

The Agency of Aesthetics

Exploring the potential of Aesthetic Urban Forest Infrastructure

Graduation Thesis

Landscape Architecture - Urban Forestry

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This graduation project tries to rediscover the importance of three concepts - urban forestry, infrastructure and aesthetics – and unites them with each other, in an attempt to develop a method to design ‘aesthetic urban forest infrastructure’ and discover the potential of such a method. Whereas urban forestry will need more space in our future cities, because of its positive influence on social, environmental and ecological aspects, the form and function of infrastructure are changing and this calls the need for a more integral way of designing it. Aesthetic perception and experience are a new approach to look at this problem. It is hypothesised that combining these concepts will make it more feasible to create urban forestry and will make sure that future infrastructure will be more than just functional. The site specific design is done on and along the Prinses Beatrixlaan in Delft, a road that currently creates a barrier between the neighbourhoods surrounding it.

By upgrading some elements of the private, car-oriented, infrastructure and creating a new

east-west public transport connection along the Prinses Beatrixlaan, the road can be downgraded and lanes can be removed. This opens up a lot of space along the road, that can be used for urban forestry and better connections between surrounding neighbourhoods. Using four aesthetic categories – the sublime, beautiful, interesting and plain – visions and designs have been created on four different scales, leading to a toolbox, that in its turn form the base for the design.

The evaluation of this project has also been done on the basis of these four scales. It can be concluded that combining these three concepts has a lot of potential, for both designers, visitors and nature itself. In the reflection however, is stated that following this method does not necessarily lead to a good design.

keywords: experience, sublime, beautiful, movement, infratecture, green infrastructure

part one - introduction

1. project outline

1.1 Problem Statement

In 2050, approximately 68% of the entire world population will be living in urban areas (United Nations, Department of Economic and Social Affairs, Population Division, 2018). All over the world, action is being taken to create enough housing, jobs and amenities and improve all types of infrastructure, including but not limited to those of transportation, energy and health care. However, an aspect that often is not yet being addressed in detail, is that of urban forestry, although it has been proven to be very beneficial for the living conditions, especially in densely populated cities.

Urban Forestry

The concept of urban forestry arose in the 1960s as a result of urbanization that had a large impact on natural European forestry (C.C. Konijnendijk, 2003). Today, almost 10% of all Dutch forest is considered to be urban forest, but it still seems difficult to develop true urban forestry policies on a city scale – and certainly on a metropolitan scale – due to funding issues, political struggles and different priorities (C.C. Konijnendijk, 2003), although the use of urban forestry has many advantages.

Trees can improve their physical environment by cleaning the air from pollutants, reducing the wind speed – and therefore reducing noise – managing

storm water and cooling their surroundings by evapotranspiration. When strategically planted, they can also reduce the energy use of buildings, by creating shade in hotter periods and radiation in cooler periods and also reduce convective heat loss by breaking wind (Engel-Yan, Kennedy, Saiz, & Pressnail, 2011). Additionally, urban forestry often has a remarkable high level of biodiversity, sometimes including endangered species (Alvey, 2006).

The presence of urban green spaces can also lead to more and new types of interaction between people (Totaforti, 2020) and can increase the perception of safety (Westphal, 2003). Generally, urban forestry has a very beneficial influence people’s mental and physical health (Grahm & Stigsdotter, 2003). It has the ability to reduce stress, improve attention capacity, help to recover from illness and improve people’s mood (Velarde et al., 2007).

A scientific field within landscape architecture that specifically deals with research into the integration of more green, and thus forestry, into cities, is that of biophilic design or biophilic urbanism. It uses natural elements and processes to create certain spatial experiences and stimulate the senses, to ultimately create a better (local) environment, stimulate ecology and improve the socio-cultural situation of a place (Xue et al., 2019).

A very important aspect of urban green – and thus urban forestry – is the connectivity between the different green areas. The current fragmentation has a negative impact on both the ecological and the socio-cultural quality of it. The presence of a continuous, preferably large, green structure throughout a city is very important for the leisure experience of the user (Madureira, Andresen, & Monteiro, 2011) and the ecological diversity in the area (Tyrväinen, Silvennoinen, & Kolehmainen, 2003).

Infrastructure

Another aspect, as previously mentioned, that will need to be improved over the next few decades due to urbanization, is infrastructure. Whereas many forms of infrastructure exist, this project deals with transportation infrastructure, specifically private transport (cars, bicycles and pedestrians) and public transport (trains, metro’s, trams and busses); physical infrastructure that transports people during their everyday life in the city. From now on, this is what the word ‘infrastructure’ will refer to.

For several reasons, one of which is also urbanization and thus a scarcity of space in the city, infrastructure will need to change, in both form and function. We will need to rely more on public and even shared transport, which calls the need for a different use of space on and along existing

infrastructure.

Several authors, one of which Gary Strang (1996), argue for redesigning infrastructure in a more integrated and inclusive manner. Marc Verheijen (2015), an architect and traffic engineer, has created the term infratecture, by which he means a form of infrastructure that is more than functional. It is experiential, multifunctional and bedded into its context. An additional benefit of creating infratecture, is that the enormous amount of funding that is usually reserved for infrastructure, can in this way also be used for other purposes, like public places and green spaces (Strang, 1996).

Aesthetics

Going back to this pre-modernistic vision on infrastructure could be a method to integrate more urban forestry into cities. Because where roads were once designed as a form of recreation, nowadays, larger infrastructure is purely functional (Verheijen, 2015).

According to Nohl (2001), not only infrastructure, but many landscapes too have been reduced to the bare minimum in terms of aesthetics, which means they have lost their character and are often incomprehensible to people. Whereas they once were perceived ‘as a comprehensive whole’ (Nohl, 2001, p.224), they now have lost their variety, naturalness, structuring and identity. Therefore he

calls for designing with the use of new aesthetic categories: the (new) sublime, the (new) beautiful, the interesting and the plain (Nohl, 2001), in order to once again make aesthetic experience an important element of landscapes.

1.2 Research Objective

Because of urbanization, a growing awareness for the environment and great technical developments, urban forestry and infrastructure will need and have the ability to respectively get more and less – or at least a different – space in the future. This project deals with this question from an aesthetic point of view, instead of a more commonly used functional approach. The project tries to rediscover the importance of the three main concepts – urban forestry, infrastructure and aesthetics – and unites them with each other, in an attempt to develop a method to design aesthetic urban forest infrastructure.

Therefore the main question is: What is the potential of combining urban forestry, infrastructure and aesthetic experience with each other?

The hypothesis is that this method will make it more feasible to create urban forestry and develop existing infrastructure to prepare for future urbanization, while making sure the whole is experien-

tial and aesthetically pleasurable.

The sub questions are related to the different stages in the research. Whereas the first set focusses on the separate concepts, in order to understand these better, the second set is about their relationship with each other. The final set of questions is to discover how one could design using the concepts and their relations.

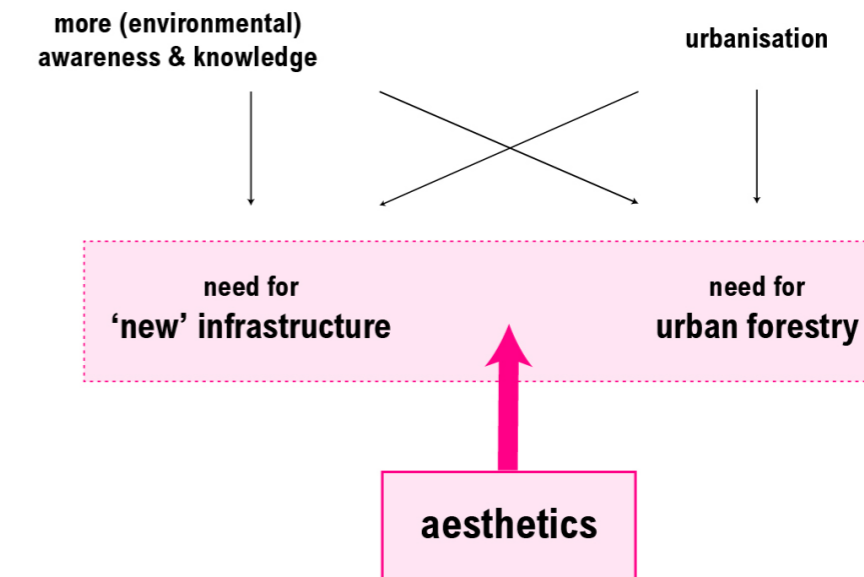


Figure 1.1 - Overview Project

main question

What is the potential of combining urban forestry, infrastructure and aesthetic experience with each other?

sub questions

- What influence does infrastructure have on its surroundings?
- How will (and should) infrastructure develop over the next few decades?
- What is the role of aesthetics in relation to experience?

- What is the relationship between urban forestry and infrastructure?
- What is the relationship between urban forestry and aesthetics?
- What is the relationship between movement and aesthetic experience?

- How can one design urban forest infrastructure?
- How can one design urban forestry while taking in mind its relation to aesthetic experience?
- How can one (re)design infrastructure while taking in mind its relation with aesthetic experience?

2. methodology

1.3 Design Location

The location that this project focusses on is the Prinses Beatrixlaan in Delft, The Netherlands, as seen in figure 3.1. This is a five kilometre long road that connects the south of Delft through Rijswijk to The Hague. The main focus lies upon the part of the road that is located in Delft.

The city of Delft has a similar situation as previously described in the problem statement. In 2035, the population will have increased by 18,9% and the city is well working towards creating enough housing and jobs, but initiatives about improving the green structure and urban forest are still very conceptual. Furthermore, the road is surrounded by a variety of neighbourhoods. People in these neighbourhoods are experiencing all the negative aspect of the road. It is the cause of noise and air pollution and creates a large barrier between neighbourhoods west of it and the city centre. Partly as a result of this, the people living in these neighbourhoods have rated their neighbourhoods as one of the worst in Delft (Gemeente Delft, 2016).

1.4 Thesis Structure

This thesis consists out of five parts. The first part is the introduction, which outlines the project and the research objectives. It briefly introduces the

site and describes the methodology that was used during the project.

The second part presents the site more thoroughly. It includes most of the site analysis that has been done, especially that related to the concepts of infrastructure and urban forestry, but also described other contextual aspects, such as water, soil and the socio-cultural situation. It concludes with a diagnosis of the site.

In the third part, the aesthetic point of view is introduced. It begins with the theoretical framework that focusses on aesthetics, its importance, its issues and its relation to the other concepts. The theoretical framework leads into some specific site analyses.

The fourth part sets out the vision and the design for the site, that are based upon the conclusions previously drawn. Whereas the vision is done on three scales – on the Prinses Beatrixlaan, on Delft and on the larger metropolitan region -, the design also zooms into some specific locations along the Prinses Beatrixlaan. This part of the thesis concludes with a visual of the aesthetics that can be experienced while traveling along the road.

In the final part, a conclusion is drawn and the research questions are answered. It also includes a reflection on different aspects of the graduation project. Finally, other elements, like the glossary,

references and appendix can be found here.

An overview of the methodology used for this graduation can be seen on the next pages. It includes the types of questions that were asked, the methods that were used to answer these questions and which parts of the research led to specific parts of the project; vision, conclusion and toolbox.

Part Two and Three

In the second and third part of this thesis, the first two sets of questions – about what the three concepts are and what their relationship with each other is – have been answered. This has been done by literature study, some precedent projects and site analysis. The analysis has been done on three scales; on the Prinses Beatrixlaan itself, on Delft and on the larger region.

The focus in the second part lies on site analysis and includes the more functional concepts of urban forestry and infrastructure. Also general, more contextual observations of the site are presented. Some literature research has been done on these concepts, but relevant notions from this have already been mentioned in the introduction, part one. Finally, policies of the municipality of Delft are discussed.

The third part however, is introduced by the theoretical framework. This framework explains the different aspects and importance of aesthetics,

but also the relationship with the other concepts. A precedent study was used to illustrate the relation between aesthetics and infrastructure. New notions from this literature study have led into a new type of analysis: the aesthetic analysis of the urban forest of Delft.

Part Four

In the fourth part, the vision and design are presented, that is based upon the research previously done. Through design experiments, the use of 3d models (in Sketchup) and talks with experts on different subjects, ecology, detailing and infrastructure, the questions of how to design with the three concepts and their relationships could be answered.

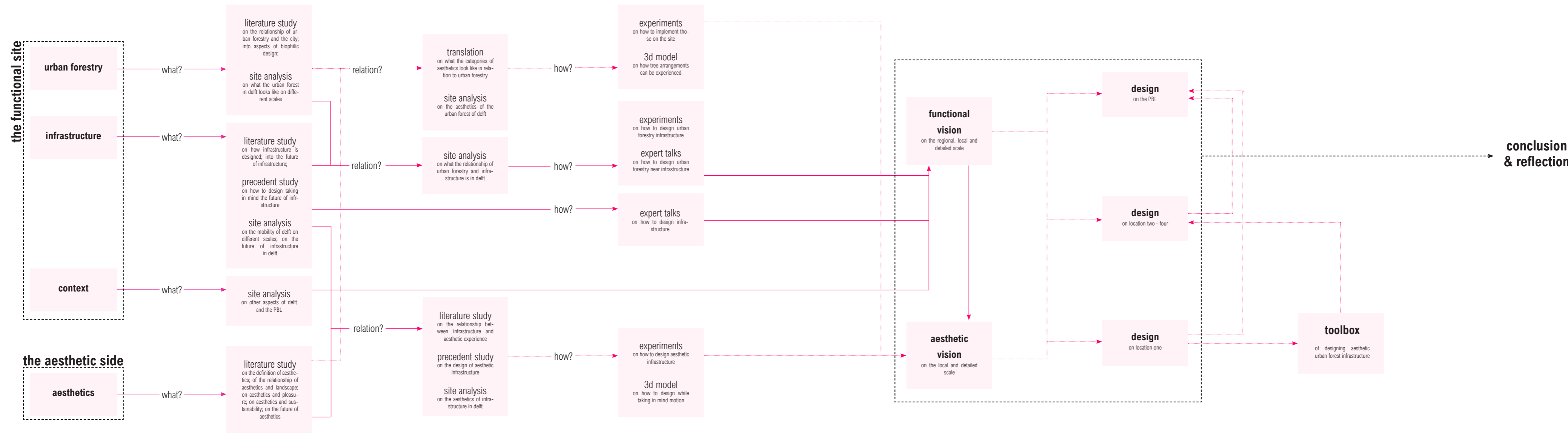
A vision has been created on three different scales, and consists out of two layers: a functional layer and an aesthetic layer. The functional layer is based upon notions from the second part, and combined with information from the third part, the aesthetic layer has been drawn up.

The vision has informed the design, that focusses on two scales, those of the Prinses Beatrixlaan and on four areas along it. Especially one of those areas has been designed in more detail. Several elements from this design have been selected for the toolbox. This toolbox has been tested and elaborated through the design of the other three lo-

cations. All have informed the masterplan design for the whole PBL.

Part Five

All products that belong to part four, both the vision as the design, have given insight in how big the potential is of combining the concepts of urban forestry, infrastructure and aesthetics. In part five, a conclusion has been presented, that answers this main research question. It also includes a reflection in regards to the methods used, the products, processes and planning, as well as the relevance of the project.





part two - the functional site

Prinses Beatrixlaan, Delft

Figure 3.1 - Overview Location (Google Earth, 2020)

3. Infrastructure

3.1 Regional Infrastructure

Private Transport

As previously mentioned, the Prinses Beatrixlaan – from now on abbreviated as the PBL – is a road that connects the south of Delft, through Rijswijk, to The Hague. In the south it is connected to the Kruithuisweg (KHW), that leads to the A4 and A13, in the north of Delft to the A4.

The map on the right shows three types of roads: A-roads, N-roads and S-roads. The PBL can be classified as a S-road; a city-road. Looking at the map, it is clear that the roads the PBL connects to, and even the part of it that is located in Rijswijk and The Hague are much busier than the part in Delft.

Another map that focusses on these roads on the same scale can be found in the appendix (figure 13.1). However, this one shows the amount of traffic on the roads. It is clear that the highways, the A-roads, but also some N-roads have the heaviest traffic. The PBL and KHW do not play a very big role on this regional scale.

- A-road
- - - N-road
- S-road



Figure 3.2 - Regional Private Transport

Public Transport

Although Delft is surrounded by highway, the connections between the city and its surroundings through public transport could really be improved. The Randstad rail, a vast network of metros, trams and busses, introduced in 2006, connects larger cities like The Hague and Rotterdam, but also smaller towns like Pijnacker and Berkel and Rodenrijs. Up until now, Delft is not a part of this network yet.

It does have a train connection with The Hague and Rotterdam, a tram connection with The Hague and a bus connection with Delfgauw, Pijnacker and Zoetermeer.

- Train
- Metro (RandstadRail)
- Tram (RandstadRail)
- Tram
- Bus

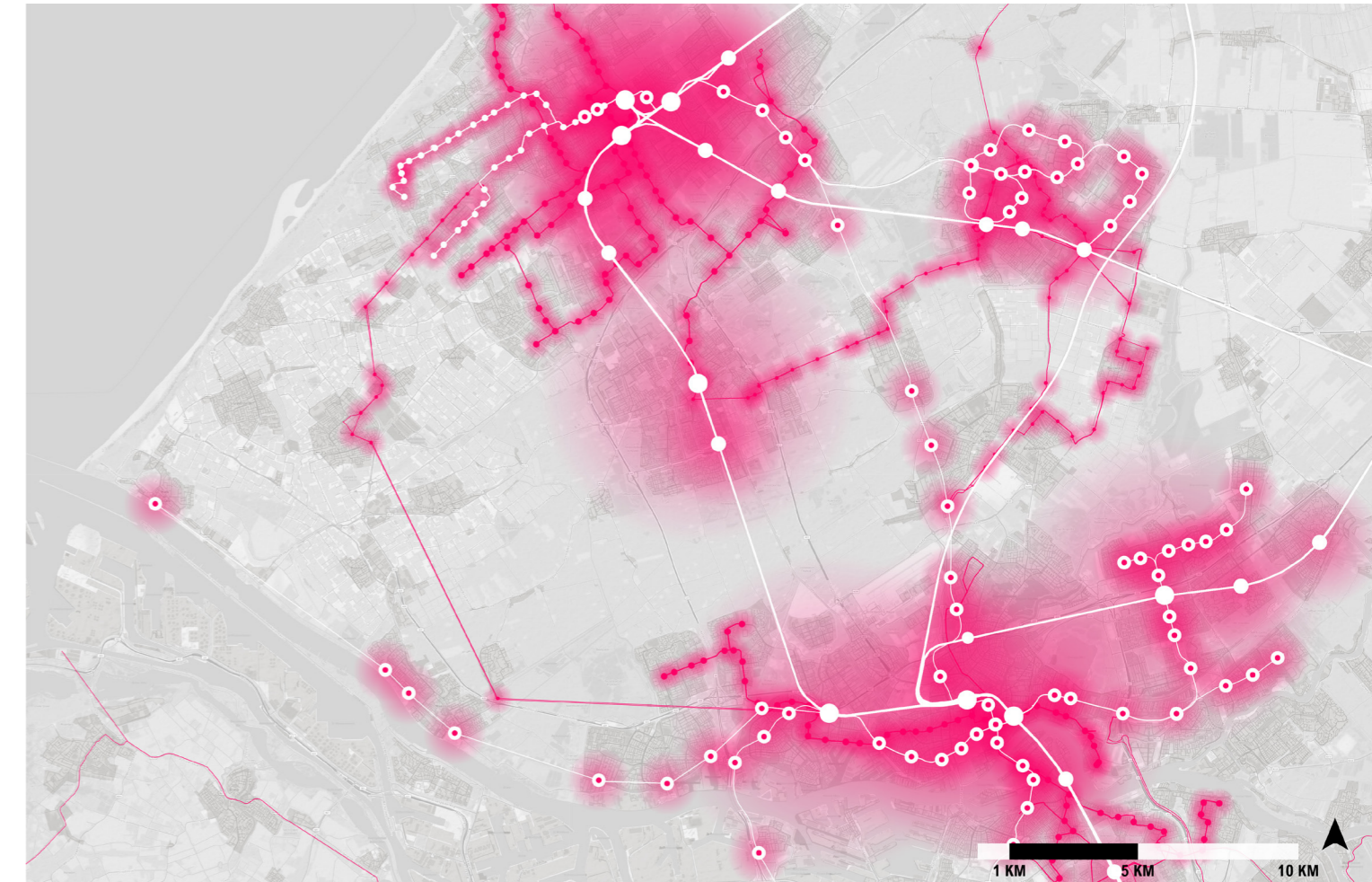


Figure 3.3 - Regional Public Transport

3.2 Local Infrastructure

Private Transport

On a smaller scale, the entire road network is divided into four categories of roads: expressways, distributor roads, neighbourhood roads and access roads. Different rules exist for the specifics of these roads inside or outside heavily built-up areas, but the following are the rules for the roads within the city.

Expressways are the largest type of road, often have multiple lanes and the speed limit is above 50 kilometre per hour, usually 80, 100 or 130 km/h. Therefore, expressways do not have any same level-intersections. Distributor roads and neighbourhood roads are fairly similar, but have different scales. Whereas the distributor road is to access an entire district, the neighbourhood road is to access smaller neighbourhoods within that district. Both have same level-intersections and crosswalks, but also separate bicycle lanes. The access road is the smallest of all roads. The maximum speed level is 30 kilometre per hour and fast transport (car) and slow transport (bicycle) share

- Expressway
- Distributor road
- Neighbourhood road



Figure 3.4 - Local Private Transport

the same space. Although there often is a sidewalk, pedestrians can cross the street at any time, because there are little to no official crosswalks.

What stands out, is that according to the previously mentioned rules, both the PBL and the KHW are part expressway and part distributor roads (figure 3.3). Along some segments the maximum speed is 70 km/h (PBL) and 100 km/h (KHW) and same level-intersections are avoided. Other segments have a speed limit of 50 km/h and does have intersections on one level.

Public Transport

Delft has two train stations that have, as previously mentioned, a quick train connection with both Rotterdam and The Hague. Within the city itself, three tram lines connect the TU Campus, the district Buitenhof and the north of Delft with each other. It also has several bus lines. Areas that are not as well connected yet are the city centre, and some neighbourhoods, especially along the Prinses Beatrixlaan.

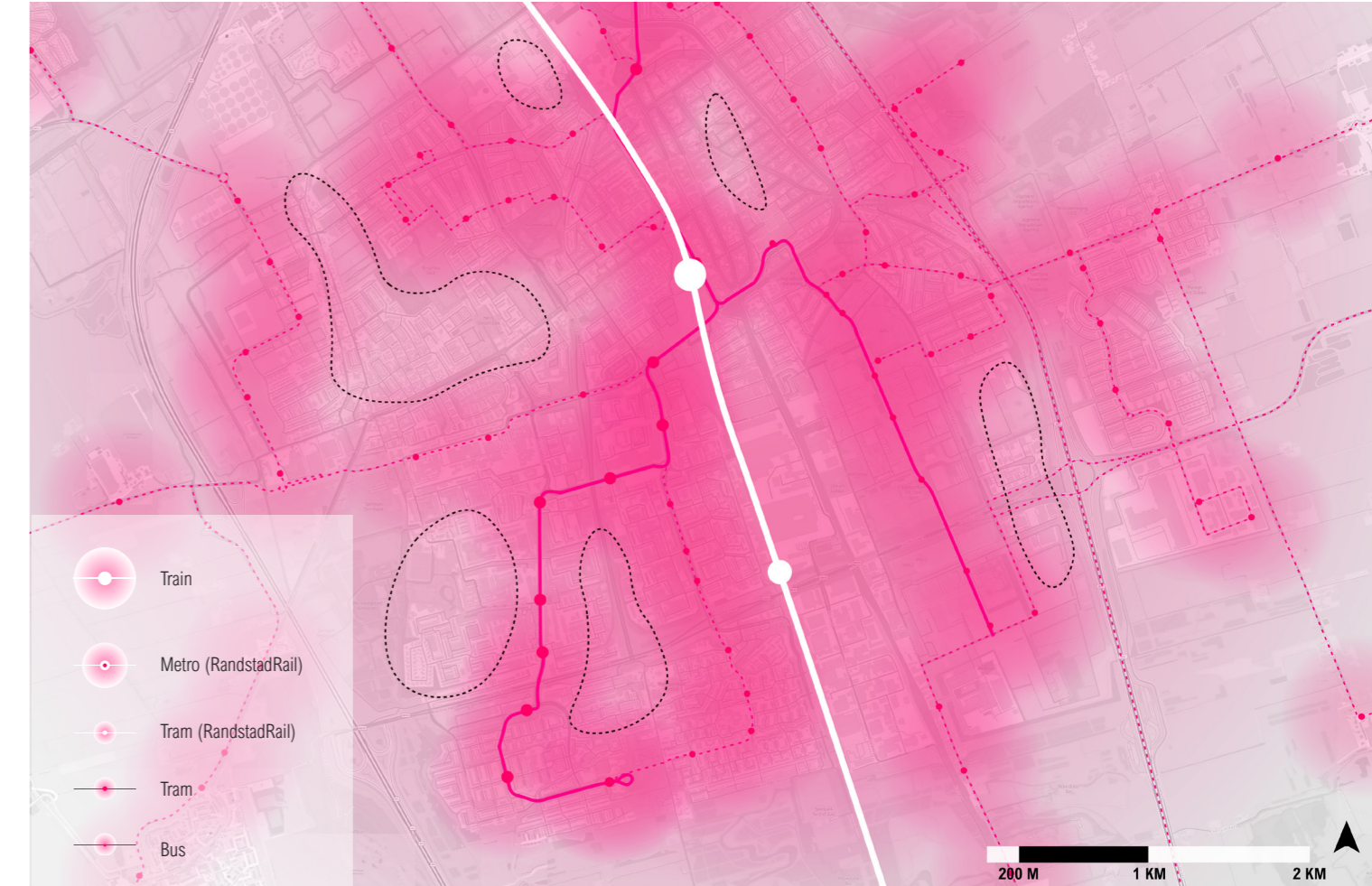


Figure 3.5 - Local Public Transport

3.3 The Prinses Beatrixlaan

As previously mentioned, some segments of the PBL can be classified as an expressway, and others as a distributor road. This might explain the large barrier function that the road has.

The part of the road that is located in Delft is approximately 3,5 kilometres long, but it only has eleven other roads, both for fast traffic (cars) and slow traffic (bicycles and pedestrians) crossing it. Out of these eleven, only five actually intersect with it, meaning one could get from the crossing road onto the PBL. Four of these intersections are accessible by all traffic, one by cyclists and pedestrians only.

An overview of the eleven roads that cross the PBL can be found on the next page. The municipality of Delft has the desire to improve three out eleven crossings (indicated with a pink line around the photo), but none of these initial plans seem to create a better connection with the PBL itself or the neighbourhoods along it. The main focus lies on making the crossing safer or bigger, in order to improve the flow of traffic.

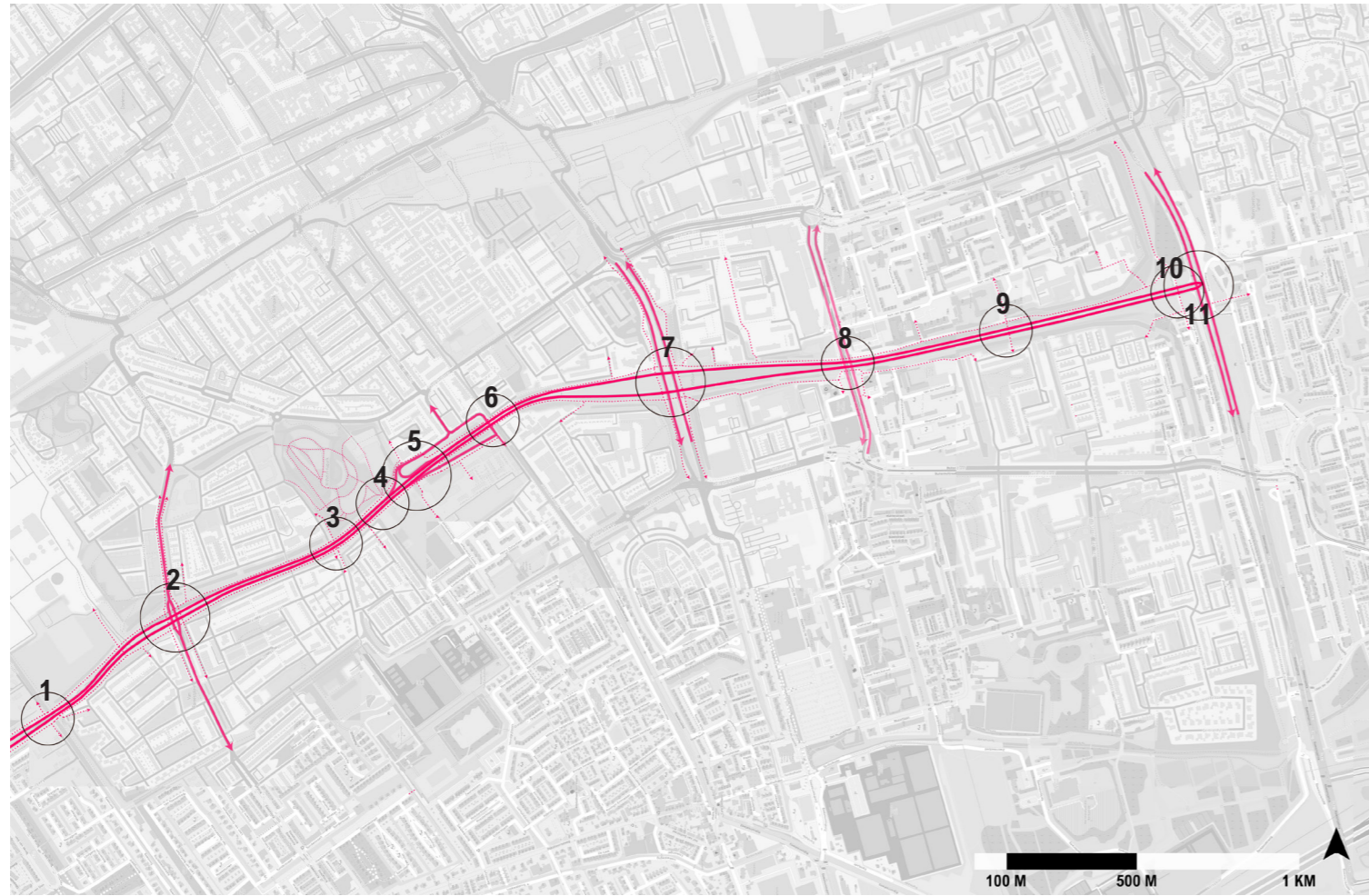


Figure 3.6 - Private Transport on the Prinses Beatrixlaan



plans to develop intersection by the municipality

Figure 3.7-3.17 (Google Streetview)

3.3 Policies

In terms of infrastructure, Delft is located in the middle of the Metropolitan Region Rotterdam The Hague (MRDH), that consists out of 23 municipalities ('MRDH Metropoolregio Rotterdam Den Haag', n.d.). The MRDH, that is controlled by the VA (Vervoersautoriteit – English: transport authority), aims for one recognizable and trustworthy mobility system (Gemeente Delft, 2020). It is also trying to develop high-quality and innovative public transport, in order to reduce car use and therefore reduce CO2 emissions ('MRDH Metropoolregio Rotterdam Den Haag', n.d.).

To support the following text, an overview of various maps - created by different parties involved in the mobility of Delft and its region - can be found in de appendix (figure 13.2 – 13.7).

Private Infrastructure

On a smaller scale, the municipality of Delft has created a vision on the private infrastructure within Delft. In the future, the several roads, including the PBL, could be downgraded from an expressway to a distributor road. Because 42% of all people working in Delft live in nearby cities and towns, focussing on improving bicycle routes and public transport, could relieve pressure on the PBL (Gemeente Delft, 2016). Without any measures though, the amount of traffic on the PBL

is only expected to increase (Bothof & Souren, 2018).

In previous analysis we have seen that actually only part of the PBL can be classified as an expressway, but this would mean that it is possible to make the entire road a distributor road. The municipality has also indicated some intersections that need to be improved to develop a more efficient road and bicycle network on a local and regional scale (Gemeente Delft, 2013).

