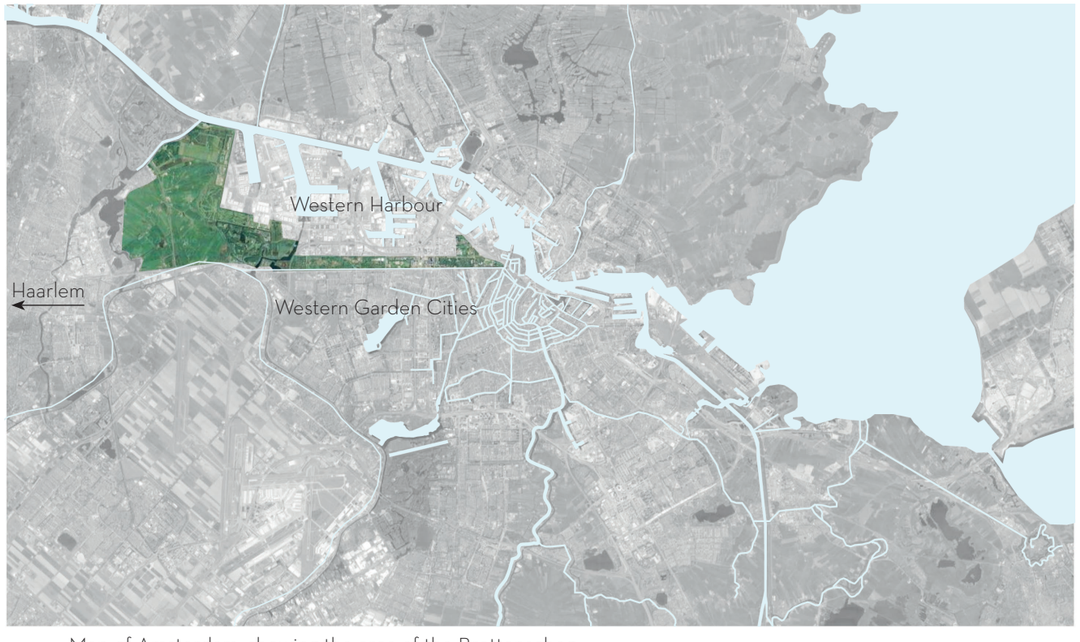
densification

Brettenscheg

The Brettenscheg is a green area in the north western part of Amsterdam, from the city centre of Amsterdam towards Haarlem, with the Western Harbour area on the north side and the Western Garden Cities on the south side.[37]

The Brettenscheg has various recreational functions, such as a city park, several allotment gardens, sports fields, water features and nature reserves.

This chapter provides a description of the existing situation in the site. First the history of the site is described, then the spatial-functional structure and the sensorial aspects, and finally the future development plans for the area.



Map of Amsterdam, showing the area of the Brettenscheg

Landscape characteristics

As previously mentioned, the Brettenscheg has several recreational functions, such as a city park, several allotment gardens, sports fields, water features and nature reserves.

The pictures below show the variety of landscape characteristics and spatial qualities in the area.

Pictures of the Brettenscheg, showing the landscape characteristics

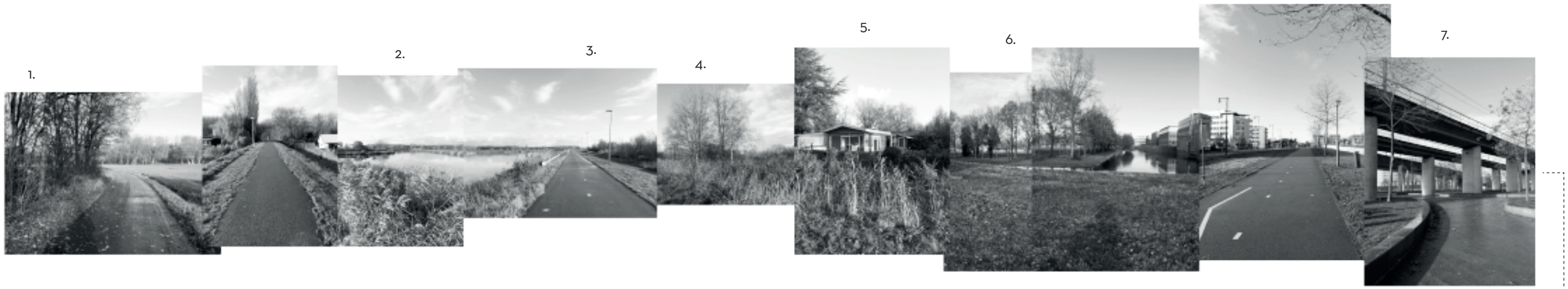
[37] Bestemmingsplan Brettenzone Ontwerp (2013)

The series of pictures on this page, once again shows the spatial qualities and landscape characteristics of the area.

It shows that there is a gradient from more natural landscape characteristics in the west to more cultural in the east.

Getting closer to the city of Amsterdam the landscape changes to a more cultural landscape with urban elements. Going outwards of the city you will see the landscape change to a more natural landscape.

1. forest park Spaarnwoude
2. nature reserve Groote Braak
3. allotment gardens Groote Braak
4. nature reserve Lange Bretten
5. allotment gardens De Bretten
6. sports fields complex Spieringhorn
7. station Sloterdijk
8. allotment gardens Sloterdijkermeer and Nut en Genoegen
9. city park Westerpark



gradient from nature to culture

Historical development of the Brettenscheg

In this chapter, the history is treated in chronological order, describing the historical elements still present.

The structure of the landscape is a result of human intervention. The very first inhabitants of the area found an extensive peat marsh. They settled on the high creek ridges in the landscape. This is how the settlements of Sloterdijk and Amsterdam were created.[38]

From the beginning of our era until about thousand years after Christ, the peat was reclaimed.[38]

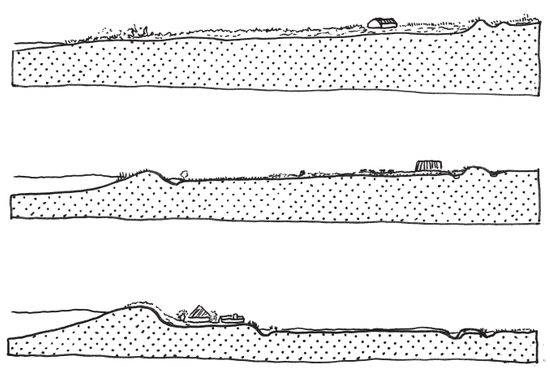
The IJ was formed by a sea break-through at Castricum. To end the flooding of the IJ and protect the peat meadows, the Spaarndammerdijk was constructed during the 13th Century. The old sea dike is one of the oldest dikes in Europe. Remains of this old dike are still present in the area.[38]

The people who settled permanently in the area around 1100 were farmers who reclaimed, drained and protected the land from water. This created the polder structure, shown in the map at the top of the next page.[38]

The Haarlemmertrekvaart, together with the Haarlemmerweg, were constructed in 1631, to facilitate a better connection between Haarlem and Amsterdam. The Haarlemmervaart is still completely present and forms the southern border of the Brettenscheg.[38]

The IJ is drained between 1865 and 1876. The map at the bottom of the next page shows how large parts of the IJ were reclaimed during the 19th Century. The IJ polders had an agricultural function.[38]

The area remained agricultural, but also gained significance for urban growth. In 1913 the city council decided to build a large harbour area.[38]



During the reclamation of a peat area, a dike was constructed at a distance from the reclamation base. The farms were at some distance from the dike in the back.

Over time, the peat surfaces began to subsidence at the first reclaimed areas. The peat had to be diked in this phase.

The dikes were raised after a further peat surface subsidence. The farms, which started producing for the urban market, were placed along the dike.

Peat reclamation process in sections

Infrastructure and estate development 1600-1800

Development of the outskirts 1800-1934

[38] Abrahamse, J., Kosian, M., & Schmitz, E. (2010). *Tussen haarlemmerpoort en halfweg : Historische atlas van de brettenzone in amsterdam.*

The map at the top of the next page shows the vision Cornelis van Eesteren made for the area, as part of The General Expansion Plan (AUP) from 1934. As chairman of the International Congress for Modern Architecture (CIAM), he proposed that the social problems faced by cities during that time could be resolved by a functional segregation of the city into the four main functions of urban life: living, working, recreation and traffic. These functions should occur separately in the city. The living and working areas are separated by recreational areas with different characters. The Brettenscheg is such a buffer zone, between the Western Harbour (working) and the Western Garden Cities (living).[39]

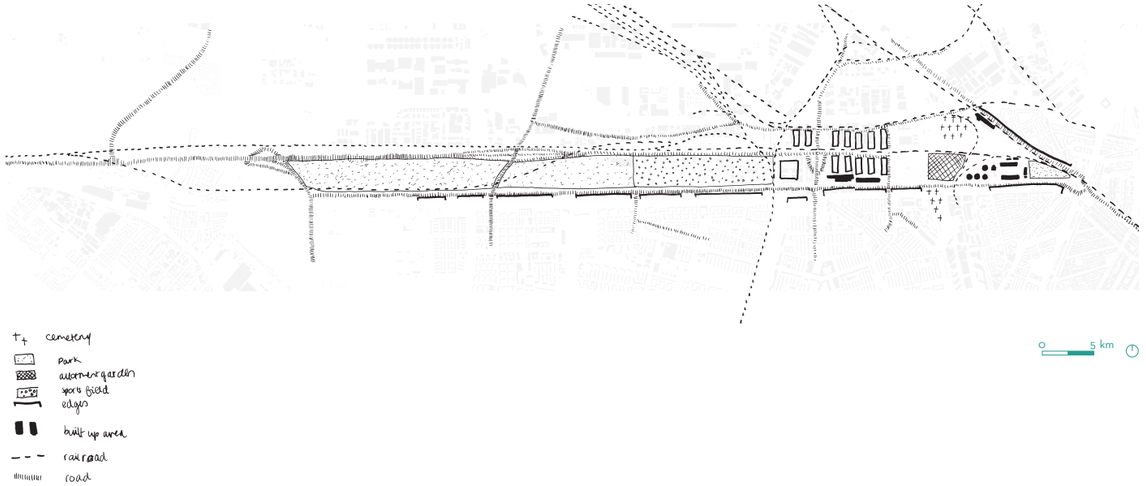
The Brettenscheg has gone through a number of changes after that. Allotment gardens and sports fields were constructed. The harbour area developed in the 1950s. The A10 ring road and other highways were constructed and the rail network was expanded, including the arrival of the new Sloterdijk station in 1983.[39]

The primary flood defence line, the old sea dike, can still be recognized to a small extent, but no longer has a water retaining function. The Spaarndammerdike has been largely moved or combined with the railway between Haarlem and Amsterdam.[39]

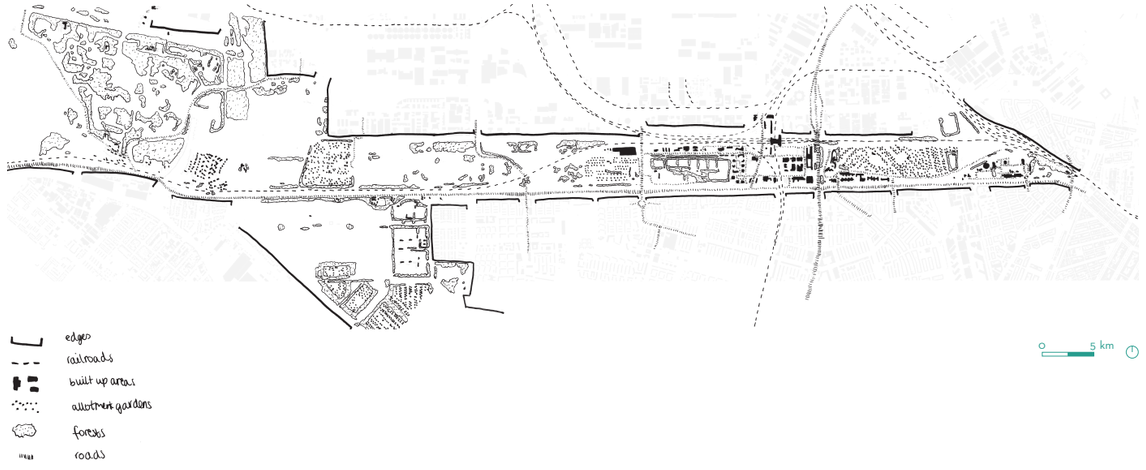
The absence of integrated plans, and the placement of various functions, has created the Brettenscheg as it is today.

Cultural historical elements from the rich past are present throughout the area, but do not stand out because of the versatile expression.

