Creating safe space

Enhancing neighborhood safety in Hillesluis, Rotterdam
South through spatial design

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All the maps shown are oriented exactly with the top facing north, unless mentioned differently.

TUDelft
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Preface

This P4 report is part of the Design of the Urban Fabric studio of the master program Urbanism at TU Delft. The final product of this thesis is a design that tries to improve the perceived safety and livability of the neighborhood Hillesluis within Rotterdam South. This thesis uses an approach that takes into account the residents' point of view.

During the 10 months I worked on this thesis, I had support from my supervisor Gerdy Verschuure-Stuip. I would like to thank her for all the guidance and positive approach. I would also like to thank my second mentor Els Bet for all the guidance and the new insights she gave me.

Abstract

Several areas in the Netherlands are considered vulnerable. These areas have poor livability and safety. Creating safe space is about improving the perceived safety and livability in neighborhoods by designing spatial interventions. One of these vulnerable areas is Rotterdam South. In Rotterdam South, Hillesluis is perceived by the inhabitants as the most unsafe and has low livability. The following research question is guiding this thesis:

''How can the perceived livability and safety in Hillesluis be improved by designing spatial interventions?''

In many cases, improving vulnerable neighborhoods involves gentrification; lower-income people are driven out of the neighborhood by higher-income classes. The goal of this thesis is to find a solution to improve the perceived livability and safety of Hillesluis without gentrification. To achieve this, the resident's perspective will be used. Being in contact with residents reveals the negative and positive aspects of the neighborhood. In addition, locations in the neighborhood will emerge that need improvement because here livability or safety is poor.

To improve the safety and livability of a neighborhood, there are six important principles. These principles are social cohesion, attractivity, connectivity, accessibility, visibility, and territoriality. The pattern language method will provide a set of interventions related to these principles. These patterns were applied to the locations in need of improvement. The patterns used in this thesis are summarized in an accompanying pattern atlas, which can be used as a toolbox for improving safety and livability in neighborhoods.

This thesis sought to improve perceived safety and livability in Hillesluis by creating spatial designs for 5 locations. These locations were obtained by conducting a survey among residents of the neighborhood and making a spatial analysis.

Keywords: *safety, livability, gentrification, social cohesion, spatial interventions, pattern language*

Content

01

Introduction

This first chapter will discuss the current urgencies that exist in terms of the urban planning context in the Netherlands. Since the location that this thesis will look at is Rotterdam, this chapter will investigate in which parts of Rotterdam the most problems currently are. After this, the personal motivation of the subject of this thesis will be clarified.

In the context of urban planning, there is an increasing attention on making the living environment livable and safe. Poor livability and safety are more common in urban environments, often in vulnerable areas that are social economically less developed than the rest of the city. Improving those areas often involves gentrification (Wittebrood & van Dijk, 2007).

1.1.1 Vulnerable areas

In 2022, the Ministerie van Binnenlandsezaken en Koninkrijkrelaties (BZK) came with the 'Nationaal Programma Leefbaarheid en Veiligheid'. This program aims to improve livability and safety in the twinting most vulnerable areas in the Netherlands over the next 10 to 15 years. In these areas there is often a lot of unemployment, poverty, bad eduaction, housing problems, and poor health. These 20 most vulnerable ares in the Netherlands are shown in figure 1.1. Rotterdam South is one of these vulnerable areas.

1.1.2 Livability

In the vulnerable areas, the livability is often lower than in the rest of the city. In Rotterdam, the livability of the neighborhoods with the lowest income has not improved in recent years (Snel, 2022). This is also reflected in fig 1.3: only the areas in the Netherlands which are scoring insufficient in terms of livability have barely been improved in the last 18 years.

According to Liedelmeijer & Van Kamp (2003), the definition of livability is as follows: ''The extent to which the environment matches with users needs and requirements''. Also van de Valk and Musterd (1998) state that livability is the individual's appreciation, or lack of appreciation, of his or her living environment. Thus, livability consists of the perception of residents. Next to that, the livability in a neighborhood is dependent for a part on safety.

Amsterdam Zuidoost	**Leeuwarden** Oost
Amsterdam Nieuw-West	**Lelystad** Oost
Arnhem Oost	**Nieuwegein** Centrale as
Breda Noord	**Roosendaal** Stad
Delft West	**Rotterdam** Zuid
Dordrecht West	**Schiedam** Nieuwland-Oost
Den Haag Zuidwest	**Tilburg** Noordwest
Eindhoven Woensel-Zuid	**Utrecht** Overvecht
Groningen Noord	**Vlaardingen** West
Heerlen Noord	**Zaandam** Oost

Fig 1.1: 20 most vulnerable areas in the Netherlands (Ministerie van BZK, 2022)
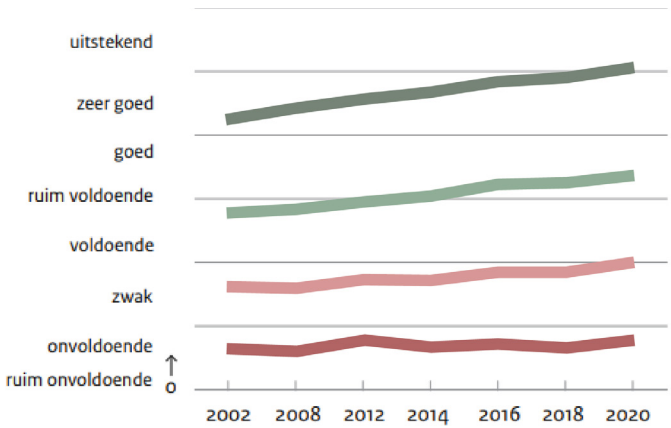

Fig 1.2: Snel (2022)

Fig 1.3: Development Leefbaarometer score 2002-2020 (Ministerie van BZK (2022)

1.1.3 Safety

Rotterdam is also experiencing unsafety in some neighborhoods. In fact, inhabitants of Rotterdam feel much more unsafe than in other municipalities (RTV Rijnmond, 2022). Regarding safety, a distinction can be made between numbers (objective) and residents' perceptions (subjective). This report will focus on the perception of the inhabitants. The score of the perceived safety (fig 1.5) in Rotterdam is the lowest in three neighborhoods in Rotterdam South: Charlois, Feijenoord and IJsselmonde.

Rotterdammers voelen zich onveiliger in hun buurt, criminaliteit daalt minder dan in rest van Nederland

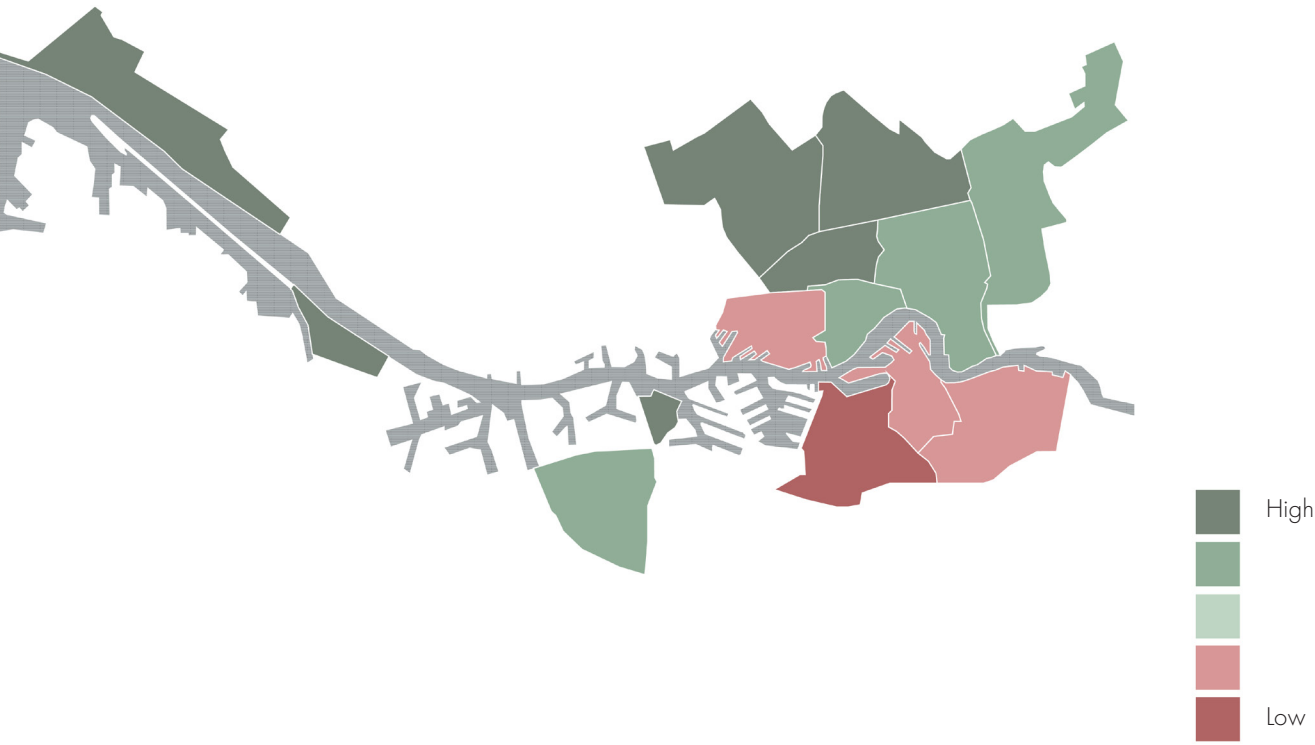**Fig 1.4:** RTV Rijnmond (2022)

High

Low

Fig 1.5: Perception of safety Rotterdam. (By author, based on Gemeente Rotterdam, 2022)

1.1.4 Gentrification

A hot topic in terms of area development and spatial planning in the last years is gentrification. Gentrification is about displacing lower-income groups from neighborhoods by attracting higher-income groups. This is done to improve neighborhoods, but also to drive up property prices. This displacement process is often controlled from above, by local governments and market players. So there is a challenge here for improving vulnerable neighborhoods without gentrification (De Graaf, 2023).

Fig 1.6: De Graaf (2023)

1.1.5 Housing shortage

Another important issue that should be mentioned is the housing shortage in the Netherlands and in Rotterdam. If there will be no direct changes, in 10 years there will be a shortage of 72.000 housing units in Rotterdam (ANP, z.d.). Rotterdam's population will grow by 15 percent from 2019 to 2035, which is one of the main reasons fot this housing shortage (Open Rotterdam, 2021). There is also challenge in terms of safety here: according to CBS (2020), there is more crime in more densely populated areas.

Fig 1.7: Holtermans (2022)

1.1.6 Climate crisis

According to the KNMI, there is an increase in average summer temperatures of between 0.9 and 2.9 degrees until 2050. On the 10% warmest days, this will be between 1.0 and 3.6 degrees. This temperature increase may involve health effects such as sleep disturbance (Runhaar et al., 2011). There is also an increasing chance of flooding in cities in the coming years. Due to the increasing chance of flooding and heat stress, climate adaptation in the urban area is becoming increasingly important (Witte, 2014).

Fig 1.8: De Volkskrant (2023)

My personal interest in the field of urban planning lies in using the perspective of residents. In the end, residents of neighborhoods are the people who use the neighborhood the most, so I think you should approach it from their point of view. This approach is called a bottom-up approach. In addition, I do think it is important to make a neutral spatial analysis of an area in addition to the resident's perspective. In this way, a research has a subjective and an objective side. However, it is difficult for a spatial analysis to be completely objective, because in the end it will always be done by the hand of an urban designer. However, the spatial analysis that is done can be based on literature, which makes the analysis as objective as possible.

In the context of urban planning, I am also interested in improving places in a city that are generally considered less. Places where people with lower incomes live. I think there is a very interesting challenge here in improving deprived neighborhoods without gentrification. Also, disadvantaged neighborhoods are quickly seen as less safe places in a city. Because of my urban planning background, I am fascinated by the spatial aspect of safety. What kind of spatial characteristics make you feel safe or unsafe in a neighborhood? I am particularly interested in this perceived safety: safety that may not be captured in numbers.

In addition, I have felt a strong connection to Rotterdam all my life. I come from a village nearby, Bergschenhoek, and have been visiting Rotterdam regularly all my life. So choosing Rotterdam as the location for this thesis was an easy choice. I also did an internship at the Municipality of Rotterdam. Here I worked on Rotterdam North. It seemed interesting for my thesis to focus on Rotterdam South, a part I know less well.

02

Problem field

This chapter will present the problem statement of this thesis. For this, we will look at the livability of all the neighborhoods of Rotterdam South. It will also the the perceived safety of Rotterdam. After this, a choice will be made for a neighborhood in Rotterdam South that is representative for the neighborhoods in Rotterdam South with low livability and safety. The density and building period will be taken into account here. Finally, the ''Wijkprofiel'' and ''Leefbaarometer'' of the chosen location, Hillesluis, will be investegated further.

2.1 Problem analysis

As stated in the urgencies, Rotterdam South is one of the most vulnerable areas in the Netherlands. These areas often have a low safety. Safety can be divided into two elements: objective and subjective safety. These are both strongly related to livability in a neighborhood. First, the 'Leefbaarometer' and the 'Wijkprofiel', two indicators of the livability of a neighborhood, will be examined to see in which neighborhoods in Rotterdam South the livability is scoring the lowest. After this, perceived safety will be examined.

2.1.1 Livability Rotterdam South

As shown in the urgencies in paragraph 1.1, the part of Rotterdam with the most problems is Rotterdam South. The 'Leefbaarometer' and the 'Wijkprofiel' are both indicators of the livability in neighborhoods. The 'Leefbaarometer' compares the neighborhood relative to the rest of the Netherlands. The 'Wijkprofiel' compares the neighborhood to the rest of Rotterdam. The precise explanation of what these two indicators are consisting of will be explained later.

A number of neighborhoods in Rotterdam South are scoring below avarage on both indicators (fig 2.1 & fig 2.2):

- Wielewaal
- Carnisse
- Tarwewijk
- Zuidplein
- Bloemhof
- Hillesluis
- Pendrecht
- Lombardijen
- Feijenoord
- Beverwaard

Of these neighborhoods, two neighborhoods score far below average on both indicators:
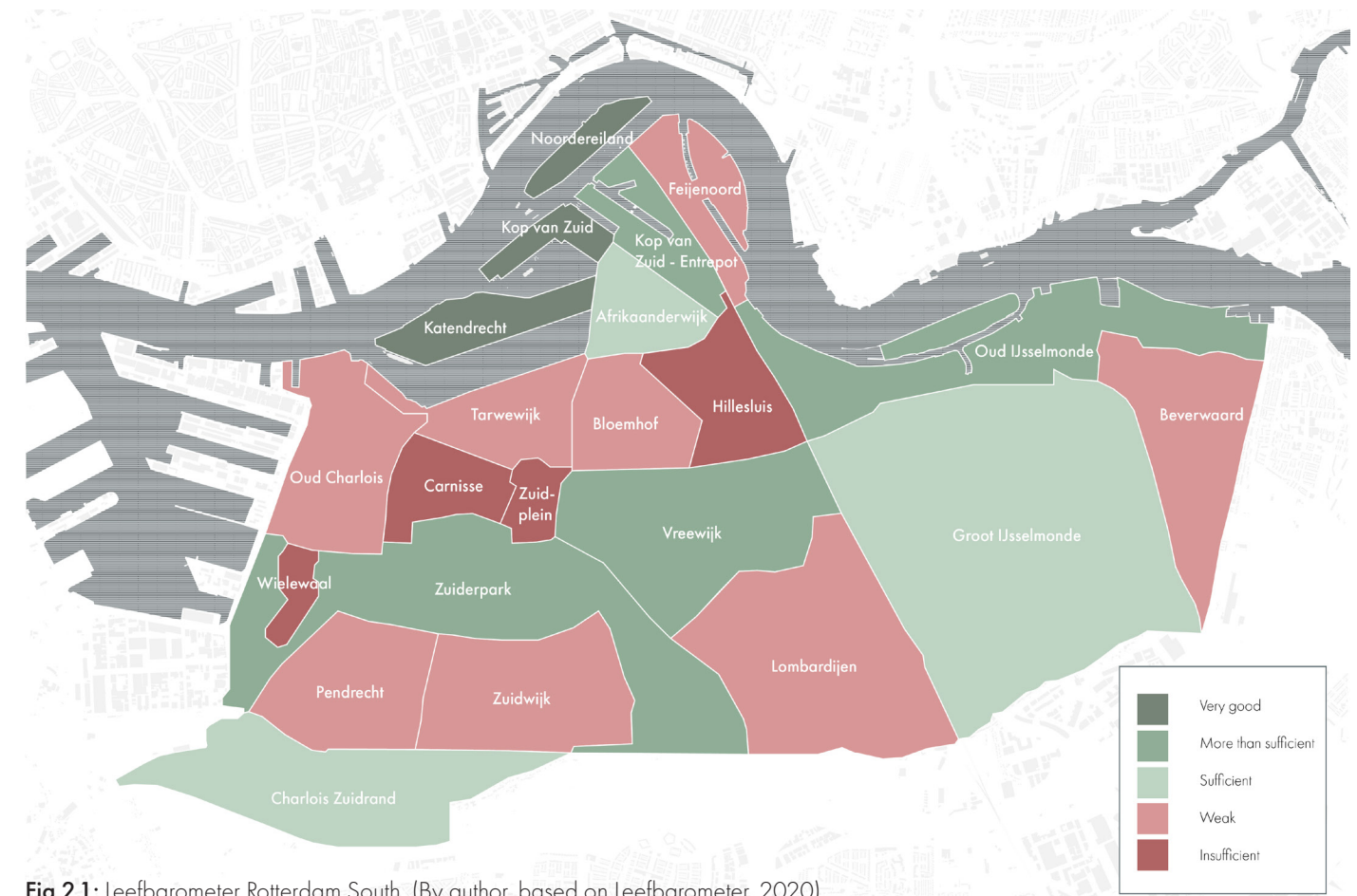
- Carnisse
- Hillesluis

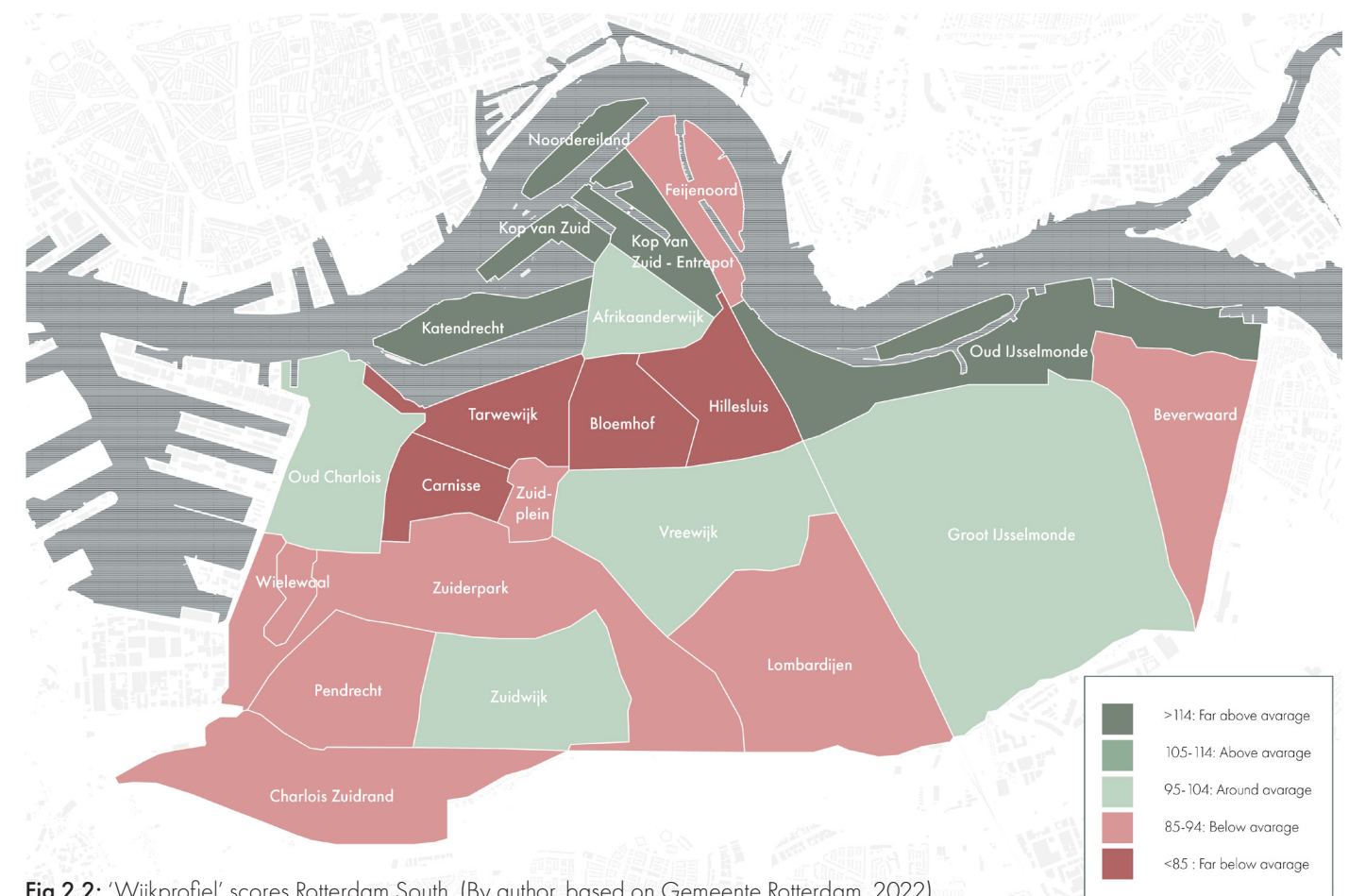Fig 2.1: Leefbarometer Rotterdam South. (By author, based on Leefbarometer, 2020)

Fig 2.2: 'Wijkprofiel' scores Rotterdam South. (By author, based on Gemeente Rotterdam, 2022)

2.1.2 Safety and livability

The attractiveness and functioning of an urban area can be affected by crime and fear of crime. A feeling of unsafety has a bad influence on the lifestyle of people and there usage of the city. People do not go out at night anymore; make less use of public transport, use public outdoor spaces less and stay inside more. This has a strong negative influence on the livability. So, there is a strong relationship between safety and livability (Agis, 2007).

There are many different aspects that influence a feeling of safety in a city. For example, social problems and the physical environment are important. Urban planning can have a strong influence on the feeling of safety in cities. A good layout and organization of the urban morphology can contribute to improving the feeling of safety, but a bad layout and organization can have a strong negative impact on the feeling of safety (Agis, 2007).

Fig 2.3 shows that Hillesluis scores the lowest in terms of perceived safety compared to all neighborhoods in Rotterdam. The perceived safety of fig. 2.3 is consisting of 4 indicators:

- Satisfaction of own neighborhood
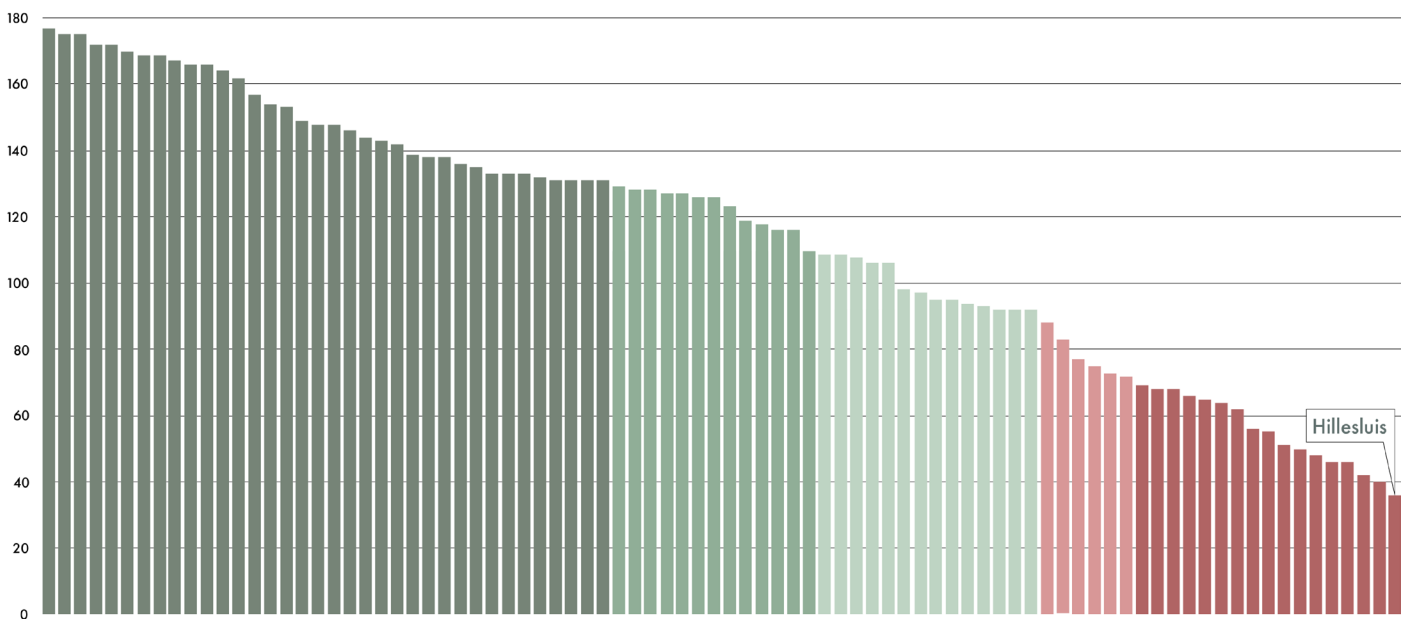- Perceived probability of victimization
- Avoiding places in neighborhood
- Afraid to open door at night

A distinction can be made in which of these indicators are spatial and which are not. The first indicator is spatial and contains the perception of inhabitants about buildings, public spaces, and amenities. The second indicator is partly spatial, such as the visibility of a neighborhood, but will primarily be related to the perception of an individual. An older woman may have a different perception of this than a young man. The third indicator is also spatial. Some places in a neighborhood may be perceived as unsafe, causing people to avoid them. Striking about this indicator is that the number of people in Hillesluis who are avoiding places is the highest in all of Rotterdam (Gemeente Rotterdam, 2022). However, there is no data available on which places in the neighborhood are avoided and thus perceived as the most unsafe. In the further course of this thesis, for the chosen neighborhood, it is interesting to examine which places in the neighborhood are now avoided because they are perceived as unsafe. The fourth indicator is not directly spatial-related.

Fig 2.3: Perceived safety neighborhoods (By author, based on Gemeente Rotterdam, 2022)

2.1.3 Design location choice

Hillesluis will be the location for further research and design. As mentioned in paragraph 2.1.1, Hillesluis is one of the neighborhoods in Rotterdam South with the worst livability. In addition, the perceived safety in Hillesluis is the lowest in all of Rotterdam. Hillesluis is also a representative neighborhood for the neighborhoods in Rotterdam South where livability is poor. Hillesluis is in a vital city neighborhood. These vital city neighborhoods have a similar density (appendix 11.2) and building period (appendix 11.2) and all score below average as far as livability and perceived safety is concerned. Hillesluis is a relatively high-dense neighborhood and is mostly built pre-war.

Inhabitants: *12.280*

Density: *4.763 adresses per km2*

Building period: *70 % built before 1940 (pre-war)*

Fig 2.4: Living environments (By author, based on Gemeente Rotterdam, 2022)

Compact center & high rise
Creatively mixed urban
Green-urban
Vital city neighborhoods

2.1.4 Wijkprofiel Hillesluis

The ''Wijkprofiel'' shows how each neighborhood in Rotterdam is doing in terms of their social, physical, and safety aspects, which are reflected in the three indexes of the 'Wijkprofiel'. The scores of these indexes contain measurable facts as well as the perceptions of inhabitants. In this way, there is a subjective and an objective side to the ''Wijkprofiel''. All the scores are reflecting how a particular neighborhood is scoring compared to the rest of Rotterdam. For each neighborhood, between 175 and 300 people have been interviewed (Gemeente Rotterdam, 2022).

Figure 2.5 shows what all three indexes of the neighborhood profile consist of. The physical index consists of housing, public space, amenities, and environment. The safety index consists of theft, violence, burglary, vandalism, and nuisance. The social index consists of self-reliance, together-reliance, participation, and bonding.

What is striking about the 'Wijkprofiel' of Hillesluis is that the subjective part scores worse than the objective part. Many dark red areas can be seen, which means that the appreciation of residents of Hillesluis scores far below the average of the rest of the Rotterdam neighborhoods. The subjective aspects on which Hillesluis scores far below the avarage of Rotterdam are:

- Housing supply
- Public space
- Environment
- Violence
- Vandalism
- Nuisance
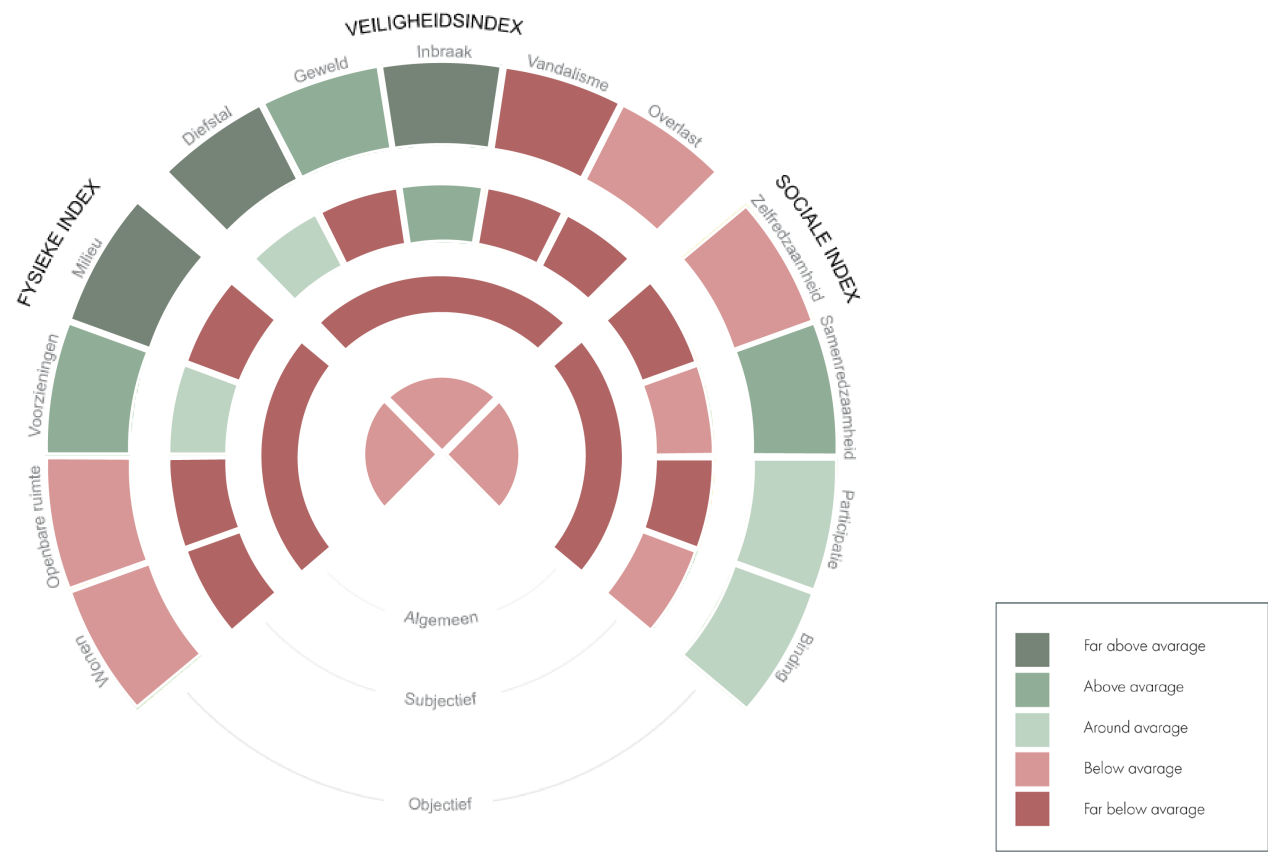- Self resilience
- Participation

2.1.5 Leefbaarometer Hillesluis

The 'Leefbaarometer' shows the scores compared to the rest of the Netherlands. It shows whether there is a negative or positive deviation. The ''Leefbaarometer'' consists of five components: housing stock, physical environment, amenities, social cohesion and nuisance & unsafety.

What is striking about the Leefbaarometer of Hillesluis (fig. 2.5) is that the neighborhood is scoring far above avarage in terms of amenities. The physical environment is scoring around the avarage. However, Hillesluis scores below average in terms of social cohesion and housing supply. In addition, the neighborhood scores far below average in terms of nuisance and unsafety.

Thus, the Wijkprofiel and the Leefbaarometer of Hillesluis have fairly similar outcomes. The housing stock and public space score poorly. Violence, vandalism and nuisance from the Wijkprofile score below avarage, as do nuisance and unsafety from the Leefbaarometer. Finally, self resilience and participation score poorly at the Wijkprofiel, as does social cohesion from the Leefbaarometer.
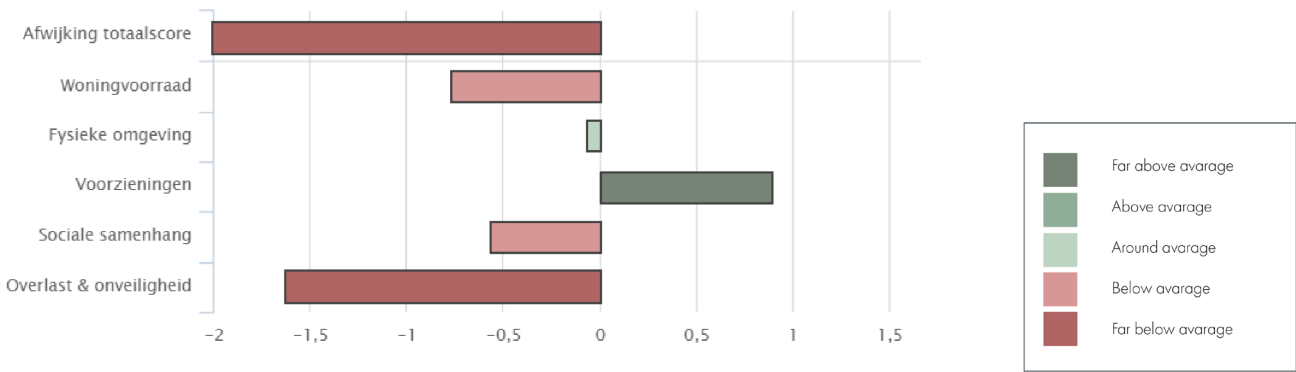
Fig 2.5: Leefbaarometer Hillesluis (Leefbaarometer, 2022)

2.1.6 Problem statement

*Rotterdam South is one of the most **vulnerable** areas of the Netherlands. There is a **low livability** and **low safety**. Within Rotterdam South, the **pre-war neighborhoods** with a **high density** are **perceived** as the **lowest livable** and **most unsafe**. Often, improving vulnerable areas involves **gentrification**.*

*Hillesluis is one of those pre-war neighborhoods and has the lowest **perceived safety** of all of Rotterdam. There is room for improvement in terms of the **housing supply, public space, environment, social cohesion, nuisance, and safety**.*

Fig 2.5: Wijkprofiel Hillesluis (Gemeente Rotterdam, 2022)

2.2 Research aim

The research aim of this thesis is to design spatial interventions for Hillesluis in Rotterdam South that contribute to the perceived livability and safety of the neighborhood.

This thesis will aim to provide a way to improve the livability and safety of a neighborhood that takes into account the resident's perspectives. In addition to the perception of the residents, it is also important to make an objective analysis of the neighborhood. This analysis will be based on literature and intends to be as objective as possible. In this way, both the objective and subjective sides can be taken into account in design decisions.

Through spatial analysis and investigating residents' perspectives, locations should emerge that are perceived as unsafe or unlivable. For these locations, it is important to identify the unsafety or poor livability and explain the task. A detailed design will then be made for two locations. For the design, a pattern language will be developed. These are design interventions based on literature. All the patterns are summarized in the related pattern atlas.

The pattern language can be used as an example or toolbox for improving other unsafe neighborhoods. Finally, it can be examined whether this way can also be implemented in other neighborhoods where livability and safety are poor, and thus if the developed pattern language is useful.

2.3 Research questions

2.4.1 Research question

The main research question that this thesis will try to answer is:

*How can the **perceived livability and safety** in **Hillesluis** be improved by designing **spatial interventions**?*

1.   2. & 3.

4.

2.4.2 Subquestions

To answer the main research question, the following 4 subquestions will be answered first:

*1. What causes **unsafety** and a bad **livability** in neighborhoods?*

*2. Which locations within Hillesluis are **perceived** by the inhabitants as **unsafe** or with a low **livability**?*

*3. What are the current **physical**, **social** and **individual characteristics** of Hillesluis?*

*4. What kinds of **spatial interventions** can improve **livability** and **safety** in a neighborhood?*

The first subquestion will provide a theoretical background about what influences safety and livability in a neighborhood. This theoretical background can be used as a base for the spatial analysis.

The second subquestion will provide locations within Hillesluis which the inhabitants perceive as unsafe or with a low livability. These locations can be used for designing spatial interventions in the design part.

Subquestion three is about the spatial analysis of Hillesluis. This analysis is based on theory and is the objective part of the analysis.

The last subquestion is related to the design part of this thesis. The interventions will be based on literature using pattern language method which will be explained in the methodology chapter.

03

Methodology

This chapter will first give an overview of the whole research. In this research framework, the different methods linked to the different research questions will be shown. After this, the methods will be explained further. Finally, the relevance of this thesis will be discussed.