Public Infrastructure

The MRDH has an ambitious view on the future of public transport in the region, as previously mentioned, but also a few very practical ideas, which it believes are absolutely necessary. Two of these are related to the public transport of Delft. First of all, it would be very beneficial to create more train stations and a more frequent train schedule between Leiden and Dordrecht. Secondly, new light rail (a form of transport between a metro and a tram) connections should be build between The Hague and Zoetermeer, and Scheveningen-Delft and Zoetermeer ('MRDH Metropoolregio Rotterdam Den Haag', n.d.).

The municipality too sees the need for a new east-west connection, especially between Delft and Zoetermeer and preferably also to The Hague or the Westland (Gemeente Delft, 2013).

4.1 Green Structure

The two maps below show a general overview of the current green structure of Delft itself and its surrounding region, that also includes cities like The Hague and Rotterdam. Looking specifically at the regional scale (figure 4.1), it is clear that all cities are surrounded by different types of green. But it seems that whereas the larger cities also

have a vast structure of green within them, Delft does not.

On a smaller scale (figure 4.2) though, it is immediately visible that Delft in fact does have much green, specifically trees. But generally, this green is build up out of smaller elements. It does not have any very large parks or extremely long lanes.



Figure 4.1 - Regional Green Structure

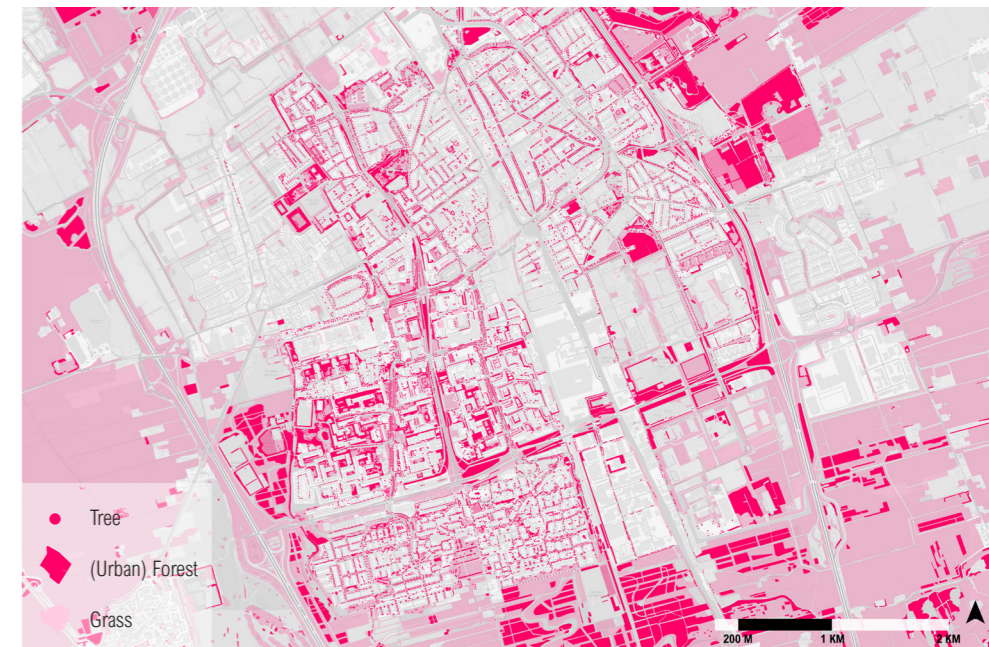


Figure 4.2 - Green Structure of Delft

Green Typologies

How specifically the green structure within Delft is built up, varies between the different areas of the city. Six different types can be distinguished.

Area 1, in the north western part of the city, has relatively many patches of green, varying in shape and size. Generally, they are quite large. Area 2 includes the city centre and other relatively old neighbourhoods. It has little to no parks, but on the outskirts lie larger parks from the surrounding areas. Area 3, on the south eastern side of the city, that also includes the TU campus, has large, and especially elongated green patches, that lie close together. Here, also the Kruituisweg (KHW) begins, a road that for a large part is surrounded by trees. Area 4, currently an industrial area, also has almost no green, except for the KHW that runs through it and the Kruituis itself, a historical element that gave the KHW its name. Area 5 also benefits from the KHW. Furthermore, it has several, but very small green parks in between the building blocks. Finally, area 6, on the south western side of the city, has narrow but very long green areas that run through the neighbourhood. Stretching from west to east, they are intersected by north-south oriented lines, that connect to the



Figure 4.3 - Green Typologies in Delft

- Urban Green within the City
- Urban Green outside of the City

larger green areas outside of Delft.

As previously mentioned, a road that stands out because of the green surrounding it is the Kruituisweg. Especially the eastern side is almost completely surrounded by forest.

4.2 In relation to Infrastructure

4.2.1 Green Policies

The municipality of Delft has been working on a vision on the green structure of the city. They focus on two different types of visions; one on how the green structure within Delft should look like in the future (figure 4.4) and one about the larger green areas around Delft (figure 4.5).

Although both are still quite conceptual, the vision for the green structure within Delft is a bit more specific. Focus lies on improving the qualities of the existing green; the compact scale of the city, the green and water structures that run through the city and the variety in the different neighbourhoods. An interesting aspect of their vision, that has a lot of potential, is connecting the green structure with the private infrastructure network and water network. Mainly focussing on east to west-roads and north to south-water lines, a grid has been created that covers almost the whole city

and is connected to the larger green areas outside of Delft.

As of yet, there are little to no policies or visions for the green structure on a more detailed scale, for instance the decision on specific trees or planting typologies.



Figure 4.4 - Vision on the green structure in Delft for 2030 (source: Gemeente Delft, 2013)



Figure 4.5 - Vision on the green structure around Delft for 2030 (source: Gemeente Delft, 2013)

4.2.2 Site Analysis

These maps, that contain the most important private infrastructure and green elements in and around Delft, show that there definitely lies a great potential in using the infrastructure as a carrier for the green structure. By transforming the roads into green veins that run through the city and connect it with surrounding cities, a vast network of

green can be created. This is very beneficial for both ecology and the leisure experience, as previously mentioned.

More specifically, on the regional scale (figure 4.6) can be seen that the Kruithuisweg and the Prinses Beatrixlaan (PBL) together can connect the green areas around Delft with each other, as well as create a shortcut between these areas and

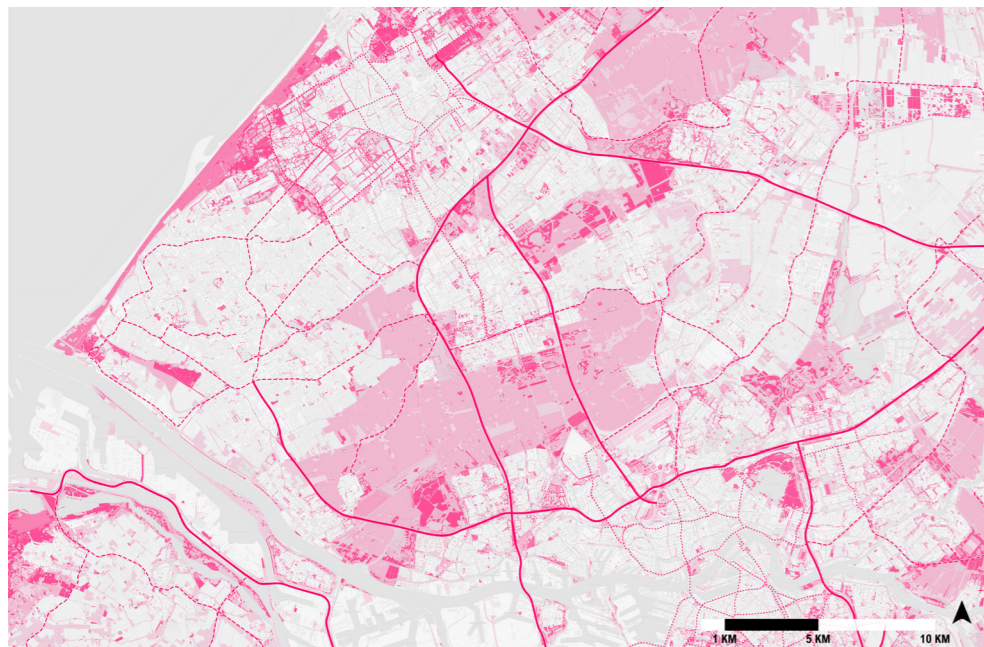


Figure 4.6 - Regional Urban Forestry and Private Transport

the urban green in The Hague. By doing this, the PBL can, on a local scale (figure 4.7), also be a connection between the various types of green within the neighbourhoods. Furthermore, it creates new green places within the city itself.

Therefore, more analysis has been done on the relationship between infrastructure and urban forestry on the scale of the PBL.



Figure 4.7 - Local Urban Forestry and Private Transport

The Prinses Beatrixlaan (PBL)

Along the PBL, different green typologies can be distinguished; lines and bodies. Whereas the lines are most common on the north part of the road, the bodies are mainly located on the south side. The difference between the several line types lies in their composition (single line, multiple lines, alternating lines) and direction (parallel or perpendicular to the PBL), knowing the tree species make these differences more clear. The four species that occur most often along the PBL are Populus (four different species), Tilia (two different species), Ulmus (seven different species), and Acer (four different species).

Populus almost only occurs parallel to the PBL, usually in combination with a different species in a second line behind it, away from the PBL. Tilia are never located directly next to the road, but occurs both parallel and perpendicular to the road. Ulmus occur very often, but mainly perpendicular to the road and in a composition of multiple lines of the same species. Finally, Acer is only planted on the most northern part of the road, mainly perpendicular to the PBL, and occurs in different compositions.

The bodies mainly consist out of the same variety of species. The largest different is their shape and size.

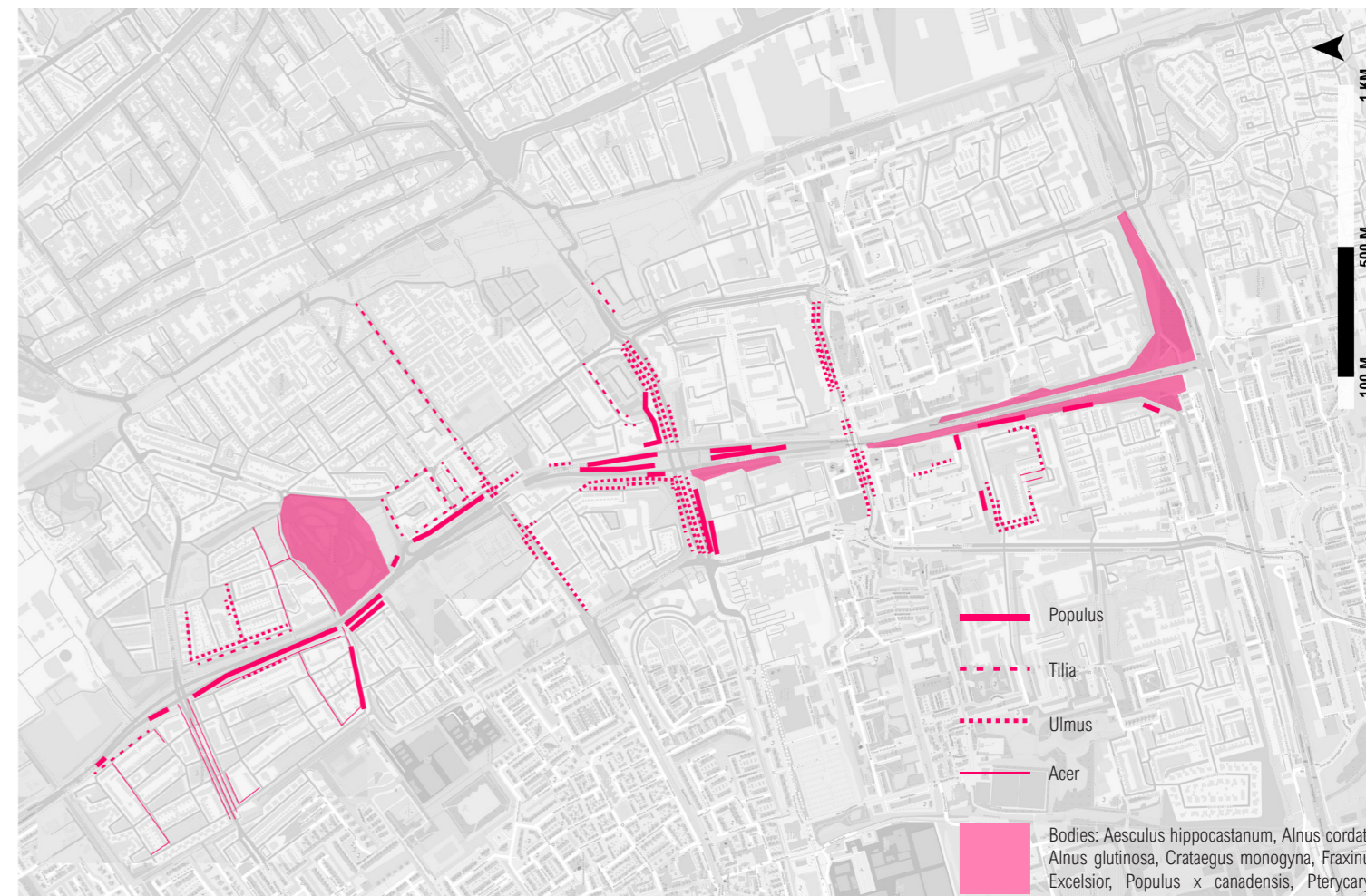


Figure 4.8 - Urban Forestry along the Prinses Beatrixlaan

Bodies: *Aesculus hippocastanum*, *Alnus cordata*, *Alnus glutinosa*, *Crataegus monogyna*, *Fraxinus Excelsior*, *Populus x canadensis*, *Pterycarya fraxinifolia*, *Quercus cerris*, *Taxodium distichum*, *Tilia x europaea*, *Ulmus x hollandica* 'Vegeta'

Zooming in even further, to specific sections along the PBL, a few relations between the urban forest and the infrastructure can be found. When entering the road from the south side – from the Kruithuisweg – there is a lot of space for the road and its adjacent landscape, a lot of space between the large buildings on both sides. This results in a large distance between the fast transport lanes (for cars) and slower transport lanes (for bicycles and pedestrians). This large scaled-character can also be seen in the size of the trees, which have been given a lot of space and are therefore very wide and high. The further north you move along the PBL, the smaller all elements become; the space for the road becomes smaller, fast and slow transport lanes lie closer together, the buildings decrease in size and the trees have less space and are therefore smaller.

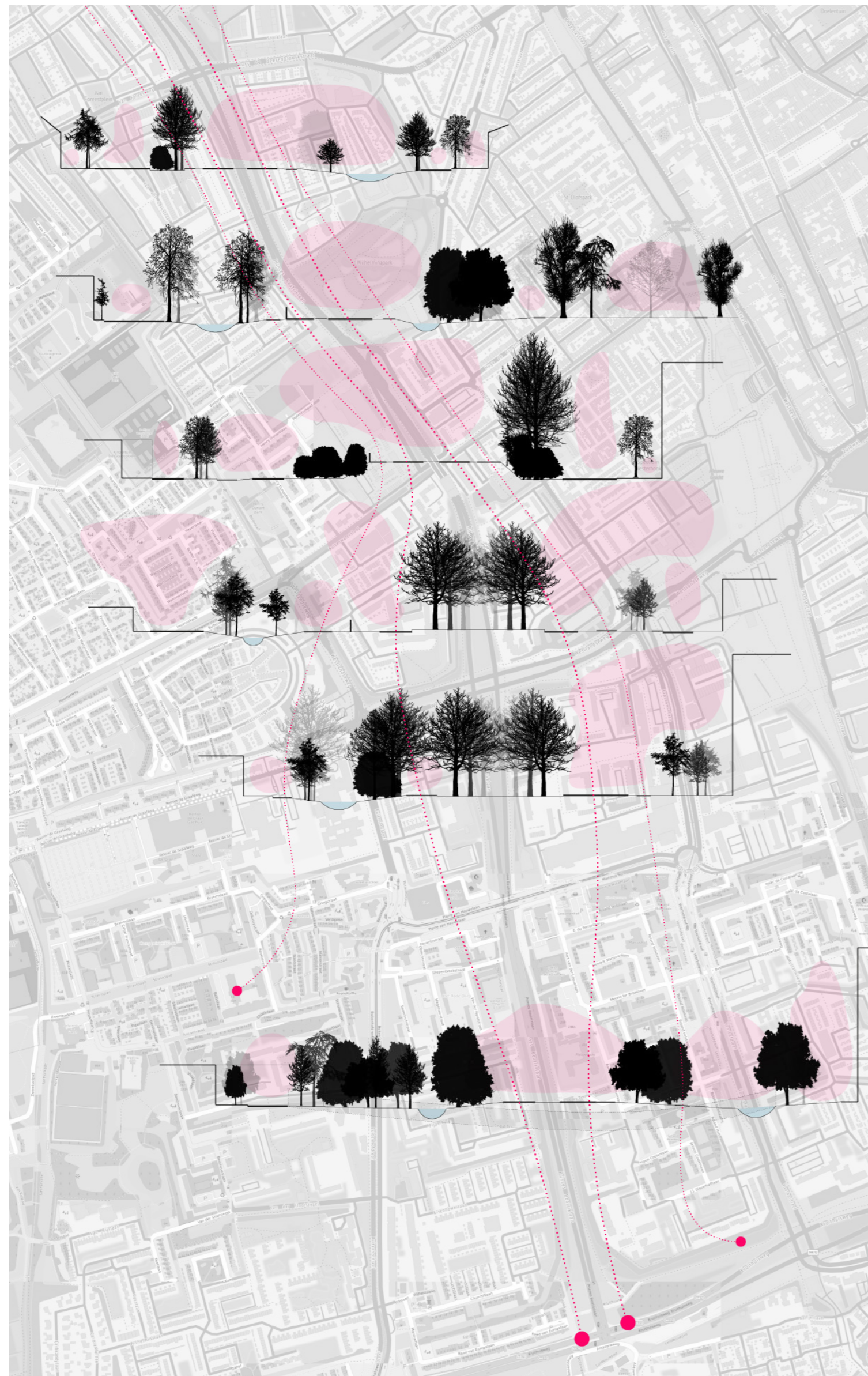


Figure 4.9 - Urban Forestry along the Prinses Beatrixlaan

5. Context

This next chapter presents other site analyses done, not related to urban forestry or infrastructure, but related to the general human and natural context of the site. Whereas some drawings are elaborated on in more detail, others have been added to the appendix, and are described less thorough.

5.1 Density and Amenities

The maps below give an overview of the current population and amenity-density of Delft. It can be seen that especially the western part of Delft is very densely populated. The highest density of amenities – consisting out of health services, shops, restaurants, tourist attractions, parks, sport

locations, government buildings and general entertainment areas – is found in the city centre. To other amenity-hotspots can be found in very population dense areas though. analysis was done, showing the expected density for the year 2040.

In the year 2040, the municipality of Delft will need to have build 15.000 new houses and created 10.000 new jobs. This is an increase of

respectively 30% and 19% in regards to the current situation. Based on these numbers, and the municipal vision on where these new buildings will go, another analysis was done, showing the expected density for the year 2040. These maps can be found in the appendix.

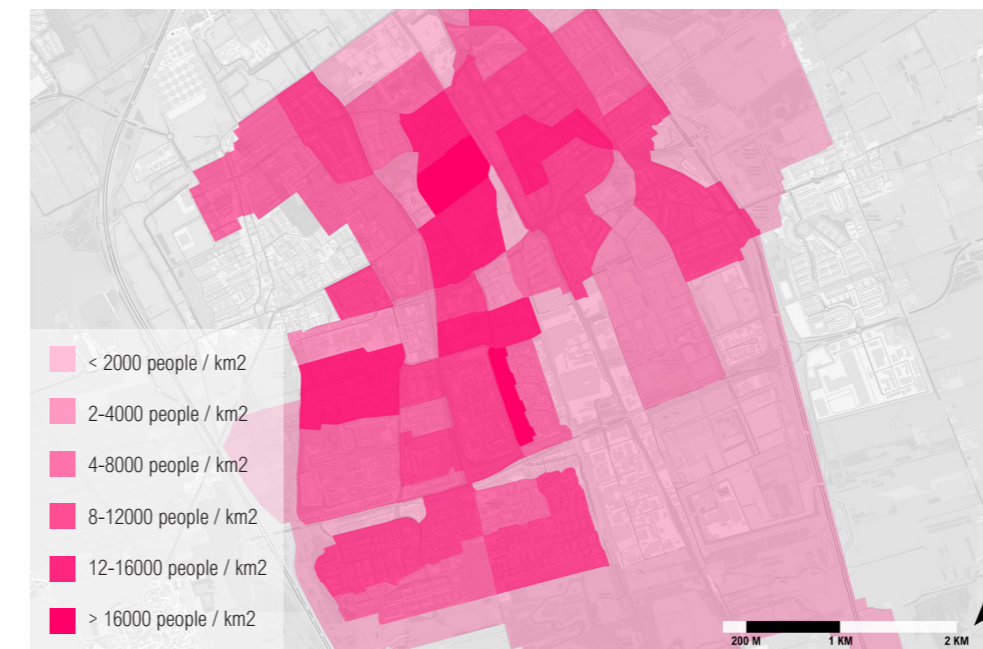


Figure 5.1 - Current Density

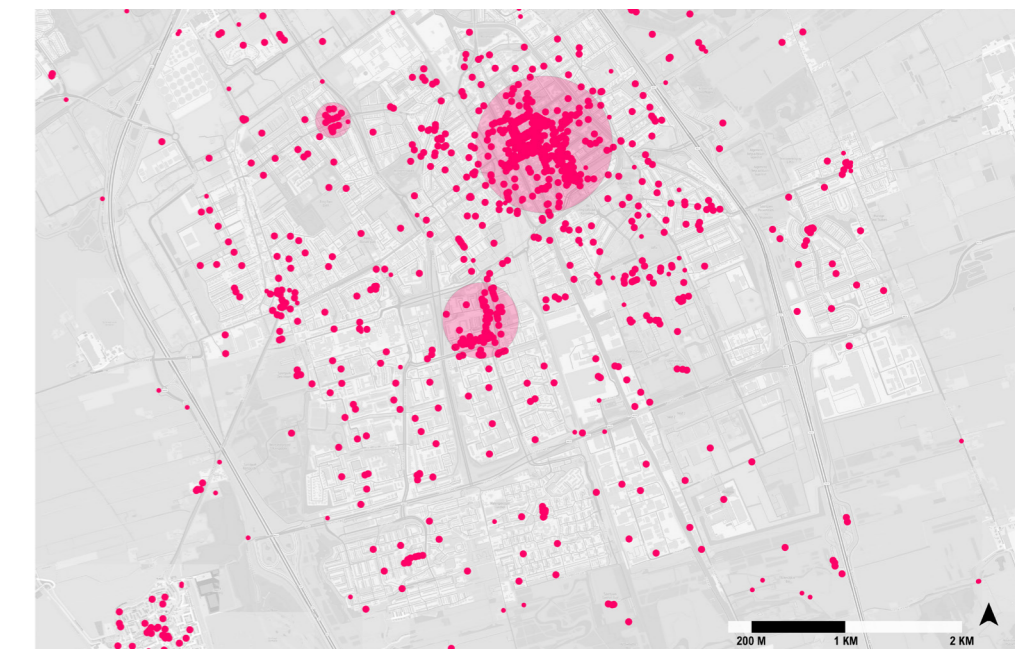


Figure 5.2: - Current Amenities

5.2 Social Context

In 2016, a study was done to see how satisfied people living in Delft are with their neighbourhood. The outcome of this study can be seen in figure 5.3. As previously mentioned in part one, especially people living in neighbourhood around the Prinses Beatrixlaan are obviously not satisfied with it (Gemeente Delft, 2016). The next part elaborates on the situation in four neighbourhoods: Voordijkshoorn, Hof van Delft, Voorhof and Buitenhof. This information is based upon graphs by Bothof & Souren (2018), which can be found in the appendix.

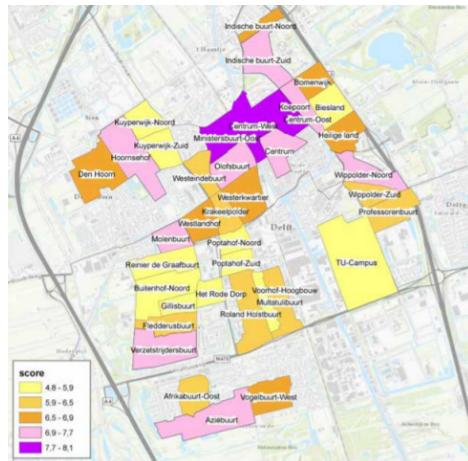


Figure 5.3 - (Gemeente Delft, 2016)

Voordijkshoorn

Voordijkshoorn is the neighbourhood lying north-west of the Prinses Beatrixlaan. Although people living here feel little connection with their neighbourhood, they are less lonely than average and the general housing price is higher than average. The rating they give their neighbourhood, the amount of work they put into it themselves, their sense of safety and security and the amount of unemployed people is average (Bothof & Souren, 2018).

Hof van Delft

Hof van Delft lies north-east of the Prinses Beatrixlaan, next to the city centre. This neighbourhood rates best out of all four. Whereas people's connection with the neighbourhood, their sense of loneliness, the amount of work they put into the neighbourhood themselves and the amount of unemployed people is average in comparison to the others, people rate their neighbourhood higher than average and their sense of security is also larger. The housing prices are higher than average too (Bothof & Souren, 2018).

Voorhof

The thirteen thousand people living in Voorhof, south-east of the Prinses Beatrixlaan, have stated to have little to no connection with their neighbourhood, to be lonely and have therefore graded their neighbourhood very low in comparison to

other others. They do not participate in their neighbourhood and grade it low in terms of safety. The WOZ-value of houses is low and many people do not have a job (Bothof & Souren, 2018).

Buitenhof

Finally, Buitenhof, located on the south-west of the Prinses Beatrixlaan, has the worst scores out of all neighbourhoods. People's connection with it, as well as the sense of loneliness, the rating people give it themselves, the sense of security and the amount of unemployed people is far below average. This might explain why the housing prices are also very low. People state to take better care of their neighbourhood than people living in Voorhof though (Bothof & Souren, 2018).

5.3 Neighbourhood Character

As previously mentioned, the more detailed design of this thesis will focus on a specific location on the north side of the Prinses Beatrixlaan. Because of the road running through it, this area has two very different characters. The area east of the Prinses Beatrixlaan includes the neighbourhoods Agnetaparkbuurt and the Ministersbuurt-West. The area west of the Prinses Beatrixlaan includes the Kuyperwijk-Noord and Kuyperwijk-South.

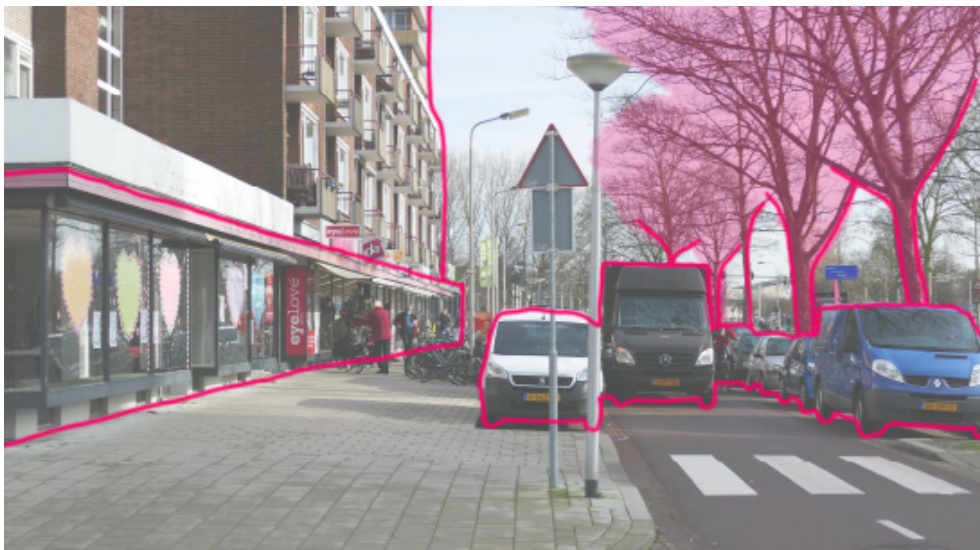
Figure 5.4-5.6 - Photos Agnetaparkbuurt & Ministersbuurt-West (Google Streetview)



Agnetaparkbuurt & Ministersbuurt-West

This neighbourhood consist out of various types of houses, apartment buildings and single houses. It has a lot of green, both a park-like forest, that also includes various lines of trees and a water line. It also has some very unmanaged, overgrown forest, where dead trees are left.





Kuypervijk-North and Kuypervijk-South

This area mainly consists out of two different parts; a busy area for shopping, that also has a playground and some restaurants, where trees are only planted as a necessity, and a neighbourhood park. This park is very open and has just a few, but large, trees. There is no boundary between the park and the road. In the area around the shops, there are many cars, parallel roads and parking spots. The playground is surrounded by a grid of trees and has elements like a basketball court and small hills.

Figure 5.7-5.9 - Photos Kuypervijk-North and Kuypervijk-South (Google Streetview)



5.4 Environmental Context

For this thesis, also information about the environmental aspects of the Prinses Beatrixlaan and Delft has been used. This includes information about the soil conditions of Delft and some specific areas and the water structure of Delft. This information was provided by different maps from the municipality and various websites. These maps or websites can be found in the appendix and will be referred to in part four when relevant.

6. Diagnosis

Functional Approach

In the previous two chapters, several observations have been made clear. It was discovered that Delft could greatly benefit from more public transportation, especially on a regional scale. Secondly, the Prinses Beatrixlaan currently functions as a large barrier between different parts of the city. Improving the infrastructure, and making it into a green corridor, could improve the connectivity, but also create space for more urban green and connect the existing green patches with each other. Furthermore, it was presented that in the future, Delft will need to build more houses and thus create more amenities. The social situation and living conditions in the different neighbourhoods along the PBL could also be improved.

Aesthetic Approach

Now that the site has been functionally diagnosed, the question rises of how to solve these problems. This project suggests using the aesthetic experience as a directive for the design, to base certain decisions on. The next part will elaborate further on the concept of aesthetics.

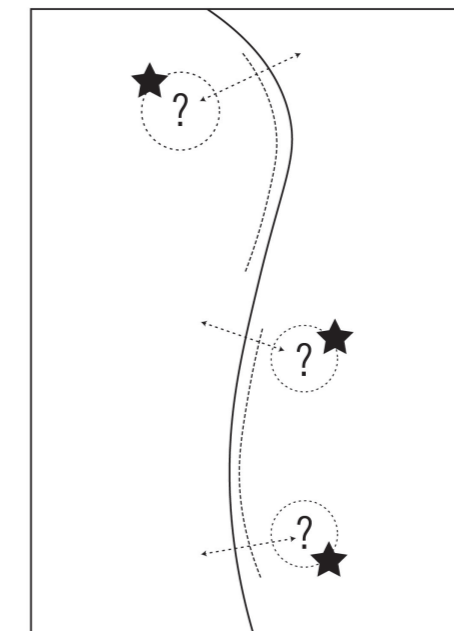


Figure 6.1 - Functional Approach

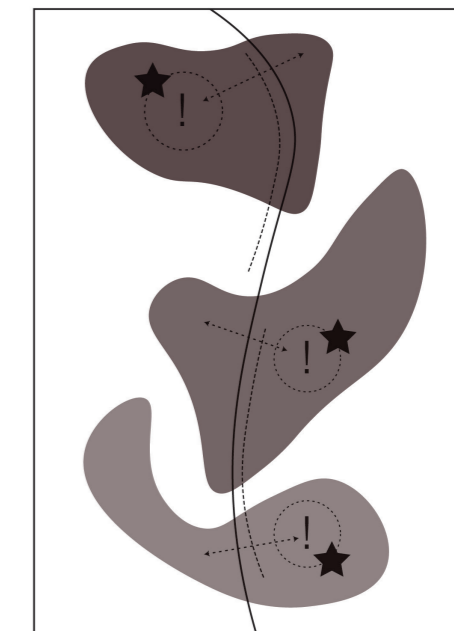


Figure 6.2 - Aesthetic Approach



In the previous chapters, the many functional aspects of the site have been discussed. But for a project – especially one of this size – to be coherent, it is valuable to take a specific design stance. In this project, focus lies on the aesthetic experience of the user, a fairly new and experimental approach. Inspiration and insight into the topic have been drawn from many authors, but in particular Werner Nohl's Sustainable landscape use and aesthetic perception - preliminary reflections on future landscape aesthetics (2001).

