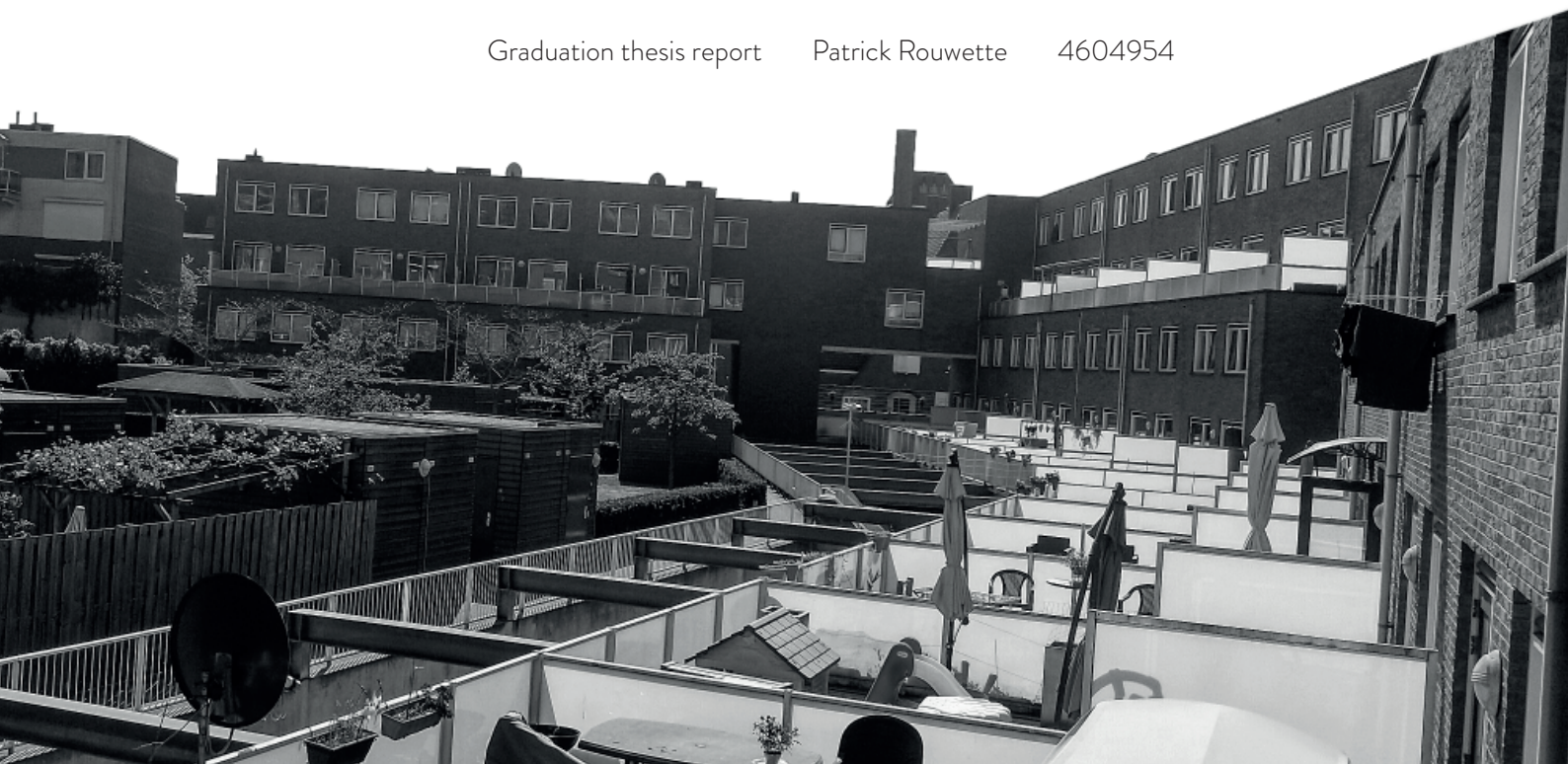


Rethinking Urban **Domestic Gardens**

Aligning Urban Domestic Gardens to concrete urban demands

Graduation thesis report Patrick Rouwette 4604954



Acknowledgements

I want to thank several people for their support and inspiration during the thesis process. Firstly, my mentors Birgit Hausleitner, Denise Piccinini and Andrea Fitskie, for their continues support, knowledge, beliefs and happiness during the contact moments. I would also like to especially thank the Veldacademie and Otto Trienekens, for the support and giving the opportunity for the cooperation and offering a beautiful working space helping me through rougher times. Furthermore to my family, who made it possible for me to study something where my passion is in, and their love and encouragement to keep pushing. Lastly, thank you to all my friends, making this long process fun and entertaining. Thank you!

Colophon

MSC Graduation Thesis

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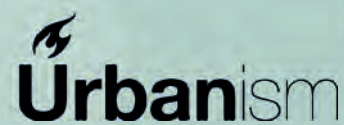
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Cover image: Gardens in the Tarwewijk. By author

Date: January 21st , 2021

All image sources not made by the author can be found in the Appendix (List of Figures)



Rethinking Urban Domestic Gardens

Aligning Urban Domestic Gardens to concrete urban demands

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CHAPTER

0

Introduction

- 0.1 Motivation Of The Study
- 0.2 Clarification Of Terms
- 0.3 Relevance Of The Study
- 0.4 Scale Definition

0.1 Motivation Of The Study

A personal interest and experience has been the main motivation focusing on urban domestic gardens in this research. In the neighbourhood where I grew up, in a certain period, many front gardens changed into personal parking spaces for cars. This change, influencing the aesthetic quality of the neighbourhood has always stayed with me. That's why I am grateful having the opportunity to research this topic.

It is important to see increasing initiatives like the Operatie Steenbreek, on the topic of the urban domestic gardens in the urban environment. While urban conditions in neighbourhoods can be influenced and steered by urban planners, creating opportunities for initiatives, the inhabitants themselves are the ones who create the neighbourhood and are responsible for it.

Urban domestic gardens have the opportunity to be important for the living conditions in neighbourhoods. While the Dutch government regulates sustainability in housing through building regulations, and municipalities create implementation plans for the public spaces, the urban domestic gardens remain a grey area, with a lot of potential for improvements.

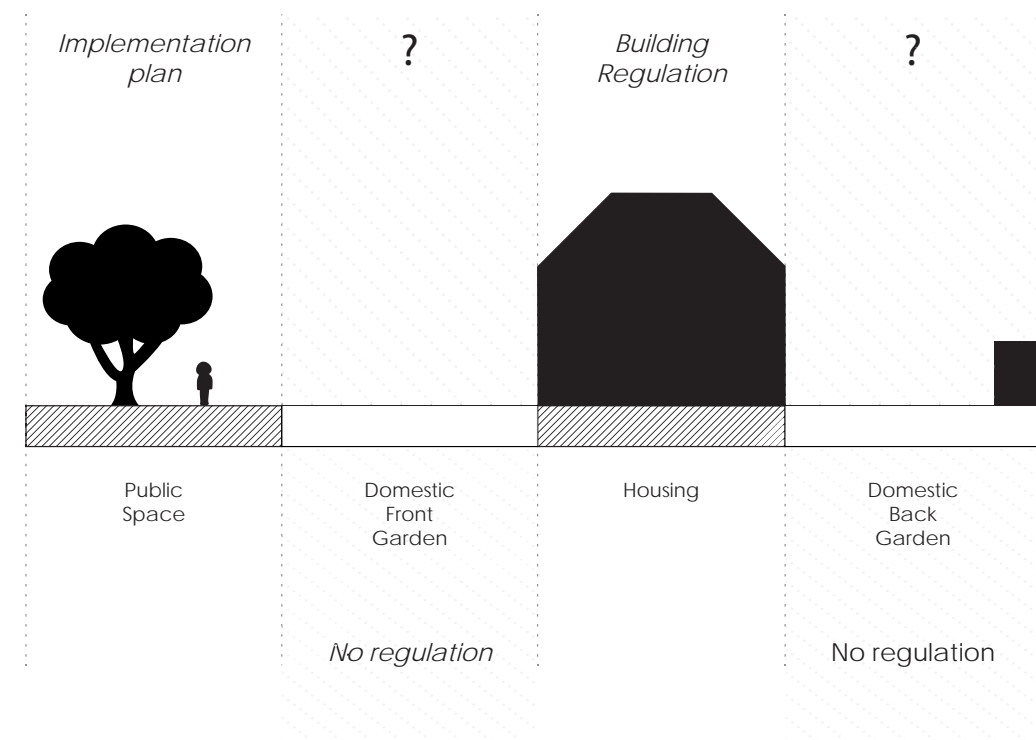


Fig. 1 Grey area urban domestic gardens. By author

0.2 Clarification Of Terms

Urban domestic gardens

Urban domestic gardens are considered the outdoor private spaces, attached to a house or building, which is either rented or privately owned. The autonomy over the garden is in hands of the resident/s (Cameron & al, 2012)

Public Space

The term public space is used for all the open land which is accessible for the public. Examples of public spaces are streets, squares, playgrounds, parks and other green spaces.

Liveability:

Liveability can be explained as 'the extent to which a living environment matches the adaptive repertoire of humans and is appreciated by an inhabitant' (Dorst, 2005). The term liveability will be further discussed in a later stage of the thesis.

Concrete urban demands

Concrete urban demand is used as a collective term which includes multiple urgent and ongoing processes in the urban environment, like climate change and the densification of the built environment. These demands are not specific for a certain city, but are common in the urban environment in the Netherlands.

0.3 Relevance Of The Study

Societal relevance

The concrete urban demands which were taken into account in the thesis, the densification of the urban environment, adapting the urban environment to climate change, the increased soil sealing and changing socio-environmental conditions will affect whole societies living in the urban environments. Together with the fact that social behaviour regarding urban domestic garden use in multiple aspects is the direct cause of the declining liveability of urban environments, the societal relevance of this research is considered significant. The recent Covid-19 pandemic also made clear how important having a qualitative private outdoor space can be, since large parts of residents in dense urban areas do not have access to it. The outcomes will have potential to facilitate change at multiple scales, from the Tarwewijk to the city of Rotterdam, creating a sense of collectivity, counteracting the NIMBY-effect an improving the liveability and thereby positively affecting the whole urban societies.

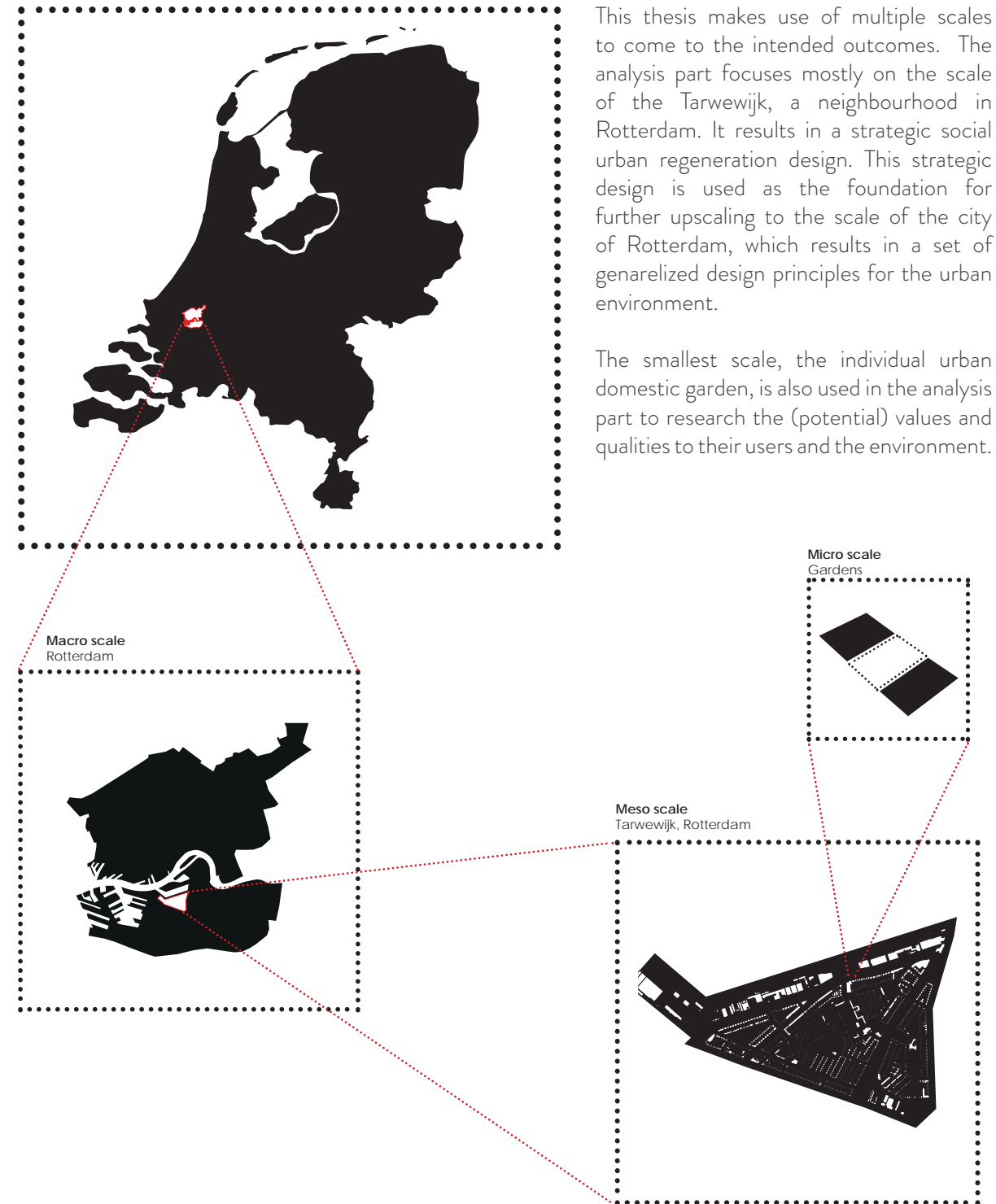
Scientific relevance

In times where the effects of climate change are becoming more noticeable and the need for denser and more liveable urban environments grow, the outcomes of the research have potential to reinforce common existing and future urban typologies in the Rotterdam, counteracting the negative effects of climate change and soil sealing on the urban environment, while providing more liveable and denser environments. And thereby respond to contemporary issues in the discipline of

Ethical considerations

The research takes several ethical values into considerations, like the transparency of the gathering and processing of data by literature research or interviews. Collaboration with local people, and by that improving the understanding or informing people of climate change, is also an important ethical factor in the research. An important part of the research is also thinking about and designing ways on how to provide certain qualities of private gardens for all the citizens. Whereas dense urban environments cannot provide everyone with an urban domestic garden, other ways to create inclusive environments with the same qualities are developed to strengthen the inclusivity of the neighbourhood. Translating this to general principles also creates opportunities to deliver more inclusive environments on a larger city scale, where people, from young children growing up in the neighbourhoods too elderly people enjoying their days, have access to the same qualities.

0.4 Scale definition



CHAPTER

1

Problem Field

- 1.1 Problem Context
- 1.2 Problem Field
- 1.3 Context of Tarwewijk
- 1.4 Problem Statement
- 1.5 Research Questions
- 1.6 Research Aim
- 1.7 Research Outcomes

1.1 Problem Context

URBANISATION & URBAN SPRAWL

The urbanisation in the Netherlands from the beginning of the 20th century has seen core cities started to develop into densely populated and thriving urban environments. Driven by population growth and the need for more housing, especially after WWII, suburbanization through urban sprawl has led smaller cities to expand into their peripheries (Nabielek & al, 2016). Being part of the Dutch culture for centuries, urban domestic gardens have played a significant role in the urban environment of Dutch cities. The urban sprawl strengthened this role even more. Front- and back gardens became the standard for most of the neighbourhoods that were built, taking up a significant number of space in the cities, increasing their value for the cities social- and environmental climate and the aesthetic quality of neighbourhoods (Kullberg, 2016).

Around the 2000s, a trend has been established with the re-urbanisation of mostly core cities (G4) in the Netherlands (Amsterdam, Rotterdam, The Hague and Utrecht). After decades of population growth, with approximately 17 million people living in the Netherlands in 2020, it is predicted that the number of inhabitants will stabilize in the coming years. At the same time, it is also predicted that the number of household in the G4 will substantially grow (CBS, 2016).

With available space for urban sprawl being limited due to increased concerns about the quality of the surrounding landscape and the popularity of the G4 further increasing, the Dutch government has been developing strategies to overcome the need for housing in these regions, by adding one million homes, while also protecting the landscapes surrounding the cities. A focus has been on the re-urbanisation of these

core cities, true further densification of the existing urban environment (Nabielek & al, 2012) (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2019)(Bijlsma & Geest, 2017).

While the livability in cities in the Netherlands has grown over the last few decades, concerns regarding livability becoming under pressure with climate change, the projected growth of the G4 and further densification have arisen. With the Nationale Omgevingsvisie (2019), the Dutch Government strives to improve the living environments for inhabitants, by prioritizing development towards a climate adaptation and strong and healthy cities, with extra focus on social health, integration of green and water and cultural heritage. Sustainable urban regeneration of the existing urban environments will play an important role in accommodating these priorities which will provide space and quality for housing and living for the current and future society (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2019).



Fig. 2 Urban regeneration in Rotterdam

1.2 Problem Field

SUSTAINABLE URBAN REGENERATION

As mentioned in the Nationale Omgevingsvisie (2019), sustainable urban regeneration will play an important role in fulfilling the priorities regarding the improvement of the quality of the urban environment. While many cities in the Netherlands nowadays use urban regeneration to improve the quality of the urban environment, it has been a commonly used method for decades. Started from 1901 with the Woningwet, but mainly used since the 1960s, urban regeneration was used for demolishing and rebuilding complete neighbourhoods without taking positive characteristics and elements of neighbourhoods into account (Schuiling, 2007). It was thereby mostly the social context and participation which was being neglected in developments. With the growing importance and knowledge regarding sustainable urban development, which consist of four components, environmental, social, economic and governance, urban development focus more on including all four components, whereas participation and the existing social aspects of areas are becoming more important (Valentin & Spangenberg, 2000) (Stren & Polèse, 2000).

Sustainable urban regeneration can be seen as “the regeneration policies and processes within a city, which seek to address inter-related problems to consider, reduce and mitigate their environmental impact” (Czischke, Moloney, & Turcu, 2014, p. 7). With multiple approaches of urban regeneration being present to address urban problems, including the urban form and design perspective, health and well-being perspective and the community-based, social economy approach, the social component is included in all three approaches, varying in strength and position

(Colantonio & Dixon, 2009).

Being the social component of sustainable urban regeneration, social sustainability has potential to generate outputs and outcomes in multiple dimensions for local communities and neighbourhoods, like health and safety, housing and environmental health, identity, sense of place and culture, participation, social capital, social mixing and cohesion, well-being, happiness and quality of life (Colantonio & Dixon, 2009). This is also dependent on the approach of how social sustainability is interpreted. According to Chiu (2003), the first approach equates social sustainability to environmental sustainability. The environmental-oriented approach focusses on the social preconditions to achieve environmental sustainability, while the people-oriented approach focusses on maintaining or improving the well-being of people, with a possibility to combine the last two into a more comprehensive concept of social sustainability (Chiu, 2003). Combining it is in line with the findings of Stren and Polèse (2000), who state that social sustainability is critical to become environmentally sustainable, which is becoming increasingly important with the undergoing climate change.

The majority of the sustainable urban regeneration projects focus on the housing stock and the public spaces in neighbourhoods to achieve social sustainability. While urban gardens take up a significant number of space in the cities, and their alleged social and environmental contribution to the urban environment (Kullberg, 2016), it's contribution to social sustainability remains largely under-studied (Bernardini & Irvine, 2007) (Brindley, Jorgensen, & Maheswaran, 2018) (Dunnett & Qasim, 2000) (Farahani, Maller, & Phelan, 2018).



A Lesson from Social Distancing: Build Better Balconies

Lockdown UK: 'There are now two classes, people with gardens and the rest of us'

Home gardening blooms around the world during coronavirus lockdowns

Covid-19 is highlighting cities' unequal access to green space

In lockdown, gardens have become the new great social divide

Coronavirus highlights the need for open green spaces in cities

How we've rediscovered the natural world during the lockdown

Cities after coronavirus: how Covid-19 could radically alter urban life

Fig. 3 Newspapers Covid 19

COVID-19: OPEN SPACE INJUSTICE

The COVID-19 crisis (2020) with its corresponding lockdowns and restrictions is changing the daily life patterns of residents in cities in the Netherlands and all over the world. Ordering people to stay home, closing down facilities, fighting the virus from spreading any further has been a focus point of the many governmental organisations across the Netherlands. While access to the open space has not been completely prohibited, several campaigns directly focused on the behaviour of people in cities, prescribed the use of their own balcony or private garden to get fresh air and enjoy the weather, see figure 4. But as a result of decades of urban development, with cities becoming bigger, denser, less green and open spaces coming under pressure, the COVID-19 crisis starts to highlight the flaws in urban design of many cities. This is translated into the injustice of accessibility to qualitative open spaces in cities and with that the liveability for certain inhabitants. Open spaces in cities are present in many different forms, from public spaces to private spaces like balconies and private gardens. But while having a private open space can facilitate certain qualities of public open

spaces if access is somewhat prohibited, the reality is that a large part of the population in dense urban areas do not have the luxury of a private garden or large balcony, or even a (usable) balcony at all, limiting their options to move around and do activities, affecting their comfort and mobility.

The Covid-19 crisis has the potential to change the view on the importance and appreciation of (public) open spaces in cities, of being able to sit outside and enjoy nature (Jordi Honey-Rosés et al, 2020). But while this development is positive, forms of injustice in the urban environment also become more apparent like unequal access to private outdoor spaces and qualitative open (green) spaces.



Fig. 4 Covid 19 regulations: (translated: Enjoy the sun in the garden and on the balcony!)

**Ruim een derde van de tuinen
bestaat uit tegels: 'Risico op
wateroverlast'**

**Nederlandse tuinen worden ieder
decennium kleiner**

**De verstening van Nederland
gaat onverdroten verder,
'voor bijna 90 procent' ten
koste van landbouwgrond**

**Stadsvogels komen
steeds verder in de
problemen**

**Tuin van rijtjeshuis kleiner dan
ooit**

**Vergrijzing leidt tot verstening
tuinen**

**Klimaatverandering +
plensbui = natte sokken**

Nederland vertegelt

Tuinen Mensen willen meer groen, maar tuinieren doen ze niet van harte. Gevolg is „een verharding van tuinen“.

Boven de stad is het nóg heter

Fig 5 Newspaper headlines concrete urban demands

CONCRETE URBAN DEMANDS

Re-urbanisation through densification: soil sealing

With the national course of developing 1 million homes until 2030, and in the case of South-Holland adding 230.000 houses in the urban environment, a new era of re-urbanisation through densification is currently unfolding (De Zwarte Hond, 2017). As described in the problem context, with the protection of the landscapes surrounding the cities and densification of the existing urban environment, in the case of Rotterdam 50.000 homes until 2040, more stress on the open soil occurs than an increase of sealed soil. While (re) urbanisation and urban sprawl, in general, are seen as the major drivers for the soil sealing of the environment, other factors also play a role in the increasing soil sealing (Science for Environment Policy, 2012). Since the last few decades there has been a shift in the use of urban domestic gardens, which have become more neglected or paved for ease of maintenance. This trend has resulted, together with the same phenomenon in the public space, that gardens play a significant role in the soil sealing of Dutch cities. In Rotterdam for example, almost 40% of the domestic gardens are paved, which has many negative effects on the quality of the urban environment, partly caused by the negative effects of climate change becoming more apparent (Teije, 2019).

Climate transition:

With the climate transition, the urban environment will have to respond to the effects of climate change. While taking up a significant number of space in the cities and having the potential to be valuable for the cities environmental climate, the increase

of soil sealing of urban domestic gardens do not correspond to this. Increased extreme precipitation in combination with paved gardens increase the chance of flooding's because natural infiltration is not possible and the dated sewage systems are not capable do deal with the water. Lack of green due to the paved gardens also results in the increased effects of the Urban Heat Island, influencing the health and living conditions of residents in cities (Kennis voor Klimaat, 2011). Not only humanity is affected by this. Also for nature itself, it has been proven that a lack of green in the urban environment results in a loss of biodiversity (McKinney, 2002).

Changing urban conditions:

Expected changing urban conditions which could alter the urban environment include an aging population, individualisation of the society and lifestyle changes. In an individualizing society, where the number of single-person households is expected to increase with 700.000 by 2030, the social aspects of life become more important, increasing the need of social cohesion and communities in living environments (CBS, 2016). The importance of social cohesion is also present in an ageing society, where the overall social- and physical well-being of inhabitants is linked with need of stronger ties among neighbours and a sense of belonging (Cramm & Nieboer, 2015). But with the ongoing change in the use of urban domestic gardens resulting in more soil sealed gardens, the benefits of the gardens for the social environment in the neighbourhood are lost, influencing the social cohesiveness and the sense of a community (Kullberg, 2016), creating a dis-alignment.

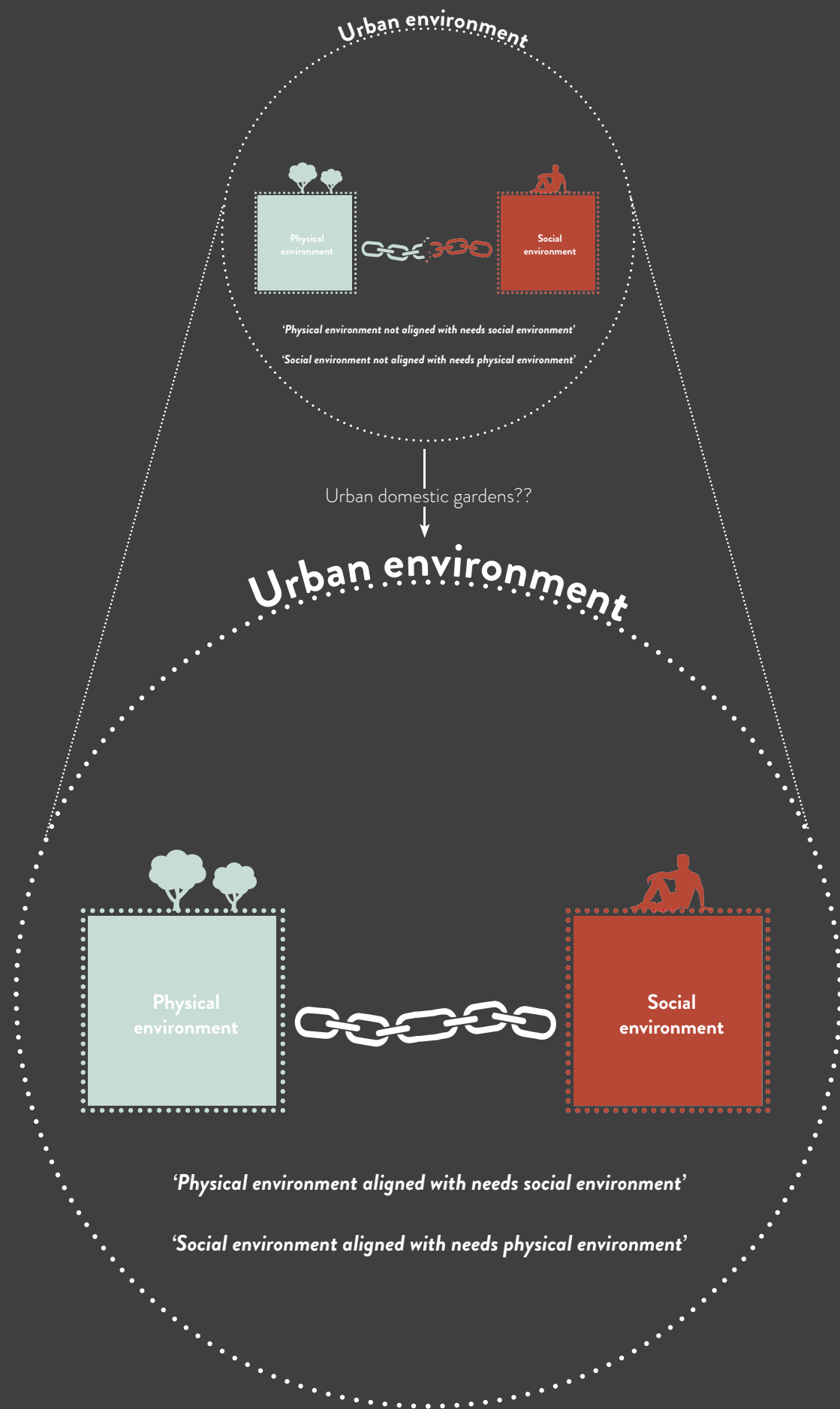


Fig. 6 Aligning social and physical environment

Liveability

Driven by concrete urban demands, such as the urban densification, the climate transition and changing environmental and social conditions, the Nationale Omgevingsvisie (2019) and the Nationaal Programma Rotterdam Zuid strive to improve the living environment for inhabitants. Commonly used as a communicative political term, liveability is often linked with the living environment of inhabitants in urban environments (Dorst, 2005). Further explained in the theoretical framework, the following definition of liveability is used: 'the extent to which a living environment matches the adaptive repertoire of humans and is appreciated by an inhabitant' (translated) (Dorst, 2005).

Consisting of a physical- and social environment, the current living environment shows a mismatch between the two, where the physical environment is not aligned with needs of the social environment (its inhabitants), and the social environment is not aligned with the needs of the physical environment

Taking the demand for gardens and its presence in the urban environment into account, opportunities arise to increase the liveability of the living environments through urban domestic gardens. Where livability is about creating an environment where there is a balance between the physical and social environment.

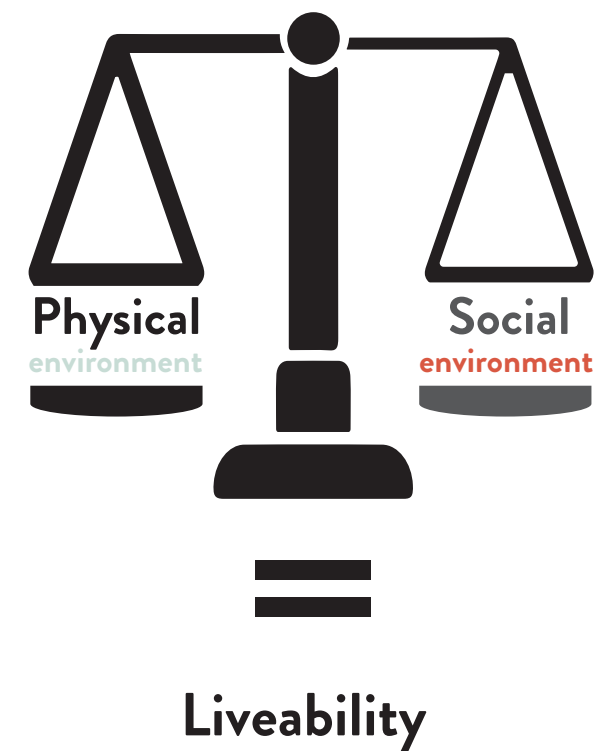


Fig. 7 Liveability as a balance between the social and physical environment

1.3 Context of Tarwewijk

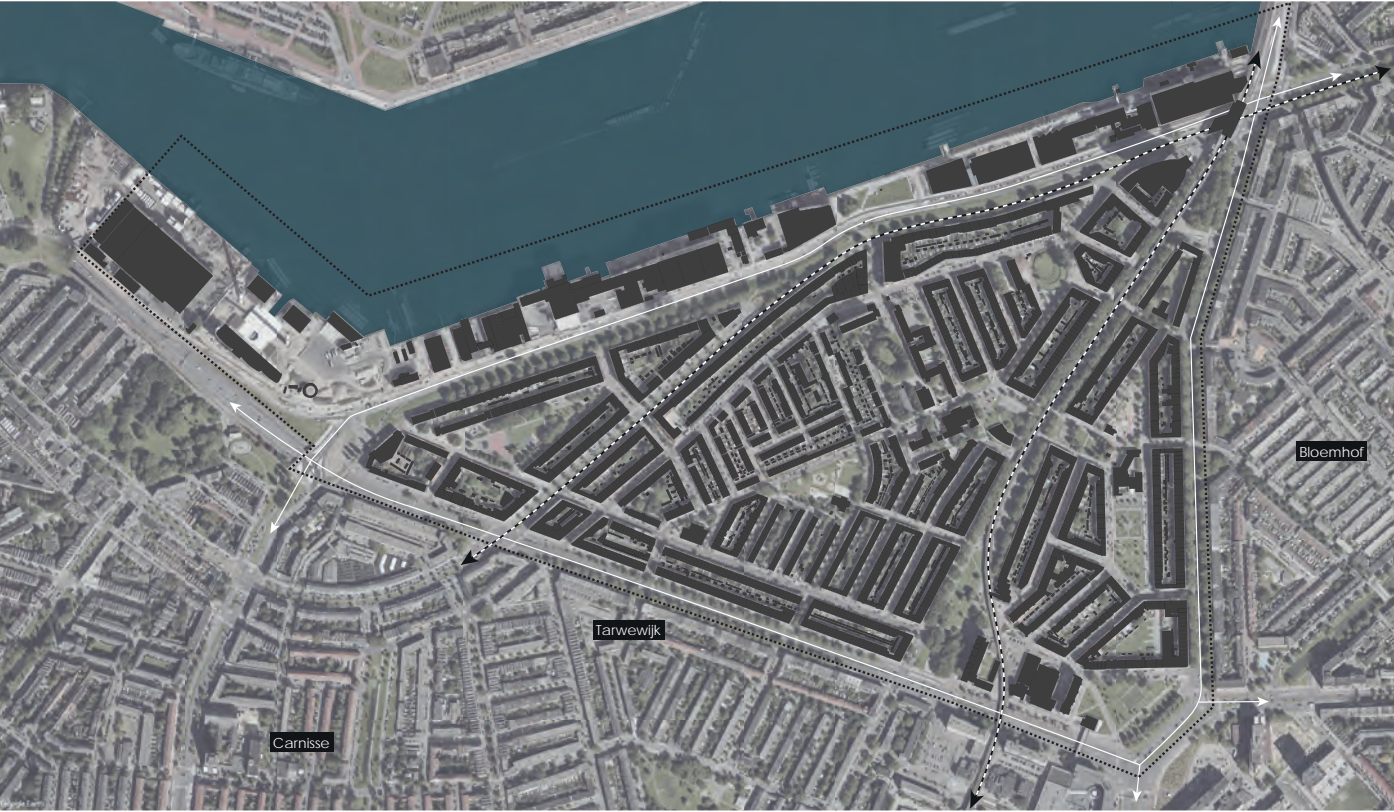


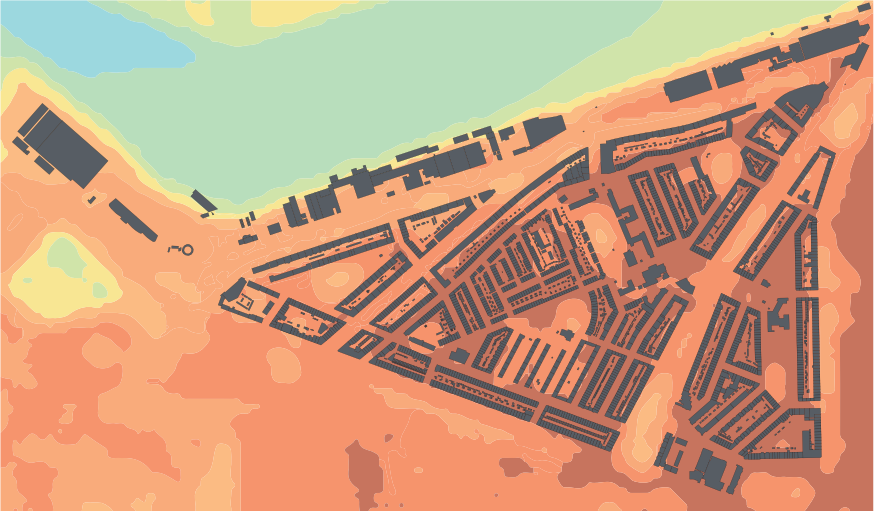
Fig. 8 (up)& 9 Rotterdam & Tarwewijk context - Source: Google Earth, GIS



Legend
 Private space to stay
 Semi-public space to stay
 Public space to stay
 Buildings
 Fig. 10 Places to stay: private vs. public



Legend
 1 dwelling - 1 urban domestic garden
 2 stacked dwellings - 1 urban domestic garden
 3+ stacked dwellings - 1 urban domestic garden
 Other buildings
 Fig. 11 Dwelling density vs access to urban domestic garden



Legend
 +0,8 - 1°C
 +1,0 - 1,2°C
 +1,2 - 1,4°C
 +1,4 - 1,6°C
 +1,6 - 1,8°C
 +1,8 - 2°C
 +2°C
 Buildings
 Fig. 12 Urban Heat Island Tarwewijk

Located in the southern part of Rotterdam, the Tarwewijk is a dense neighbourhood with a mix of different outdoor areas intended to stay as a resident. As seen in figure 10, the majority of space is occupied by private urban domestic gardens, while several patches throughout the neighbourhood serve as a public space. Combined with the data from figure 11, it becomes clear that, because of the dense environment and despite a large amount of space occupied by urban domestic gardens, the vast majority of the inhabitants do not have access to urban domestic gardens. Therefore, inhabitants have to rely on the public spaces for leisure

or activities to experience the benefits of a garden, making the quality of it extra important (see figure 13).

While being a small percentage, the traditional implementation of the urban domestic gardens with row housing can also be traced back to the Tarwewijk. This typology provides both front- and back gardens for the residents, without the presents of balconies overlooking the garden, increasing the privateness and usability because of the absence of shadow, see figure 14.

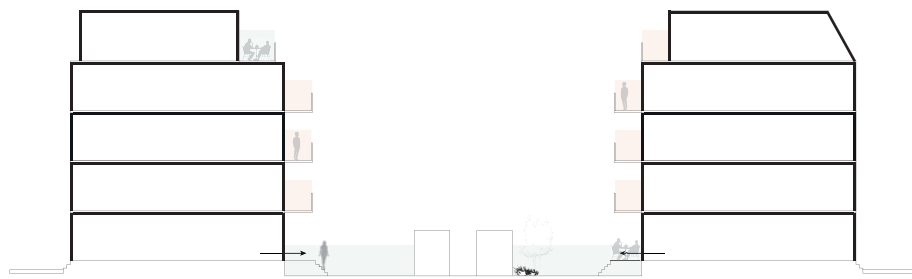


Fig. 13 Section Tarwewijk closed building blocks: limited access urban domestic gardens. By author

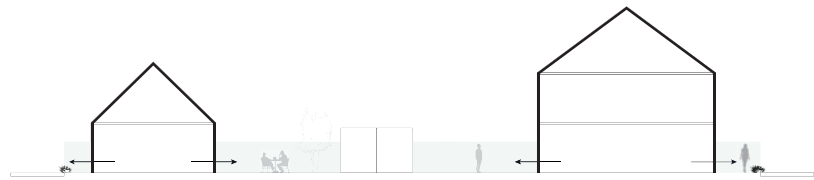


Fig. 14 Section Tarwewijk low rise blocks: full access urban domestic gardens. By author

It is known that dense urban areas like the Tarwewijk are more vulnerable for the effects of the Urban Heat Island. With a large amount of space occupied by urban domestic gardens, and official numbers showing a soil sealing of 34% of the urban domestic gardens in the Tarwewijk, soil sealing is partly responsible for the effects of the Urban Heat Island, as shown in figure

7, with an increased temperature up to two degrees Celcius in some areas (Stichting Steenbreek, 2020). The open public spaces show how green can have positive effects on minimizing the increase in temperature.



Fig. 15 Soil sealing in front gardens



Fig. 16 Soil sealing front garden



Fig. 17 Gardens and balconies in building block



Fig. 18 Gardens and balconies in building block



Fig. 19 Low quality public space Tarwewijk

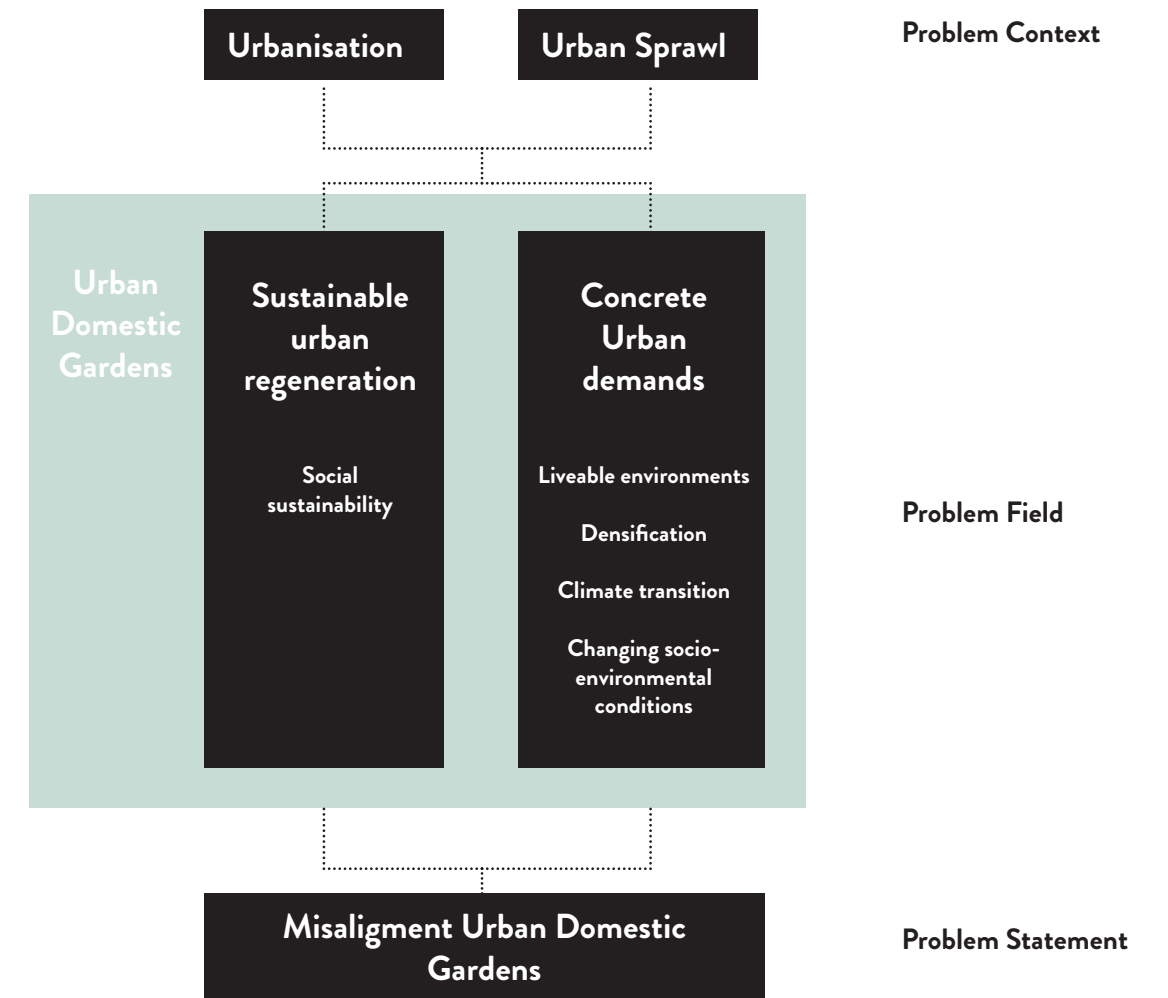


Fig. 20 Fenced off public space Tarwewijk



Fig. 21 Aerial view of the Tarwewijk in 1957

1.4 Problem Statement



PROBLEM STATEMENT

The integration and use of urban domestic gardens in the urban environments in the current way do not align with concrete urban demands in the Netherlands, such as the densification of urban environments, the adaptation of the built environment to climate change and changing socio-environmental conditions in cities.

1.5 Research Questions

RESEARCH QUESTION

How can urban domestic gardens contribute to a more liveable urban environment through a sustainable urban regeneration of the built environment, in response to concrete urban demands in the Netherlands?

SRQ1

What are the values of urban domestic gardens for the quality of the urban environment and its users and how is this affected by concrete urban demands?

SRQ2

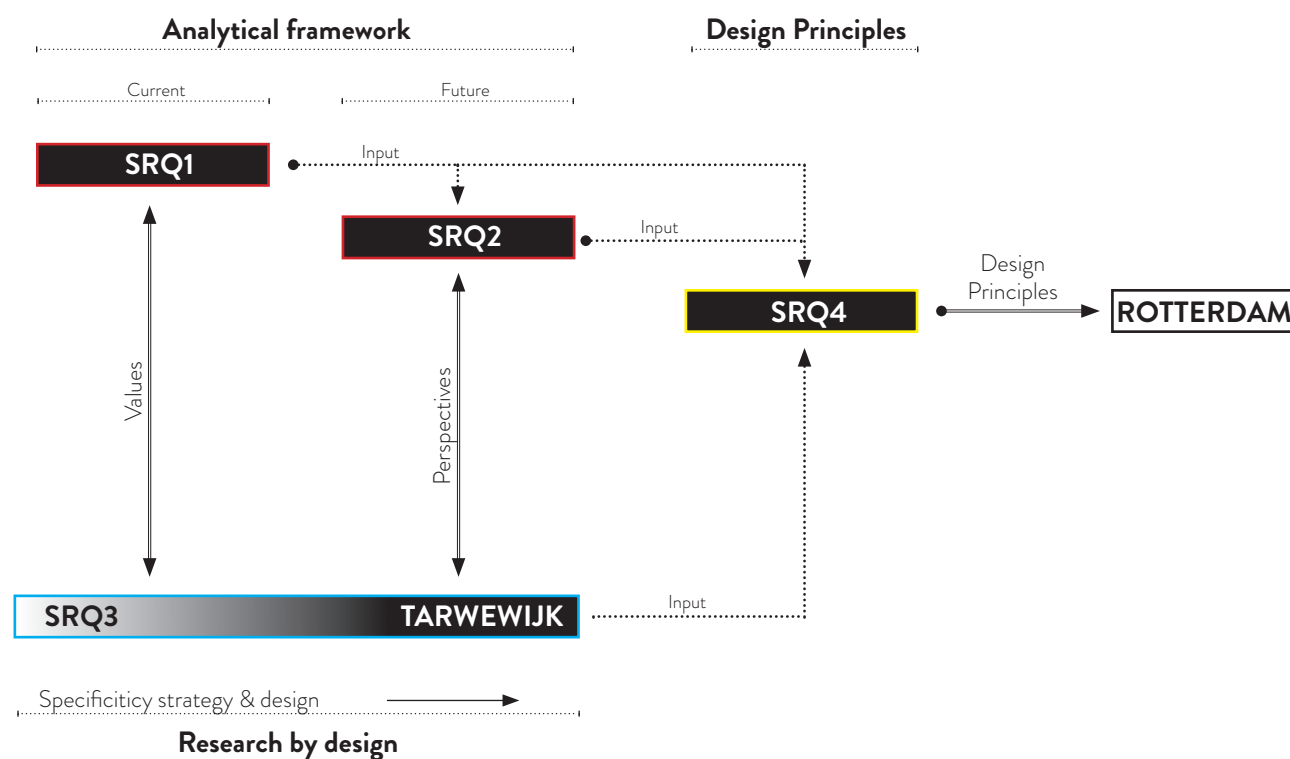
What are the socio-, spatial- and morphological perspectives of urban domestic gardens in the urban environment?

SRQ3

How can a more liveable urban environment in the Tarwewijk be activated through a local sustainable urban regeneration strategy and design by utilizing values and perspectives of urban domestic gardens?

SRQ4

Which elements of the sustainable urban regeneration of the Tarwewijk can be upscaled into generalized design principles for the built environment and what potential does this have for the liveability in Rotterdam.



1.6 Research Aim

The research aims to reveal the possibilities to align the integration and use of urban domestic gardens to concrete urban demands, such as the densification of urban environments, the adaptation of the built environment to climate change, and changing socio-environmental conditions in cities. Reconnecting the social and physical environment which benefits both, and result in a more liveable environment.

1.7 Research Outcomes

The thesis has several outcomes, which are divided into the three different sections, related to specific research questions:

- SRQ1** 1. An assessment of current and future values and perspectives of urban domestic gardens in the urban environment and the Tarwewijk in Rotterdam.
- SRQ2**
- SRQ3** 2. A strategic sustainable urban regeneration design of the Tarwewijk in Rotterdam and a guidance form for urban domestic gardens to utilize the potential values.
- SRQ4** 3. A set of generalized design principles to utilize the values and perspective of urban domestic gardens in the built-environment and increase liveability on the scale of Rotterdam.

CHAPTER

2

Methodology

- 2.0 Introduction
- 2.1 Research Framework
- 2.2 Research Methods
- 2.3 Conceptual Framework
- 2.4 Roadmap
- 2.5 Methodological Framework
- 2.6 Theoretical Underpinning

2.0 Introduction

This methodological chapter is an introduction of the methodological framework of the master research and will present the base structure and research approach which includes the specific research methods used to be able to answer the different research questions. The chapter starts with an overview of the research approach, presented in the methodological flowchart. After that, the research framework is presented, including the problem statement, research aim with the working hypothesis, and the research questions of the thesis.

In the third paragraph, the selected methods which help to answer the research questions are described, including their specific outcomes. It is followed by the conceptual

framework. The fourth paragraph summarizes the process of the thesis in the methodological framework.

The fifth and last paragraph will focus on the theories which are used in this research.

The research makes use of scales, from the smallest scale of individual gardens to the biggest scale of the city of Rotterdam. The main scale for analysis and the strategic sustainable urban regeneration design is the Tarwewijk, located in the city of Rotterdam.



MOTIVATION

PROBLEM CONTEXT

PROBLEM FIELD

LOCATION

PROBLEM STATEMENT

RESEARCH AIM

RESEARCH QUESTION

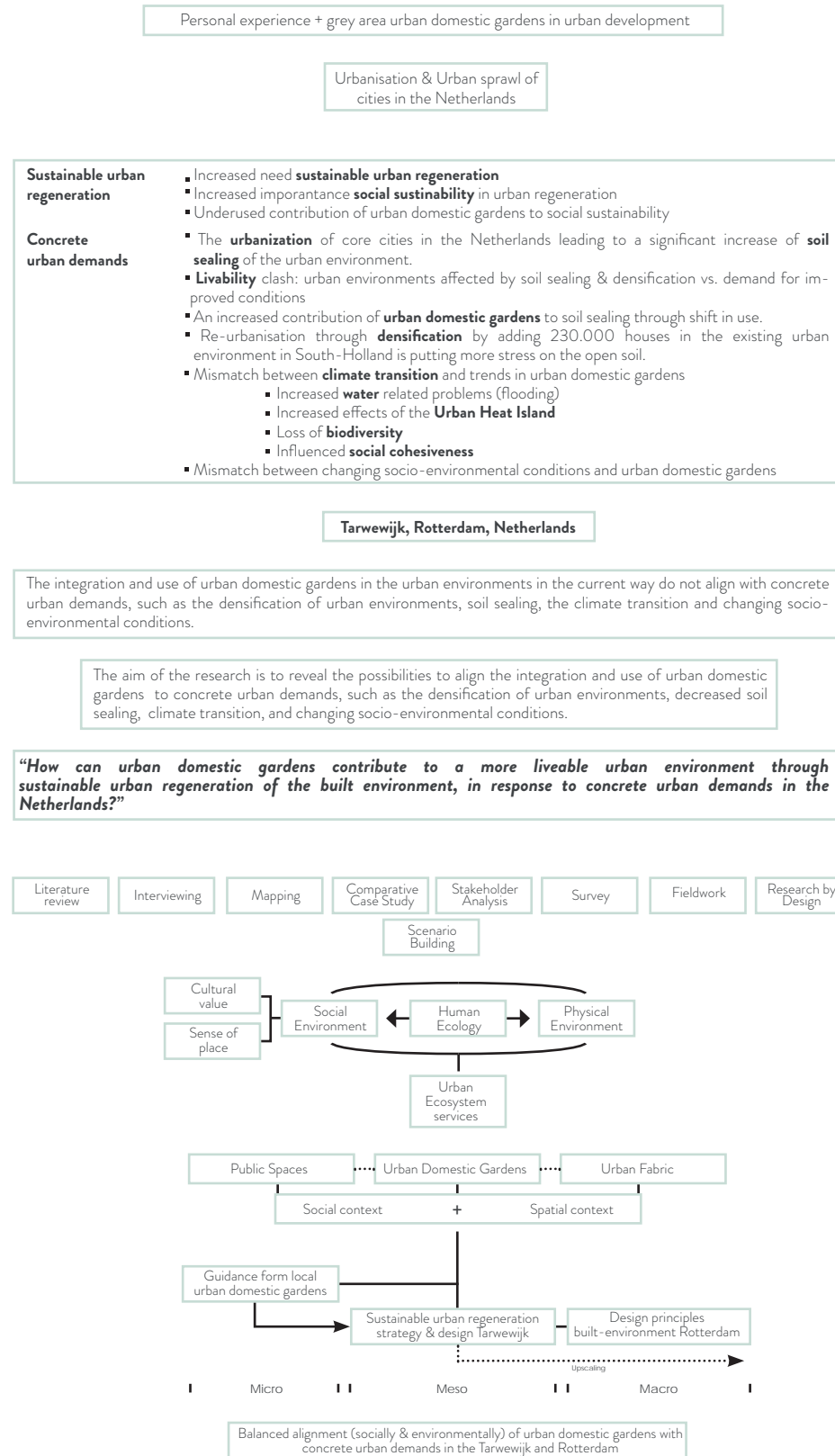
METHODOLOGY FRAMEWORK

THEORETICAL FRAMEWORK

ANALYSIS

STRATEGY & DESIGN

CONCLUSION



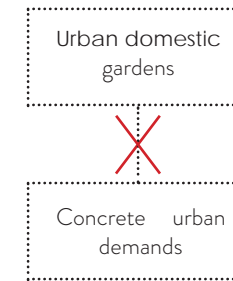
2.1 Research Framework

Problem statement

The integration and use of urban domestic gardens in the urban environments in the current way do not align with concrete urban demands, such as the densification of urban environments, the climate transition and changing socio-environmental conditions.

Research aim

The aim of the research is to reveal the possibilities to align the integration and use of urban domestic gardens to concrete urban demands, such as the densification of urban environments climate transition, and changing socio-environmental conditions.



Research Question

How can urban domestic gardens contribute to a more liveable urban environment through sustainable urban regeneration of the built environment, in response to concrete urban demands?

SRQ1

What are the values of urban domestic gardens for the quality of the urban environment and its users and how is this affected by concrete urban demands?

SRQ 2:

What are the socio-, spatial- and morphological perspectives of urban domestic gardens in the urban environment?












SRQ 3:

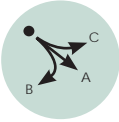





How can a more liveable urban environment in the Tarwewijk be activated through a local sustainable urban regeneration strategy and design by utilizing values and perspectives of urban domestic gardens?

SRQ 4:

Which elements of the sustainable urban regeneration of the Tarwewijk can be upscaled into generalized design principles for the built environment and what potential does this have for the liveability in Rotterdam.

2.2 Research Methods

Research Outcomes	Sub Research Questions	Research Methods	Specific outcomes	
<p>Outcome 1</p> <p>An assessment of current and future values and perspectives of urban domestic gardens in the urban environment and the Tarwewijk in Rotterdam.</p>	<p>SRQ1</p> <p>What are the values of urban domestic gardens for the quality of the urban environment and its users and how is this affected by concrete urban demands?</p>	 LR  SM  CS  F  S	<p>Understanding of the current values of the urban domestic gardens, current changing urban condition and its interrelation.</p> <p>Set of different maps of the current state and quality of the built environment in Tarwewijk through urban structures (domestic gardens, public spaces)</p> <p>Insight in design solutions for the transition space between private- and public spaces, possible values and qualities of those solutions, territorial depth overviews, input for design principles.</p> <p>A visual and spatial understanding of the Tarwewijk. Recognizing social structures, values, potential problems, human behaviour in different locations.</p> <p>Understanding the local values of urban domestic gardens, other private outdoor spaces and public spaces.</p>	
	<p>SRQ2</p> <p>What are the socio-, spatial- and morphological perspectives of urban domestic gardens in the urban environment?</p>	 LR  I  S  RD	<p>A literature review on the development and implementation of urban gardens and open spaces in the urban environments, expected trends in urban development regarding use and implementation of urban domestic gardens.</p> <p>Interviewing residents with different backgrounds (age, gender, cultural background), spatial planners or urban designers and social housing corporations on their ideas and viewpoint of the future perspective of urban domestic gardens.</p> <p>Constructing a survey for local residents with different backgrounds (age, composition,..) in order to understand the perspective of urban domestic gardens, other private outdoor spaces and public spaces in the Tarwewijk.</p> <p>Research by design is used to translate findings about the perspective of urban domestic gardens into possible design solutions</p>	<p>Understanding of the future socio, spatial and morphological perspective of the urban domestic garden, based on the literature.</p> <p>Understanding of the future socio, spatial and morphological perspective of the urban domestic gardens.</p> <p>Understanding the local values of urban domestic gardens, other private outdoor spaces and public spaces</p> <p>Insight and ideas for translating knowledge about the perspective of urban gardens into valuable design solutions.</p>
<p>Outcome 2</p> <p>A local sustainable urban regeneration strategy & design of the Tarwewijk based on multiple scenario's.</p>	<p>SRQ3</p> <p>How can a more liveable urban environment in the Tarwewijk be activated through a local sustainable urban regeneration strategy and design by utilizing values and perspectives of urban domestic gardens?</p>	 SA  F	<p>Through a stakeholder analysis, different actors involved in a sustainable urban regeneration of the Tarwewijk are analysed and mapped on their power, interest, possible problematic subjects and values.</p> <p>Fieldwork will form the base to experience the Tarwewijk, talk to people about ideas, design testing, and document other valuable information for designing.</p>	<p>An overview of the actors and their their power, interest, possible problematic subjects and value for the sustainable urban regeneration of the Tarwewijk</p> <p>A visual and spatial understanding of proposed design solutions of the sustainable urban regeneration of the Tarwewijk.</p>

Research outcomes	Sub Research Questions	Research Methods	Specific outcomes
		 SB  CS  RD	<p>Scenario building for different densification and implementation strategies and designs in the Tarwewijk. Used to define different focus areas for the strategic sustainable urban regeneration design.</p> <p>A comparative case study of concepts and design principles of key projects, from architecture towards the neighborhood – to challenge the integration of the built and the unbuilt.</p> <p>Research by design consists of a design study with different scenario's, creating spatial and morphological solutions for the sustainable urban regeneration of the Tarwewijk, including knowledge gained in earlier sub questions.</p>
<p>Outcome 3</p> <p>A set of design generalized design principles to utilize the value and perspective of urban domestic gardens in the built environment, and increase liveability.</p>	<p>SRQ4</p> <p>Which elements of the sustainable urban regeneration of the Tarwewijk can be up-scaled into generalized design principles for the built environment and what potential does this have for the liveability in Rotterdam</p>	 SM  CS  RD	<p>Spatial mapping includes sets of maps to show the upscaling possibilities of the pre-war closed building blocks in Rotterdam for further upscaling.</p> <p>A comparative case study of the pre-war building blocks in Rotterdam, to define design principles and test them for further upscaling to the scale of Rotterdam.</p> <p>Research by design consists of a design study for spatial and morphological solutions for upscaling the design solutions from Tarwewijk.</p>

2.3 Conceptual Framework

The conceptual framework combines the starting point (from) and the destination (towards) of the research. Both sides direct towards the concept of **Liveability**, which is the central element in the framework. Building on the relationship between the **Built-environment** and humanity plus **Urban adaptation** and humanity, the

central element of humanity includes the concepts of **sense of place, placemaking and cultural value**. Using the base concepts through the concepts of humanity generates a **sustainable urban regeneration**, which is intended to positively effect the social and environmental conditions and thereby the **Liveability**.

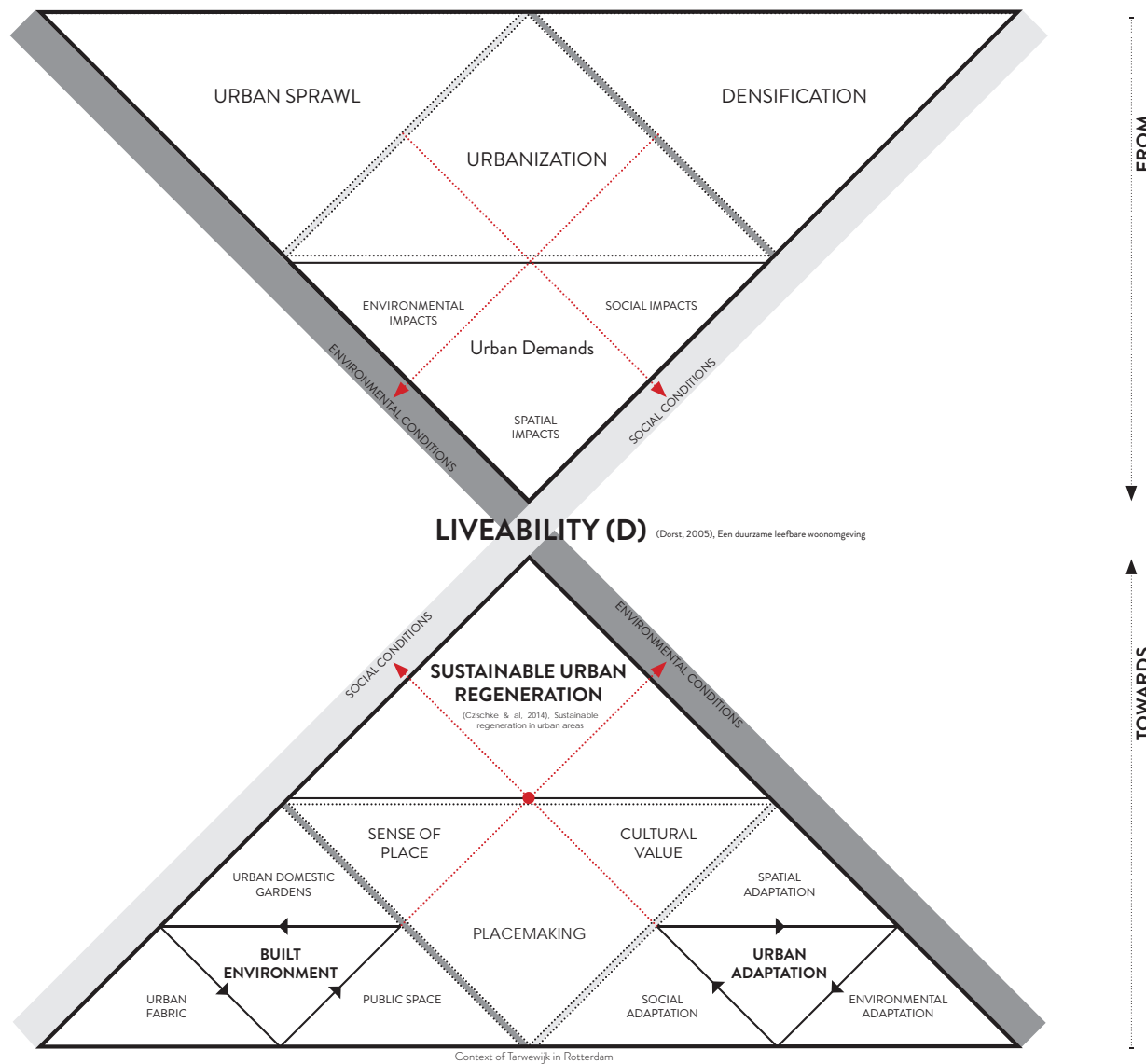


Fig. 22 Conceptuel framework. By author

2.4 Roadmap

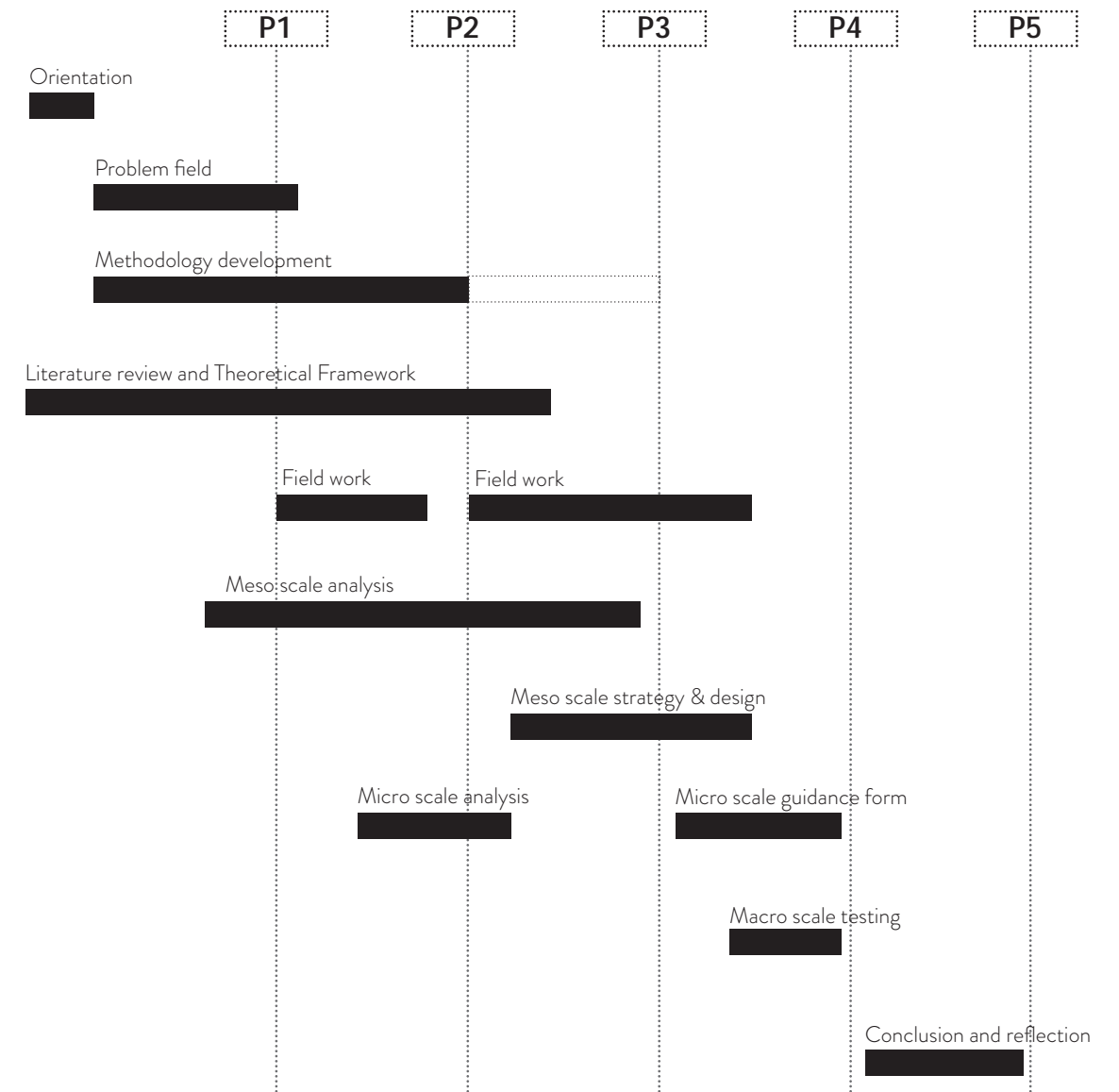
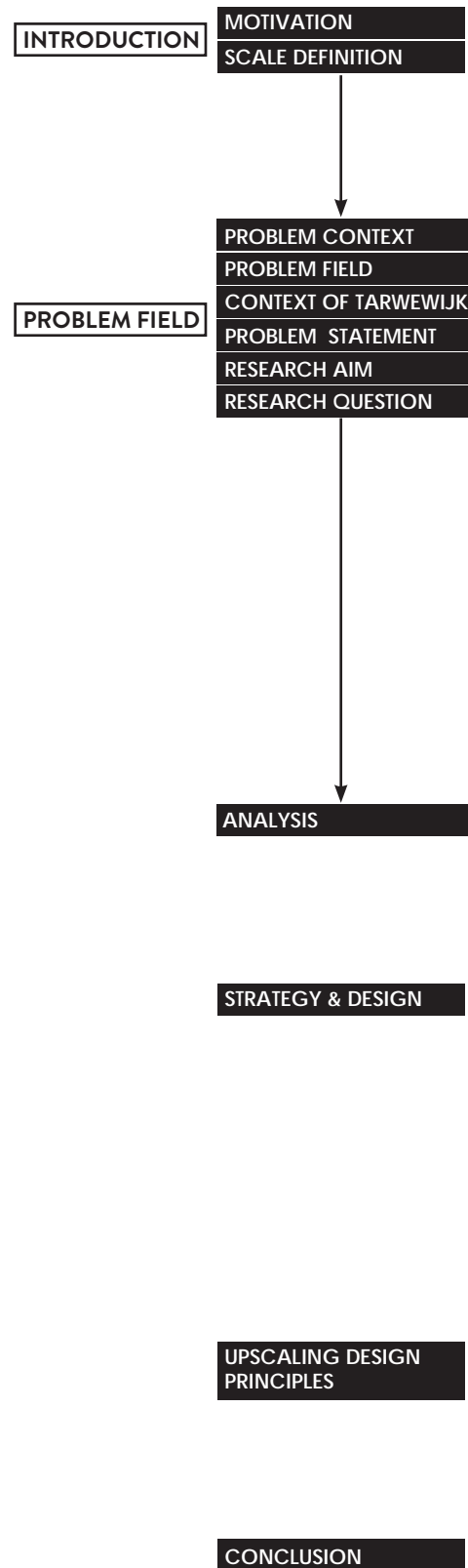


Fig. 23 Roadmap of the research. By author

2.5 Methodology Framework

Research Framework



Methodology Framework

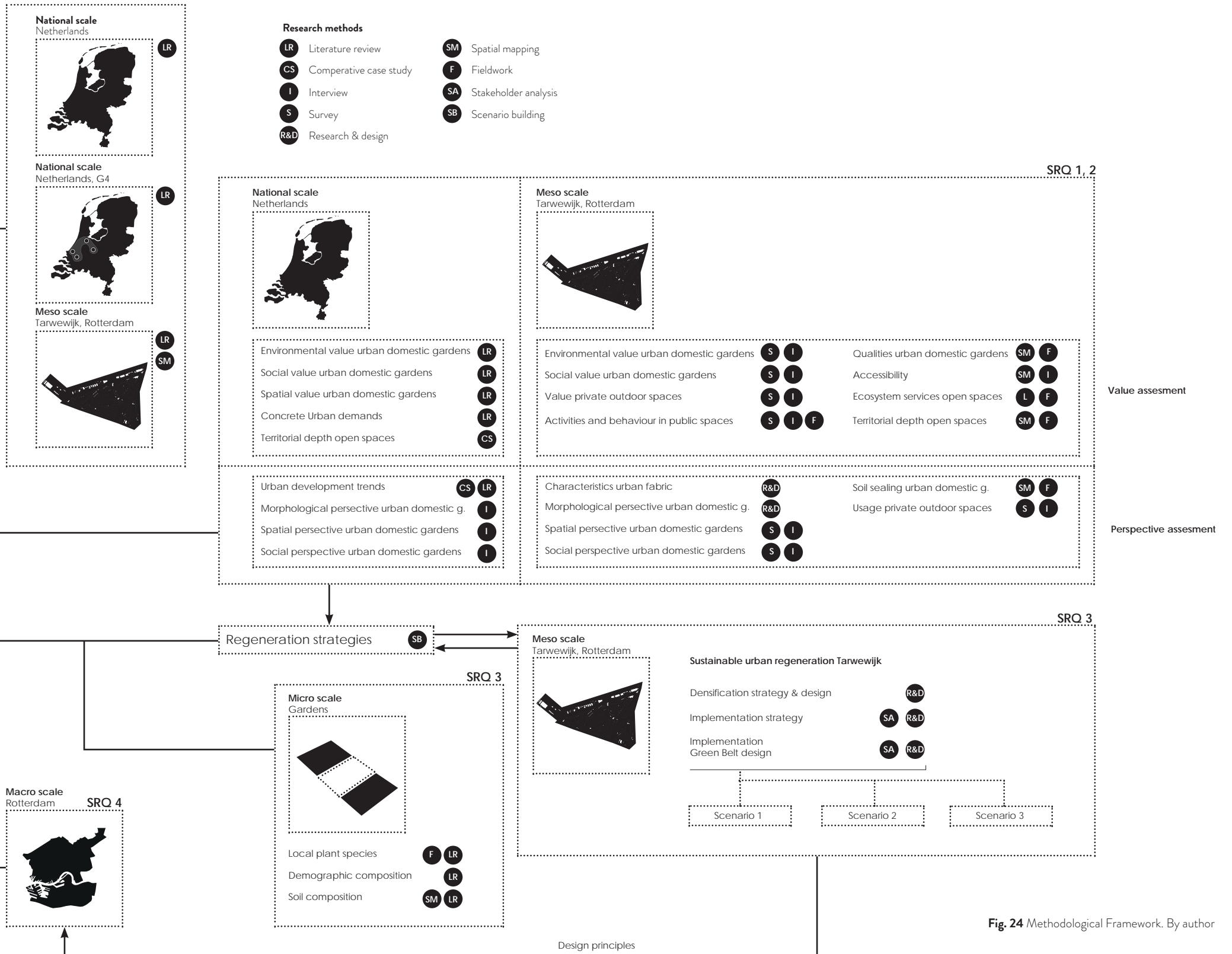


Fig. 24 Methodological Framework. By author

2.6 Theoretical Underpinning

This theoretical underpinning clarifies the main theories that when used in the project.