The General Expansion Plan 1928-1939



Green zone in urbanized landscape 1939-2010



[39] Abrahamse, J., Kosian, M., & Schmitz, E. (2010). *Tussen haarlemmerpoort en halfweg : Historische atlas van de brettenzone in amsterdam.*

Cultural historical elements

There are a number of cultural historical elements in the Brettenscheg, which are visible and could be experienced to a greater or lesser extent. The most important are discussed below.[40]

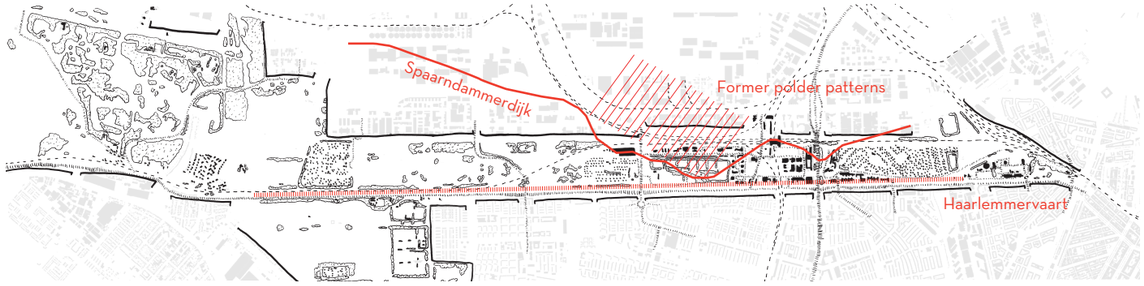
Spaarndammerdijk
This early medieval dike is still visible at two locations, namely in the Spieringhorn sports park and at the allotment gardens the Grote Braak.[40]

Haarlemmervaart
The Haarlemmervaart is one of the oldest and most striking cultural historical elements in the area. It was built in the 17th Century for transport by boat between Haarlem and Amsterdam. The towing boat served as the main means of transport between the two cities until the 19th Century. Only when the train was introduced the transport function of the canal gradually disappeared.

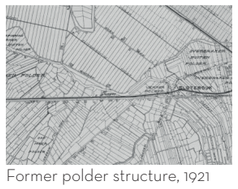
Over a large part of the length, the canal seems to be a somewhat large roadside ditch rather than a valuable cultural-historical element.[40]

The wide and low bridges, the often not so tight banks and the direct proximity of the Haarlemmerweg on one side and the railway on the other, have marginalized the once striking canal.[40]

Old polder patterns
Remnants of the original polder patterns can still be found in various places within the area. In the nature reserves De Kluut and the eastern part of Lange Bretten, the original ditch pattern was partly excavated and the old peat creeks were restored at the beginning of this century.[40]




Spaarndammerdijk, 1826


Former polder structure, 1921


Haarlemmertrekvaart, 1750-1800

[40] Gemeente Amsterdam (2013). *Bestemmingsplan Brettenzone.*

Spatial functional structure of the Brettenscheg

The spatial functional structure of the Brettenscheg is determined by the different functions and the infrastructure that intersects the zone.

Infrastructure
Large scale infrastructure is dominantly present in the Brettenscheg. The Haarlemmerweg is located on the south side. This road is an important access for Amsterdam. The road connects the city centre of Amsterdam with Haarlem.[41]

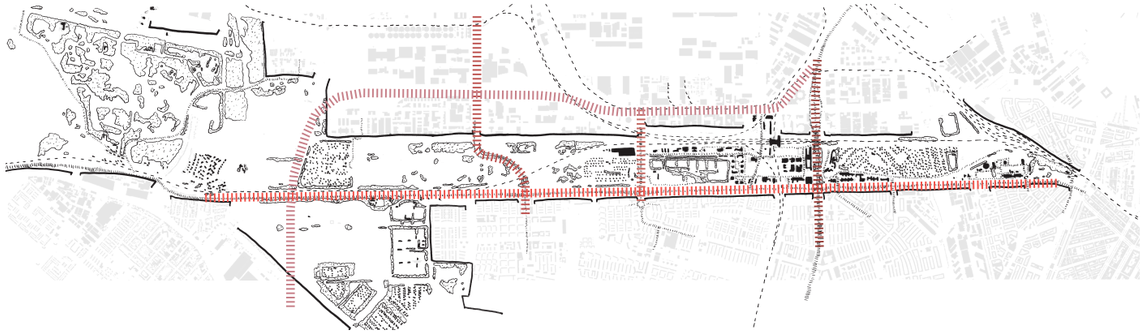
Due to the function of the road, it has a considerable width. The road therefore forms a clear separation between the Brettenscheg and the 'Westelijke Tuinsteden'.[41]

Recently a part of the Haarlemmerweg is transformed. Between the Seineweg and Admiraal de Ruijterweg, the road got a double irregularly planted row of elm trees.

The Australiëhavenweg runs straight through the Brettenscheg, from north to south. This winding road connects the Haarlemmerweg with the industrial zone of the Wester harbour area, and it forms a connection between the 'Westelijke Tuinsteden' and the harbour area.[42]

On the east side of the Brettenscheg there is another north-south connection that cuts through the area, the Seineweg. This road is the main connection of the 'Westelijke Tuinsteden' with the harbour area and the Sloterdijk office area.[42]

The Brettenscheg is also intersected by the Westrandweg (A5). This road must relieve the burden on the A10 and improve the accessibility of the Western harbour area.[42]



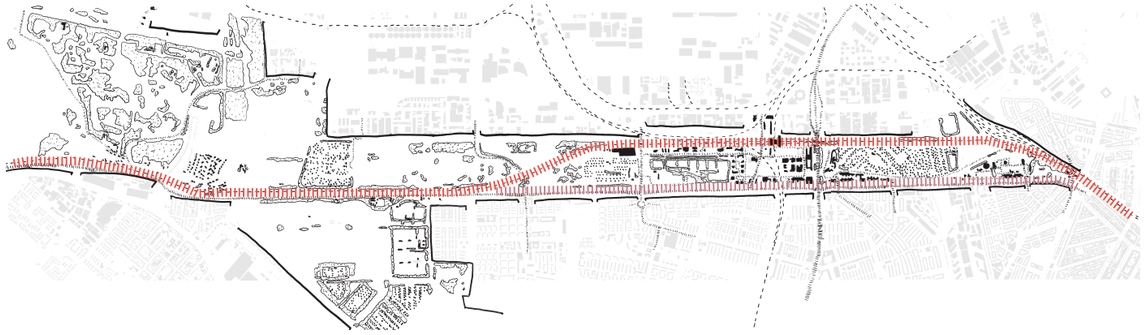
[41] Gemeente Amsterdam (2013). *Bestemmingsplan Brettenzone.*

In addition to road structure, the Brettenscheg also has a railway that determines the spatial structure. This is the oldest railway in the Netherlands. West of Seineweg, this railway cuts the Brettenscheg diagonally from north to south. The railway then continues parallel to Haarlemmerweg in the direction of Haarlem. The railway crosses the Australiëhavenweg. This intersection is designed with a bridge, the road crosses the railway.[42]

The Haarlemmervaart is located parallel to the Haarlemmerweg. In the past, this 'trekvaart' was part of an important route from Amsterdam to Haarlem.

Today the canal has the character of a wide ditch and is still important for the water management in the area and as an ecological connection.[42]

An important disadvantage of the infrastructure in the Brettenscheg is that the area has become increasingly fragmented over time, and, as it were, has been divided into different areas. This does not benefit the natural and recreational function of the area.[42]



Barriers and Edges

The urban context of Amsterdam West forms a lot of boundaries, which have been formed during time.

The build-up areas around the Brettenscheg form the edges of the area.

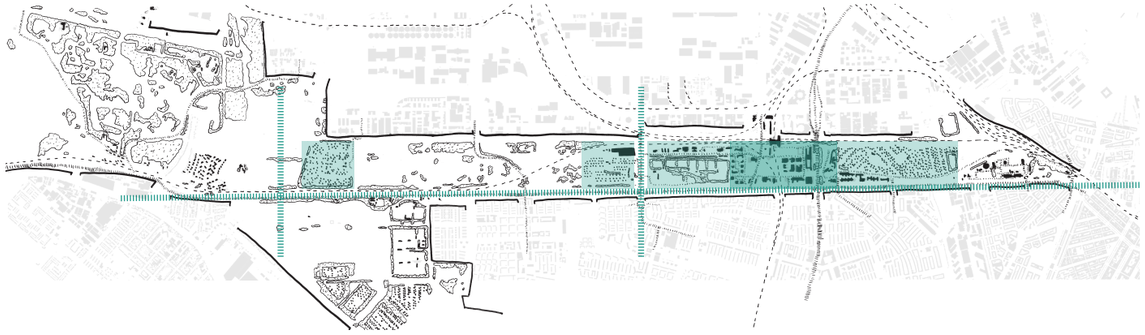
The A5 highway forms a barrier between Spaarnwoude and the ongoing Brettenscheg to the east. From the map it looks like it is a big barrier but in real life you are not experiencing it that much, because there are is a bicycle connection going underneath the highway. So it forms more a visual barrier than an actual barrier.

The Haarlemmerweg forms a barrier between the Western Garden Cities and the Brettenscheg. There are only a few possibilities to access the Brettenscheg in north south direction.

The railway forms a barrier between the harbour area and the Brettenscheg near the Sloterdijk train station.
And the Seineweg forms a barrier between the sports park and the ongoing Brettenscheg to the west.

The allotment gardens in the Brettenscheg are not an actual barrier, but because they are private spaces they feel as a visual boundary. Although they blend quite well with their surroundings, they still feel like islands on their own.

The office area around the Sloterdijk train station feels like a spatial barrier, because it is so different in spatial layout than the rest of the Brettenscheg.

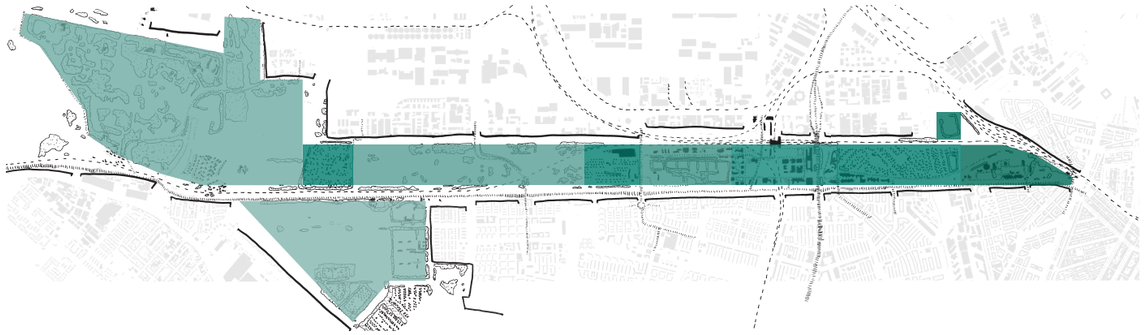


[42] Gemeente Amsterdam (2013). *Bestemmingsplan Brettenzone*.

Zones

The Brettenscheg consists of many different functions, which all have their own spatial characteristics and atmospheres .

The different functions of the area are:
- Westerpark (public)
- Cemetery (semi-public)
- Allotment gardens (private)
- Office area Sloterdijk (public)
- Sports park (semi-public)
- Allotment gardens (private)
- Nature reserve (public)
- Allotment gardens (private)
- Eendrachtspolder (semi-public)
- Spaarnwoude (public)



westerpark
cemetery
allotment gardens
office area Sloterdijk
sports park
nature reserve
spaarnwoude
eendrachtspolder

0 5 km

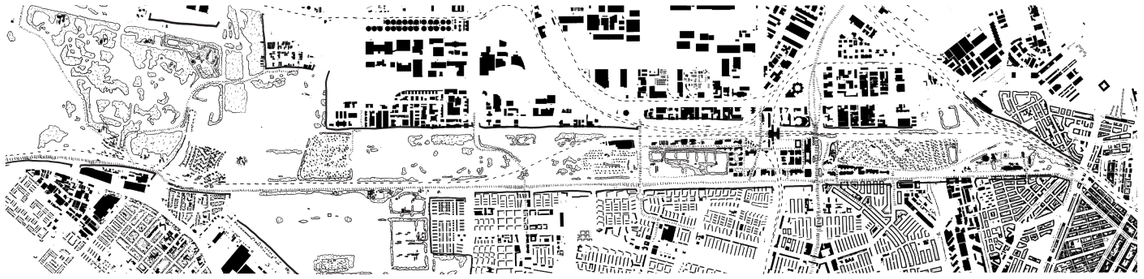
Morphology

The map on the bottom clearly shows there is a big distinction between the morphologies on the north and south side of the Brettenscheg.

