FOURTH TO SIXTH NATURE

FERALISING THE POST INDUSTRIAL LANDSCAPE

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"When we build, let us think that we build forever. Let it not be for present delight nor for present use alone. Let it be such work as our descendants will thank us for; and let us think, as we lay stone on stone, that a time is to come when those stones will be held sacred because our hands have touched them, and that men will say, as they look upon the labor and wrought substance of them, 'See! This our fathers did for us."

- John Ruskin

Colofon

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This project started with my fascination for feral nature - the nature that returns to areas altered by man after it loses function or when it's maintenance stops for whatever reason. The powerfull natural processes that reclaim these territories result in cultural-natural hybrids I think are really interesting and have a lot to offer. As people we put a lot of resources and energy into countering these processes. As a landscape designer I am interested in finding ways of co-operating with these processes in order to improve the quality of our own living environment, but also to create an environment that is more inclusive to other species that we are depending on.

Landschaftspark Duisburg: Post-Industrial Landscape Park

Chernobyl: completely reclaimed by nature in 25 years

Zollverein: Post-Industrial UNESCO Heritage

Forest colonizing the railway. Südgelande, Berlin

There's beauty in the forgotten corners of the city. There where maintenance is neglected because of the decrease of programme or vacancy, the natural world will surely colonize the man-made landscape, with a force that can break through concrete slabbing and tear down construction. All that it needs, is time.

Nature thrives often in surprising places

Site visits

Louis le Roy's Ecokathedraal in Mildam

Le Roy's Ecokathedraal is a tribute to long-term thinking and natural succession. The artists build incredible structures with rejected paving material and without cement, resulting in a wide variety of habitats. Nature is free to colonize the area.
The municipality embraced his ideas about thinking in the long-term, and made policy to ensure its survival for the next millenium. (Stichting TIJD, 2018)

Landschaftspark Duisbrug

Another inspiring example of nature taking over man-made landscape is Landschaftspark Duisburg, Germany. Here clever design and maintenance strategies are applied, so that the former industrial landscape can gain new life as a park for the people while the soil and vegetation regenerates over time.

As you can see in the picture, the cultural language of the built environment form the boundaries and condition for natural development.

Abstract

This thesis explores the possibilities for semi-spontaeneous forest succession as the solution for creating a healthy living environment in the formerly industrial area of Schieoevers, Delft. The thesis describes what measurements are needed in order to make the uncertainties of feralisation acceptable for the larger public, as well as the opportunities and benefits that feralisation, the understudied counterpoint to domestication, could bring to the post-industrial landscape.

INTRODUCTION

1.1 The problem with domestication

Social, cultural and technological developments have always gone hand-in-hand with the domestication of the natural world. In order to grow as a species, we feel that we need control over our environment. As modern society emerged, and the human population condensed into urban areas, industrialisation freed many people from reliance on direct consumptive interactions with nature. (Keniger et al., 2013)

However, this development, aiming to solve old problems, creates new ones. In this process of modernisation, economic growth and technological development, we tend to overlook what we lose to these developments. It seems we are losing our connection to the natural world, and slowly we gain an idea of the consequences of that loss.

Many of the climatal problems we now face, can be seen as the consequence of domestication. Because it appeared for a long time that we had achieved control over the natural world, mankind perceived itself to be above nature, instead of being part of it. It is this belief that allows us to think that we don't need nature to thrive, and offers an excuse to deplete resources and conquer territory, and by doing so damaging the fragile balance within the natural world.

Biodiversity is at an all time low. Currently about 15% of the natural amount of species remain in the Netherlands. This percentage is much lower than anywhere else in Europe. The main reason for this is habitat loss is due to urbanization and intensive agriculture. The urgency for adressing this problem is evident. Our ecosystem, formed by millions of years of evolution, is what makes life on earth managable, creates stability, resources and allows us to produce food from crops. At this rate, it is very likely that we will lose species that we are dependant on in order to maintain our food production industry.

The climate agreement states that we have to reduce 49% of our carbon emmissions by 2030. The Dutch government is now looking into forestation as a possible solution for capturing and storing carbon, which would mean planting 37000 ha of forest in the Netherlands in order to capture and store carbon.

Hence we are realizing that the limits of our domestication have been reached, and that we are subject to the same laws of nature as are all organisms. Our antropocentric reign has to come to an end in order to shift towards the ecocentric approach that is needed in order for our own species to survive.

The key to achieving this, is re-connecting to nature. As many people know, an encounter with nature can be a humbling experience. We feel it when we are eye-to-eye with a wild animal, when we take a dive in the cold water, or when we get lost in the woods. When our instincts kick in, we can experience a deeper understanding of our primal connection to nature. That connection strengthens us, keeps us healthy and gives us a sense of fulfillment. But it also makes us understand that we are part of nature, and that we are dependant on it.

1.2 Feralisation as a way out

Feralisation, the understudied counterpoint to domestication, might very well offer a pathway to re-connecting with nature. As Henry Thoreau (1908) once stated: "We need the tonic of wildness.". By allowing natural processes to occur in our landscapes instead of trying to fix and maintain the image that is to our liking, we promote biodiversity and create a resilient landscape (Müller et al., 2015) that can improve our mental and physical health. (Keniger et al., 2013) "This new nature has the potential to "sharpen our senses and reconcile us with our environments" (Girot, 2005)

Now, in the Netherlands, there are a few examples of landscapes like the Hollandse Duinen, Oostvaardersplassen and parts of the Hoge Veluwe that allow natural processes to occur and so are dynamic, intervention is kept to a bare minimum to make recreational use possible. These national parks are a very popular destination for hiking and excursion. In fact, these types of landscape gain the highest appreciation compared to other landscape types. (CBS, 2009)

However, when it comes to our direct living environment, most people seem to fail to appreciate any form of unplanned nature or sign of natural process. Here it is associated with neglection, it's unfamiliar to the image of the city and so it doesn't belong there. (Nassauer, 1995) Apparently, we can only appreciate this kind of nature when it is outside the boundaries of our day-to-day environment. This conception too derives from the many centuries of Western domestication and is best explained as the NIMBY (Not In My Back Yard) phenomenon, which is the psychological resistance against change in an individual's direct living environment. This phenomenon is responsible for slowing down urban developments projects worldwide. (Devine-Wright, 2009)

And this is problematic, since the world's population is growing at a fast pace, and will continue to do so for the coming decades. A growing percentage of these people will live in the city. And in order to keep up with this growth, urban expansion is needed, claiming more and more natural habitats. (UNDESA, 2019)

This puts pressure on urban development projects. Planners and developers are tempted to opt for short-term and cost-efficient strategies, in order to meet the demand in time.

In Western Europe we are looking into transforming former industrial sites to residential areas. Many of these sites have lost their industrial function and are suitable for building, gaining the interest of many developers.

We've seen many succesful landscape architectural researches and projects on developing feral nature on former industrial sites. The research on developing feral nature in the transformation of industrial site to residential area however, is scarce. Over the last few years, many municipalities are envisioning transforming industrial sites to residential areas as a way to cope with the housing shortage. This research could prove to be a valuable input for the planning processes that will follow these visions.

At the core of this thesis is the discipline of Urban Forestry. This field of studies is focussed on the "art, science and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society." (Konijnendijk et. al., 2006) The governmental task to plant 37 000 ha of forest is a complex one, and a multidisciplinary approach is needed in order to find solutions that benefit both the natural environment and society.

Therefore the character of the research is dualistic. On the one hand there is the question how feralization and succession can play a role in the spatial transformation of a post-industrial landscape to an urban forest. The goal here is not to design a fixed end result, but to set a dynamic framework that allows movement, natural processes and stimulates man-nature co-existence. However, in order to find how feralization can promote this co-existence, human needs in terms of physiology, sociology, economy and aesthetics need to be taken into account as well. Accordingly, the second main question this research is focussed on is:

How can we utilise the potential of feralisation in transforming the post-industrial landscape to a healthy, climate-adapted and inclusive living environment for all species?

Subquestions supporting the main question:

> What place specific aspects give motive for design intervention?

> How can we create the optimal conditions for forest development in the urban context?

> How can we gain public acceptance for integrating feralisation in this transformation?

> How will this change the relation to our environment?

1.3 Methodology

Answers to the research questions are sought-after through the case study of Schieoevers, Delft. The city of Delft lies in South Holland, the most densily built province of the Netherlands, facing imminent urban expansion in the coming decades. Plans are being made for the Schie-oevers to transform the industrial site to a 'new city centre', with housing and offices. The area is now in post- industrial state. *Terrain vagues* define the spatial layout, shaping a suitable case for studying how feralization can play a role in this development.

In the process, the interaction between research and design is essential. At the core of the thesis is the shaping of conditions for and the guidance of natural processes in different scenario's, with respect to the sites' palimpsest. Future developments of the landscape will build on to historic qualities and spatial qualities of the Schieoevers.

In order to uncover these often hidden qualities, patterns and structures, a compositoric analysis will be performed. The results lead to a framework, a main structure for different scenario's for the long-term development.

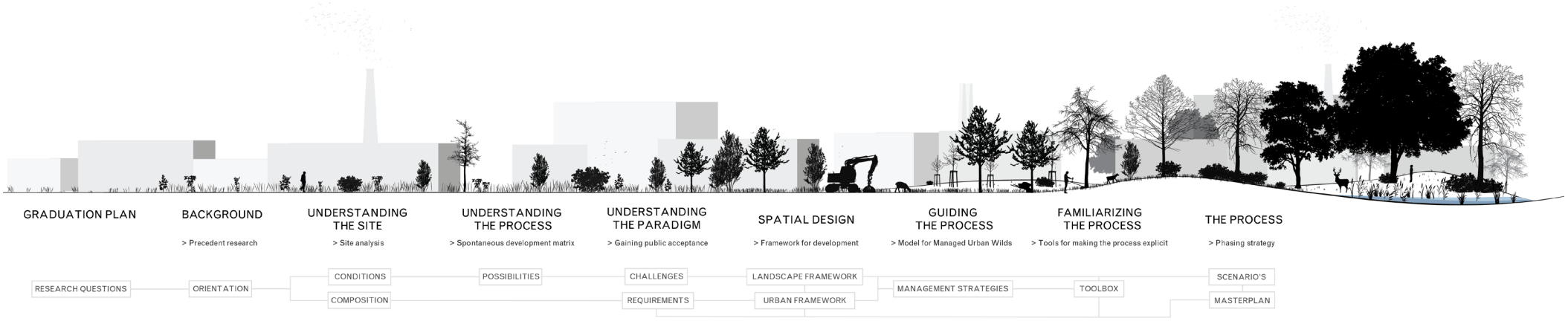
Precedent and reference studies
A study towards the spontaneous development of possible different forest types will set the baseline for the possibilities of the transformation. The site analysis will expose the current different conditions of the Schieoevers area that will determine the course of development of the different scenario's for feralization. The dynamics of each scenario are researched through ecologic succession and ruderal ecology theory.

This research will show how the site could develop over time through natural processes, and the requirements for cohesive vegetational classes and their successional stages. This should give an idea about how natural processes could be guided and stimulated. Also it will give insight on the difference between pre-settlement first nature and the expected fourth nature. Finally, for each type and succesional stage, the different spatial characteristics of the vegetation will be appointed, by which this becomes a design tool.

Then, an analysis will be made of what programme is needed for developing housing at Schieoevers. Going from industrial landscape to dwelling area will require interventions in infrastructure and spatial layout. These requirements will be met in the light of forest development in the design. The forest development is prioritized here, and this will be the main input for the urban plan.

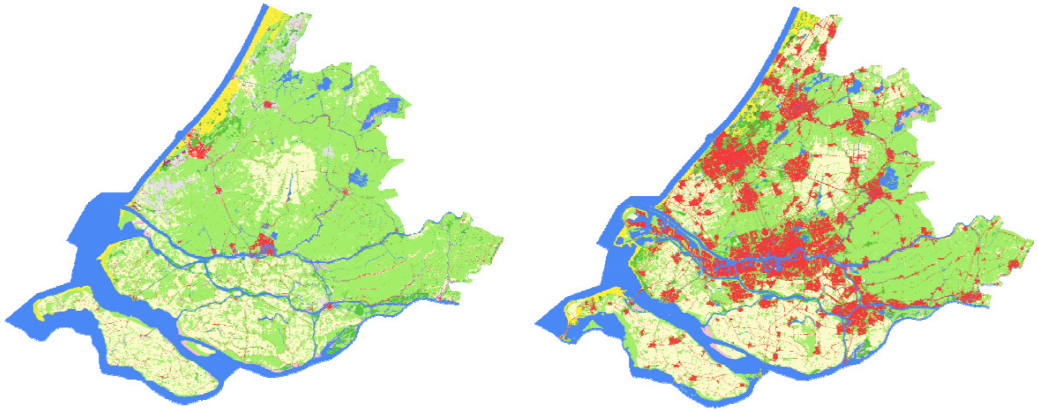
A strategic approach that adresses both the time-scale of forest development as well as the transformation of the urban plan should form the core of the answer to the main research question. This strategic approach is elaborated by design principles on the scale of Schieoevers and application to a part of the area on a smaller scale level.

The rest of the subquestions are answered in support of answering the main question over the course of the thesis.



1.4 Background

1.4.1. Urbanisation and habitat loss



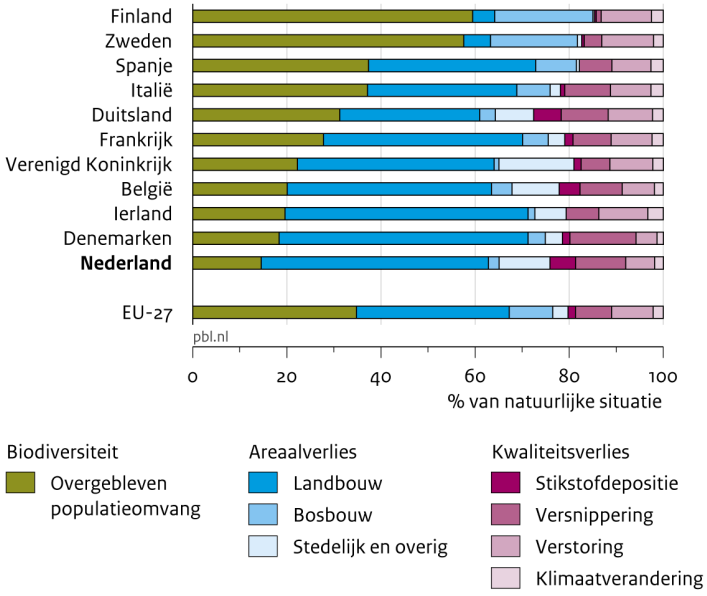
Urbanisation in South Holland over the last century

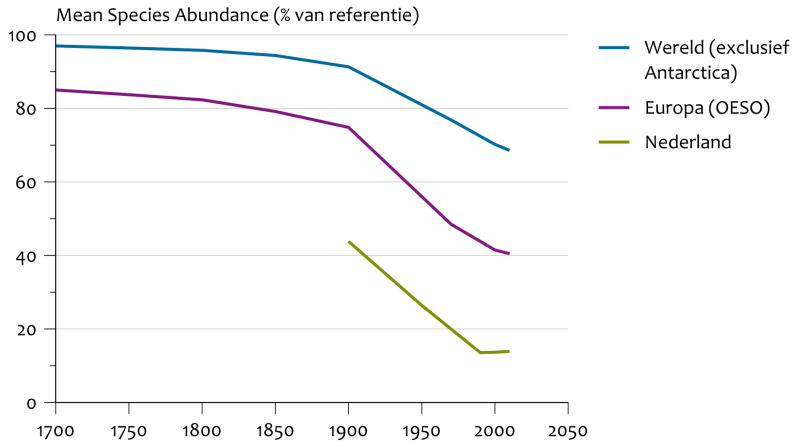
We live in an urbanizing world

In 1950, 30% of the people lived in the city. In 2018, this percentage had gone up to 55%, about 4 billion people. The prospect for 2050 is that 68% of people will live in the city. This counts up to 7 billion residents, of a predicted 10 billion total population. (CBS, 2019)

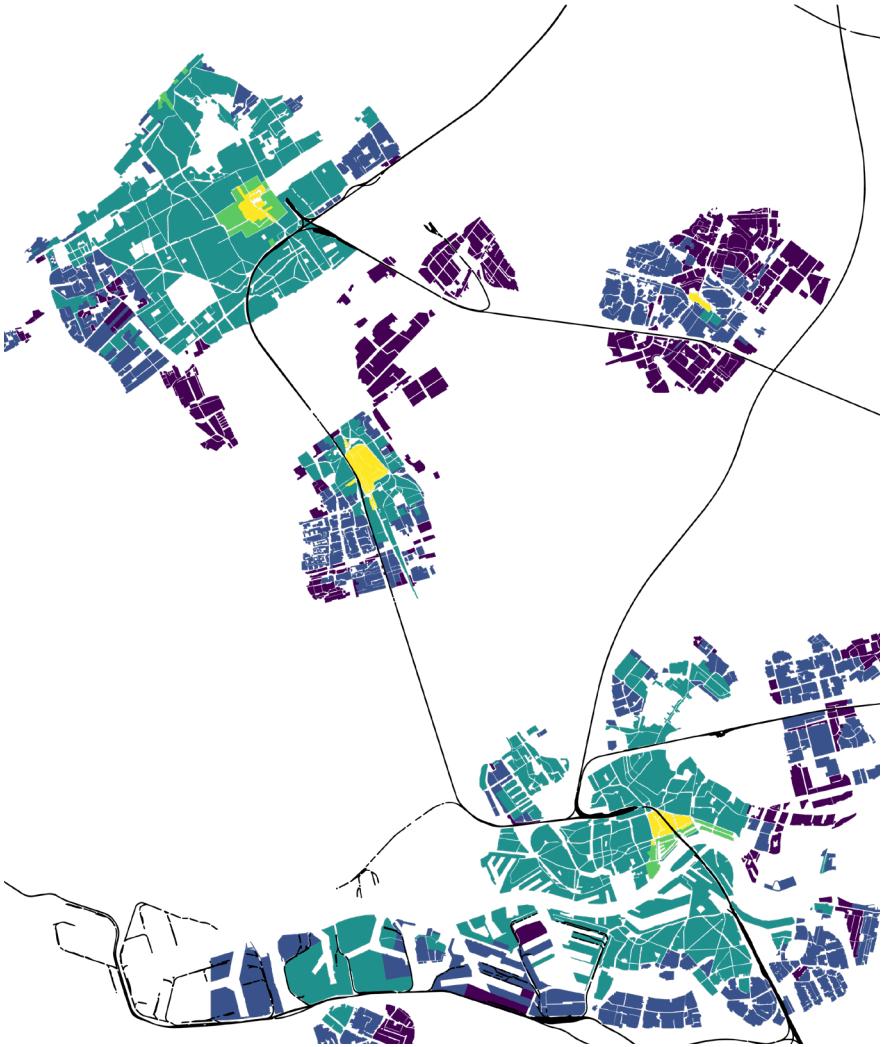
Living planet at risk

At the same time, we are witnessing a great decline in our planet's wildlife population size and diversity, a shocking 68% since 1970. Important factors in this decline are habitat loss due to urbanisation and agriculture. The Living Planet Index (remaining biodiversity as a percentage of the diversity before human interaction) is lowest in the most urbanized continents (Europe: 24% and North America: 33%) The disregard for the environment in the way we built our cities has pushed the natural world to it's limits.





Source: PBL, Globio



20th century urbanisation in South Holland (Source: Atlas van de Verstedelijking)

20th century urbanisation in South Holland (Source: Atlas van de Verstedelijking)

1.4.2 Climate and forestation goals

As a part of the strategy towards becoming climate-neutral in 2030, the Dutch government is planning to develop 37.000 ha of the land back to forest. This forest should help in storing carbon, increasing biodiversity and provide recreational space for the growing cities. The search area is usually far away from the city, in the agricultural landscape bordering existing forests.

> 2030: reduced carbon emission 49% irt 1990

> Search area reforestation

Rijk en provincies: 10% meer bos in Nederland

Nieuwsbericht | 04-02-2020 | 15:09

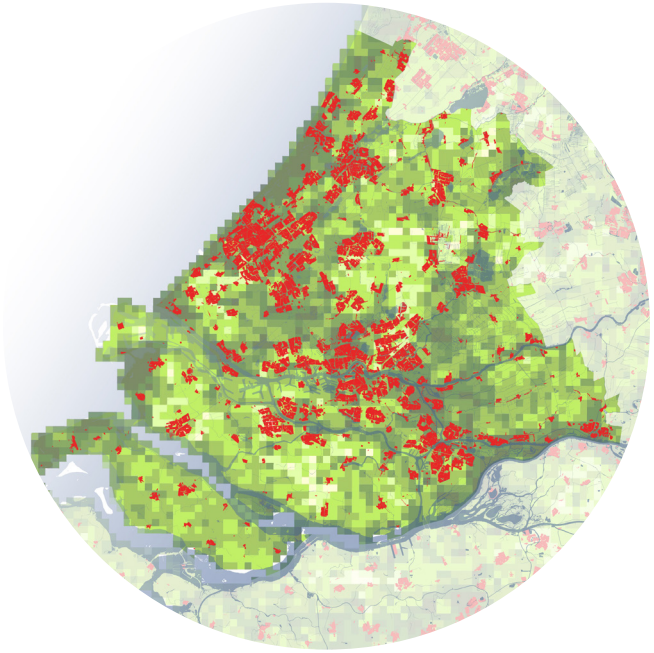
10% meer en gezonder bos in 2030 (ofwel 37.000 hectare, 2x de omvang van Apeldoorn), vervanging van gekapte bomen en meer bomen in woonwijken. Dat zijn de belangrijkste onderdelen van de vandaag gepresenteerde visie op de toekomst van het Nederlandse bos die minister Schouten van Landbouw, Natuur en Voedselkwaliteit (LNV) – mede namens de provincies – naar de Tweede Kamer heeft gestuurd. Medio 2020 volgt er een invulling van de benodigde stappen om deze visie in praktijk te brengen.

> 2030: 10% more forest (37.000 ha)

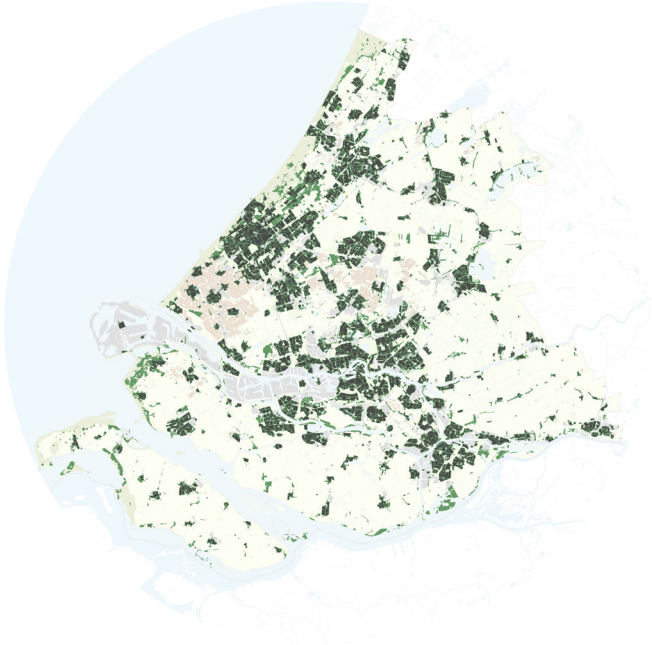
1.4.3 Urban Forestry

But when we look at the species richness of south holland, we can see that the pattern follows the urban fabric. The city is actually full of life, in terms of both planned and unplanned vegetation. Apart from that i think that the forest can have a lot to offer to the city, so why not search for potential forestation areas a little bit closer to the city? And if we are to create this much forest its important that we think about how we should do that and what we want it to look like.

Species richness



Species richness pattern follows urban fabric



Urban Forestry as the solution for reforestation?

PEOPLE AND NATURE

2.1 People and nature

In the 1990s a lot changed in Dutch politics with regard to nature policy. In 1992, the Habitats Directive (Habitatrichtlijn) was set up, a directive from the European Union that aims to contribute to safeguarding biodiversity by protecting habitats and species of European interest. (Ministry of Agriculture, Nature and Food Quality, 1992) The term Ecological Main Structure (Ecologische Hoofdstructuur) is also introduced. A network in the Netherlands that connects important nature reserves. A similar term is also being introduced from Europe: Natura 2000. It is striking that this policy for spatial planning is always based on a separation of city and nature. Minister Pronk's Fifth Policy Document on Spatial Planning (Vijfde Nota Ruimtelijke Orde) in 2001 confirms this idea, because it indicates the areas where most of the urbanization will take place in the Netherlands. It also indicates which areas are intended for nature and landscape. (Commission for Housing and Spatial Planning, 2001) Le Roy also notes this, and believes that his Eco-Cathedrals are becoming more important than ever. He writes a series of articles in which he criticizes this way of conducting policy and in which he argues for the fusion of man and nature. This creates a more pleasant living environment for people and more space for nature to manifest itself and to develop biodiversity.

In this chapter, the relationship between man and nature is researched. Researching how this relationship evolved over time, allows us to speculate on how this relationship can develop in the future.

The lack of nature-inclusivity in urban planning is due to the fact that the natural world does not have a seat at the planning table, and can therefore never fully be represented. Landscape architects often aim to represent the voice of nature, but since they work for a client, the planning approach often remains antropocentric.

Another obstacle in the way to nature-inclusive design is the phenomenon of Not In My Backyard (NIMBY), which is the predictable psychological resistance to changing pretty much anything. The irrational thought that the status quo or lack improvement is better than change. irrational and hostile reaction when ownership or local respect are perceived to be threatened, particularly by an outsider or competitor.[x] this phenomenon is estimated to cost 10 to 20 trillion dollar per year in potential progress worldwide. User participation in design process aims to reduce this resistance.

Finally there's the challenge of long-term thinking. Policy in spatial planning today is made for a maximum of 20-30 years. If politics change during that time, it is possible that natural areas are reprogrammed. If we want to include natural forest development, we'll have to start thinking in the time-scale of the forest, and make policy for longer stretches of time.

Representing the voiceless

2.2 Categorising Nature

In order to be able to design for nature in the urban context, it's important to understand the complexity of the relationship between people and nature.

In landscape architectural theory, many attempts to categorize this relationship have been made. These categorizations are often numerical, and aim to display how our relationship towards nature changes over time. In many of the theories, categories over nature overlap (See figure). Most theorists agree that the First Nature is nature untouched by man. This nature is a complex system of succesional cycles that are self-sustaining. Many would argue that this type of nature no longer exists on the face of the earth, since human influence has reached every far corner of the earth. (Geuze, A. 2010) All other types are a reflection of First Nature.

The moment we seperate from First Nature is the moment humans started to cultivate the land in order to practice agriculture. This is where domestication starts, where we start to create Second Nature. In the earliest cases, the cause for this domestication was necessity. Land was altered in order to produce food, so that the human population could survive.

The contrast between First and Second Nature is high. Where First Nature is cyclical, complex, dynamic and diverse, Second Nature is linear, simple, static and monotonous. Many theorists describe the transition to Third Nature as the point where we manipulate nature not out of necessity, but for our pleasure. The concept of the garden arose in the Middle Ages, and the commisioning of term Third Nature began during the Renaissance. The land was altered in a way that is aesthetic. In many cases the motivation was status. Man felt showing dominance over nature reflects power, and (requires maintenance)

During the industrial era, humans stray further from nature. They condense in cities, and build factories. The succesional ecosystems that came to be in urban industrial sites either due to a lack of maintenance, or on plots where industrial activities had ended, represented a type of nature that did not fit within the earlier notions of nature. The succession itself was not planned or maintained, and the colonizing plants are those of the First Nature, however the development of this nature is dependant on conditions shaped by man. And thus a new category is born: Fourth Nature. There's many similarities between First and Fourth Nature. The introduction of Fourth Nature sparks hope for a pathway away from domestication.

Cultural ecologist Hofmeister states "Wild 'natures' are far more rich, surprising, and shrewd than the dominated, controlled, calculated and miscalculated nature of our past." (Hofmeister, 2009)

"The question becomes wether these spaces can be designed to increase their cultural and economic benefits, without compromising their ecological value. " (Desimini, 2013)

Natures Enumerated, (Desimini, J. ,2013)

First Nature *Source: Far Out*

First Nature is nature untouched by human influence. This nature is a complex system of succesional cycles that are self-regulating. Many would argue that this type of nature no longer exists since human influence has reached every far corner of the earth.

According to Desimini all other types of nature are a reflection of First Nature.

> Uninfluenced by man

> Self-sustaining successional cycles

> Cyclical, complex, dynamic and diverse

Second Nature *Source: Hugova*

Where we seperate from this First Nature is when we start to cultivate land for production. The cause for this domestication was necessity. Land was altered in order to produce food, so that the human population could survive.

In contrast to first nature, second nature is linear and static, and is dependant on our intervention to be regulated.

> Start of domestication

> Out of necessity

> Focus on growth

> Linear, simple, static

Third Nature *Source: UK National Trust*

Many theorists describe the transition to Third Nature as the point where we manipulate nature not out of necessity, but for our pleasure.
The land is altered in a way that is aesthetic, but natural processes do not occur, because its maintained to a fixed image.

> Start of landscape culture

> Manipulating no longer out of *necessity*, but out for our *pleasure*

> Maintaining a fixed image

> Aesthetics, status

Fourth Nature

Fourth nature is defined as spontaneous development on a site of which the *conditions* are altered by man (or woman), but in its development it is not disturbed. The altered conditions set out a different successional course compared to the successional stages that would have occured in the natural landscape.

> *Conditions* are altered by man

> No human intervention in the process of forest development

> Different vegetation/processes compared to the natural landscape

Fifth Nature *Source: Valkenburgh Associates*

Fifth nature is described as fourth nature, which is managed in order to increase cultural and economic benefit, without compromising the ecological value

> Managed Urban Woodland

> Intervention in the successional development of fourth nature on industrial sites

> In order to increase cultural and economic benefits, without compromising the ecological value

Sixth Nature *Source: Kengo Kuma & Associates*

Sixth nature is the Managed successional progression of feral nature in industrial sites, combined with new programme, resulting in a Ecological-cultural hybrid.

> Managed successional progression of feral nature in industrial sites, combined with new programme

> Ecological-cultural hybrid

2.3 The midfield between control and letting go

As we're moving towards nature-inclusive design strategies, the natural world seems to be adapting to our urban areas too. For example, birds in more heavily populated urban areas are much more tolerant of humans than birds in rural areas. (Samia et. al., 2015) Or the dandelion, Taraxacum officinale, of which of a population has evolved to be more succesfull in growing and spreading in the urban climate. (Arathi et. al., 2012)

This implies that it might be possible for our several interests to ultimately intersect. If we shift our attention to the natural world and start moving towards a multispecies built environment while simoultaneously the natural world adapts to the man-made environment, we may be able to reach a point of mutualistic co-existion.

When we explore the possibilities of integrating natural processes and urban development, it is crucial to address the time-scale. Natural processes occur in a wide range of periods, from the yearly seasonal changes to the successional cycle that can take up to hundreds of years to come full circle.

Ideas of guiding the natural processes are elaborated by Julian Raxworthy in *Overgrown*. There he states that the field of landscape architecture has strayed from gardening over the years, and underlines the loss that disconnection caused. In gardening, the garden is treated as a process, for the main concern is *growth*. Gardeners are much more connected to nature as they witness this growth first hand, and can intervene in real time. Landscape architects on the other hand, try to imagine the future state of the landscape before anything is even built. And eventually they carry out their vision to others to be built and maintained by others, only hoping that it will be carried out as they envisioned. (Raxworthy, 2019)

Growth is not the only aspect of natural processes that should be emphasized in our natural environment. By cutting down ill trees and removing dead plant material, we deny the process of decay. in order to reconnect to nature and reflect an honest image of it's dynamics, we should reconsider allowing decay to occur in our natural environment.

The idea of feralizing nature resonate with Raxworthy's idea of the *viridic*. The viridic is the landscape architectural equivalent to tectonic in architecture. This theory is largely influenced by Frampton's *Studies in Tectonic Culture*, which "seeks to mediate and enrich the priority given to space by a reconsideration of the constructional and structural modes by which, of necessity, it has to be achieved." Tectonic architecture, allows insight in how it's made and how it functions, by revealing parts of the construction. (Frampton, 1995) Percieving plants as the construction material of landscape, Raxworthy's *viridic* opts for a similar approach, in order to attach meaning to landscape architectural design we are to reveal the natural processes that shape the landscape. It underlines that the only way of dealing with growth is *maintenance*, and states that this should be an important aspect of the design. For example, the simple act of pruning will affect the spatial perception of a tree and the space that surrounds the tree. When executed correctly, we can guide the tree towards a branch configuration that is more ideal for the structural integrity of the tree. Also it gives a 'cue for care', a sign of human interference, which often has a reassuring or comforting effect on people. (Kaplan & Kaplan, 2012) Through maintenance, we can either *fixate* a certain image that is to our liking or *guide* natural processes in a way that is beneficial for both the natural world and life in the city.

2.4 Messy Ecosystems, Orderly frames

An interesting approach is raised by Nassauer in *Messy Ecosystems, Orderly Frames*, which states that in order to infiltrate ecological notions into the urban fabric, we have to translate ecological patterns to cultural language. In other words, how do we place these unfamiliar forms into familiar packages? She poses Cues for Care, small signs of human intervention that have a reassuring effect on people as a familiar package. (Nassauer, 1995) Accordingly, through design we can raise awareness to the dynamics of natural process and strengthen our connection to nature.

Care					
Neatness		Stewardship		Naturalness	
Attractive	Unattractive	Attractive	Unattractive	Attractive	Unattractive
Apparent yard care	*Dead or rotten*	*Good conservation*	*Poor conservation*	*Apparent naturalness*	*Too formal*
Fences	Dead or rotten	Conservation	All planted to corn	Development blends in	Too formal
Flowers or shrubs	*Lack of yard care*	Contour plowing	Effluent from feedlots—poor water quality	Habitat	Too much concrete
Home	No flowers	No erosion	Erodible land plowed	Native vegetation	Too open
Landscaped	No shade	Pasture	No conservation practices being used	Natural	Bare
Lawn ornaments or architectural details	Not landscaped	Stripcropping	Pastures are overgrazed	Trees	Flat
Trees in rows	Not mown	Terraces	Plowing up the hills	Wildlife	Monotonous
Big yard	*Messy*	Windbreak	Runoff		No trees
Big yard	Cluttered		Slimy looking water		
Clean and neat	Construction going on				
Clean	Junk				
Neat	Messy				
No junk	*Poor care*				
Put away	Abandoned				
Good care	Neglected				
Cared for	No house on a farmstead site				
Maintained	*Weedy*				
Well kept	Weedy				
Mown					
Mown					
New					
New					
No weeds					
No weeds					
White					

Cues for care as defined by Nassauer

THE POST-INDUSTRIAL LANDSCAPE OF SCHIEOEVERS

Because a Landscape Architectural design should always be building on the existing layers of the landscape, the development of post-industrial terrain should always be custom to it's context. What does this site demand? In order to find the identity of the area and make a place-specific design for the development of an Urban Forest, a Landscape architectural analysis is performed. The 'layer approach' method is used to unravel the landscape's patterns and systems which are a result of these interacting layers:

> Natural layer
    Biotic/Abiotic systems
    Water system
> Network layer
    Infrastructure
    Green structure
> Occupational layer
    Urban structure

In this theory, the underlying layer set the conditions for the layer above. This means that when all layers and their interaction are unravelled, the conditions for future development should become clear. (Hagens, 2006)

3.1 Site introduction

The case-study location for this research is Schieoevers, a former industrial area in South Holland that is subject to housing development in the coming decades.