3.1 Research framework

The research framework is a scheme which summarizes the whole thesis. The framework can be read starting from the left side with the urgencies and motivation, following the arrows, to the research output.
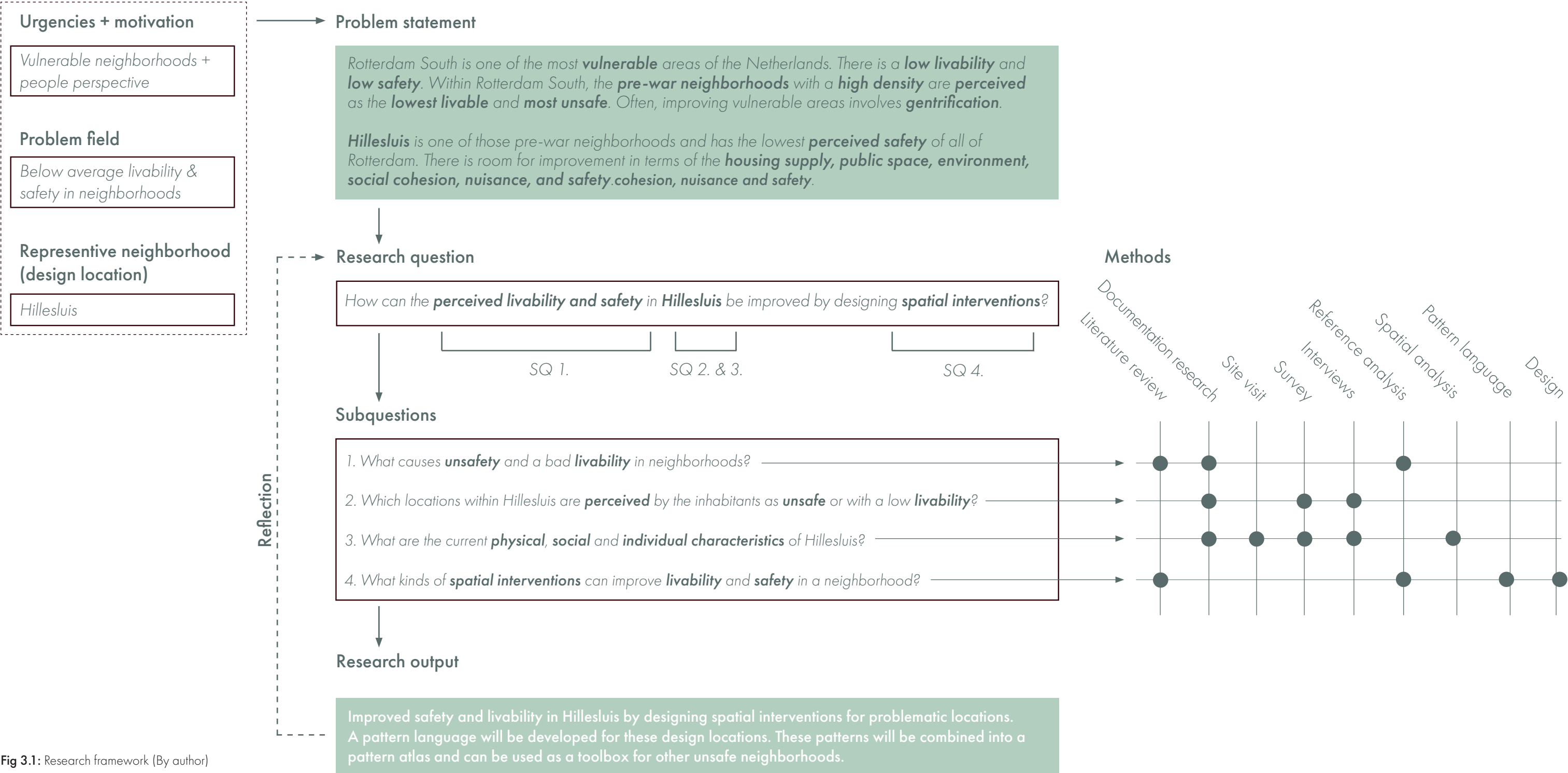
Urgencies + motivation

Vulnerable neighborhoods + people perspective

Problem field

Below average livability & safety in neighborhoods

Representive neighborhood (design location)

Hillesluis

Problem statement

Rotterdam South is one of the most **vulnerable** areas of the Netherlands. There is a **low livability** and **low safety**. Within Rotterdam South, the **pre-war neighborhoods** with a **high density** are **perceived** as the **lowest livable** and **most unsafe**. Often, improving vulnerable areas involves **gentrification**.

Hillesluis is one of those pre-war neighborhoods and has the lowest **perceived safety** of all of Rotterdam. There is room for improvement in terms of the **housing supply, public space, environment, social cohesion, nuisance, and safety**.cohesion, nuisance and safety.

Research question

How can the **perceived livability and safety** in **Hillesluis** be improved by designing **spatial interventions**?

SQ 1.   SQ 2. & 3.   SQ 4.

Subquestions

1. What causes **unsafety** and a bad **livability** in neighborhoods?

2. Which locations within Hillesluis are **perceived** by the inhabitants as **unsafe** or with a low **livability**?

3. What are the current **physical**, **social** and **individual characteristics** of Hillesluis?

4. What kinds of **spatial interventions** can improve **livability** and **safety** in a neighborhood?

Research output

Improved safety and livability in Hillesluis by designing spatial interventions for problematic locations. A pattern language will be developed for these design locations. These patterns will be combined into a pattern atlas and can be used as a toolbox for other unsafe neighborhoods.

Reflection

Methods

Literature review
Documentation research
Site visit
Survey
Interviews
Reference analysis
Spatial analysis
Pattern language
Design

Fig 3.1: Research framework (By author)

3.2 Methods

Literature review

Safety and livability are topics on which much research can be found in the literature. The literature review serves as the basis for the analysis. In addition, the literature review ensures that all design interventions have a theoretical basis. In addition, the literature review will also be used for the pattern language part of this thesis.

Documentation research

The documentation research will give more insights into existing plans and visions from the municipality. Through documentation research, the municipality's existing plans can be taken into account. This allows future changes to be anticipated. Another scenario is to contradict the existing future plans, though this will require a good justification. Most importantly, a clear position will have to be taken.

Site visit

Site visits are an important part of the whole process from the beginning. At first, to get first impressions of the planning area. Later in the process, more focused research can be done on problem spots. Thus, by site visit, it is a must to return to the planning area several times. A site visit is an important means of getting a better sense of a place, which is not always possible behind a computer. Visiting the site is also important for obtaining respondents for the survey.

Survey

The survey is an important part of this thesis because it will help with the bottom-up approach. Through this survey, insight will be gained into what residents think are strengths and weaknesses of the Hillesluis neighborhood. In addition, by means of a map, places can be found that residents consider good and places that are considered less or unsafe.

Interviews

Interviews will also contribute to the bottom-up approach and get residents' opinions. In addition, interviews with people who have a lot of knowledge about the neighborhood can be helpful. These could include neighborhood police officers, people from the neighborhood council, or people working in the neighborhood.

Reference analysis

Using reference cases with similar problems and solutions can inspire the design part of this thesis. In addition, these reference cases can serve as useful tools to visualize design ideas in the report or presentation.

Spatial analysis

The spatial analysis will be used to gain more insights about the plan area. The spatial analysis will be based on the literature, to be as objective as possible. This will allow for an examination of the strengths and weaknesses of the area. The spatial analysis will provide a basis for the final design, along with the survey and interviews. In this way, this thesis attemps to have an objective and subjective part.

Pattern language

The pattern language method consists of several design principles that can be applied to different areas. All of these design principles are based on literature. As a result, all design interventions have a good theoretical foundation. This set of principles is created for this thesis and thus not an existing set. However, the pattern language of this thesis can be a useful set for other projects related to improving safety and livability.

Design

In the design part, spatial interventions will be designed to improve Hillesluis. For five locations, the task at hand will be made explicit. There will be impressions showing the improved design. The spatial interventions of the design are based on literature by using the pattern language. For two locations, a more detailed design will be made.

3.3 Conceptual framework

The conceptual framework shows the relationship between the main concepts in this thesis. The currently vulnerable neighborhoods will try to be improved without gentrification. There will be a focus on spatial interventions that use the perception of inhabitants and a pattern language. This pattern language can be used for other neighborhoods where safety needs to be improved.
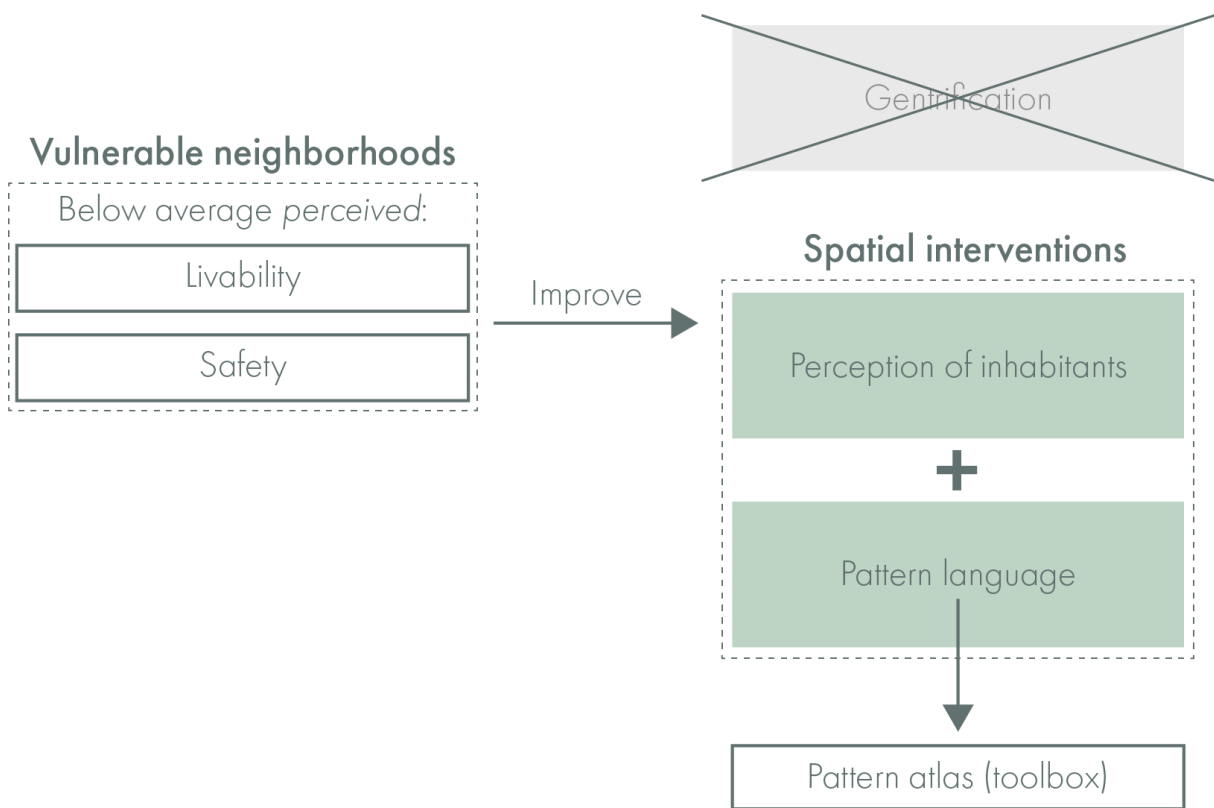

Fig 3.2: Conceptual framework (By author)

3.4 Relevance

3.4.1 Social relevance

The social relevance of this thesis lies in the fact that criminality is a problem that is and will always be present. Since 2021, criminality in the Netherlands has increased by 6% (Haenen, 2023). Criminality and unsafety is a problem that must be dealt with. The perception of residents is important here. After all, everyone has the right to a safe living environment, regardless of income or origin.

Next to that, the current housing shortage that exists in the Netherlands and in Rotterdam is currently also an issue in the context of urban design. This provides a challenge in for urban planners and designers: denser environments have higher amount of crimes (CBS, 2020).

Finally, the climate crisis is also a current problem. Especially in the urban environment, climate adaptation is becoming increasingly important (Witte, 2014).

3.4.2 Scientific relevance

The scientific relevance of this thesis lies in the fact that currently urban designing is often done from a top-down perspective. This thesis will try to contribute to the bottom-up approach of urban design. It will investigate how the perspective of inhabitants can be taken into account, while also analyzing the neighborhood in a objective way.

In addition, this thesis contributes to the theories of Veilig Ontwerp en Beheer (Luten et. al, 2008) and CPTED (ICA, n.d.). In this thesis, the principles of these theories are summarized in 6 principles. These are reflected in the theoretical framework (pg. 38 & 39), which summarizes all relevant theories. The theoretical framework also shows which neighborhood characteristics influence safety and livability.

3.4.3 Ethical considerations

Gentrification is an ethical dilemma in this thesis. As mentioned in the urgencies, gentrification is often controlled by above. After all, when improving and making a deprived neighborhood safer, there is a strong question of whether you want to attract new, wealthier residents to upgrade the neighborhood. Changing the resident population of a neighborhood is a tool to improve safety and livability (Wittebrood & van Dijk, 2007). This can be at the expense of the current, less wealthy residents of the area, who then have to find a new place to live. This thesis will try to prevent gentrification by focusing on the current inhabitants of Hillesluis.

04

Theory

The theory chapter will examine the different types of safety that are existing. After this, the different kinds of characteristics that influence livability and safety in a neighborhood will be shown. To conclude, different theories about what aspects are important in the safe design of buildings and public spaces are investigated.

The following research questions will be answered in this chapter:

SQ1: *What causes **unsafety** and a bad **livability** in neighborhoods?*

SQ4: *What kinds of **spatial interventions** can improve **livability** and **safety** in a neighborhood?*

4.1 Theoretical background

This chapter will first explore the different types of safety and what safety and livability in a neighborhood depend on. Then different theories and research on safety in the physical environment will be discussed. These are "Aandacht voor de Wijk" (Wittebrood & van Dijk, 2007), CPTED (ICA, 2022), Veilig Ontwerp en Beheer (Luten et. al, 2008) and 'Duurzame leefbare woonomgeving' (Van Dorst, 2005). In these theories and research, a distinction will be made between the relevant and irrelevant aspects for this thesis. Finally, the theories will be compared and all aspects reduced to six relevant principles that will be used in the remainder of this thesis.

4.1.1 Types of safety

Safety is a broad concept and has many different forms. Different classifications of safety can be found in the literature. It is difficult to give an exact definition of safety. However, some distinctions can be made regarding types of safety. The characterizations of safety that are interesting concerning urban design are (Elffers & de Jong, 2004):

- *Objective and subjective safety:*

Objective safety is about how often forms of crime occur. This is expressed in numbers and can be measured. Subjective safety is about the extent to which a person feels threatened. So here it is about a person's perception (Elffers & de Jong, 2004). There is no strong relationship between objective and subjective safety, although this is often assumed. Indeed, a resident of an objectively safe neighborhood with little crime may still not feel safe (CBS, 2015).

- *Physical and social safety*:

Physical safety deals with threats caused by nature or technology. Physical safety includes, among other things, fire safety, traffic safety, user safety, lighting and visibility. Thus, physical safety has a strong relationship to public spaces and buildings. Social safety has to do with the
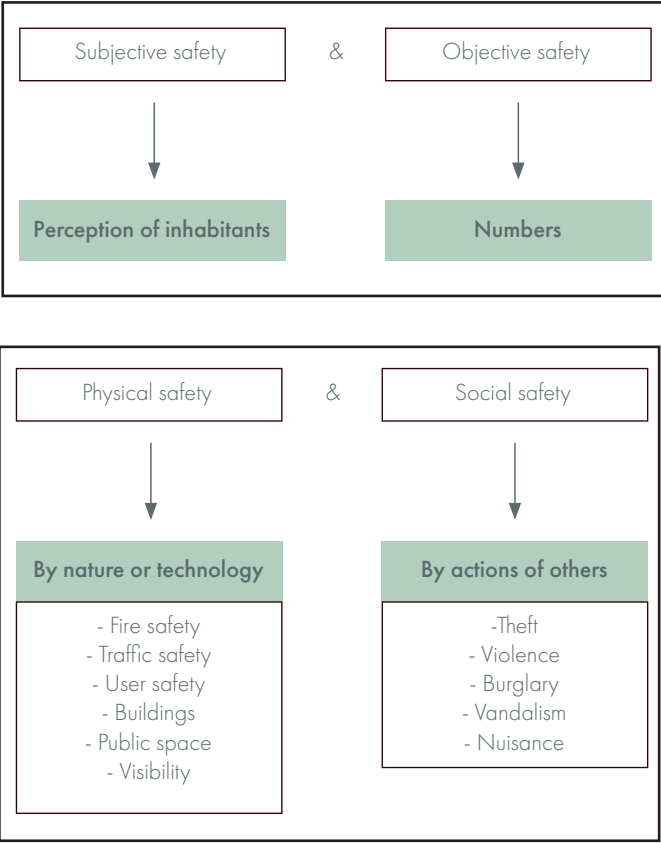
Fig 4.1: Safety types (By author)

direct actions of other people. Examples for social safety are theft, violence, burglary, vandalism and nuisance. There is a connection between physical and social safety. The design of public spaces and buildings can influence social safety, for example by improving visibility (Elffers & de Jong, 2004).

4.1.2 Perceived safety and livability

According to Oliviera (2015) and Wittebrood & van Dijk (2007), there are three aspects that create a feeling of safety in a neighborhood. These are social neighborhood characteristics, physical neighborhood characteristics and individual characteristics. There is often a correlation between physical, social and individual characteristics in a neighborhood.

Social characteristics include social cohesion, relocation mobility, participation and resilience. Physical characteristics consist of the housing stock, layout of public spaces and the presence of facilities. Important individual characteristics that influence residents' perceptions of safety are age, gender, ethnicity, income, education and household composition. If a neighborhood has a relatively large number of young people, it is more likely to experience crime and degradation. Changing the social composition of a neighborhood can have a positive impact on livability and safety (Wittebrood & van Dijk, 2007).

According to van Ringelenstein (2012), the relationship between safety and livability depends on the interaction between individual, physical and social neighborhood characteristics.

4.1.3 Aandacht voor de wijk

Aandacht voor de wijk (Wittebrood & Van Dijk, 2007) is about the effects of restructuring on livability and safety in residential neighborhoods in 30 large cities in the period 1995-2006. According to Wittebrood & van Dijk (2007), a deprived neighborhood with poor livability and safety can be improved in three ways:

1. *Design of public space*
Urban space should be designed to have as many eyes on the street as possible. Neighborhoods should have a high building density and a good mix of functions for this purpose. In addition, lighting and prevention of deserted areas is important.

2. *Change of resident population*
Changing the resident population can also have a positive impact on the safety and livability of a neighborhood. This is because the livability and safety of a neighborhood is highly dependent on the individual characteristics of the population. For example, many young people in a neighborhood often create more nuisances.

3. *Social processes in the neighborhood*

Social processes in a neighborhood increase social cohesion. More social cohesion can contribute to feelings of safety. The presence of social amenities such as schools, stores, parks, community centers and playgrounds can promote interaction among residents and thus improve social cohesion

For this thesis, the first principle is relevant because it is a spatial principle. The second principle, change of resident population will not be used in this thesis. This principle is about gentrification, what will be tried to prevent. The third principle is not directly spatial, but has a spatial relation and will thus be relevant.

4.1.4 CPTED

CPTED is a theory of how crime can be prevented through urban design. The International Crime Prevention Through Environmental Design Association gives the following definition of CPTED on their website (ICA, 2022):

''Crime Prevention Through Environmental Design (CPTED) is a multi-disciplinary approach of crime prevention that uses urban and architectural design and the management of built and natural environments. CPTED strategies aim to reduce victimization, deter offender decisions that precede criminal acts, and build a sense of community among inhabitants so they can gain territorial control of areas, reduce crime, and minimize fear of crime. ''

Through the years, two generations of CPTED have been developed. The first generation consists of six principles (ICA, 2022):

1. *Territoriality*
When there is a clear division of which space belong to who and how a space needs to be used, people feel more responsibility.

2. *Natural surveillance*
Natural surveillance can be achieved by having as many eyes on the street as possible. This is achieved through

lighting, landscaping, clear sight lines and other design features that improve visibility to reduce the likelihood of crime.

3. *Image and milieu*
The appearance and image of the environment have a major influence on the feeling of insecurity and the occurrence of crime. In this regard, maintenance is an important aspect. This can be maintenance by residents themselves, but also by the Municipality.

4. *Access control*
Access control is about the extent to which a particular place is accessible to the public. Spatial barriers are also related to access control.

5. *Target hardening*
This makes the execution of the criminal act more difficult for potential offenders by making their end goal harder to reach. This can be done, for example, by improving locks for windows and doors and fencing.

For this thesis, the first four principles are of interest. These are largely spatial principles and relate to the prevention of crime. The fifth principle, target hardening is about countering crime and is thus less of interest.

The second generation of CPTED added four principles to the already existing six principles. Here, there was the criticism that the first six principles lacked cultural and social dynamics. The following four principles were added (ICA, 2022):

1. *Social cohesion*
Social cohesion here is about social relationships between residents in a neighborhood. Social programs in a neighborhood are important here. In addition, residents coming together is also important in addressing neighborhood problems and providing social cohesion.

2. *Community culture*
Community culture here is about the presence of social events in a neighborhood involving music, sports, and art. Here people of different ethnicities, ages, and genders must come together.

3. *Connectivity*
Connectivity can be both physical and social and are about connections to other neighborhoods. Social connections are about shared neighborhood events, communication, and alliances. Physical connections are containing all kinds of infrastructures, such as walkways, roads, bicycle paths and bridges.

4. *Threshold capacity*
For threshold capacity, there must be enough multiple-land uses in a neighborhood, and thus that there are not many one-sided areas. There should be enough places where people can interact, such as parks, stores, and sports facilities.

As mentioned above, these four principles deal with the social factors of a neighborhood. These principles are not always entirely spatial because they are about organizing activities. However, they do have a spatial relationship because there must be enough spatial facilities for social activities. This will be important in this thesis. In addition, physical connections are also relevant.

4.1.5 Veilig ontwerp en beheer

Veilig Ontwerp & Beheer (Luten et. al, 2008) is the Dutch translation of the internationally proven and applied approach of Crime Prevention Through Environmental Design.

CPTED uses clear and simple principles. In the "Handboek van Veilig Ontwerp en Beheer," these are summarized as:

1. *Visibility*
Visibility is about having eyes on the street. Here, lighting, sight lines, function mix, front doors, and facade transparency are important.

2. *Clarity*
Clarity is about a clear division of space. Here the transition between private and public is important. In addition,

the distinction between traffic and residential space is also important.

3. *Accessibility*
Accessibility is about being able to get somewhere, as well as being able to keep others out. In addition, accessibility for emergency services, the closeness of private spaces, and alternative routes are important.

4. *Attractiveness*
Attractiveness is divided into six principles: aesthetic sustainability, technical sustainability, social sustainability, attractive feature offerings, maintenance and management, and aesthetic quality.

All of these four principles are spatial in nature and thus all are relevant to this thesis.

4.1.6 Duurzame leefbare woonomgeving

According to Van Dorst (2005), the territoriality principle of CPTED is one of the most important aspects of a livable and safe living environment. In Veilig Ontwerp en Beheer, this term can be found as clarity. In "Een duurzame leefbare woonomgeving" Van Dorst (2005) states that social contacts are only possible if people can regulate their privacy. Thus, the environment must provide both opportunities for contact and opportunities for isolation. The legibility or territoriality of an environment is important for regulating social interaction. The environment must consist of clearly legible zones.

The transition from private to public space is an important aspect according to Van Dorst and will also be an important part of this thesis. A hybrid zone as a transition between public and private can play an important role here. A hybrid zone can be of different sizes, but it must always be clear that the hybrid zone belongs to the house. The hybrid zone softens the transition from private to public and provides opportunities for the resident to have control over interactions. In addition, the resident can personalize the hybrid zone by decorating their front yard. Finally, the hybrid zone can allow less direct views

into the home, allowing the home to maintain its openness. This can contribute to eyes on the street.

4.1.7 Conclusion

Concluding, there are three different sorts of neighborhood characteristics that have an influence on the perceived safety and livability in a neighborhood. These characteristics have a direct influence on each other (Wittebrood & van Dijk, 2007):

- Social neighborhood characteristics
- Physical neighborhood characteristics
- Individual neighborhood characteristics

To improve perceived livability and safety in a neighborhood, various principles of different theories have been discussed. These principles are reduced to the following six relevant principles and will be used in the rest of this thesis:

1. *Social cohesion*
According to Wittebrood & van Dijk (2007), social processes in a neighborhood are important. The second generation of CPTED (ICA, 2022) consists of four principles related to social dynamics. All four of these principles will fall under this social cohesion principle. This principle will focus on the presence of social amenities such as: schools, stores, parks, community centers, playgrounds and sports facilities.

2. *Attractivity*
The 'image and milieu' principle of the first generation CPTED (ICA, 2022) and the 'attractiveness' principle of Veilig Ontwerp en Beheer (Luten et al., 2008) are related to each other and be combined into the principle of 'attractivity'. Here there will be looked at the aesthetic quality of public spaces and buildings.

3. *Connectivity*
The third principle, 'connectivity', will focus on the physical aspects of the connectivity principle of the second

generation of CPTED (ICA, 2022). There will be looked at the physical infrastructures such as walkways, roads, bicycle paths and bridges. This can be about infrastructures in the neighborhood itself and to surrounding neighborhoods.

4. Accessibility
The principle 'acces control' of the first generation of CPTED (ICA, 2022) and the principle 'accessibility' of Veilig Ontwerp en Beheer (Luten et. al, 2008) will be combined into the principle 'accessibility'. Accessibility is about being able to get somewhere, as well as being able to keep others out. It will also focus on spatial barriers.

5. Visibility
'Natural suveillance' of the first generation of CPTED (ICA, 2022) and 'visibility' of Veilig Ontwerp en Beheer (Luten et. al, 2008) are related to eachother and will be combined into the principle 'visibility'. Having as many eyes on the street as possible is important here. This principle will focus on sightlines and lighting, function mix, front doors, and the transparency of facades.

6. Territoriality
The principle 'territoriality' will contain 'territoriality' of the first generation of CPTED (ICA, 2022) and 'clarity' of Veilig Ontwerp en Beheer (Luten et. al, 2008). A clear division which space belongs to who is important because people will feel more responsable. Van Dorst (2005) also states that territoriality is important. This thesis will also look at the transition between private and public, called 'hybrid zones' by Van Dorst (2005).

4.1.8 Theoretical framework

The theoretical framework is a summary of how the literature is interpreted in this thesis. It shows that the perceived livability and safety in a neighborhood are depending on the social, physical, and individual neighborhood characteristics. These three characteristics have a direct relation to each other. The perceived livability and safety can be improved by using six principles: social cohesion, attractivity, connectivity, accessibility, visibility, and

territoriality. The structure of the spatial analysis is based on the theoretical framework.
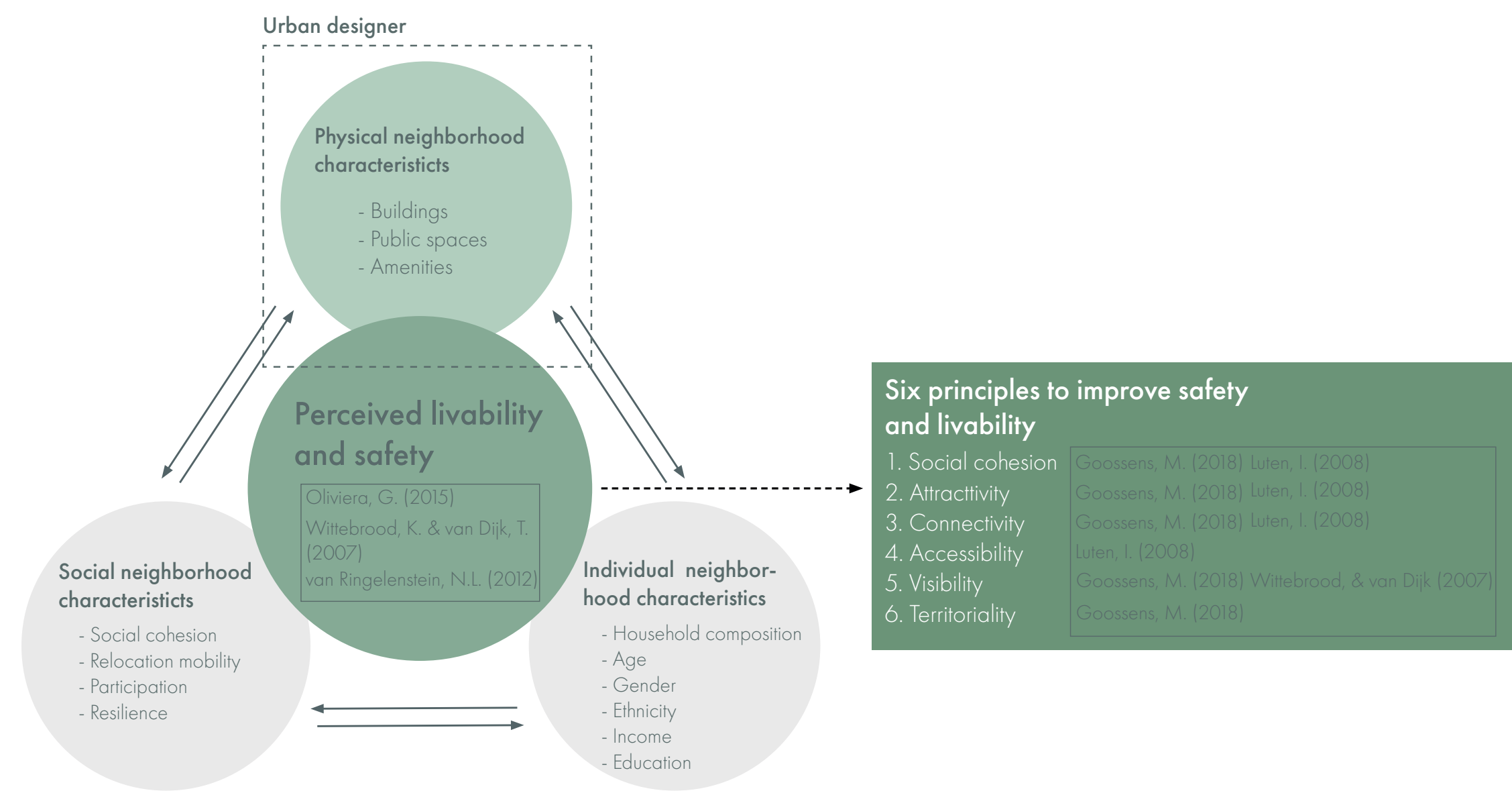

Urban designer

Physical neighborhood characteristicts
- Buildings
- Public spaces
- Amenities

Perceived livability and safety
Oliviera, G. (2015)
Wittebrood, K. & van Dijk, T. (2007)
van Ringelenstein, N.L. (2012)

Social neighborhood characteristicts
- Social cohesion
- Relocation mobility
- Participation
- Resilience

Individual neighborhood characteristics
- Household composition
- Age
- Gender
- Ethnicity
- Income
- Education

Six principles to improve safety and livability

1. Social cohesion	Goossens, M. (2018) Luten, I. (2008)
2. Attracttivity	Goossens, M. (2018) Luten, I. (2008)
3. Connectivity	Goossens, M. (2018) Luten, I. (2008)
4. Accessibility	Luten, I. (2008)
5. Visibility	Goossens, M. (2018) Wittebrood. & van Dijk (2007)
6. Territoriality	Goossens, M. (2018)

Fig 4.2: Theoretical framework (By author)

05

Survey & interviews

This chapter will show the results of the survey which is used to get insights into the inhabitants of Hillesluis. Following are the main conclusions from the three interviews conducted.

The following research questions will be answered in this chapter:

SQ2: *Which locations within Hillesluis are **perceived** by the inhabitants as **unsafe** or with a low **livability**?*

SQ3: *What are the current **physical**, **social** and **individual characteristics** of Hillesluis?*

5.1 Survey

5.1.1 Goal and content survey

The main objective of the survey, found in its entirety in appendix 11.1, was to find places in the neighborhood that residents perceive as less so. It also tried to find places that residents avoid because they perceive them as unsafe. Residents could also indicate places in the neighborhood they like to visit. All these places could be indicated in a map attached to the survey.

In addition to the spatial part, people could also indicate their general positive and negative points of the neighborhood, to get a general picture of the perception of the residents of Hillesluis.

Residents could also fill in their age and gender. In this way, it was possible to examine whether age or gender affects people's perception of safety.

5.1.2 Results

Most of the answers were obtained during a neighborhood meeting of Hillesluis (fig 5.1). Here many residents were present and thus there were many respondents. Regarding the general comments about the positive features of the neighborhood, multiculturalism was mainly mentioned. Unsafety was often mentioned as a negative characteristic. In addition, the lack of parking spaces and the amount of garbage on the street were considered problematic.

The survey was filled in by 19 people (fig 5.2), from who 12 were men, 6 were women and 1 was unknown.

Two locations in Hillesluis were indicated by several people as locations which they liked to visit:

1. Beijerlandselaan
2. Varkenoordsepark

There are a few places indicated by several people as places they prefer to avoid. These places are:

3. Hillevliet
4. Intersection at the Beijerlandselaan
5. Space below the Stadionviaduct
6. Stichtseplein

There are a few places indicated by several people as places which they consider a lesser part of the area. These places are:

3. Hillevliet
7. Riederbuurt Zuid

In general, no differences were found between men and women, which was expected. The only striking difference is that the four people under the age of 20 had not indicated places they perceived as unsafe. Some of them indicated the Stichtseplein as a place which they liked to visit. This is striking because many people avoid this place.
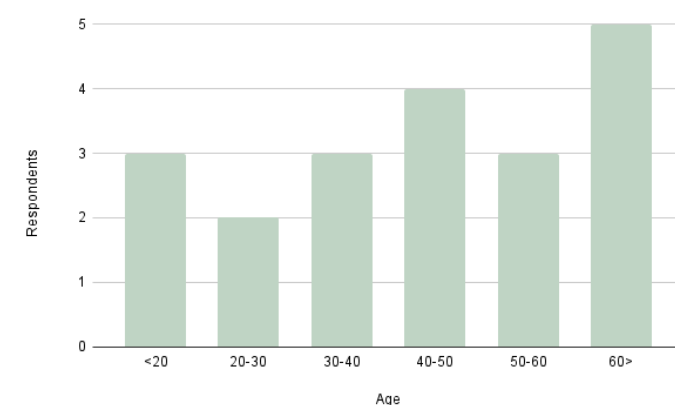

Fig 5.1: Neighborhood meeting Hillesluis (Image by author)

Fig 5.2: Respondents survey (By author)

Fig 5.3: Conclusionmap survey (By author)

1. BEIJERLANDSELAAN
2. VARKENOORDSE PARK
6. STICHTSEPLEIN
7. RIEDERBUURT ZUID
3. HILLEVLIET
4. INTERSECTION BEIJERLANDSELAAN
5. STADIONVIADUCT

Places people like
Places people avoid
Places considered less

5.2 Interviews

Three different interviews were conducted with people (fig 5.4) who work in the district and have considerable knowledge of the district. These interviews can be found in their entirety in appendix 11.2. The first person is Said Aharchaou, who has worked as a neighborhood counselor in Hillesluis for 4 years. Anja Bergsma is also interviewed, a volunteer at Sportspeeltuin Hillesluis, and a Hillesluis resident since 1987. Finally, an interview was also conducted with Hillesluis neighborhood police officer Jasper Nootenboom.

Several positive things were reported about Hillesluis by the people interviewed. For example, multiculturalism in the neighborhood is seen as a positive aspect. In addition, the Beijerlandselaan is one of the strengths of Hillesluis. At the same time, these positive aspects also have a downside. Namely, there is a lot of crime in Hillesluis, in which Beijerlandselaan plays a role. There are many cheap unhealthy fast food chains on Beijerlandselaan, contributing to residents' unhealthier lifestyles. Next to that, there are also many people with a language or educational disadvantage. As a result, there are many people without jobs or education: this makes them more likely to choose the side of crime.

Another problem in the neighborhood is trash on the streets. People do not feel a responsibility to keep the neighborhood clean. In addition, there are not enough places in the neighborhood for meetings, such as community centers. There are also a few sports clubs. These are facilities that could add a lot to social cohesion in Hillesluis. There is a challenge here because there is a lot of variation in age. There are many young people in the neighborhood. However, there are few facilities for these young people, causing a lot of trouble on the streets. Especially the Stichtseplein and the Stadionviaduct are places where there is a lot of nuisance. This is also reflected in the survey. The Stadionviaduct and the Stichtseplein were indicated by several people as places they avoid. In addition, some young people like to visit the Stichtseplein, which explains the nuisance here.

From the interviews conducted, some aspects are interesting to focus on in the remainder of this thesis because they can be improved through spatial interventions. For example, the lack of social amenities and the nuisance on the Stichtseplein and near the Stadium Viaduct are interesting problems.

Name: Said Acharchou

Origin: Morroccan

Function: Ex neighborhood counselor Hillesluis

Name: Anja Bergsma

Origin: Dutch

Function: Volunteer Sportspeeltuin Hillesluis

Name: Jasper Nootenboom

Origin: Dutch

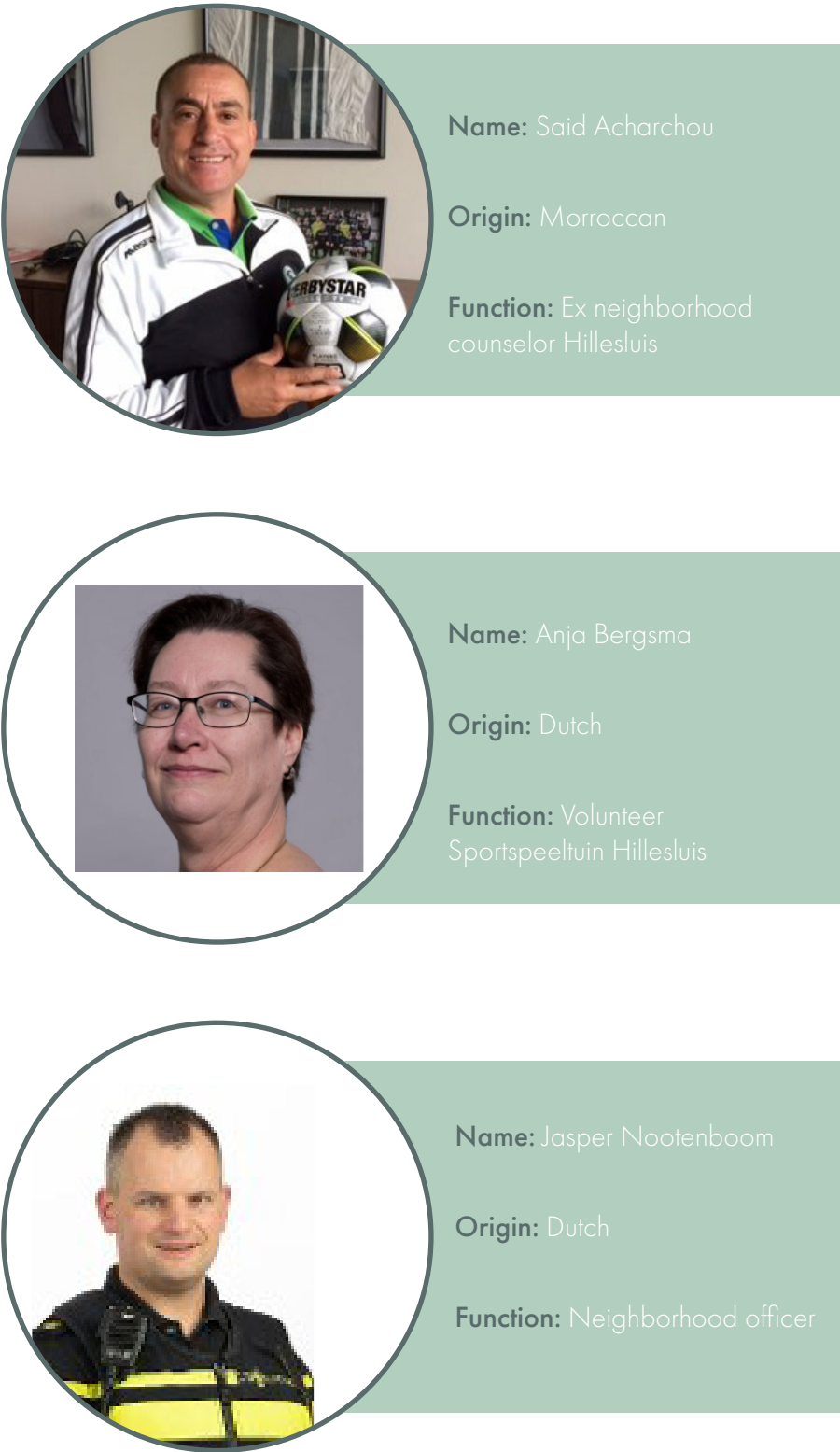**Function:** Neighborhood officer

Fig 5.4: Interviewed people (By author)

06

Analysis

The analysis chapter is based on the theoretical framework. According to the theoretical framework, the perceived livability and safety in a neighborhood depends on the individual, social and physical characteristics. Thus, there will be an individual analysis, social analysis and physical analysis. Before this, there will be a chapter about the background information of Hillesluis.