Human ecology

The theory of human ecology is used to understand the interrelationships between the human species and the environment. It can be seen as an evolution from the theory of ecology, with a focus on reconsidering human systems (Steiner, 2016). Environments, divided into natural physical-biological, social-cultural and human built-environment, being inhabited by human organisms, form a place of constant interaction, the context of their behaviour and development and form the base for communication, order, and coordination of human activities. This interaction of human organisms with their natural physical-biological, social-cultural and human built-environment can be considered as a human ecosystem (Bubolz & Sontag, 2009).

Change and adaptation are major components of the human ecosystems (Bubolz & Sontag, 2009) (Steiner, 2016). By adapting to changing conditions or modifying the state or structure of the system, the environment, or both to reach desired outcomes, living systems can grow, progressively integrate and interact with differentiated and complex environments, on physical, social, emotional and cognitive levels (Bubolz & Sontag, 2009) (Steiner, 2016).

In the adaptation of systems, novelty emerges as part of a cycle, also known as the adaptive cycle. This cycle can be used as a theoretical framework to understand the transformation of linked systems like human ecosystems. It consist of four stages, rapid

growth, conservation, release (creative destruction) and renewal, with the last stage having the greatest potential of either destructive or creative change through invention, experimentation, and re-assortment of systems (Gunderson & Holling, 2002) (Sundstrom & Allen, 2019). "It is the time when human actions-intentional and thoughtful or spontaneous and reck-less-can have the biggest impact" (Gunderson & Holling, 2002, p. 8).

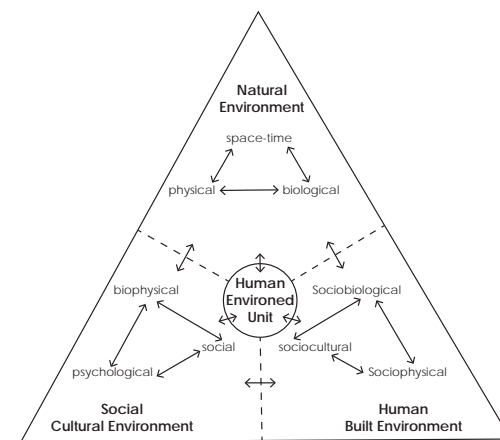


Fig. 25 Human ecology interaction

Liveability

As discussed earlier, the theory of human ecology connects humanity and their environment (social and physical) with each other. Following the same structure, the concept of liveability is also related to the interrelation between human and their environment and focusses on the quality of the interrelation of the two (Dorst, 2005). Liveability requires two elements, the interaction between environmental conditions and social conditions (Ruth & Franklin, 2014) (Dorst, 2005) (Leidelmeijer & Kamp, 2004). The environmental

element consist of its physical and biological characteristics- the built infrastructures and ecosystems (Ruth & Franklin, 2014). According to Leidelmeijer & Kamp (2004), also social and culture are part of the environmental element.

Dorst (2005) describes three different perspectives of using liveability, from which environmental psychology is used here as the main perspective. Environmental psychology uses the relation between the individual person and their environment, both the social- and the physical environment. With a focus on behaviour of humanity in and with urban domestic gardens in relation to the public space, as part of the built-environment, the perspective of environmental psychology is the best fitting, with accent on the ecological psychology. In this accent the environment is a 'behaviour setting' in which the environment raises perception and behaviour (Dorst, 2005). Following this accent, Dorst (2005) defined apparent liveability, which uses environment and behaviour in relation to each other, as follows: 'the extent to which a living environment matches the adaptive repertoire of humans' (translated) (Dorst, 2005) While this is focused on the current inhabitants, a sustainable development also focuses on future inhabitants.

Using the definition of apparent liveability, while keeping sustainable development in mind, the following definition of liveability is relevant for this research: 'the extent to which a living environment matches the adaptive repertoire of humans and is appreciated by an inhabitant' (translated) (Dorst, 2005).

Urban ecosystem services

Linking urban form with urban ecosystem services, which includes local ecosystems where cities depend on, could play a crucial role in the sustainable urban development, directed by a movement to strategies of adaptation (Marcus & al, 2014). According to Marcus & Pont (2015), urban ecosystem comprises of biotic and abiotic dimensions. Examples of biotic dimensions are humans and their activities, while abiotic dimensions comprise of physical artefacts like buildings, with the last dealt with through urban morphology. The urban morphology for urban landscapes can be seen as "descriptions of the 'abiotic' foundations of the 'biotic' systems" (Marcus & Pont, 2015, p. 5). This can be translated as a link between the built environment and the human ecosystems (biotic systems).

Sense of place

Sense of place can be seen as an umbrella concept, built around the complex relationship between humans and its environment, or place. Place in this case can be multiscalar, whereas it for example can be a house, neighbourhood, city or a country (Shamai, 1991) (Qazimi, 2014). Sense of place can be described as the "feelings, attitudes, and behaviour towards a place which varies from person to person, and from one scale to another (e.g. from home to country)" (Shamai, 1991, p. 354). Important factors here are knowledge, belonging, attachment and commitment, which can be transformed into a set of different scales of Sense of place according to Shamai (1991), which do not apply to each place, as the scale of the place will have influence:

(0) not having any sense of place, (1) knowledge of being located in a place, (2) belonging to a place, (3) attachment of a place, (4) identifying with the place goals, (5) involvement in a place and (6) sacrifice for a place.

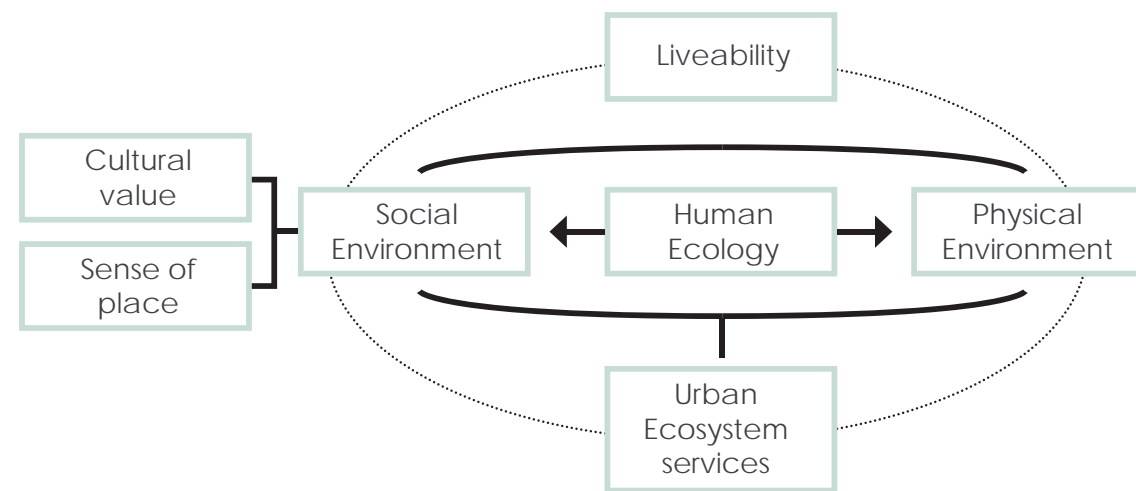


Fig. 26 Construction of the clubhouse of the playground association Tarwewijk, 1957

CHAPTER

3

Urban open spaces

- 3.0 Introduction
- 3.1 Urban Domestic Gardens
- 3.2 UDC: Context of the Tarwewijk
- 3.3 Case study Urban Blocks
- 3.4 Public Spaces
- 3.5 A Local Perspective
- 3.6 Design Principles

3.0 Introduction

This chapter focuses on the urban open spaces, consisting of the urban domestic gardens and the public spaces, both in general and specific for the Tarwewijk. As part of the vision to use urban domestic gardens as a catalyst for change, to reconnect the social environment with the physical environment in order to cope with ongoing urban processes, both the social and physical characteristics of gardens are of great importance. It starts with a theoretical view on the values of urban domestic gardens for the physical- and social environment.

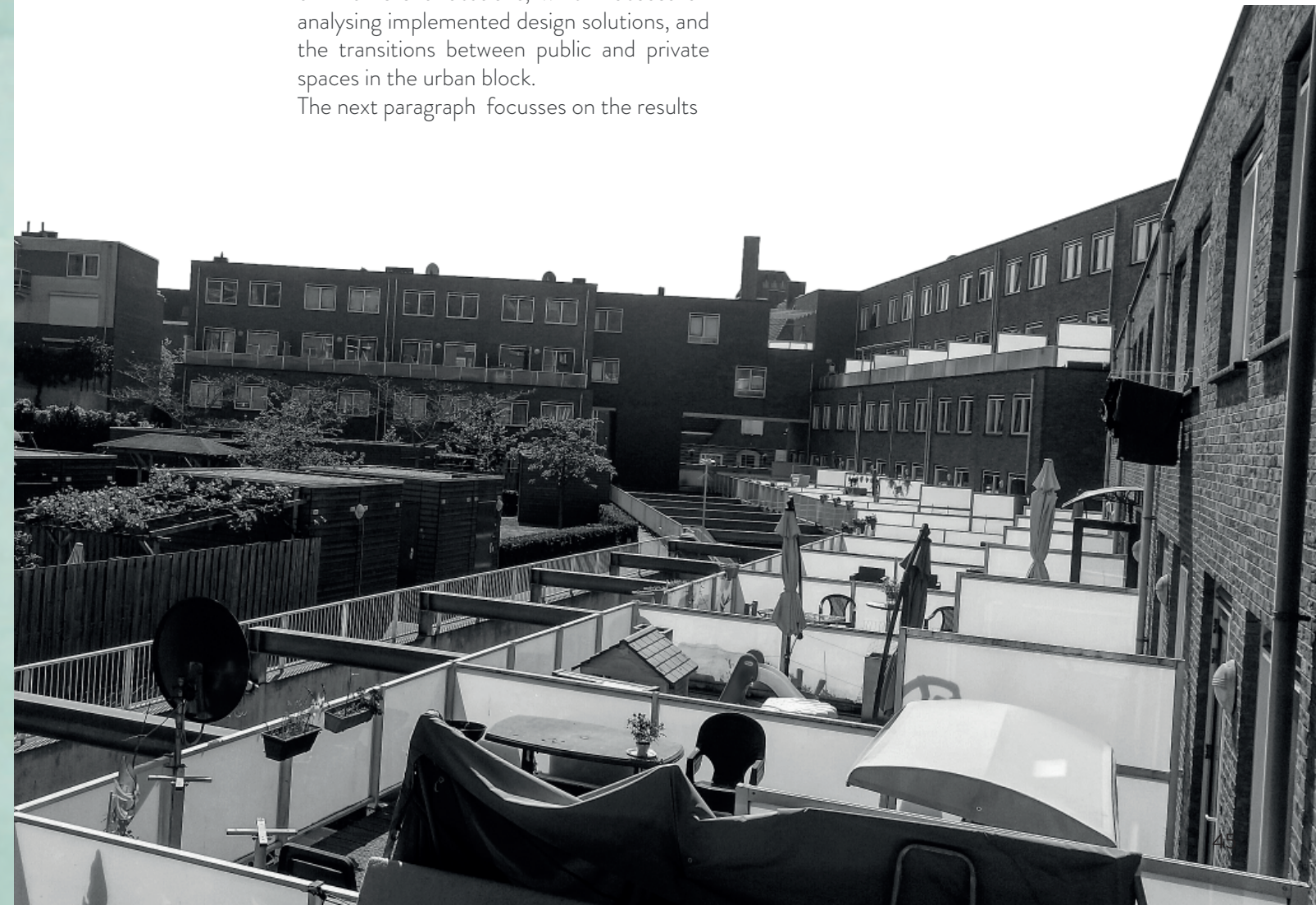
The next part zooms in on the context of the Tarwewijk, how urban domestic gardens in the Tarwijk are embedded and how their quality is related to the urban fabric.

The third paragraph includes a case study of 4 different locations, which focuses on analysing implemented design solutions, and the transitions between public and private spaces in the urban block.

The next paragraph focusses on the results

of conducted fieldwork, including interviews with residents of the Tarwewijk to test the values of urban domestic gardens in practice, also compared to other forms of private outdoor spaces and the public space.

The chapter ends with a set of design principles, which are a product of combining findings in this chapter with the conducted fieldwork and interviews.



Urban domestic gardens: not the only (private) outdoor space

Urban domestic gardens in the Tarwewijk are present all throughout the neighbourhood, but because of the domination of dense building blocks with 3, 4 or 5 storeys, only few people have direct access to this type of private outdoor space. Especially in a dense urban environment near the city centre of Rotterdam, it gives them some sort of privilege compared to the other residents. This privilege became more clear during the Covid-19 crisis, which shows how important a larger private outdoor space can be for humans.

With the majority of the residents living in apartment buildings, the most common type of private outdoor space are balconies. And while their contribution to the environmental climate in the neighbourhood is limited compared to urban domestic gardens, they can be of great value in other ways, acting as a space for different activities or functions. Hence why they should not be forgotten while looking at urban domestic gardens. But since the possibilities with balconies are more limited than with gardens, opportunities arise, keeping the increasing popularity and demand for urban domestic garden in mind, to start seeing public spaces as places to incorporate specific values of urban domestic gardens and values or activities which are physically not possible for people with balconies, or without a private outdoor space at all. To make the urban garden more accessible to a wider public. This makes it also important to understand the current public spaces in the Tarwewijk, which will be the focus later in this chapter

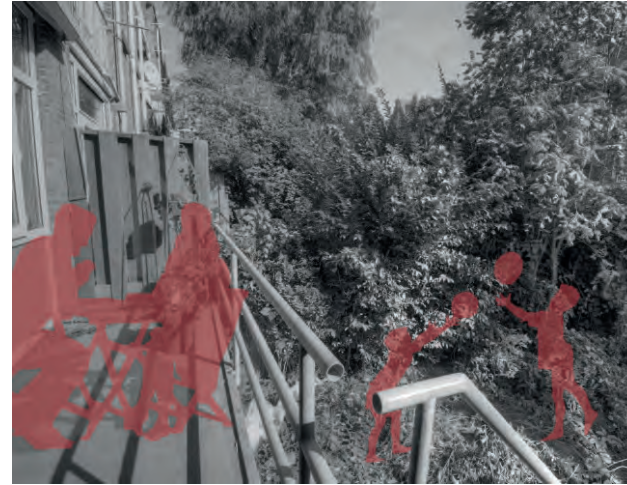


Fig 27-29 Garden, balcony and public space in the Tarwewijk. Edited by author

Fig 30 (next page) Gardens in the Tarwewijk. By author



3.1 Urban Domestic Gardens

The value assessment of urban domestic gardens consists of two parts. First, the values of urban domestic gardens from a theoretical perspective and how changing urban demands could potentially affect these values. The second part values gardens from the perspective of the residents of the Tarwewijk, obtained through data analysis from local fieldwork.

Values of urban domestic gardens

Urban domestic gardens are present in all sorts of sizes, in different locations, in different urban settings and from people with different backgrounds and cultures. All of these factors will have an influence on the values of the urban domestic gardens, both for individual human beings and the larger community through its contribution to the urban environment. An important example of a factor is the differentiation in types of gardens, as described by Coolen & Meesters (2011, p. 52): '(a) the living garden, which is an outdoor extension to the dwelling more suited for domestic activity than the requirements of plants; (b) the well-tempered garden, which is a formal, ordered, neat and well-attended to garden that is hardly used for leisure; and (c) the expressionist garden, which is a place for cultivation by their owners who love gardening.' The hypothesis that urban domestic gardens, in general, are valuable for people can be validated by the fact that approximately 80 per cent of the people who are intended to move prefer a house with an urban domestic garden as a private space over a balcony as a private space. This preference is affected by income and household configuration, where gardens are more preferred with increasing income. Furthermore, children play a big role in the preferred private space, as couples with

children or single-parent families prefer a garden over a balcony, while single-person households prefer a balcony (Coolen & Meesters, 2011).

Environmental values urban domestic gardens

Depending on the type of garden, whether it's green or paved, or a combination of both, domestic gardens can deliver environmental values to their users and the surrounding environment. Cameron et al (2012) argue that large domestic gardens, or gardens from people with higher incomes or education have more complex garden styles with proportionally more, and more diverse vegetation. Green gardens can have a positive effect on the cooling of the urban environment, which tackles the Urban Heat Island. Furthermore, precipitation will infiltrate more easily into the ground than in a paved garden, which is beneficial for the natural replenishment of the groundwater level. This will have extra benefits, because it decreases the volume of direct runoff of water in the sewerage systems and runoff times, which lowers the chances of urban floods and the need for bigger sewerage pipes (Verbeeck & al, 2011) (Kelly, 2016). Climate changes increase the need for change, because of the expected increase in heatwaves and heavy rainstorms (Kelly, 2016). Depending on the amount of green in the garden and the types and diversity of plants and trees, also biodiversity in the local environment can benefit from urban domestic gardens (Farahani & al, 2018). Looking from the perspective of a single green urban domestic garden, while they can be valuable for the surrounding environment regarding the reduction of heat, increased water infiltration and contribution to biodiversity, the value will increase significantly and

be much stronger if multiple gardens in a small area gardens form a network of green space. It is, therefore, necessary to look at the larger scale than single urban domestic gardens itself to become part of the urban green infrastructure.

While an urban domestic garden can be seen as a private space that is part of the property for personal use, the front garden is also valued as a privacy buffer between the street and the façade of the house, increasing the depth of space. With the increased use of space in dense urban areas, less space is available for front gardens or in many cases no space at all, which means that the privacy value is not present everywhere (Kullberg, 2016) (Brindley & al, 2018). And even though the garden is a private space, also the environment could benefit from a garden, as social cohesion between neighbours can be strengthened from spending time in the urban domestic gardens. Furthermore are gardens linked with positive childhood memories, which can result in strong place attachment, resulting in more responsible behaviour and involvement towards the environment (Cameron & al, 2012). On the other hand can gardens be negative to the environment and society, acting as barriers (Cameron & al, 2012). This can unintentionally be increased in multicultural environments, where the attitude against gardens can differ from cultures. Cameron & al (2012, p. 135) describe the example of "white, middle-class residents in the UK appreciated the privacy and security offered by a private garden, whereas 'Bengali and Afro-Caribbean participants play out their scenes in cafes, kitchens, streets and parks – never their back gardens'".

User values urban domestic gardens

According to Kullberg (2016) gardens represent different meanings for people, which also depends on factors like age, gender and ability (Farahani & al, 2018). One of the most present meanings of gardens is that they are seen as a place of peace and quietness (Dunnnett & Qasim, 2000). With the individualization of the society and the increased workload on people during working weeks, these places become increasingly important. Especially because gardens have a social value, functioning as a meeting place between neighbours to meet and talk to each other. Furthermore, it is valued as a place to be active outside or creative, and to come in direct contact with nature. Being active outside has a strong relationship with age, where people of 55 years and over plus retired people spend significantly more time in their garden compared to younger people (Dunnnett & Qasim, 2000). Depending on factors like size, location and orientation, being active outside can comprise of many activities in front- & back gardens like:

'drying clothes and exercising the dog. Passive activities such as playing music, or just sitting and relaxing are next in frequency. Other activities include watching wildlife or birds, reading, feeding birds or wildlife, and sunbathing. Maintenance activities concerned with greenspace included the following: watering plants by hand, mowing the lawn, flower gardening, weeding the lawn or garden and vegetable gardening. Activities involving social play and entertainment include the following: playing with friends or children, entertaining friends or family, and picnicking or eating outside' (Smardon, 1988, p. 89).

Getting in contact with nature can also count for children, as many gardens function as a playground for children, but this is depending on the amount of green in the garden. A more recent trend is that gardens, both for front- and back gardens, are valued as an extension of the living room. Lastly, for some people, gardens, and especially front gardens, are valued as a selling point to other people, where they can show their own identity and personality (Kullberg, 2016) (Dunnett & Qasim, 2000). This includes the value of satisfaction that keeping the garden tidy and neat gives, which is also more important for people above 55 years old. Front gardens especially, because of their exposure to the outside world, as a way of communicating status and territoriality (Dunnett & Qasim, 2000). In contrast of this, depending on the factors like design of the public space, availability of parking spaces and accessibility and space for storage, is the use of front gardens as private parking spaces or storage of other vehicles like bikes and scooters (Cameron & al, 2012) or low maintenance (paved) gardens (Kelly, 2016).

User values: Health

While it has been proven that green in urban environments can have health benefits on humans, Brindley et al (2018) argue that urban gardens specific can lead to increased health benefits, both physical and mental, and social wellbeing. It is stated that ‘contact with nature in domestic gardens leads to both hedonic (positive emotional states) and eudaimonic (meaning of life) wellbeing benefits associated with a sense of nature connectedness’ (Brindley & al, 2018, p. 2). According to Dunnett & Qasim (2000), urban domestic gardens are valuable for the health of humans because of the fresh air and exercise, while contact with green can lead to

therapeutic improvements. This last notion, which is also implied by Smardon (1988), could result in reducing stress and anxiety. Maximizing the health benefits through exercising can be achieved by regular all-season gardening, because of consistent and moderate exercise opportunities (Cameron & al, 2012). The importance of domestic gardens towards these health benefits can be directly linked with the average size of urban domestic gardens, where poor self-regulated general health correlate with small size gardens (Brindley & al, 2018). Despite numerous mentioned health benefits, however, it is also argued that the link between urban domestic gardens and health is not clear according to Cameron & al (2012), as it is dependent on the studied people, the form, extend and quality of the garden, ease of access degree of motivation and perception of safety. Furthermore is it unclear if it also applies for balconies overlooking the urban domestic gardens, which is a common substitute for gardens in densely populated urban environments.

Environmental values



Microclimate value
Restorative value

Cooling of the urban environment
Natural replenishment groundwater
Decreasing urban floods
Increasing biodiversity
Increasing privacy (front gardens)
Barrier effect

Contributory value

Place attachment
Social cohesion (increased contact neighbours)

User values



Place for passive activities

Place to be passive
Sitting and relaxing
Watching and feeding wildlife and birds
Sunbathing
Drying laundry

Place for active activities

Exersising pets
Green maintance/gardening
Playing with friends/children
Entertaining friends/family
Eating picnicking outside

Restorative values

Place of peace and quietness
Increasing mental health
Increasing physical health
Social well-being

Representative value

Selling point to others

Fig. 31 Overview values urban domestic gardens. By author

Concrete urban demands in the urban environment are expected to have influence on the current values of urban domestic gardens. For each of the relevant topics it is predicted if and how it will change the value of urban domestic gardens.

Densification cities

With the urgent need of dwellings in the Netherlands, densification of cities is one of the strategies accompanied by the Dutch government and municipalities to accommodate 1 million new dwellings until 2030, with a focus on the G4 (Amsterdam, Rotterdam The Hague, Utrecht) and surrounding cities (De Zwarte Hond, 2017). Densification of the existing urban environment is a strategy to increase the efficiency of existing urban systems and conserving (natural) landscapes surrounding the cities while fulfilling the demand for dwellings. This can be done by either urban regeneration or filling in existing open spaces.

By densifying the urban environments, changes in the values of urban gardens are expected. With an increase of dwellings leading to a more compact area, the size of gardens is likely to further decrease, following a current trend (Teije, 2019), with a possibility of losing multiple values. Because space will be more valuable and intensely used for buildings, a possible effect is that front gardens will no longer be implemented in urban designs, resulting in the loss of the restorative value of privacy. Furthermore, it is expected that the number of people with an urban domestic garden will decrease, and the number of people with a balcony will increase. While balconies can provide some of the values of urban domestic gardens like passive and some active activities, almost no environmental values are related. Depending

on the size and integration of green systems, new buildings could incorporate vertical green systems with balconies to enhance biodiversity and direct contact with nature. With the increased amount of balconies, decreased accessibility to domestic gardens, and taking the potential values of gardens into account, densification increases the importance of converting the values of gardens to public spaces to meet the needs of the residents. Coolen & Meesters (2011) argue that public space is valued by people who do not have a domestic garden and serve to bring people together, while domestic gardens express the personal values. Because they serve different functions and have different meanings, public space, used in the current way, cannot substitute the absence of domestic gardens (Coolen & Meesters, 2011).

Soil sealing environment

Linked with the densification of urban environments, the appearance of soil sealing will put more stress on existing open soil in urban environments. While densification is one the major drivers for the soil sealing of the environment because of new buildings covering more open land, the soil sealing of domestic gardens is becoming more apparent in the urban environment (Science for Environment Policy, 2012). Rotterdam for example already experiences a soil sealing of almost 40 per cent of the domestic gardens, with some cities even up to 65 per cent (Teije, 2019). Soil sealing causes negative effects on the quality of the urban environment, including loss of biodiversity (McKinney, 2002), partly because of the negative effects of climate change becoming more apparent (Teije, 2019). This leads to an urgent need to reverse the increase of soil sealing in the urban environment.

If the soil sealing of the urban environment continues to increase, the value of domestic gardens regarding the environmental microclimate will become more important. Focussing on more green in favour of pavement could positively affect the values, with increased biodiversity, more direct contact with green, together with related health benefits. Breuste & al (2015) state the high potential of urban ecosystem services, including domestic gardens for microclimate regulation and healthy urban environments. Because residents play a vital role in managing urban soil sealing and urban green, impacting urban green by personal choices of living (Breuste & al, 2015), the need of decreasing soil sealing should also lead to different lifestyle choices. The specific effects these lifestyle changes will have on the value of domestic gardens remains unclear, but it could be both negative as positive. Negative in a way that people who prefer paved gardens for certain passive or active activities, like sunbathing or eating outside, have to make offers to increase the amount of green, with the possibility to lose their connection with the domestic garden and thereby place attachment. Positive in a way described earlier, with increased opportunities for improved health, place attachment, and representative values like the selling point of gardens, It is expected that this is dependent on several factors, like the personal value of the garden and size.

Climate change

Adapting the built environment in the coming decades to the effects of climate change is one of the challenges cities have to undergo. Like discussed earlier, increased heavy precipitation and heat waves will increase the chance of flooding and strengthen the effects of the Urban Heat Island, which

affects the health- and living conditions of residents (Kennis voor Klimaat, 2011). While taking up a significant number of space in the cities and having the potential to be valuable for the cities' environmental climate, the increase of soil sealing of urban domestic gardens do not correspond to the need of adapting the urban environment.

With a high potential to adapt to climate change, domestic gardens can play an important role in reducing the effects of climate change (Breuste & al, 2015) in urban environments. The environmental values or domestic gardens, as described in the first paragraph, already show this potential with values of cooling the environment, decreasing floods and increased natural water infiltration. Because the urgent demands of decreasing soil sealing and climate change have an interrelation, the effects on the values are considered almost identical with a focus on adding more green in gardens. This will not only improve the environmental conditions, but also creates opportunities for improved biodiversity and health benefits, but also stronger contributory values like place attachment and social cohesion, since everybody is affected by climate change and working together as a community increases the adaptability of places. It could also lead to the addition of an educational value to domestic gardens, whereas to be able to adapt to climate change, residents have to be informed (Breuste & al, 2015), for example on the use of specific plants or materials in the domestic gardens. Further exchange of knowledge between the residents has the potential to strengthen social cohesion even more.

Changing urban conditions

Not only adapting to climate change effects is challenging for the urban environment. Changing urban conditions like an ageing population and individualisation of the society are expected to change the way the urban environment is used. In an individualising society, with an increase of single-person households of 700.000 by 2030, the social aspects of life become more important, increasing the need for social cohesion and communities in living environments (CBS, 2016). The importance of social cohesion is also present in an ageing population, where the overall social- and physical well-being of inhabitants is linked with the need for stronger ties among neighbours and a sense of belonging and community (Cramm & Nieboer, 2015) (Kullberg, 2016).

The individualisation of the society is expected to influence the values of the garden in some aspects, which can be viewed from two sides. With less free time available due to work, need for privacy, more diverse wishes for domestic garden activities like lounging, cooking and eating outside, together with the fact of domestic gardens getting smaller due to denser urban environments, an increase of paved gardens is a possibility (Kullberg, 2016) (Teije, 2019). With this development with less space for green, the social and health value of gardening and green is lost, together with the microclimate- and restorative value, the last including the natural replenishment of groundwater, decrease of floods and increase of biodiversity. But it could also strengthen the restorative value of a place of peace and quietness. On the other hand, with more single-person households, following the national sharing trend, sharing gardens could lead to an increase in the value of social cohesion and social well-being

(Kullberg, 2016). Furthermore, with shared gardens, the size of gardens could increase, with potentially more space for green and related activities like gardening, retaining the environmental values and regenerative value of health improvement.

With an ageing population, the user values of urban domestic gardens are expected to become more important. As mentioned earlier, being active outside has a strong relationship with age, where people of 55 years and over plus retired people spend significantly more time in their domestic garden gardening compared to younger people (Dunnett & Qasim, 2000). This is also visible in the popularity of allotment- and community gardens in cities. Linked with the increased value of places for active activities, the value of providing health benefits will become more important. With the increased active activities like gardening, the amount of green in gardens is expected to increase, which will raise the environmental value, with microclimate, restorative values the natural replenishment of groundwater, decrease of floods and increase of biodiversity. Furthermore can contributory values like generating social cohesion and place attachment benefit from activities like gardening, which is also recognized as a social activity.



Fig. 32 Front sides of urban blocks in the Tarwewijk. By author

3.2 UDG: Context of the Tarwewijk

Green spaces, squares & playgrounds Tarwewijk

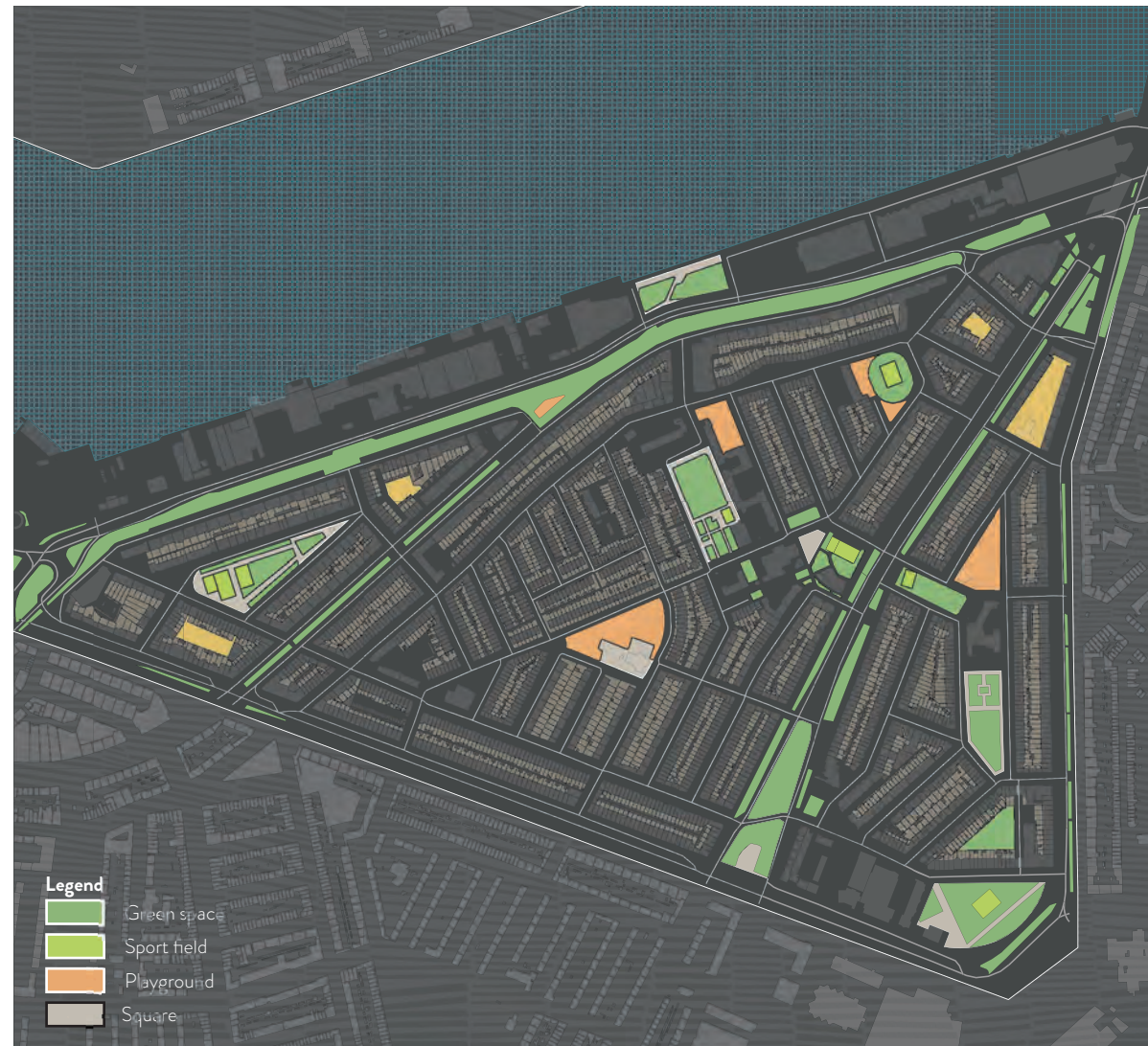


Fig. 33 Green spaces, squares & playgrounds in the Tarwewijk, By author

Open spaces function for a large number of the 13.000 inhabitants of the Tarwewijk as spaces to meet, play and to do other activities. Spread throughout the neighbourhood, a large part of the green spaces are part of or directly next to infrastructure, and from relatively low quality. Despite their low quality, mostly existing out of grass and trees without other functions, their contribution to the surrounding environment from the perspective of the local climate can be significant, as they open up the urban fabric, mostly consisting of dense 4 or 5 storey high building blocks.

Playgrounds for children and public squares are located more inside the neighbourhood. Often surrounded by

dense building blocks, this results in more intimate open spaces, used by people from the directly surrounding building blocks. With the absence of larger pedestrian-friendly open space structures, many playgrounds and squares remain underused by people from other areas of the Tarwewijk. A plan to increase the use and overall quality through a large open space structure will be discussed in a later moment.

Urban domestic gardens Tarwewijk

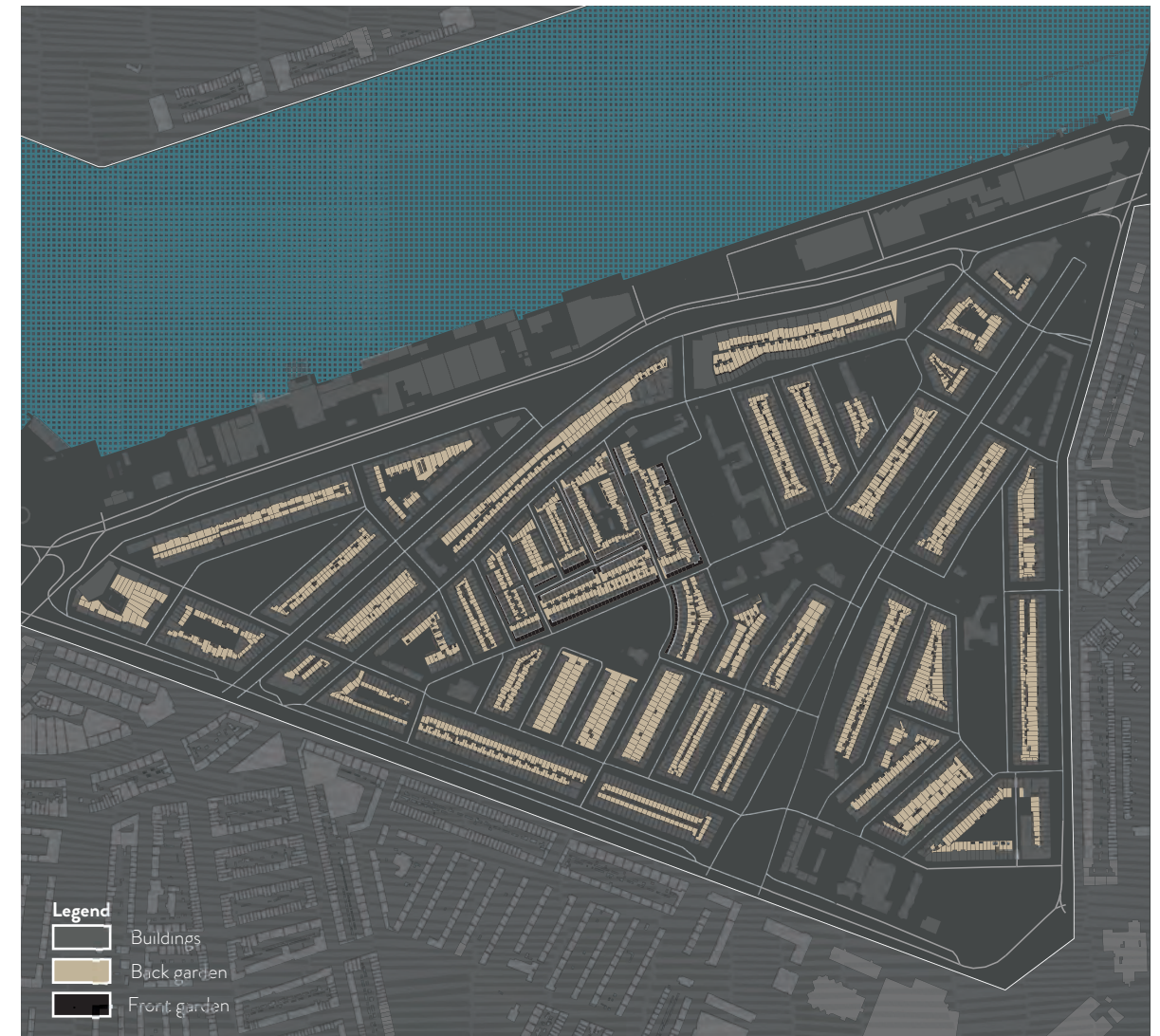


Fig. 34 Urban domestic gardens in the Tarwewijk, By author

Despite the Tarwewijk being a dense neighbourhood with mostly 4 or 5 storey high building blocks, all residential building blocks include urban domestic garden on the ground floor. This results in a large number of space of the Tarwewijk being occupied by a total of 2374 urban domestic gardens, which increases the potential role in both the local environmental and social climate. Depending on the qualities and characteristics of the gardens, which will be assessed later, the role of the gardens in their current state can be either positive or negative.

Front gardens are not common in the Tarwewijk. Only a small amount of the residential buildings in the

middle of the neighbourhood have front gardens. These buildings were not built following the same concept of dense multi-storey building blocks, but according to the Dutch row housing tradition, where both front- and back gardens play an important role.

Accessibility urban domestic gardens Tarwewijk



Fig. 35 Accessibility urban domestic gardens in the Tarwewijk. By author

Increasing the usability of back gardens, back alleys provide direct access from the inside of the building blocks towards the public spaces in the front of the building, without having to move through the house. Analysis of the back alleys in the Tarwewijk shows the lack of coherence in the different building blocks, with many different situations being present. Around half of the urban domestic garden do not have direct access to the public space, while also differences occur in building blocks itself. This even though most of the large building blocks were constructed around the same period.

While there are examples of building blocks being entirely accessible through back alleys, in other blocks only a few gardens are accessible or non at all. In most situations, the entrances of the back alleys, located in the open sides of open buildings blocks, or, in case of closed blocks, incorporated in the building, are locked.

Potential green roofs Tarwewijk

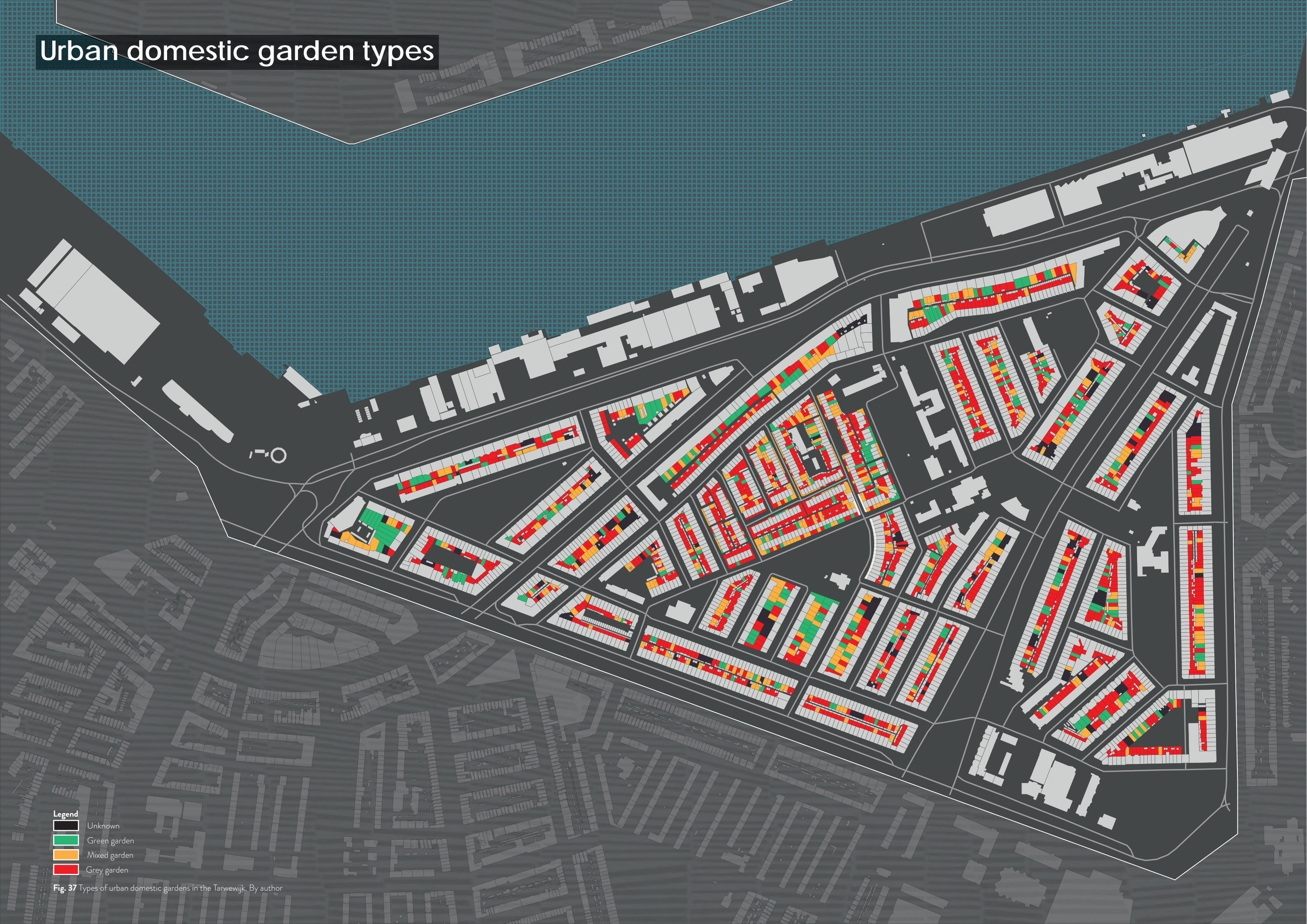


Fig. 36 Potential green roofs Tarwewijk. By author

While urban domestic gardens can and need to provide more contribution to the local environmental conditions, in addition, other options also need to be taken into account. Green roofs in cities can provide many benefits for residents, flora/fauna and the buildings itself. Increased absorption and storage of precipitation and reduced heat stress are among the many advantages of green roofs. With the majority of the buildings in the Tarwewijk having a flat roof, it has great potential to introduce green roofs on a large scale, with the extra green helping to reduce the number of sealed surfaces. A large number of (social) rental housing further increases the potential, since social housing corporations

or/and VVE's could work together to lower the costs and have a bigger impact on the urban environment.

Urban domestic garden types



Legend

- Unknown
- Green garden
- Mixed garden
- Grey garden

Fig. 37 Types of urban domestic gardens in the Tarwewijk. By author

Satellite observation using Google Maps, and where possible fieldwork, shows that the green garden is the least common type of urban domestic garden in the Tarwewijk. A green garden consists of at least 75% green, while the other 25% can consist of pavement or other non-green features. The green gardens in the Tarwewijk are spread throughout the entire neighbourhood, and together form only 20% of the total amount of urban domestic gardens. Demonstrated in figure 31, the green garden

type has the highest contribution potential to the ecological systems in the urban environment. With multiple interrelated processes, green gardens generate several ecological ecosystem services and social urban ecosystems services. Large scale integration is important to increase the performance of the output.

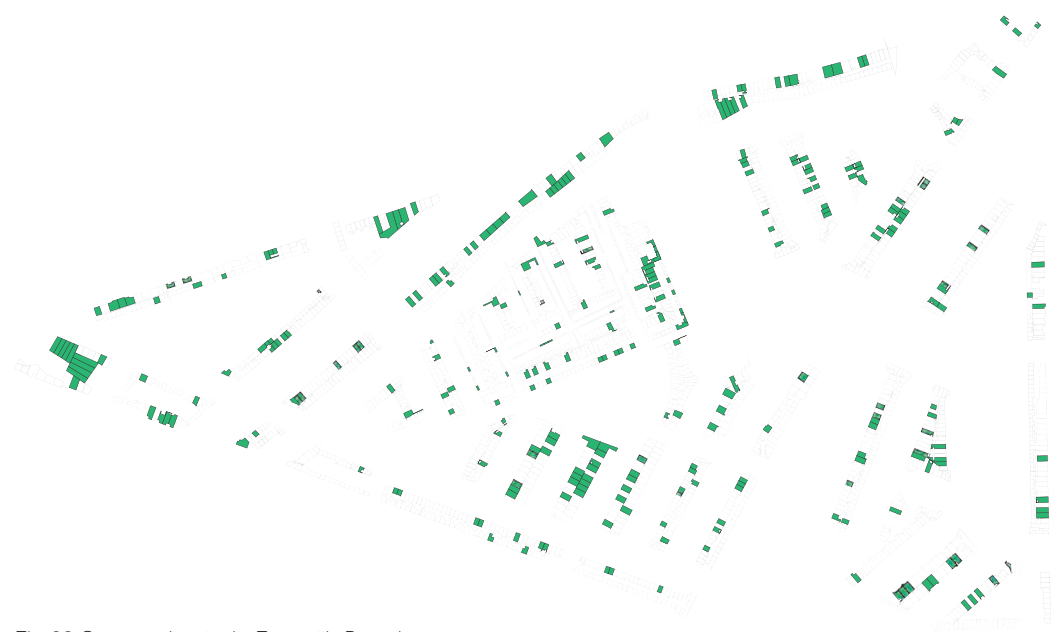
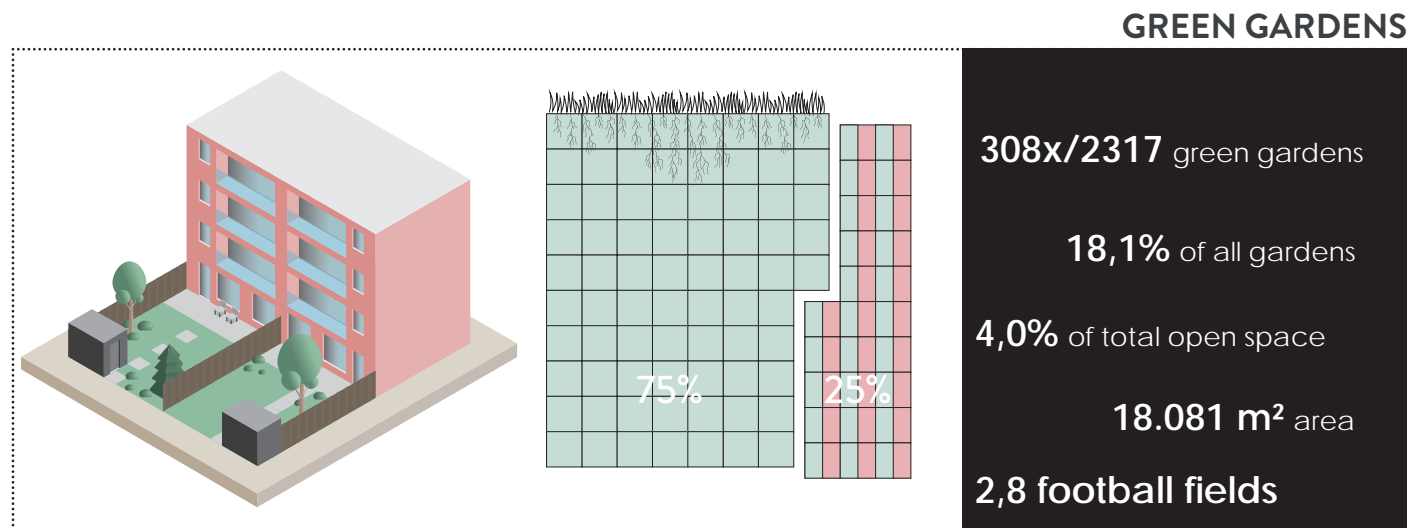


Fig. 38 Green gardens in the Tarwewijk. By author

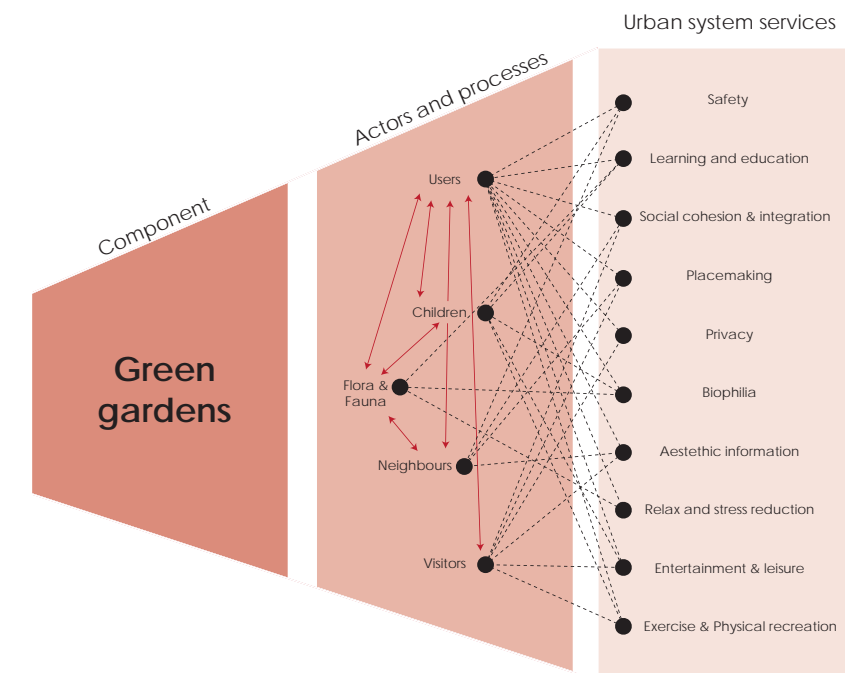
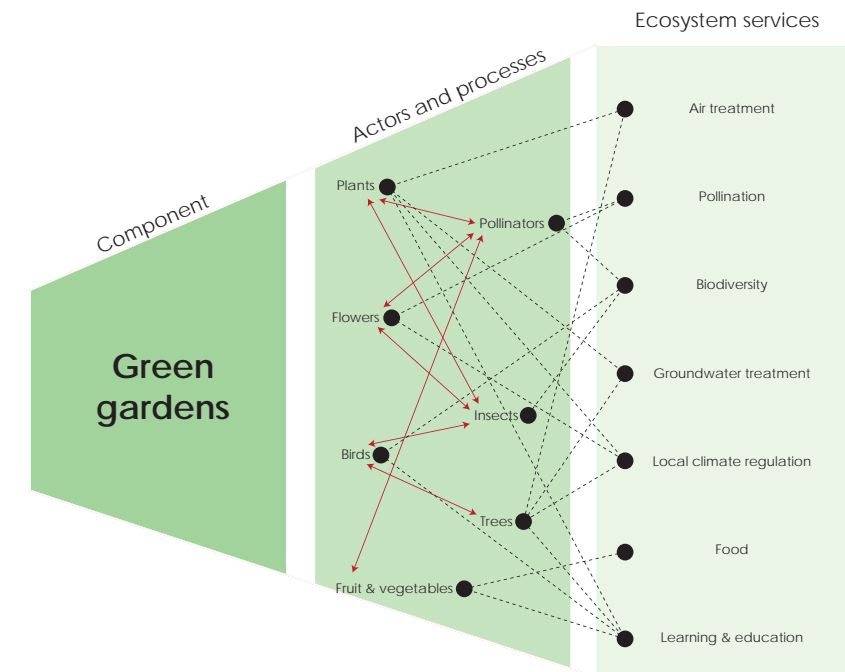


Fig. 39 (above) Ecological ecosystem services green gardens. By author

Fig. 40 Social urban services green gardens. By author

The grey garden, or sealed garden, is the most common type of urban domestic garden in the Tarwewijk. This type consist for almost 100% out of pavement or other non-permeable ground, with a minimum of 75%. If some green is available in the form of transferable pots with plants, it is still considered a grey garden. With more than 50% of the gardens being considered grey, it follows the Dutch trend in the urban environment of increased soil sealing of gardens and exceeds the average amount in

Rotterdam of 40% (Teije, 2019). Figure 34 shows that grey garden have no contribution to the output of environmental ecosystem services,. Instead, they are considered harmful for the local climate regulation and biodiversity. On the other hand, grey gardens can generate social urban ecosystems services which are beneficial for its users and interrelated actors.

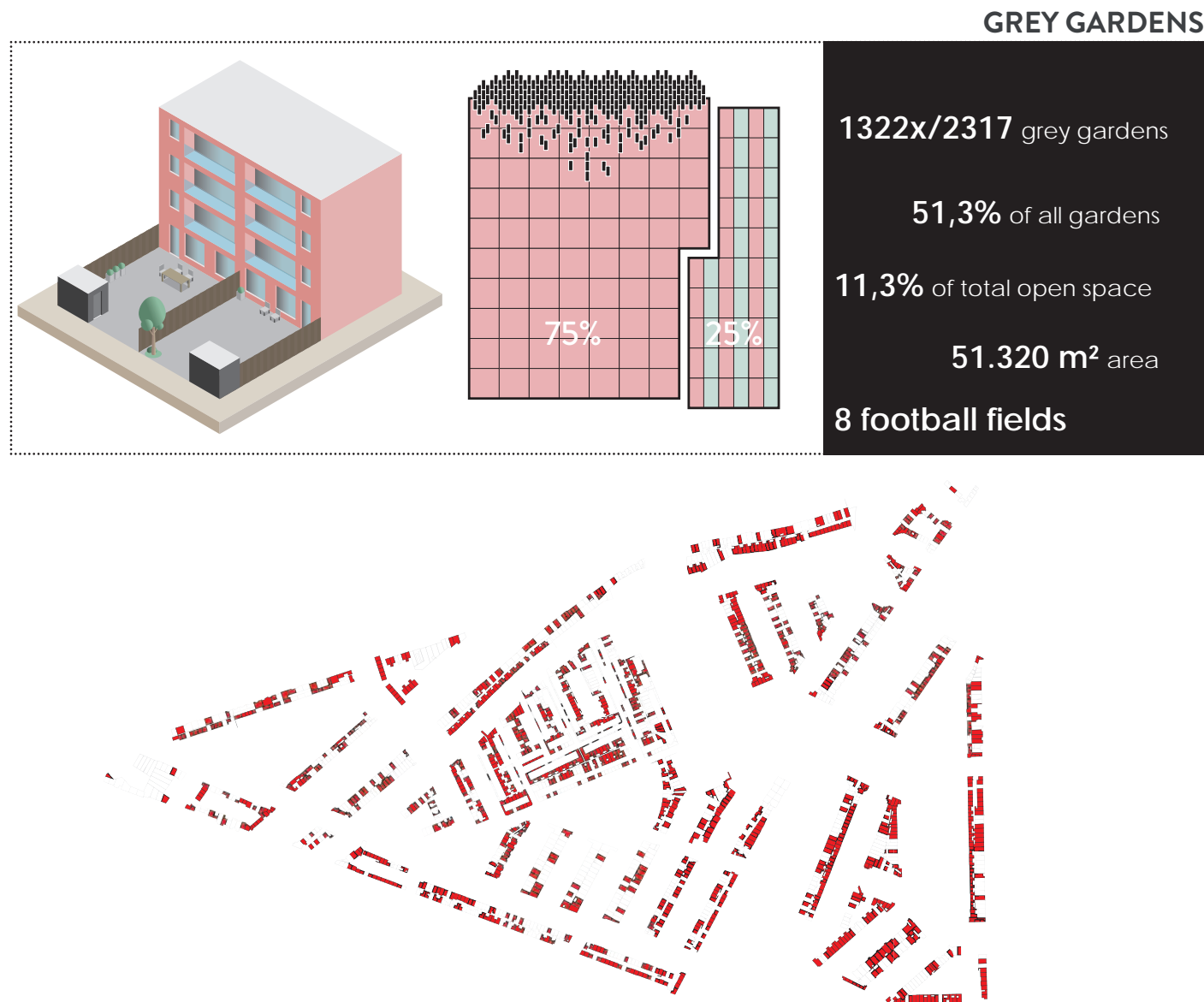


Fig. 41 Grey gardens in the Tarwewijk. By author

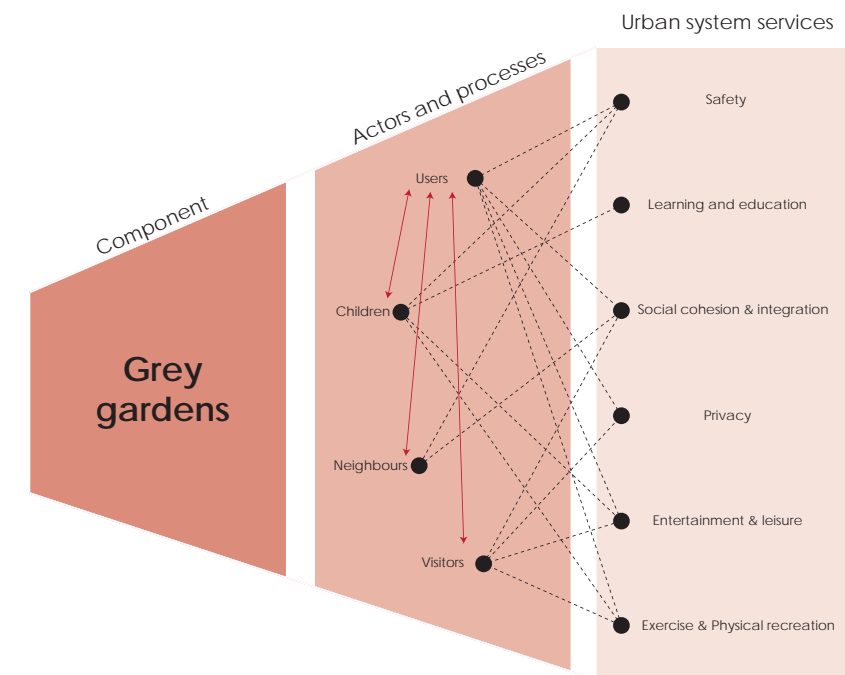
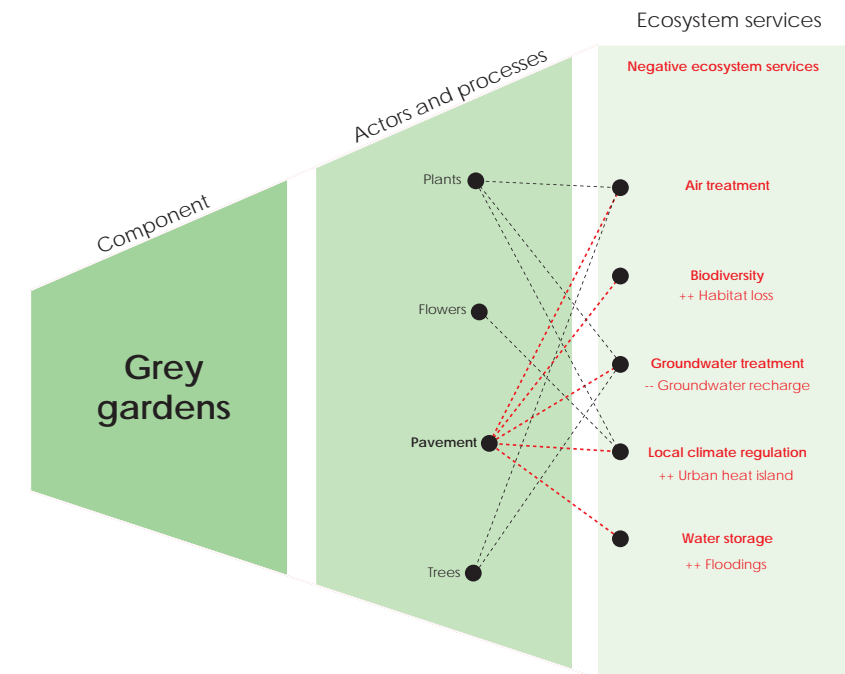


Fig. 42 (above) Ecological ecosystem services grey gardens. By author

Fig. 43 Social urban services grey gardens. By author

The third garden type, called mixed garden, is a combination of the grey and green garden, and has between 25 and 75% green. It is the second most common type of urban domestic garden, with around 24 %. Mixed gardens are an interesting type, because they have the potential to generate a balanced mix of the ecosystem services and social urban ecosystem services they can provide. While green gardens are the best type for environmental ecosystems services, mixed gardens can generate social benefits, while

also supporting environmental ecosystems services. The degree to which they support what system should be balanced, to increase the value for both the users and the environment. In a later stage, the location of mixed gardens is linked with variables like housing type and ownership to test if these factors show a correlation with this type of garden.