On the north side the morphology of the Western harbour is characterised by big offices and workplaces, with large open spaces in between.

Whereas the morphology of the Western Garden Cities on the south side of the Brettenscheg is characterized by smaller housing blocks.

This forms a gradient from industrial to residential in the north south direction.



Industrial area

Residential area

0 5 km

Green structure

Instead of the allotment and sports park complexes planned in the General Expansion Plan, a lot of spontaneous nature has arisen in a large part of the Brettenscheg.[43]

The Brettenscheg can in fact be characterized as a somewhat neglected and desolate area with spatial and programmatic intentions that have been carried out partially or not at all. In the course of a few decades, this has spontaneously created valuable nature in the area: the nature reserves *De Kluut* and *Lange Bretten*. These areas form extensive habitats for a diverse collection of flora and fauna. Human entry is partly impossible here. Cattle and goats help with the management of the nature.[43]

De Kluut
De Kluut is a nature reserve located to the west of the *Lange Bretten*. It is an almost forgotten little island, an old peat polder overgrown with reed and willows and birch trees. The amount of reed ensures that several birds like to breed here.

The flora and fauna mainly consists of land vegetation in various stages of succession. Here you will find blackberry fields, various fern species, a peat moss zone and a nutrient-rich swamp. There are around 48 species in this swamp, including buttercup flower, cuckoo flower, marsh orchid, fern and sweet grass.[43]

Pioneer species of moist, moderately nutrient-rich soils are found in the area. These are species that remain wet during spring. You can find water-loving species such as red bartsia, knotted pearlwort and centaury.[43]

De Kluut is part of the *Groene AS*, which connects a number of nature areas between Amstelland and Spaarnwoude. It creates an ecological connection, as well as an attractive landscape that is suitable for recreation and habitat for animals. It is an important link in the ecological main structure of North Holland. [43]

Picture of the nature reserve *De Kluut*, taken in April 2010 (*source: landschap noord holland*)

Lange Bretten
Lange Bretten is a nature reserve located between two allotment gardens (*Groote Braak* and *Bretten*). *Lange Bretten* is also part of the *Groene AS* (ecological corridor). Within the area you will find a mixture of scrub, willow forest, wet grass and herb vegetation.[44]

The flora of the Brettenscheg includes a wide variety of different plant species. This is due to the relatively silt rich sand, in combination with still existing peat polders and later covered with a very nutrient rich substrate. The following types can be distinguished:

- Grasslands on moist, nutrient rich soil. *(Geranium pratense)*
- Grassland on dry, moderately nutrient rich soil. *(Silene vulgaris, Silene nutans, Senecio inaequidens, Anthyllis vulneraria, Hippophae rhamnoides)*
- Tall herb vegetation on wet, moderately to very nutrient rich soil. *(Epilobium hirsutum, Typha latifolia, Sonchus palustris, Lotus pedunculatus, Thalictrum flavum)*
- tall herb vegetation on wet to moist, moderately to very nutrient rich soil *(Calamagrostis epigejos, Rubus caesius, Salix, Sambucus, Crataegus, Betula)*
- Forest and scrub on moist and very nutrient-rich soil *(Salix, Populus; Salix is the dominant species, the expected end stage is a forest of Fraxinus and Ulmus)*
- Forest planting, divided into two variants: forest plants on moist, vey nutrient rich soil and forest plants on drier soils.[44]

Picture of the nature reserve *Lange Bretten (source: landschap noord holland)*

[43] Gemeente Amsterdam (2013). *Bestemmingsplan Brettenzone*.

[44] Gemeente Amsterdam (2013). *Bestemmingsplan Brettenzone*.

Sensorial analysis

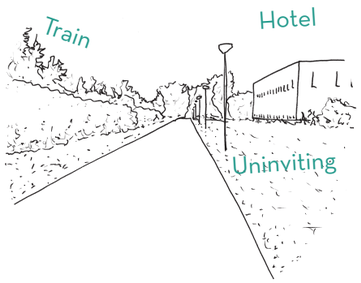
This part presents the experiences of the Brettenscheg from a phenomenological perspective. For this sensorial analysis a route has been cycled from the central station of Amsterdam, through the Brettenscheg, with Spaarnwoude as final destination. Along the way several different places pass by, with their own functions and spatial characteristics.

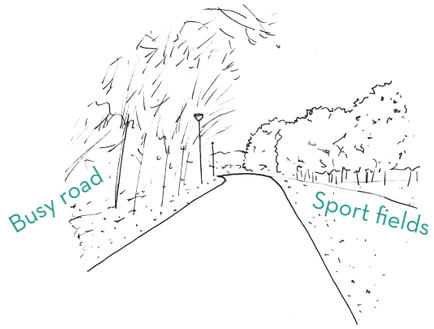
Over all, the Brettenscheg feels like a continuous green spaces, which is interrupted by busy roads, or build-up areas in some places. For instance the area of Sloterdijk station, which felt like a big interruption, and as a concrete jungle in the middle of the ongoing green zone.

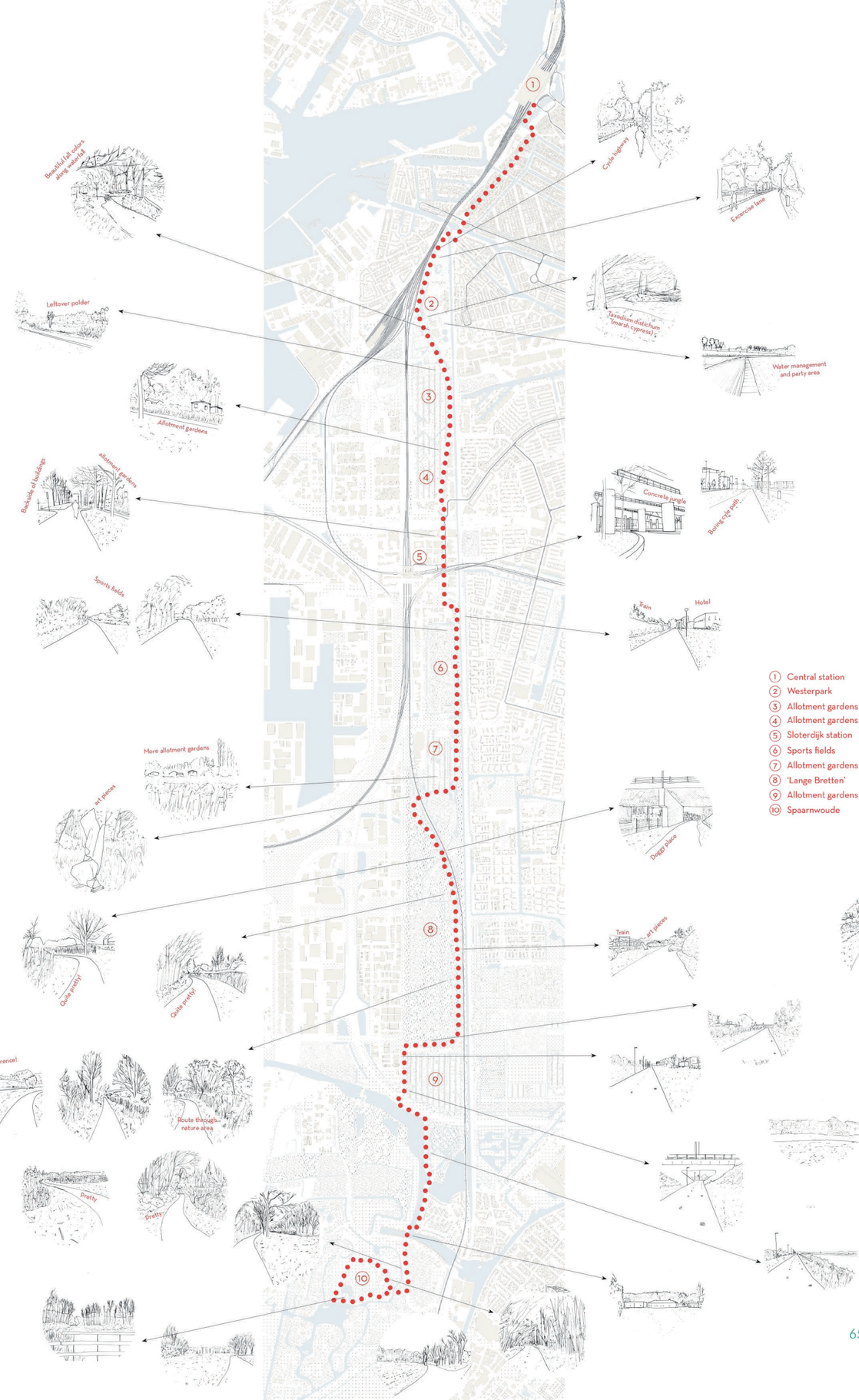
Also the noise of car traffic, trains and planes flying over was unpleasant at some places, it disturbed the peace, and overruled the sound of birds singing.

Moreover, bicycle paths felt undervalued and secondary to the cars in this area. In some places the bicycle path run along the backsides of offices or hotels, which is not inviting.

Finally, did the allotment gardens and sports fields felt like visual interruptions. Although they are green spaces, they are not public accessible, so visitors cannot enter or use these areas within the Brettenscheg.







Sloterdijk as test case

Sports park Spieringhorn is located directly east of the Seineweg. It is surrounded on the north and east side by office buildings. It is a traditionally established sports park, it focuses on field sports, soccer and hockey, and is difficult or inaccessible to other users of the zone. The sports park has a green appearance due to the sports fields and the green belts around the park and between the different fields. A bicycle path runs through the park and here are parking facilities.[45]

Sloterdijk was chosen as the location for the design intervention, because it is a missing link in the ecological corridor of the Brettenscheg. Sports parks are also seen as a type of green within the Main Green Structure. Sports fields are therefore included in calculations about the amount of square meters of green space in the city. Even if the field is not made of grass but of plastic. Sloterdijk has a lot of potential to create this link in the ecological corridor of the Brettenscheg.

And even more important, the sports fields are not restorative. The location does not meet the requirements of the restorative environments theories.

In addition to adding ecological value, the recreational use will also increase. The adjacent area to the north east will change from an office area into a mixed residential area, which means that more and more people will live here. By transforming the sports park into a public park more people from the surrounding neighbourhoods can use the location as a public space in the future.

Accessibility is very important, that's why better connections should be created to the surroundings context. Although the park is well connected because of the Sloterdijk train station, the link between the station and the park could be improved to attract more people from the station as well.

sports park *Spieringhorn*

[45] Gemeente Amsterdam (2013). *Bestemmingsplan Brettenzone*.

Planting analysis

This part outlines the planting analysis of the sports park Spieringhorn.

The are four different planting typologies distinguishable: planting along the dike, planting along the edges of the area, planting around the sports fields, and planting along the big roads.

There is no clear planting scheme or structure, the different tree species seem to be scattered all over the place.

The only structure distinguishable, is the lines of trees around the sports fields, that function as screens and form separate rooms in the area.

Ulmus *elm*

Tilia *linden*

Tilia *linden*

Tilia *linden*

Acer *maple*

Fraxinus *ash*

Platanus *plane*

Quercus *oak*

Populus *poplar*

Alnus *alder*

Alnus *alder*

Salix *willow*

Betula *birch*

Betula *birch*

Prunus *cherry*

Carpinus *hornbeam*

Crataegus *hawthorn*

Aesculus *horse chestnut*

https://www.ebben.nl/
https://www.vdberk.com/

https://maps.amsterdam.nl/bomen/

Vision of the municipality for Sloterdijk

This part outlines the analysis of the vision of the municipality of Amsterdam for the area Sloterdijk.