The following research questions will be answered in this chapter:

SQ2: *Which locations within Hillesluis are **perceived** by the inhabitants as **unsafe** or with a low **livability**?*

SQ3: *What are the current **physical**, **social** and **individual characteristics** of Hillesluis?*

6.1 Background

1. Historical development
2. Morphology
3. Existing plans

6.2 Individual analysis

1. Age
2. Gender
3. Ethnicity
4. Income
5. Education

6.3 Social analysis

1. Social cohesion
2. Relocation mobility
3. Participation
4. Resilience

6.4 Physical analysis

1. Buildings
2. Public spaces
3. Amenities
4. Attractivity
5. Connectivity
6. Accessibility
7. Visibility
8. Territorality

Fig 6.0: Structure of the analysis

Hillesluis is located in the former Hillepolder. The Lange Hilledijk and the Groene Hilledijk were two important dikes in the area. Hillesluis already formed a small core at the place where both dikes crossed (Gemeente Rotterdam, 2022b).

At the beginning of the last century, Hillesluis was formed, like many other neighborhoods in Rotterdam South. This was due to the demand for labor in the ports of Rotterdam. Because of this, Hillesluis is traditionally a working-class neighborhood. At that time, Hillesluis was not designed for car use, which resulted in very narrow street patterns which are still visible now (Gemeente Rotterdam, 2022b).

From 1960, the Beijerlandselaan developed into a prosperous shopping street. The Beijerlandselaan was a place where many people came to stroll. Since 1990, the quality and the retail offer of the Beijerlandselaan has greatly degraded. At the east side of Hillesluis, a very big rail yard was placed (Gemeente Rotterdam, 2022b).

Much demolition and new construction has taken place in the northern part of Hillesluis since the year 2000. In addition, The Beijerlandselaan has been greatly improved in recent years. The rail yard has been replaced with a big park, called the Varkenoordsepark (Gemeente Rotterdam, 2022b).

Hillepolder (Stadsarchief Rotterdam, n.d.)

Narrow streets (Stadsarchief Rotterdam, n.d.)

Beijerlandselaan (Stadsarchief Rotterdam, n.d.)

New building projects (own image)
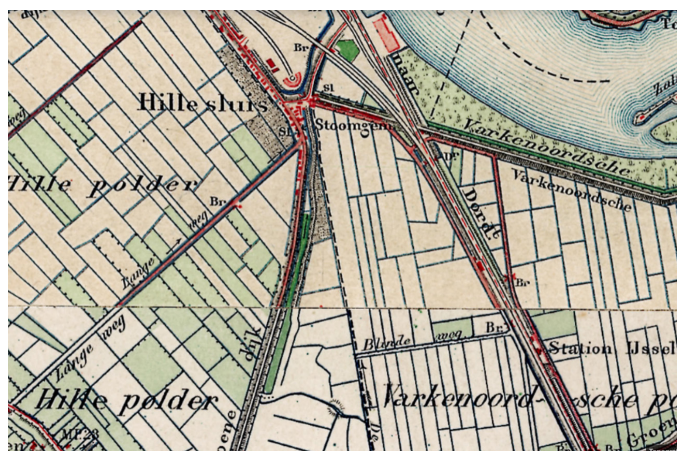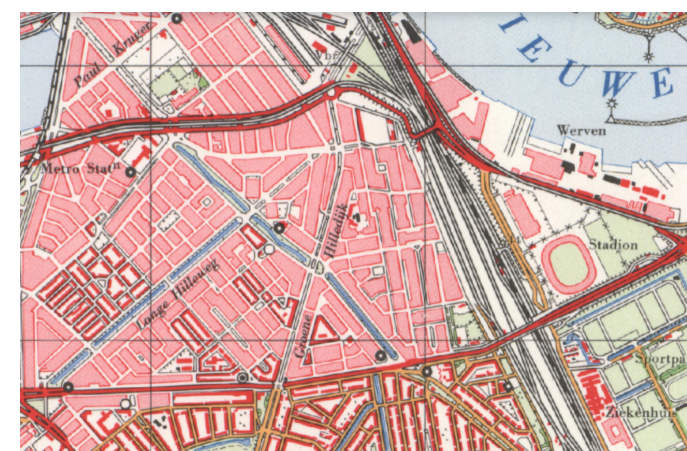
1882 — 1940 — 1970 — 2021

Fig 6.1.1: Historical development Hillesluis (Topotijdreis.nl, n.d.)

Some historical structures can still be found in the current urban morphology of Hillesluis. For example, the Beijerlandselaan used to be a dike, called the Groene Hilledijk. The Lange Hilleweg and the Colosseumweg were also important historical routes that are still important routes in the area today.

In addition, in a part of Hillesluis, the polder structure can still be found in the street pattern (fig 6.1.2). This is a reason for the narrow streetpattern of Hillesluis.

Because of these historical routes and polder structure, the current urban structure consists of long main lines with inner areas (fig 6.1.3). The historical structures and the Wetering have formed te current smaller neighborhoods within Hillesluis.

These smaller neighborhoods are the Slaghekbuurt, the Polderbuurt, the Riederbuurt Noord, the Riederbuurt Zuid, and the Walravenbuurt. Each of these neighborhoods are containing one or more squares (fig. 6.1.3). In most cases these squares are located centrally in the small neighborhoods. Only the eastern part of the Riederbuurt Zuid is lacking a square and is only consisting of an orthogonal street pattern. So at the Riederbuurt Zuid, there is a challenge to add a square.

Streets following polder structure
---- Old dike
— Historical route
····· Hillesluis

Fig 6.1.2: Historical structures

Slaghekbuurt

Riederbuurt Noord

Polderbuurt

Riederbuurt Zuid

Walravenbuurt

Neighborhood edge

Square

Fig 6.1.3: Neighborhoods and squares

There are several future plans in and around Hillesluis that may influence the neighborhood and thus this thesis. In this thesis, it is important to consider the existing future plans to best anticipate future changes. Also, in this way, the vision of the municipality can be taken into account.

Nieuwe Oeververbinding

There are plans for a new connection between the northern and southern part of Rotterdam, connecting both sides of the Maas. This connection will connect Kralingen and Feijenoord and is called the 'Nieuwe Oeververbinding' (fig 6.1.4). The exact location is not yet known and it is also still being investigated whether this will be a bridge or tunnel. The new connection will most likely focus on pedestrians and cyclists. Next to that, the bridge will be used for public transport in the form of a tram (MRDH, n.d.).

In the vision and design chapter of this thesis, the Nieuwe Oeververbinding will be taken into account because it can contribute a lot to connecting Rotterdam South with the rest of the city.

Urban redevelopment around de Kuip

For several years there have been plans for a new Feyenoord stadium with urban redevelopment around it. The Feyenoord stadium, the Kuip, is located next to Hillesluis, with a train track in between. Known plans are those of Feyenoord City and de Moderne Kuip (fig 6.1.5). It is still unclear which plans will become reality, but it seems certain that something will happen in the future. De plan of the Moderne Kuip incorporates a new trainstation (de Moderne Kuip, n.d.).

This thesis will assume that urban developments will take place around the Kuip, regardless of exactly what plan will be implemented. An important aspect assumed is the new train station. This will greatly enhance the public transportation connection of Hillesluis.
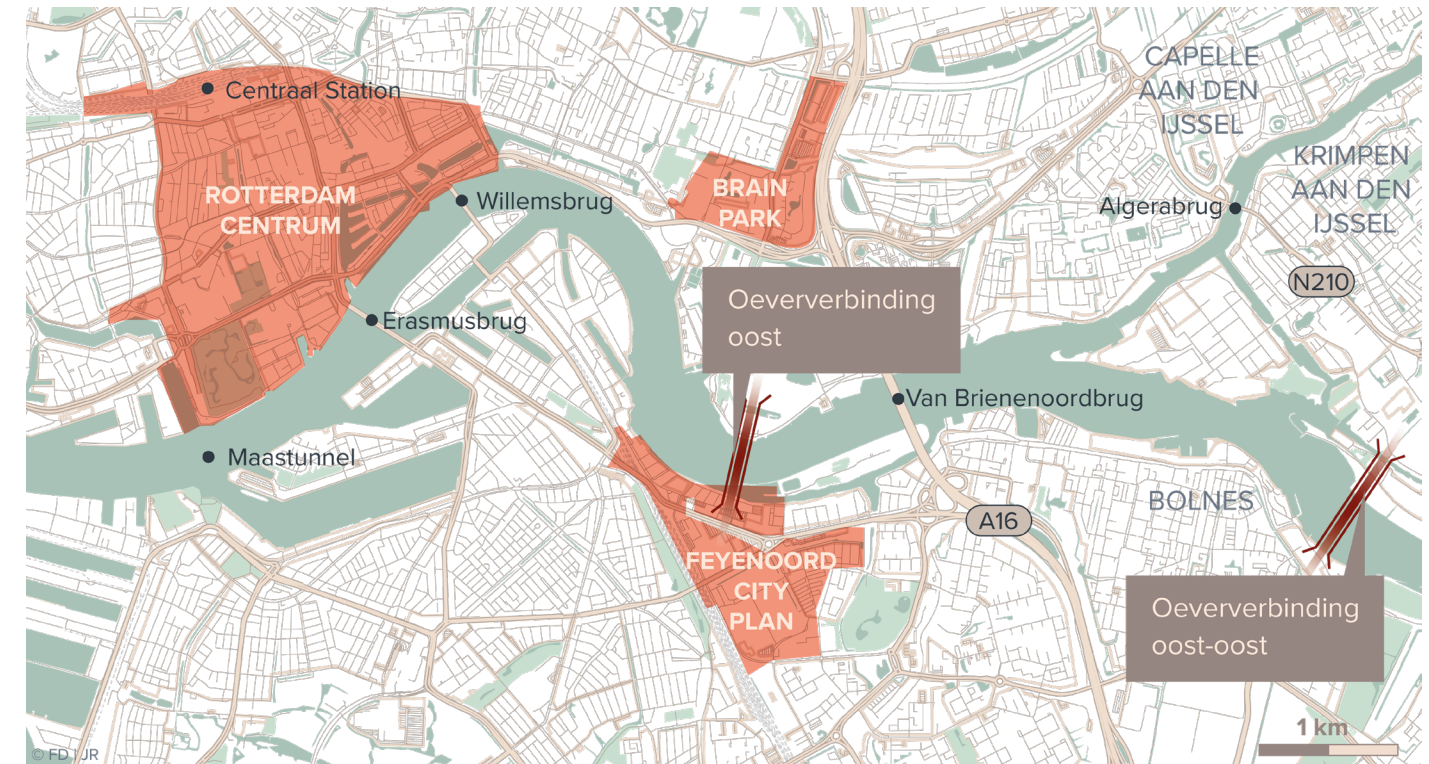

Fig 6.1.4: Nieuwe Oeververbinding (MRDH, n.d.)

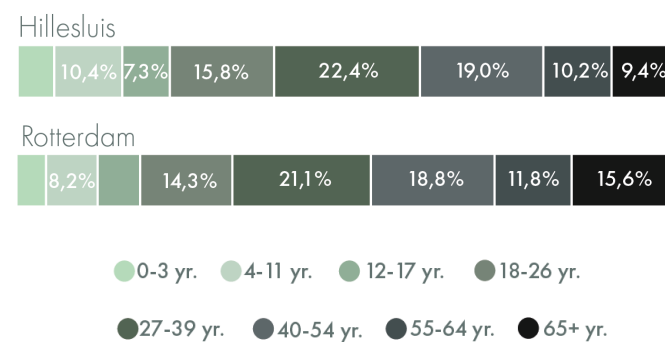**Fig 6.1.5:** De Moderne Kuip (de Moderne Kuip, n.d.)

De individual analysis is based on the theoretical framework. One subject is added, the labor marker position. All numbers about the demographics are retrieved from Onderzoek010 (n.d.) and are compared to Rotterdam as a whole. Neighborhoods with a insufficient livability and safety often have a high unemployment, a low education level, and low income levels (Ministerie van BZK ,2022). This is also the case in Hillesluis.
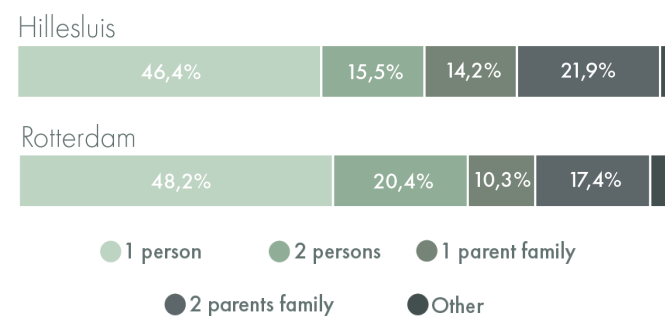
Age groups

Hillesluis has a relatively high number of young people compared to the rest of Rotterdam. 39% of the inhabitants of Hillesluis is younger than 26 years old, compared to 32.7% in the rest of Rotterdam. The genders in Hillesluis are evenly distributed: 50% of the people in Hillesluis are women and 50% are men.

Hillesluis

| 10,4% | 7,3% | 15,8% | 22,4% | 19,0% | 10,2% | 9,4% |

Rotterdam

| 8,2% | | 14,3% | 21,1% | 18,8% | 11,8% | 15,6% |

● 0-3 yr. ● 4-11 yr. ● 12-17 yr. ● 18-26 yr.
● 27-39 yr. ● 40-54 yr. ● 55-64 yr. ● 65+ yr.

Households by composition

There are a lot of 1 person households in Hillesluis, the same as in Rotterdam as a whole. The most striking difference between Hillesluis and Rotterdam in terms of household composition is that there are relatively a lot of 1-parent and 2-parent families.

Hillesluis

| 46,4% | 15,5% | 14,2% | 21,9% | |

Rotterdam

| 48,2% | 20,4% | 10,3% | 17,4% |

● 1 person ● 2 persons ● 1 parent family
● 2 parents family ● Other

Migration background

One of the biggest differences in demographics between Hillesluis and Rotterdam as a whole is the migration background. In Hillesluis, 83.7% of the people have a migration background, compared to 53.7% in Rotterdam. The most people have a Turkish or Moroccan origin.

Hillesluis

| 16,2% | 10,0% | 6,8% | 24,2% | 14,8% | 12,3% | 10,0% | |

Rotterdam

| 46,3% | 7,9% | 7,3% | 7,0% | 10,8% | 8.7% | |

● Geen (NL) ● Suriname ● Nederlandse Antillen ● Turkije ● Marokko
● Kaapverdië ● Overig niet-westers ● Overig Europese Unie ● Overig westers
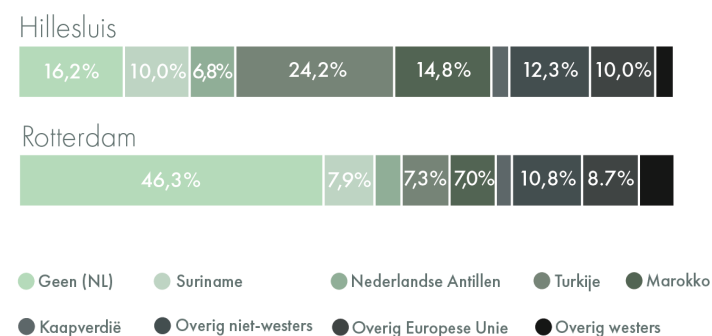
Labor market position

The working population in Hillesluis is relatively low, 55.9% compared to 61.2% in Rotterdam as a whole. 8.1% of the people between 15 and 26 years are not studying or working.

Hillesluis

| 55,9% | 15,5% | 7,1% | 21,5% |

Rotterdam

| 61,2% | 12,2% | | 20,1% |

● Working ● Not-working ● Studying ● Other
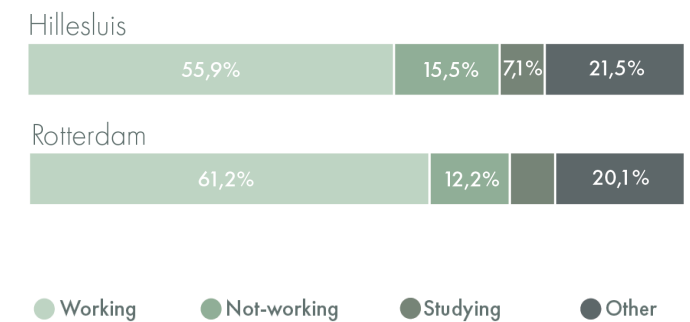
Education level

The avarage education level in Hillesluis is also relatively low. Only 15.3% of the people in Hillesluis have a high education level, compared to 31% in Rotterdam. Next to that, 41.7% of the people have a low education level.

Hillesluis

| 41,7% | 43,1% | 15,3% |

Rotterdam

| 31,4% | 37,6% | 31,0% |

● Low ● Middle ● High
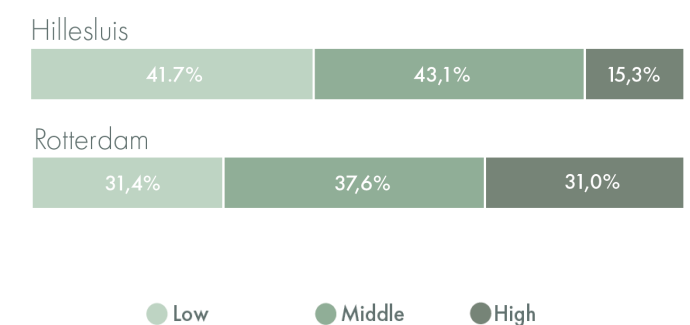
Salary level

Hillesluis is a low income neighborhood. 13.8% of the people have a low income, compared to 10.2% in Rotterdam.

Hillesluis

| 13,8% | 37,2% | 48,9% |

Rotterdam

| 10,2% | 24,4% | 65,4% |

● Low ● Middle ● High
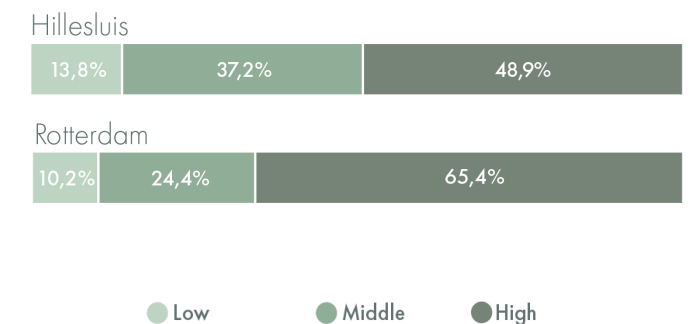
The social neighborhood characteristics are consisting of social cohesion, relocation mobility, participation and resilience. The types of crime will also be briefly presented here. This thesis is focusing on improving Hillesluis by using spatial interventions. Thus, social characteristics will be indirectly tried to improve through physical interventions that affect them. Therefore, social characteristics are briefly explained.

6.3.1 Social cohesion

In Hillesluis, social cohesion is below average. There is little interaction between residents, especially between different age groups. The different age groups are living separately from each other. The inhabitants of Hillesluis think that there are too few places for resident activities. In the last four years, inhabitants perceive social cohesion in Hillesluis (fig 6.3.1) as increasingly less good (Gemeente Rotterdam, 2022b).

6.3.2 Relocation mobility

Hillesluis has one of the highest relocation mobilities in Rotterdam (fig 6.3.2). The relocation mobility of Hillesluis

is 35%. When the location mobility in a neighborhood is high, people feel less connected. In addition, neighborhoods where the relocation mobility is high have more criminality (Olivieira, 2015).
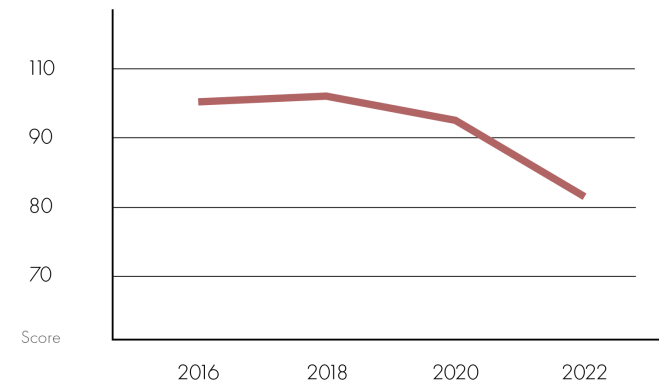
Fig 6.3.1: Development social cohesion Hillesluis (By author, based on Gemeente Rotterdam, 2022b)

6.3.3 Participation

In terms of participation, the inhabitants of Hillesluis are not satisfied with their participation in general. Next to that, Hillesluis scores far above average in terms of people who are feeling discriminated sometimes (Gemeente Rotterdam, 2022b).

6.3.4 Resilience

The self-resilience in Hillesluis scores far below average in comparison to the rest of Rotterdam. A lot of people in Hillesluis have trouble reading, speaking, and writing Dutch. Because of this, in general people of Hillesluis don't feel connected to their neighborhood and there is no initiative to contact other people. A lot of people in Hillesluis are having a feeling of loneliness. Next to that, the health of people in Hillesluis is poor (Gemeente Rotterdam, 2022).

6.3.5 Criminality

The objective crime will be briefly mentioned here. This is about how the crime numbers of Hillesluis are compared to the other neighborhoods of Rotterdam. Several forms of crime are common in Hillesluis. Regarding vandalism and nuisance, Hillesluis scores worse than the Rotterdam average. An explanation for this may be the large number of young people in the neighborhood and the relatively high presence of people without jobs and education. Strikingly, Hillesluis scores better than the Rotterdam average for theft, burglary, and violence (Gemeente Rotterdam, 2022b).

Fig 6.3.2: Relocation mobility neighborhoods of Rotterdam in % (By author, based on Gemeente Rotterdam, 2022b)

Building ages & density

Most of the buildings in Hillesluis are built pre-war (fig 6.4.2). In the middle and northern part of Hillesluis some new construction projects have taken place in recent years. Hillesluis has an FSI of 1.0, a GSI of 0.3 and an OSR of 0.7. The high density of Hillesluis is similar to the rest of the comparable residential neighborhoods in Rotterdam South (fig 6.4.1). This leaves relatively little room for densification. However, the average building height of 9 meters is relatively low. There are mostly low-rise buildings in the area. So, a higher density can be achieved through taller buildings.

Buurt	Adressen per ha.	% Bebouwd	Inwoners per ha.	Gem. gebouwhoogte
Carnisse	5023	30%	175	10
Oud-Charlois	3447	18%	43	10
Afrikaanderwijk	5052	26%	194	12
Bloemhof	5933	29%	172	8
Hillesluis	4577	22%	120	9
Tarwewijk	5528	22%	134	11
Vreewijk	3973	20%	68	7

Fig 6.4.1: Density (Timmer & Visser, 2012)

Fig 6.4.2: Building ages

Legend:
- 1995 >
- 1970 - 1995
- 1945 - 1970
- 1920 - 1945
- < 1920

Corporation buildings

Hillesluis has a relatively high amount of corporation houses, with two big clusters in the southern part of Hillesluis (fig. 6.4.4). Almost half of the building stock, 47%, is owned by housing corporations (fig 6.4.3). The biggest part of these houses is owned by Woonstad Rotterdam. Areas owned by corporations can more easily be designated as transformation areas. Because of this, there are opportunities for a bigger-scale transformation at the corporation clusters in the neighborhood.
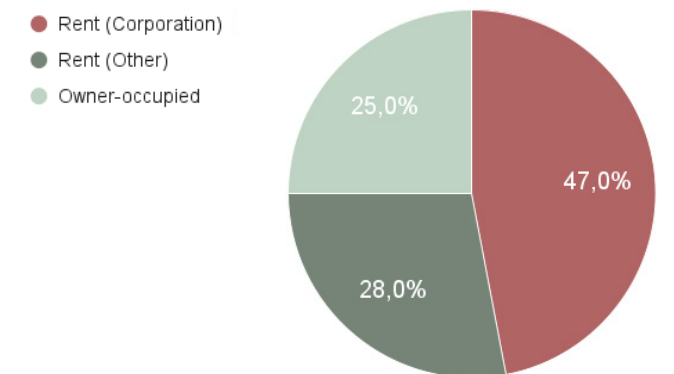

Legend:
- Rent (Corporation)
- Rent (Other)
- Owner-occupied

25,0% / 47,0% / 28,0%

Fig 6.4.3: Housing ownership Hillesluis (Timmer & Visser, 2012)

Fig 6.4.4: Corporation housing

Legend:
- Corporation owner

Creating safe **space**

Typologies

The most common typology in Hillesluis is ''upstairs/downstairs'' (1) housing. 58% of the housing stock consists of this typology. The second most common housing typology is porch housing (2). This means that the housing stock is not diverse. In general, the inhabitants of Hillesluis are less satisfied with the housing in their neighborhood than the average in Rotterdam. Inhabitants are, among other things, not satisfied with the housing size and type (Gemeente Rotterdam, 2022b). Because of this, people are quicker tempted to move to another neighborhood. This has a negative influence on social cohesion.

Legend:
- Gallery housing without elevator
- Stacked housing with elevator
- Single family housing with garden
- Porch housing
- Upstairs/downstairs housing & floor apartments

Pie chart values: 5,0% | 8,0% | 9,0% | 58,0% | 20,0%
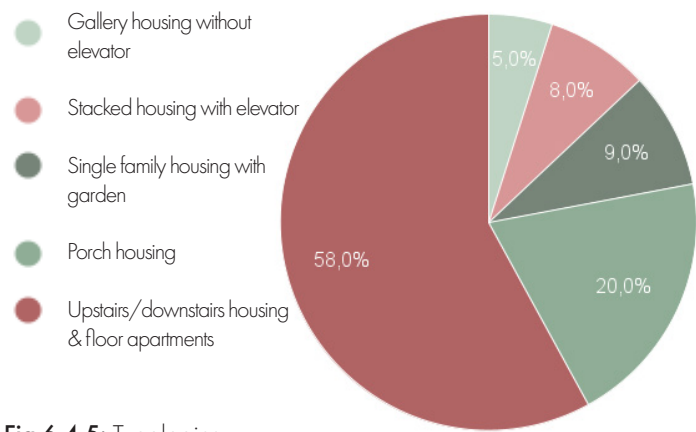
Fig 6.4.5: Typologies

1. Upstairs/downstairs housing (image by author)

2. Porch housing (image by author)

Legend (map):
- Other functions
- Gallery housing without elevator
- Single-family housing with garden
- Porch housing
- Stacked housing with elevator
- Downstairs/upstairs housing & floor apartments

Fig 6.4.6: Typologies

Surface materials

16% Of the area in Hillesluis is occupied by green space. This seems a relatively high percentage compared to the other neighborhoods (fig 6.14), but the Varkenoordsepark gives a wrong impression. There is relatively little green space in the neighborhood itself. Residents also feel that there is too little green space in the neighborhood. Next to that, 24% of the area in Hillesluis is occupied by traffic areas, which is a relatively high amount. So, a lot of improvement can be made in terms of greenery inside the neighborhood.

Squares

There are a lot of squares present in the areas, of different scale levels. The Polderplein for example is a big neighborhood square with a playground and a sports court. The Blokweg has a smaller scale square, focussing on its street. Only in the eastern part of Hillesluis the squares are lacking, so there are opportunities for adding squares here.

Playgrounds & sports courts

In and around a lot of squares in Hillesluis are also playgrounds and small sports courts present. Next to that, there are also a few smaller playgrounds in the streets or on street corners. Same as with the squares, playgrounds and small sports courts are also lacking in the eastern part of Hillesluis.

Fig 6.4.7: Big neighborhood square Polderplein (image by author)

Fig 6.4.8: Small street square Blokweg (image by author)

Buurt	% Water	% Groen	% Verhard	% Publiek groen	Totaal opp (Ha)	% Verkeersterrein
Carnisse	1%	7%	92%	5%	62	3%
Oud-Charlois	10%	22%	68%	18%	149	10%
Afrikaanderwijk	1%	9%	90%	10%	48	9%
Bloemhof	1%	6%	93%	5%	80	4%
Hillesluis	2%	16%	83%	12%	90	24%
Tarwewijk	26%	6%	68%	5%	113	6%
Vreewijk	2%	21%	77%	12%	204	10%

Fig 6.4.9: Surface materials (Timmer & Visser, 2012)

Fig 6.4.10: Public space map

Water
Square
Public green
Sports court
Playground
Collective garden

Amenities

The range of amenities in Hillesluis is one of its strengths. This is mostly due to the Beijerlandselaan, which provides a wide range of stores and restaurants. The average distance to facilities such as a supermarket, catering, healthcare, daycare, and primary school is relatively short (fig 6.15). Residents are generally satisfied with the amenities in the area. There are only too few facilities for the elderly and too few indoor sports facilities (Gemeente Rotterdam, 2022). In addition, a downside is the lack of function mix throughout the whole neighborhood. Besides having many functions at the Beijerlandselaan, the eastern part of Hillesluis is very one-sided in terms of functions. This part is consisting almost entirely of housing. Here is an opportunity for adding more different functions.

Assosiations and community centers

Only one association is located in Hillesluis, the Sportspeeltuin Hillesluis. Next to that, two community centers are located in Hillesluis: Huiskamer Riederkwartier and Huis van de Wijk Hillevliet. So there are relatively few community centers and associations. Residents also feel these are too few. What is striking, is that there are very few assosiations for young adults, which are a big part of the inhabitants of Hillesluis.

1. Sportspeeltuin Hillesluis (image by author)
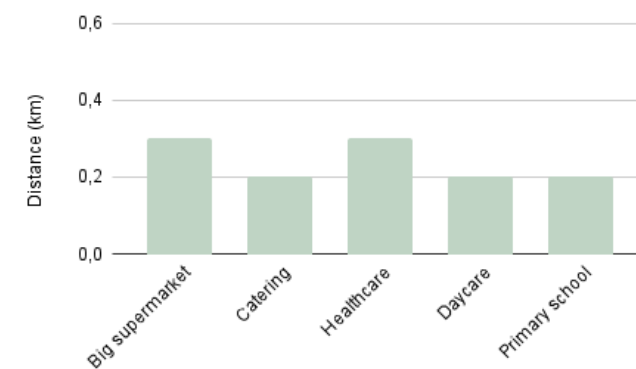
Fig 6.4.11: Distance amenities

2. Huiskamer Riederkwartier (image by author)

3. Huis van de wijk Hillevliet

Other
Residential
Services + residential
Shops + residential

Museum
Daycare
Healthcare
Shops & Catering
Mosque
Church
Education
Community centers & associations
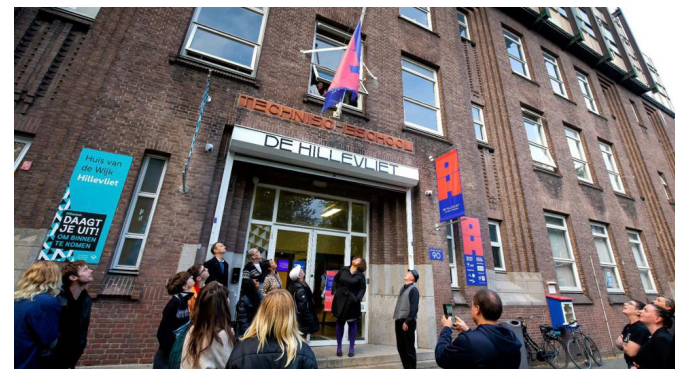
Fig 6.4.12: Functions & amenities

The attractiveness of a neighborhood is difficult to assess because it is a subjective term. An attempt has been made to show the attractiveness of Hillesluis. There will be primarily looked at aesthetic quality and maintenance, which are mentioned in paragraph 4.1.5. A distinction will be made between buildings and public space.

Buildings

There are a lot of outdated buildings in Hillesluis. As mentioned before, a lot of the building stock is built before 1940. Next to that, there are also some empty, neglected buildings. As mentioned before, the northern part of Hillesluis has some new buildings which are well maintained.

The valuation of the residents of Hillesluis about the attractiveness of the buildings in their neighborhood is lower than the avarage of Rotterdam (Gemeente Rotterdam, 2022b). So, improving the housing stock in Hillesluis is desired.
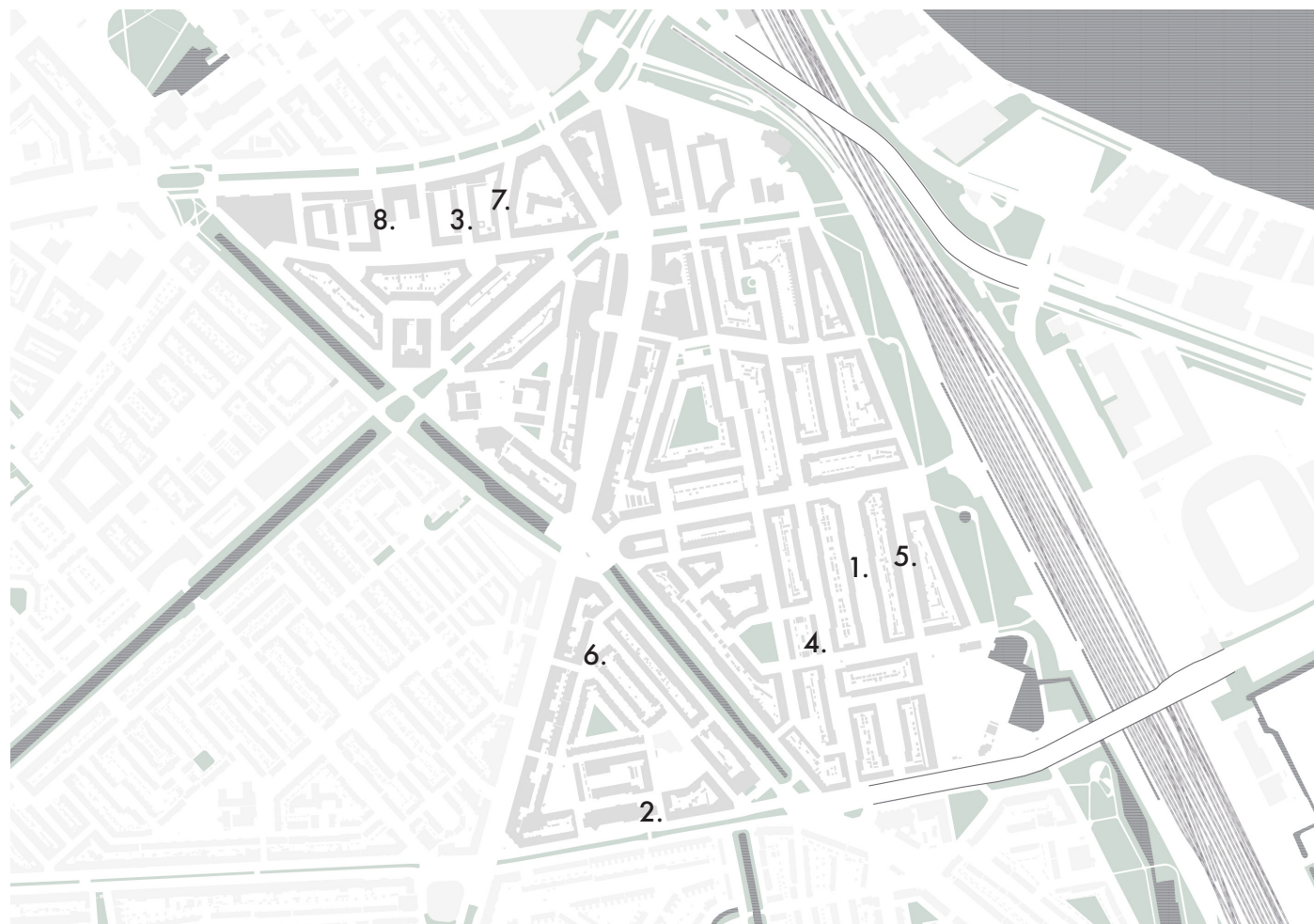
Fig 6.4.13: Map Hillesluis with location of pictures

1. Outdated buildings

2. Empty, neglected buildings

3. New buildings Slaghekstraat

4. New buildings Drentsestraat

5. Outdated buildings

6. Empty, neglected buildings

7. New buildings Putsestraat

8. New buildings Kegelstraat

Public space

The steets in Hillesluis are dominated by cars and contain a lot of pavement . There is almost no green present within the residential streets, only some trees. Greenery is perceived by people to make a neighborhood more attractive in general (Luttik & Zijlstra, 1997). Next to that, there is a lot of small trash on the streets. This make the streetscape of Hillesluis not very attractive.

There are some playgrounds and small sportsfields on the squares in Hillesluis, but the most of these squares are dominated by pavement. This pavement does not make the squares very attractive.

The Varkenoordsepark is the biggest park in Hillesluis. It has a lot of green and a lot of pedestrian paths. It is one of the more attractive places of Hillesluis.