This part discusses the different views and theories on aesthetics, and functions as the main theoretical framework of this project. This framework then leads into an aesthetic-based site analysis, from which certain conclusions can be drawn.

part three the aesthetic side

7. Theoretical Framework

7.1 Landscape Aesthetics

The authors of *Highway Aesthetics* (1957) refer to Webster's Dictionary when they define aesthetics as 'the branch of philosophy dealing with the beautiful and its relation to the human mind; and the branch of psychology treating the sensations and emotions evoked by the fine arts' (DeSilets, Scott, Simonson, & Shurcliff, 1957, p.34).

Where many authors argue that aesthetics are irrelevant to landscape architecture, Nick Zangwill, who wrote about the Aesthetic Creation Theory, believes that landscape architecture too is a form of art. According to him art can – and should – have various functions, both aesthetic and non-aesthetic. With non-aesthetic functions he refers to for example functional or ecological aspects of a landscape. Zangwill believes that not paying attention to the aesthetic functions however, will have a negative impact on the final design (Zangwill, 2007 and van Etteger, Thompson, & Vicenzotti, 2016). From this point on, aesthetics or aesthetic experience will refer to the aesthetics of the landscape.

Aesthetic perception can be seen as a way of gaining information through sensory experience. Werner Nohl (2001) writes about four different levels of aesthetic perception; the perceptual level, the expressive level, the symptomatic level and the symbolic level.

The perceptual level includes the sensory experience, everything the viewer sees, hears, feels, tastes or smells. It is an direct observation of the direct place or landscape the viewer is located in. The expressive level is about what emotions, like pleasure and excitement, are evoked through this sensory experience. The symptomatic level is about the understanding of the viewer. What can he or she assume about the landscape that is not directly experienced? Nohl (2001) gives the example that the presence of a seagull can indicate that the sea is nearby. Finally, the symbolic level is about the imaginary experience. The viewer's observations lead to thoughts and ideas about the past or future, personal or impersonal.

Whereas the perceptual (sensory) and symptomatic (understanding) levels of experience mainly deal with the narrative function of a landscape and getting factual information on it, the expressive (emotional) and symbolic (imaginary) levels of experience are more related to the poetic function of a landscape in relation to the mind of the observer (Nohl, 2001).

7.1.1 Aesthetics and Pleasure

Zangwill (2007) also states that the point of art is to create pleasurable experiences and that this in itself can be a goal of art and thus of landscape

architecture. He gives the example of looking at 'a red-leaved tree in autumn against a clear-blue sky and enjoying the sound of its leaves rustling in the wind' (van Etteger, Thompson, & Vicenzotti, 2016, p.83). These kinds of pleasurable experiences induced by art are aesthetic pleasures.

Marc Treib agrees with Zangwill on that an important job of (landscape) designers is to make a something – in this case a landscape – pleasurable (Treib, 1995). In *Must Landscapes Mean?* (1995), he debates on how important and difficult it is to communicate meaning through a design, especially nowadays. In order to communicate meaning or significance, there should be a mutual understanding of the medium and the message between the designer and the visitor. Both the medium and the message are heavily influenced by current trends and are thus constantly changing. In the past, communicating meaning was easier, because it was much more likely that the designer and visitor belonged to the same cultural background, which meant they had similar values and believes. Of course, there were still differences between people like education, experiences and personal taste and interests, but society was relatively homogenized. This is not the case anymore. Our current society is very fragmented, with every fragment having their own values and believes and as a result, trends change much quicker. Consequently, it has become very difficult to communicate meaning through design (Treib, 1995).



Figure 7.1 - 'A red-leaved tree in autumn against a clear-blue sky' quote: (van Etteger, Thompson, & Vicenzotti, 2016, p.83, image: (Brian-B-Photography, 2012)

Therefore, Treib wonders why we keep trying to design meaningful landscapes, instead of just pleasurable landscapes. He is very clear about why we should design a pleasurable place. First, pleasure is a very valuable pursuit in itself. Secondly, pleasure is also much more predictable than meaning. It comes from physiological processes in our bodies, which are all relatively similar. We see the same colours and we hear the same sounds. Designing with this in mind has a much higher chance of creating a landscape that can be read and be understood by the viewer, which will ultimately be more successful and pleasurable. And over time, when a landscape is pleasurable to people, they will assign significance and meaning to it themselves. That is one of the most important things Treib states in this text: significance and meaning will grow over time, at the end of the receiver, the viewer, when a place is pleasurable (Treib, 1995).

7.1.2 Aesthetics and Sustainability

Although there have been authors that say that aesthetic design and ecological design are mutually exclusive, Elizabeth Meyer (2008) argues that this is not the case. She states that aesthetic experiences in landscapes can result in a better environmental understanding and awareness. 'So while I do not believe that design can change society, I do believe it can alter an individual's con-

sciousness and perhaps assist in restructuring her priorities and values (...) We need multiple forms and forums for caring and learning about the impact of our actions on the planet: some visual, some textual, and some experiential' (Meyer, 2008, p.10 & 21). Furthermore, she states that real sustainable landscapes should do more than have a good ecological function, they should also



Figure 7.2 - AMD Reclamation Park, Vitondale, US ('D.I.R.T. Studio', 2004)

benefit in a social and cultural manner (Meyer, 2008).

The authors of *Urban forests, ecosystem services, green infrastructure and nature-based solutions: Nexus or evolving metaphors?* state that although a work of art has the ability to provoke environmental awareness, this awareness is not necessa-

riely a result of its aesthetic features. In this article argument is made that we can also enjoy and take aesthetic pleasure in landscapes that show the destruction of the environment. This is done by showing a design of Meyer herself, particularly the site of AMD Park in Vitondale, in the United States, that includes the 'strange, toxic beauty of rainbow-colored water polluted by acidic mine drainage at a coal mine' (Meyer, 2008, p.8, van Etteger, Thompson, & Vicenzotti, 2016, p.87).

7.1.3 The Current State of Aesthetics

There have been mayor changes in the aesthetics of landscapes since the late 19th century. Economic and technical developments have completely altered the cultural landscape. Whereas most landscapes used to be a 'comprehensive whole', which were clear and easily understood, leading to an aesthetically pleasing experience, they are now often experienced as alien areas (Nohl, 2001).

To get to this point, two things happened. To get a better overview and more efficiency, the landscape was simplified by removing various elements, structures and qualities of the landscape. In its place, nothing recognisable was reintroduced, only completely new and alien elements that met economical, technological and therefore the current societal needs. This ultimately led to the diminishing of the character of the landscape,

specifically on five aspects; the loss of variety, the loss of naturalness, the loss of structuring, the loss of regional identity and the loss of vista quality (Nohl, 2001).

Because of these developments, the perceptual field, and thus all four levels of aesthetic perception (the perceptual level, the expressive level, the symptomatic level and the symbolic level) is weakened. Nohl writes about a coarsening of the perceptual field, an impoverishment of the perceptual field, a destabilization of the perceptual field and an alienation of the perceptual field. This means that the viewer of a landscape has trouble observing and understanding the landscape, as well as having emotional and imaginary feelings towards it (Nohl, 2001).

7.1.4 Aesthetic Categories

Whereas some experts think that the loss of these aesthetic qualities can be resolved by just adding ecological valuable elements and implementing a rigid planning strategy, Nohl (2001), feels that this way of thinking seems to downplay the severity of the issue. He stresses that we need to find new concepts and strategies to improve the aesthetic qualities of our landscapes.

Nohl assumes that by developing our landscapes in a more sustainable manner, its aesthe-



Figure 7.3 - Simplified and Alien Landscape ('Power To The People by Brian Wallace', 2019)

tic qualities will also improve. He states that only if economy, ecology and cultural aspects within a landscape are coordinated in such a way that human-oriented processes can take place without disturbing nature-oriented processes, real sustainability is achieved. This means that our new landscapes really should include areas where nature is let free to develop on its own, without outside influences. Although people are often not used to gaining (aesthetic) information from such 'natural' places, as mentioned in the previous subchapter, this is something that needs to be developed through time. In order to achieve this,

Nohl (2001) introduces four (new) categories of aesthetic, which all have their own characteristics, relationship between nature and non-nature and purposes.

The Sublime

The Sublime symbolizes the spontaneity of nature and the fact that not everything on the earth depends on humans, their actions and their desires. It gives hints of freedom. It is 'disharmonic, unordered, fragmented and unstable' (Nohl, 2001, p.232). It lures people in, it is mysterious. This mystery can also be created by the variety of elements or because of the cues that imply there may be more to be seen (Kaplan, Kaplan and Ryan, 1998, p.13). It makes people feel they are "right in the middle" of the landscape' (Nohl, 2001, p.323). Spaces within the sublime can be narrow and untransparent. Here, nature is free to develop according to its natural succession (Nohl, 2001).

The Beautiful

The category of The Beautiful usually applies to traditional cultural landscapes, in which all elements are familiar to the viewer, and in which they are arranged in a balanced order. This pattern is able to be grasped in one view. They do not have a great variety and diversity of elements. This type of landscape immediately makes sense to the beholder, because everything is in the right – expected – place. Also in this type of landscape, the

viewer experiences to be a part of his natural surroundings – there is no clear distinction between human and nature (Nohl, 2001).

The Interesting

The category of The Interesting is generated on places with various different types of land use and mostly consists out of technical elements. The landscape is chaotic and might be confusing and incoherent for the viewer. This type of landscape can be found in areas with construction, in (sub) urban areas, or on derelict areas. Although on first glance it is a difficult landscape to understand and it can include 'ugly things', to the viewer it is often experienced as being attractive (Nohl, 2001).

The Plain

The category of the plain is homogenous, looks reduced and alien. It can be enriched by adding natural elements, trees and other types of planting to create a more visually structured landscape. In this way, it is ecologically improved, but its modern management is not disturbed. A landscape like this does not evoke exciting emotions, but can arouse feelings of contentment and gratitude (Nohl, 2001).

7.2 Aesthetic Infrastructure

As previously stated in the introduction, a transition is going on in the form and function of infrastructure. Nowadays, infrastructure is still mainly looked at from a functional point of view. It often has only one purpose, similarly to other forms of infrastructure, like those of water and energy. Structures like these are unable to support biological diversity and will not grow to be a part of local ecological systems. The current method often is to hide infrastructural elements or try to beautify them (Strang, 1996). But this has not always been the case. The first larger car-oriented roads, dating back from the early 1900s', were created as a form of recreation (Verheijen, 2005). People would use them to experience and enjoy nature while driving. The aesthetic experience of driving along these roads was an important consideration during the design phase.

Precedent Study

The Blue Ridge Parkway (1934)

An example of this is the Blue Ridge Parkway (BRP), located in the eastern United States, which construction started in 1934 and finally finished in 1987. It is considered to be one of the most beautiful roads in the United States. Although functionally it connects two national parks – the Great Smoky Mountains National Park and the

Shenandoah National Park – it can also be considered as a linear park on itself, containing a road (Simonson, 1936).

As all other roads, the Blue Ridge Parkway consists out of three elements; the roadbed, the road side and the adjacent landscape. One of the most important concepts for the design of this road was to 'disguise the line of ownership' (Myers, 2004). This means that the boundary between the road itself and the surrounding landscape is softened, making the road more embedded into its landscape and creating a unified whole (Simonson, 1936). 'The landscape beyond becomes part of the composition' (Myers, 2004). This was partly done by planting native tree species, that also occurred in the surrounding landscape, in an irregular way along the side of the road (figure 7.4), leaving carefully located gaps between the planting to create vistas (figure 7.5).

In her article The Line of Grace: Principles of Road Aesthetics in the Design of the Blue Ridge Parkway, Myers (2004), tries to discover how much of the BRP is based upon thoughts of William Hogarth and Edmund Burke, two aesthetic theorists from the eighteenth century. She refers to three themes that Hogarth and Burke have written about and that can also be applied to the Blue Ridge Parkway: the concept of beauty, the principle of variety and the principle of motion.



Figure 7.4 - Planting Irregular Indigenous Species (source: Unlimited / Corbis, 2010)



Figure 7.5 - Creating Vistas (source: 'A Blue Ridge Parkway Adventure in 10 Amazing Views', 2017)

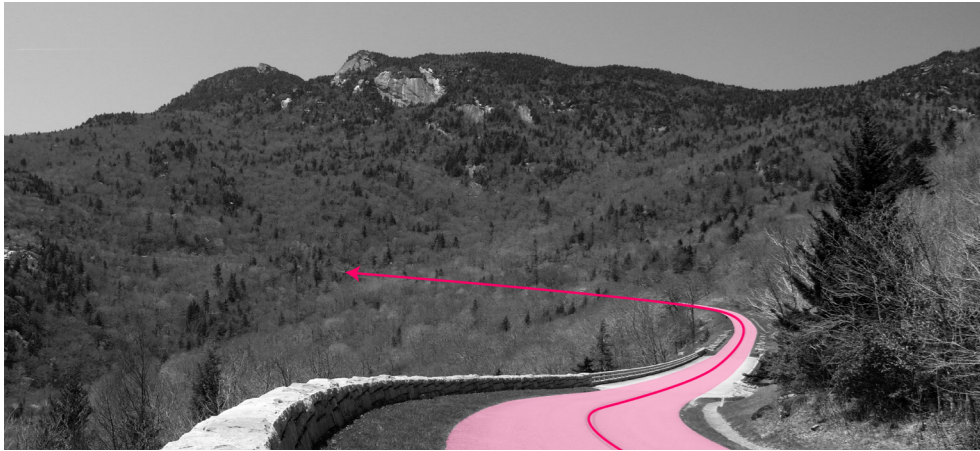


Figure 7.6 - The Serpentine Line (source: Thomas, 2008)

Whereas Burke stated that the concept of beauty can only be achieved by the evoking of emotions, Hogarth said that 'beauty is structured by and relies upon a compositional feature identified as the serpentine line' (Myers, 2004, p.124). This serpentine line can certainly be discovered in the design of the Blue Ridge Parkway (figure 7.6). Hogarth considers straight lines to be the least attractive of all lines.

According to Burke and Hogarth, the concept of beauty also relies on the principles of variety and the principle of motion, both principles that apply to the BRP. The principle of variety includes elements like a curvature of the road and a chan-

ging surrounding landscape, that consists out of irregular planting and vistas. This variety should not be smooth though; sudden transitions are not considered to be pleasurable. These flowing lines can also 'add to the sense of speed' (Crowe, 1960, p.33). The principle of motion is based upon a gentle gradient of the road and the use of landmarks, enough to keep the drivers attention, but not too much to distract him or her (Myers, 2004).

The Future of Infrastructure

But since roads became more about speed and functionality, the focus on the driving experience faded. In the 1970s, the idea that the motorway had no direct relationship with its surroundings grew. Because of this, roads have become more prominent in our current landscapes, in the fact that they take up much more space and in that their negative aspects, like smell and noise pollution, have become greater (de Wit & Jockel, 2006).

In *Infrastructure in Landscape* (1996), Gary Strang advocates using our large infrastructure systems – including but not limited to transportation infrastructure – as a regional, more integrated strategy into our landscapes. He describes them as 'complex mechanisms, which are beyond any individual's understanding or direct influence'. but believes they have the potential create a By (re) designing them to perform multiple uses and in a way that shows their importance - including the connection with their natural surroundings - to society, they have the potential to create a 'tangible relationship to the region' (Strang, 1996). For example, detailing the street in a certain way can help regulate storm water, by making them less wide, using impermeable materials and creating storm water storage (Engel-Yan, Kennedy, Saiz, & Pressnail, 2011).

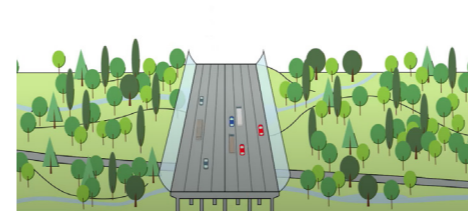
For sustainable neighbourhoods and a sustain-

able city, infrastructure should be designed to encourage the use of more sustainable modes of transportation, like walking, cycling and public transport (Engel-Yan, Kennedy, Saiz, & Pressnail, 2011).

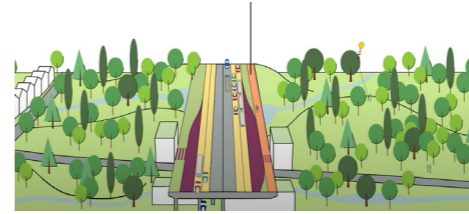
A13: A pact for Overschie (by Mecanoo)

Although it is clear that the future will bring many changes in regards to infrastructure and the general mode of transportation, it is still unpredictable what and when these developments will be. This study and design, by Mecanoo Architects (2016), shows a way of dealing with this unpredictability.

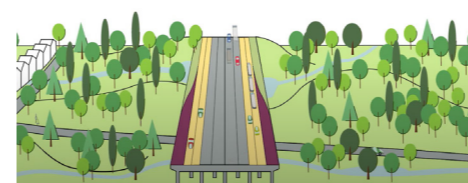
They state that in the near future, the year 2030, electric and self-driving cars will be used on a large scale and that the highway, in this case specifically the A13 near Rotterdam, The Netherlands, should be transformed in a way to deal with this new kind of transport. Mecanoo proposes an integral design, consisting out of a highway, housing strategy and urban park. Because of the unpredictable infrastructure developments, they work with three phases in which the highway and its surroundings are transformed. In the first phase they plan to introduce new lanes for autonomous vehicles. In the second phase they reduce traditional vehicle lanes for bicycle paths and finally they integrate the park with the highway (figure 7.7).



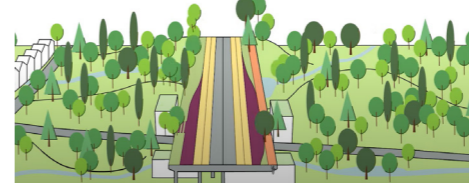
current situation



phase 2: reduce conventional vehicle lanes in favour of bicycle highways



phase 1: introduce lanes for autonomous vehicles



phase 3: integrate the highway with the park

Figure 7.7 - Infrastructure Design in Three Phases (Mecanoo, 2016)

7.3 Aesthetic Urban Forestry

Between designers and users of a landscape, there are different opinions about the extent of forest management. Although little to no maintenance is beneficial for ecological purposes, for human use a forest should also be safe, secure and aesthetically pleasing. Before, there used to be a sole focus on the human experience of a forest, but lately the demand for unmanaged, ecological valuable forest has been growing (Tyrväinen, Silven-

noinen, & Kolehmainen, 2003). In particular, young(er) people, people with a higher education, people that visit forests often and men prefer less managed forests. Where people in apartment buildings also prefer less managed forests, people living in private houses prefer forests with more maintenance. A possible reason for this is that the latter might view these urban forests as a continuation of their (usually very managed) gardens (Tyrväinen, Silvennoinen, & Kolehmainen, 2003).

Previous studies done on this topic, most of them in the 1980s, revealed that although people usually prefer managed forests, they do not prefer visible traces of human activity. This might have to do with the fact that people often think forests are natural and unmanaged, although in reality this is not true and there is actually a lot of maintenance being done. Natural forests have elements like dead and decaying wood, which is something the bigger public definitely does not find attractive (Tyrväinen, Silvennoinen, & Kolehmainen, 2003).

noinen, & Kolehmainen, 2003).

In *Ecological and aesthetic values in urban forest management* (2003), researchers have looked at combinations of different types of forests and a variety of maintenance options; thinning, understorey management, the leaving of dead snags and decaying ground-wood. They learned that the majority of their study group preferred managed forests, although their preferences are also closely linked to their individual backgrounds (Tyrväinen,

8. Aesthetic Analysis

8.1 Aesthetic Aspects

In the previous chapter, four aesthetic categories were introduced; the sublime, the beautiful, the interesting and the plain (Nohl, 2001). These, more general, categories of landscape aesthetics have been translated to categories of urban forestry-aesthetics. By looking at five aspect – the planting scheme of the urban forest, the amount of tree species, the spatial aspects of the urban forest, the types of human elements that are visible and the amount of maintenance – an analysis could be done to determine the aesthetics of the urban forest of Delft. All five aspects are elaborated on in the upcoming part, with a map and diagrams. Most of the data used for this analysis has come from the tree database that has been provided by the municipality of Delft.

Planting Scheme

The first, and a very important aspect, that has been analysed is the planting scheme of the trees. Attention has been paid to whether the trees are planted in a formal or informal manner. Often people experience this as appearing either a human or a natural way of planting. Whereas the category of the sublime only consists out of informal planted trees, the beautiful has a mixture of both formal and informal. the interesting and the plain consist out of only formally planted trees (figure 8.1).

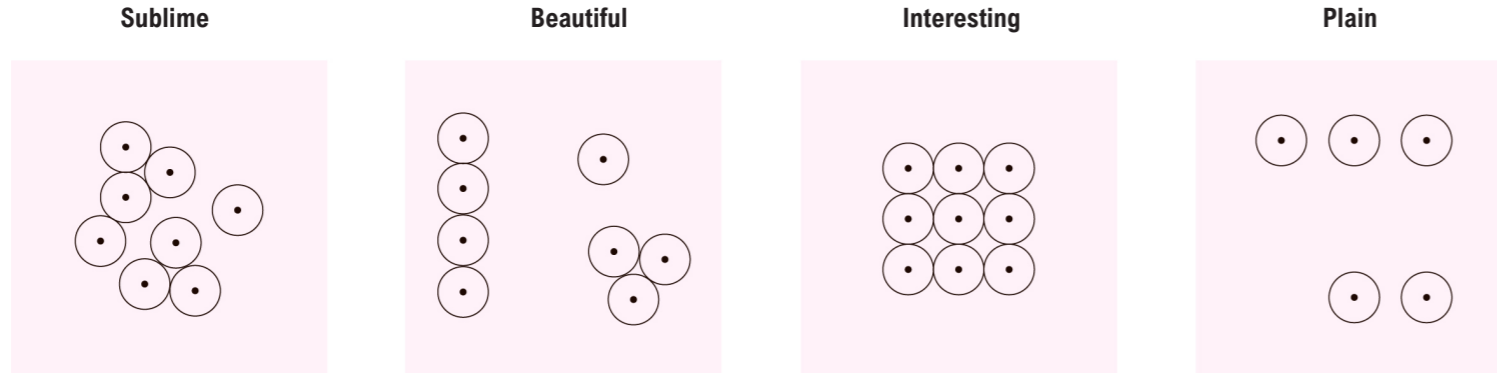


Figure 8.1 - Planting Scheme Diagram



Figure 8.2 - Planting Scheme

Tree Species

The second aspect is the variety in tree species the urban forest has. Whereas the sublime and the beautiful often consist out of various species, the interesting and the plain are more homogenous (figure 8.3).

This analysis was done by counting the amount of tree species in an areas of approximately 70 by 70 meters. The more tree species in this area, the darker the colour of the square (figure 8.4).

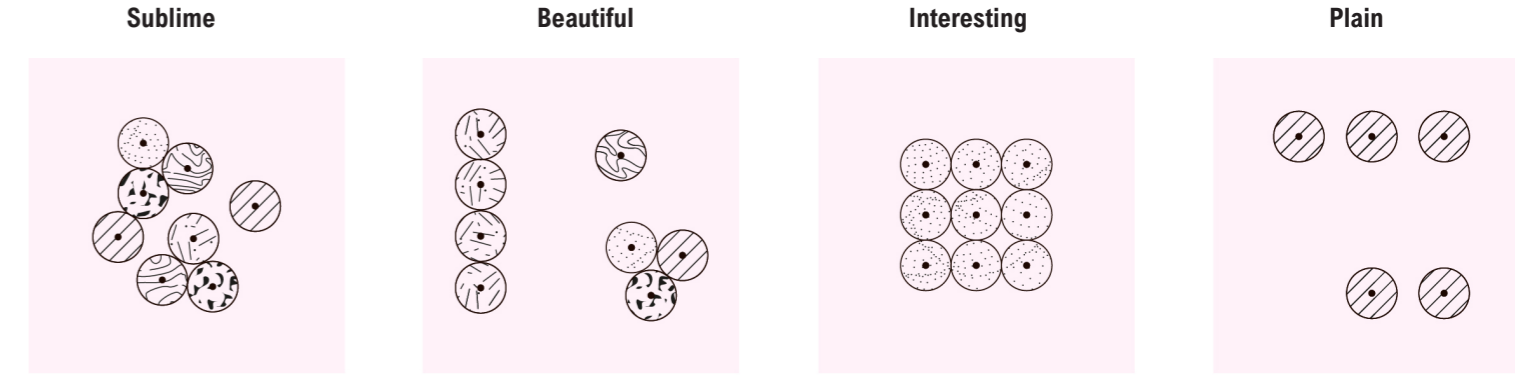


Figure 8.3 - Tree Species Diagram



Figure 8.4 - Tree Species

Spatiality

The third aspect is about the space that the trees create. Whereas space in the sublime consists out of the room that is left free by trees, in the beautiful, space is created by single trees or lines of trees. The space is relatively open. The interesting consists out of a multitude of spaces created by the trees, all relatively small, but changing in shape and size. Finally, in the plain, space is not really determined by trees, but by other, human elements (figure 8.5).

In order to analyse the spatiality, the height of the trees was looked at and the ones that created the biggest spatial difference were extracted. In this way, really only the spatial differences of the sublime could be determined (figure 8.6).

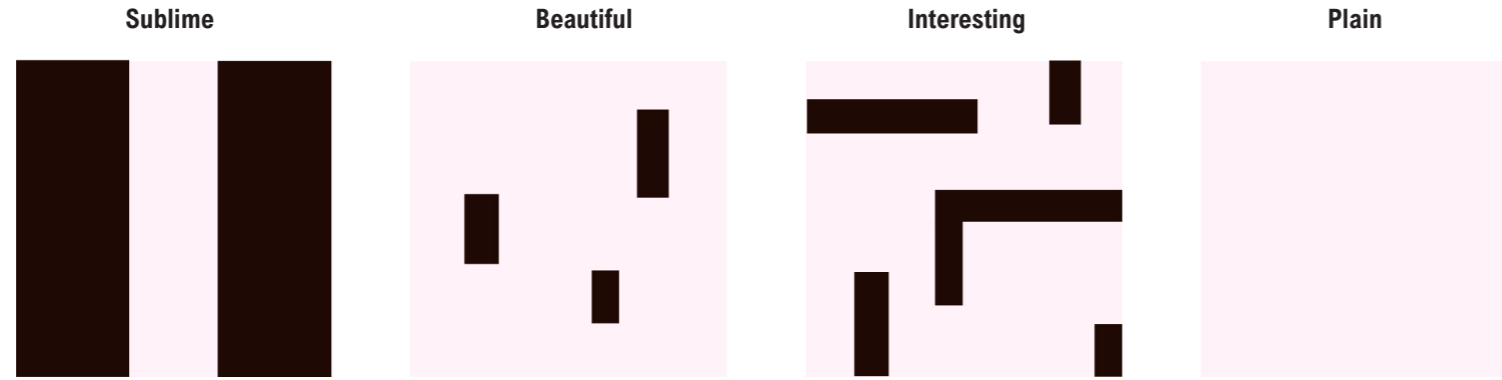


Figure 8.5 - Spatiality Diagram



Figure 8.6 - Spatiality

Human Elements

Another aspect that is important for the aesthetic experience of the urban forest, is the presence of human elements. In the sublime, there are no human elements to be seen. In the beautiful however, there are some human elements, but these have a predominantly historical or romantic appearance. In the interesting and the plain are many human and technical elements. In the interesting though, these elements have a certain relation with the urban forest, whereas this relation does not exist in the plain (figure 8.7).

This analysis was done by marking all the buildings of Delft and making a division between the historical buildings – the monuments – and the more standard or technical buildings (figure 8.8).

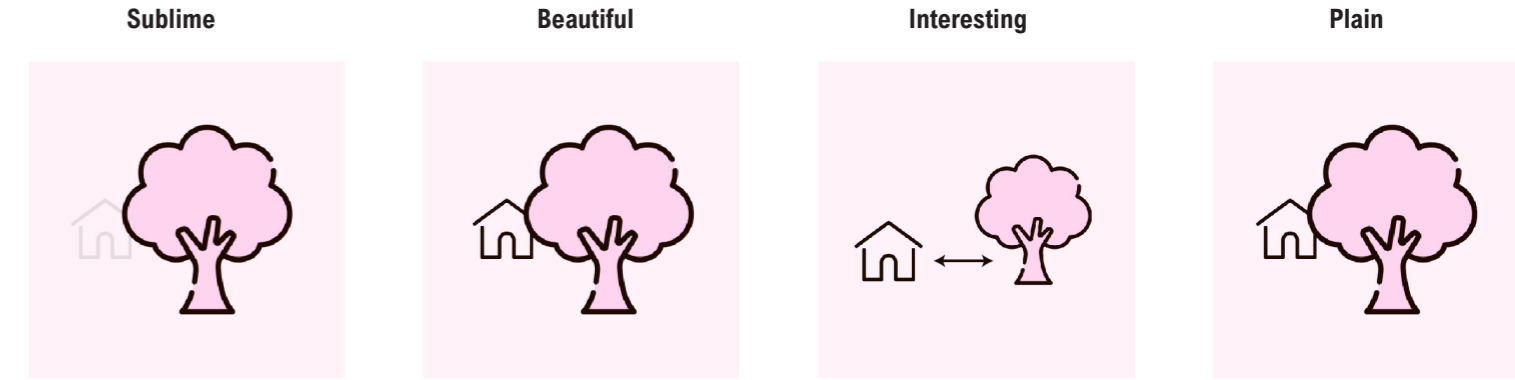


Figure 8.7 - Human Elements Diagram



Figure 8.8 - Human Elements

Maintenance

The final aspect that has been analysed is the amount of maintenance being done to the urban forest. Whereas there is little to no maintenance in the sublime, the beautiful is managed more, in order to keep it 'beautiful', to a certain extent. There is much maintenance being done in both the interesting and the plain (figure 8.9).

The information about maintenance has been retrieved from the tree database, provided by the municipality of Delft. In the analysis, maintenance has been applied as a negative. This is why, in figure 8.10, it is not yet visible.

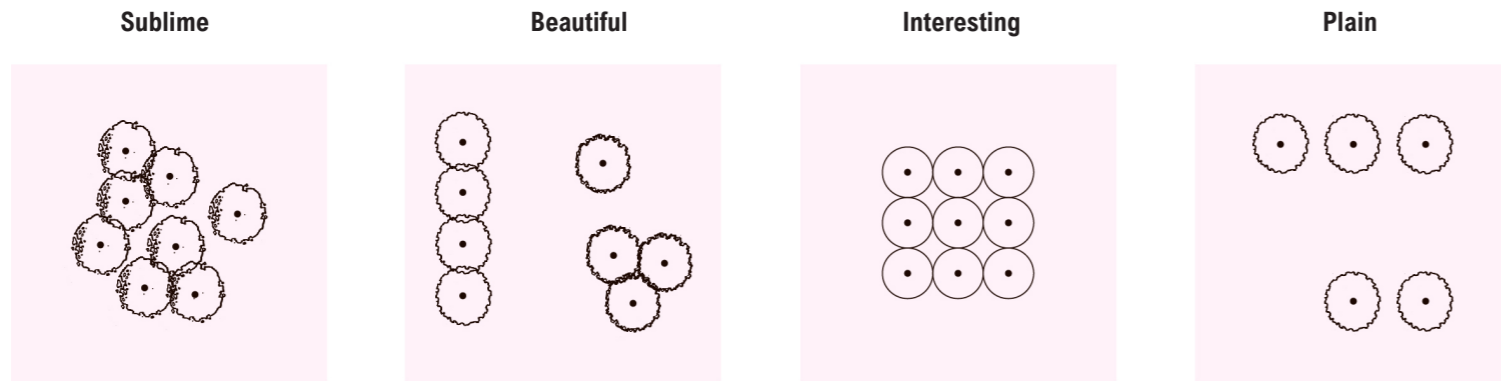


Figure 8.9 - Maintenance Diagram



Figure 8.10 - Maintenance

8.2 Categories of Urban Forestry Aesthetics

This part summarizes the four categories of urban forestry once more, relating to the theoretical framework of chapter 7.1.4 and the aesthetic aspects of chapter 8.2.

