Biophilic Urban Childhood

A Healthy Childhood with Biophilic City Model under Urban Densification in Post-war Neighbourhood, Zuidwijk

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Master Thesis: Biophilic Urban Childhood
A Healthy Childhood with Biophilic City Model under Urban Densification in Post-war Neighbourhood, Zuidwijk

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CONTENT

Abstract

In the first two decades of the 21st century, urbanisation along with the virtualized social and educational methods, childhood today is increasingly becoming an indoor experience. Under urban densification, a high percentage of childhood is lacking outdoor activities, especially when nature is not accessible enough in the city. The range of the space where children are free to reach and explore the environment is decreasing with the exclusion of consideration of the need for children in urban planning and design. Growing up with little connection to nature is not only negative for mental/physical well-being, but helps create a society that forgets the biophilic needs of humans and ends up building a natureless environment and lifestyle. The research method is to review existing studies about the impact of urban densification on healthy childhood; and how the biophilic city model can contribute to enhancing childhood development. The research is aiming to conclude effective methods for planners and designers to create a city where children can develop a healthy childhood in an urban environment with abundant natural experience.

Keywords
Healthy Childhood, Urban Densification, Biophilic City, Child-Friendly City, Post-war Neighbourhood, Zuidwijk

Photo of kindergarten Source: Author

1. Introduction

1.1 Overview

The research will consist of three main sections, research development, methods, and conclusion. The first section consists of the foundation of the research from motivation to problem statement with research questions as a conclusion to form the conceptual and theoretical framework. In the next section, the methods of the research will be addressed with proposed approaches and outcomes. The last section will be a conclusion with the summary of this chapter, ethical paragraphs, and the limitation of the research.

1.2 Research Outline

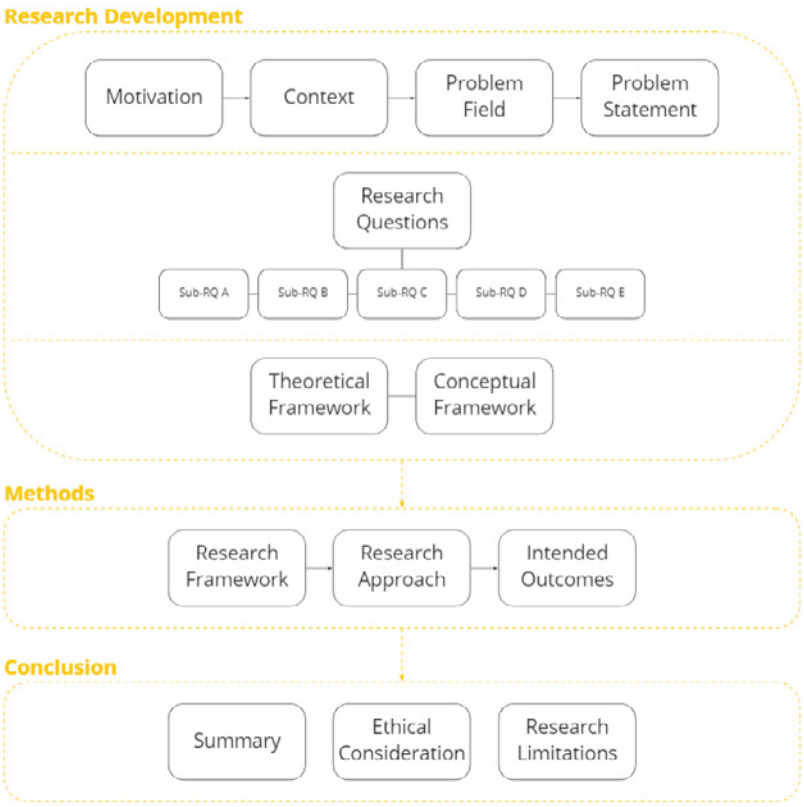


Fig. 1.1 Research Outline. Source: Author

1.3 Motivation

“We need to allow children to develop their biophilia, their love for the Earth, before we ask them to save it. The more personal a child’s experience with nature, the more environmentally concerned and active children are likely to become.”

- Randy White, Fresno Pacific University

The motivation of this project can be related to my personal experience from childhood. I was raised in a suburban area with the daily nature play on the family farm. Since I was 7, we moved to the city centre to be closer to my parent’s work. Thus, I started to have friends from different upbringing backgrounds in the class. Throughout the years, including college life, I notice some different patterns of characteristics and health problems are very much related to the amount of exposure to nature during childhood.

Speaking of health problems, I noticed that people who are having more allergic problems usually grew up in a more strictly managed play space, mainly indoor environment. Without enough exposure to different kinds of bacteria, the body will be more sensitive to the surroundings, which results in a relatively vulnerable health condition.

Another observation of my personal experience is the appreciation of nature. Some people feel absolutely fine for wasting food; some feel dirty when they were asked to do gardening work with the exposure to touching the soil and some insects. From my observation and discussions with these people, I came to a conclusion as follows. People who grew up in the city or have less engagement experiences with nature tend to have less appreciation of nature or feel distanced from nature.

Biophilia, “The innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature.”, defined by E.O. Wilson in 1984. The hypothesis of the previous paragraphs were proved through the study of biophilic cities in my graduation project in bachelor degree. The concept of biophilic cities contributes to human society in many aspects. As children are the future citizens of the world, it is crucial to ensure their connection to nature before expecting them to lead the world to a more sustainable and healthy society in the future.

Photo of Zuidwijk Source: Author

1.4 Problem Fields

Problem Fields
The problem fields can be seen from three main domains, the trend, the process, and the context. Combining the three components, we can address the problem statement more clearly and lead to a clearer research structure. Following paragraphs will be elaborating the three domains of the problem fields.

The Trend - Unhealthy Childhood
Unhealthy childhood by lacking outdoor and natural experience is an ongoing trend especially in urban environments. Plus the advances of technology, it is happening everywhere.

The Process - Urban Densification
Urban densification is a facilitator that makes the unhealthy trend even more severe to the vulnerable, yet crucial group of people to the future, children.

The context - Post-war Neighbourhood, Zuidwijk
The research is focusing on the post-war neighbourhood, Zuidwijk, which has a low performance on social and natural engagement in the neighbourhood.

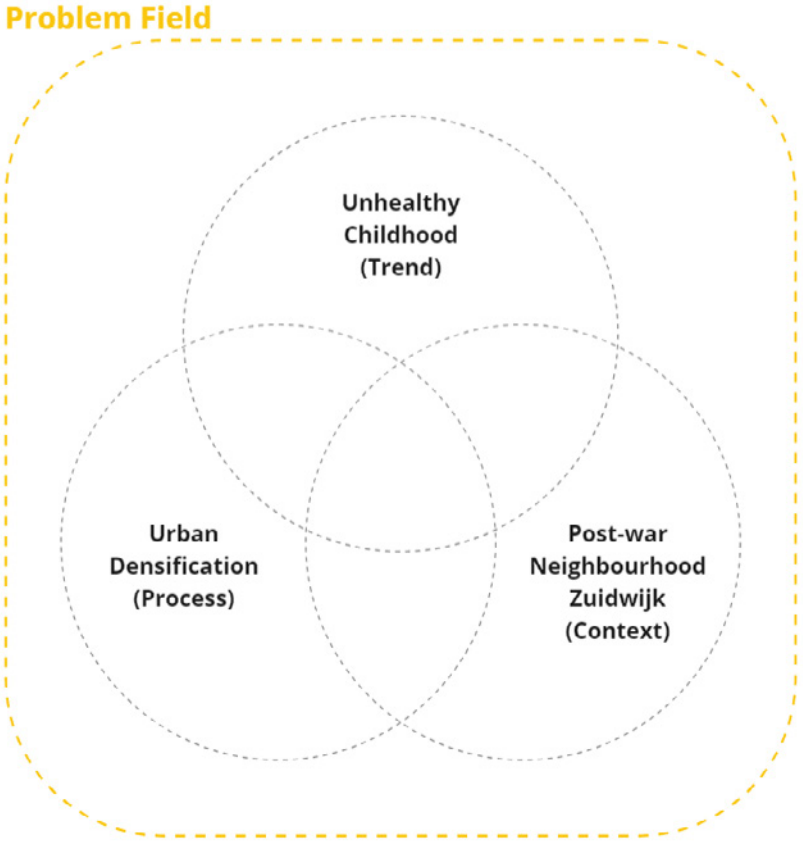


Fig. 1.2 Problem Field. Source: Author

1.5 Problem Statement

Problem Statement

We know from Randy White, the Executive Director of the Center for Community Transformation at Fresno Pacific University, that if we want to create a better society that values sustainability and the environment, we need to ensure the presence of biophilia is present in childhood development. Unfortunately, children that live in the densifying urban environment are facing the unhealthy trend of disconnection to nature. They are the vulnerable group in the community but also the representation of the future society. If we want to achieve a healthier society in the future, we need to thrive to find solutions for creating better cities for children to grow up in.

The cities today are facing the problematic trend of unhealthy childhood development due to the decreasing outdoor physical activities and the experience with nature. The trend is even being facilitated with the continuous urban densification, which is intensifying the tension between the demand of space and the space for nature. Looking at the densified and densifying urban fabrics, the needs and consideration of children are less seen in the developing process.

Under the context of the city of Rotterdam, the city was scored as the worst in terms of child-friendliness compared to all the other Dutch cities. (Lefaivre, 2007) In reaction to this issue, the municipality of Rotterdam has been publishing and executing projects that improves the living quality for children to keep or attract families with children to live in Rotterdam. However, with the changing demand and interest of families and children, some projects are in need of new directions to continue ensuring child-friendliness in the city. (See Chapter 2)

Within the city of Rotterdam, the post-war neighbourhood, Zuidwijk, was the pilot neighbourhood that was created with the vision of connecting the residents together with more public space in the neighbourhood. However, it is now lacking social cohesion with its presence of public green spaces. Zuidwijk is also one of the most populated neighbourhoods in Rotterdam, with a higher percentage of young children. (See Fig. 1.3) Thus, there is a gap between the demand for a child-friendly environment and the supply that the current context of Zuidwijk can support.

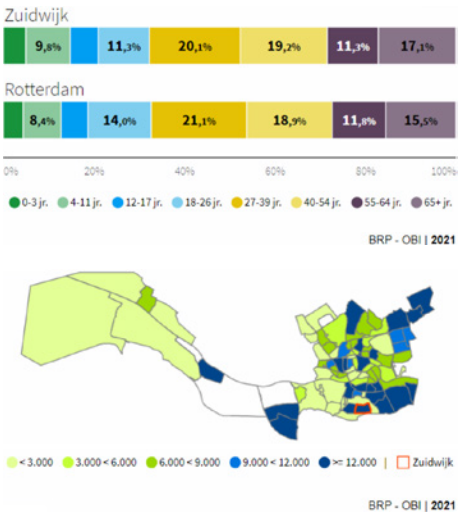


Fig. 1.3 Zuidwijk Polulation.
Source: Gemeemte Rotterdam

Fig. 00 Photo of kindergarten Source: Author

2. Methodology

2.1 Conceptual Framework

The main concept of this thesis is to achieve Biophilic Urban Childhood, which can be constructed with three main domains as stated in the conceptual framework below.

The densification as the ongoing process with the focus on governance of the regeneration of dense neighbourhood and spatial typology analysis. Healthy childhood as a condition to achieve. It can be achieved with six main qualities of child-friendly design. (Krisiak N., 2020) The biophilic city as a model to form specific principles and methods to achieve the condition of healthy childhood in the process of urban densification.

The conceptual framework forms the vision of enhancing the condition of healthy childhood with the model of biophilic city under the process of urban densification.

The vision of Biophilic Urban Childhood is also aiming to contribute to a more sustainable society with environmental, social, and economic benefits.

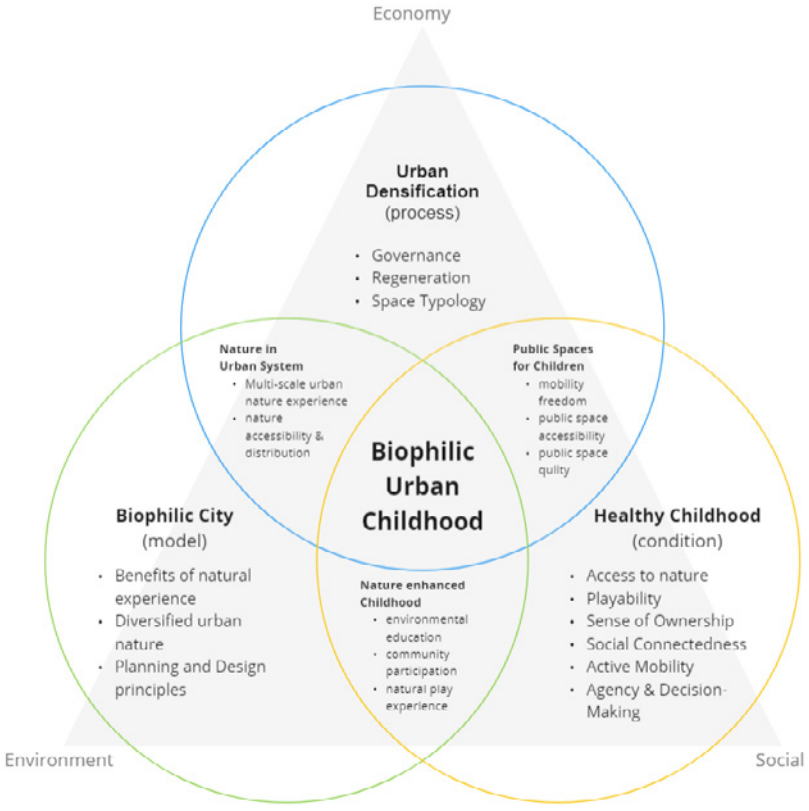


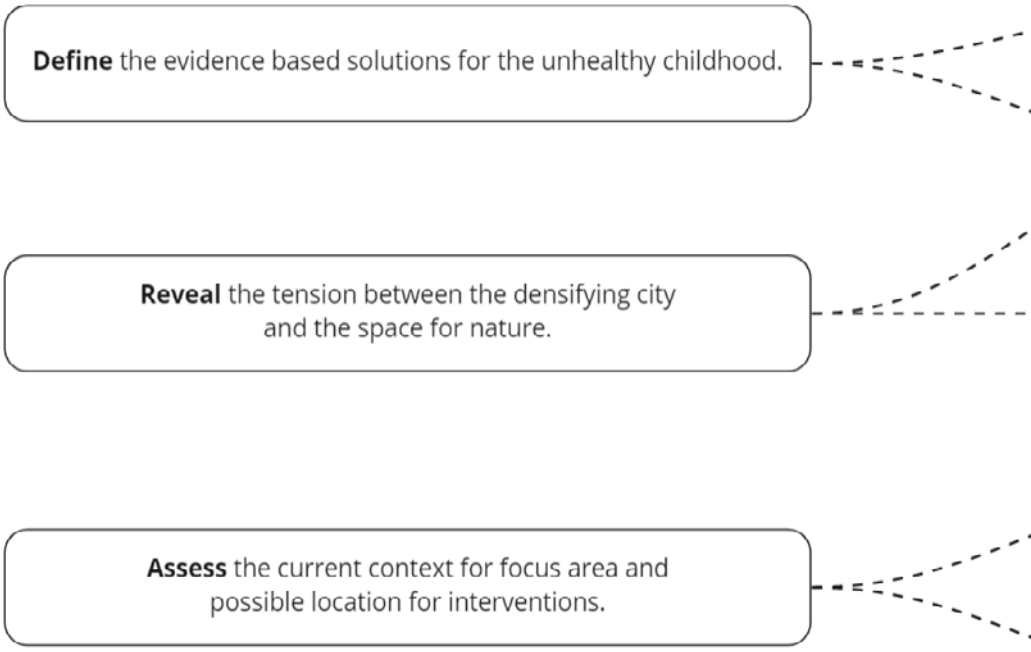
Fig. 2.1 Conceptual Framework. Source: Author

2.2 Research Aim

Research Aim
The research aim is to provide a method of city planning and urban design, concluding from the literature review and case study. The method is aiming to create cities where children can have an abundant natural experience while growing up in an urban environment.

Looking at the existing planning and design process, we seldom see the needs of children to be considered or have their voice be heard in the decision making. With community-based and children-inclusive strategies, the project is aiming to create an urban environment that provides children enough natural experience and the inclusive system to make the healthy childhood a priority of the society to maintain and enhance.

By reconnecting urban upbringing to nature, we are introducing a healthier lifestyle to the citizens of the future.



2.3 Research Question

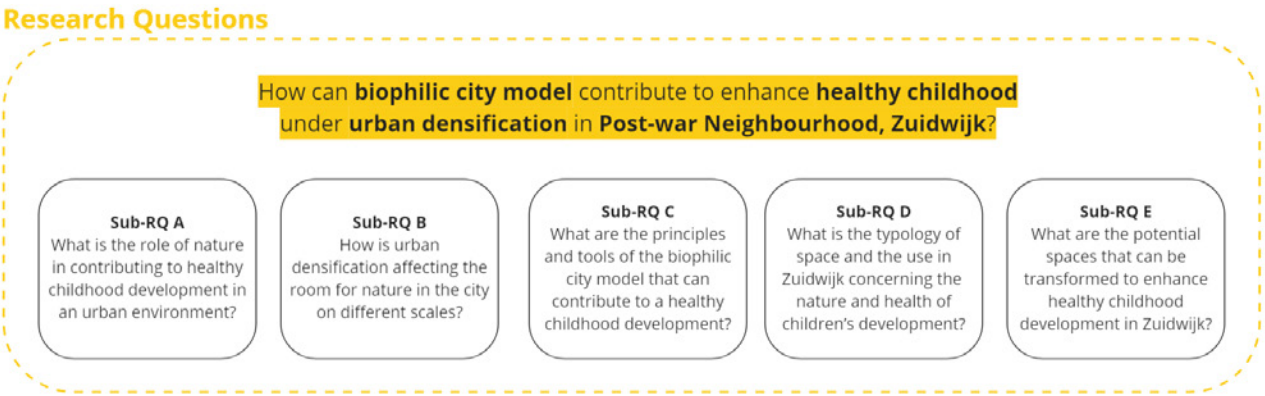


Fig. 2.2 Research Questions. Source: Author

Concluding from the problem statement and research aim, the research question is formed as "How can biophilic city model contribute to enhancing healthy childhood under urban densification in Post-war Neighbourhood, Zuidwijk?" Which is going to be answered with the following five sub research questions.

Sub research question A
What is the role of nature in contributing to healthy childhood development in an urban environment?

Sub research question B
How is urban densification affecting the room for nature in the city on different scales?

Sub research question C
What are the principles and tools of the biophilic city model that can contribute to a healthy childhood development?