Thus, the Varkenoordsepark is an attractive green part of Hillesluis, but the rest of the neighborhood lacks this-greenery.
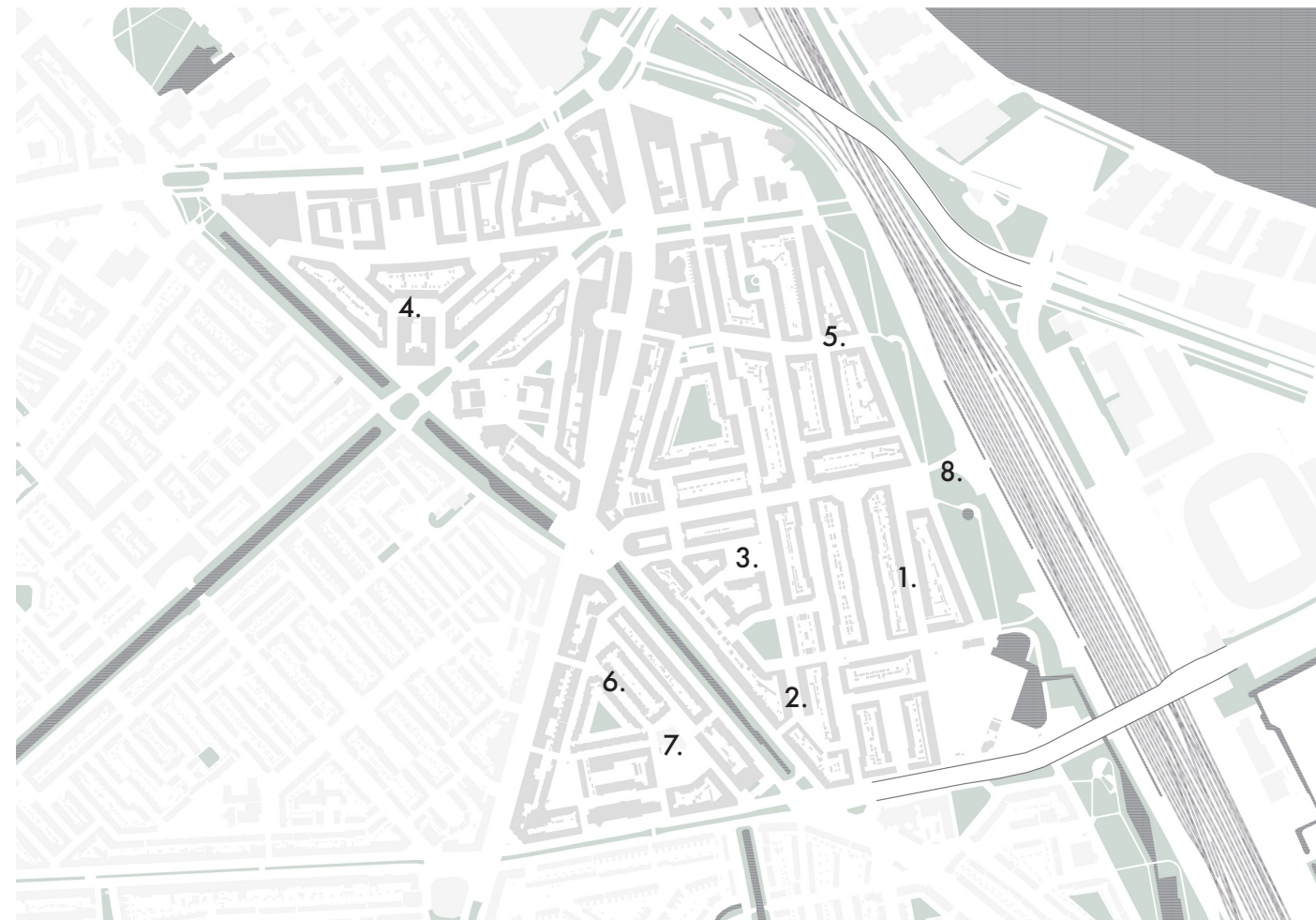
Fig 6.4.14: Map Hillesluis with location of pictures

1. A lot of pavement & car dominance

2. A lot of trash

3. Stichtseplein

4. Kokerstraat new public space

5. A lot of pavement & car dominance

6. A lot of small trash
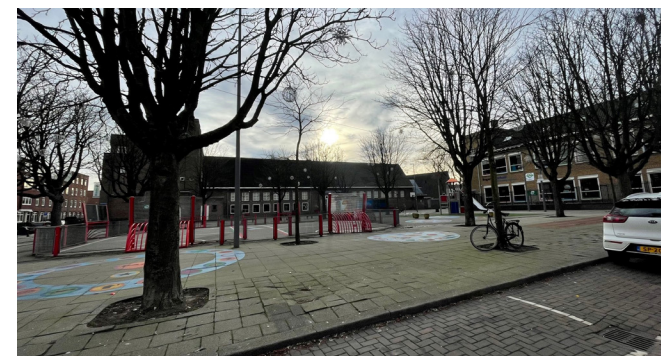
7. Square Janne Bouwensstraat
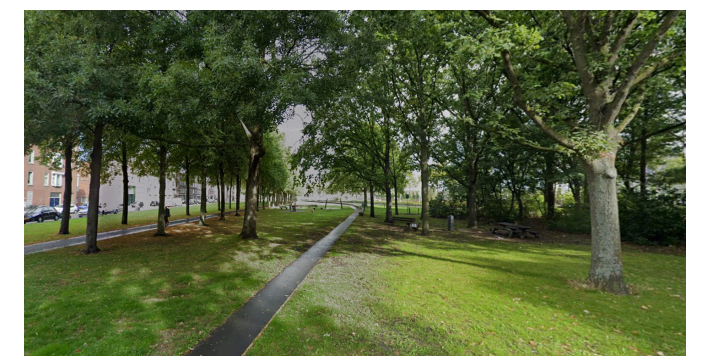
8. Varkenoordsepark

6.4 Physical analysis

6.4.5 Connectivity

Connectivity is about the different kinds of infrastructural connections to surrounding neighborhoods and the rest of the city (paragraph 4.1.5). This paragraph will focus on public transport and slow traffic, because Hillesluis is a car oriënted neighborhood. Almost every place in the district is accessible by car (appendix 11.3).

Public transport

Hillesluis has a tram network running through the neighborhood. The nearest NS station is Rotterdam Zuid. When traveling by public transportation from Hillesluis to Rotterdam Central Station, the quickest option is to go with the tram towards the metro network. Another option is to walk to station Rotterdam Zuid and take the train to Rotterdam Central Station. The travel time from Hillesluis to Rotterdam Central Station is between 25 and 30 minutes, which is relatively long.

400 meters is considered the maximum acceptable walking distance to a public transport stop (OVPro, 2021). The eastern part of Hillesluis is further away than 400 meters from a public transport stop (Fig 6.20). So in terms of connectivity in public transport, there is room for improvement.

Slow traffic

The heatmaps of the cyclists and pedestrians show that the slow traffic is primarily using the north-south connections in the area. East-west connections are barely used. A reason for this could be the big barrier of the train track on the eastern side of Hillesluis.
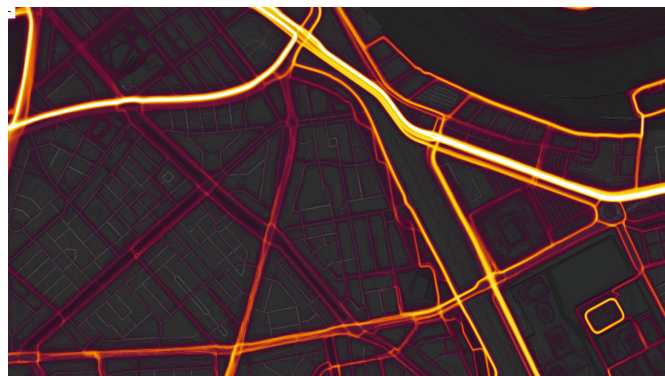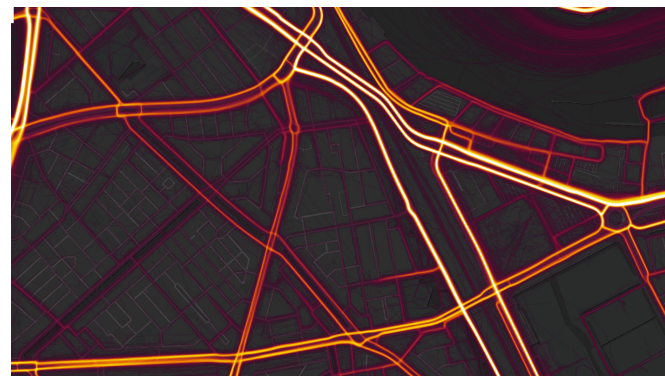

Fig 6.4.15: Heatmap pedestrians (Strava)
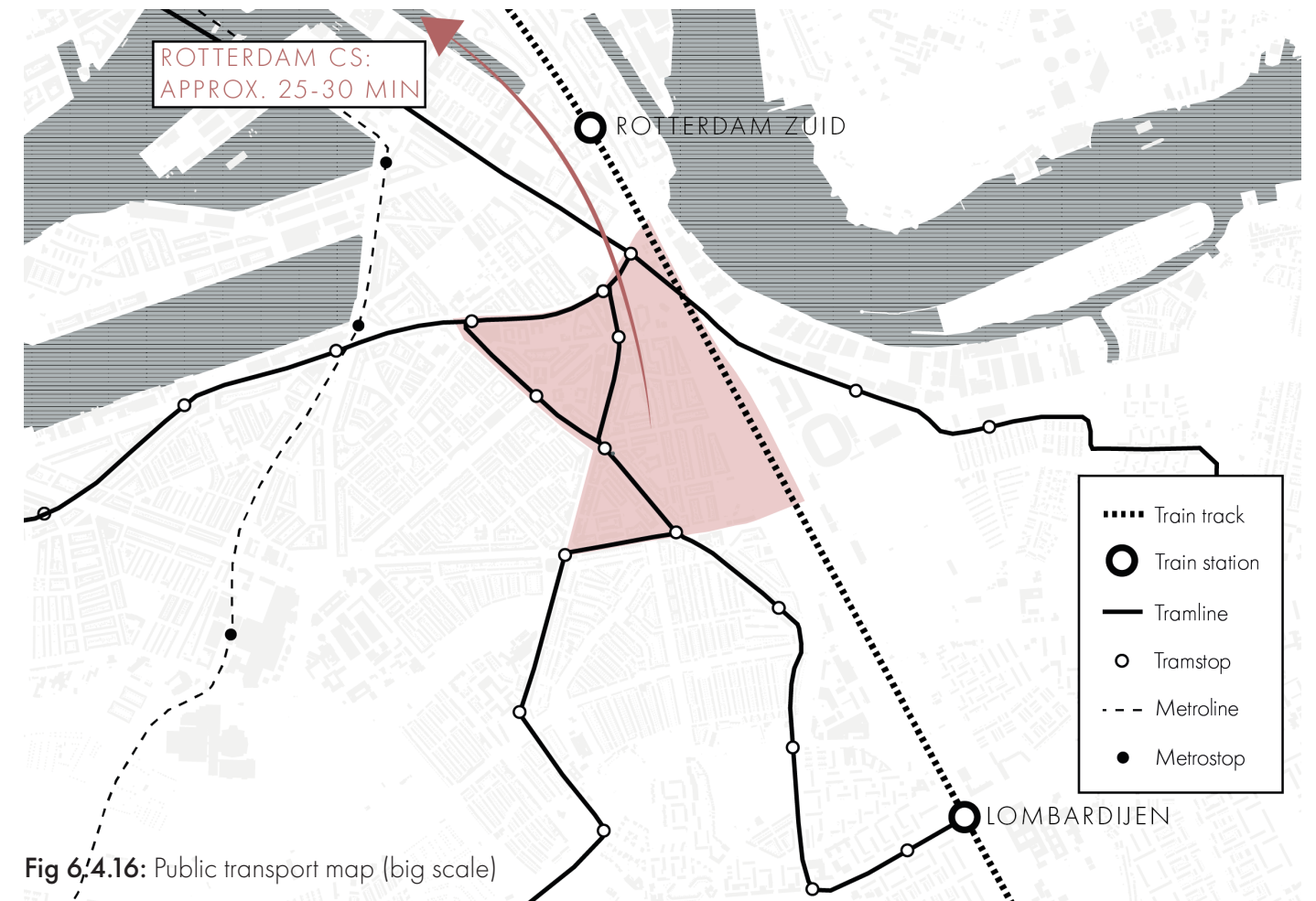

Fig 6.4.16: Heatmap cyclists (Strava)

Fig 6.4.16: Public transport map (big scale)

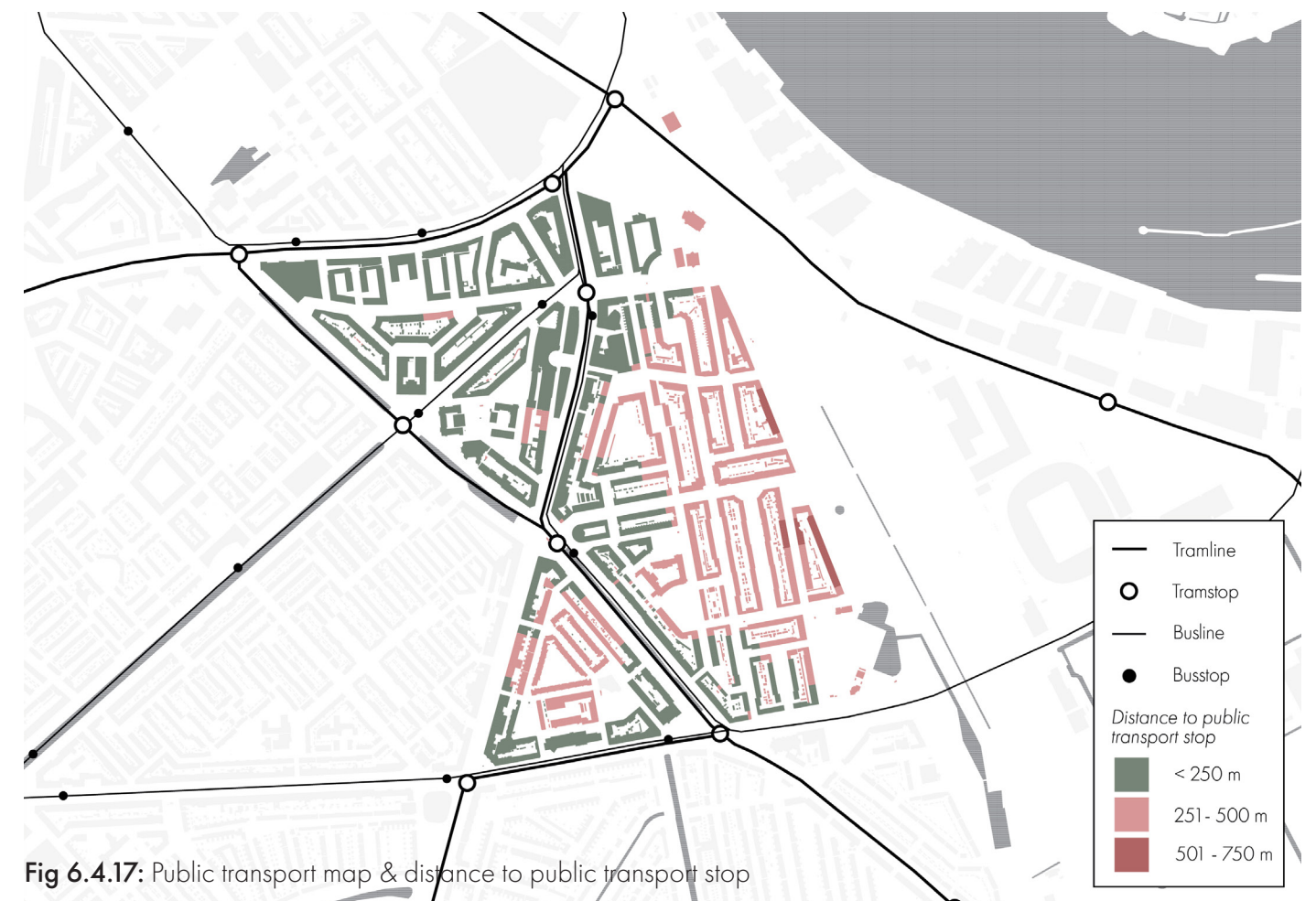Fig 6.4.17: Public transport map & distance to public transport stop

According to paragraph 4.1.5, accessibility is about the ability to get somewhere. The focus here will be on analyzing the spatial integration and barriers of Hillesluis.

Spatial integration

Fig 6.4.18 shows the spatial integration of streets in Hillesluis. The Hillevliet is the most integrated street. This is the busiest infrastructural axis in the area. In addition, the Polderlaan and Beijerlandselaan are also well-integrated streets. Some streets can be pointed out that do not have a high spatial integration. These are Brabantsestraat, Riederlaan and Immobilialaan. So, in these streets, car traffic is not necessary.

Barriers

Besides its important infrastructural function, the Hillevliet also forms a barrier for pedestrians. There are only two places where the Hillevliet can be crossed. These places are two busy, car-oriented intersections. Another road with few options to cross is the Bree, which also has very few options to cross. The biggest barrier in the area is the train track located on the eastern side of Hillesluis. These train tracks can only be crossed on the north side, at the busy Roseknoop, and on the south side of the area. Reducing all these barriers can help improve the accessibility of Hillesluis.

1. Hillevliet

2. Bree

3. Train tracks next to Varkenoordsepark

4. Roseknoop

Fig 6.4.18: Spatial inegration of streets

Fig 6.4.19: Barriers

Visibility contributes to natural surveillance and a feeling of safety in a neighborhood. Functionmix, frontdoors and sightlines are important factors for visibility (paragraph 4.1.5).

Function mix

The degree of function mix is important for the activity of people throughout the day on the street. Hillesluis has a mix of functions along Beijerlandselaan and in the northwestern part of the area. In the eastern part of Hillesluis, there is no mix of functions, here there are only residential buildings. The Varkenoordsepark only has buildings on the western side of it and has no diversity of functions next to it. This causes the park to have a lack of eyes on the street during the night.

Frontdoors

Front doors of residential buildings are important for eyes on the street. Hillesluis has a few places where the visibility because of the lack of front doors is bad. The Polderplein (1) and the Stichtseplein (2) are squares with a lack of front doors. A part of the building stock of Hillesluis consists of porch housing. In porch houses, no front doors are facing the street. An area in the Riederbuurt Zuid (3) is consisting of these porch houses. The Varkenoordsepark also has a lack of eyes on the street because it has only buildings on the western side of it. The eastern side is next to the train track and has less activity, which is negative for visibility.

Fig 6.4.20: Function mix

Legend:
- Other
- Residential
- Services + residential
- Shops + residential

Fig 6.4.21: Frontdoors

Legend:
- Building with housing
- Other functions
- Front doors
- Shops at ground floor
- Porches
- Entrance flats / apartments

Sightlines

Because of the orthogonal street pattern in Hillesluis with long streets, there are a lot of long sightlines of more than 100 meters (fig 6.4.23) which are good for the visibility in the area.
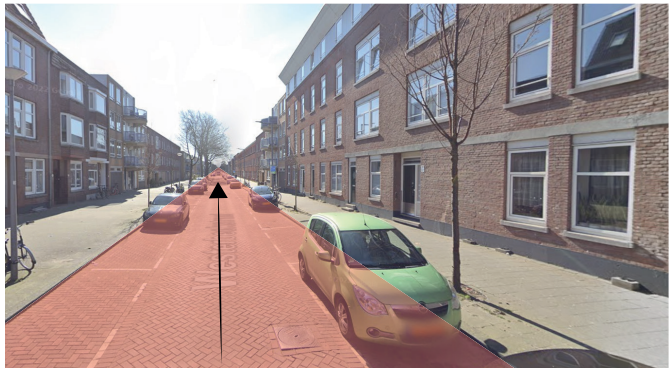

Fig 6.4.22: Long sightline

Fig 6.4.23: Sightlines

Sightlines shorter than 100m
Sightlines longer than 100m

Parking spots

In Hillesluis there is a lot of car parking in the streets (fig 6.4.25). These cars can have a bad influence on the visibility in streets (fig 6.4.24). Reducing the many street-level parking spaces present in Hillesluis will help with visibility.

Fig 6.4.24: Cars bad for visibility
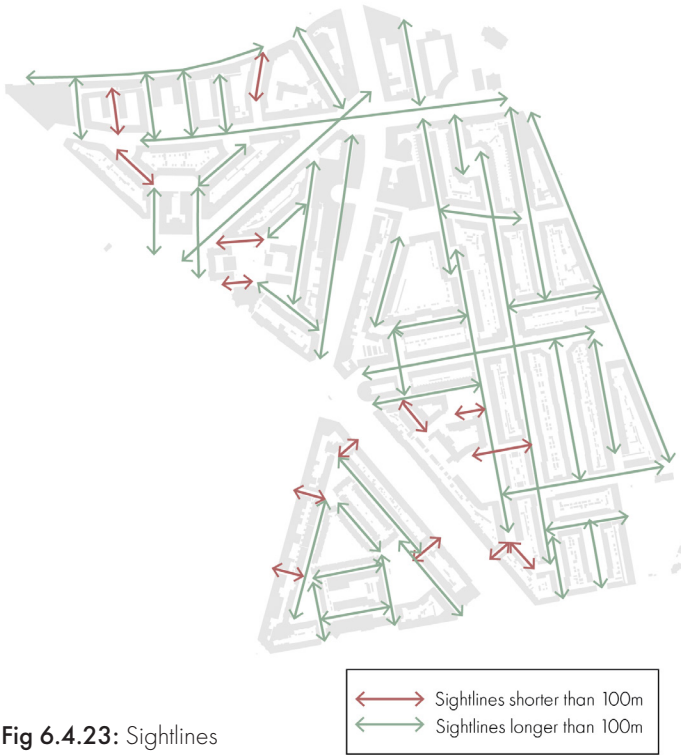
Fig 6.4.25: Parking spaces

Varkenoordsepark

As indicated on pages 74 en 75, the Varkenoordsepark has a lack of front doors and functions, which has a negative influence on visibility. Figure 6.4.26 shows the situation in terms of trees, with views from the residential buildings next to it. The southern part of the Varkenoordsepark has a high density of low trees which blocks the sight. There is a bad visibility around the Stadionviaduct. The northern part of the Varkenoordsepark has a lower density of higher trees which causes better visibility here.

Fig 6.4.26: Zoomed in map Varkenoordsepark

1.

2.

3.

A clear division of which space belongs to who contributes to the feeling of responsibility and safety (paragraph 4.1.5). The transition between public and private space playes an important role here (van Dorst, 2005).

Sidewalks & transition public private

Hillesluis has a lot of sidewalks wider than 3m (fig 6.4.27). A lot of these sidewalks are very empty and there is no clear definition of public space. People park their bikes against trees and facades. Next to that, there are very few front gardens in Hillesluis. The front gardens that do exist are often very anonymous and used for parking bicycles. In only a few places are there small front gardens, called hybrid zones, that soften the transition between public and private. Thus, territoriality in terms of sidewalks and front yards in Hillesluis is generally poorly stated and there is a lot of room for improvement here.
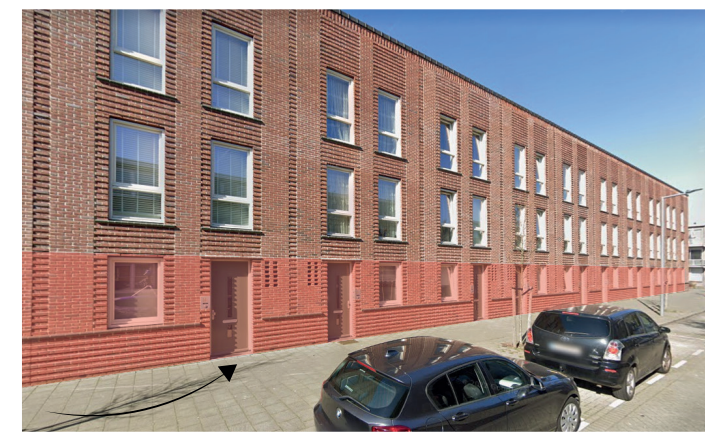

1. Big sidewalks with no territoriality

1. Small frontgardens: hybrid zone

3. Anonymous frontgardens: used for bicycle parking

2. Big frontgardens

4. No frontgardens: hard transition public-private

Sidewalk wider than 3m

Fig 6.4.27: Sidewalk wider than 3m

Frontgardens
Small frontgardens (hybrid zone)

Fig 6.4.28: Frontgardens

6.5 Conclusions

Several important conclusions can be drawn from the analysis. The physical analysis is particularly interesting and this will be discussed in more detail. The conclusions from the background, individual analysis, and social analysis will be given briefly.

6.5.1 Background

Hillesluis was formed in the early 19th century and has been a working-class neighborhood from the beginning. Hillesluis has a lot of narrow streets, which are the result of the old polderlandscape. A lot of streets are still following this polder landscape pattern. The morphology of Hillesluis consists of long lines with inner areas, the smaller neighborhoods in Hillesluis. There are many squares in these smaller neighborhoods.

East of Hillesluis, two big plans are taken into account in this thesis. These are the Nieuwe Oeververbinding and the urban development around the Kuip.

6.5.2 Individual analysis

A relatively large number of young people live in Hillesluis, and 83.7% of the population are immigrants. In addition, many people live in Hillesluis who do not have jobs or do not go to school. Education levels and income levels are low in the neighborhood. All these individual characterisics can be one of the reasons for the criminality and perceived unsafety in the area.

6.5.3 Social analysis

In Hillesluis, social cohesion is perceived as poor by residents. There is also a high relocation mobility. These two aspects have a negative influence on perceived safety. In terms of crime, it is striking that Hillesluis scores poorly only on vandalism and nuisance. An explanation for this could be the large number of young people and the large number of people without jobs or education in the neighborhood.

6.5.1 Physical analysis

Buildings

In terms of buildings, Hillesluis has a very one-sided housing supply. There are a lot of the same typologies, mostly upstairs/downstairs housing. Because of this, people can not move to a bigger house in their neighborhood and are quicker tempted to move to another neighborhood. This has a negative influence on social cohesion. Also, a lot of the housing (47%) is owned by corporations, especially in the southern part of Hillesluis, which offers possibilities for transformation.

Public space

Regarding public space, there is very little greenery inside the neighborhood. Only the Varkenoordsepark is a very big green structure, but only this park is not enough. Next to that, Hillesluis has a lot of squares, playgrounds, and sports fields which are good for interaction and social cohesion. Only the eastern part of Hillesluis is lacking these kinds of public spaces.

Amenities

In general, the amenity network of Hillesluis is one of its strengths. This is mainly because of the Beijerlandselaan. However, some amenity types are currently lacking in the area. There are very few amenities for the elderly, few indoor sports facilities, and few community centers. What is striking, is that there are very few amenities for young adults, which is a big part of Hillesluis.

6.5.4 Attractivity

In terms of attractivity, there are a lot of outdated buildings in Hillesluis, especially in the southern part. Next to that, there is a lot of trash on the streets and there is a lot of trash on the streets and there is bad maintenance of public space. The big amount of pavement and the high amount of cars in Hillesluis also have a negative influence on the attractivity.

Connectivity

The public transport connection from Hillesluis to Rotterdam Central Station is relatively bad. It takes between 25-30 minutes on average to get from Hillesluis to Rotterdam Central Station. Also, some buildings in the eastern part of Hillesluis are more than 400 meters away from the closest public transport stop.

Accessibility

Hillesluis has many barriers surrounding the neighborhood. Because of this, Hillesluis is not well connected to its surroundings. The Hillevliet and Bree are acting as barriers because they have very few options to cross. The biggest barrier is the train track at the eastern part of Hillesluis, next to the Varkenoordsepark. Hillesluis also has a few streets which are spatially not integrated into the street pattern. No car traffic is required on these streets.

Visibility

Visibility in Hillesluis is poor in some places. First, there is no function mix in the eastern part of Hillesluis, which is bad for visibility. In addition, the Polderplein and Stichtseplein are squares with poor visibility because there are no front doors located at the square. There are many long sight lines in the area which is good for visibility. However, the many cars parked in the area reduce visibility. Finally, the Varkenoordsepark is a place that is not a through route and where there is no mix of functions. Also, the southern part of Varkenoord Park has many dense trees and shrubs. Thus, in the Varkenoordsepark, visibility is also poor.

Territoriality

The territoriality of public space in Hillesluis is bad in general. There are a lot of big and empty sidewalks, with no functions. Next to this, there are a lot of places with no front gardens. In this way, there is a hard transition between public and private and people can not control interactions. In that do have front gardens, the gardens often are big and anonymous and are used for bicycle parking.

07

Pattern language

This chapter will explain the used pattern language method. After this, an overview of all the patterns is shown. Below there is a QR code that leads to the pattern atlas, where all the patterns are individually explained.

The following research questions will be answered in this chapter:

SQ4: *What kinds of **spatial interventions** can improve **livability** and **safety** in a neighborhood?*

Pattern atlas

Dennis Groen

MSc thesis

June 2023

Creating safe space
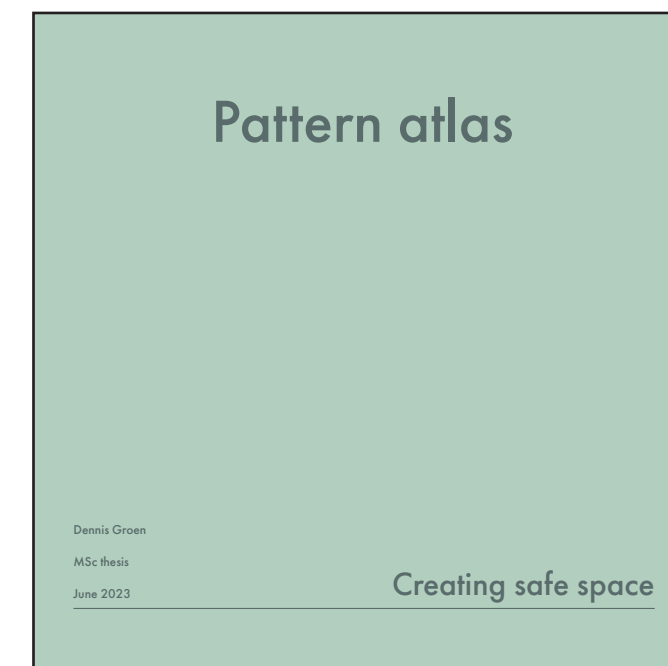
7.1 Introduction

Pattern language is a tool that can help with design interventions, created by Christopher Alexander (1979). Pattern language can be designed in different ways, but the essence is to provide solutions with a theoretical foundation (van Dorst, 2005).

In the related pattern atlas, a pattern (fig 7.1) consists of a short title (A) and a corresponding hypothesis (B). Each pattern has an icon (D) and a reference image (C) which provides a spatial image of the pattern. Each pattern is based on literature with a theoretical backup (E). In addition, the practical implication (G) is shown, with further explanation. The relationship with other patterns is also shown (F). Finally, each pattern has a score (H) regarding the aspects that contribute to a safe design: attractivity, connectivity, accessibility, visibility, and territoriality. In addition, social cohesion has also been added, since some patterns are primarily socially related rather than spatially related.

In this thesis, the pattern language is used to bridge the gap between research and design. The patterns in the related atlas are reflected in the design locations. As a result, most of the design interventions in the related thesis are underpinned by literature. An overview of the patterns is shown at the page on the right.

A   Title

B   Hypothesis

C   Reference image

D   Icon

E   Theoretical backup

F   Relation to other patterns

G   Practical implication

H   Score

City scale

- 01 Public transport network
- 02 Connect

Neighborhood scale

- 03 Participate
- 04 Bicycle network
- 05 Sports facilities
- 06 Diversify typologies
- 07 Versatile functions
- 08 Reducing car usage
- 09 Activating the waterfront
- 10 Squares
- 11 Community centers
- 12 Youth centers
- 13 Community garden

Block / street scale

- 14 Safe crossings
- 15 Active street
- 16 Clean it up
- 17 Greenify streetscape

Object scale

- 18 Eyes on the street
- 19 Transition public-private
- 20 Natural territoriality
- 21 Lighting
- 22 Permeable pavement
- 23 Seating space

A B C D E F G H

15 Transition public-private

A less harsh transition between public and private will provide more social control.

Reference: Kersbergenstraat, Delft (own image).

Theoretical backup

The transition between public and private can be softened by a small semi-open front yard, also called a hybrid zone. In this small area in front of the house, the resident can choose whether he or she feels the need to meet or not. Because the resident can control this, it creates a safer feeling (van Dorst, 2005). When this transition is very hard and the sidewalk is right next to the facade, people are also more likely to cover the windows (Blom & van Soomeren, 2015).

Practical implication

A front garden as a transition zone between private and public will contribute to social control. In addition, the streetscape will be less anonymous because people can control what their front garden looks like.

Relation to other patterns

- 04 Reducing car usage
- 09 Diversify typologies
- 11 Eyes on the street
- 16 Natural territoriality

Score

Social cohesion	●●●○○○○
Attractivity	●●○○○○○
Connectivity	○○○○○○○
Accessibility	○○○○○○○
Visibility	●●●○○○○
Territoriality	●●●●●○○

Fig. 7.1: Pattern example (By author)

Creating safe space

7.2 Pattern field

All the patterns of the pattern language can be organized by the extent of which they are concrete or abstract. Next to that, the different patterns are operating on different scale levels. These two distinctions can be seen on the two axes in fig 7.2.
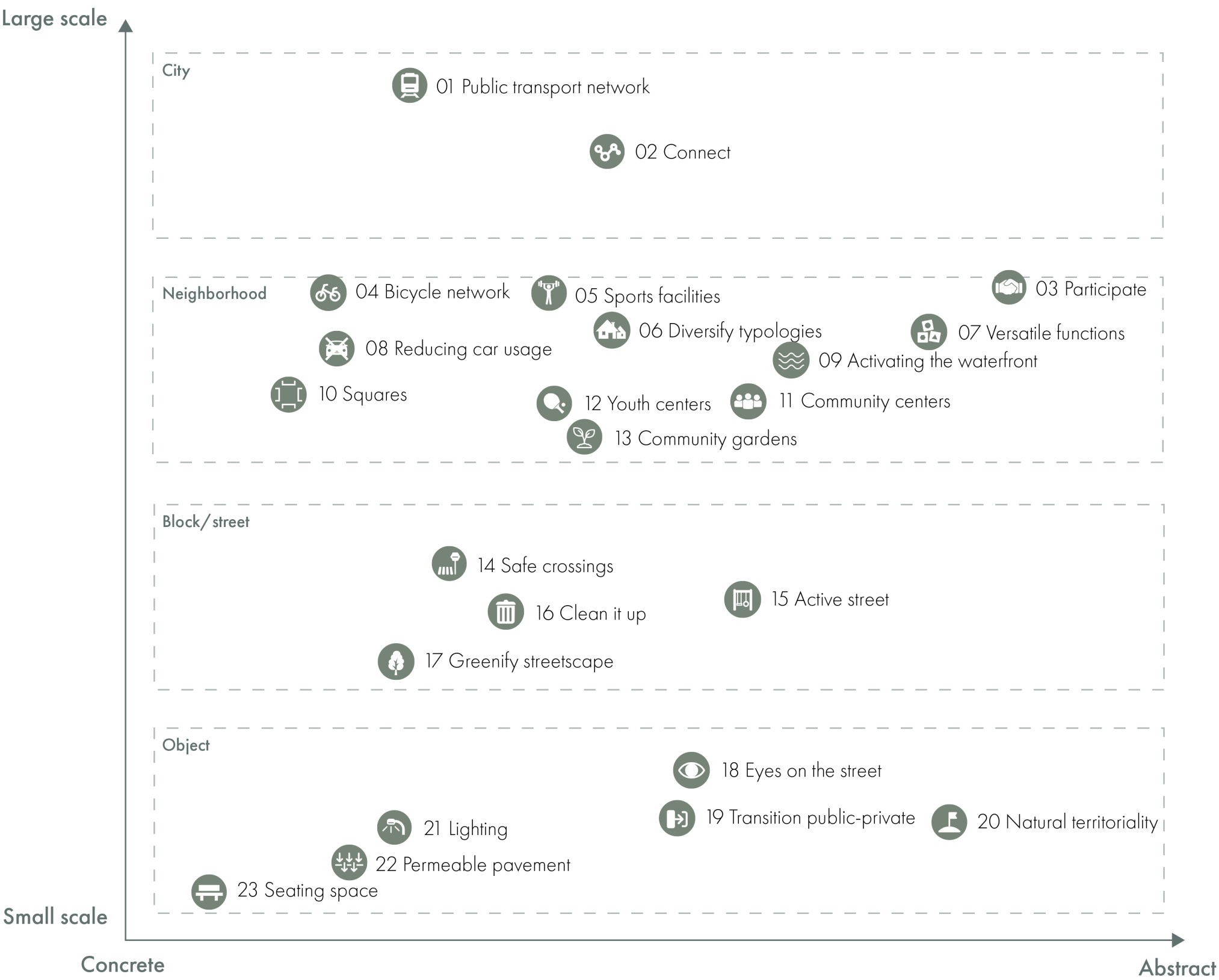
Large scale

City
01 Public transport network
02 Connect

Neighborhood
04 Bicycle network
05 Sports facilities
03 Participate
06 Diversify typologies
07 Versatile functions
08 Reducing car usage
09 Activating the waterfront
10 Squares
12 Youth centers
11 Community centers
13 Community gardens

Block/street
14 Safe crossings
15 Active street
16 Clean it up
17 Greenify streetscape

Object
18 Eyes on the street
21 Lighting
19 Transition public-private
20 Natural territoriality
22 Permeable pavement
23 Seating space

Small scale

Concrete .... **Abstract**

Fig 7.2: Pattern field

08

Design

The design chapter will first show five locations coming from the survey and the analysis which are in need of a new design to improve safety or livability. For two locations, the Stadionviaduct and the Riederbuurt Zuid, are more detailed design will be made.

The following research questions will be answered in this chapter:

SQ4: *What kinds of* **spatial interventions** *can improve* **livability** *and* **safety** *in a neighborhood?*

8.1 Vision

In the vision, it is important to take the future existing plans into account. These plans are a redevelopment area around the Kuip Stadium on the other side of the train track and a new connection to the other side of the Maas, the Nieuwe Oeververbinding.