The Sublime

In the sublime, the planting scheme is informal and looks very natural. It has many different tree species. The trees create great differences in space. Spaces are very sudden and disproportionated. There are little to none human elements and there is little maintenance, in order for nature to be free.



The Beautiful

The beautiful often includes formal elements like lanes, surrounded by more informally planted areas. There is a certain variety in tree species, but the lines usually consist out of the same species. The space consists out of a large open area with different elements placed into it. In this landscape there are human elements, but most are historical or romantic and there is a certain amount of maintenance.



The Interesting

The category of the interesting in urban areas has a very formal planting scheme, using compositions like multiple lanes and grids. These compositions usually consist out of the same tree species. With the use of these lines and grids, a variety of smaller spaces is created. In the interesting are many human elements, mostly modern and technical ones. There is a lot of maintenance to keep everything neat and user-friendly.



The Plain

A landscape with a plain urban forestry-aesthetic either has no trees at all, or a very homogenous appearance. It has a clear planting scheme, consisting out of the same species. But no real spaces are created because of these trees. There are many human elements and a lot of maintenance being done.



Figure 8.11 - The Sublime (Friedrich, 1821)

Figure 8.12 - The Beautiful (Repton, 1805)

Figure 8.13 - The Interesting ('Graduate Guide Birmingham

Figure 8.14 - The Plain ('Branches', n.d.) | Things to Do in Birmingham | Hallam', n.d.)

8.3 Aesthetic Analysis of Delft

Overlaying the different aspects as discussed in chapter 8.2, has created this map (figure 8.15). It is clear that some areas are very dark, whereas others are fairly light. The darkest areas can be classified as sublime, the medium dark as beautiful, the light as interesting and the transparent as plain. A more clear overview of the different categories of urban forestry aesthetics can be found on the next page.

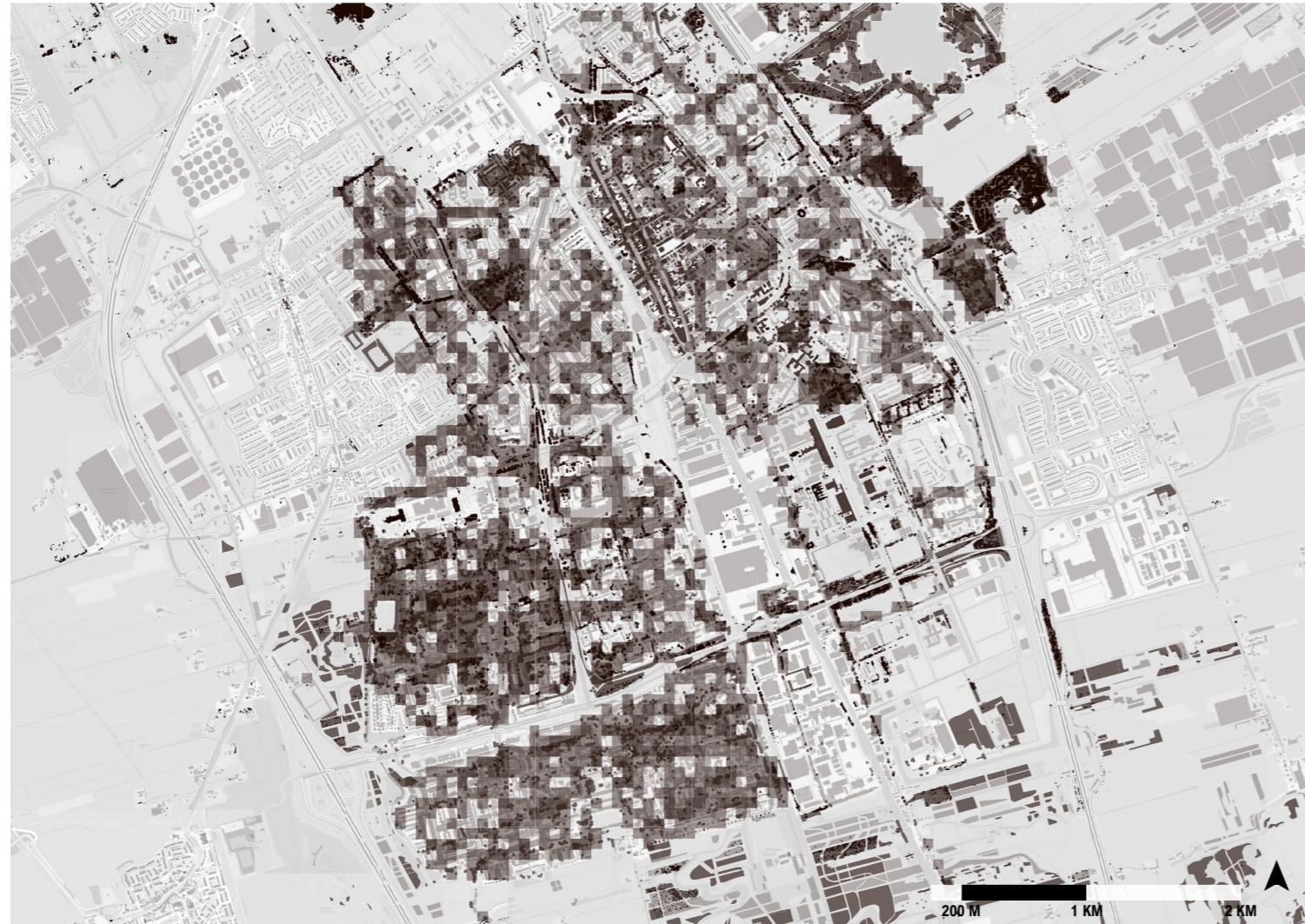


Figure 8.15 - Aesthetics of the Urban Forest of Delft

This map is a distillation of figure 8.16, in which the categories of urban forestry aesthetics have been made more clear. It can be seen that most of the city is a combination of the categories of the interesting and the plain, with some smaller hints of beautiful. Larger patches of beautiful can be found in the Delftse Hout and the neighbourhoods Buitenhof and Tanthof. Only some areas in Delft, around the Delftse Hout, along the Kruihuisweg and in the Wallergarden, can be classified as sublime. The Kruihuisweg is also the only road which is clearly defined by a specific aesthetic.

-  The Sublime
-  The Beautiful
-  The Interesting
-  The Plain
-  large beautiful areas
-  sublime areas
-  Kruihuisweg = Sublime



Figure 8.16 - Aesthetics of the Urban Forest of Delft

part four - vision and design

9. Vision

9.1 Regional Vision

From the analysis, it was clear that Delft would greatly benefit from a new mode of public transport. Thus, a new tramline is introduced, entering the Prinses Beatrixlaan almost halfway. This tramline connects on the west side on an existing tramline in The Hague and on the east side to the Randstadrail in Zoetermeer. By also upgrading the western part of the Kruithuisweg, thus making the whole Kruithuisweg a 'stroomweg', it is argued that the whole of the Prinses Beatrixlaan can be downgraded to a 'gebiedsonsluitingsweg' and the size of it be decreased from 2 by 2 lanes, to 2 by 1 lane.

Of course, the implementation of this new tramline has large consequences. The sections on the next page give an overview of how different areas this tram runs through, should be developed in the future. Sections A until E correspond with several points on the map, showing the development on different aspects; specifically housing, urban forestry and infrastructure. Only section C is not located on the tramline, but it shows a part of the Prinses Beatrixlaan that will nonetheless suffer consequences from the downgrading of the road.

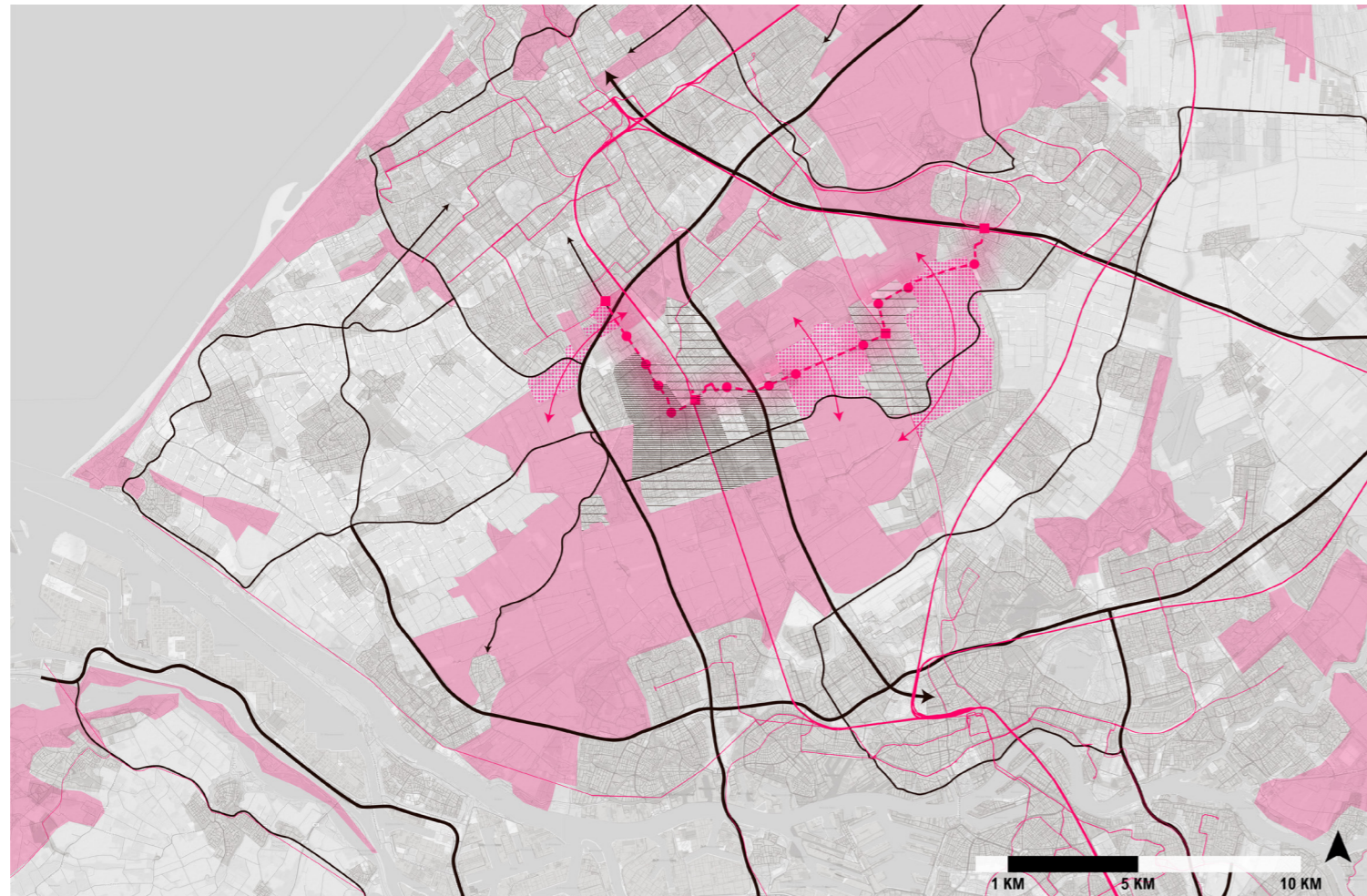
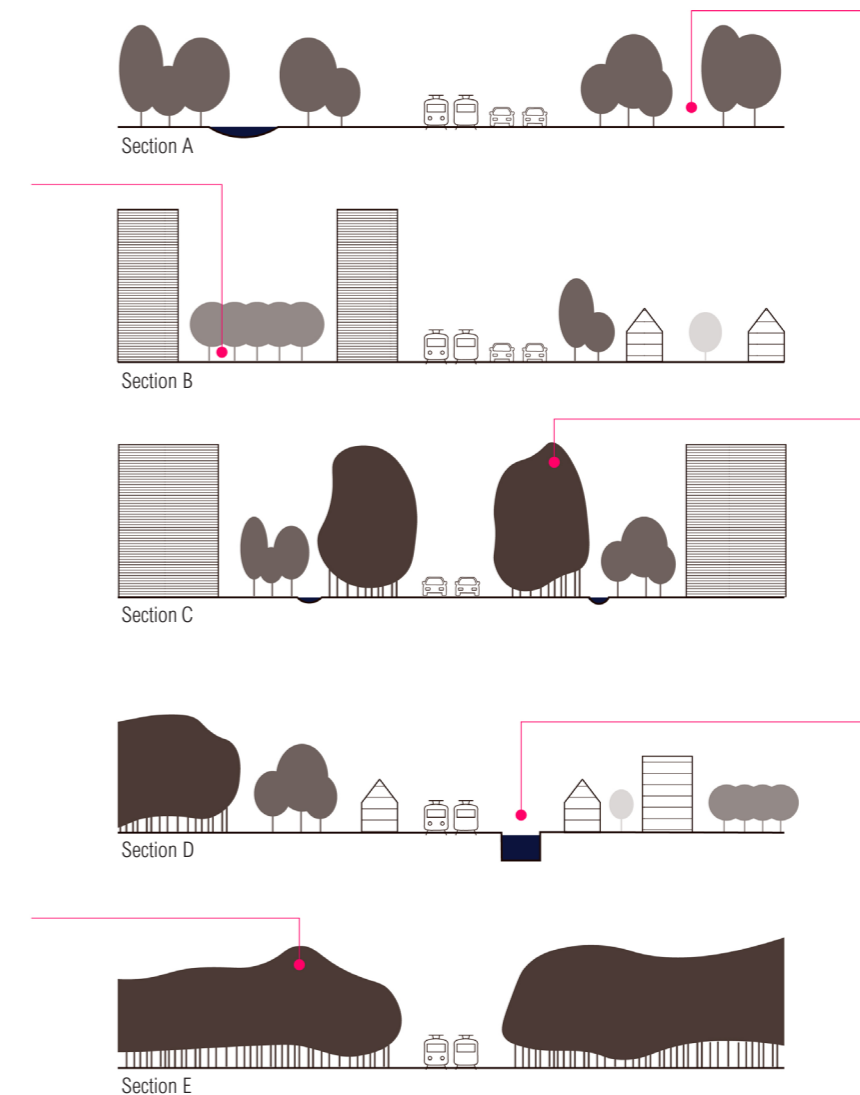


Figure 9.1 - Regional Vision

On the western part of the Prinses Beatrixlaan more houses will be build, by replacing old existing buildings for large apartment buildings. Existing neighbourhood-centres will be extended and the trees will be planted in a formal way, specifically according to the interesting aesthetic category.

This area is now covered in green houses. In the future, when these greenhouses will need to be replaced, they will move somewhere else and this area will slowly become a dense, unmanaged forest. The tram will move through a small corridor between the trees. These large forests will connect existing green on both sides of the tramline.



Here lies an existing golfing course, which urban forest can be classified as beautiful. Because of the sparse trees, the view from both the car and the tram is wide. This landscape should be kept this way, to make sure no houses are being build and to ensure a green corridor between Delft and The Hague, that connects existing green.

The existing green that shields the Prinses Beatrixlaan from the surrounding neighbourhoods can be extended, because of the narrowing of the road. This urban forest is dense and unmaintained, but behind it lays a more park-like green structure, to accommodate the many people living in these dense neighbourhoods.

Although a new tramline is introduced, the small-town character of these places can be maintained. The tramline will replace the car lanes here, making it a car-free zone. On one side of this car free zone there is a small strip of houses, behind which large green patches lie. On the other, the urban green in the town centre will be upgraded from a plain to an interesting aesthetic, using specific compositions, like grids.

Figure 9.2 - Regional Vision in sections

9.2 Local Vision

Functional Vision

The map on the right shows the vision on Delft. The green structure will stretch along the whole of the Prinses Beatrixlaan, and connect with the characteristic green areas from surrounding neighbourhoods, either physically or visually. The tram line will have three stops along the road, that will lead to the densifying of neighbourhoods and development of neighbourhood centres. The line connects to other important areas of the city; the city centre, the train station and the university campus. When possible, the neighbourhood centres are connected with the road. Especially in these areas, the connection with the neighbourhoods on both sides will be improved.

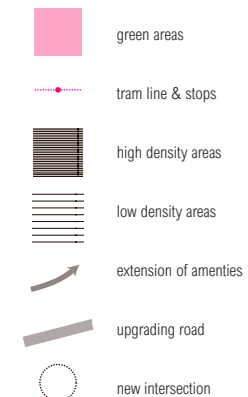


Figure 9.3 - Functional Vision on Delft

Aesthetic Vision

The aesthetic vision on Delft is based on the 'brain-scan' map from chapter 8.3 and altered according to the functional vision. The sublime character of the Kruithuisweg is extended and pulled into the southern part of the Prinses Beatrixlaan. Other sublime areas have also been extended into the city. Large parts of the previously interesting areas, have been upgraded to the category of the beautiful, as seen in the city centre. Plain areas have been upgraded to the interesting category. Interesting areas have been extended to areas with multiple functions and amenities, whereas the beautiful has pulled into living neighbourhoods, with less variety in functions. In general, all categories have been extended in a way that they form larger continuous structures throughout the city, by which they can be experienced better.

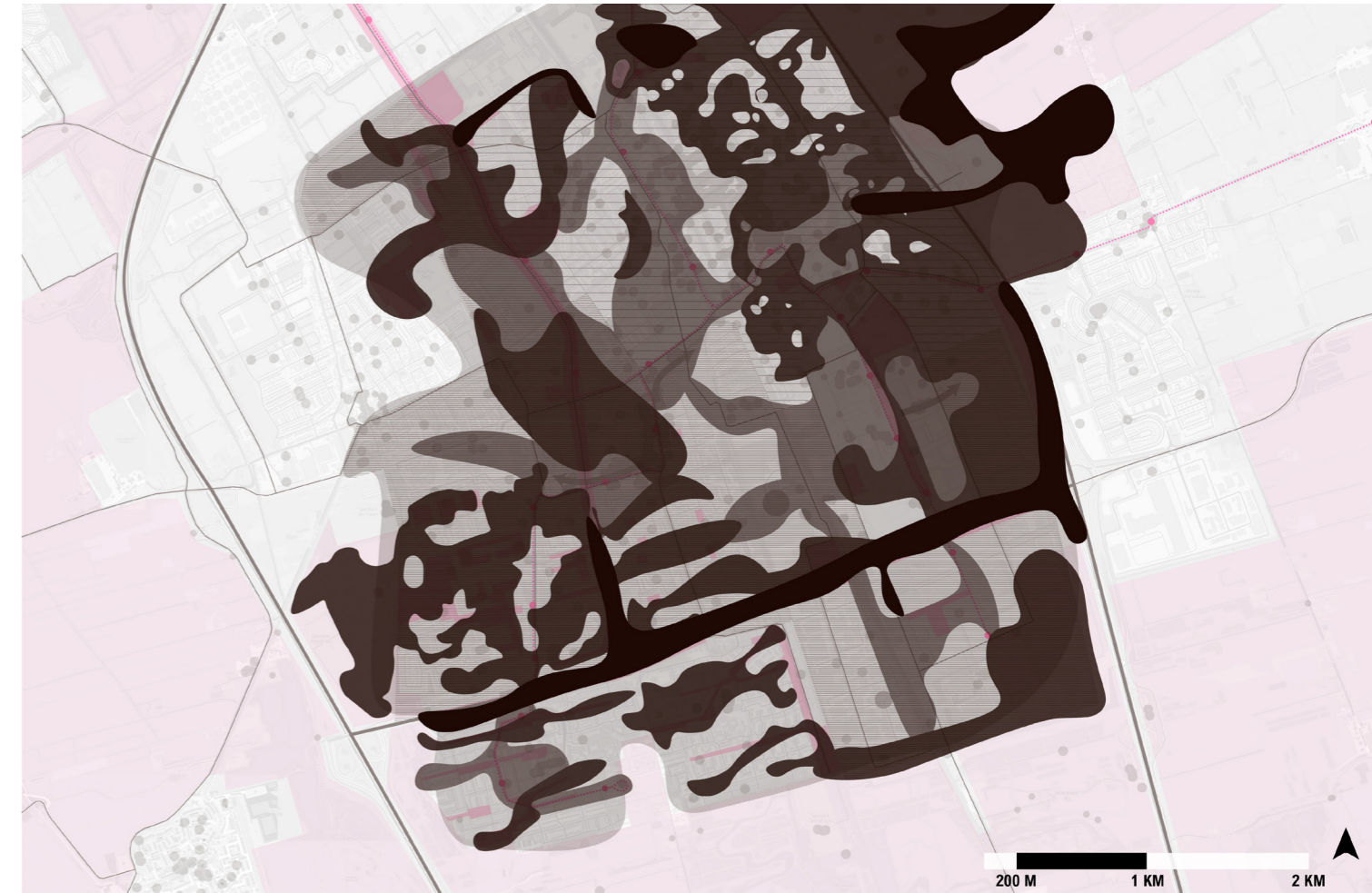


Figure 9.4 - Aesthetic Vision on Delft

9.3 Vision on the PBL

Functional Vision

This map shows the vision on the Prinses Beatrixlaan in more detail, especially which existing green areas will be connected to the green structure along the PBL, where (new) connections between the neighbourhoods on both sides should be and where exactly the new tram stops are. It also shows how the three different infrastructure lines – the car, tram and slower recreational lane – will run in relation to each other.

Aesthetic Vision

The diagrams on the next page give an overview of the vision for the Prinses Beatrixlaan in relation to its aesthetic experience. Basically, the road consists out of three lines, with three different speeds; the car lanes, the public transport and the bicycle / pedestrian path (figure 9.6). Whereas the first and the last begin at the intersection with the Kruithuisweg, the public transport only enters the road halfway through. The car lanes and public transport do have a few bends in the road, the bicycle and pedestrian path has much more. Sometimes it is located almost directly next to the faster transport, other times deviates a lot.

This mainly happens when it moves through a green 'room', a place that is often experienced while standing still. These rooms exist on both sides of the main road, but only on the eastern side the bicycle path moves through them. On the western side these rooms are more integrated in the neighbourhoods (figure 9.7).

These rooms have different aesthetic qualities, those of the sublime, beautiful and interesting, with all their different characteristics (figure 9.8). The green space around the room itself changes in aesthetics, but relates to the rooms that are adjacent to it. The categorization of the rooms is based on existing qualities of the site and the desired purpose of the room. Whereas the sublime occurs in places with more space and little buildings, or when a boundary between fast traffic and its surroundings is necessary, the beautiful builds upon the existing green structure and typically occurs in neighbourhoods. The interesting is used in places with amenities; shops, schools and sport field.

This is also what the stops of the new tramline are oriented upon. They connect the areas with amenities with each other and with the larger region. These new tram stops will also attract new developments, like a bigger housing density. This is why the entire east side of the road will be densified, as well as around the tram stops on the west side (figure 9.9).

A final element that is used is the introduction and of tree lanes, similar to the ones that already exist. These give direction to the faster traffic and cause a sense of coherence to the road (figure 9.10).

Figure 9.5 - Functional Vision on the PBL

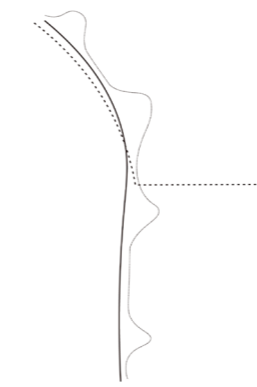
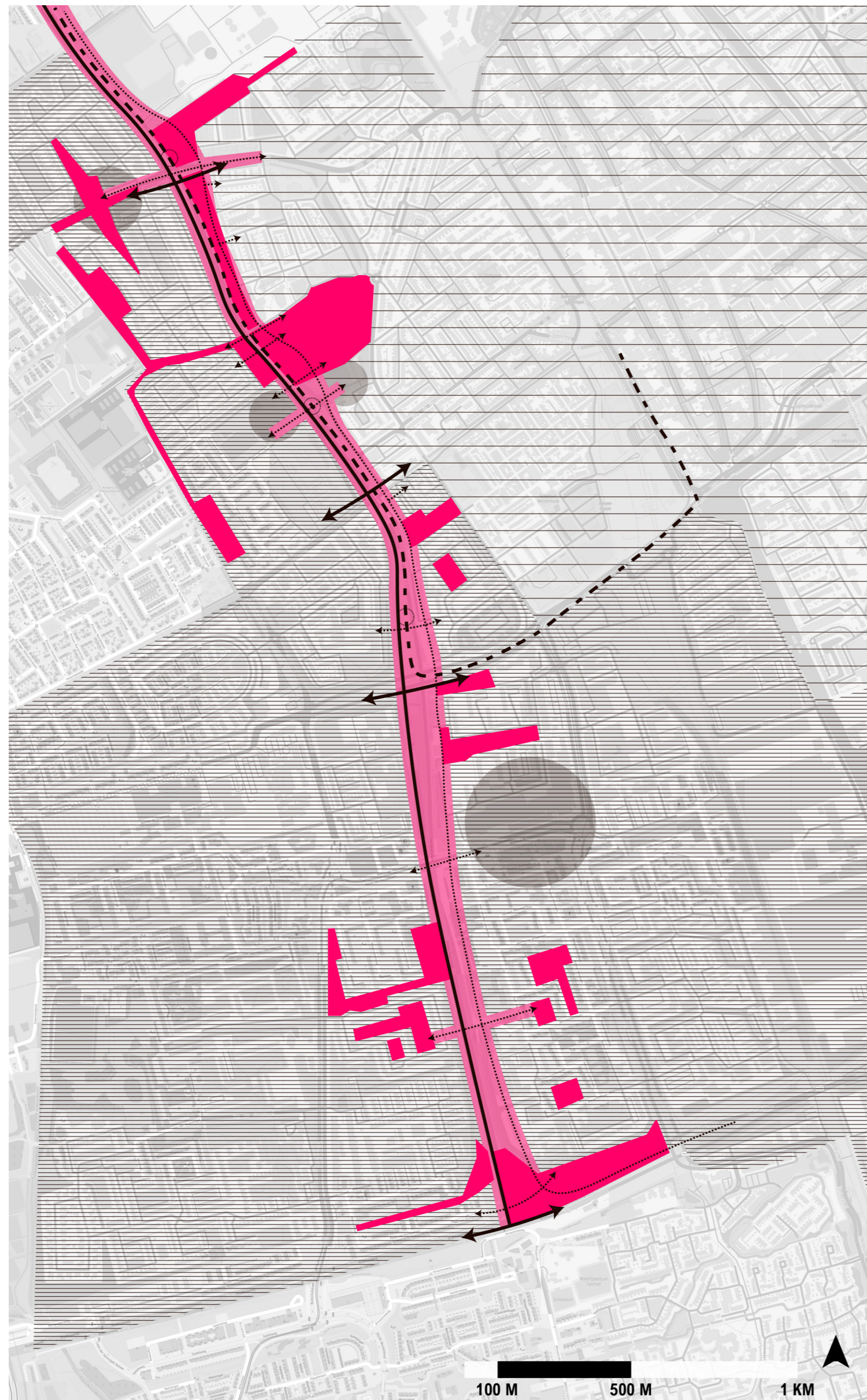


Figure 9.6: Three Different Speeds

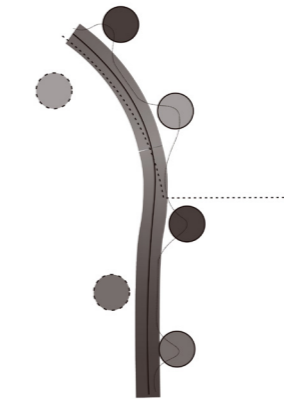


Figure 9.8: Aesthetics of Rooms

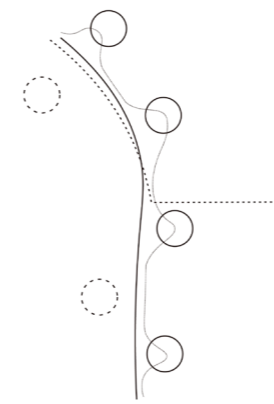


Figure 9.7: Rooms

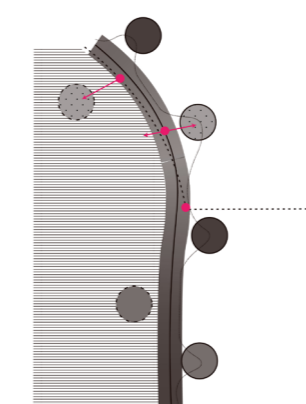


Figure 9.9: Building density, Amenities & Tram Stops

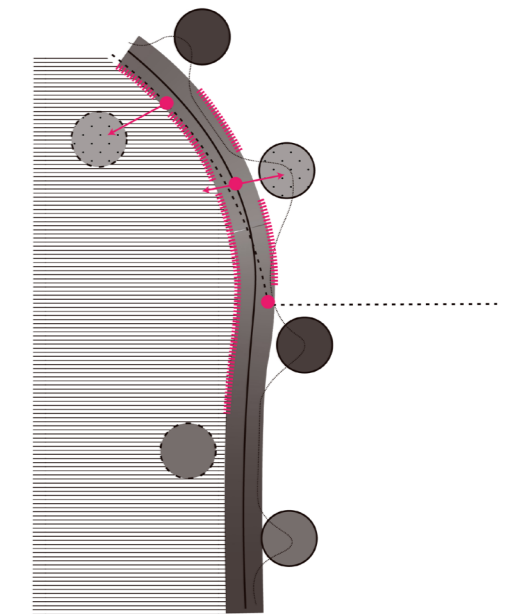
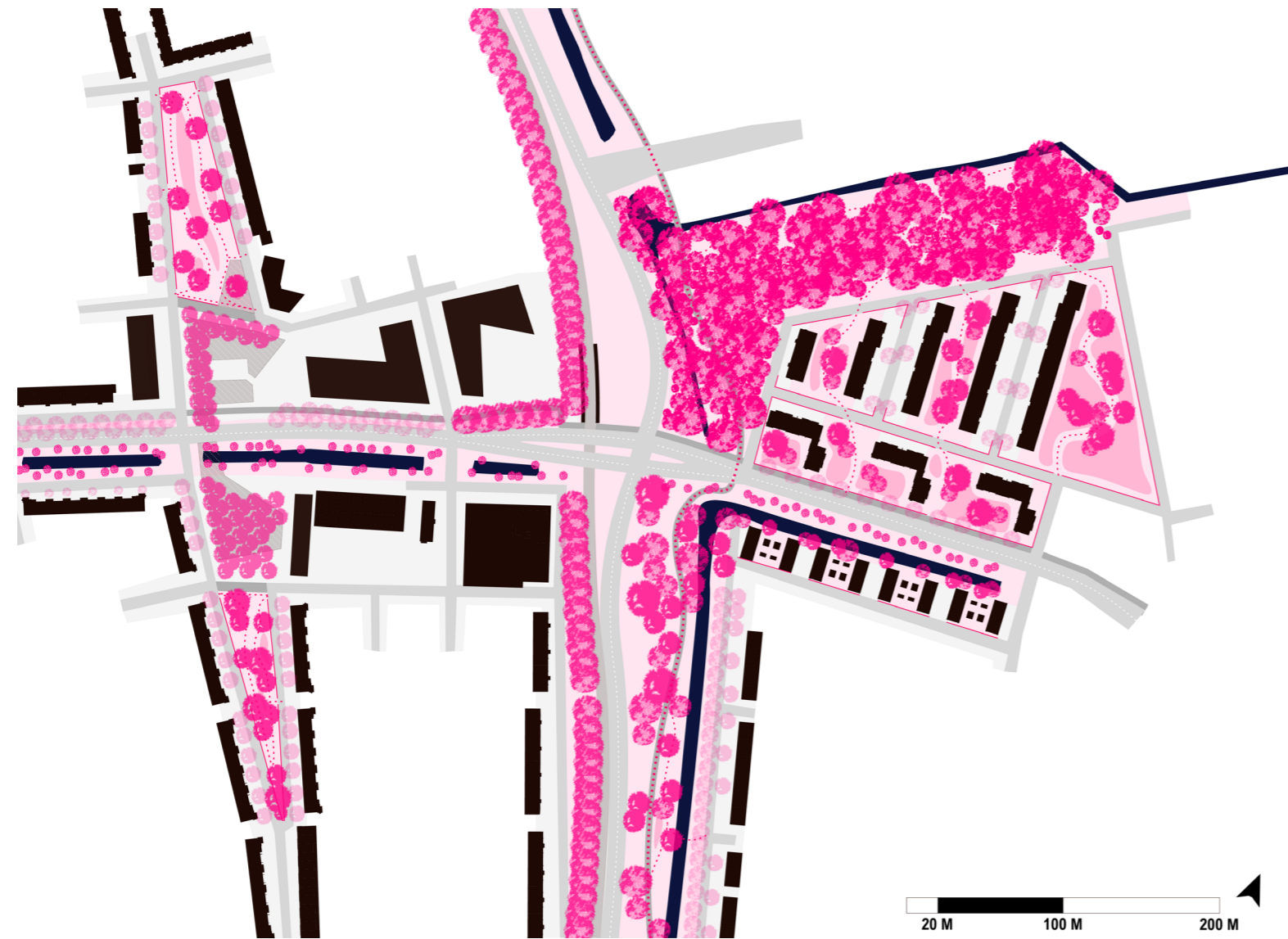


Figure 9.10: Tree Lanes





10.1 Location One

For the design, one location along the Prinses Beatrixlaan has been zoomed into in more detail. This location, on the north side of the Prinses Beatrixlaan, has all elements that were written about in the vision. It has different areas of green, holds all types of infrastructure, including a tram stop, and has some areas that will need to be densified in the future.