MIXED GARDENS

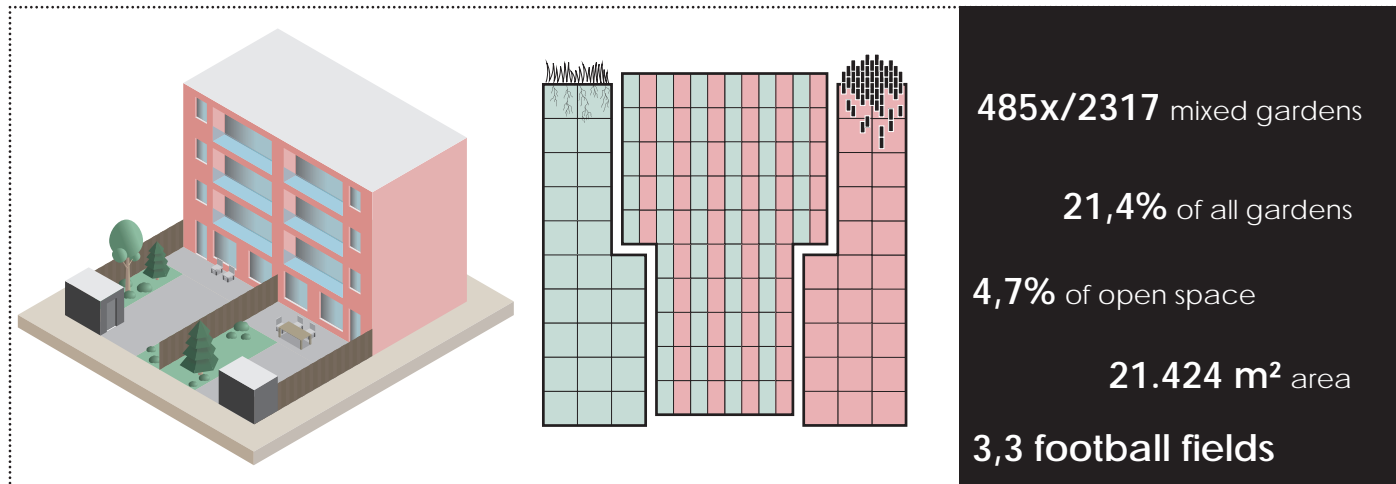
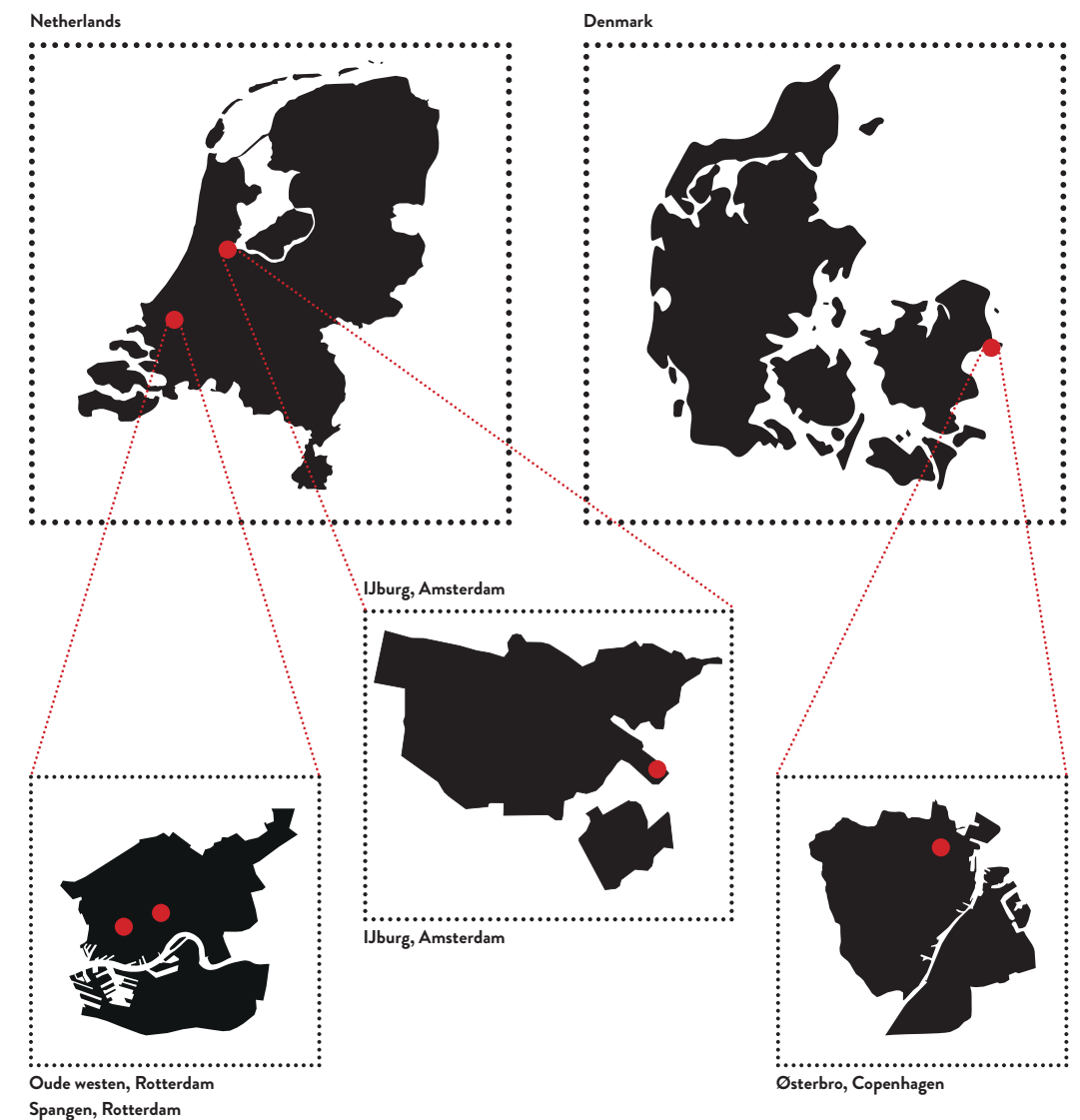


Fig. 44 Mixed gardens in the Tarwewijk. By author

3.3 Case study Urban Blocks

Working towards the sustainable urban regeneration of the Tarwewijk, a case study of 4 different locations with similar building blocks is used to analyse the current situations and used design solutions to spot potentials of transformation of urban blocks. Focus is laid on the inside of the buildings blocks, often consisting of gardens or shared gardens, and the transition between the private space, the building block, and the public space in front of the block using the method of territorial depth. Depending on the location, front gardens are part of the

transition, while in other cases different solutions are present which affect the territorial depth. Territorial depth is expected to have an influence on the liveliness on the streets. Since front garden in dense environments are not common, despite their growing popularity, it is interesting to see how places without front gardens function and these transitional spaces look like.



Oude Westen, Rotterdam, Netherlands

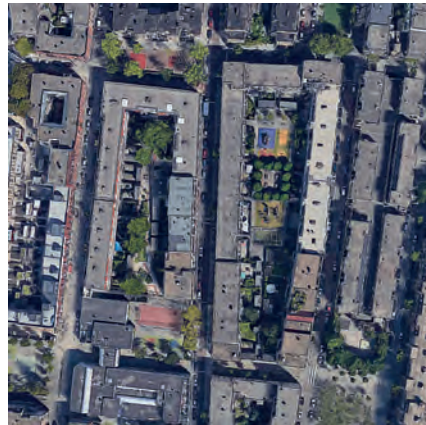


Fig. 45 t/m 48 Oude Westen, Rotterdam:

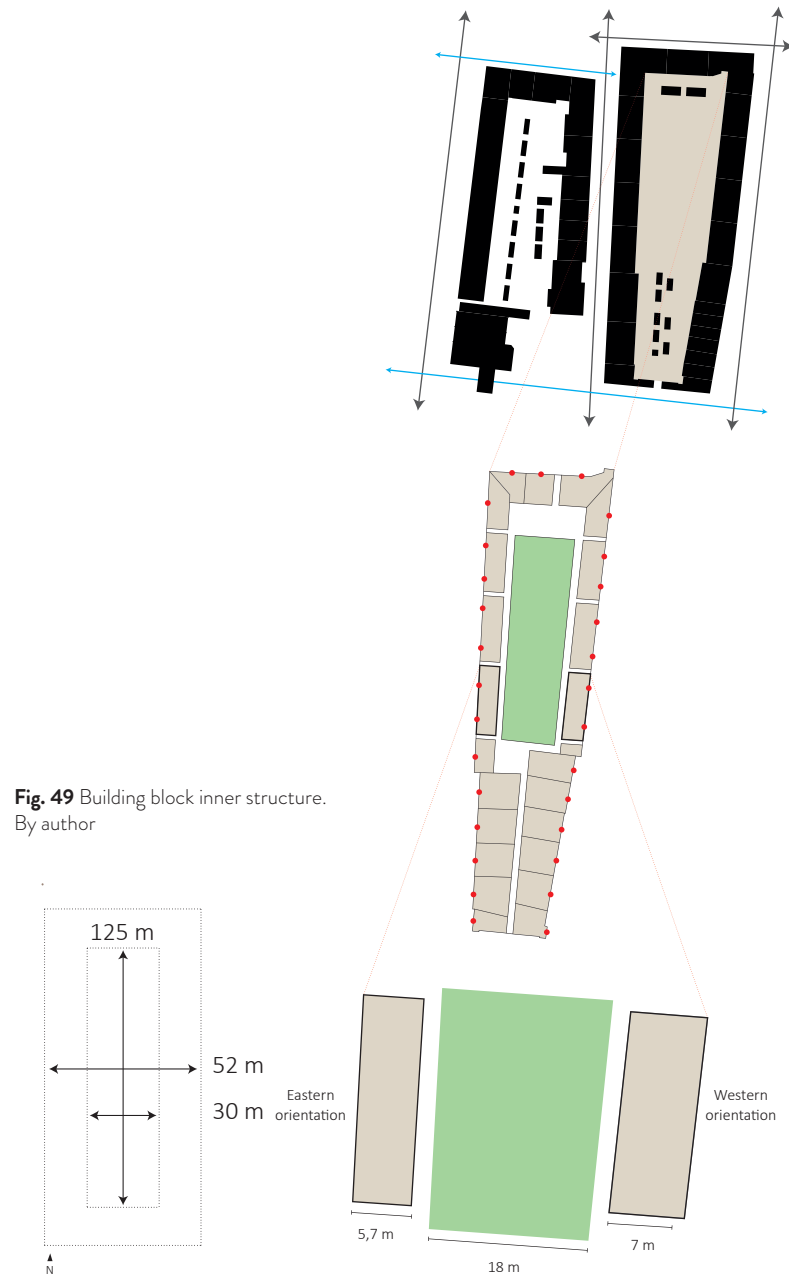
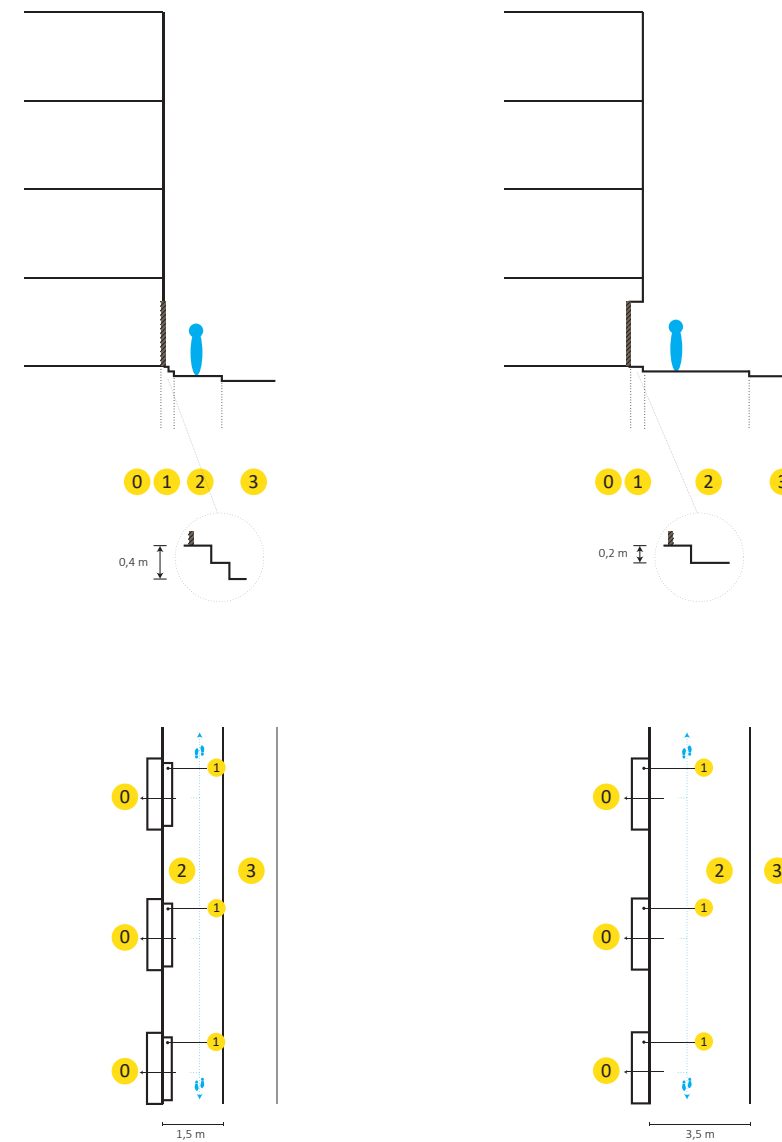


Fig. 49 Building block inner structure. By author

The inside of the building block consists of a shared inner garden, surrounded by private shared gardens. The use of high, closed fences results in a hard border between the two spaces, limiting the interaction with each other. Despite this limited interaction, observation shows that this does not affect the usability of the inner garden. It is plausible that the width of 18 meters of the inner garden alone affects this, increasing the openness of the middle area. In the case of a smaller inner garden with fenced-off barriers, it is possible that a feeling of enclosure could occur. This observation shows the importance of transparency of the borders between the different spaces, or how width can influence positively affect the use of a space.



The building blocks in Oude Westen do not use front gardens as an extra layer between private and public spaces. To create extra layers of territorial depth, two solutions near the entrances of the building stand out. In both cases, a small stairs in front of the entrance door is used to increase the depth. Observation shows that these stairs have a double function, where it is commonly used as a place to sit and to interact with people passing by. It is expected that this type of use is depending on the number of entrances that are connected to one stair. The more entrances connected to one stair, the less likely that it is going to be claimed as an active 'private space', which influences the use. This observation is used to conclude that building blocks could benefit from more private entrances into the buildings, instead of a few larger entrances. Especially with wider sidewalks, creating distance towards the car-focused streets could enhance the interaction between the building block and public spaces.

Fig. 50 Territorial depth Oude Westen. By author

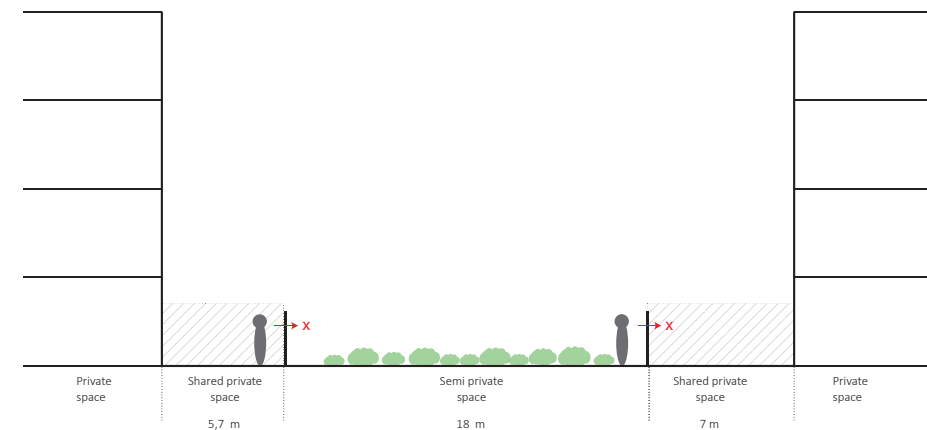


Fig 51 (down) Inside building block Oude Westen, Rotterdam. By author

Spangen, Rotterdam, Netherlands



Fig. 52 t/m 55 Spangen

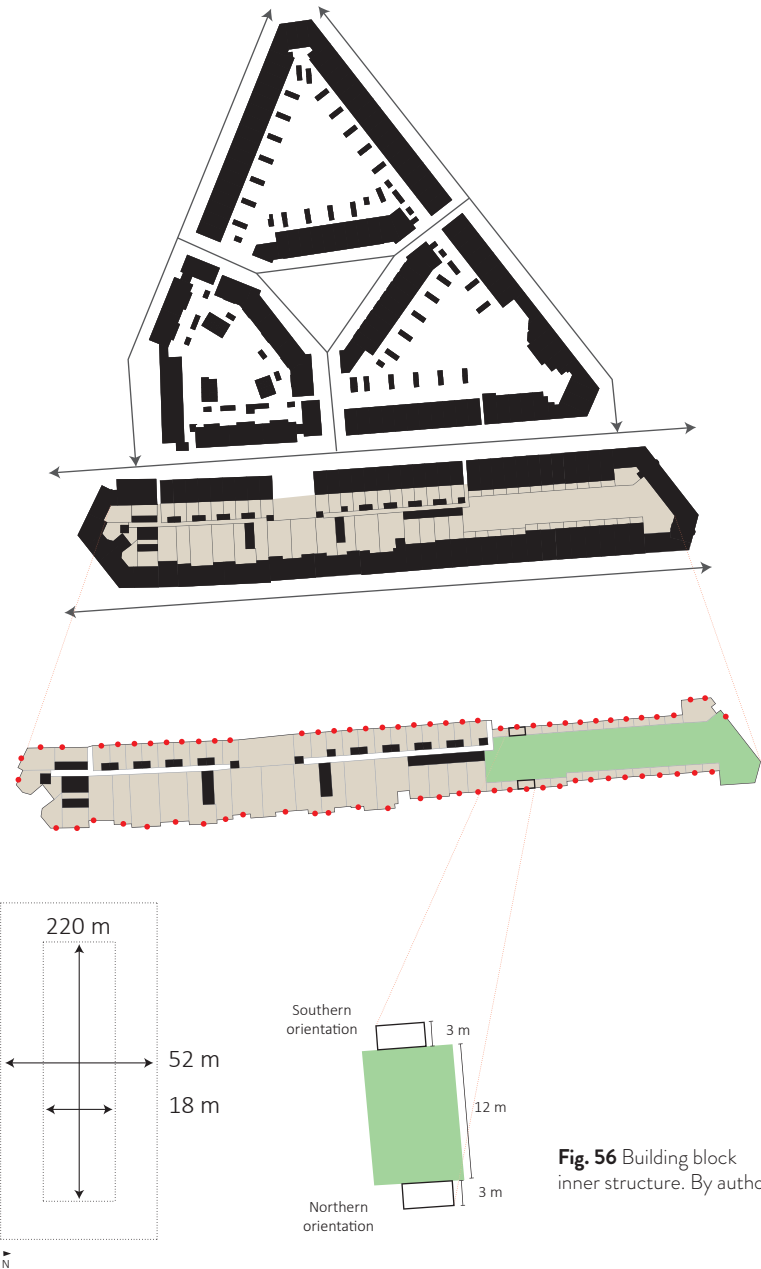


Fig. 56 Building block inner structure. By author

The size of the building block in Spangen is most comparable to the situation in the Tarwewijk, with both being around 18 meters wide inside. This example shows the potential of a narrow inner space, with a combination of raised private terraces, for extra privacy included with transparent side barriers, and a shared inner garden. The open character of the terraces increase the connectivity with the active inner space, which is important as stated in the case of Oude Westen, especially because of the minimum width. By raising the terraces 1 meter, and making them accessible via a small stairs, extra privacy is created, while the stairs can also function as a place for interaction. The example where the terrace is raised by more than 2 meters, makes double use of space possible, with the inclusion of storage space under the terraces, which keep the inner garden shed free.

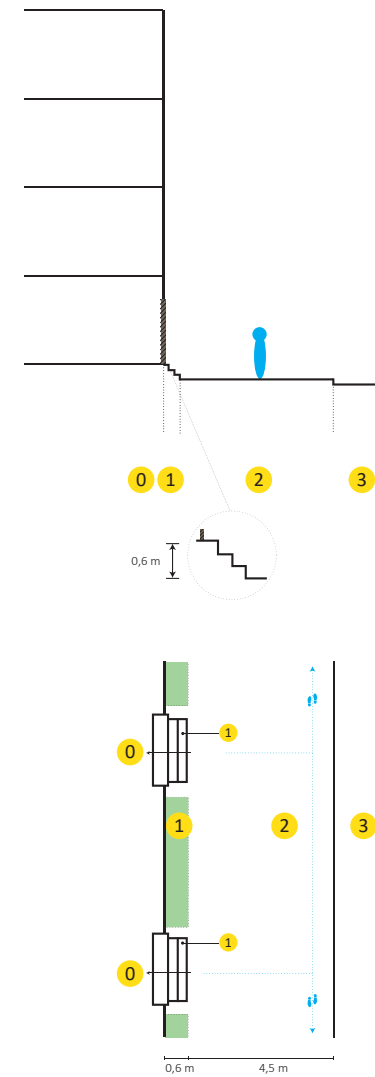


Fig. 57 (up) Territorial depth Spangen. By author

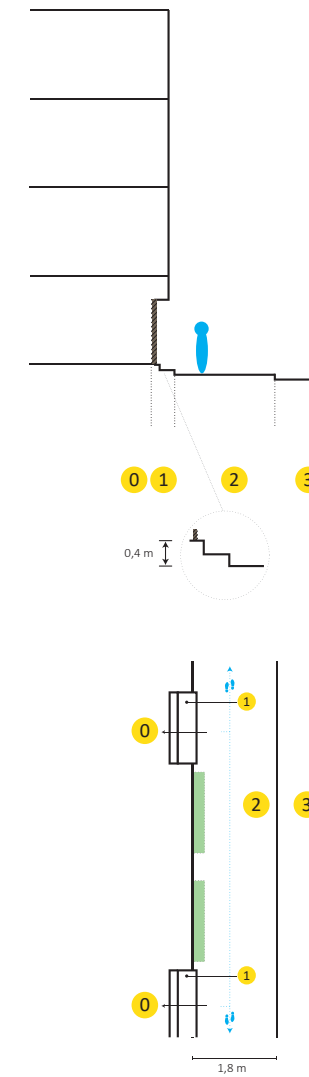
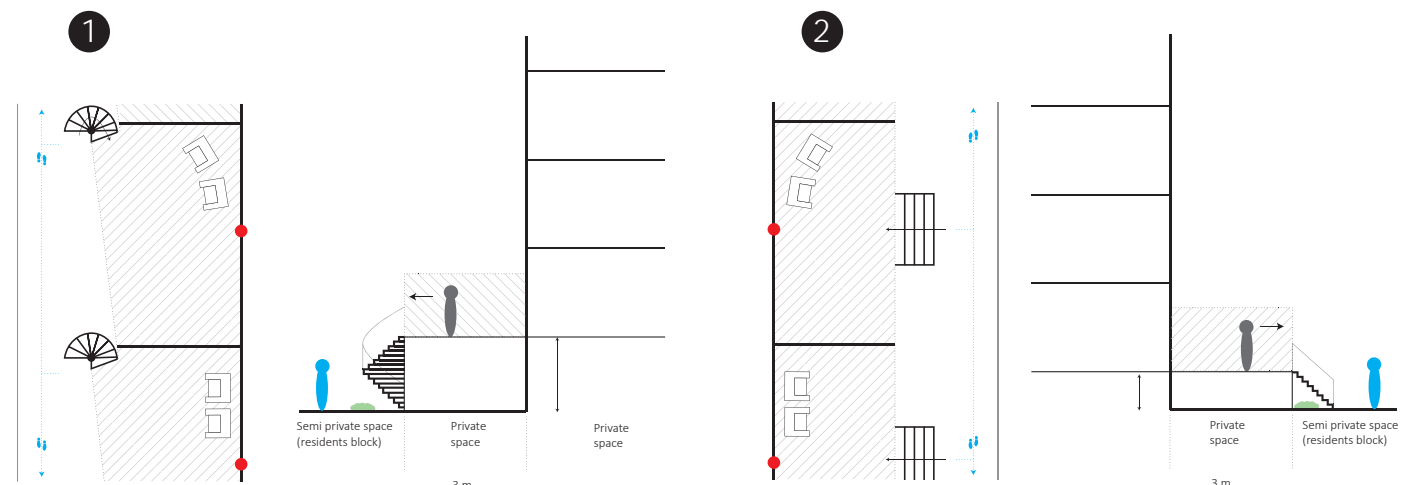


Fig. 58 (down) Inside building block Spangen. By author

The transition between the building block and the public space in Spangen shows the potential of a wider sidewalk for the interaction between the two spaces, as stated in the Oude Westen case. Also in this situation, the same two principles are used at the entrances of the buildings, with small stairs, which could be used to sitting and interaction. The difference to what a wider sidewalk can do is visible in the presence of personal attributes near the entrance. A wider sidewalk creates opportunities for residents to 'claim' a piece of public space, also because the distance between passers-by and the facade increases. Observations show that the extension of the stair, or other structural elements belonging to the building block, towards the public space, creates so-called inlets in the public space along the facade. These inlets, in this case only 0,6 meter deep, are often used to start facade gardens or as a place for other activities or attributes, which also increases the territorial depth. It is concluded that extensions of structural elements belonging to the building into public space, even small ones, can create opportunities to increase the use of public spaces directly linked to the building by residents and thereby the liveliness on the street.



IJburg, Amsterdam, Netherlands

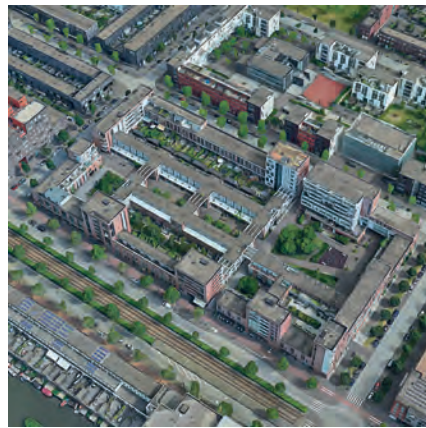
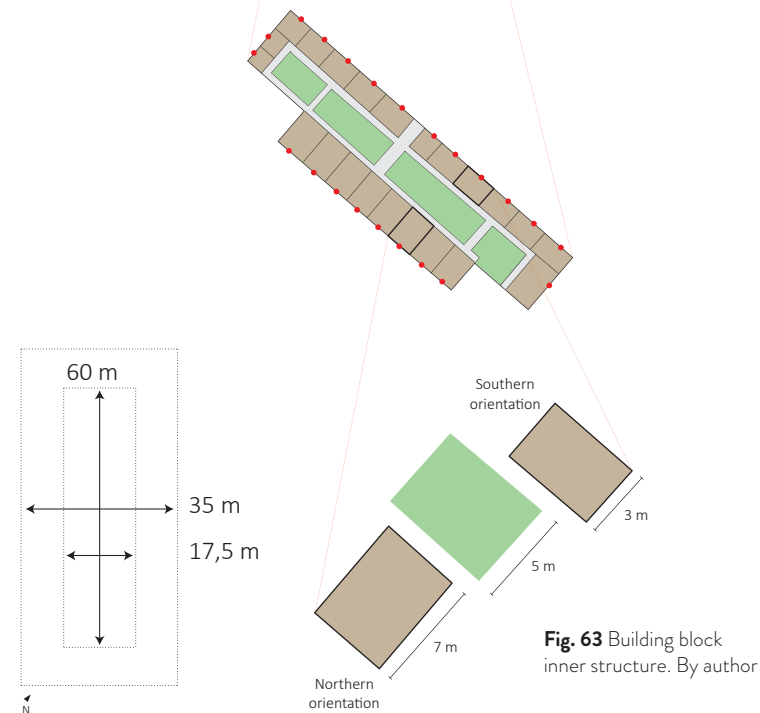
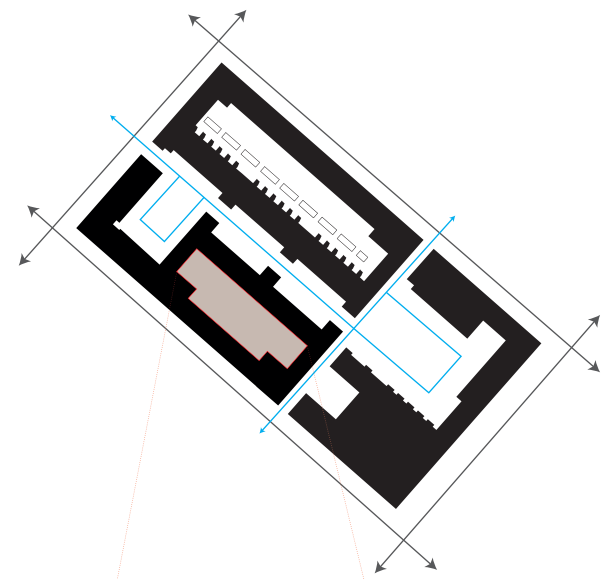


Fig. 59 t/m 62 IJburg



The building block in IJburg is an example of a 'superblock', consisting of multiple smaller blocks, divided by pedestrian street, and car-free public spaces. Inside the superblock, different forms of private spaces are present. In the highlighted zone, the same concept as of Spangen and Oude Westen is used, with a combination of private gardens and a passive shared inner garden. Observation shows that the use of low hedges as borders between the territories increases the transparency of the block, but also diminishes the privacy value of gardens between neighbours. The shared inner garden compromises this partially, by the implementation of dense green, blocking direct view to the other side of the block. Another interesting finding is that the southern oriented gardens are only half as deep compared to northern oriented gardens, whereas in other cases this is vice versa.

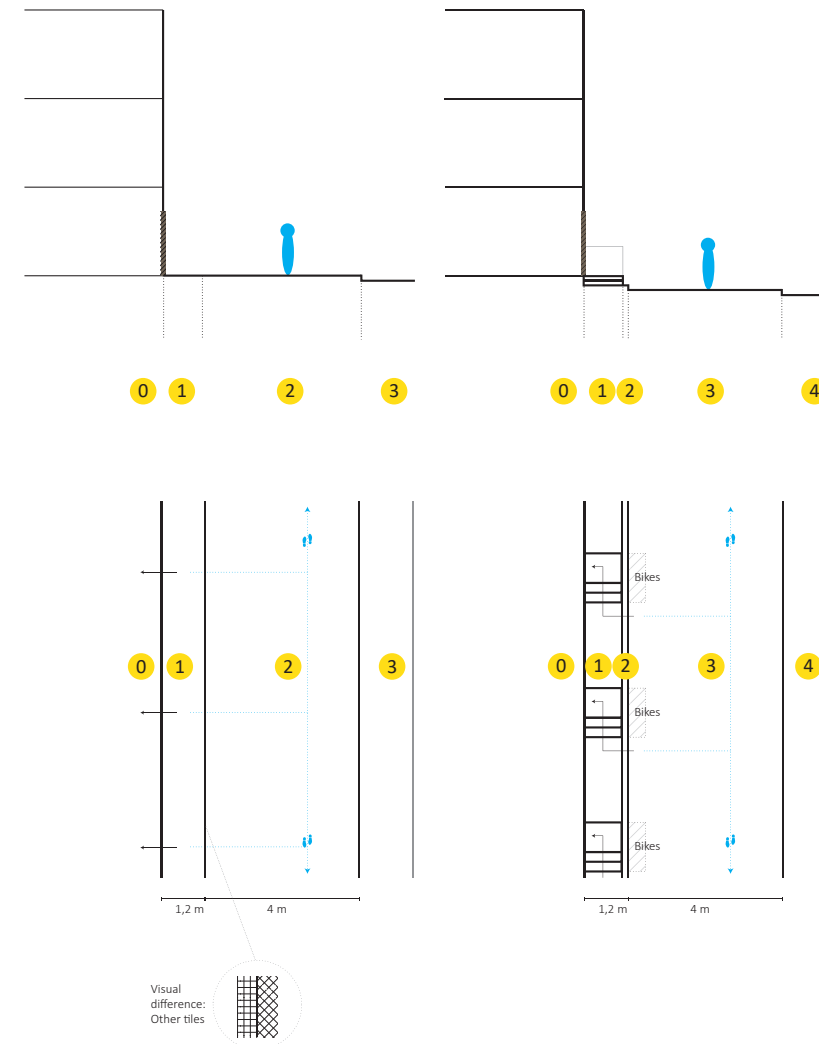
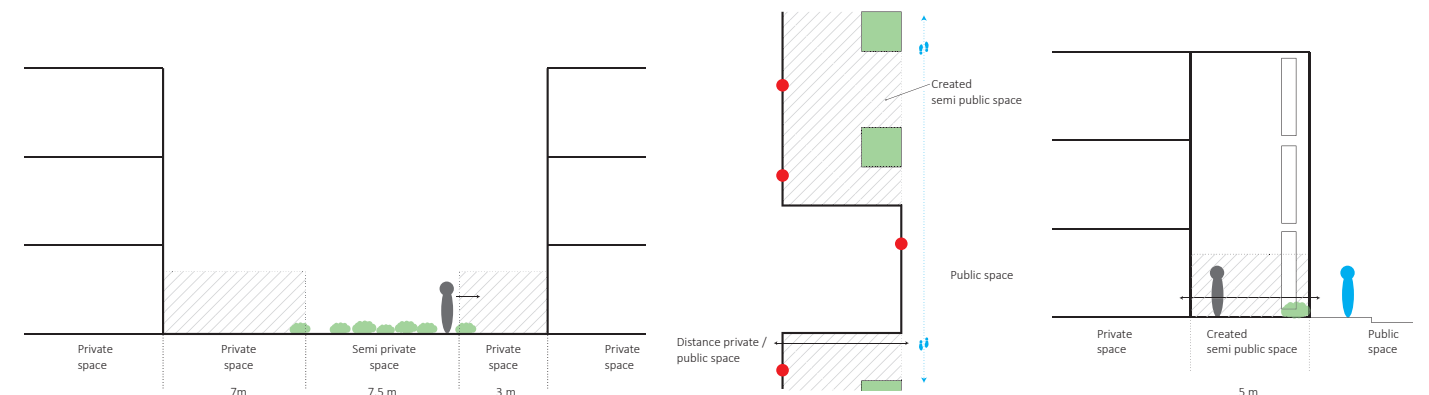


Fig. 64 (up) Territorial depth IJburg. By author

Fig. 65 (down) Inside building block IJburg. By author

The transition between private- and public spaces in the superblock in IJburg shows the different solutions which are possible to increase territorial depth. The first example is creating a visual difference instead of the commonly used height difference by using different styles of pavement to highlight 'private space' of the residents, without creating physical borders. Based on observation it is concluded that in this case, the solution can work to increase the distance between passers-by and the facade, but 'claiming' the personal space doesn't happen as intended, since very few people used personal attributed to mark their territory. It is concluded that a double step-up variant can result in 'claiming' of the public space. The first step up can be used as a seating and for interaction, while the second stairs, and especially the railing of the stairs, creates a physical structure which is used for parking bikes or flower pots, and thereby claiming the public space. From the pedestrian street, a prime example shows how building form can result in a softer transition between private and public spaces. By extending the building block a few meters towards the street at certain points, inlets are created which transform the public pavement into semi-private space.



Østerbro, Copenhagen, Denmark



Fig. 66 t/m 69 Østerbro

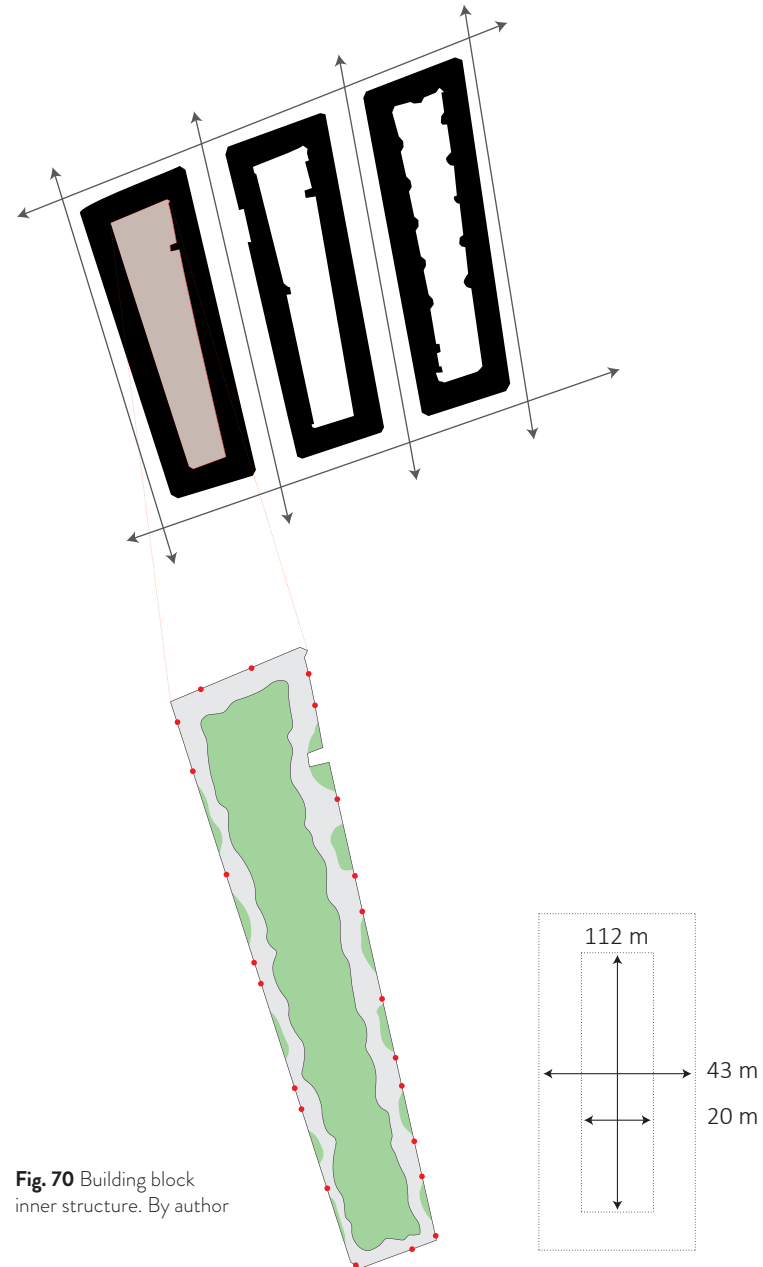


Fig. 70 Building block inner structure. By author

The building block in Østerbro is an example of how heavily paved inner blocks can be transformed into a valuable shared garden. It consists of a large semi-private green space, available for multiple activities, surrounded by 1 connected pathway. Multiple entrances from the building blocks into the inner space are directed along this route, where two types of physical elements are used to 'create' private spaces. The first element is the use of green patches in combination with a winding pathway, resulting in private inlets for residents. It also increases the distance between passers-by and the facade, resulting in more privacy. The second one, similar to the IJburg case, is using the building block, extended towards the semi-private pathway at certain points, as a physical element to create private spaces in the inlets.

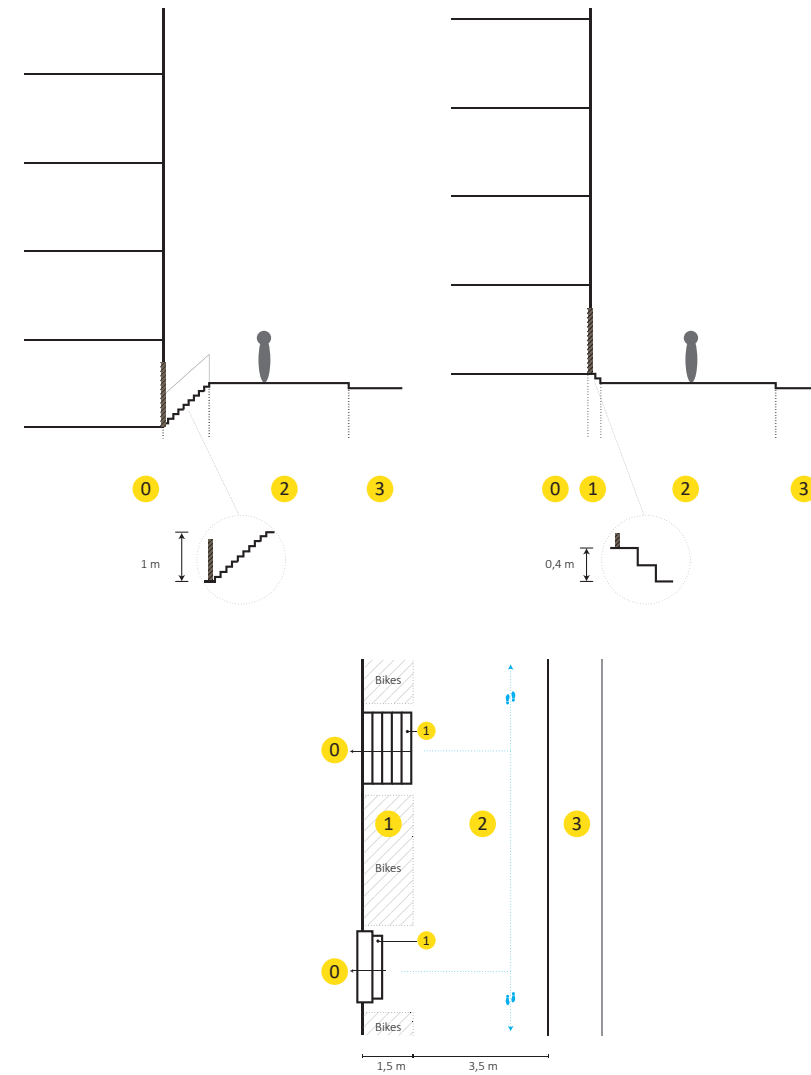


Fig. 71 (up) Territorial depth Østerbro. By author

Fig. 72 (down) Inside building block Østerbro. By author

Extra territorial depth from the outside of the building blocks is created in two ways, from which the first one is also used in the cases of Rotterdam. Raising the entrance of the building creates a small step-up, which adds depth. In this particular case, it is not expected to be used as a place to sit and interact with people because the amount of entrances is much more limited, increasing the number of apartments per entrance, making it more difficult to claim the space. Extending the step-up into the public space increased the distance between the facade and the passers-by, creating small inlets. These inlets are strengthened by a second method to increase territorial depth. To reach the cellar of the building blocks, direct access is made possible from the public street via stairs. These stairs are extended into the public space, which together with the step-ups form inlets. Observation shows that these inlets have been 'claimed' by residents, used as a place to store their bikes. This further increases the distance between the facade and the passers-by, creating more privacy in the dwellings on the ground floor of the building block.

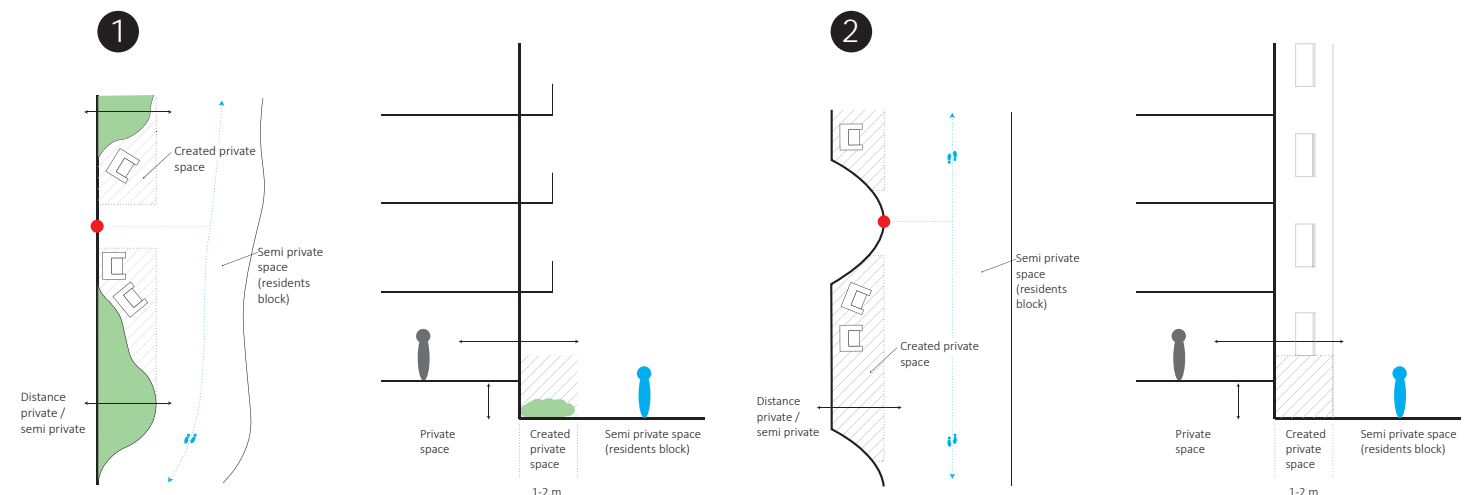




Fig. 73 Public space inside a block in the Tarwewijk

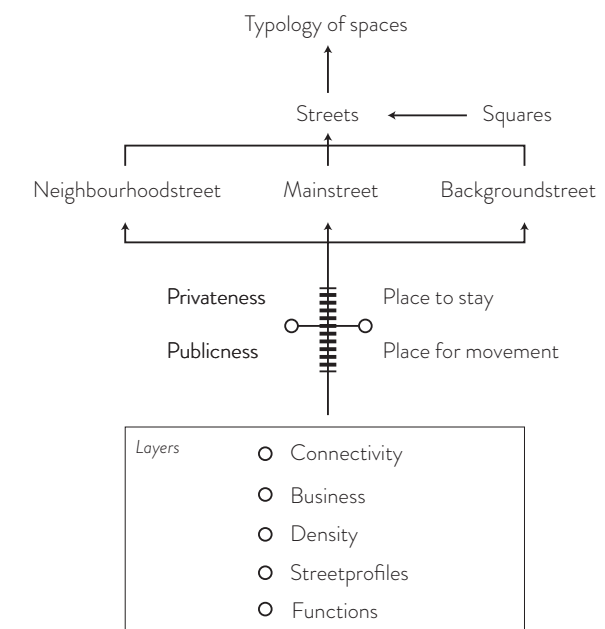
3.4 Public spaces

In order to understand the transition zone between public and private spaces, in which qualities of urban domestic gardens can play an important role, research has been conducted to develop a typology of places of the Tarwewijk. The focus has been mainly on a typology of streets, but also squares will be shortly discussed. For the typology of streets, research showed that different street types are present in cities, each having specific characteristics (Berghauser Pont, M et al, 2019). To make the typology of spaces more manageable, three types have been selected which are relevant for the research and the Tarwewijk:

- Main street
- Neighbourhood street (local mainstreet)
- Background street

The type of street is related to two factors, the publicness/privateness of a street and if it is a place to stay or a place for movement. To distinguish how private or public a street is, and if it is used to stay or for movement, the following layers have been researched:

- Connectivity of streets
- Business of streets
- Density of urban blocks along the streets
- Street profiles
- Function along a street



Connectivity

Business



Connectivity

Using the space syntax method, focused on the connectivity of streets, reveals an expected hierarchy between the outer main streets surrounding the Tarwewijk and the inner background streets. Being part of a larger street network in Rotterdam South, connected to important corridors, these streets tend to generate more movement than other types of streets. Better connectivity and thus more movement will result in a higher publicness of the streets.

Also revealed are the important connections between the main streets and the background streets, being the entrance to the neighbourhood in multiple places.

Not only between different types of streets is a hierarchy possible. Also in specific types, in this case, the less connected background streets in the middle of the urban structure, is a hierarchy visible, which can indicate which local background streets will more private.

Fig. 74 Connectivity streets Tarwewijk. By author

Busyness

The busyness of streets is an important indicator to reveal a hierarchy between the different street types. The space syntax methods reveals that the largest streets are also the most busy ones, which can be related to their connectivity with other parts of Rotterdam South and into the Tarwewijk. It is likely that along these streets more activities and functions will be located, thus being able to identify them as main streets. Looking more into the streets in the neighbourhood shows a clear distinction

in the busyness between one-way streets and two-way streets. Two-way streets in the Tarwewijk function as important connectors between different parts of the neighbourhood, while the one-way streets function as in the middle in the category of one-way streets, depending on the direction and layout of connection streets.

Exceptions are visible in specific part of the neighbourhood, where one-way streets are part of most busy streets. These can be labeled as neighbourhood streets, since they are important for the accessibility.

Fig. 75 Busyness streets Tarwewijk. By author

Density



Density urban blocks

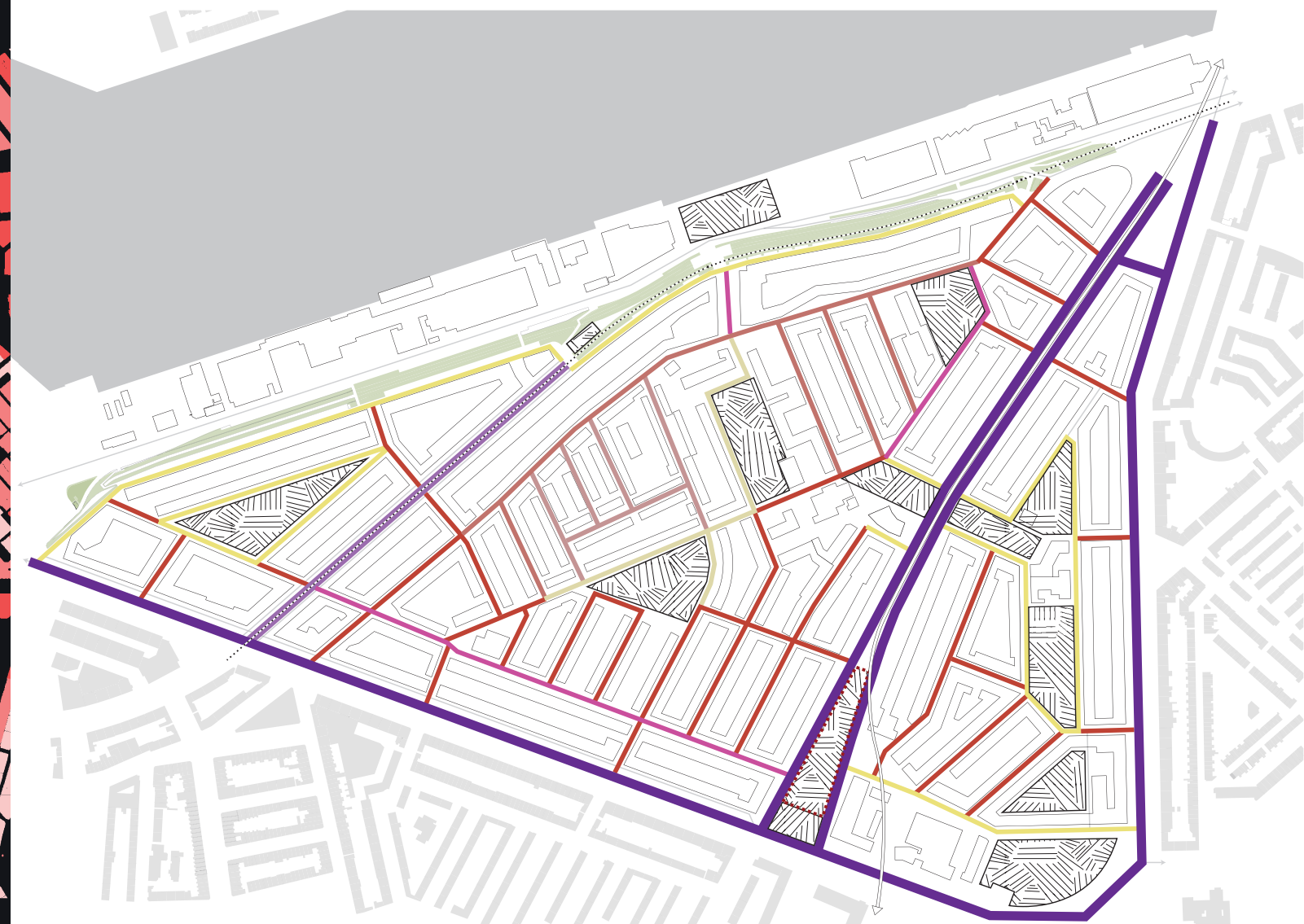
The density of urban blocks can help indicate the types of streets and its publicness or privateness. Areas with denser urban blocks result in more residents and corresponding functions, which generate more movement too and from these areas. The publicness will thereby increase in dense environments, where low dense areas will have less movement and be more private.

The density analysis of the Tarwewijk reveals a mix of high, medium and low-density urban blocks. The highest density blocks are

located in the corners of the Tarwewijk, along the busiest and best-connected streets. The majority of the urban blocks has a medium-density and consist of 4-storey high closed building blocks. The lowest density blocks are found in the middle of the neighbourhood, along the less connected and less busy background streets. These building blocks mainly consists of row housing, and are thereby considered as more private streets with less movement.

Fig. 76 Density of urban blocks in the Tarwewijk. By author

Street profiles



Profiles: movement or staying place

Street profiles can play an important role in the way streets are used and thereby the publicness or privateness of a street. Analysing the existing streets in the Tarwewijk, different groups of streets have been identified based on profiles and configuration, resulting in the following zones:

- Transitional zones
- Edge zones
- Inner zones
- Main zones

Legenda

Fig. 77 Different street profiles in the Tarwewijk. By author

Transitional zones

The street profiles part of the transitional zones see height differences of the buildings on both sides of the streets. These types of street profiles are present in the Tarwewijk in locations where changes appear in the urban block morphology. The majority of the space in these streets are dedicated to fast traffic, with parking on both sides of the road. Because of their location close to the edges of the neighbourhood, as

a connection between areas where the tallest urban blocks bordering the neighbourhood change in lower urban blocks, they consist of two-way roads. The transitional zones thereby can be considered more to the public side, generating movement without places to stay for slow traffic.

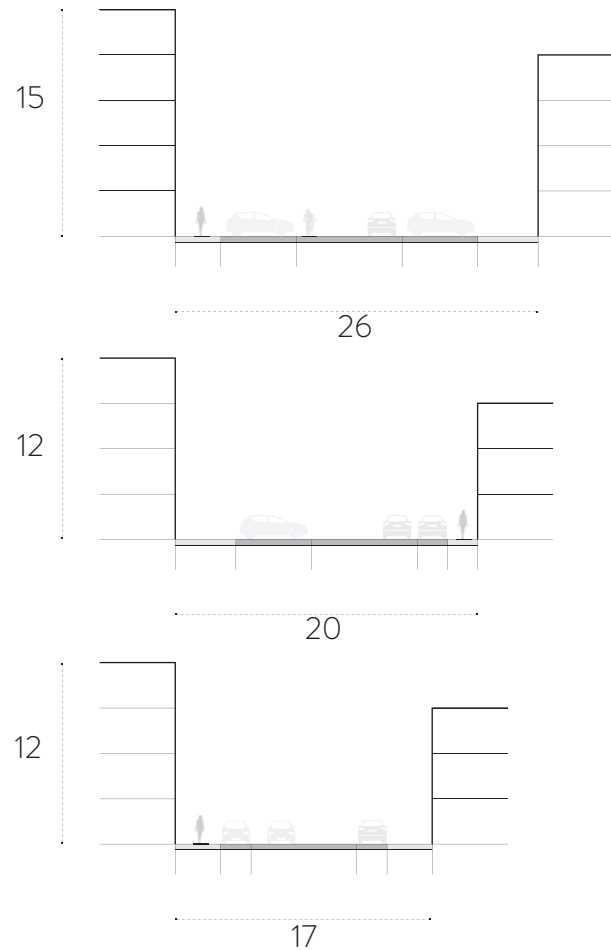


Fig. 78 Types of transitional zones. By author



Fig. 79 Transitional zones from eye level

Edgy zones

Located along the borders of the neighbourhood, along public squares in the middle of the Tarwewijk and in places functioning as an entrance deeper into the neighbourhood, the edgy zones have buildings on only one side of the street. Depending on the type, these zones tend to have a more open character than other types and have the potential to shape the larger public space they surround, influencing the way they are

used. The encountered examples in the Tarwewijk see differences in the amount of privateness or publicness, but in all cases, the majority of space is dedicated to fast traffic, without a clear connection with the open spaces on the other side of the street. In some cases, the sidewalks tend to be wider on the side where the buildings are, creating opportunities for more use by the residents, resulting in more privateness.

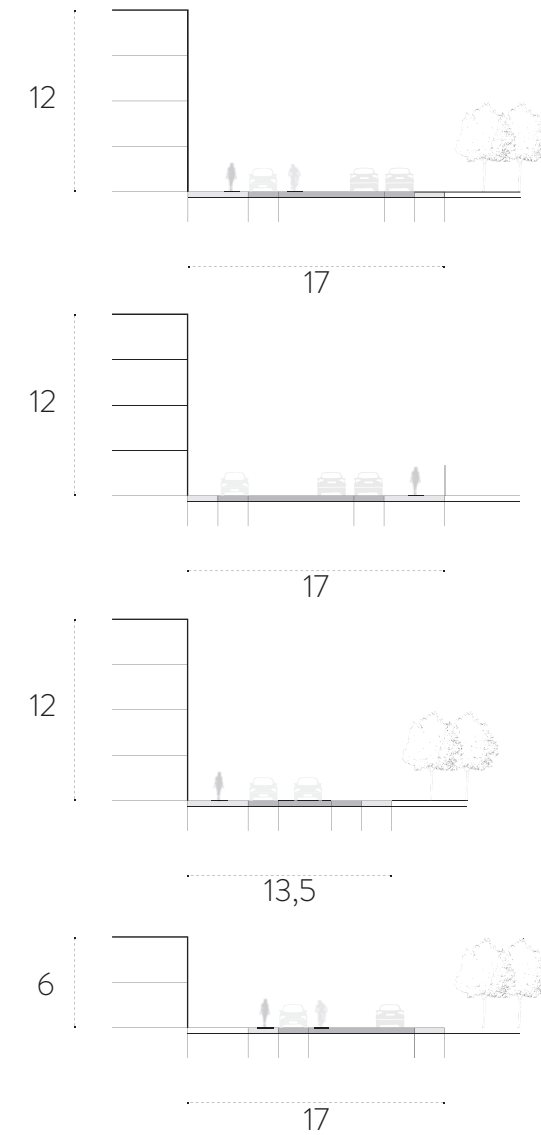


Fig. 80 Types of edgy zones. By author



Fig. 81 Edgy zones from eye level

Inner zones

The inner zones are mainly concentrated towards the middle of the Tarwewijk, further away from the busier streets, and come in a wide variety. A clear distinction is visible is the width of the streets, combined with the building type, where higher buildings blocks are located along wider streets than the smaller row housing. Almost all street profiles have a focus on fast traffic. But despite the focus on fast traffic with

space distribution, wider sidewalks are also present in most cases, whether or not on one side of the street. Exceptions are the low-density parts with row housing, the only types with a front garden, where sidewalks are smaller or non-existing. Since inner zones are more locally used, the privateness increases and potential for more human scale redevelopment increases.

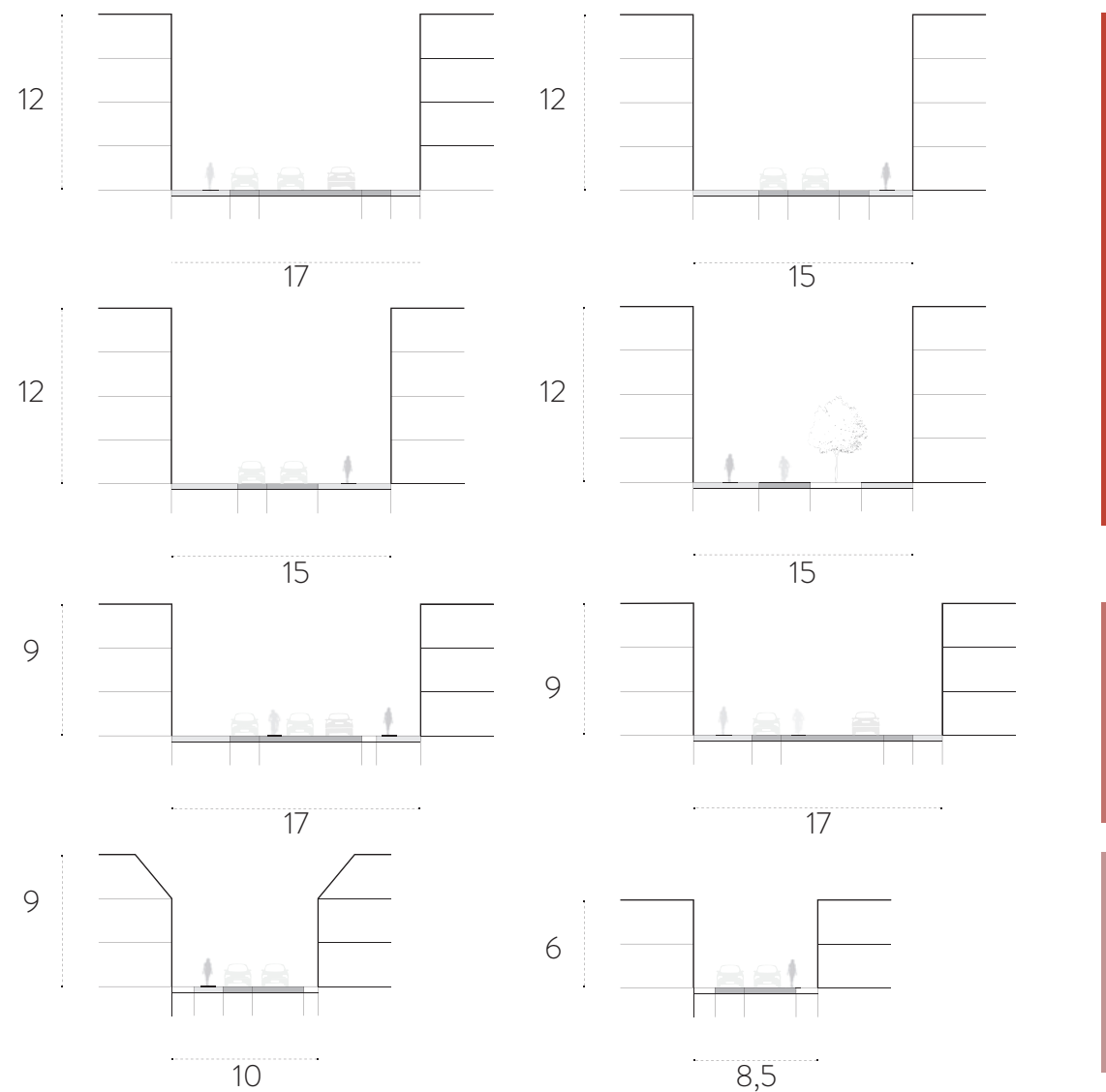


Fig. 82 (above) Types of inner zones. By author

Fig. 83 (down) Inner zones from eye level



Main zones

The street profiles of the main zones in the Tarwewijk are clearly designed as streets for movement, to distribute as many people as possible from one place to the other. Consisting of wide roads, sometimes even double roads, metro- or tramlines, and parking spaces on both side of the streets and in the middle, these zones mainly serve as connectors to other neighbourhoods or as the central spine connecting

smaller neighbourhoods in the Tarwewijk. Compared to the width of the street of other zones, the sidewalks tend to be rather narrow, despite the presence of different functions other than housing. The main zones thereby can be considered to be the most public zones, with hard borders between private and public.

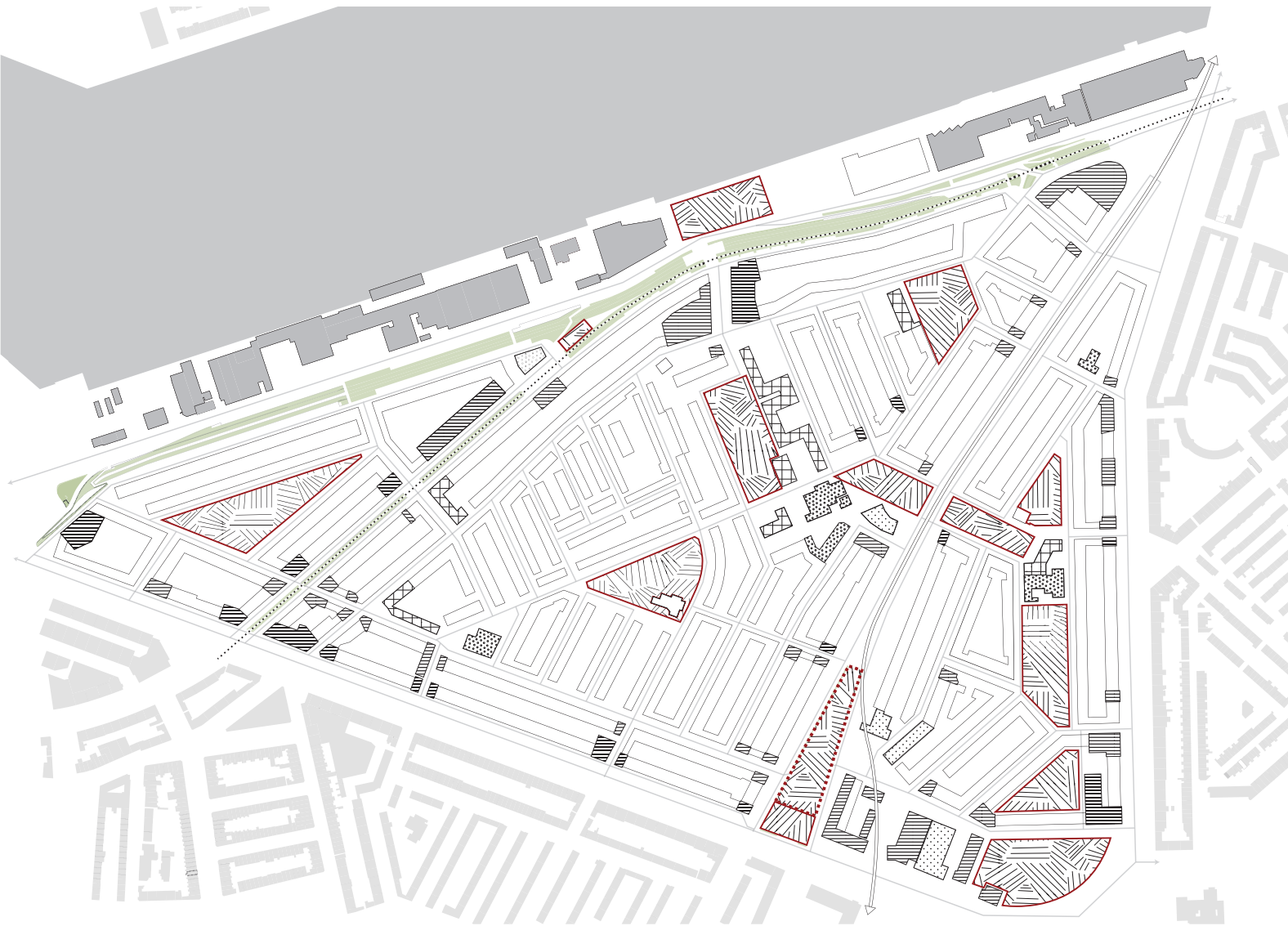


Fig. 84 (right) Types of main zones. By author

Fig. 85 (down) Main zones from eye level



Use of (public spaces)



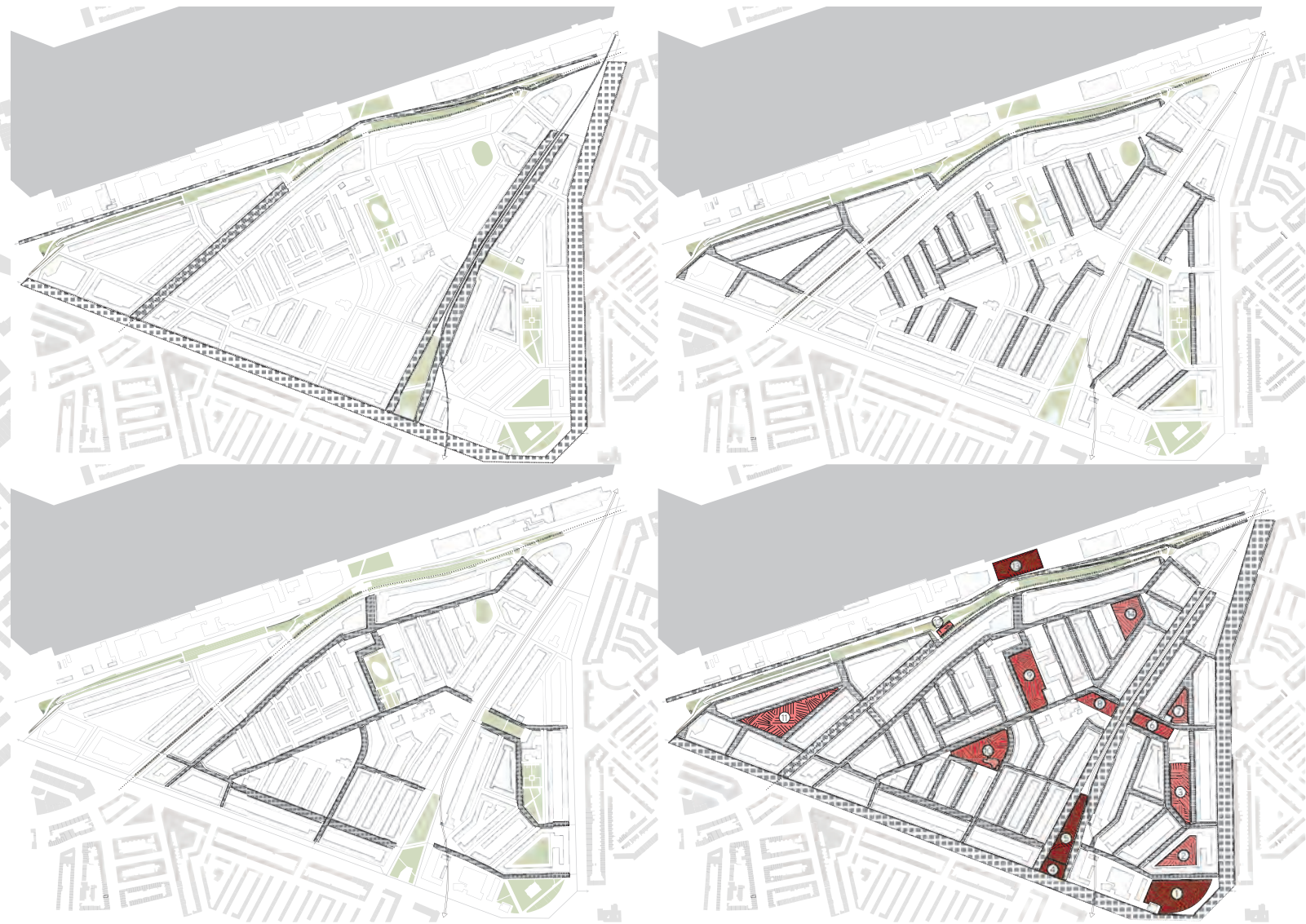
Functions in the built environment:

The built environment in the Tarwewijk consists of different types of functions. While the majority of the buildings are dedicated to housing, other types are present in specific places. A pattern is visible where the edges of the Tarwewijk, as well as along some specific connections inside the neighbourhood house these other functions. Along the wider, more public streets are most of the commercial and social functions like a pharmacy, while public spaces are positioned near large junctions. Educational and religious functions can

be found deeper into the neighbourhood, mainly along streets which connect different parts of the Tarwewijk with each other, due to their local accessibility. More local public spaces like squares or larger playgrounds can also be found along these well connected and accessible streets. Here, on the corners of the building blocks can also some local commercial functions be found, like small vegetable shops or supermarkets. The smaller and less connected streets, deeper into the neighbourhood, serve only for housing.