These plans need to be exploited by making new pedestrian bridges over the current train track. In this way, Hillesluis will be better connected to its surroundings. These pedestrian bridges will also connect to a new NS Station. This new station will reduce the travel time by public transport from Hillesluis from 25-30 minutes to about 15 minutes. In addition, this new NS Station will also mean that all buildings in Hillesluis will be less than 400 meters from a public transportation stop. Another reason for adding pedestrian bridges over the tracks and adding the new NS station is to make Varkenoord Park more lively. This way, the Varkenoord park will be part of a route and thus there will be more activity, improving its visibility.

The barrier of the Hillevliet will also need to be reduced by adding pedestrian bridges. These bridges will ensure that pedestrians are no longer forced to cross over the two busy, car-oriented intersections. This also better connects Hillesluis to its surroundings.

Visibility at Stichtseplein and Stadion Viaduct will need to be improved. These are locations where community centers should be added, something that is currently lacking in the neighborhood.

Finally, Riederbuurt Zuid is a place in need of improvement. This location contains porch homes owned by a housing corporation. These porch houses are outdated and have poor visibility on the streets due to the lack of front doors. In addition, there is no square present in this part of Hillesluis, but anonymous street patterns with little quality in the outdoor space which is bad for social cohesion in the neighborhood.
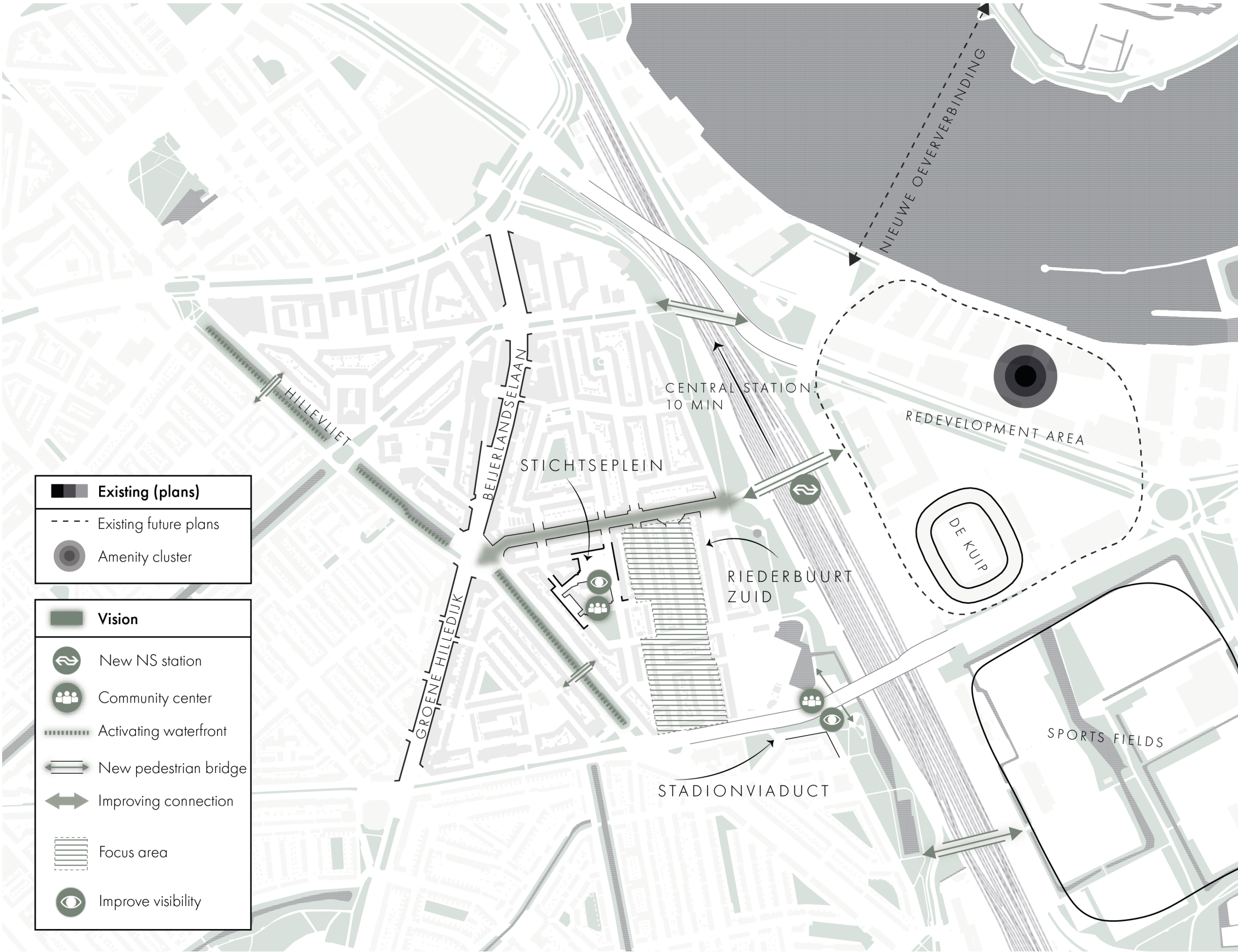
Fig 8.1: Visionmap

8.2 Design locations

Five locations will be researched further and their type of unsafety and tasks will be identified. For two locations, the Stadionviaduct and the Riederbuurt Zuid, are more detailed design will be made. For the Riederbuurt Zuid, two variants will be made. One variant will focus on the current buildings, and 1 variant will focus on rebuilding. In fig 8.2, the different goals per design location are shown. It is also reflected which kind of safety is involved per location. Locations with objective safety are derived from the spatial analysis. Locations with subjective safety are derived from the interviews and survey. Three locations are derived from both the spatial analysis as the survey and interviews and are thus both subjective and objective.

1. PEDESTRIAN BRIDGES

3. STICHTSEPLEIN

2. HILLEVLIET

5. RIEDERBUURT ZUID

4. STADIONVIADUCT

Location	Goal	Safety
1. Pedestrian bridges:	Connecting	Objective
2. Hillevliet:	Connecting	Objective + subjective
3. Stichtseplein:	Reducing nuisance	Subjective
4. Stadionviaduct:	Connecting + Reducing nuisance	Objective + subjective
5. Riederbuurt Zuid:	Improving housing supply & public space	Objective + subjective

Fig 8.2: Design locations

8.3 Pedestrian bridges

8.3.1 Current situation

Currently, the train tracks are forming a big barrier at the eastern part of Hillesluis. There is a length of 1.2 kilometer which can't be crossed. When people want to walk from the middle of Hillesluis to the amenity cluster at the other side of the train track, it is currently a 25 minute walk. The train track need to be crossed using the Varkenoordseviaduct or Stadionviaduct, which are car oriented bridges. The closest option to cross the train track at the southern side of the Stadionviaduct is a pedestrian and cyclist tunnel, which is located 580 meters further away.

Next to the train track, the Varkenoordsepark is situated. The Varkenoordsepark is a big green area, but does not have a lot of public functions in it. The Varkenoordsepark is not part of a route, only a destination for recreational people. This can cause the Varkenoordsepark to be deserted at night.

Task

Making new connections to connect Hillesluis to other side of the train tracks. In this way also attract more people in the Varkenoordsepark and improving its visibility.

CAR ORIENTED BRIDGES

1. Varkenoordseviaduct

Type of unsafety

In this location, there is an objective safety, because it is only based on the spatial analysis and not on the residents' perspective. Next to this, physical safety is the case in this location. There is no visibility because the Varkenoordsepark is not part of a route and there are no options to cross the train tracks. In terms of public space, there are no activities in the Varkenoordsepark, which has a negative influence on the eyes on the street.

Fig 8.3.1: Current situation (image by author)
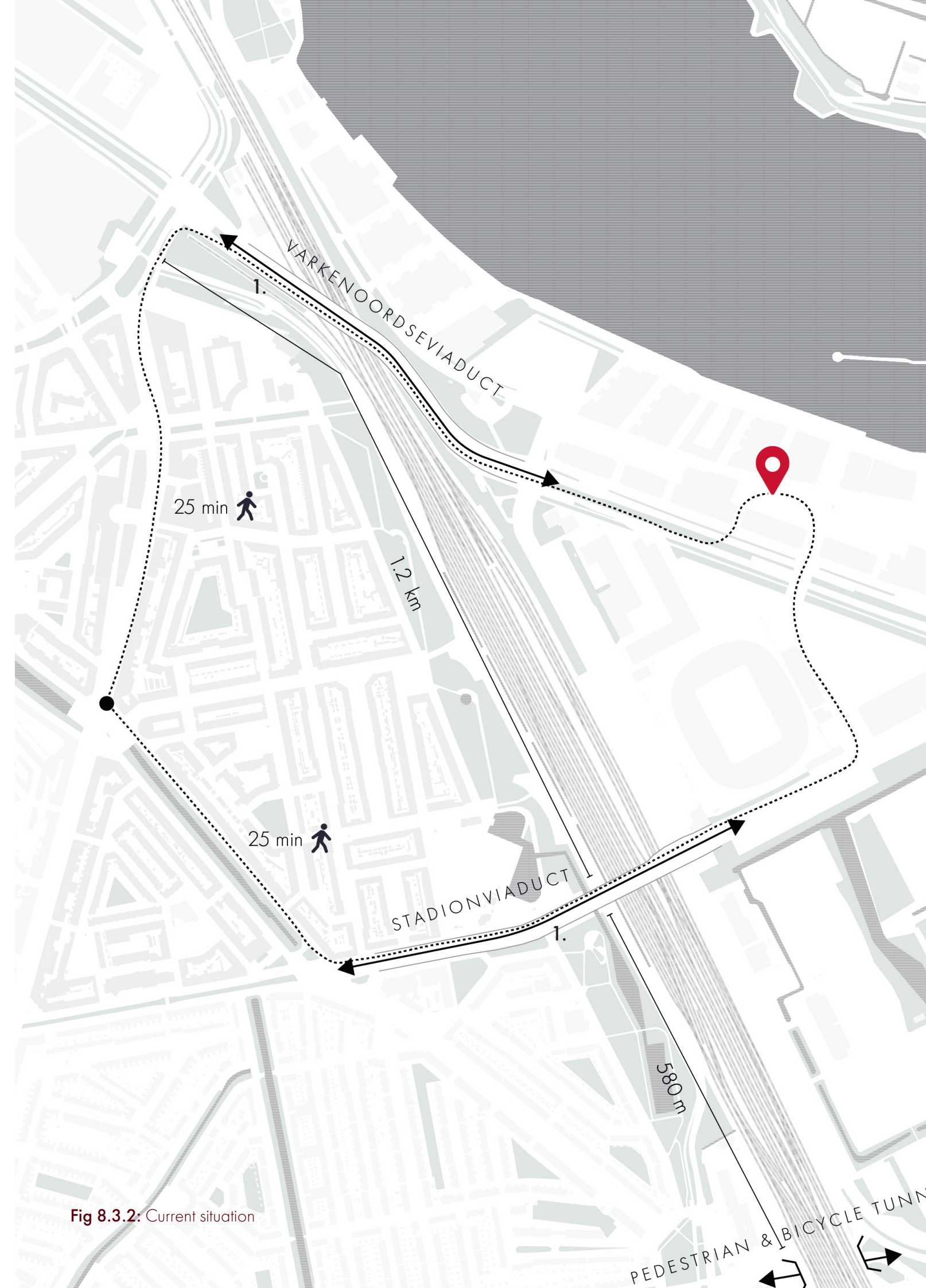
Fig 8.3.2: Current situation

8.3 Pedestrian bridges

8.3.2 New situation

By adding three new pedestrian bridges, Hillesluis will be better connected to it's surroundings. The distances between the crossing options will be shortened from 1.2 kilomter to between 250 and 440 meters. The northern bridge will connect the northern part of Hillesluis to the Nieuwe Oeververbinding and the redevelopment area. The middle pedestrian bridge will be situated in the extension of the Riederlaan and will connect to the new NS Station and the redevelopment area. This will shorten the travel time from Hillesluis to Rotterdam Central Station. The southern bridge will on a bigger scale connect Hillesluis to the existing sports fields, which are lacking in the neighborhood itself.

The greenery of Varkenoordsepark can be extended onto the pedestrian bridges. This allows the bridges to match the green look of the park. In addition, public functions can be added on a small scale at the foot of the park. This will provide more eyes on the street throughout the day. Next to this, cyclists can walk with their bikes over the bridge. Because of the height, it is not possible to bike up the bridge, because this will require a very large ramp.

The new connections to the other side of the train tracks also have a few downsides for the residents. This way, there will be connections to the area around De Kuip Stadium. Because of this, more supporters will use parking in the neighborhood and walk through the neighborhood around match days. However, there is a match about once every two weeks. The advantages of the new connection outweigh this disadvantage. There could be other solutions here such as making parking more expensive for non-residents during game days. Another downside of attracting more people to the Varkenoordsepark is that the park becomes less of a quiet green space. However, also here the benefits in terms of eyes on the street and connection outweigh the benefits.

Fig 8.3.3: Current situation (image by author)

- Public transport network
- Connect
- Versatile functions
- Squares
- Eyes on the street
- Lighting
- Seating space

NIEUWE OEVERVERBINDING

440 m

350 m

13 min

400 m

REDEVELOPMENT AREA

330 m

250 m

SPORTS FIELDS
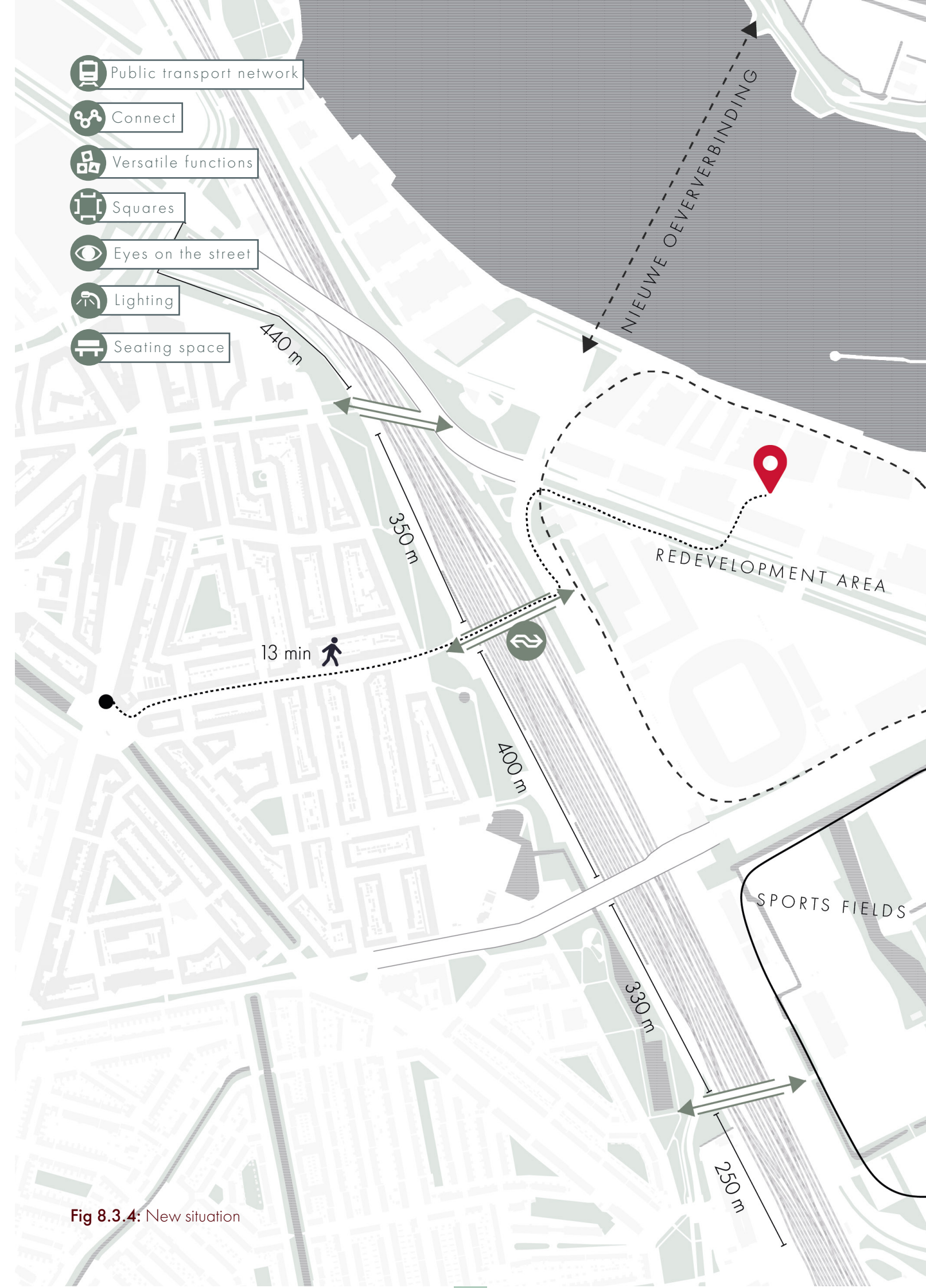
Fig 8.3.4: New situation

8.4 Hillevliet

8.4.1 Current situation

Currently, the crossing options have a distance of between 225 and 355 meters between it. The only options to cross the Hillevliet is by using busy, car oriented intersections. Walking next to the Hillevliet is only possible next to the buildings, the waterfront is not accessible. Because the size and location (2) of the sidewalk, the pedestrian routing can be perceived as not attractive. Next to that, the Hillevliet is a very busy infrastructural route. According to the spatial analysis, the Hillevliet is the most integrated street of Hillesluis.

Type of unsafety

At the Hillevliet, there is both objective and subjective safety. The barrier effect of the Hillevliet came out of the spatial analysis. In addition, some residents perceive the Hillevliet as negative (fig 8.4.6). In addition, there is physical unsafety in various forms. These are traffic unsafety and low qualitative public space because there are no options to cross. This has a negative influence on the activity and eyes on the street.

Task

Making new pedestrian bridges to connect Hillesluis better to surroundings and reduce stress on busy intersections. Also making more attractive pedestrian routes by making the waterfront accessible.

1. Intersection Beijerlandselaan

FORCED TO CROSS HILLEVLIET BY BUSY INTERSECTION

SIDEWALK SEPERATED FROM WATER
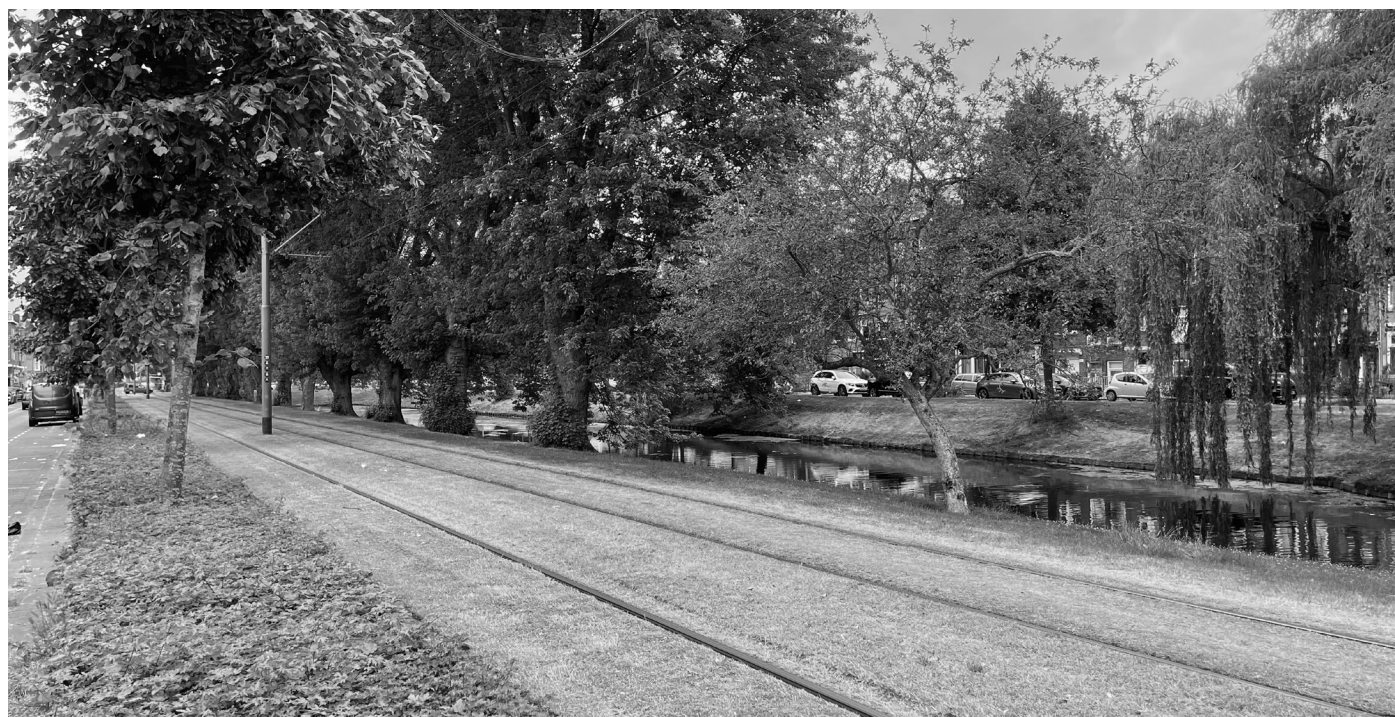
2. Hillevliet

Fig 8.4.1: Current situation (image by author)

Name: Anonymous (nr. 1)
Gender: Man
Age: 62
Origin: Turkish

''I avoid the Hillevliet because it is a very busy road.''

Name: Anonymous (nr. 6)
Gender: Man
Age: 23
Origin: Dutch

''I avoid the busy intersection at the Hillevliet.''

Name: Anonymous (nr. 5)
Gender: Man
Age: 38
Origin: Turkish

''I consider the Hillevliet as one of the lesser parts of Hillesluis.''

Fig 8.4.2: Perception of inhabitants (conducted from survey)

Fig 8.4.3: Map Hillevliet current situation

3.0	2.0	4.7	2.0	16.0	13.0	7.0	2.0	4.7	2.0	3.0	3.0
Sidewalk	Parking	Street	Parking	Tram + Waterfront (Not accessible)	Water	Waterfront (Not accessible)		Street	Parking	Sidewalk	Frontgarden
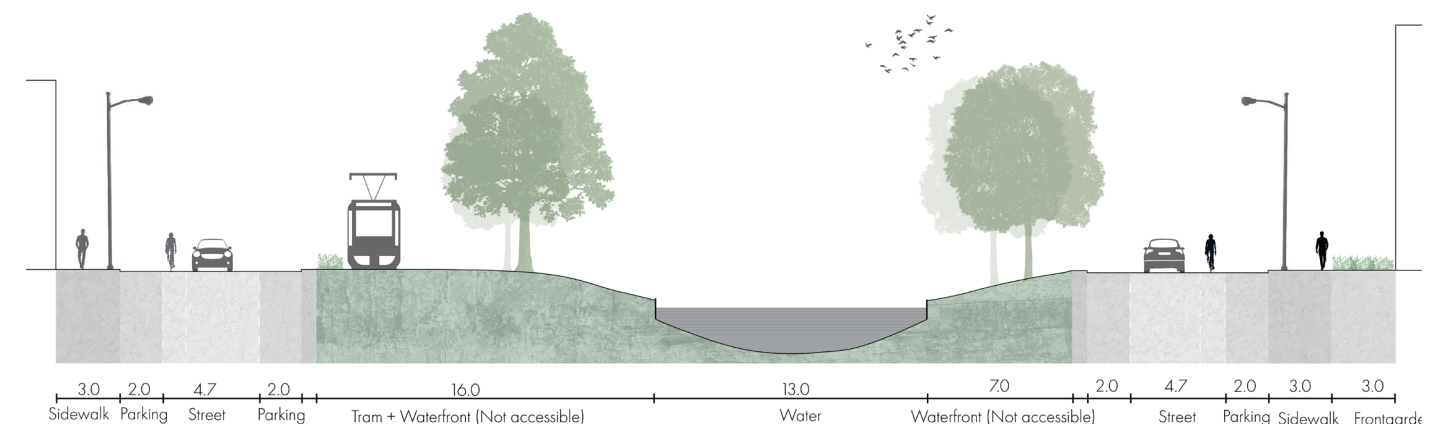
Fig 8.4.4: Section A: Hillevliet current situation

8.4 Hillevliet

8.4.2 New situation

New pedestrian bridges can reduce the barrier of the Hillevliet. In this way, the neighborhood will be better connected to its surroundings, which can contribute to its vibrancy. There are two interesting locations for new bridges which are connecting to squares of other neighborhoods. These bridges will shorten the maximum distance between crossing points of the Hillevliet to 230 meters. Next to this, pedestrians can now walk along the water more quietly, separated from the busy traffic. Improving the accessibility of pedestrian routing also aims to ensure that there is more activity on the streets. The waterfront is not only activated by adding a walkway. There can also be opportunities to sit and in some places, there may be jetties for staying or fishing.

It will not be pleasant for pedestrians when many cyclists come over the bridges at high speed. Therefore, there will be no bike lanes across the bridges. In addition, the bridges are not part of a large-scale bicycle route. However, cyclists can cross the bridges when they get off their bikes.

Fig 8.4.6: Map Hillevliet new situation

Fig 8.4.5: New situation (image by author)
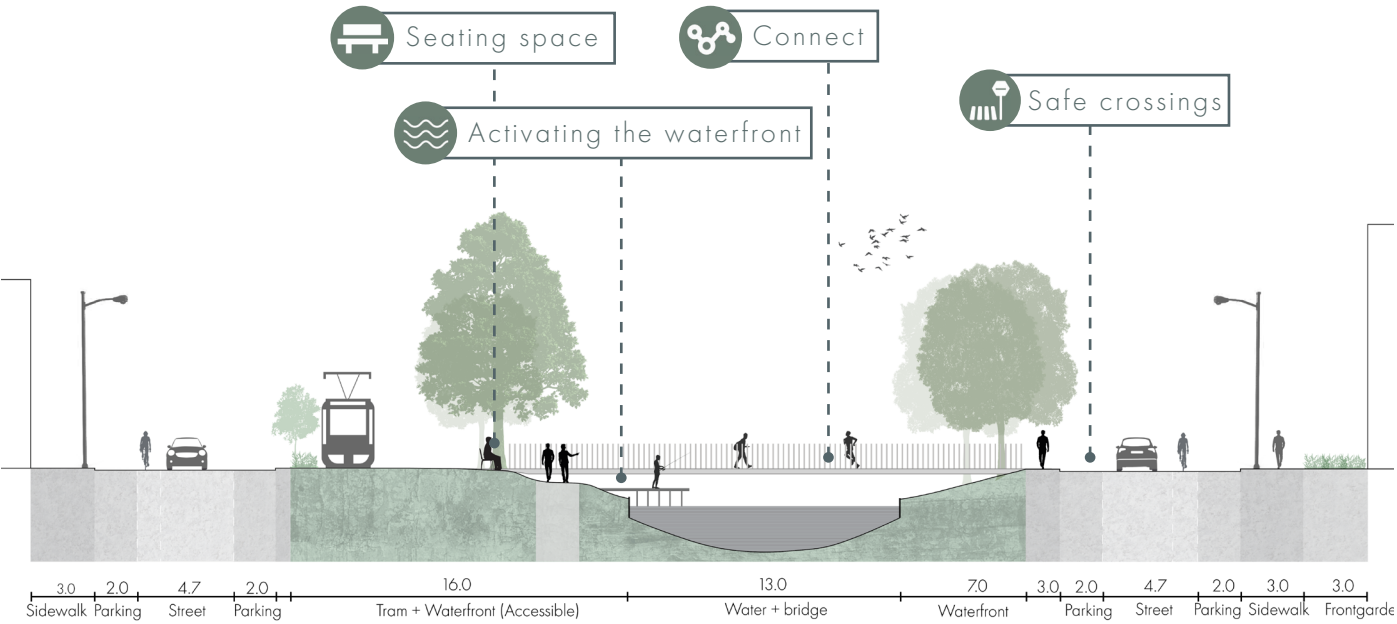
Fig 8.4.7: Section Hillevliet new situation

8.5 Stichtseplein

8.5.1 Current situation

The Stichtseplein is the location in Hillesluis with the most nuisance, according to neighborhood police officer Jasper Nootenboom (fig 8.4.12). There are two schools and a community center located in the Stichtseplein. The community center has a very closed facade and is not used by many different groups. Next to the square, storage of houses are located. This causes the visibility of the square to be bad, because there are no eyes on the square from residential buildings. The square has trees, but the surface is almost entirely consisting of pavement and there are very few places to sit.

A LOT OF PAVEMENT

1.

Type of unsafety

At the Stichtsplein there is subjective safety, because people are avoiding the square and it is one of the places with the most experienced nuisance (fig 8.4.12). So there is both physical unsafety and social unsafety here. Nuisance falls under social unsafety and physical unsafety consists of the poor visibility and poor public space.

Task

Improving the visibility on the Stichtseplein and making the square more attractive and active by designing more green and amenities. In this way, the square can be used by different people and will hopefully reduce the nuisance.

BACKSIDE & SCHOOL BAD VISIBILITY

2.

Fig 8.5.1: Current situation (image by author)

Name: Jasper Nootenboom
Gender: Man
Age: ?
Origin: Dutch

''As a neighborhood officer, I experience Stichtseplein as one of the places with the most nuisance, especially from young people.''

Name: Anonymous (nr. 15)
Gender: Man
Age: 62
Origin: Dutch

''I avoid the Stichtseplein, .''

Fig 8.5.2: Perception of inhabitants (conducted from survey)

SCHOOL

COMMUNITY CENTER

1.

SCHOOL

BAD VISIBILITY

STORAGE

2.

EVLIET
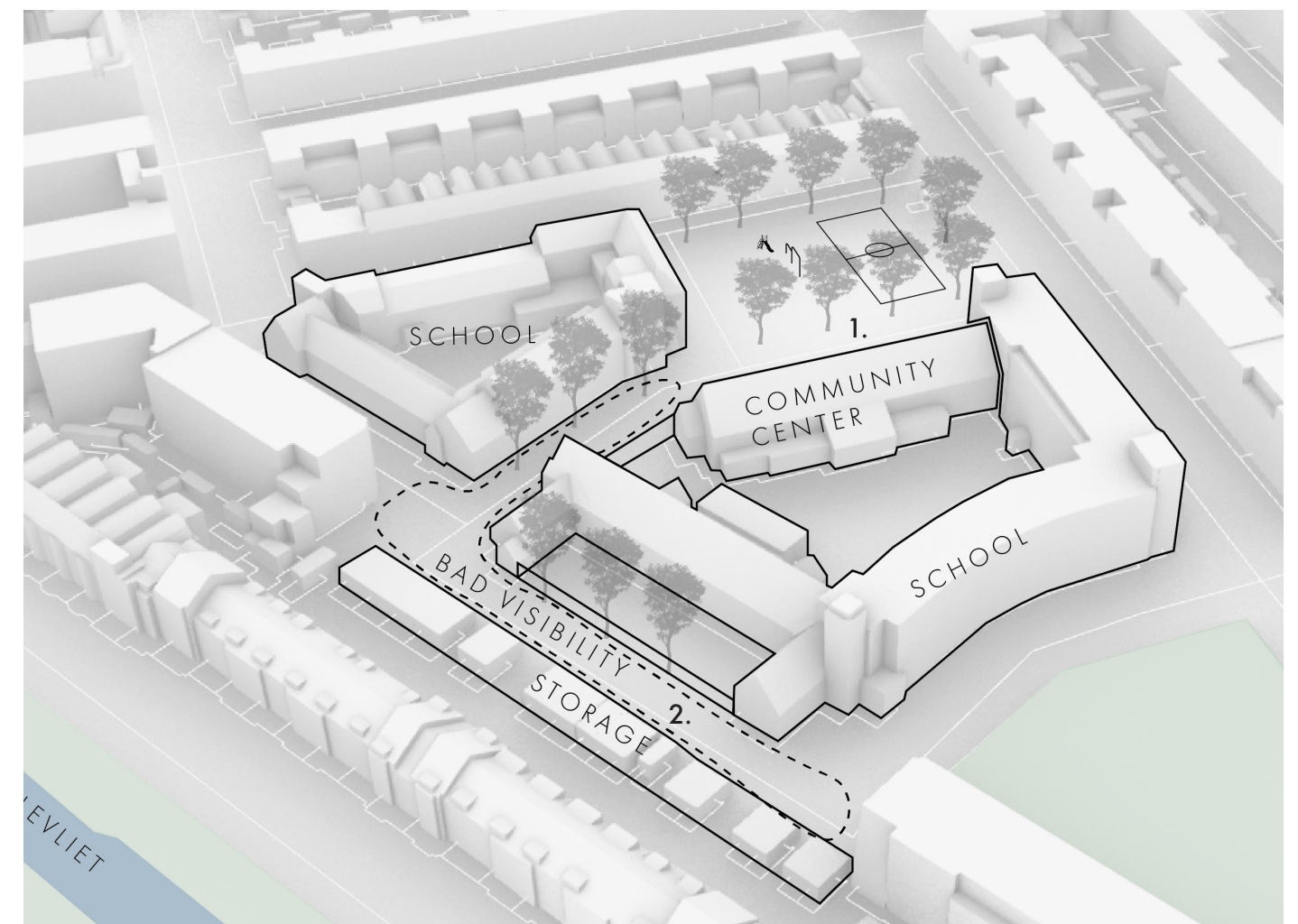
Fig 8.5.3: Current situation Stichtseplein

8.5 Stichtseplein

8.5.2 New situation

An improvement for the Stichtseplein could be the addition of green in order to make the square more attractive. Also, more seating possibilities will be added. The community center can be used multifunctionally, by adding a youth center. A youth center will provide an indoor space for young people, which intends to keep them off the street and will reduce the nuisance. All these interventions are intended to attract as much different people to the square as possible. In this way, the square will not feel owned by one group.

Fig 8.5.4: New situation (image by author)

Community + youth center

Active street

Seating space

Greenify streetscape

Versatile functions

Fig 8.5.5: New situation Stichtseplein

8.6 Stadionviaduct

8.6.1 Stadionviaduct - current situation

The Stadionviaduct is located between the northern and southern part of the Varkenoordsepark. Thus, it could act as a connection between these two sections. However, there is no logical pedestrian connection between the north and south (1.). Because this connection is not clear, fewer people will walk under the viaduct, which is negative for activity under the viaduct. A skate park and a Cruyff Court are located under and next to the viaduct (2.). However, there are no opportunities to sit and watch people skate or play soccer. Therefore, in terms of functions and possibilities, the viaduct is not designed for many different target groups. There are also no opportunities for children to play. In addition, there are several car garages under the viaduct. This is not a function that looks very inviting to outsiders. As a result, people may not feel welcome in the area.

There are only buildings on the south side of the viaduct. On the north side, there is an empty plot and a play farm that is no longer in use. The lack of buildings has a negative impact on the eyes of the viaduct.

The Stadionviaduct is one of the places with the most nuisance. In addition, it is a space avoided by residents (fig 8.6.3).

UNCLEAR PEDESTRIAN ROUTING

1.

SKATEPARK

CREATIVE CRUYFF COURT

2.

NO PUBLIC FUNCTIONS

3.

Fig 8.6.1: Current situation Stadionviaduct

8.6 Stadionviaduct

8.6.1 Stadionviaduct - current situation

Type of unsafety

The type of unsafety at the Stadionviaduct is both subjective as objective unsafety. This location emerged from both the survey and the spatial analysis. Next to that, there is social unsafety because of the nuisance and there is physical safety because of the bad visibility and public space.

Task

Create different functions for different groups for as much activity and eyes on the street and viaduct as possible. In addition, also increasing visibility and eyes by improving the viaduct as a connection on the bigger scale.

Name: Jasper Nootenboom
Gender: Man
Age: ?
Origin: Dutch

''As a neighborhood officer, I experience the Stadionviaduct is one of the places in Hillesluis with the most nuisance.''

Name: Anonymous (nr. 3)
Gender: Woman
Age: 50
Origin: Surinamese

''I avoid the Stadionviaduct.''

Name: Anonymous (nr.14)
Gender: Man
Age: 60
Origin: Dutch

''I avoid the Stadionviaduct.''

Fig 8.6.3: Perception of inhabitants (conducted from survey)

Fig 8.6.2: Current situation Stadionviaduct
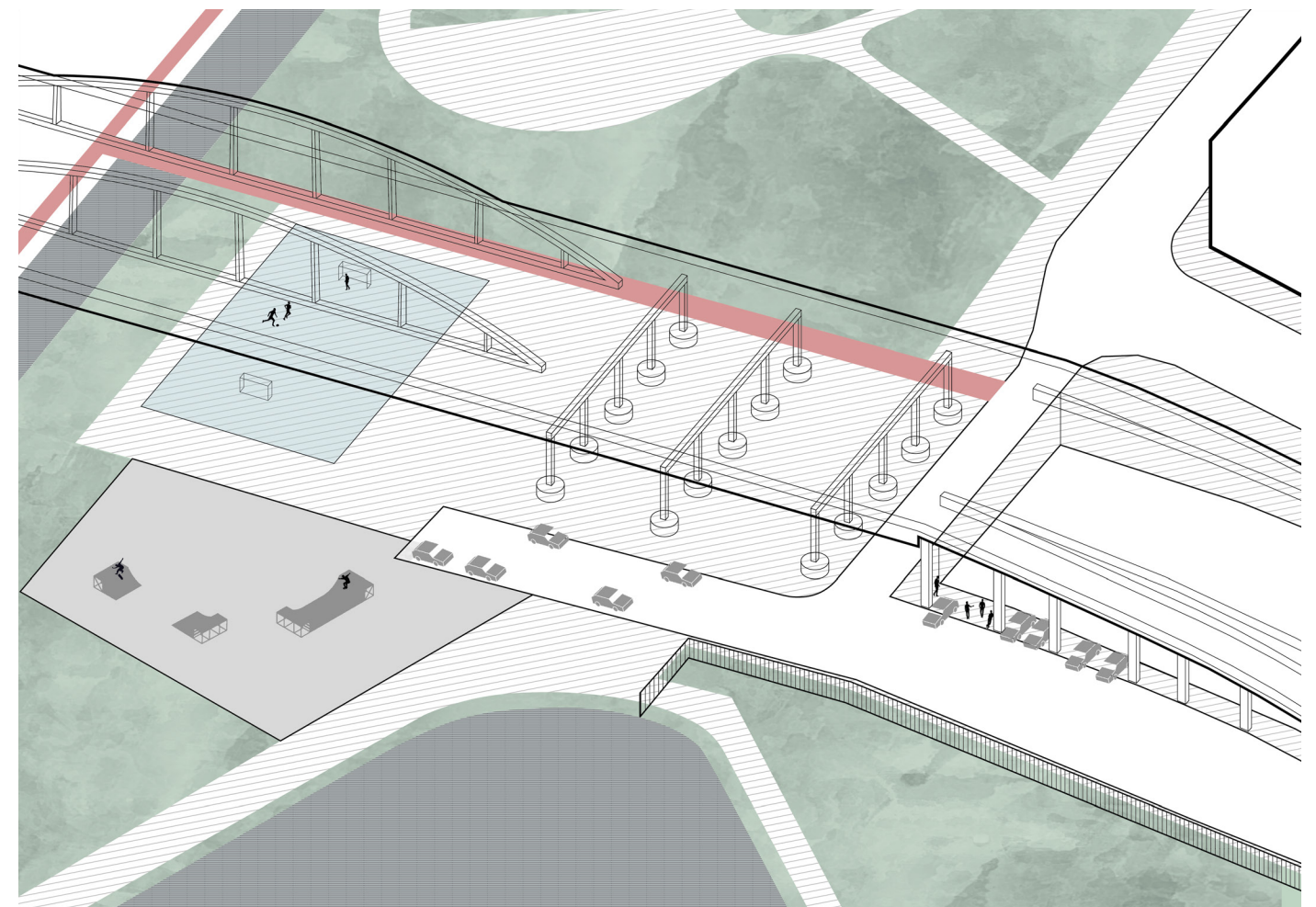
Fig 8.6.4: Current situation Stadionviaduct

8.6 Stadionviaduct

8.6.2 Stadionviaduct - new situation

The stadionviaduct will be improved by having a clear pedestrian connection underneath the viaduct which connects both sides of the Varkenoordsepark. This will improve the activity of the viaduct and thus the eyes on the street. There will also be added green and seating options underneath the viaduct. This will provide options to sit and watch other people doing activities. The program under the viaduct can be flexible: this makes the viaduct feel owned not by one kind of group but by everyone. On the next page, different activities which could take place underneath the viaduct are shown. In the viaduct, were currently a car garage is located, could be a place for new communal functions, like a community center or a youth center. These are more social inviting functions and will not chase away people. At last, a new residential building can be added where currently the empty plot and the former playfarm is located. This location is one of the few open places in Hillesluis where there is room for densification. By adding this residential building, the visibility of the viaduct will be improved.