3.2 The Natural Layer

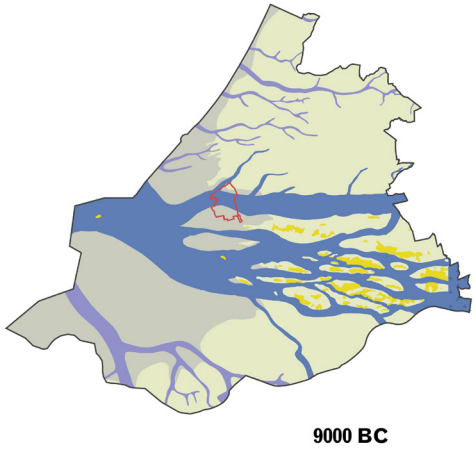
Holocene genesis of the natural landscape

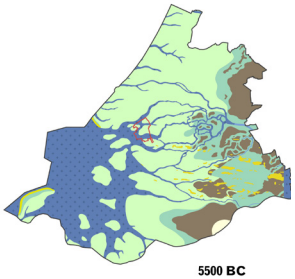
9000 B.C. (Atlanticum)

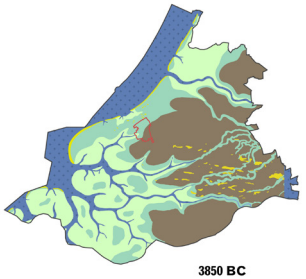
After the Weichselien, the latest ice-age, temperature rises, melting the ice-sheets and causing a 120 meter rise in sealevel to 20 meters below the current level. South-Holland is covered by a layer of sand from the Pleistocene era, reaching the approximate height of 16m below the current sealevel. Rivers created by the melting Scandinavic glacier exit the Netherlands through South-Holland, creating riverplains and riverdunes. The sea reaches far into the riverplains.

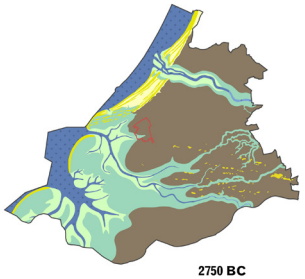
5500 B.C. - 500 B.C. (Boreal)

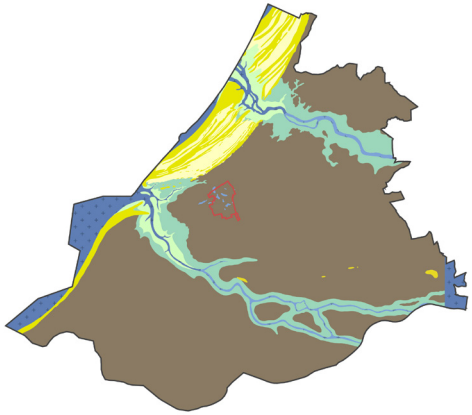
The amount of water flowing through South-Holland is reduced, resulting in more deposition of sand along the current coastline. This results in a decline in influence of the sea, and the salty lagoon water turns sweet, stimulating peat growth.

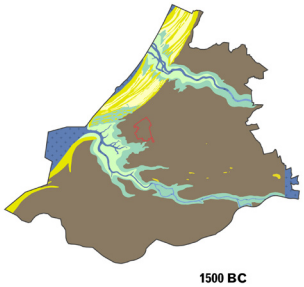


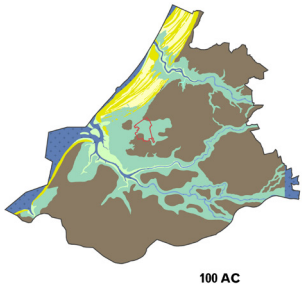


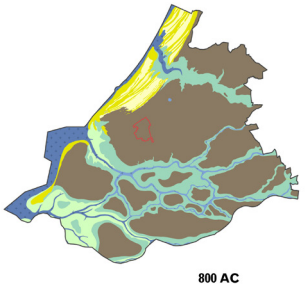


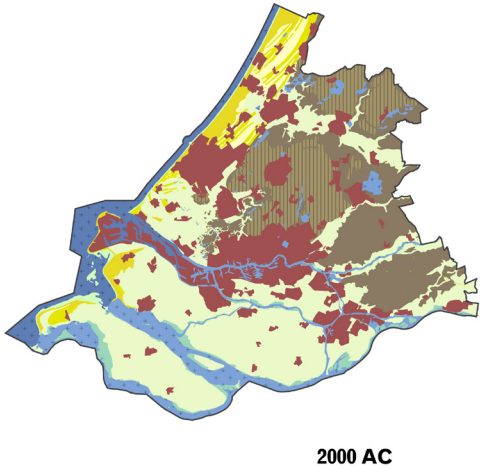


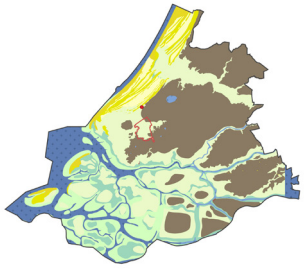








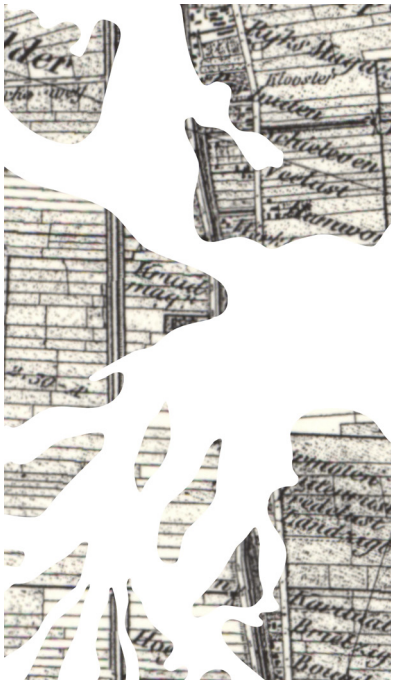




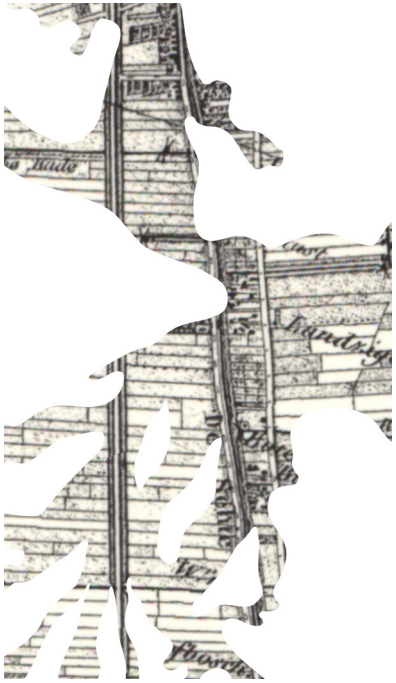
Sub-atalanticum 500 B.C. - Human settlement

The coast starts to break down as a result of a stable sealevel and a higher storm frequency. This widens the outfalls of the river, which again raised the influence of the sea. As a result, the peatmeadows are drained, causing erosion of the peat. Trenches cut through the peatmeadow, depositing sandy parths. Further away from the trenches is the deposition of clay.

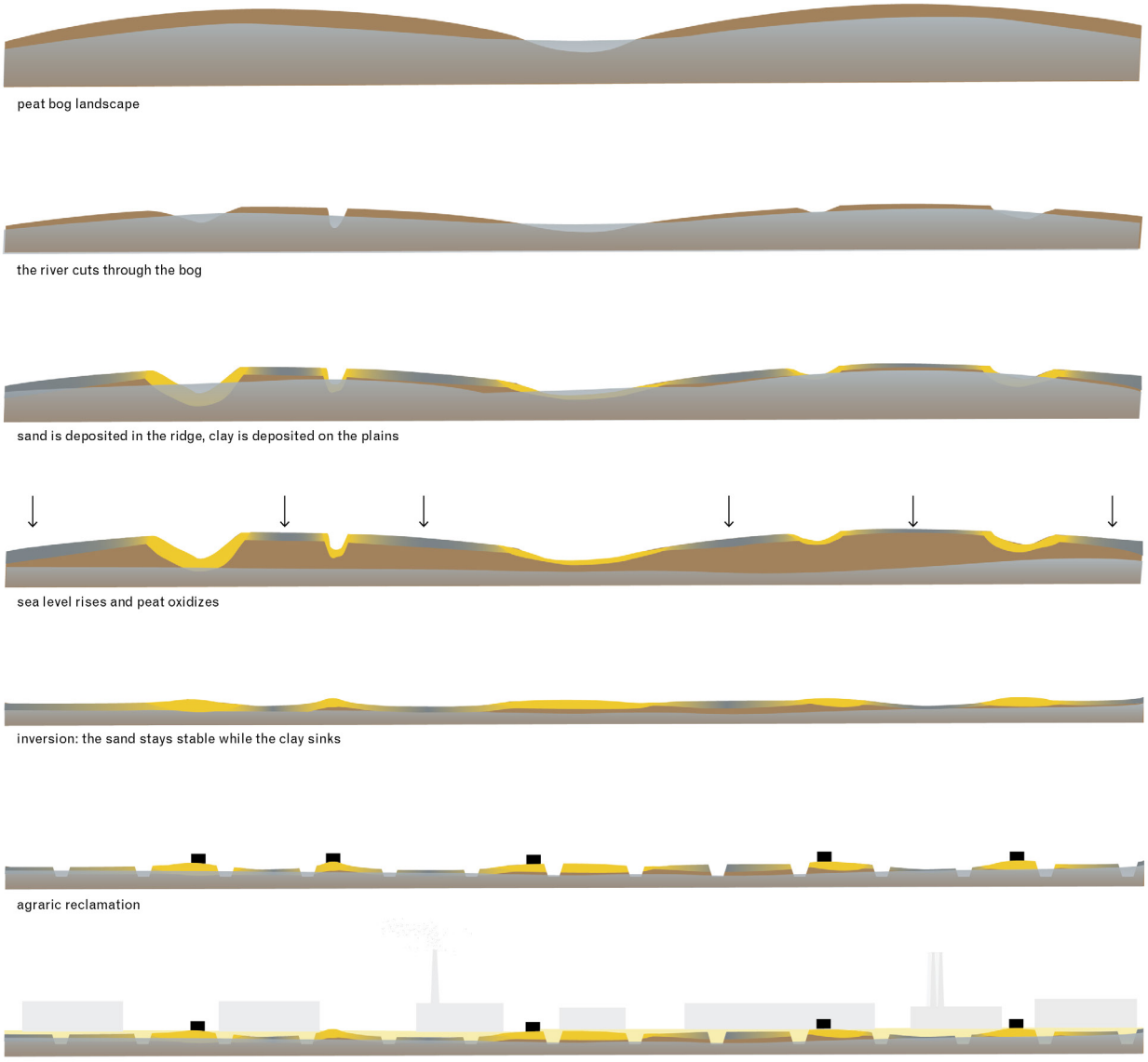
Then, inversion happens. As the peat oxidizes, the groundlevel lowers the clayish plains. The trenches however, are stable because of the sand and the lack of peat underneath. As a result the trenches remain as a slight elevation in the area. These trenches later became interesting for settlements because they were more dry than its surroundings.



Claybed polders
Smaller plots, more ditches

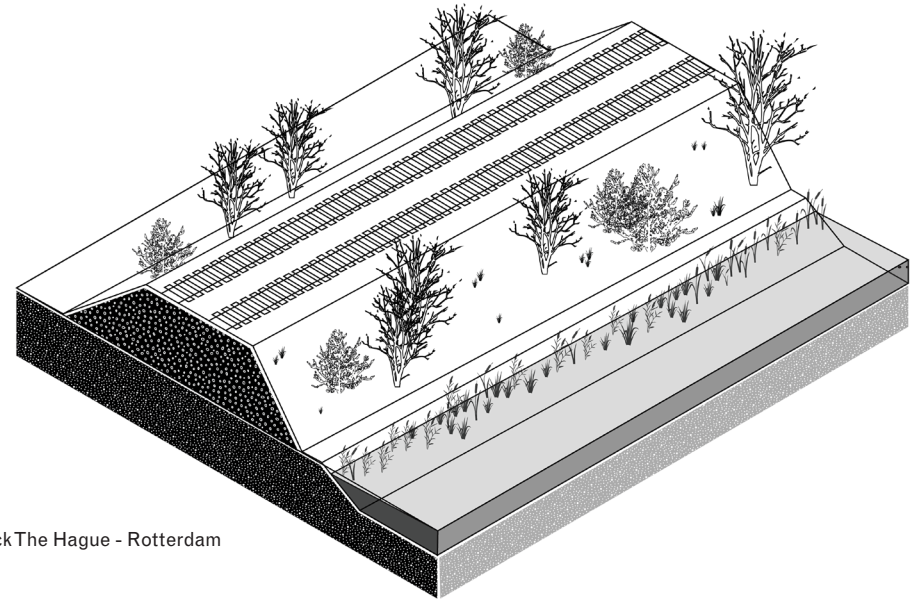


Sandridge polders
Larger plots, less ditches



3.3 The Network Layer

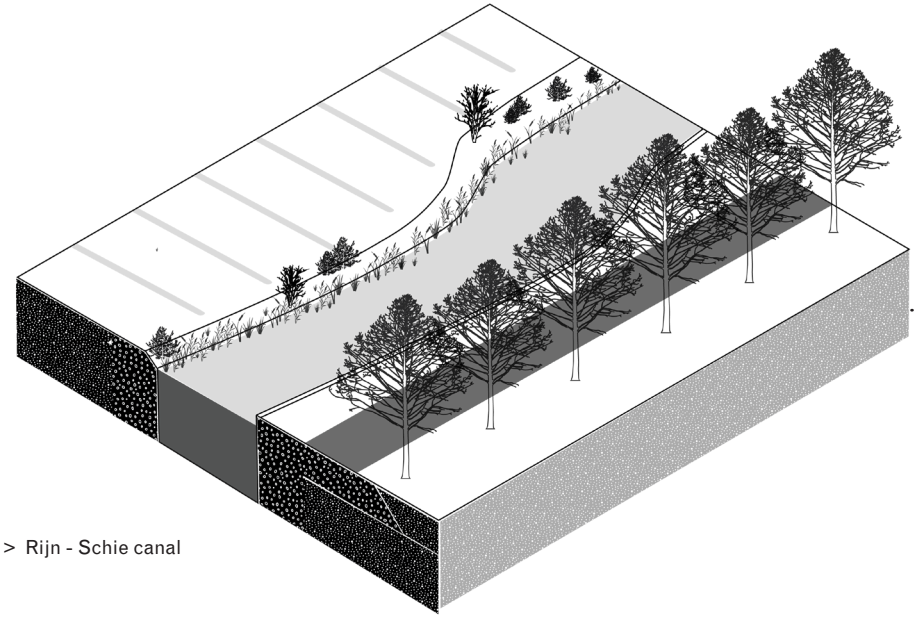
3.3.1 Green Structure



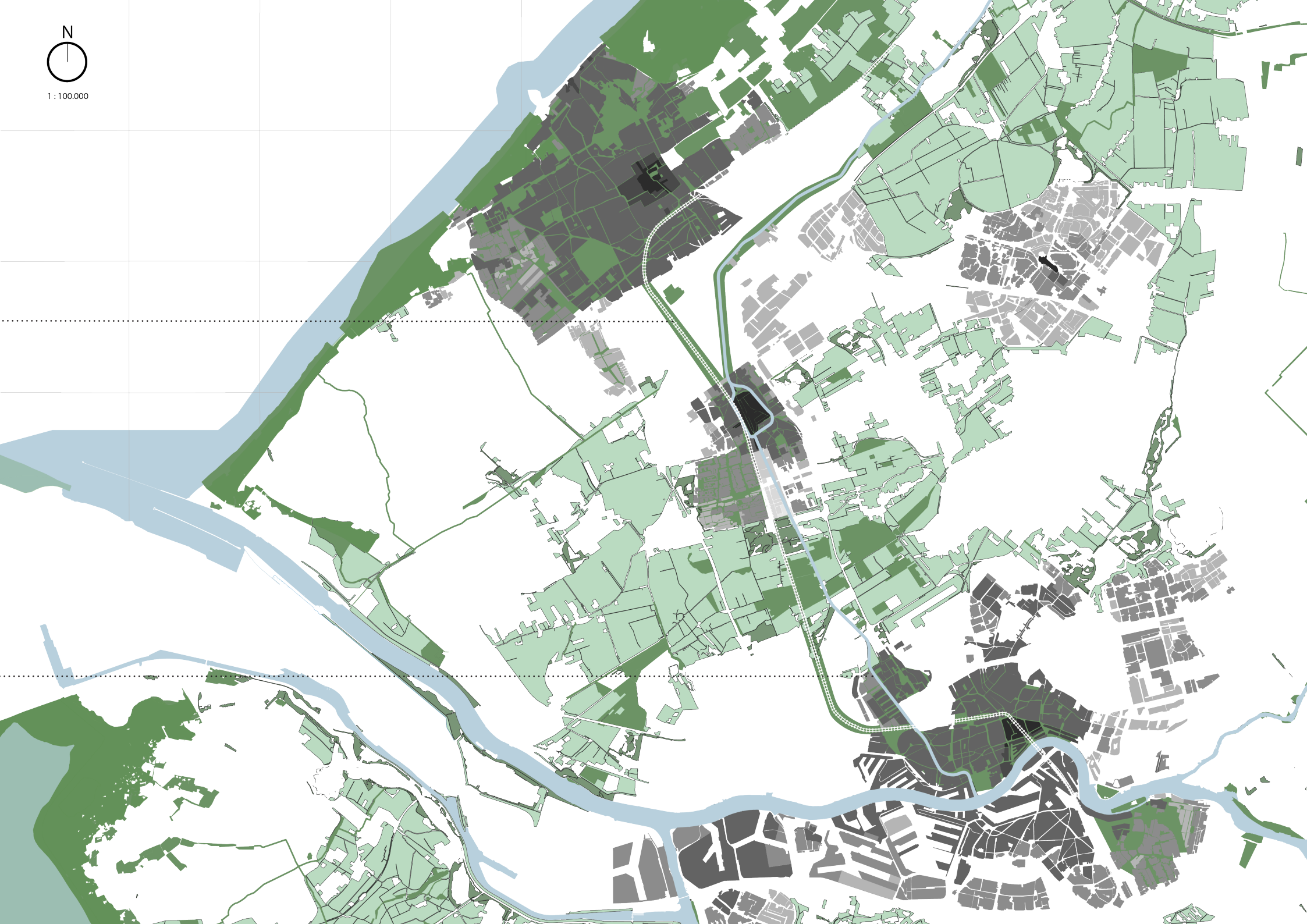
> Train track The Hague - Rotterdam

For the most part, the train track is elevated with a layer of sand, same as most cities on this side of the country, resulting in vegetation on the slopes that is similar to the fourth nature found on the Schieoevers site.

The Schie canal itself however, flows through wet peatmeadows and former floodplains. Vegetation along the sides is more typical for this landscape.

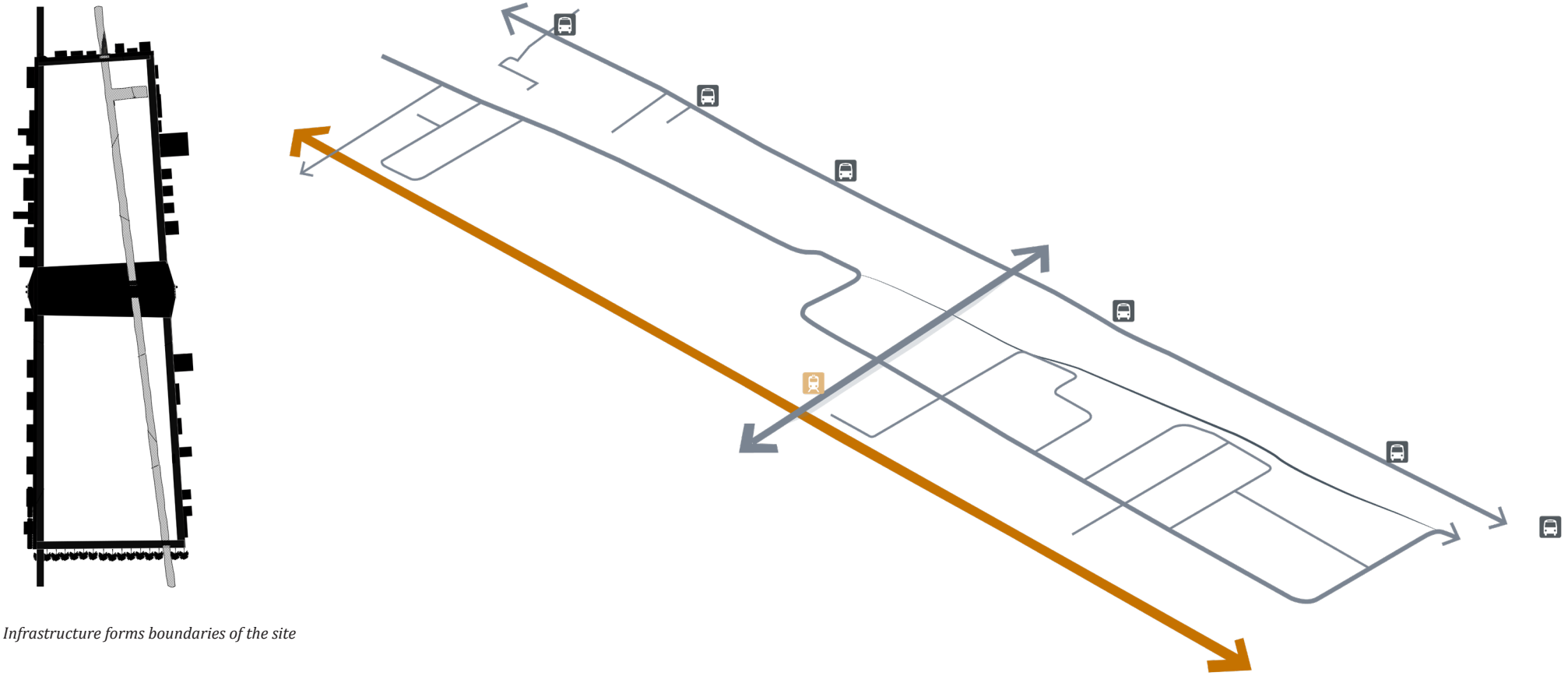


> Rijn - Schie canal


N
1 : 100.000

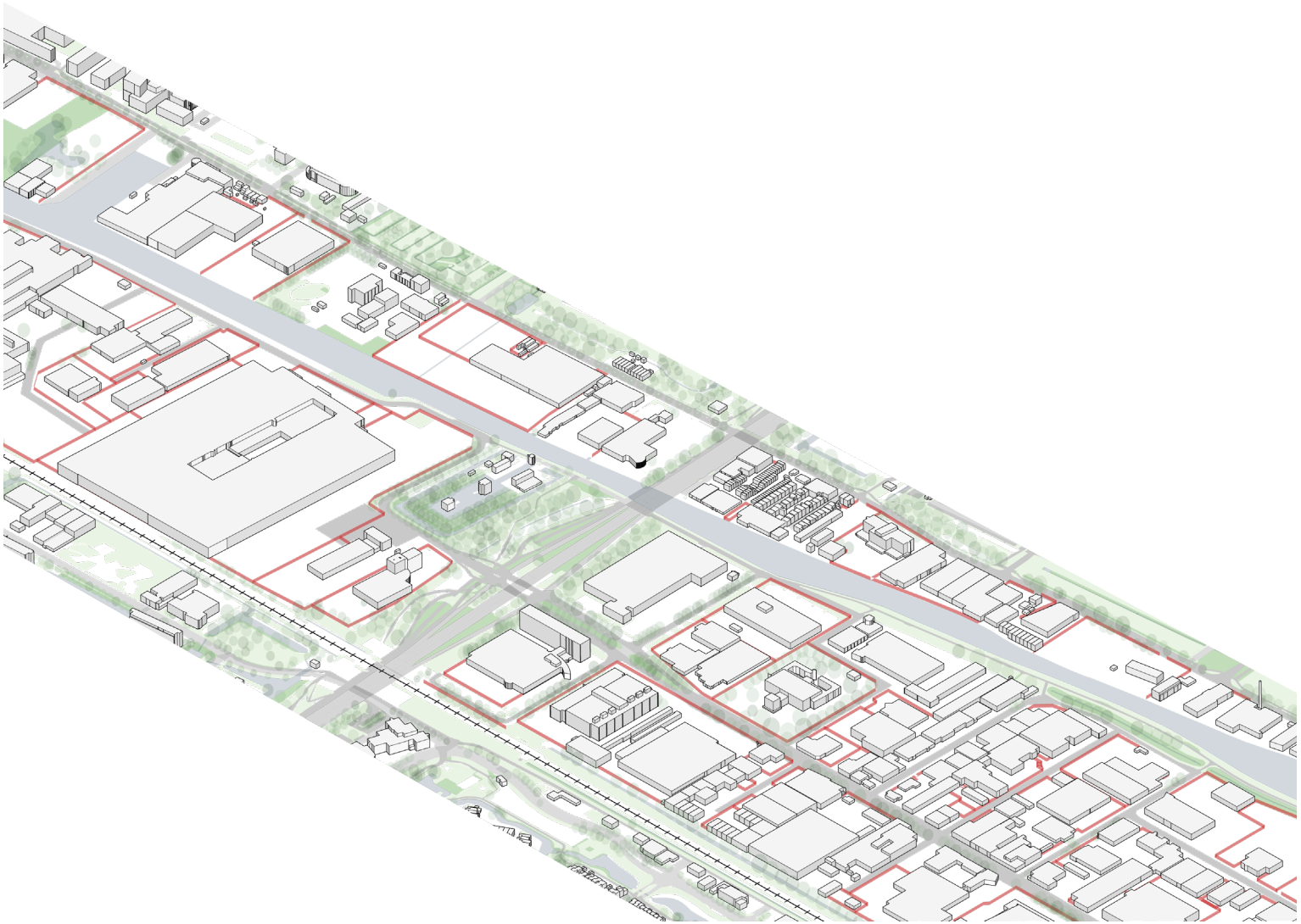
3.3.2 Infrastructure

The infrastructure is set up for efficient transport of goods. One main car road passes the larger plots on the north side on the front, shifting west on the south side, moving inbetween smaller plots. The train track on the west side forms a physical boundary with the surrounding neighbourhoods, and the Schie canal forms a boundary within. Crossing through the middle is the N470 that forms the boundary between the north and the south part. In terms of mobility and connecting to the surrounding neighbourhoods there's room for improvement.



Infrastructure forms boundaries of the site

3.3.3 Fencescape



Keep out!

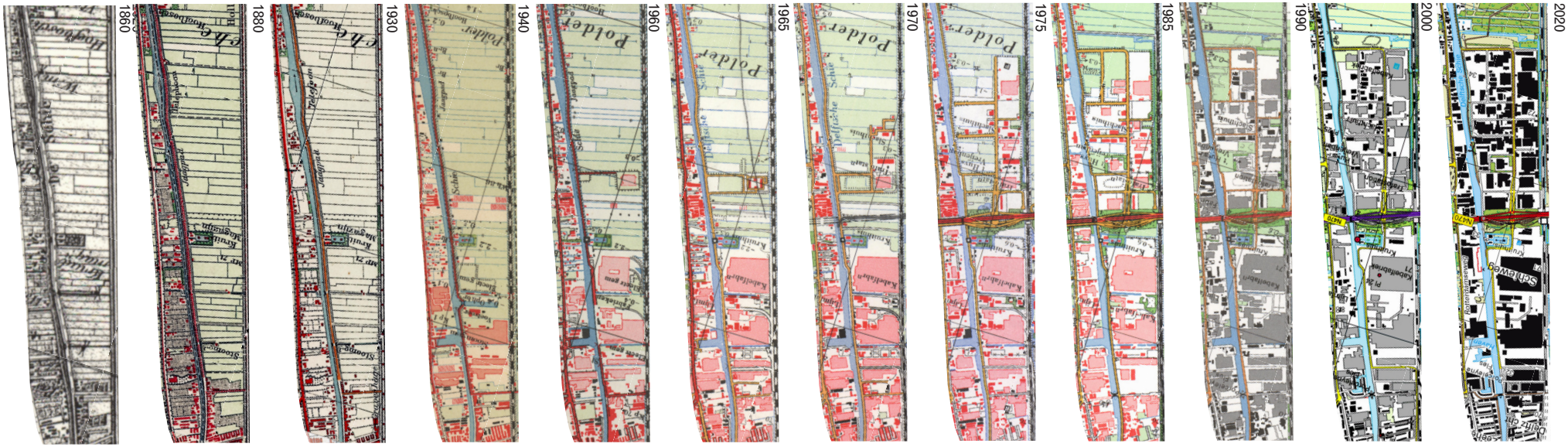
The fences cloud everything that can be seen on eyelevel and below.. This has a daunting effect on people, for it's a statement that you are not welcome on this terrain.

Follow the lines

The space along these fences is rarely used or maintained. As a result, often spontaneous vegetation is found along these lines, softening down the harshness that these fences emit.

3.4 Occupational Layer

3.4.1 Land Use Development



Agraric period

In 1654 the gunpowder storage ‘Kruythuis’ is built here along the Schie-canal, after the first one exploded in the city centre. The new building is ‘just a canon ball’ away from the city.

Until the 20th century, most parcels are used for agraric purposes. On the north-eastern part there’s gardens and orchards. The floodplain of the former river deposited clay here, resulting in very fertile soil.

Early industrial period

Industrial relics like brick chimneys and warehouses from this time period are much more appreciated then the steel warehouses from the late-industrial plots.

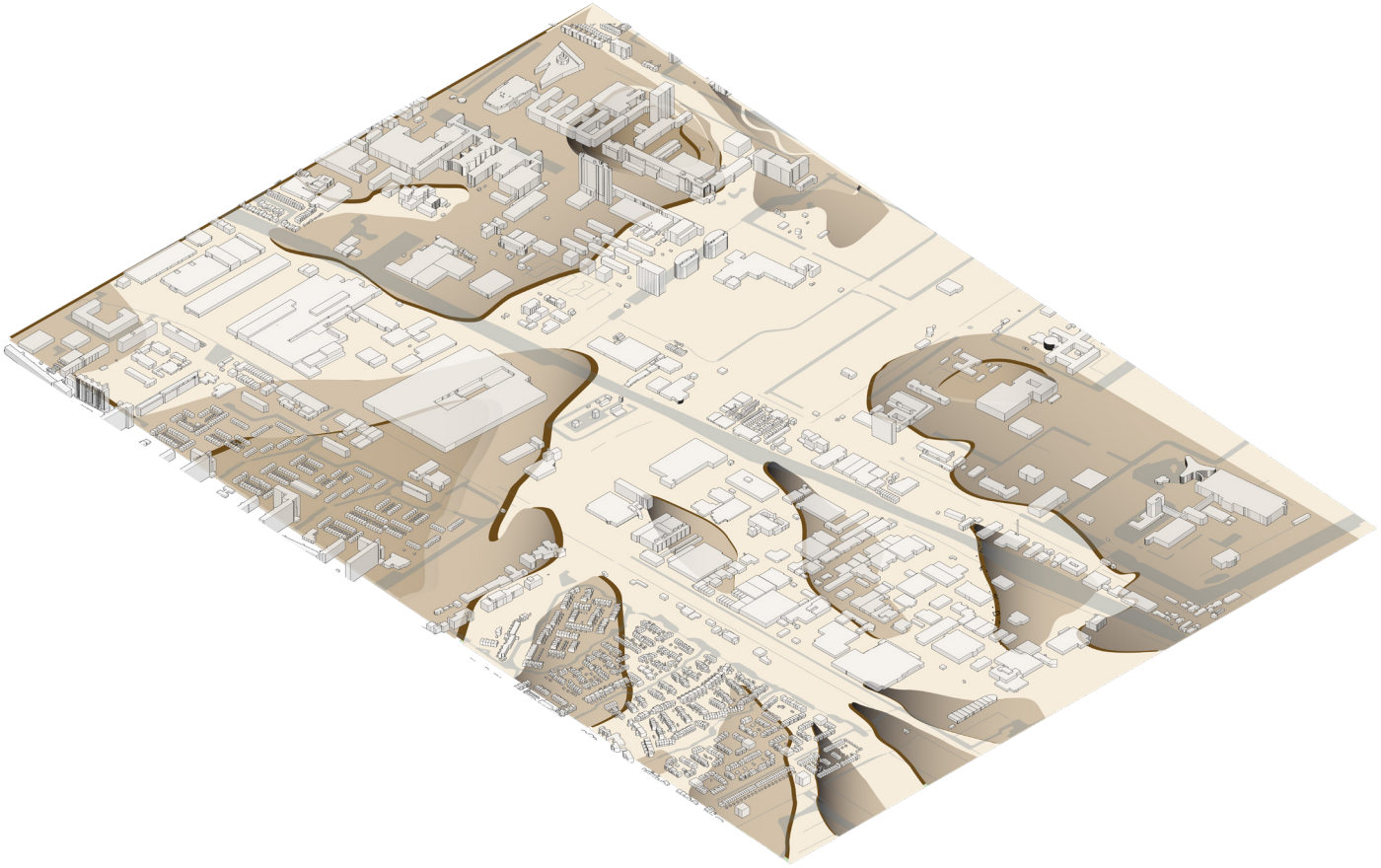
Late industrial period

Smaller scale development on the south side and in the voids on the north side - resulting in diverse pallette of plot sizes

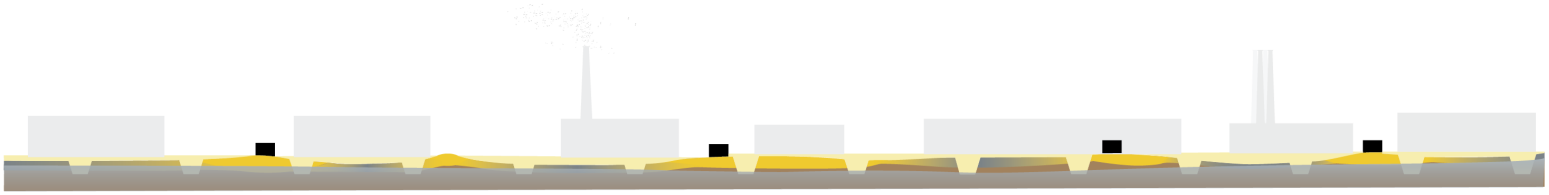
Modernisation

> Industrial decrease
> Fourth Nature development in urban voids
> Cultural renewal (Lijm & cultuur)
> Industrial downscaling (Kabelfabriek)
> Influence TU Campus
> Station Delft Zuid

During industrialisation, the clay soil of the former river landscape is elevated with roughly one meter of sand. This makes provides a more stable soil for building, but the landscape loses its natural elevation differences. Underneath this layer, the natural landscape remains.



agraric reclamation

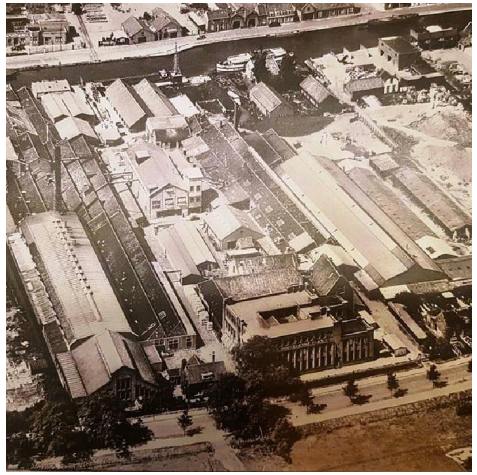


industrial development

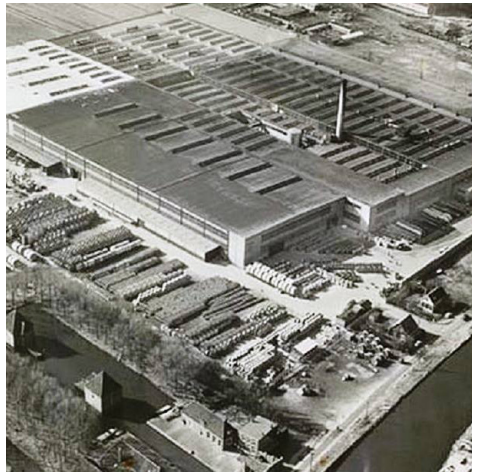
3.4.2 Monumental buildings

The buildings from the early industrial period seem to be much more appreciated then the ones that followed in the late industrial period. In this period there was more focus on aesthetics and detailing. Some of the older buildings later received the monumental status. It is important to preserve those in the design for their cultural value.