Fig. 86 Functions in the built environment in the Tarwewijk. By author

Typology of public spaces



Typology of public spaces:

Analysing all the layers and stacking them on top of each other makes it possible to make an typology of public spaces in the Tarwewijk, which will be used to further analyse the transitional space between public and private spaces in the Tarwewijk. All the streets in the Tarwewijk have been labelled with one of the following types of streets: main street, neighbourhood street or background street. Furthermore, also other public spaces like squares, based on the

adjacent type of street, can be divided into different categories. From squares which are used for staying, to squares which are used for movement. And public squares along important streets to more private squares in the middle of the urban blocks.

Fig. 87 Types of public spaces in the Tarwewijk. By author



Fig. 88 Aerial view of different public spaces in the Tarwijk

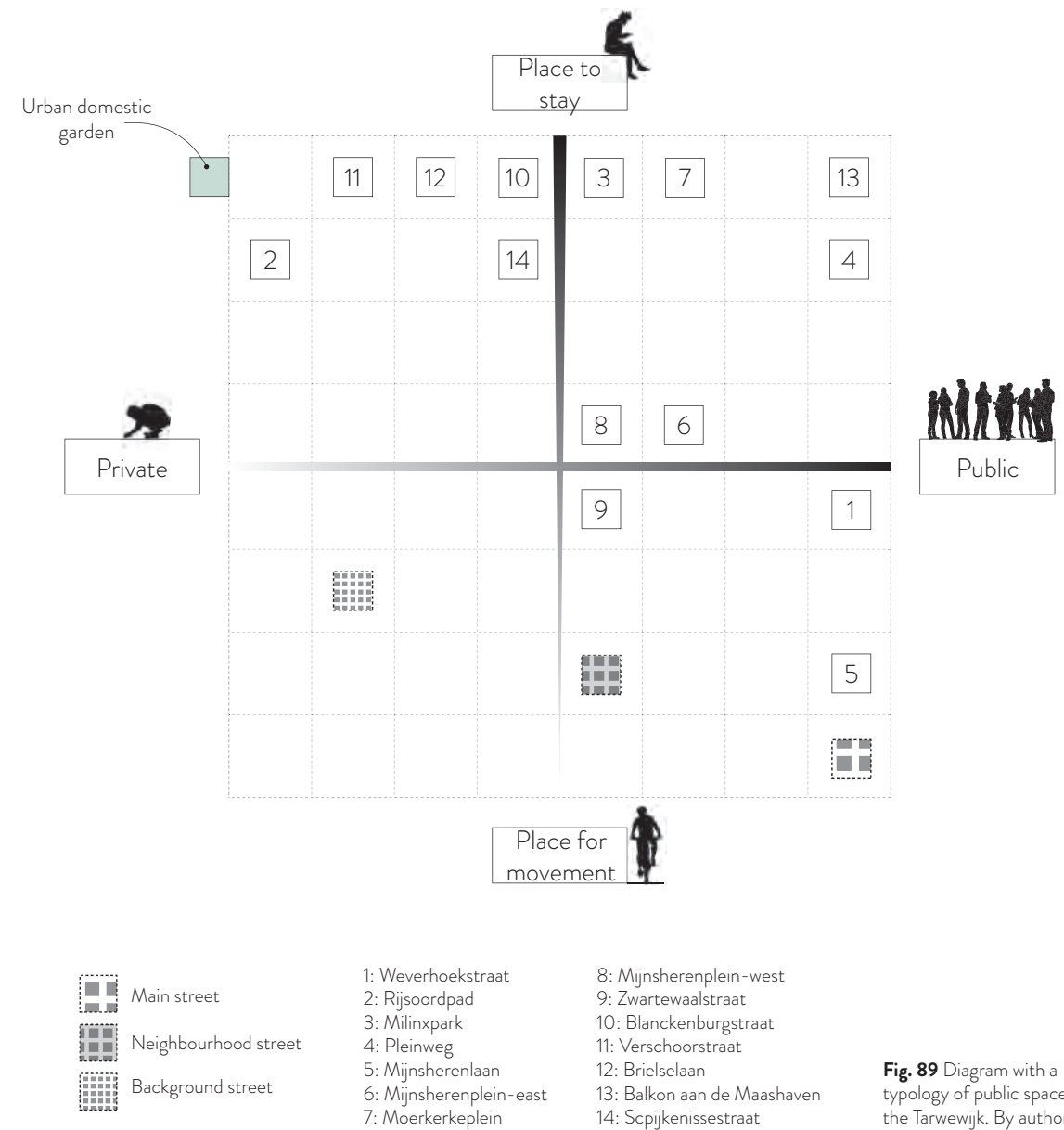


Fig. 89 Diagram with a typology of public spaces in the Tarwijk. By author

When the two factors, 1, the publicness/ privateness of a public space and 2, place to stay or place for movement are joined together in a diagram, it is possible to give the different street types and public squares a place and see how they differentiate from each other.

The next paragraph will focus more on three public squares and the three different street

types. For the public squares, number 3 (Millinpark), 8 (Mijnsherenplein-west) and 11 (Verschoorstraat) are analysed further. These three squares are selected because they fit the expected design direction of public placed which are more private, and used as a place to stay. Furthermore are they spread out equally through the neighbourhood, to give a better representation of the whole Tarwijk.

Variables Assessment

Activities and accessibility are the two main variables that are used to assess the following public spaces. According to Karaçor (2016), activities form the base of public spaces, because it gives people a reason to go to a certain place, and also return later. Furthermore, it is stated that places cannot become public if they are not accessible (Karaçor, 2016)

Verschoorstraat

Accessibility public space

The open space in the Verschoorstraat consists of multiple sport fields, playgrounds and open grass areas with seating. Surrounded by building blocks on all three sides, the open space is not visible from a greater distance and thereby not used as a place for movement to other areas. People who are present are local or want to be here. This is also visible in the amount of fast traffic, which is limited, despite the multiple connections with public streets from three directions. This makes it highly accessible for slow traffic, pedestrians or bikers, which is confirmed by a high amount of slow traffic users in the area.

The presence of multiple entrances of the open space from the street makes it possible for users to directly enter the open space from multiple directions without having to take a longer route. It is suggested that this has positive effects on the use of this particular space.

The building blocks surrounding the public space also have multiple entrances, resulting in a strong connection between the built and unbuilt. It furthermore results in a gradual

distribution of residents into the public space, which increases the quality of the area. In some of the building blocks, direct access from the inside, from the urban domestic gardens, through a gate in the front facade is possible. It is expected that a direct connection between these two can increase the use and quality of the gardens, for the same reason that public spaces need to be accessible. The quality of the urban space could potentially also increase if the connection between the front and back of the building block is increased, with less cluttering of bikes along the edges of the public space.

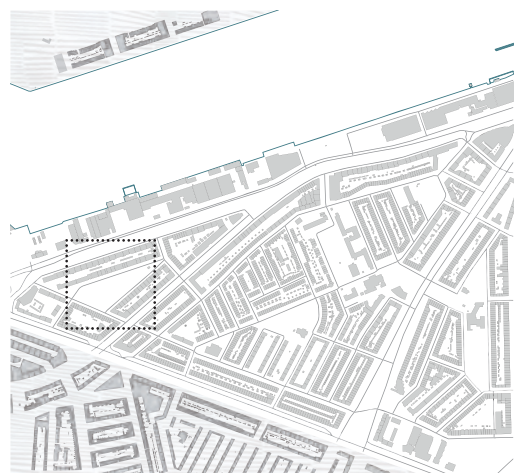
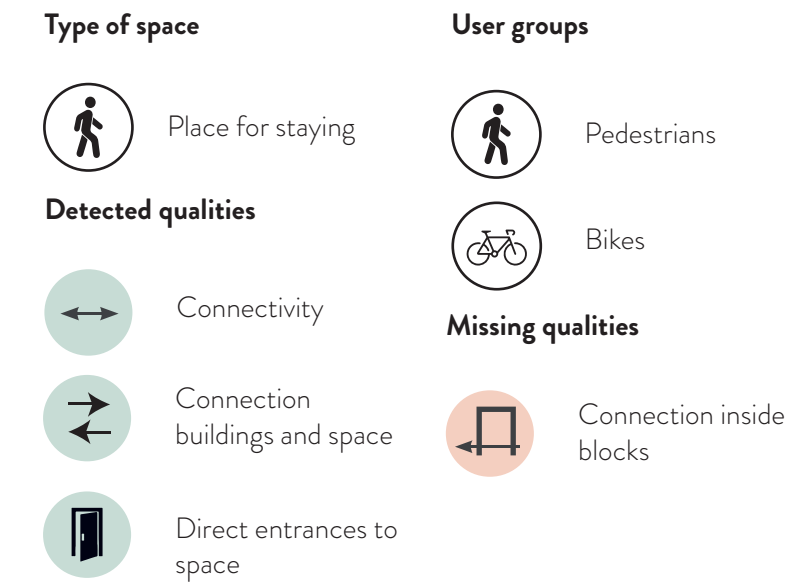


Fig. 90 Location public space in the Tarwewijk. By author

Verschoorstraat Accessibility public space



Fig. 91 Accessibility public space location. By author



Verschoorstraat

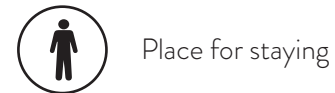
Activities public space

The public space in the Verschoorstraat consists of multiple sport fields, playgrounds and open grass areas with seating. This makes a lot of different activities possible. From observing the location, it can be concluded that most activities are related to the presence of children or younger people. First of all, the wide variety of playgrounds and sport fields serve as a pull factor towards the open space for children. Together with these children, parents join to keep an eye out. This creates opportunities for interaction between parents and other people, who make use of the availability of benches and picnic table spread around the public space.

Sports fields tend to attract a certain group of younger people to gather and do activities. These activities can also be organised by local groups, which was captured during the observation. Because of the enclosed appearance of the public space, feeling quieter, different user groups make use of it than in more busy places. Groups of older men and women gather on the seating areas, while also people on their own or with dogs come to enjoy the open space and sit down.

Observation showed that the building blocks surrounding the public space can also generate activities. With raised entrances of the dwellings, the small step-up to reach the ground level is widely used as a place to sit down and interact with people. Furthermore, balconies oriented towards the open space showed to be able to generate cross-level conversations between people from the ground floor with the apartments and eyes on the street.

Type of space



User groups



Detected qualities

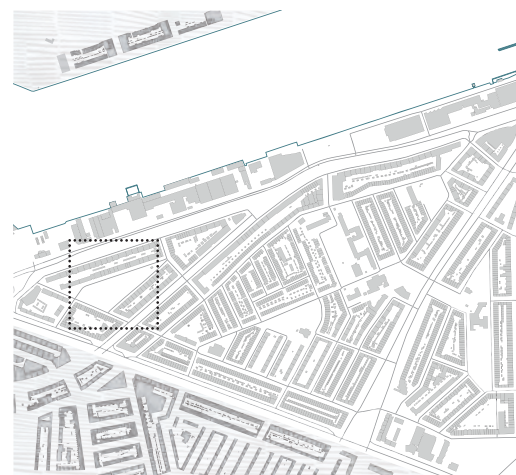
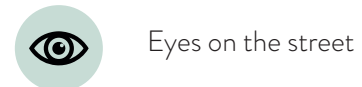


Fig. 92 Location public space in the Tarwewijk. By author

Verschoorstraat Activities public space



Fig. 93 Activities public space location. By author



Millinpark

Accessibility public space

The public space in the Millinpark consists of a park, with multiple seating areas, open grass fields and a small playground. Because of its location in the middle of the built environment, the accessibility of the public space is excellent. Being surrounded by building blocks, making it invisible from outside the block, the area isn't used as a corridor by fast traffic. For slow traffic it is different, where more cyclists use the streets adjacent to the park as a faster route through the neighbourhood. These streets make the public space connected in all directions. Despite this intenser slow traffic, it doesn't affect the quality of the space.

The Millinpark has a total of four entrances, which are located on all sides of the park, making it directly accessible from multiple directions. A huge negative element infecting the quality and accessibility is the fence surrounding the park. Because of safety reasons, during evening and night times it is locked, closing off the public space from the residents.

The building blocks surrounding the open space have multiple entrances, resulting in a strong connection between the built and unbuilt on the ground floor. As mentioned earlier, this results in a gradual distribution of residents into the open space, which increases the quality and accessibility of the area.

Observation shows that direct access from the urban domestic gardens in the inside of the surrounding building blocks, towards the public space is limited, because of the absence of back alleys. With only one gate

available, closed off from strangers, there is no connection between the public space and the inside of the building blocks.

Type of space



Place for movement

User groups



Bikes



Pedestrians

Detected qualities



Connectivity



Connection buildings and space



Direct entrances to space

Missing qualities



Barriers (fence)



Connection inside blocks

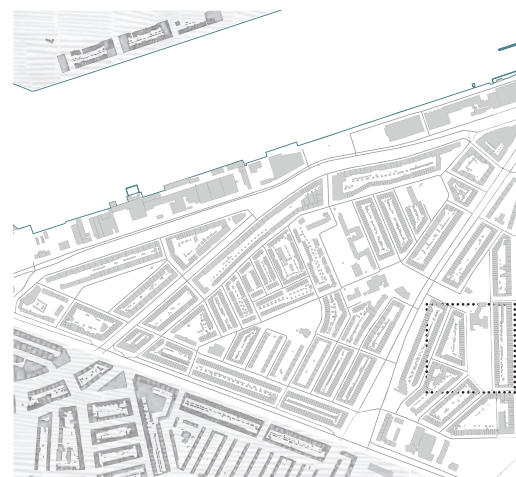


Fig. 94 Location public space in the Tarwewijk. By author

Millinpark Accessibility public space

- Back-alley
- Entries public street
- Entries central public space
- Gate
- Private gardens with access to back-alley
- Private gardens
- Housing
- Public street



Fig. 95 Accessibility public space location. By author



Millinpark

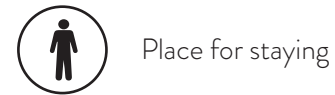
Activities public space

The open space in the Millinpark consists of a park, with multiple seating areas, open grass fields and a small playground. Targeting the younger generation, most activities taking place are related to this group. Observation of the area revealed that larger groups of children make use of the playground and grass fields. At the same time, parents of the children will keep an eye out, while making use of the seating areas. These places then generate interaction between multiple people, while activities like outdoor eating are also common. The earlier criticised fence around the park could now be beneficial for parents with children because of increased safety for children. Furthermore are illegal or disruptive activities less of a problem in this particular location.

The strong connection between the built and unbuilt on the ground floor is clearly visible in the activities taking place on this level. Just like the Verschoorstraat, the step-up design of the entrances generate interaction between residents and passers-by, or as a place to eat outside.

Despite the strong connection between the built and unbuilt on the ground floor, upper floors do not show much activity or provide eyes on the street. The most logical reason for this could be the absence of outdoor spaces on this side of the building block.

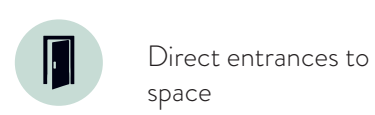
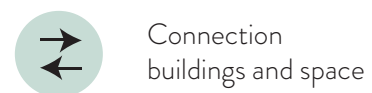
Type of space



User groups



Detected qualities



Missing qualities

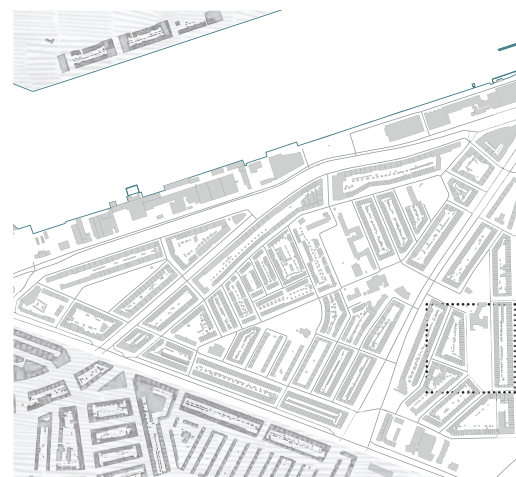
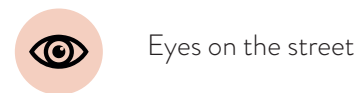


Fig. 96 Location public space in the Tarwewijk. By author

Millinpark Activities public space



Fig. 97 Activities public space location. By author



Mijnsherenplein

Accessibility public space

The Mijnsherenplein is the most central public space in the Tarwewijk, located next to the metro line and the busy Mijnsherenlaan, making it accessible from all directions. Observation of the area shows that the place is mainly used as a space for movement, connecting the northern part of the Tarwewijk with the southern part. This crucial connection in the neighbourhood makes it an important place, which currently doesn't live up to its potential. A big factor here is the high amount of fast traffic, which has negative effects on the quality and safety of the public space.

Completely open from all sides with no hard borders, the space can be entered from all directions, which is also visible in the high amount of slow traffic users, especially pedestrians. All these entrances lead users to or along the central element of the space, the sports field. Because of the unstructured border definition along the edges of the open space, created by the presence of non-residential, low-density buildings with closed of facades, the number of entrances directly connected to the Mijnsherenplein is relatively low compared to the other two examples. Because of this, a clear connection between the built and the unbuilt is not existing, influencing the quality of the space. The connection between the built and unbuilt is also lacking when looking at the accessibility from the inside of building blocks towards the open space, with no possibilities to reach the urban domestic gardens via back alleys.

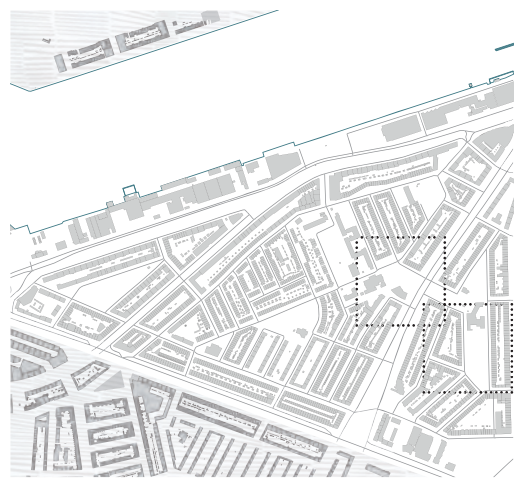
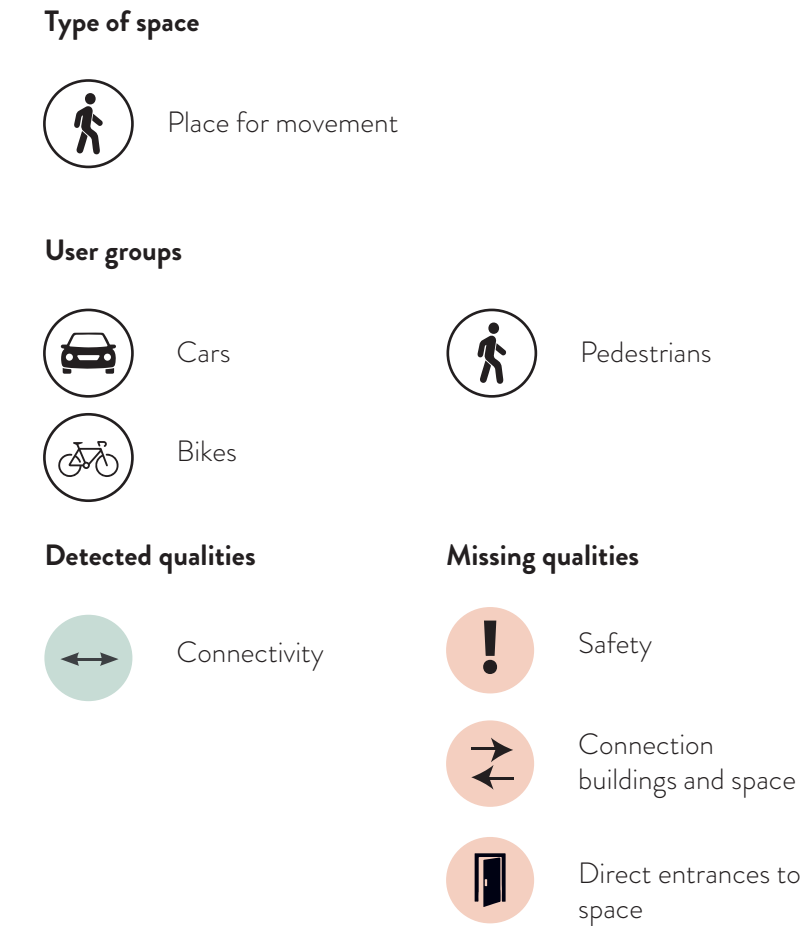


Fig. 98 Location public space in the Tarwewijk. By author

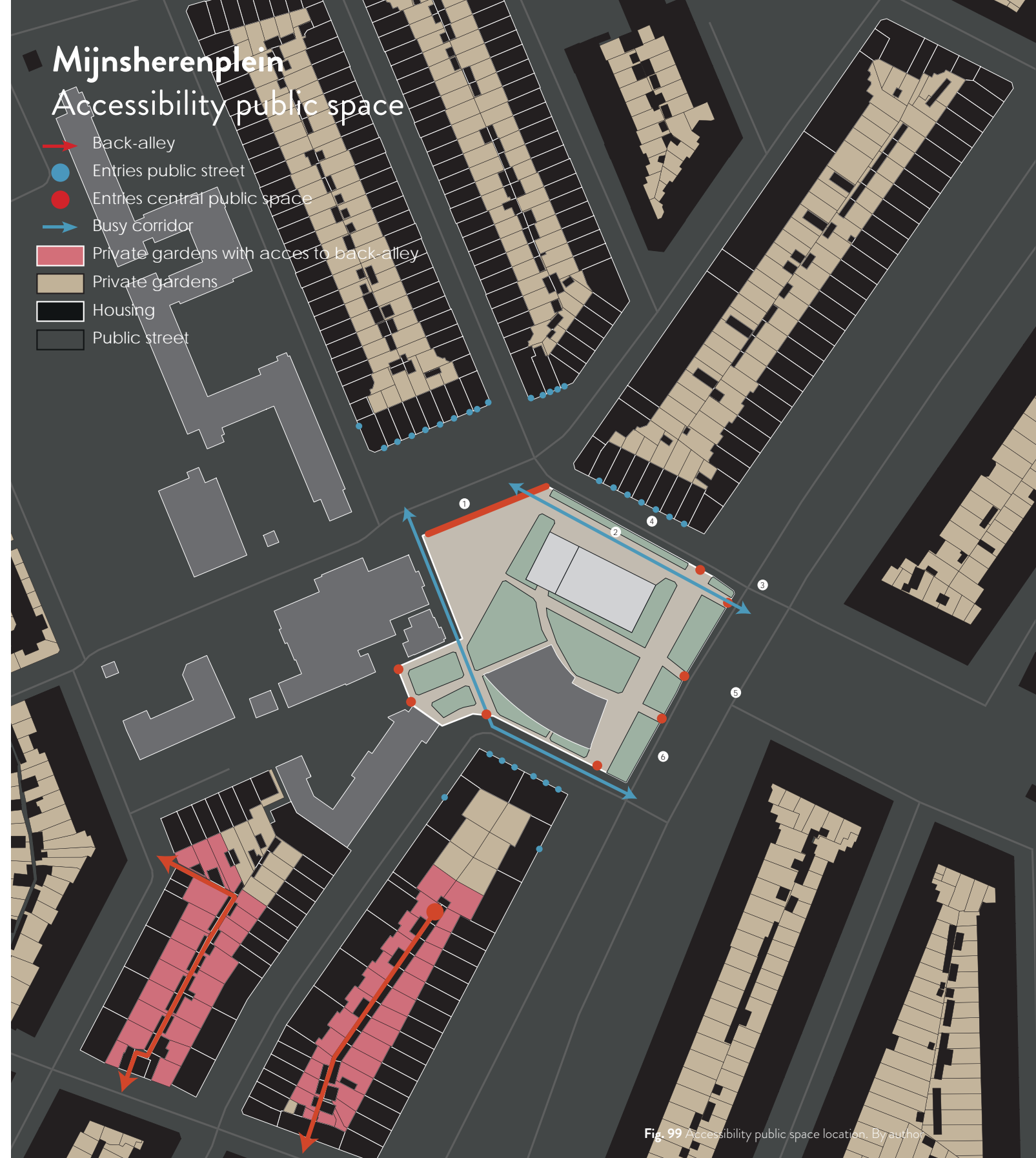


Fig. 99 Accessibility public space location. By author



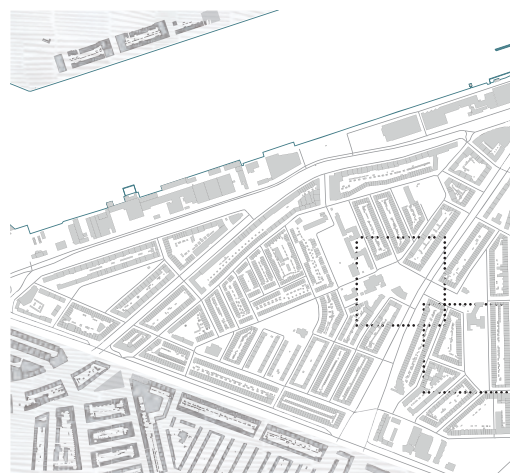
Mijnsherenplein

Activities public space

The Mijnsherenplein in the Tarwewijk consists of a large basketball field, a small football field, open grass areas and a square with some benches. Observation of the area shows that these functions produce activities that are targeted towards teenagers and young adults. This is visible in the presence of larger groups of young adults, which use the sports fields as a place to do both passive and active activities.

Already mentioned in the accessibility part, the Mijnsherenplein is mainly used by people as a place for movement towards other areas of the neighbourhood. It is concluded that this is partly caused by the lack of interesting seating areas of other qualitative structural elements to stay. With only five benches in an unattractive environment, passers-by are not invited to stay for a longer period. This unless it is intended to stay in the public space, as examples show how the more excluded grass patches of the space are used for studying and eating outside by young adults, almost creating an atmosphere regularly found in urban parks.

The building blocks and separate buildings surrounding the public space do not generate activities. The few building blocks with the step-up entrances along the Mijnsherenplein do not generate interaction or activities like eating outside. A potential cause for this could be the busier location in combination with a high amount of people using the pavement, while the pavement itself is too narrow. Increasing the territorial depth while making the pavement more attractive could potentially change the use of the entrance, following other examples in the Tarwewijk.



Type of space



Place for movement

User groups



Young adults



Teenagers

Detected qualities



Eating outside



Studying



Sport

Missing qualities



Furniture to stay

Fig. 100 Location public space in the Tarwewijk. By author

Mijnsherenplein Activities public space

- Communication house and open space
- Playground equipment
- Seating
- Sportfields
- Pavement
- Public green
- Housing
- Public street



Fig. 101 Activities public space location. By author



1



2



3



4



5



6



Fig. 102 Private roof terrace in the Tarweijk built by the residents

3.5 A Local Perspective

This paragraph focusses on the values and perspectives of urban domestic gardens and public spaces in the Tarweijk, from a local perspective of the residents of the Tarweijk, who make use of gardens and public spaces regularly. Gathered from a large survey, personal interviews with residents of the Tarweijk and a special organised day with an interactive bike for interviewing passers-by, the outcomes form a crucial element working towards a sustainable urban regeneration of the Tarweijk, which will be part of chapter 4.

Already showed at the beginning of this chapter, the Tarweijk and large parts of denser urban areas do not have an equal distribution of outdoor spaces. Some people will have a private garden, while most people only have a balcony as their own private outdoor space. And in some situations none. Furthermore, all the residents make use of the public spaces, in one way or another. So while not everybody has same qualities of outdoor spaces, or uses it in the same way, everybody has an opinion about it, knows how they use it and know what they miss and would like to see. For this reason, during the application of the methods, a wide range of

people from different cultures, age groups, genders and with different private outdoor spaces have been targeted to get the most complete view on the values, implications and needs of the residents of the gardens and public spaces.

The information gathered from the different methods have been documented and combined in one diagram on the next page, where the most valuable findings have been selected. Further analysis to make it applicable have resulted in a set of 8 design principles which represent the most valuable and desired variables of gardens, which can also be used in situations where public spaces adopt these qualities. Striving towards an increase of the liveability of the Tarweijk, where the social environment and the physical environment are in balance, the design principles are linked to these categories:

Social environment

- 1: Learning - 2: Working - 3: Eating
- 4: Playing - 5: Meeting

Physical environment

- 1: Greening - 2: Cooling - 3: Infiltrating



Fig. 103 Fieldwork in the Tarweijk with an interactive bike. By author

Relation findings and design principles

			Learning	Working	Eating	Playing	Meeting	Greening	Cooling	Infiltrating
65+	m	I have a garden for the green elements , with nice plants and vegetables. I like doing gardening for the physical aspect , which is important for my age.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Having an allotment garden in the public space would be nice .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	My parents would also like to have the allotment garden and make use of it.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	Also educational equipment or educational public space needed.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	More availability needed to share things for children/adults/elderly (learning shared economy).	✓	✓	✓	✓	✓	✓	✓	✓
18-	w	Educational elements needed in the public space: for example, once per week a lesson about a specific animal (animal also present). Or about plants/flowers/vegetables .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Make educational gardens from a part of the Millinxpark.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Would like to be educated about green/plants . Doesn't know how green/plants work.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	He thinks that other people, like Turkish people from the neighbourhood would make use of a allotment garden in the public space . To grow vegetables to be eaten by themselves.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Sharing equipment for the allotment garden would be smart: questioning if things will not get broken or lost.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Would like to have a private garden for her to be able to work outside . Works at home a lot and likes working outside. Needs WIFI for that. ↳ She has a balcony, but doesn't use it and needs more room.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	She knows a lot of friends in the neighbourhood who would also like the allotment garden and make use of it.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Likes to use the allotment garden for working outside/inside in a green area.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Tables in the public space are needed to be able to work outside .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Has her own garden , but it's too small for real vegetable gardening , such as in allotment gardens.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	It would be nice if the green area in front of the school would be better maintained and would be clean (without dog shit) so that people could use this space for picnicing .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	She would go for a picnic towards the water , but not at the dog space. ↳ Teacher at school, has children and lives in an apartment without garden .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Would use the garden also for activities like eating/BBQ , to sit outside with the family.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Eating is an important activity she would like to do more often. Going outside with a plate of food , and picnic or eat outside . The public spaces should be designed to make this possible. Especially in combination with space for children . It could also result into more contact between residents.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	She uses the garden for BBQ and eating outside .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Would like to have a garden to relax , for her children to play in and to eat .	✓	✓	✓	✓	✓	✓	✓	✓
65+	w	Eating is a really interesting theme, which should get attention in the public space.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Garden is used for BBQ, drinking coffee en spending time with the family .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	He thinks that there should be more squares or playground areas for children . He feels like that there are a lot of grey areas with only buildings.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	Children with a foreign cultural background tend to play more outside than Dutch children, so especially within the Tarwewijk enough spaces to play with others is necessary.	✓	✓	✓	✓	✓	✓	✓	✓
18-	w	Most of them do not have a ball to play with so they are depending on someone else's ball. So they can only play if that person shows up. (SHARING!!)	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	The neighborhood does not support enough room to walk/sport for elderly , that's why they go to Zuiderpark	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	She doesn't have a garden . Maybe she is going to look for a house with a garden . The garden would be for her children to play , not for herself or green	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	For the children , there needs to be more playground equipment and playgrounds	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	The fence around the Millinxpark is nice for the safety of her children. With the fence, they can play safely . ↳ Doesn't have a private garden , but she would like to get one so her children can make use of it and play there	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Wants a private garden , for her kids to play in. ↳ She doesn't have garden at the moment, only a small balcony	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	There needs to some sort of sharing system for children , where they can share playground equipment , like Duimdrop	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	More playground equipment needed for the children	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Would like to have a private garden for her daughter to play undisturbed in without constantly having to pay attention on her ↳ She has a balcony, but doesn't use it and needs more room	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Her garden is used for her children to play	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	She uses her garden to relax, for her children to play in and for plants/perennials borders	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	At a certain age, children do not use the garden anymore to play . They will use the public space to play.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	Green is important for a neighborhood, it's a place to relax and meet people , create places where people can gather and sit, that would be nice	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	A design focus should be combining different age groups , like elderly and children . Contact is possible between the parents, children and the elderly.	✓	✓	✓	✓	✓	✓	✓	✓
65+	w	Would like to see a coffeebar in the public space to meet with friends, drink tea and eat.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	She wants more space to meet people in the public space .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	There is a lot of fake green in the neighbourhood , like the tram track, with gras and the dike. These elements are not usable for people. More usable green is needed.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	m	Green in the neighbourhood in an important element .	✓	✓	✓	✓	✓	✓	✓	✓
18-	w	More plants needed in the public space .	✓	✓	✓	✓	✓	✓	✓	✓
18-	w	Flowers in stead of bushes. More color is needed in the public space .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Would like to have a private garden for flowers and a grassy area ↳ She has a balcony, but doesn't use it and needs more room.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Garden is used for plants with perennial borders .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	The public space has relatively few bloomers / color .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	More trees needed in the neighbourhood.	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	The public space needs more green .	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Elderly people she knows experience a lot of heat in the public spaces . They need more benches (in the shade) and shade overall	✓	✓	✓	✓	✓	✓	✓	✓
18/65	w	Quality of life in the neighborhood must be improved by planting trees . It's to hot.	✓	✓	✓	✓	✓	✓	✓	✓



Fig. 103 Diagram with the translation from fieldwork to design principles of values of urban domestic gardens. By author



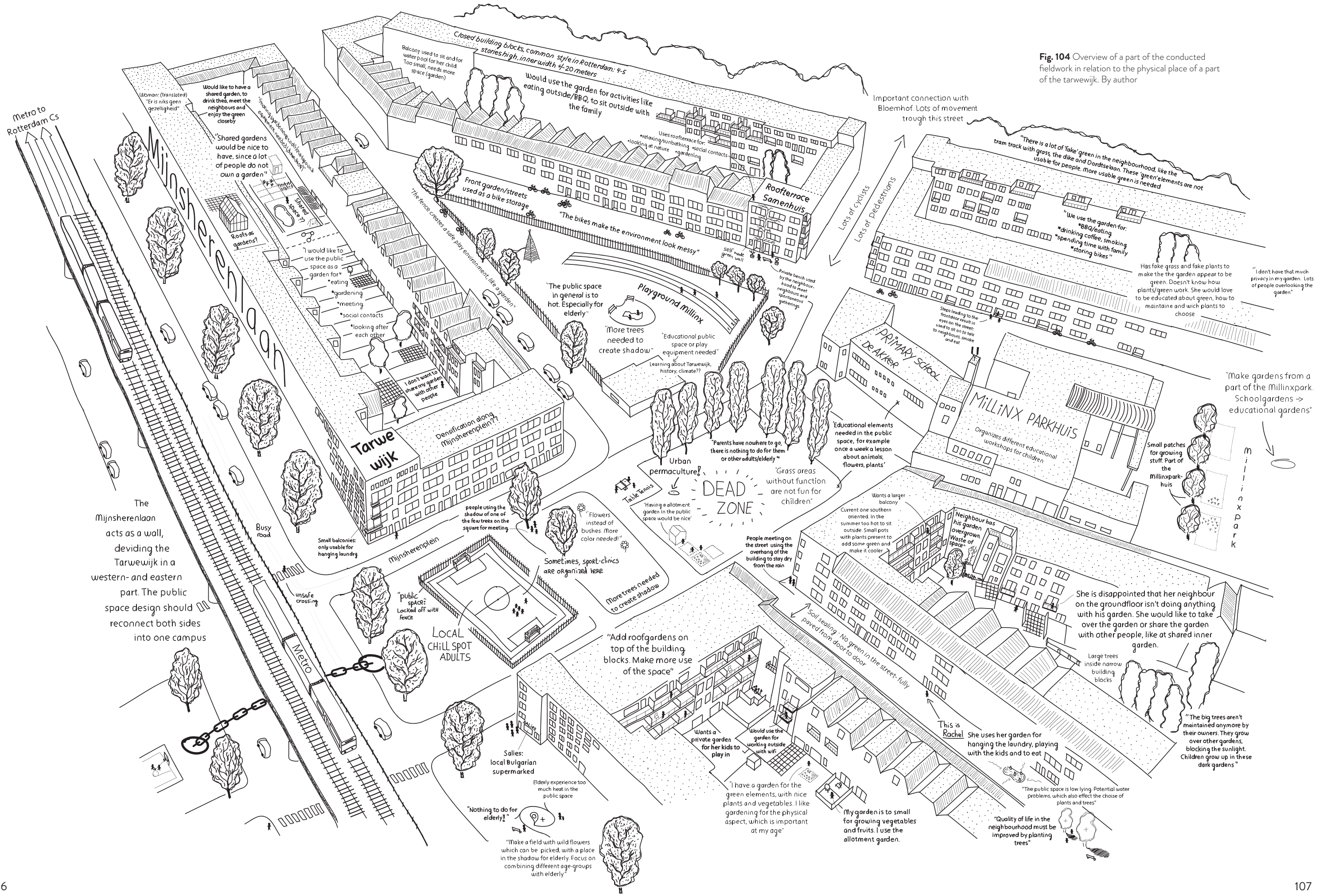
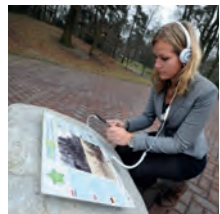


Fig. 104 Overview of a part of the conducted fieldwork in relation to the physical place of a part of the tarwewijk. By author

3.6 Design principles

Learning



The design principle learning is focused on the qualities of the urban domestic gardens as a place to learn new things, alone or with others, about a wide range of aspects and subjects. Because of the wide range of possibilities with this aspect, it is divided into a set of two, from which the second one will be discussed later. This learning principle focuses on the adults and elderly age groups, both men and woman.

General principle:

Create places which provide opportunities for adults and the elderly to learn about different topics, alone or with other people.

Context:

Public spaces, shared gardens,

Possible components

Where urban domestic gardens are used by people to learn about new

topics, public spaces do not often offer clear possibilities to do so and be valuable in this way for its users and the environment. But public spaces do have the opportunity to deliver these qualities. The implementation of Learning can vary from place to place. The following components are based on examples and suggestions given by residents of the Tarwewijk:

1: Educational gardens

Educational garden can form a place where both groups of people, as well as single persons, can learn about green and plants. Like how plants grow, which plants are easy to maintain, how many times they need to be watered, what benefits plants offer to their environment, which plants or fruits can be grown and eaten, or as a place to experiment with growing plants and fruits which can be used in community rooms.

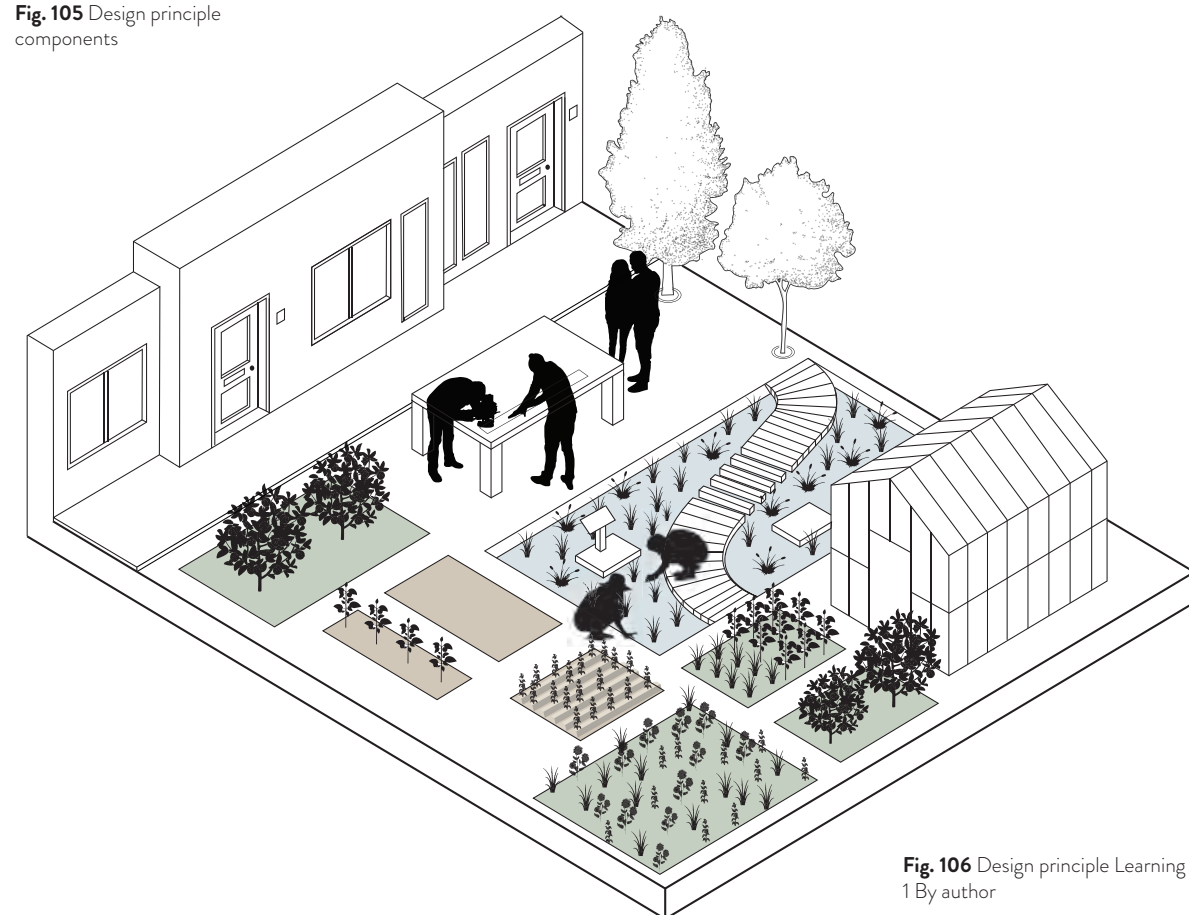


Fig. 106 Design principle Learning 1 By author

2: Open places for workshops

Open places to host temporary workshops for residents of a block or parts of a neighbourhood could generate informative gatherings between residents and offer opportunities to learn about specific topics, like repairing bikes, using tools, or ways on using fruits and vegetables from the gardens in outdoor cooking. Indoor community rooms could also be linked to these places, to offer more opportunities and flexibility.

3: Flexible outdoor tables

Flexible outdoor tables can be used as central elements which offer space to learn new hobbies and practices outdoors as an individual, or as a place to watch and learn other people do specific things. Gatherings around the table(s) could also result in new contact between people or as part of a hosted workshop, as explained in the last component.

4: Informative signs

Informative signs can teach residents and users of the public space, for example about interesting topics like green and plants, or the history of a place. To make the signs more connected to the residents and potentially to each other, it could also be possible that the sign can be updated or changed by the local community, to teach people about changing topics, cultures or food they are interested in and would like to share to other residents.



Fig. 107 Outdoor workshop



Fig. 108 Outdoor workshop 2

Components



Educational gardens



Workshop places



Flexible outdoor tables



Informative signs

Learning



The second version of the design principle Learning is also focused on the qualities of the urban domestic gardens as a place to learn new things, alone or with others, about a wide range of aspects and subjects, but this time focused on children.

General principle:

Create places which provide opportunities for children to learn about different topics and develop themselves, alone or with other children.

Context:

Public spaces

Possible components

Urban domestic gardens can be used by children as a safe place to play and playfully learn basic things, or get things learned by their parents. Because public spaces in general offer more space than private urban domestic gardens, public

spaces have the potential to extend the learning environment in different ways. The following components are based on examples and suggestions given by residents of the Tarwewijk:

1: Educational gardens

Educational garden can just like the first version of learning be a place where children can learn about green and plants, the importance of them for their environment, how they grow, which plants or fruits can be grown and eaten, or as a place to experiment with growing plants and fruits which can be used in community rooms or primary schools. The educational garden could also have a strong relationship with these primary schools, to make it an active form of outdoor teaching.

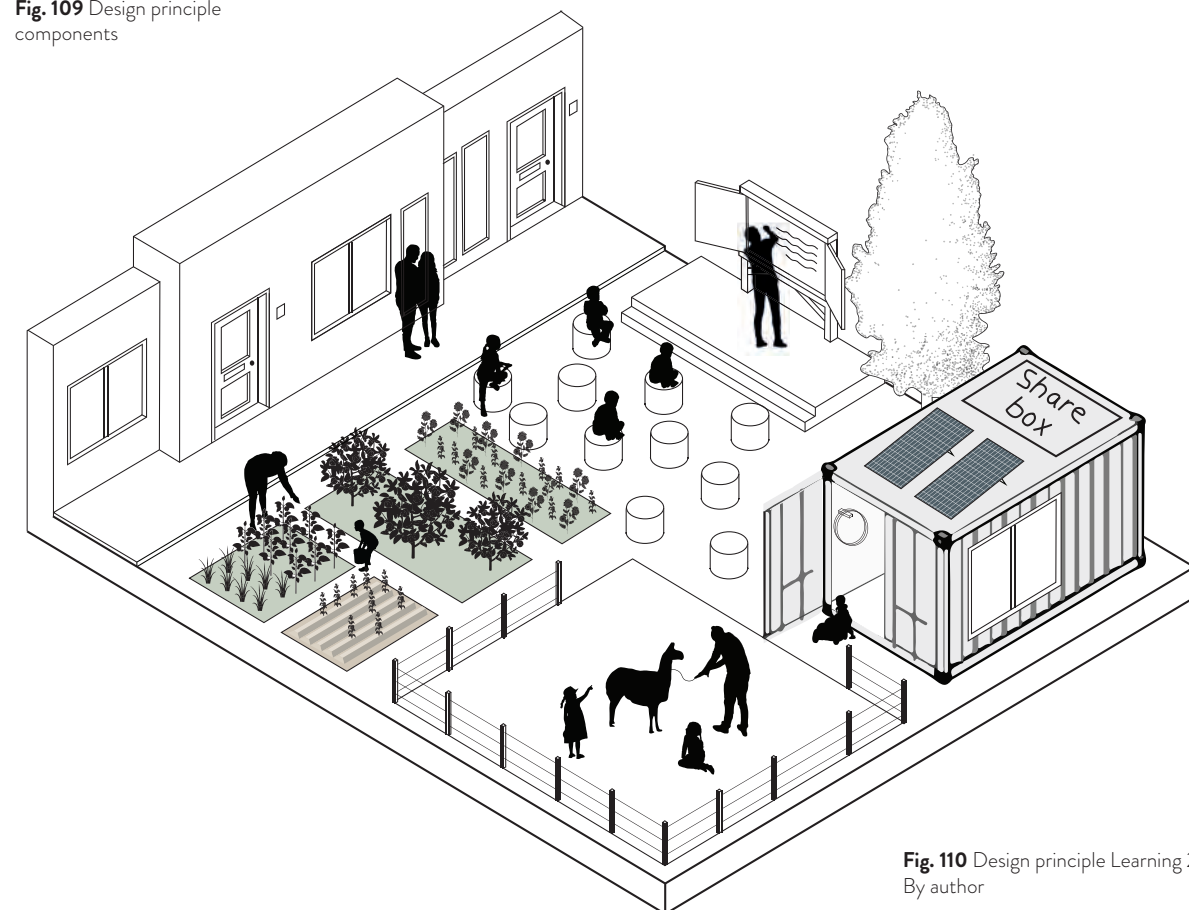


Fig. 110 Design principle Learning 2
By author

2: Outdoor classroom

The active forms of outdoor teaching can also be translated into outdoor classrooms, with flexible and playful seating elements, an outdoor chalkboard with a central podium to recreate the indoor classrooms. Use of outdoor classroom can not only create new forms of active education, but also stimulate the use of public spaces during quieter hours of the day, potentially increasing the use of the public space by other groups, like adults or elderly. The central podium mentioned above could also be used for other (school)activities. Locations for outdoor classrooms should be in proximity of the primary school.

3: Open places for workshops

After school hours or on weekends, open places could be used as central places to teach children and teenagers about animals, flowers, dancing, as an example. Leaving these places open makes them more flexible for other kinds of use if needed.

4: Share box

The share box is based on the existing Duimdrop containers, which are placed throughout public spaces in Rotterdam. Share boxes can not only serve more children with play equipment, they can also serve as a way to learn children to sharing play equipment.

Components



Educational gardens



Workshop places



Outdoor classroom



Sharebox



Fig. 111 Active learning



Fig. 112 Outdoor classroom

Working



The design principle working is focused on the qualities of the urban domestic gardens as a place to work outside. Working can be divided into a set of two, with each having a different target group. The second one will be discussed later. This working principle focuses on different age groups, from children to adults and elderly who want to work in a green environment.



General principle:

Create places which provide opportunities for different age groups to do active work outside.

Context:

Roof gardens, shared gardens, public spaces



Possible components

Where urban domestic gardens are used by people to work in gardens for mental and physical health, be active outside,

other spaces such as roof gardens, shared gardens and public spaces also have possibilities to do so and strengthen the connection between the residents and the environment they live in, by giving them more control.

The implementation of Working can vary from place to place. The following component is based on examples and suggestions given by residents of the Tarwewijk:

1: Allotment gardens

Allotment gardens already exist in the urban environments but are often located near the borders of cities or in larger parks, out of direct sight of the users. By locating the allotment gardens in direct sight of its users, or in close proximity like a shared garden, a roof garden or in the adjacent public space, the use and value for the users and the environment could be increased. The allotment gardens

form a place where people can spend time working outside in a green environment, with potential physical and mental health benefits. The gardens can produce fruits and vegetables which can be used for own consumption or as a form of sharing with others. Or as a place to grow flowers, to give the specific places more colour as an example. Giving the power to the people to control their own small outdoor space and to be creative.

Allotment gardens form the base to create new communities for people with the same interests, to work on their own and to make people enthusiastic about it, through social events like local markets as an example.

2: Central glass house:

A central glasshouse located in or next to the allotment garden can function in different ways. It offers opportunities to keep working outside during bad weather or in wintertime. Furthermore, can it be used as a central place to store equipment used in the gardens, which could also be shared with other people.

Components



Allotment garden



Central glass house

Fig. 113 Design principle components

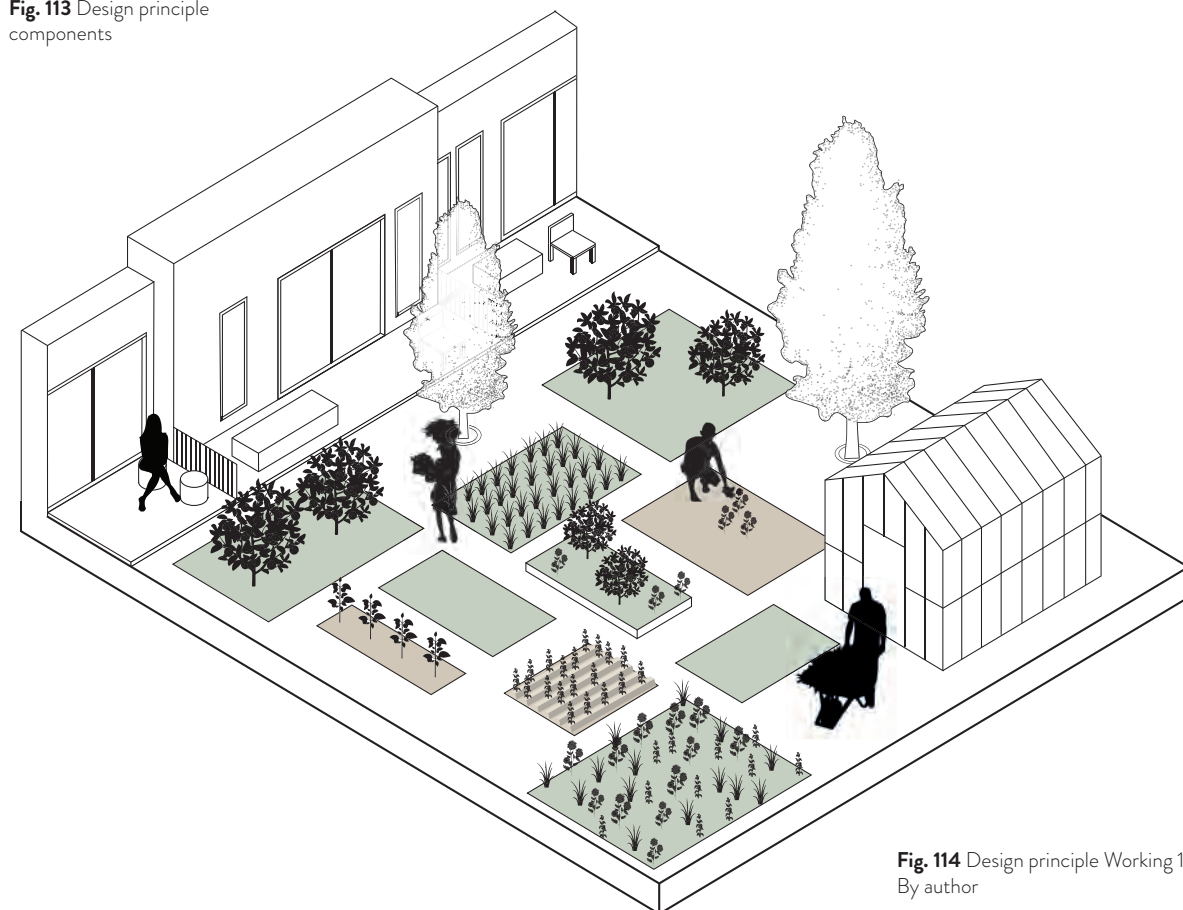


Fig. 114 Design principle Working 1. By author



Fig. 115 Allotment gardens on a roof



Fig. 116 Central glasshouse

Working



The second design principle working is focused on the qualities of the urban domestic gardens as a place to work outside, but focused on the office style. This working principle focuses on teenagers and adults who would like an outdoor office to work on school assignments or other types of office work.

General principle:

Create places which provide opportunities for teenagers or adults to work outside.

Context:

Public spaces

Possible components

Urban domestic gardens can be used by people who work from home as a private outdoor office. The Covid-19 pandemic resulted in an increase of people working from home, and expectations are that this will be a new style of working in the

future. At the same time, with time it becomes more clear that working people miss the social contact of the office or schools, and in some cases a suitable working space. The following component anticipates on this, and is based on examples and suggestions given by residents of the Tarwewijk:

1: Outdoor working places

The outdoor working places in public spaces will offer people a suitable working space. To be able to serve different needs, the working spaces could come in at least two variants. All the variants should come with seating and a table, lights, electrical outlets to be able to charge laptops or phones and wifi connections. From a sustainable perspective, solar panels could be used to not only supply the energy need but also as an element to protect the users from sunlight/rain. The first variant could be used as a single

person-, or concentration working space for people who would like to work on their own without being disturbed. The second variant offers places to work is a small group, or for people who don't mind working next to other people they are not intended to meet. This variant could also be upgraded to larger tables for even more people, in combination with lightweight construction to be even better protected against the sun or rain. The benefit of the second variant is that they are flexible in use and usable for other occasions.

2: Indoor community room

An indoor community room directly on the public space next to the outdoor working spaces can function as a meeting and working space for local communities, offering the same qualities like wifi and electrical outlets. The benefit of an indoor space is that it is also usable during colder, or bad weather times. By keeping the community rooms open for multiple functions or multifunctional use, the community rooms can be used throughout the whole day by different groups of people instead of only peak moments with specific groups.

Components

-  Outdoor working places
-  Indoor community room

Fig. 117 Design principle components

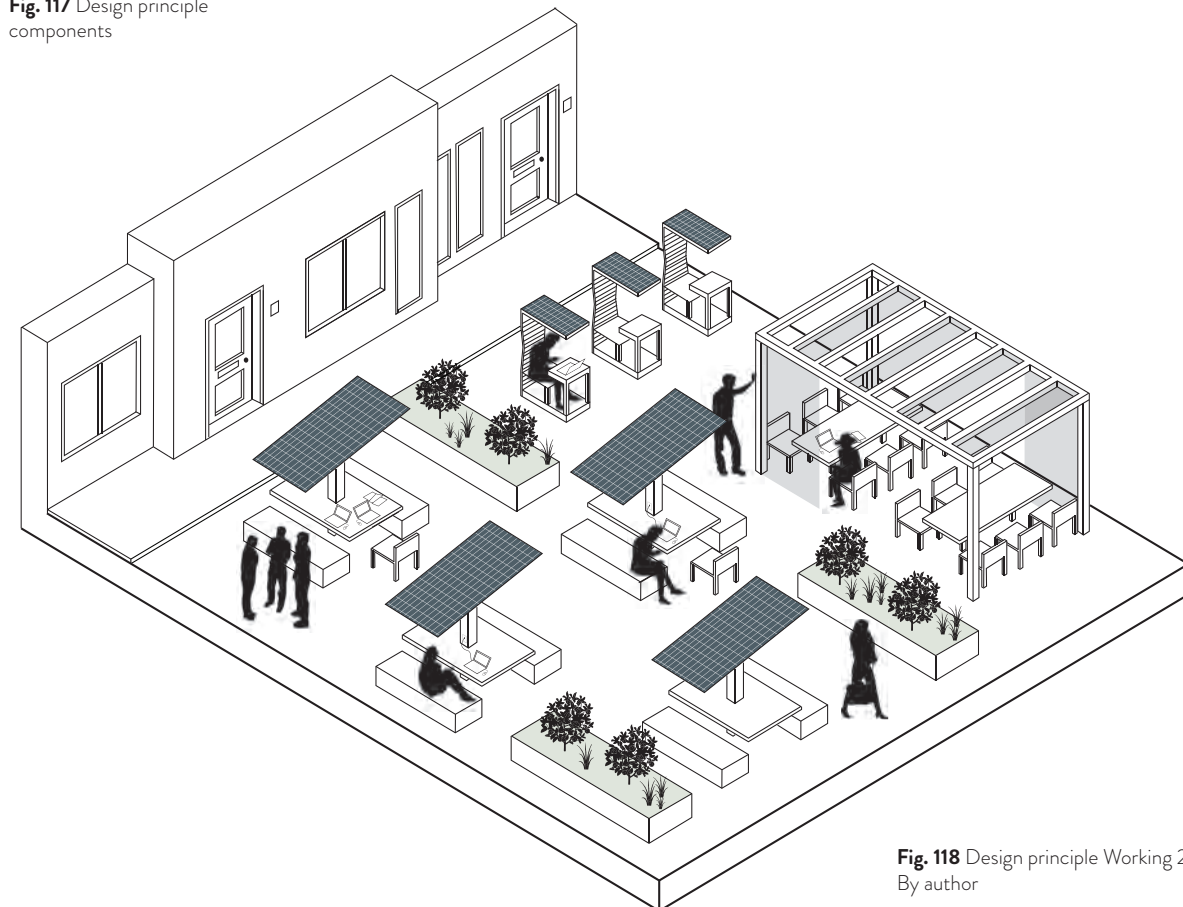


Fig. 118 Design principle Working 2. By author



Fig. 119 Outdoor working space with solar panel



Fig. 120 Single-person outdoor working space

Eating



The design principle Eating is focused on the qualities of the urban domestic gardens as a place to eat outside, as an extension of the kitchen or the living room. Eating can be divided into a set of two, with each having a different fitting context. The second one will be discussed later. This Eating principle tends to lean more towards the private, intimate side.

General principle:

Create more private, intimate places which provide opportunities to eat outside

Context:

Shared gardens, Roof gardens

Possible components

Urban domestic gardens are used by people as a private space to eat outside, cook, have breakfast, lunch or dinner during a nice day. While it is allowed to eat in the public space, the qualities of

a more private and intimate space to eat are often non-existing. Because this principle is more focused on the private, intimate side, roof gardens or shared gardens for only a certain number of people are designated as the best fitting contexts, compared to the public space. The following component is based on examples and suggestions given by residents of the Tarwewijk:

1: Outdoor eating places

Outdoor eating places will offer residents of a shared garden or roof garden a suitable place to eat outside, alone, with the family or other people who make use of the garden. The places should come with seating, tables and lights, to be able to make use of it during darker hours. A possibility could be to include an outdoor kitchen, to enhance the usability for residents whose dwelling is on higher floors and not directly connected to the

shared garden or roof garden.

2: 'Private zones'

With the principle to create more private, intimate places to eat in spaces which will be shared with a certain amount of other people, private zones will create opportunities to get the desired privateness. Creating private zones in shared gardens or on roof gardens, partly closed off from the surrounding garden, can be used by people living on the shared garden, or having access to the roof garden. The private zones should include seating and tables fitting for eating alone, with the family or other people who make use of the garden. Since private zones are designed as a staying place, it is desired to have multiple of these private zones per garden, depending on the size available and the number of people having access to the gardens.

Components



Fig. 121 Design principle components

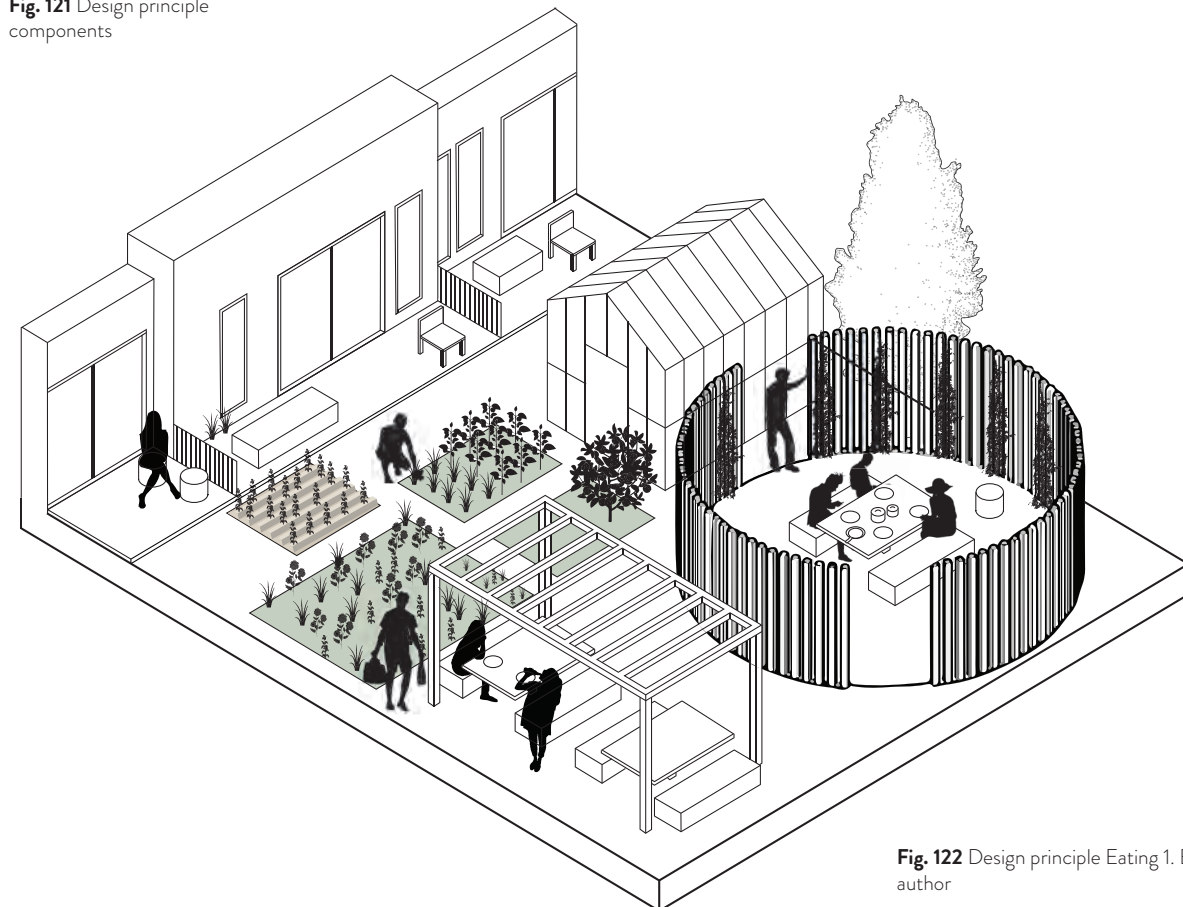


Fig. 122 Design principle Eating 1. By author



Fig. 123 Private outdoor eating place



Fig. 124 Outdoor eating in garden

Eating



The second design principle Eating is focused on the qualities of the urban domestic gardens as a place to eat outside, but focused on a more public, larger audience. In comparison to the first Eating principle, the public space is therefore the fitting context.