The area of Sloterdijk is rapidly changing from an area with a monoculture of working into a mixed residential and business district.[46]

Housing development
In the coming years, the focus will be on adding homes, in combination with social and commercial facilities in the plinth. Around 7.500 new homes will be built in Sloterdijk until 2040. This is done in two ways, new construction and transformation. For the houses, the focus is on students, starters, expats and young families. The facilities and the layout of the public space must also connect to this.[46]

Haven-Stad
Sloterdijk is part of the large-scale development strategy of Haven-Stad. This area, including old harbour areas, will be transformed into an area where houses, shops, offices and other facilities will be combined. More than 150.000 people will eventually live in Haven-Stad and approximately 50.000 will work here.[46]

Public (green) space
Sloterdijk is getting greener, which contributes to an attractive environment where people want to stay longer. Not only public spaces will become greener, green will also be added to facades and roofs of buildings. The public space is aimed at pedestrians and cyclists.[46]

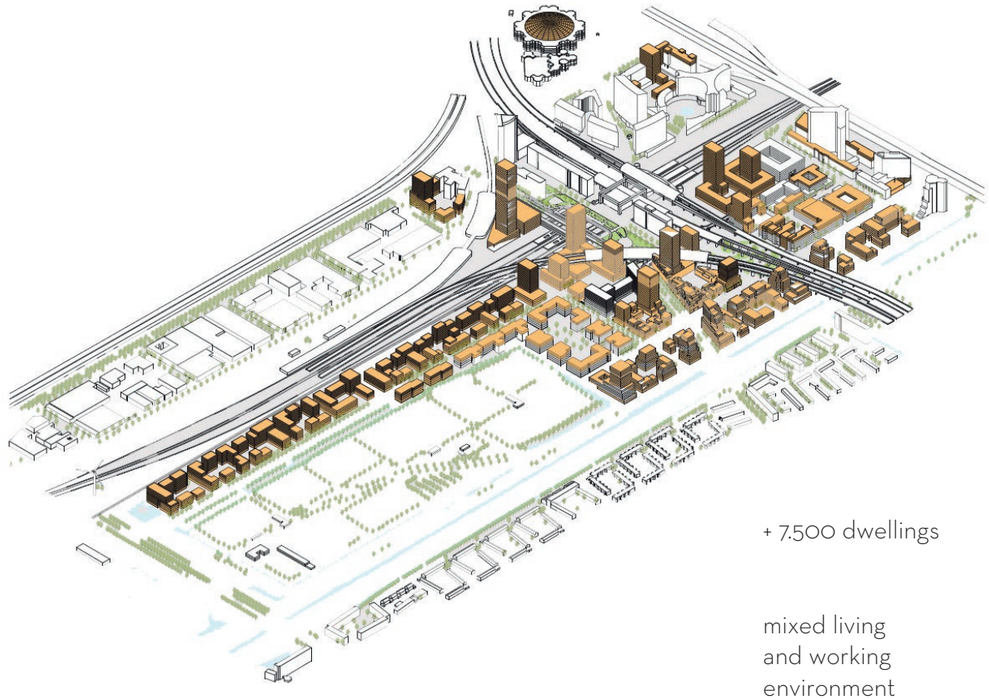
Sustainability
Green will be added, high densities will be realized and the existing infrastructure will be optimally used with a focus on public transport, pedestrians and cyclists. The main focus is on themes such as green and water, sustainable mobility and energy.[46]

The addition of green and water increases the spatial quality, but also plays an important role in the water resistance of the area. Due to climate change, more rain falls in a short time. Adding green contributes to temporary water storage and delays the drainage of water.[46]

Mobility
Due to the increase in people in the area, the pressure on space in Sloterdijk is increasing enormously. More space is needed for cyclists and pedestrians, who are given more priority in the street profile compared to the car. [46]

Key points are:
- Fewer cars
- Focus on pedestrians and cyclists
- Adaptive space for smart-mobility, such as sharing systems
- Sustainable mobility

Mobility
Parked means of transport, at homes, offices or other programs, use a lot of space. It is better to use this space for green. The need for paring spaces is decreasing due to the increasing use of shared cars. So the area has a parking standard between 0 and 1 parking space per house.[46]



Sloterdijk vision 2040

+ 7.500 dwellings

mixed living and working environment

mix of students, starters, expats and young families.

[46] Gemeente Amsterdam (2019). *Concept Visie 2040 Sloterdijk-Centrum.*

04

Research for Design

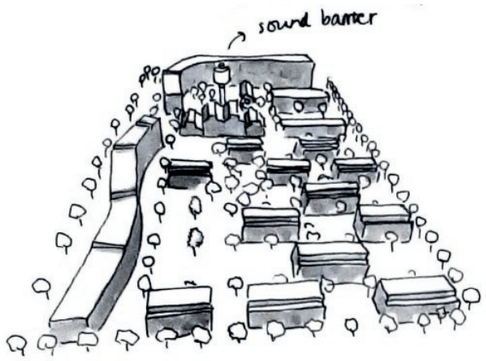
This chapter outlines the research done for the design. It presents the case studies done for the urban plan.

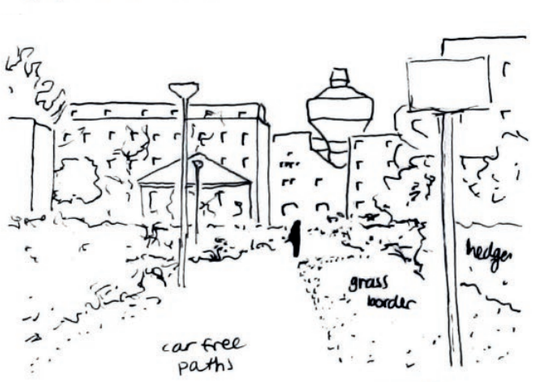
Case studies

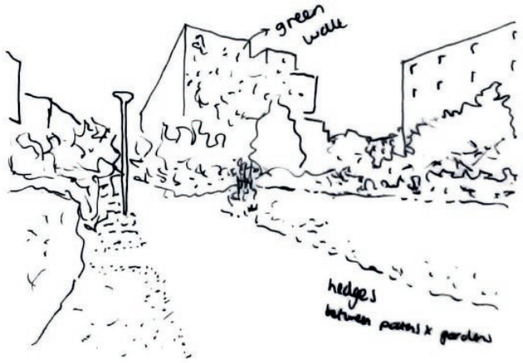
This part outlines the case studies done for the urban plan of the project. From these case studies several variables were distinguishable, and formed input for the urban design plan.

The most important variables were, focus on collective and private outdoor spaces, promote slow traffic such as walking, and create a threshold between private and public spaces.

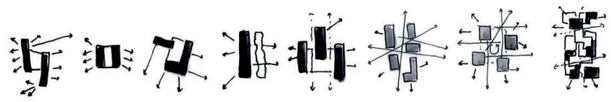
GWL terrein (1997)
location: Amsterdam
Architects: KCAP + West 8

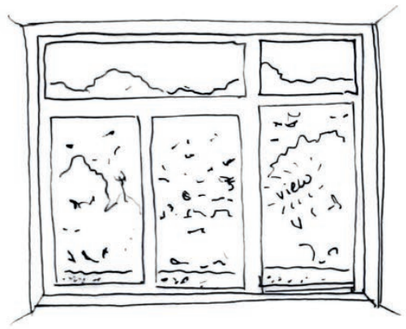


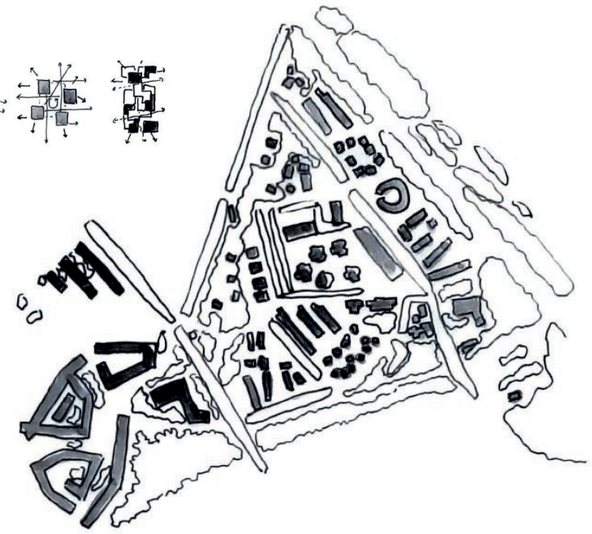




Bosrijk (2008-present)
location: Eindhoven, Vinexwijk Meerhoven
Architect: Karres en Brands