Kruythuis, Schieweg



De Porceleyne Fles, Rotterdamseweg

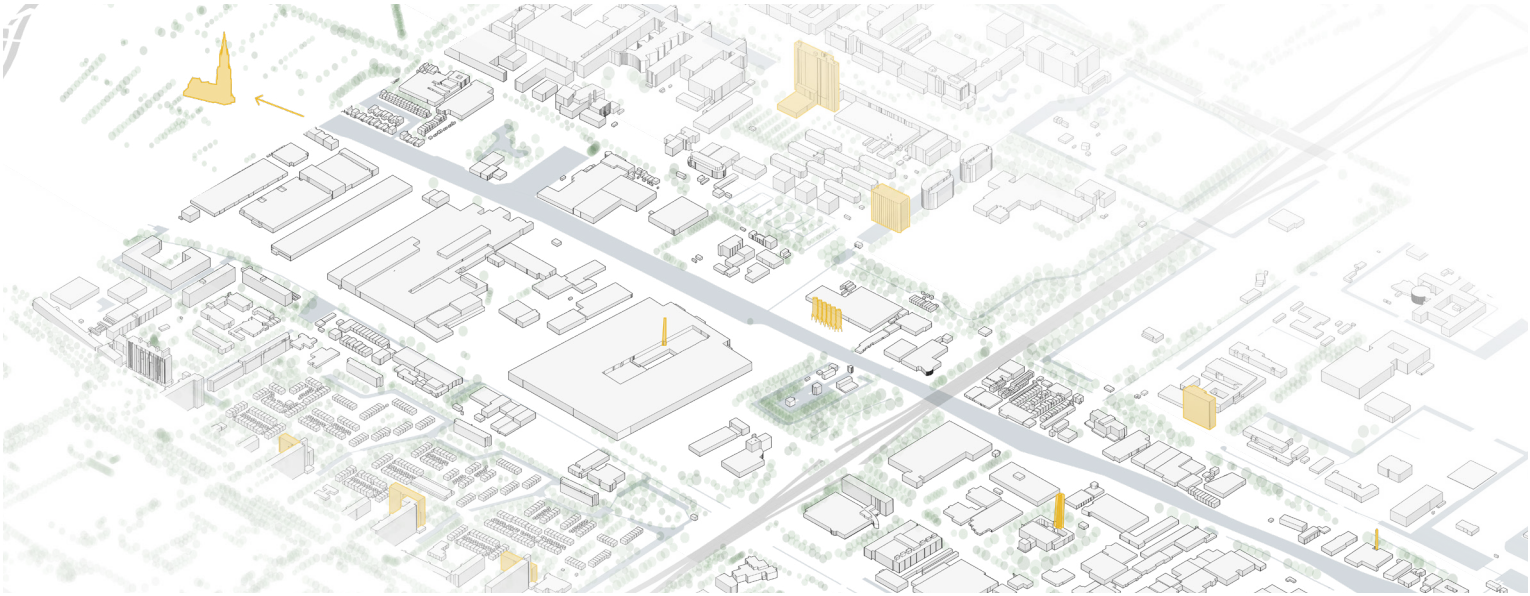


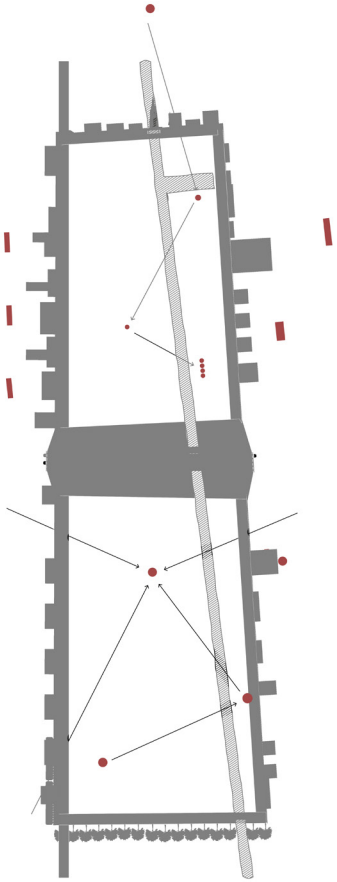
Cable factory, Schieweg

Cable factory HQ, Schieweg

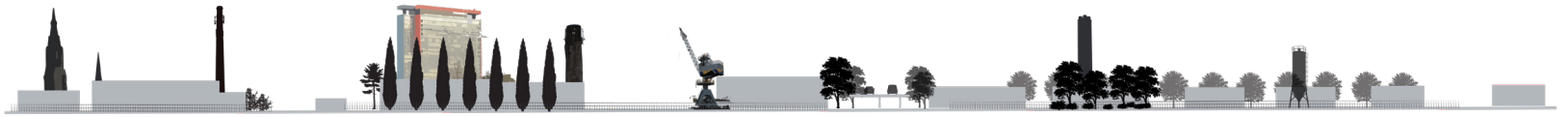
3.4.3 Industrial landmarks

Characterizing for the Schieoevers is the skyline filled with industrial eyecatchers. These impressive machines, storage units and chimneys can be seen as the follies of the industrial landscape, they tell the story of the industrial era, and that's why they should be preserved and integrated in the design.





Visual relation between landmarks



Chimney power plant

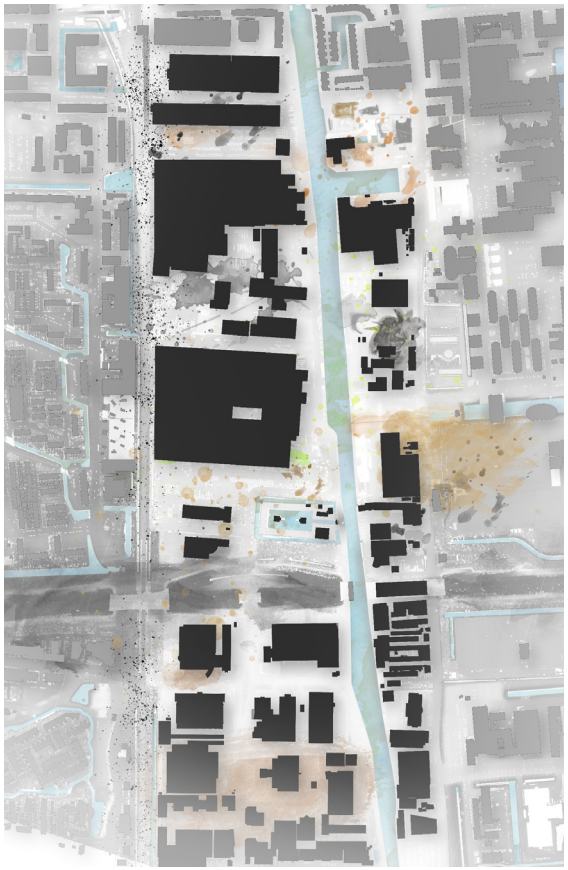
Chimney Rotterdamseweg

Chimney Kabelfabriek

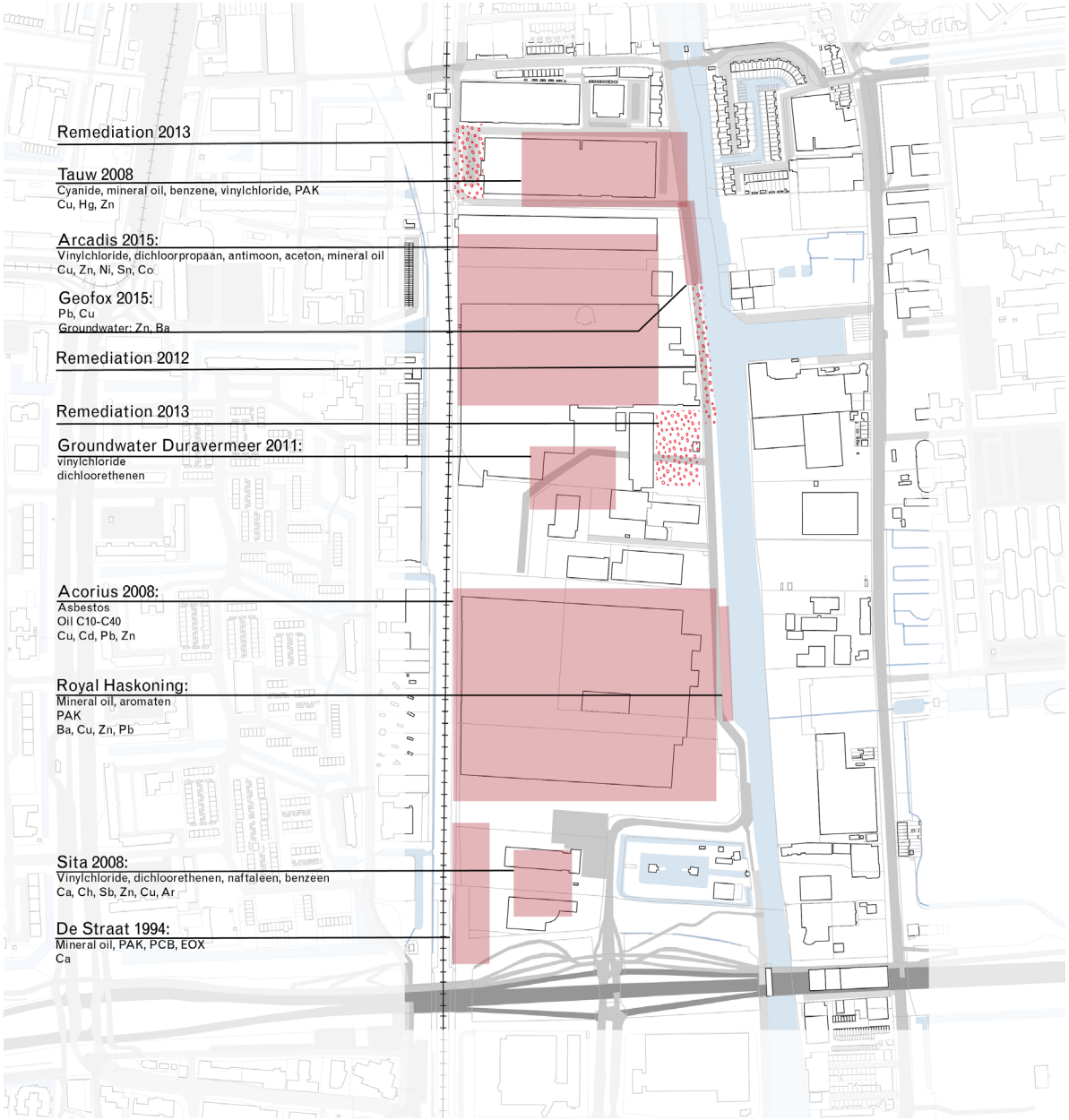
Crane BMN

3.4.4 Pollution

A big obstacle on the path creating a healthy living environment is the heavily polluted subsoil as a result of the industrial activities of the past. Industrial use of the Schieoevers area has altered the soil conditions. Depending on the type of industry that took place, different depositions of metal, oils and chemicals are found in the soil.



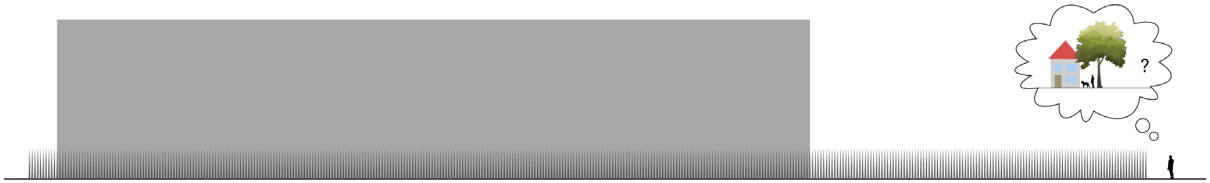
Artistic impression of soil pollution



Current (known) state of pollution of the north-west corner of Schieoevers based on municipal records

3.4.5 (Un)desirable space

Schieoevers is not built for people, let alone for nature. It is built around efficient logistics and maximizing economic profits. Spatially, this results in a grey, monotonous area with large open spaces surrounded by fences. It feels out of proportion, the human scale is lacking. Reforestation can play a part in bringing back this human scale by downsizing these spaces and masses and changing the materiality from cold steel and concrete to vibrant vegetation, that provides a softness in a hard landscape



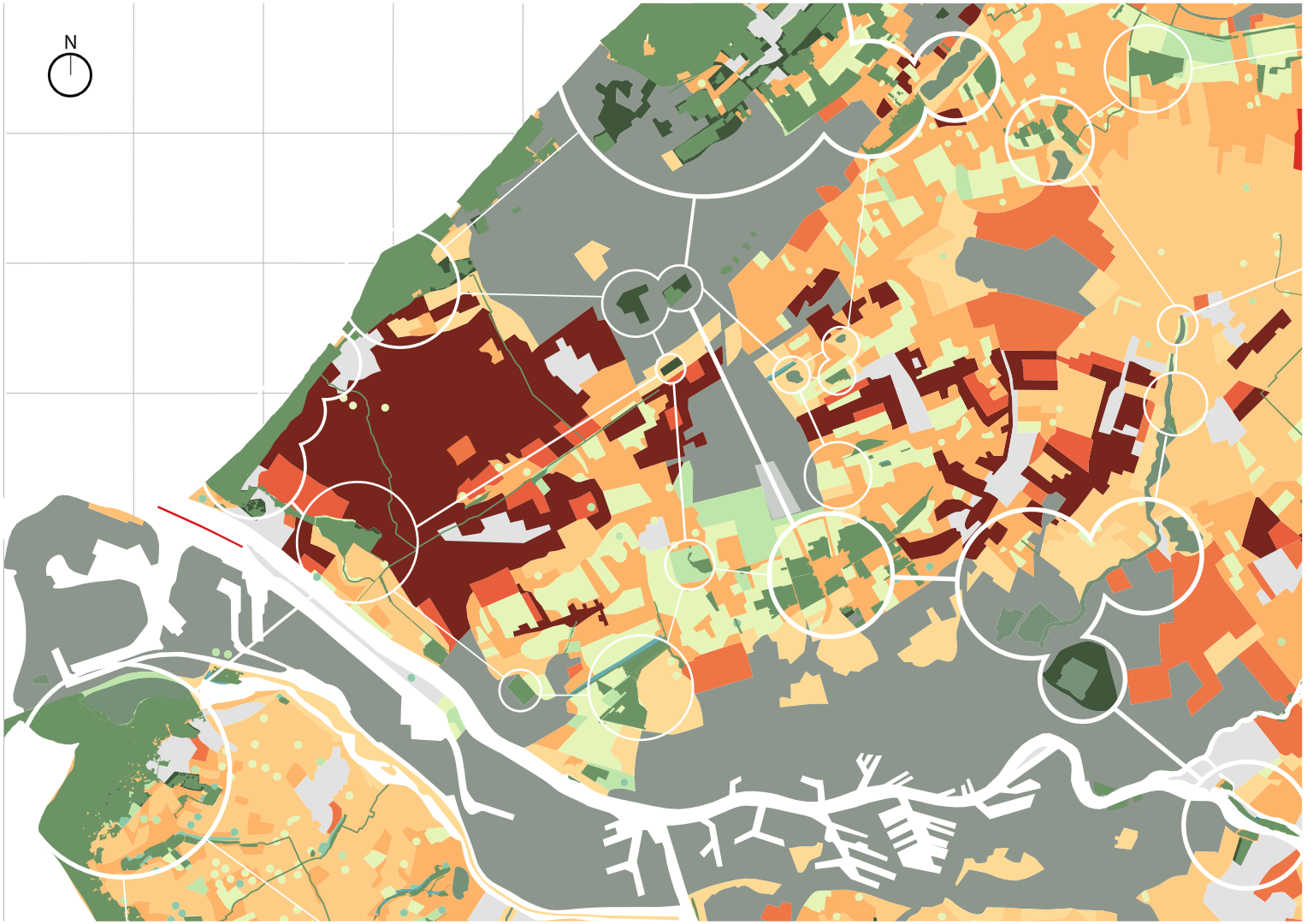
(Industrial) landmarks in a box landscape

DESIGNING AN URBAN FOREST

4.1 Regional vision

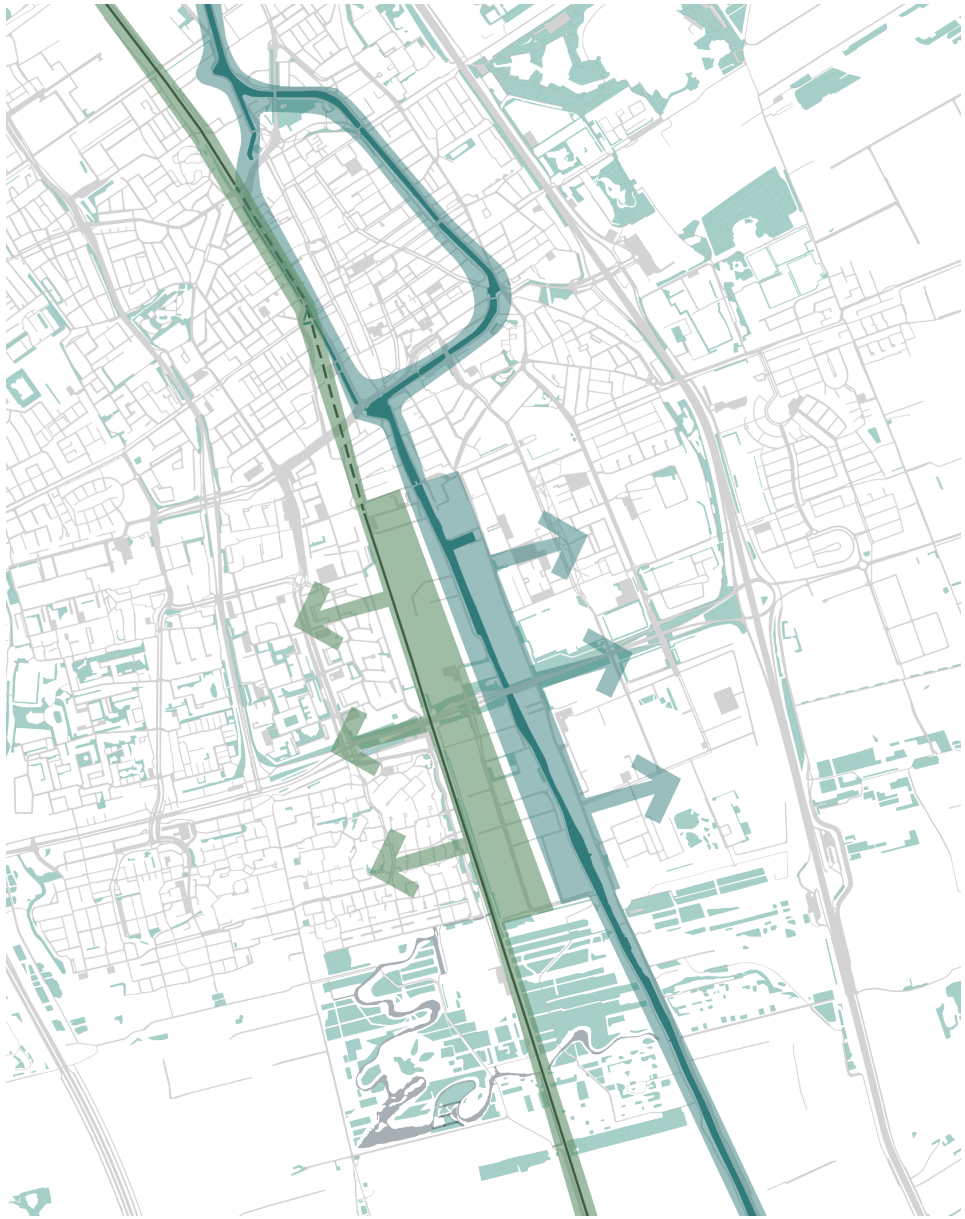
With the growing perspective of looking at the urban environment as a new kind of ecosystem, comes the need to re-evaluate our notions about the ecological main structure. The NNN (Natuurnetwerk Nederland) aims to connect the natural areas of the Netherlands, Natura2000 does this on a European level. They focus on areas far away from the city, thereby missing out on the opportunity to include flourishing urban ecologies into this network.

Including urban nature into these networks would not only make for a more resilient ecological network, for people there would be an opportunity to strengthen the recreational network in this very urbanised region.



The earlier mentioned train track and Schie canal would be perfect examples of corridors for this network, because they show similarities of the conditions of respectively urban and rural habitats, running almost parallel through the area between The Hague and Rotterdam. So in a way they already function as both ecological and recreational corridors.

Ecological networks consist of corridors and nodes (Lawton, 2010). If the train track and the Schie function as corridors, Schieoevers has the potential to become a significant node or stepping stone in this urban/rural ecological network. On a local scale it would connect the city centre to the surrounding neighbourhoods and the Abtwoudsebos on the south, on a regional scale it can reinforce the connection between The Hague and Rotterdam.



4.2 Designing an Urban Forest

When it comes to the designing a forest, there's a few important tools in the landscape architects' visual toolbox:

> Forest type - Different forest types have different spatial characteristics.
> Topography/Waterbodies
> Successional stages

In general, there's two types of approaches to forest development

Active development

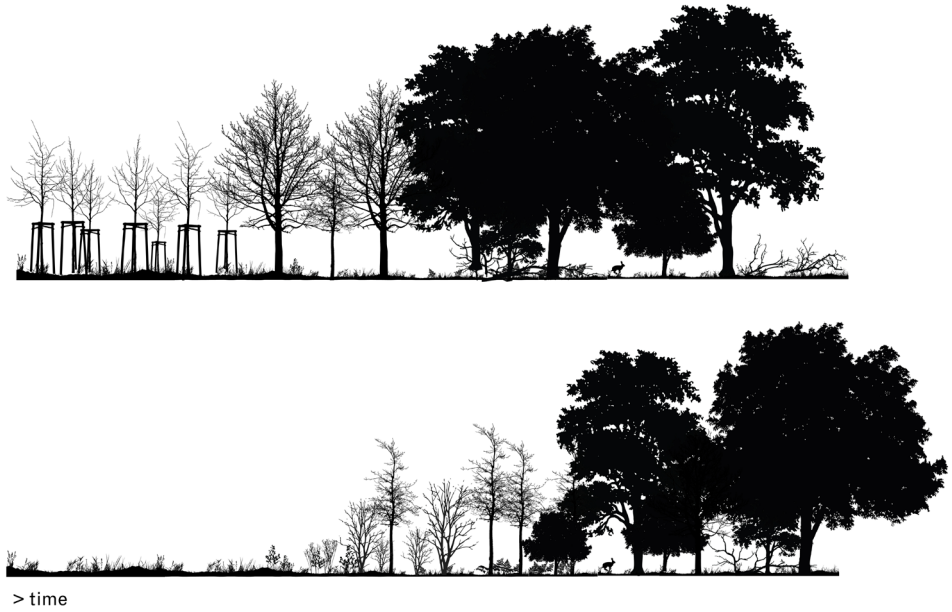
In this case the trees are planted. This results in a significantly faster successional cycle, because the pioneer stages can be passed. However, this requires large investments in planting material and labor. Also, a planted forest can cause a disruption of the soil profile and the trees will be more prone to deceases because of the little variety in genetic material (often clones are planted).

Furthermore, when planting or re-planting trees, the root system is slightly damaged. As a result it's less likely that the root system can connect to the previously described mycelium network.

Spontaneous development

Here species settle as a result of natural processes. Which species settle is dependant on:
> the soil type
> existing vegetation
> water level(s)
> availability of seeds
Spontaneous development leads to more resilient forests, more stable soil life. Unlike with active development, every plant is right where it's supposed to be.

In the strategy of the transformation of Schie-oevers active development will in many cases be preferred, for trees that are important to establishing the new spatial structure, for example the trees of the Living Frames. The Orderly Frames form the cultural side of the hybrid, as they structure and contain the feralisation of the area.



Active forest development allows us to 'buy time'

4.3 The Forest as Superorganism

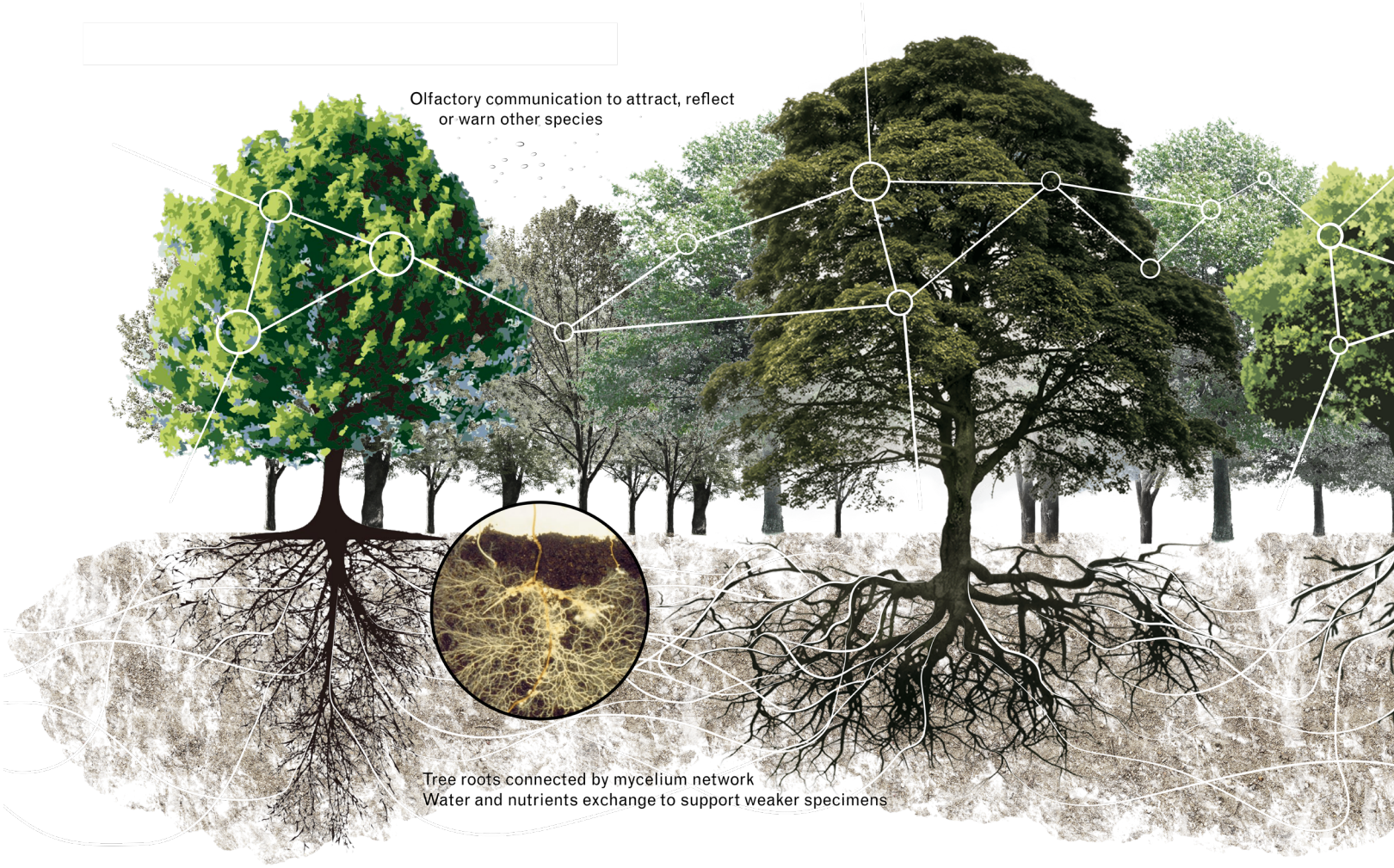
In order to design with the process of natural/ruderal forest development, a deeper understanding of what the forest is and how it changes through time is needed. This chapter will go into that.

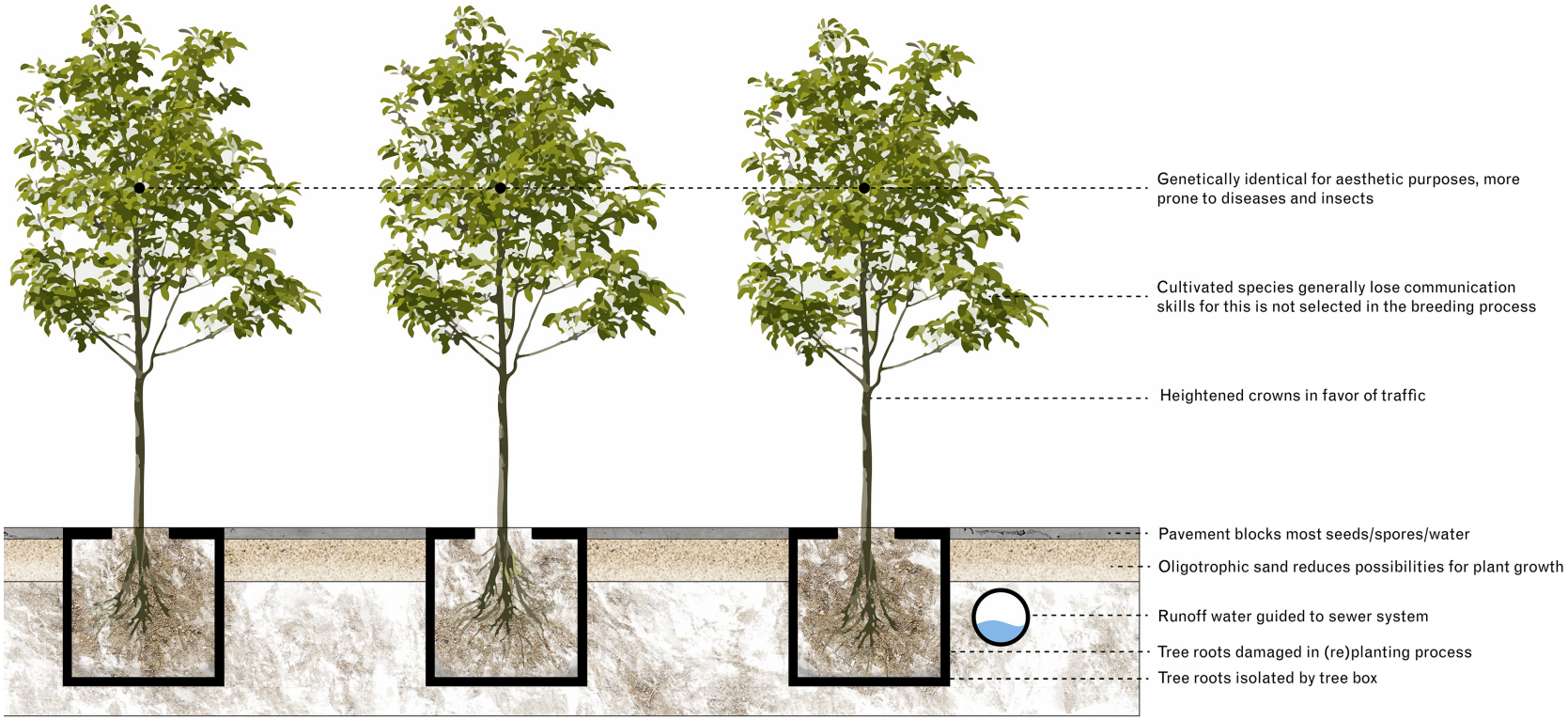
The forest is often perceived as a collection of solitary trees, individually competing for sunlight and nutrients. Recent findings point out that the contrary might be true: in many ways the trees work together in order to maintain a balanced and resilient ecosystem. This system is very social in nature; stronger trees support the weaker by equally distributing water and nutrients among the species. Esspecially among climax species like the beech tree this is an important factor, because the death of weaker species can result in altered, more dynamic conditions for the remaining species. For climax species that require stabile conditions this can be fatal.