General principle:

Create public places which provide opportunities to eat outside with larger audiences

Context:

Public spaces

Possible components

Urban domestic gardens are used by people to eat outside, alone, with family or friends. The amount of people who can be invited depends in a lot of situations on the amount of space which is available in the garden. The public space offering more space than private gardens creates

opportunities to fulfil the need for more space for eating outside with larger groups and contact with other residents. The following components anticipate on this, and are based on examples and suggestions given by residents of the Tarwewijk:

1: Outdoor eating places

Large scale outdoor eating places will offer residents of the neighbourhood a suitable place to eat outside with larger groups, or in case residents are open for social contact with other residents while eating. The places should come with seating, long tables for large groups, and lights, to be able to make use of it during darker hours. By focusing on making these places cosy and comfortable to be around, the attractivity will increase, and with that the potential use. An example is to include shelters which makes it possible to continue eating with rain.

Fig. 125 Design principle components

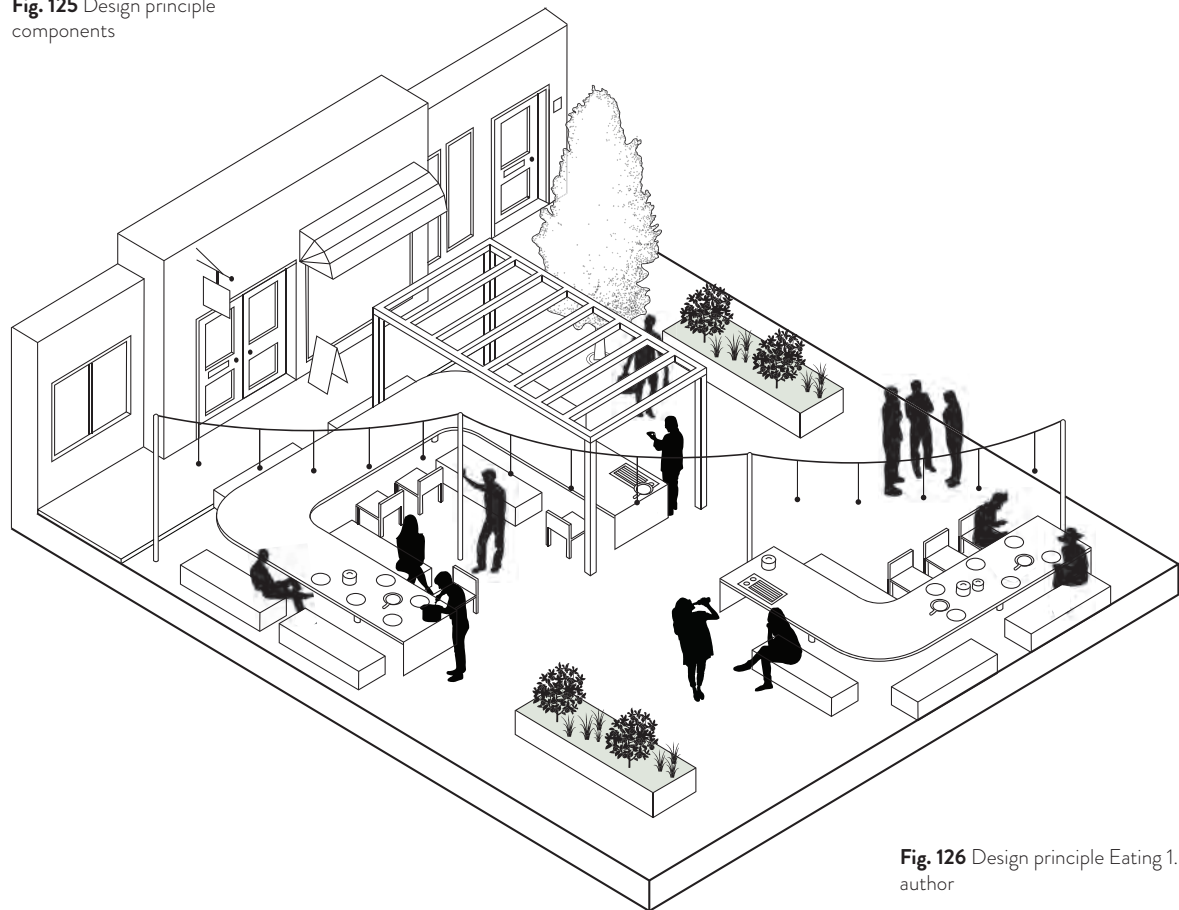


Fig. 126 Design principle Eating 1. By author

Increased use by different larger groups also make it possible that spontaneous contact takes place between groups and passers-by. To increase the potential of this, the outdoor eating places should be located in places which are easily accessible. To increase the quality and usability of the spaces, outdoor kitchens could also be included.

2: Indoor community room

An indoor community room directly on the public space next to the outdoor eating spaces can function as a meeting, eating and cooking space for local communities and groups. They provide the opportunity to be used during colder, or bad weather times. The indoor community rooms can also serve as a place where indoor cooking workshops can take place, as part of the Learning principle. By keeping the community rooms open for multiple functions or multifunctional use, the community rooms can be used throughout the whole day by different groups of people instead of only peak moments with specific groups, like eating.

Components



Fig. 127 Public outdoor cooking place



Fig. 128 Public outdoor eating place

Playing



The design principle Playing is focused on the qualities of the urban domestic gardens as a safe place for children to play outside, as an extension of the livingroom. The principle focuses primarily on the group of younger children, since they need the qualities of a safe environment of the garden more than older children.

General principle:

Create safe places which provide opportunities for younger children to play outside, alone or with other children.

Context:

Public spaces, shared gardens

Possible components

Urban domestic gardens are used by young children as a safe place to play or learn basic things in a playful way, without the need for parents to constantly have full focus on their child. While growing up, the use of the garden as a playground

will furnish a little bit, since most garden then become too small to fulfil their needs and interests. In order to provide a safe play environment, especially for the children without a garden, the following components will be used, which are based on examples and suggestions given by residents of the Tarwewijk:

1: Safe playground

The playgrounds in the public spaces should be designed with safety for children as one of the main focus points, in order to represent the qualities of the urban domestic garden. One of the foremost solutions for this is to remove potential danger in the close proximity of the playgrounds, like roads. Ideally, the playgrounds would be located inside urban blocks, in pedestrian-only streets/spaces, away from fast-moving vehicles. To increase safety even further, the playground could be surrounded by a

low fence or hedge, to prevent the children from walking away unnoticed. The playground equipment should also be suitable for the younger age group. Not only for their own safety, but also for a lower temperature and infiltration of water in the ground, extra green elements could be integrated into the playground.

2: Meeting place

With a safe place for their children to play, without having to worry and constantly paying full attention, parents can also spend time meeting other parents or passers-by, like elderly. Making the playgrounds a meeting place of different groups of people, potentially creating small communities.

3: Share box

The share box is based on the existing Duimdrop containers, which are placed throughout public spaces in Rotterdam. Share boxes can not only serve more children with play equipment, they can also serve as a way to learn children to sharing play equipment and play together. And be a reason for parents to go to the playgrounds.

Components



Safe playground



Meeting place



Sharebox

Fig. 129 Design principle components

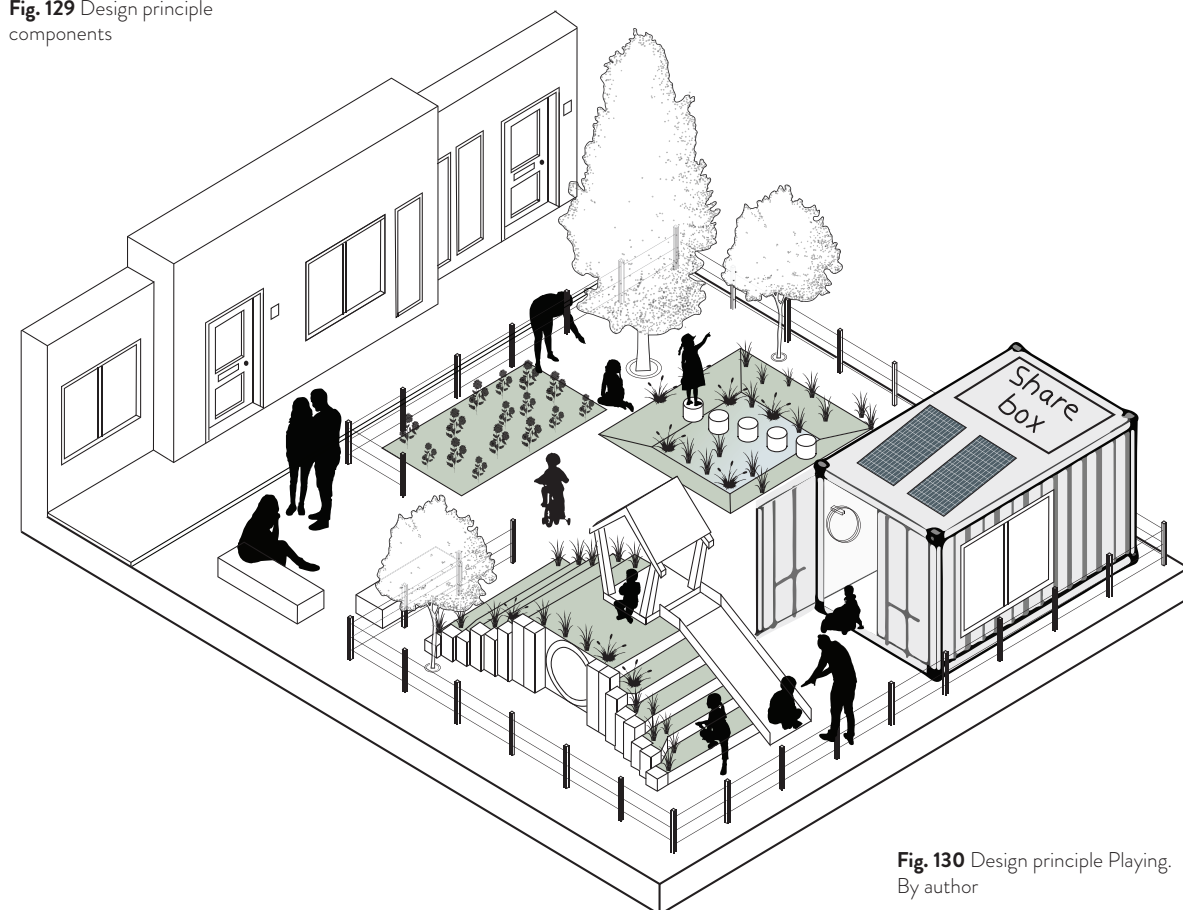


Fig. 130 Design principle Playing. By author



Fig. 131 Safe and green playground



Fig. 132 Safe and green playground 2

Meeting

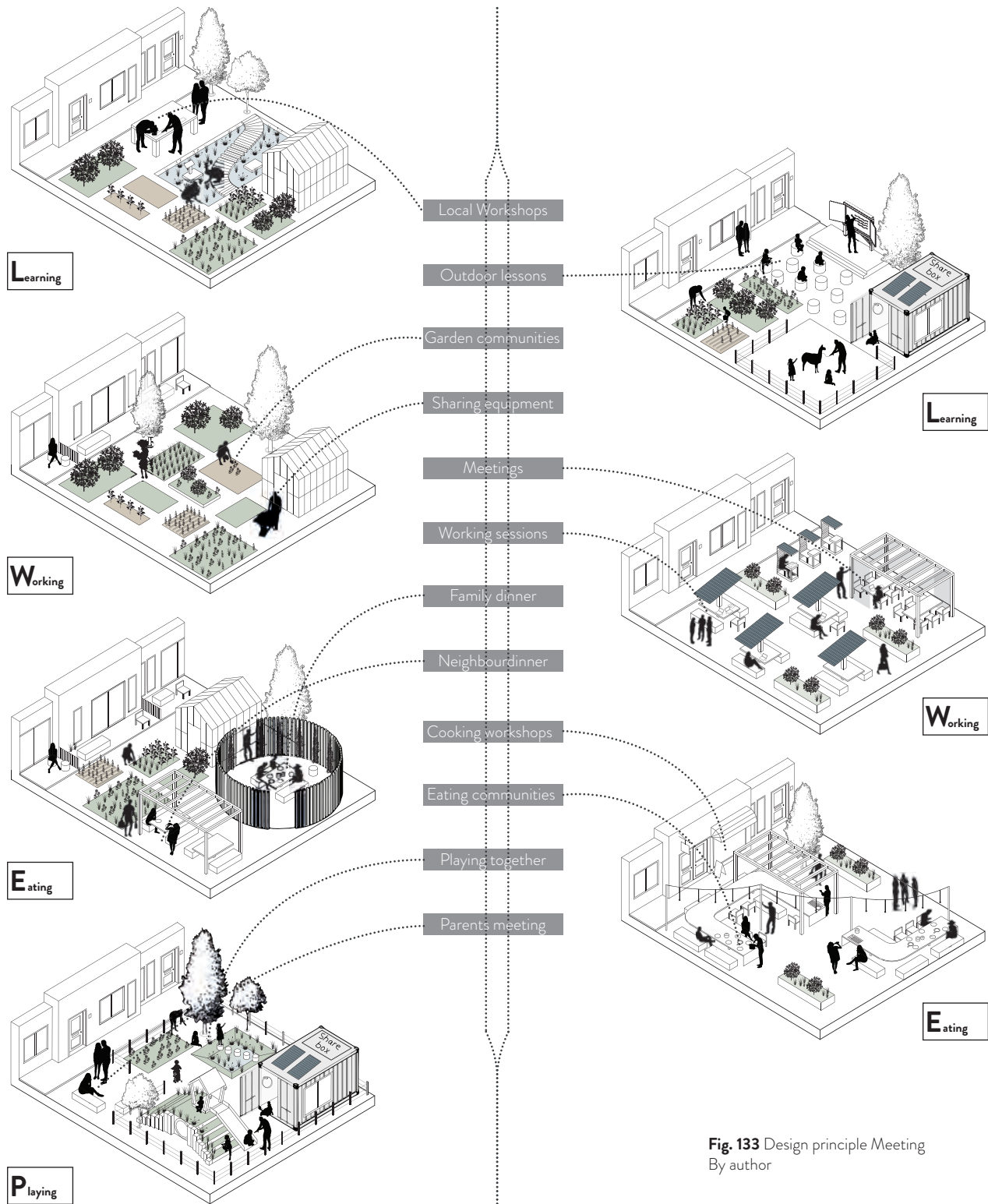


Fig. 133 Design principle Meeting
By author

The design principle Meeting is focused on the qualities of the urban domestic gardens as a meeting place between the owners, family and friends. Meeting acquaintances and new people can stimulate the use of private and public spaces, and well designed private and public spaces can stimulate meeting acquaintances and new people. Places where people like to meet can stimulate their use also in other ways when they feel comfortable and trusted. It is, therefore, an important principle to create places which stimulate the meeting between people. Looking at the earlier presented design principles shows that Meeting is already present in all the principles in different ways, and can work as a binding factor to combine certain principles, to make their appearance even stronger. Special components for the design are therefore not needed since they come out of the other principles themselves.

General principle:

Create places which stimulate meeting between people

Context:

Public spaces, shared gardens, roof gardens



Fig. 134 Outdoor meeting place



Fig. 135 Combining playing and meeting



Fig. 136 Meeting benches



Fig. 137 Public outdoor meeting place



Fig. 138 Meeting place with trees

Greening



The design principle Greening is focused on the need of adding green into the public spaces. Where green urban domestic gardens offer multiple qualities and benefits to their users and the environment they are part of, design principles are not applicable to private spaces. Therefore, it is strived for that focussing on greening the public spaces first, together with the earlier presented design principles can work as a catalyst for change in private places by the people themselves too.

General principle:

Create greener spaces which are valuable for their environment

Context:

Public spaces, green roofs

Possible components

Greening of the public space can be done in multiple ways, from top-down, to

bottom-up strategies. A combination of both can help quick start the process of change, while bottom-up strategies will have more and better impact on the long term.

1: Trees

Adding trees to the public spaces can positively affect the environment in multiple ways. Creating shadows on the ground surface cools down the public space, which creates more pleasant conditions to be in. Trees furthermore act as a nestel place for birds and insects, helping to restore biodiversity in the urban environment. Increased aesthetics value and property value are additional benefits.

2: Plants and bushes

Adding more plants and bushes in the public spaces can help to create more

hiding places for small animals, birds and insects, increasing the biodiversity in the urban environment. Selecting the right types of plants and bushes can result in lower maintenance costs, while the aesthetic quality of the public space can increase. Plants and bushes are therefore more valuable for the environment than plain grass areas. With more bushes and plants instead of pavement, the temperature of the public space will be cooler, creating a more pleasant environment for the users. Furthermore will it decrease potential precipitation problems during heavy rainstorms, due to natural infiltration.

3: People ownership of the public space

Giving people opportunities of ownership to the public spaces can help in the greening of these places, by allowing residents to create allotment gardens or facade gardens in the public space. Ownership and self-maintenance can help in increasing connectedness with the neighbourhood and other residents, and be positive for the overall maintenance costs.

4: Green roofs.

Flat roofs from existing buildings should be changed to green roofs if the construction is capable supporting it. New buildings should at least include a green roof, if not used for other functions like private- or roof gardens. Green roofs are capable of creating new biotopes for insects and store rainwater.

Components



Trees



Plants and bushes



People ownership of public spaces



Green roofs

Fig. 139 Design principle components

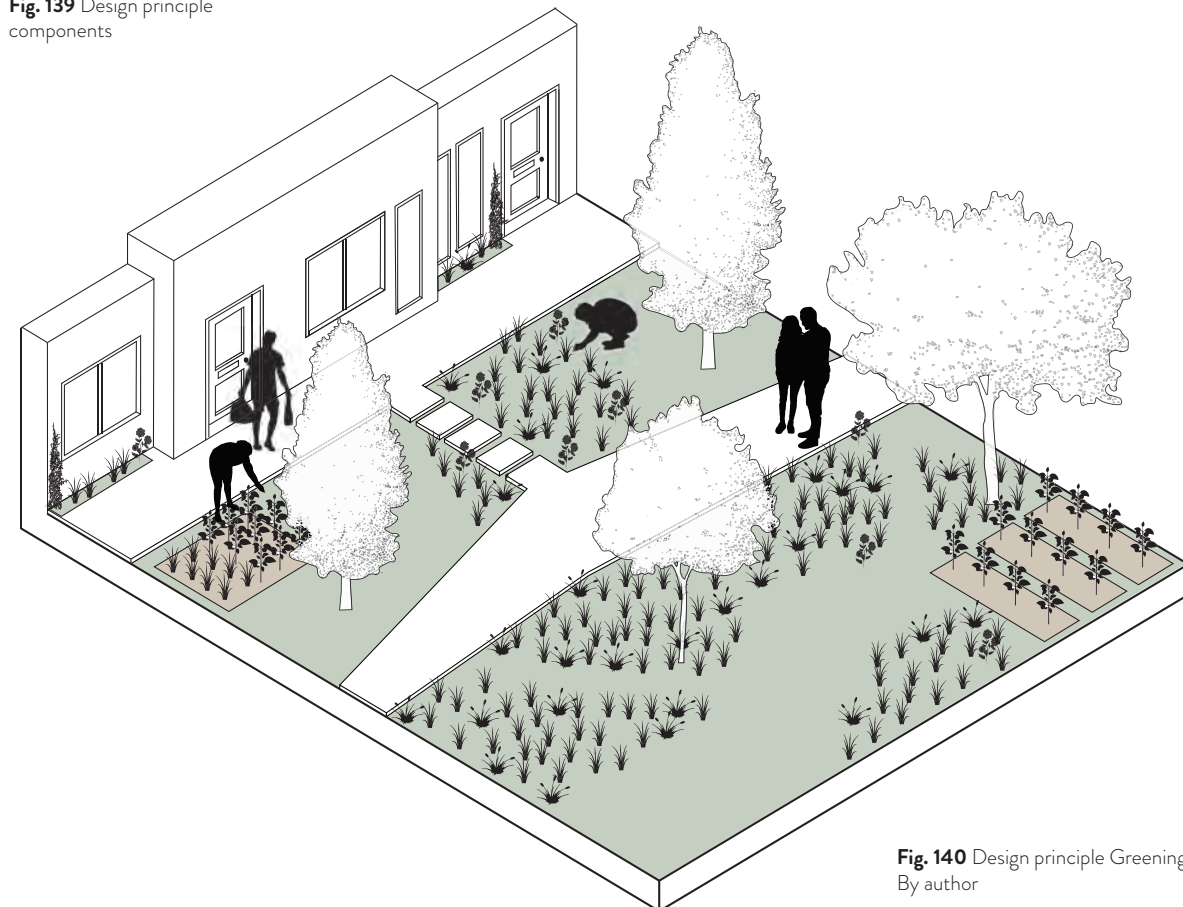


Fig. 140 Design principle Greening. By author



Fig. 141 Extensive facade garden



Fig. 142 Trees for cooling squares

Cooling



The design principle Cooling is focused on the need of cooling public spaces to make them more climate-proof, and to tackle the Urban heat island to create a pleasant public space to stay. This principle has a direct connection with the Greening principle, since more green will help cooling down the public spaces.

General principle:
Create cooler spaces which are valuable for their environment

Context:
Public spaces, green roofs

Possible components
Cooling the public spaces can be done by selecting the right vegetation and materialization of the public spaces. Therefore the following components will be used.

1: Trees
Adding trees to the public spaces will have a huge impact on the temperature on the ground floor of the public space. Shadows created by the trees on the ground surface cools down the public space, which creates more pleasant conditions to stay in. Selecting the right types of trees can result in more or less generated shadow, depending on the context and needs of the public space. Trees could also be selected on their potential size, which determines how much evaporation of water will take place, which helps to cool down the direct vicinity of the tree.

2: Materialization public space
Selecting the right materialization used in the public spaces will influence how warm or cool it will get. With more bushes and plants instead of pavement, the

temperature of the public space will be cooler, creating a more pleasant environment for the users. When pavement is needed, depending on the context, light coloured materials will be beneficial for reducing the reflective heat from the sun.

3: Shaded seating areas
Incorporating shaded seating areas will help users of a public space to have a more pleasant experience of the public space. This could be done in a natural way using the trees, or by adding canopies above seating areas. Adding the shaded seating areas in strategic places can increase their use and effectiveness.

4: Green roofs.
Green roofs instead of black tarmac helps cooling down the urban environment. Flat roofs from existing buildings should be changed to green roofs if the construction is capable to support it. New buildings should at least include a green roof, if not used for other functions like private- or roof gardens, which could be even more effective for cooling with intensive green roofs with bigger plants and bushes having an increase in evaporation of water.

Components



Trees



Materialization public space



Shaded seating areas



Green roofs

Fig. 143 Design principle components

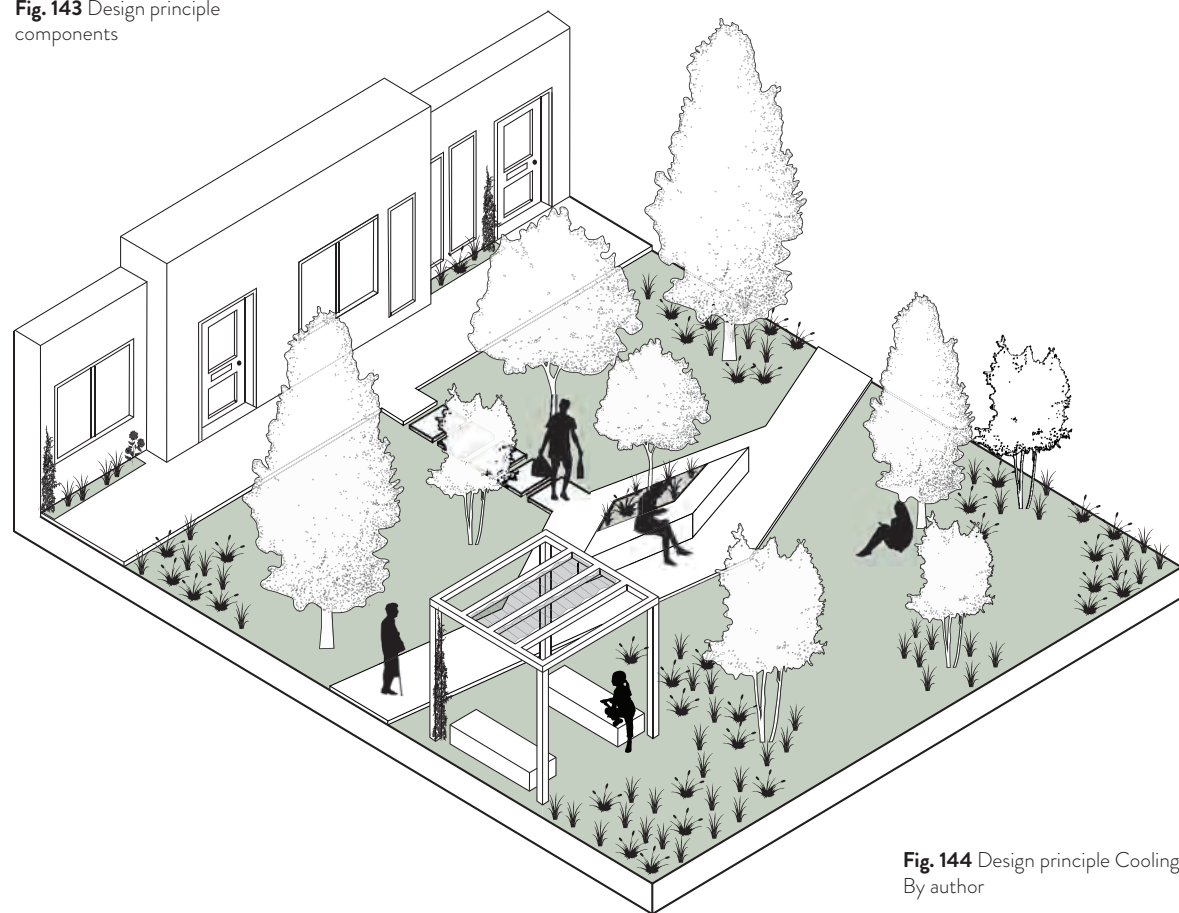


Fig. 144 Design principle Cooling. By author

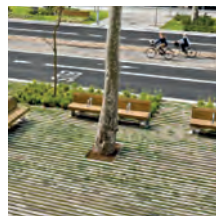


Fig. 145 Extensive facade garden



Fig. 146 Trees for cooling squares

Infiltrating



The design principle Infiltrating is focused on the need of increasing the infiltration capacities of the public spaces. Despite urban domestic gardens tend to be more soil sealed each year, having negative effects on the water systems, the design principles are not applicable to private spaces. Therefore, the focus for Infiltrating will be on public spaces, making them more climate-proof for extreme weather event. This principle has a direct connection with the Greening principle, since more green will help improve the infiltration of water in the public spaces.

General principle:

Create spaces with improved and more natural water infiltration.

Context:

Public spaces, green roofs

Possible components

Different methods are available to improve the infiltration of the public spaces. The following components will be used.

1: Wadi's

Wadi's offer the possibility to be a central, infiltration place where stormwater can get directed towards. In case of high peak rain showers, wadi's have can store water for a short time, to infiltrate slowly into the ground and decreasing the impact of the shower on the water systems. To make the wadi's even more effective grasses and plants can be incorporated to increase the aesthetics value and biodiversity of the public space.

Fig. 147 Design principle components

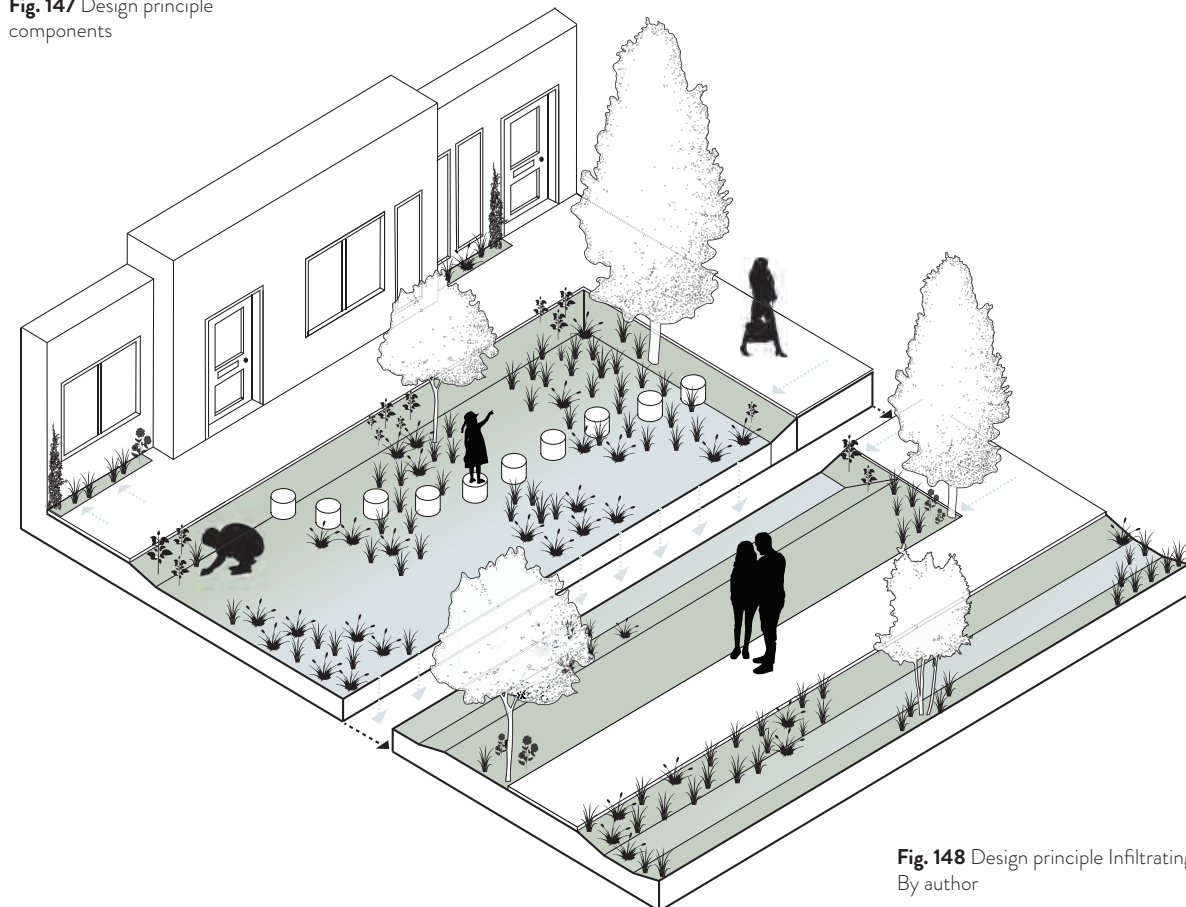


Fig. 148 Design principle Infiltrating. By author

2: Materialization public space

Selecting the right materialization used in the public spaces will influence the infiltration rate of public spaces. With more bushes and plants instead of pavement, water will have more possibilities to infiltrate naturally into the ground. When pavement is needed, depending on the context, open materials with a higher infiltration rate can be selected to reduce the flow of water into the sewerage.

3: Green roofs.

Flat roofs from existing buildings should be changed to green roofs if the construction is capable to support it.. New buildings should at least include a green roof, if not used for other functions like private- or roof gardens. Green roofs instead of black tarmac helps decreasing the direct runoff into the sewerage in case of rain showers, decreasing the impact on these water systems. Slowly releasing the water towards the ground floor, opportunities arise to reuse the water in the dwellings or in roof gardens. In the dwellings, water could be used for flushing the toilet, where in the roof gardens it could be used to water plants in the allotment gardens.

Components



Wadi



Materialization public space



Green roofs



Fig. 149 Wadi in the public space



Fig. 150 Green permeable public space

Design principle components	Learning 1	Learning 2	Working 1	Working 2	Eating 1	Eating 2	Playing	Greening	Cooling	Infiltrating
Educational gardens	X	X								
Workshop places	X	X								
Flexible outdoor tables	X									
Informative signs	X									
Outdoor classroom		X								
Sharebox		X					X			
Allotment garden			X							
Central glass house			X							
Outdoor working places				X						
Indoor community room			X		X					
Outdoor eating places				X	X					
'Private zones'				X						
Safe playground							X			
Meeting place							X			
Trees							X	X		
Plants and bushes							X			
People ownership of public spaces							X			
Green roofs							X	X	X	
Materialization public space								X	X	
Shaded seating areas								X		
Wadi										X

Fig. 151 Overview of the components of the design principles

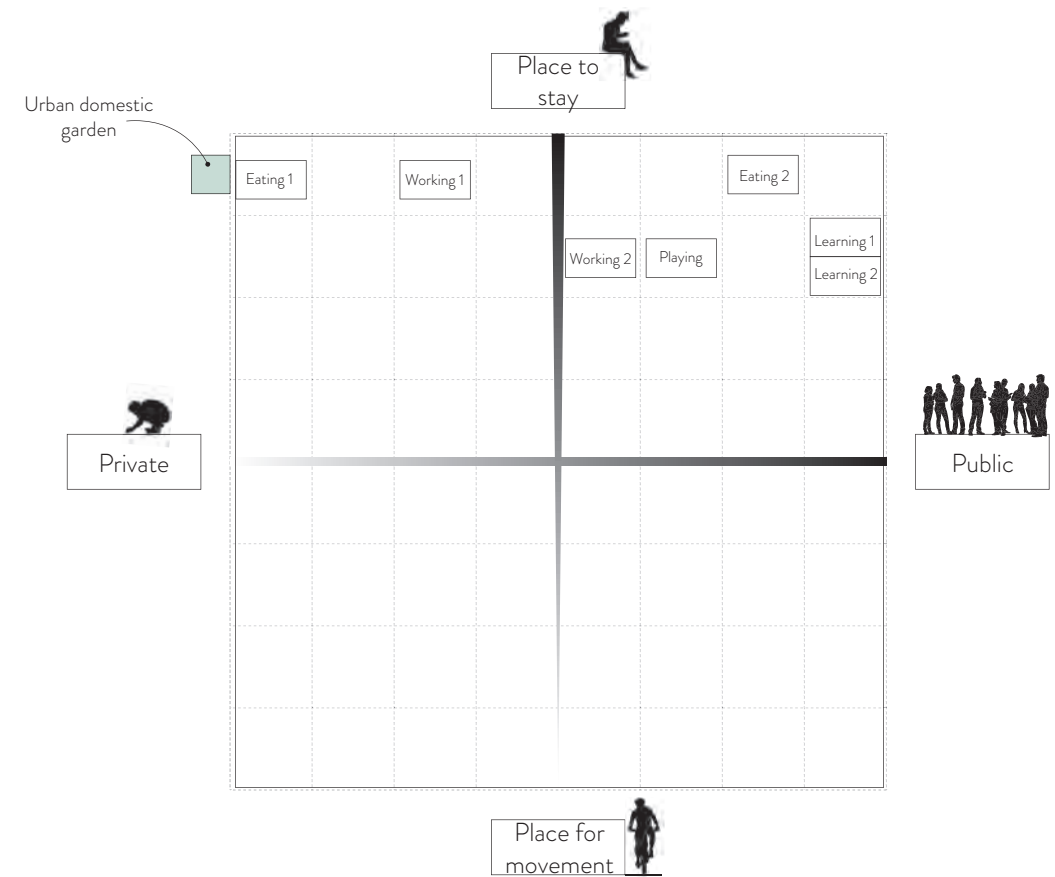


Fig. 152 Diagram with the design principles typology. By author

Applied earlier in this paragraph with different types of public spaces and street types, it is also possible to give the different design principles a place in the diagram where publicness/privateness of a public space and place to stay or place for movement are joined together. Since all the design principles are created for places to stay, placing them in the diagram shows which principles are more desired in private spaces,

and which principles in more public spaces. In this way, it gives a first overview of which principles do not fit together that well in one place or in which type of locations, more public or private, they can be implemented.

As one of the most urgent concrete urban demands, urban densification is needed to provide more housing in existing urban environment of Rotterdam. This way of developing a city has shown difficulties in keeping the human scale which makes cities alive and pleasant to live in. To densify in a way that liveability of cities for its residents can be improved, multiple design principles are presented which make it possible to densify urban environment, while keeping the human scale (Sim, 2019).

1: Diversity of built form:

The urban environment should consist of different kinds of buildings, mixing typologies and dimensions.

2: Diversity of outdoor spaces:

The urban environment should consist of different kinds of public and private outdoor spaces, including shared spaces, responding

to different needs and activities.

3: Human scale

The urban environment should be developed with the human scale in mind, with smaller dimensions, smaller spaces and quality at eye level in and around buildings and spaces.

4: Walkability

The urban environment should consist of walkable buildings and higher open spaces, easily accessible from the ground floor, with a physical connection between inside and outside of the buildings. Creating neighbourhoods which are pleasant and safe to walk in.

Based on these design principles for human-scale densification, six design principles have been developed which will be used in the design intervention process.

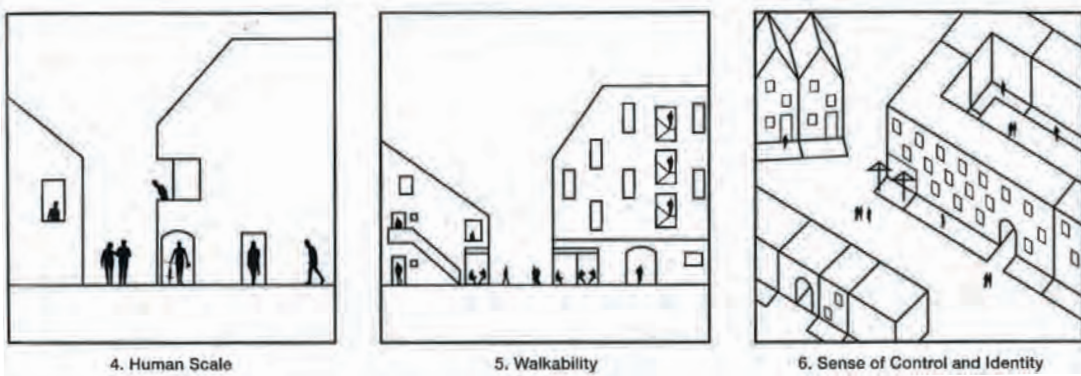
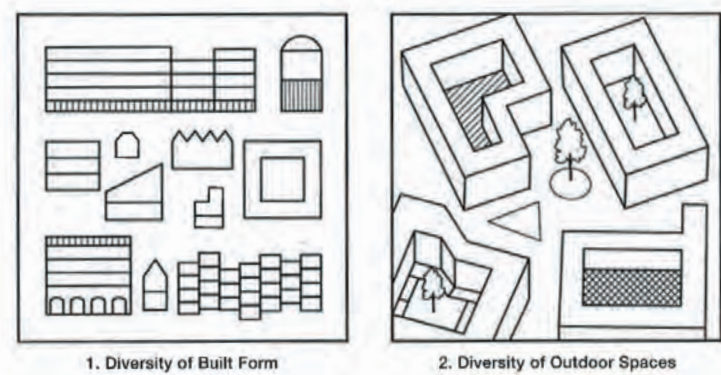
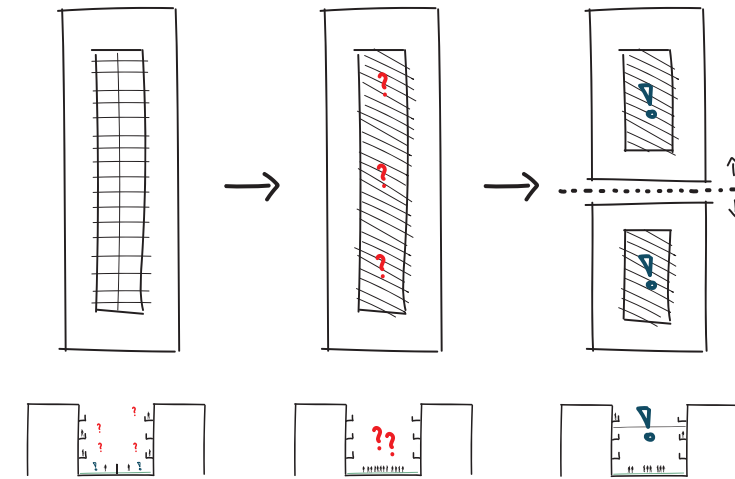


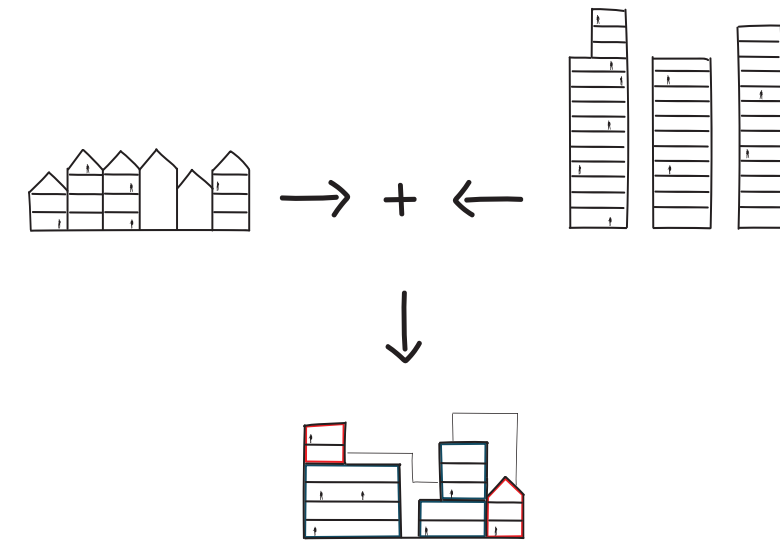
Fig. 153 Design principles for dense environments with a human scale



Smaller courtyards

Creating large courtyards inside large closed building blocks increases the number of users of a shared garden, with a potential of making it unclear to its users who the space belongs too. Creating multiple smaller courtyards with shared gardens for less users can potentially increase the use and community creation.

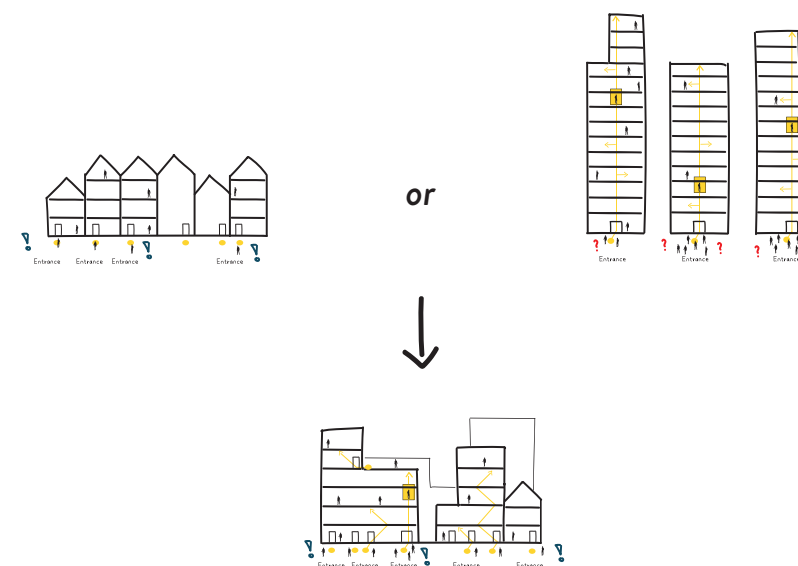
Fig. 154 Smaller courtyards. By author



Mixed buildform

Smart mixing of different build form like low density and high density can result in denser urban environments, while keeping the human scale of the ground level intact, increasing the livability.

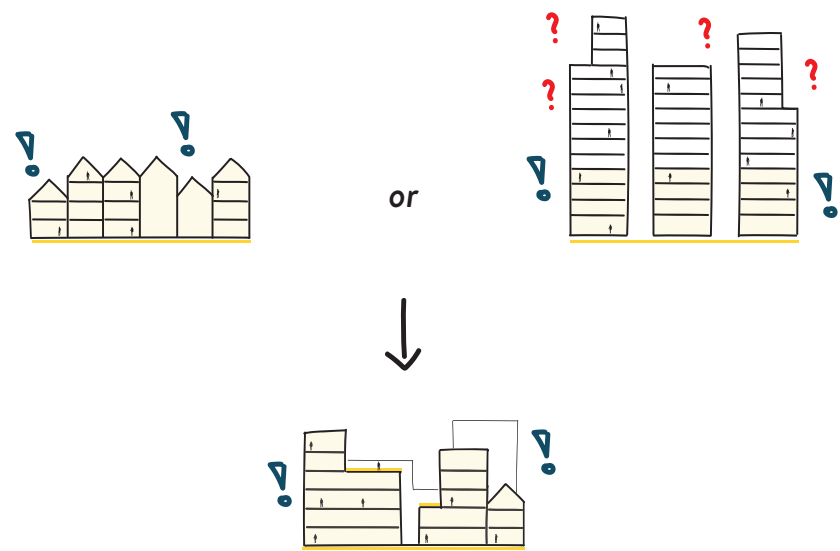
Fig. 155 Mixed buildform. By author



More individual entrances

Multiple individual entrances to houses and apartments on higher floors from public spaces on the ground floor, in favour of a larger, single anonymous entrance, can increase the connectedness with these public spaces, with opportunities of making the space surrounding their entrance their own.

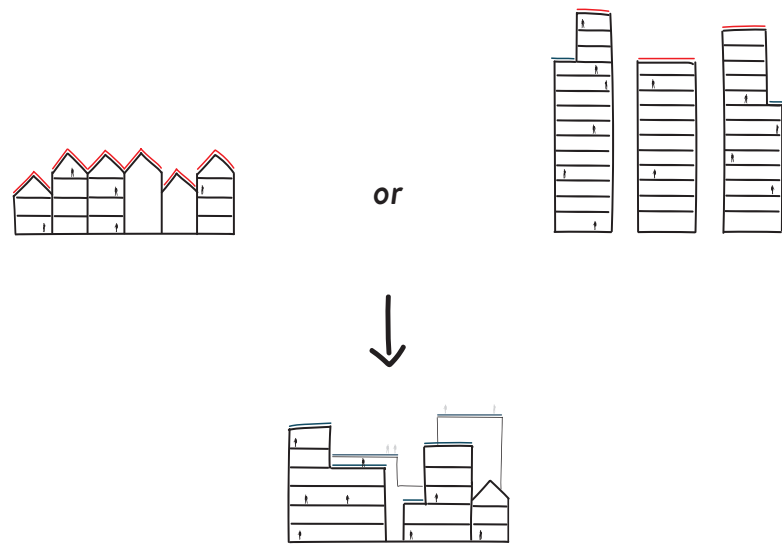
Fig. 156 More individual entrances. By author



Second public ground floor

Dwellings on upper floors in highrises, high above the public ground floor, can lose connectivity with the ground floor. Introducing a second ground floor in dense urban environments can increase the walkability of dwellings on the upper floors, making these places less anonymous and better connected.

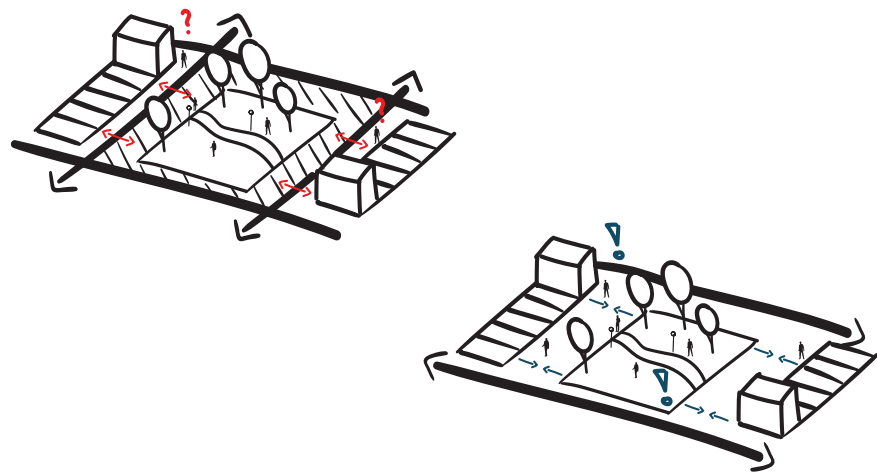
Fig. 157 Second ground floor. By author



Using the roofscapes

In dense urban environments, roofscapes can offer opportunities for smart vertical use of scarce space, creating liveliness and leaving space on the ground floor open for green, public spaces or further densification. Flat roofs in a mixed build form environment can respond to this.

Fig. 158 Second ground floor. By author



Pedestrianized public spaces

Pedestrianizing public spaces, focused on slow traffic by removing obstacles and danger like roads and spaces for fast traffic, can result in a more pleasant, safe and liveable space to stay. Potentially increasing the use and connectedness between the residents and public spaces.

Fig. 159 Pedestrianized public spaces. By author



Fig. 160 Claiming of the public space in the Tarwewijk

Fig. 161 Transitional space between public and private in Spangen

CHAPTER

4

Design intervention

- 4.0 Introduction
- 4.1 Methods for a sustainable urban regeneration
- 4.2 Design intervention location
- 4.3 Design Exploration
- 4.4 Design Exploration Conclusion Drawings

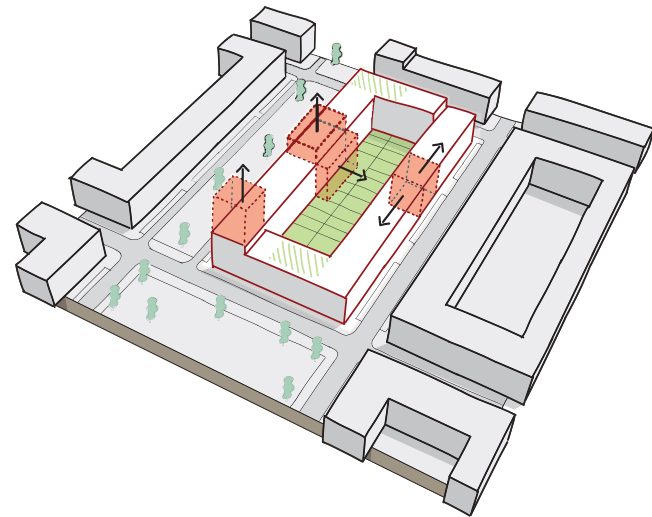
4.0 Introduction

This chapter focusses on the sustainable urban regeneration of a specific location in the Tarwewijk. It will start with an explanation of four methods of sustainable urban regeneration, which are used during the process. The second paragraph explains the specific design location, with the current networks and structures as a starting point for change. The third paragraph includes the design exploration of the location, discussing three different blocks and streets, explaining design interventions to increase the liveability in the Tarwewijk with the values of urban domestic gardens. The chapter is concluded with a set of drawings, giving an overview of how the different layers work together and align to concrete urban demands, increasing the liveability on the Tarwewijk.

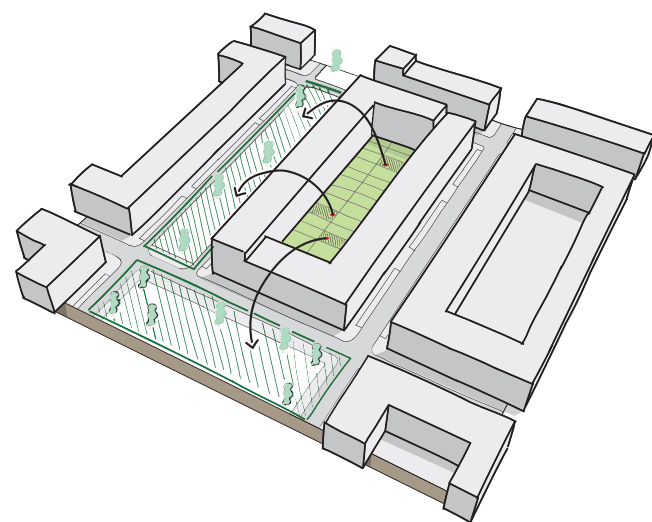


4.1 Methods For A Sustainable Urban Regeneration

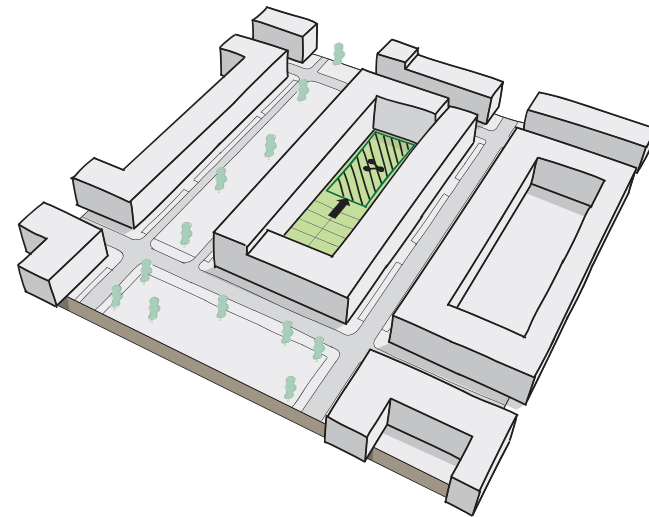
In order to develop a plan for the regeneration of the locations in the Tarwewijk, 4 methods for a sustainable urban regeneration are used in the design process.



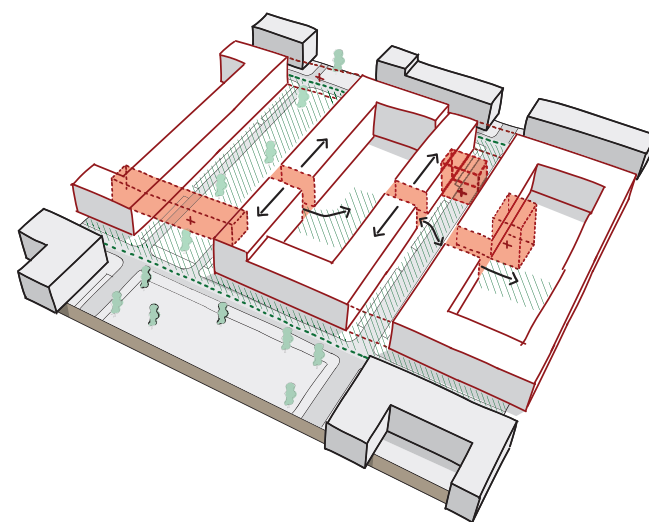
The first method of the urban regeneration is focused on the individual blocks itself. Through a redefinition of the urban blocks, by adding and removing parts of the urban blocks, or raising and lowering them in certain points, new urban forms with new qualities can be introduced.



Regenerating the public spaces surrounding the urban blocks by transferring the qualities of private gardens to the public spaces, using the developed design principles, a new way of giving more people access to the qualities of private gardens in the urban environment is introduced.



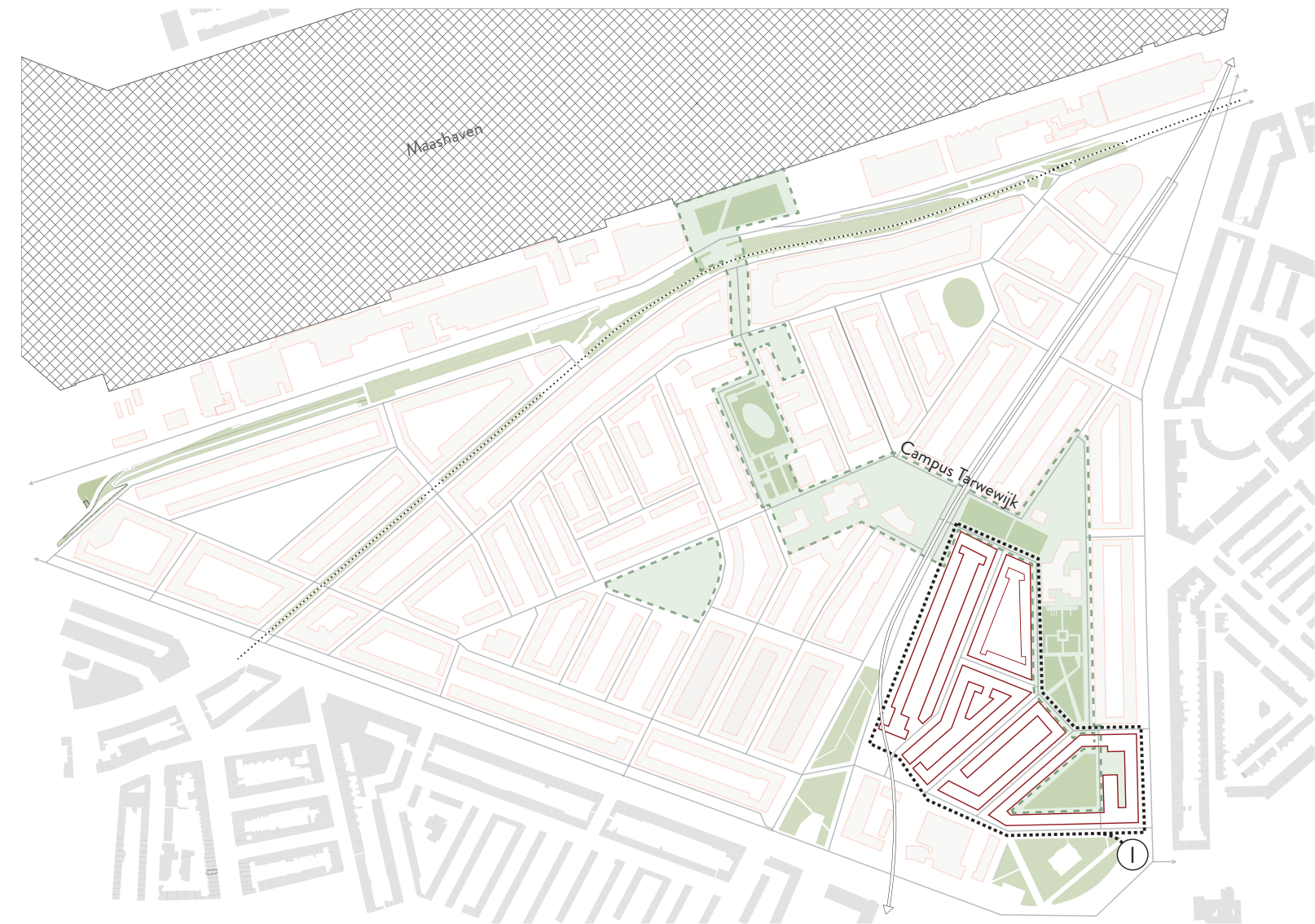
The second method focuses on the inside of the blocks, where private gardens currently define the quality and use of the inner blocks. By looking at possibilities to change from private to collectivism, by changing private gardens to collective gardens, new qualities can be introduced.



The method of redefining the urban structure seeks to create superblocks as a way to regenerate the urban blocks and the adjacent public spaces, introducing new urban forms and qualities into the neighbourhood, using a set of design principles.

Fig. 162 Methods for a sustainable urban regeneration. By author

4.2 Design Intervention Location



Location

The area is located on the southeastern side of the Tarwewijk, on the right side of the metro line connecting Rotterdam-South with the city centre of Rotterdam, and consist of 5 urban blocks with public spaces. Proposed by the municipality as one large connected public space, the Campus Tarwewijk (green dots) will border the location on the north-eastside, and be part of the location in the southernmost part.

Fig. 163 Location design intervention in the Tarwewijk. By author

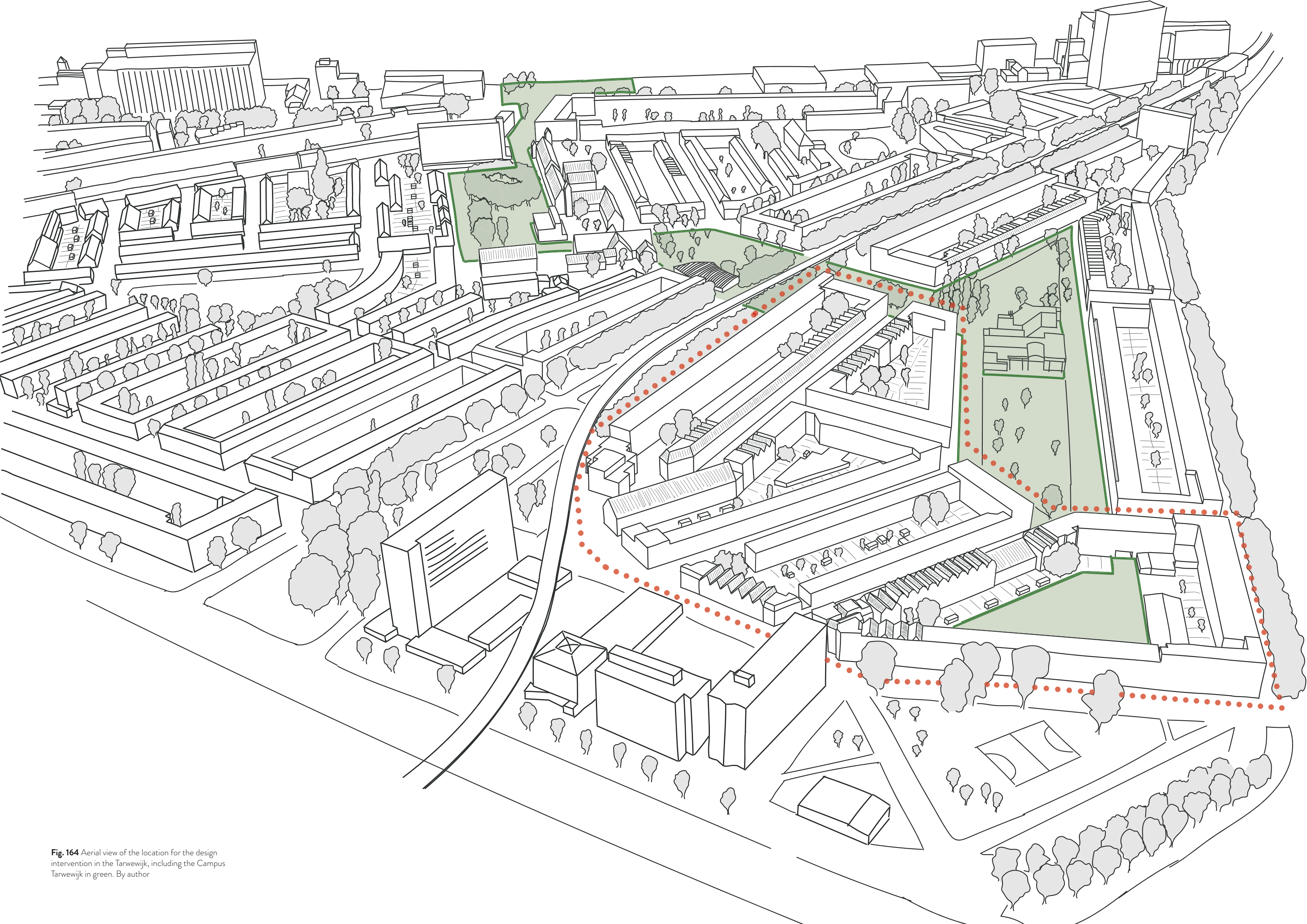
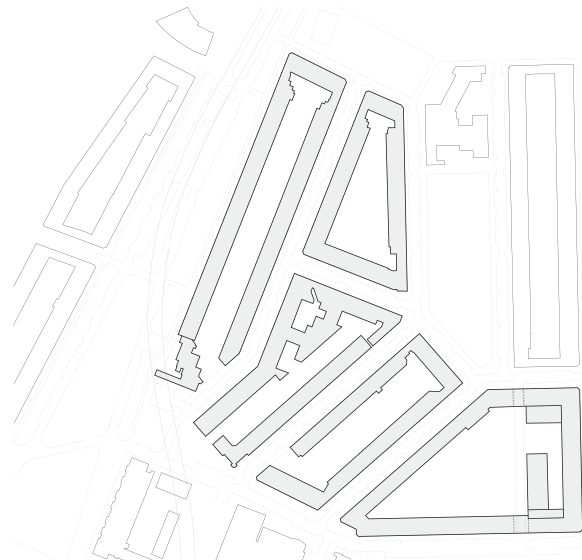


Fig. 164 Aerial view of the location for the design intervention in the Tarwijk, including the Campus Tarwijk in green. By author

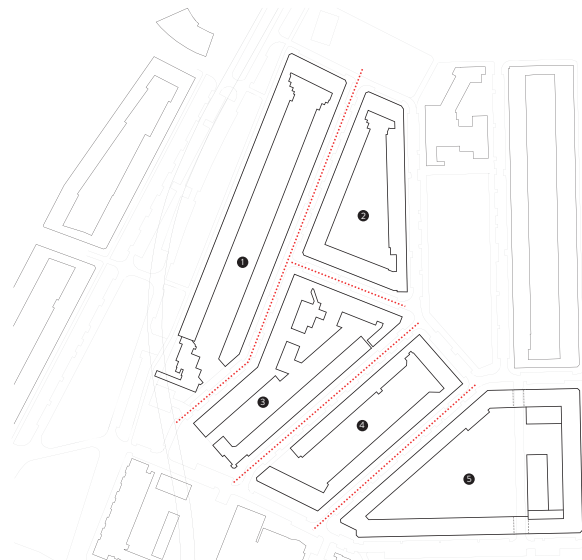
4.2.1 Current situation



Buildings:

The location consists of 5 different building blocks, varying from 3-story-buildings to 5-story-buildings, with the last being positioned along the larger main roads. The buildings form a mix of mainly post-war architecture, combined with newer 80s and 00s redevelopment.

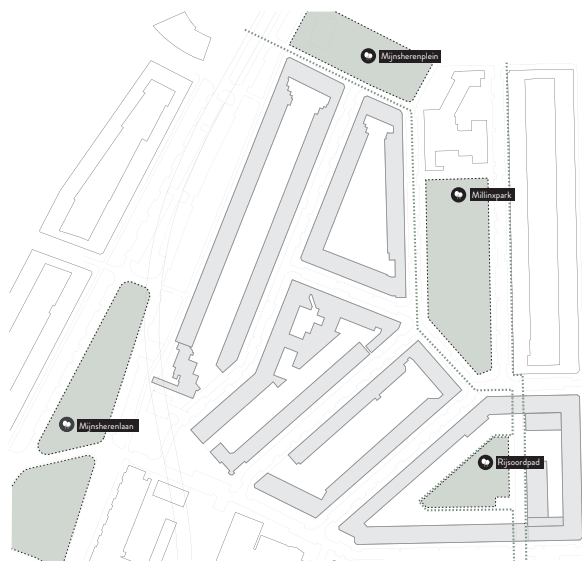
Fig. 165 Current building in the location. By author



Building blocks

The location currently consist of 5 different blocks, separated from each other by a system of one-way roads.

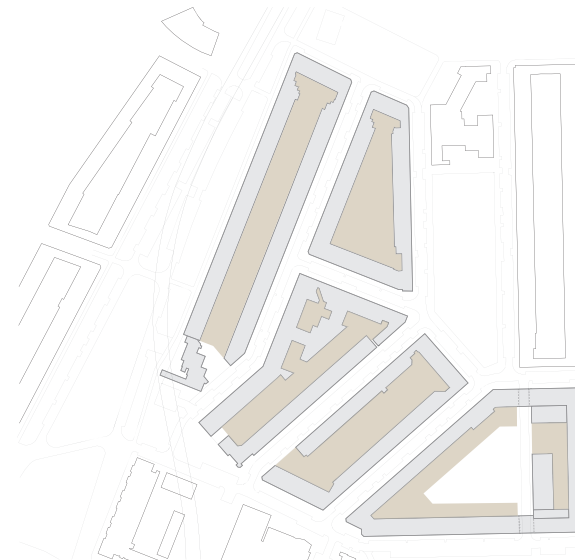
Fig. 166 Current building blocks in the location. By author



Public spaces:

Adjacent to the location are three larger public spaces, or public squares. Part of a proposal by the municipality of Rotterdam, these three public squares, along with several other throughout the neighbourhood, will be joined together into one campus, the Campus Tarwewijk.