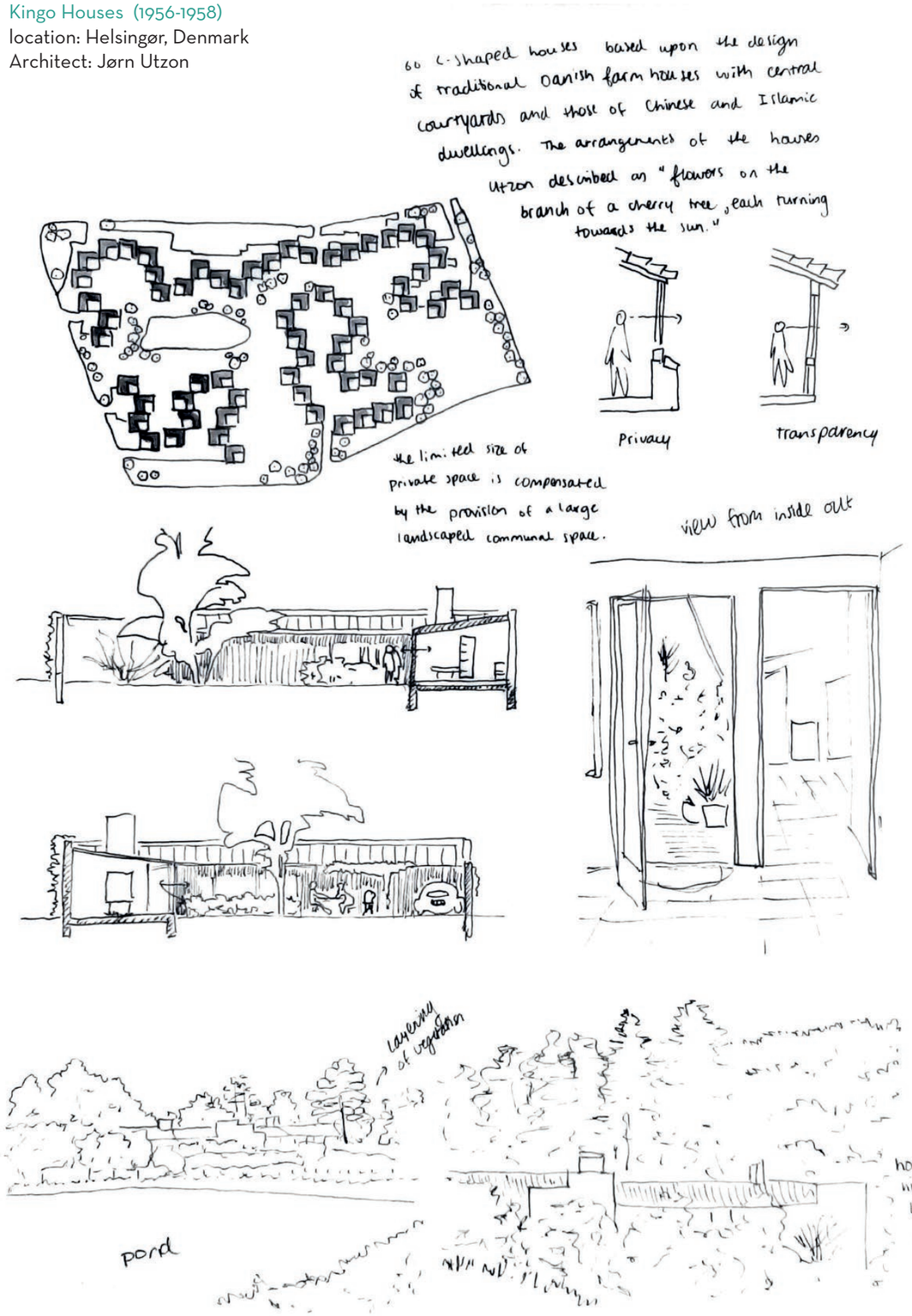






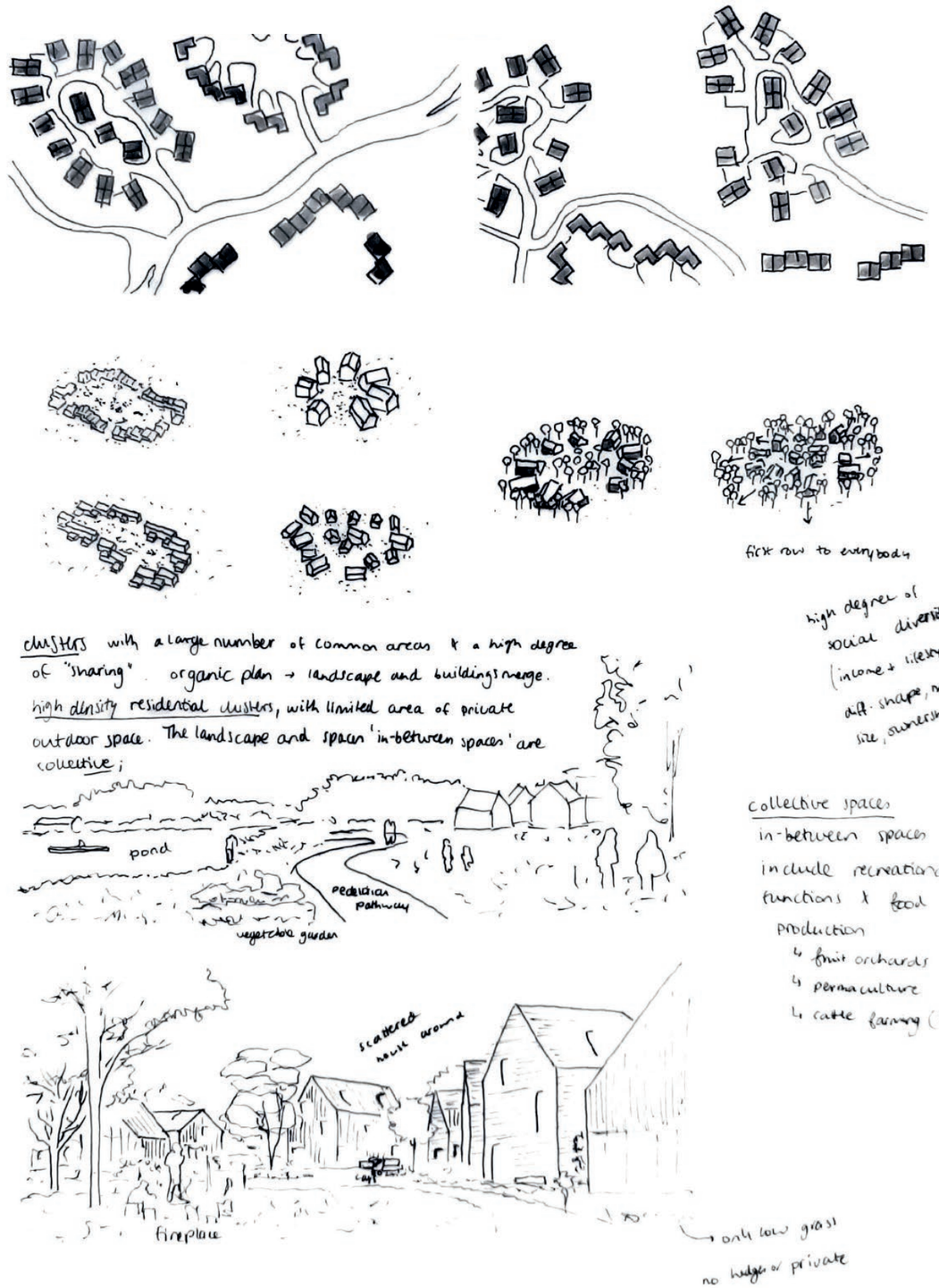
Kingo Houses (1956-1958)

location: Helsingør, Denmark
Architect: Jørn Utzon



Helsinge Garden City (2016-present)

location: Helsinge, Denmark
Architect: Karres en Brands + EFFEKT + Atkins + CFBO + Trafikplan



05

Design

This chapter outlines the final design proposal as a conclusion of the research and design processes. It presents the application of the design principles as found in the theory and case studies.

Concept

This part is an explanation of the concept for the design. The aim of this thesis project was to design a restorative forest park in Amsterdam Sloterdijk that contributes to reducing mental stress.

In order to integrate themes such as health and safety in our cities, the focus should shift to incorporating health and safety in our cities as a positive contribution to the urban city life.

Health and safety should not be a particular characteristic of one specific spot, but should be understood as equally as important as other vital infrastructures of our cities.

The aim of the design is to create a restorative environment to improve the quality of life and mental health of residents and future users of this area.

One of the main tasks is to make the area more accessible, and create a set of pathways to create connections within and outside the park.

Recreational routes will connect the valuable landscapes of the Brettenscheg for the visitors of the area.

A bridge over the railway will be constructed, which forms a connection for pedestrians and cyclists and connects both sides of the railway.

A bridge over the Seineweg will create a better connection for pedestrians and cyclists between the city centre and the valuable landscapes of the Brettenscheg west of the location.

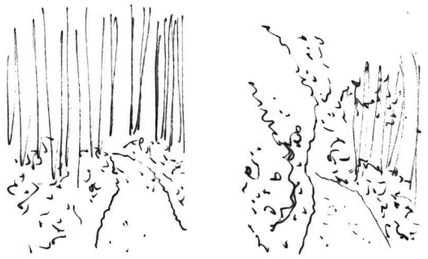
A connection to the south has already been made, a new entrance will attract more people to the park.

The ecological corridor will be continued, to solve the problem of the missing link, and improve the biodiversity in the area.

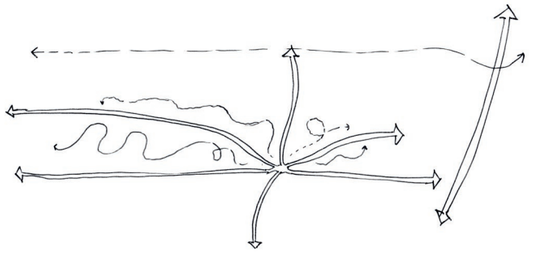
A restorative urban forest park will be created, which will create a new destination and identity for the area. By diversifying the topography of the natural environment, creating a swampy forest, and elevations, this generates conditions for diverse types of vegetation, which all have their own qualities.

The park is a place where visitors can come to relax, contemplate, and experience the restorative environment. The park provides a range of sensorial experiences for its visitors, such as watching the movement of the trees, listen to the birds, watching the movement of water, feel the wind, feel the sun, or make them aware of a change in weather and change of seasons, smell the flowers, and be actively aware of what is happening around them.

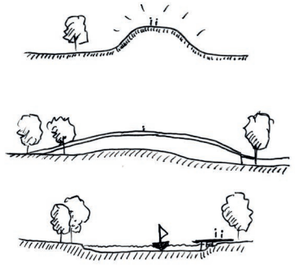
1. create a restorative environment



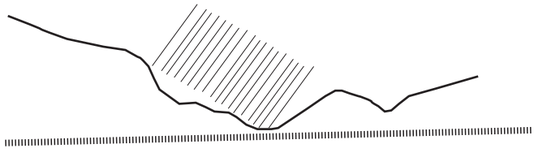
2. improve accessibility of the park



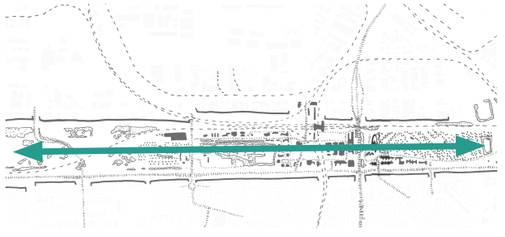
3. overcome barriers



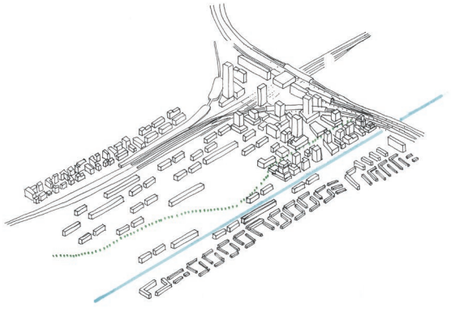
4. make use of the valuable cultural historical elements



5. enhance ecological green corridor



6. integrate housing development with park design



Structural vision

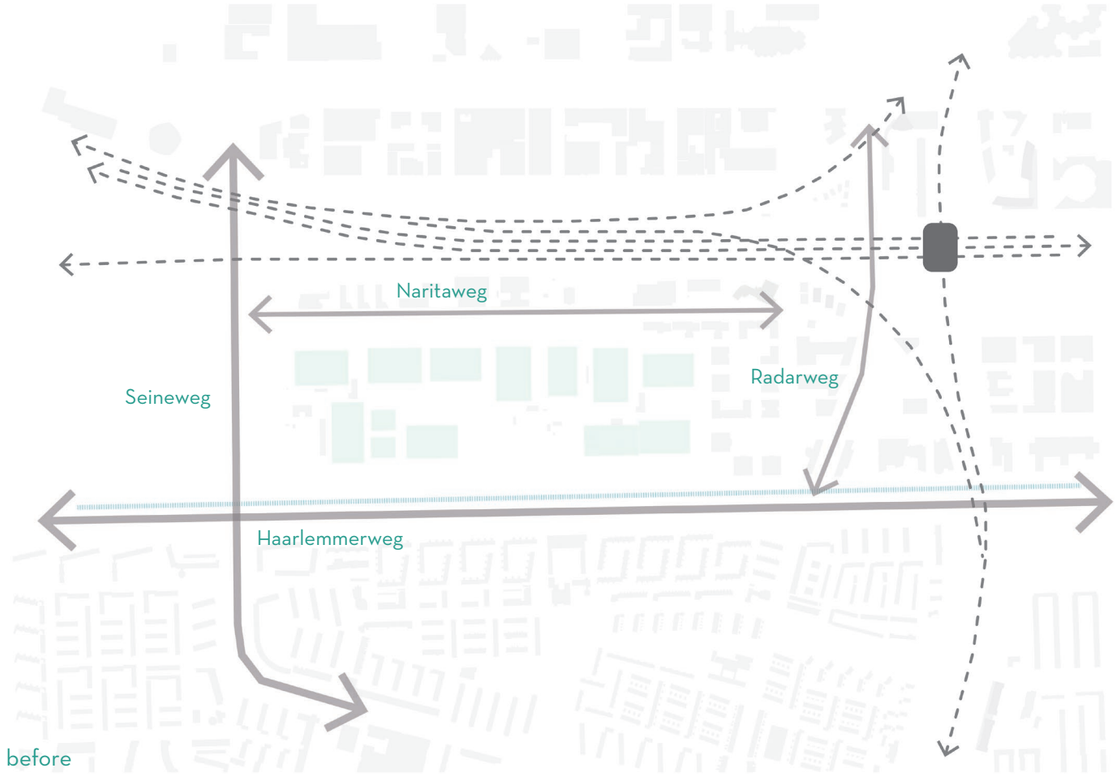
This part elaborates the structural vision. The map on top of the next page is shows of the existing structures of the site, the map on the bottom shows the proposed structural interventions.

First of all the accessibility of the park will be improved by creating three new entrances to the park. Namely, on the east, south and west side. A distinction is made between a cycling route and a walking route. The walking route follows the dike, and the cycle route follows the Haarlemmervaart.

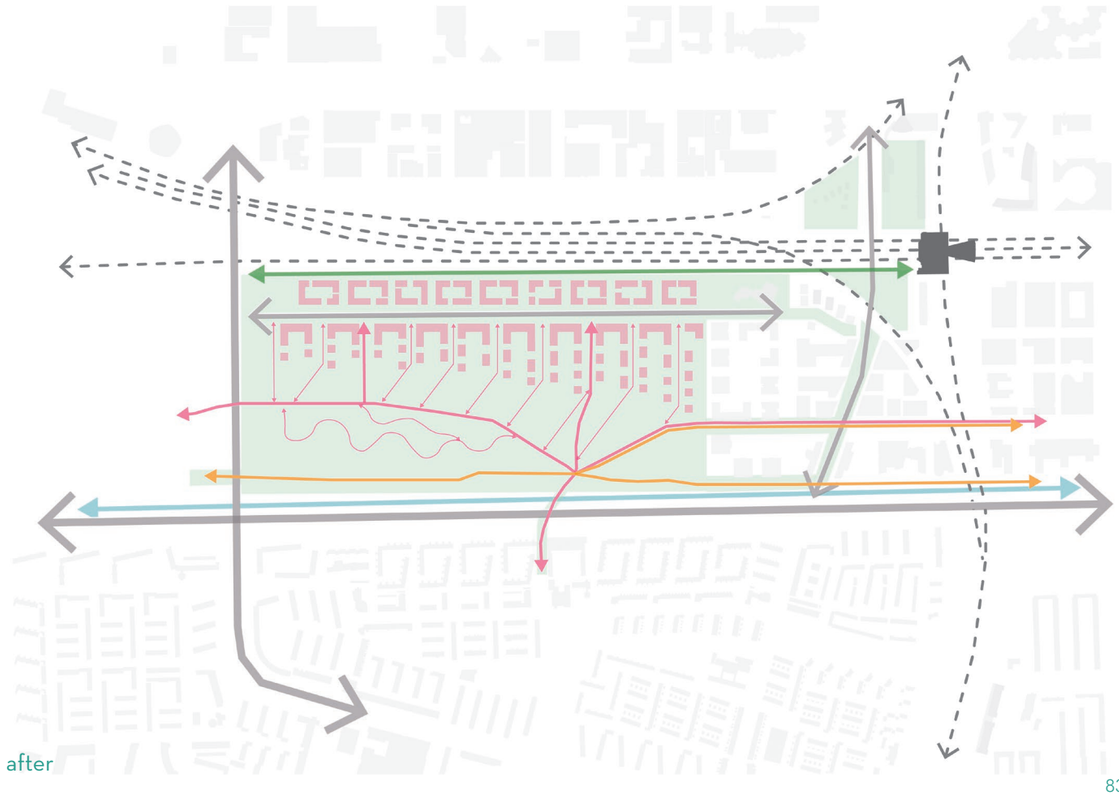
For the smaller walking routes through the park, a distinction is made between both sides of the dike. On the north side the paths follow the former ditch patterns of the lake bed polder. And on the south side the paths run organically through the park, representing the difference between the former outer and inner dike landscapes.