The main skill required in order for the trees to work together is communication. We've only scratched the surface of discovering the ways that trees communicate, and these findings show the trees interdependance and so shines new light on the way a forest functions as more then a collection of trees.

A large part of this communication happens through the root systems of the tree. In a healthy forest, these root systems are connected through a symbiosis with fungi like mycelium, mimicing a neural network with axons and dendrites, passing on electrical signals and nutrients. This network is often referred to as the Wood-Wide-Web. To give an idea of the complexity of this network; one teaspoon of healthy forest soil contains kilometres worth of mycelium strings.

In planted production or urban forests this interconnection is lacking because the act of planting or replanting damages the roots in a way that they can no longer connect to the other species. Also most cultivated tree species have lost their communicative skills because this is overlooked in the breeding process. This makes them an easier target for insects and disease. (Wohlleben, 2017)





Many of the trees in the city are in poor condition. This can be explained partly by the lack of space they are given to grow. Often they are confined by tree boxes that limit the growth of roots in order to prevent it from the underground infrastructure like sewer lines and electricity cables. This renders the tree less able to assimilate enough water and nutrients for growth and to connect to a mycelium network as seen in the last paragraph. As they cannot connect to other specimens, they are all individuals, rendering them more prone to desease. The amount of water and nutrients that the trees do receive, are often just enough for the tree to stay alive. Other explainations for the poor conditions of most trees in the city are described in the diagramme on the right.

And this is a shame, because by depriving the trees from all of these requirements for life and growth, we are not fully profiting from all the benefitial effects that they could have on the microclimate and our wellbeing.

> Apparent relation between amount of underground infrastructure and tree condition

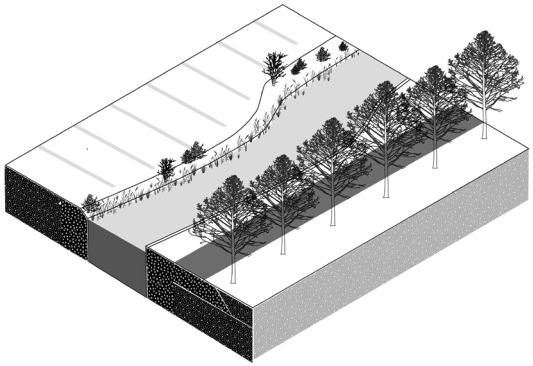
Condition of the trees in Delft-Zuid

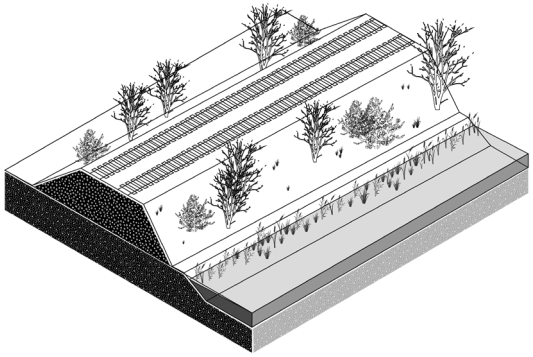
Sewer- and cable infrastructure in Delft-Zuid

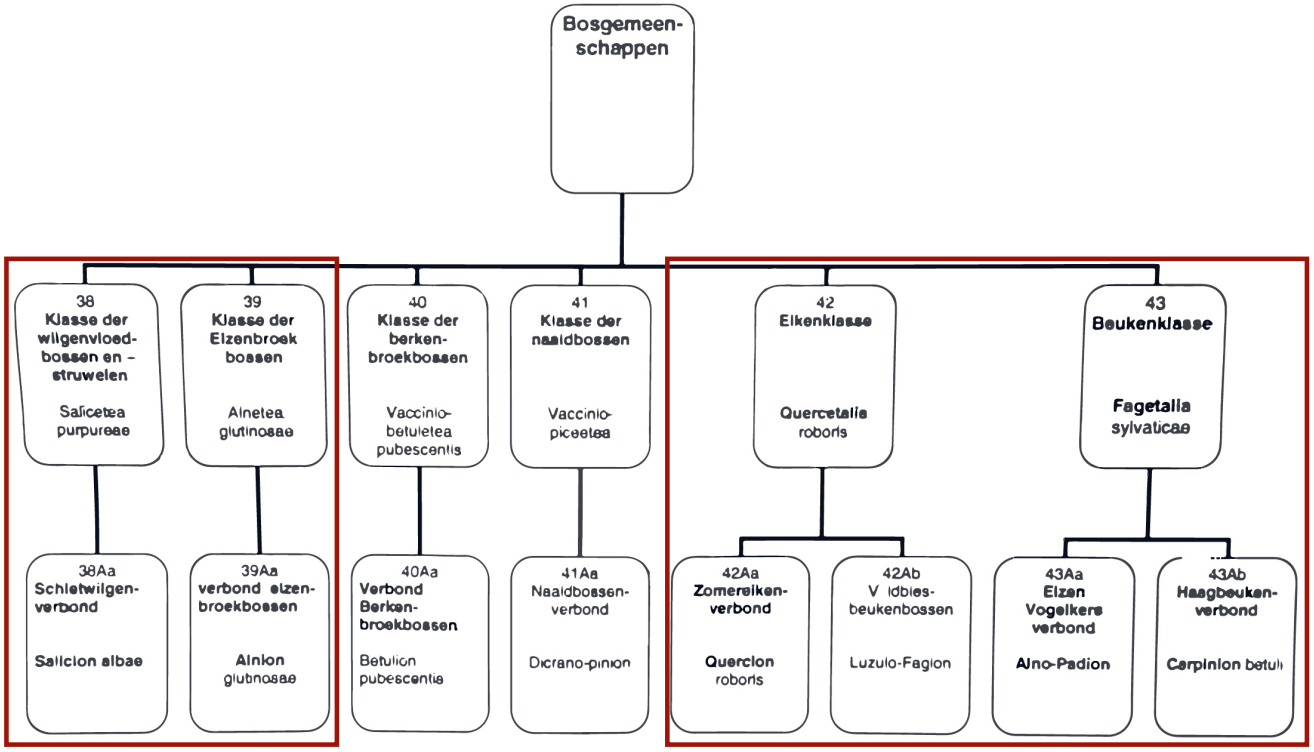
4.4 The Natural Forest types

The growing conditions found along the earlier mentioned potential ecological carriers of the Schie canal and the train track, are respectively wet and clay-ish and dry and sandy. As seen in the site analysis, this is the range of conditions found in the subsoil of Schieoevers, due to the flow of the former river. However, since during industrialisation this landscape was covered in a layer of sand, these conditions became limited to just dry and sandy. But there's still the potential of excavation and revealing the fertile clay soil.

The conditions correspond with the succesional courses of respectively willow-alder succession and oak-beech succession. In order for the design to land in this ecological context, these types of forest development should be aimed at. The next paragraph shows more eleborate research of this development. Apart from the successional development the research covers the spatial and phenomenological characteristics of each type, this will help implementing the successional courses as design tools.







Willow-Alder forest

The willow-alder successional course is dependant on euthrophic conditions, preferably with clay in the subsoil and with the ground level close to or underneath the water level. In the case of a fluctuating waterlevel, the willow will be dominant. In more stable conditions, its the alder tree.

This nature type is less diverse in species then other forest types, and therefore less resilient to disturbances. The ecological value however, is high, because of the high amount of potential niches and the purifation of nitrates and phosphates.
This forest type is known to reach the climax stage earliest of all classes, due to the high amount of nutrients in the soil. This fast growth causes tall, weeping reeds and branches that really represent a dynamic that symbolises the conditions that formed this nature. Also because of this, this forest type can be characterized as transparent and more open.

Reedland stage *Source: Fryske Gea*

Wetland stage *Source: Waamps*

Forest stage *Source: Van Goesen-Groot*

Willow-Alder class on rich soils

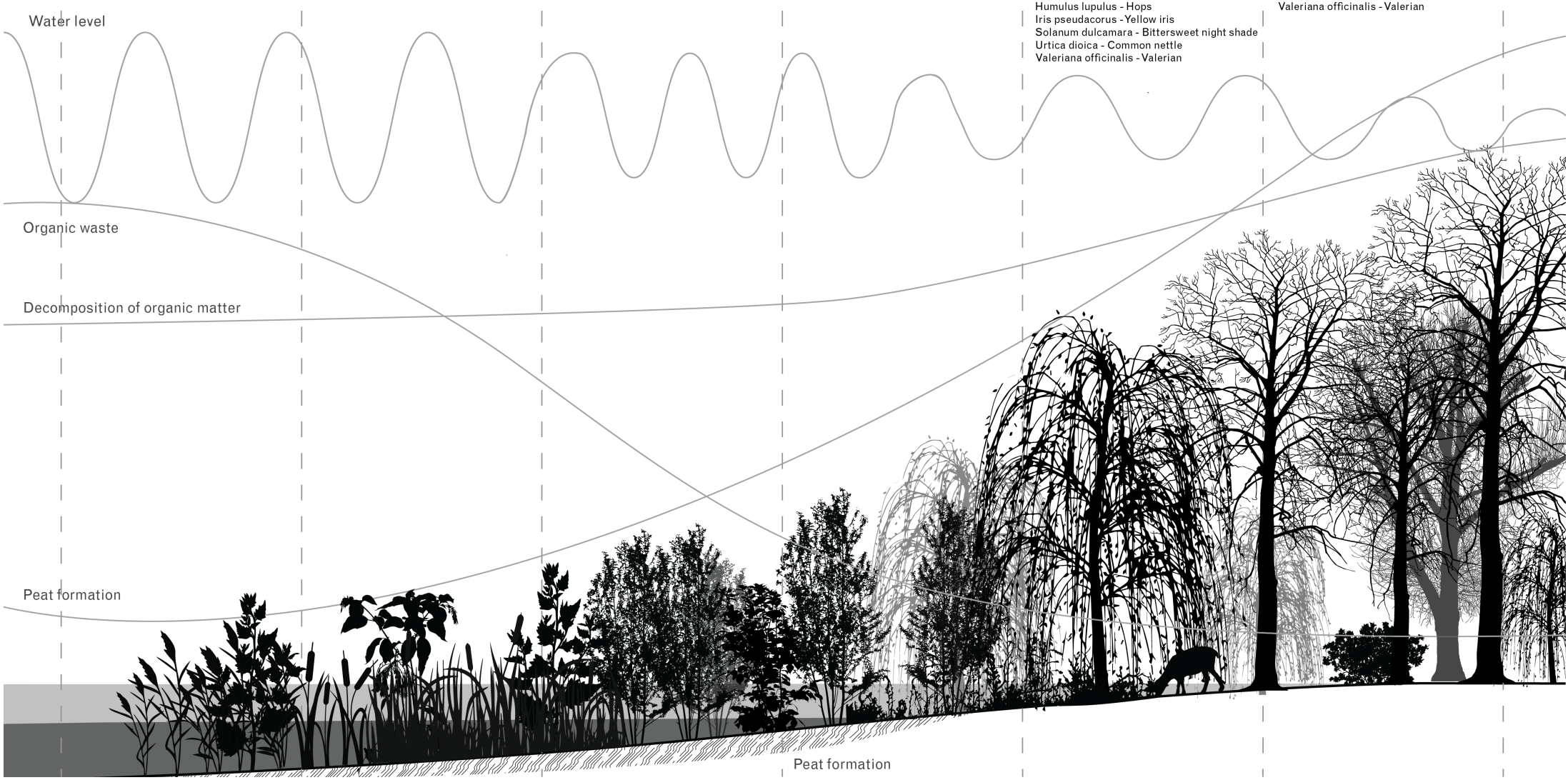
<u>Willow-Alder Forest: Salicion-alisa albea</u>
Conditions: neutral, euthrophic clay, possibly stagnating waterlevel

Spatial characteristics
> Dense tree/shrub layer when unmaintained
> Open, diverse when grazed
> Dynamic: waving branches and leaves

> mysterious | whimsical | purifying | dancing | transparent | symbolic | eager | vulnerable

Willow - Elder Forest Hydrosere Succesional Cycle

Reedland stage	Wetland stage	Shrub/heathland stage	Pioneer forest	Transition forest	Climax stage
± 0 - 2 years	± 3 - 5 years	± 5 - 10 years	± 10 - 25 years	± 25 - 60	± >60 years
		Shrubs Salix alba Salix viminalis - Basket willow Salix fragilis Salix triandra	Trees Salix alba 95% Populus nigra 5% Shrubs Salix viminalis - Basket willow	Trees Alnus glutinosa 10>90% Salix alba 90>10% Shrubs Salix viminalis - Basket willow Sambucus nigra - European elderberry Herbacious vegetation Aegopodium podagraria - Ground elder Angelica archangelica - Garden angelica Caltha palustris - Marsh marigold Carex paniculata - Greater tussock-sedge Humulus lupulus - Hops Iris pseudacorus - Yellow iris Solanum dulcamara - Bittersweet night shade Urtica dioica - Common nettle Valeriana officinalis - Valerian	Trees Alnus glutinosa >90% Salix alba <10% Shrubs Salix cinerea - Grey willow Sambucus nigra - European elderberry Herbacious vegetation Aegopodium podagraria - Ground elder Angelica archangelica - Garden angelica Iris pseudacorus - Yellow iris Urtica dioica - Common nettle Valeriana officinalis - Valerian



Oak-beech forest

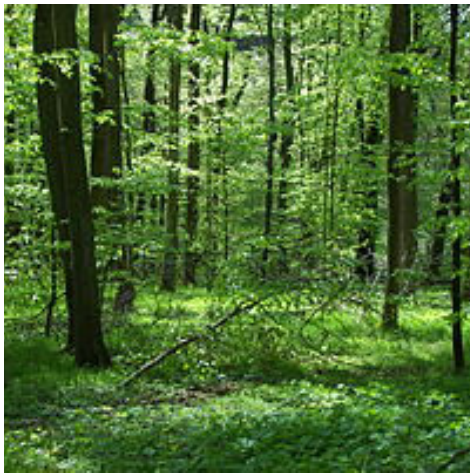
The oak-beech successional course is in many ways different from the willow-alder course. the conditions have to be oligothropic and dry
This type knows many species, and thus is more tolerant of intruding species. Most of the newcoming species in the netherlands as the result of climate change can be categorized in this nature type, as they thrive in warmer, drier and more oligothrophic, so urban-like) conditions.

The successional course of this class takes more time due to the lack of nutrients. But because it requires these “urban-like” conditions, this type of forest is better capable of hosting urban programme.

In cultural references, the oak and beech often stand for strength and endurance, and thats also what a forest of these trees expresses.

Shrubland stage *Source: Natura2000*

Young forest stage *Source: Own picture*



Adult forest stage *Source: Wikipedia*

Oak and beech class on poor soils

<u>Birch-Oak Forest: Betulo-Quercetum roboris</u>
Conditions: acidic, oligothrophic sand, possibly stagnating rainwater, seedless

Spatial characteristics
> Open tree layer due to oligothrophic conditions
> Small shrubbery like heather and vaccinium
> Rich moss layer

Seasons
Slow consumption of litter layer > no spring aspects
> Autumn peak (heather, mushrooms)

> strong | monumental | stable | heritage | power | opaque | endurance | frugal | resilient

Birch - Oak - Beech Succesional Cycle

Herbacious stage ± 0 - 2 years	Grassland stage ± 3 - 5 years	Shrub/heathland stage ± 5 - 10 years	Pioneer forest ± 10 - 25 years	Transition forest ± 25 - 100	Climax stage ± >100 years
Population sizes	Deschampsia flexuosa - Wavy hair grass Galium saxatile - Heath bedstraw	Corylus avellana - Hazel (chalk-rich) Frangula alnus - Alder buckthorn Sorbus aucuparia - Rowan Vaccinium myrtillus - European Blueberry *Ailanthus altissima - Heaven tree* *Buddleja davidii - Butterfly bush*	Betula pendula - European birch 90% Quercus robur - European oak 10% (Pine?) Pteridium aquilinum - Eagle fern	Betula pendula - European birch 90>10% Quercus robur - European oak 10>40% (Pine?)	Betula pendula - European birch <10% Quercus robur - European oak >45% Fagus sylvatica - European beech >45%

Dies
↓
Light

Beech — Oak/Birch

Shade

Nutrient circulation

Species richness

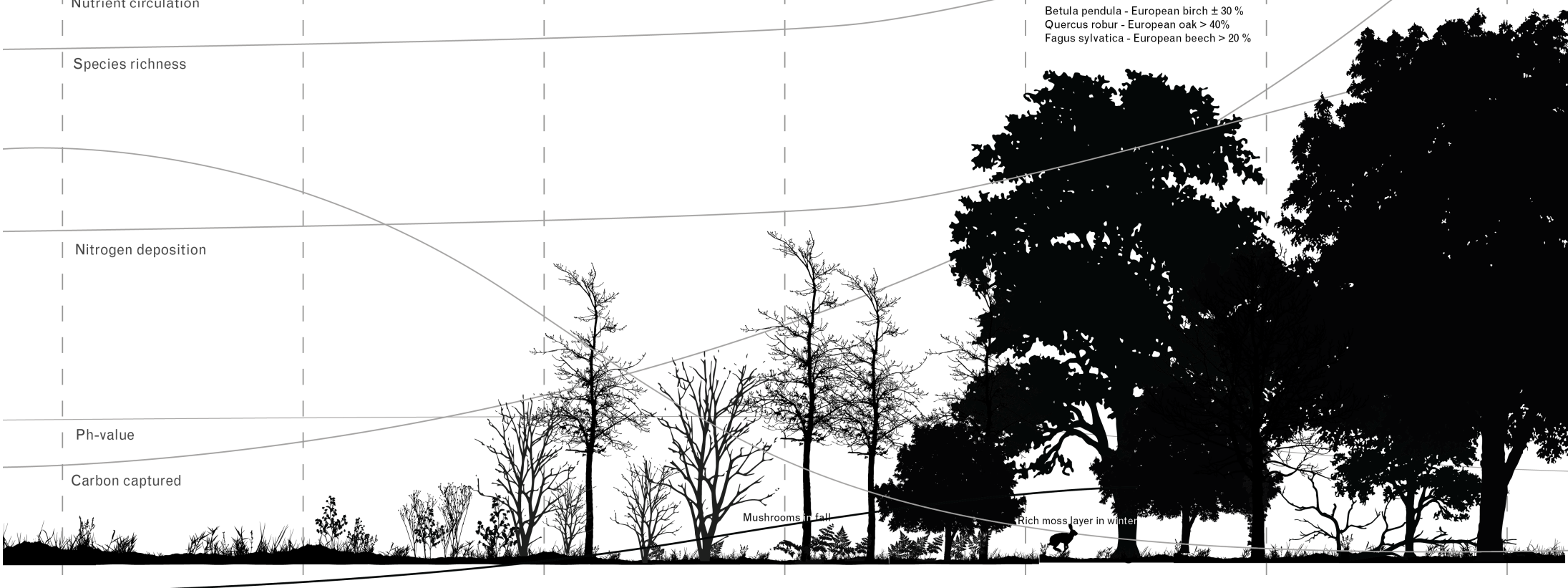
Nitrogen deposition

Ph-value

Carbon captured

Betula pendula - European birch 10 %
Quercus robur - European oak 45 %
Fagus sylvatica - European beech 45 %

Betula pendula - European birch ± 30 %
Quercus robur - European oak > 40%
Fagus sylvatica - European beech > 20 %



4.5 The Urban Forest

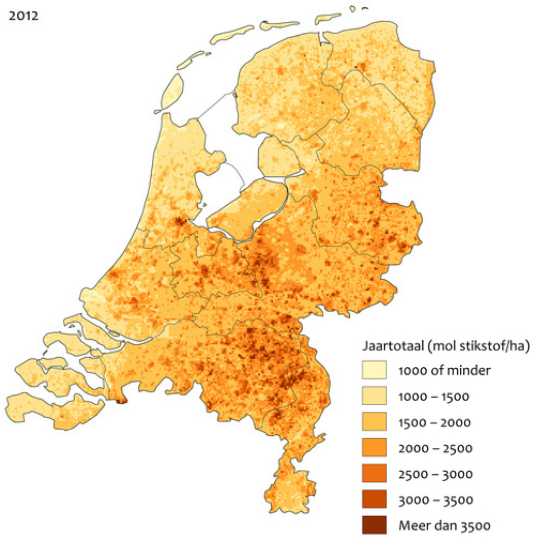
Impact of human activities on the successional course

We've become quite succesfull at denying natural processes. The materials used to shape the industrial environment are aimed at slowing down it's decay and so natural growth. (Schubert, source)
Each of these decaying materials affect all growing conditions of the site. They can alter the throphicity, the acidity, the hydraulic conductivity and the availabilty of sunlight. The most common materials found above and below the surface are steel and concrete. In decay, these materials respectively decrease and increase the pH value of the soil (Source), eventually resulting in the colonization of different plant communities.

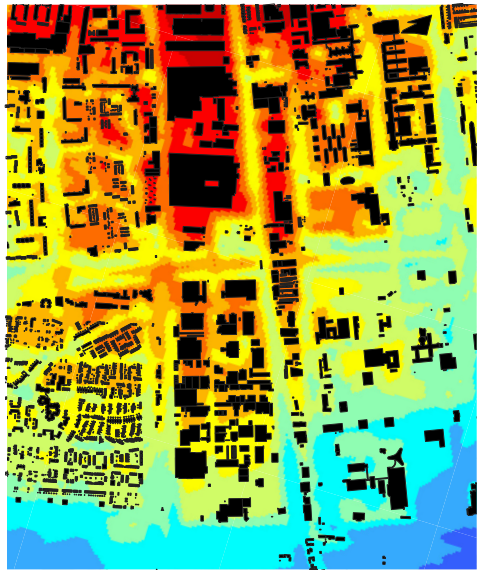
As a result of to carbon emmission, the planet is heating up every year. This relatively small rise in temperature has an enormous effect on earth
s biota. With a temperature rise of 3° C, the Dutch climate would be suitable for a thousand species from usually warmer climates, while for fivehundred indiginous species it would be too warm. This effect is amplified by the urban heat island effect: lack of vegetation and heat-absorbing pavement and buildings result in a significantly higher temperature in the urban environment.

Impact of climate change on the successional course

Uprise of thermophile plants
Among newcomers, 80% can be characterized as thermophile. 20% are species that are vulnerable to frost
> Mediterenean plants like Pariettaria judaica, Catapodium rigidum and Asplenium



Nitrogen deposition *Source: RIVM*



Urban heat stress

Acidic soil has a corrosive effect on concrete (Burghardt et. al., 2015) , causing pavement to break down more easily. This corrosion then heightens the pH of the soil.

Soil sealing

Much of the soil in the Schieoevers area is sealed by construction. The land is covered with an almost impermeable layer of artic-ficial material separating the soil from the atmosphere, which leads to soil consumption. (European Commission, 2013)

Soil sealing puts pressure on the watersystem. Rain- or stormwater can not infiltrate the soil, leaving no capacity for the soil to buffer or filter the water before it enters the Schie. With the prospects of higher peaks during storms, increased pressure is put on the sewersystem, more floodings will occur and contamination of the surface water of the Schie.

Furthermore, the sealed soil undermines most hidden of natural processes: the processes that take place in the soil. A healthy soil is bursting with life, ranging from micro-organisms to insects, animals and plants that work together to maintain balance and provide structure to the soil.

When considering the symbiosis between the forest and the city, it is important to take into account the effects of human day to day activities on the forest.

> rugged | wayward | adaptive | diverse | surprising | regenerative | exposing

Sealed stage
± 0 - 5 years

Grassland stage
± 3 - 5 years

Shrub/heathland stage
± 5 - 10 years

Pioneer forest
± 10 - 25 years

Mature forest with open spaces
>25 years

pH-level

Composition of pavement

Microclimate temperature

Carbon captured

Uprising, city dependant neophytes

Polygonum aviculare
Taraxacum officinale
Tradescantia virginiana
Nicandra physalodes
Verbena bonariensis
Linaria purpurea
Campanula poscharskyana
Centrantus ruber
Phragmites australis
Papaver setiferum
Oxalis debilis
Persicaria capitata (hanging baskets)
Silene conica
Lychnis coronaria
Saponaria officinalis
Actea rosea (verwilderd)
Geranium cv

Shrubs

Ailanthus altissimma
Buddleja davidii
Cotoneaster horizontalis
Molinia caerulea
Morus alba
Polygonum cuspidatum
Rhus typhina
Rubus phoenicolasius

Climbers:

Hedera helix
Parthenocissus quincefolia

Trees

Ailanthus altissima
Betula pendula
Paulownia tomentosa
Populus deltoides
Ulmus hollandica
Quercus ilex

Forest edge

Polygonum aviculare
Taraxacum officinale
Tradescantia virginiana
Nicandra physalodes
Verbena bonariensis
Linaria purpurea
Campanula poscharskyana
Centrantus ruber
Phragmites australis
Papaver setiferum
Oxalis debilis
Persicaria capitata

Shrubbery

Ailanthus altissimma
Buddleja davidii
Cotoneaster horizontalis
Molinia caerulea
Morus alba
Polygonum cuspidatum
Rhus typhina
Rubus phoenicolasius

Trees

Acer platanoides
Betula pendula
Paulownia tomentosa
Platanus x hispanica
Quercus ilex
Quercus robur

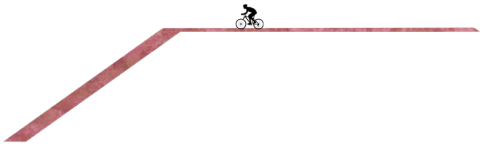
4.6 Industrial frames

Since the article written by Nassauer dates from 1995 and is written in the context of North-American sub-urbs, it seems appropriate to redifine the Orderly Frames towards the case of the post-industrial Schieoevers site.

Clear lines or boundaries between rough, wilder patches of green, establishing a cue for care and so forming a contrast with the 'messy' ecosystems. These lines can be materialized with either abiotic or biotic materials, and they can form a continuous line as well as suggest a line with repetitive elements. In order to emphasize the contrast between the 'messy' nature and the orderly frames, it is important that the frames themselves are neat and well maintained.

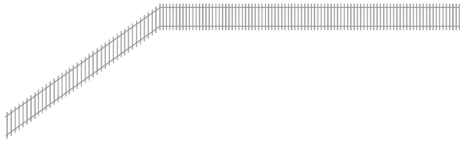
Preserving elements from the industrial landscape as Orderly Frames in the Urban Forest is a sustainable way of preserving the site's identity and applying them to improve its cultural value and spatial structure. The selection of these elements is an important part of the design assignment, for they will for a large part decide the composition of the urban framework.

Larssen sheet piling

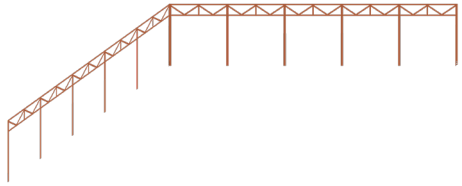


Existing infrastructure

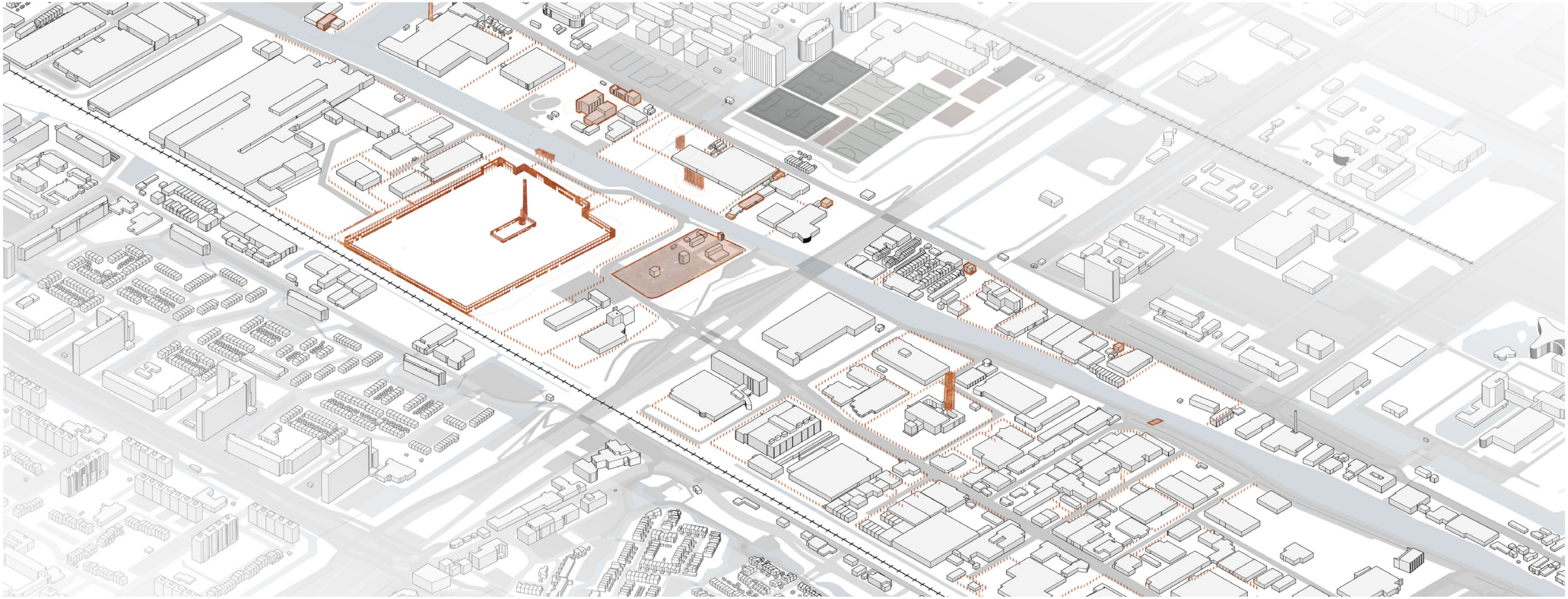
Building facades

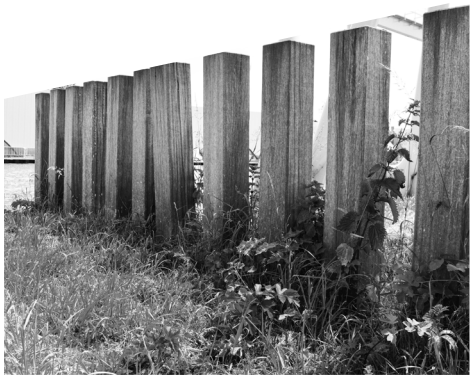


Property boundaries



Existing building constructions





> Property boundaries

> Industrial relics

> Historical remnants

> Construction/facade

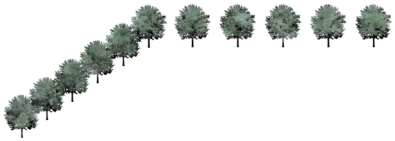
4.7 Living Frames

Apart from the unplanned vegetation that can be found at Schieoevers, there's also a little planned vegetation to be found mainly in the public space. This vegetation usually accompanies the infrastructure, making them linear elements in the area, emphasizing the geometrical patterns of the formerly agraric industrial landscape. This makes us able to perceive them as the earlier mentioned Orderly Frames. However, this system of lanes and strips is fragmented and incomplete, leaving potential for improvement in the framework.