The map on the left shows the masterplan. Attention has been paid to the existing characters and elements and the design has built on this. The neighbourhood on the west side of the road includes a park, consisting out of two squares and two triangle shaped parks. Although these smaller, triangle shaped park will benefit from a beautiful aesthetic, for the squares the interesting

aesthetic would be best suited. The east side of the road is a smaller area, consisting out of just a few apartment buildings and some single houses. Next to these, a large, semi-open green area lies that gives the most space for a sublime forest, that can then create a boundary between the buildings and the road. Because of the transformation of the road, the transition from 2x2 to 2x1 lanes, much space has opened up and the road itself has also gotten its own character.

Generally, the area east of the road is more for nature and ecology, whereas the west side is more for people to enjoy.

Figure 10.1 - Masterplan of Location One

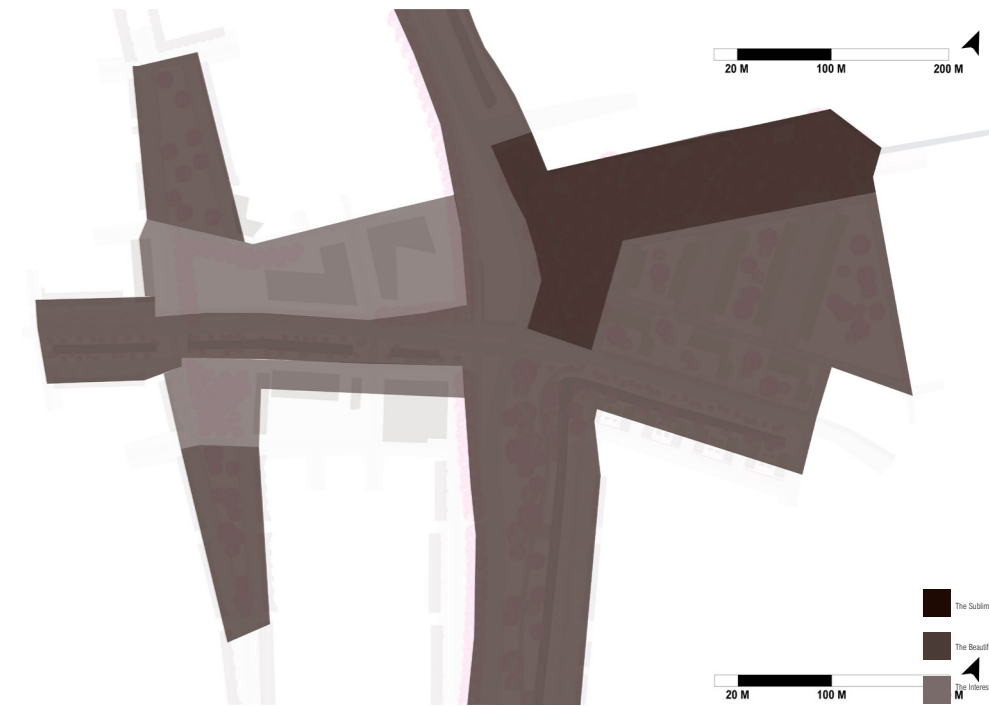


Figure 10.2 - Aesthetic Vision on Location One

10.1.1 Green & Ecology



In terms of green and the planting of trees, three different types can be distinguished.

There is one larger area with a specific type of forest; alder and ash forest, which is very dense, looks informal and is almost unmanaged. It has, next to the alder and ash, a great variety of species, also in the other layers this forest consists of; the shrub and herb layer. The spaces created in this forest are very small and enclosed by trees.

Then there are several areas with more of a park-like structure, consisting out of formal plan-

ting, lines, and informal planting, patches of sparse forest. Whereas the lines consist out of similar species, the sparse forest has a larger variety. Although the trees are generally large, the space still feels open.

Finally, there are some very formally planted trees, planted in a double line and grid, that form either the boundary or the roof of the two squares. This planting scheme is based upon the existing situation. By mirroring the existing planting scheme from one of the two squares to the other, a visual connection is created.

Figure 10.3 - Green & Ecology (Location One)

10.1.2 Water Structure



A specific area of trees that has also been extended, is the one indicated on this map and illustrated by the section, to accentuate the continuing water line. For various reasons, but mainly the presence of the large intersection, it was not possible to physically connect these historical water lines. By planting clearly noticeable trees along the lines, a visual connection could be created. Malus and Prunus, two species that already occur in this area, are chosen to accentuate this line.

Another benefit of these trees is that they attract many insects and other small animals.

Furthermore, one specific area will be slightly excavated, by a meter. Because of this, there will be more room for stormwater storage, but it will also help create this dense forest consisting out of mainly alders and ashes. In the next pages, this forest is focussed on in more detail.

Figure 10.4 - Water Structure (Location One)

Detail 1: The Sublime Forest - 0 years

These drawings show transformation from a semi-open space to an alder and ash forest, for which the conditions have been shaped on the location. Only at the beginning of this process, some interventions will be done, and other developments will happen naturally.

By removing the upper meter of soil, the area can be used for storm water storage when needed. Some species, like *Crataegus monogyna*, *Fraxinus excelsior* and *Alnus glutinosa*, species that do not mind the wetness, will be planted. These will be planted in an informal manner, to look as natural as possible.

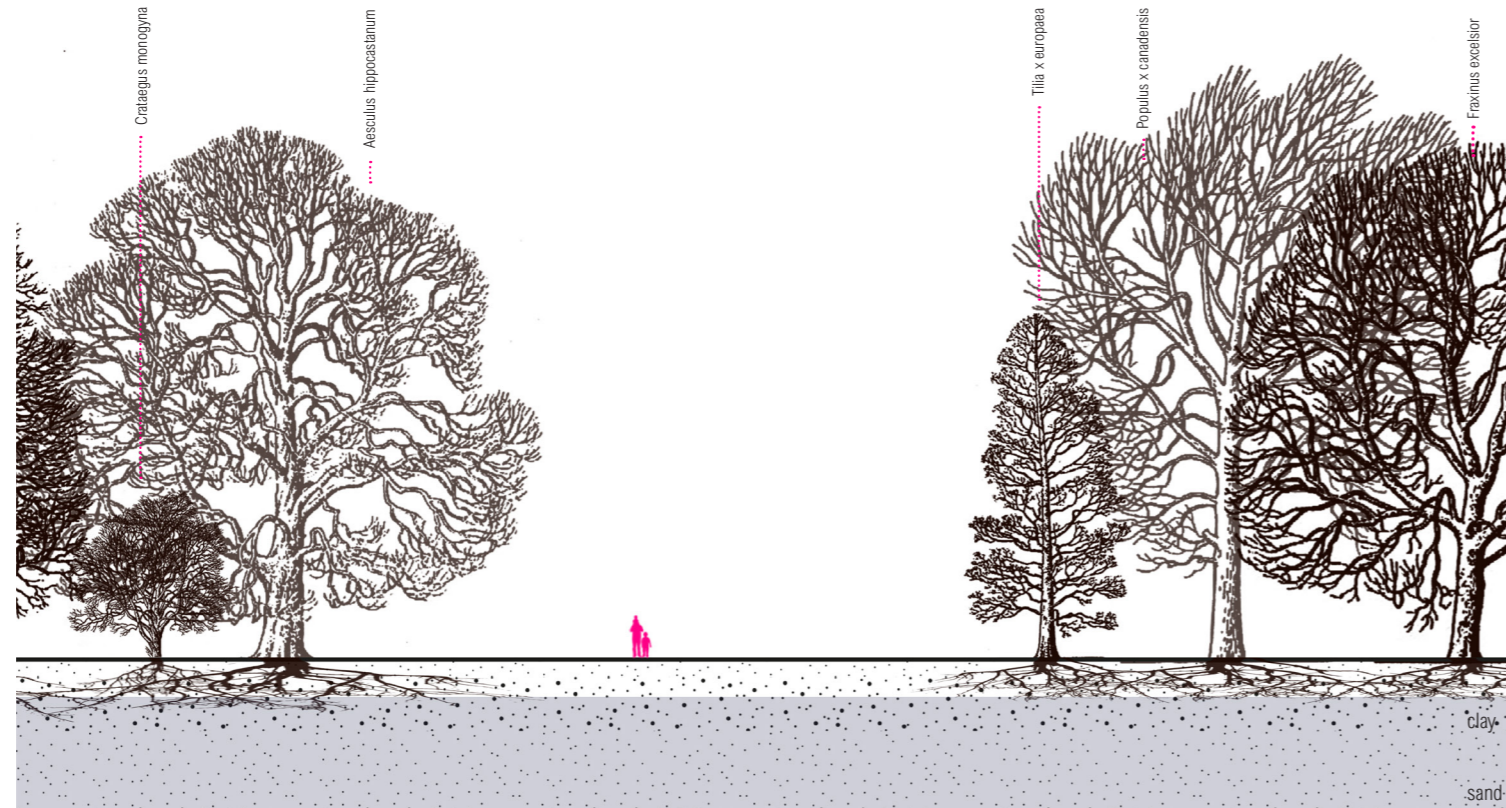


Figure 10.5 - Detail Sublime Forest (0 years)



Figure 10.6 - Detail Sublime Forest (10 years)

Detail 1: The Sublime Forest - 10 years

In the next ten years, these species will have grown slightly. The trees that have died in the meantime, will be left out in the forest. A layer of grass and herbs will have grown. Now the forest already consists out of three layers; the tree layer, shrub layer and herb layer, which is very beneficial for ecology.

Detail 1: The Sublime Forest - 30 years

In thirty years, the forest already seems quite dense, although the young trees are still relatively small. They have grown up to almost ten meters. The spaces inside the forest have already gotten somewhat enclosed.



Figure 10.7 - Detail Sublime Forest (30 years)



Figure 10.8 - Detail Sublime Forest (60 years)

Detail 1: The Sublime Forest - 60 years

In sixty years, the planted trees have reached their full height and create small, narrow and enclosed spaces. From within the forest, no human elements can be seen, just the forest itself and the sky above. The forest is very dense, and although some parts of it are planted, it looks very natural. In the sublime, nature is more important than human.

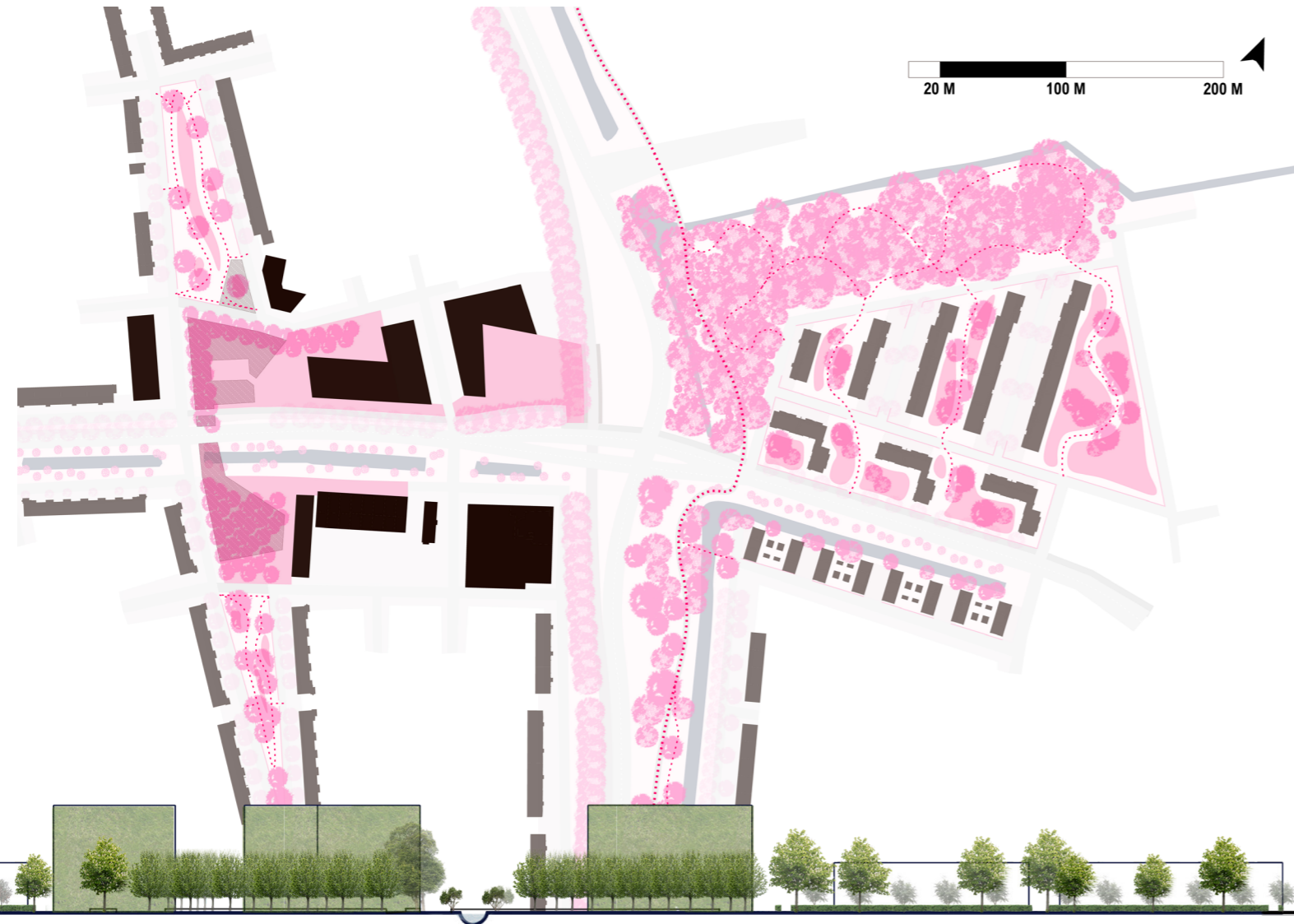
Aesthetic Experience of the Sublime

The following visuals give an insight in how the sublime can be experienced. Walking towards it, it already stands out as a large body of trees, that creates large spatial differences with its surroundings. From close by, small entrances can be distinguished. Inside the sublime forest, it is dark, except for the skylight above you. The forest is dense and it feels like you are in right in the middle of nature.



Figure 10.9-10.10 - Aesthetic Experience of the Sublime

10.1.3 Housing & Recreation



- recreational bicycle & pedestrian path
- pedestrian path
- place to sit down

The area that needs to be densified, according to the vision, is the area west of the Prinses Beatrixlaan, that has been given an interesting aesthetic. In order to densify this area, on the location of existing buildings, new buildings have to be build. These will have more stories, but some of them have also been placed in a way that they open up towards the public space. On the first floor, various shops and restaurant will be located, so that this area will be an attractive area with

many functions and amenities. Recreation here is very facilitated. In the other areas though, this is much less the case. In areas with sparse forest, recreation consists out of walking through nature and sitting in nature. Here, the buildings function just as a background for the forest. In the denser sublime forest, no trace of buildings or other human elements can be found. Recreation here consist out of solely walking through nature and looking at it.

Figure 10.12 - Buildings & Recreation (Location One)

Detail 2: The Interesting Forest

In the interesting category, there is a lot of interaction between the human, technical elements and the natural elements, the trees. The new buildings will have green facades and roofs. Another important element on this location, is the presence of a large deck, that is placed upon the two squares. This deck creates different places for recreation, outdoors cafes on top of it, and an enclosed playground inside of it. The shape creates a visible continuous route from one square to the other. It also interacts with the triangle shaped parks north and south of it. On the north side, the deck is slightly pulled into the park, whereas it prematurely stops on the southern square. In this way, the square continues into the park.

On the northern square, the existing double tree line is altered to a in order to create a more inviting space. This grid is continued into the southern square, where it turns into a grid. In this way, two different climates are created; one sunny and one shady. It also creates two very different spaces.



Figure 10.13 - The Interesting Deck

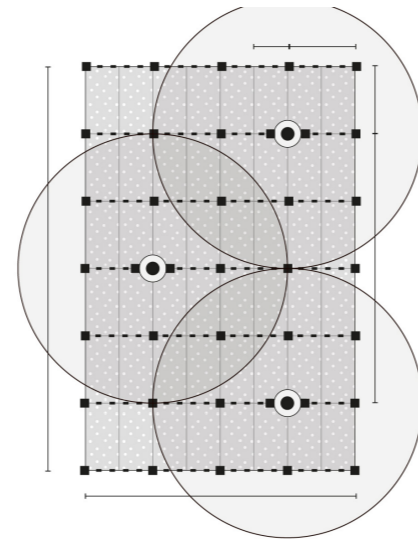


Figure 10.14 - Detailed Map of the Deck

The deck is built with steel columns and beams, and the finishing material is white galvanized steel with small holes. These holes make sure that some water and light infiltrates the deck, which results in plant growth. Although these plants are free to grow inside the deck, maintenance makes sure that it does not grow outside of it. This is in line with the extreme maintenance done in the interesting.

The deck is built around the trees, that are or have been planted in a very formal composition; a double line on the northern square and a grid in the southern square, as previously mentioned. Both compositions consist out of one tree species; *Aesculus hippocastanum*, the same species the existing line already has. Between the deck and the bottom of the tree crowns, a very specific, low space has been created.

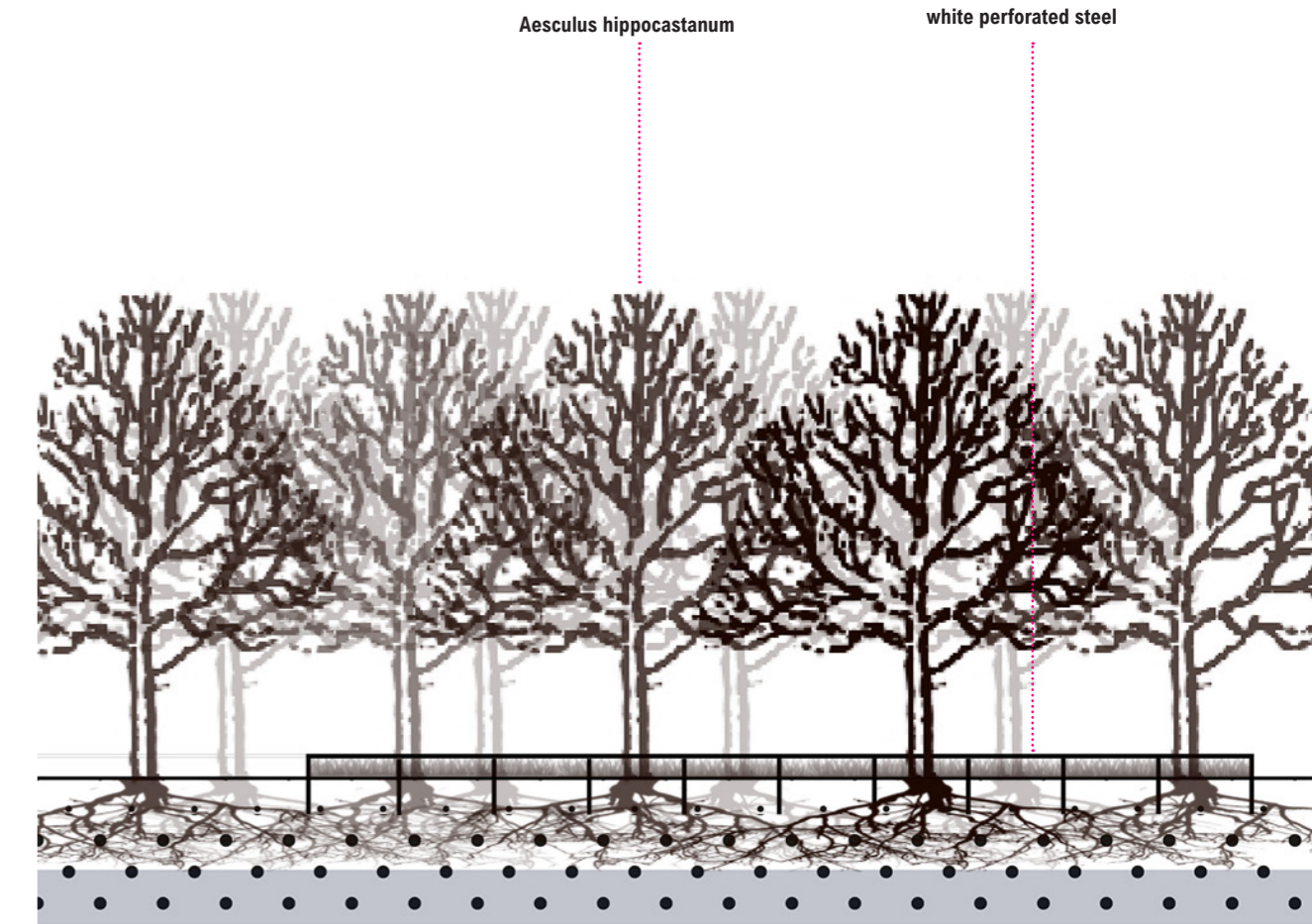


Figure 10.15 - Detailed Section of the Deck (Section AA')

Aesthetic Experience of The Interesting

Starting from the northern side, the deck is first introduced by a small part of it that is located in the park. From there, the double line of trees is already very visible. The first of that double line can be experienced from ground level, the second is surrounded by the deck. The first deck, on the northern square is open and bright. While walking through the gallery, you have to cross the street before entering the second deck. Here, the space is very low, and dark.

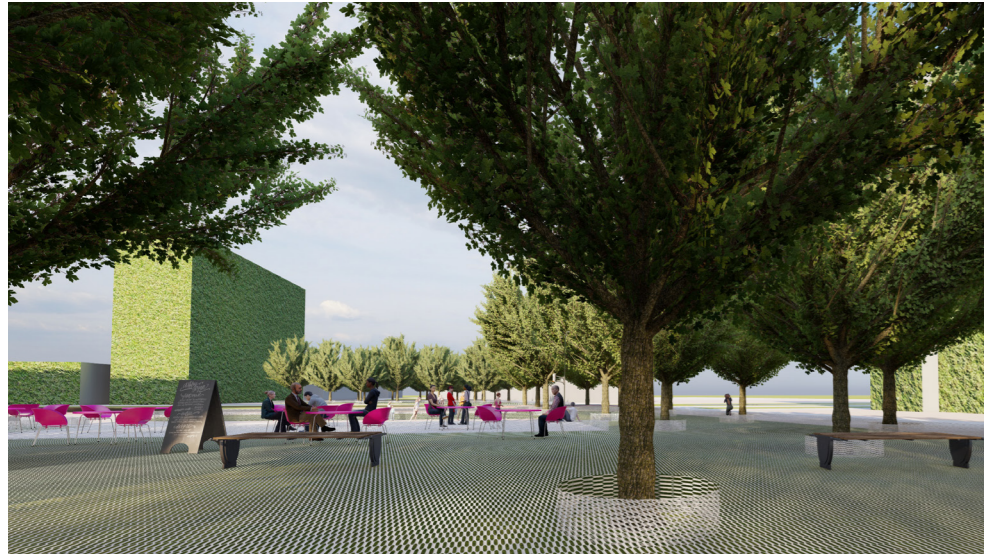


Figure 10.16-10.18 - Aesthetic Experience of the Interesting

10.1.4 Infrastructure



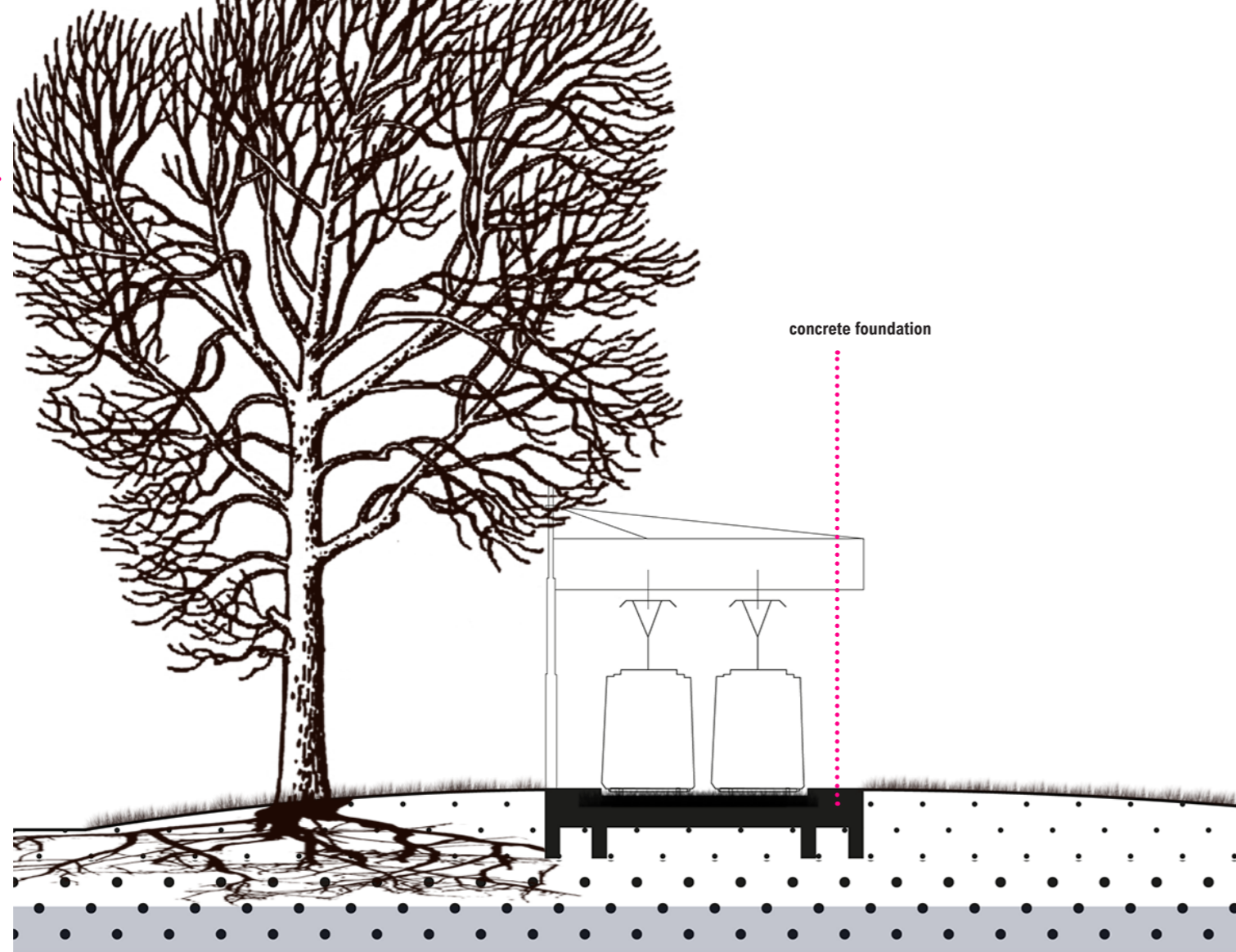
Looking at the infrastructure on this location, it is visible that the Prinses Beatrixlaan has been downgraded from 2x2 to 2x1 lanes. The intersection has therefore also gotten smaller. The new tram line runs through this location and has a stop here, close to the newly densified area and amenities. Due to these two interventions, space has opened up along the road. This makes it possible to create more bends and create a meandering

road, that has been proven to improve the aesthetic experience. It introduces variety and keeps the driver's attention.

Finally, small adjustments have been made to the infrastructure in the neighbourhood on the left side of the road, creating car-free areas, so that the spaces are more enjoyable for people.

Figure 10.19 - Infrastructure (Location One)

Populus x canadensis



Detail 3: The Beautiful Forest

This detail focusses on the implementation of the new tram line and tram stop on this location. According to the category of the beautiful, human and nature are a whole and therefore it was attempted to embed the infrastructure as much in the landscape as possible. By small hills that lead up to the platforms, almost all technical solutions are invisible from a distance. The only element that can be seen from a distance are the electrical wires and the tram itself. The posts for the electrical wire stand pretty close to the large trees, which means a certain amount of maintenance is definitely necessary.

A foundation has to be laid to carry the weight of

Figure 10.20 - Detailed Section of the Tram Stop

the tram itself, but the roots of the trees next to it can grow underneath this. The areas around the trees have been kept open, to get more oxygen to the trees, but small stairs between these openings lead to the square next to it.

The tree shown in the section is part of a line of trees. In combination with other, more park-like forest structures, the aesthetic of that part can be classified as beautiful. Because of the line of trees, which are all Populus, there is not a very great variety in species. The informal planted trees do consist out of different species though. The space along the tram line is a fairly large, open space. The trees are just elements within this space.

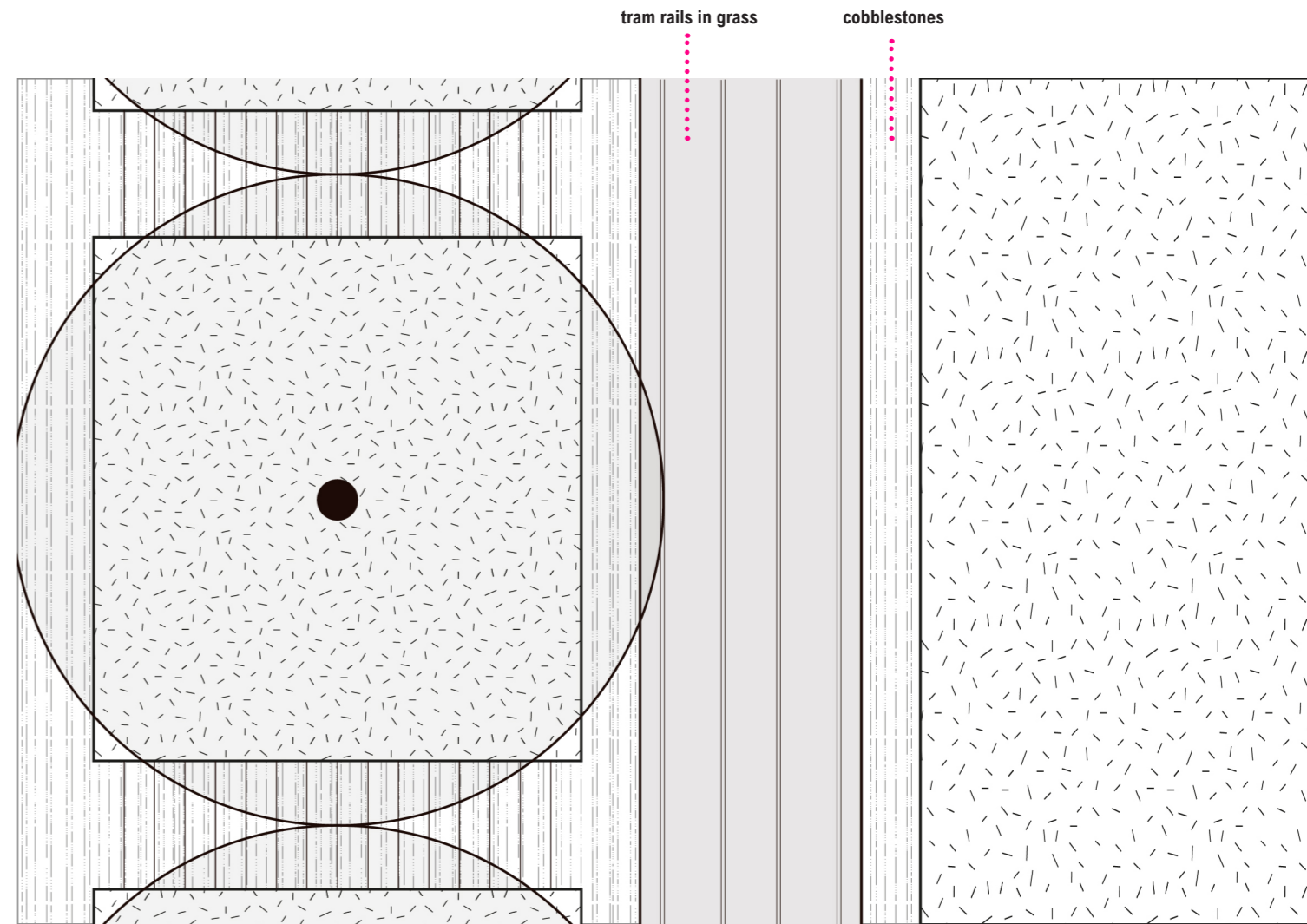


Figure 10.21 - Detailed Map of the Tram Stop

Aesthetic Experience of The Beautiful

As previously mentioned, there is a long line of Populus along the western side of the tram line. This line forms a guiding element along the road. The urban forest on the eastern side changes more. Towards the tram stop, it changes from a sparse, park-like forest into a very dense forest.