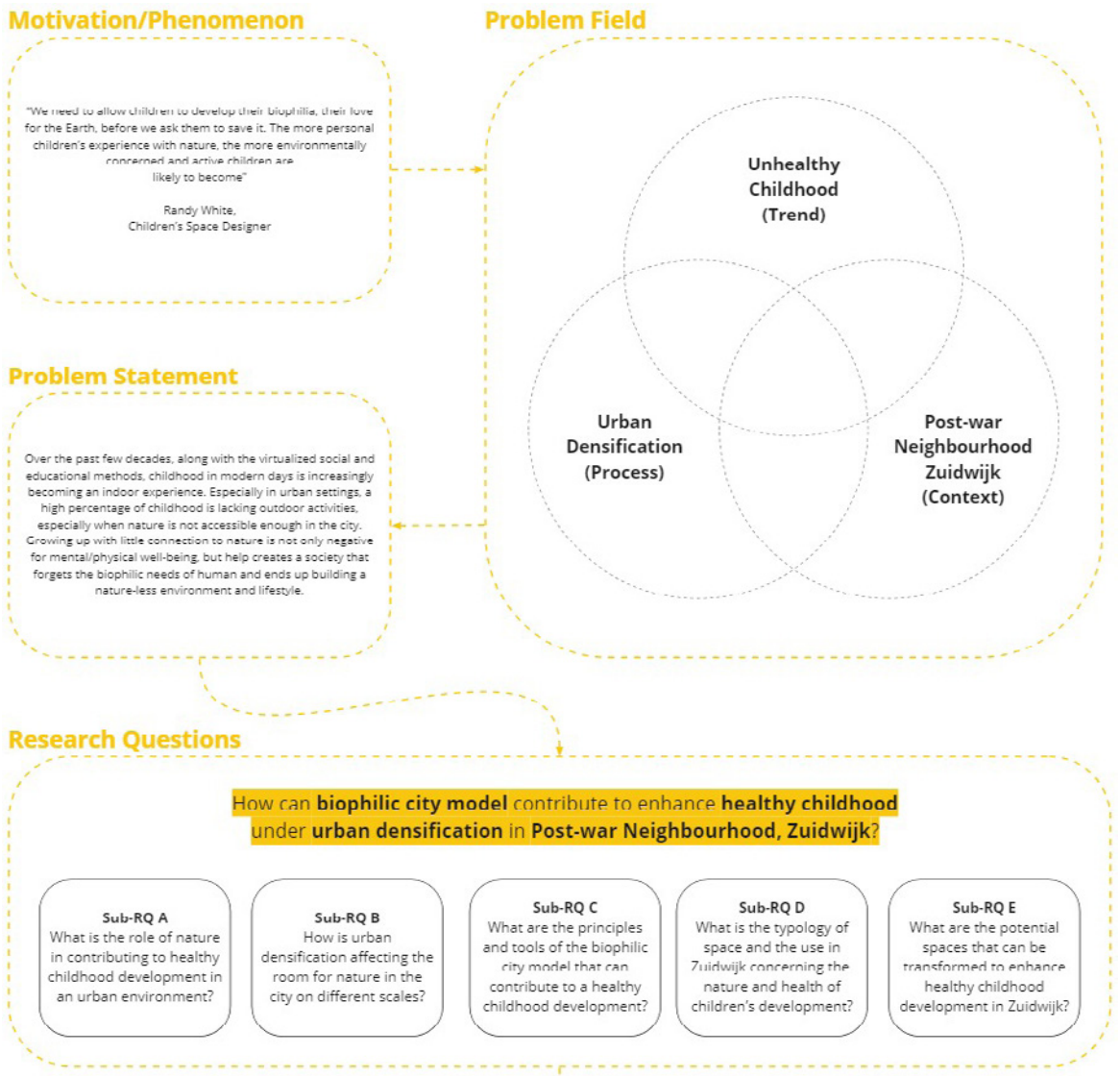
Sub research question D
What is the typology of space and the use in Zuidwijk concerning the nature and health of children's development?

Sub research question E
What are the potential spaces that can be transformed to enhance healthy childhood development in Zuidwijk?

2.4 Analytical Framework

Research Background

Vision / Goals



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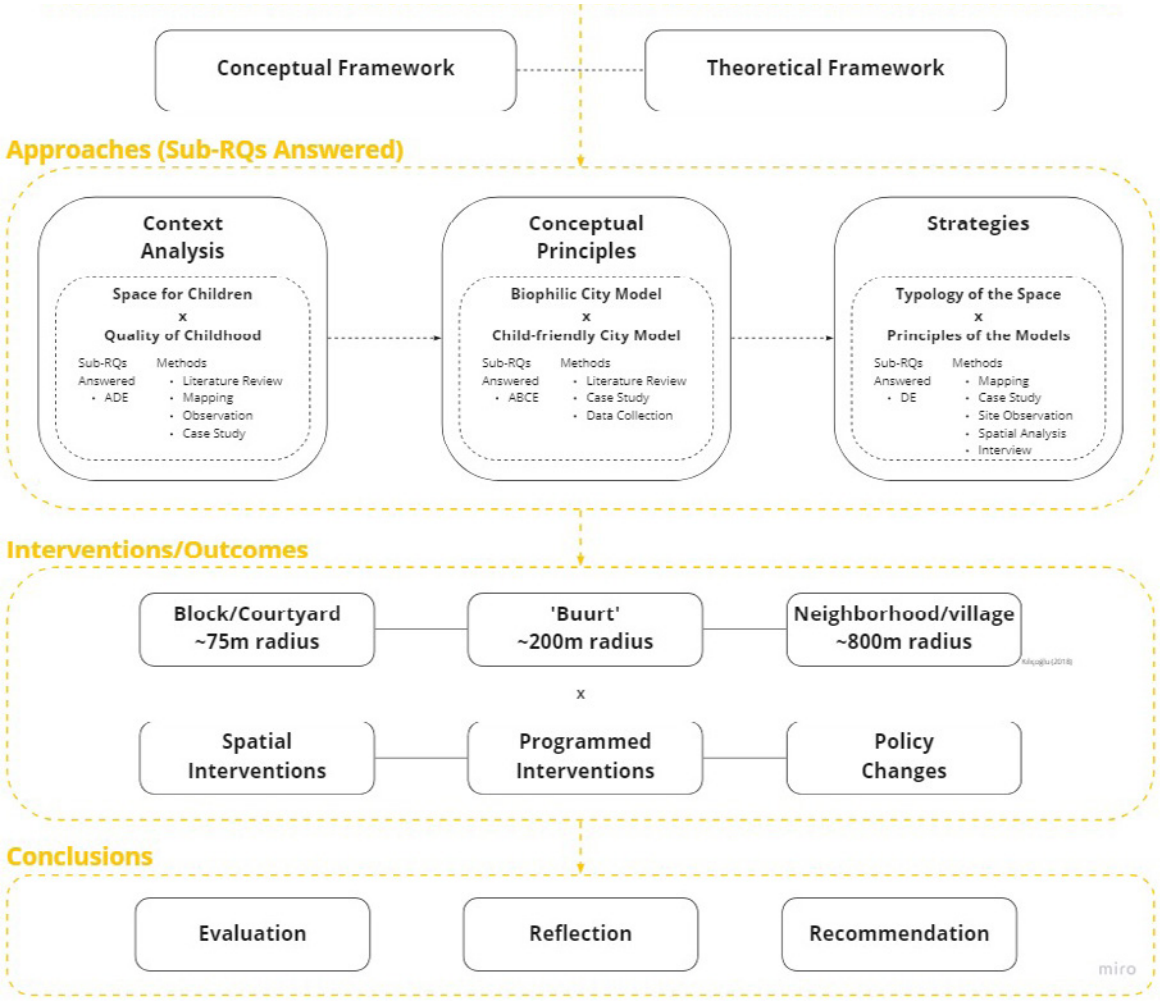


Methods / Analysis

Test / Realization

Fig. 2.3 Analytical Framework. Source: Author

2.5 Methods

Establishing the overall framework of the research, the next section in the methodology is to find tools and methods to realise every step of the research. This section will be explaining the methods that are useful and effective to answer the research questions, and how it will be used in the research.

Literature Review

(Answering the Sub-Question ABC)

The method of literature review will mainly be conducted in the early stage of the research. The purpose is to establish the foundation of the research. It is used to understand and reveal the issue and the gap between known knowledge and the opportunity of research or experimental design of this research. Concluding from the literature review, some of the principles can be revealed to further guide the planning and design stage of the research.

Case Study

(Answering the Sub-Question ABC)

This project will be focusing on two types of case studies: the child-friendly design and the biophilic city planning and design. The case study will be emphasizing on how the projects measure and identify the context, and how they develop the strategies to reflect on those problems.

Data Collection

(Answering the Sub-Question BE)

The method of data collection can be done with statistic review or historical study from the published reports and statistic materials. It is essential to collect enough data to understand the context and the problem with an evidence based background.

Mapping

(Answering the Sub-Question BDE)

With the information that is gathered from other methods, the data will be mapped with different layers to show the spatial relation between each material. By mapping and overlapping the information, we can reveal the problems with spatial perspective, and see the potential solution while understanding the interrelation.

Site Observation

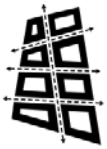
(Answering the Sub-Question DE)

Site observing is the method that collects first-hand data from visiting the site and observing the critical aspect for the project. For this project, the main focuses will be the children's activities and the use of the public space in the neighbourhood, and the connection to the natural or outdoor amenities that are located around the neighbourhood.

Spatial Analysis

(Answering the Sub-Question BDE)

With the materials gathered from the site observation and the base context maps from mapping data, spatial analysis can be done for different purposes in order to reveal the problem and potentials, and become the bridge to the decision making in the design process.



Interview or Questionnaire

(Answering the Sub-Question BDE)

The interviews and questionnaires will be conducted with the local residents in Zuidwijk and the people that are working in the neighbourhood to get an impression of how the users interpret the environment. This method is critical for filling the gap of second handed data and the real experience of the users.

2.6 Research Approach

The research approach is aiming to answer the sub research questions to solve the overall research question. According to Kılıçoğlu's research in 2018, the approaches will be focused on three main scales of space for children, and different domains and quality of childhood development.

The approaches can be separated in three steps. The content analysis will be studied in two aspects, the space for children and the quality of childhood. The conceptual principles will focus on concluding and extracting the principles of biophilic city model and child-friendly city model with literature review and case study. The last step, strategies forming, will be formed with the previous two steps, the typology of the space and the principles of the models.

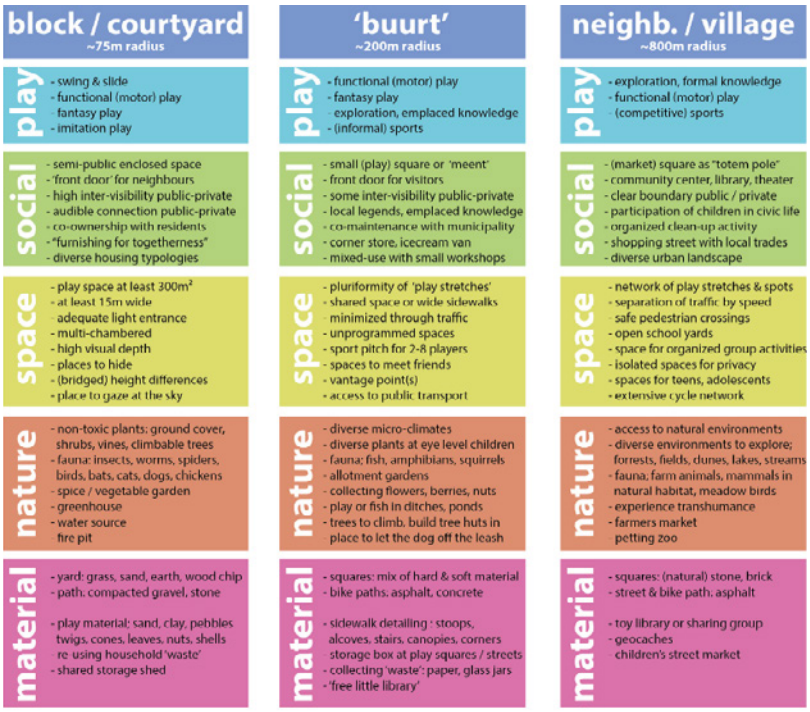


Fig. 2.4 Socio-spatial scales of childhood. Source: İhsan D. Kılıçoğlu (2018)

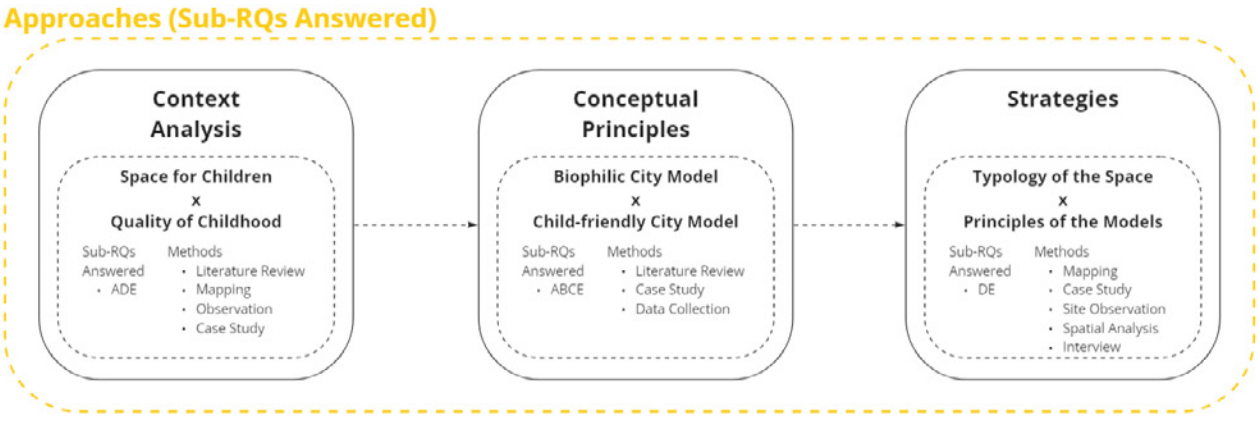


Fig. 2.5 Research Approaches. Source: Author

2.7 Intended Outcomes

The intended outcome of this thesis is to provide a spatial transformation method and urban design proposals to promote and test strategies that transform the city with nature into a healthier environment for children to live in.

The interventions will be focused on different scales of radius, which is accessible for different age groups of children. (Kılıçoğlu, 2018) The types of interventions will be formed in three main categories as Spatial Interventions, Programmed Interventions, and Policy Changes.

Combining the scale of the scope and the types of interventions, the research is aiming to develop a toolbox of transformation methods to a healthy urban environment for childhood development. In addition to the toolbox, different strategies will be tested with the context of the targeted neighbourhood in Rotterdam South to produce site-specific design proposals.

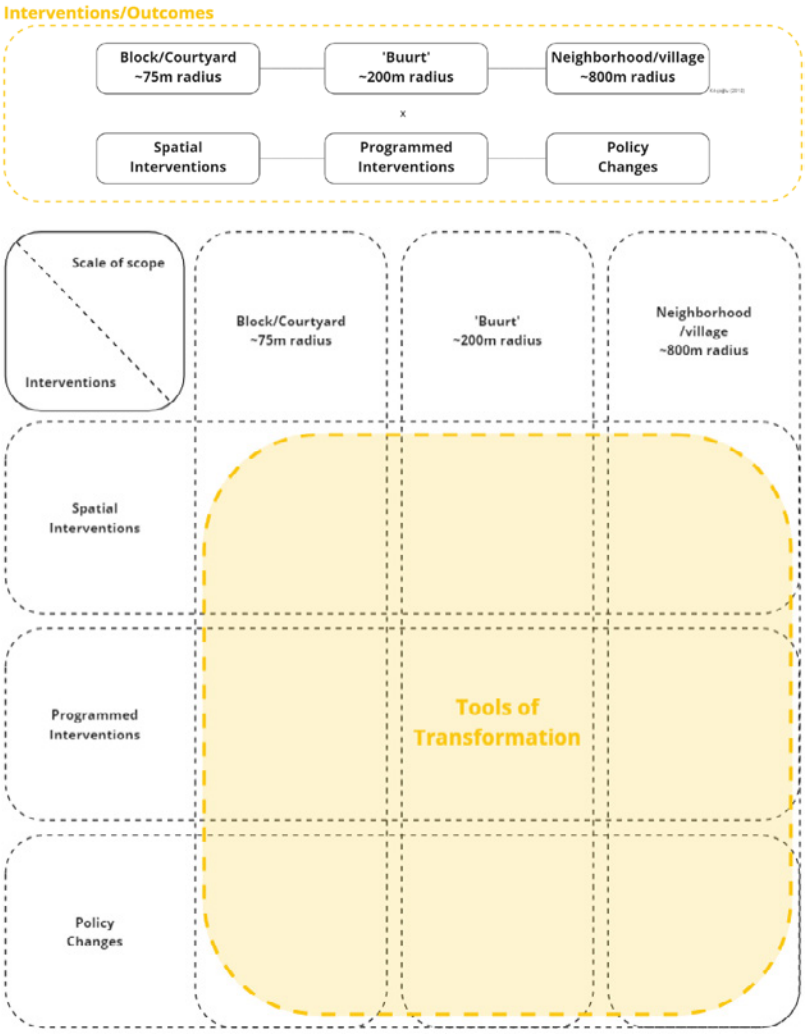
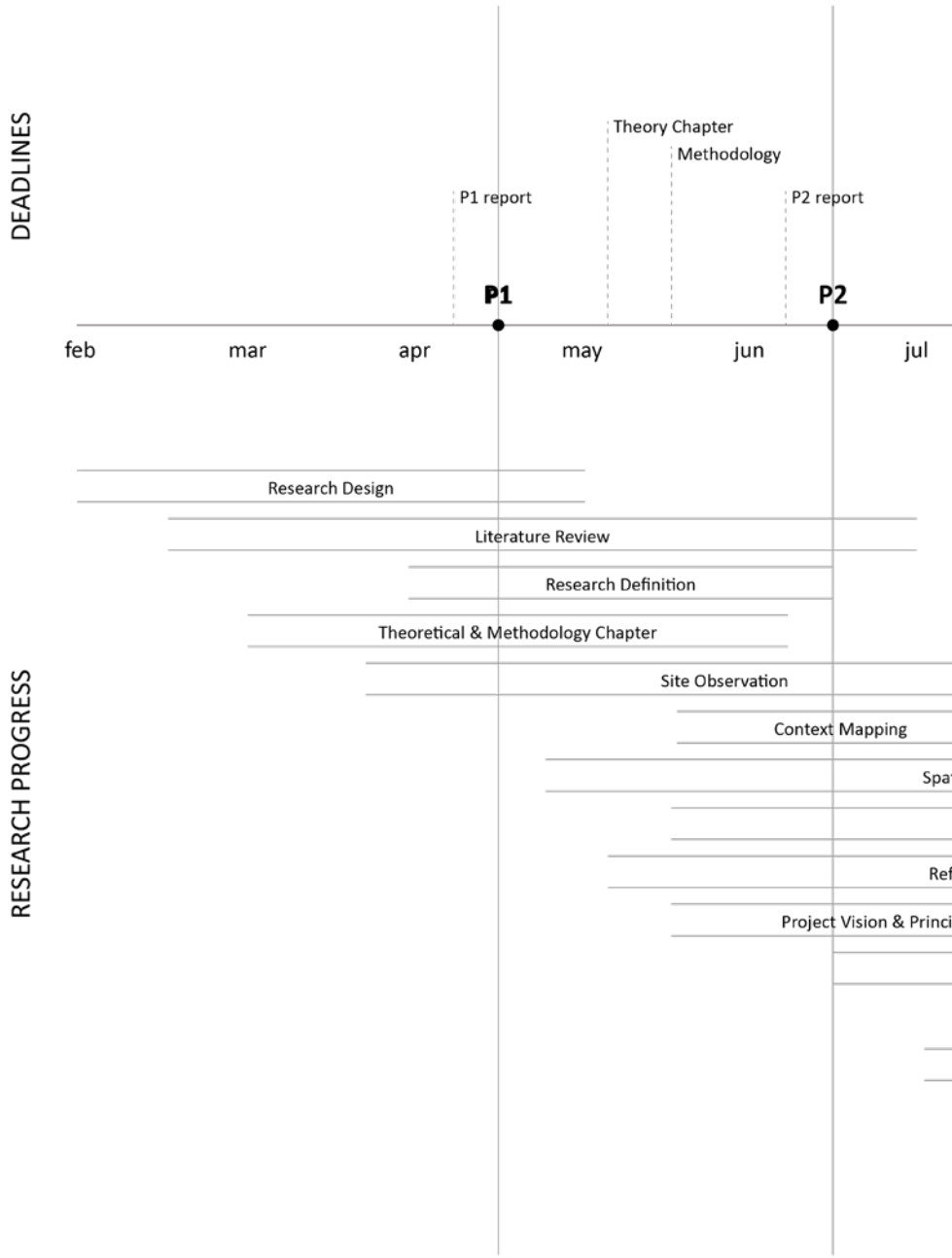