Strip of lawn

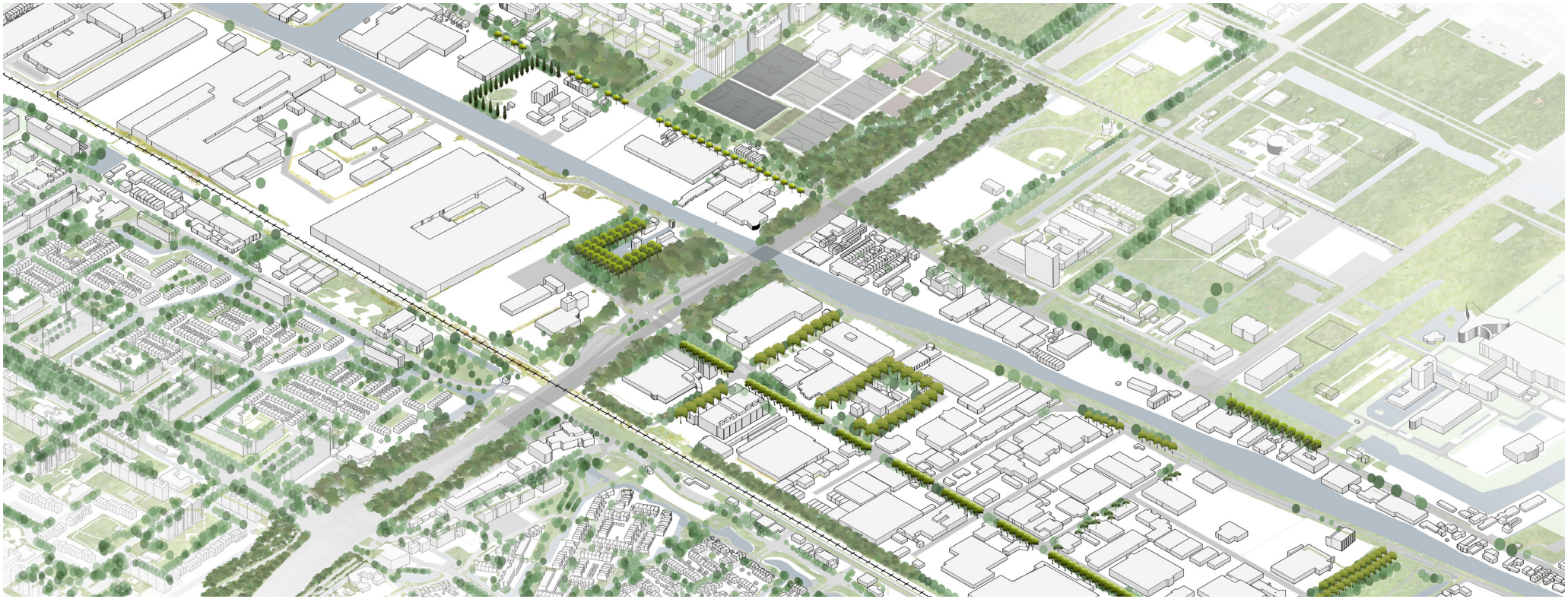
Strip of wildflowers

Tree lanes - Conical



Tree lanes - Round

Trimmed hedge



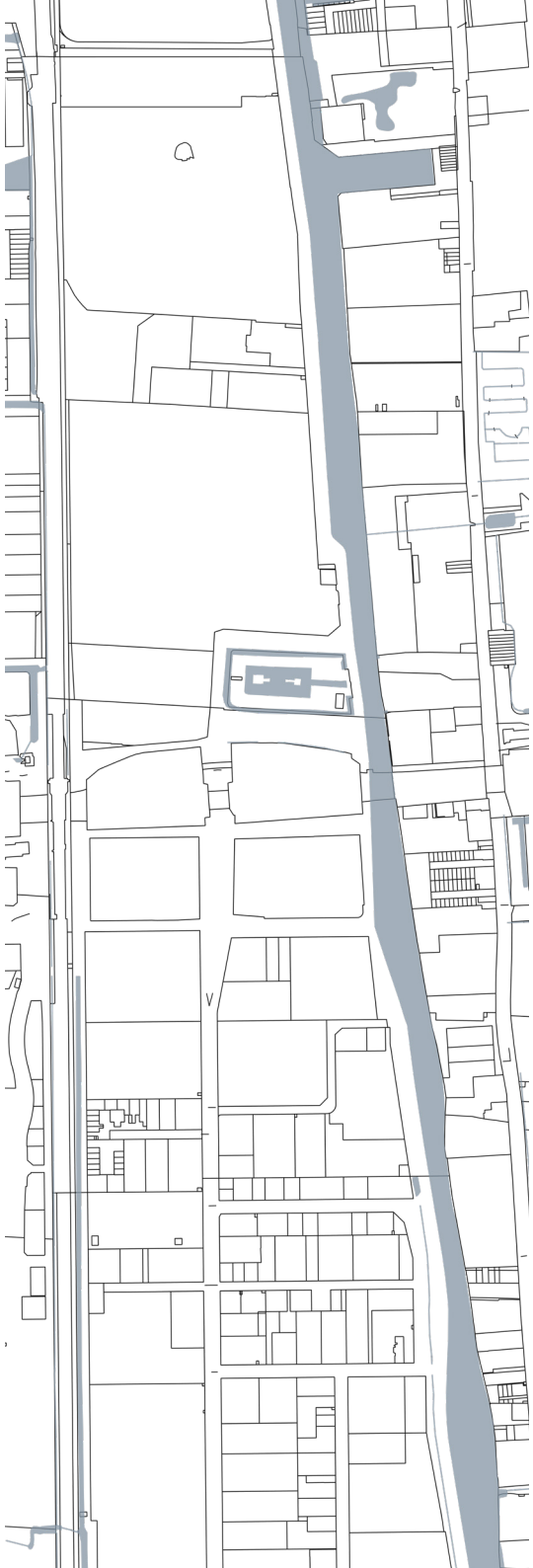
> Herbacious vegetation

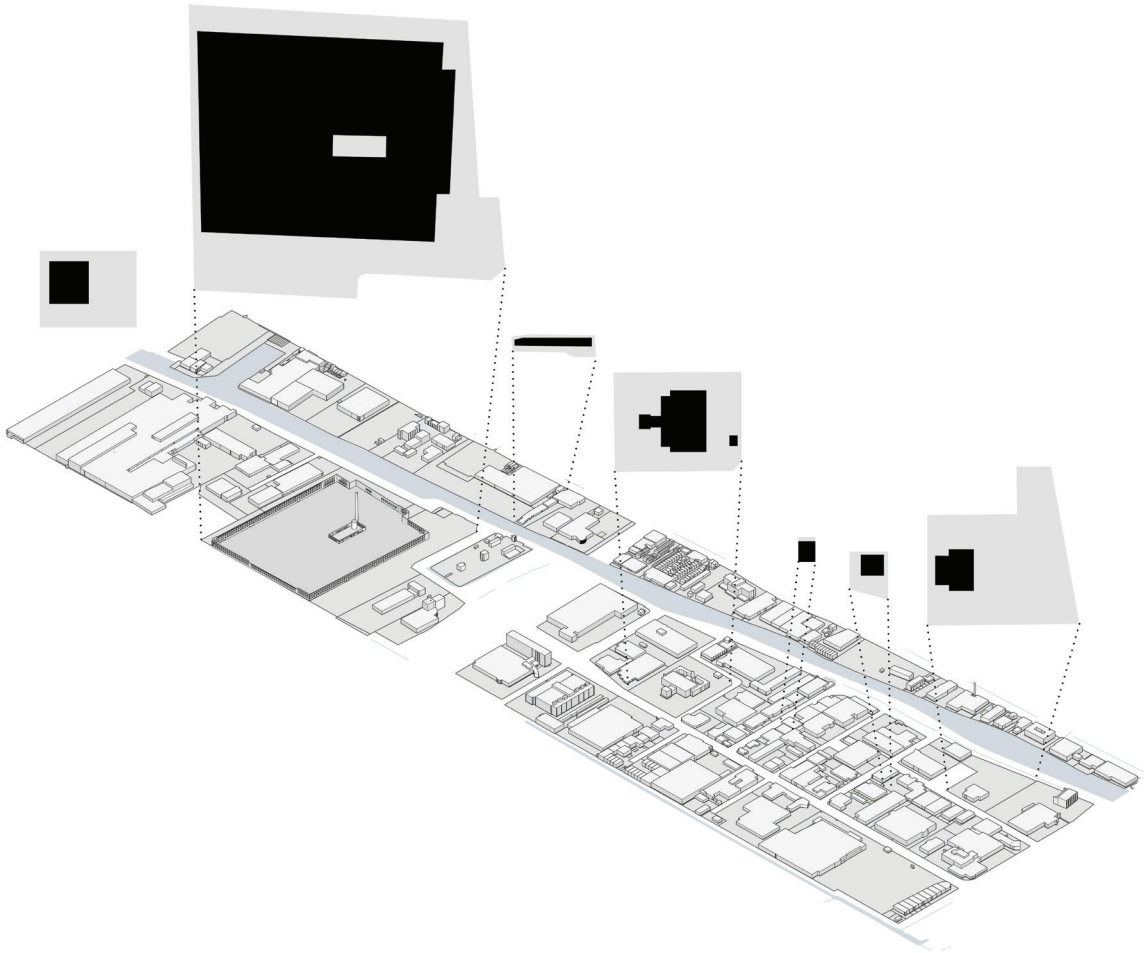
> Shrubbery

> Conical trees

> Forest patches

TRANSFORMING THE POST-INDUSTRIAL LANDSCAPE INTO AN URBAN FOREST





5.1 Strategy for Development

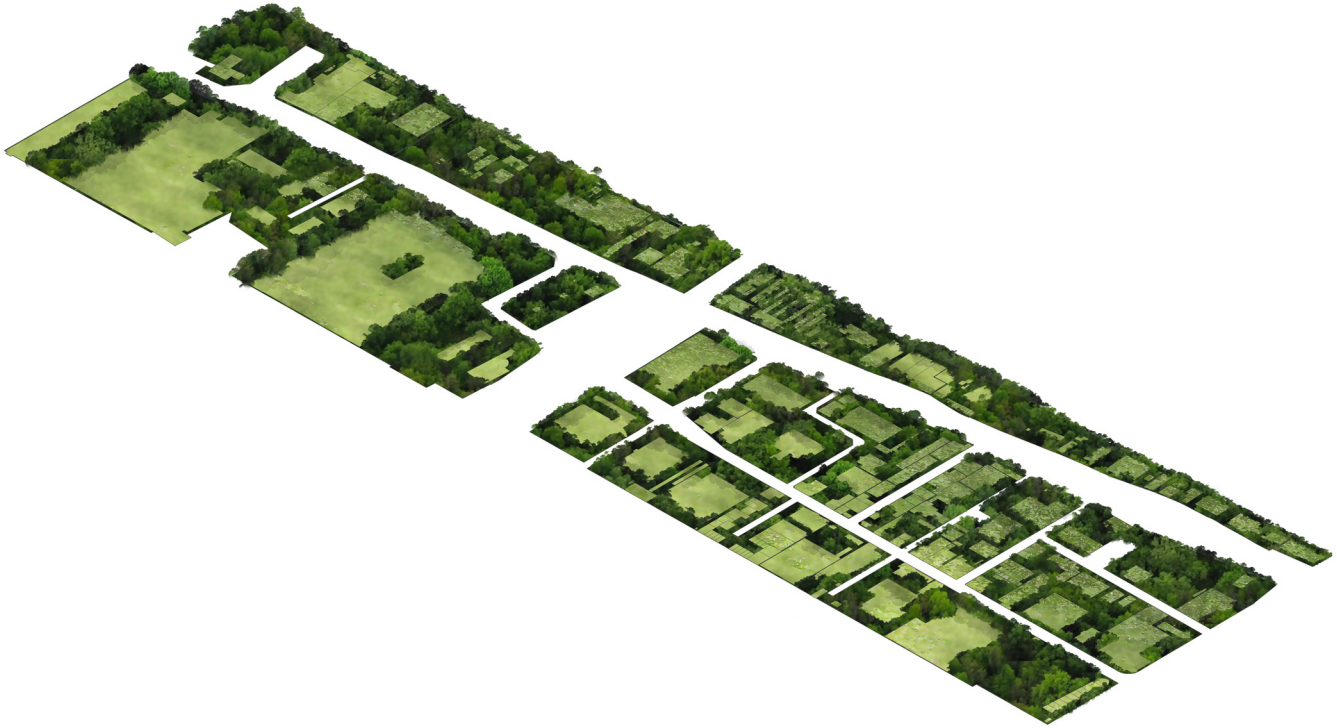
One of the challenges in this project is that the decrease of industry is a gradual process. Plots are going vacant one by one over a large stretch of time, making it harder to restructure the area as a hole. Once they are vacant, it can take many years for the plot to be sold and/or for developers to start the building process.

It's unrealistic and unpreferable to propose that the whole site should become a forest. It would cause inconveniences like a lack of sunlight, monotony, and it undermines the need for housing

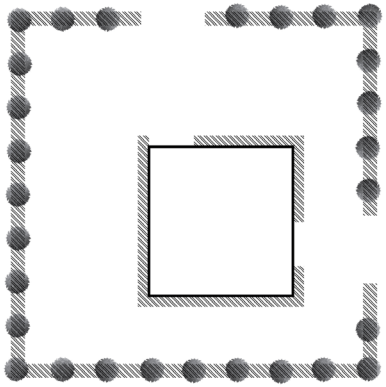
Strategically it's most interesting to look for space to develop forest in the area between the building contour and the property contour.

Since the industrial area is highly compartimentalized, with many different owners and different ambitions for their plot, it's sensible to approach the transformation of the whole in the same way as it came to be: plot by plot.

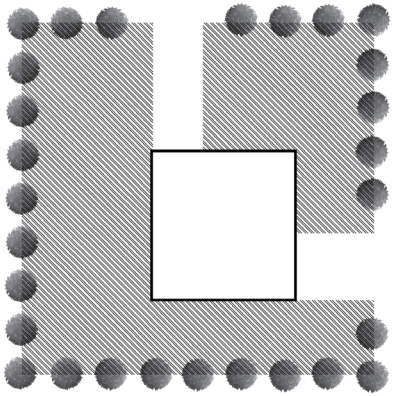
However, even when a plot is not yet vacant, there's still interventions that can be done. In many cases, a large part of the area between the building contour and the property boundary are not in use. Specially around the edges, this becomes visible through the plants or shrubs growing here. There's areas can, in collaboration with the owners, be used to apply the Orderly Frames in order to set out a main spatial structure for the area and indicate the changes that are coming.



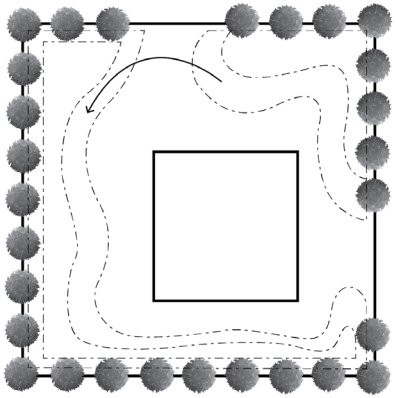
In the strategic masterplan a depot is incorporated for storing and sanitizing soil and materials. It has a prominent position at the north entrance, so that people get an idea of the logistics of the development. It's also located next to a existing harbour, in this way the materials can be transported easily and sustainably by boat.



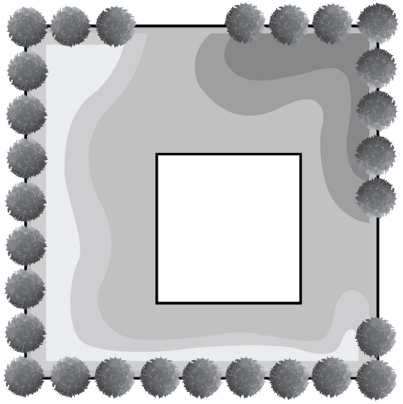
t=-1 plot is still in industrial use
unused/nonfunctional areas (often along plot edges) can be depaved and planted with lanes/hedges



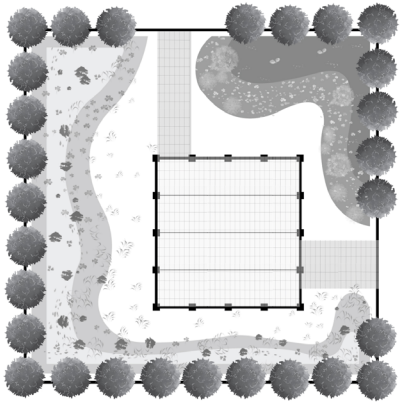
t=0 plot is vacant
future infrastructural connections are anticipated, the rest of the plot is depaved



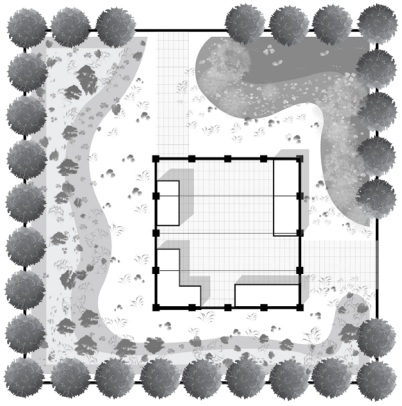
t=0 plot is vacant
groundwork is done through cut/fill method or by use of the depot. goals:
> shaping diverse conditions for ecological development
> this includes soil sanitazition or phytoremediation
> utilising depression for water buffering and connecting to the water system



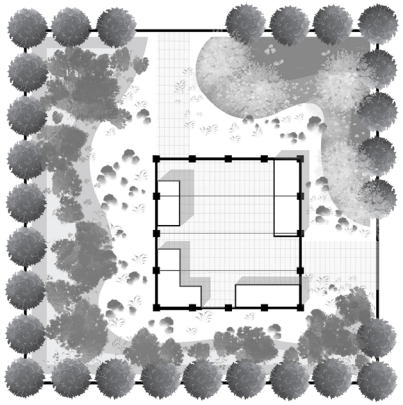
t=1 plot is vacant, nature development, this phase lasts as long as there are no plans for future developments



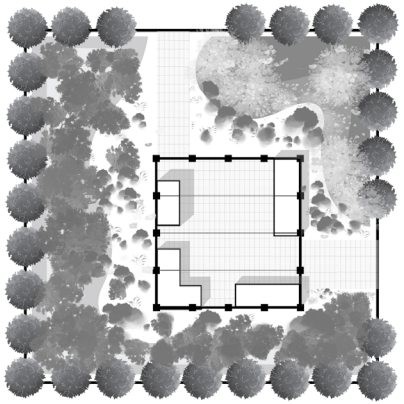
t=2 the building is reduced to a casco state and the remains of the construction form the boundary of the new building plot



t=3 vegetation is starting to grow as the new houses are being developed



t=4 right before inhabitation of the new housing units, a selection of the spontaneous vegetation is being made and placed within orderly frames



t=5 from this moment, the plot is maintained as a managed urban woodland

Vacant plot
Shaping conditions & remediation
Brushwood land
Shrubwood land
Woodland

Existing industry
Repurposed industry for housing
Feral industry
Developed housing

With this strategy there's not only diversity in the different conditions that are shaped, but also through the differences in forest stage, since each plot will start development at a different point in time there will be a large variety of successional stages.

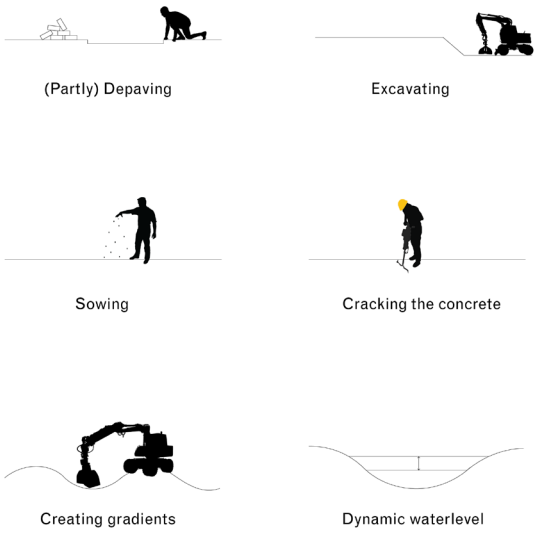
5.2 Shaping Conditions

The first step in commencing the successional course is shaping the conditions for the forest to develop. These conditions decide for a large part the eventual forest that will become. An important factor here is reserving space and time for plants and trees to grow.

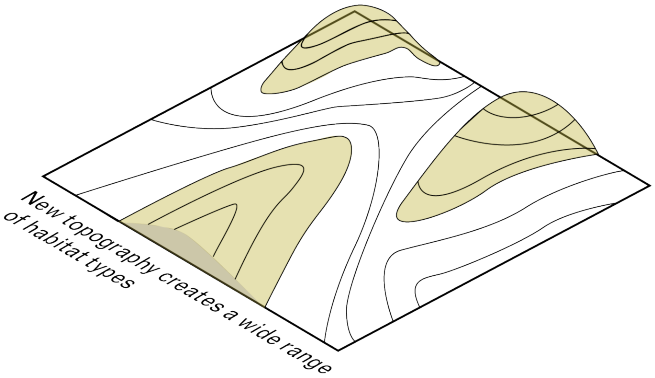
By removing parts of the excessive amounts of pavement and concrete we can speed up the colonization of plant populations.

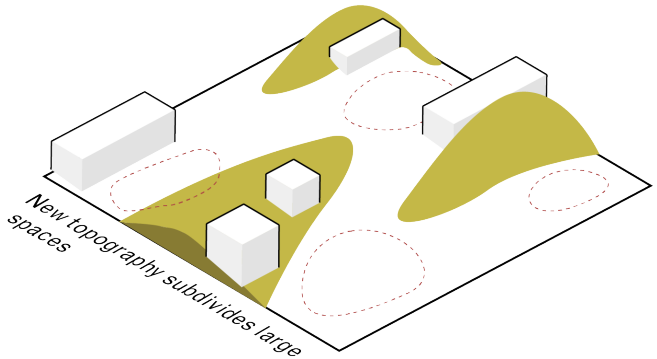
Secondly, in order for the forest to be as biodiverse as possible, it is important for the growing conditions to be as diverse as possible as well. By applying the cut-and-fill method we can excavate certain areas to reach the wet, fertile clay soil underneath, and using the excavated sand to heighten other areas to make for dryer and more poor habitats, creating a gradient with a wide range of different habitats.

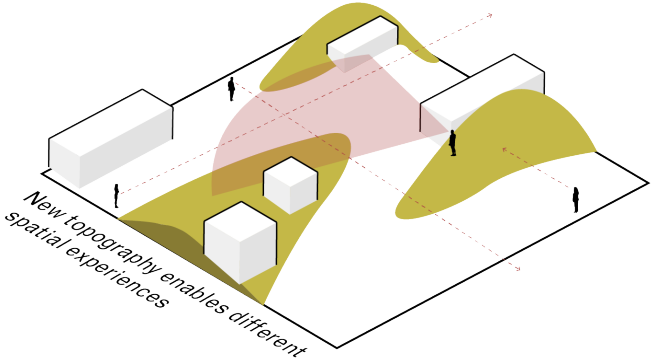
The sloping landscape that will arise from doing this groundwork, will bring a certain softness to the harsh industrial landscape. The mounts can be designed in a way that they make for a more interesting, spatially diverse landscape. They can both hide and express views, or emphasize lines of sight.



Forms of active forest development in shaping conditions

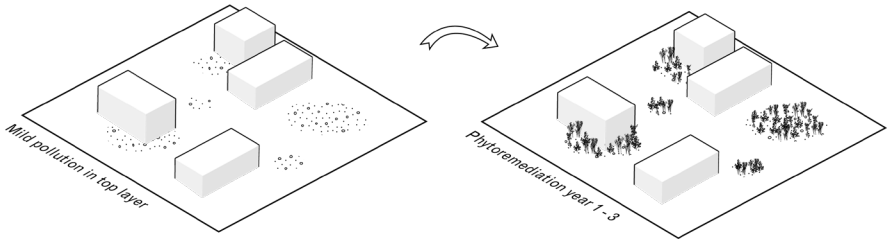






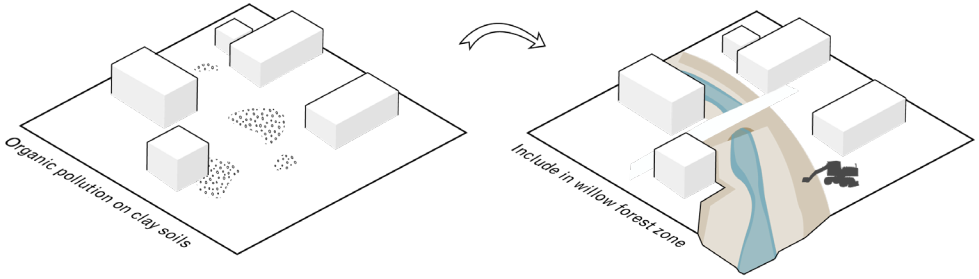
5.3 Remediation

With bringing back a dynamic water system in the area comes the risk of contamination entering the regional water system. It's important that we think about ways of dealing with this pollution in a responsible and sustainable way. The methods that are chosen are the ones I think fit best into the narrative of shaping conditions and letting go of control as well as the strategy for development.



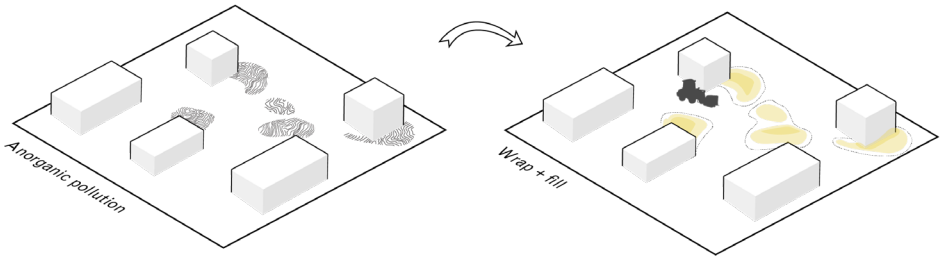
Phytoremediation

In the case of mild pollution in the top layer of the soil, the relatively simple act of phytoremediation will suffice. More specific research on polluting substances has to be done in order to pick fitting species to remediate the soil with accordingly.



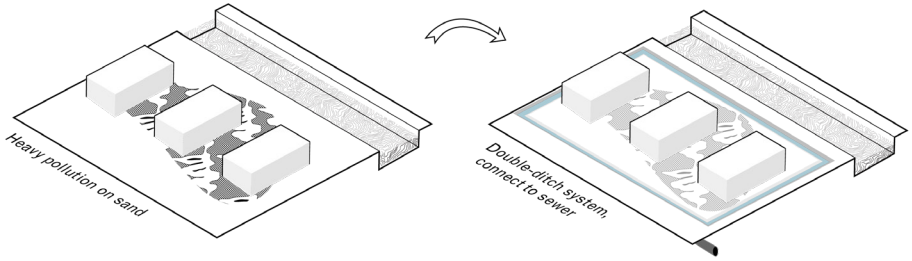
Willow succession remediation

In the case of only organic pollution being above the intervention value, an attempt will be made to include the area in the willow forest zone. All succesional phases of this zone are well capible of dealing with nitrate and phosphate pollution



Wrap and fill

When there's anorganic pollution, we want to inhibit the chances of the substances being exposed to the dynamics. In this case we can wrap a certain foil around the polluted soil and apply a layer of covering soil.



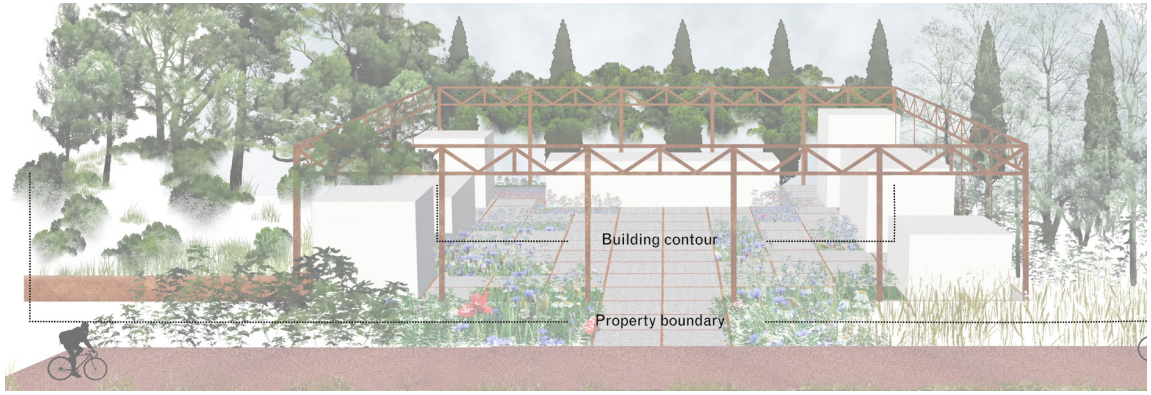
Double-ditch system

In the case of more complex, mixed pollution, a double-ditch system connected to the sewer system offers a solution. The contaminated area is in this way isolated from the dynamic watersystem. Over time, rain water will flush out most of the contamination to be handled in the treatment plant.

5.4 Single plot design principles

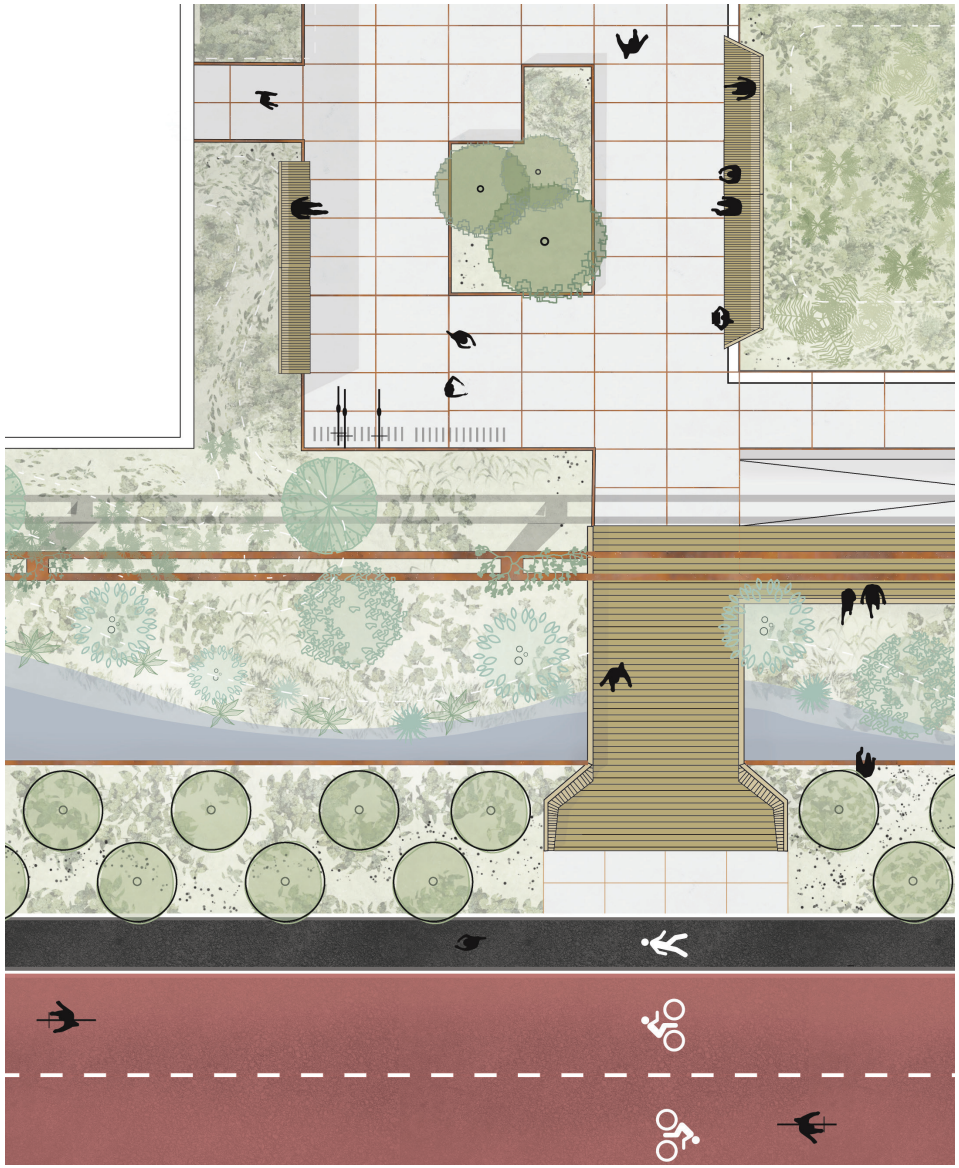
5.4.1 Impression

This image shows an impression of a fully transformed plot. How the warehouse constructution serves as the frame for new housing development, how the oak-beech forest serves as a backdrop for this housing and how the willow-forest opens up towards the Schie. Also it shows how the industrial landmarks are preserved and emphasized and so tie the area together trough sight-relations and aid in wayfinding.

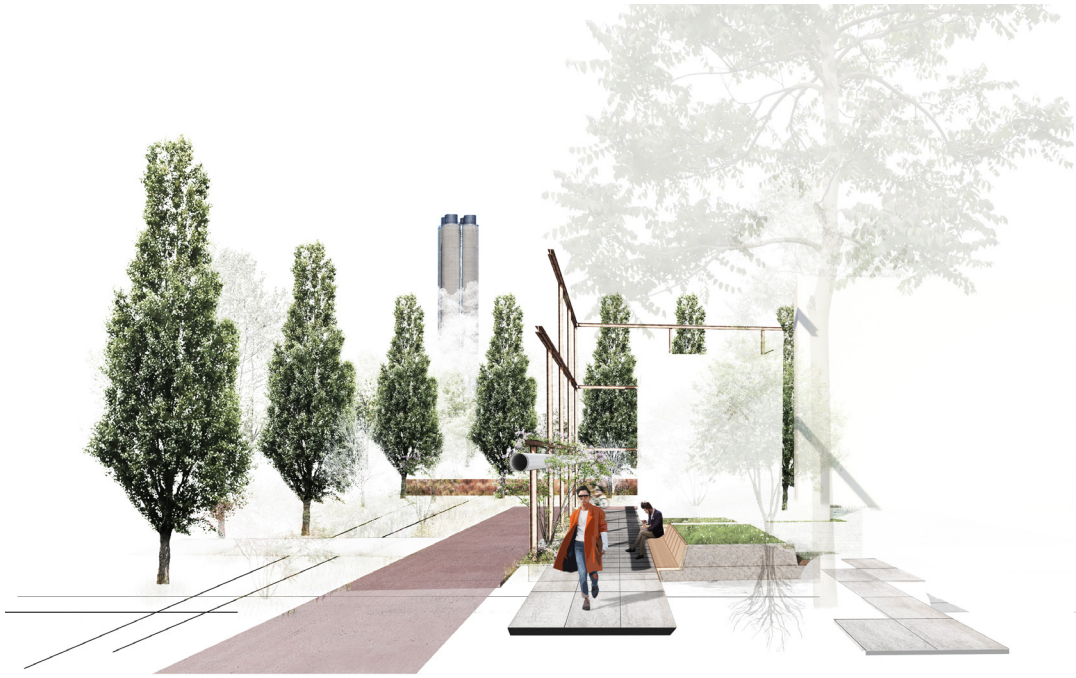


5.4.2 Transitions

Here you see a detail of the transition from public space to urban courtyard. The benches are materialized in the same way as the footbridge in order to create a coherent image. The former warehouse construction functions as an entrance gate as you enter the courtyard. Industrial materials are re-used as much as possible. The typical stelcon tiles are used for paving and sheet pilings are re-used as retaining wall for the new waterbodies.