Figure 10.22-10.24 - Aesthetic Experience of the Beautiful

10.2 Toolbox

Certain elements from the design of location one have been categorized into three toolboxes, those of the sublime, the beautiful and the interesting. These elements have been distributed into four groups; composition, green & water, buildings & recreation and infrastructure. The following pages show these toolboxes.

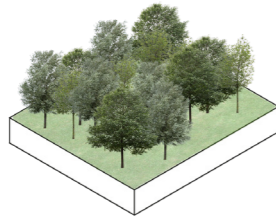
The Sublime

The composition within the sublime consists out of dense, informal planting, that creates large or sudden contrasts. Spaces in the sublime are usually enclosed by trees.

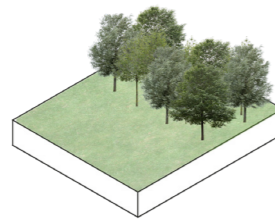
The forest consists out of different layers, the tree, shrub and herb layer. It has a great variety of species, and there is little to no maintenance. Places with a sublime forest could from time to time also be used as storm water storage.

In the sublime, there are no human elements visible and recreation consists out of moving through and looking at nature. The road can be made into a tunnel by the dense trees that stand next to it and this road is often meandering.

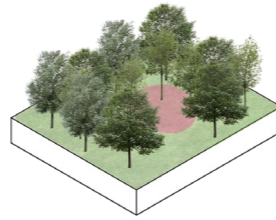
composition



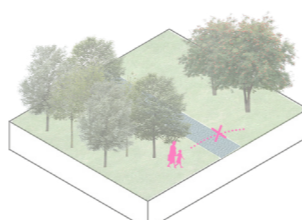
dense, informal forest



large, sudden contrast

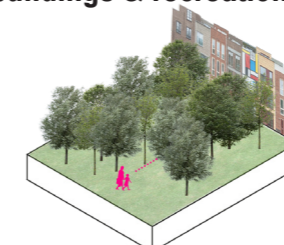


enclosed spaces

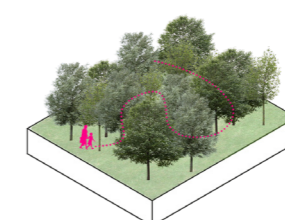


unreachable places

buildings & recreation

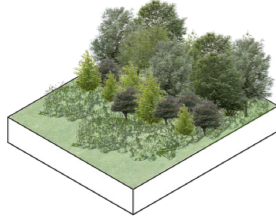


no human elements

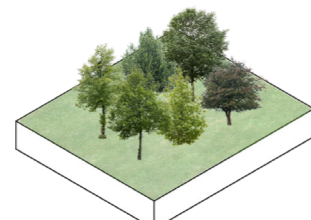


moving through nature

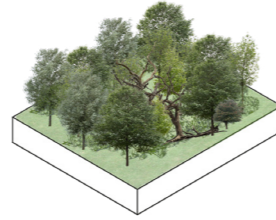
green & water



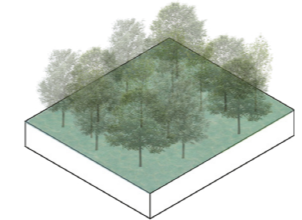
different layers



great variety in species

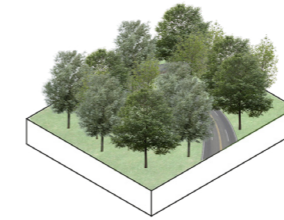


no maintenance

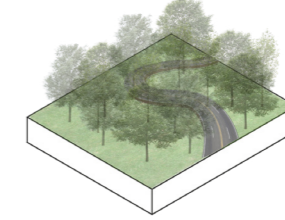


water storage

infrastructure



road as tunnel

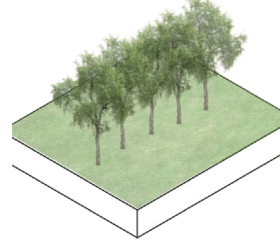


meandering road

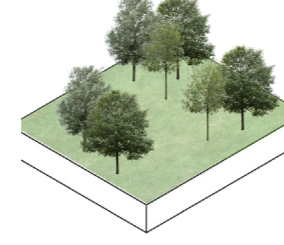
The Beautiful

The beautiful consists out of formal and informal planting and the space is very open and sometimes a hillscape. The forest in the beautiful also consists out of different layers, but these are separated. Because of the formally planted trees that are often from the same species, the variety in species is less than in the sublime. There is an adequate amount of maintenance and certain trees can create a visual connection between water bodies. Buildings function only as a background for the trees and recreation consists out of moving through and sitting in nature. The road here also has bends and it can be submerged in hills.

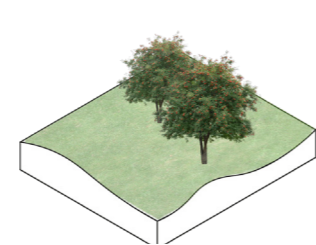
composition



formal planting

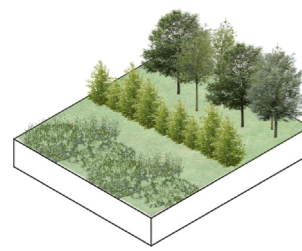


sparse, informal planting

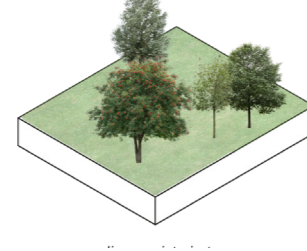


open, hilly spaces

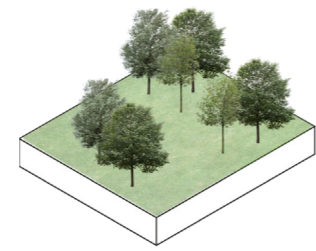
green & water



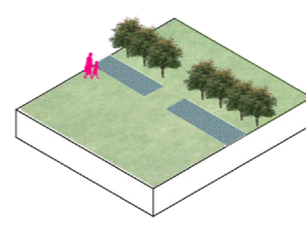
different, separates layers



variety in species

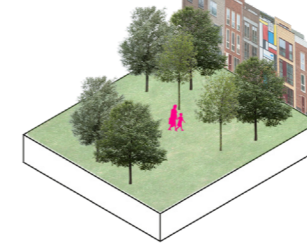


maintenance

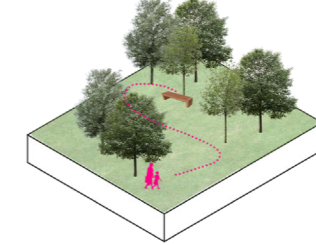


visual connection between water structures

buildings & recreation

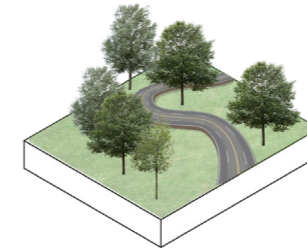


buildings as background

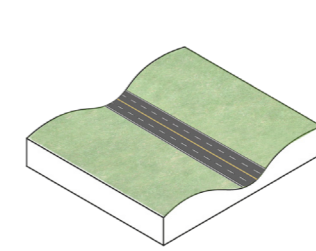


moving through & sitting in nature

infrastructure



meandering road

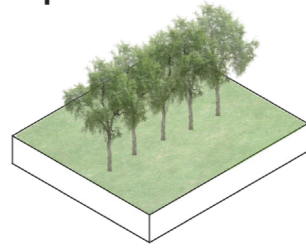


submerged in hills

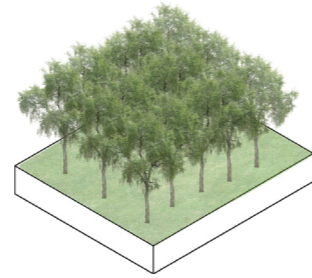
The Interesting

The interesting only consists out of formal planting, for instance double lines and grids, which create a variety of small spaces. There is little variety in tree species and extreme maintenance. There is an interaction between the trees and the human elements, because of their shape and materialisation. Recreation happens mainly on hard surfaces and consists out of for instance shopping and restaurants. Roads are straight.

composition

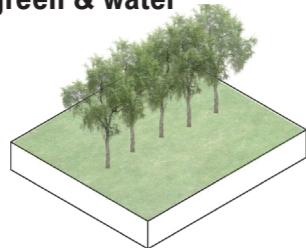


formal planting

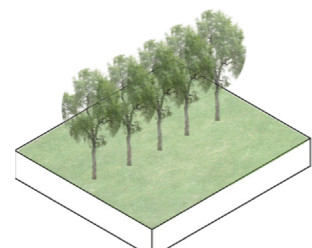


small spaces

green & water

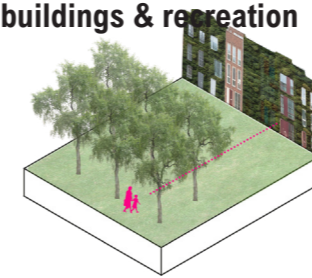


little variety in species

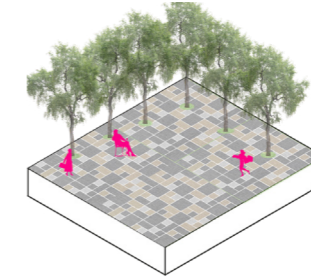


extreme maintenance

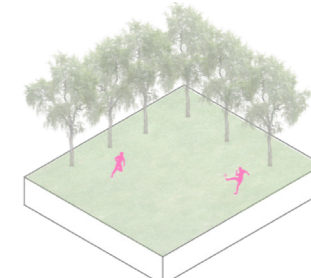
buildings & recreation



interaction with buildings

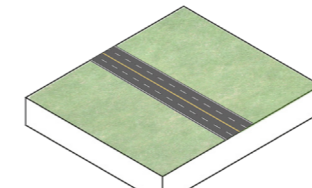


recreation on hard surface

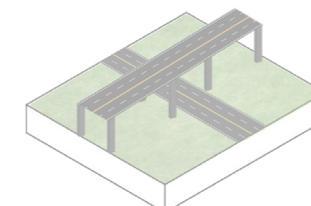


recreation on soft surface

infrastructure



straight road



visible technical infrastructure



10.3 Application Toolbox

In the next part, the toolbox has been applied to three other sites along the Prinses Beatrixlaan. This was mainly done to check and see if any other items needed to be added to the toolbox.

All of these areas have a different character and function. The application has been presented by a birdseye view, but for each location, a map and some smaller sections can be found in de appendix.

Figure 10.28 - Overview Location Two, Three, Four

10.3.1 Location Two

Location two is one with many different amenities, including various sports field, school and a festival terrain. It also includes one of the biggest parks of Delft. From the vision, it was clear that all three aesthetic categories could be applied to this place.

Toolbox items from the sublime could be applied to the outside of the park, where the dense, sublime forest creates a boundary between the inside of the park and the buildings next to it. Especially with the inside of the park, it creates a large contrast. The forest consists out of different layers and there is little to no maintenance.

The category of the beautiful could be applied to the inside of the park, which consists out of sparse, informal planting. For recreational purposes,

moving through and sitting in nature, this park is managed. The meandering recreational path runs through it.

Many elements from the toolbox of the interesting could be applied to the road and the adjacent sport fields. To guide the direction towards certain amenities, formal planting has been used. To accentuate these formal lines, there is a lot of maintenance being done, but there is little variety in species. There is interaction between the trees and the buildings through green facades of the school buildings. Finally, to new toolbox items have been added. Recreation here also occurs on soft surfaces and a very technical intervention, raising the car lane, was necessary to make all the different functions and amenities accessible for slower transport.

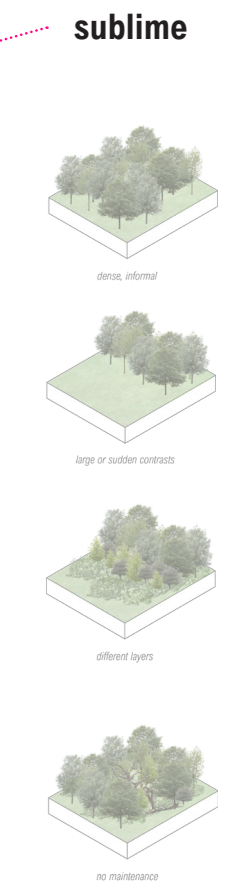
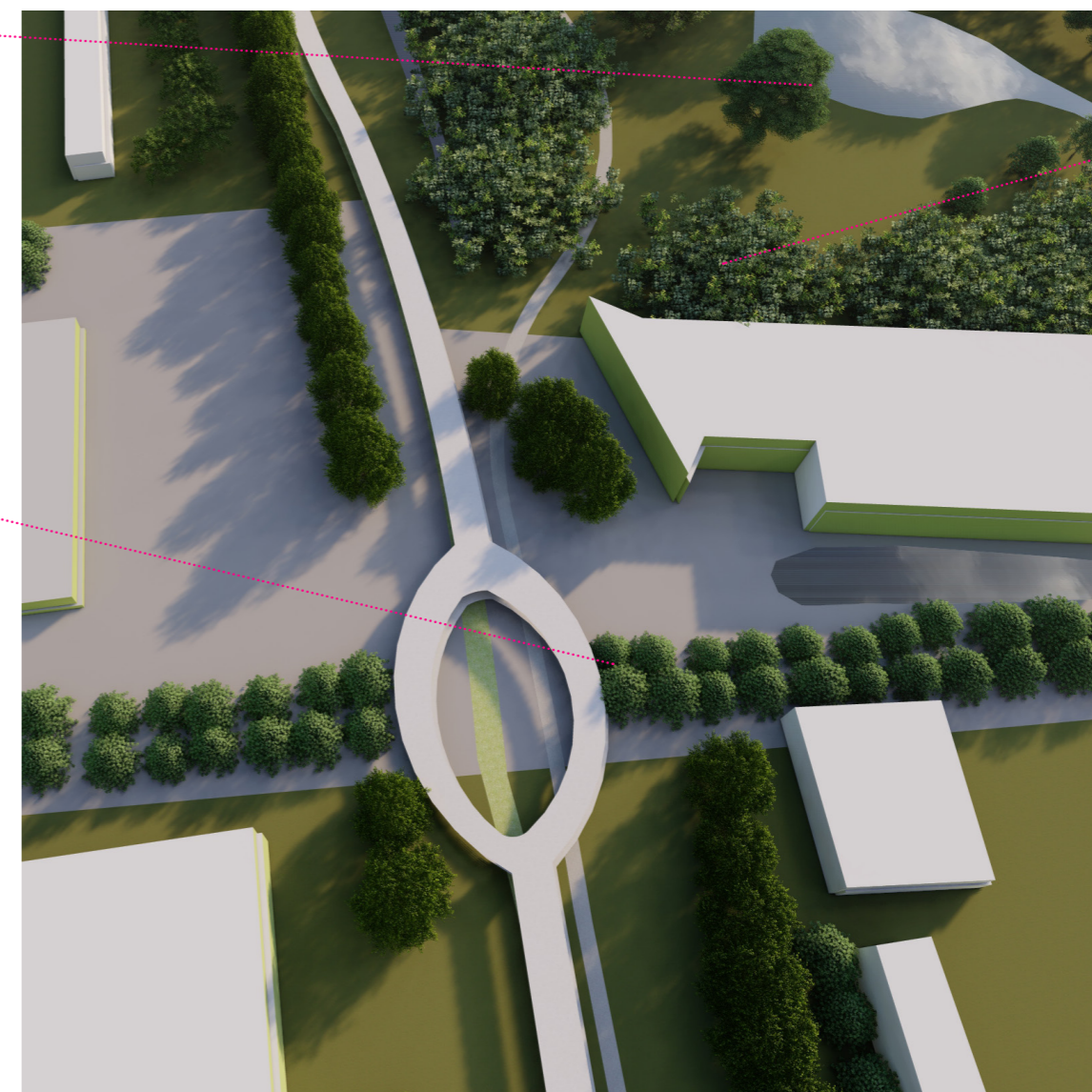
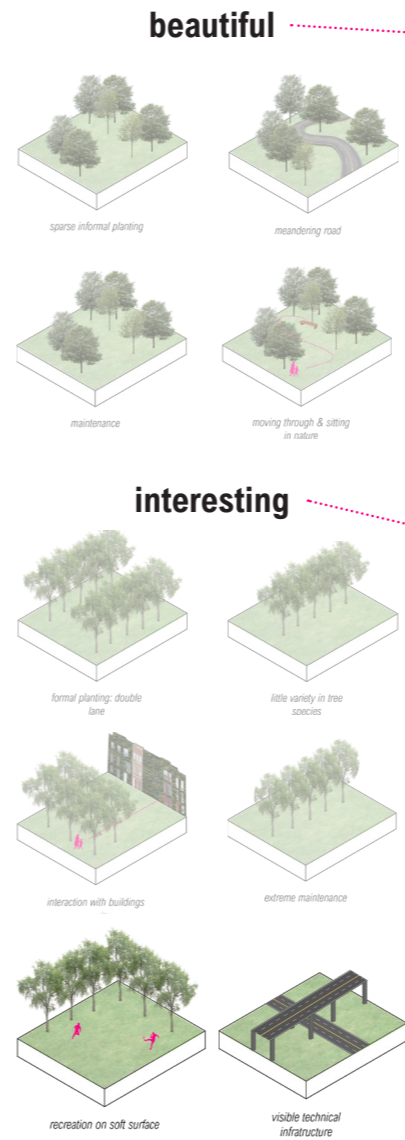


Figure 10.29 - Application Location Two

10.3.2 Location Three

Location three consists out of a large intersection. Here, the tram line enters the Prinses Beatrixlaan. Again based on the vision, the categories of the sublime and the beautiful could be applied here.

There is a large area of dense, informal forest, that consist out of different layers and encloses several spaces. There is little to no maintenance to this forest. The slower, recreational lane meanders through this forest, which creates a roof above it. From this path, no human elements can be seen. Recreation is moving through and looking at na-

ture.

The other part of the road has a beautiful aesthetic. The forest consists out of sparsely, informally planted trees, and a line of Populus. There is a certain amount of maintenance and the sparse forest has a variety of tree species. The buildings are at the background of the composition. In the sparse forest, one could move through and sit in nature.

There was no need to add any other toolbox items.

beautiful



sublime

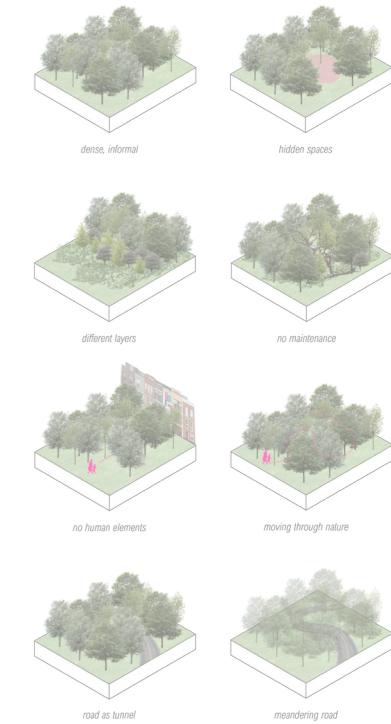


Figure 10.30 - Application Location Three

10.3.3 Location Four

Finally, for the last location, also the sublime and the beautiful could be applied. The sublime consists out of a narrow strip of dense forest, that creates large spatial differences with its surroundings, specifically the neighbourhoods next to it. The forest consists out of different layers and there is little maintenance. Some areas can be used for storm water storage. Both the car and recreational lane meander through the forest, that creates a roof above them. A new item that has been added,

is the use of unreachable places. This creates a sense of mystery and therefore fits perfectly in the category of the sublime.

These unreachable places though, consist out of beautiful urban forestry. A few, sparsely planted trees from different species have been maintained to look beautiful. In these places, people living in the neighbourhoods can move through and sit in nature. The buildings form as a background for this composition.

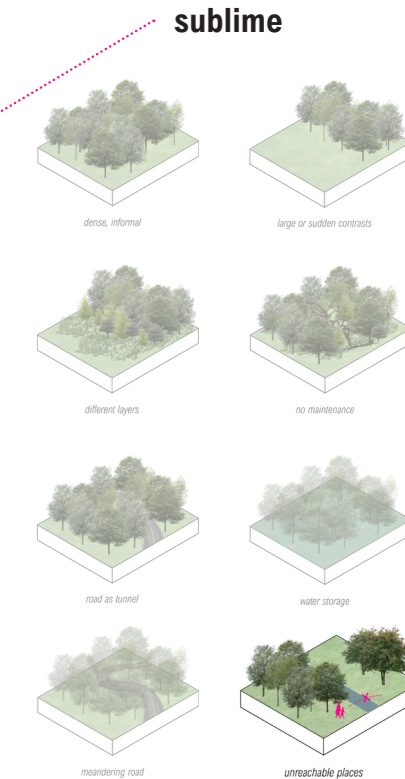
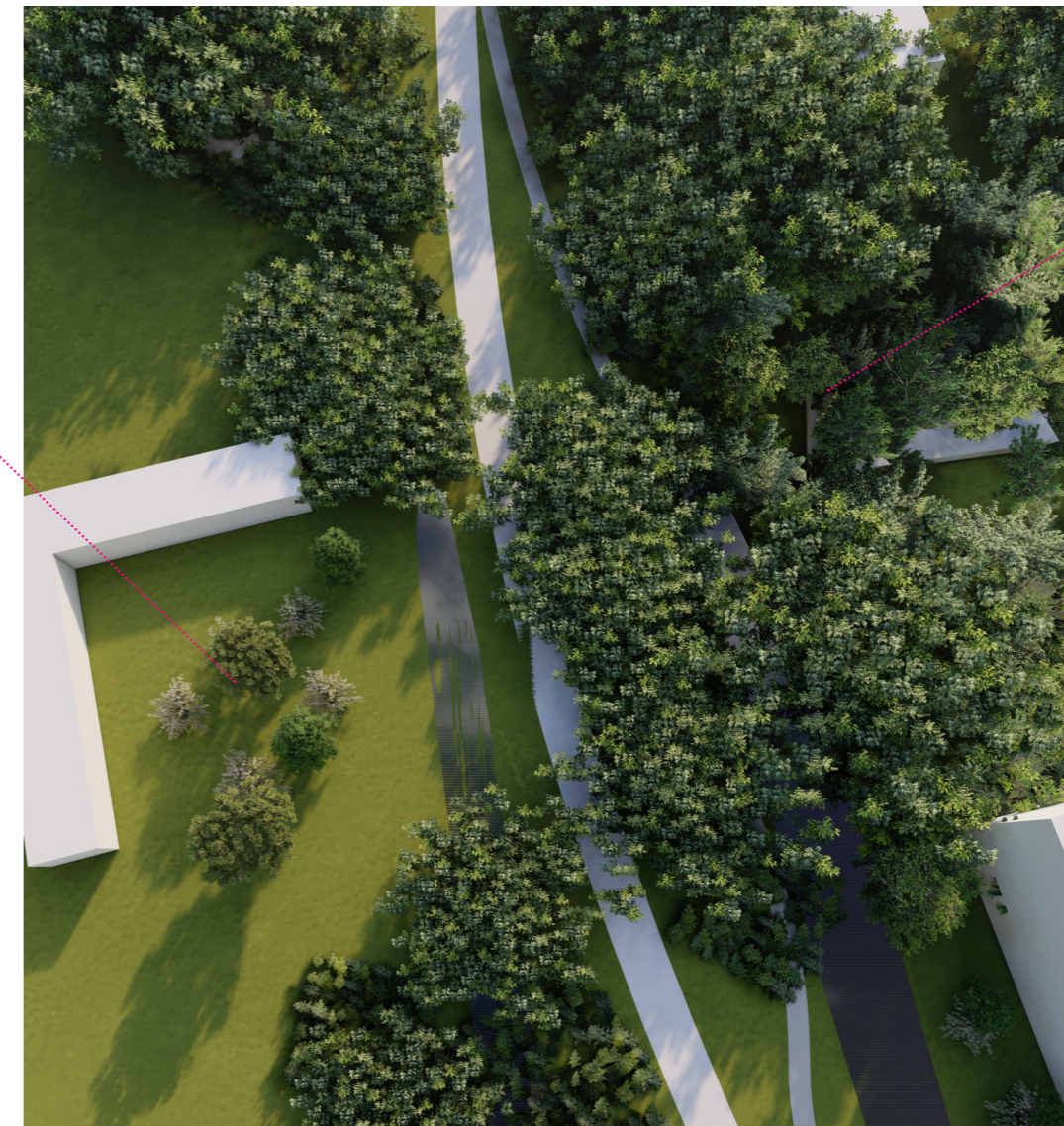
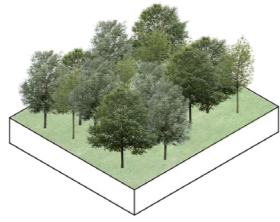


Figure 10.31 - Application Location Four

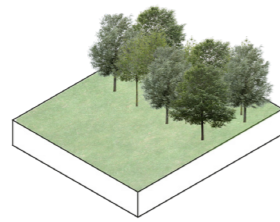
10.3.4 Complete Toolbox

The next few pages show the new toolboxes, that have been updated with the items described in the previous part.