Fig. 2.6 Intended Outcome Diagram. Source: Author

2.8 Research Timeline



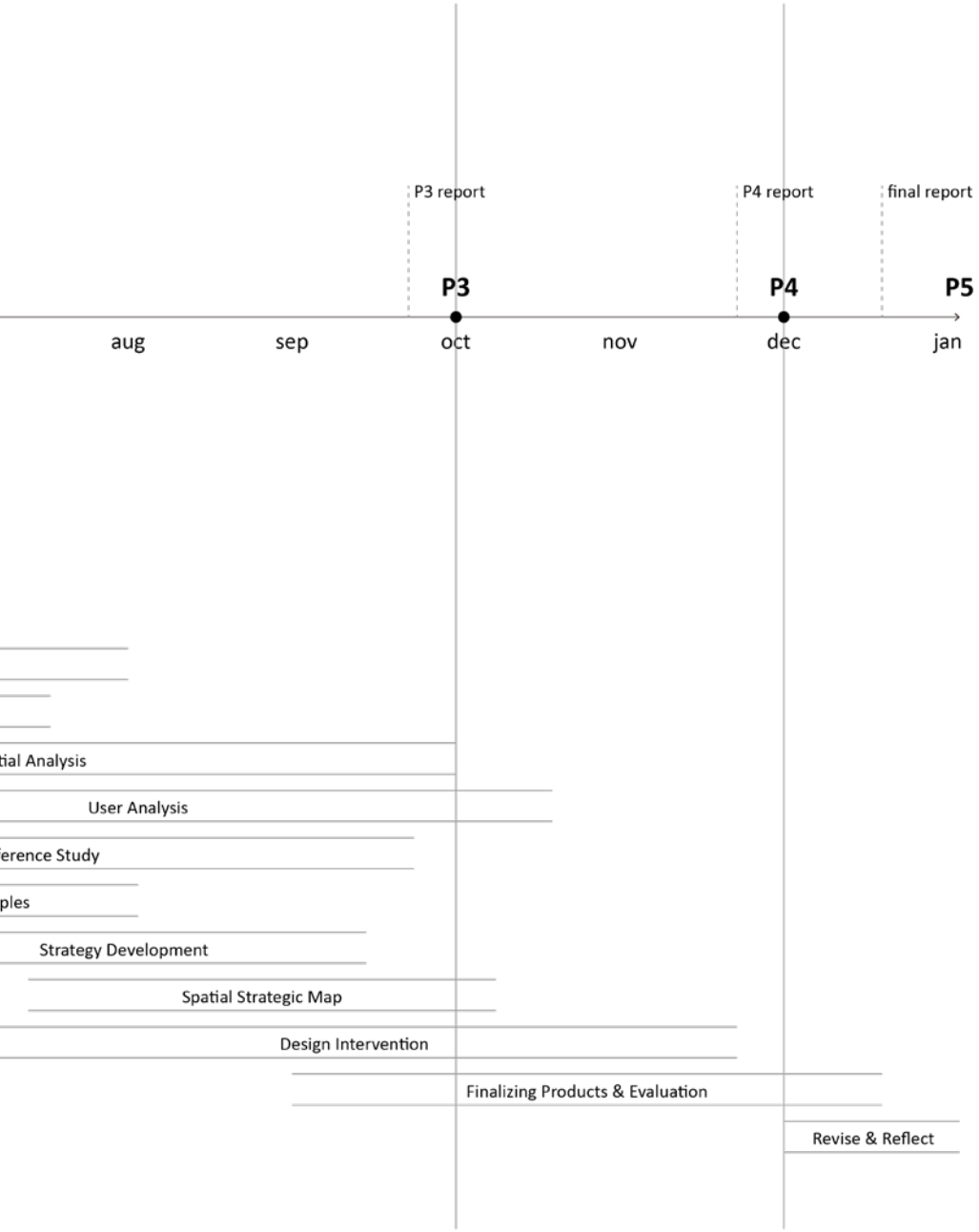


Fig. 2.7 Research Timeline. Source: Author

Photo of kindergarten Source: Author

3. Theoretical Chapter

3.1 The trend of Unhealthy Childhood

Natureless Childhood

Since the first two decades of the 21st century, along with the virtualized social and educational methods, childhood in modern days is increasingly becoming an indoor experience. Studies show that this trend is providing negative impacts on the health of children. “The decreasing outdoor & physical activities in school dramatically raised life-threatening childhood obesity with growing evidence that links physical exercise and experience in nature to mental acuity and concentration.” (Munter et al, 2004). Lacking time spent in outdoor spaces, children are prone to having insufficient nature experience, which is another critical factor to unhealthy childhood. As Louv stated in his book, Last Child in the Woods, “Nature-Deficit Disorder can change human behaviour in cities and its design, according to studies that show a relationship between the absence, or inaccessibility, of open space with high crime rates, depression, and other urban maladies.” (Louv, 2005)

The trend of unhealthy childhood has been facilitated even more with the process of urban densification. Children living in the densifying area can access a smaller range of space. (Fetto, 2002) They have lower freedom to play in outdoor public space. (L. Karsten, 2005) With the growing tension of the demand of space, formal and informal regulations are formed, which have been restricting the freedom of mobility for children, (Hillman & Adams, 1992) “As open space shrinks, overuse increases. The disappearance of accessible open space escalates the pressure on those few natural places that remain. Meanwhile, the regulatory message is clear: islands of nature are to be seen, not touched.” (Louv, 2005)

This unhealthy trend and densifying process can also be found in the Dutch context. “Comparing children’s play in the Netherlands in the 1950s and 1960s to child’s play in the first years of the 21st century, children today play outside less often and for briefer periods; they have a more restricted home range and have fewer, less diverse playmates.” (Karsten, 2005) According to a survey of students from seven Dutch secondary schools by Jana Verboom-Vasiljev, the love of nature is not a main value in many of the family. “About 75% of pupils thought there was only ‘a bit of interest’ for nature at home, and 11% said there was none. More than half never go to nature

reserves and parks, zoos or botanical gardens." With the spatial factor, the urban environment is providing insufficient nature experience. Adding the social aspect of the parenthood of generation that is lacking in the love of nature, it is becoming harder for children who are growing up in the city to develop their innate affiliation to nature.

Unfriendly Urban Environment for Children

The rapid trend of urbanization is contributing to the form of unfriendly urban environment to the children living in it. This trend is also increasing the urban challenge of growing towards an unsustainable future. In 2015, more than half of the population in the world, which is around 4 billions of people, lived in the cities. By 2030, the city population is expected to reach another billion people, which means the cities will contain 60 percent of the population in the world. (UNICEF, 2018) With the growing needs of accommodation in the cities, the urban expansion will increase the fragmentation of the built environment. The urban form can become less compact with less public space and centrality of the agglomeration. In various aspects, the expansion is contributing to many environmental, social, and economic issues. For children, according to Pieterse's study of child-friendly cities in the case of Wroclaw in Poland, the outflow of families from the city center is causing the safety problem for children due to the increase of traveling distance to the school. (Pieterse, 2012) Another example of the impact of urbanization can be seen in Belfast, Ireland from a proposal of ARUP. It shows that the city is not only growing, but growing less hospitable for children and their families. Children are the future of our society, while they have been increasingly neglected from the decision of the urban planning process, which results in an environment that limits the freedoms of children to expose to different experiences in order to develop their lifelong health and essential skills. (ARUP, 2020)

As the urban environment becomes the context of where most children live, a better way of shaping urbanization for children is not only essential to support children's needs, but also creating a better urban system as homes for the future generation. According to a report from unicef in 2018, we need to understand the vulnerabilities of children in urban settings (see Fig. 3.1) to offer them a healthier urban

and better future. (UNICEF, 2018) From the diagram, we can see that there are four categories of vulnerabilities of urban childhood. In the built environment category, it's mainly about the accessibility of children and their family to the urban services. The other three categories are focusing on the concern of children's health, protection and participation.

In terms of the design of the urban fabrics, reports are showing that the neighbourhoods and street design is crucial on the impact of the health of childhood development. Numbers of challenges on the street level are causing a health crisis on a global level. According to the research from the National Association of City Transportation Officials (NACTO), four crucial issues were highlighted as follows. Firstly, the road traffic crashes issue shows that globally, 500 children die each day from it, which is the top cause of death for people ages 5 to 29. The second topic is the ambient air pollution. Around 127,000 children under age of five die from air pollution worldwide. The third and the last issues are the mental health stresses and lack of physical activity. The exposure to noise pollution can lead to concentration problems, high stress level, and cognitive function reduction. With the facilitation of urbanisation, 81 percent of adolescents are insufficiently active in physical activities.

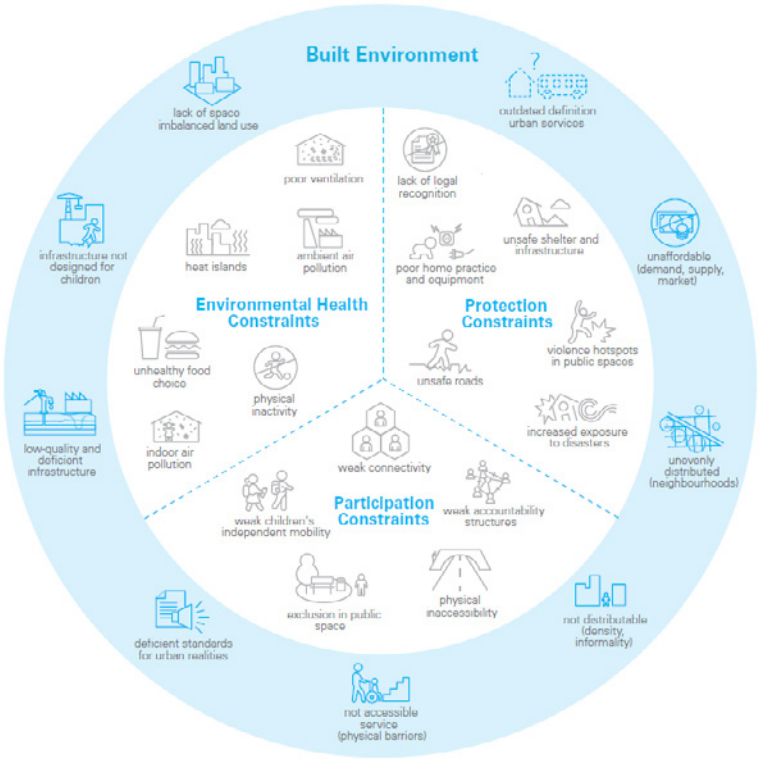


Fig. 3.1 Taxonomy of children's vulnerabilities related to the built environment.
Source: unicef, 2018

3.2 The Post-war Neighbourhood - Zuidwijk

Background of Post-war Neighbourhood

The origin of the post-war neighbourhoods can be dated back to the 1950s when the gap between population growth and the slow operating architecture market was increasing in the first few years of the post-war periods. Due to the lack of architectural materials from the insufficient infrastructure of the architectural profession, and the fall of the capitalism market, the housing production is starting very slow in the first few years. (Ouwehand, 2018) The trend of the growing gap of housing demand and the difficulties of producing sufficient accommodation from the free market is causing the first bloom of the post-war neighbourhoods. Since 1948, the government has started to intervene in the imbalance of demand and supply issues. The policy of stimulating housing production started to influence the market. The form of the housing was mainly produced for social rental purposes. (Ouwehand, 2018)

Structure of Zuidwijk

From the book 'De stad der toekomst, de toekomst der stad' (The City of the Future, the Future of the City) by Alexander Bos and Willem van Tijen, where they proposed a concept of 'connecting the neighborhood and community' for the city development based on their study during the war in Zuidwijk. (Van Wijk, 2019) The book was published with the study group, Studiegroep-Bos (Study Group Bos), in 1946 with the purpose of answering how to rebuild and develop the city of Rotterdam after the bomb in May, 1940. The planning of Zuidwijk was based on the vision of 'co-living in the city,' which was mainly related to the concept that was proposed from the Study Group Bos. Zuidwijk was also the first neighbourhood that was developed with this concept, which makes Zuidwijk a pioneer post-war neighbourhood. (Ouwehand, 2018; Van Wijk, 2019)

The Study Group was studying the concept of neighbourhood. Based on the historical and social references, they have proposed that the idea of neighbourhood is formed with different scales of urban components including the connection in between each element. (See Fig. 3.2) The lower schemes of Figure 02 are the concept that was proposed for post-war neighbourhoods. The concept of neighbourhood can be explained with the structure of the city as concentric circles.

Every circle represents different scales of components, such as, house, neighbourhood, district, and city whole. They are all related to each other and they all have different meanings on individuals and different scales of communities. They later pointed out that the intention of this scheme is not to divide the city into isolated provincial towns, but to bring residents into contact with the larger community and the city as a whole. (Ouwehand, 2018)

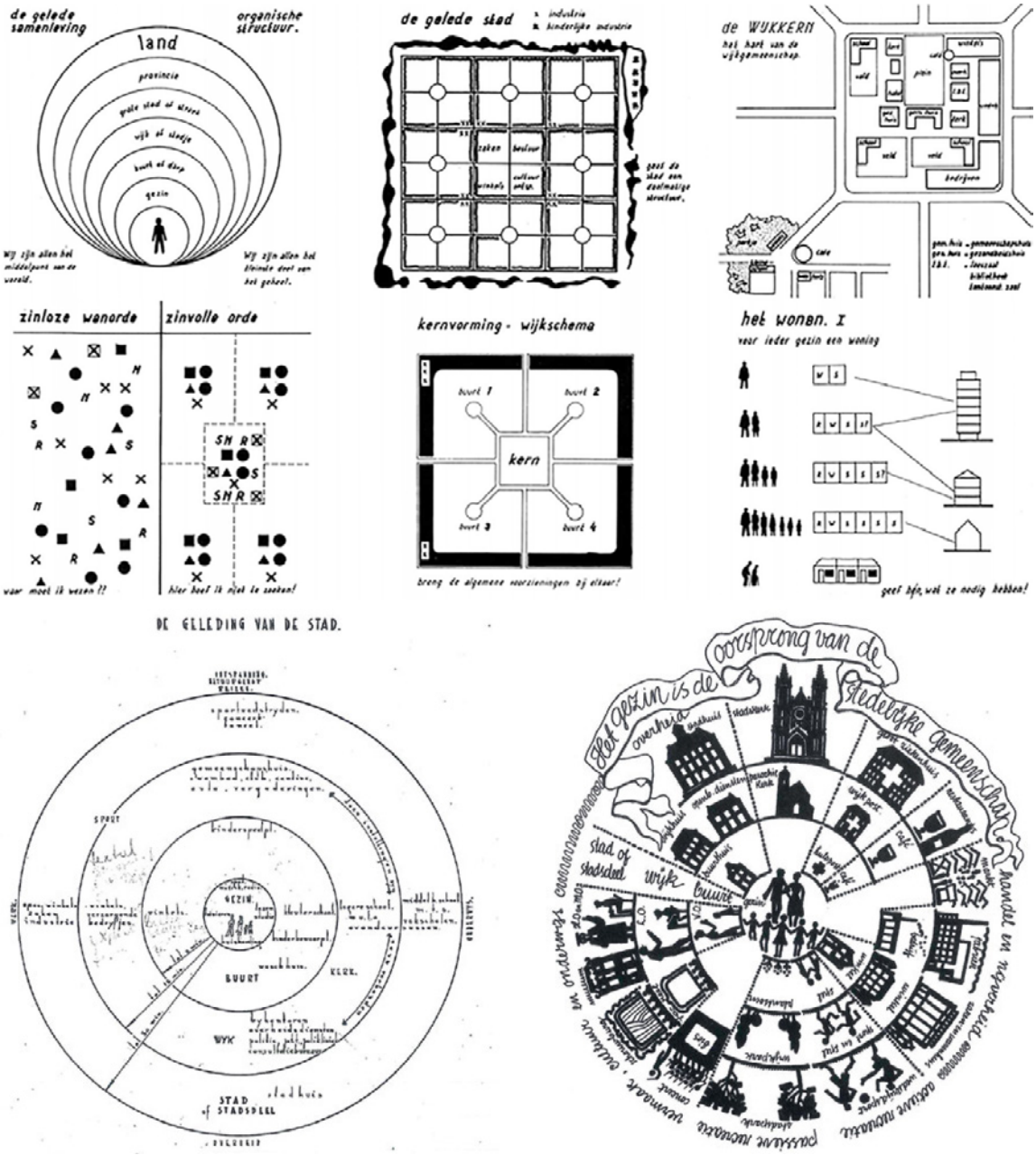


Fig. 3.2 The Articulation of the City. Source: Ouwehand, 2018

Nature in Zuidwijk

Speaking of nature in Zuidwijk, the design of public green from the post-war neighbourhood concept is clear to be seen in the structure. However, most of the 'public' green is no longer being publicly used, but becoming 'anonymous' green lands that are not recognised nor attached by the residents. The urban green was redefined in the new concept of post-war neighbourhoods which can be articulated with hierarchical layers as; the residential green, the block green, the neighbourhood green (het buurtgroen), district green (het wijkgroen), and the city green (het stadsdeelgroen). (Merriënboer, 2011) The public green concept was clearly implemented in Zuidwijk. It was the first time where most of the people could have the opportunity to live in a wide residential area with greens and shadows. (Van Wijk, 2019)

There are two characters of public green in the post-war neighbourhood, the public frontyard, and the courtyards. On the one hand, the public front gardens were introduced under the influence of Scandinavian urban planning and architecture. The main purpose of the public front gardens was to create a more architectural unity along the facades. The idea was started from the urban planner, the architect, and the landscape architect in pursuit of unity between residential blocks and outdoor space. However, more and more of these spaces that were originally designed for pedestrians and greens were occupied by cars with the trend of increasing ownership of vehicles. (Merriënboer, 2011; Van Wijk, 2019) The second character is the 'binnentuinen' (courtyard), which was already well known by the public before World War II. The idea of these courtyards was for the public use in rental residential housings that are usually three to four stories high. The courtyard has an important meaning of connecting the block socially and spatially. Compared to the pre-war housing complex that divided the inner courtyards into cluttered private gardens, the new communal courtyard was referred to as the 'outdoor living space' in the post-war years. Unfortunately, part of the courtyards were quickly sacrificed for the increased car ownership in the 1960s and 1970s. (Merriënboer, 2011) The image of the public green then becomes children playing beside the parking lots where the gardens became a green for viewing instead of using.

What are the possibilities to transform?

Situations have changed a lot since the 1950s, thus the accommodation capacity and living quality of post-war neighbourhoods are no longer sufficient for the requirement and demand of the society today. Including Zuidwijk, many post-war neighbourhoods are facing large-scale regeneration processes. (Van Wijk, 2019) According to Van Wijk's interviews with the residents in Zuidwijk, the public spaces are losing its public function to the neighbourhood. Except for serving as circulation purpose, residents are not using the public space often thus have nearly zero sense of responsibility to it. Children are rarely using the courtyards due to the weather condition and the social restrictions from their family or cultural backgrounds. Most of the time in a year, the courtyards are anonymous, no one feels responsible to it nor feeling the sense of belongings in their living environment. (Van Wijk, 2019) It is clear that there is a great gap between the origin purpose of these public spaces and how they are now as anonymous spaces. The gap brings the weakness of the post-war neighbourhood but also shows the opportunity for interventions to kick in.

With the different scale of public green in the city, children are able to access to a certain range of distance within different age groups. (Kılıçoğlu, 2018) Each scale serves different functions to the children's everyday life. (See Fig. 3.3) Compared to the public green hierarchical layers, it would be the scales from the residential green to the district green. The transformation therefore should be targeted on the relation of the spaces and the children within these scales.

Fig. 3.3 Socio-spatial scales of childhood. Source: İhsan D. Kılıçoğlu (2018)

3.3 Biophilic & Child-friendly City

Concerning the increasing threat of unhealthy childhood development under the rapid urbanization process, and the opportunities that are brought by the anonymous public green in the post-war neighbourhoods, the city should thrive for providing a better quality of urban nature to take care of our future generation. In this section, we will be looking at the concept of Biophilic City and Child-friendly City to see what are the possibilities that could be the new future of a healthy Zuidwijk.

Biophilic City

What are biophilic Cities? 'Biophilia' was defined by E. O. Wilson, American biologist, in 1984 as 'The innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature.' Except for the innate demand to connect to nature, many researches have proved that urban nature, in many forms, can help to foster social relationships and networks, and even build friendships that in turn yield significant health benefits and contribute to emotional resilience. (Beatley, 2016) According to the Biophilic Cities Pledge that was proposed by Timothy Beatley, a biophilic city is in spatial, social, organisational aspects, a nature abundant city that citizens are well developed with their biophilia in their everyday life. (See Fig. 3.4, 3.5) However, the city and society we have been building today are disconnecting children from nature, which leads to the result that children growing up in the city today, often feel a fear of nature, and a fear of the outside world. (Louv, 2005)

To implement nature into the urban environment, we need to understand the natural experiences existing in our environment in different forms. The Nature Pyramid shows us that nature experience happens on different scales with various frequency, duration, and intensity of immersion. (See Fig. 3.6)

What Are Biophilic Cities?

- a city of abundant nature
- where citizens have rich daily contact with the natural environment
- where citizens have nature nearby
- where larger natural areas and deeper nature experiences are an easy walk, bike or transit ride away
- where the urban environment allows for and fosters connections with diverse flora, fauna, and fungi
- where citizens spend extensive time outside, learning about, enjoying and participating in the natural world
- where leaders and elected officials place nature at the heart of their decision making
- where every major planning and development decision is judged by the extent to which nature is restored and connections with the natural environment enhanced

Fig. 3.4 Biophilic Cities Pledge. Source: Beatley, 2016

Principle of Biophilic Design

1. Biophilic design requires repeated and sustained engagement with nature.
2. Biophilic design focuses on human adaptations to the natural world that over evolutionary time have advanced people's health, fitness and wellbeing.
3. Biophilic design encourages an emotional attachment to particular settings and places.
4. Biophilic design promotes positive interactions between people and nature that encourage an expanded sense of relationship and responsibility for the human and natural communities.
5. Biophilic design encourages mutual reinforcing, interconnected, and integrated architectural solutions.