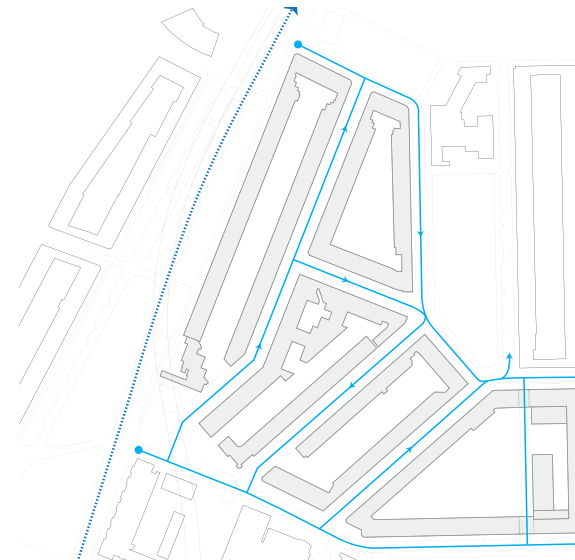
Fig. 167 Current public spaces around the location. By author



Private outdoor spaces

On the inside of the building blocks, the ground floor is currently only in use as urban domestic gardens for the residents of the ground floor dwellings. The middle part of the block on the southern right side of the location surrounds a public space, which will be part of the Campus Tarwewijk.

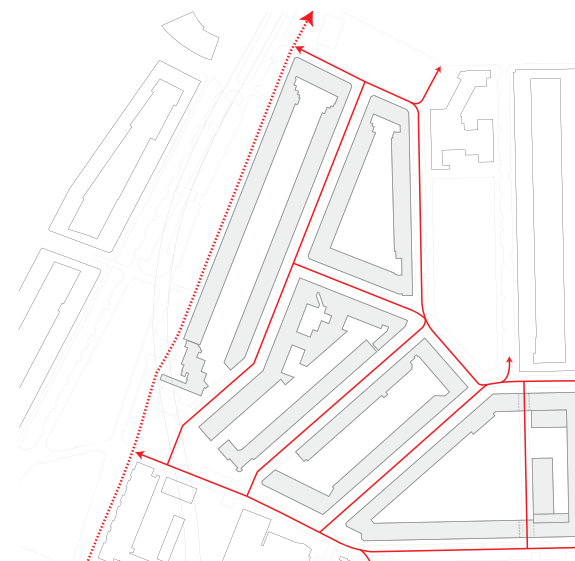
Fig. 168 Current gardens in the location. By author



Street network:

The street network surrounding the building block consist of multiple one-way streets, which form a connection with the two-way street, bordering the location at the southern part.

Fig. 169 Current streetnetwork in the location. By author







Bike & pedestrian network:



Sharing the same street network as the cars, the bike and pedestrian network contains of multiple one-way streets, accessible in both directions for pedestrians and cyclist. Along the western side of the area, the Mijnsheerenlaan offers a dedicated bicycle lane connecting the southern part with the northern part of the Tarwewijk, following the metroline.

Fig. 170 Current bike- and pedestrian network in the location. By author

4.3 Design exploration

Integrated design principles

-  Smaller urban blocks
-  Mixed buildform
-  More individual entrances
-  Second groundfloor
-  Using the roofscapes
-  Pedestrianized public spaces

-  Learning P laying
 - Working M eeting
 - E ating
-
-  G reening I nfiltrating
 - C ooling



-  Private gardens
-  Shared gardens

Fig. 171 (left) Design exploration map.
By author

The design exploration map shows the proposed new situation of the area, after the sustainable urban regeneration. Changing from several separate blocks into a superblock, introducing new qualities to both private and public spaces, by implementing several design principles related to the built environment, and specially developed design principles regarding the social and physical qualities of urban domestic gardens. Densifying and diversifying the built-environment, while maintaining the human scale and increasing the walkability of the entire block. Besides connecting to the Campus Tarwewijk, the new urban structure also offers a possibility for an extra green, walkable connection in the east-west direction, as part of a second version of the Campus Tarwewijk, connecting other parts of the neighbourhood.

4.3.1 Block 1

Starting point:

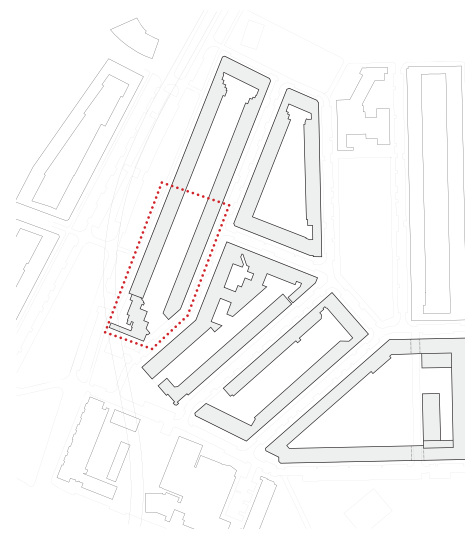
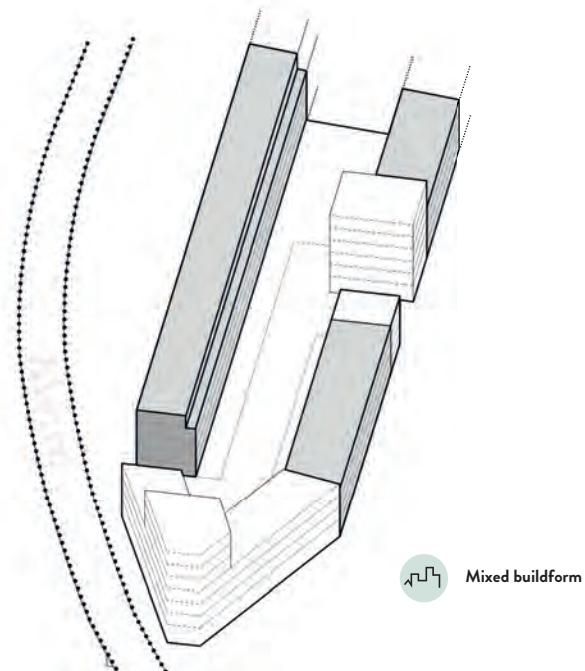
In the current situation, the building block is a half-closed block, with an opening on the southern side, next to the fire department. The fire department, different in architectural style and form, creates an awkward end of the block, with the backside of the building in com-

ination with parking spaces facing the street, having a negative effect on the quality of the place. The inside of the block consists of private gardens for the dwellings on the ground floor, while dwellings on upper floors have small balconies overlooking the gardens.



Re-use of existing buildings:

Parts of the current block will be re-used in the new situation. Two new buildings will be added, while two openings are created on the eastern and western side of the block for a new pedestrianized public connection.



- Legend
- Re-used buildings
 - New buildings

Fig. 172 (top) Aerial view current situation

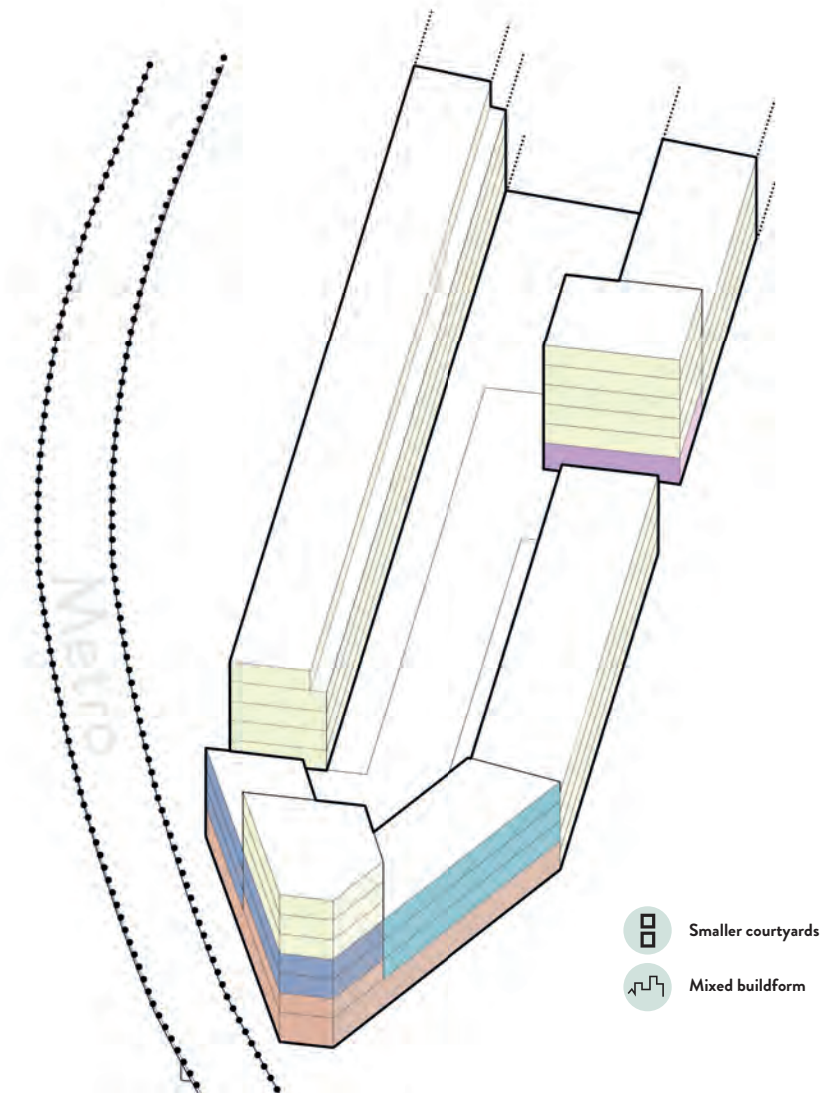
Fig. 173 (above) Location block 1. By author

Fig. 174 (left) Re-used buildings block 1. By author

Legend

- Fire department
- Offices
- Single-family dwellings
- Apartments
- Community room

Fig. 175 Typologies block 1. By author



Typology:

The new situation uses densification and diversification to increase the use and attract different types of people during different times of the day. With three-layered family homes for larger families, including a small private garden, it introduces a new type of dwelling in the block. Furthermore, a higher multifunctional building where the current fire department is located houses offices and apartments on top of the fire department to increase movement and use of space in and around the building and the corner of the block during different times of the day.

In the middle of the block, on both sides of the newly created opening into the Millinxbuurt, apartment blocks of similar height are positioned around a new public space. Positioning one of the buildings more inwards divides the long, stretched block into two connected blocks, offering more possibilities for more diverse use of the inside.

Typology in numbers:

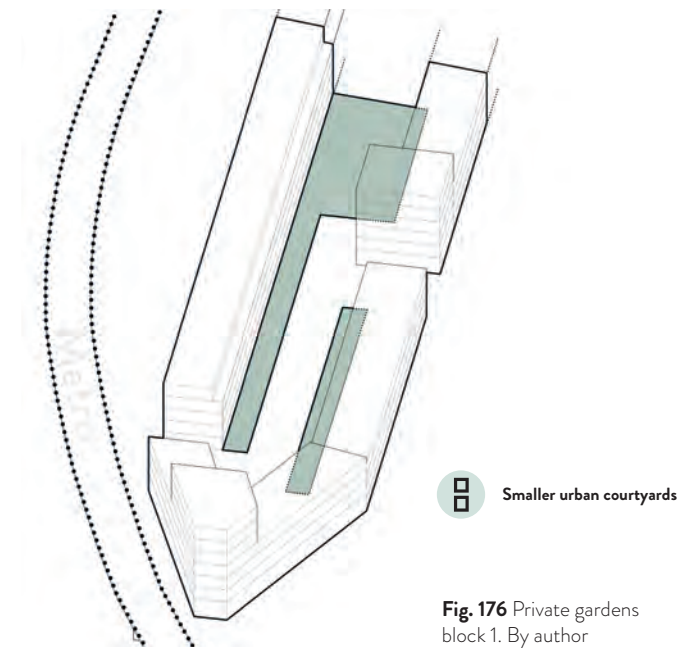
Housing:	
-22 dwellings (demolished):	1735 m ²
+39 dwellings:	3234 m ²

+17 dwellings	+1499 m ²
Offices:	
+1630 m ²	
Community room:	
+108 m ²	
Fire department:	
-1088 m ² (demolished)	
+990 m ²	

-98 m ²	

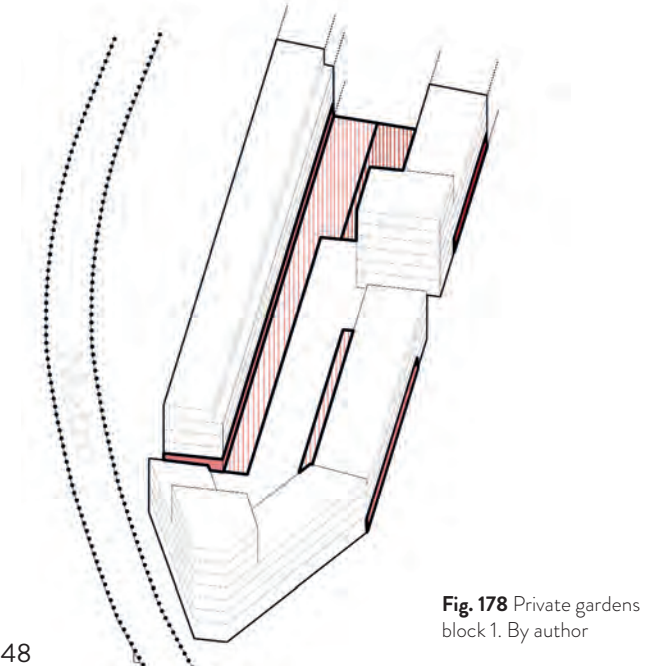
Private gardens

Existing private gardens for dwellings on the ground floor are partly preserved in the new situation. To generate enough space for a new public space through the block, the private gardens will have a new depth of 5 meters. To ensure a connection between private and public, backsides are kept open on eye level.



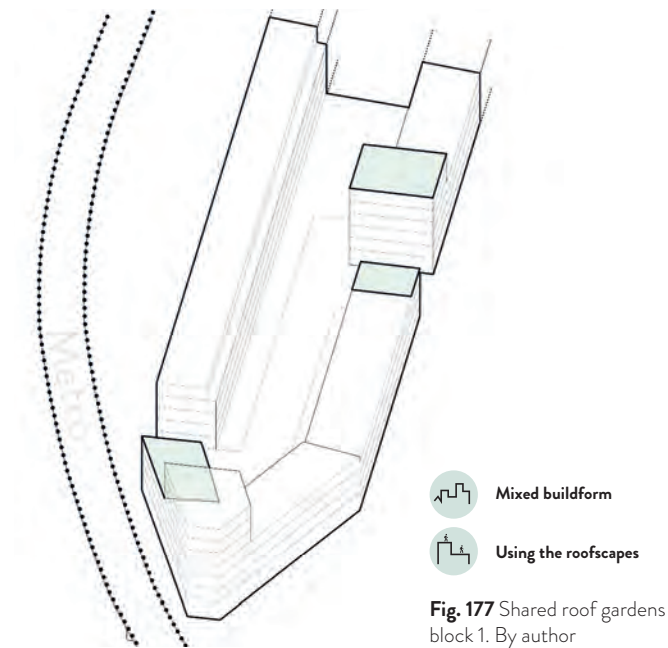
Accessibility private gardens:

The private gardens are for private use, belonging to the dwellings on the ground floor. By keeping private gardens available in the block, a mix of different private outdoor spaces is retained, together with balconies and private roof terraces, attracting different user groups with different needs, diversifying the local community.



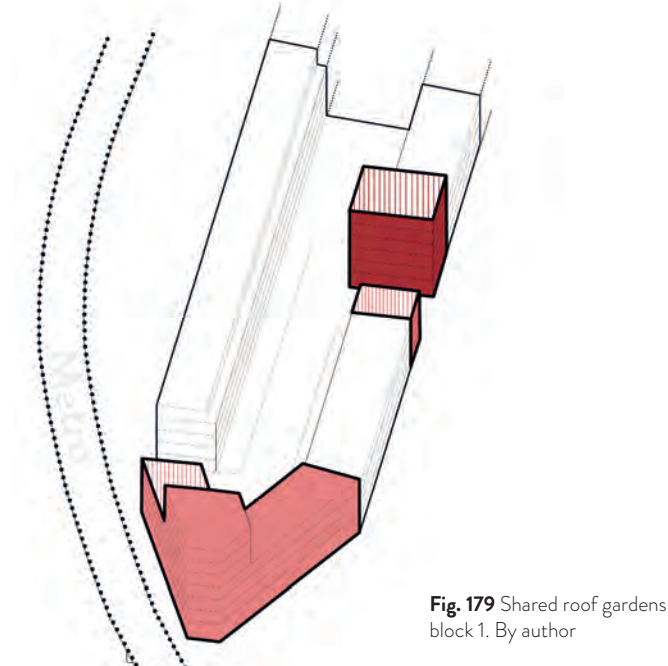
Shared roofgardens:

The roofscapes of the new implemented buildings will be used for semi-private roof gardens to further diversify available outdoor spaces, add new qualities to the block and minimize the use of valuable space on the ground floor, leaving opportunities to more qualitative spaces for all the residents of the block.



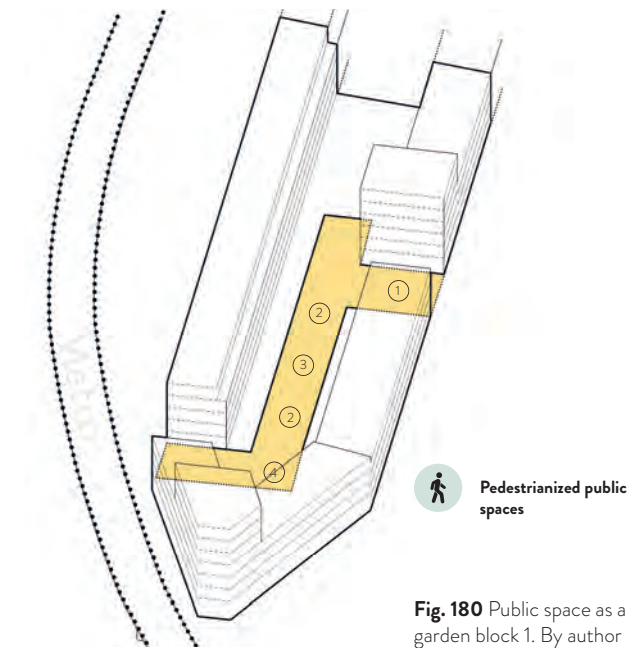
Accessibility roof gardens:

The three separate roof gardens will not be accessible for residents of the entire block but is limited to the buildings they are part of. This to minimize the flow of people through the inside of these buildings, offer unique qualities to certain dwellings and offices, and assure the social safety on the roofscapes.



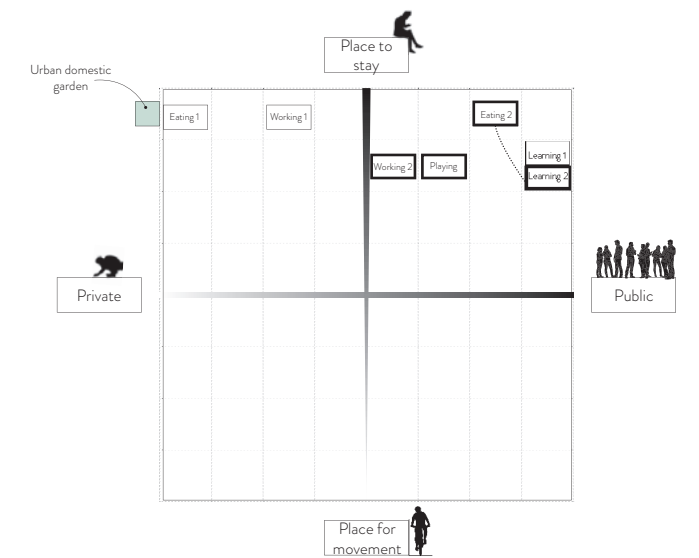
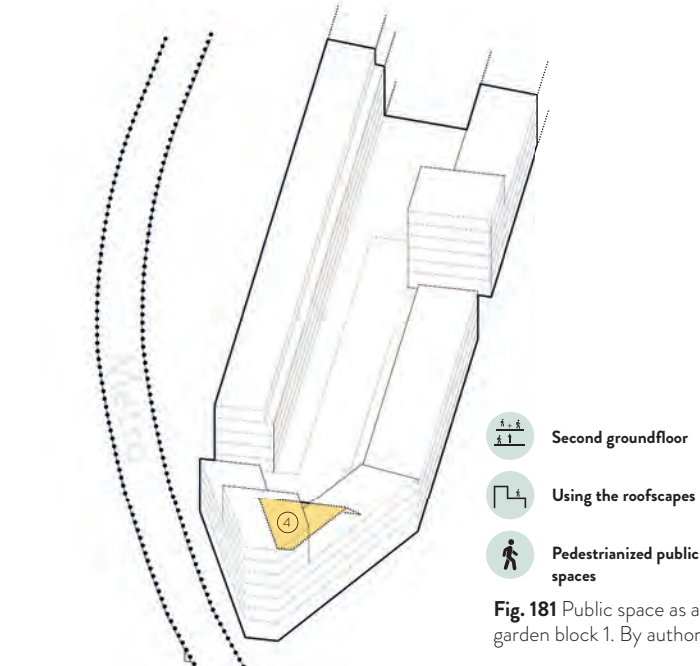
Public space as a garden

Two new openings in the block make it possible to create a new pedestrianized public space, as part of the vision to create a branch of the Campus Tarwewijk. The public space offers the opportunity to add new, fitting qualities of private gardens for local communities which increase the living qualities and accessibility to gardens.



Raised public space as a garden

To maximize the available space inside the block, the roofscape on top of the fire department is used to extend the public space to a second level, increasing the usability of the adjacent building and creating a more private, public environment. A large active stairway connects the two levels and makes the second layer accessible to the public.



New qualities public space:

- ① **E**ating 2 + **L**earning 2
- ② **G**reening + **C**ooling + **I**nfiltrating
- ③ **P**laying
- ④ **W**orking 2

Consisting of three zones with specific qualities of private gardens of the social environment, connected by two zones focused on improving the physical environment, different qualities or a combination of qualities are designated to the zones, based on the typology of public spaces from the diagram above and site characteristics:

- 1:** Centrally located in the block, next to the entrance of the new public passage, surrounded by dwellings and accessible from multiple directions, this type of space offers characteristics for adding the quality of Eating, focused on larger groups of people. Fitting in the same type of public spaces makes it possible to combine the qualities of Eating with Learning, focused on bringing larger groups together and developing the communities.
- 2:** Being flexible in use in different types of spaces, the Greening, Cooling and Infiltration qualities can be used between the three social zones to improve the climatic and physical conditions of these zones, and create a balance with the more active social zones as more calm places.
- 3:** Surrounded by green and buildings, located in the middle of the corridor, and the furthest away from any fast traffic, the middle zone offers characteristics which fit the implementation of the quality of Playing, focused on (younger) children.
- 4:** Partly on the second ground floor, creating a calmer part of the public space, adjacent to new offices and dwellings, the public space has characteristics to implement the qualities of outdoor Working.

Fig. 182 Regeneration plan block 1. By author



Trees provide shade and cooling for the playing children and passers-by, creating a more pleasant open space

Safe playground inside the building block, away from fast traffic. Accessible via the private gardens and public pathway.

Plants and bushes provide distance and privacy for the gardens. Water can infiltrate naturally into the ground.

Public pathway along the playground increases social contact between kids, parents and passers-by.

Social safety from the private gardens and balconies overlooking the playground

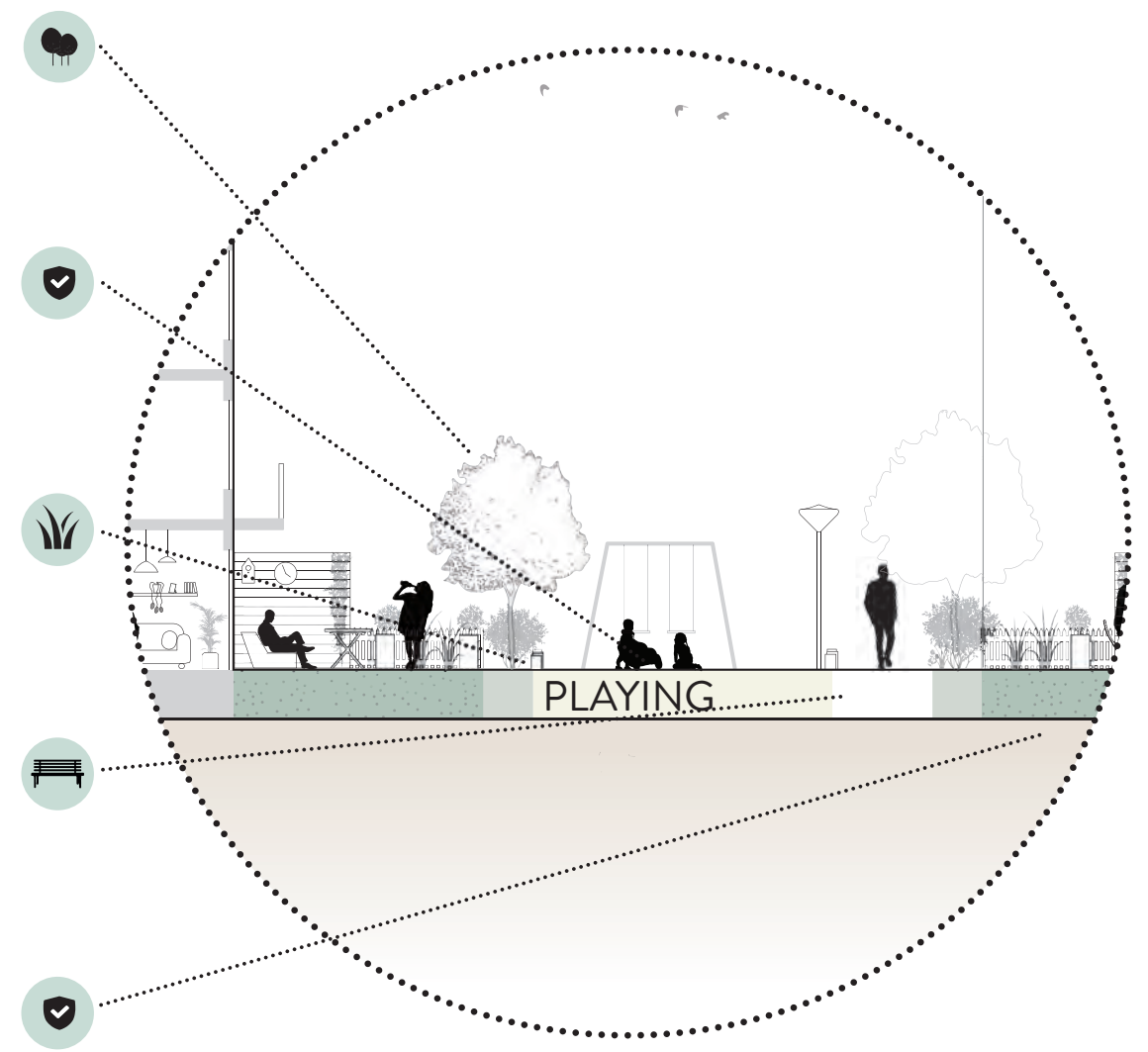
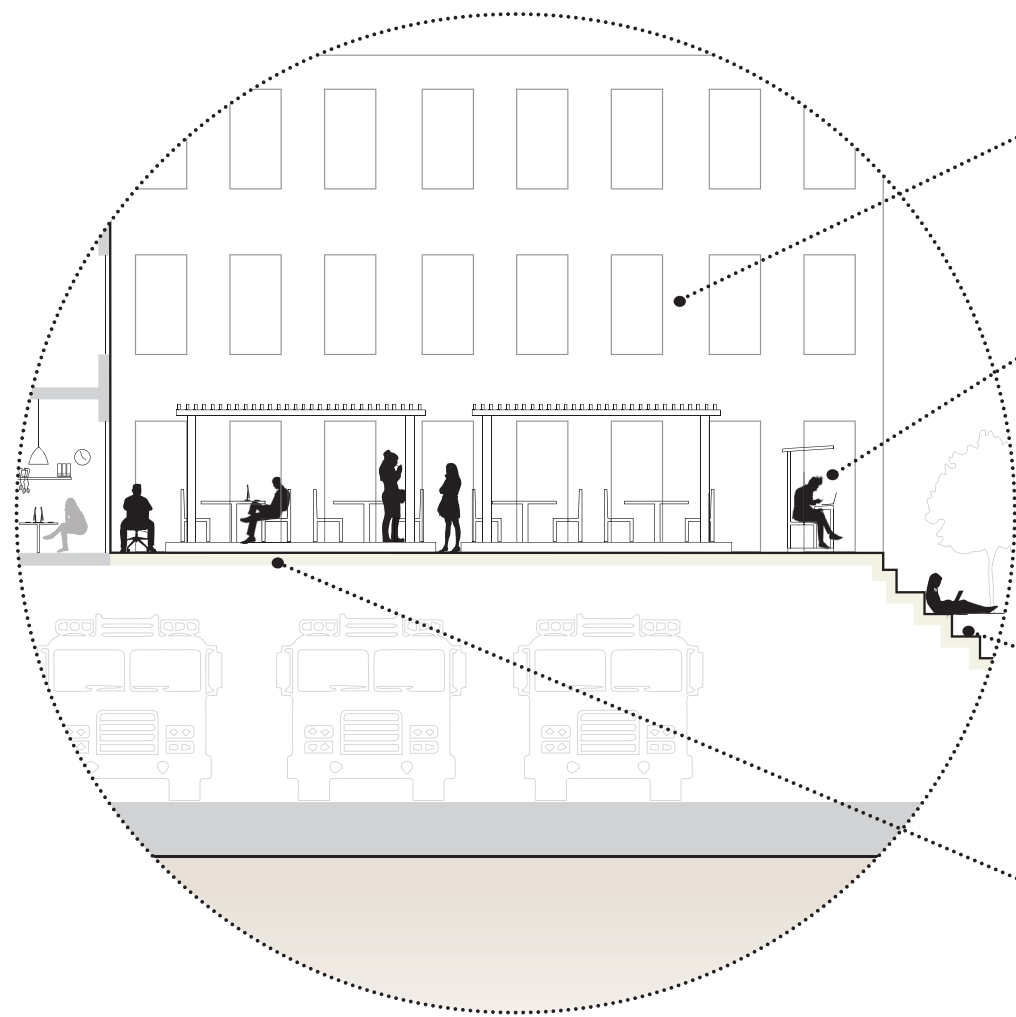


Fig. 183 Section AA block 1. By author



Flexible indoor offices adjacent to the outdoor working spaces. Meeting and working space for local communities & office workers



Single-person working stations, functioning as concentration spots. Energy for lighting and electricity is generated by solar panels.

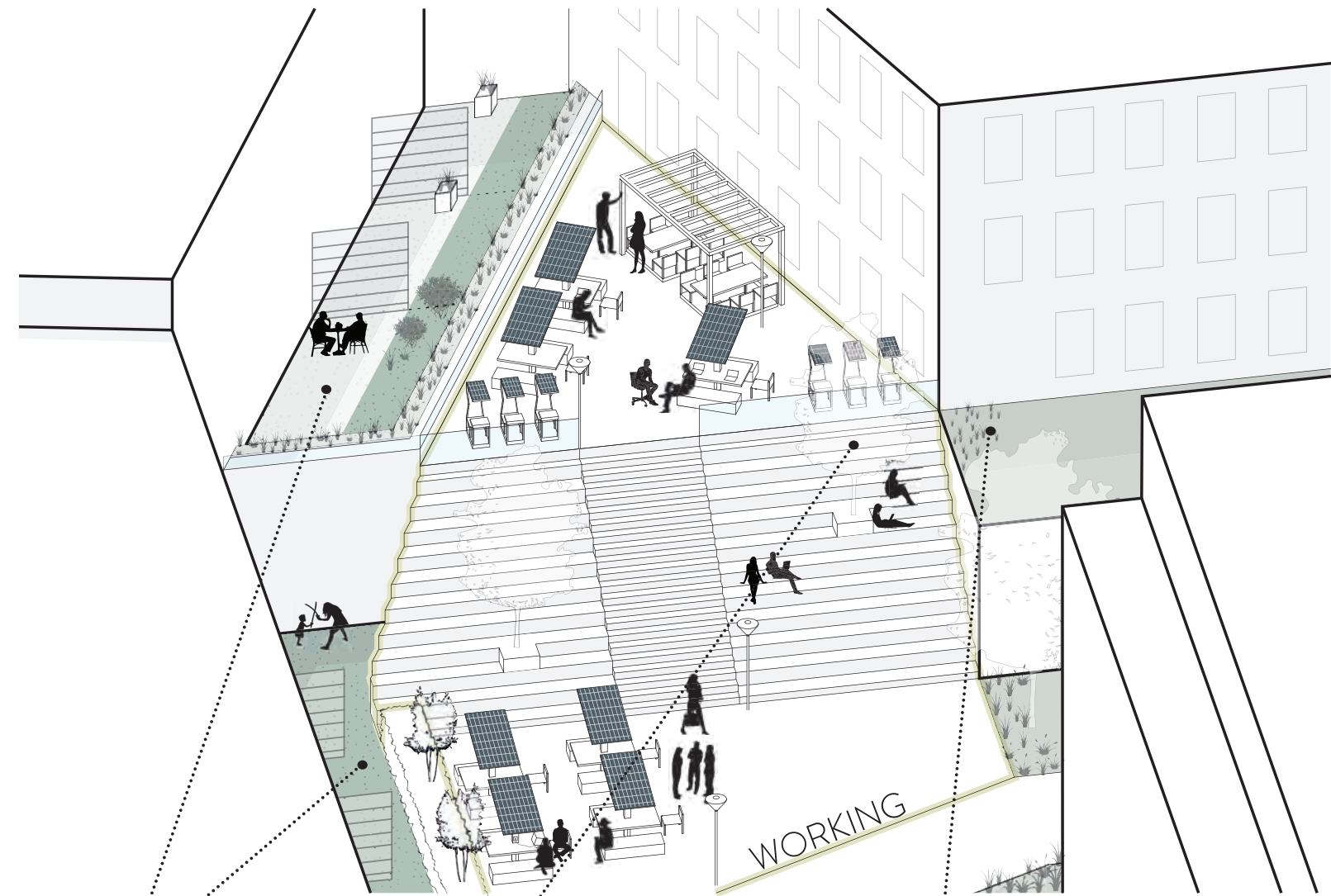


Active working stairs. Multi-purpose in use, for example as a stand for local initiatives.



Multi-person working tables as a place to meet, gather and work with others. The pergola provides shadow for more pleasant working conditions.

Fig. 184 Section BB block 1. By author



Private gardens adjacent to the public working area improve the liveliness and social safety during different times of the day.



Trees provide shade for the working people, creating a more pleasant working and meeting place



Green roofs cool the surrounding area and collect rainwater

Fig. 185 (above) 3D section public square with stairs. By author



Fig. 186 The new situation inside the block with private gardens and a new a public passage, adding multiple new qualities to the inside of the block. By author

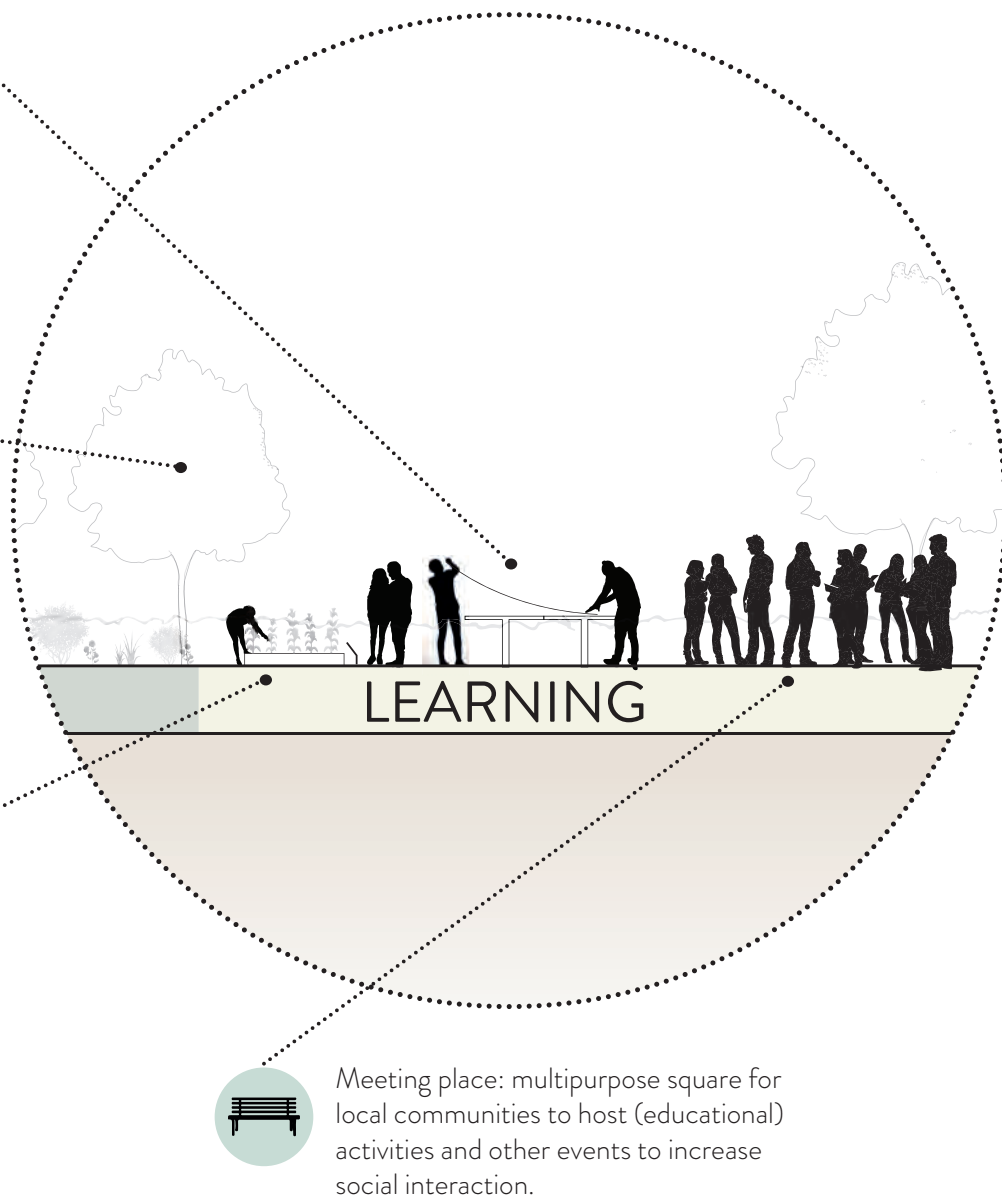
Durable outdoor tables can be used for workshops, events and educational purposes, like demonstrations of maintaining different plants.



Trees provide shade and cooling on the square for a more pleasant experience, and increase the privacy of the adjacent private gardens.

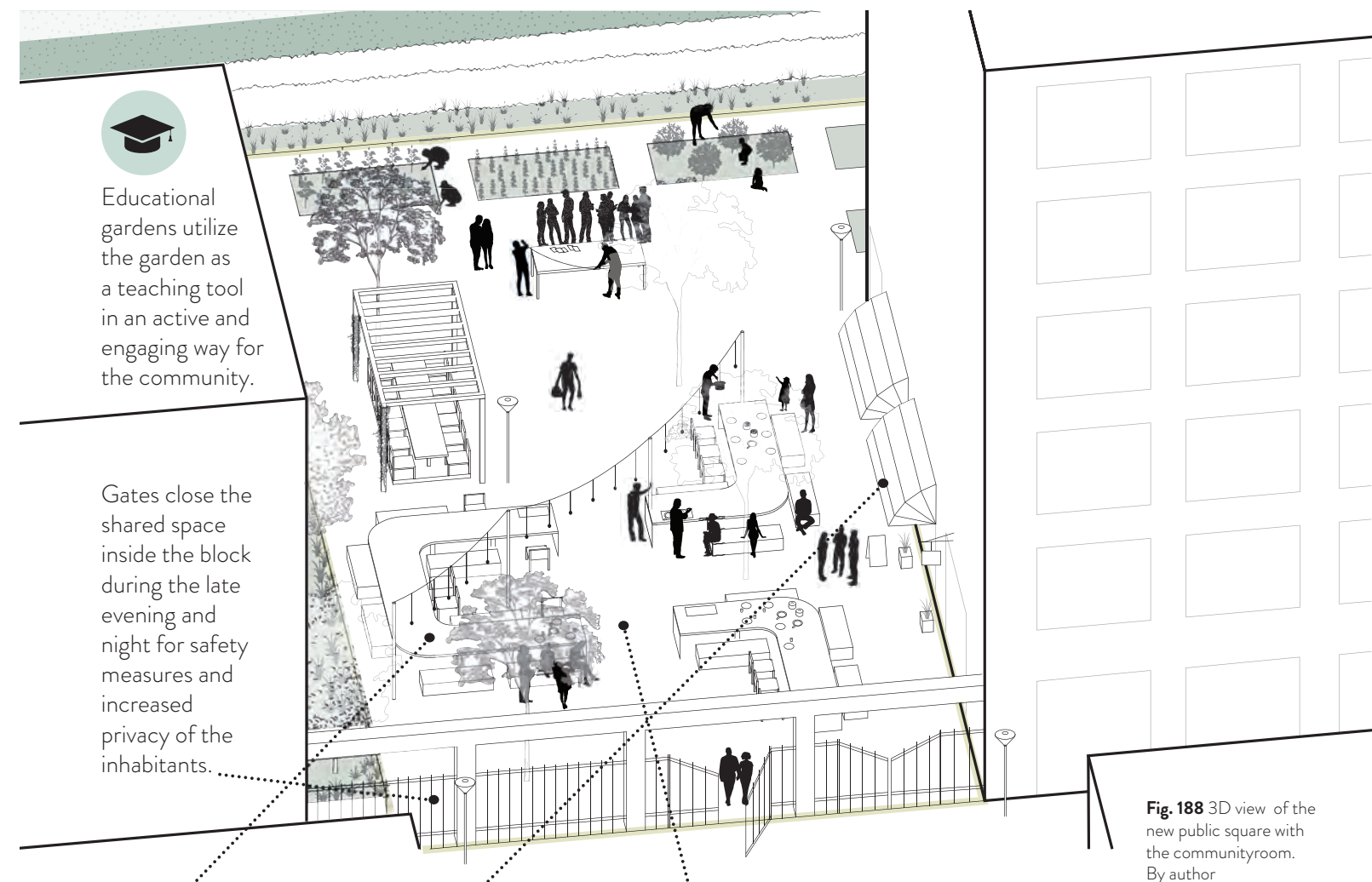
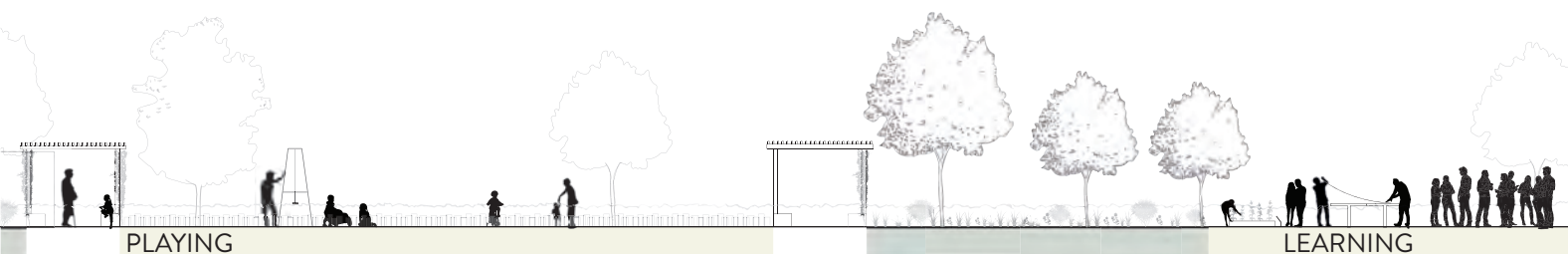


Educational gardens can provide knowledge to the local community on different topics and can deliver vegetables/herbs for the community room.



Meeting place: multipurpose square for local communities to host (educational) activities and other events to increase social interaction.

Fig. 187 Section BB (right side) block 1. By author



Educational gardens utilize the garden as a teaching tool in an active and engaging way for the community.

Gates close the shared space inside the block during the late evening and night for safety measures and increased privacy of the inhabitants.

Fig. 188 3D view of the new public square with the community room. By author



Outdoor eating area focused on bringing larger audiences of the local community together through the topic of food and eating, an important quality in many cultures in the multicultural neighbourhood. It also offers space for outdoor cooking and is flexible in use on other occasions.

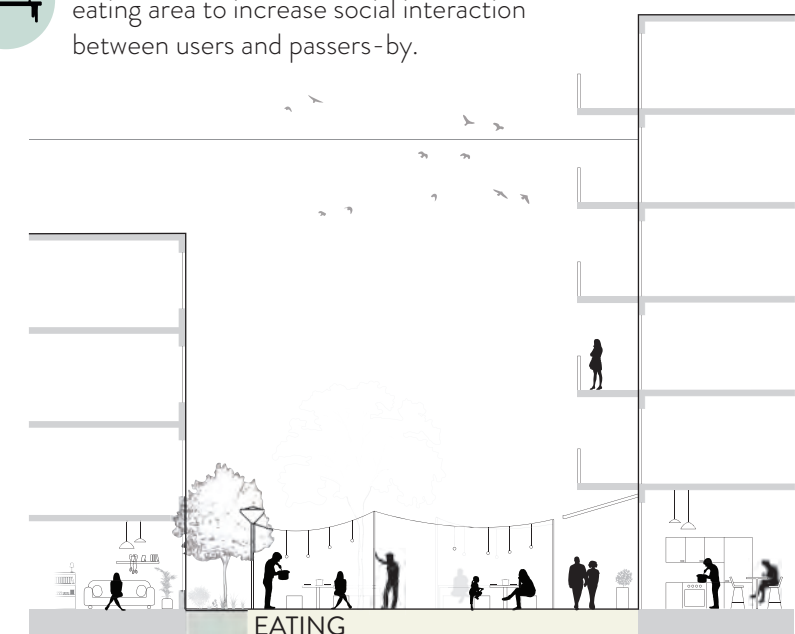


The indoor community room can serve as a place for meeting, eating and cooking for the local communities and groups. The indoor community rooms can also serve as a place where indoor cooking workshops can take place, as part of the Learning principle. Two entrances, one inside the block and one at the street side, make it possible to still make use of the room in case the gate is closed down.



Pathway directed through the outdoor eating area to increase social interaction between users and passers-by.

Fig. 189 Section CC block 1. By author





Friday evening, 18:30 o'clock:

After a productive working week, 'Semih and Esila have come to the public square with their child Eren to have dinner with their neighbours Floris and Jasmijn. The couple, with two kids, Sem and Ramon, recently moved into the Tarwewijk from Rotterdam-North into a larger family dwelling on the other side of the public garden. While the kids were playing outside and Esila was chatting with her neighbours, Semih prepared a Turkish meal in the kitchen of the community room, which is available for use by the local residents. Just finished with cooking, Semih has arrived at the table with a hot plate of food, and dinner is about to start, while enjoying the last sunrays of a nice, late spring evening sun.

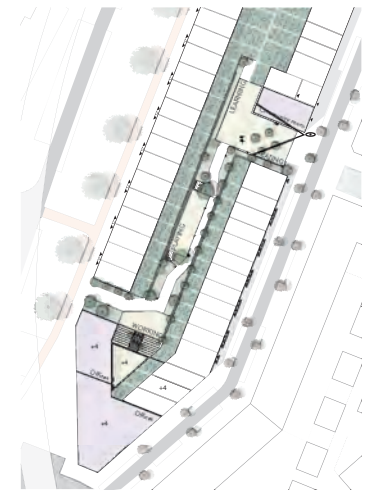


Fig. 190 Square from eyelevel perspective. By author



Tuesday afternoon, 15:00 o'clock:

Just arrived at the office with a fresh cup of coffee after having a meeting with a client, Emma and Alexandra who run their graphic design studio, are about to discuss the outcomes of the meeting with the client. At walking distance from the metro station Zuidplein, their new office above the fire department of the Tarwewijk is adjacent to outdoor working places, available to the public. After being inside for the whole day, they decide to take advantage of the sunny weather and make use of the outdoor working station. While the solar panel above their head is working at full power, delivering the needed energy for their laptops to have a successful session, also residents of the adjacent dwellings take advantage of the weather and enjoy their free time in the pedestrianized public space.

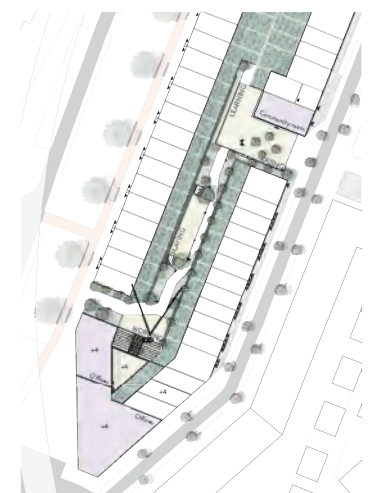


Fig. 191 Inner passage from eyelevel perspective. By author

1. Green space for natural infiltration of excess stormwater and cooling of the square. Combined with different types of grasses for easier maintenance and increased biodiversity.

2. Smaller trees with an open crown provide some shadow and cooling of the square, without disturbing the open and intimate character, making it a more pleasant space to stay.

3. Lights above the central seating elements increase the usability of the square during the evening and increase the social safety, while improving the esthetics and intimacy of the square.

4. Sleek and robust, vandal-proof tables and seating elements lower the maintenance cost, while forming the central elements for different activities like eating and meeting.

5. Different types of light, open pavement provide natural infiltration of stormwater, while the overflow is directed towards adjacent green spaces. Light colours will reduce heating of the air.

6. Private outdoor spaces like balconies oriented towards the public square, for increased social safety and use during different times of the day.



1. Open grass area for multifunctional use like playing, relaxing and sitting. It forms a buffer between the private gardens and the public pathway, increasing the privacy of the residents.

2. Green space with grasses and plants for natural infiltration of excess stormwater, cooling and increased biodiversity, while being easier in maintenance. Forms a buffer between the private- and public garden.

3. Small trees provide some shadow and cooling, while acting as a natural fence, partly covering the open backside of the private gardens, increasing the privacy of the residents.

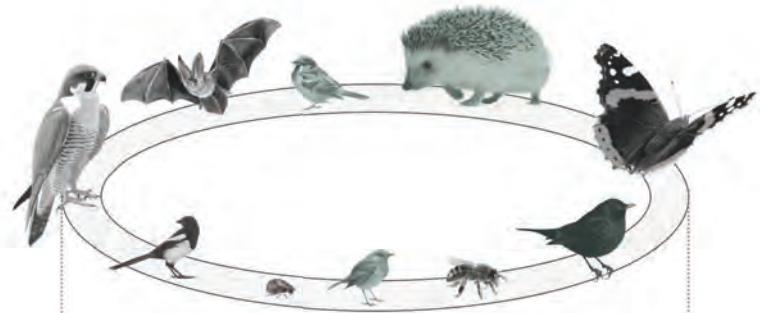
4. Hedges at the backside of the private gardens provide an open character and connectivity with the public garden, making interaction possible while serving as a natural privacy barrier.

5. Different types of light, open pavement provide natural infiltration of stormwater, while the overflow is directed towards adjacent green spaces. Light colours will reduce heating of the air.

6. Larger species of trees in the public space at strategic points like entries provide a pleasant and attractive area, by providing shade and thereby cooling the area, while enhancing biodiversity.



Fauna



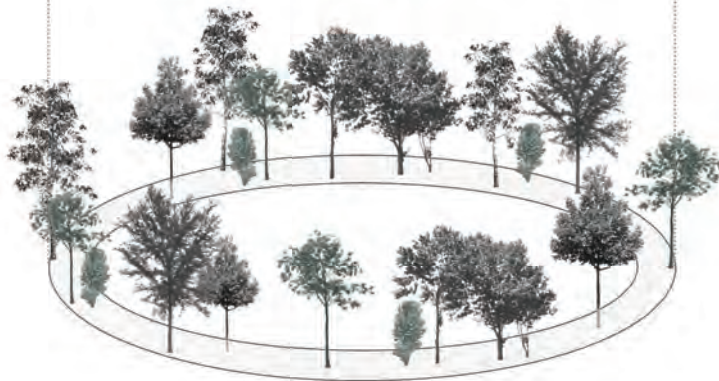
Hedgehogs
Sparrow
Blackbird
Robin Redbreast

Grasses



Pennisetum
Calamagrostis Acutiflora
Stipa Tenuissima
Fagus Sylvatica

Trees



Honey Locust
Amelanchier Alnifolia 'Obelisk'
Ulmus frontier
Acer campestre

Square:
Honey locust

Garden trees:
Amelanchier Alnifolia 'Obelisk'

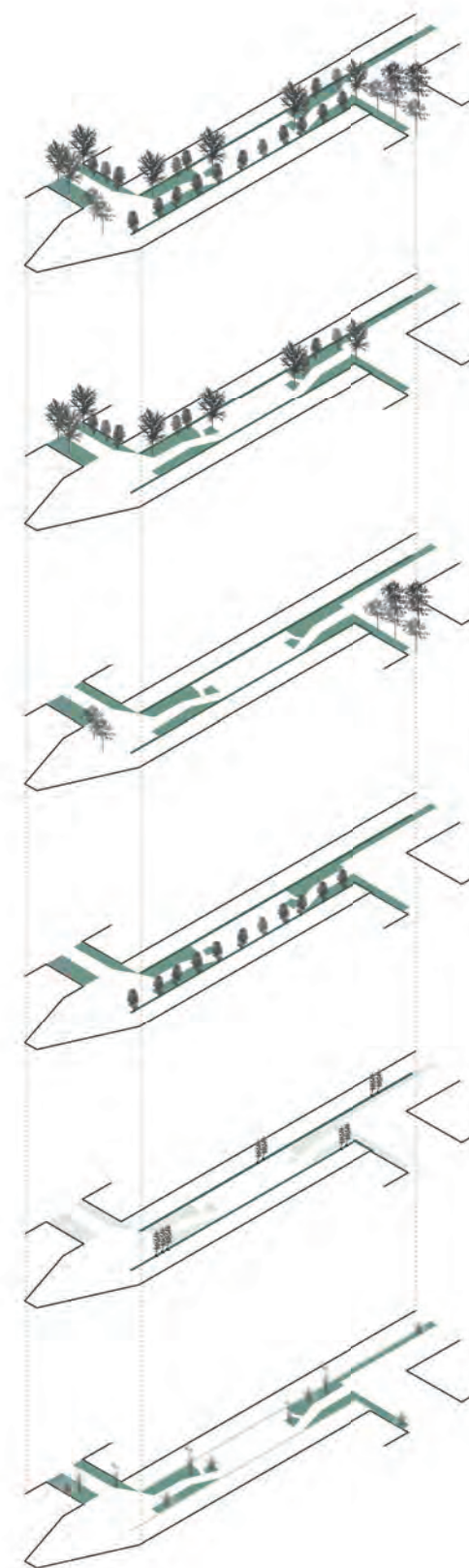
Hedge:
Fagus Sylvatica

Borders:
Pennisetum



Fig. 192 Overview of the plants and trees present in block 1

Total green structure block 1



Street trees: **Amelanchier Alnifolia 'Obelisk'**
Ulmus frontier, Acer Campestere
Small and medium-size trees with a normal crown to provide shadow, intimacy inside the public garden.

Square trees: **Honey locust**
Small tree with a light crown to provide shadow and intimacy, without creating darkness

Garden trees: **Amelanchier Alnifolia 'Obelisk'**
Small size trees with a normal crown along the pathway, to provide privacy to the gardens, accentuating the strong lines of the public space.

Hedge: **Fagus Sylvatica**
An evergreen hedge as a natural wall at the backends of the private gardens, for increased privacy/distance, while staying connected with the public garden.

Borders: **Pennisetum, Calamagrostis Acutiflora, Stipa Tenuissima**
A mix of grasses and plants for increased value (biodiversity & lower maintenance cost) and beautification of the borders.

Fig. 193 Overview of the different layers of the green structure in block 1. By author

Regeneration process block 1

To reach the intended end result of the regeneration of block 1, the 5 following steps are proposed which will transform, upgrade and demolish existing buildings and public spaces, while keeping parts of the block liveable and accessible. The individual steps are based on the composition of the new buildings, ownership, and building

age, and make it possible to start using parts of the new public spaces and shared gardens already, increasing the living quality of the new residents.

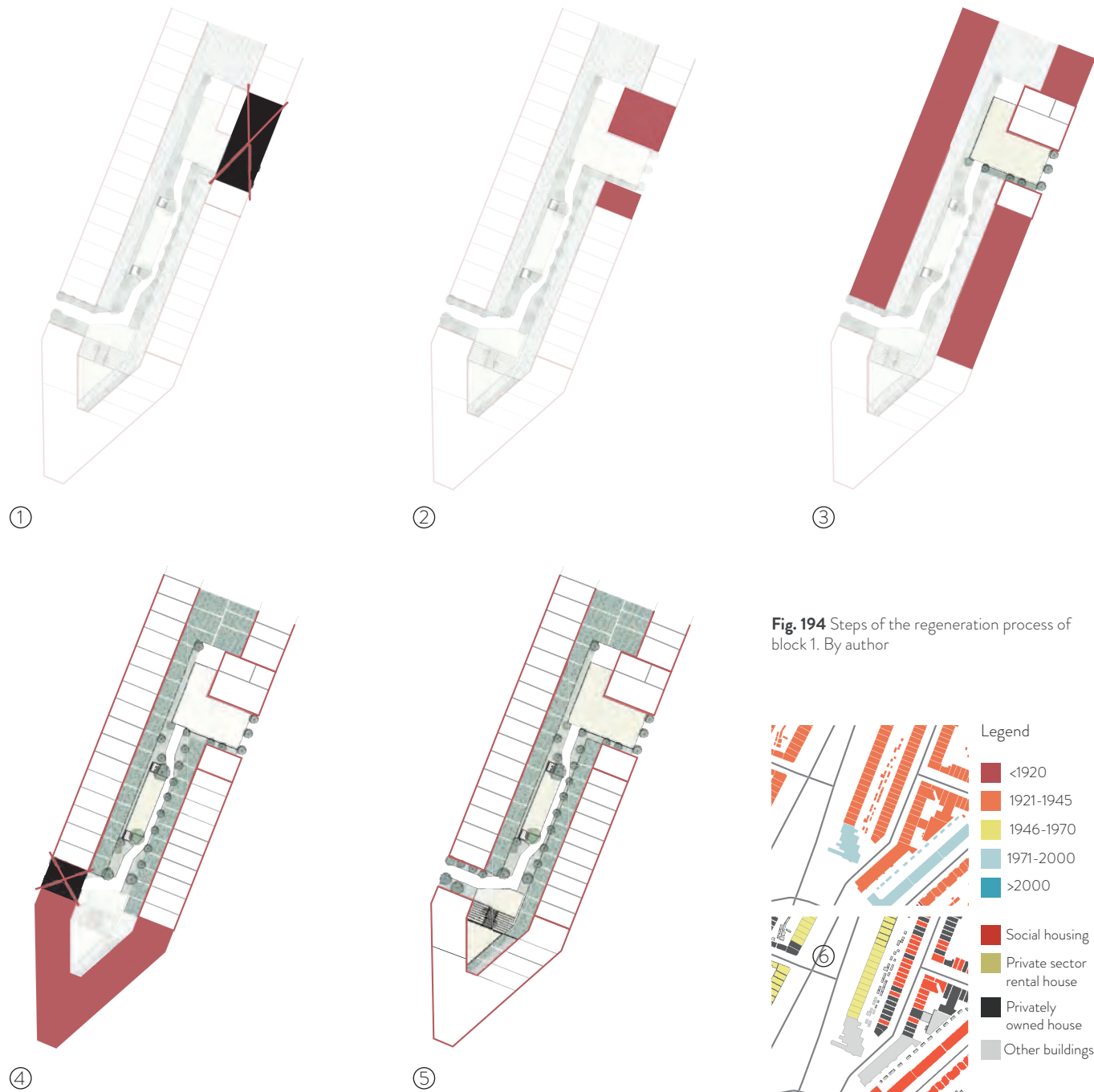


Fig. 194 Steps of the regeneration process of block 1. By author

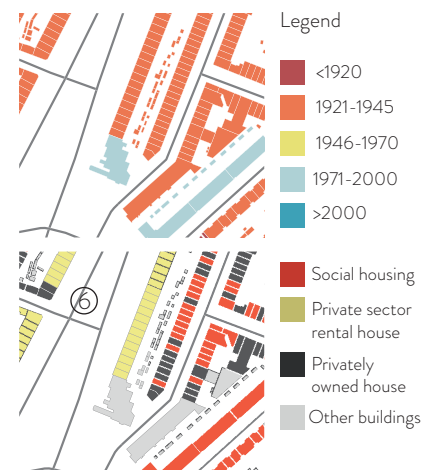


Fig. 195 (above) Building age and ownership in block 1. By author

Fig. 196 (next page) Inside the closed building block in the Tarwewijk (not block 1!). By author



4.3.2 Block 2

Starting point:

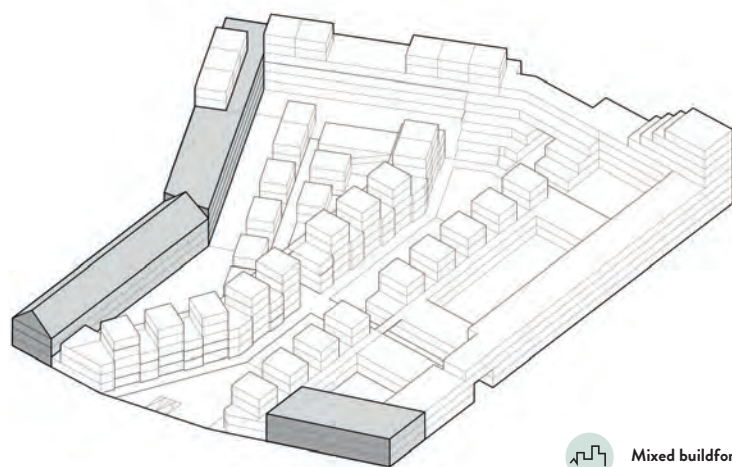
Block 2 consists of two separate blocks, divided and surrounded by one-way streets with parking on both sides with no space for noteworthy green. The typology consists of dwellings, mostly apartments, with some commercial functions at the corners of the streets. The

inside of the blocks consists of private gardens for the dwellings on the ground floor, while dwellings on upper floors have small balconies overlooking the gardens. Large back extensions of commercial functions and clusters of sheds contribute to the messy structure.

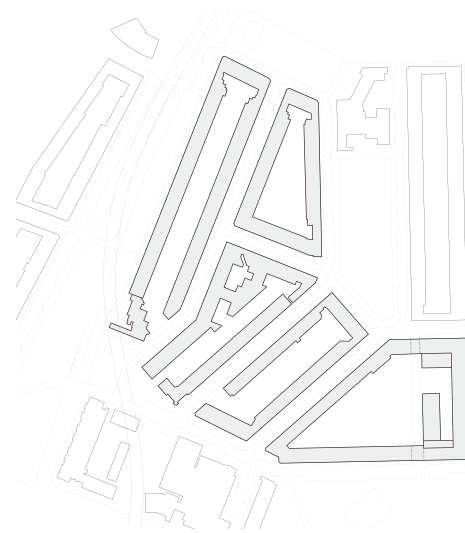


Re-use of existing buildings:

A small part of the existing buildings in block 2 will be re-used in the new situation, which are mainly considered as characterised complexes with certain architectural qualities. The new urban structure has been designed to preserve or improve these qualities, like the old KPN datacenter building with the gable roofing, which will be transformed from industrial to dwellings.



Mixed buildform



Legend
 ■ Re-used buildings
 □ New buildings

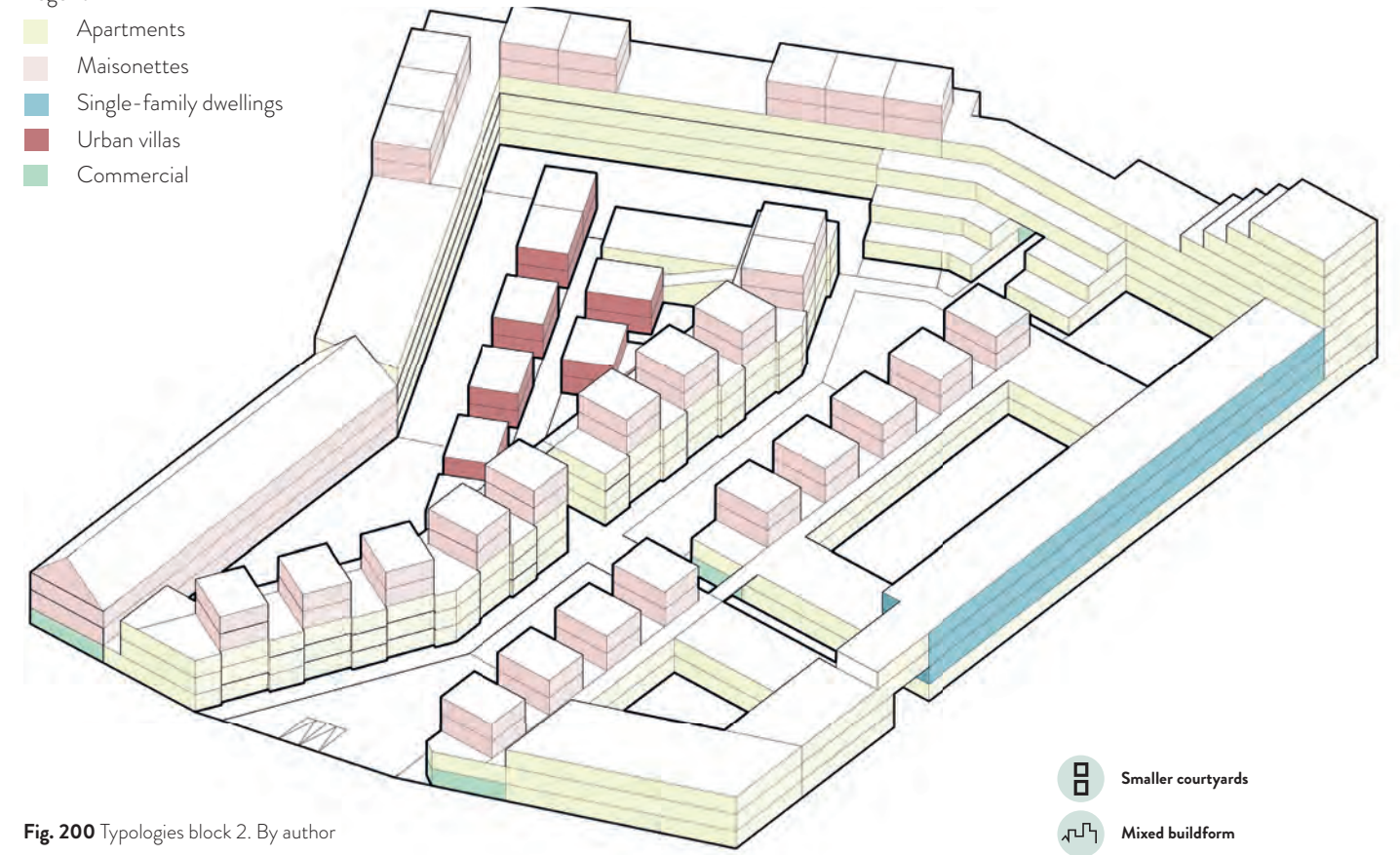
Fig. 197 (top) Aerial view current situation

Fig. 198 (above) Location block 2. By author

Fig. 199 (left) Re-used buildings block 2. By author

Legend

■ Apartments
 ■ Maisonnettes
 ■ Single-family dwellings
 ■ Urban villas
 ■ Commercial



■ Smaller courtyards
 ■ Mixed buildform

Fig. 200 Typologies block 2. By author

Typology:

Densification and diversification are used to increase the liveliness in the area and attract different types of people during different times of the day. Layering different typologies makes it possible to increase the density of the block, and offer diverse qualities like different (semi) private outdoor spaces, fitting multiple user groups. Apartments will come in a wide variety of sizes for different user groups, from small (40m²) for starters and elderly to larger (100+ m²) for couples and families. The strength of the neighbourhood with a lot of younger people (0-45) creating liveliness, is being strengthened with the introduction of private single-family homes, urban villas and maisonnettes for larger families. Offering this diverse typology with different types of outdoor spaces makes it possible and attractive for residents to live for a longer period in the area if their household- or income structure changes, which can be positive for the connectedness and social cohesion.