The ecological corridor will be enhanced by developing an ecological zone along the railway, which at the same time form a closure of the park on the north side.

Additionally, new apartment blocks will be added to the park. North of the Naritaweg closed building blocks with inner courtyards will be developed and on the south side the apartment blocks open up to the park.



Legend:
- Sloterdijk Station
- Existing structure
- New structure
- Forest park
- Ecological zone
- Walking route
- Cycling route
- Sailing route
- Railroads
- Roads

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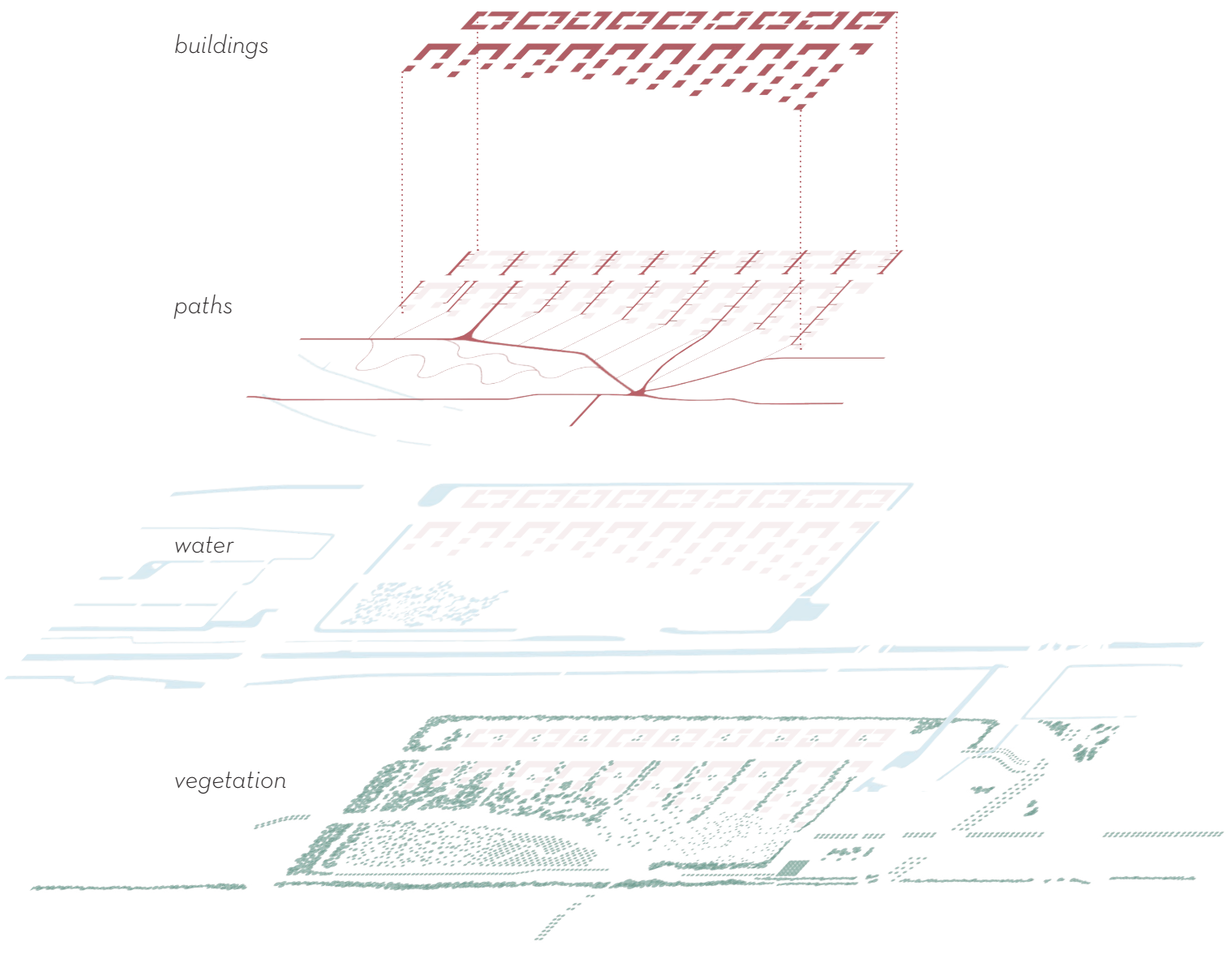
Program



Buildings
A high density residential neighbourhood will be added to the park to meet the demand for more housing.

The buildings mainly consist of apartments. With space for cafés and home offices in the plinth on the ground floor.

The a gradient in north south direction from the Western Harbour to the Western Garden Cities, is reflected in the building heights. The further south, the lower the buildings.

The parking has been solved with semi-underground parking facilities, with openings through which trees can grow in the full earth. The entrances to the parking garages are located along the Naritaweg, so that the streets between the apartment blocks are mainly used as collective spaces. Where it is possible to come by car, but only if it is really necessary.

Paths
First of all, the accessibility will be improved by creating three new entrances to the park. Namely, on the east, south and west side. By creating new bridges, barriers such as busy roads and water bodies can be crossed.

Furthermore, a connection will be made with Sloterdijk station, to attract more people from the station to the park. This connection is established by planting all infrastructure lines on both sides.

There is a separate path system for pedestrians and cyclists. The walking route follows the dike, and the bicycle route follows the Haarlemmervaart, so there is a quick connection through the whole Brettenscheg.

For the smaller secondary walking routes through the park, a distinction is made between both sides of the dike. On the north side of the dike, the paths follow the ditch pattern of the former lake bed polder. And on the south side the paths run organically through the park, representing the difference between the former outer and inner dike landscapes.

Water
To improve the water system a more natural approach to water management is applied. A swampy forest is added to buffer and infiltrate rainwater into the soil.

The water line north of the site functions as a buffer to retain and purify the rainwater from the buildings. The rainwater is also retained on green roofs.

The water is drained off slowly from the roof and stored in the water buffer. During period of drought water is pumped up and used as a water supply for the green roofs, which means a limitation of the use of drinking water.

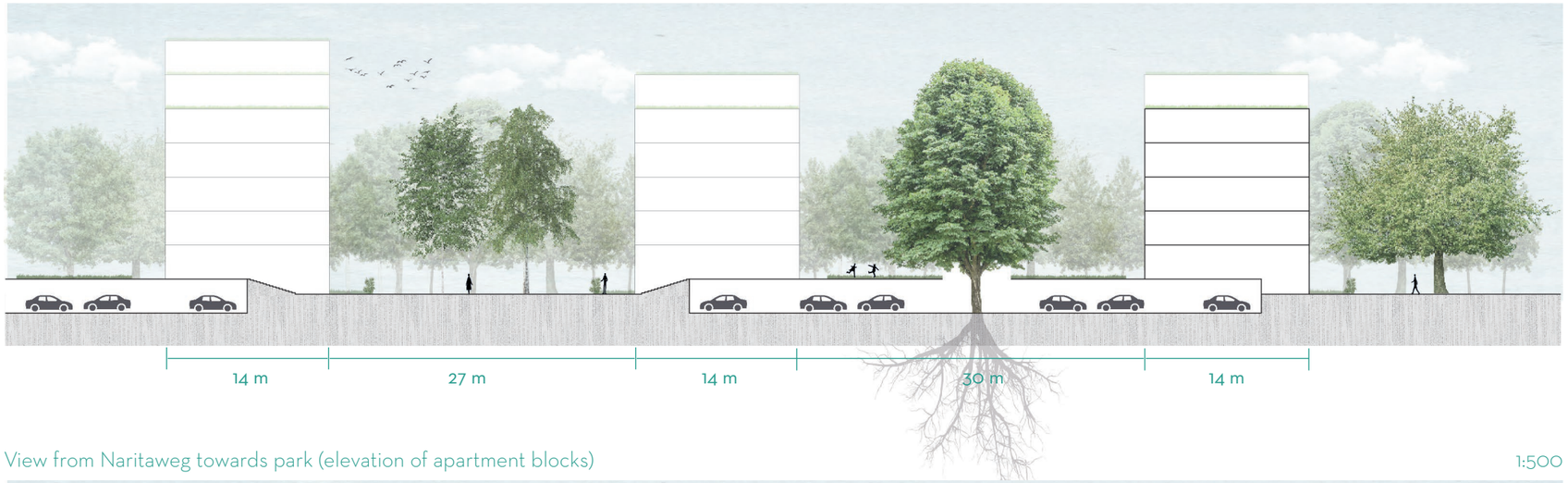
The Haarlemmervaart is enhanced as a recreational route along the Brettenscheg, by making it accessible for boats again.

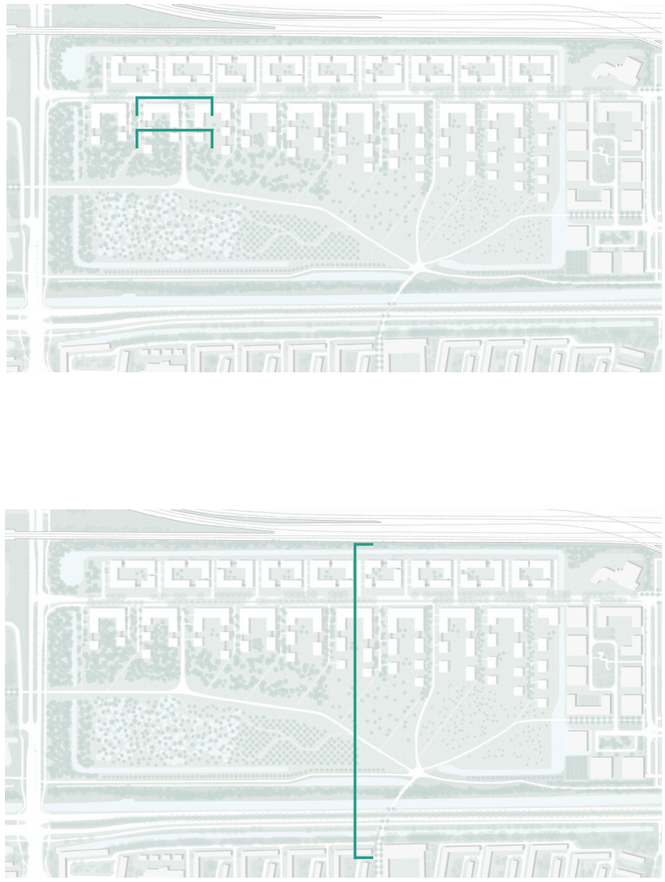
Vegetation
The forest park is designed in such a way that it creates a restorative environment, where people can come to relax and unwind, and find an escape from everyday life.

The design consists of different plant typologies, which will be explained later.

Building typologies

View from Naritaweg towards park (section of apartment blocks) 1:500





View from Naritaweg towards park (elevation of apartment blocks) 1:500

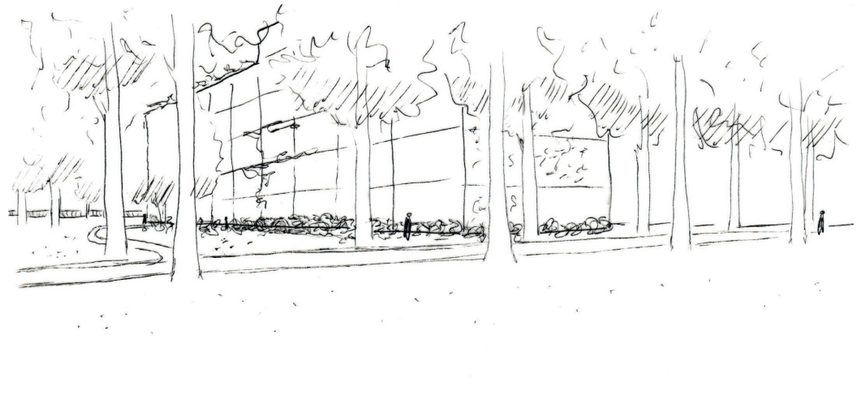
Section from Ecological zone to Western Garden Cities

Relation public and private spaces

These perspective drawing show the relation between the private gardens and the public accessible park. The apartments on the ground floor have private gardens in front of their houses. The borders of the private gardens will be planted with hedges, to form a transition between the private and public spaces.