Fig. 3.5 Biophilic Design Principle. Source: Kellert, 2015

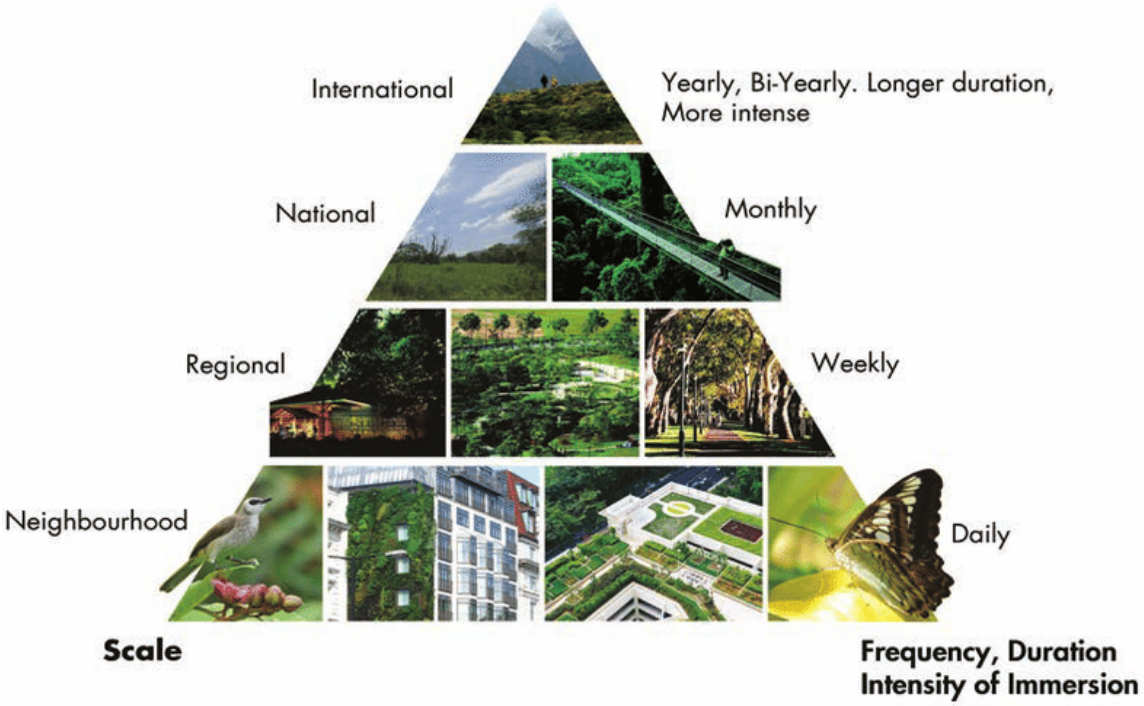


Fig. 3.6 The Nature Pyramid. Source: Singapore National Parks Board

How do we approach developing biophilia in the city? According to the Yale professor Stephen Kellert, there are five main principles of biophilic design. (See Fig. 05) In summary, the principles are aiming to sustain and encourage human interaction and emotional attachment to nature, in order to create a community that has positive relationships and a sense of responsibilities with nature. Kellert also proposed an attribute of biophilic design that includes three types of nature experience design elements. The elements also represent the multisensory aspect of nature experience in biophilic design. The first section is 'direct experience of nature' which includes commonly known natural elements such as, lights, air, water, plants, animals, weather, natural landscapes, and ecosystems. The second section is 'indirect experience of nature' which are elements that use natural materials to provoke the connection to nature in a built environment or using man-made materials or structure to imitate the nature patterns. The last one is 'experience of space and place' which relates the broader environmental psychology aspects. This section includes prospect and refuge, organized complexity, integration of parts to wholes, transitional spaces, cultural attachment to place, etc. (Kellert and Calabrese, 2015) To elaborate the ideas from those three types of design elements, Terrapin Bright Green LLC. has developed a report proposing arguments about 14 patterns of biophilic design. (See Fig. 3.7) These patterns provide practical design ideas to achieve the intention to implement biophilia indesign.

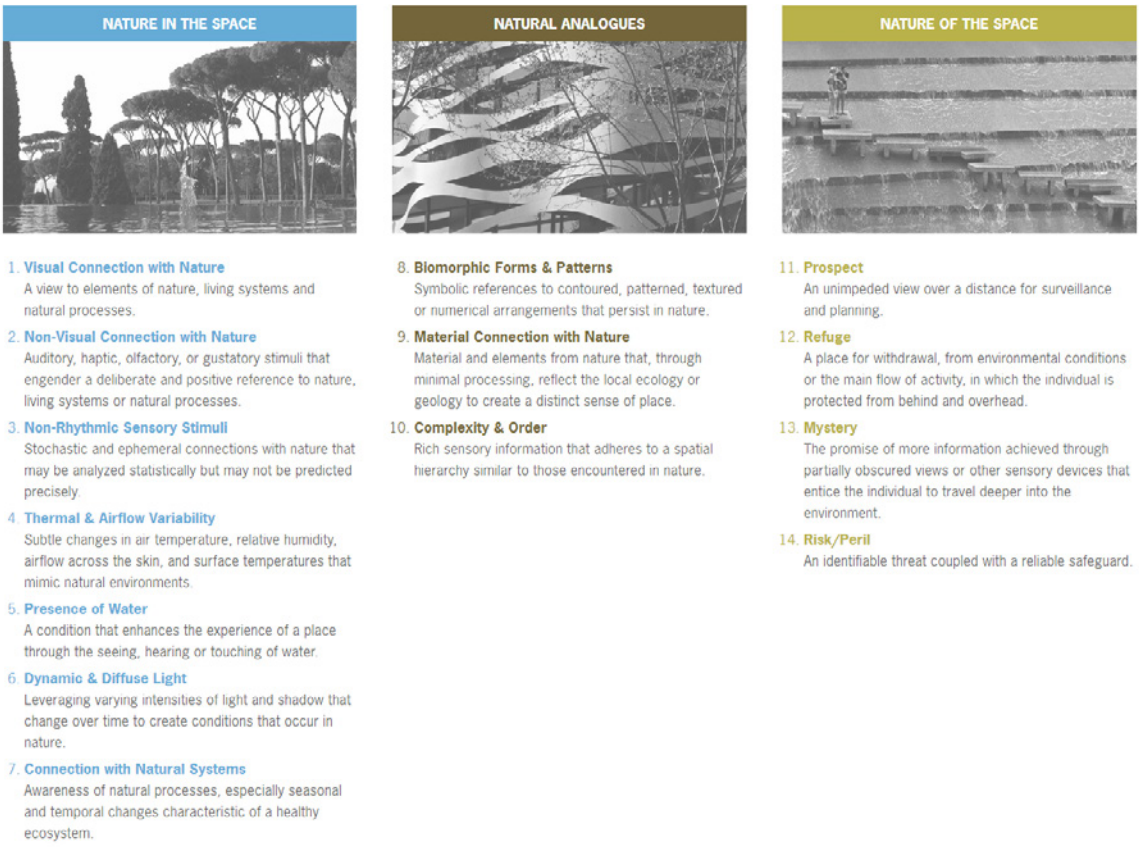


Fig. 3.7 14 Patterns of Biophilic Design. Source: Terrapin Bright Green LLC., 2014

Child-friendly City

A child-friendly city was defined by the United Nations Children's Fund (UNICEF) as follows, 'A child-friendly city is a city, town, community or any system of local governance committed to fulfilling child rights as articulated in the Convention on the Rights of the Child. It is a city or community where the voices, needs, priorities and rights of children are an integral part of public policies, programmes and decisions. Thus, a child-friendly city is a city that is fit for all.' In their Handbook of Child Friendly Cities and Communities, they stated four guiding principles to achieve child-friendly cities on a global level. Those principles are as follows,

1. Non-discrimination on children of any conditions.
2. Best interests of the child: primary consideration in all actions concerning children.
3. The inherent right to life, survival and healthy development
4. Respect for the views of the child: have the right to voice their opinions and have their opinions considered in decisions that affect them.

Understanding the general concept of child-friendly cities and the principles, as urban planners and designers, we need to consider the spatial condition in relation to this topic and its social aspect. In the report by UNICEF in 2018, Shaping urbanization for children: a handbook on child-responsive urban planning, they organized the children activities in a chart based on the urban scales and their correlated functions and accessibility. (See Fig. 3.8) In this figure, we can see the possible space for interventions in multiple scales for different age groups of children and the related urban spaces.

By developing child-friendly cities, we are not only achieving to protect the rights of children and the sustainability pillars, but also creating benefits in many aspects to the whole society. The following figure was proposed by UNICEF to explain the benefits of developing child-friendly cities. The benefits are divided in five areas: Health, Safety, Citizenship, Environmental Sustainability, and Prosperity. (See Fig. 3.9) From a practical case, Urban Childhoods Belfast City Centre, by ARUP in Belfast, Ireland, we can see that child-friendly planning and design is not only the purpose, but also the strategy to achieve resilience in the city.

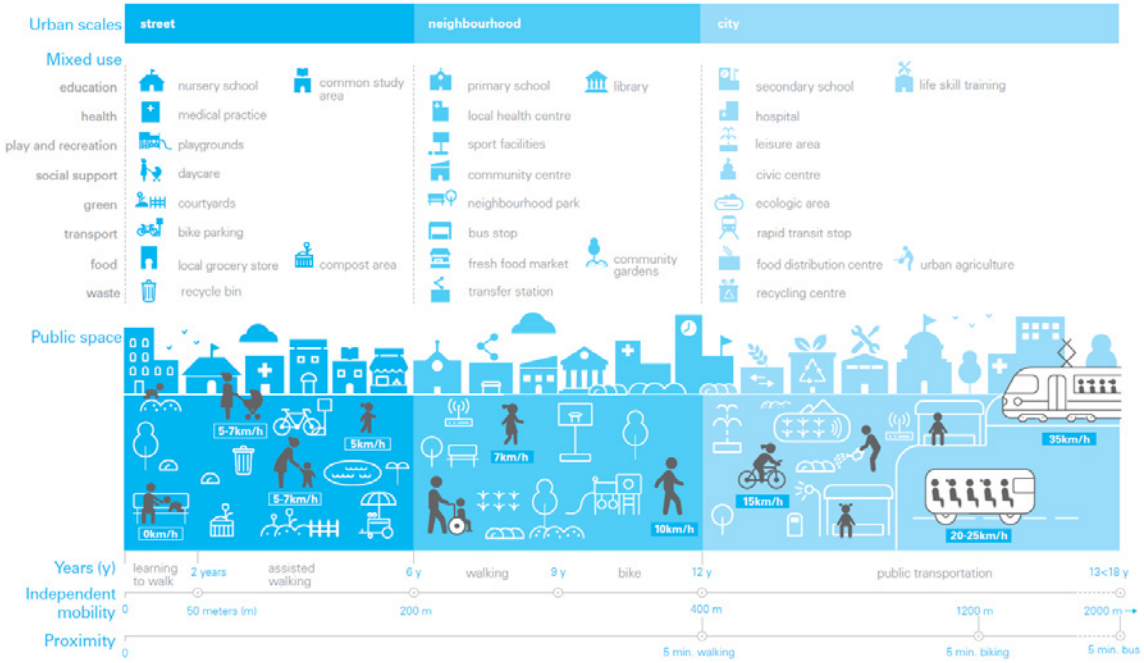


Fig. 3.8 Space and scale of urban childhoods. Source: UNICEF, 2018

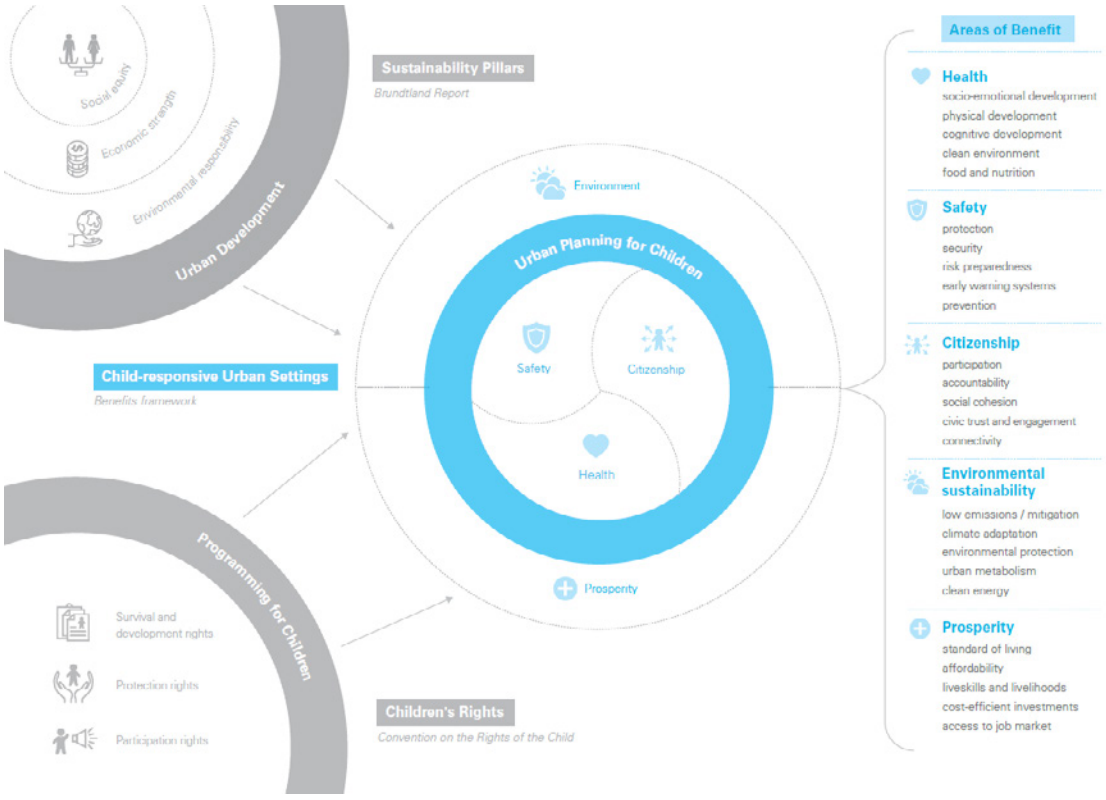


Fig. 3.9 Child-responsiveness and five areas of benefit. Source: UNICEF, 2018

3.4 Governance & Policy

Following the trend, the context, and the city models, it is crucial to also look at the current condition and governance of the context to build upon the existing policy or to seek for better adjustment. In this section, we will be looking at some programmes that were published by the municipality of Rotterdam, and are operated by the collaboration of public and private sectors. The city of Rotterdam was once rated as the worst Dutch city in terms of child-friendliness in the early years of 21 century. (Lefaivre, 2007) However, the city of Rotterdam proposed a project, Programme Child Friendly Rotterdam, in 2007, in order to improve its child-friendliness. The programme aims to:

1. Enhance the city as a residential location
2. Keep families in the city
3. Strengthen the economy
4. Improve the quality of life for children from 0 to 18 years

The programme developed an urban planning method, Building Blocks for a Child Friendly Rotterdam, to scan neighbourhoods on their degree of, and potential for, child friendliness. The method consists of four building blocks: Child Friendly Housing, Public Space, Facilities, and Safe traffic routes. In relation to the research, the method suggested minimum space suitable for playing in housing and public space, especially the use of the space between front door and street level (liminal space). It also recommended increasing the nature elements and variation on play areas. For buildings and facilities, it states that shops, sports clubs, and schools are generally highly appreciated by parents and children, which contribute to the liveliness of a neighbourhood with social cohesion. The last building block focuses on encouraging children to explore the city and engage in city life more independently by limiting car speed and access, and locating public amenities at strategic points. (Municipality of Rotterdam, 2010)

Since 2013, the municipality has been developing a playground policy, which today, has created 56 playground associations (speeltuinverenigingen) that receive a subsidy from the municipality. (See Fig. 3.10, 3.11) However, they no longer have the obvious strong position in the neighbourhood as before, and the number is declining as well.

The project, Action Program Speeltuin Associations, is aiming to create more spacious and accessible playgrounds, and increase the use intensity, which includes 5 strategies:

1. Open and semi-open playgrounds to be more accessible.
2. The playground as a meeting place for the neighborhood.
3. The multifunction sports and play area.
4. Increasing nature in the playground to create challenging and creative play behaviours.
5. Flexible layout of playgrounds to adjust along the development of the neighbourhood.

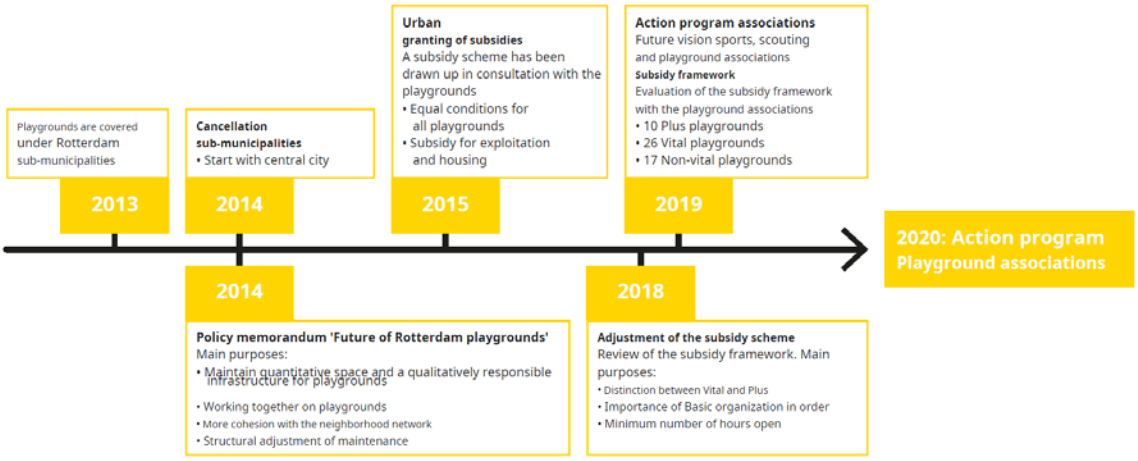


Fig. 3.10 Timeline of Playground Policies. Source: Municipality of Rotterdam, 2020

Fig. 3.11 Location of Playground Associations. Source: Municipality of Rotterdam, 2020

3.5 Conclusion & Principles

As noted by author Joe L. Frost: 'For the first time in history, the children of entire industrialised nations are losing their natural outdoor grounds for play and forgetting how to engage in free, spontaneous outdoor play. The consequences are profound.' (Forst, 2010) To achieve the sustainable and resilience goals of the future society, we need to thrive to put children in priority with our decision making process.

From the literature review of the trend of unhealthy urban childhood, it is clear that the lack of natural experience is highly crucial to the unhealthy childhood in the urban settings. The current urban development and design process that tends to neglect children's needs are also one of the main reasons that children today can hardly fully develop their potential and stay healthy physically and mentally. With the study of the post-war neighbourhood, Zuidwijk, we can see that the structure of the neighbourhood resulted from a vision to connect people together to the larger community. However, the modern lifestyle of car use has sacrificed the public open space for children or adults to be active in natural outdoor spaces that are right in front of their home. The next section we reviewed the principles and influence of the two city models, Biophilic City and Child-friendly City. As noted by Natalia Krysiak in her report, Designing Child-Friendly High Density Neighbourhoods, 'Ultimately, designing child-friendly neighbourhoods will not only provide the best possible developmental outcomes for our youngest citizens, it will also create more inclusive and liveable higher-density neighbourhoods for everyone to enjoy.' (Krysiak, 2020) In the last section we reviewed the related programmes from the municipality to see the past and future direction of child-friendly development. Without a doubt, nature in the city is a key factor and a powerful tool for urban planners and designers to build a better environment and society to make healthy childhood development possible in the urban settings.