A downside of this intervention is the removal of the car industry under the viaduct. Indeed, the goal is to make any group of people feel welcome at this location, only now that won't include the car industry. However, by removing the car industry, there is room for community functions under the viaduct that will contribute much to the neighborhood.

Fig 8.6.5: Current situation Stadionviaduct

Versatile functions

Greenify streetscape

Seating space

Sports facilities

Eyes on the street

Connect

Community + youth center

Natural territoriality
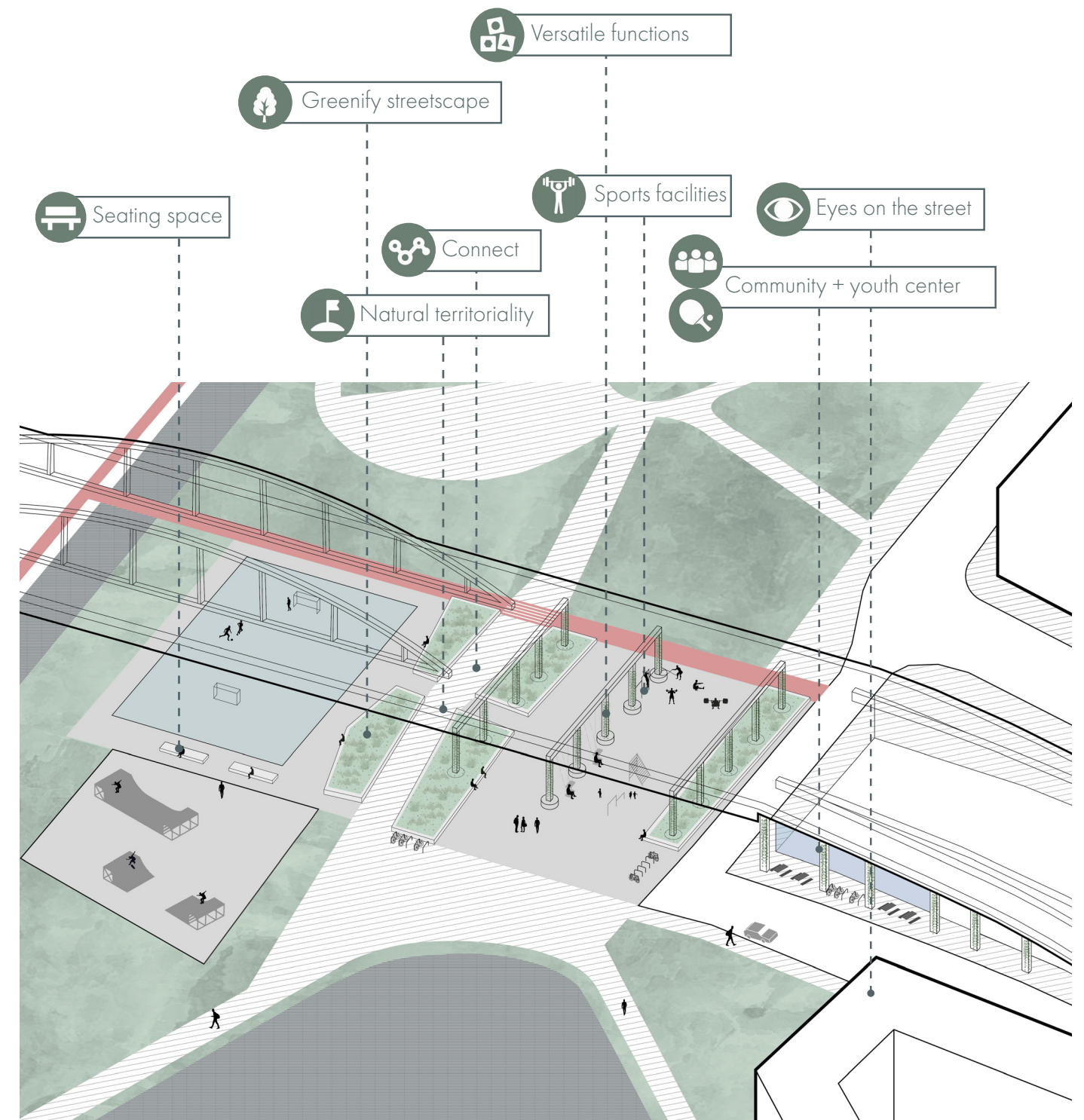
Fig 8.6.6: New situation Stadionviaduct with patterns

8.6 Stadionviaduct

8.6.2 Stadionviaduct - new situation

Viaduct options

The viaduct is a space where many different activities can take place. It is a convenient place because it provides a dry pad during rain and shade during the heat. Figure 8.20 shows different options for what can be done with the space under the viaduct. These are options made for as many different audiences as possible. For example, there could be seating options for the elderly, play facilities and swings for children and a bouldering wall and sports facilities for young people. The space under the viaduct can be built flexibly, allowing the layout to be changed. This will keep it a surprise for residents what the infill of the viaduct can be. As a result, the viaduct will not be appropriated by one group but will belong to everyone.
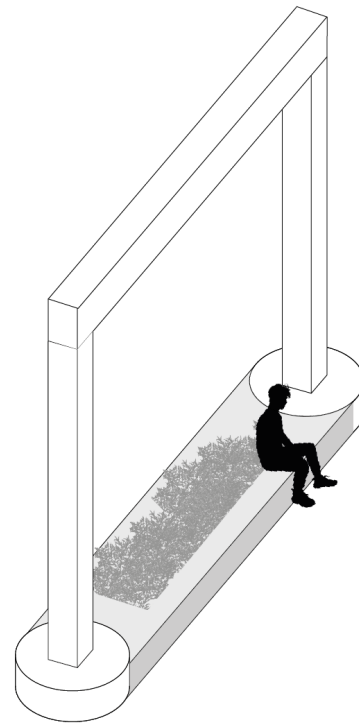
Seating space
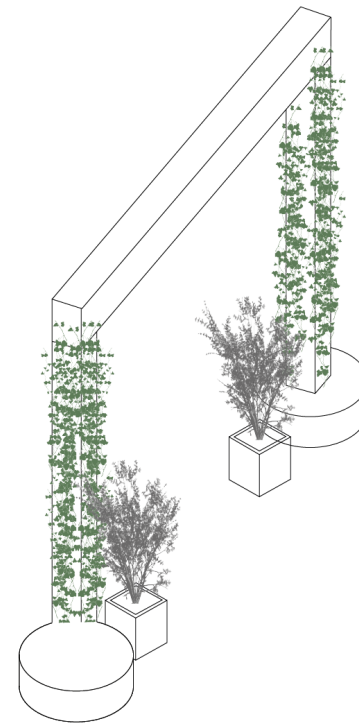
Greenery
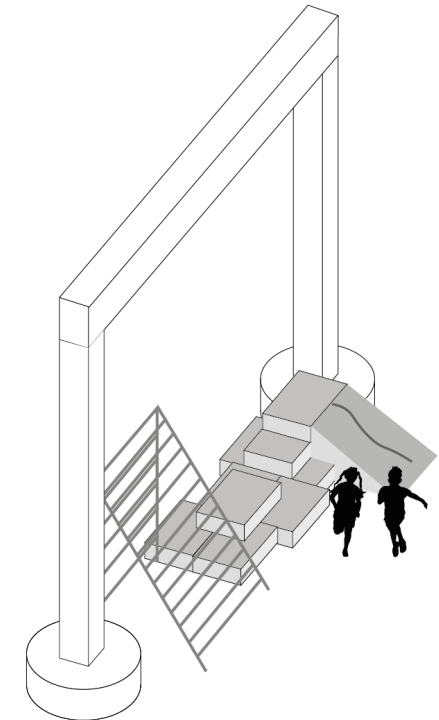
Playground
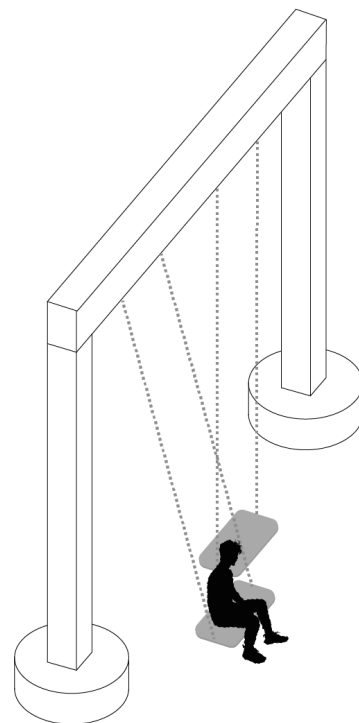
Swing
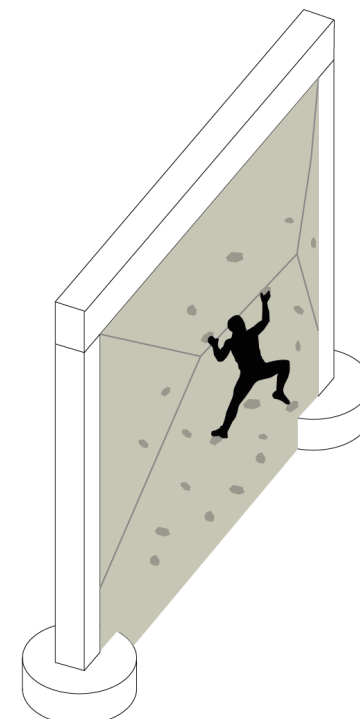
Bouldering wall
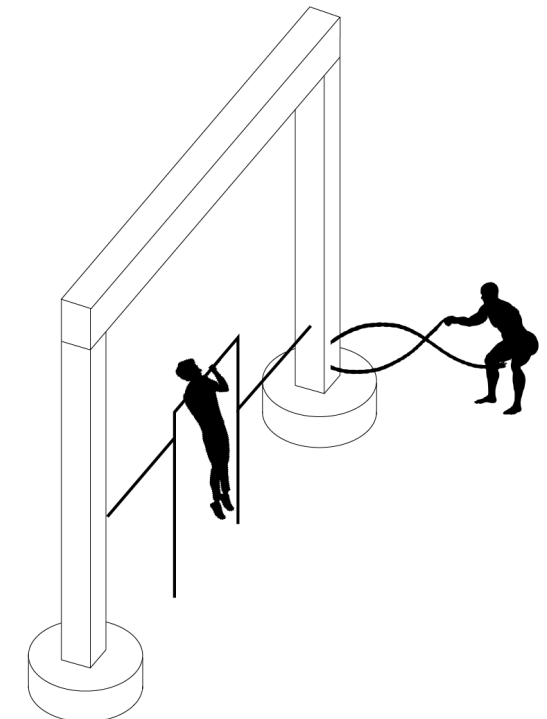
Sports facilities

Fig 8.6.7 Different options for functions under viaduct

8.7 Riederbuurt Zuid

8.7.1 Current situation

The Riederbuurt Zuid is consisting of three layer-porch houses which are all owned by a corporation. The housing supply is very onesided, all the houses are between 60 and 70 square meters. According to paragraph 6.4.6, the Immobilialaan and the Riederstraat are spatialy not integrated. There are no squares or playgrounds in the neighborhood, except one playground in the Immobilialaan (5.). Furthermore, the neighborhood is characterized by the presence of a lot of space for car parking and there is a lot of pavement (3). In addition, in many places, there are large front gardens (1) whose owners are not clear. In other places, there are no front gardens at all (2) and the transition between private and public space is very hard. Finally, there are many wide sidewalks where nothing happens and where there is no territoriality (1).

Type of unsafety

At the Riederbuurt Zuid there is both subjective as objective unsafety because the area is conducted from both the spatial analysis as the survey. Next to this, there is physical unsafety in terms of public space, buildings and visibility.
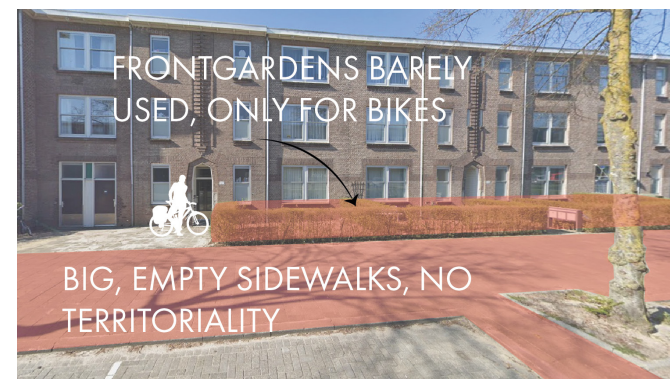
1. Riederstraat

2. Vlasakkerstraat

Task

Improving the visibility by having more activity and more eyes on the street. This can be done by redesigning public space and adding new typologies. There is also a task to add squares in this part of Hillesluis.

3. Riederstraat

4. Westerbeekstraat

5. Immobilialaan

Creating safe space

114

Name: Anonymous (nr.8)
Gender: Woman
Age: 47
Origin: Surinamese
''I perceive the Riederbuurt Zuid as a bad part of Hillesluis.''

Name: Anonymous (nr.14)
Gender: Man
Age: 60
Origin: Dutch
''I perceive the Riederbuurt Zuid as a bad part of Hillesluis.''

Current numbers:
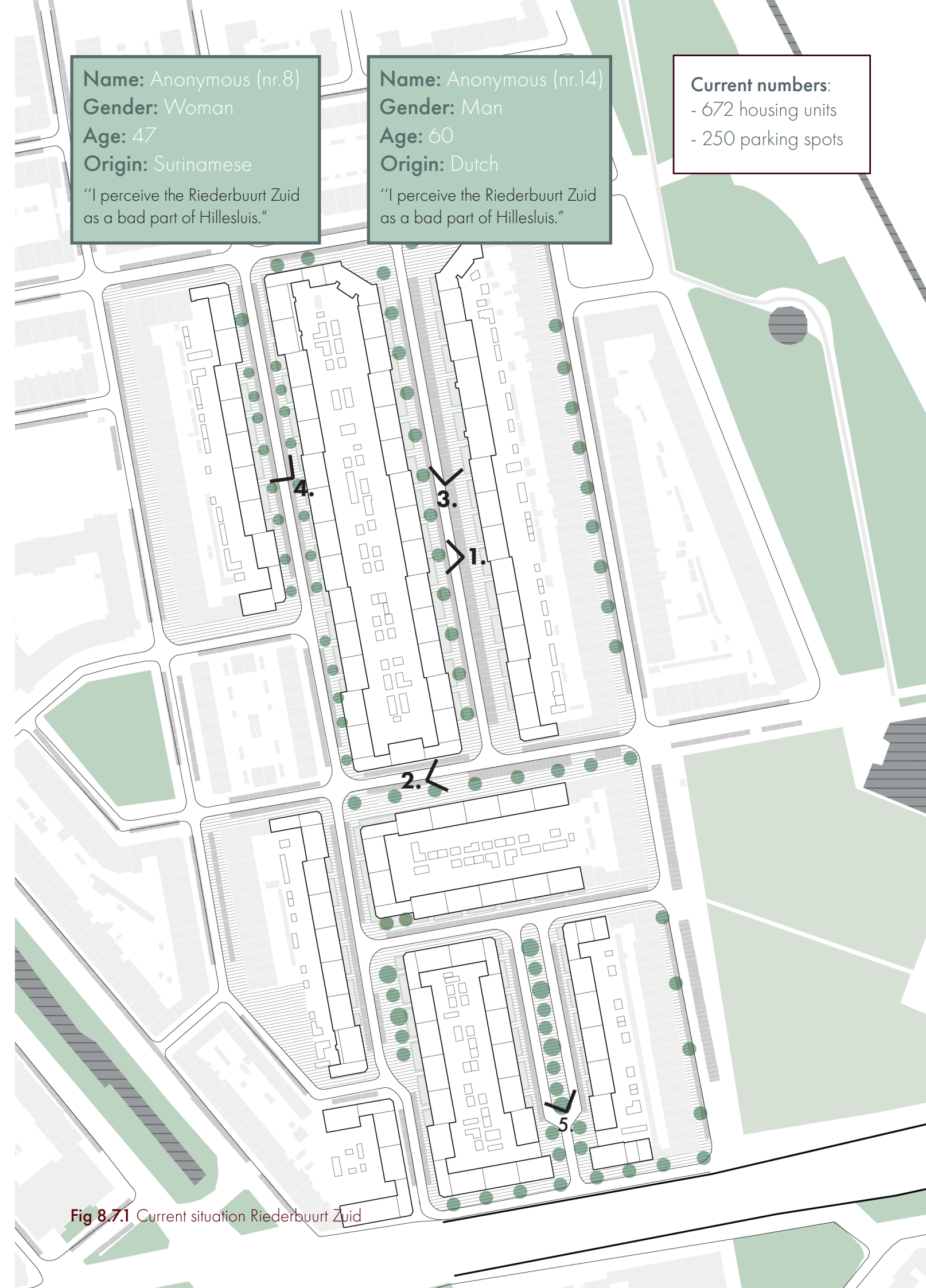- 672 housing units
- 250 parking spots
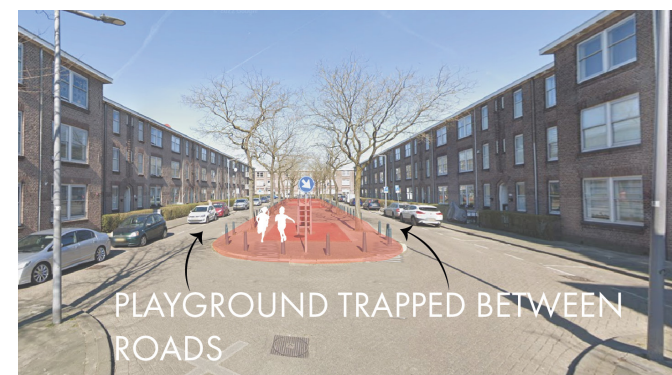
Fig 8.7.1 Current situation Riederbuurt Zuid

8.7 Riederbuurt Zuid

8.2.5 Riederbuurt Zuid - variant 1: Preservation

Variant 1 will focus on keeping the existing buildings and designing interventions in public space for more activity, territoriality and visibility.

In the Immobilialaan and the Riederstraat there will be small street squares. These streets are spatially not integrated and thus not part of a route on the bigger scale.

Because of this, these streets can be dead-end streets. These small street squares will try to create a neighborhood feeling. This will contribute to social cohesion and the feeling of safety. One of these streetsquares can be seen in fig The Vlasakkerstraat and Immobilialaan will also be redesigned.

Fig 8.7.2: Current situation

Fig 8.7.3: New situation

Current:
- 672 housing units
- 250 parking spots

Variant 1:
- 672 housing units
- 220 parking spots

Small street squares

Redesigning Vlasakkerstraat

A

Redesigning Immobilialaan

B
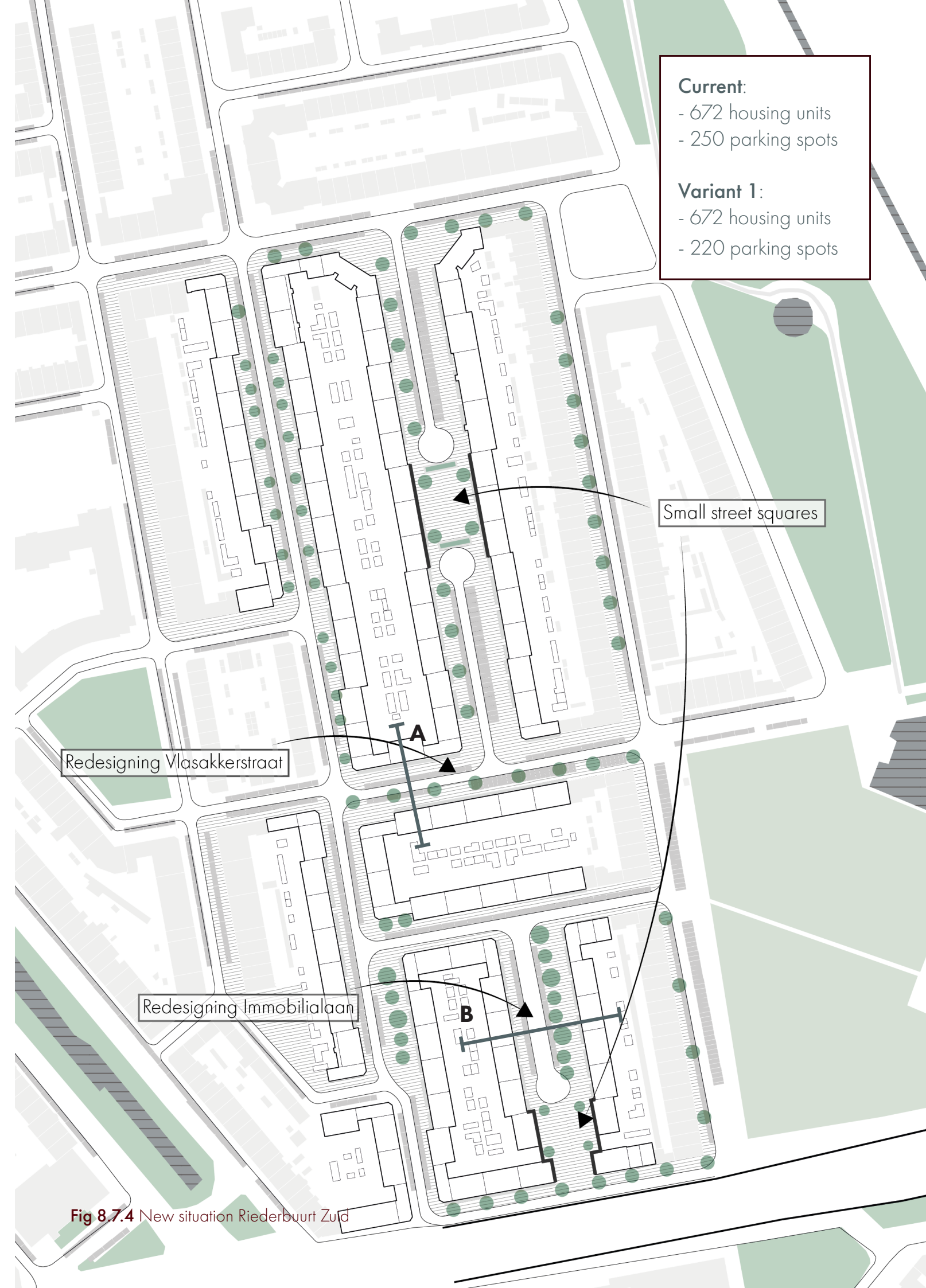
Fig 8.7.4 New situation Riederbuurt Zuid

8.2.5 Riederbuurt Zuid - variant 1: Preservation

Concept of interventions

In variant 1, the parts of the neighborhood with big, unused frontgardens will be replaced with smaller frontgardens. At the parts with no frontgardens, small frontgardens will be added. In this way, people will have control over interaction with other people. In the first floor, frontdoors will be added for more eyes on the street.

The streetscape will be made more attractive by adding green. This green will be tactically placed in combination with bicycle parking spots which are situated in front of the porches. This will provide a natural territoriality in the streets.

No frontgardens

Big frontgardens, no owner

No territoriality

Car dominance

No frontdoors at street
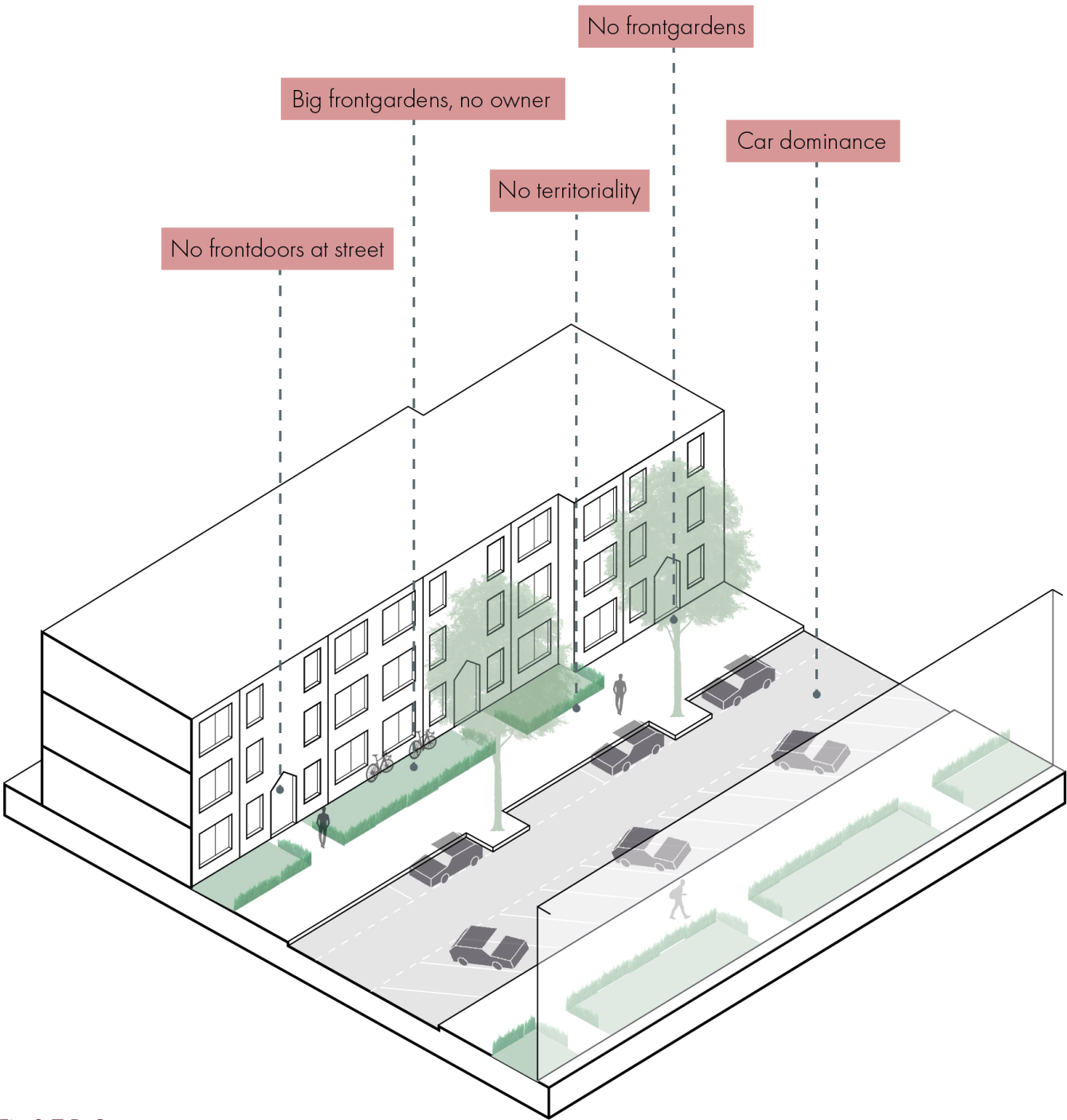
Fig 8.7.5: Concept current situation

Greenify streetscape

Seating space

Transition public-private

Eyes on the street

Natural territoriality
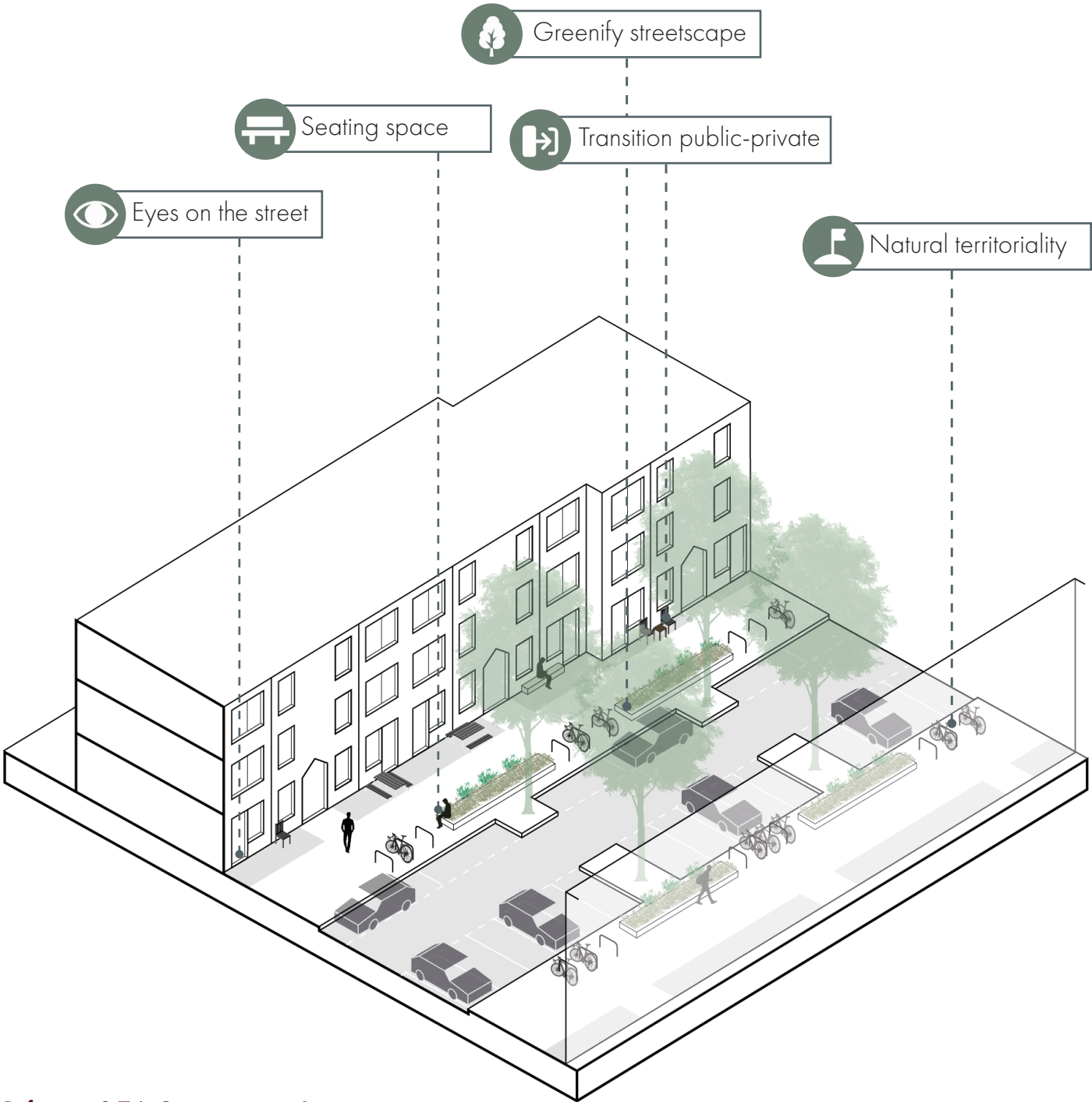
Reference 8.7.6: Concept variant 1

8.7 Riederbuurt Zuid

8.2.5 Riederbuurt Zuid - variant 1: Preservation

Detailing - front gardens

In the design for the Riederbuurt Zuid, the transition between public and private is an important aspect. As mentioned earlier, the current transition is not good. In some cases there are no front gardens, making the transition hard. In other cases, there are large front gardens in front of the porch houses that are not owned by anyone. These are currently not used, or used for bicycle parking.

According to van Dorst (2005), a hybrid zone is a way of softening the abrupt transition between public and private. A hybrid zone is a small frontgarden that allows the resident to control encounters. In addition, the resident can also add a personal touch to the hybrid zone. finally, the hybrid zone forms a buffer causing less people looking into their home. As a result, there will be more visibility from the home onto the street because the house can contain its openness.

There are different sizes of hybrid zones and different ways to express the hybrid zone. Hybrid zones can be quite big (fig 8.7.10) or very small (fig 8.7.9). The expression of the hybrid zone can be done through a difference in materialization (fig 8.7.7), or by adding a physical element like for example a small pole (fig 8.7.8).

Fig 8.7.9: Small frontgarden

Fig 8.7.7: Difference in materialization (own image)

Fig 8.7.8: Small poles to express hybrid zone (own image)

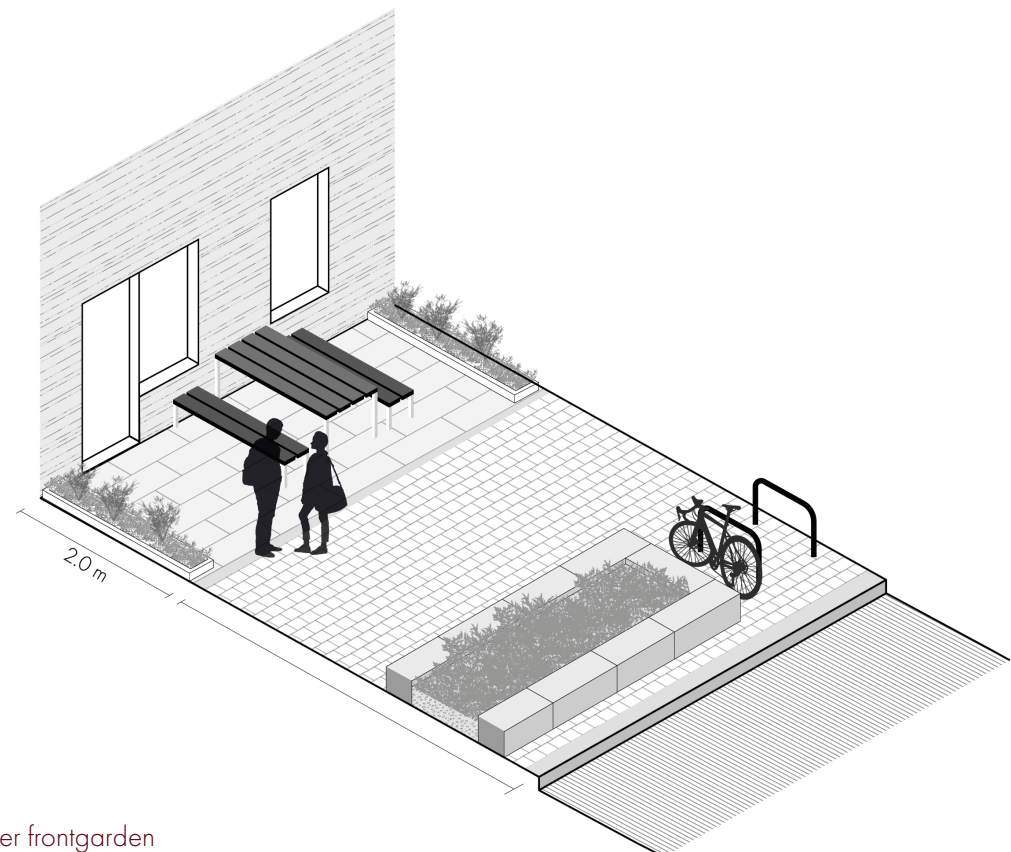**Fig 8.7.10:** Bigger frontgarden

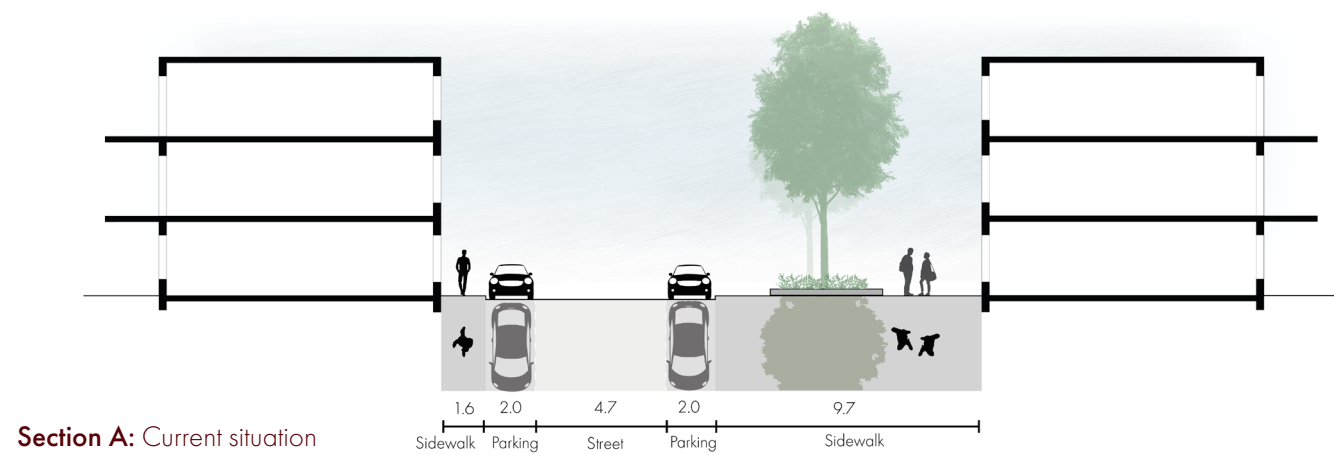# 8.7 Riederbuurt Zuid

8.2.5 Riederbuurt Zuid - variant 1: Preservation

Redesigning Vlasakkerstraat

The Vlasakkerstraat currently has a very small sidewalk at te left side of the street with a very hard transition between public and private. At the other side of the street there is a big, unused sidewalk, also without frontgardens.
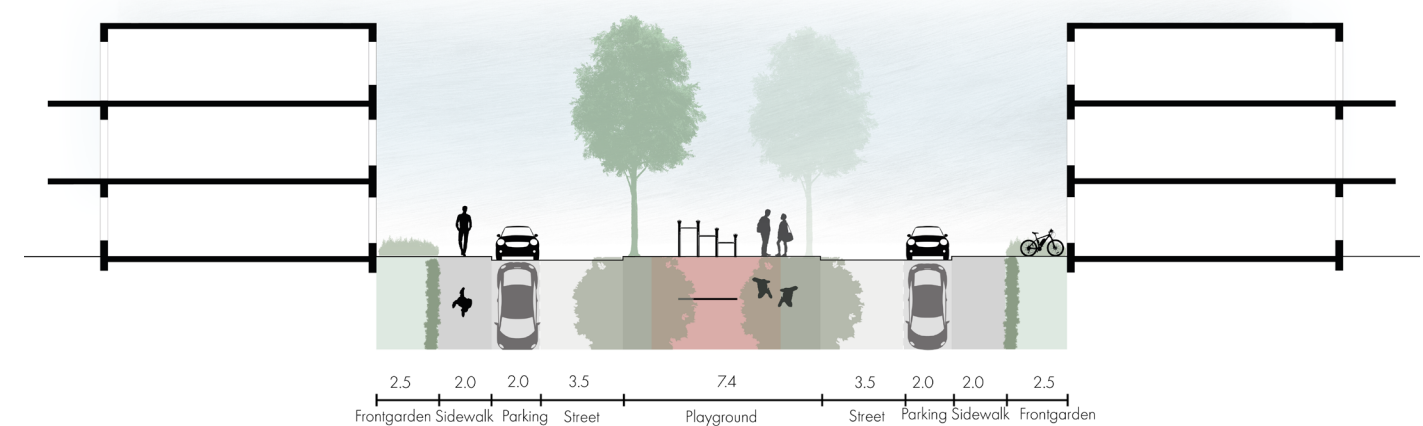

Section A: Current situation

In the new situation, the road will be replaced to the middle of the streetprofile. This will provide more space at te left side of the street for a broader sidewalk. In this way, on both sides of the streets frontgardens can be added.