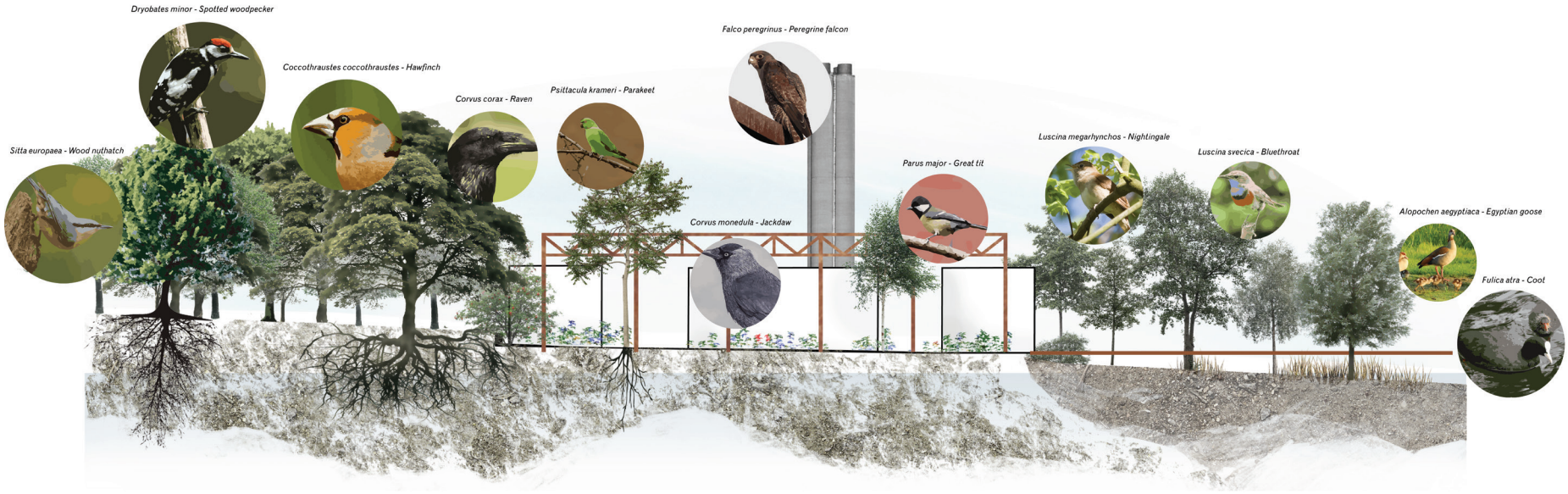
5.4.3 Frames in action



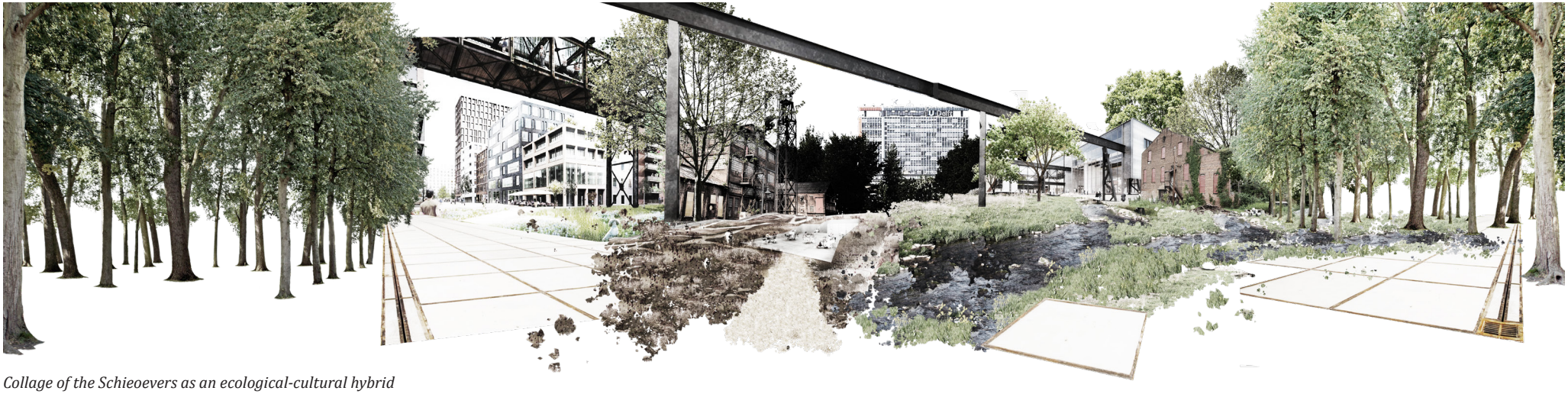
These images serve to illustrate how the Orderly Frames are forming the familiar packaging for our feral and messy forest development. The composition of existing and added frames work together to structure the landscape and make very clear that human influence is present, while the feral nature brings dynamics, texture and color.

5.5 Indicative species

In order to have an idea of wheter the successional developments are headed in the anticipated direction, these sections show an overview of species that can be expected to be found in the different forest zones. A lack of these species can potentially be a motive for changing maintenance or altering conditions.


Dryobates minor - Spotted woodpecker
Coccothraustes coccothraustes - Hawfinch
Corvus corax - Raven
Psittacula krameri - Parakeet
Falco peregrinus - Peregrine falcon
Sitta europaea - Wood nuthatch
Corvus monedula - Jackdaw
Parus major - Great tit
Luscina megarhynchos - Nightingale
Luscina svecica - Bluethroat
Alopochen aegyptiaca - Egyptian goose
Fulica atra - Coot

LIVING IN THE URBAN FOREST



Collage of the Schieoevers as an ecological-cultural hybrid

6.1 Living in the Urban Forest

Crucial to the success of the transformation is the willingness of people to contribute. It largely depends on altruism. This generation may not yet suffer the consequences of the biodiversity crisis, making it harder for them to understand the necessity of nature-inclusive cities or long-term thinking. At the first glance, reserving space and time for nature development may seem to them as a sacrifice of areal and resources, which will lead to a decrease in economic profit. It is important to inform the public of how the forest can actually benefit the people and their living environment. That is what this chapter is dedicated to. How will the forest affect the living environment? And how can it strengthen our relationship with nature?

Impression of the Urban Forest

6.2 Experiencing the Urban Forest

This sequence of images shows the many ways in which the Urban Forest can be experienced.

By playing

Outdoor play in nature provides many benefits for children like discovery, creativity and problem-solving. Exploring, climbing trees and getting dirty are great ways to connect to nature.

By wandering

There is a lot to explore in the urban forest. Discovering hidden paths, mysterious open spaces in the forest and overgrown industrial relics. This lookout tower evokes this exploration.

By bicycle

The bicycle is the main mode of transport at Schieoevers. The bike track goes past several highlights of the area, as well as several industrial relics. Except for the north-south connection that is important for the recreational network, there's east-west connections that connect the area to the surrounding neighbourhoods and the TU campus.

By car

To minimize disturbance of the forest, the car has a subordinate role at Schieoevers. The car roads are pushed to the boundaries of the area and hidden through ground level elevation. However, the driver gets an occasional look in, for example here by driving through one of the Orderly Frames.

By contemplating

The Urban Forest offers relief from the busy city life. With the increase of stress-related disease, finding stillness in the forest can be an effective medicine.

By really looking

The process of nature overtaking the industrial area is an inspiring one. The cold steel- and concrete environment makes place for lush, green vegetation with a different image every season and every year.

By being near

The urban forest offers the luxury of enjoying nature from the comfort of your own home.

By working together

People live in the urban courtyards in relatively small communities, which will result in more social coherence then in the anonymous, dense city. They also have a shared responsability over the maintenance of the forest in their plot, which will leave them engaged with their own living environment and the community.

6.3 The Urban Forest and the microclimate

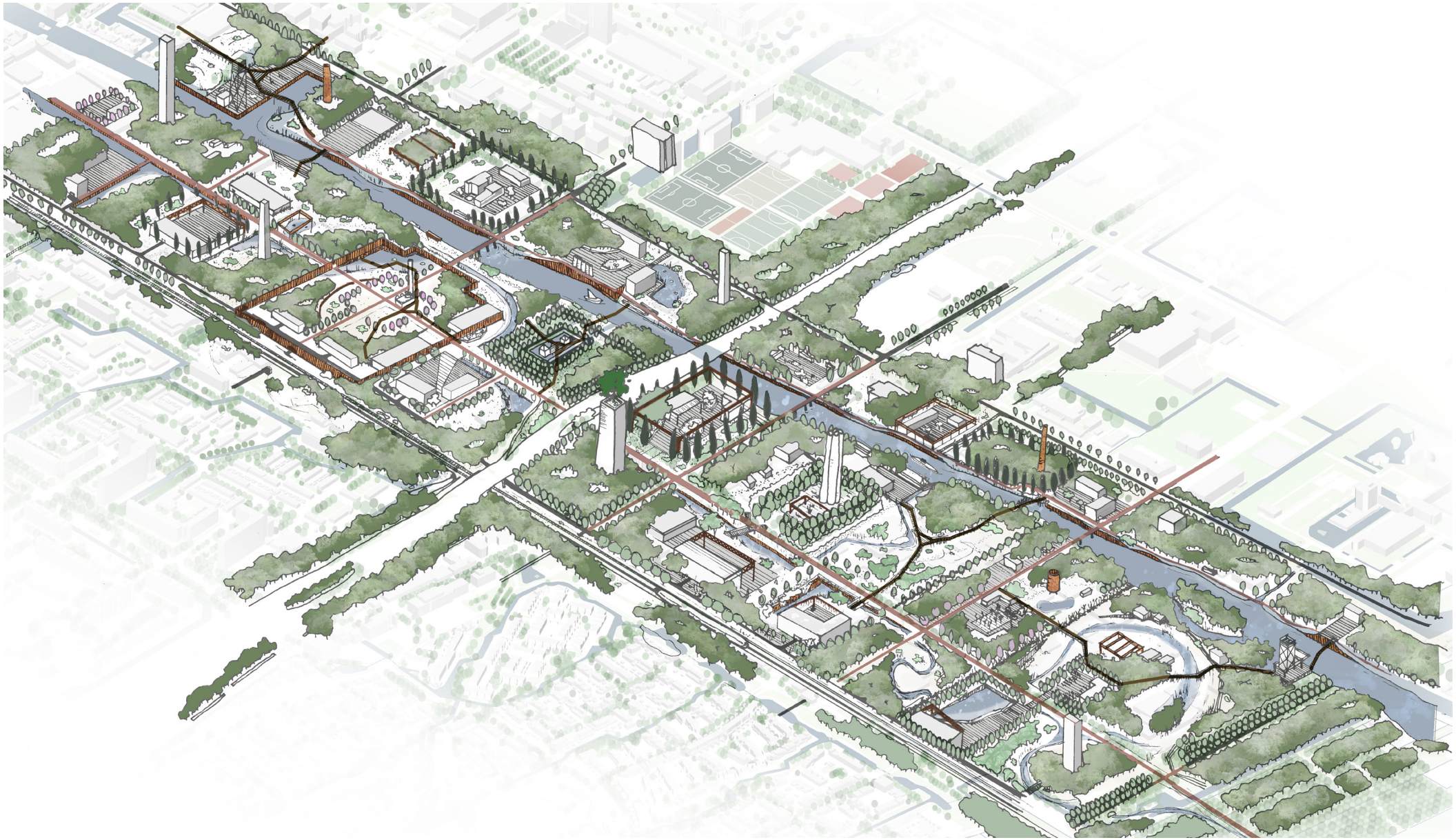
The forest offers countless positive effects on the microclimate. For example, the forest will nullify the urban heat island by absorbtion. Air reaching the houses will have been filtered and purified by the trees. The herbacious vegetation will lead to an increase in biodiversity and will attract pollinators. The willow forest and water bodies increase the buffering capacity and increase the water quality. People will directly benefit from the effect that the forest has on the microclimate.

Scale 1:1000

SCENARIO AND DESIGN PRINCIPLES

7.1 Overview

This image shows a possible outcome for the design strategy. The design principles are explained by going through the plan layers.

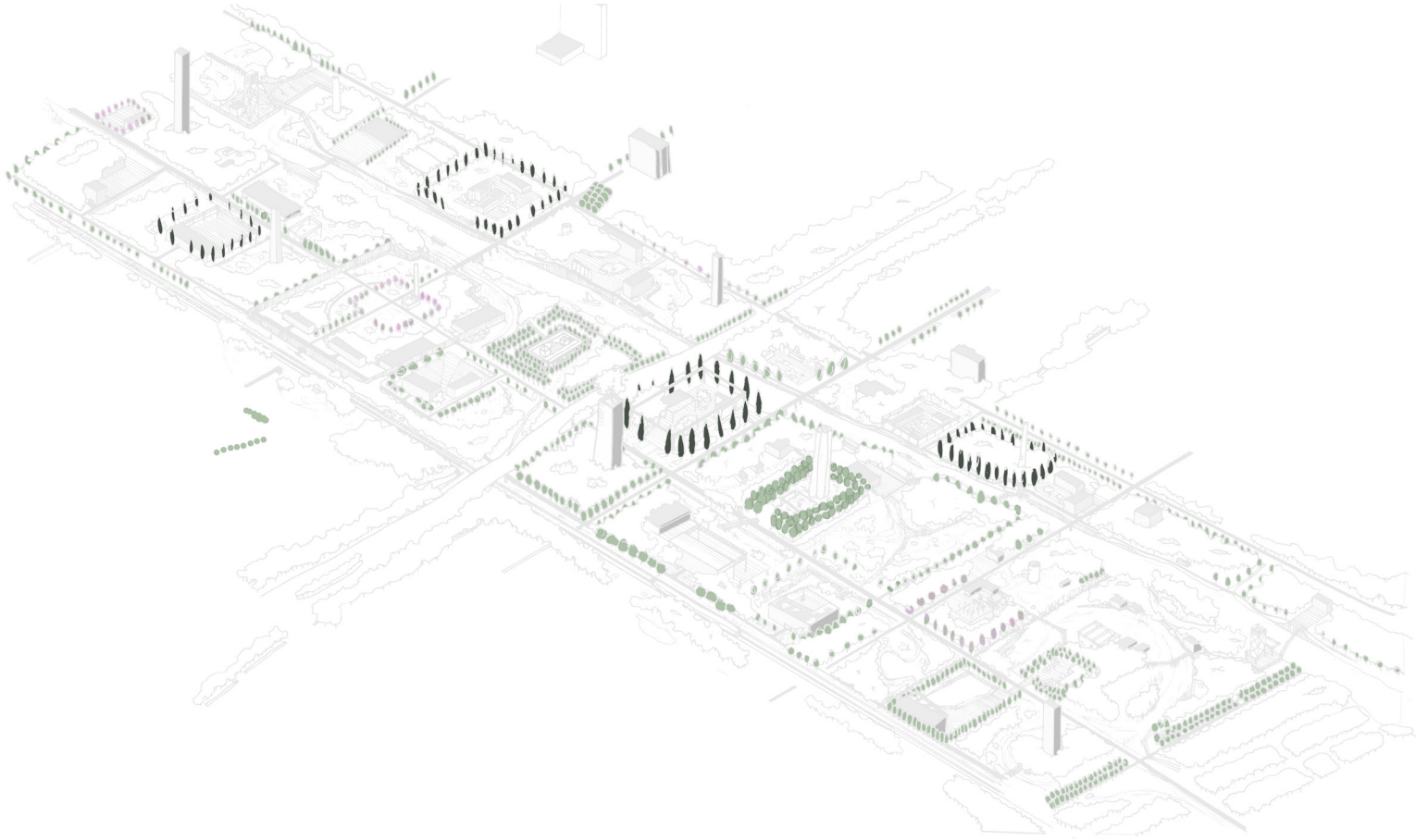


7.2 Living Frames

Besides forming a frame for the feral on the small scale, the living frames together form a composition and help structuring on the larger scale. By these repeating patterns, they make the total site more coherent.

The trees chosen for forming the Living Frames are selected mainly on aesthetics of the crown shape. They are either a tree that is commonly found in the existing landscape or a cultivated variety of a tree from the predicted forest type.

The vegetation of the Living Frames, as opposed to the feral nature, is very well maintained. The trees are pruned and undergrowth is limited to herbaceous plants and shrubbery is removed.



Lane trees on sand

Platanus x hispanica

Quercus robur ‘Fastigiata’

Betula pendula ‘Fastigiata’

Ulmus ‘New Horizon’

Lane trees on clay

Salix babylonica ‘Umbraculifera’

Alnus glutinosa ‘Pyramidalis’

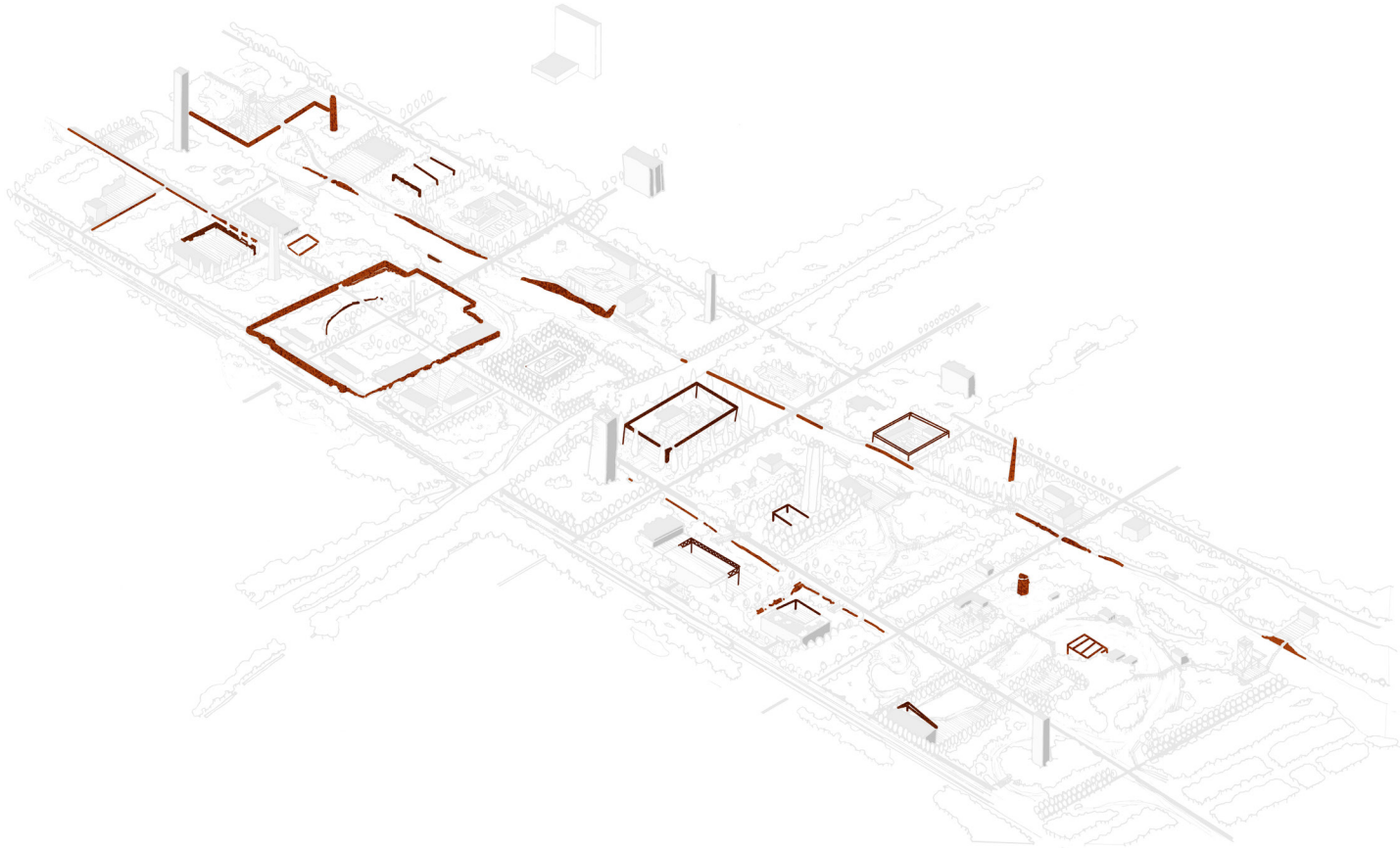
Prunus avium ‘Plena’

Populus nigra ‘Italica’

7.3 Industrial Frames

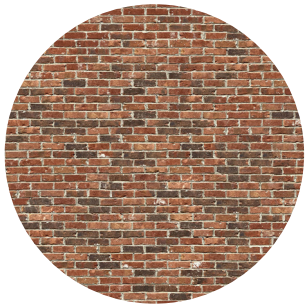
The Industrial Frames compositionally aim to achieve the same as the Living Frames; to structure the area and bring coherence in the forest. Culturally, they perserve the industrial character that defines the history of this place.

These industrial materials are very suitable for forming orderly frames, since it's harshness and ruggedness form a strong contrast with the softness and texture of the vegetation.



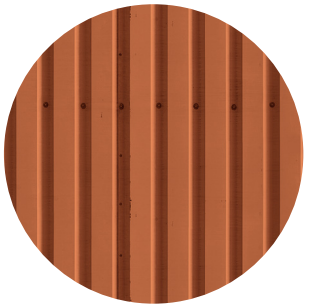
Rusted metal/corten steel

Concrete



Brickwork

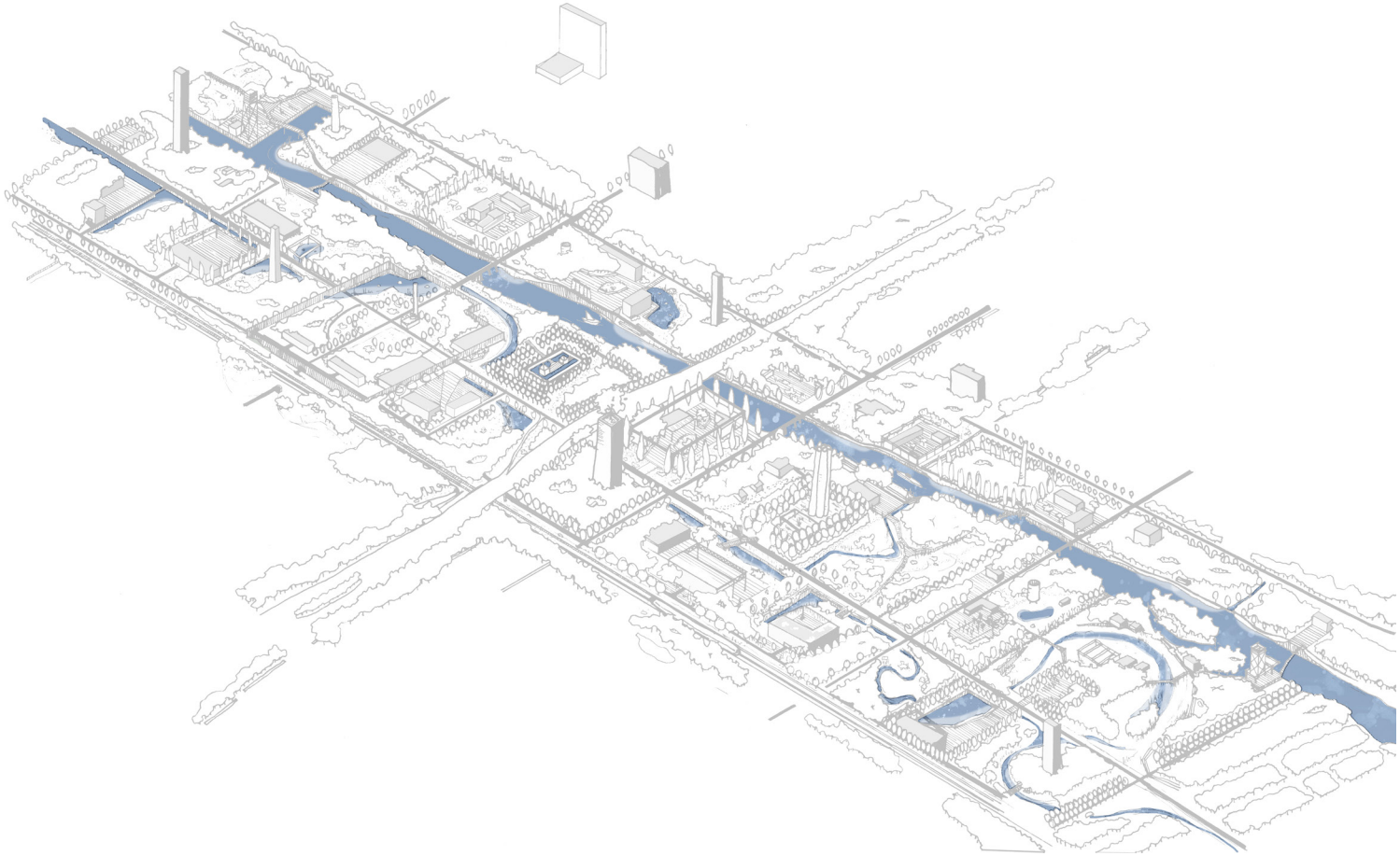
Stelcon tiles

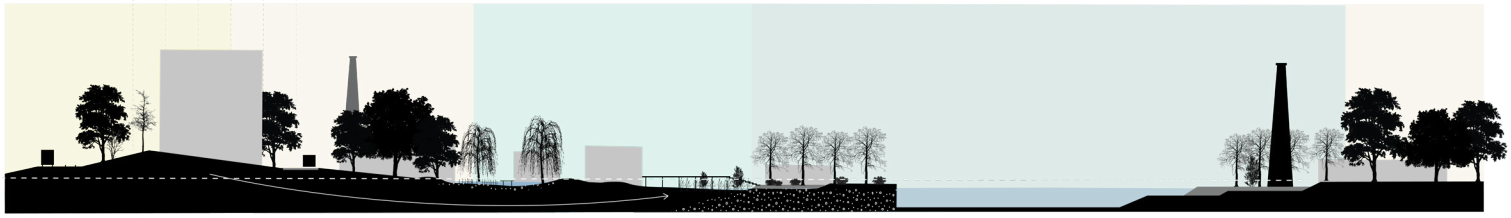


Corrugated metal

7.4 Watersystem

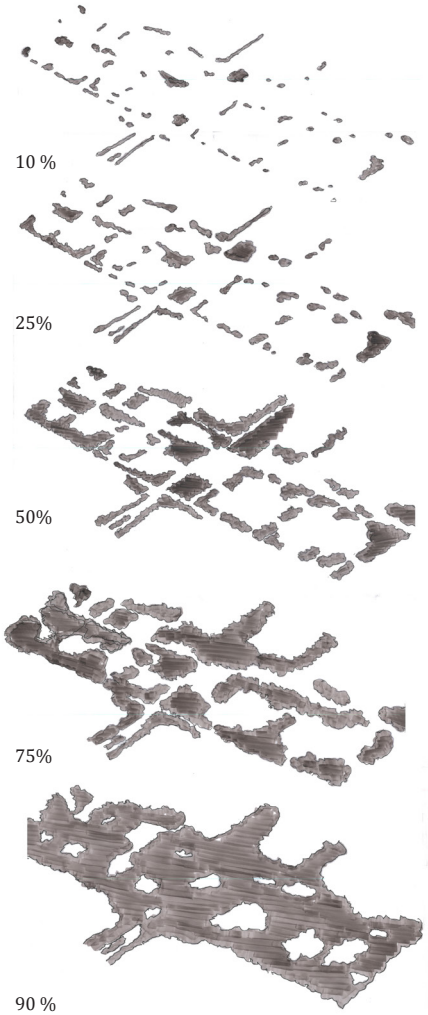
The water system is important for diversifying the overall conditions and climate adaptation. The design utilises the underlying traces of the river landscape in the subsoil. During the transformation, the water bodies function as retention ponds, so the water level is dynamic, which will result in willow forest. It needs to be kept open in favor of water flow. This can be done by grazers or by maintainance. Once the transformation is complete and the water system is fully connected to the surrounding neighbourhoods, the water level will be stable, resulting in alder forest.

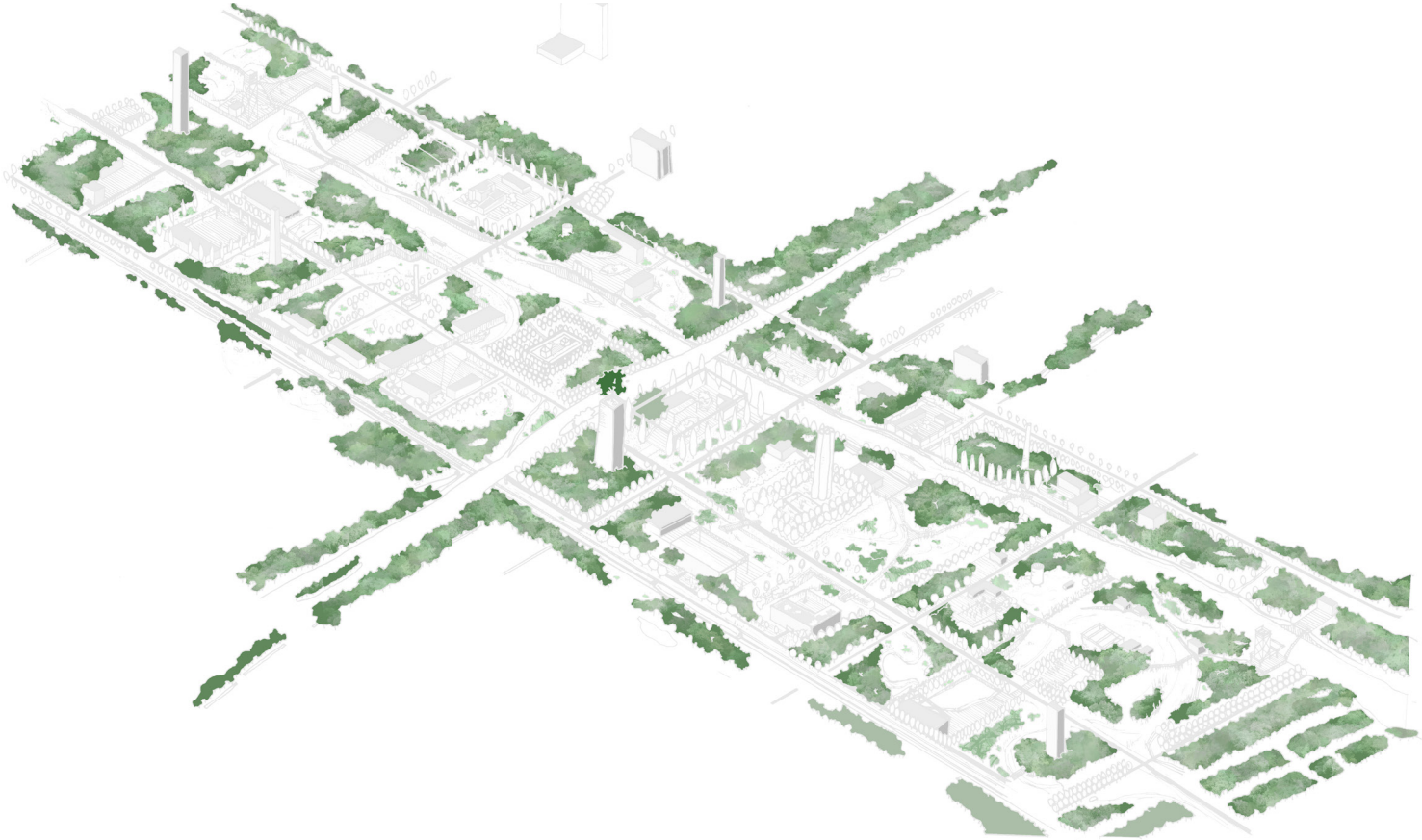


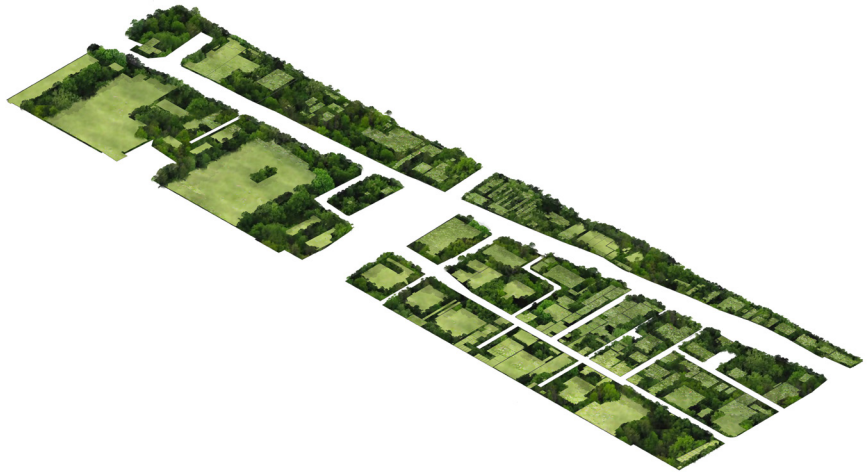


7.5 Forest structure

The forest structure is based on the drawing on the bottom-right, that shows the forest structure in the scenario that all space between plot boundary and building contour would be developed to forest, with alterations made in order to create more coherent spaces and vista's towards industrial relics. The ratio of forest/ open space is balanced, in a way that it is a coherent but still varied landscape.





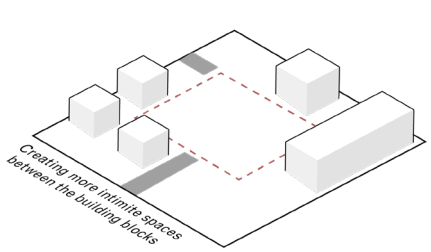


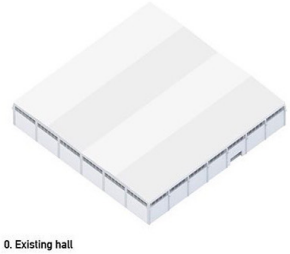
7.6 Urban Plan

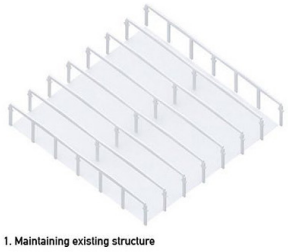
The new housing developed within the existing building contours aim to form a square-like space in the centre of the contour. In this way the housing is also in located in the forest edge, so that they are not excluded from sunlight.

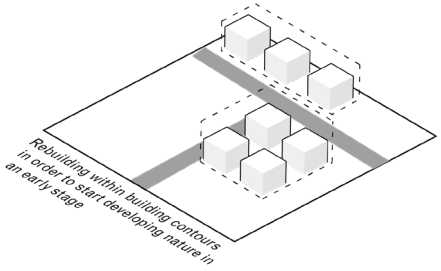
Furthermore the there's a few highrise buildings that look out over the forest. Compositionally they speak the same language as the preserved chimneys, blending into the landscape and increasing the housing capacity without claiming too much space.

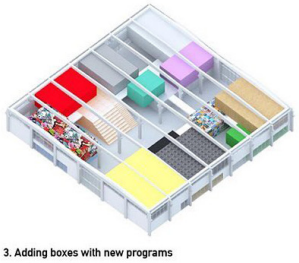
The density of housing is highest in the north, closer to the city center. As you go south towards Abtwoudsebos, this density decreases and the urban forest becomes less urban and more forest.