The chapter presented the problematic trend of urban childhood and the specified issues and governance projects in the context of Zuidwijk and Rotterdam. Concluding the above, six principles (See Fig. 3.12) were developed with three main goals:

1. Increase quality of nature experience. (environmental)
2. Enhance inclusive access to nature for children. (social)
3. Create attractive space for families & children. (economy)

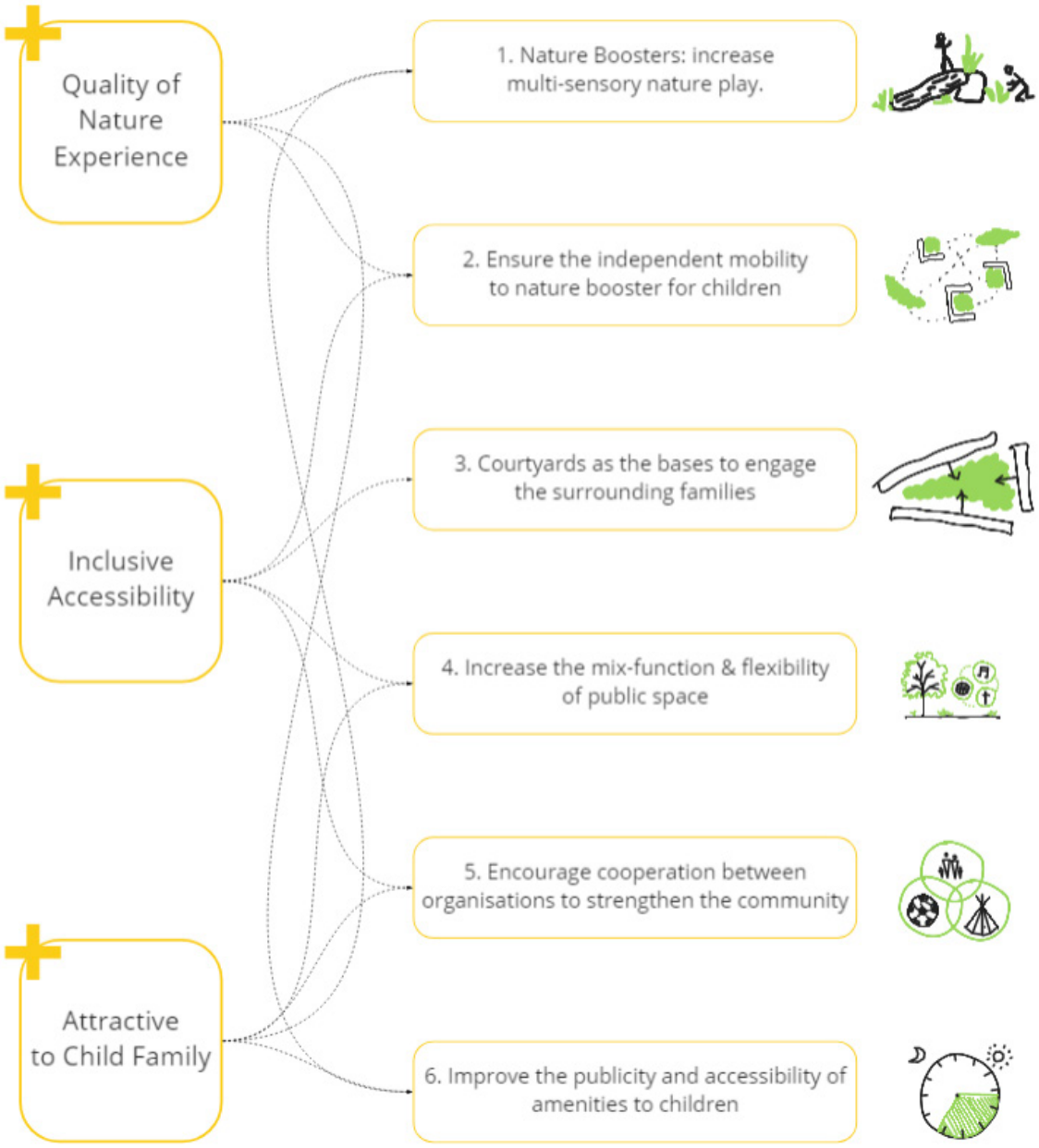


Fig. 3.12 Principles. Source: Author

Fig. 00 Photo of kindergarten Source: Author

4. Design Hypothesis

4.1 Context

4.2 Site Analysis

4.3 Strategic Map

4.4 Reference Cases

4.1 Context - Zuidwijk

The context of this research is focused on the post-war neighbourhood, Zuidwijk, as discussed previously. (See chapter 3.) Zuidwijk is one of the highest in population density among all the neighbourhoods in Rotterdam. As children are the main focus of this project, the population of 0-17 years-old children were used here to point out that Zuidijk, with a 21% of children population, compared to the city of Rotterdam which consists 18.7% of young population, is where this unhealthy childhood phenomenon can be discussed at.

Fig. 4.1 Location of Rotterdam. Source: Apple Maps

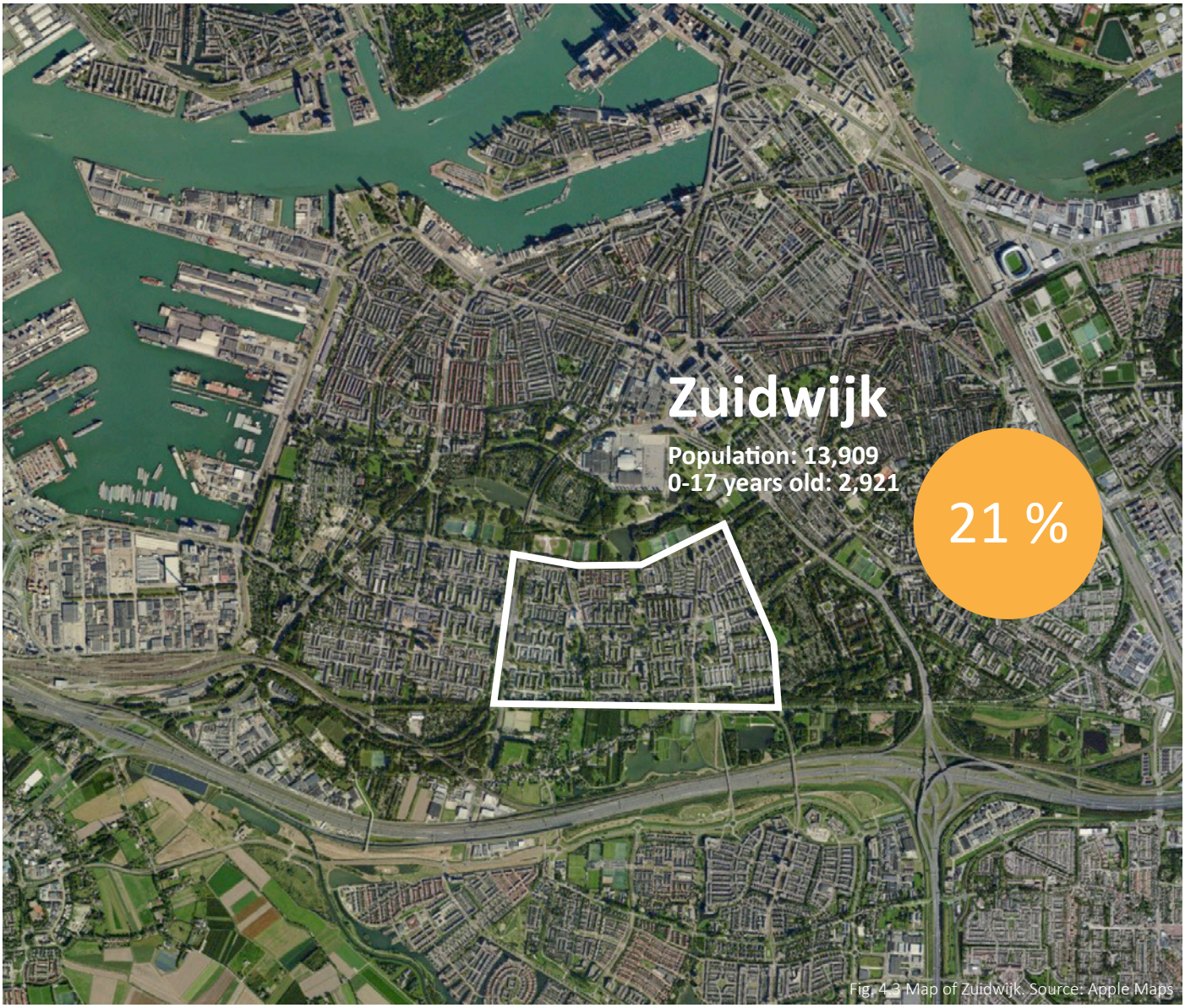


Fig. 4.3 Map of Zuidwijk. Source: Apple Maps

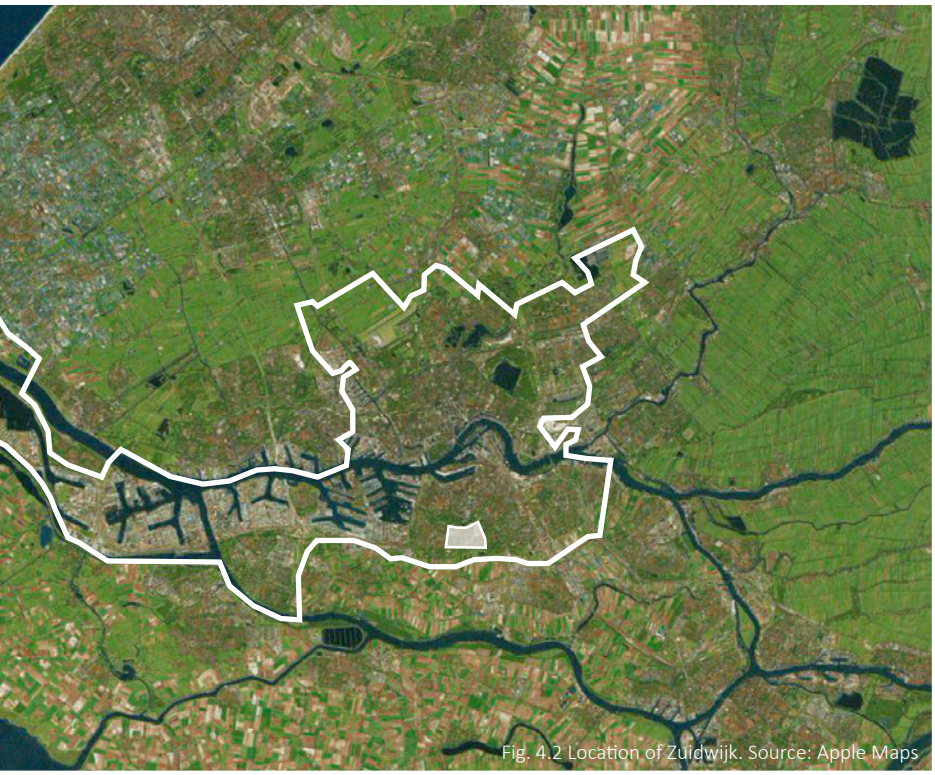


Fig. 4.2 Location of Zuidwijk. Source: Apple Maps

Rotterdam

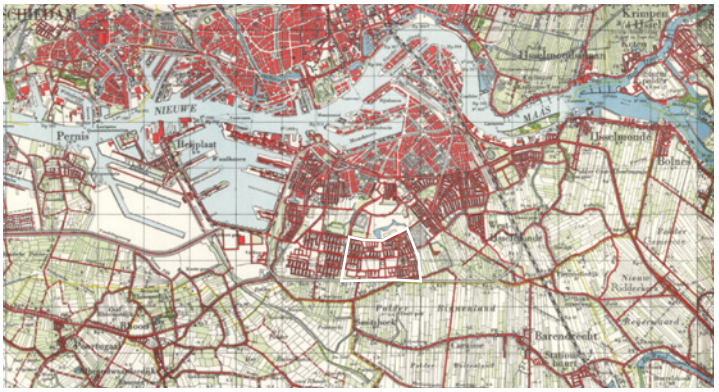
Population: 651,269
0-17 years old: 121,787

18.7 %

Data Source: Gemeente Rotterdam onderzoek 010

Zuidwijk is a neighbourhood located in the southern part of Rotterdam with well connected public transportation to the city center. From the historical point of view, Zuidwijk has been developed since 1945. Most of the area in Zuidwijk was fully developed around 1980. Until the year of 2000, it was on the edge of the agglomeration of Rotterdam. However, in 2020, we can see that with the development of the southern neighbourhood, Zuidwijk is no longer at the position of the edge of the city. (See Fig. 4.5)

Fig. 4.4 Aerial View of Zuidwijk. Source: Apple Maps edited by author



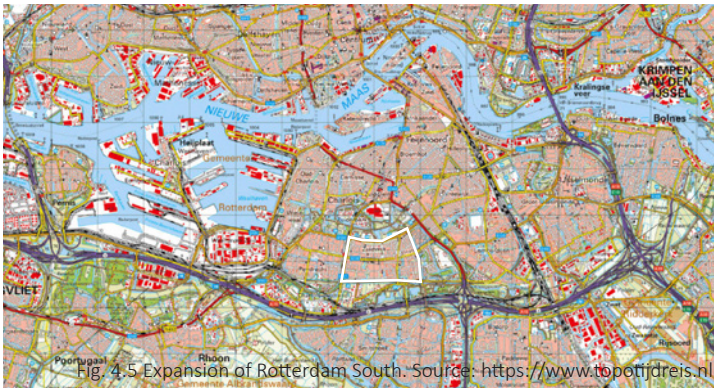


Fig. 4.5 Expansion of Rotterdam South. Source: https://www.topotijdreis.nl

Zooming in to the approximately 1km range of Zuidwijk, we can see that Zuidwijk is surrounded by large area of green areas. However, many of those are hardly accessible for children or even private. The Slinge is the main road in the center of Zuidwijk connecting the neighbourhood to the city center and to the highway. Seeing from the building age, Zuidwijk was mainly constructed during 1945-1985. From 1985 onwards, new tyoes of stamp houses were built on the east side of the neighbourhood. Some small range of reconstruction were also being done in recent years. (See Fig. 4.7)

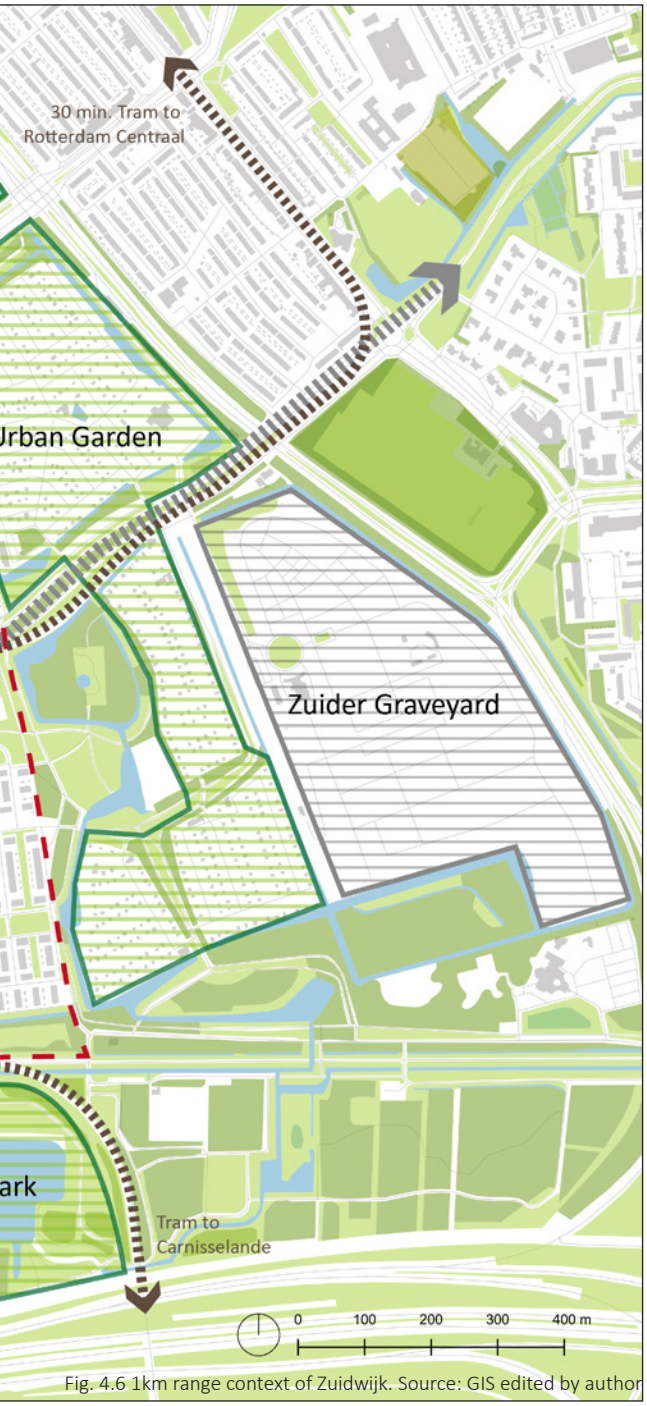


Fig. 4.6 1km range context of Zuidwijk. Source: GIS edited by author

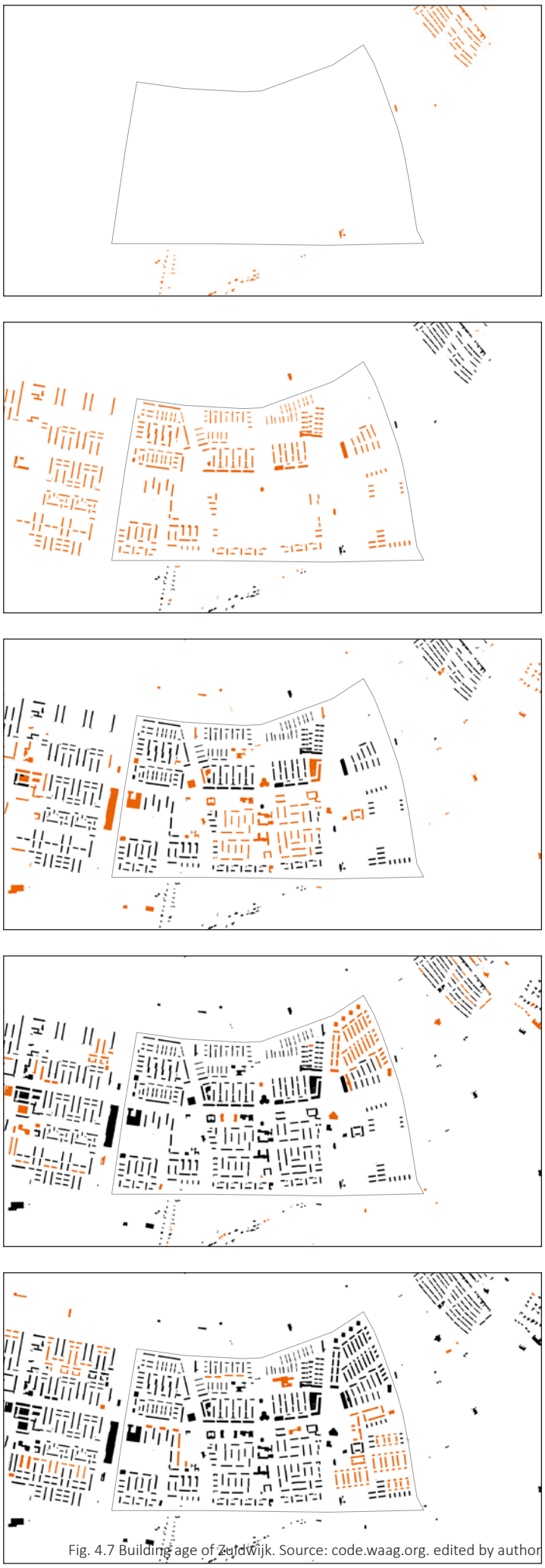


Fig. 4.7 Building age of Zuidwijk. Source: code.waag.org. edited by author

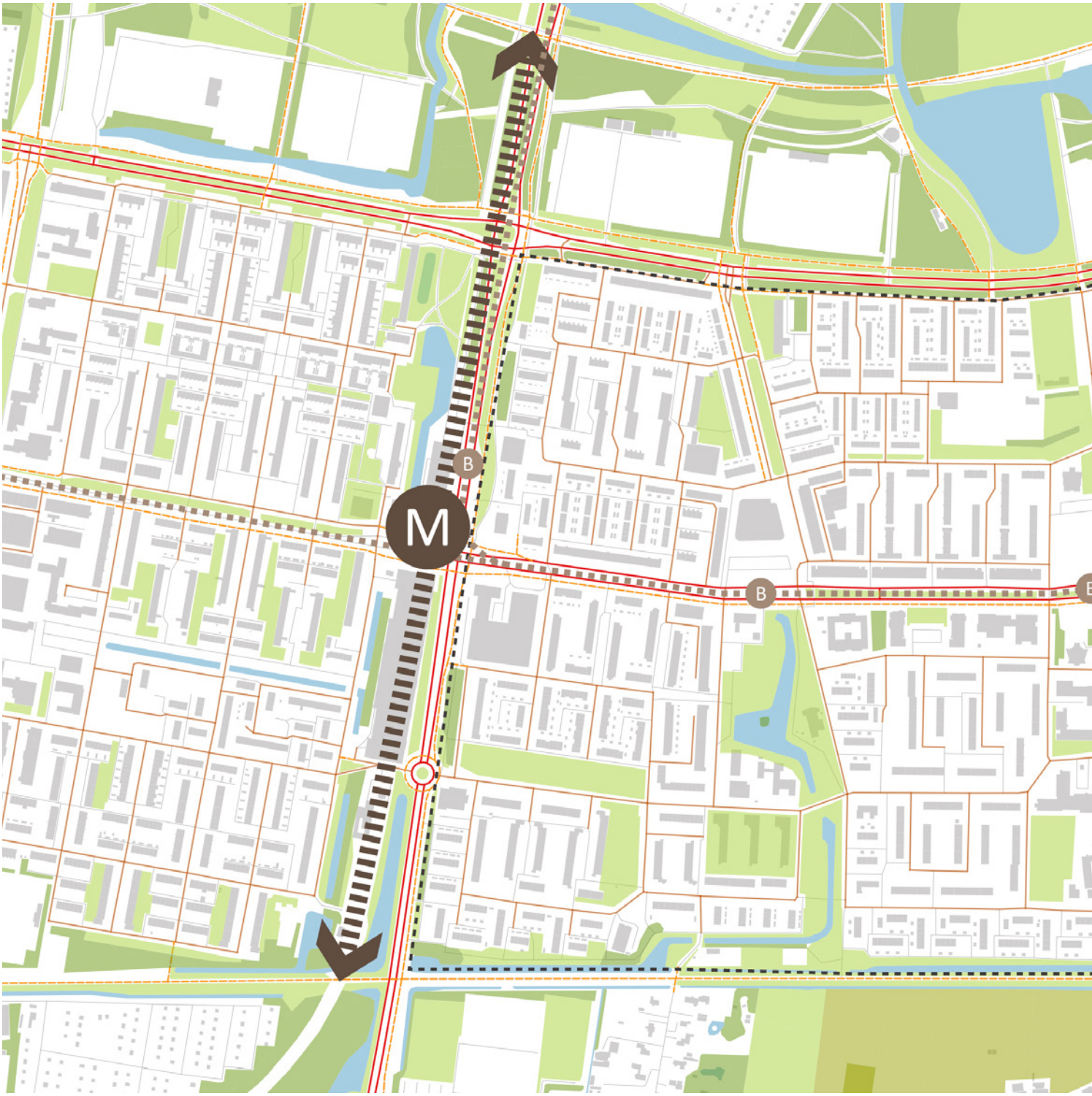
Nature

The nature in the context of Zuidwijk mostly consists of a large area of grassland in between the buildings or the courtyard. Two waterfront parks are present in the southern Zuidwijk. The green area in the north is Zuiderpark, which is divided by a 40m wide road to Zuidwijk. On the edge of the park near the neighbourhood were mostly built with sport yards. The green areas in the south are mostly private zones.