Transition public-private

Greenify streetscape
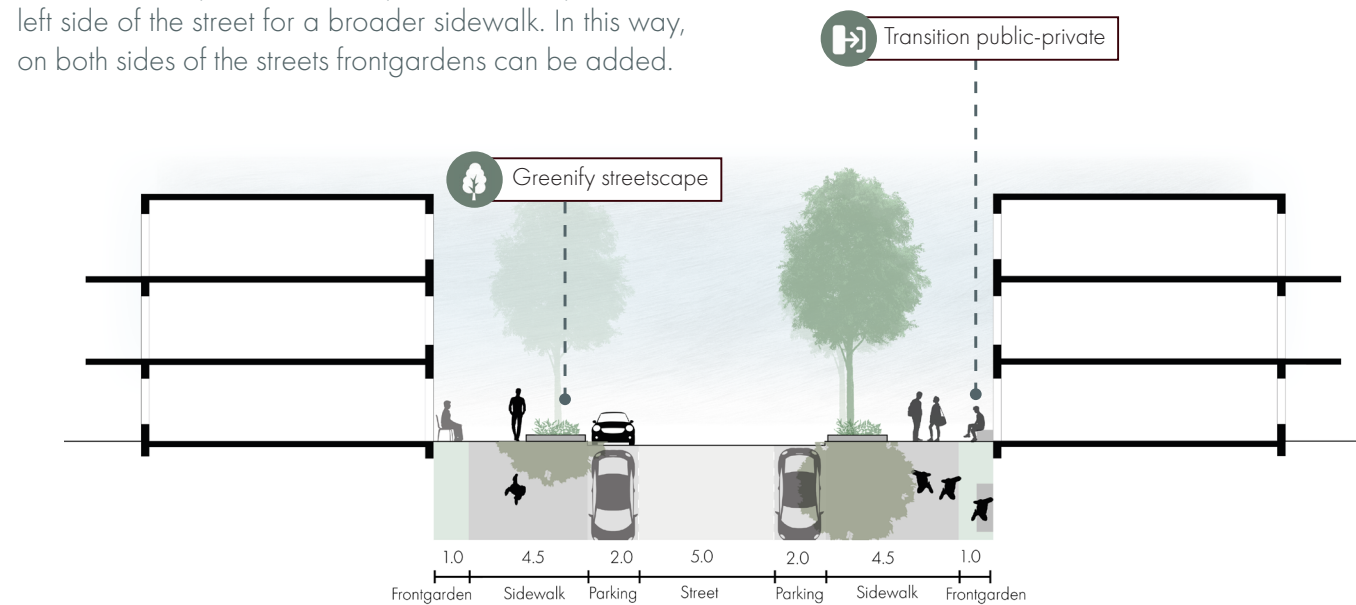
Section A: New situation

Redesigning Immobilialaan

The Immobilialaan is the only place in the neighborhood with a playground. However, this playground is trapped between streets at both sides. Children have to cross the road if they want to play at the playground.

Section B: Current situation

Both sides of the road will be replaced to the left side of the street and the playground to the right side. In this way it is safer for children to play and there will be less traffic space.

Transition public-private
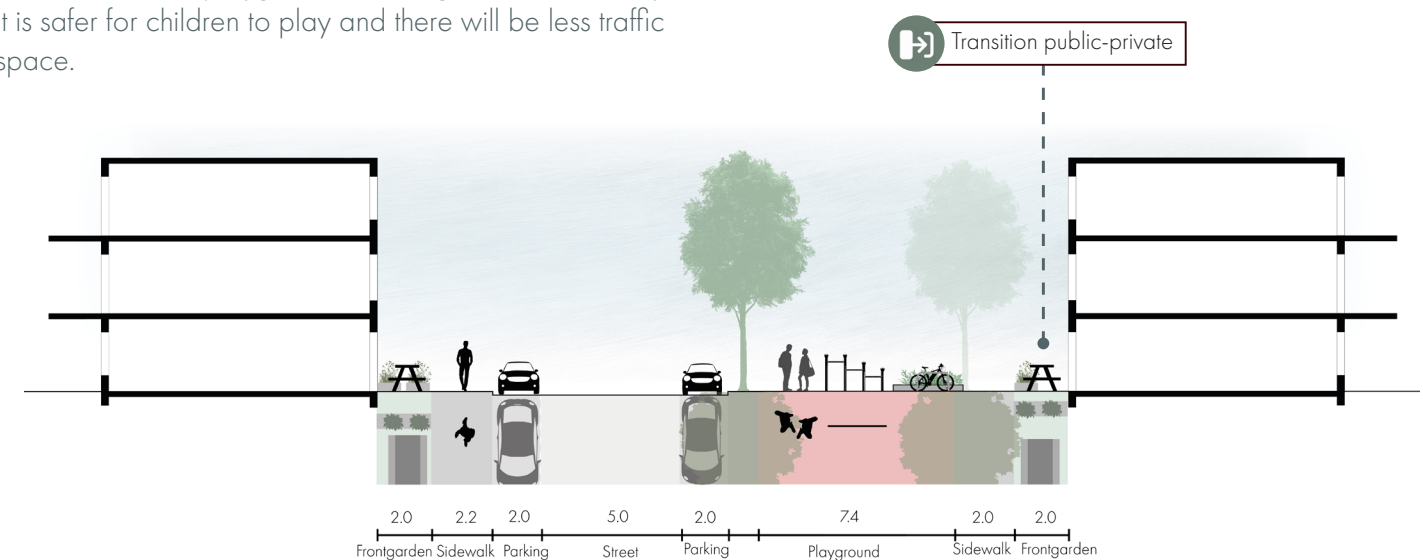
Section B: New situation

8.2.5 Riederbuurt Zuid - variant 1: Preservation

Street squares

The purpose of the small street squares is to create a place in the neighborhood that brings people into contact with each other, thus increasing social cohesion. In this way, the small street squares can contribute to the perception of safety, On the small street square there is space to sit and eat together and barbecue. In addition, natural territoriality has been applied by placing bicycle parking spots at the edges of the square. These bicycle parking spaces are situated toward the road to ensure that cars cannot pass through. Because the streets are now dead ends, turning loops have been applied. These are designed so narrowly that people cannot park their cars there. In addition, in the squares space has been made for other functions. In the small square of Riederstraat there is a small playground, which is not present in the street now.

A community garden in the form of a vegetable garden has been placed at the square of the Immobiliastraat. This can be used by all ages and gives the residents of the street a sense of responsibility.

In terms of materialization, the square is made of a contrasting material to the sidewalk to emphasize the little square. Trees have been placed around the square to again emphasize the square feeling.
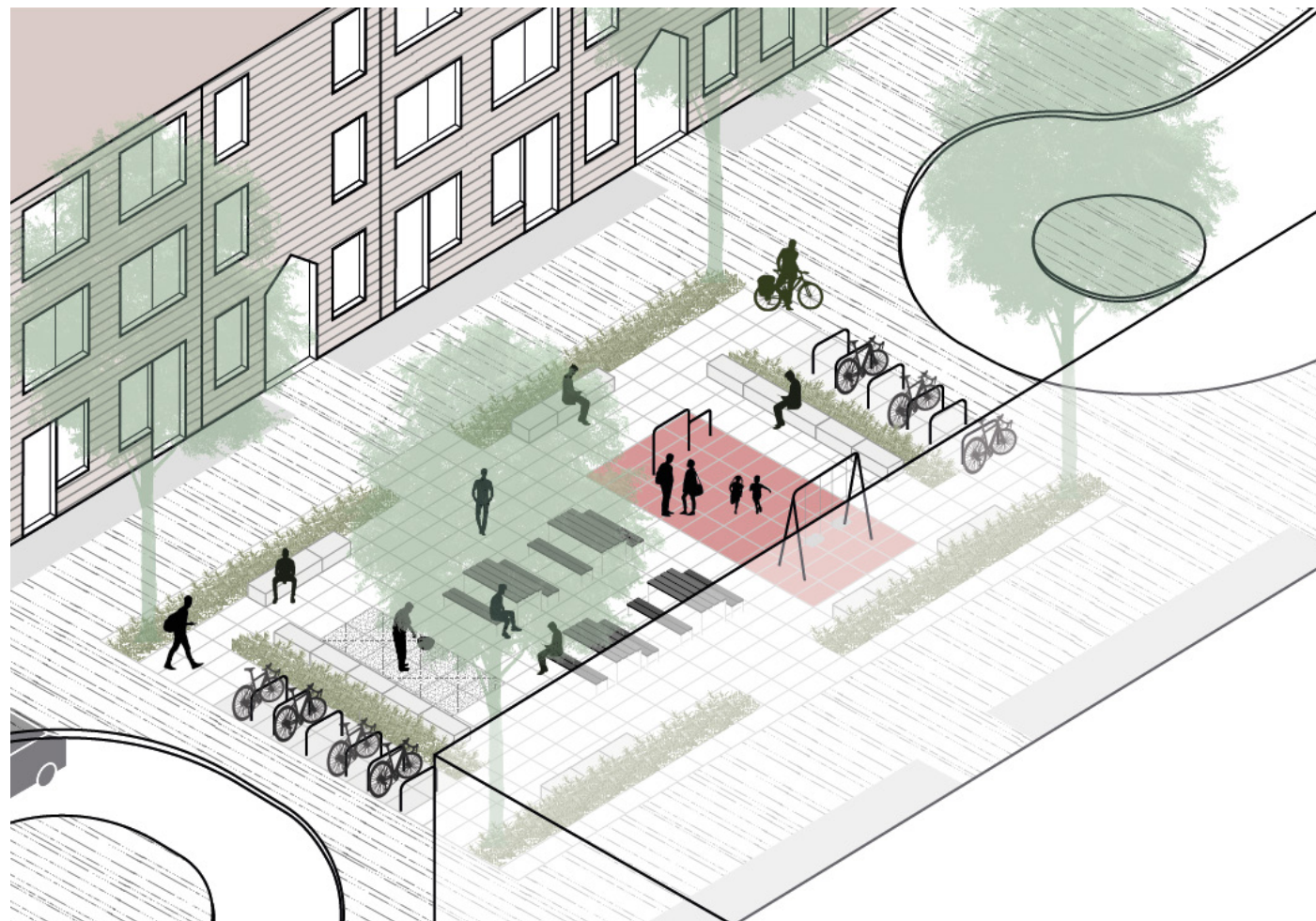

Active street

Reducing car usage

Seating space

Natural territoriality

Squares

Greenify streetscape

Community garden
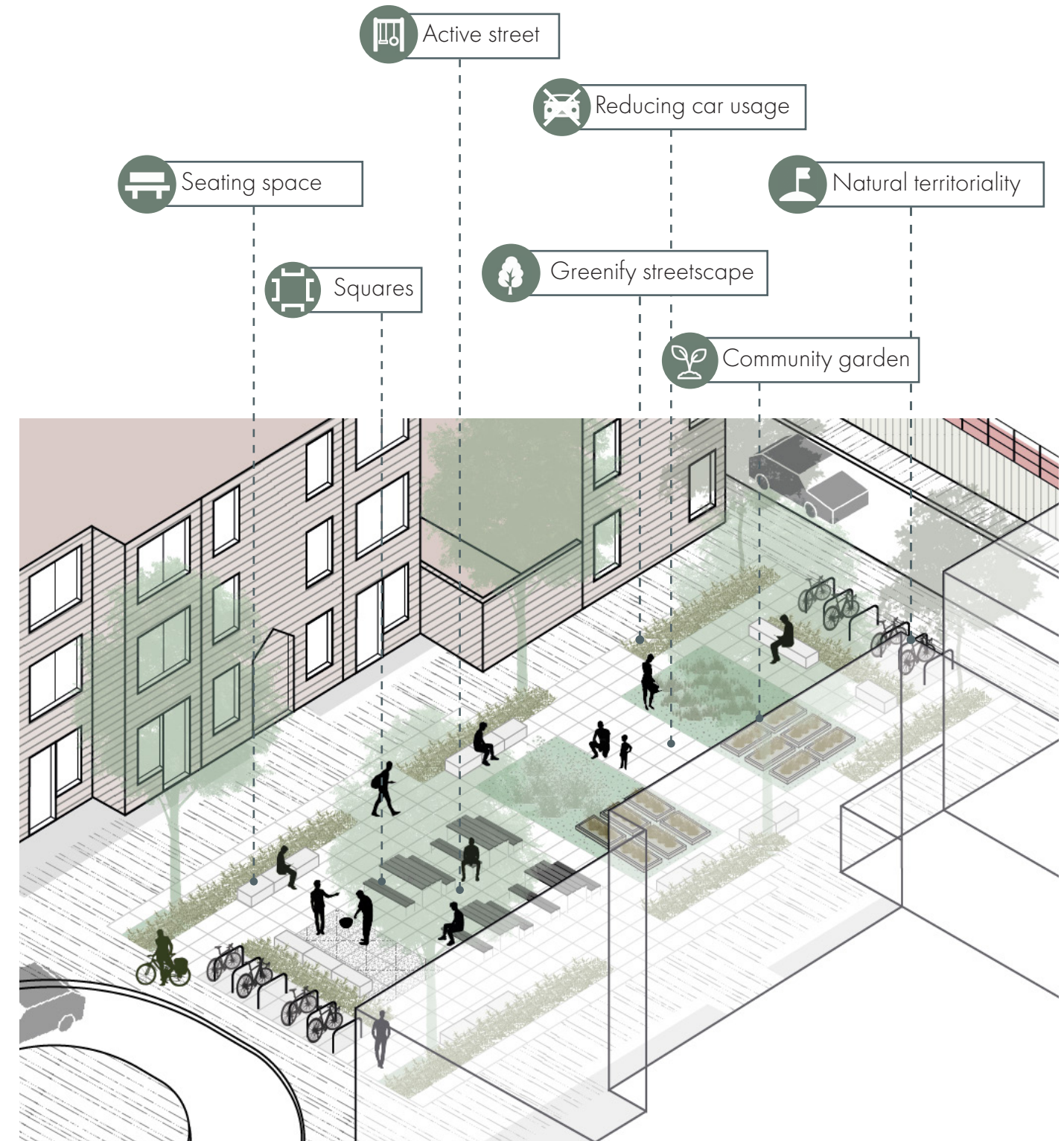

Fig 8.7.11: Small streetsquare Riederstraat

Fig 8.7.12: Small streetsquare Immobilialaan

8.7 Riederbuurt Zuid

8.2.5 Riederbuurt Zuid - variant 2: Rebuilding

Focus

Variant 2 will demolish the current buildings and build new buildings, following the old morphology. The goal was to create a new neighborhood square. A few options have been investigated (fig 8.7.15). The choice has been made for a combination of option 2 and 3. This will provide a big new neighborhood square with 3 building blocks of the same size. These building blocks will have a parking garage inside the building block with a collective garden on top. 1 block will have 88 parking spots and 130 houses. In this way, parking can removed partly from the streets,

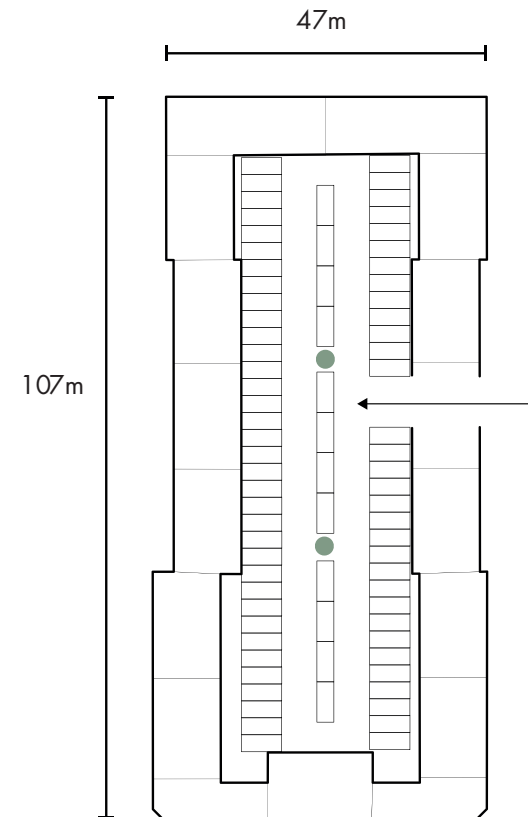**Reference 8.7.13:** Holenkwartier Hoorn (Delva, 2022)

47m

107m

Fig 8.7.14: Calculated amount of parking spots inside block

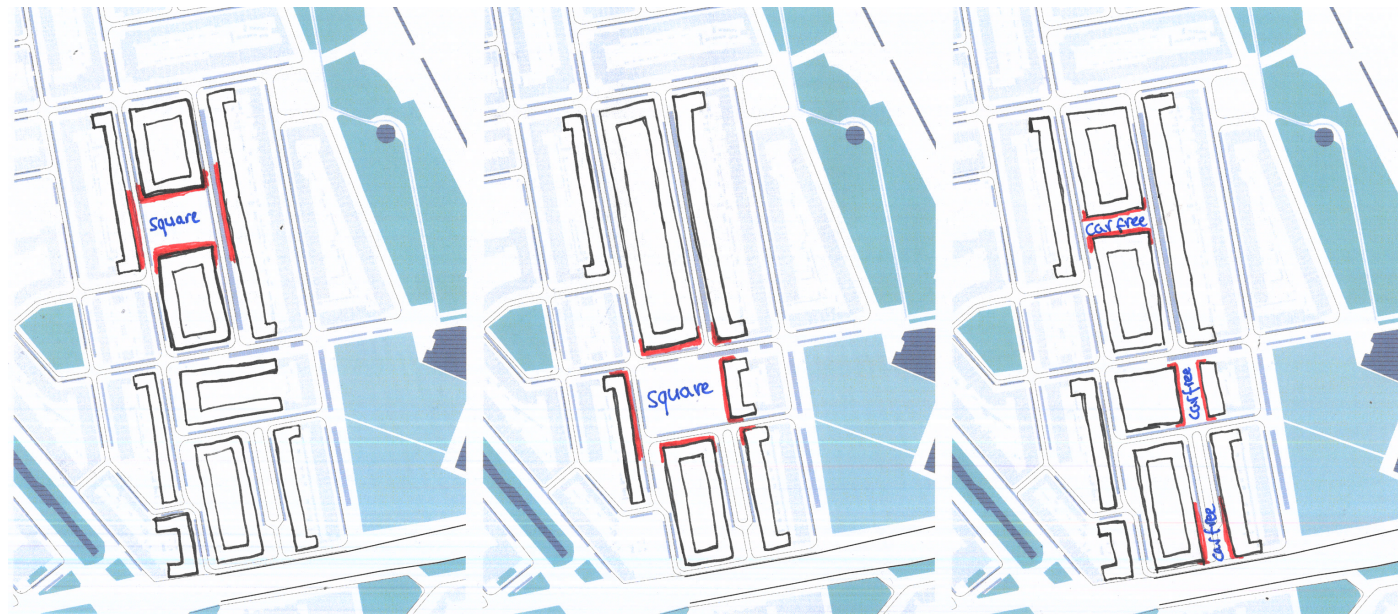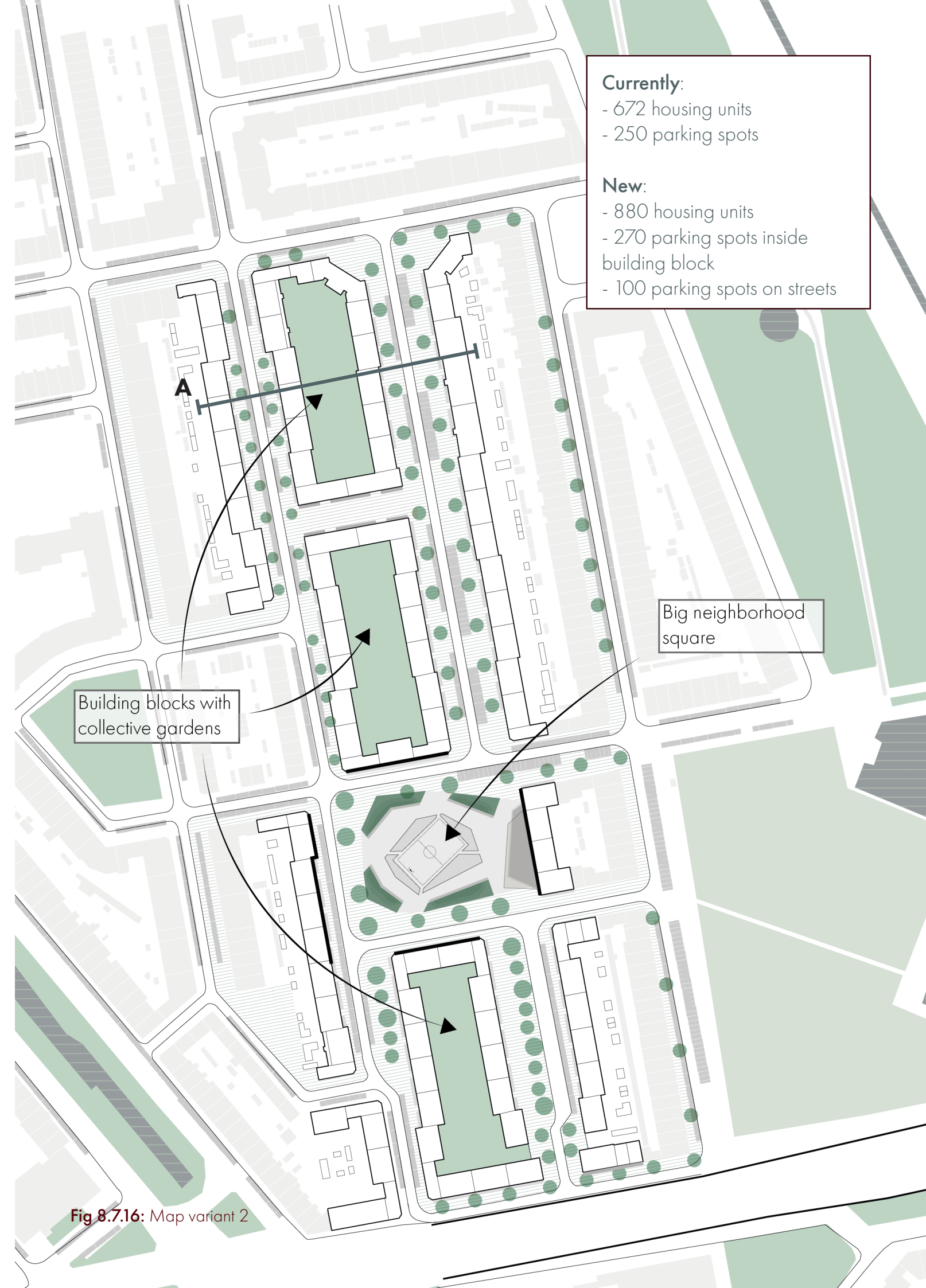**Fig 8.7.15:** Options 1-2-3 (in order)

Currently:
- 672 housing units
- 250 parking spots

New:
- 880 housing units
- 270 parking spots inside building block
- 100 parking spots on streets

A

Big neighborhood square

Building blocks with collective gardens

Fig 8.7.16: Map variant 2

8.2.5 Riederbuurt Zuid - variant 2: Rebuilding

Concept interventions

Variant 2 will have 5 building layers instead of the current 3 building layers at the buildings blocks with the collective gardens. The surrounding blocks will contain 4 layers. Because of this, the total amount of houses will increase. The first two layers will be maisonette housing, which is a new typology in the neighborhood. Inside the building block will be above ground parking, underneath a collective garden. These collective gardens will encourage interaction and social cohesion. A big part

of the parking in the streets can be removed because of the parking garage. This space can be used for sidewalks with seating spots and playgrounds. Same as variant 1, variant 2 will also add frontdoors, natural territoriality, green and small frontgardens.
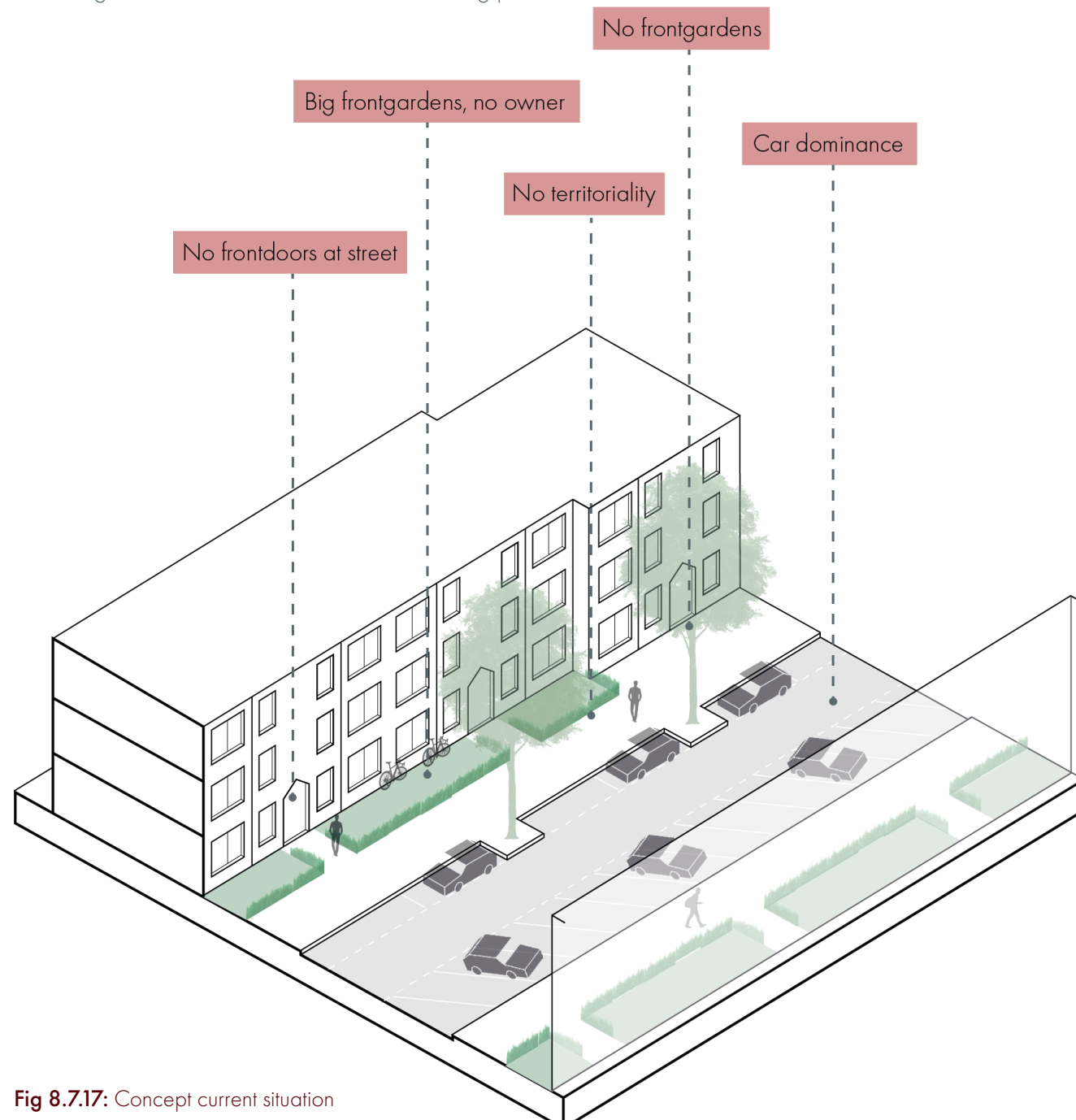
No frontgardens

Big frontgardens, no owner

No territoriality

Car dominance

No frontdoors at street

Commuity garden

Eyes on the street

Natural territoriality

Diversify typologies

Reducing car usage on streets

Greenify streetscape

Transition public-private

Active street

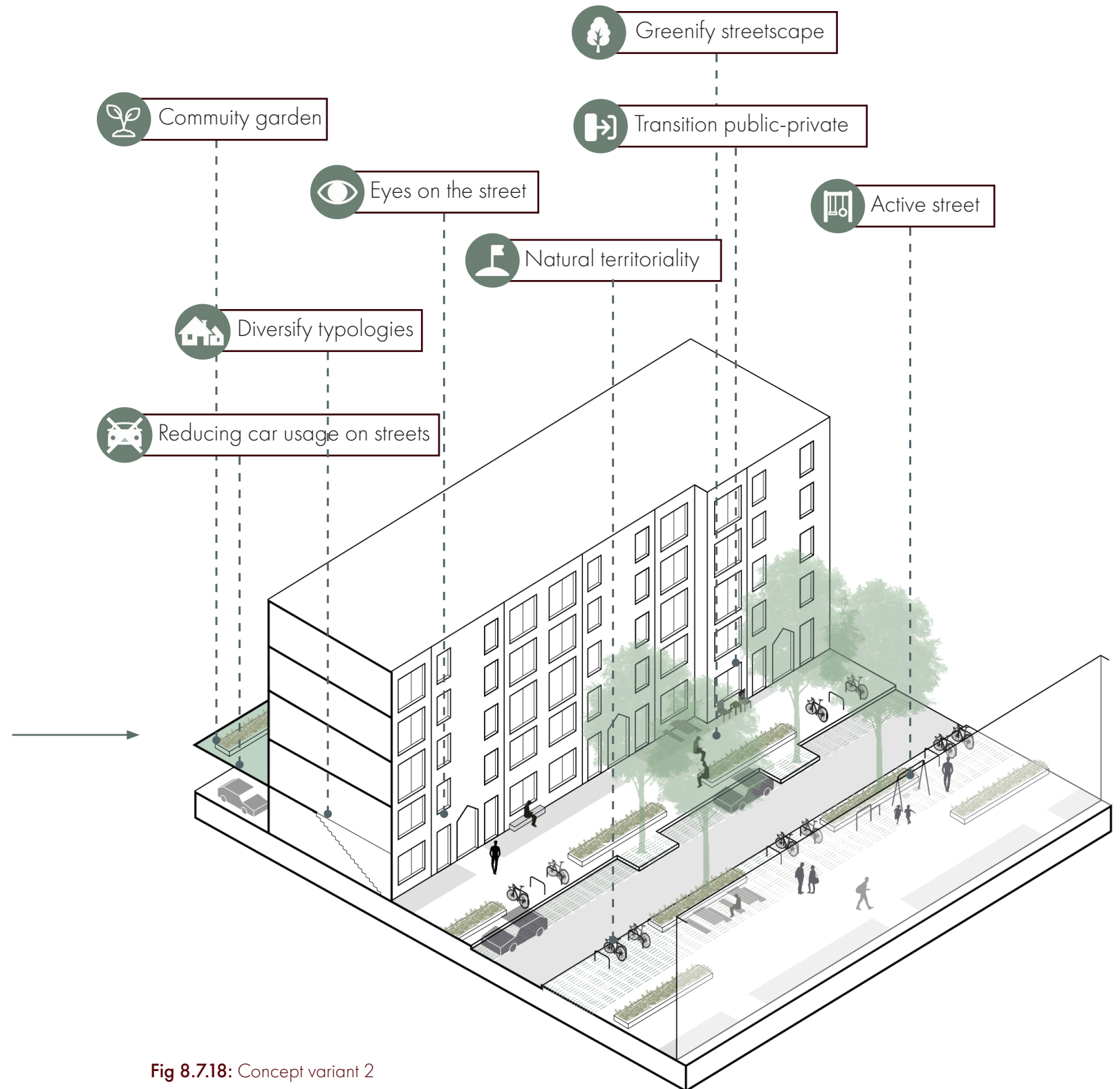**Fig 8.7.17:** Concept current situation

Fig 8.7.18: Concept variant 2

8.7 Riederbuurt Zuid

8.2.5 Riederbuurt Zuid - variant 2: Rebuilding

Westerbeekstraat & Riederstraat (Section A)

3.0	4.5	2.0	4.0	5.0	6.0	3.0	10.0	23.0	10.0	3.0	4.5	2.0	4.0	5.0	6.0	3.5
Frontgarden	Sidewalk	Parking	Street	Parking	Sidewalk	Frontgarden	Building	Private gardens	Building	Frontgarden	Sidewalk	Parking	Street	Parking	Sidewalk	Frontgarden

Section A: Current situation

In section A the new building layers can be seen, with the collective garden on top of the parking garage. To keep in mind the human scale, the buildings at te left and right side of the section will be 4 layers.