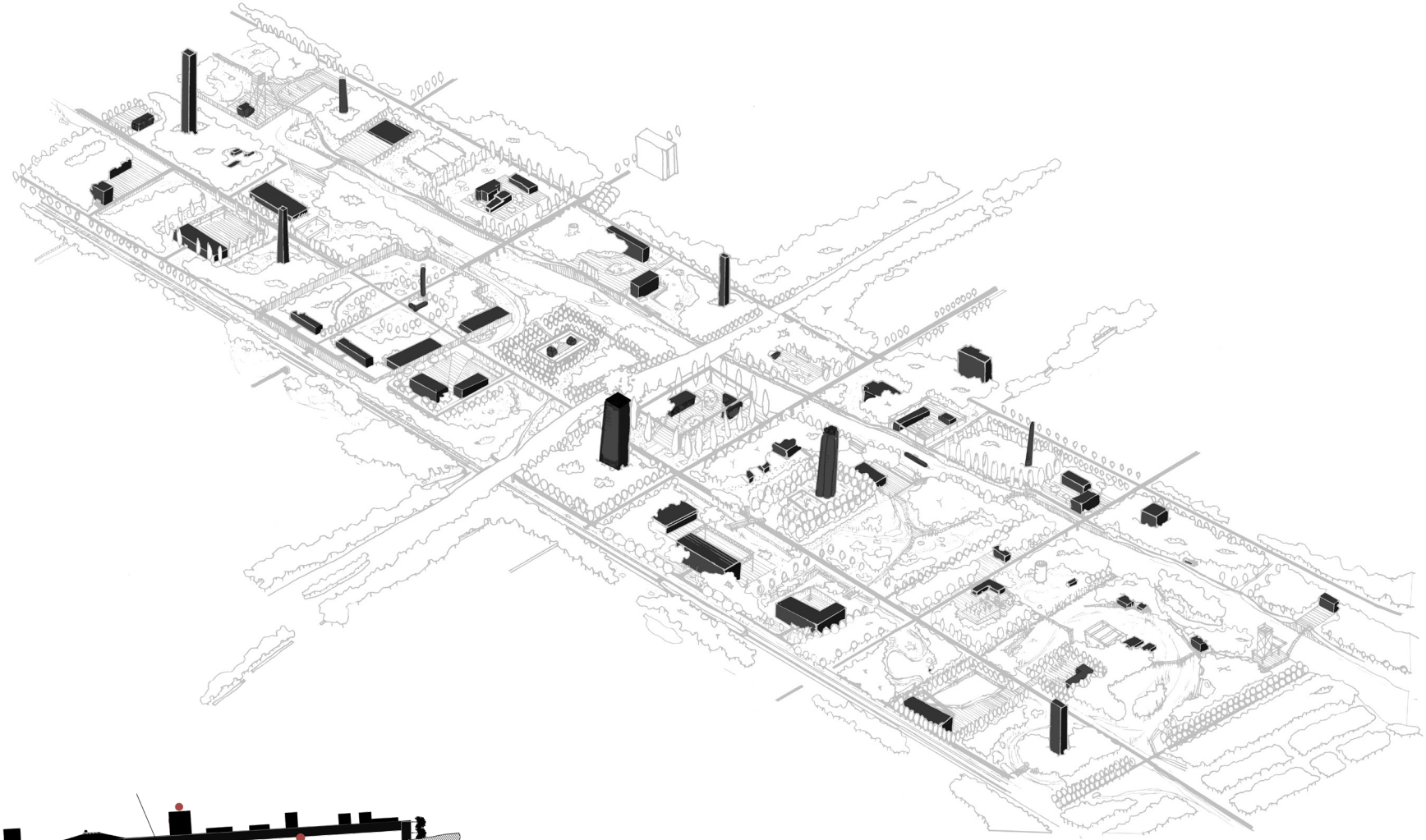


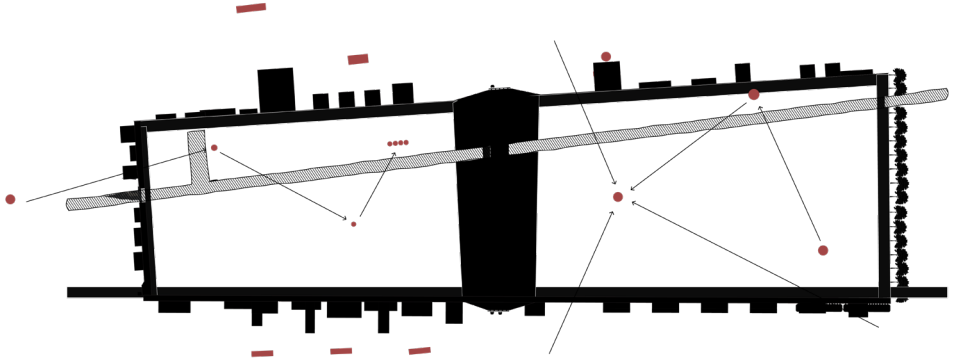


source: MVRDV

Current amount of planned housing Schieoevers	8.000	North
	4.000	South
	12.000	Total
Total area Schieoevers	118,3 ha	
Total area - infrastructure - Schie	96,9 ha	
Total current built area	16,6 ha	North
	22,8 ha	South
	± 40 ha	Total
New situation - ±35% of the built area redeveloped	± 14 ha	

Scenario's (% of built area programmed for housing)	**50%**	**75%**	**100%**
	7 ha	**10,5 ha**	**14 ha**
95% of 5 layers average	33,25 ha	50 ha	66,5 ha
5% of 12 layers average	4,2 ha	6,3 ha	8,4 ha
Total area redeveloped for housing	37,45 ha	56,3 ha	74,9 ha
Amount of houses (65 m2 average)	**5.761**	**8.662**	**11.523**
Area for nature development	73 ha	69,5 ha	66 ha

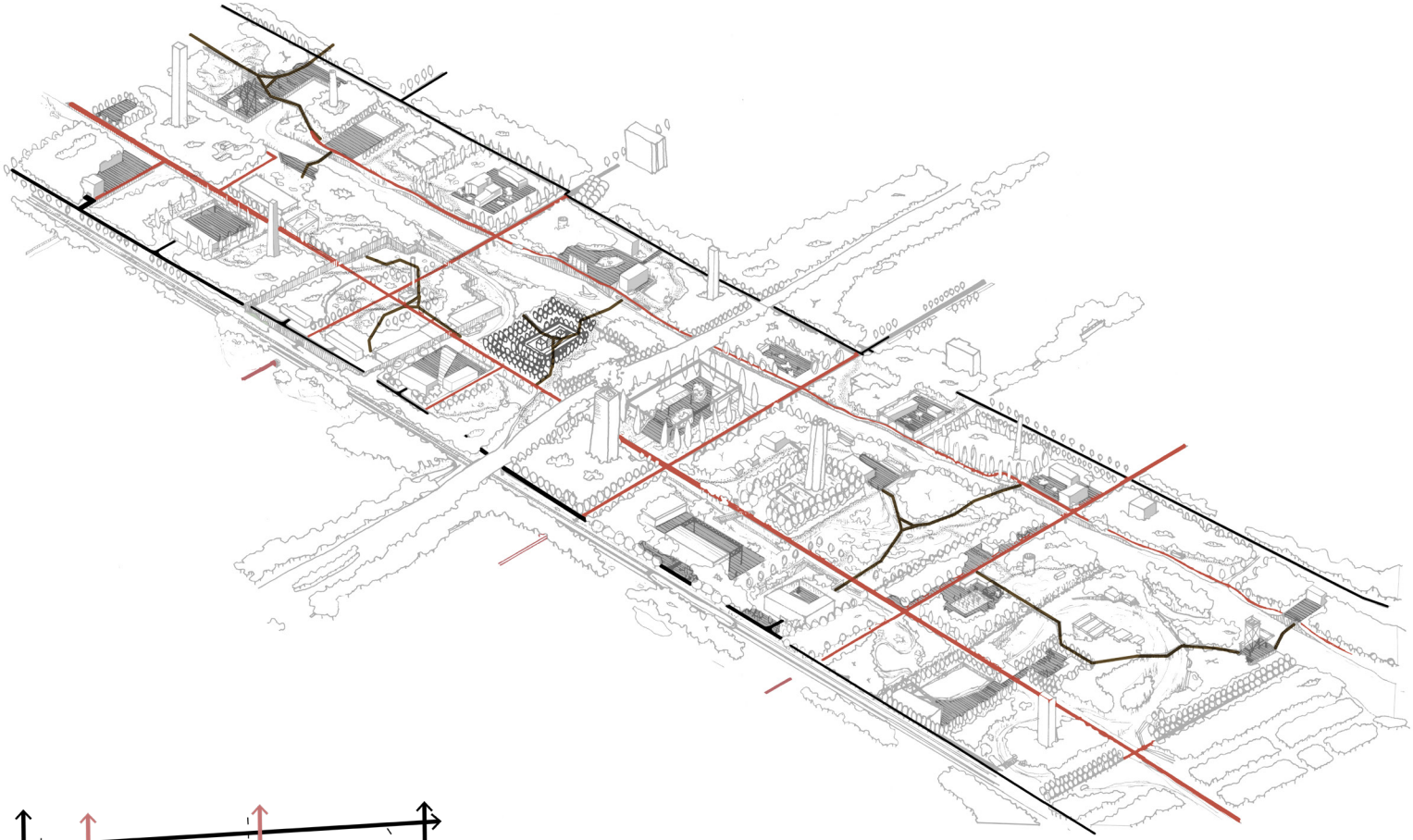


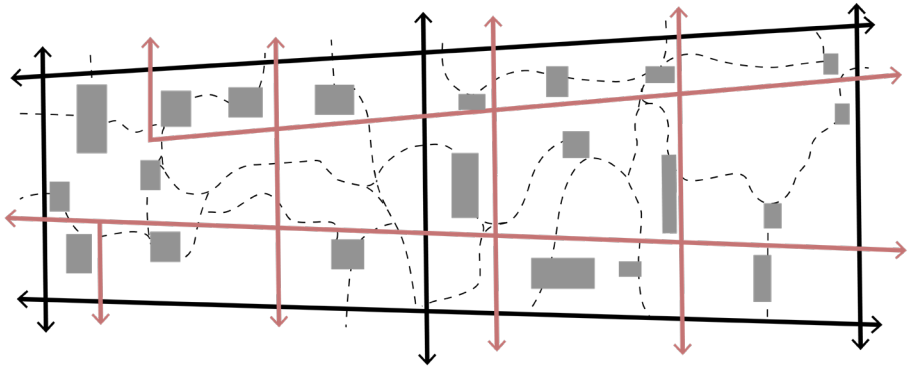


7.7 Infrastructure

There's a clear, primary road structure that connects to the urban courtyards and surrounding neighbourhoods. Eventually, car traffic will only be able to drive and park along the outer edges of the area as to minimize it's disturbance within the urban forest. The bicycle track however, has the capacity to support occasional car traffic for logistic reasons.

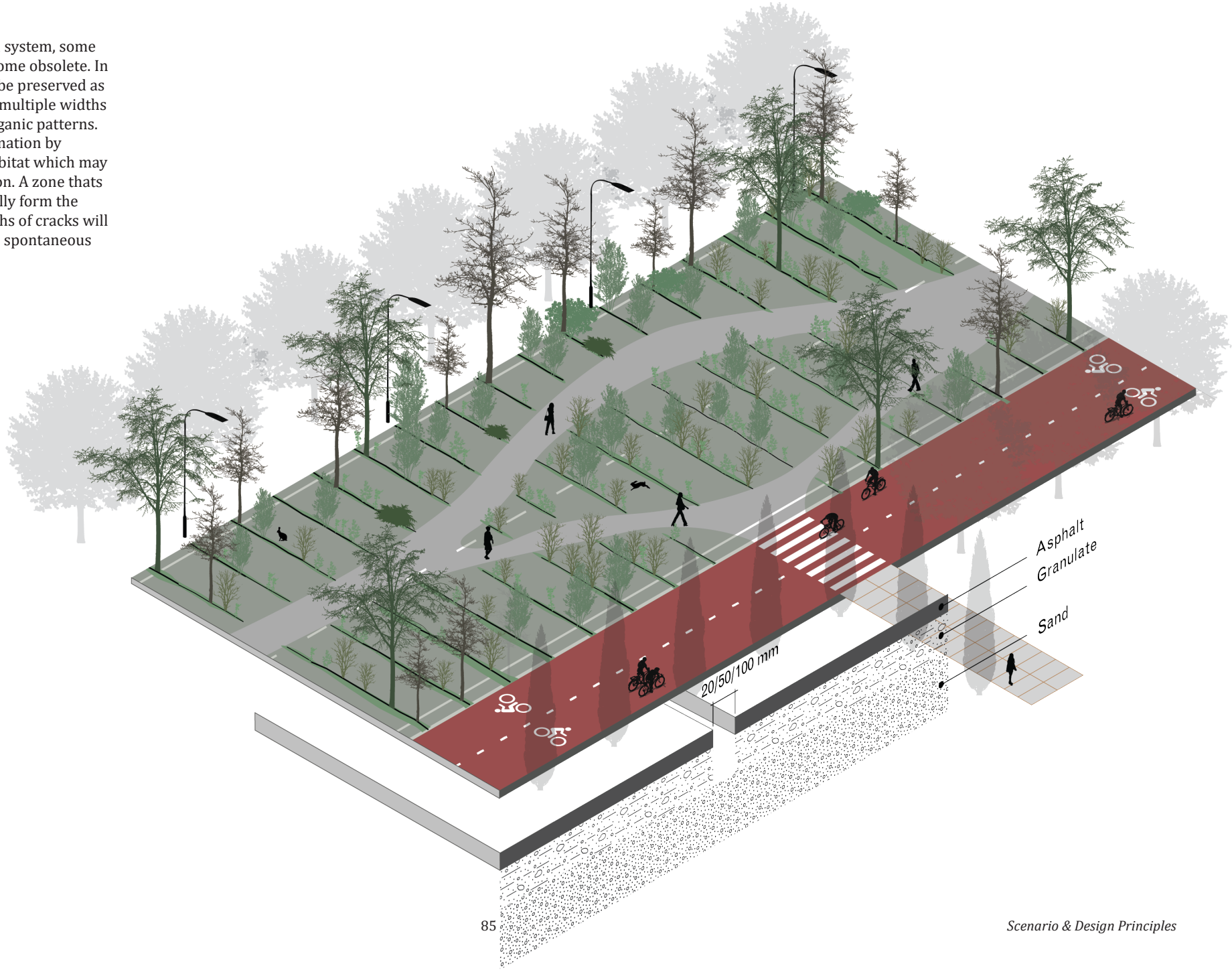
Then a more informal second path system allows recreational passage through the area. It consists of mowed paths, semi-paved paths and raised walkways. These routes pass by the preserved industrial relics and through the forest.





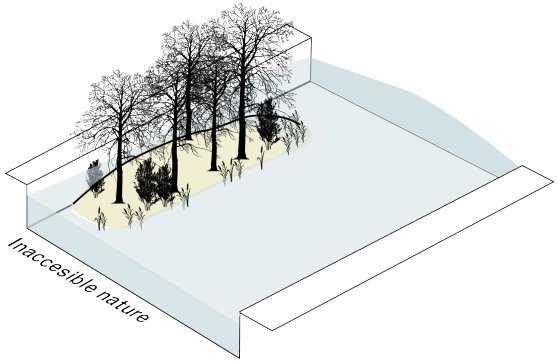
7.7.1 Obsolete roads

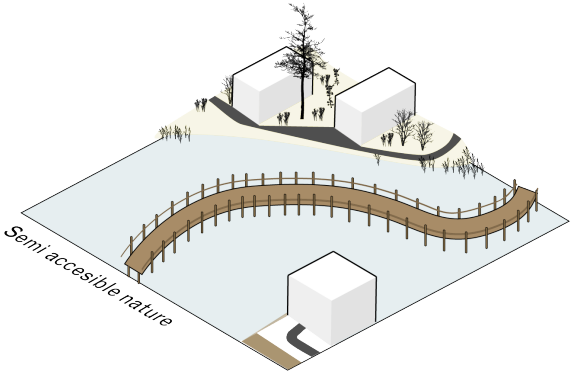
With this new infrastructural system, some of the existing roads will become obsolete. In the transformation they will be preserved as Orderly Frames. Cracks with multiple widths are made in the asphalt in organic patterns. This will speed up the reclaimation by nature, introducing a new habitat which may result in interesting vegetation. A zone thats free from cracks will eventually form the foothpath. The different widths of cracks will preserve a layeredness in the spontaneous vegetation.



7.7.2 Infrastructure in relation to nature

Some of the forest areas are chosen to be completely free from human disturbances. But instead of prohibiting entrance, or building fences around it, topographical boundaries will be introduced, like retaining walls or water bodies. In this way, the areas are inaccessible without visitors feeling unwelcome.



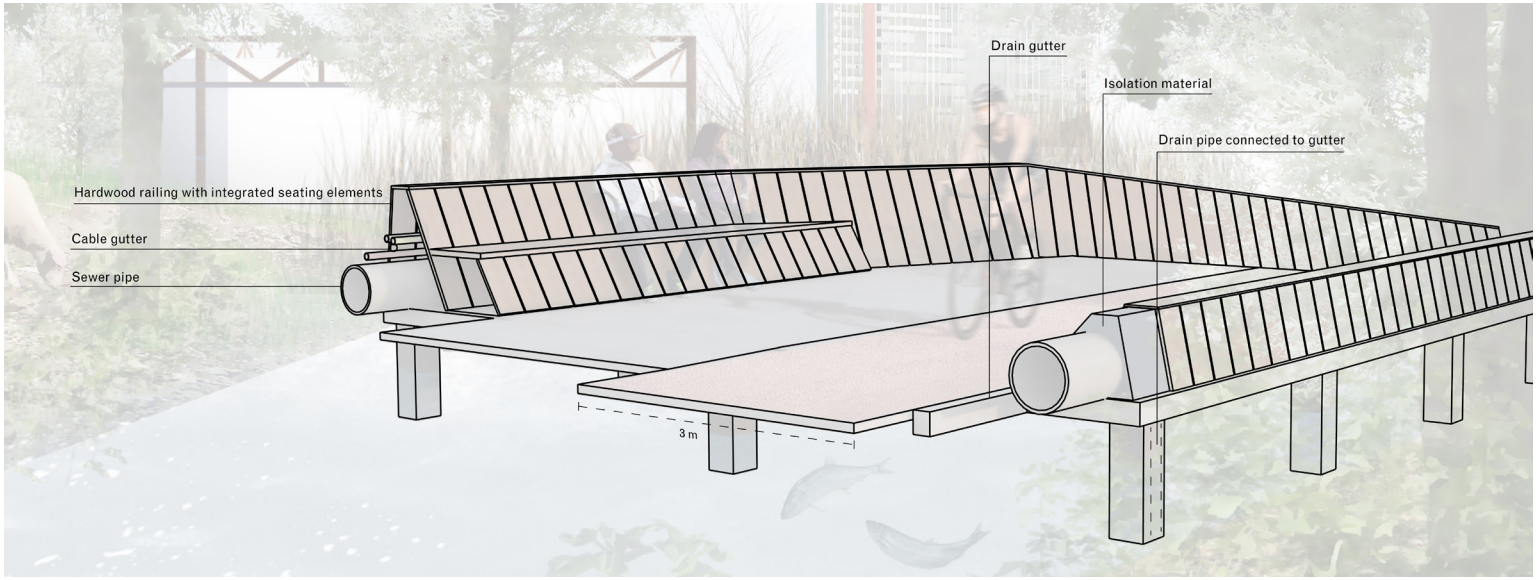


> Car lane is pushed to the outer edge, with parking on ground level of the building

7.7.3 Raised walkways

The raised walkways reduce the amount of ground level area we have to occupy so there's more space for nature development. It can also be seen as one of the orderly frames, because it brings structure to the forest and literally frames the views. And it allows movement through the forest while minimizing its disturbance.

These walkways also carry the previously underground infrastructure, so there's more space for roots to grow and connect. The walkway is integrated with seatings on locations with vista's.



GUIDING THE PROCESS

8.1 The Urban Forester

The strategy for development is built around being flexible towards the forest development. We can never accurately state how the forest will develop over the large stretch of time. This makes it more difficult to set up a maintenance plan for the area. That's is why on-site management is needed. An Urban Forester would be the mediator between ecological and social needs. This means that the Urban Forester doesn't just need knowledge of the natural world, but also about the social needs in relation to this natural world, meaning knowledge of safety, and aesthetics.

<u>Goals</u>

> Mediating between ecological and social needs
> Maximizing diversity
> Minimizing disturbances

The Urban Forester

<u>Knowledge</u>

> Flora & fauna, ecosystem services
> Succession
> Social needs, safety, aesthetics

<u>Activities</u>

> Maintaining Living and Industrial Frames
> Forest rejuvenation/preserving layeredness
> Tree selection & support
> Organising and guiding community maintenance

Trimming edges

Pruning lane trees

Select & Support

Forest rejuvenation

Herding

8.2 Urban Grazing

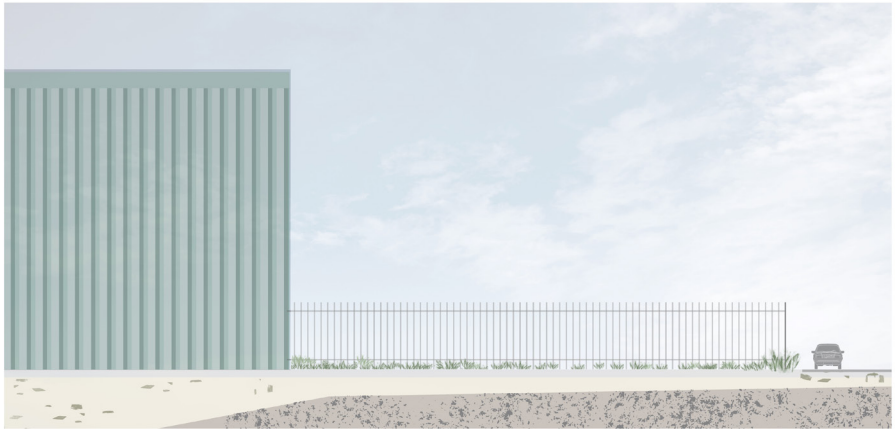
Parts of the forest are maintained by grazers. For example the willow forest along and inside waterbodies will need grazing in order to avoid the vegetation becoming to dense and stop the flow of water. They will also help in maintaining spatial variation and layeredness of the vegetation.

Furthermore grazers are more selective then the mowing machine, which will result in higher biodiversity. Also they will help the spread of seeds, provide the soil with organic fertilization and promote man-animal interaction.

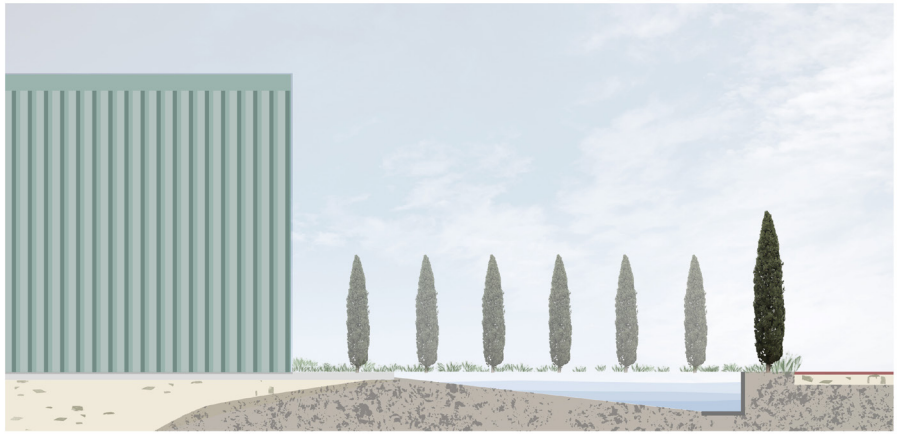
Retaining wall as the boundary of a maintenance zone

8.3 Strategy and natural process

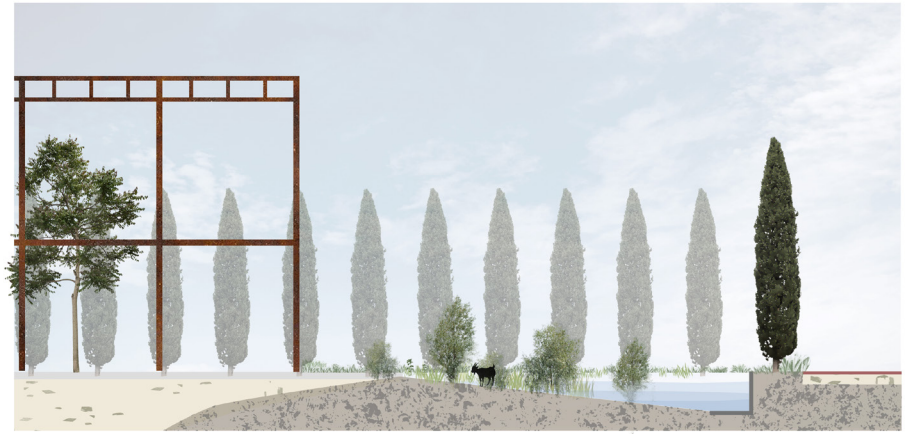
This sequence of drawings shows an example of how the strategy is integrated with the successional forest development .



> Plot is in industrial use, clay in the subsoil is covered by 1m of sand



> Plot is vacant, groundwork is done through cut and fill and Living Frames are planted



> During development, the basins function as retention pond. Therefore the waterlevel is dynamic, which will result in a willow successional course. It needs to be kept open in favor of water flow. This can be done by grazers or by maintainance.

> The plant community of the willow successional course is specialized in capturing nitrogen, and some can even capture industrial pollutants

> Once the transformation is complete and the water system is fully connected to the surrounding neighbourhoods, the water level will be stable, resulting in alder forest

8.4 Rejuvenating the forest

As mentioned earlier, in order to maximize biodiversity we need diverse space and time. Diverse space meaning a diversity in starting conditions, diverse time meaning a diversity of succesional stages. Over the first decades this diversity in successional stage will occur naturally, due to the patch-by-patch development strategy there will be a natural balance in pioneer vegetation, shrubbery and woodlands. Once the plots start developing towards a climax stage, most of the forest will have become woodland. Since the goal is diversity, 'doing nothing' is not the most suitable maintenance strategy.

Rejuvenation is a process that occurs in natural circumstances too, like during storms, floodings or forest fires. By strategically rejuvenating the climax forest, we structurally allow for earlier successional stages to be present throughout the entire course of development.

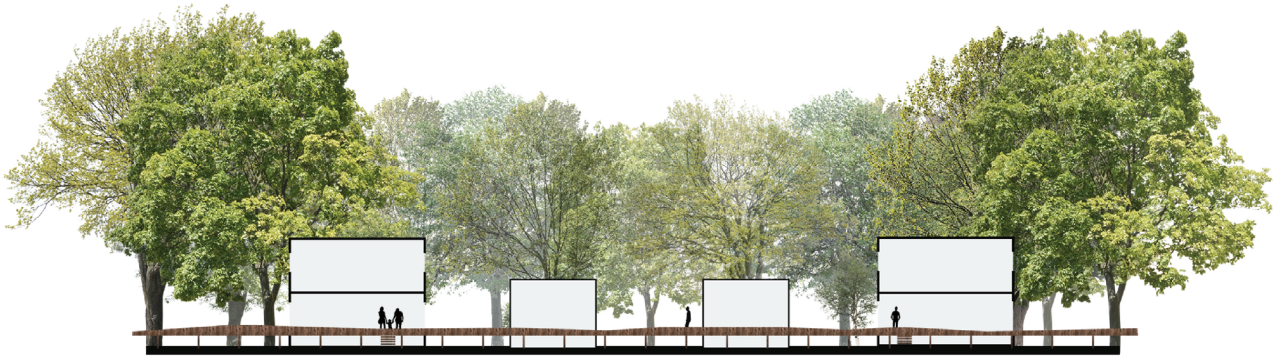
At the same time, this strategy allows for more efficient carbon fixation, since young forest captures more carbon than old forest, and the harvest of the old forest can be preserved and put to new use, or be left on site to be consumed in order to increase biodiversity even more.

Finally, this strategy can be incorporated with a solution for temporary housing. The open spots in the forest could be used for small-scale housing for a period of 10-20 years as shown here.

> 'doing nothing' leads to a less diverse closed phase in the forest

> the patch to rejuvenate is selected by the forester based on ecological quality and speed of growth

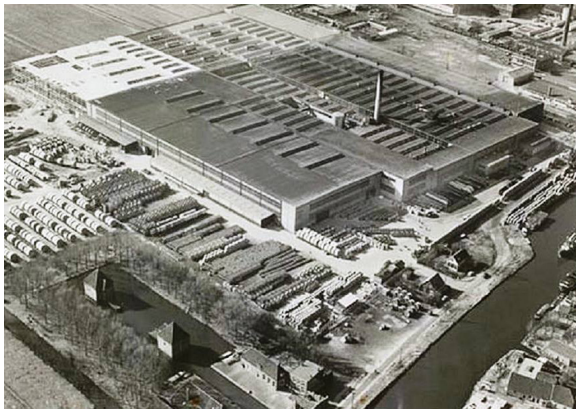
> open spaces in the forest make for a more interesting spatial differentiation



> the open space can be temporarily occupied by mobile/tiny houses

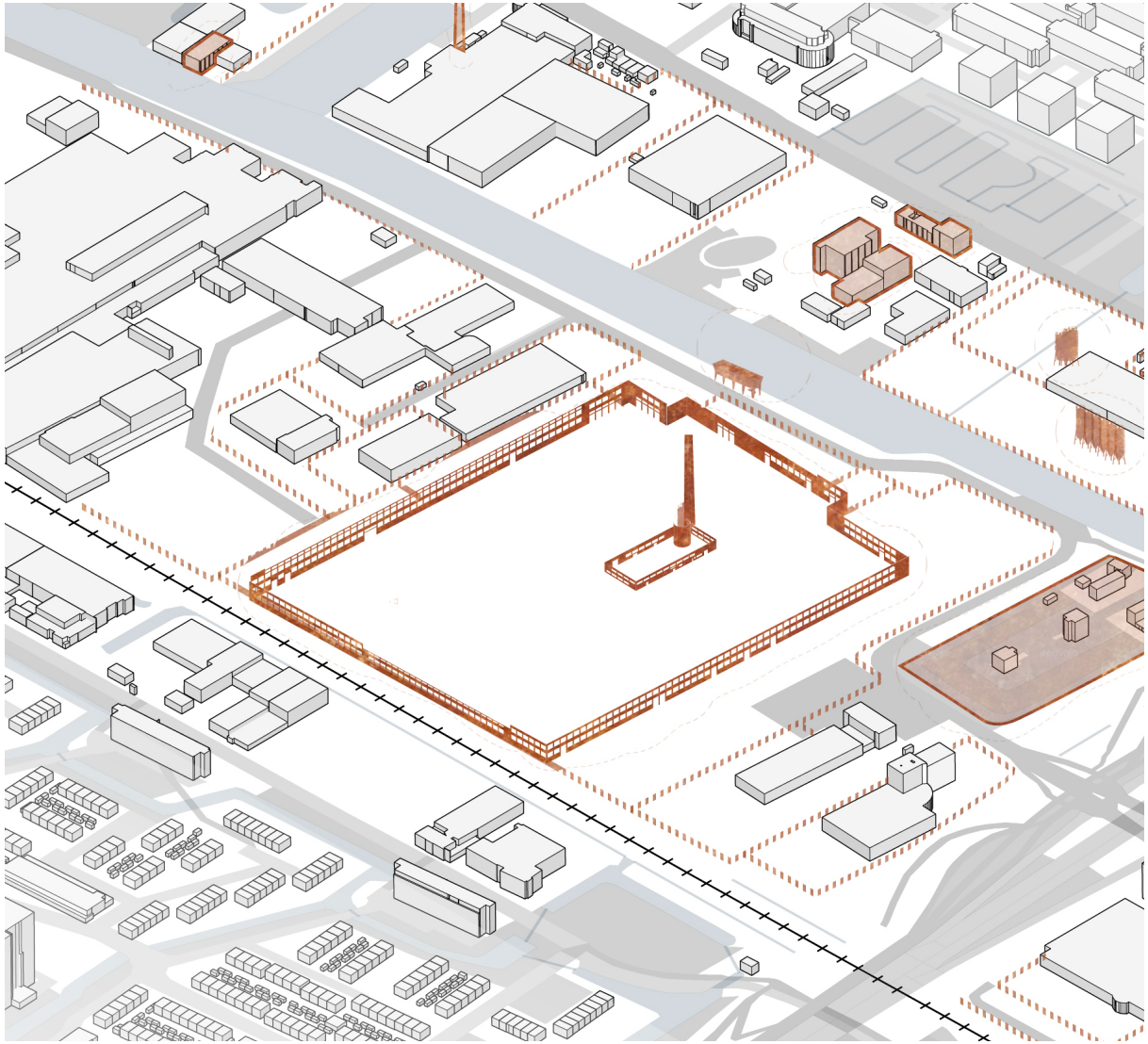
> the open space allows for more ground covering vegetation and shrubbery to grow

THE STARTING POINT



Kabelfabriek in 1958

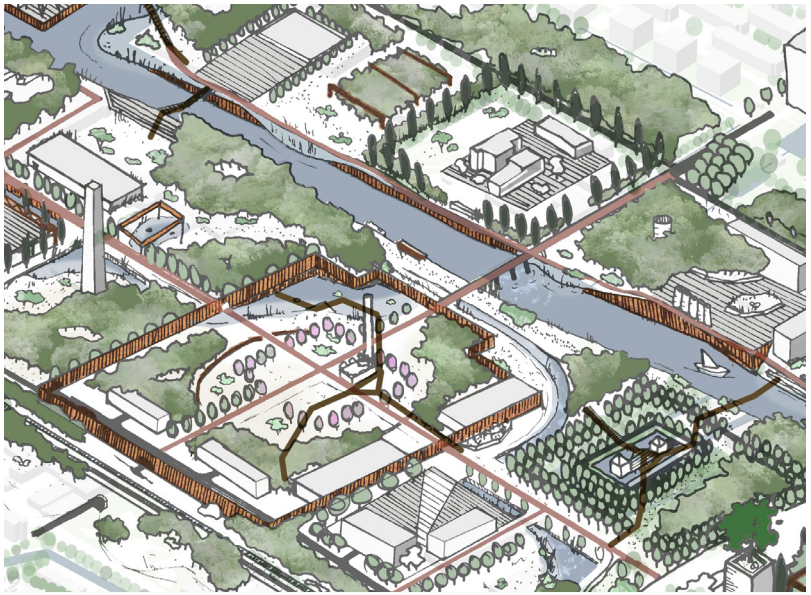
Brickwork facade



The Kabelfabriek makes for a suitable starting point of the transformation, as it is currently vacant/under temporary use, and it's located on a key location, inbetween train station Delft Campus and the TU Delft Campus. Plans for building a bridge in front of the old factory have already been made.

Furthermore the factory dates from the early industrial era, which means it's made mainly out of brickwork, giving it a rustique industrial look.

9.2 Vision



Since this is the largest plot and the starting point for the transformation, this is the transformation that should inspire and encourage the rest of the transformation, so a large gesture is needed. In this plan the entire facade of the building is preserved and it will serve as one enormous orderly frame for the urban forest development that will happen within.