Fig. 4.8 Nature of Zuidwijk. Source: GIS open street data edited by author

Transportation

The public transportation in Zuidwijk is well connected with Metro on the west, tram on the south east, and bus on the Slinge in the middle. Although the public transportation connects the neighbourhood well and the streets within the neighbourhood are accessible by bikes, however, most of the streets are designed for car oriented purposes which a lot of them are occupied on both sides with parking lots.



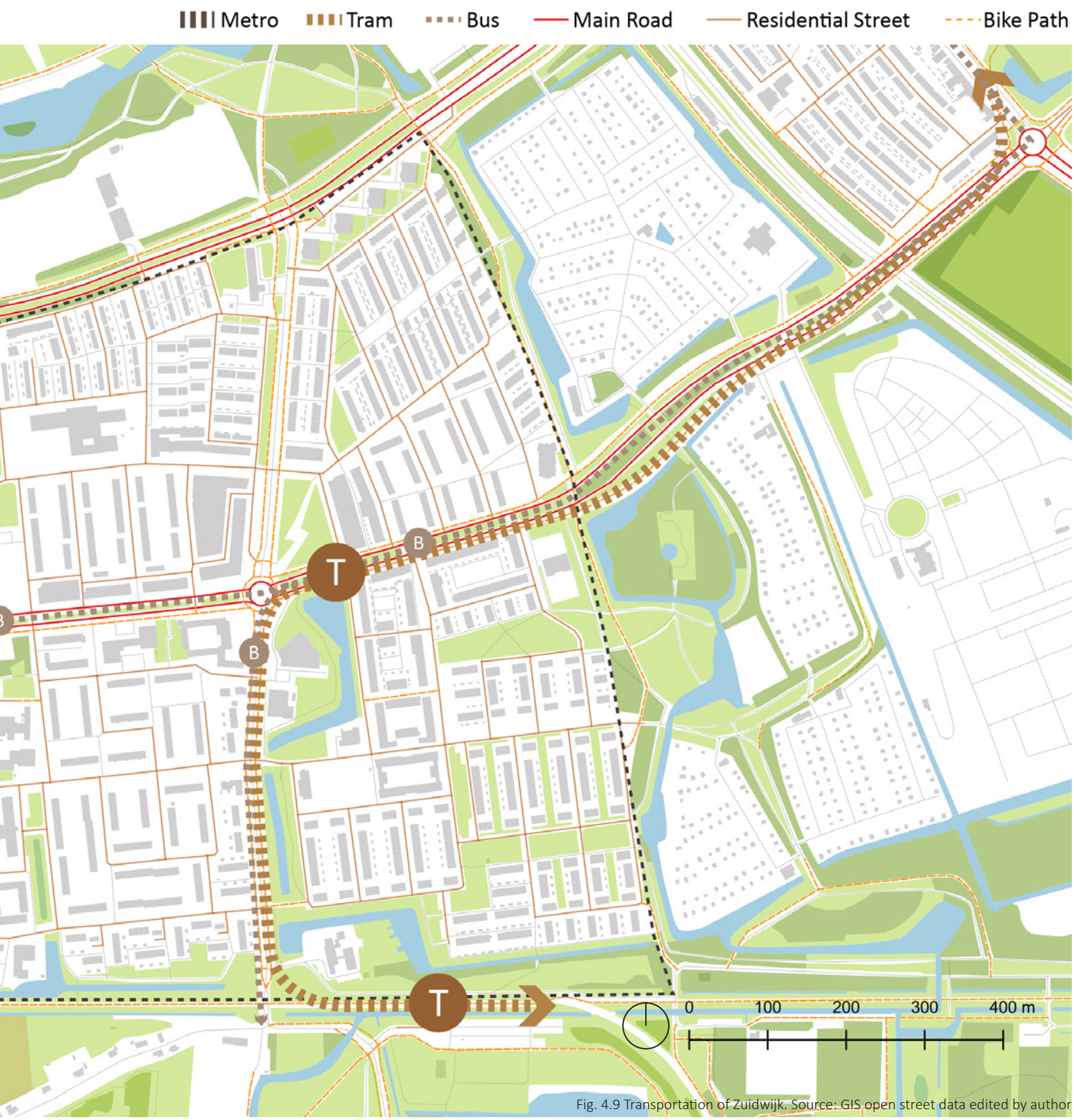


Fig. 4.9 Transportation of Zuidwijk. Source: GIS open street data edited by author

Building Functions

The residential buildings in Zuidwijk mostly consist of 3-4 storey apartments in the center of the neighbourhoods or within the building block. Most of the 1-2 storey houses are located on the edge of the neighbourhood, especially the houses that were built after 1985 on the east side of Zuidwijk. Most of the mixed use buildings with commercial functions are situated in the center. Public amenities are spreaded in the neighbourhood to provide public services.

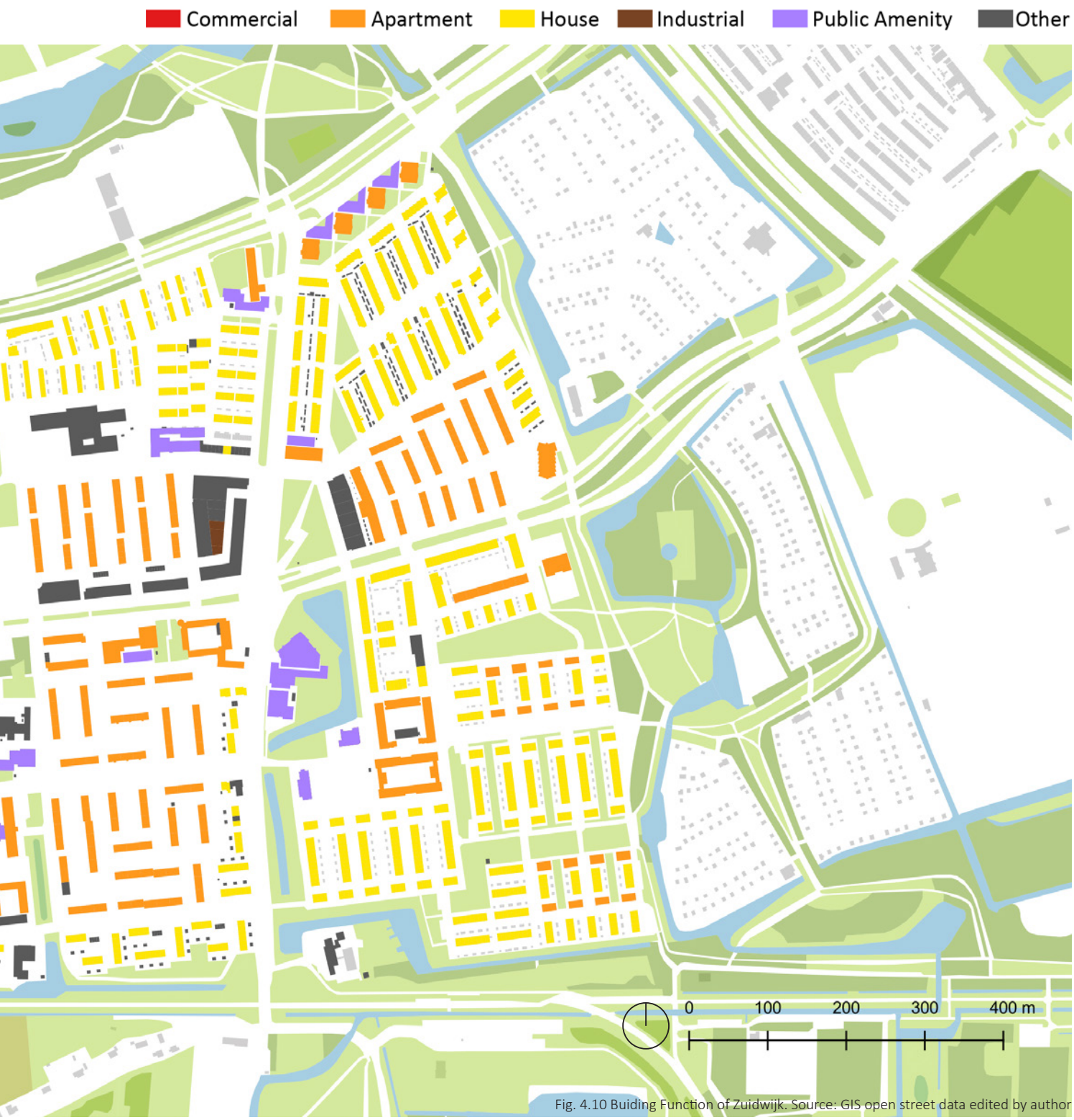
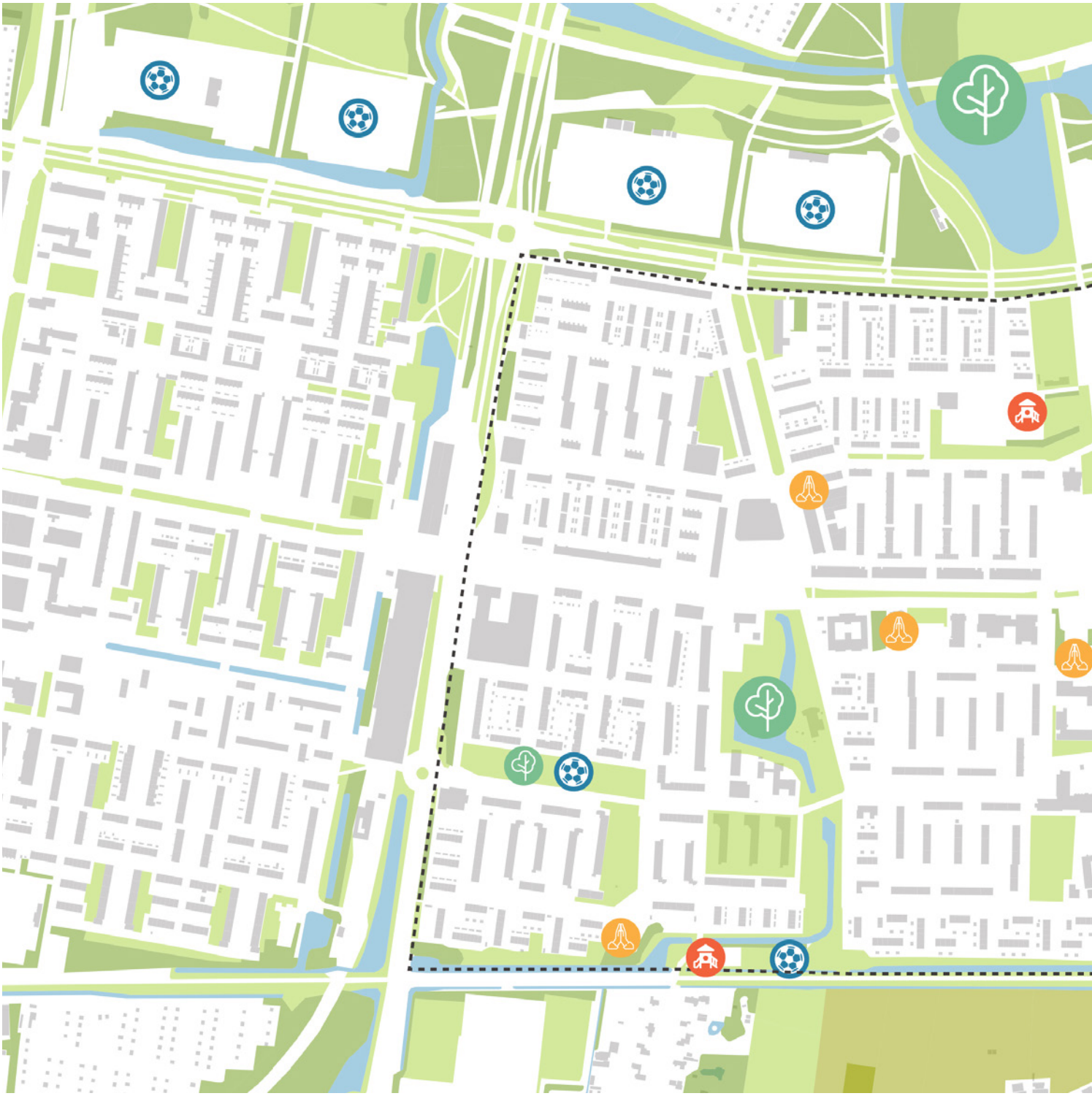


Fig. 4.10 Buiding Function of Zuidwijk. Source: GIS open street data edited by author

Public Function

There is a large park, Zuiderpark, on the northside of Zuidwijk which includes many sport fields on the edge. In Zuidwijk, there are not many sports facilities but there are some parks and play facilities in the neighbourhood. However, the parks and playgrounds are mostly not designed for facilitating nature experiences. Religious buildings, which mostly aside with public space, are spreaded over this neighbourhood that is populated with many immigrant families.



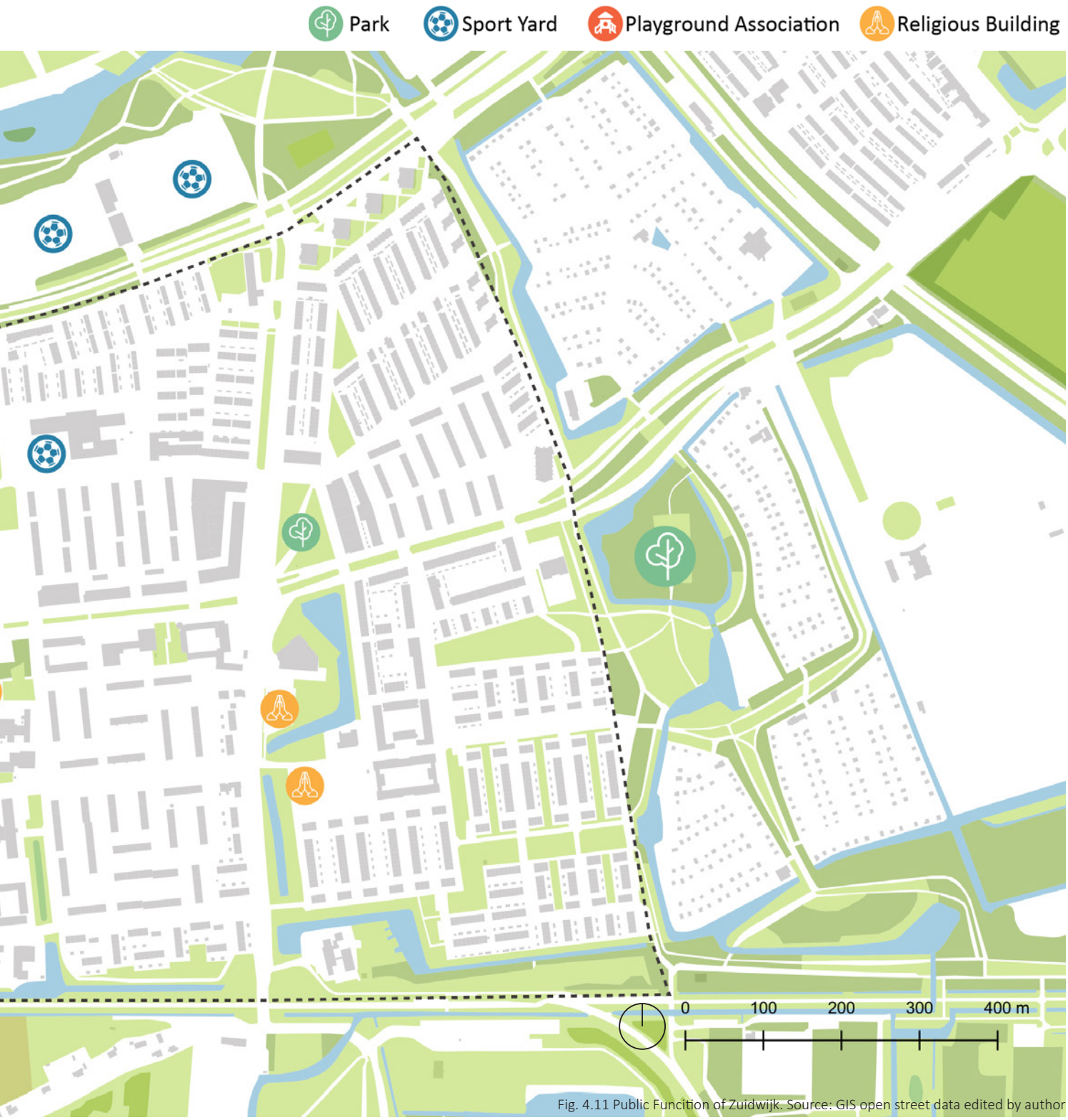


Fig. 4.11 Public Funcition of Zuidwijk. Source: GIS open street data edited by author

Schools

Figure 4.12 shows the school distribution in Zuidwijk and the mobility range of their corresponding age group of children. Children of age under 12 years are capable of a smaller range of mobility with companions especially for those in kindergarten. We can see on the map that the center and southern part of the neighbourhood is where the children are likely to appear.