- Commuity garden
- Reducing car usage on streets
- Diversify typologies
- Transition public-private
- Eyes on the street
- Greenify streetscape
- Active street

1.0	4.5	2.0	4.0	2.0	3.5	1.0	10.0	23.0	10.0	2.0	6.0	2.0	4.0	7.5	2.0
Frontgarden	Sidewalk	Parking	Street	Parking	Sidewalk	Frontgarden	Building	Private gardens	Building	Frontgarden	Sidewalk	Parking	Street	Sidewalk	Frontgarden

Section A: New situation

Creating *safe* space
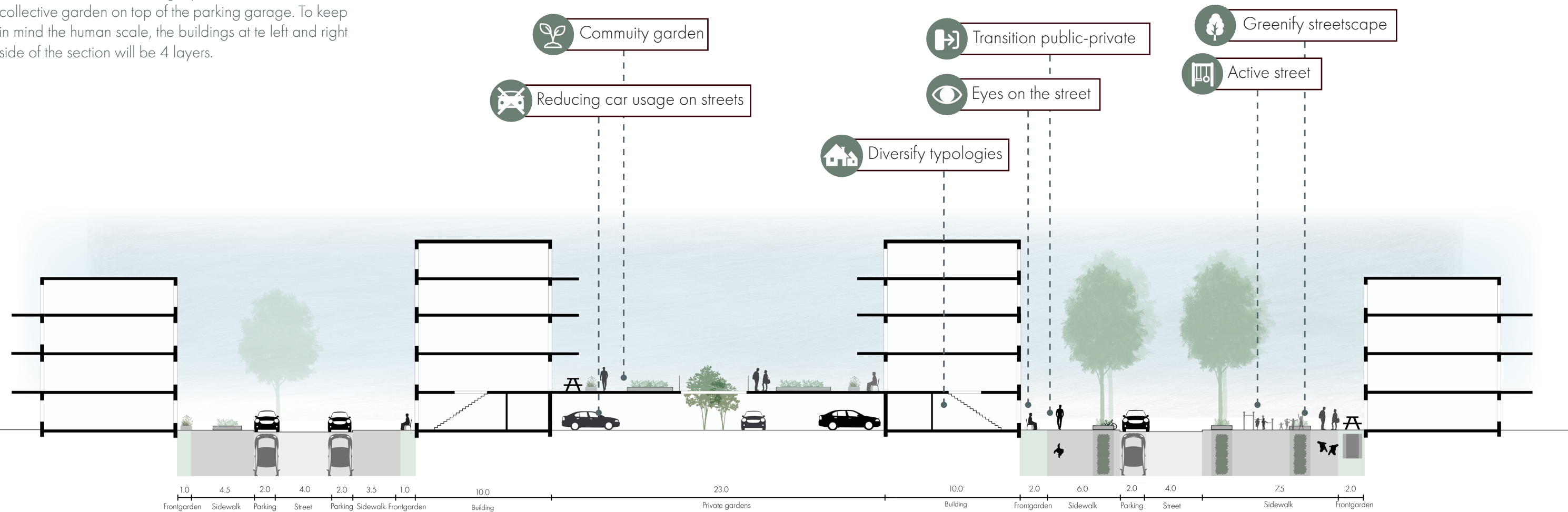
8.2.5 Riederbuurt Zuid - variant 2: Rebuilding

Square

One of design goals of this big neighborhood square was multifunctionality. The square needs to be usable by different kinds of groups. In this way, the square feels owned by the whole neighborhood and brings as many people as possible together. The square consists of a football and basketball court which also is a water square. Around the court are green surfaces with seating possibilities, so people can watch other people. These seating edges are not too high, to maintain the visibility from the buildings to the sqare. Next to the

square is a community center. This community center has a terrace which is facing the square. This terrace is elevated and can also be used as a stage. Because of this elevated terrace, the community center is functioning as the head of the square. The square has taken into account the ten principles of a succesful square (PPS, 2005). Two of the principles are displayed in figures 8.7.12 and 8.7.13.
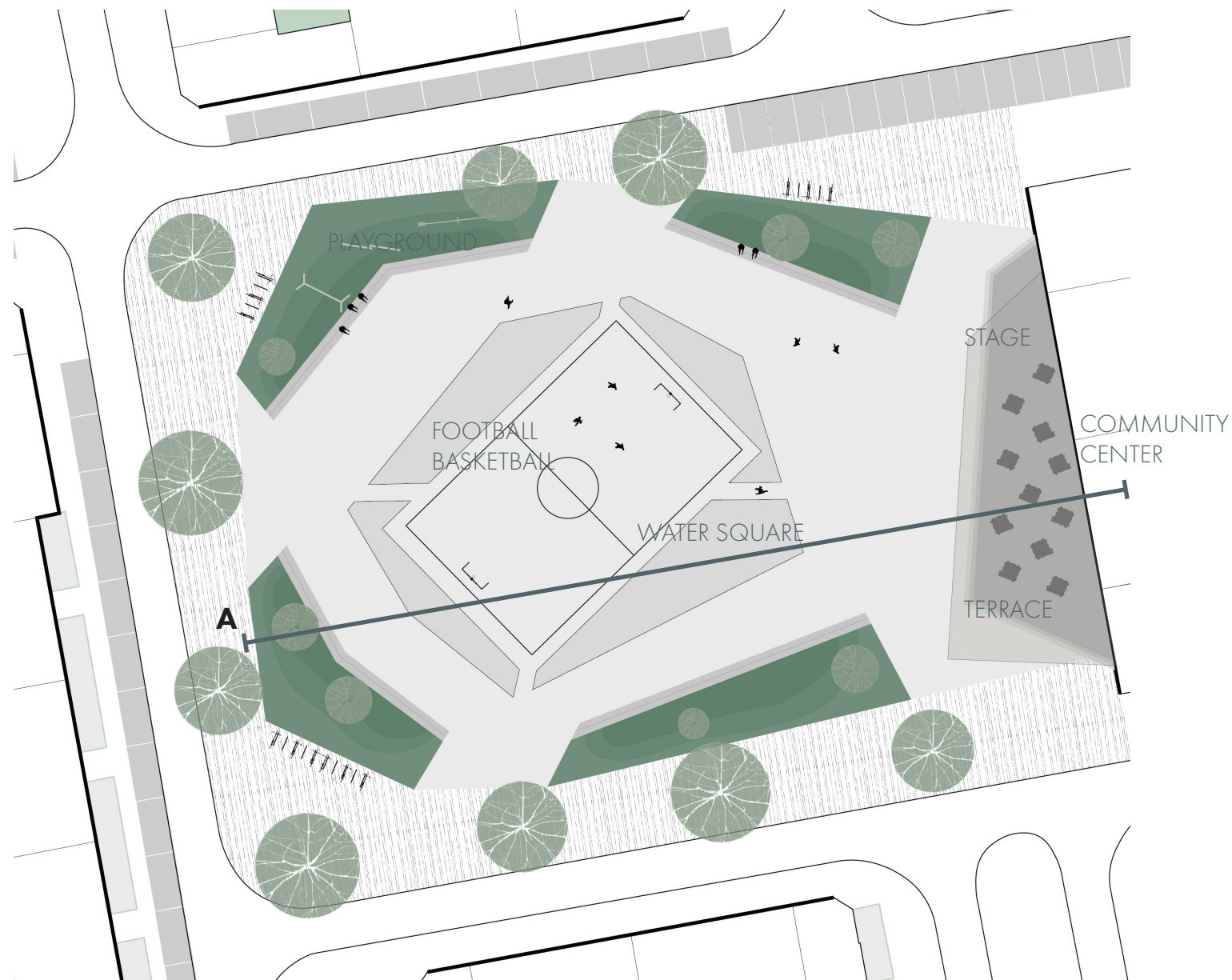
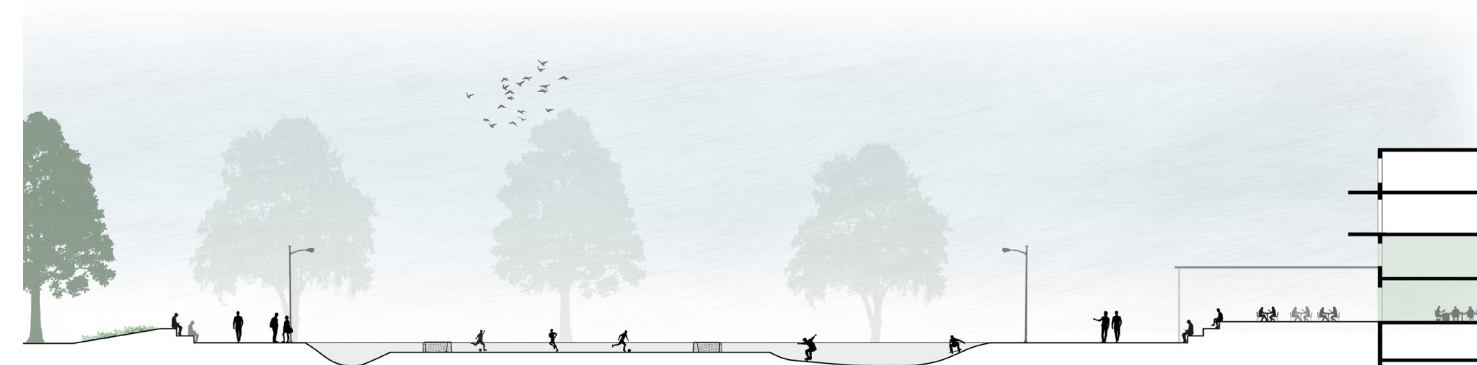Ten principles for successful squares (PPS, 2005):
1. Image and identity
2. Attractiveness & destinations
3. Amenities
4. Flexible design
5. Seasonal strategy
6. Access (for pedestrians)
7. The inner square & the outer square
8. Reaching out like an octopus
9. The role of management
10. Diverse funding sources

Fig 8.7.19: Plan map square

Fig 8.7.12: Seasonal strategy (5.) & flexible design (4.)
Watersquare Van Benthemplein Rotterdam
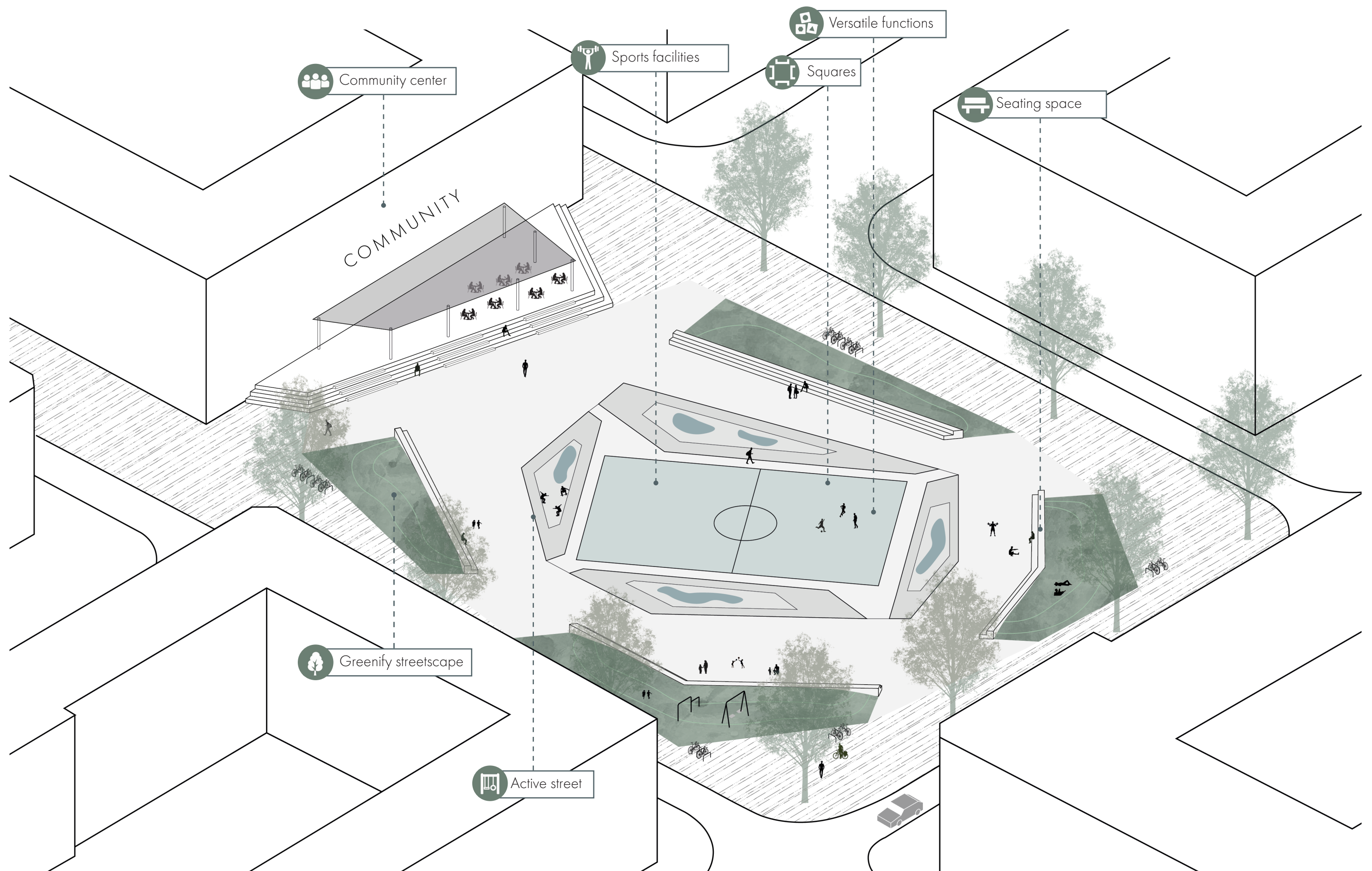

Fig 8.7.13: Image & identity (1.)
Arena square

Section A

8.2.5 Riederbuurt Zuid - variant 2: Rebuilding

Community center

Sports facilities

Versatile functions

Squares

Seating space

COMMUNITY

Greenify streetscape

Active street

09

Conclusions

In the conclusion chapter first the main conslusions of this thesis will be given. After this there will be a reflection on the whole process. Also, the method and pattern language used will be tested on another district.

This chapter will answer the main research question:

RQ: *How can the* **perceived livability and safety** *in* **Hillesluis** *be improved by designing* **spatial interventions?**

8.1 Conclusions

This thesis has sought to provide an answer on the following research question:

''How can the perceived livability and safety in Hillesluis be improved by designing spatial interventions?''

To answer this research question the first subquestion *'What causes unsafety and a bad livability in neighborhoods?'* is answered in chapter 4 about the theory. The answer to this question is that the safety and livability of a neighborhood are depending on the social, physical and individual characteristiscs of a neighborhood. This subquestion is an indirect connection between research and design. The spatial analysis is based on the literature used for this chapter. In the end, the design is partly based on the spatial analysis.

The second subquestion, *'Which locations within Hillesluis are percieved by the inhabitants as the most unsafe or with a low livability?',* is answered in chapter 5. A survey is used here to obtain locations in Hillesluis. The most frequenlty mentioned unsafe locations where the Stadionviaduct and the Stichtseplein. The most frequently mentioned locations which were considered less were the Hillevliet and the intersection at the Beijerlandselaan.

The third subquestion, *'What are the current physical, social and individual characteristics of Hillesluis?',* is answered by using a spatial analysis in chapter 6. A lot of data and conclusions came out of this. One of the most relevant conclusions here was the current barrier of the train tracks. According to the spatial analysis, the Riederbuurt Zuid is also emerged as a less considerd part. This correspondents with the inhabitants.

Subquestion four, *'What kinds of spatial interventions can improve livability and safety in a neighborhood?'* is answered in chapter 4 (theory), chapter 7 (pattern language) and chapter 8 (design).
The theoretical framework in chapter 4 shows that the

safety and livability can be improved by using six principles: social cohesion, attracttivity, connectivity accessibility, visibility and territoriality.
In the pattern language in chapter 7 a design of patterns is established. The patterns are design interventions based on literature, which contribute to the livability and safety of a neighborhood.
Chapter 8, the design, shows how these patterns are implemented on the design locations in Hillesluis.

By answering these four subquestions, an answer on the main question can be given. The perceived livability and safety in Hillesluis can be improved by developing a pattern language which can be implemented on different design locations based on both the spatial analysis as the perception of the inhabitants. This perception of inhabitants is obtained through a survey.

The location specific answer on the main research question is that the livability and safety of Hillesluis is improved by designing spatial interventions for 5 locations. The connectivity of Hillesluis to it's surroundings is improved by making new pedestrian bridges over the Hillevliet and the train tracks. Also, the visibility and safety at the Stichtseplein and the Stadionviduct are improved. At last, the Riederbuurt Zuid is redeveloped and now has an improved safety and livability.

8.2 Reflection

This reflection will first address the key chapters of this thesis: problem statement, methodology, and theory. It will then reflect on the relationship of this thesis to the graduation studio and the relationship between research and design within this thesis. Finally, the transferability and the next steps of this thesis will be reflected.

8.2.1 Problem statement & location

The problem statement of this thesis includes both low livability and unsafety in a number of neighborhoods in Rotterdam South. The concepts of livability and safety will recur after this as main topics throughout this thesis. For a long time, I was in doubt whether I should specify the problem to only unsafety, or also include livability. I found out that there is a very strong connection between livability and safety, which was the reason to also include livability. However, the research could have been further specified if there was only focused on safety.

In the problem statement, Hillesluis is chosen as a location for analyzing further. I am satisfied with focussing on Hillesluis instead of Rotterdam South as a whole because otherwise, the outcome would have been more strategic and visionary. My personal intention was to have design solutions as the outcome of this thesis.

The only thing I have missed in terms of location is space for densification. Hillesluis already has a very high density of buildings so there is no room for larger-scale interventions without demolishing homes. Because of this, most of the interventions I have done are smaller interventions in public space. By working with two variants for the design of the Riederbuurt Zuid I was able to also create a more extremer option with demolishing current housing.

8.2.2 Methodology

The main principle of this thesis was to approach livability and safety from the resident's experience. To achieve

this, several methods were used. The main methods will be reflected on.

1. Spatial analysis

Before obtaining residents' perceptions, a spatial analysis based on literature was done. As a result, Hillesluis was first analyzed from a neutral perspective. I think it is certainly a requirement to make an objective analysis in addition to the residents' perceptions: this will make the analysis of the problems in the neighborhood as complete as possible. However, the extent to which the spatial analysis is objective can be questioned. The aspects on which Hillesluis was analyzed are based on theory. However, the execution of the analysis can still go by the person who analyzes the neighborhood. In addition, I did my own interpretation of the principles of the various theories. This is ultimately what the structure of the analysis is based on and is maybe not totally objective.

2. Survey

A survey is used to obtain the perception of residents of Hillesluis about safety and livability. However, it was difficult to find residents willing to participate in the survey. Through various social media platforms such as Facebook and Instagram, there was no response. I then went to the neighborhood to speak to people on the street, which provided some responses. Most of the responses came from attending a Hillesluis neighborhood meeting. This is an event where only the most involved people of a neighborhood come. In the future, it would be better to conduct more interviews on the street. In the end, 19 people completed the survey. A critical note can be made here: looking at Hillesluis' total amount of inhabitants of more than 11 thousand, 19 respondents is a relatively small number. In addition, most of the people interviewed are over the age of 30. In contrast, Hillesluis as a whole has relatively many residents under the age of 30. Thus, the respondent group is not entirely representative in terms of age. In addition, there are some critical things on the survey that could be handled differently in the future. For example, in the survey, people could be asked to write down their zip code, this way it can be seen where the respondent lives. It is plausible that a resident regards his street or neighborhood more positively than someone who lives somewhere else. Another improvement could

be asking for an explanation of why people avoid certain places or perceive them as less so. This can more quickly uncover the problem of the place.
The method itself to get in touch with people from the neighborhood was a good one. It gave me insights that I did not gained through spatial analysis. The residents are the people who use the neighborhood most intensively and therefore have the most knowledge of it.

3. Pattern language

In addition, I also used the pattern language method. The pattern language provided a set of 23 interventions. The patterns used are focused on interventions that are spatial. The thesis could be improved by adding more patterns. The pattern language method helped me a lot to combine research and design. This will be discussed in more detail later in the reflection.

Another critical note can be made about using the approach to use the residents' perspective. Residents' perceptions were only used to find locations that were considered less so or perceived as unsafe. After this, there has been no contact anymore with the residents. Thus, there is no knowledge of what the residents think of the new interventions.

8.2.3 Theory

Throughout the process, I struggled to have a clear definition of safety. There was challenge for me in defining the different types of safety and making explicit which types of safety are spatial and which are not. This is the main feedback I received from my mentors throughout the process. In the end, I tried to incorporate this feedback on safety into the theory part of this thesis. The first paragraph of the theory chapter is dedicated to making safety more explicit. Here I made a distinction between objective and subjective safety and social and physical safety. I also received a lot of feedback about making clear the type of safety and the task per design location. In this way I could apply the theory into the design part. The type of safety and task are incorporated in the different design locations.

The theory chapter used several theories on how crime can be prevented through urban design. The theoretical framework combined these theories. Here, the spatial aspects from the theories were used. However, the theories of CPTED and Veilig Ontwerp en Beheer were very similar, because Veilig Ontwerp en Beheer is the Dutch translation of CPTED. So maybe it's a little double to have covered both theories because some of the principles were very similar. Next to that, 'connectivity' and 'accessibility' were named as separate princples in my own interpretation of the theories. However, after analyzing Hillesluis in terms of these two aspects, I found out that these are very similar, and it can be questioned whether they should not be combined into one aspect.

8.2.4 Relation thesis with master & studio

This thesis is part of the graduation studio ''Design of the Urban Fabric'' within the mastertrack Urbanism. The performance of societies' social, economic, and environmental systems depends on the quality of the urban environment, according to the Urbanism track of the TU Delft (Urbanism, n.d.). In this thesis, the quality of the urban environment recurs in the form of the concept of livability.

In the Design of the Urban Fabric studio the focus is on the relation and interaction between the physical and the sociocultural, ecological, managerial, and economical aspects (Aalbers et al., 2021). I think it is important that my project is versatile and takes all these aspects into account to achieve the best possible design as an end product of my thesis. Therefore, the versatility of this studio fits well with my personal approach. These different aspects are almost all covered in my thesis. Only the manegerial aspect was less discussed because it was less relevant to the approach of my thesis: looking resident point of view. The climate crisis and increasing social diversification are two of the most important issues in the Design of the Urban Fabric studio (Aalbers et al., 2021). Especially the subject of social diversification is extensively discussed because this thesis deals with unsafety in a

socio-economically inferior neighborhood, Hillesluis. In addition, the climate crisis is also a problem addressed in this thesis and a solution is sought through the addition of greenery in the neighborhood. Thus, the studio's two major addressed issues align good with this thesis.

8.2.5 Relation research & design

Research and design are interwoven in the Design of the Urban fabric studio (Aalbers et al., 2021). In general, I find it difficult to mix these two processes. I received a lot of feedback from my teacher on making explicit the different conclusions I could draw from the spatial analysis. In the report and during the presentations, I gave a lot of information, but there was still some work to be done in making the conclusions more explicit. By always making conclusions per part of the spatial analysis, it is easier to make a connection between research and design. I eventually tried to do this by concluding each part of the analysis with a concluding sentence.

The pattern language intensive helped me a lot with creating a good connection between research and design in my thesis. By using the pattern language, most of the design decisions in this thesis are based on literature. This also forced me to start thinking early in the process about what interventions could contribute to livability and safety, because the pattern language intensive took place before the P1 presentation. I then added and modified patterns from start to finish in the whole process.

8.2.6 Transferabillity

When a neighborhood needs to be analyzed in terms of livability and safety, the structure of the analysis used in this thesis can be used because it is based on literature and is thus not site-specific. In addition, the theoretical framework of this thesis can be used as an overview of where livability and safety in a neighborhood are depending on and how it can be improved.

The method of using a neighborhood survey to find out which places people like to avoid and thus perceive as unsafe is a method that can be used well with other neighborhoods, regardless of whether this is a neighborhood that is generally considered less or better. This efficiently identifies the less perceived spots in a neighborhood.

Partly because of this survey, designs were made for locations in Hillesluis which as a whole are not transferrable to other cases. However, the design interventions can serve as examples for other projects addressing safety. One of the design locations is a viaduct, a place regularly perceived as less safe. Therefore, this intervention shows options for activities that can take place under a viaduct.

Next to that, a pattern language is used for the design locations. This pattern language is based on general theories on improving safety and livability in neighborhoods. Thus, the pattern language of this thesis is transferrable and can be used for other neighborhoods where livability and safety are poor. Therefore, all the patterns used in this thesis have been compiled in the related pattern atlas.

8.2.8 Next steps & step-by-step plan

Several steps are interesting to explore further. For example, it is interesting to go back to the residents with the different designs to see what they think of the new designs. In addition, it is interesting to extensively test whether the method and pattern atlas used applies to another neighborhood. There has not yet been time for these steps in the current process of this thesis.

Taking the reflection on the whole process and the areas for improvement together, the following step-by-step plan can be drawn up for improving livability and safety in a neighborhood by designing spatial interventions, while taking the perception of the residents into account:

1. *Spatial analysis based on literature*
It is important to do the spatial analysis of a neighborhood independently first. This allows the spatial analysis not to be influenced by the insights coming from the inhabitants. The spatial analysis may reveal places in need of improvement.

2. *Survey and interviews with inhabitants*
By engaging with residents, their perception can be obtained. From this, as with the spatial analysis, locations in need of improvement will emerge.

3. *Using the pattern atlas*
The pattern atlas can be used for inspiration in making the final spatial interventions made for the various sites.

4. *Developing designs*
Combined with the pattern atlas, spatial designs can be made for problematic locations.

5. *Input from residents*
After this, the spatial interventions created can be taken back to the residents. In this way, the residents' opinions about the interventions can be obtained. Here it is useful if this is not done at the very end of the process. Any adjustments can then be made more easily.

6. *Finalizing*
Finally, residents' input can be taken into account to create the final design.

10
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11

Appendix

11.1 Survey

Voor u ligt een korte vragenlijst over de wijk Hillesluis in Rotterdam Zuid. Voor mijn scriptie aan de TU Delft ben ik onderzoek aan het doen naar de leefbaarheid en veiligheid in Rotterdam Zuid en zal ik Hillesluis als voorbeeldwijk nemen.

De vragenlijst zal maximaal 5 minuten tijd in beslag nemen en zal anoniem worden verwerkt. Als u een vraag niet wilt/kunt beantwoorden, kan deze leeg worden gelaten.

Alvast bedankt,
Dennis Groen
06 42621134
dennis-groen-98@hotmail.com

Algemene vragen

1. Wat is uw geslacht?

☐ Man
☐ Vrouw
☐ Overig

2. Wat is uw leeftijd?

----

3. Wat is uw afkomst?

----

4. Bent u in Hilllesluis woonachtig?

☐ Ja
☐ Nee

Vragen over Hillesluis

5. Wat ervaart u als sterke / positieve eigenschappen van Hillesluis?

6. Wat ervaart u als zwakke / negatieve eigenschappen van Hillesluis?

Doormiddel van de volgende vragen wil ik informatie verkrijgen waar de goede en mindere plekken in de wijk zich bevinden. Deze plekken kunt u in de onderstaande kaart aangeven. Daarnaast kunnen deze plekken ook worden benoemd of eventueel worden toegelicht in het tekstkader.

7. Zijn er plekken in Hillesluis waar u graag komt?
(*Graag deze in de kaart aangeven met een +*)

8. Zijn er plekken in Hillesluis waar u liever niet komt?
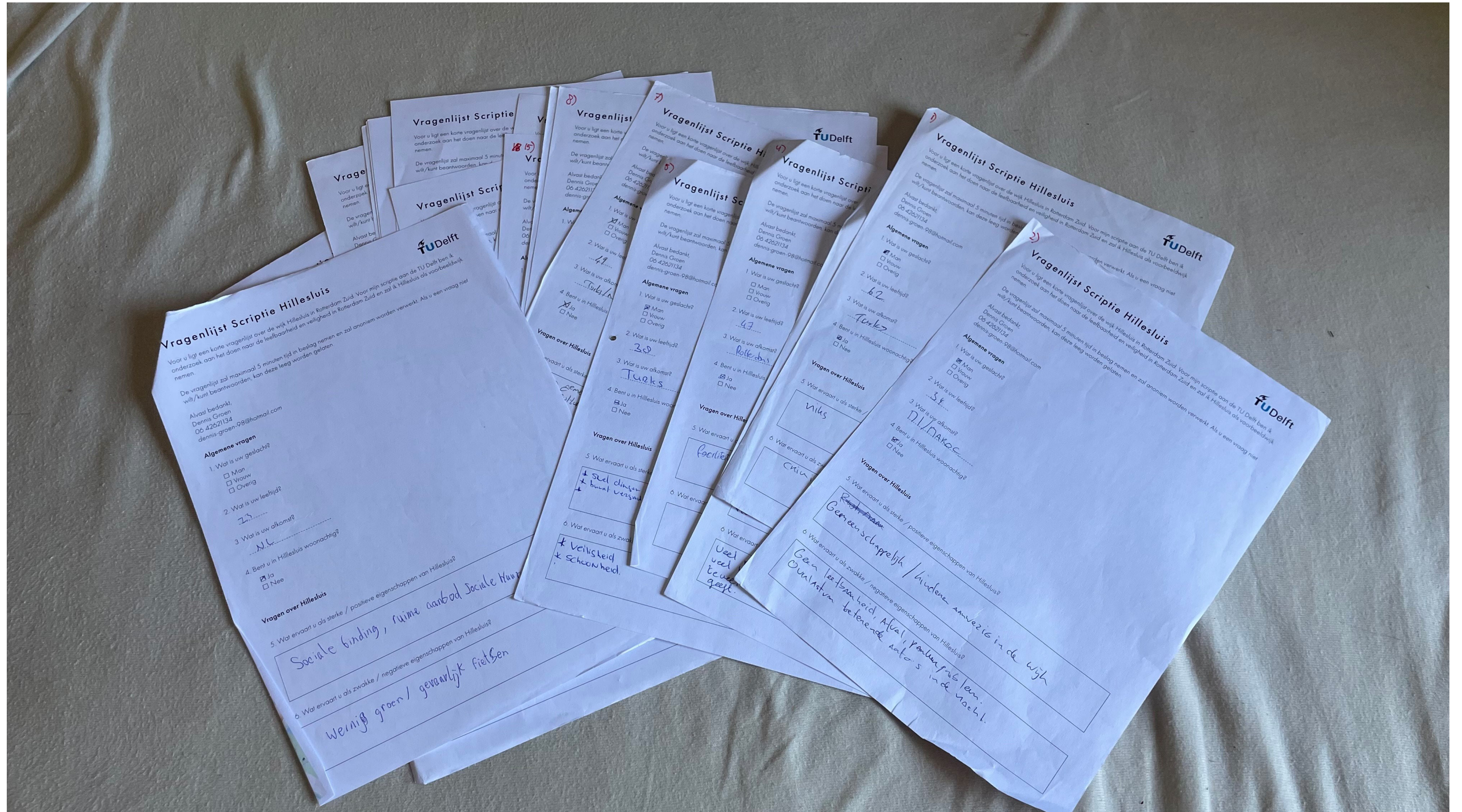(*Graag deze in de kaart aangeven met een -*)

9. Zijn er plekken in Hillesluis die u als minder ervaart?
(*Graag deze in de kaart aangeven met een x*)
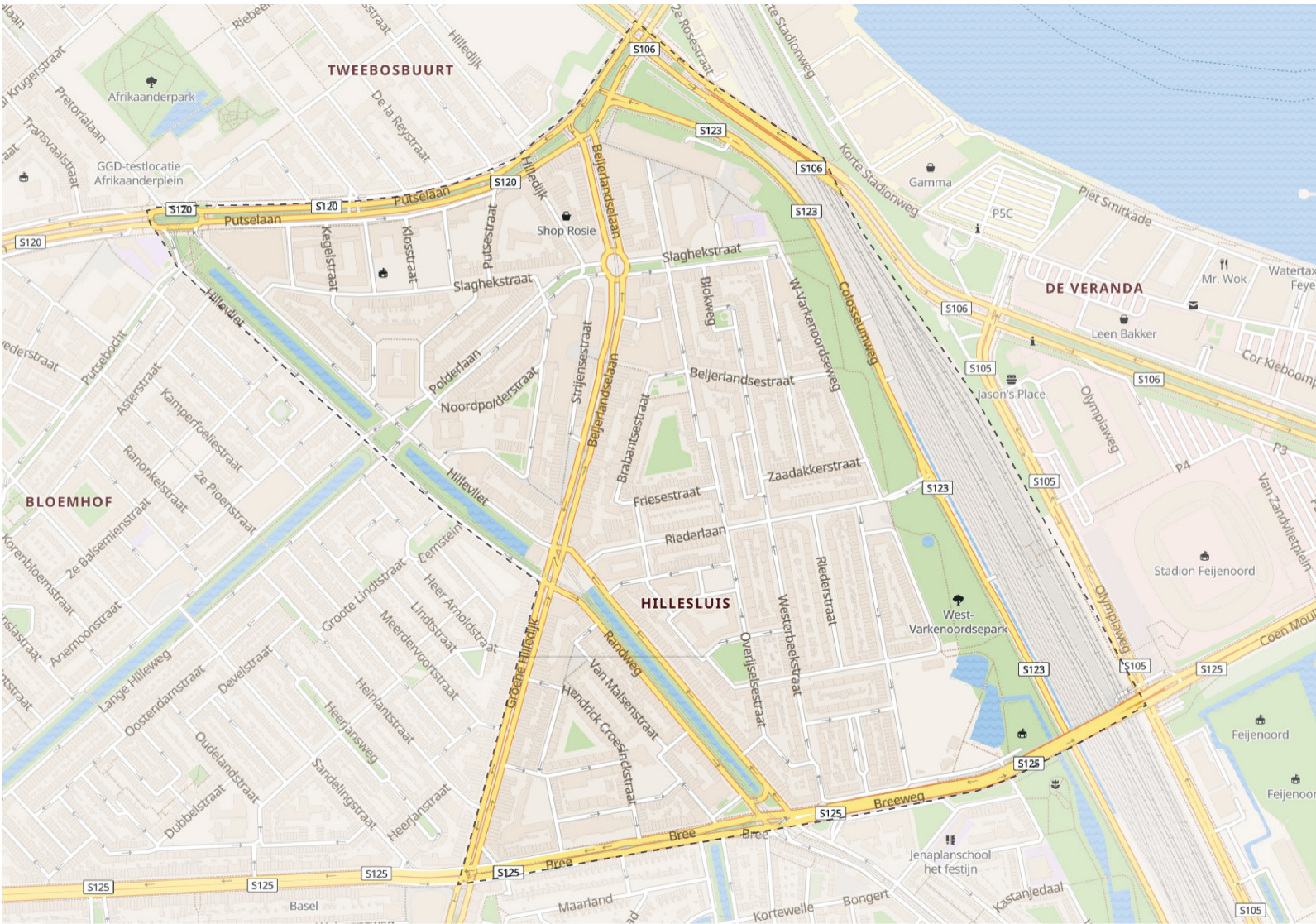
All surveys

Said Aharchaou (53)

Served for 4 years as neighborhood counselor in Hillesluis.

Origin: Moroccan

Positive aspects
'' I experience the diversity in Hillesluis as a positive feature. In addition, the Beijerlandselaan is one of the qualities of the neighborhood, but it is currently not well used.

Negative aspects
''However, there are also many problems in the neighborhood. Many people have a language deficiency and an unhealthy lifestyle. This is partly due to the low incomes. The Beijerlandselaan contributes to this because there are many cheap fast food chains. There are also few sports clubs. This does not contribute to social cohesion; people live very much by themselves. Many young people are without education and work. This makes them more likely to choose the side of crime.

The Beijerlandselaan plays a big role in this, it is a place where business can be done.'   '

New building plans
''In addition, I don't think you can change Hillesluis by putting up new buildings. The problems will remain the same if housing and education are not addressed. In that way you won't attract new people to the neighborhood. As a result, young graduates are moving away from the Hillesluis neighborhood. They don't want their children to grow up there and go to Barendrecht, for example.''

Jasper Nootenboom

Neighborhood police officer in Hillesluis

Origin: Dutch

Positive aspects
''For me, positive aspects about Hillesluis are the multiculturality and the amount of social housing. Next to that, there are a lot of stores at the Beijerlandselaan.''

Negative aspects
''I always prefer to talk about points that can be improved rather than negative points. One point for improvement is de amount of trash on the streets. People do not feel responsible for the neighborhood, and therefore do not feel de need to clean their neighborhood.

Another improvement is the need for a meeting place. However, the great diversity in age makes this a challenge to achieve. ''

Nuisance
'' I do not experiece places in Hillesluis as unsafe, so there are no places that I tend to avoid. That would not be good for a neighborhood officer. But from my own experience, the most nuisance is at the Stichtseplein or the Stadionviaduct.''

Anja Bergsma

Lives in Hillesluis since 1987 and is volunteer at the playground association.

Origin: Dutch

Positive aspects
'' I have lived in Hillesluis since 1987 and I like it here. I know many people in the neighborhood and can therefore rely on many people. To me Hillesluis feels just like a village, if there is something people help each other.''

Positive aspects
''However, there are also negative points about Hillesluis. Everyone knows that it is one of the deprived neighborhoods of Rotterdam. There is a lot of garbage on the streets because people don't care where they leave their garbage. There are many immigrants and low educated people living there. There are also many young children, which is positive, but they also cause a lot of nuisance. In addition, different cultures live alongside each other around. The municipality does not help with this, organizing activities only for immigrant women, for example.

I was also once given a grant for the playground assocciatino to organize more activities for immigrant youth. I refused this one, because I think everybody needs to be incorporated. I also think there are too few community centers in the neighborhood. This does not benefit social cohesion.''

New building plans
''In addition, there are already some newly built sections in the neighborhood. However, many people who live in the new construction area move away quickly. In addition, young people from the neighborhood say they would rather live in Barendrecht later on, for example. The other new construction plans such as Hand in Hand, Feijenoord City and Feijenoord XL seem to want to tackle the areas around Hillesluis but forget the neighborhood itself, where the real problems lie. ''

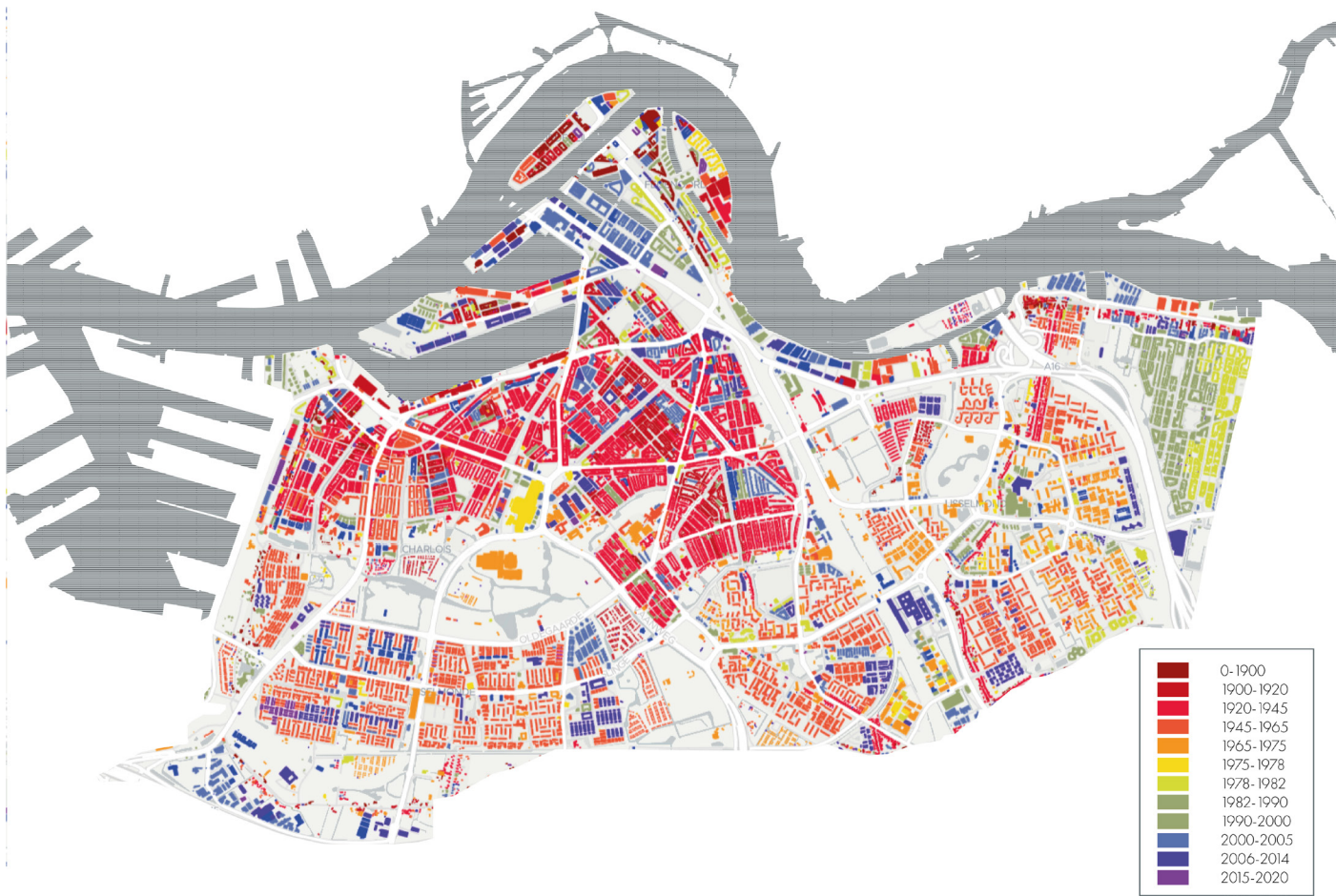# 11.3 Analysis maps

11.2.1 Building periods

Fig 11.1: Building periods (Kaart.edugis.nl)

11.2.2 Density

Fig 11.2: Density (Own image, based on Gemeente Rotterdam (2022))

11.2.1 Road network Hillesluis

Main roads
Secondary roads
Tertiary roads

Fig 11.3: Road network