View from the park towards the Naritaweg

View from the dike towards the apartment blocks



View from the Naritaweg towards the park

View from the dike towards the apartment blocks

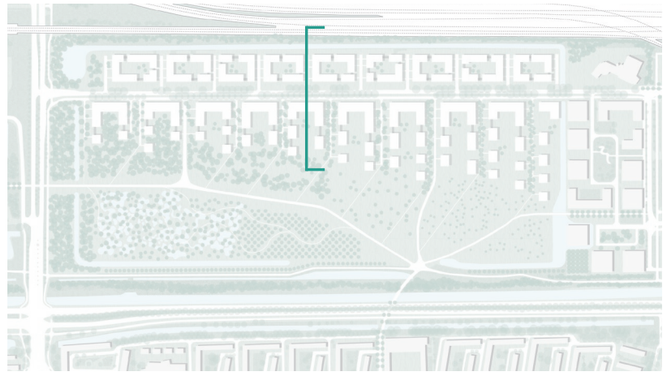
Transition from collective to public spaces and gradient in building height

The sections below show the before and after situation of adjacent areas of the Naritaweg. The location and direction of view of the section are indicated on the map at the top right.

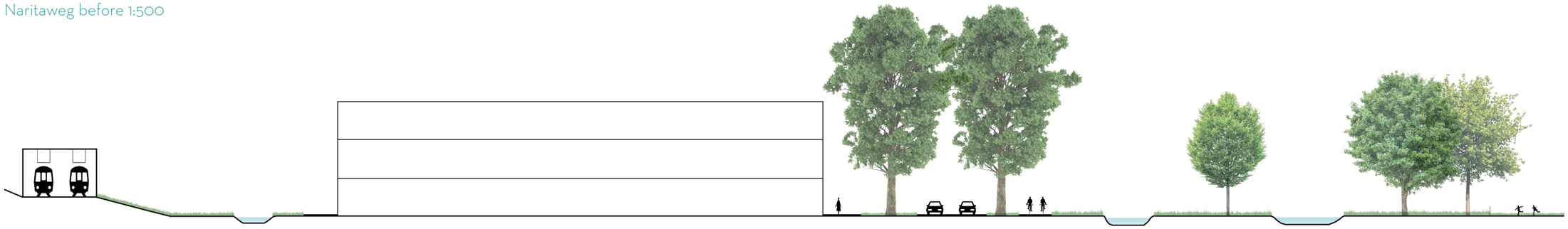
The buildings mainly consist of apartments. With space in the plinth on the ground floor for cafés and home offices.

From the section on the bottom you can see the gradient from the Western Harbour (west) to the Western Garden Cities (east), which is reflected in the building heights.

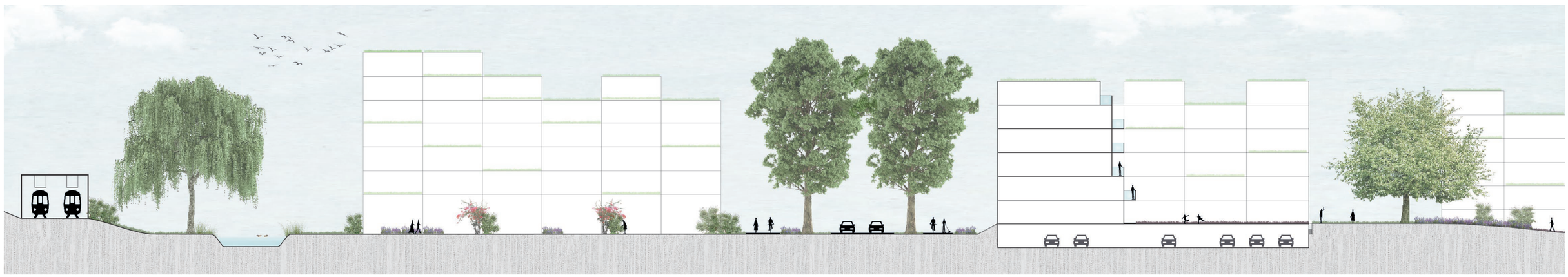
The transition zone between the collective courtyards and the public park will be planted with a layer of vegetation, to form a transition between semi-private and public spaces.



Naritaweg before 1:500



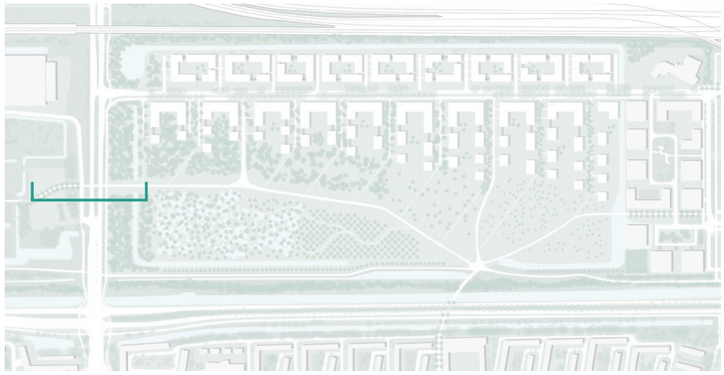
Naritaweg after 1:500



Extension of the dike

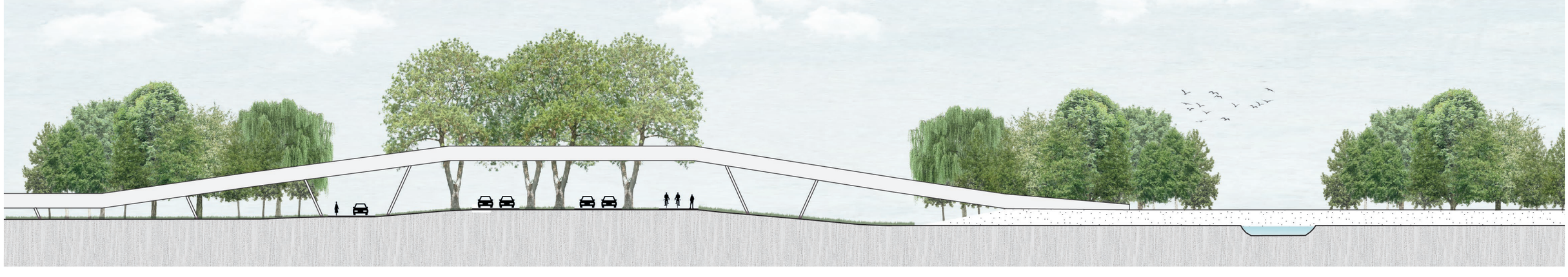
The sections below show the before and after situation of Seineweg. The location and direction of view of the section are indicated on the map at the top right.

To overcome the barrier of the Seineweg, a new bridge will be developed. This new bridge continues as an extension of the dike. On the west side of the road, the bridge stays at the same height as the dike. To make the dike experience possible in a different way.



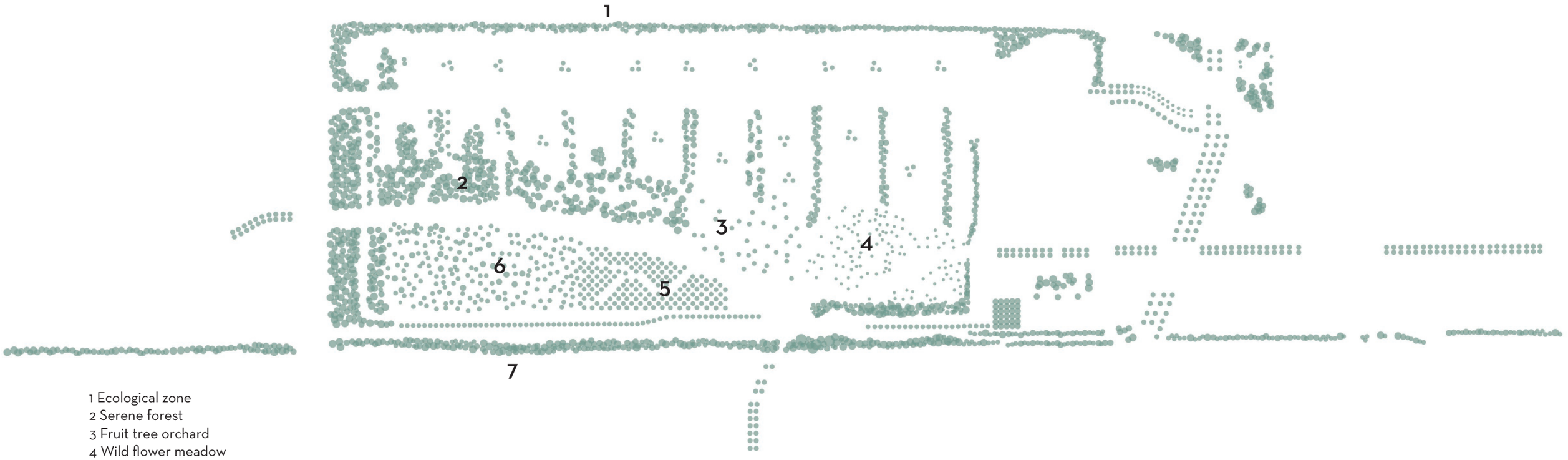
Seineweg before 1:500

Seineweg after 1:500



Planting typologies

This map indicates the different planting typologies of the design. The forest park is designed in such a way that it creates a restorative environment, where people can come to relax and unwind, and find an escape from everyday life. The different planting typologies, are discussed on the following pages.

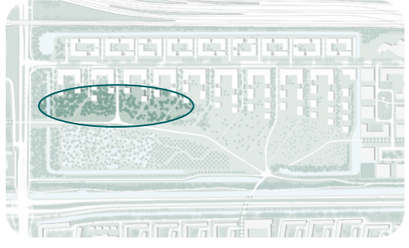


1 Ecological zone
2 Serene forest
3 Fruit tree orchard
4 Wild flower meadow
5 Birch forest
6 Swampy forest
7 Haarlemmervaart zone

Serene forest

This area represents a serene forest, a place where people feel safe. The area feels private, inviting and natural. Trees, such as the walnut, honey locust and Japanese pagoda tree, are chosen because of their soft textures and colours.

The trees and shrubs provide shelter, they create a feeling of safety. There are places to sit and experience of what is happening around. It is a place where you can let your thoughts wander.



Juglans regia
walnut

Gleditsia triacanthos
honey locust

Sophora japonica
japanese pagoda

Fruit tree orchard

This area functions as a social place, where local residents can come together, and pick fruit from the orchard. Mowed paths run through the area, from where people can experience the movement of the trees, listen to birds, feel the wind, feel the sun, smell the herbs, and be aware of what is happening around them.

Malus domestica
apple

Prunus avium
cherry

Prunus domestica
plum

Wild flower meadow

The wild flower meadow is providing richness, diversity and complexity to the sensorial experience. Mowed paths run through the area, where visitors can walk around barefoot and feel the grass under their feet. And where they experience all the different colours and smells from the flowers and trees, listen to the birds and insects, feel the wind or sun, while wandering around or laying in the grass.

Juglans regia
walnut

Quercus robur
oak

Tilia platyphyllos
linden

Birch forest

In this area birch and alder trees are planted in a regular grid. There is no paved path, so people can walk around freely to explore the area on their own. People can wander around or sit on one of the concrete benches placed in the area.

The trees are planted in a grid because so provides a coherent and legible space.

The birch trees are chosen because of their bright colour, rough texture on their barks, and transparent foliage.

Betula pubescens
birch

Betula pendula
birch

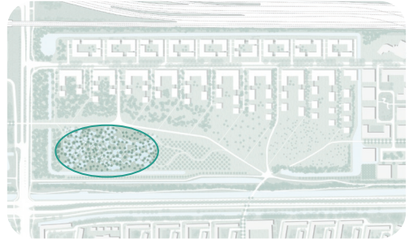
Alnus cordata
alder

Swampy forest

In this area a mixture of birch, alder and willow trees, together with ferns, are planted around small ponds.

An elevated wooden path is winding through the area. The area provides a mysterious experience, where people are attracted to explore, and wander around. The atmosphere feel serene and calm.

The leaves of the trees are reflected on the water surfaces. You can hear the wind through the leaves of the trees. And the area has a moist climate.