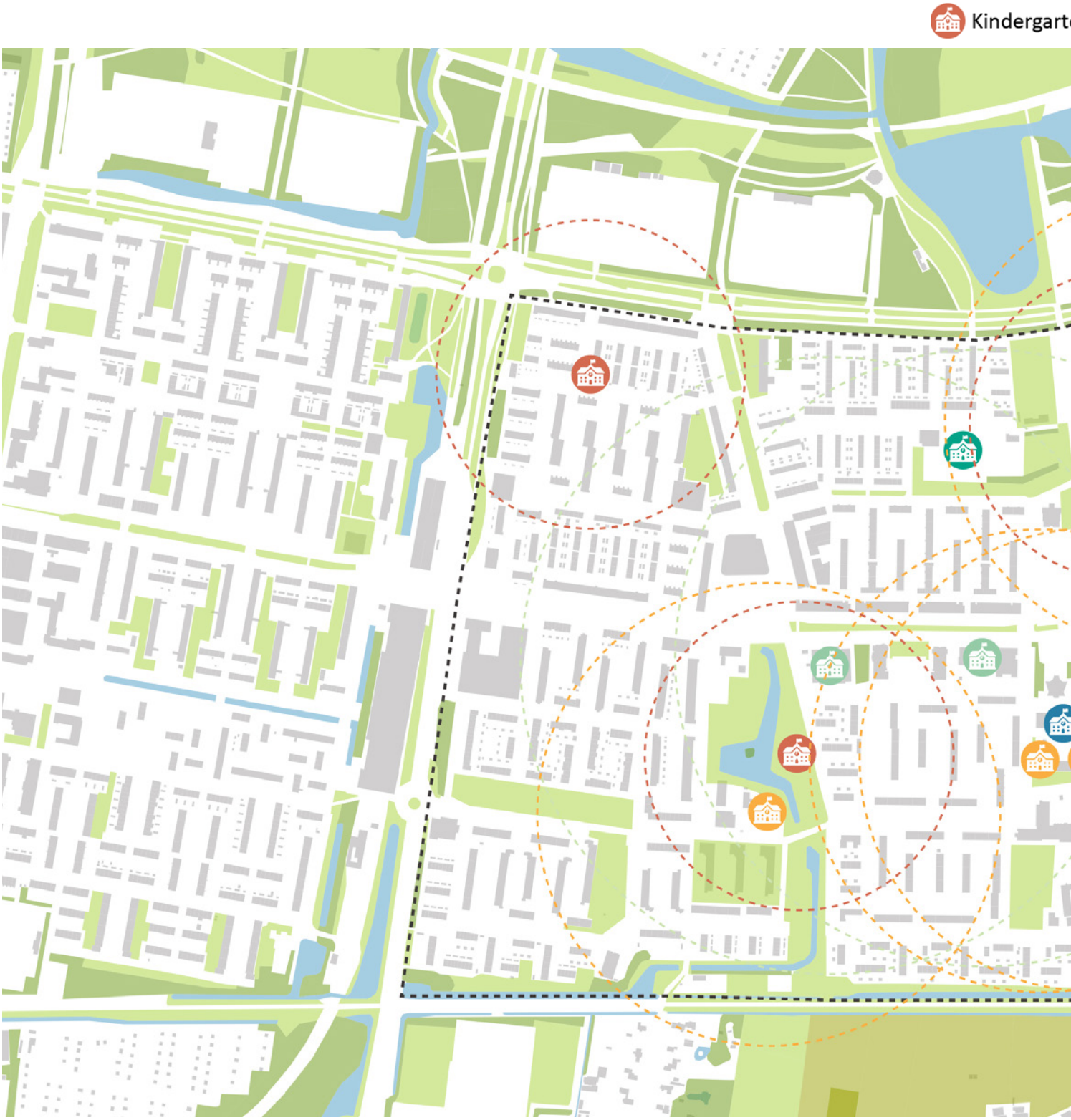


Fig. 4.12 School of Zuidwijk. Source: GIS open street data edited by author

4.2 Site Analysis

Site Observation

The first part of the site analysis starts with the site observation of Zuidwijk. The observation is aiming to reveal an impression of child activities and the spatial condition for child use, which later on will be analysed with its spatial quality (naturalness) and using condition (activeness).

Observation Time:
April 21th Wednesday afternoon 15:00-17:00
April 24th Saturday afternoon 15:00-16:00

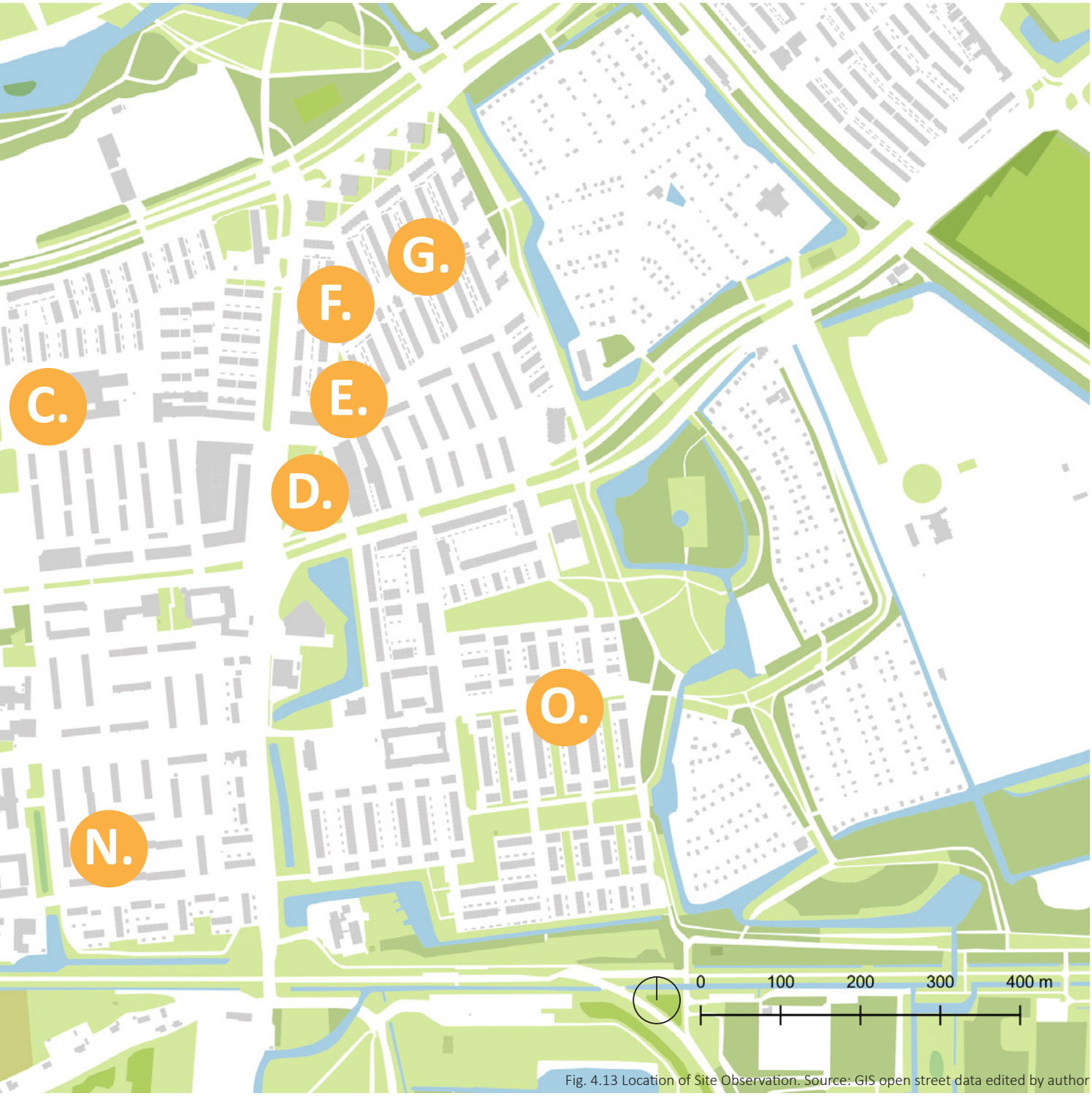


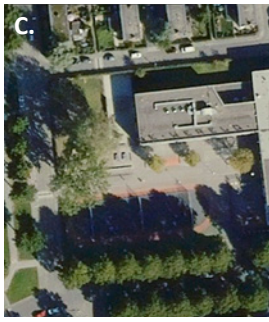
Fig. 4.13 Location of Site Observation. Source: GIS open street data edited by author

Observation of Space for Children

On this page, different types of space are listed with conditions on its naturalness, materials, facilities type, and accessibility. The naturalness and materials shows how much is nature present in the space, while the facilities type can be further studied on how much it stimulates play behaviour, especially the connection with nature.

- Naturalness: ●●○○○
- Materials: tiles, sands, grass, several trees
- Facilities Type: formal play facilities
- Accessibility: 24 hours

- Naturalness: ●●●○○
- Materials: tiles, grass, bushes, trees
- Facilities Type: formal play facilities
- Accessibility: 24 hours



- Naturalness: ●○○○○
- Materials: tiles, several
- Facilities Type: formal p
- Accessibility: 9:00 - 22:

- Naturalness: ●●○○○
- Materials: tiles, sands, grass, several trees
- Facilities Type: formal play facilities
- Accessibility: 24 hours

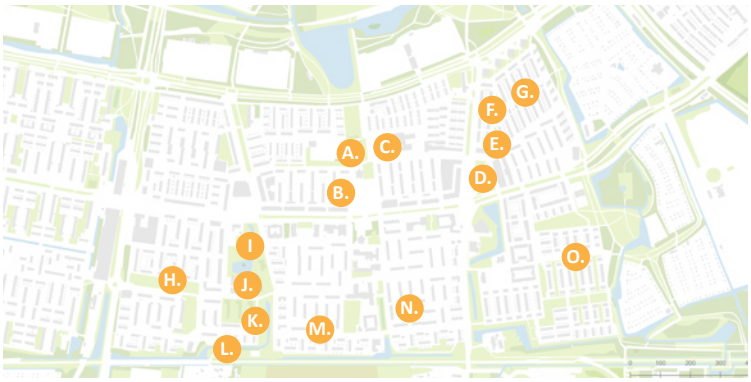
- Naturalness: ●●○○○
- Materials: tiles, grass, several bushes & trees
- Facilities Type: table tennis
- Accessibility: 24 hours

- Naturalness: ●●●○○
- Materials: tiles, grass, s
- Facilities Type: mixed fu
- Accessibility: 24 hours

- Naturalness: ●●○○○
- Materials: tiles, grass, several trees
- Facilities Type: formal play facilities
- Accessibility: 24 hours

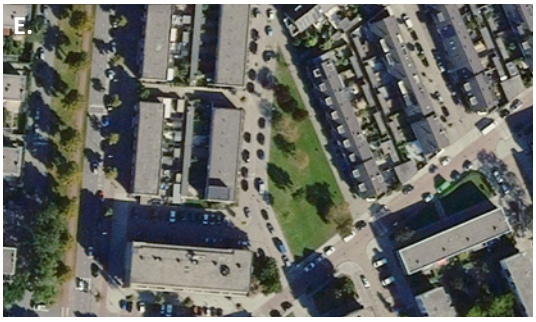
- Naturalness: ●●○○○
- Materials: tiles, sands, grass, trees
- Facilities Type: formal play facilities, sport court
- Accessibility: 10:30 - 17:30 Tue - Sat

- Naturalness: ●○○○○
- Materials: tiles, grass
- Facilities Type: no facili
- Accessibility: 24 hours



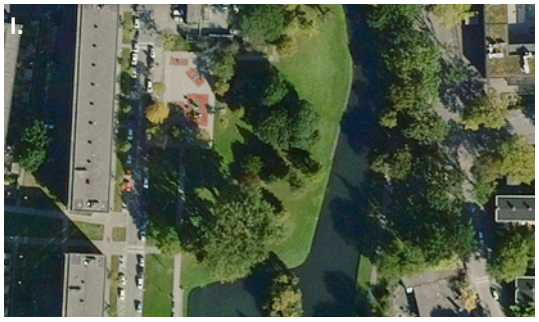
trees
lay facilities
00 weekdays

- Naturalness: ●●●○○
- Materials: tiles, grass, several trees
- Facilities Type: benches with pavilion
- Accessibility: 24 hours

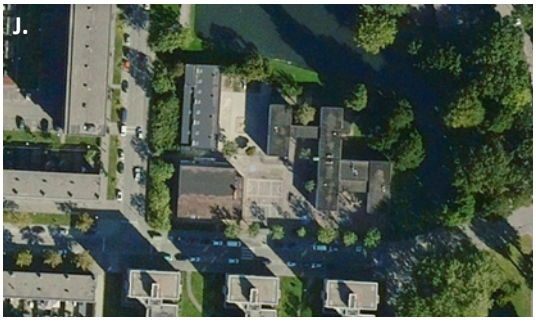


- Naturalness: ●●●●○
- Materials: grass, several trees
- Facilities Type: no facilities
- Accessibility: 24 hours

everal trees
unction, nature play

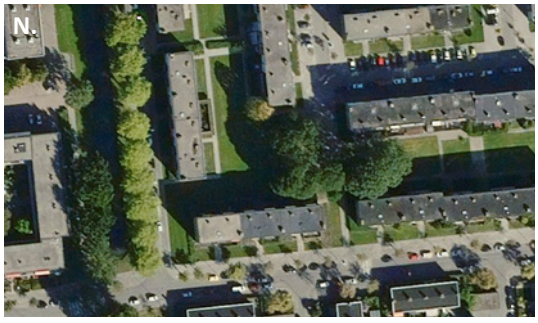


- Naturalness: ●●●●○
- Materials: tiles, grass, trees
- Facilities Type: formal play facilities
- Accessibility: 24 hours



- Naturalness: ○○○○○
- Materials: tiles, several trees
- Facilities Type: basketball courts
- Accessibility: 8:00 - 16:30 weekdays

ties



- Naturalness: ●●○○○
- Materials: tiles, grass, trees
- Facilities Type: formal play facilities
- Accessibility: 24 hours

- Naturalness: ●●○○○
- Materials: tiles, grass, several trees
- Facilities Type: no play facilities
- Accessibility: private courtyard

Fig. 4.14 Types of Space for children. Source: Apple Maps

Observation of Children Activities

Following the spatial observation, here we look at the children's activities on each location of different types of space. The activeness shows how intensively the space is being used. The age, amount, and companion shows what types of users are attracted to the space. Lastly, the activities combined with the user information can be studied with its relation to the space condition and design.

- Activeness: ●●○○○
- Age + Amount: 3 of 2-5 years old children
- Companion: with parents
- Activities: walking and chatting

- Activeness: ○○○○○
- Age + Amount: none
- Companion: none
- Activities: none

- Activeness: ●●●●○
- Age + Amount: 15-20 y
- Companion: no compar
- Activities: basketball, sk

- Activeness: ●●●○○
- Age + Amount: 5 of 5-7 years old children
- Companion: two adult
- Activities: playing soccer & running

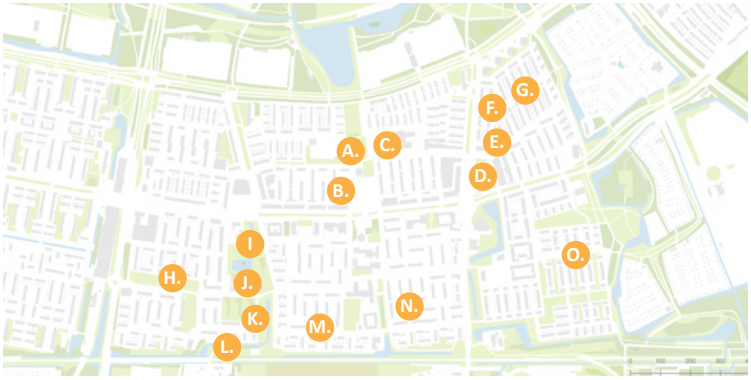
- Activeness: ●●●●○
- Age + Amount: 10 of 7-10 years old children
- Companion: one adult
- Activities: playing table tennis, hide and seek

- Activeness: ●●●●●
- Age + Amount: mixed w
- Companion: no adults
- Activities: climbing, run

- Activeness: ●●○○○
- Age + Amount: 3 of 7-10 years old children
- Companion: no adults
- Activities: playing skate board

- Activeness: ●●●○○
- Age + Amount: 15 of 5-10 years old children
- Companion: with parents
- Activities: playing facilities

- Activeness: ●○○○○
- Age + Amount: 2 of 7-1
- Companion: no adult
- Activities: chatting & dr



ears old teenagers
nions
kate board

- Activeness: ooooo
- Age + Amount: none
- Companion: none
- Activities: none

- Activeness: ●●ooo
- Age + Amount: 3 of 7-10 years old children
- Companion: no adults
- Activities: playing soccer

ith children & teenagers

ning, playing basketball

- Activeness: ooooo
- Age + Amount: none
- Companion: none
- Activities: none

- Activeness: ●●●oo
- Age + Amount: 4 of 5-10 years old children
- Companion: with adults from facility
- Activities: playing soccer

0 years old children

awing

- Activeness: ●●ooo
- Age + Amount: 3 of 5-7 years old children
- Companion: no adults
- Activities: playing swings, running

- Activeness: ●●●oo
- Age + Amount: 7 of 7-10 years old children
- Companion: no adults
- Activities: playing balls over fences

Fig. 4.15 Types of Children Activities. Source: Author & Google Streetview

Types of Space for Children

Concluding from the observation of spatial quality and using condition, there are mainly eight types of existing space for children in Zuidwijk. (See Fig. 4.16) Some of these places are designed for children with different purposes, some have the potential of transforming into a space that engages children with nature. On the map we can see that long liminal spaces in front of the apartments usually go together with the large homogeneous courtyards which is not serving its original purpose of connecting people.