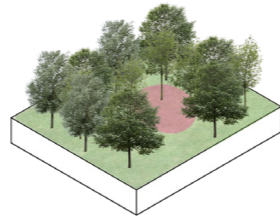
sublime composition



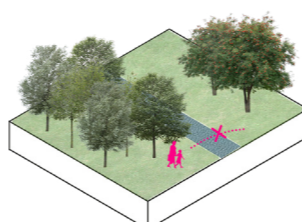
dense, informal forest



large, sudden contrast

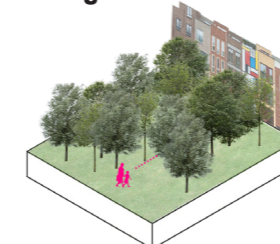


enclosed spaces

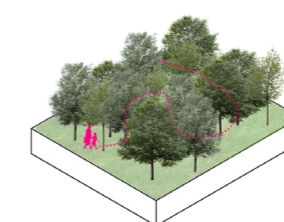


unreachable places

buildings & recreation

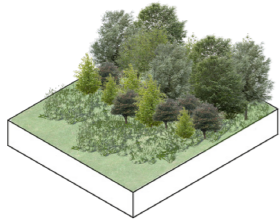


no human elements

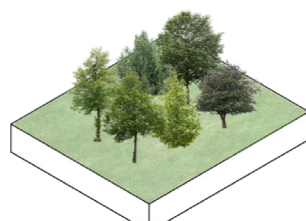


moving through nature

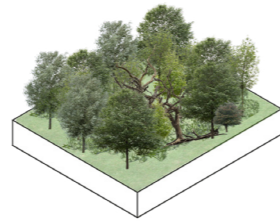
green & water



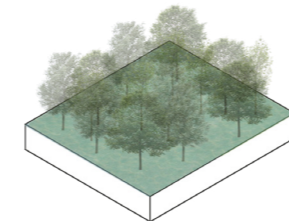
different layers



great variety in species

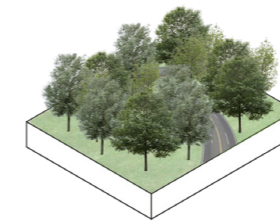


no maintenance

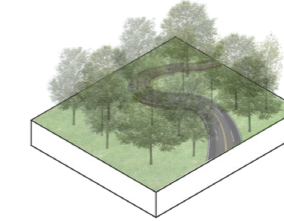


water storage

infrastructure

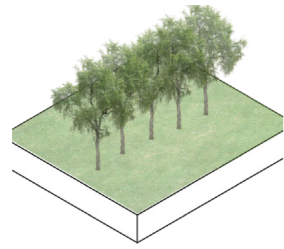


road as tunnel

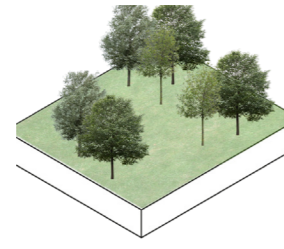


meandering road

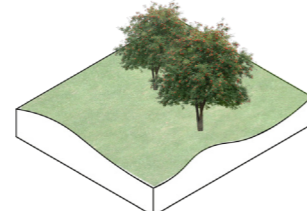
**beautiful
composition**



formal planting

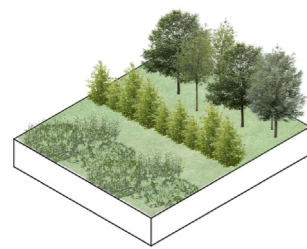


sparse, informal planting

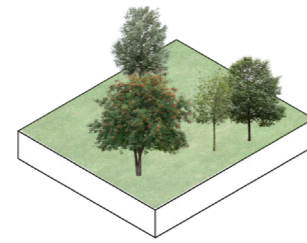


open, hilly spaces

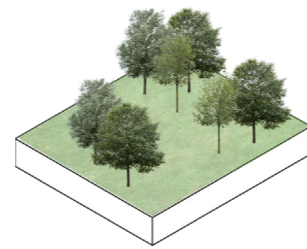
green & water



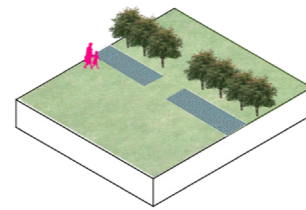
different, separates layers



variety in species

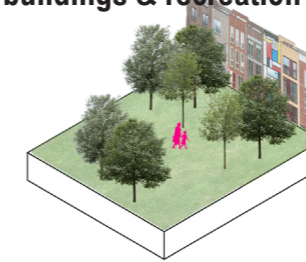


maintenance

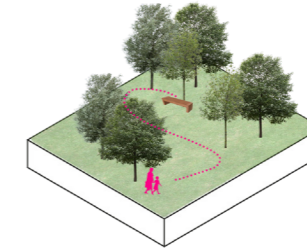


visual connection between water structures

buildings & recreation

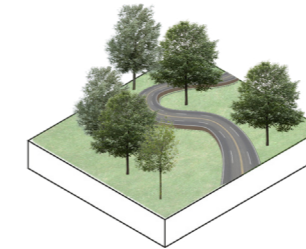


buildings as background

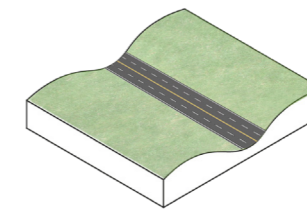


moving through & sitting in nature

infrastructure

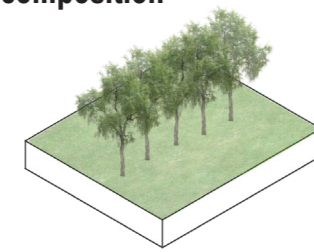


meandering road

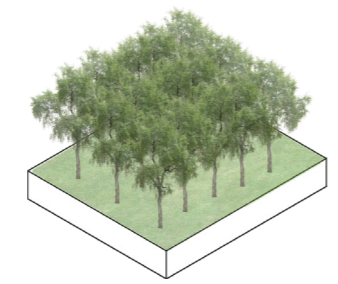


submerged in hills

**interesting
composition**

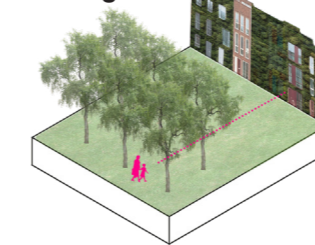


formal planting

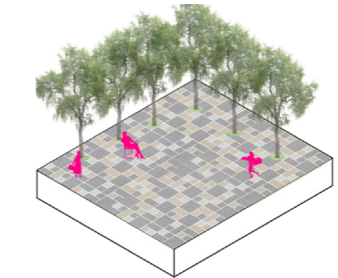


small spaces

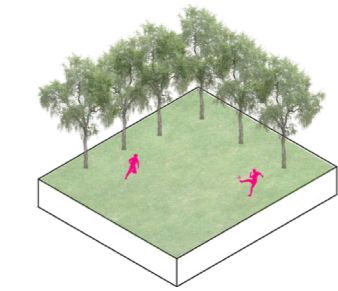
buildings & recreation



interaction with buildings

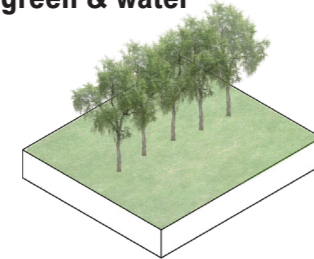


recreation on hard surface

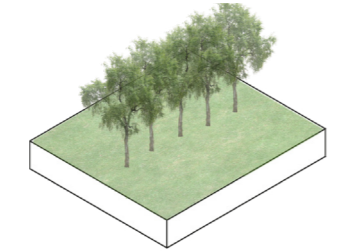


recreation on soft surface

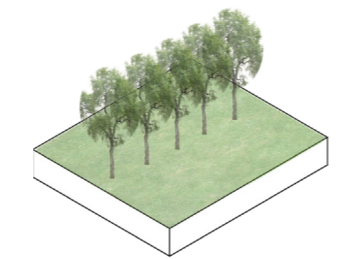
green & water



one layer

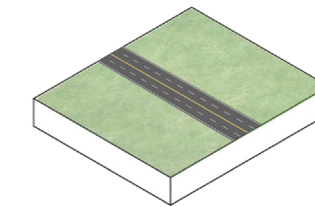


little variety in species

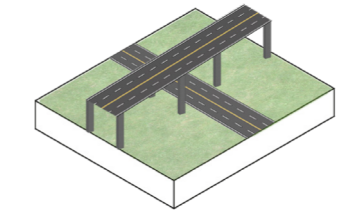


extreme maintenance

infrastructure



straight road



*visible technical
infrastructure*



Figure 10.32 - Masterplan Prinses Beatrixlaan

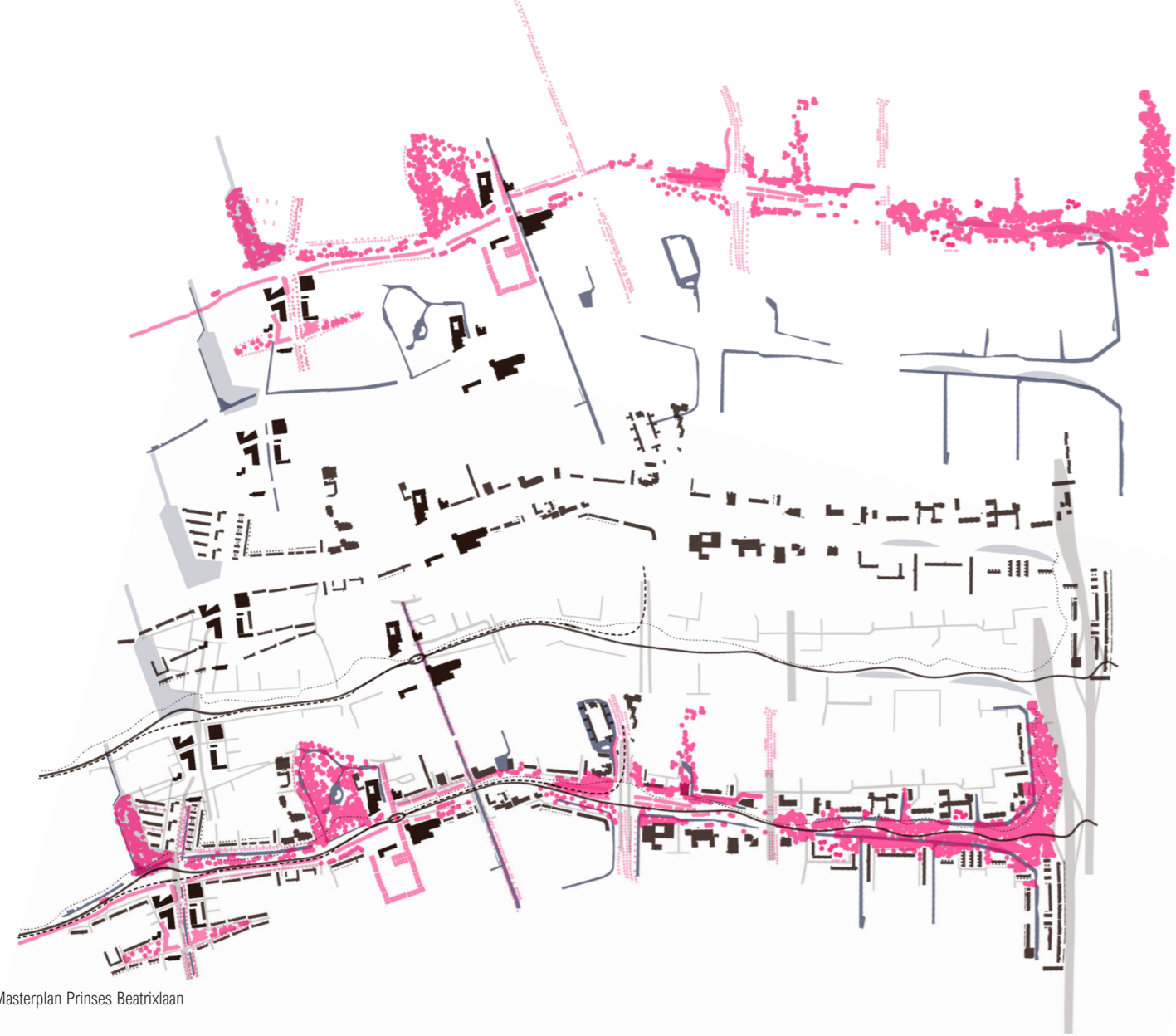
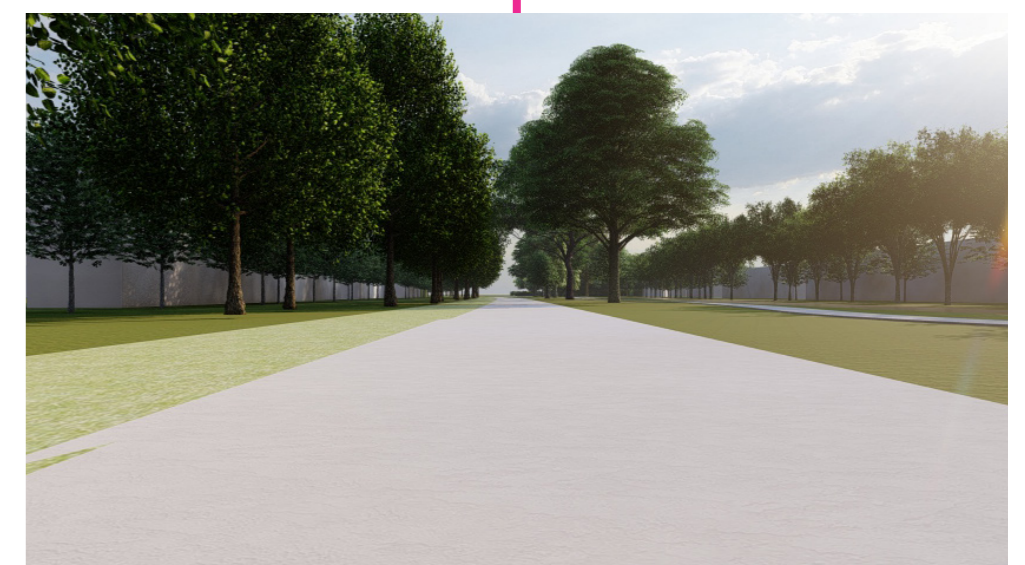
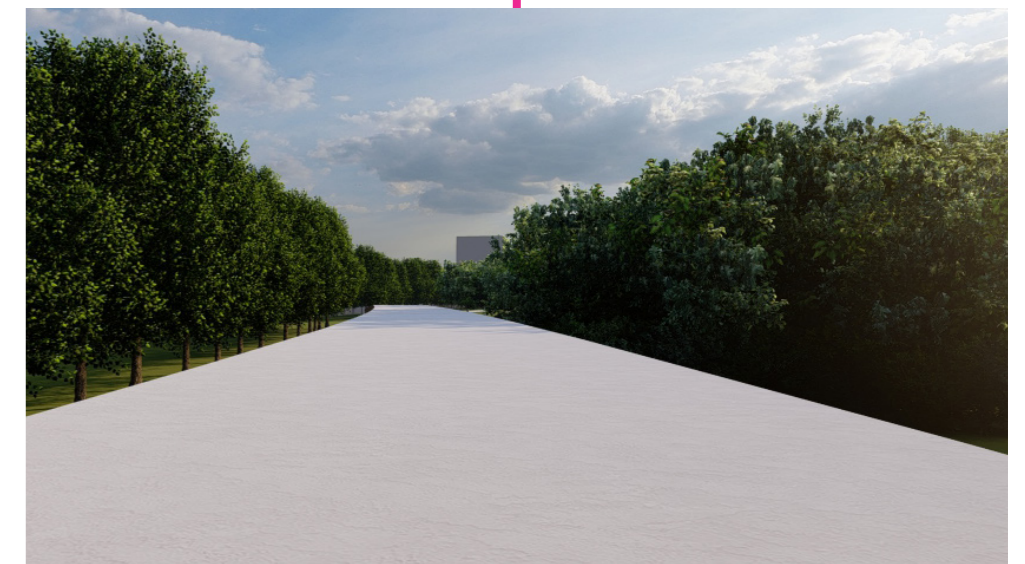


Figure 10.33 - Layers Masterplan Prinses Beatrixlaan

10.4 Masterplan

The previous spread shows the complete masterplan of the Prinses Beatrixlaan, containing all the locations that have been elaborated on before. It has transformed into a road that is not solely about functional infrastructure anymore, but contains many other valuable aspects, like green and ecology, water, buildings and recreation and more sustainable modes of transportation. The separate layers can be viewed in the map on the previous page.

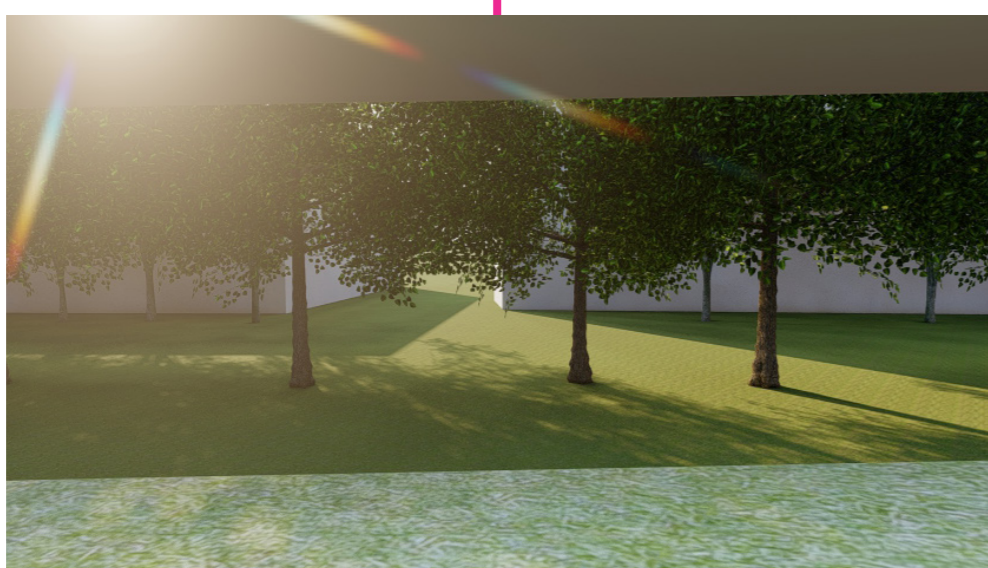
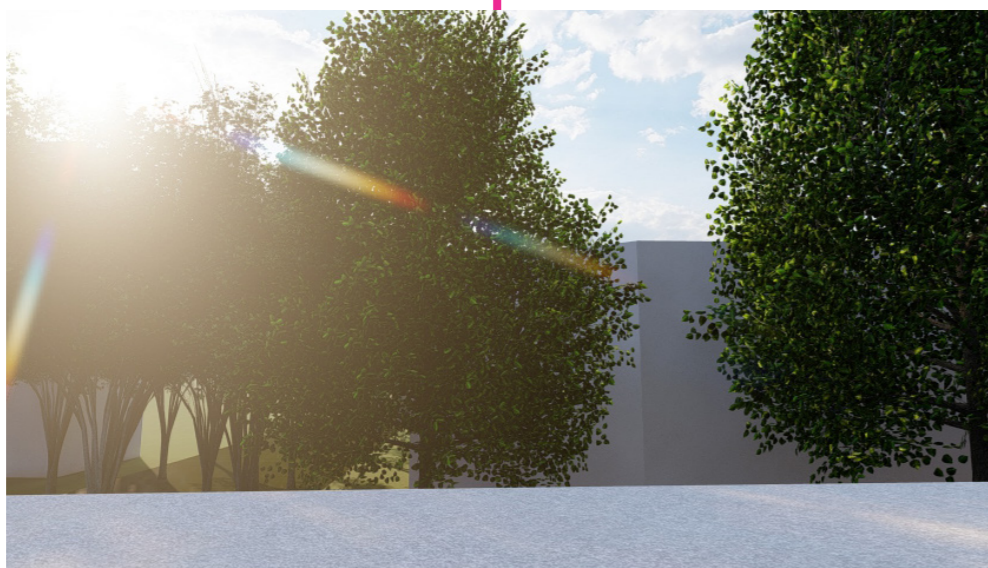
The full experience of the Prinses Beatrixlaan is hard to convey through a map. To give a better overview of the aesthetic experience one would have while traveling along the road, a sketchup model has been created. In this model, you could physically walk along the road. The next view pages show the most important parts of this model, including large spatial differences, sudden sight lines, a different perspective on the urban forest from a raised road. All three lanes, the car lane, tram line and recreational bicycle and pedestrian path have been paid attention to in this walkthrough.



10.4.1 The Car Road

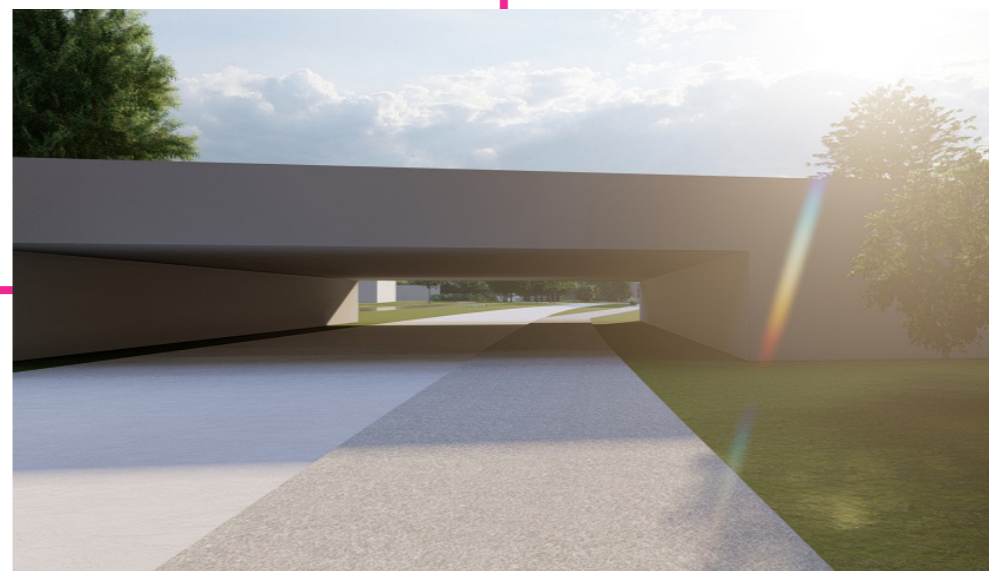
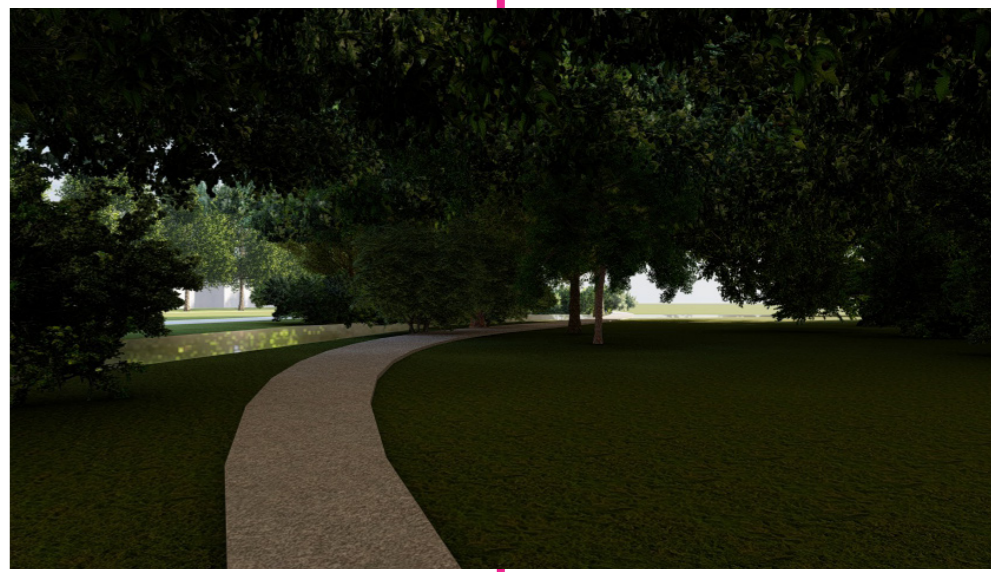
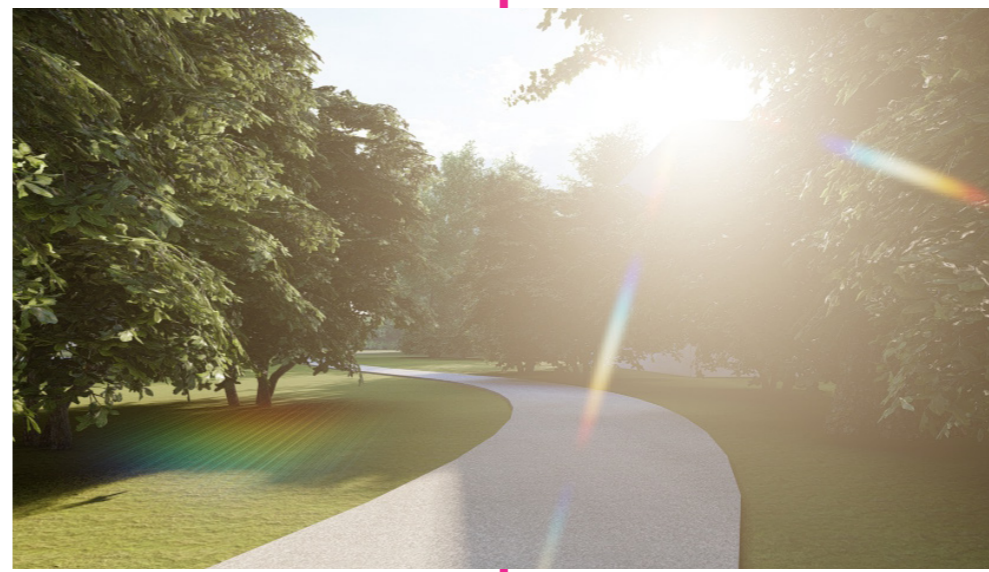
When entering the Prinses Beatrixlaan on the south side, the road is very dark and surrounded by dense forest. Sometimes, there are sudden sightlines into the beautiful within the neighbourhood, but these are unreachable. After this dark corridor, the space totally opens up. Moving through this open space, you will be guided into a smaller space again, which then again opens up onto a large intersection. Here the tram line also enters the road. After this intersection, the road goes up and you have a totally different view on your surroundings, seeing hints of the park in the distance and seeing a large amount of different lines of trees crossing each other. When leading up to the park, there are some sightlines through the overgrown and sublime forest, into the beautiful heart of the park. From here, a line of populus will lead you along the park, with on your other side a thin strip of park, which after the last intersection changes into a dense forest.

Figure 10.34 - Visual Experience PBL along car road



10.4.2 The Tram Line

Figure 10.35 - Visual Experience PBL along tram line



10.4.2 The Recreational Path
Figure 10.36 - Visual Experience PBL along recreational path

part five - conclusion and reflection

11. Conclusion

This graduation project was an attempt to discover the potential of combining the three concepts urban forestry, infrastructure and aesthetics. It was hypothesised that a method to design 'aesthetic urban forest infrastructure' would make it more feasible to create urban forests in our dense cities and would make sure that infrastructure would be more than just a functional feature.

The first set of sub-questions that were asked where about the concepts themselves; 'what influence does urban forestry have on its surroundings?', 'what influence does infrastructure have on its surroundings?', 'how will and should infrastructure develop over the next few decades?' and 'what is the role of aesthetics in relation to experience?'

These questions were answered mainly through literature study and site analysis. As previously mentioned in the introduction, urban forestry is very beneficial for its environment; it leads to great biodiversity, it has a positive influence on the (micro)climate and it has the ability to improve people's mental and physical health. Furthermore, it was discovered that due to the current functional-focussed character of infrastructure, which is also the case for the Prinses Beatrixlaan, roads can form a large barrier between parts of a city. Because of this, infrastructure should be more integrated with its context. Whereas the future of infrastructure is still fairly unclear, some things,

like improving public transport, can definitely make sure that traffic on car roads will be relieved. Finally, four new categories of aesthetics were introduced, as a way to improve the aesthetics of current landscapes, something that they have lost over time because of economic and technological developments. An aesthetic landscape is experienced as something pleasurable for people, and thus can become sustainable.

The second set of sub-questions related to the relationship between the different concepts; 'what is the relationship between urban forestry and infrastructure?', 'what is the relationship between urban forestry and aesthetics?' and 'what is the relationship between movement and aesthetic experience?'

As previously mentioned in the introduction, was that the construction of infrastructure usually lead to fragmentation of the urban forest. But through site analysis it was discovered that infrastructure could also be the key to connect existing green, that until now had been fragmented. To be able to answer the second question, the aesthetic categories had to be translated to aesthetic categories of urban forestry. By analysing five aspects, the planting scheme, tree species, spatiality, human elements and maintenance, a map of the aesthetics of the urban forest of Delft was made. By looking at a precedent study, that of the Blue Ridge Parkway, it was discovered that certain ele-

ments like flowing lines, irregular dense planting and variation in scenery can create a bigger sense of speed and keep the drivers attention.

The last set of sub-questions were related to designing while using the three concepts; 'how can one design urban forest infrastructure?', 'how can one design urban forestry while taking in mind its relation to aesthetic experience?' and 'how can one (re)design infrastructure while taking in mind its relation with aesthetic experience?'

These questions have been answered during the design process. Specific answers to these questions are more difficult to formulate. By transforming the Prinses Beatrixlaan to a less car-oriented road and inserting public transport, space opened up for green. The design of the urban forest is based upon a structure of trees, mainly consisting out of lines and bodies, that previously existing along the stretch of the road. Using these configurations along the whole line to implement more green, gives a coherent character to the road. When designing the urban forest, the first step was to pay special attention to the aesthetic categories and how they are experienced in general. A 3d model was used to determine how trees can be arranged to create a certain experience, varying from narrow and dark, to wide and open. By zooming in on location one, more functional aspects of the aesthetic categories were discovered, focussing on the green structure, water structure,

buildings and recreation, and infrastructure. Specific design concepts for these aspects were collected in a toolbox and were later tested on other sites along the Prinses Beatrixlaan, informing the toolbox. By using this toolbox, a masterplan of the entire Prinses Beatrixlaan could be created. During this process, another 3d model was used. Within this model, experiments with different site lines were done, taking in mind various bends and the movement along the road.

All of this led to an answer to the main question: 'what is the potential of combining urban forestry, infrastructure and aesthetic experience with each other?'. This question can be answered on different scale levels and from different perspectives, those of the designer, those of the visitor and those of 'nature'.

On the larger scales, those of the region and the city, this approach comes in helpful for a designer in the way that it gives a clear direction. Using the aesthetic categories as a guideline, certain decisions can be made quickly in order to create a coherent vision. By using the category of the sublime, which is based on the most natural circumstances, nature and ecology are given a lot of space. This project has created a clear incentive to create more urban forestry, because of its many benefits, not only for ecology but also for the aesthetic experience of people.

Also on the smaller scale, this coherence because of the aesthetic categories is visible. By using elements from the toolbox, certain choices can be made more easily. Combining two concepts, urban forestry and infrastructure, that respectively will need more and will use less space in the future, the concept of aesthetics has the potential to create an integral design, that has room for both human and nature, room for recreation and for ecology. This method will lead to a more conscious design of urban forestry, in which every tree is placed with purpose in a context that suits it.

12. Reflection

This project has focussed on combining the concepts of urban forestry, infrastructure and aesthetics and has attempted to discover the potential of this method, specifically along the Prinses Beatrixlaan in Delft. Although it has resulted into various benefits, which have been previously mentioned in the conclusion, this approach also has its limits. This chapter reflects on the project, specifically its methods and process, position within the scientific field, relevance, and ethics.

Methods & Process

A large part of the theoretical framework has been based upon the paper written by Werner Nohl (2001) and thus, this has influenced the whole project. The four categories of aesthetics that have been introduced by Nohl, have formed a base for the aesthetic analysis and vision, and the entire design. A first side note that needs to be made, is that there are definitely other ways to categorize aesthetics, and using these would have given a different outcome.

Secondly, whereas Nohl describes these as being sustainable aesthetic categories, this project has mainly focussed on the aesthetic aspect of them. The aesthetic categories do relate to a certain human-nature relationship, and this, along with the more functional needs of the site, has resulted into the sustainable aspects of the design, like the implementation of water storage.

Then, whereas Nohl created aesthetic categories of all landscapes, this project has translated them into aesthetic categories of urban forestry. Some aspects that he has described, do not apply to the urban landscape and have therefore not been used. Nohl wrote about five aspects: variety, naturalness, structuring, regional identity and vista quality, whereas this project used the aspects: planting scheme, tree species, spatiality, human elements and maintenance. These overlap with some of Nohl's aspects, but are more relevant to the urban forest.

Furthermore, it is easier to create large landscapes with a similar aesthetic in a rural area, than in an urban area. This project has created several small pockets with different aesthetics, which can all be experienced while traveling along the road. The full experience thus, while moving along the Prinses Beatrixlaan, is a mix of different aesthetics. While this is not necessarily an issue, more experimentation could have been done to create one coherent experience.

In the separate pockets though, the use of the aesthetic categories has given a lot of coherence to the design, as already mentioned in the conclusion. It also has its downfalls though. As a designer that knows and understands these categories really well, it is sometimes difficult to convey all the different elements that go into the design and

create a certain aesthetic experience, because it is thought that these are already obvious. Looking back, this is something that should have been focussed on more.

It is something which the toolbox help with though. It started out as a compilation of different planting compositions, but has evolved to include much more functional aspects, like green and water, buildings and recreation, and infrastructure. The consults with experts, Sjef Janssen, Gabriel Geluk and John Baggen really helped to give more depth to these aspects. This also led to a much better relationship between research and design. Where these two actions were first too separate from each other, the toolbox literally functioned as a tool to build a bridge between the two. It also gave a more solid way of testing the design experiments.

Position in the Scientific Field

The project is related to the theme of biophilic design, or biophilic urbanism, because it attempts to develop new ways of inserting green – and in this case urban forestry – into cities, mainly for people to enjoy. Within biophilic design, already a lot of attention is being paid to the aesthetic qualities of a design, but seldom so specifically in aesthetic categories and on a scale this large.

Within landscape architecture, four different per-

spectives are used; landscape as spatial-visual perception, landscape as palimpsest, landscape as scale continuum and landscape as ecologic, economic and social process. This project is most related to the first perspective; landscape as spatial-visual perception. Great attention has been paid to the spatial qualities the design encompasses, also while moving through the landscape. Although not very elaborated, the design has resulted into a palimpsest too. In the design, existing and historical elements have been used, like the water structure and the specific types of green in the different neighbourhoods. The project works as a scale continuum too. On the most detailed scale, certain rules for ecological diversity and technical solutions have been created. On a larger scale, they create continuous structures for both ecology and recreation. Finally, some parts of the project have been designed as a process, for instance the sublime forest. Here, some interventions are done in the beginning, through which, over time, it will grow to a dense forest containing certain species.

Scientific, Professional and Societal Relevance

The project gives a new approach to the development of forestry and redevelopment of infrastructure within cities, specifically from an aesthetic point of view. All of these concepts, and especially combined, have not (yet) been given a lot of atten-

tion in scientific research and thus this project can form a foundation for more in depth research on them and their relationship with each other.

As mentioned in the conclusion, the method could be very beneficial for professionals, to create integral and coherent visions and designs for aesthetic urban forest infrastructure. But the question then rises; do we even want to create this kind of aesthetic urban forestry infrastructure? Why would we want to implement an urban forest onto a functional road and create specific aesthetic experiences? As mentioned in the introduction already, space in the city is sparse. And urban forestry and infrastructure are important aspects of the city that will definitely need to and will change. Why not combine them and use the space wisely? However, the realization of a project like this would need an enormous amount of communication between the different parties involved. Often, roads like these are not owned and maintained by the municipality, but by the province. As seen in other projects that involve different jurisdictions, it will be a long and difficult process.

The aesthetic aspect of a project like this, but also the presence of urban green is especially important for the people living close to it or visiting it. Certain forms of recreation, but also everyday-life will be improved.

Ethical dilemmas

Throughout the project, a few ethical dilemmas have been encountered. First of all, it was difficult finding a balance between the functionality of the Prinses Beatrixlaan and the liveability in the neighbourhoods. The more functional, faster, and experiential the road is, the bigger influence it has on the neighbourhoods. This became easier after the decision to implement public transport and upgrade the Kruithuisweg, because of this the Prinses Beatrixlaan could be relatively relieved from the large amount of traffic.

Another dilemma was the insertion of sublime urban forestry. From literature was discovered that although people are getting used to the idea of natural forests, it is still not something that is generally found attractive. The decision to implement it anyway was based on the idea that this appreciation of natural forests will grow over time, especially because it can be experienced now close to home. Other reasons were its value for ecology and the fact that many other spaces were already designed according to the liking of people.