Typology in numbers:

Housing:
 -160 dwellings (demolished): 12.140 m²
 +244 dwellings: 22.790 m²

 +84 dwellings +10.650 m²

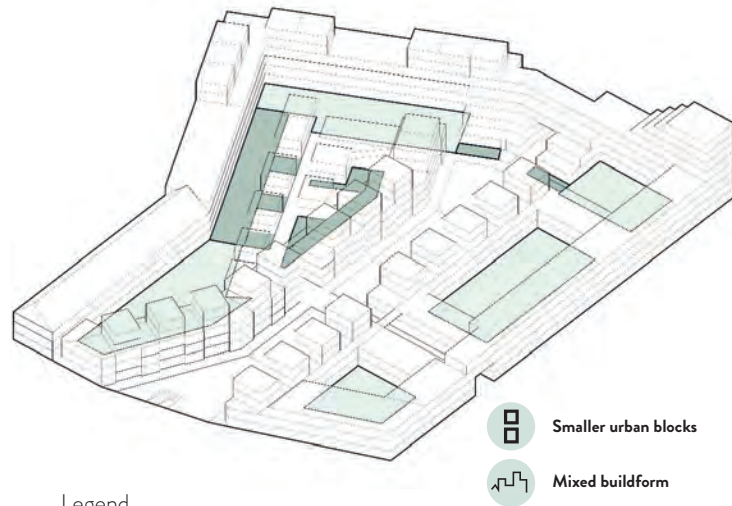
Commercial functions:

-595 m²
 +410 m²

 -98 m²

Garden ground floor

Starting with only private gardens, going to a mix of private and shared gardens gives the opportunity to densify and make gardens accessible to more residents. Private gardens are assigned to the urban villas and existing re-used buildings, while the semi-private shared gardens are accessible by all dwellings of the surrounding buildings.



Legend
 ■ Private gardens
 ■ Shared gardens

Smaller urban blocks
 Mixed buildform

Fig. 201 Gardens ground floor block 2. By author

Accessibility shared gardens:

Each of the five shared gardens is only accessible by the surrounding dwellings overlooking the garden. Keeping the accessibility limited to a smaller number of people will increase the privacy, make it possible to do maintenance through an owners association (VvE) and potentially increase the connectedness with the users.

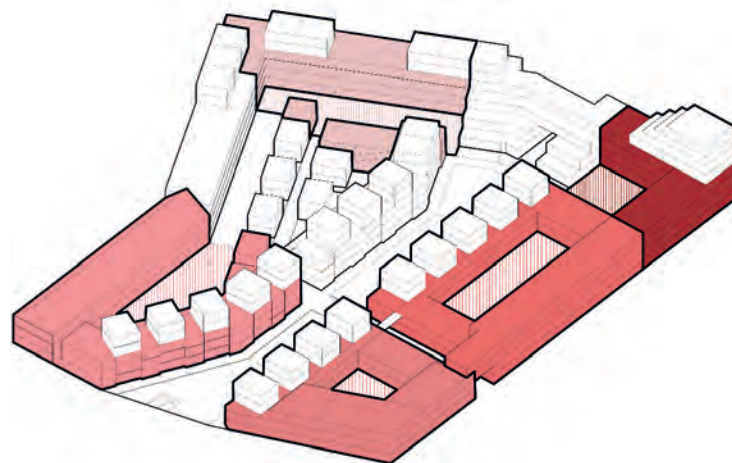
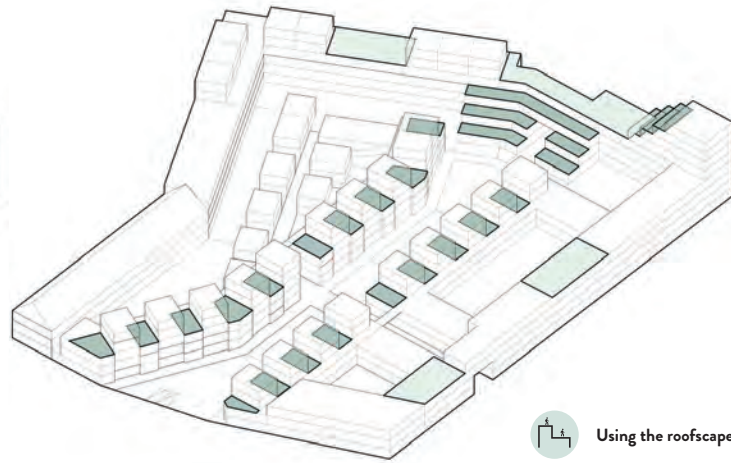


Fig. 203 Accessibility shared gardens block 2. By author

Roof gardens

Maximizing the available space, diversifying it and offer unique qualities in the Tarwewijk, the roofscapes of the buildings are used for a mix of private and semi-private shared roof gardens. Adding roof gardens will positively increase the liveliness of the higher floors and add space for green while saving space for more public spaces.



Legend
 ■ Private roofgardens
 ■ Semi-private roofgardens

Using the roofscapes

Fig. 202 Gardens second groundfloor block 2. By author

Accessibility roof gardens:

The same as for the shared gardens, each of the four semi-private roof gardens are only accessible by an individual block, to keep the number of users lower to increase the privacy, use the owners association (VvE) for maintenance and potentially increase the connectedness with the users.

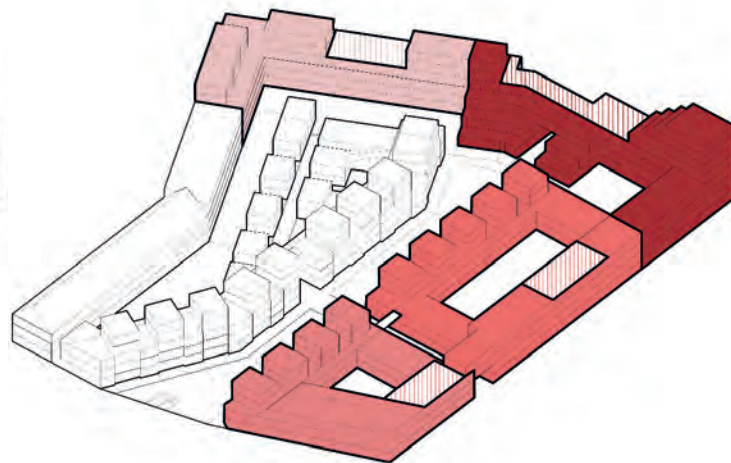
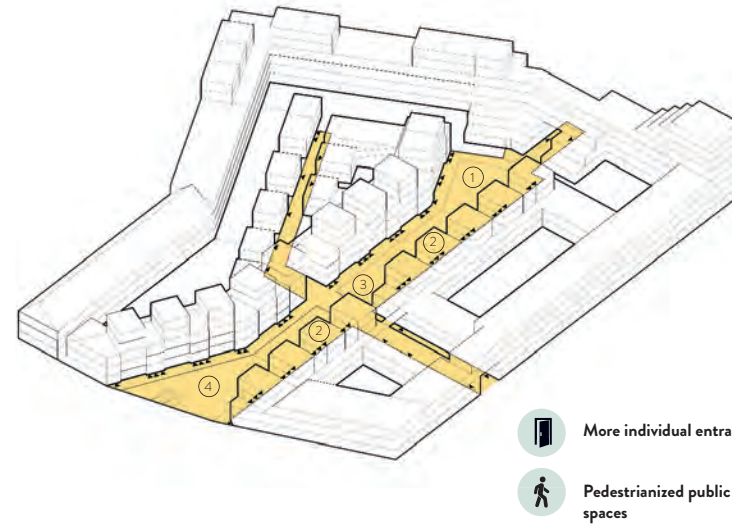


Fig. 204 Accessibility roof gardens block 2. By author

Public space as a garden

A new pedestrianized public space makes it possible to adapt new, fitting qualities of private gardens for the local communities. These qualities, based on the design principles, increase the liveliness and accessibility to the qualities of gardens for more people, strengthened by placing individual entrances of dwellings along the space.



More individual entrances
 Pedestrianized public spaces

Fig. 205 Public space as a garden block 2. By author

Raised (semi) public space

Increasing the walkability of the buildings, making the upper dwellings better accessible and improving social contact, a second ground level is introduced, giving access to dwellings and private gardens on top of the apartments. Placing the entrances to the second level in the side streets increase the walkthrough, positive for the social safety.

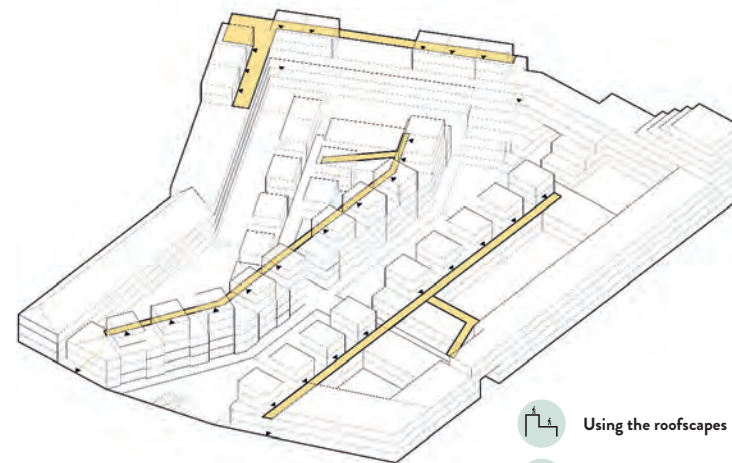
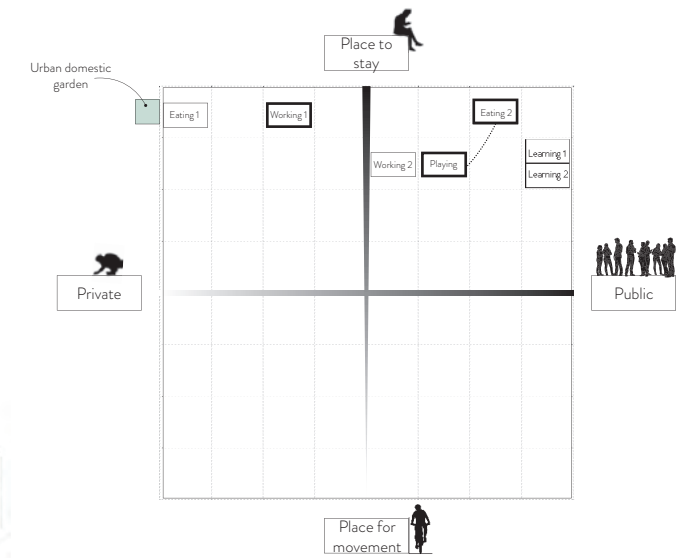


Fig. 206 Public space as a garden block 2. By author



New qualities public space:

- ① Eating 2 + Playing
- ② Greening + Cooling + Infiltrating
- ③ Playing
- ④ Working 1

Consisting of three zones with specific qualities of private gardens of the social environment, connected by two zones focused on improving the physical environment, different qualities or a combination of qualities are designated to the zones, based on the typology of public spaces from the diagram above and site characteristics:

- 1: Along the wide public walkway, surrounded by dwellings and accessible from multiple directions, this type of space has the characteristics which fit the quality of Eating, focused on bringing larger groups of people together with food. Combining Eating with Playing is possible as they are almost the same typology of public space, and have the potential to strengthen each other being usable by specific user groups, like parents with children, at the same time.
- 2: Being flexible in use in different types of spaces, the Greening, Cooling and Infiltration qualities can be used between the three social zones to improve the climatic and physical conditions of these zones, and create a balance with the more active social zones as more calm places.
- 3: Surrounded by green and buildings, creating social safety, located in the middle of the corridor next to the daycare, and the furthest away from any fast traffic, the middle zone offers characteristics which fit the implementation of the quality of Playing, focused on (younger) children.
- 4: Preferably integrated in less public areas like shared rooftops, but in this case the design principle Working 1 with allotment gardens is used as a counterpart against the more busy neighbourhood street, creating a calmer area with the most amount of direct sunlight during the day.



Fig. 207 Regeneration plan block 1. By author

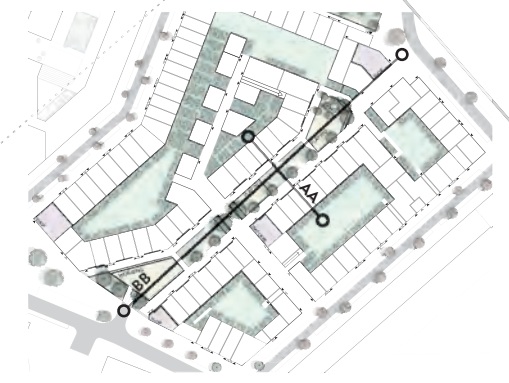
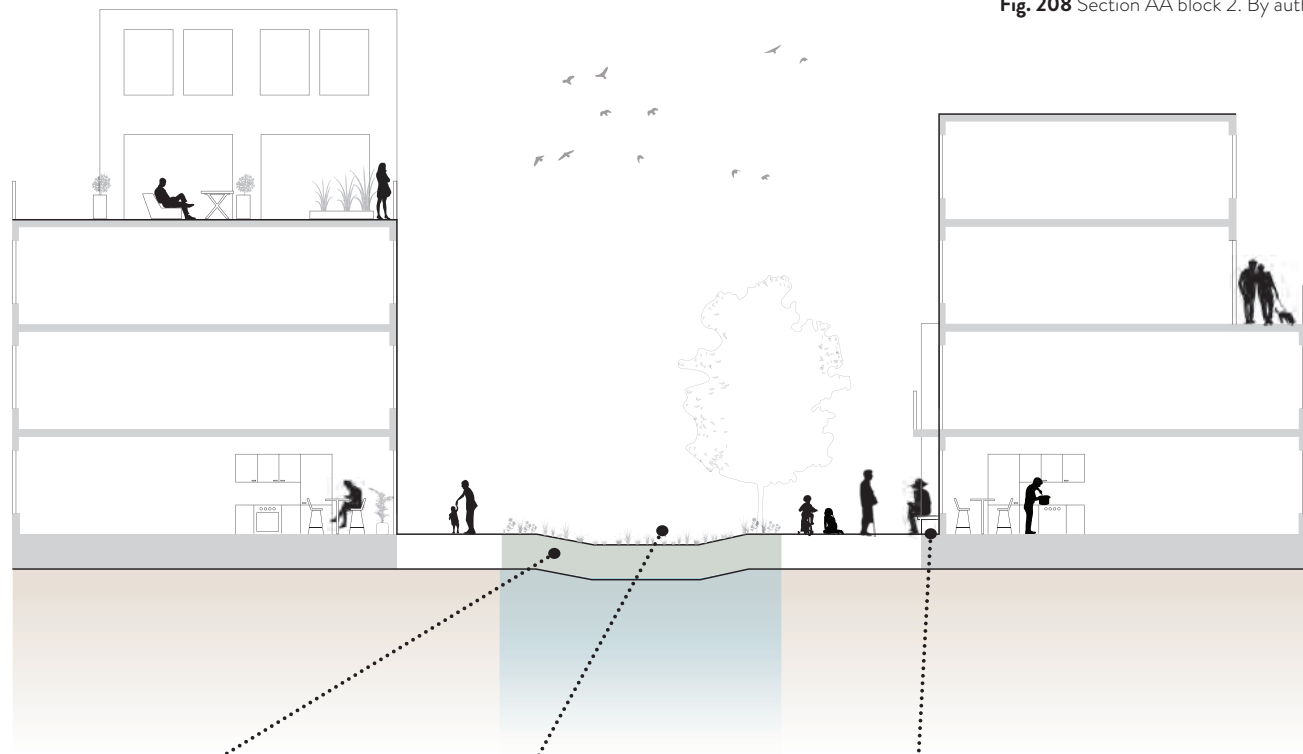


Fig. 208 Section AA block 2. By author



The wadi is used for temporary storage of stormwater during heavy rainstorms to infiltrate naturally into the ground. When not in use for water storage, it is an open green space.



Adding longer grasses to the wadi will have a positive influence on the maintenance cost, biodiversity and the physical appearance. By alternating with normal grass, it is also usable for sitting and playing.



Incorporating private benches into the facade of the apartment can help stimulate the use of the front side, with more social contact possibilities. The pedestrianized street strengthens this.



The central glasshouse in the allotment garden can be used to store materials and equipment, for sharing with other gardeners to stimulate social contact.



Working in the allotment garden can help improve the physical and mental condition of the residents, while it is also a meeting place for social contact between people.



Allotment gardens give people ownership of the public space, being responsible for the maintenance. Local organisations can help stimulate this process further.

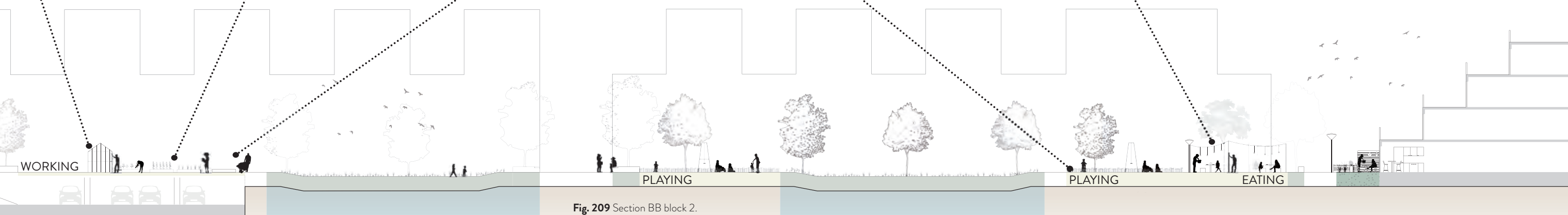
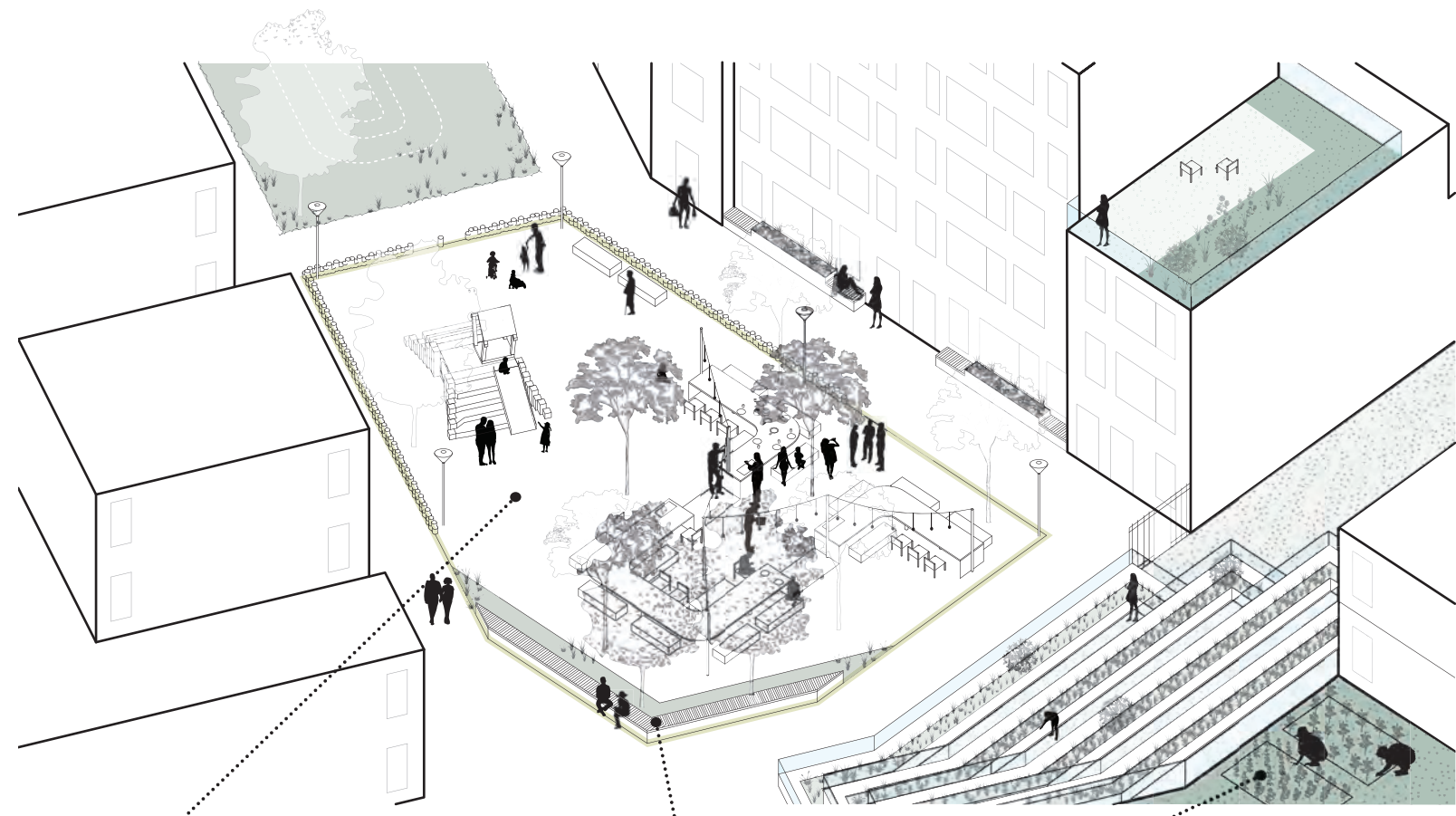


Fig. 209 3D view of the new public square with the outdoor eating and playing facilities. By author



Using light and water permeable pavement reduces overheating of the square while decreasing potential water problems. Excess water is guided to the wadi.



Combining trees with a larger and thicker canopy together with seating areas help to make the seating area along the square cooler, increasing the potential use of it.



Outdoor eating area focused on bringing larger audiences of the local community together through cooking and eating together, an important quality in many cultures of the people in the neighbourhood.



Green roofs are used for water storage and cooling of the environment, or in this case as a semi-private roof garden, usable by a specific block as an allotment garden for growing local fruits and vegetables.



Surrounding the playground, focused on younger children (0-6), natural fencing keeps them in sight of their parents, preventing them from wandering around away from the playground.



Fig. 209 Section BB block 2. By author



Wednesday afternoon, 14:00 o'clock:

Not having kids herself at the moment, Priya really likes being around them. Having picked up the two girls of her upstairs neighbour from the day-care around the corner to spend the rest of the afternoon together, the playground in front of her dwelling is one of her favourite spots to go to because of the safe, car-free surrounding area. While she let the girls do their own thing for a moment, catching up with her old neighbour passing by on his way to the metro station, her husband enjoys his free afternoon to finish reading the newspaper he didn't have time for this morning. He believes that the bench, part of their facade, overlooking the beautiful green wadi is the perfect place for this. Especially being partially in the shadow.



Fig. 210 The new pedestrianized street is a green and active space through the heart of the block. By author



Thursday evening, 19:00 o'clock:

Even though Denise has a nice balcony overlooking the shared inner garden belonging to her cosy apartment, a perfect place to read her favourite books, often she likes to go to the public square in front of her apartment. Like many other people, watching other people passing by is one her favorites things to do while reading and enjoying the public space. That's why she chose to use the bench along the walking route through the block. Especially seeing children makes her happy, and she would love to see her own child grown up in this safe and green environment. But being single at the moment doesn't help. Will today be the day that her Prince Charming passes by?

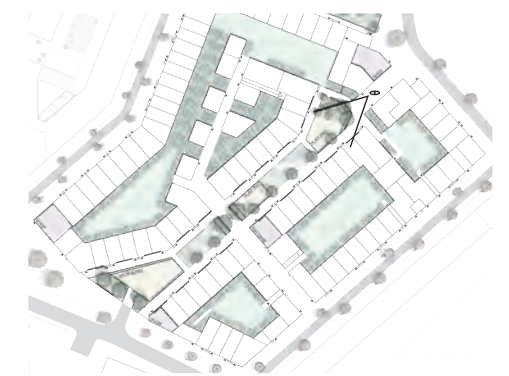


Fig. 210 The central square surrounded by building offer outdoor eating and playing facilities. By author

1. Incorporating seating/planters into the facade of the dwellings creates a softer transition between private and public spaces and the opportunity for increased use and connectivity.

2. A different type of pavement in front of the facade is used to soften the transition between private and public for increased use and connectedness without the need of front gardens.

3. Pedestrianized streets increase the safety of the public space, making it possible for children to use the streets as a playground, besides the designated play areas.

4. Low fencing of natural materials and hedges create safe playgrounds for young children with the qualities of a garden, while enhancing the open character of the street, supporting social interaction.

5. The wadi acts as a green space for temporal storage of stormwater and cooling of the street. It is planted with different types of grasses for easier maintenance and increased biodiversity.

6. Layering different types of dwellings create a denser and mixed urban environment, providing different types of outdoor spaces for different user groups.



1. Both back and front sides of dwellings at ground level oriented towards the public space for spread out use during different times of the day and 'eyes on the street' from the human perspective.

2. Buildings surrounding the public space with multiple individual entrances to the dwellings and public space, for increased walking routes through the space and increased connectedness.

3. Flexible seating area at the northern entrance of the pedestrianized street, at a crosspoint of different walking routes for more opportunities to meet passers-by.

4. Larger species of trees in the public space at strategic points like seating areas provide a pleasant area for staying and meeting, by providing shade and thereby cooling the area.

5. Incorporating seating/planters into the facade of the dwellings create a softer transition between private and public spaces and the opportunity for increased use and connectivity.

6. Different forms of private outdoor spaces like balconies and gardens oriented towards the public space, for increased social safety and use during different times of the day.

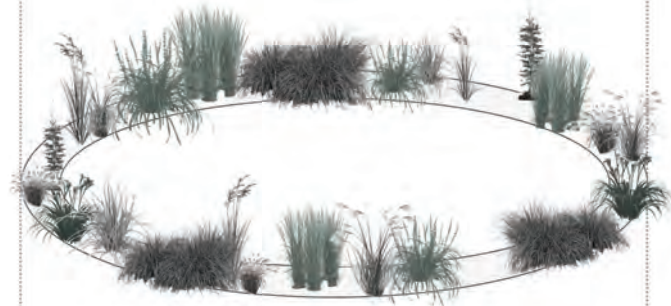


Fauna



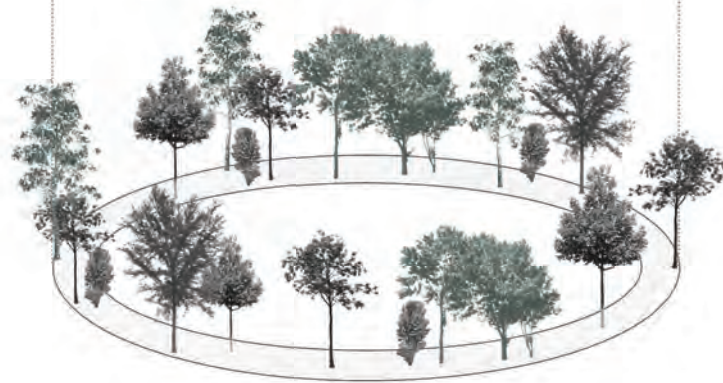
Bat
Butterfly
Magpie
Bee

Plants



Aster laevis
Persicaria
Miscanthus Sinensis
Molinia caerulea 'Variegata'
Fagus Sylvatica

Trees



Betula utilis 'Doornbos'
Acer Campestre
Platanus
Honey locust
Ulmus frontier

Allotment garden square
Betula utilis 'Doornbos'

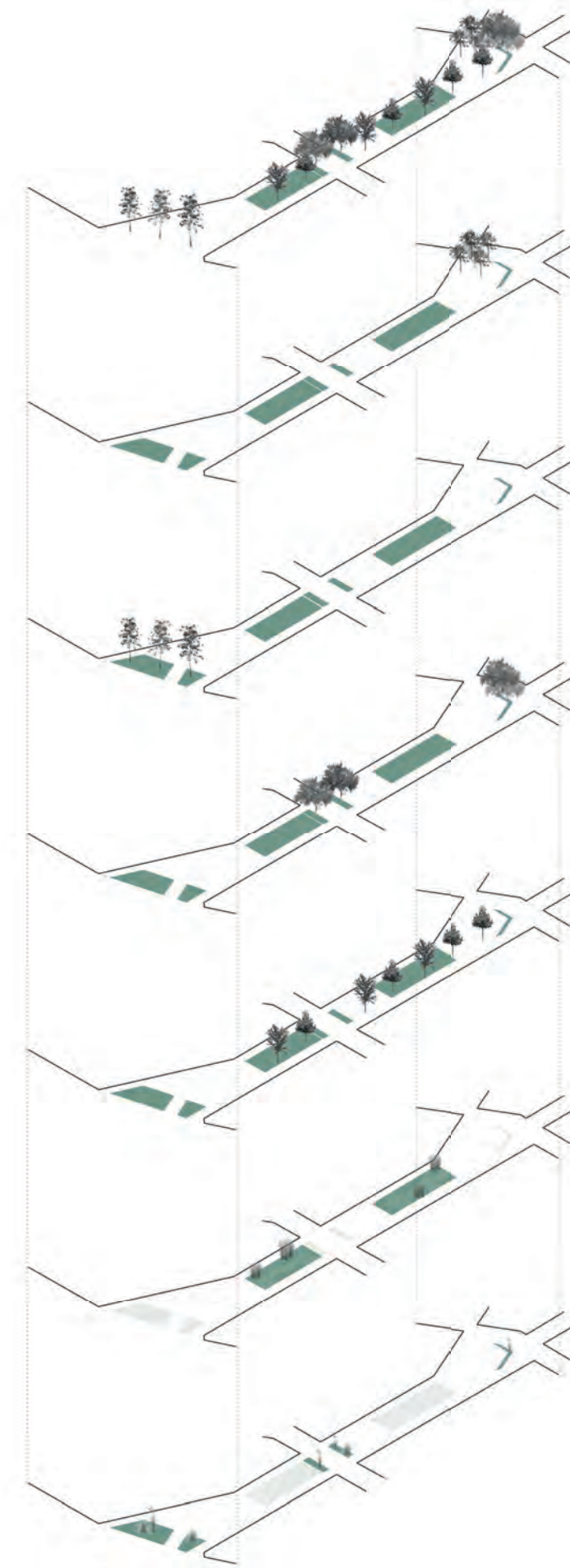
Borders
Persicaria

Wadi
Fagus Sylvatica

Seating areas
Platanus



Fig. 211 Overview of the plants and trees present in block 2



Total green structure block 2

Square trees: **Honey locust**
Small tree with a light crown to provide shadow and intimacy, without creating darkness

Border trees: **Betula Utilis 'Doornbos'**
Large tree with an open crown as a green continuation of the adjacent facades, strengthening the borders of the block, preserving enough light for the allotment garden.

Solitary trees: **Platanus**
Large tree with a thick crown at intersections of pathways or open squares. Combined with benches as pleasant meeting places.

Street trees: **Ulmus Frontier & Acer Campesterre**
Medium size trees with a normal crown along the pathway, to provide shadow without creating darkness, accentuating the strong lines of the public space.

Wadi: **Miscanthus Sinensis, Fagus Sylvatica**
A mix of normal grass and higher grasses for flexible use, increased value (biodiversity & lower maintenance costs) and beautification of the wadi.

Borders: **Aster laevis, Persicaria, Molinia Caerulea 'Variegata'**
A mix of grasses and plants for increased value (biodiversity & lower maintenance costs) and beautification of the borders.

Fig. 212 Overview of the different layers of the green structure in block 2. By author

Regeneration process block 2

To reach the intended end result of the regeneration of block 2, the 8 following steps are proposed which will transform, upgrade and demolish existing buildings and public spaces, while keeping parts of the block liveable and accessible. The individual steps are based on the composition of the new buildings, ownership, and building

age, and make it possible to start using parts of the new public spaces and shared gardens already, increasing the living quality of the new residents.

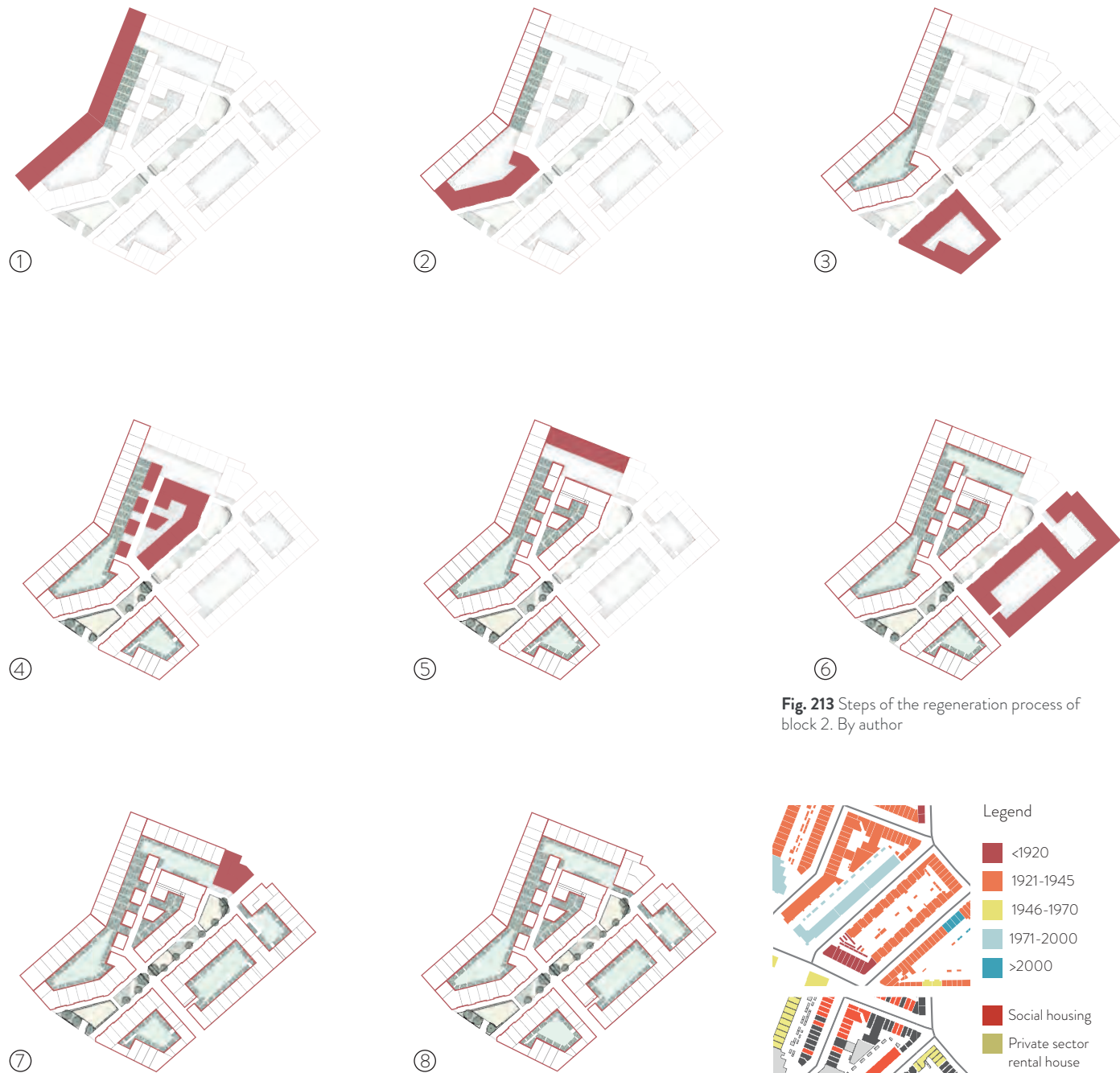


Fig. 213 Steps of the regeneration process of block 2. By author

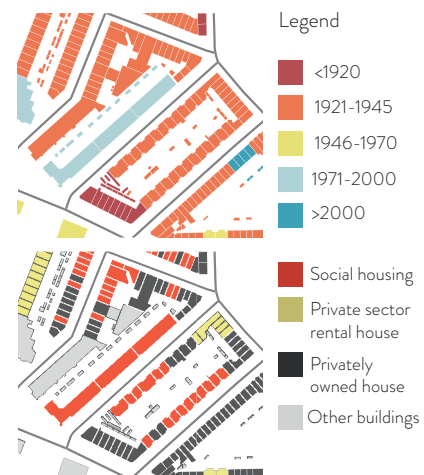


Fig. 214 (above) Building age and ownership in block 2. By author

Fig. 215 (next page) Pedestrianized streets increase the liveliness and activities



4.3.3 Block 3

Starting point:

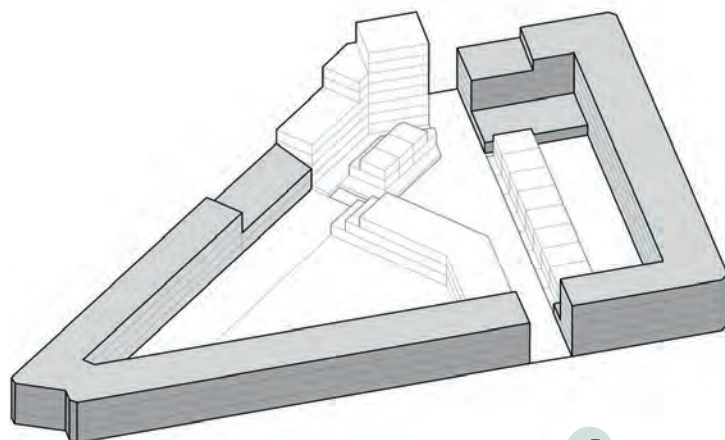
Block 3 is located at the southern edge of the Tarwewijk, close to the shopping centre with two passages connecting a street, making the inside area accessible by cars and pedestrians. The typology consists of dwellings, mainly apartments, with commercial functions and a

bar at the corners of southern edges. The inside of the blocks consists of a warehouse, private gardens for the dwellings on the ground floor, with a large, low quality and unused public space in the middle. Projected through the block is the future Campus Tarwewijk.

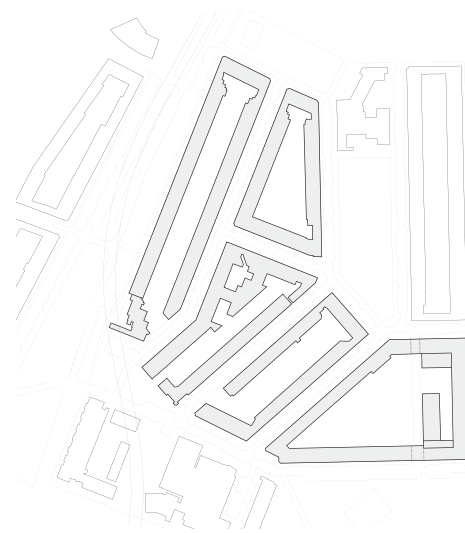


Re-use of existing buildings:

New buildings are mainly added inside of the existing block to increase the quality and usability of the new public space. They will be implemented with the existing exterior buildings in mind, which will be re-used. Opening up the passages, demolishing the floors on top will increase the safety and permeability of the inside space.



Mixed buildform



Legend
 ■ Re-used buildings
 □ New buildings

Fig. 216 (top) Aerial view current situation

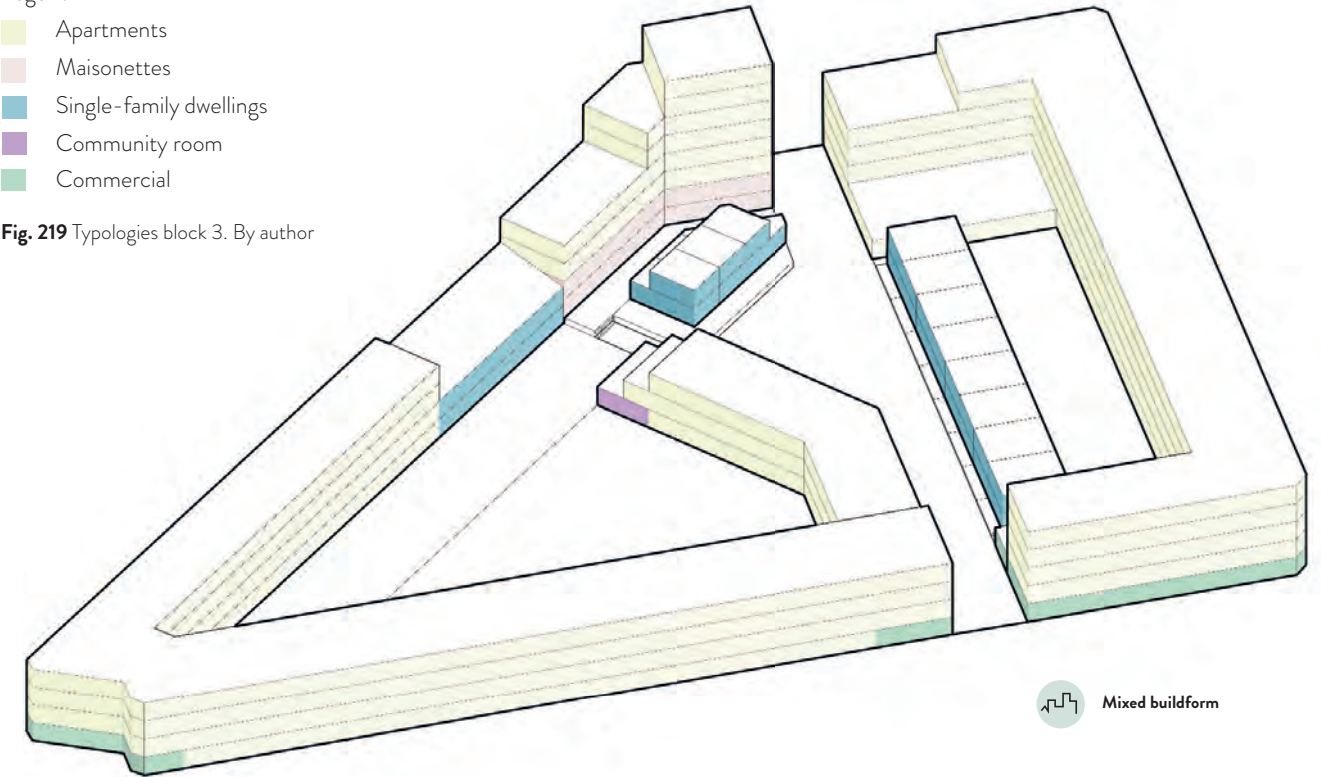
Fig. 217 (above) Location block 3. By author

Fig. 218 (left) Re-used buildings block 3. By author

Legend

- Apartments
- Maisonettes
- Single-family dwellings
- Community room
- Commercial

Fig. 219 Typologies block 3. By author



Mixed buildform

Typology:

Densification and diversification are used to increase the liveliness inside the block and attract different types of people during different times of the day to the public space. At the corner of the Rijsoordstraat, a new building with a maximum of 8 floors will offer small apartments for starters and elderly between 50-60 m², with balconies overlooking the public space. The two lowest floors with private entrances are reserved for larger maisonettes, 100+ m² for couples and families. Surrounding the public square with applicable qualities, private single-family homes (120m²) for larger families with raised front gardens, replacing the current warehouse, and apartments (70-80 m²) for elderly and couples will increase the number of residents living around the public square, at the end of the Campus Tarwewijk, positive for the use and social safety. Offering different typologies with different sizes and (private) outdoor spaces can help to slow down the movement of people to other parts of Rotterdam, potentially increasing their connectedness with the neighbourhood and local community.

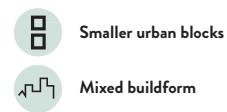
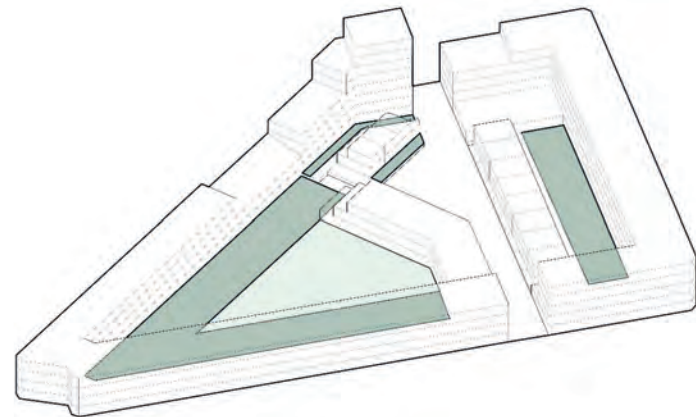
Typology in numbers:

Housing:	
-25 dwellings (demolished):	-2000 m ²
+61 dwellings:	+5004 m ²

+36 dwellings	+3004 m ²
Community room:	
	+110 m ²

Gardens ground floor

The private gardens of existing buildings are preserved and better implemented into their surrounding space by adding alleys or connecting them to a new shared garden, making them more accessible and usable to the residents of the higher apartments. The shared garden will replace the currently unused public green space.



Legend
 ■ Private gardens
 ■ Shared gardens

Fig. 220 Gardens ground floor block 3. By author

Accessibility shared garden:

The shared garden, replacing the unused public green space, will be accessible to all the residents of the surrounding block. By limiting the accessibility to these dwellings, it is possible to maintain the garden through an owners association (VvE), increase privacy and potentially increase the connectedness with the users.

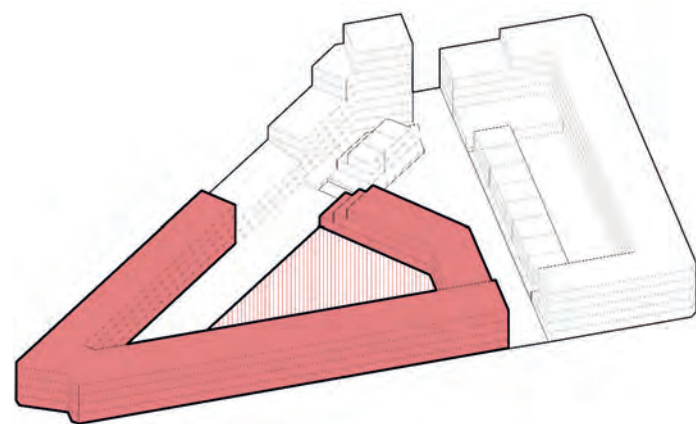
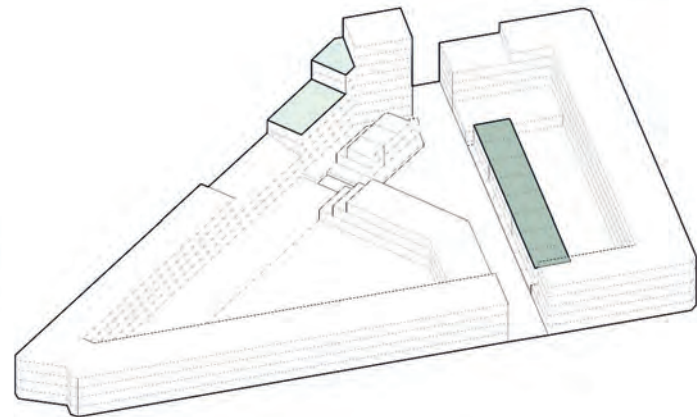


Fig. 222 Accessibility shared garden block 3. By author

Gardens second ground floor

Smarter use of space by adding (private) roof gardens of the new buildings, offering views of the public space down below or the rest of the neighbourhood increases the amount of public space for the implementation of specific design principles of gardens. Adding roof gardens will also increase the liveliness of higher floors.



Legend
 ■ Private roofgardens
 ■ Semi-private roofgardens

Fig. 221 Gardens second ground floor block 3. By author

Accessibility roof gardens:

The two semi-private roof gardens on the apartment building are only accessible by the residents of the building to keep the number of users lower for social safety, more privacy and the use of an owners association (VvE) for maintenance. Potentially increase the connectedness with the users and thereby the value.

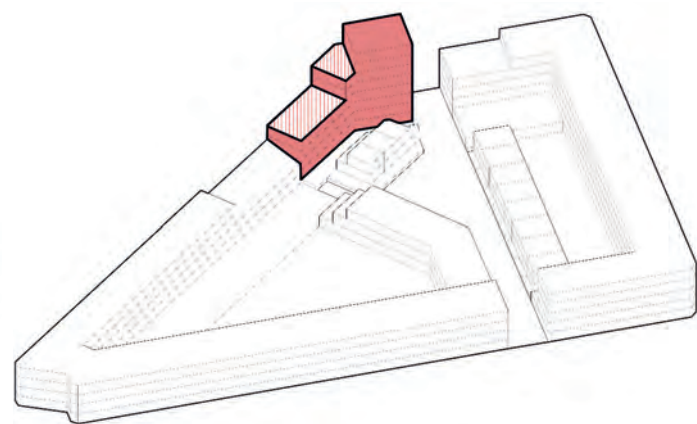


Fig. 223 Accessibility roof gardens block 3. By author

Public space as a garden

Part of the Campus Tarwewijk, a walkable green public space, the current street is upgraded to a pedestrianized public space with a square in the middle. The square will adapt qualities of private gardens from the design principles, unique to the Campus, making them more accessible to all the inhabitants of the Tarwewijk.

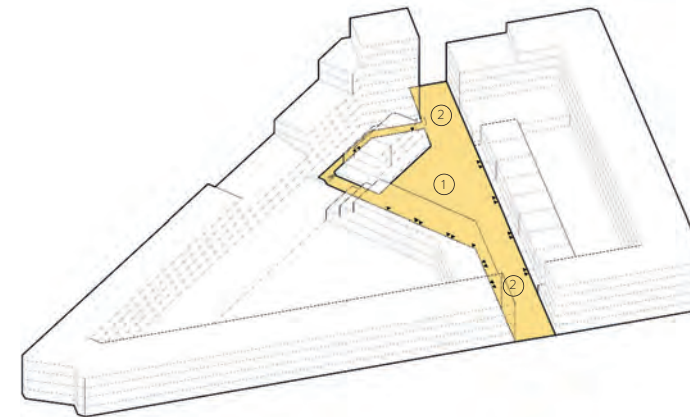
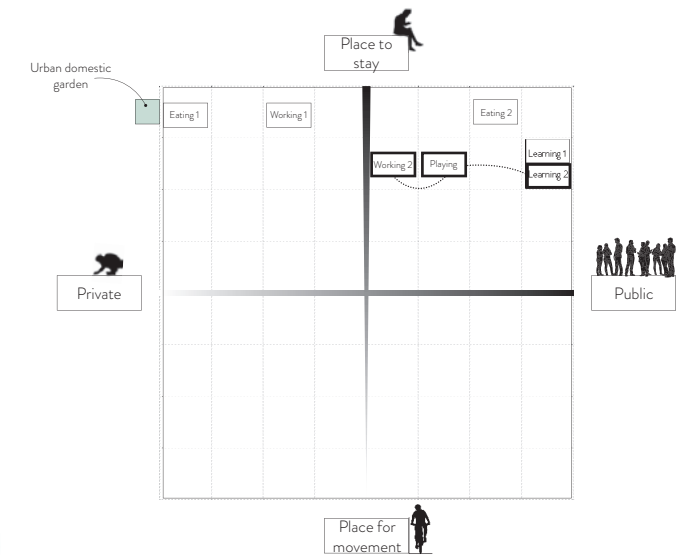


Fig. 224 Public space as a garden block 3. By author



Consisting of one large zone with a concentration of specific qualities of private gardens of the social environment, connected by two zones focused on improving the physical environment and to attract people inside the block while connecting it to the Campus Tarwewijk, different combinations of qualities are designated to the zones. They are based on the typology of public spaces from the diagram above and site characteristics:

1: As the start or the end of the Campus Tarwewijk, in the middle of a block surrounded by dwellings, the public square has the characteristics and opportunity to combine different qualities which are unique to the Campus Tarwewijk and appropriate to the surrounding typologies. The first quality, Learning 2 focused on creating an educational public space for children, fits the location with a high publicness, with the presence of children living around the square and the primary school around the corner. Like schoolyards show, combining Learning with Playing is possible as they are almost the same typology of public space, and have the potential to strengthen each other with learning through play. Surrounded by green and buildings with typologies designated to families with children and the furthest away from any fast traffic, it offers characteristics which fit the implementation of the quality of Playing.



New qualities public space:

- ① **W**orking 2 + **L**earning 2 + **P**laying
- ② **G**reening + **C**ooling + **I**nfiltrating

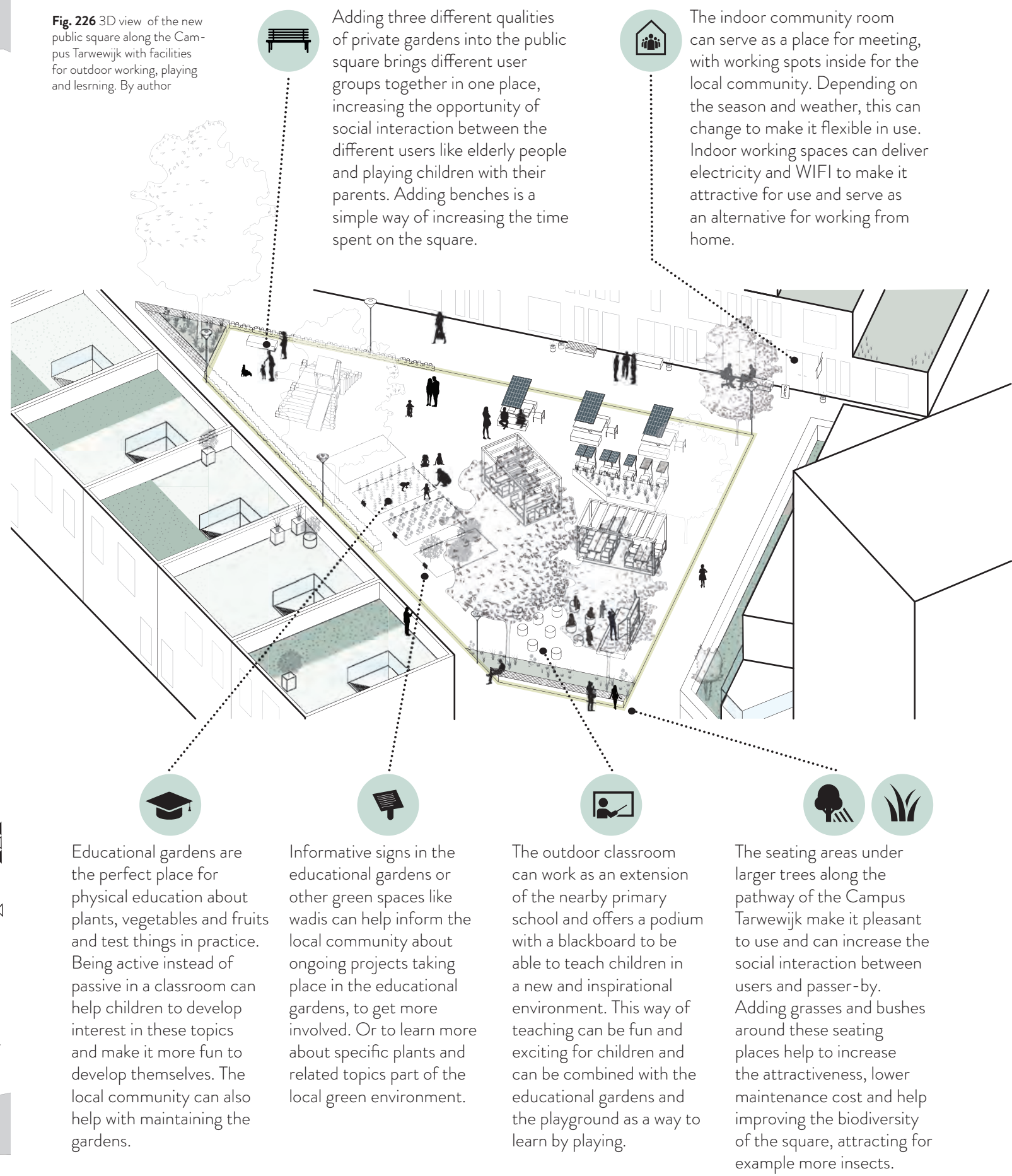
Besides offering the younger generation activities on the square, implementing Working 2 with outdoor working spaces result in a balanced square for different age groups, both serious and playful to increase the use during different times of the day. Following the public space typology, Working 2 fits in similar areas as the first two qualities, but could benefit being close to the community room with indoor working spaces, slightly further away from the public walking route through the block with more movement.

2: Flexible in use in different types of spaces, the Greening, Cooling and Infiltration qualities can be used in both openings to connect the inside of the block with the two existing green spaces adjacent to the block. The two zones improve the climatic and physical conditions inside the block and, being calmer areas, create a balance with the more active social zones.



Fig. 225 Regeneration plan block 3. By author

Fig. 226 3D view of the new public square along the Campus Tarwewijk with facilities for outdoor working, playing and learning. By author



Adding three different qualities of private gardens into the public square brings different user groups together in one place, increasing the opportunity of social interaction between the different users like elderly people and playing children with their parents. Adding benches is a simple way of increasing the time spent on the square.

The indoor community room can serve as a place for meeting, with working spots inside for the local community. Depending on the season and weather, this can change to make it flexible in use. Indoor working spaces can deliver electricity and WIFI to make it attractive for use and serve as an alternative for working from home.

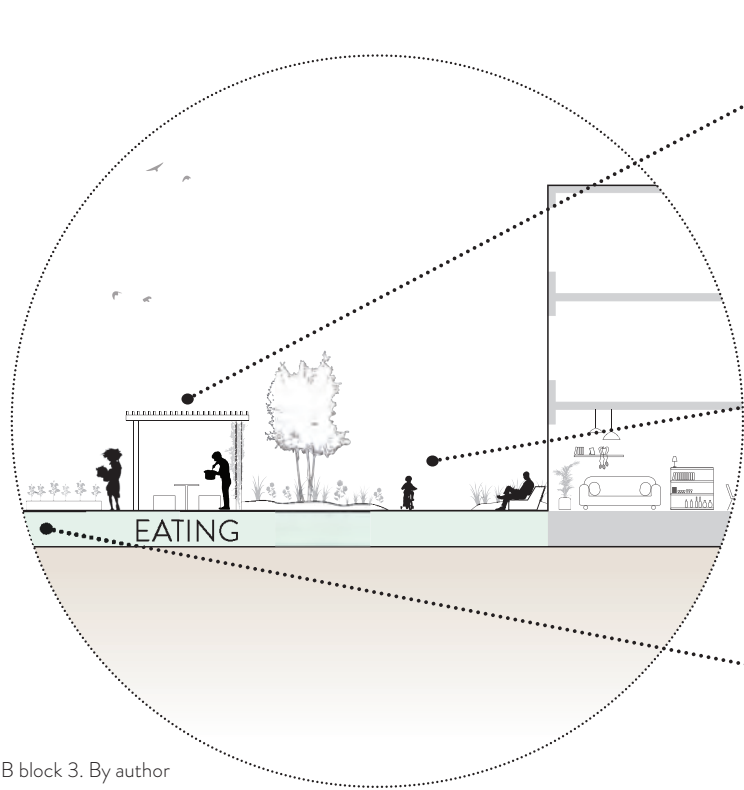
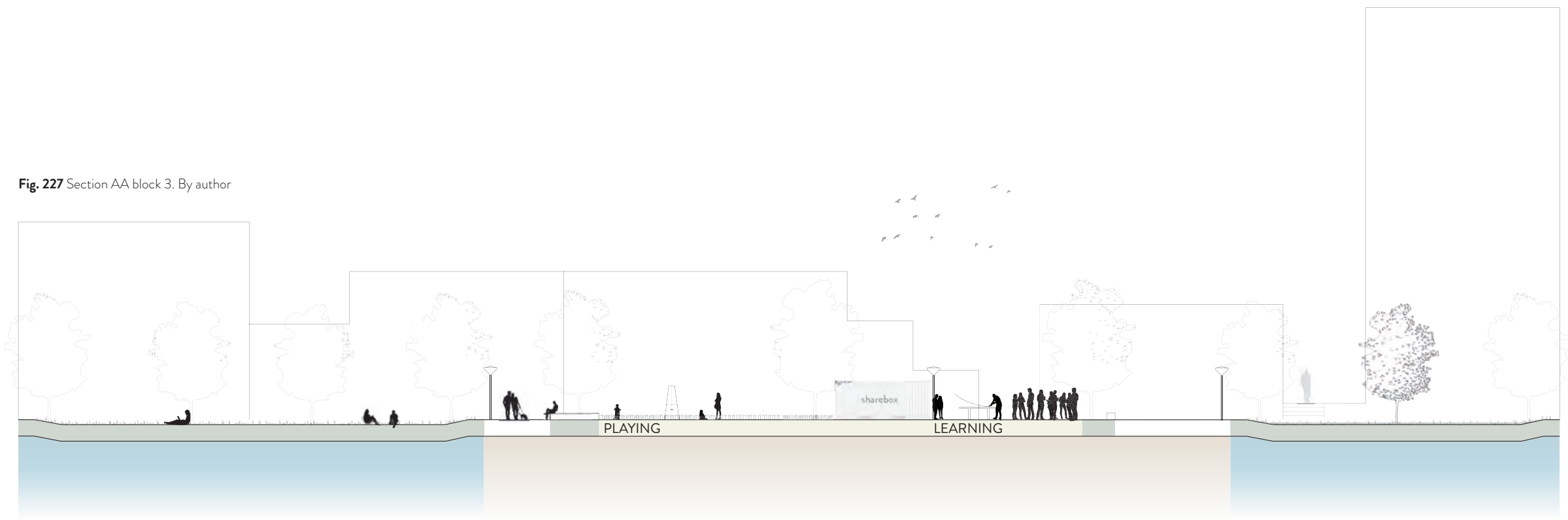
Educational gardens are the perfect place for physical education about plants, vegetables and fruits and test things in practice. Being active instead of passive in a classroom can help children to develop interest in these topics and make it more fun to develop themselves. The local community can also help with maintaining the gardens.

Informative signs in the educational gardens or other green spaces like wadis can help inform the local community about ongoing projects taking place in the educational gardens, to get more involved. Or to learn more about specific plants and related topics part of the local green environment.

The outdoor classroom can work as an extension of the nearby primary school and offers a podium with a blackboard to be able to teach children in a new and inspirational environment. This way of teaching can be fun and exciting for children and can be combined with the educational gardens and the playground as a way to learn by playing.

The seating areas under larger trees along the pathway of the Campus Tarwewijk make it pleasant to use and can increase the social interaction between users and passer-by. Adding grasses and bushes around these seating places help to increase the attractiveness, lower maintenance cost and help improving the biodiversity of the square, attracting for example more insects.

Fig. 227 Section AA block 3. By author



Private outdoor eating spaces for the users of the shared garden, focused on more intimate, private occasions between a green environment.



The shared garden is a private area which can be used as a playground by the children, supervised by the surrounding residents.



Allotment gardens give value to the shared garden, producing fruits and vegetables for own consumption.

Dubbel use of space by using roofs as green terraces, providing more privacy, while cooling down the environment and storing water.



Raised front gardens along the Green Campus pathway create more privacy, while increasing opportunities more social interaction.



More trees along the Green Campus provide shade, cooling down the public space for increased use.

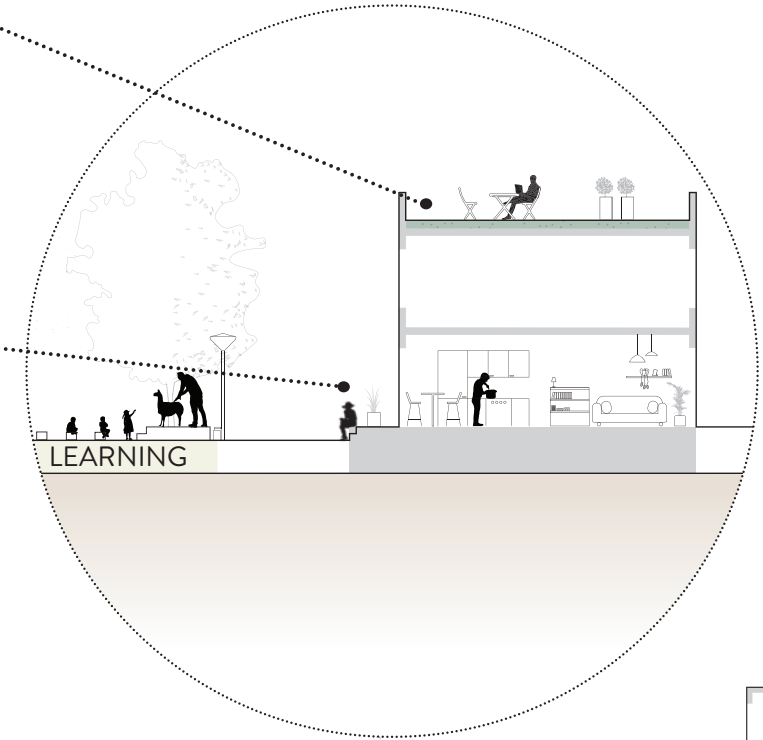
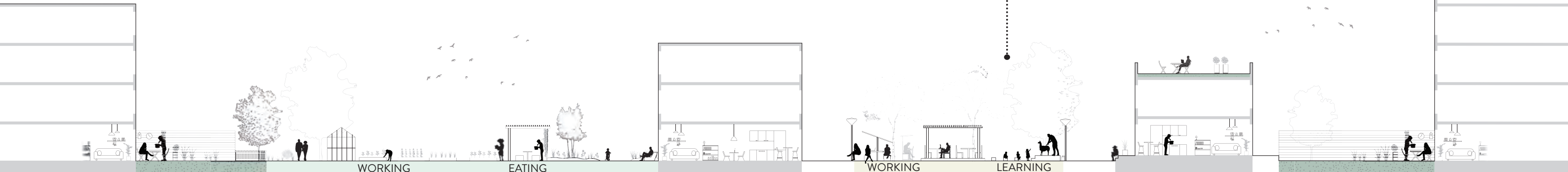


Fig. 228 Section BB block 3. By author





Saturday afternoon, 16:00 o'clock:

Being a true citizen of Rotterdam, living in the Tarwewijk for the past 40 years in three different dwellings, Gerda thinks she has now found her perfect senior dwelling to get old. Having a nice green shared garden, and an active square in front of her door, close to the Zuidplein mall fits her likings perfectly. Talking to other people of the community is also a thing she likes to do, especially children. Having relaxed in her shared garden for a while, the time has come for her daily stroll through the green environment of the recently finished Campus Tarwewijk. But just 15 meters away from her dwelling and she is already chatting with Jamie, who makes use of the public bench. The tree, creating shadow and cooling, makes it a pleasant place for both of them to be. So why not stay and get to know Jamie better.



Fig. 229 The new pedestrianized street, part of the Campus Tarwewijk, invites people to socially interact and stroll through. By author



Friday afternoon, 15:10 o'clock:

At the end of the school week, group 3 of the primary school 'De Akker' has just finished their outdoor class on the public square on the Rijsoordpad, focused on animals and insects in the city of Rotterdam. A really important subject the kids need to know more about according to teacher Guus. The outdoor classroom is a new initiative adopted by the school to make learning a fun and exciting thing to do, in an active way. While most of the children have gone home or are playing in the playground, he entertains the last three children with a game while waiting on the last parents to arrive. Luckily for Guus, after that it's only a short walk to his new apartment overlooking the square, where he can start his weekend.



Fig. 230 The active square with a community room offers multiple facilities for different activities like working, learning and playing. By author

1. Wadi's are used for temporal storage of stormwater and cooling of the street. By planting different types of grasses, biodiversity can be increased, while maintenance is simplified.