> Facade as a Frame for Forest Development

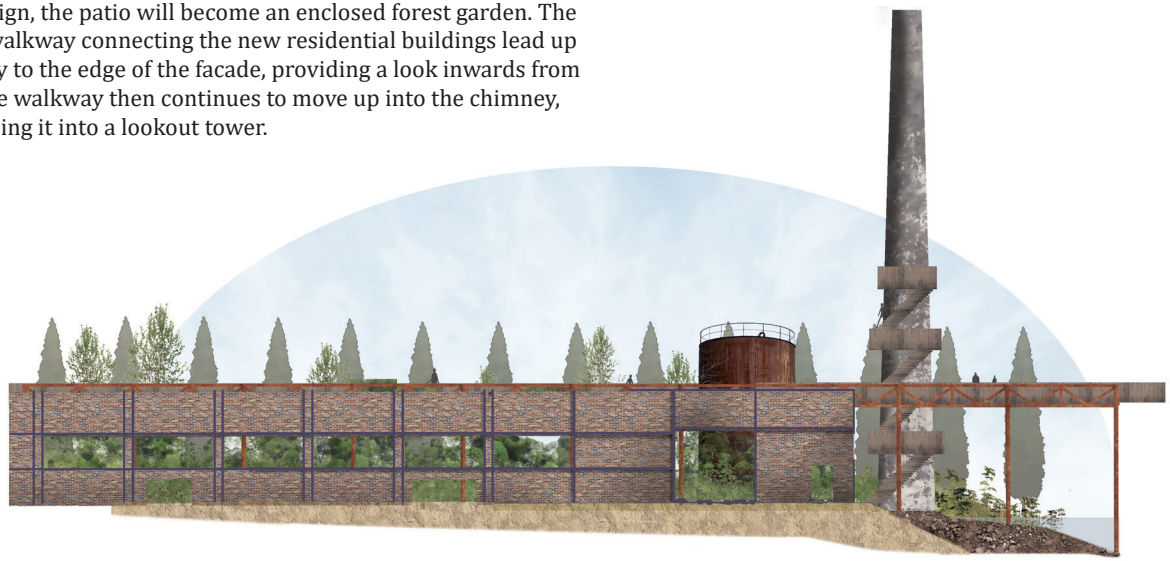
Urban Wetland

On the north-east corner of the building there's this area I'd like to call an urban wetland. I think its the perfect visible example of the power of natural processes, and therefore I wanted to include it in the design.

9.3 The Patio

The facade surrounding the patio of the Kabelfabriek will be preserved in order to form a central vocal point of the plot. It contains a very characteristic rusted oil container.

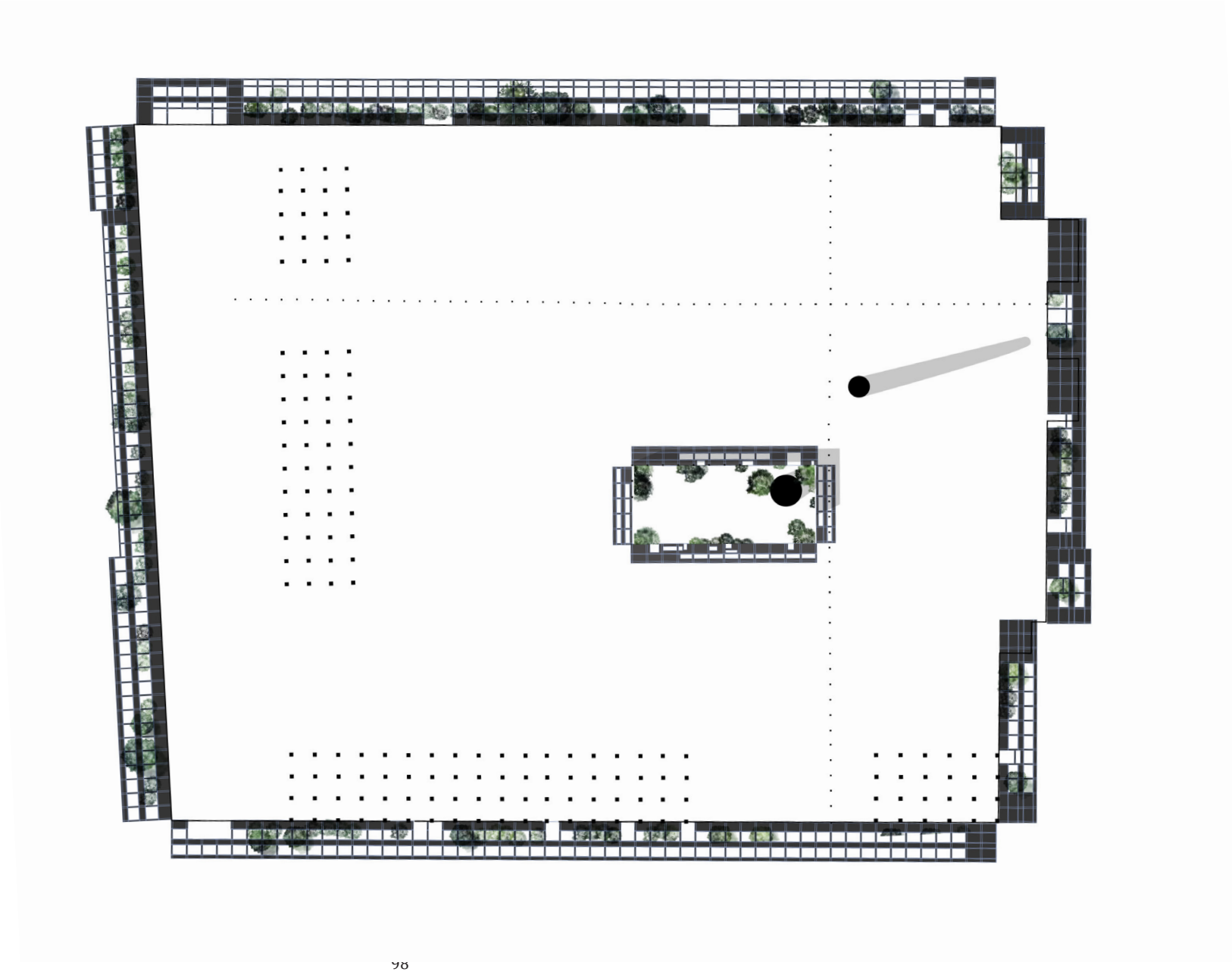
In the design, the patio will become an enclosed forest garden. The wooden walkway connecting the new residential buildings lead up all the way to the edge of the facade, providing a look inwards from above. The walkway then continues to move up into the chimney, transforming it into a lookout tower.



9.4 Design & Phasing

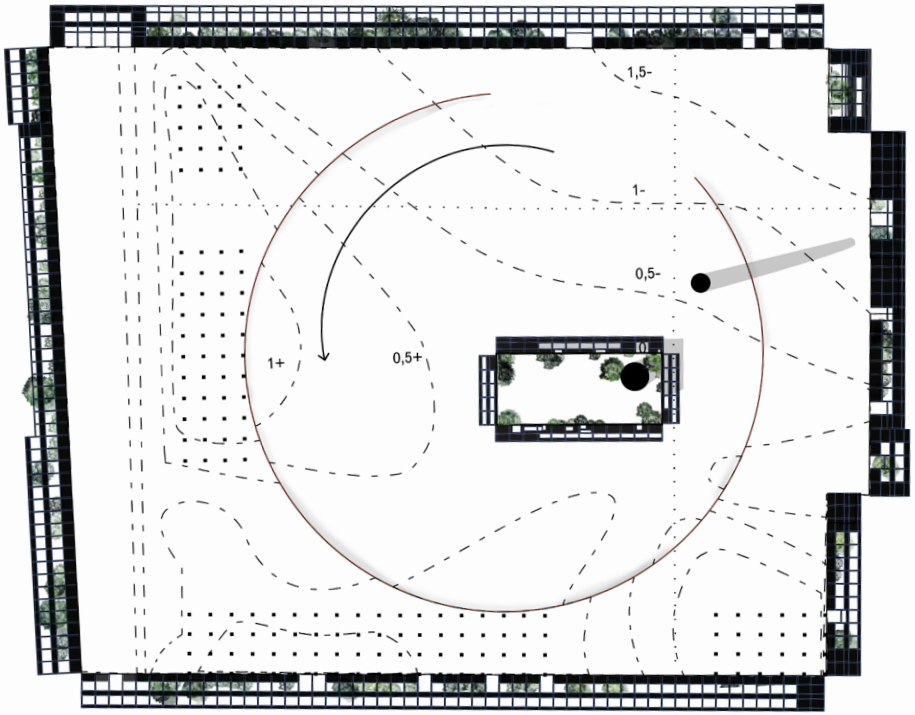
Phase 1 - Preserving Frames and Landmarks

During the demolition phase, the facades, parts of the construction and vegetation are preserved. They will form the orderly frames for the development. Also the chimney and the silo are preserved, they play an important role in wayfinding in the Urban Forest.



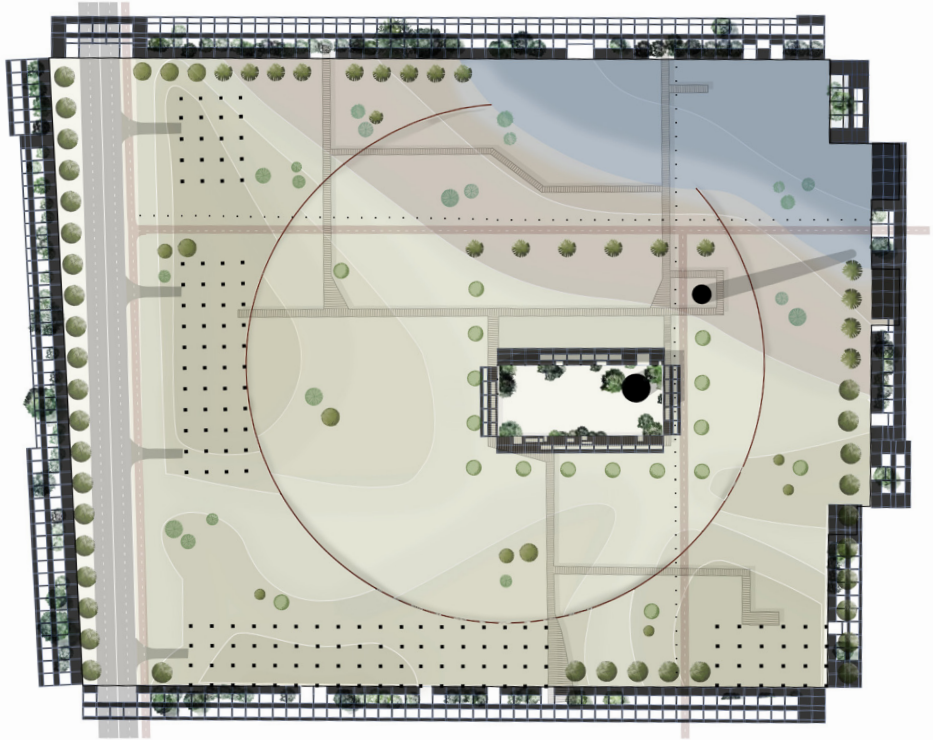
Phase 2 - Shaping conditions

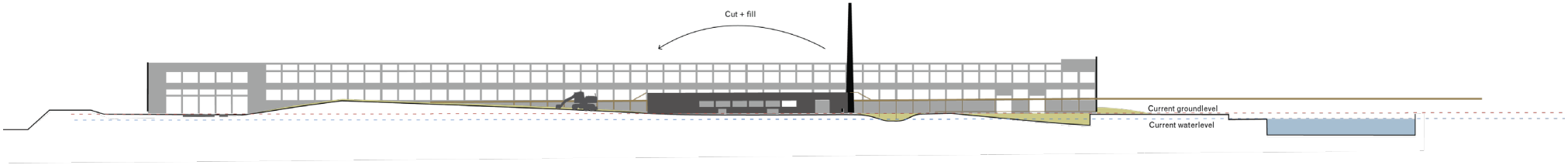
By excavation on the north-east corner of the building contour, the clay layer is exposed and the urban wetland is drawn in. The excavated sand is used to create faint hills across the rest of the plot. During this phase, the retaining wall is placed.



Phase 3 - Planting Living Frames

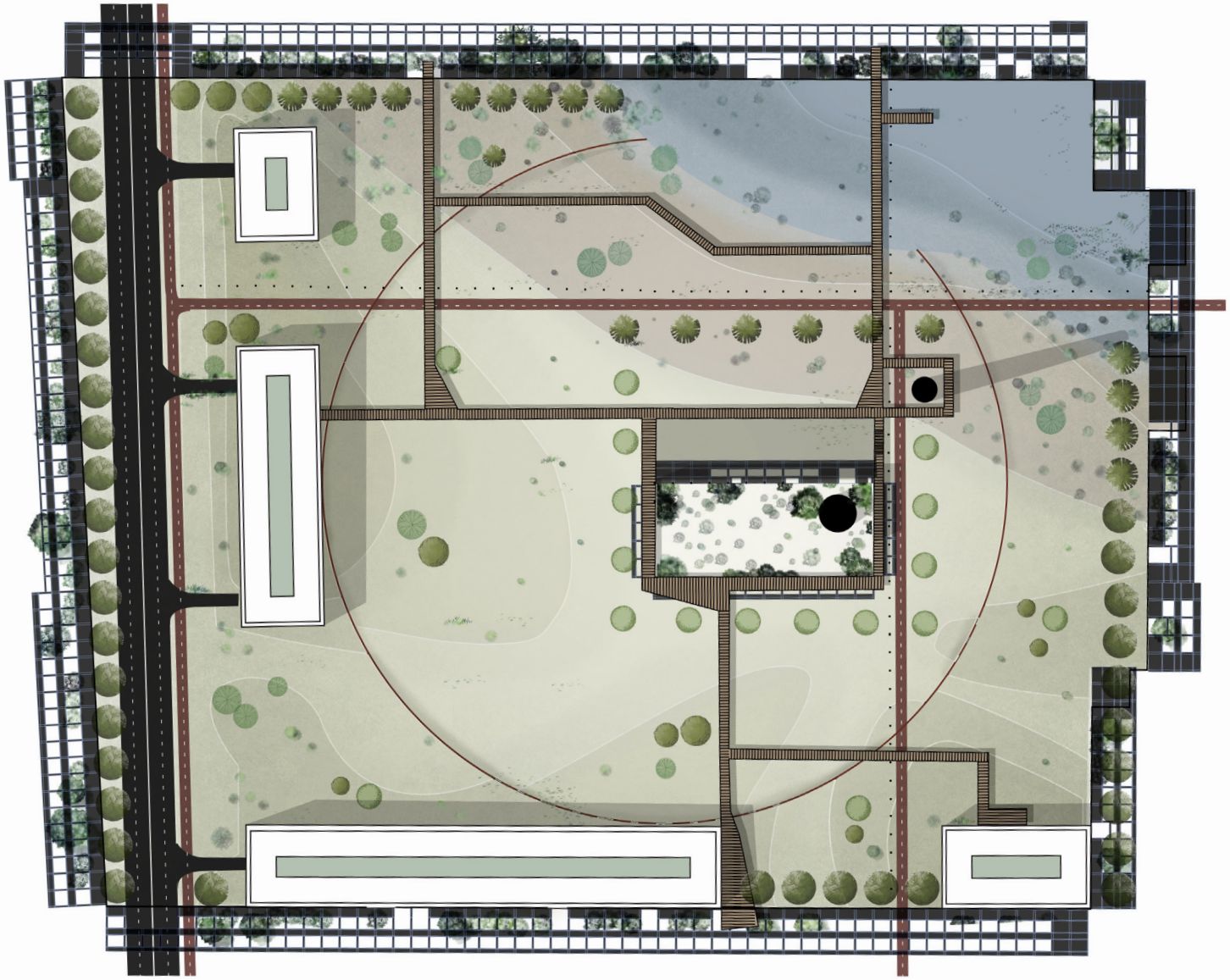
Within the same year, the lane trees of the Living Frame are planted along the contours. Furthermore there's clumps of trees being planted, that will guide the future infrastructure and lines of sight. From this point the vegetation will while the planning of building the built environment is being done.





Phase 4 - Ready for occupancy - Grassland stage

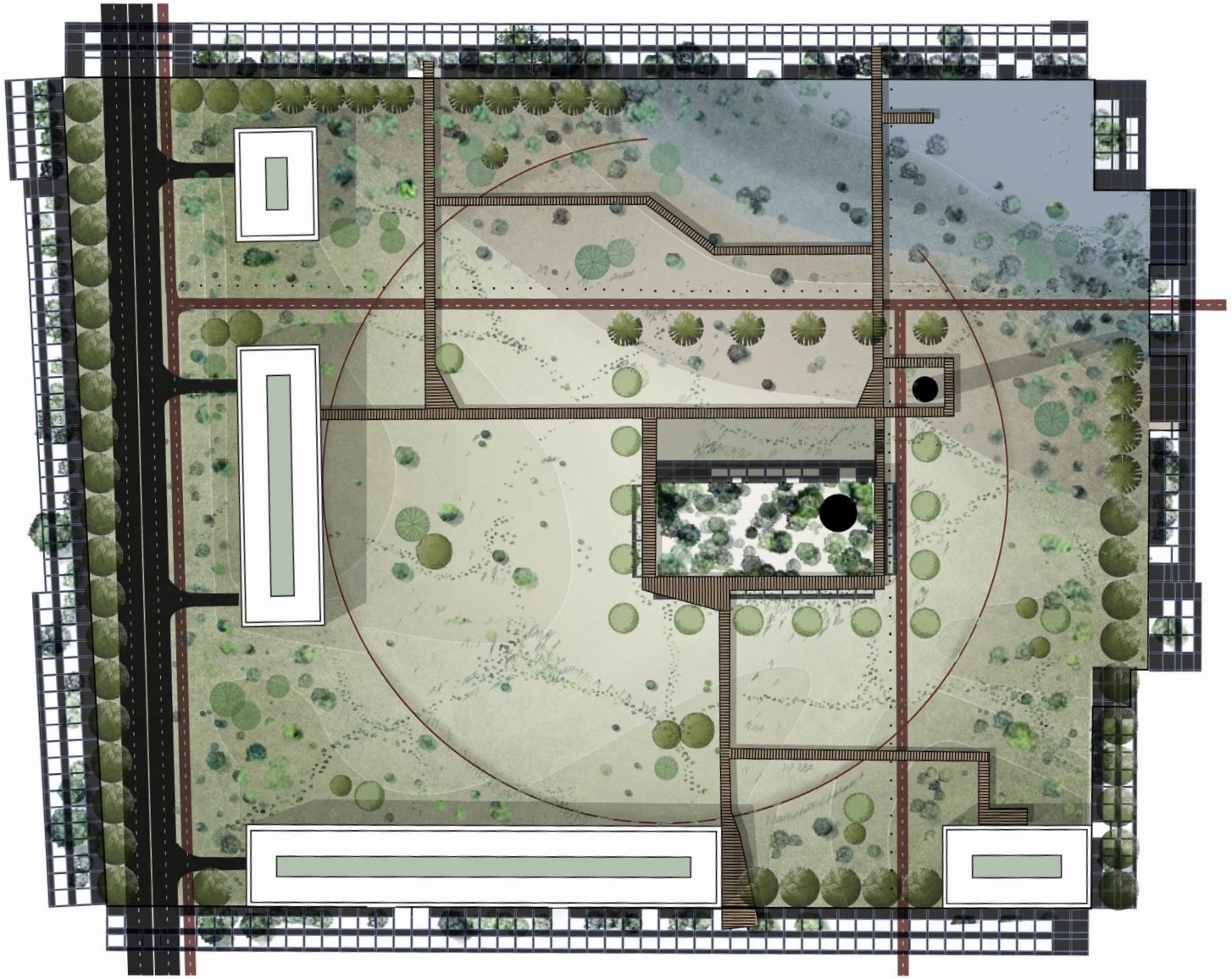
Within several years, the appartment complexes will be realised. Within these complexes there's private gardens for the residents. Large parts of the ground level will already be covered with a large variety of herbacious vegetation and occasional shrubbery.



Phase 5 - Fifth Nature - Managed Urban Woodland - Shrubland Stage

The willow forest will develop significantly faster than the birch-oak forest due to the high availability of water and nutrients.

Because of treading in the centre, natural desire paths will occur on the ground level.



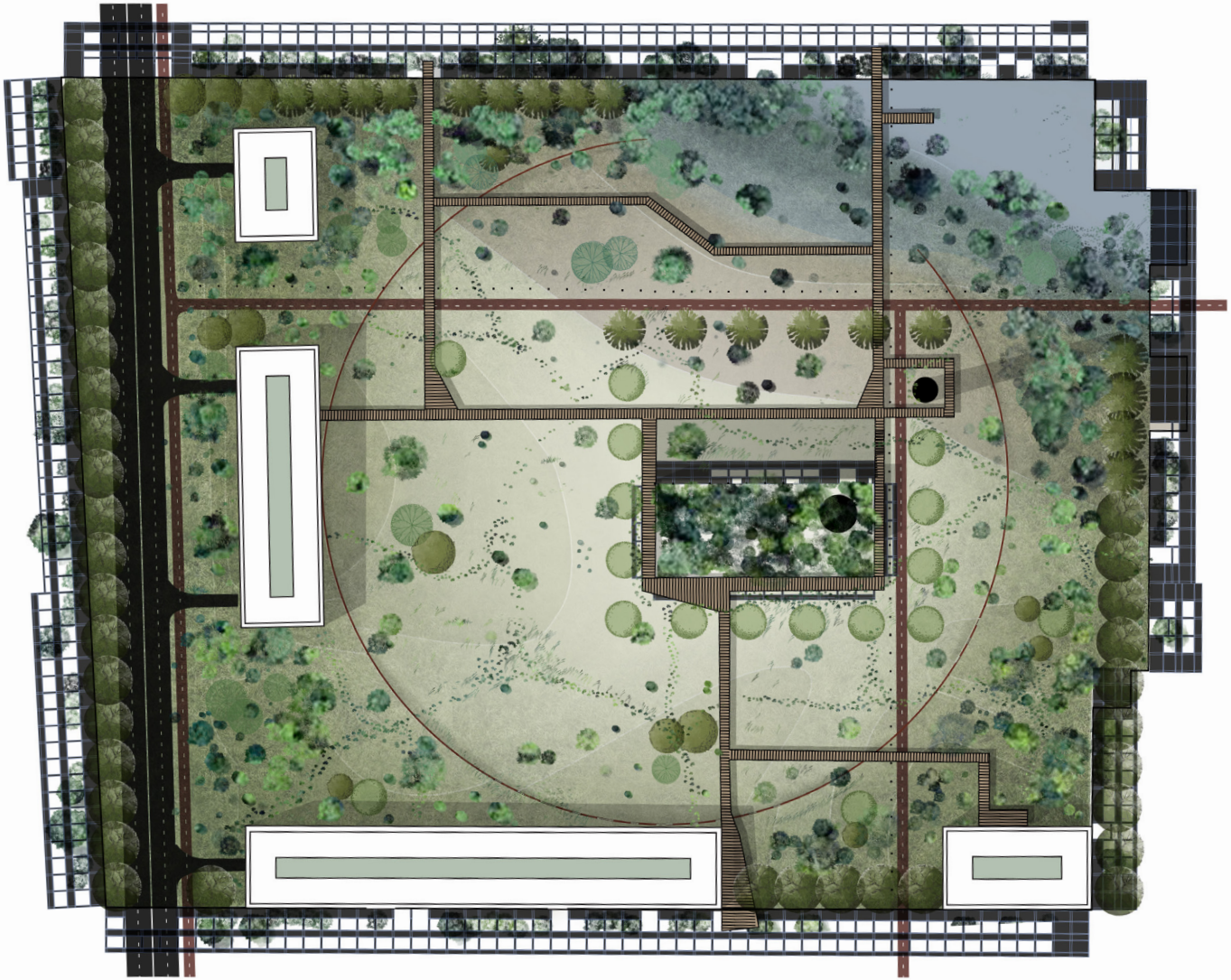
Phase 6 - Sixth Nature - Ecological/cultural hyrbid - Young Forest Stage

In about 30 years, the Kabelfabriek terrain will have developed to an Urban Forest, the mediate between people and nature, balancing on the midfield between control and letting go. The Orderly Frames bring culture where the Messy Ecosystems bring nature.

The design and strategy together give an answer to the question " *How can we utilise the potential of feralisation in transforming the post-industrial landscape to a healthy, climate-adapted and inclusive living environment for all species?* " It does so by*:*

> Considering how the forest can benefit life in the city
> Considering long-term thinking and development
> Allowing space and time for this development
> Having a flexible strategy with rules for the small scale and design principles for the whole
> Translating ecological notions to cultural language by the use of orderly frames derived from the existing built environment
> Having a starting point that encourages further development

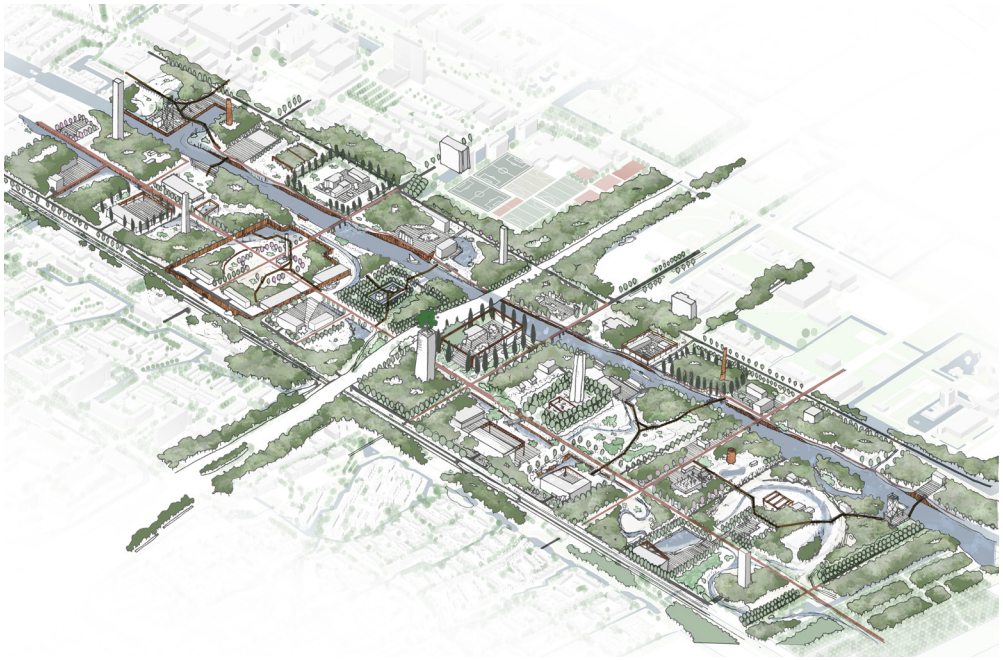
This design and strategy however, are merely one answer out of many imaginable answers, as is always the case in design. This underlines the importance of the subquestion: *"What place specific aspects give motive for design intervention?"* Without this question, the answer to the main question is only valuable within the given context of this research (Chapter 3). The design principles and strategy should always be re-evaluated in different contexts.

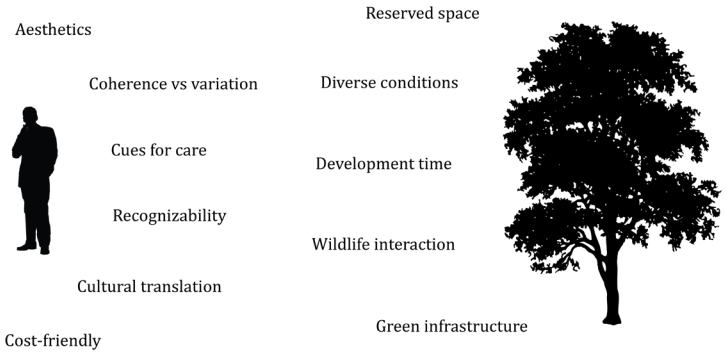


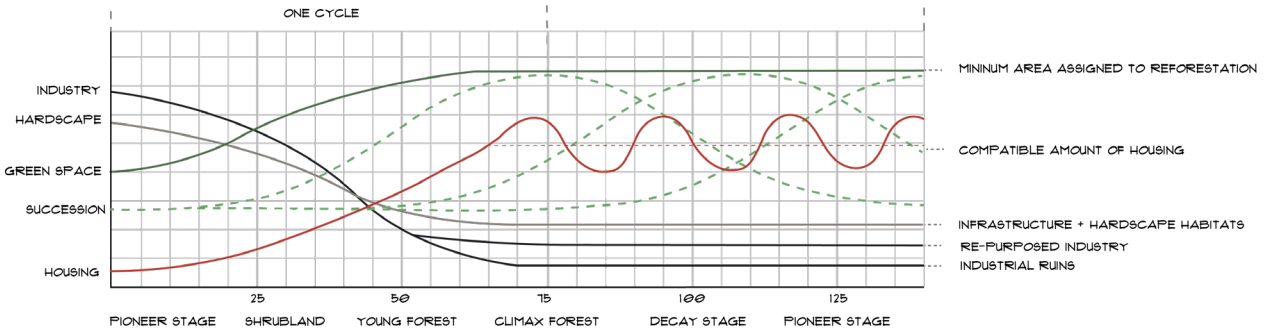
The answer to the question *"How can we create the optimal conditions for forest development in the urban context?"* (Chapter 4, 5 & 8) is seemingly simple. For a healthy forest to develop, all that is needed is space and time for that development. By shaping conditions and management we can alter the succesional course of forest development. The aspects we have most control over, can be brought down to space and time, meaning the space we 'allow' forest to grow in, and in terms of time we can either speed up forest development by for exaple planting or sowing, or slow it down by covering the bare soil with pavement or by maintenance. In the urban context this means minimizing the space we need for (underground) infrastructure and housing.

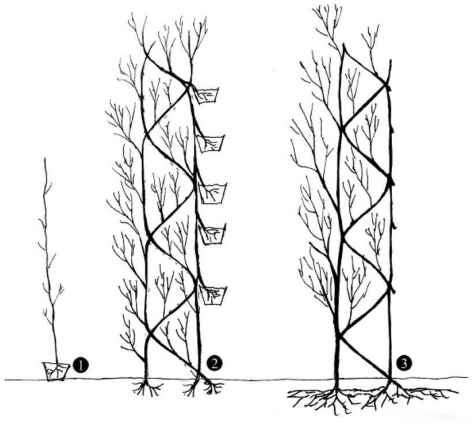
For many people, this may seem like a sacrifice of land. But by answering the question *"How will the transformation change the relation to our environment?"* (Chapter 6) it is clear that this feralisation of the post-industrial landscape will mostly benefit people's wellbeing. This also partly answers the question of *"How can we gain public acceptance for integrating feralisation in this transformation?"* - By showing people these benefits. And by showing that not just this climax forest is the end goal, but that there's beauty in these pioneering stages as well. The Orderly Frames merely create the contrast needed for people to see this with different eyes.

Both the housing crisis and the biodiversity crisis are complex questions that ask for radical change, change in the way we think and change the way we live together with nature. I think a lot of the answers to these problems can be found in thinking in the long term and opening up to new ways of looking at our living environment, and I hope that this thesis illustrates that.









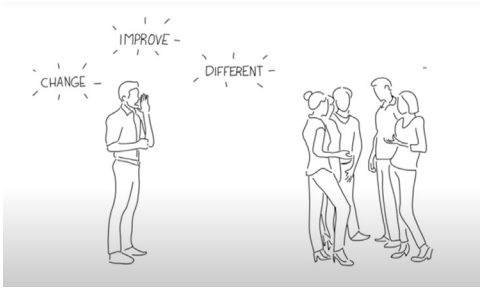
bau·bo·tan·ik the art of creating load bearing constructions from living plants, taking profit from the firmness and adaptability of the plant. This method allows us to think about new ways for nature inclusive building.

cue for care small signs of human intervention in the natural landscape that have a reassuring effect on people

eu·dai·mo·nic *(motivation|well-being)* happiness that is derived from the feeling of purpose and meaning

fe·ral·i·sa·tion the process of subsequently returning to wildness after being domesticated

main·te·nance the act of intervening in natural process in favor of cultural requirements



not·in·my·back·yard *(abbr. NIMBY)* is the predictable psychological resistance to changing pretty much anything. the irrational thought that the status quo or lack improvement is better than change. irrational and hostile reaction when ownership or local respect are perceived to be threatened, particularly by an outsider or competitor. this phenomenon is estimated to cost 10 to 20 trillion dollar per year in potential progress worldwide. user participation in design process aims to reduce this resistance.

re·gen·e·ra·tion (noun) Renewal or restoration of a body or biological system

re·ju·ve·na·tion the act of cutting down trees in order to make place for herbacious vegetation and shrubbery

suc·ces·sion a series of people or things that follow one after another; in the case of this thesis it always refers to the sequence of plant communities that naturally follow up on eachother, based on the (a)biotic conditions

su·per·or·ga·nism refers to a group of synergetically interacting organisms of the same species

un·learn refers to breaking through the cultural constructs regarding ecological aesthetics. Through understanding natural process we strengthen our partnership with nature.

ur·ban for·es·ter the proposed mediator between ecological and social requirements in the urban forest

wan·ted·weeds weeds are usually unwanted organisms in our urban fabric. But if we consider their many useful properties such as nutritional value, medicinal and purifying effects, we might want to think twice before rejecting these weeds.

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Reflection

I will reflect on the thesis through the four perspectives of Landscape Architecture defined by Dr. I. Bobbink and Ir. S. de Wit in the article 'Landscape Architectural Perspectives as Agent for Generous Design'.

Perception
Choosing the Urban Forestry Lab as a graduation studio comes from the ideal to strive for urban developments that are more inclusive towards all species. The challenges I encounter have everything to do with the way these species are perceived. Since there is often miscommunications between ecological function and cultural perception, the Orderly Frames help to translate the ecological patterns into cultural language, through which we learn to perceive this ecological function better.

Palimpsest
The aim of the design is to respond to the landscape layers of Schieoevers of the past, and form a new layer that lands on the other ones. It responds to the landscape as it was before human intervention by utilizing the soil patterns established during this time for a new watersystem, but it also respects the parcellation patterns that came with the claimation of the land during the agricultural time. Even the industrial phase, that transformed the landscape into a cold, de-humanized but profitable machine, is not to be completely erased. It is still part of the story and of our collective memory. We simply take from it what we can use to make it more beautiful, and of cultural value.

Scale-continuum
Despite the boundaries that surround the Schieoevers, it does not stand alone in the urban fabric. In fact, the area is an important link in the chain of ecology and mobility. The area connects the city centre of Delft to the rural landscape, and on a regional scale Den Haag and Rotterdam. That means that interventions done in this area will affect these larger networks. In the vision on the regional scale this is described.

Furthermore, I hope that projects like this will inspire similar projects in the future. In order to move forward with Urban Forestry we need good examples of Urban Forests. In this way I think small scale projects like this can help shift the paradigm of what our cities are supposed to look like and so affect the larger larger region.

Process
The most important perspective for this thesis. The project revolves around the idea that our domestication over natural processes is contributing to climate change and the decline of biodiversity, and that in order to restore we have to learn to let go of this control and allow natural processes to occur again. An important conclusion is that the way these processes work are often too complex for us to fully comprehend, and so intervening with them as little as possible is likely the best thing we can do. There where we do intervene, we do it as minimal as possible, in order to accomodate social life, in a way that it is least harmful for the ecology.