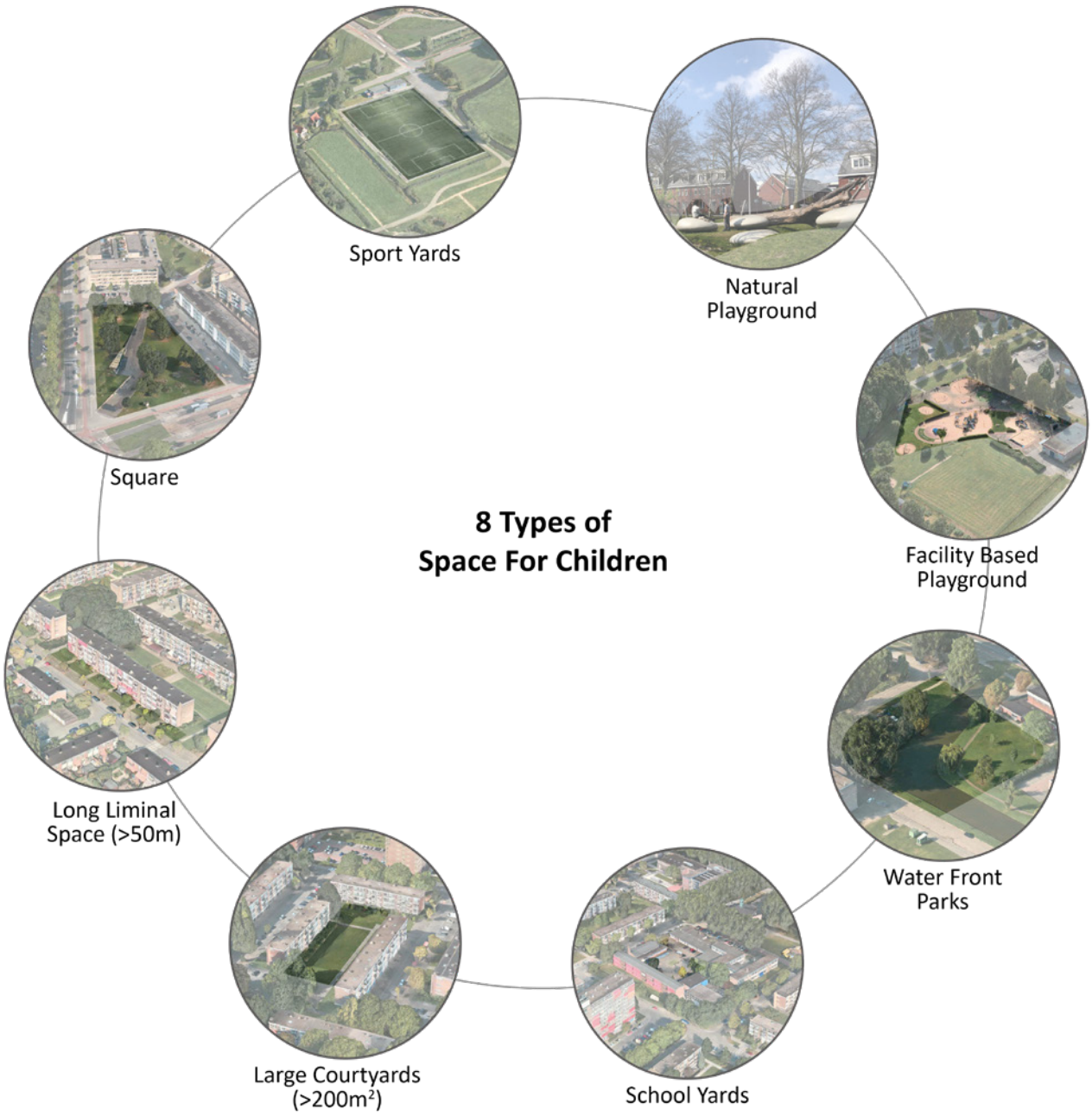


Fig. 4.16 Typology of Space for Children. Source: Author

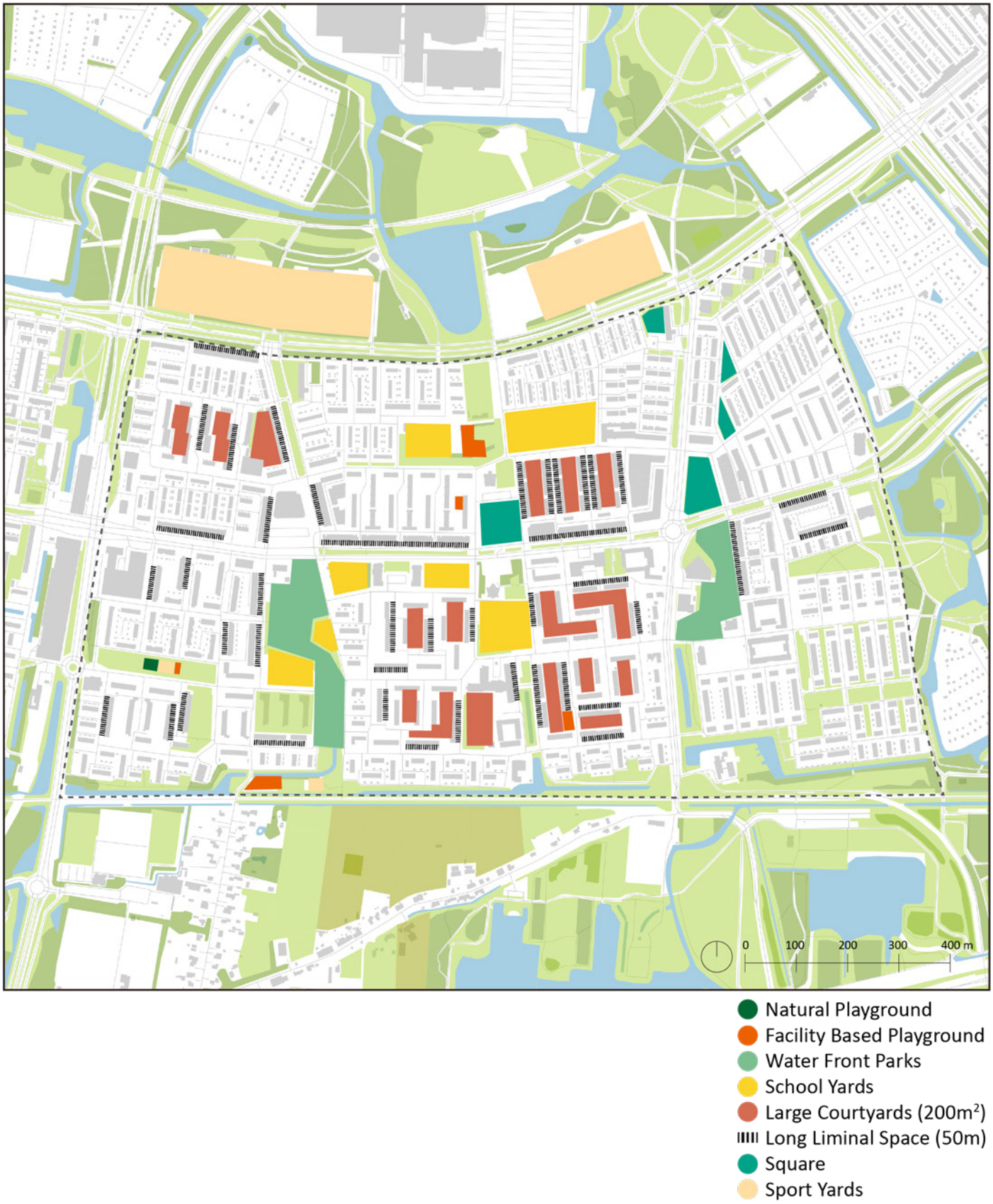


Fig. 4.17 Map of Typology of Space for Children. Source: GIS open street map edited by author

Focused Area

Following the overview of different types of spaces, this section compares the spaces with their naturalness and activeness to reveal their quality of engaging children to natural experiences. (See Fig. 4.18) This project will be focusing on the area that appears to have most of the lower quality spaces. (See Fig. 4.19) These lower quality spaces are the targeted location to be transformed while spaces with higher quality will also be discussed with possibilities to improve.

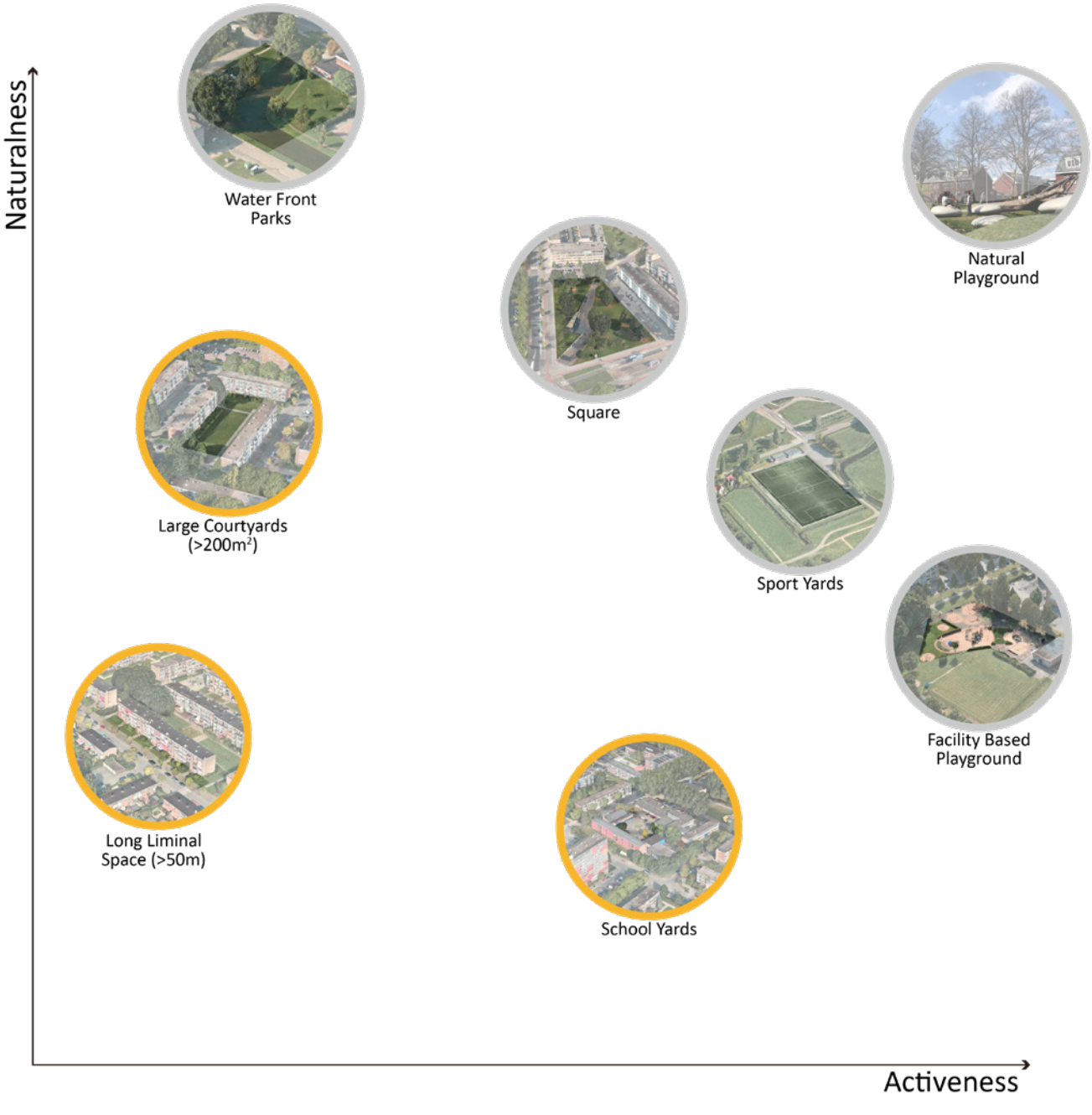


Fig. 4.18 Comparison of Naturalness and Activeness. Source: Author

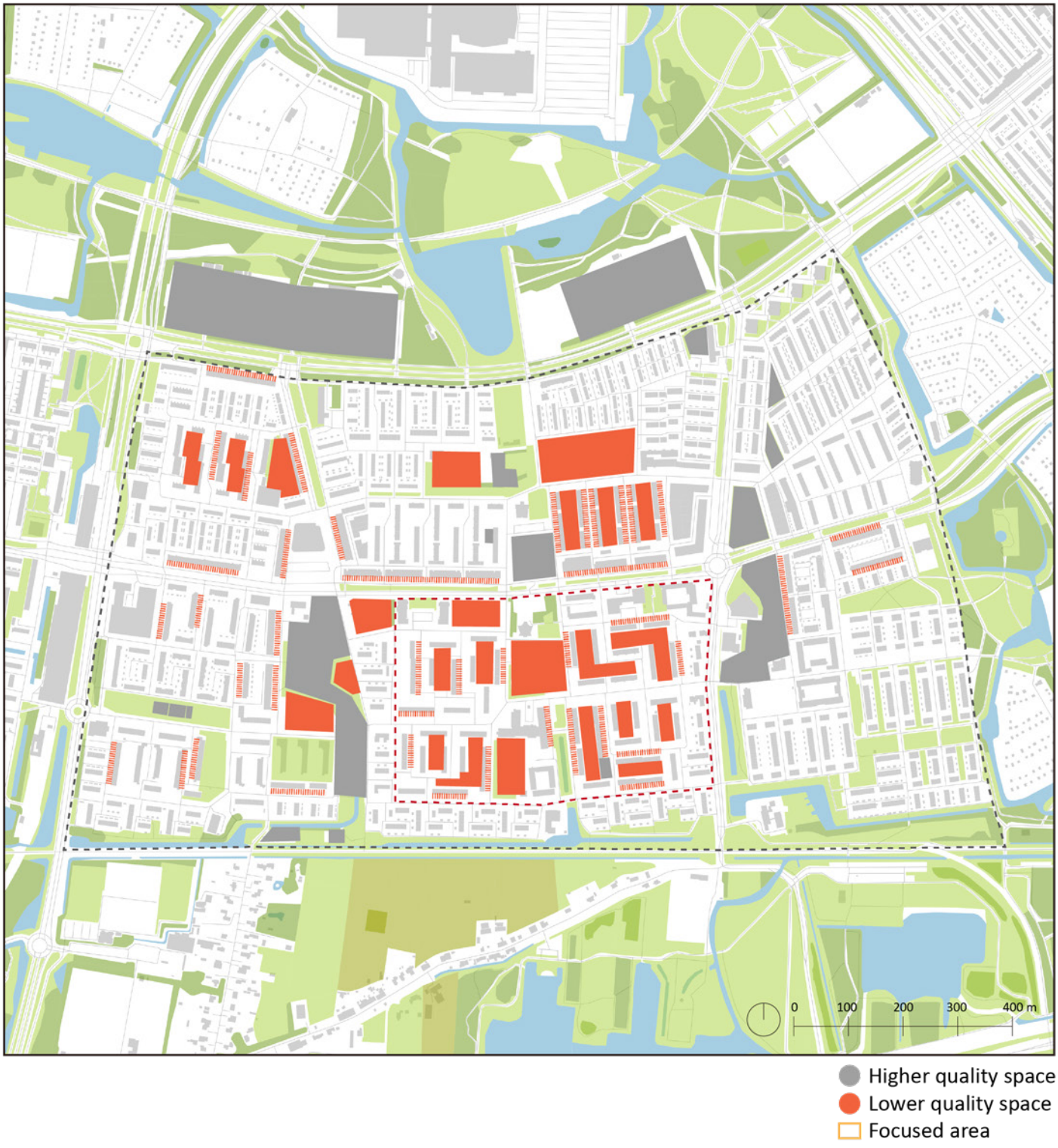


Fig. 4.19 Map of Focused Area. Source: GIS open street map edited by author

4.3 Reference Cases

School Yards

Source: ASLA 2016 Student Awards

Flowers in Crannied Walls: An Elementary Schoolyard Redesign

This project applied four types of biophilic design pattern into spatial interventions to facilitate natural experience in school yards. The school yards in Zuidwijk could also implement design patterns from biophilic and child-friendly design.

Large Courtyards

Source: AECOM, Seatle

Integrating Habitats: "Growing Together"

This project used a daily timeline of a bird and a child to show how the design of the environment can these two types of residents grow together in a residential block, which could applied to the large coutyards in Zuidwijk.

Long Liminal Space

Source: 7 Senses Foundation

Seven Senses Street
Alma Road, Clayfield, Queensland

The main strategy of this transformation of the residential street is the seven senses design, which combines the natural experiences and play activities for children perspective.

Programme Intervention

Source: NYC Parks

Camping in Urban Park
New York City

The program is aiming to engage the community and the citizens to nature. It provides weekend programs for families to camping in the city parks where they can interact with the natural wonders and learn about the ecosystem in the city with guided instructions.

Policy

4.3.6 Engage with the community

The urban forest influences everyone in the community. Engaging the wider community involves not only informing them about the importance and benefits of green infrastructure, but also highlighting the role it plays in ensuring Melbourne's liveability, sustainability and support of cultural identity.

The success of an urban forestry program relies on the commitment of citizens and local businesses to support and enhance work done in the public realm, and to translate the benefits of urban forestry and increased tree canopy into action in the private realm.

Community support for the urban forest in the public realm can include: tree-related advocacy groups and trusts; associations that lobby for more street trees and greenery in their neighbourhoods; and others who demand open space and tree protection through better planning, new regulations, and public acquisition. Community groups and dedicated individuals can provide the 'glue' to link open space networks within larger metropolitan areas, and can provide the political backbone to sustain public investment in green infrastructure.[57]

On a larger scale, business-driven civic leadership can incorporate urban forestry visibly into much broader planning initiatives and thus build its legitimacy as a public policy issue. Similarly, educational institutions at all levels should be involved in any long-term communications strategy for urban forestry.[58]

Our aim is to have the urban forest included in a broader conversation about how Melbourne's cultural identity can be enhanced through revisioning, redesign and ultimately replanting. For example: Can Melbourne's increasing diversification of its landscapes reflect its multicultural plurality? This should open the space for the community to connect with the urban forest, to establish how it contributes to their sense of place, and to allow the community a role in growing and sustaining our urban forest.

The City of Melbourne will be a strong advocate for the benefits of a healthy urban forest and will continue, through various media, to seek the views of the wider community about how to protect, manage and enhance our urban forest asset for future generations. We will work with partners to build the profile of urban forestry in greater Melbourne and Australia, and to support action on canopy enhancement in the private realm. We will continue to build on-going research and measurement into management innovations and, above all, allow the local community to have their say in the way our landscapes are planned, designed and managed into the future.

TARGET: The community will have a broader understanding of the importance of our urban forest, increase their connection to it and engage with its process of evolution.

Actions:

- Enable the community to 'have a say' in the design of landscapes of the future.
- Use innovative tools to engage and involve with the Urban Forest Strategy.
- Encourage 'diverse conversations' about the urban forest through a range of fora.
- Foster the emergence of urban forestry as an essential planning discipline in Australia.
- Align with other local municipalities to enhance the whole Melbourne urban forest.
- Encourage and support further research into Australian urban forestry.
- Create opportunities and co-benefits of producing this strategy; align with other strategies to ensure greater impact, increase fields of research, and develop relationships with private landholders.
- Work with traditional owners to develop community programs that increase knowledge of the cultural significance of landscapes in our environment.
- Develop health and wellbeing indicators to benchmark the role of our urban forests in contributing to human health.

Planting days, such as this at Royal Park, provide an opportunity for our community to be directly involved in the establishment and on-going management of the urban forest.

Source: City of Melbourne

Urban Forest Strategy
Melbourne, Australia

One of the strategies of this project is to engage the urban forest with the community. They are not only planting trees to double the city's tree canopy coverage but also developing social network that sustain and facilitate the program.

Fig. 00 Photo of kindergarten Source: Author

5. Conclusion & Discussion

5.1 Relevance

5.2 Reflection

5.1 Relevance

Social Relevance

This project is focusing on the relation of the health of childhood development and the nature experience in urban environments. Children are the future of society. The project is aiming to form a better physical and social environment for children to grow up healthy.

The current planning and city development process are mainly considering the needs of adults. However, the future society will be built with the future citizens, children. Building an urban environment that can provide children with conditions to develop a healthy childhood will help transform the community to a society that values the natural connection to individuals as well as the urban systems.

Scientific Relevance

The scientific aspect of this project includes the empirical research of the topic on the impact of nature experience on childhood development, and the reflection on spatial conditions of the urban environment. The analysis of the context and the design of the space are based on the scientific research of the literatures and theories.

5.2 Reflection

The topic of this graduation project is about reflecting the problematic issue of unhealthy childhood in the urban environment with the development and the result products of the thesis. The aim to focus on developing methods to transform the urban environment for social, environmental, and economical benefits for the citizens can be related to the sustainable aspect of the studio of Design of the Urban Fabrics.

This project is also reflecting on the focus of the studio to promote healthy lifestyles by transforming urban fabrics to provide more space for communities and ensure equal access to urban service and amenities. With the topics of child-friendly cities and the vitalization of nature in childhood development, this project reflects the current trend of critical issues of the next generation to the ongoing discussion of livability in the architectural profession. The livability is also one of the focus of the studio with the emphasis on how to keep our urban environments suitable to live in, putting people central, contextualized by the physical, geographical characteristics of the urban environments.

The scope of this research is including different scales of analysis and interventions with their interrelation of function. This aspect can be related to the challenge of the studio on tackling the core urban elements of blocks, streets, buildings, and larger networks. It is also reflecting the multiscale and multidisciplinary perspectives of the study of urbansim.

Overall, this project reflects the studio, the track of urbanism, and the architecture programme in general, with considering possibilities of the urban fabrics to accommodate healthy lifestyles, pursuing a livable urban environment in order to achieve the goal of sustainable neighbourhoods for a better future.

Bibliography

Beatley, T. (2017) Handbook of Biophilic City Planning & Design

Frost, Joe L. (2010) A History of Children's Play and Play Environments: Toward a Contemporary Child-Saving Movement

Hillman et al (1992) Children's Freedom and Safety. (Sited from Louv, 2005)

Karsten, L. (2005) It All Used to Be Better? Different Generations on Continuity and Change in Urban Children's Daily Use of Space

Kellert and Calabrese (2015) The Practice of Biophilic Design

Kılıçoğlu, İhsan Deniz (2018) Preteen use and perception of public space in Utrecht in 1996, 2016 and into the future. [master thesis] Technische Universiteit Delft.

Krysiak, N. (2020) Designing Child-Friendly High Density Neighbourhoods

Lefaivre, L. (2007) Ground-up City: Play as a Design Tool

Louv, R. (2005) Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder.

Merriënboer, van J. (2011) Vorm, inhoud en betekenisgeving van openbaar groen in de naoorlogse stedenbouw [master thesis]. Wageningen University

Municipality of Rotterdam (2010) Rotterdam, City with a Future: How to build a Child Friendly City

Municipality of Rotterdam (2020) Speeltuinen, een stap naar de toekomst (Playgrounds, one step to the future)

Munter et al. (2004) Trends in Blood Pressure Among Children and Adolescents

National Association of City Transportation Officials - Global Designing Cities Initiative (2020) Designing Streets for Kids

Ouwehand A. (2018) Menging maakt verschil. Technische Universiteit Delft.

Pieterse, S. (2012) Child Friendly Cities: The Case of Wroclaw in Poland [master thesis] Technische Universiteit Delft.

Terrapin Bright Green, LLC. (2014) 14 PATTERNS OF BIOPHILIC DESIGN. https://www.terrapinbrightgreen.com/reports/14-patterns/#the-patterns

UNICEF (2018) Child Friendly Cities and Communities Handbook

UNICEF (2018) Shaping urbanization for children.

Wijk, van V. (2019) Mind the Gap. [master thesis] Technische Universiteit Delft.

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A Healthy Childhood with Biophilic City Model under Urban Densification in Post-war Neighbourhood, Zuidwijk

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