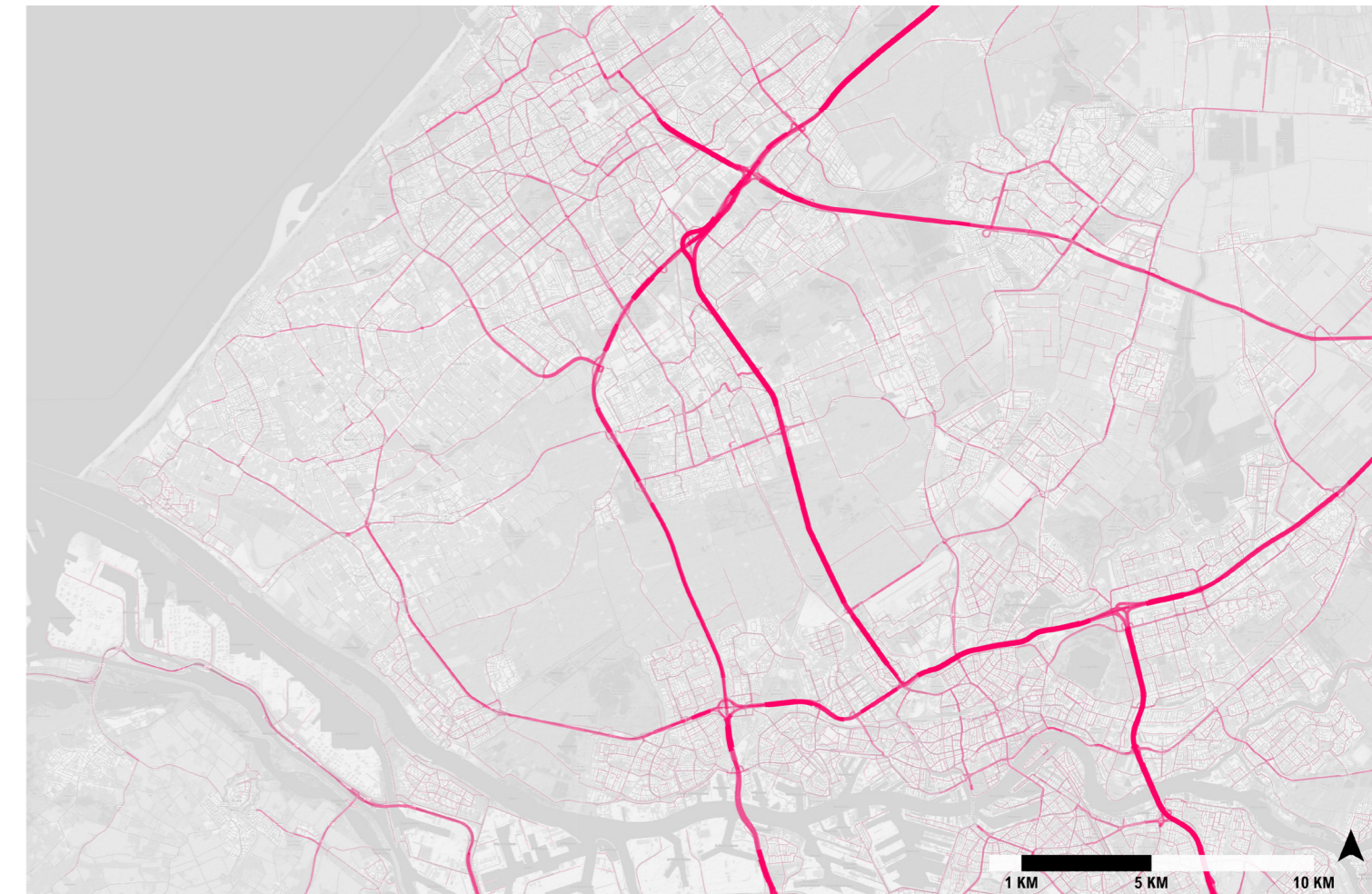


Figure 13.1 - Amount of cars on the regional private infrastructure

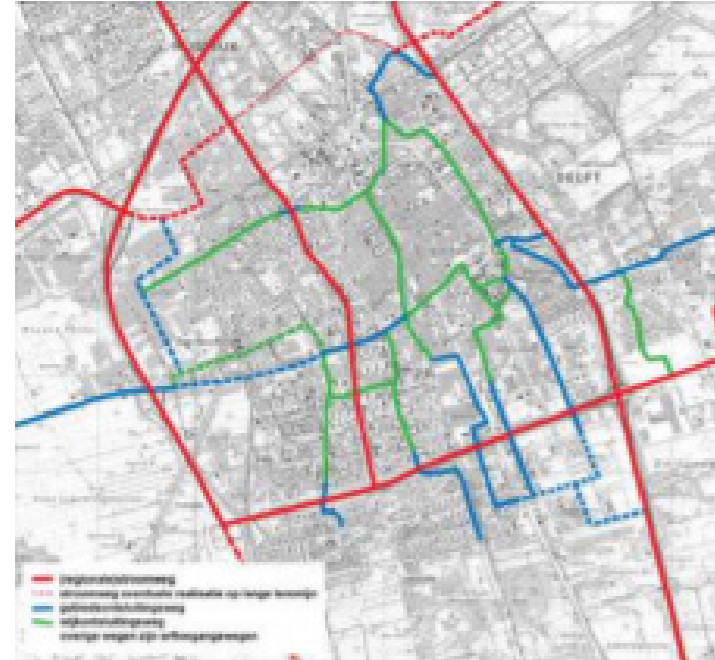


Figure 13.2 - Current Situation (source: Gemeente Delft, 2016)

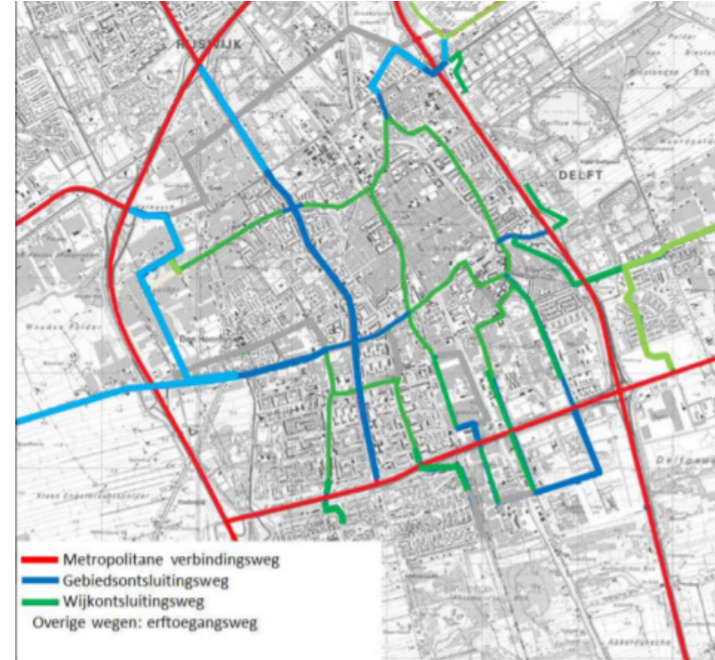


Figure 13.3 - New Situation (source: Gemeente Delft, 2016)

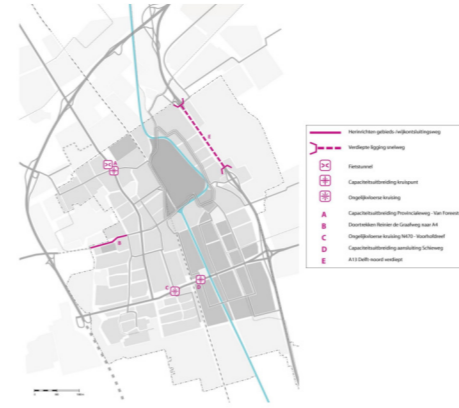


Figure 13.4 - Interventions for better regional connections (source: Gemeente Delft, 2013)



Figure 13.5 - Interventions for better cycle connections (source: Gemeente Delft, 2013)



Figure 13.6 - Interventions for better local connections (source: Gemeente Delft, 2013)



Figure 13.7 - Vision Public Infrastructure (source: Gemeente Delft, 2013)

- < 2000 people / km²
- 2-4000 people / km²
- 4-8000 people / km²
- 8-12000 people / km²
- 12-16000 people / km²
- > 16000 people / km²

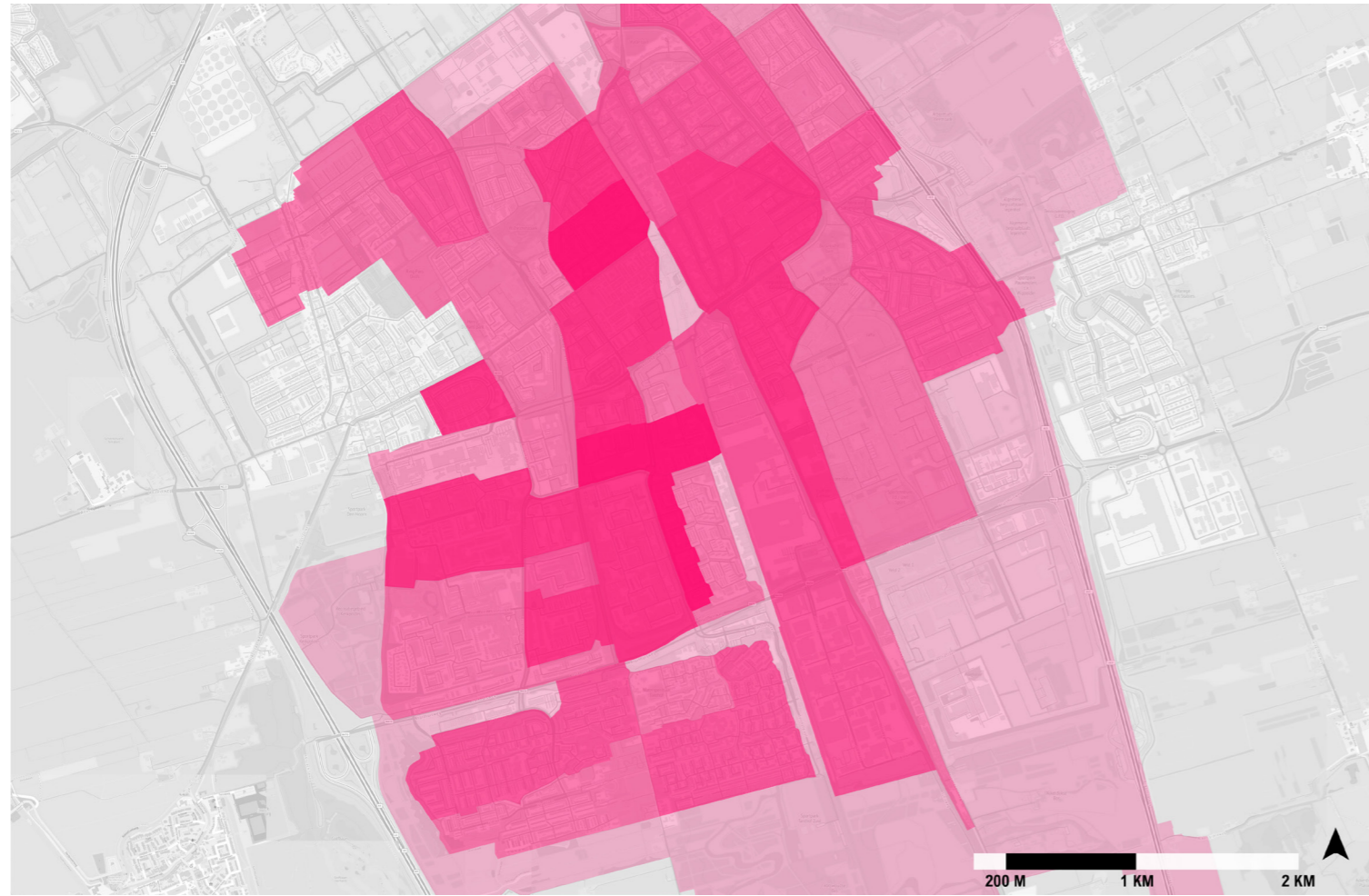


Figure 13.8 - Future Density of Delft (2040)

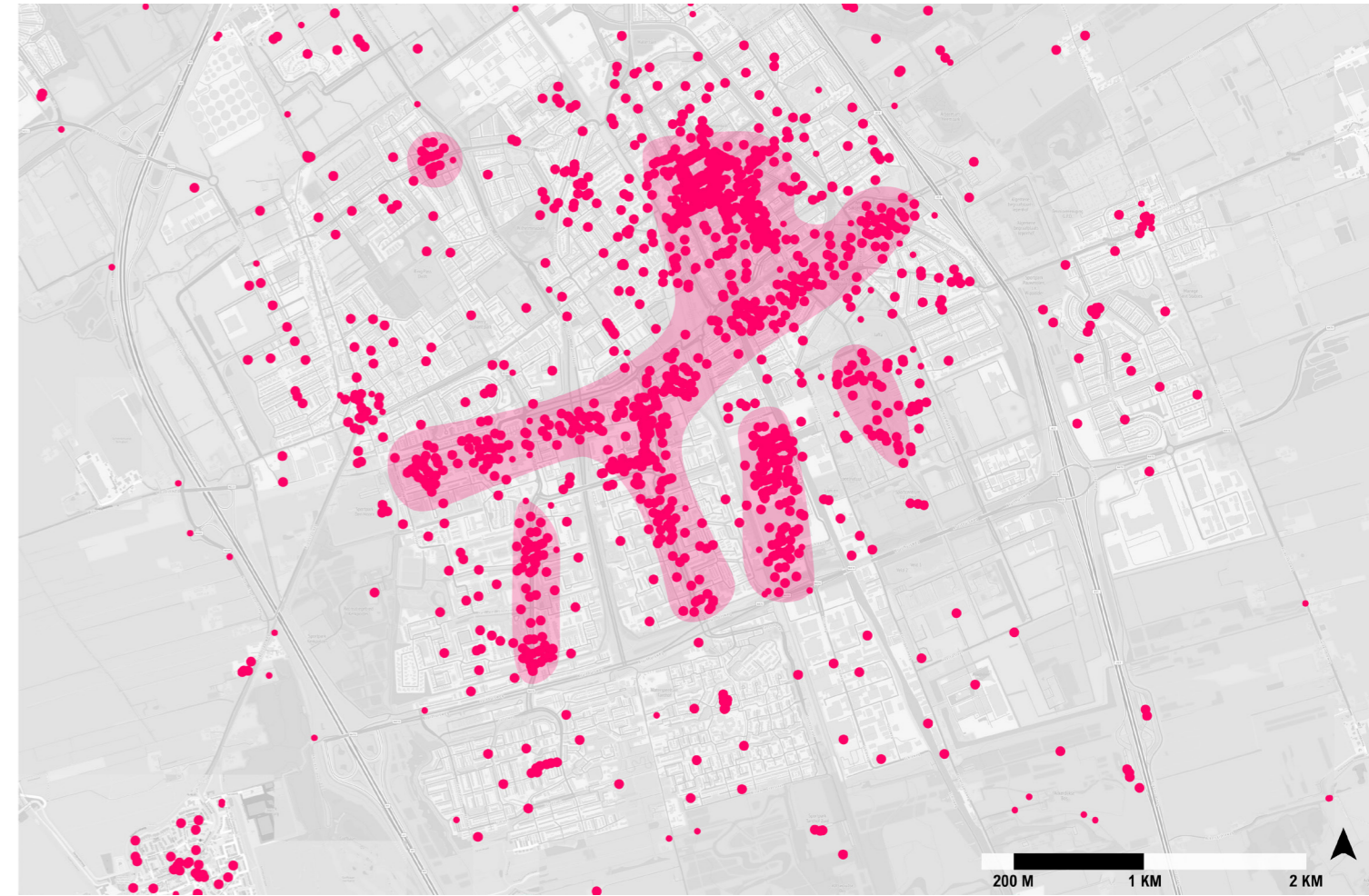


Figure 13.9 - Future Amenities of Delft (2040)



Figure 13.10 - Photo Collage of Neighbourhoods



Figure 13.11 - Soil Map of Delft (Gemeente Delft, 2013)

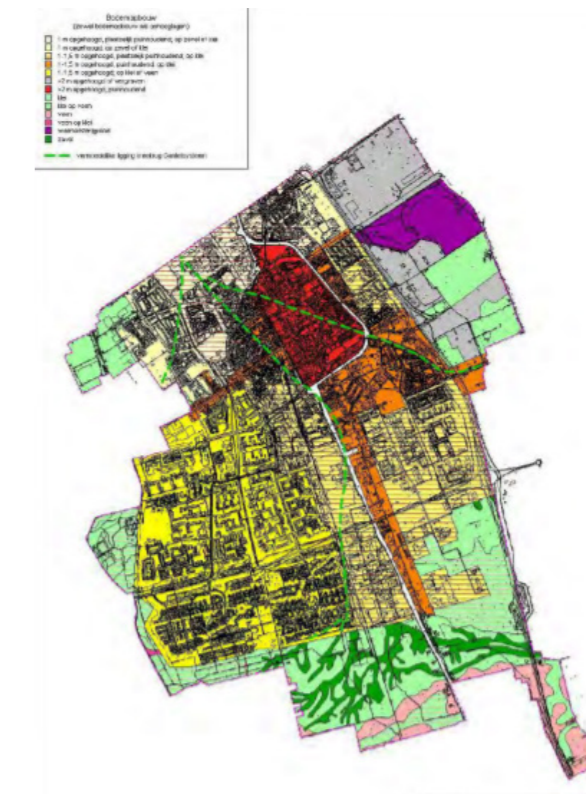


Figure 13.12 - Soil Map of Delft (Gemeente Delft, 2013)

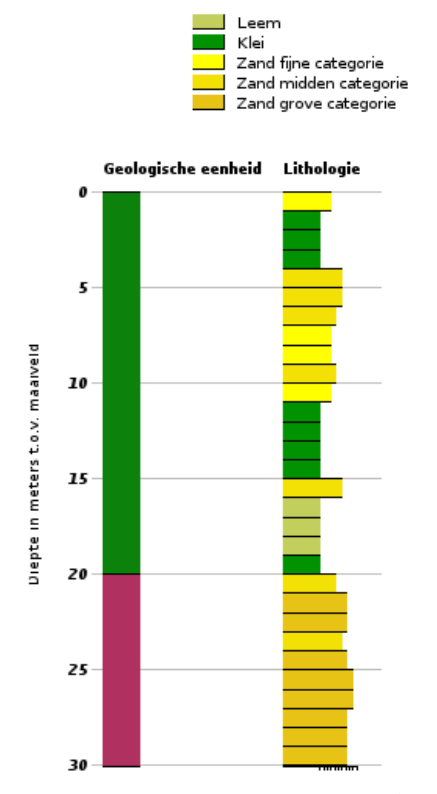


Figure 13.13 - Soil Composition of Location One ('Ondergrondmodellen | DINOloket', n.d.)

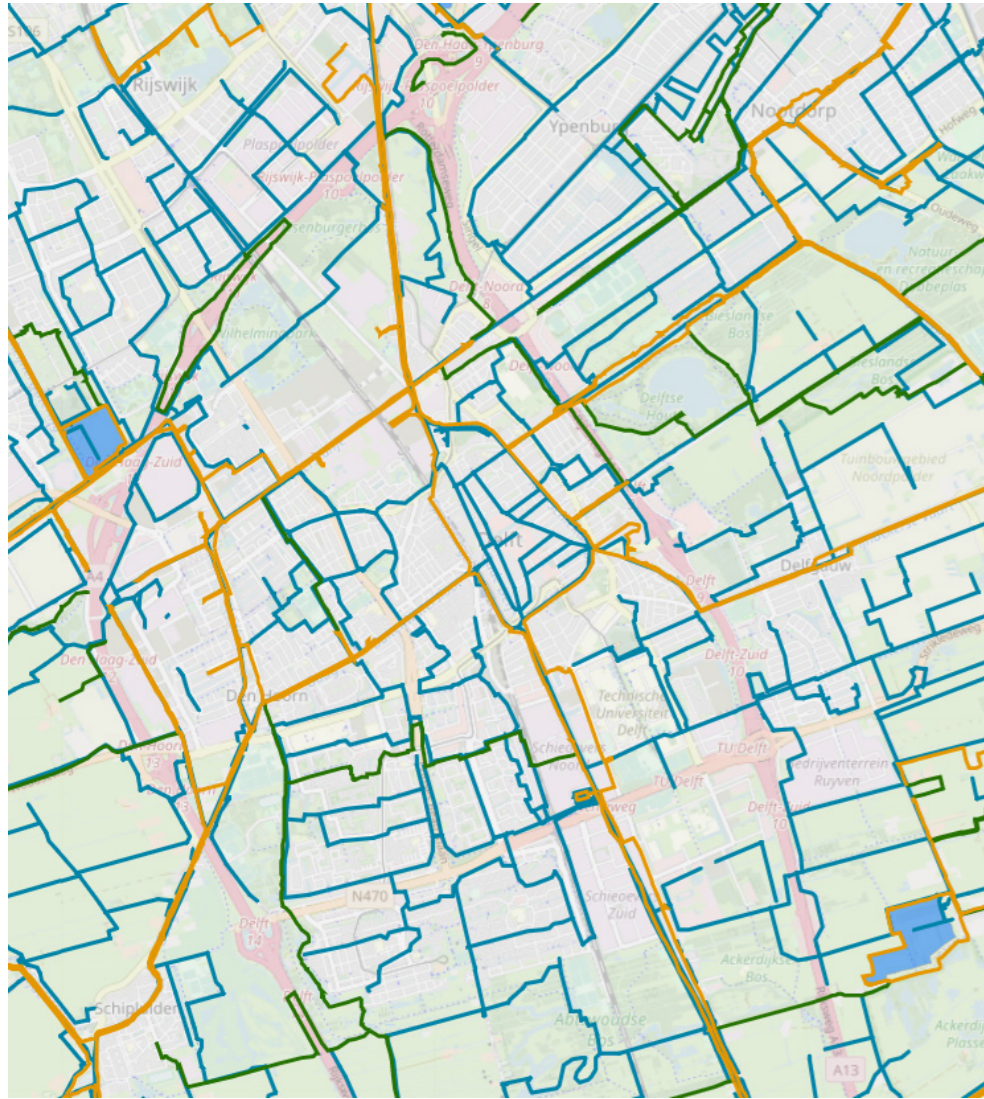


Figure 13.14 - Water Structure of Delft ('Legger Delfland', n.d.)



Figure 13.15 - Water Structure of the PBL ('Legger Delfland', n.d.)

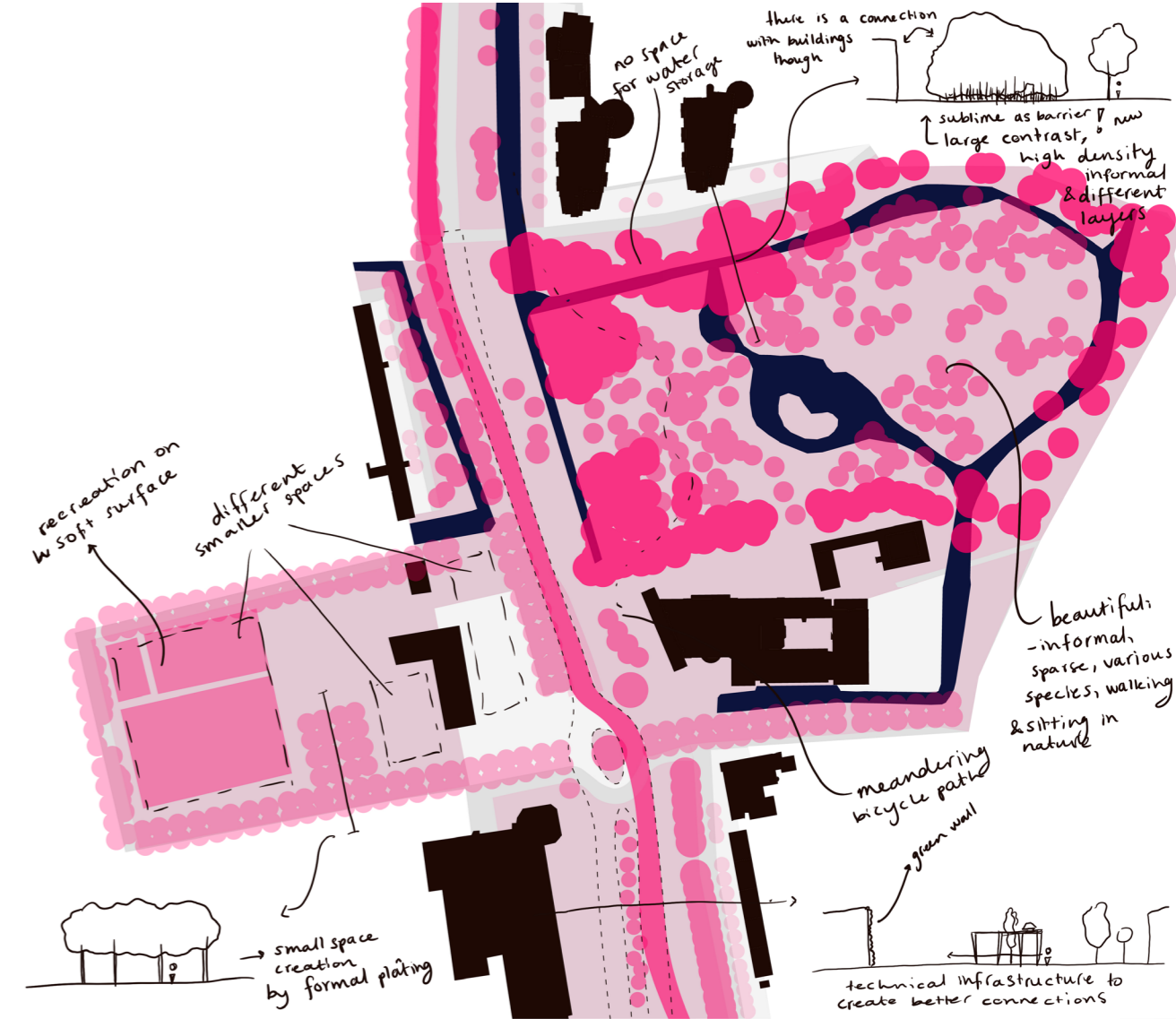


Figure 13.16 - Maps and Sections Location Two

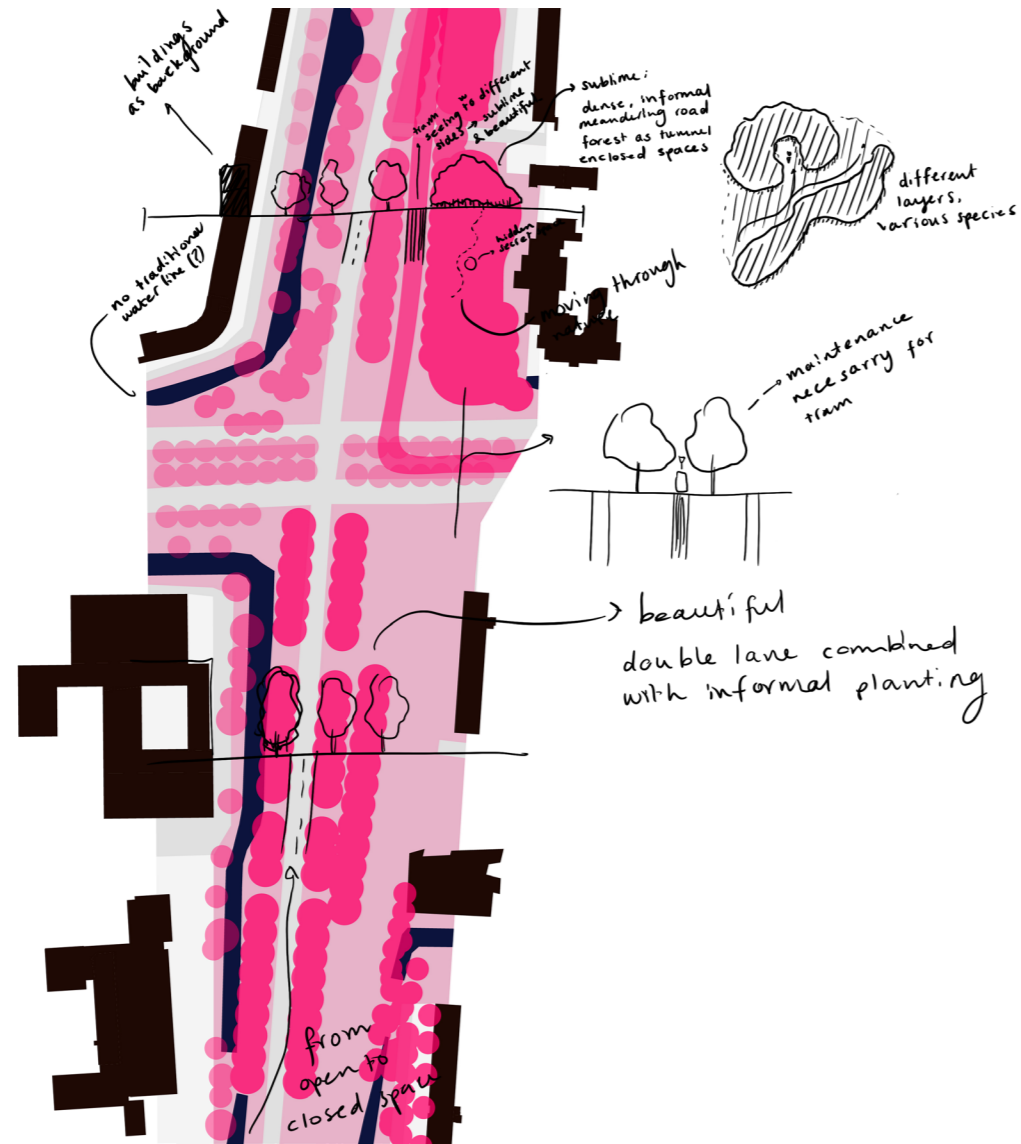


Figure 13.17 - Maps and Sections Location Three

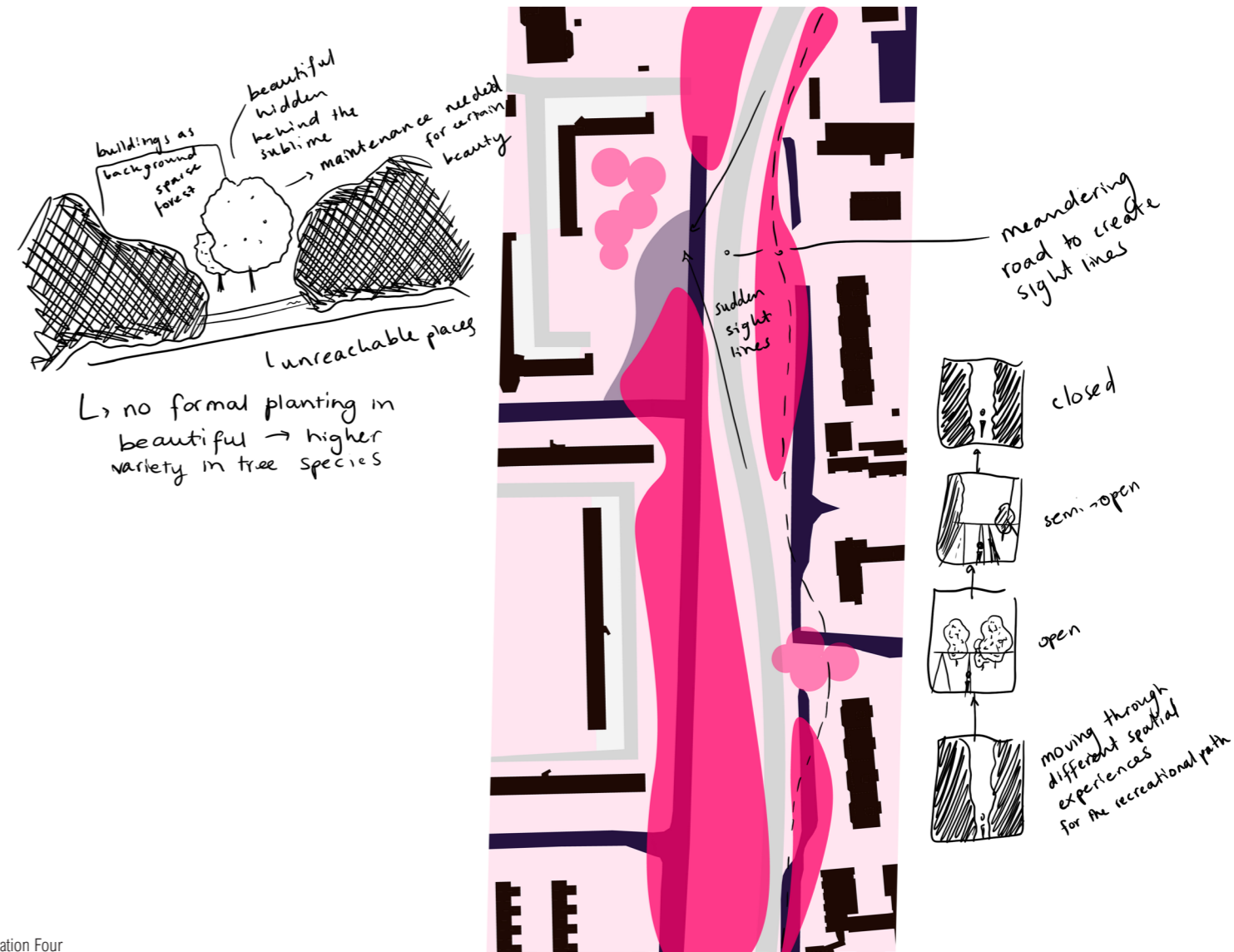


Figure 13.18 - Maps and Sections Location Four

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