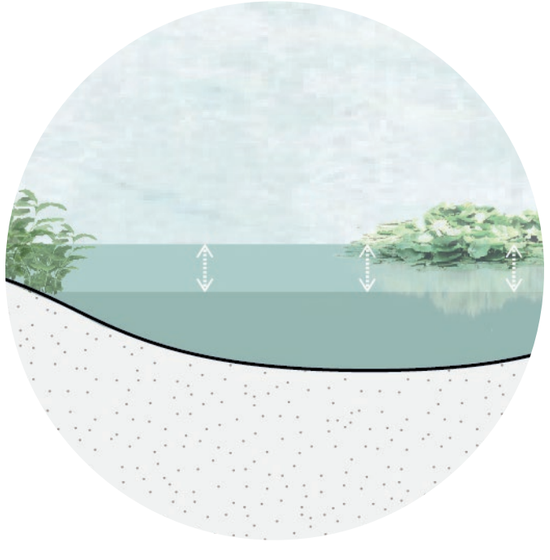
Betula pendula
birch

Alnus cordata
alder

Salix
willow

Water level

The image below shows how the water fluctuates in different weather circumstances at the swampy forest. After a heavy rainfall, the water level rises and the whole area overflows. The elevated wooden pathway ensures that the area is still accessible to people.



Elevated wooden pathway through swampy forest 1:50

Sensorial experiences

Another important aspect of the final design intervention is the sensorial aspect of the urban forest park. The sensorial aspects ensure that the park attracts and retains attention. For instance, the visible seasonal changes of trees, as shown for the cherry tree.

The park should provide sensorial experiences for its visitors, such as watching the movement of the trees, listen to the birds, watching the movement of water, feel the wind, feel the sun, or be aware of a change in weather and change of seasons, smell the flowers, and be actively aware of what is happening around them.

cherry tree in winter

cherry tree in spring

cherry tree in summer

cherry tree in autumn

sight

colours

light and shade

textures

seasonal changes

sound

wind through leaves

singing birds

buzzing insect

smell

flowers

herbs

blossom of trees

taste

fruit

herbs

berries

edible flowers

touch

wind, sun, shade

temeprature

surface textures

feel the grass under your feet

Winter

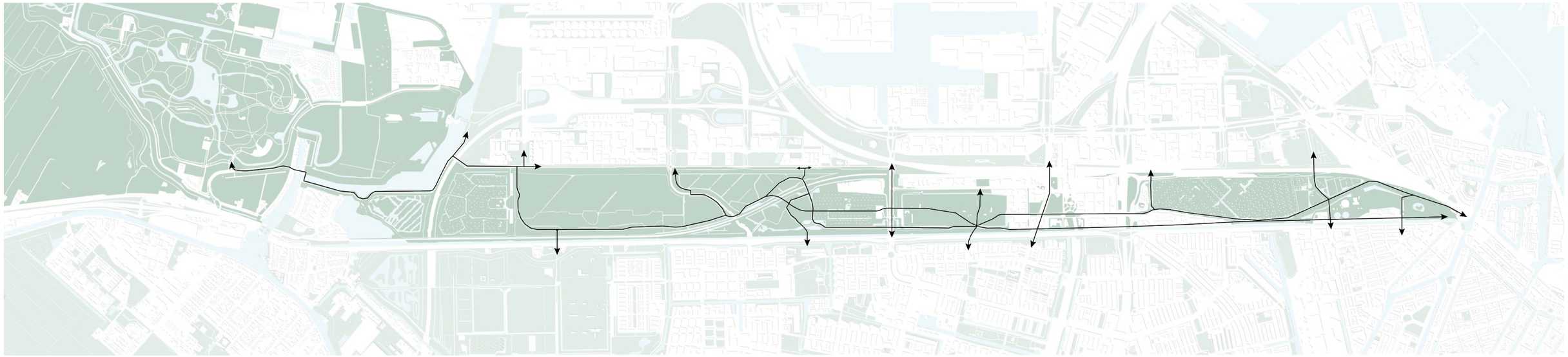
Spring

Summer

Autumn

Brettenscheg vision

The lines on the map below indicate recreational routes going through the Brettenscheg. The new interventions connect to the already existing paths in the area. The most important intervention is the addition of north south connections. As a result, the Brettenscheg becomes more accessible to the people who live in the adjacent neighbourhoods, and thus reaches more people.



Regional vision

The final sub question of this thesis project is, to what extent can the findings of the research and design be applied to other places in the city?

As mentioned before, all the Scheggen have their own characteristics and challenges. And therefore they all need their own specific sollution.

There are possibilities to add restorative forests to business centres, like the Zuidas. Or to link them to densification areas, to reach as many people as possible.

Furthermore, this project shows that it is possible to build in the Scheggen, but with very strict rules and conditions. The development of urban expansion should always go hand in hand with the development of public green spaces, so that a synergy is created between nature and buildings.

Possible locations for restorative forests..

Westerpark

06

Conclusions

This chapter outlines the conclusions of this graduation project, and it presents a reflection on the findings, and discusses the relevance.

Conclusions

The aim of this thesis project was to design a forest park in such a way that it contributes to reducing mental stress in an urban environment. To show how a potential restorative urban forest could look like, in the hope that it inspires landscape architects and urban planners to come up with alternatives for how public green spaces can be designed in urban environments to promote mental health.

The main research question for this project was: *How can a forest park be designed in such a way that it contributes to reducing mental stress in an urban environment?*

The result of this thesis project is a design proposal for a forest park for Amsterdam Sloterdijk. The design of the forest park shows that nature contributes to reducing mental stress in an urban environment.

The literature researched showed that there is an important relation between nature and stress reduction. The park should be designed in such a way that it creates a restorative environment. In order to achieve this, the design must meet the following landscape characteristics: the park should be challenging and should encourage people to discover and explore (**mystery**), the park should consist of a diversity and richness of elements, the park should keep people interested (**complexity**), the park should be readable, it should be easy for people to find their way through the park (**legibility**), and the park must have a certain degree of repetition and order to understand the organization of the environment (**coherence**).

Restorative environments require the following elements as well: there should be aspects that attract and retain attention, such as seasonal changes (**fascination**), the park should offer an escape from everyday life (**being away**), the park should be large and rich enough to discover and explore (**extent**), and finally the park should be compatible with what someone is trying to do and what someone would like to do (**compatibility**).

The results of the literature study, together with the results from the site research, have resulted in a series of principles for the site specific design proposal for Amsterdam Sloterdijk. The principles of the design are: (1) create a restorative environment, by using the principles derived from the literature research, (2) increase public access to the park, by overcoming barriers, (3) create a connective landscape, by enhancing the ecological corridor, (4) make use of the valuable cultural historical elements, (5) and integrate the housing developments with the park design.

Furthermore, the project shows that the design proposal for a forest park not only contributes to reducing mental stress in an urbanized environment, but also increases biodiversity, and acts as a climate buffer by managing rainwater and cooling the environment.

The first sub question was, *How can nature contribute to reducing stress?*

Research consistently finds a link between nature and mental health. The literature research showed that simply viewing nature can already have positive effects on human health. Kaplan and Kaplan suggest that contact with nature helps the recovery from mental fatigue, which can arise from a prolonged period of stress. Whether hiking in a large nature reserve or sitting in a local urban park, being in nature has many beneficial effects on mental health. In order to encourage people to be in nature, it is important to make urban green space accessible to everyone.

The second sub question was, *What spatial design principles can be used to design an urban forest park which contribute to reducing stress?*

The spatial design principles used for the design were derived from the literature research. The park should be designed in such a way that it creates a restorative environment. In order to achieve this, the design should not only consist of mystery, complexity, legibility and coherence, but also fascination, being away, extent and compatibility.

The third sub question was, *How to apply these design principles to a site specific forest park design for Amsterdam Sloterdijk?*

The results of the literature study, together with the results from the site research, have resulted in a series of principles for the site specific design proposal for Amsterdam Sloterdijk.

The principles of the design are: (1) create a restorative environment, by using the principles derived from the literature research, (2) increase public access to the park, by overcoming barriers, (3) create a connective landscape, by enhancing the ecological corridor, (4) make use of the valuable cultural historical elements, (5) and integrate the housing developments with the park design.

Eventually, the site is transformed from a sports park disconnected from its surrounding, into a restorative forest park in Amsterdam Sloterdijk. It provides a place where people can come to rewind and relax, and reconnect with nature. In the park a wide variety of different landscape types are present.

And the final sub question was, *To what extent can the findings of the research and design be applied to other places in the city?*

As mentioned before, all the Scheggen have their own characteristics and challenges. And therefore they all need their own specific solution. There are possibilities to add restorative forests to business centres, like the Zuidas. Or to link them to densification areas, to reach many people.

Furthermore, this project shows that it is possible to build in the Scheggen, but with very strict rules and conditions. The development of urban expansion should always go hand in hand with the development of public green spaces, so that a synergy is created between nature and buildings.

Reflection

Relationship between research and design

This thesis project focused on the relationship between urban environments and the healing aspect of nature. Amsterdam was chosen as location because it has an interesting green structure and is facing large densification tasks.

The desk analysis of all the Scheggen gave a good overview of their landscape characteristics and challenges. Based on this analysis, the Brettenscheg was chosen as design location, together with the fact that it enters the city the furthest, and therefore reaches many people, and the need for densification.

My first site visit to the Brettenscheg took place in November, which was quite late in the research process, but nevertheless influenced my image of the area enormously. During this site visit I cycled through the Brettenscheg, from the central station to the Spaarnwoude woodland park. As a landscape architect I was mainly focused on the green spaces, how easy it was to cycle through the Brettenscheg, and what types of vegetation I encountered along the way.

From the desk analysis, the need to approach the area from a historical perspective emerged. The Brettenscheg, as turned out, has a very rich history. Relics such as the Haarlemmertrekvaart and the Spaarndammerdijk, have either almost completely disappeared or lost their functions.

The Brettenscheg tells it's own narrative. Although identified as a green recreation area and one of the green scheggen, it was never fully realized as such.

The area is made of a patchwork of half executed and overlapping plans. The area is a rich but incoherent collection of atmospheres and places.

Defining the several zones and characters of the area made me understand what I needed to address in the design. The fact that Sloterdijk is going to densify, gave a great opportunity to reflect on the relationship between urban environments and the healing aspect of nature.

The urban developments in the area around Sloterdijk formed another layer in the project as well. The case studies were very useful in the exploring which variables were important for the urban plan of the design intervention.

What I have taken less into account are the developments in the adjacent neighbourhoods, an interesting next step could be that the developments of the Western Garden Cities and the Western Harbour area are further examined. As well as the allotment gardens and the Haarlememrvaart.

The site visits and the site analysis have led to a better understanding of the location, and its strengths and weaknesses. Furthermore, it has led to guiding principles for the design process, which has proven to have a major impact on my design process.

Parallel to the site visits and site analysis, a literature study was carried out. The literature research was based on literature from environmental psychology and helped to get a better understanding of the research topic. It also provided design principles that could be used to design a forest park that helps to reduce mental stress in urban environments.

To sum up, the design is based on the findings of a literature research, in combination with the findings of the site analysis, and case studies. This formed a continuous dialogue between the theoretical framework, the site research and the design process for the design of a forest park for Amsterdam Sloterdijk. This was an iterative process, going back an forth between all these aspects.

Relationship between Landscape architecture and graduation project

The gradation project is part of the Flowscapes graduation studio and the Urban Forest Places lab. Both studios are focused in the exploration of spatial, societal and environmental issues through design research and research by design approaches.

In relation to these topics, this project mainly focused on the social dimension of landscape architecture. The research explores how spatial elements have an effect on human beings and their mental health. More specifically, it explores how the sensorial and experiential aspects of nature can create an environment in which visitors can reduce their stress.

The design intervention improves the liveability of the city, by providing public green space, which can be used by more people. It also ensures landscape connectivity and protection of the ecological value of the existing landscape.

Even though I have researched the area of Sloterdijk, some of the findings of the research and design could be applied to other places. Suitable locations to implement restorative forest parks are office areas and densification areas, so that many people will be reached. But there is not one explicit design solution, the design always depends on the specific conditions and site specific characteristics of a location.

Lastly, this project has once again demonstrated the complexity of landscape architecture. There are many different aspects to take into account, such as climate, soil, geomorphology, hydrology, ecology, vegetation, animals, natural processes, social aspects, site specific elements and conditions, context, urban design, human influence,

Societal and scientific relevance

Although there are many public green space designs in cities, there are hardly any design proposals for urban forests. This project could contribute to the development of knowledge about designing urban forests.

This project is also an attempt to create awareness among landscape architects and urban planners about the effect that environmental and spatial characteristics have on people. It can contribute to the design of public green spaces in the future, aimed at the presence of healthy landscapes in our cities, beneficial for our mental health and thus a precautionary measure for possible diseases.

Westerpark

07

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Images

All images in this report are made by the author, unless further specified.

Swart, S. (2019, September 19). *Amstelscheg, met rechtsonder volkstuincomplex Amstelglorie*. https://www.nrc.nl/nieuws/2019/09/19/zijn-de-beroemde-groene-scheggen-in-gevaar-a3973775

Thank you for reading