2. The pedestrianized street, without space for cars, but with plenty of green, and places for other activities, create a safe and attractive public space to use by foot.

3. Implementing shaded seating areas at the intersection of different walking routes, result in pleasant places for staying and interaction with other people, increasing social cohesion.

4. Raised front gardens offer a soft transition between the private and public space. The height difference increases the privateness of the garden and different ways of using the space.

5. Kitchens with large windows at the front of the dwellings, facing the public space, increase eyes on the street during different times of the day, increasing the social safety of the square.

6. Using the roofs as private gardens to minimize ground floor space, the roof gardens offer a great view over the public square, making higher floors more alive during different times of the day.



1. The community room acts as the indoor living room of the public square, and can be used for multiple occasions, alone, or in combination with activities taking place on the square.

2. The working area offers a place to work outdoor, alone or with multiple people. Besides power, the solar panels also provide shadow and cover, increasing the attractiveness and usability.

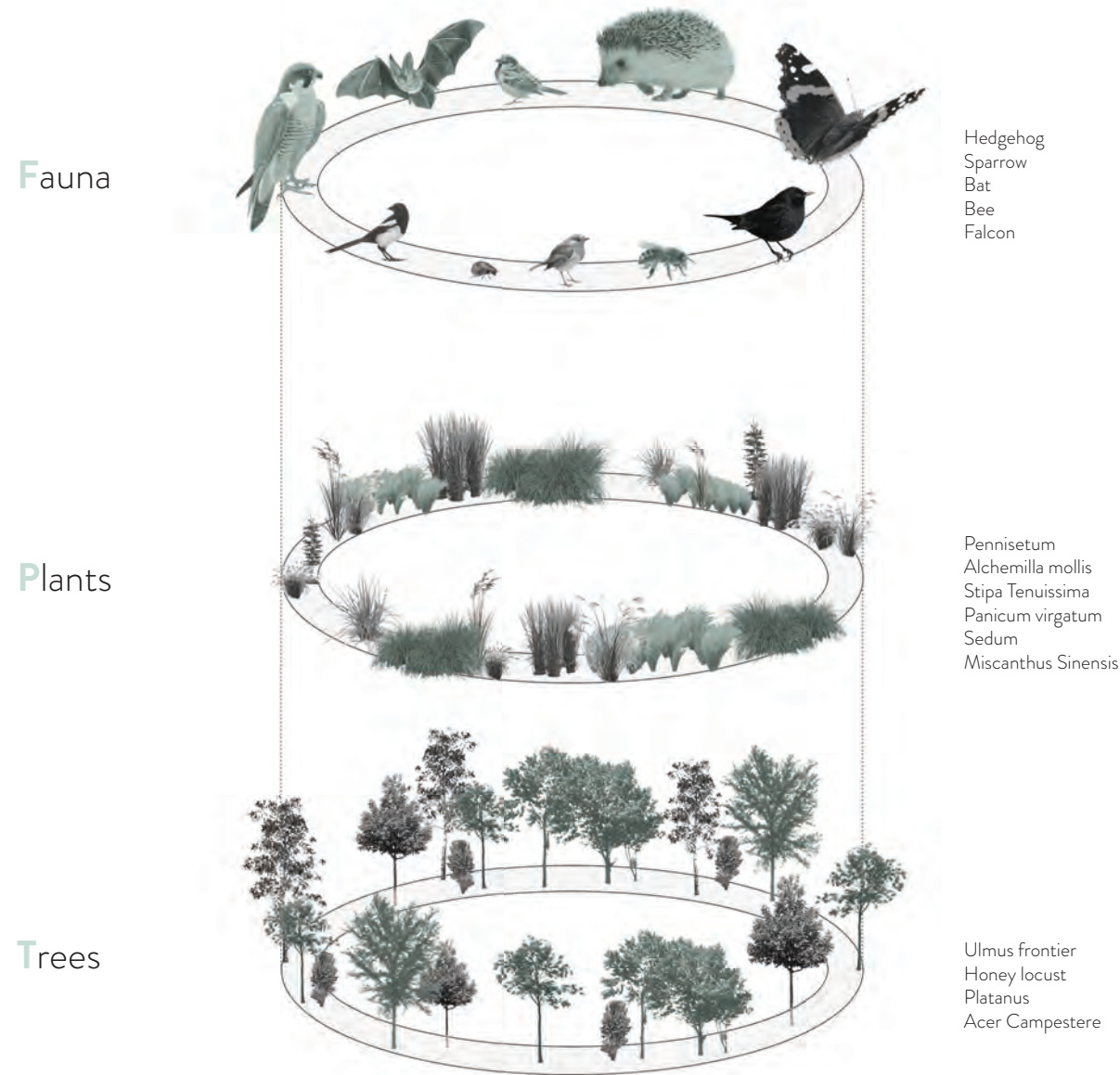
3. Placing seating areas next to the playground offer a place for parents to watch their children, interact with other parents or for social interaction between different groups of people, like the elderly and children.

4. Educational gardens are implemented in the public space to offer the community ways to learn about growing and maintaining green, fruits and vegetables, and to socialize.

5. In close proximity of the primary school, the outdoor classroom and podium offer a place for different styles of education during nice weather, while being flexible for other ways of use.

6. Larger species of trees in the public space at strategic points like seating areas provide a pleasant area for staying and meeting, by providing shade and thereby cooling the area.





Green Campus pathway
Ulmus frontier



Borders
Stipa Tenuissima



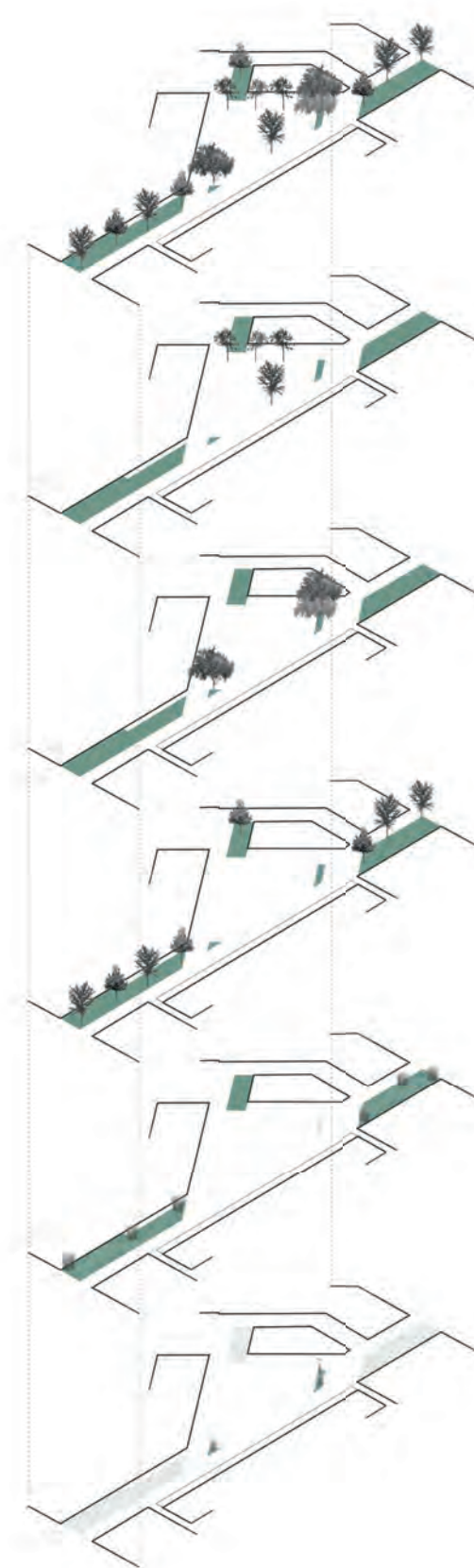
Green roofs
Sedum



Wadi
Panicum virgatum



Fig. 231 Overview of the plants and trees present in block 3



Total green structure block 3

Square trees: Honey locust
Small tree with a light crown to provide shadow and intimacy, without creating darkness for the solar panels of the working stations.

Solitary trees: Platanus
Large tree with a thick crown at intersections of pathways or open squares. Combined with benches as pleasant meeting places.

Street trees: Ulmus Frontier & Acer Campesterre
Medium size trees with a normal crown along the pathway, to provide shadow without creating darkness, accentuating the strong lines of the public space.

Wadi: Miscanthus Sinensis, Panicum Virgatum
A mix of normal grass and higher grasses for flexible use, increased value (biodiversity & lower maintenance cost) and beautification of the wadi.

Borders: Pennisetum, Alchemilla mollis, Stipa Tenuissima
A mix of grasses and plants for increased value (biodiversity & lower maintenance cost) and beautification of the borders.

Fig. 232 Overview of the different layers of the green structure in block 3. By author

Regeneration process block 3

To reach the intended end result of the regeneration of block 3, the 7 following steps are proposed which will transform, upgrade and demolish existing buildings and public spaces, while keeping parts of the block liveable and accessible. The individual steps are based on the composition of the new buildings, ownership, and building

age, and make it possible to start using parts of the new public spaces and shared gardens already, increasing the living quality of the new and current residents.

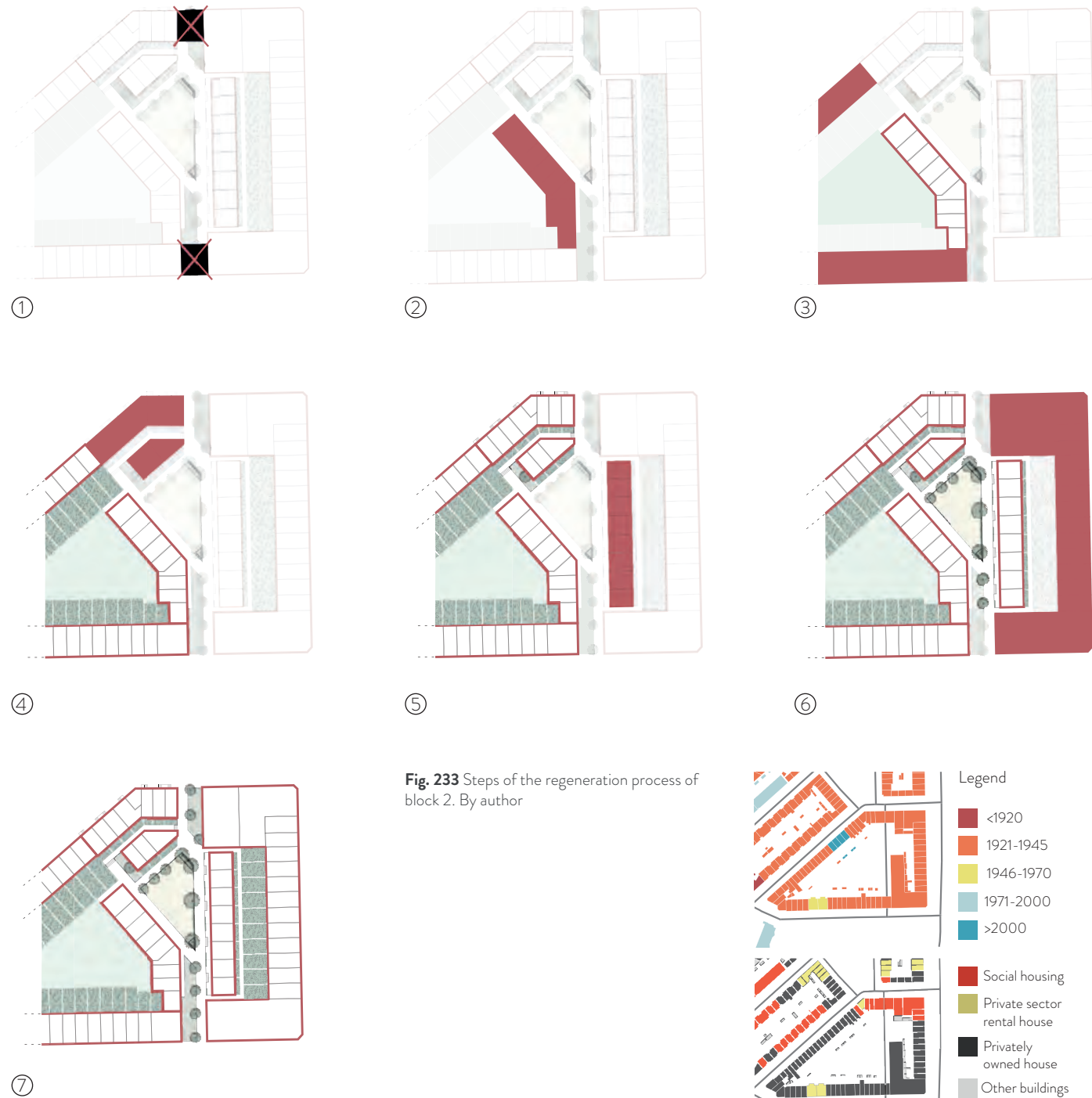


Fig. 233 Steps of the regeneration process of block 2. By author

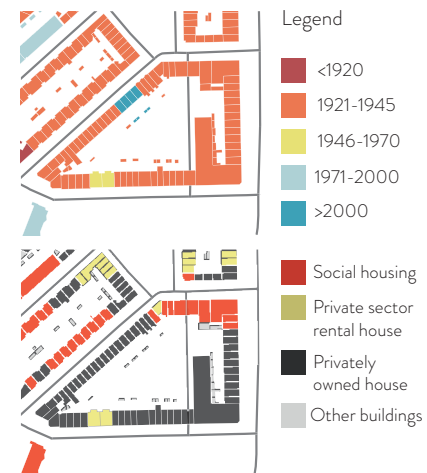


Fig. 234 (above) Building age and ownership in block 3. By author

Fig. 235 (next page) A wadi adds green and increases the water storage capacity

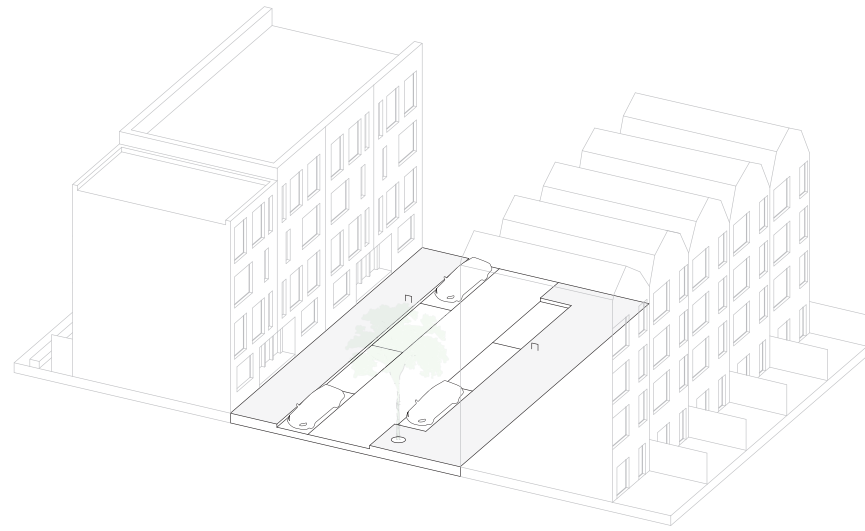


4.3.4 Streets

From the typology of streets from chapter 3, with main streets, neighbourhood streets and background streets as the distinguished types in the Tarwewijk, neighbourhood streets and background streets are the most common type of streets in the urban fabric of the Tarwewijk. Background streets being the most connected to most of the residents, adjacent to their dwellings, connecting the buildings blocks, they have a great potential, when

completely transformed or upgraded, improving the liveability of the Tarwewijk. The strategy to transform or upgrade the streets depends on their configuration and location. For this example, background streets between the regenerated blocks are taken as a starting point. It is followed by strategies how to transform neighbourhood streets, also part of the regenerated superblock.

Fig. 236 Background street 1. By author



Background streets:

The narrow background streets between the blocks consist of one-way streets, with parking and pavement on both sides. Except from some small trees, green is non-existing, while the lack of proper bicycle racks results in a clutter of bicycles throughout the streets. Being narrow and with the need to stay accessible by car for parking, the streets show little room for a complete transformation without altering the building blocks, thus possible steps for upgrading are presented:

1: Adding trees

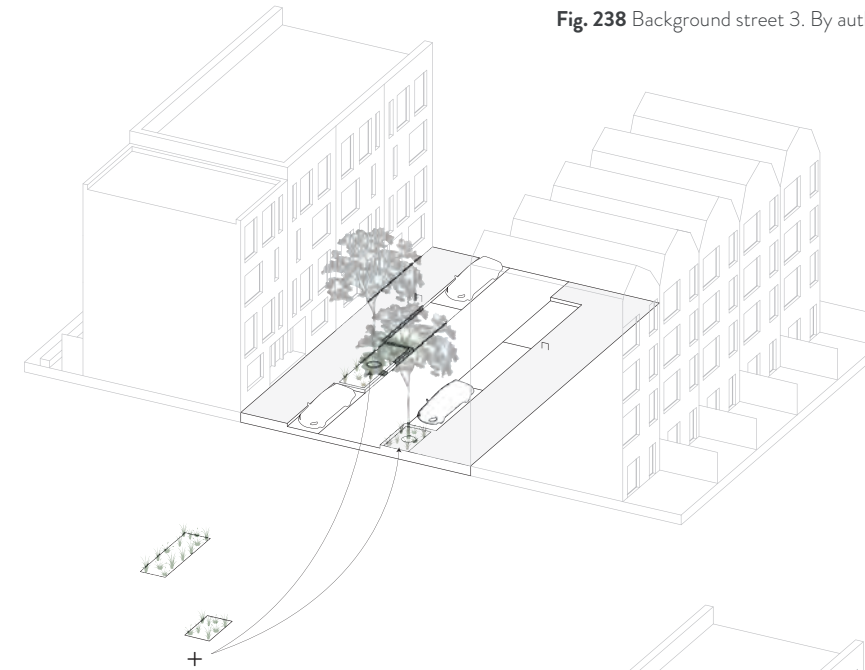
Adding more trees on both sides of the street is a first step to increase the amount of green in between the building blocks. Trees create shadow, cooling the street, which is strengthened by extra evaporation of water through the leaves, without the need for regular maintenance, keeping the maintenance costs lower. More trees can also increase the value of the dwellings.

Adding trees contribute to the addition of qualities related to the physical environment of private gardens, namely Greening, and Cooling

Fig. 237 Background street 2. By author



Fig. 238 Background street 3. By author



2: Introducing tree gardens

Tree gardens are small pockets of green around the base of the tree, and increase the amount of green even more. Opening up the ground, removing pavement and adding grasses for easy maintenance help with cooling the local environment, increasing natural infiltration of rainwater from the pavement and beautify the street. Tree gardens contribute to the addition of qualities related to the physical environment of private gardens, namely Greening, Cooling and Infiltrating.

3: Open pavement parking

Replacing existing pavement of the parking spots by open pavement will improve the natural infiltration of rainwater from the streets and parking spots. Depending on the type, like green pavement, it can also help with cooling and the beautification of the street. Adding open pavement contribute to the addition of qualities related to the physical environment of private gardens, namely Infiltration and Cooling.

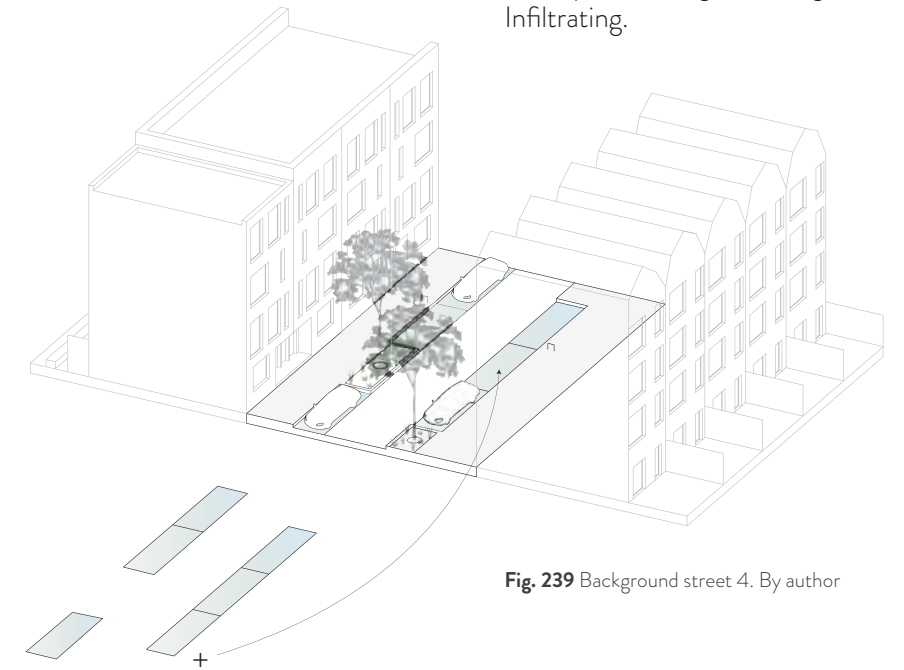
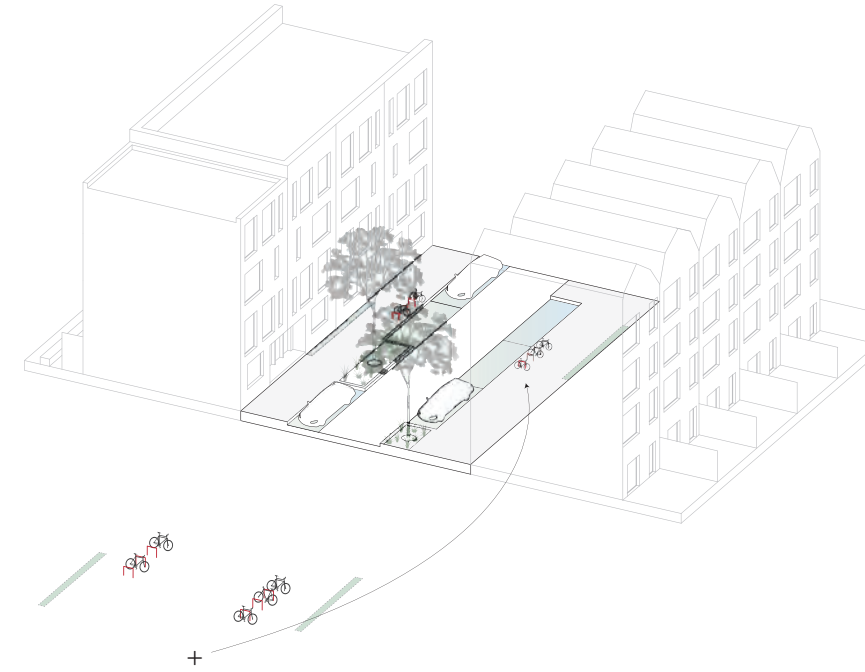


Fig. 239 Background street 4. By author

4: More bicycle stands

Increasing the number of bicycle stands in front of entrances of the dwellings can result in less clutter of bicycles throughout the pavement, making it more walkable. Vacant space along the facades of the buildings can now be used for small facade gardens, which contribute to the Greening, Cooling and Infiltration qualities of the physical environment.

Fig. 240 Background street 5. By author



Neighbourhood streets

The more public neighbourhood streets, connecting different parts of the neighbourhood, consist of wider one- and two-way streets, with parking and pavement on both sides. This type characterizes itself with the presence of commercial functions at corners of the buildings. Valuable green is also non-existing in most cases, while the lack of proper bicycle racks results in a clutter of bicycles throughout the streets. In order to increase the quality and potential of this streets, possible steps for upgrading are presented:

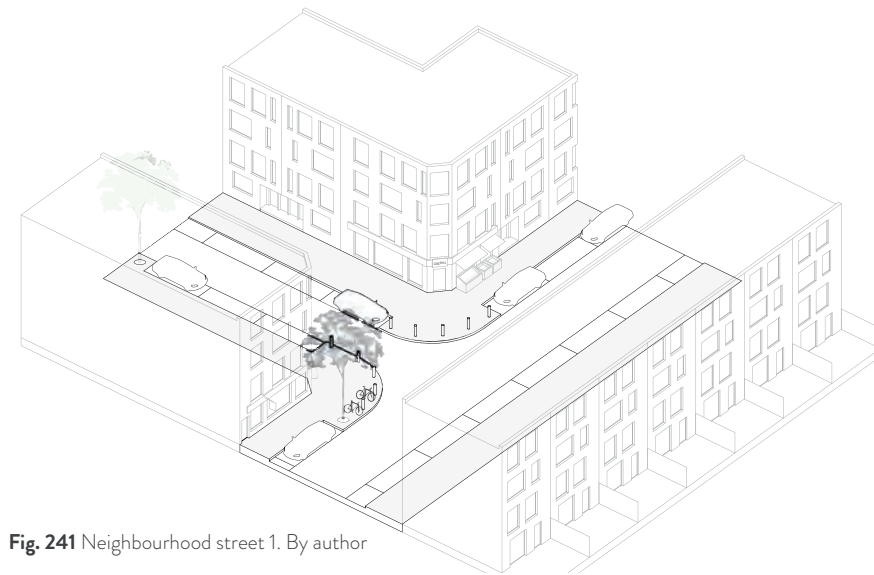


Fig. 241 Neighbourhood street 1. By author

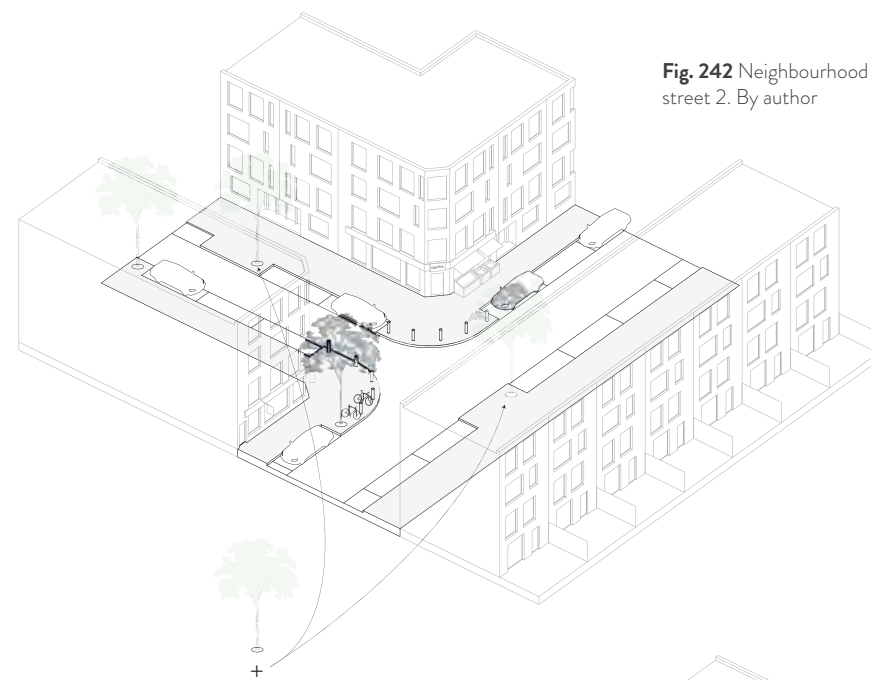


Fig. 242 Neighbourhood street 2. By author

1: Adding trees at intersections

Adding more trees at and around intersections of the neighbourhood streets with local background streets can help increase its potential for more activity and as a meeting place for local people. Trees create shadow, cooling the street, creating more pleasant places for people to stay. Adding trees contribute to the addition of qualities related to the physical environment of private gardens, namely Greening, and Cooling.

2: Widening pavement corners

Widening the pavement at the corners of intersections with commercial functions, where walking routes from different sides intersect, create new opportunities to transform these places into public spaces for staying. More liveliness at the corners of the streets increase the quality and safety, making it more interesting for other commercial functions.

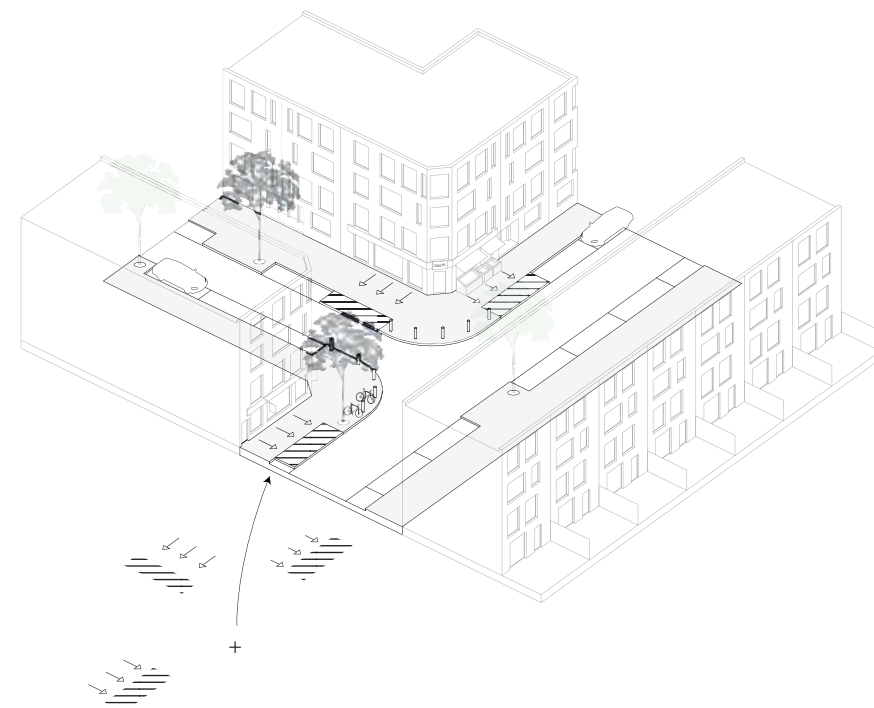


Fig. 243 Neighbourhood street 3. By author

3 Greenifying

The widened pavement at the corners of the street can be used to improve the physical quality of the public space by adding green patches with grasses, plants and small trees. More natural infiltration of rainwater from the pavement is possible, while decreasing the effects of the Urban Heat Island. The beautification of the public space can also as positively increase the value of the surrounding dwellings.

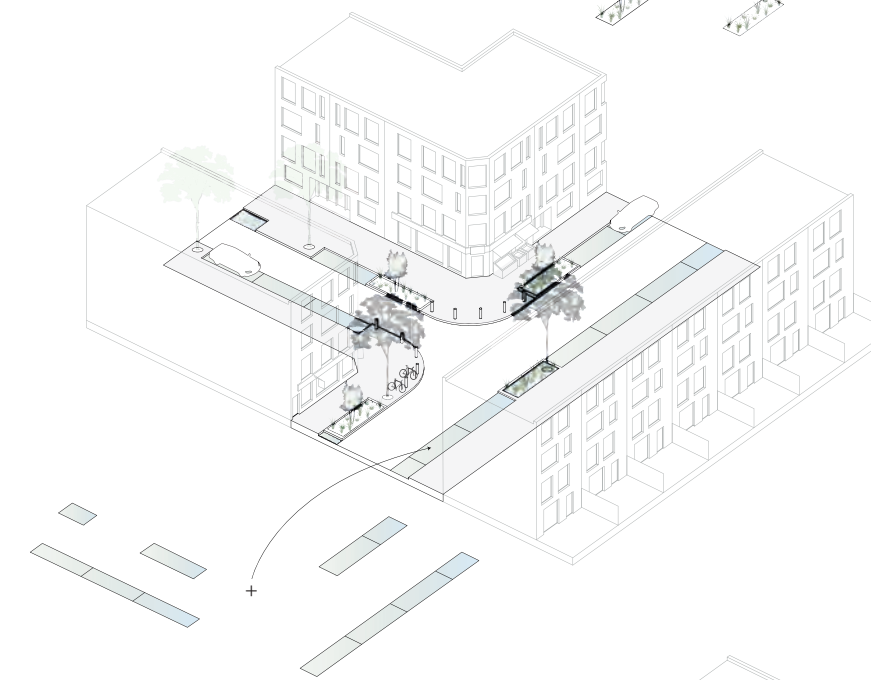


Fig. 244 Neighbourhood street 4. By author

4: Open pavement parking

A second step in greenifying the public space is done by replacing the existing pavement of the parking spots by open pavement. This will improve the natural infiltration of rainwater from the streets and parking spots. Depending on the type of pavement, like green pavement, it can also help with cooling and the beautification of the street, without losing parking spots.

Fig. 245 Neighbourhood street 5. By author

5: Extra space for social functions

The widened pavement at the corners of the street can be made available for use by local shops for more liveliness, like the expansion of terraces or shelves. Adding benches at the intersections can result in more social contact, especially in combination with trees and green patches, creating a pleasant environment to stay. Giving priority to bicycles in favour of cars by using the widened pavement for more bicycle racks, can improve the accessibility of the shops for local customers.

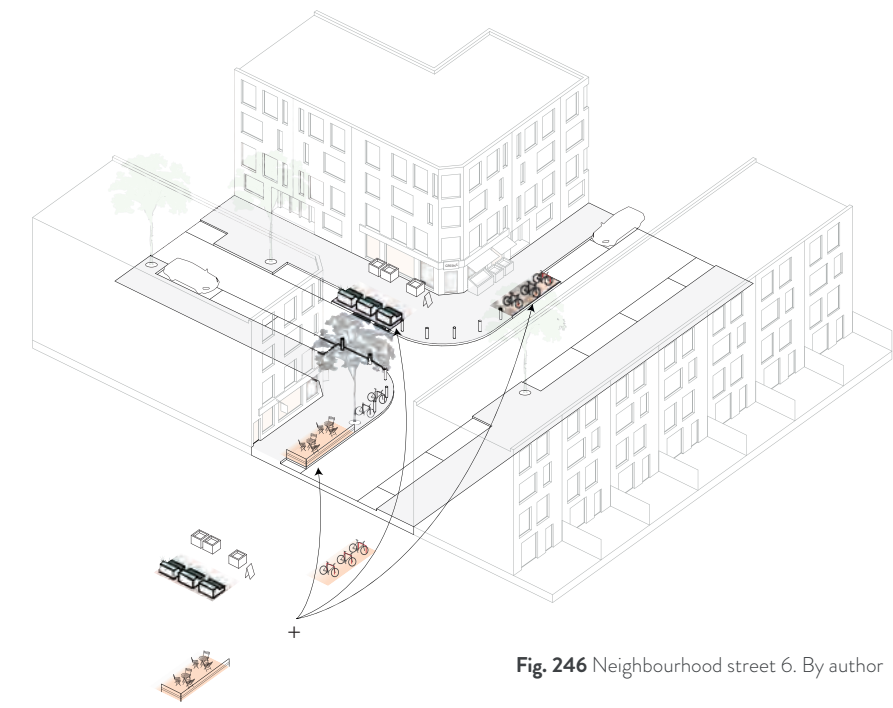


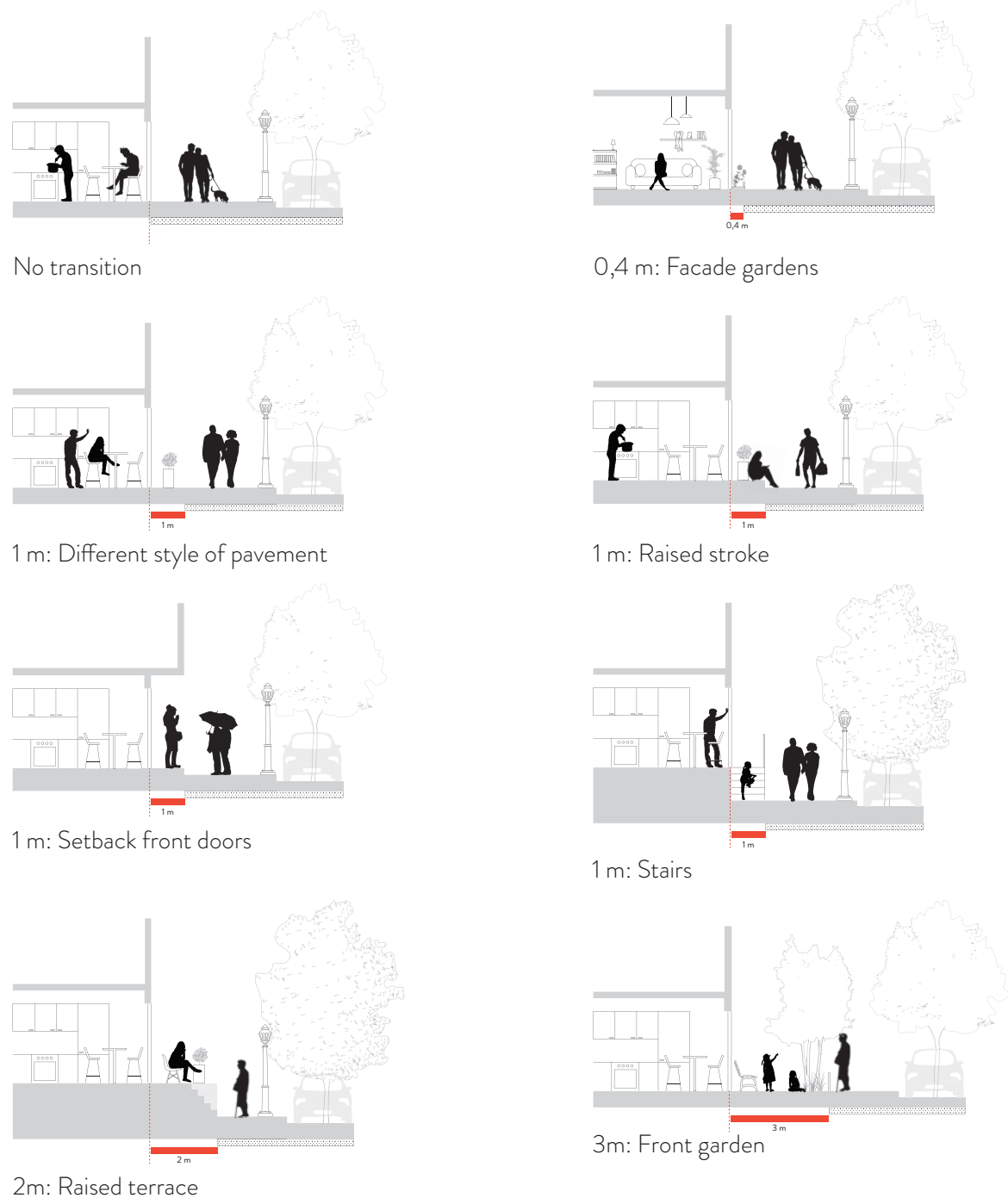
Fig. 246 Neighbourhood street 6. By author

Transitional space public-private:

Different styles of transitional space between private and public can alter how much privacy residents experience and how a street is used. For each individual street, different solutions can be better fitting, depending for example on the location in an urban fabric, and the publicness or privateness of a street. Or the profile, where pedestrianized streets will have a better quality of living, making it more appealing to use the front side of the dwellings than in a car-oriented street. More transitional space

could result in an increase of connectedness of residents with the public space, with more opportunities to reshape the space according to their own preferences, like adding benches, pots or facade gardens. On the other hand can too much space result in a decreasing quality of streets, given the bad state of existing larger front gardens in the Tarwewijk, see chapter 3. And thereby a waste of precious space, with the need for denser urban environments.

Background street & neighbourhood street: dwellings



Neighbourhood street: commercial functions



Fig. 247 Overview potential transitional spaces between private and public of commercial functions. By author

Fig. 248 (left page) Overview potential transitional spaces between private and public of dwellings. By author



Tuesday afternoon, 15:30 o'clock:

After picking up the kids from the primary school De Akker, Hannan has arrived back at her street where she has been living for the past three years. There, she lets her kids play for a little bit more time to release some energy before they take a nap. After the recent upgrade to a pedestrianized street, she really enjoys making more use of the street with the large bench, since she feels more comfortable letting her kids play on the pavement, without having to worry about cars passing by. Her boyfriend Dennis also likes that, because he now has a perfect spot, right in front of their front door to relax for a bit in the sun, before starting his evening shift at the local Meneba factory, responsible for the lovely smell of baked goods in the Tarwewijk.

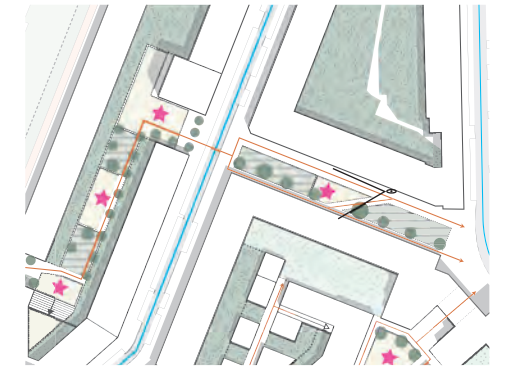


Fig. 249 The transformed Rijsoordstreet, pedestrianized, greenified and ready for the future with two large wadi's. By author



Wednesday afternoon, 13:00 o'clock:

After the Covid-19 crisis, being used to working from home and able to see his young kids more often than he was used to, Diego has kept this habit partially and is now working more from home. Having his afternoon break, he has joined his wife Sophie and two kids in the playground to take some fresh air and talk to his neighbour, who is on his way to the community room to follow a workshop about staying fit as an elderly person. Diego will soon follow his neighbour in the same direction, not to join the workshop, but to work the rest of the afternoon in the public working spots inside the building block. Perfectly fitting into his new lifestyle.

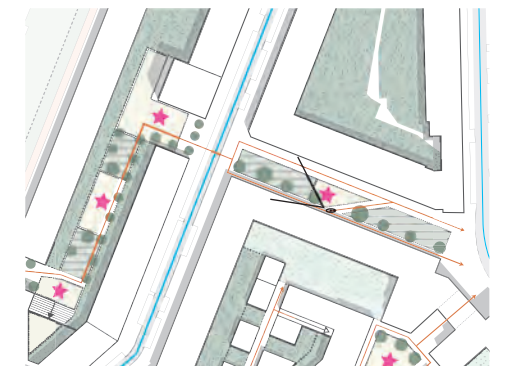


Fig. 250 The transformed Rijsoordstreet offers a new playground on the frontside of the buildings blocks in the middle of a green environment. By author

1. Step-ups in front of the entrances of the dwellings increase the usability of the front side, for example for eating and sitting, while increasing encountering between different people.

2. Using, light, open pavement provides natural infiltration of stormwater into the ground, while the overflow is directed towards adjacent wadi's. Light colours will reduce heating of the air.

3. Making the pavement along the southern oriented facade wider increases the space for facade gardens and placing seating or pots along the facade, increasing the connectedness of residents with the public space.

4. Using different types of colourful grasses increase the physical appearance of the seating area, attracting birds and insects, while also being easier to maintain than regular grass.

5. Placing the seating element next to the playground, where both sides of the pedestrianized street are linked via a connection, increases the usage and possibility for social interaction.

6. Trees at strategic points like the seating area provide a pleasant space for staying and meeting, by providing shade and thereby cooling the area, while also providing nestel space for birds and insects.



1. Step-ups in front of the entrances create a softer transition between the front door and the public space, increasing the usability of the front side and possible social interactions.

2. Wadi's are used for temporal storage of stormwater and cooling of the street. By planting different types of grasses, biodiversity can be increased, while maintenance is simplified.

3. The grassy area in the middle of the wadi's 'wet zone' is multifunctional in use, being a natural playground for children when dry, or for relaxing and sitting.

4. Low fencing of natural materials create safe playgrounds for young children, offering the qualities of a garden, while enhancing the open character of the street, supporting social interaction.

5. Pedestrianized streets increases the safety of the public space, making it possible for children to use the streets as a playground, besides the designated play areas.

6. Including more green in the playground increases the sustainability and enhances the playing conditions compared to hard, closed surfaces by reducing the heat.





Fig. 251 The corner of the Wevershoekstreet and the Borselaarstreet shows the potential of upgrading intersections of neighbourhood streets, with active corners, more green and spaces for social interaction. By author

4.4 Design intervention: conclusion drawings

The proposed design intervention, regenerating a part of the Tarwewijk into a superblock, is able to react to ongoing concrete urban demands. The design intervention shows that focusing on the values and qualities of urban domestic gardens, by transforming them to semi-private shared gardens, by diversifying the types of outdoor garden with unique qualities and serve as a mechanism for the densification and diversification of the built environment, improving

urban structures and physical forms, with related social processes and liveability. Adding new qualities, aligning the social needs with environmental needs, and aligning environmental needs with social needs increase the liveability in the Tarwewijk. The different layers, from private and shared gardens, to streets and pedestrianized public spaces, all contribute in their own way to the social or the physical environment as shown is the following conclusive drawings:

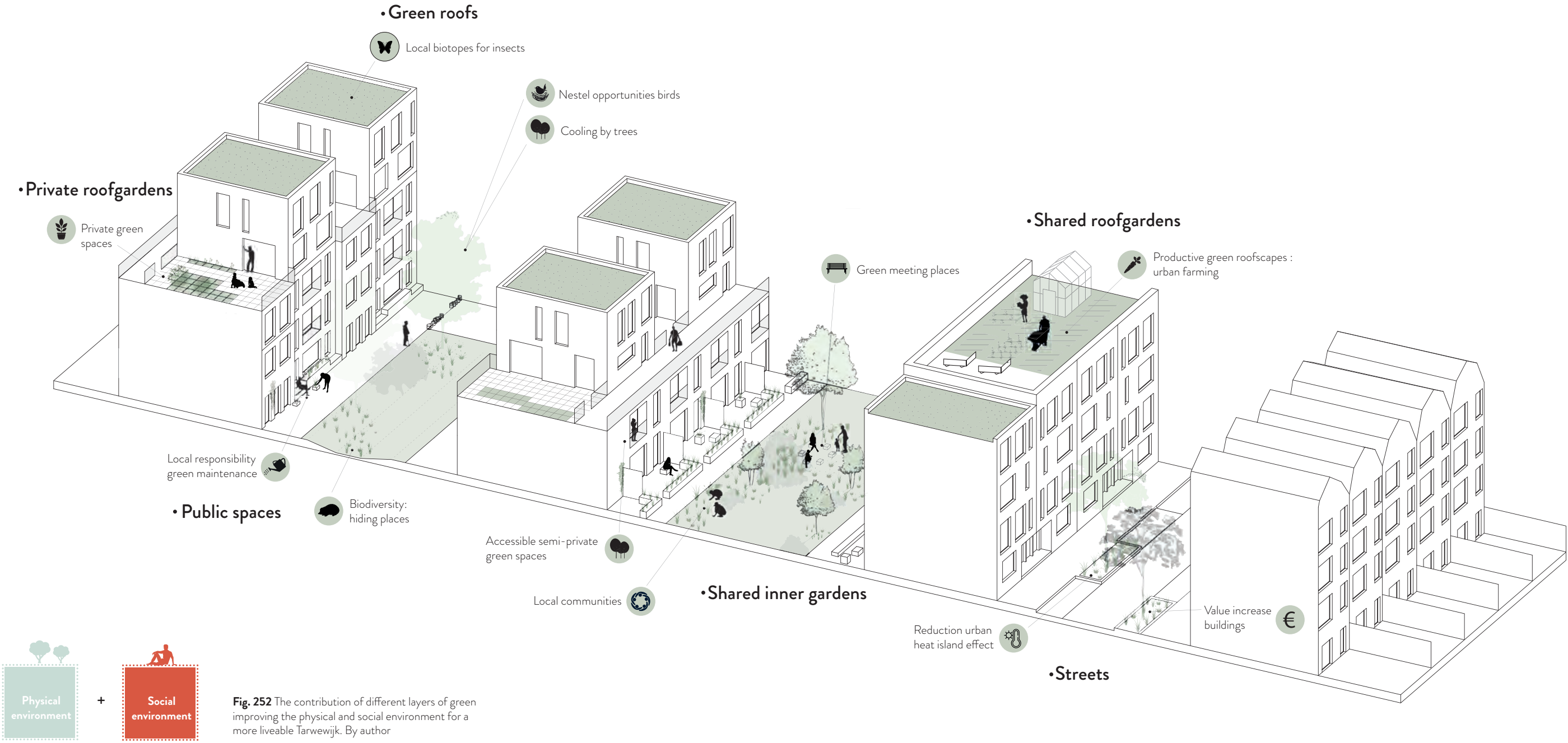


Fig. 252 The contribution of different layers of green improving the physical and social environment for a more liveable Tarwewijk. By author

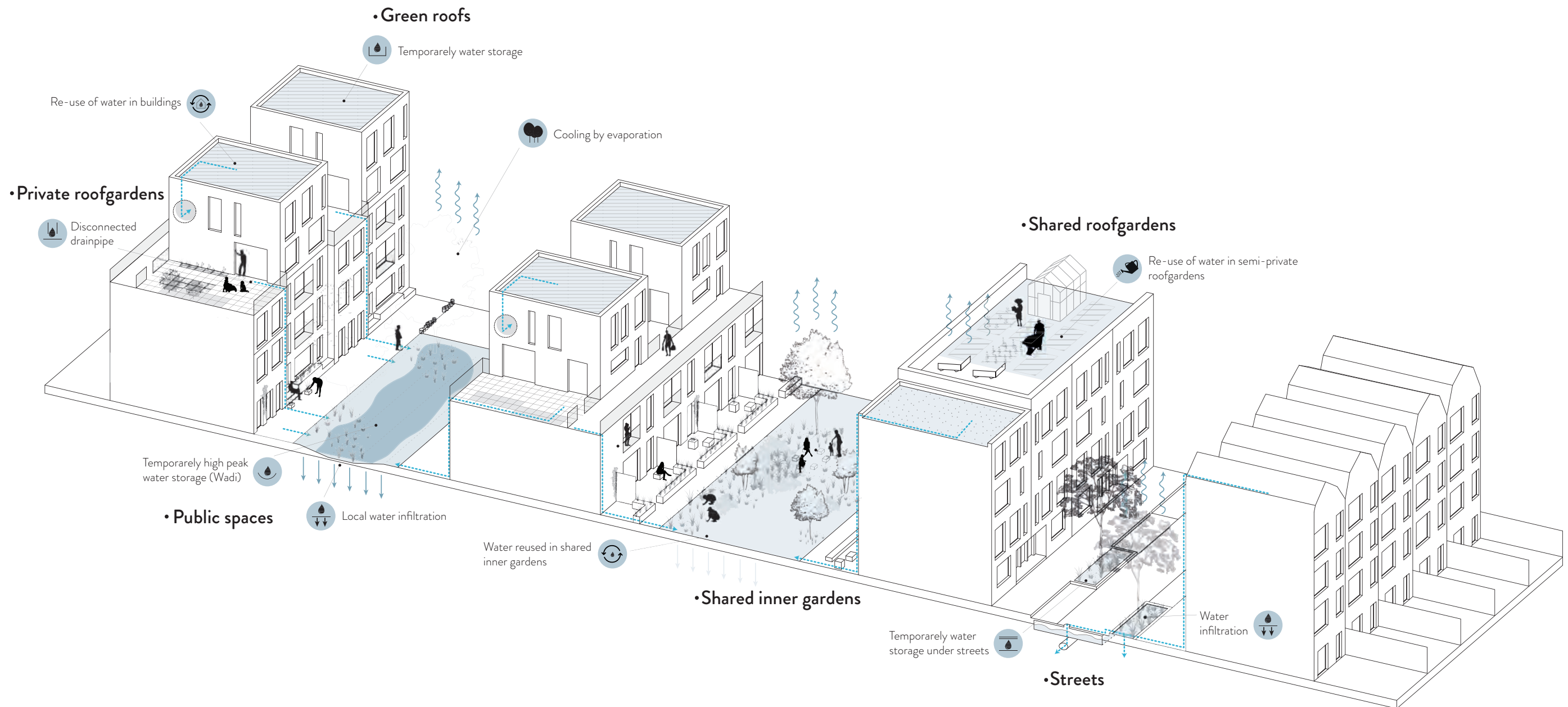


Fig. 253 The contribution of different layers of water improving the physical environment for a more liveable Tarwewijk. By author

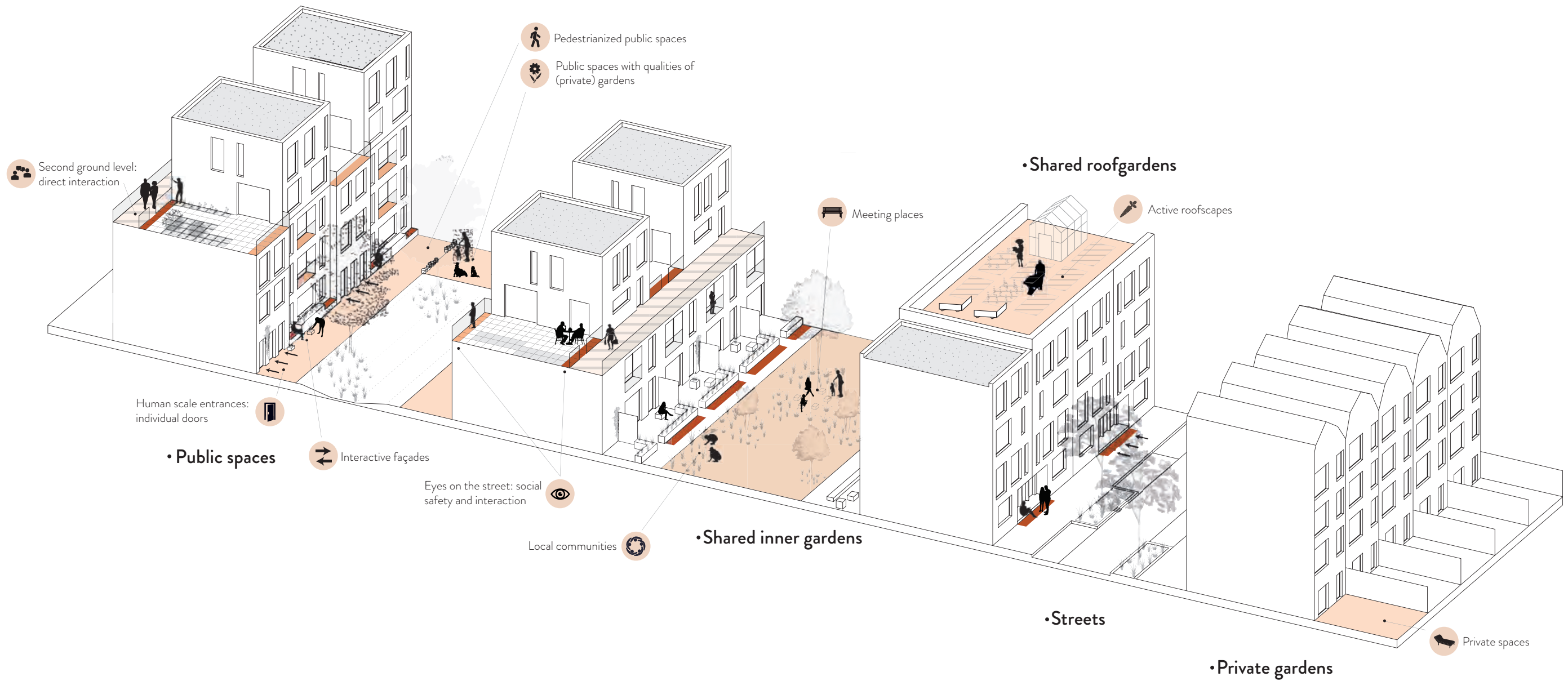


Fig. 254 The contribution of different social layers improving the social environment for a more liveable Tarwewijk. By author



Fig. 251 A view inside of one the shared gardens of block 2, with diverse types of outdoor spaces, including private roof gardens, semi-private shared gardens, balconies, and active roofscapes.
By author

CHAPTER

5

Conclusion & Reflection

- 5.0 Introduction
- 5.1 Conclusion
- 5.2 Reflection

5.0 Introduction

This last chapter concludes the research, answering the main- and subquestions which were used throughout the process. It is followed by the general reflection of the process of the research, reflecting the relationship between research and design, the relevance of the project, Advantages and limitations chosen methodology and the value of the transferability of the results.



5.1 Conclusion

RESEARCH QUESTION

How can urban domestic gardens contribute to a more liveable urban environment through a sustainable urban regeneration of the built-environment, in response to concrete urban demands in the Netherlands?

RESEARCH AIM

Reveal the possibilities to align the integration and use of urban domestic gardens to concrete urban demands, such as the densification of urban environments, the adaptation of the built environment to climate change and soil sealing.

CONCLUSION

It is questioned if continuing implementing urban domestic gardens into urban environments in the current way can result in a more liveable environment. Increasing the quality of the social- and physical environment, responding to ongoing processes like climate change and soil sealing. Despite organisations like Stichting Steenbreek stimulating people to use their urban domestic gardens to greenify, decreasing soil sealing and making their environment more climate-proof, existing urban fabric and the way urban domestic gardens are implemented into that form a limitation, not reaching the full potential gardens have for both the social and physical environment. To use the potential and qualities of gardens, it is therefore important to note that there will always be a cohesion with the built environment and public spaces. In general, urban domestic gardens on their own have the power to increase the liveability of urban environments to a certain point, with several values and benefits allocated to its users, and strengthening environmental

environmental conditions in cities. Reconnecting the social and physical environment which benefits both, and result in a more liveable environment.

conditions. But using a regeneration of the built environment and public spaces in smart ways can increase the contribution of urban domestic gardens to the liveability even more.

The design intervention shows that rethinking the implementation of urban domestic gardens leads to an increase of the liveability in the Tarwewijk, by using specific, transferable values to improve the quality of the public spaces and buildings. Transferring the values related to eating, learning, working, playing and meeting from the social environment, and greening, cooling and infiltrating from the physical environment into public spaces increase the accessibility to values of gardens, without the need to provide private gardens to every single household, taking of spacious space. This way of implementing urban domestic gardens makes it possible to use more space for extra public spaces for residents, and have more control aligning these spaces to the concrete urban demands. With only private spaces, the quality of the

environment is depending on how people use their private space, reflected in the increase of soil sealing with the corresponding Urban Heat Island. This method of transferring the values of gardens is used to cool down the urban environment, mitigating the urban heat island, making climate-proof (semi-public) spaces with extra green and natural infiltration. Combined with values from the social environment, creating places for activities, more social interaction, and connectedness with the local environment.

Transforming urban domestic gardens to more semi-private shared spaces will increase the accessibility to gardens for more residents, increase opportunities for social interaction and connectedness with neighbours, while being a more sustainable way of using space. Further diversification with other (semi-private) outdoor spaces, including shared and private roof terraces/gardens, offer more diverse (new) qualities, inside, outside and on the building blocks, attracting different user groups into the neighbourhood and differentiating the use of those spaces, which bring more liveliness, increase safety and thereby the liveability of the environment.

The design intervention also shows that the regeneration of urban domestic gardens to semi-private shared gardens serve as a mechanism for the densification and diversification of the built environment, improving urban structures and physical forms, with related social processes and liveability.

In conclusion, the research shows the high potential of aligning urban domestic gardens to concrete urban demands and improve the liveability of the urban environment, but also recognizes the importance of the public space and the built environment in order to utilize it.

RESEARCH QUESTIONS

SRQ1

What are the values of urban domestic gardens for the quality of the urban environment and its users and how is this affected by concrete urban demands?

The exact values of urban domestic gardens differ per type of garden and its users, but can be summarized into potential values. For the physical environment it can be related to restorative values, for example cooling the local environment. For the users it relates to contributory values, representative values, a place for passive and active activities and restorative values, for example increasing mental and physical health. Concrete urban demands show that the value of urban domestic gardens can increase over time.

SRQ2

What are the socio-, spatial- and morphological perspectives of urban domestic gardens in the urban environment?

Urban domestic gardens have a high socio perspective according to local fieldwork in the Tarwewijk. This is also confirmed by the fact that the popularity has risen since the outbreak of Covid-19, making accessible outdoor spaces more important. This is however not always visible in the quality of the gardens in the Tarwewijk, regarding the high number of low-quality gardens. With the need for densification in existing urban environments, increasing importance of climate-proof development and the decreasing quality of many private gardens, with negative effects on the environment, it is questionable if the current implementation of gardens is still feasible and desirable. New forms of spatial implementation show high perspective. New spatial implementations go together with the morphological perspective, where new forms of urban domestic gardens, smaller or shared in a semi-private garden, rise in popularity and implementation.

SRQ3

How can a more liveable urban environment in the Tarwewijk be activated through a local sustainable urban regeneration strategy and design by utilizing values and perspectives of urban domestic gardens?

A more liveable environment is activated by focusing on adding qualities from both the social and physical environment, related to the values of urban domestic gardens. Serving as a mechanism for the densification and diversification of the built environment and public spaces, urban structures and physical forms are improved, with related social processes and liveability.

SRQ4

Which elements of the sustainable urban regeneration of the Tarwewijk can be upscaled into generalized design principles for the built environment and what potential does this have for the liveability in Rotterdam.

Specific values of urban domestic gardens, used as a base for the regeneration of public spaces in the Tarwewijk, adding new qualities, have been translated into a set of design principles. The principles include themes like eating, learning, working, playing and meeting from the social environment, and greening, cooling and infiltrating from the physical environment. Each theme consisting of a set of specific design components makes them transferable to other neighbourhoods in Rotterdam, potentially increasing the liveability by adding qualities to both the social and environmental environment.

7: Reflection

My graduation project focusses on aligning the use and integration of urban domestic garden to concrete urban demands like adapting to climate change, densification, soil sealing and changing socio-environmental conditions, using sustainable urban regeneration as a method to improve the liveability in urban environments. This is in line with the focus of the studio topic, which is the Urban Transformation and Qualities of Density of urban environments. This topic is extremely relevant in today's working field of Urbanism. The graduation topic emerged from a personal experience and interest in private gardens in cities. In the neighbourhood where I grew up and other neighbourhoods I have visited during the last years, I started noticing a repetitive pattern occurring, where many front gardens changed into personal parking spaces for cars of being paved completely. This change, influencing the aesthetic quality of the neighbourhood, has always stayed with me. Learning more about topics like climate change, the importance of green in cities for heat and cooling and how water systems work in urban environments during the bachelor and master programme, increased my interest and need to do research this topic even more.

The Covid-19 situation also influenced my view on the importance to do more research on this topic during the process, as it became clear how important it can be to have your own garden to be outside. Being restricted to go outside to the park for a couple of weeks, and only having a small balcony available, while reading articles about it in the newspaper and on the internet made it clear how "unfair" the distribution of outdoor spaces in dense cities can be. I was surprised but happy that more people started noticing how important gardens and green in cities

are or can be, and I hope that after the Covid-19 pandemic this will result in a lasting enthusiasm and commitment of residents towards gardens and green, and their neighbourhood in general. Knowing that cities don't have the space to facilitate every resident with a garden, I also hope that my thesis project can show other ways to give the qualities of gardens to more people and thereby assist in thinking of ways to increase spatial justice.

The relation between research and design.

The project has used the method of research and design with an extra focus on the social part of the research as the main guide to come up with a design proposal. Since gardens are one of the most private outdoor spaces in cities, getting to know its users and ways of usage was considered critical for the outcome of the project. The cooperation with the Veldacademy, which interest is also in the social themes of urbanity, strengthened this focus. While the research in the beginning mainly has been focused on the theoretical part of gardens to get a theoretical understanding, the vast majority of the research has been focused on the users of the gardens and the public spaces in the Tarwewijk, and the ways how they are used. All methods used in the research, from the fieldwork, surveys, interviews and observations, conducted to a translation of current qualities and usage of private garden and public spaces, not working existing elements which should be redesigned, and methods to regenerate the neighbourhood in design principles as the core elements of the design proposal. Research and design have been interrelated throughout the whole process, both lasting till the very end of the project, where adjustments in the design where based on new research outcomes.

Relevance of the graduation project

Societal relevance

The concrete urban demands which were taken into account in the thesis, the densification of the urban environment, adapting the urban environment to climate change, the increased soil sealing and changing socio-environmental conditions will affect whole societies living in the urban environments. Together with the fact that social behaviour regarding urban domestic garden use in multiple aspects is the direct cause of the declining liveability of urban environments, the social relevance of this research is considered significant. The recent Covid-19 pandemic also made clear how important having a qualitative private outdoor space can be, since large parts of residents in dense urban areas do not have access to it. The outcomes will have potential to facilitate change at multiple scales, from the Tarwewijk to the city of Rotterdam, creating a sense of collectivity, counteracting the NIMBY-effect an improving the liveability and thereby positively affecting the whole urban societies.

Scientific relevance

In times where the effects of climate change are becoming more noticeable and the need for denser and more liveable urban environments grow, the outcomes of the research have potential to reinforce common existing and future urban typologies in the Rotterdam, counteracting the negative effects of climate change and soil sealing on the urban environment, while providing more liveable and denser environments. And thereby respond to contemporary issues in the discipline of Urbanism.

Ethical considerations

The research takes several ethical values into considerations, like transparency of the gathering and processing of data by literature research or interviews. Collaboration with local people, and by that improving the understanding or informing people of climate change, is also an important ethical factor in the research. An important part of the research is also thinking about and designing ways on how to provide certain qualities of private gardens for all the citizens. Whereas dense urban environments cannot provide everyone with an urban domestic garden, other ways to create inclusive environments with the same qualities are developed to strengthen the inclusivity of the neighbourhood. Translating this to general principles also creates opportunities to deliver more inclusive environments on a larger city scale, where people, from young children growing up in the neighbourhoods too elderly people enjoying their days have access to the same qualities.

Advantages and limitations chosen methodology

The chosen methodology have shown different advantages and limitations during the research process. Being part of the Veldacademy group resulted in an extra focus on the value/importance of the inhabitants of the Tarwewijk in Rotterdam in order to come to a final design and design principles. From the beginning, the chosen methodology has always been targeted on the inhabitants, to speak with people from different cultures, ages and genders, by combining different methods like large scale surveys, personal interviews, design workshops and a street campaign. During

the process of the research, a switch has been made into the use of the different methods, partly caused by the Covid-19 pandemic. Chosen to generate and obtain as much input as possible from a large group of inhabitants in a save way (Covid-19), the first focus was put on the surveys. A decision of which I can now say hasn't been the right one. The Tarwewijk being frequently researched already over the last few years by many organizations, combined with the neighbourhoods demographics, increased the difficulty to get in contact with people, despite actions taken to get in online contact like the creation of a website and videos, resulting in a low response of the surveys from the most important actors. Mistakes have been made during the construction of the survey, where to many questions, irrelevant question and not usable questions where included, making a large part unusable for me.

The switch to focus on methods with more personal, face to face contact, made possible by looser restrictions of Covid-19 measurements, like personal interviews and the street campaign, generated opportunities to go into deeper conversations, gaining trust and interest of the people, and building a network in the neighbourhood with new contacts. While personal contact and conversations take up a lot more time to conduct compared to the surveys, the outcomes have proven to be more useful for design part of the research, despite the lower amount of respondents. A case of less is more.

Looking back at the methods of interviewing reveal possible limitations to the project. Because of multiple reasons like time restrictions, sudden opportunities for personal interviews due to becoming part of a network of people and not being able to get

in contact with certain groups of people, the vast majority of the people interviewed have been from a Dutch nationality. While this doesn't mean that the findings are irrelevant, questions arise if they give the right reflection of the whole neighbourhood, considering the presence of many more cultural backgrounds.

Looking back on the process of setting up the methodology of the research now reveal that errors have been made, where not enough thinking process has been put in selecting the right methods, not thinking through how to use them to my advantage. This is also visible is the method of using a pattern language for consistency in the design proposal. Because this method has been selected in a later stage of the process, when the design phase already started, the way of implementation in the thesis in the current way can be questioned. I think that using this method in an earlier stage could have resulted in an improved, more consistent design outcome, which is easier transferable to other parts of Rotterdam.

The value of the transferability of the results

In the current stage of the thesis, where only one of the two bigger locations have been fully designed, the transferability to other locations has some limitations. To get a better insight, both locations need to be redesigned to see the applicability in other settings. But while this part needs some work, the overall result of findings and design of the design principles of the qualities urban domestic garden when being transferred to public spaces is considered valuable. The design principles have the potential to be used in different settings, providing new qualities to outdoor spaces, while also forming a base for further expansion and exploration.

6

Appendix

6.1 Bibliography

6.2 Reference list images

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