BACHELOR THESIS

Boosting Social Cohesion by designing Urban Greenspaces during Densification Projects

A research-by-design study

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Summary

Urbanization is accelerating, with 66% of the world population expected to live in cities by 2050. Traditional urban sprawl negatively affects human well-being and the environment, making urban densification a necessary alternative. This research explores how urban greenspace (UGS) can mitigate social drawbacks in post-war neighbourhoods after densification, as these neighbourhoods harbour densification potential. As densification can harm social cohesion this study seeks to determine how UGS can enhance social cohesion in densified neighbourhoods. The question that forms the core of this research is: *How can qualities of urban greenspace boost social cohesion after densification projects in post-war neighbourhoods?* A research-by-design approach combines a foundation of literature review with a case study of Vinkhuizen in Groningen, addressing the need for densification, benefits of UGS and social cohesion. To achieve increased social cohesion design principles are applied to Vinkhuizen; these include: communal greenspaces, activity spaces, situational crime prevention, and layered city concepts. Analysis identified areas with renewal potential, amenities that should be maintained, the potential of semi-underground parking, and creating vibrant communal areas to enhance social cohesion. Findings underscore the role of UGS in mitigating densification's social impacts, or even enhancing social cohesion; but also recognizes the importance of the built-environment in this. Recommendations call for real-world monitoring of design principles and prioritization of UGS in urban planning to foster cohesive, vibrant communities.

Introduction

Background

This research focusses on what the impacts of urban greenspace can be on social cohesion in post-war neighbourhoods after densification projects. As according to the United Nations Department of Economic and Social Affairs (2014) most – 54% – of the world population lives in urban areas and this is expected to increase to 66% in 2050. A common way in which cities develop, through Urban sprawl, has been proven to have adverse effects on both mankind and nature (Frumkin, 2002, Whitmee et al., 2015, Resnik, 2010). Therefore a different way of developing cities is needed, such as urban densification where the same amount of space is used to facilitate more dwellings or people (Götze and Jehling, 2023). KAW explained in their report 'Ruimte Zat in de Stad' that Dutch post-war neighbourhoods have the potential to house between 482.000 and 708.000 additional dwelling (Meding et al., 2020) illustrating the ability to densify.

However, densification too can have negative side effects on both humans and their environment (Emmanuel and Steemers, 2018, Götze and Jehling, 2023, Haaland and Konijnendijk, 2015). Although often in contest for space with the built-environment (Fuller and Gaston, 2009, Haaland and Konijnendijk, 2015, Jim, 2004); urban greenspace (UGS) can help relieve implications of urban densification or even improve the previous situation (Jennings and Bamkole, 2019, Emmanuel and Steemers, 2018, Erlwein and Pauleit, 2021, Lee et al., 2020, Ward and Grimmond, 2017, Wellmann et al., 2020). To improve social cohesion UGS should have certain qualities, what these qualities are will be translated from theory or practice into applicable design principles; these are discourses or actions that should lead to a preferred outcome (Fu et al., 2016).

Whilst the two separate parts – influence of urban greenspace on humans/society and nature; and the effect of urban densification on humans/society and nature – are well studied topics. Literature combining these topics to research how this information can help design (parts of-) neighbourhoods and improve their social cohesion is largely absent.

Research Problem

As aforementioned the adverse effects the needed urban growth can have on humans, their societies and their surroundings poses a challenge (Emmanuel and Steemers, 2018, Frumkin, 2002, Götze and Jehling, 2023). The aim of this research is to discover what role UGS can have in mitigating these negative impacts in post-war neighbourhoods after densification projects. Firstly, to bridge this gap in literature by connecting the positive impacts densification can have on humans through making room for more UGS. And secondly contributing to more vibrant and liveable communities in denser post-war neighbourhoods after redevelopment. The question that will be central in this research will therefore be:

How can densification projects boost social cohesion in post-war neighbourhoods through the provision of urban greenspace?

Multiple subsidiary questions will be used to answer this question:

- What spatial conditions can influence social cohesion?
- How can social cohesion be improved through spatial interventions?
    - What has worked elsewhere or in theory?
- What qualities should urban greenspace have to improve social cohesion?

Structure

This thesis will start with a review of literature on the topics of: densification, urban greenspace, social cohesion and social security. This will be followed by a case study from the neighbourhood of Vinkhuizen in Groningen where – after a case selection and analysis – this literary foundation will be applied to understand how the different parts work together. Based on this conclusions will be drawn on what the role of urban greenspace can be to alleviate social drawbacks relating to social cohesion after densification projects in post-war neighbourhoods.

Theoretical Framework

The need for densification and its implications

Urban areas are in need of densification. As the United Nations Department of Economic and Social Affairs (2014) expects 66% of the world population to live in cities by 2050. However, space in and around cities is often contended (Westerink et al., 2013). Moreover, the review article by Whitmee et al. (2015) notes that outward expansion, or urban sprawl, can have adverse effects on humans, their surroundings and the economy; this is also supported by Erlwein and Pauleit (2021), Frumkin (2002) and Patz et al. (2005). They highlighting key challenges such as high costs associated with urban sprawl, creation of urban heat islands, loss of biodiversity, unsustainable use of resources and the reliance on motorized transport.

However, Haaland and Konijnendijk (2015) found out – through their extensive research of over 100 research papers – that densification can lead to an infill of open- and greenspace, negatively impacting the amount of urban greenspace. Houghton et al. (2001) and (Patz et al., 2005) in turn connect such a lack of greenspace to the negative influences this can have on the humans by creating the urban heat island effect.

Berghauser Pont et al. (2021) found that in almost half of the 229 papers studied density had negative implications for social interaction as opposed to only one positive finding. Similar relationships were found between density and community, which was said to refer to safety, social interaction and stability. And lastly a increase in density seemed to decrease the likeliness of meeting new people. Yet they conclude that to a certain level wellbeing, social interaction and community feelings increase with density until sharply falling after densifying further. However, they do not address at what densification level this turnover point is.

Whilst Whitmee et al. (2015) adds to this that densification of cities does increase risk from extreme events as more people leads to higher risks. They do conclude densification of cities will lead to more sustainable and healthier cities, both physically and mentally. Moreover, Berghauser Pont et al. (2021) did find evidence for positive impacts on (parts of-) public infrastructure, public transport, walk- and cyclability, productivity, property value and public finances.

Based on their research on densification possibilities in Dutch post-war neighbourhoods, Meding et al. (2020) argue that solely by densifying cities the Dutch housing demand can be satisfied for two decades. In the Netherlands, they found, much of this needed space is present in post-war neighbourhoods, where between 482.000 and 708.000 additional homes can be built depending on the selected density. Moreover, they add, Dutch post-war neighbourhoods often score lower when discussing liveability and social cohesion than surrounding neighbourhoods.

Addressing these issues using urban greenspace

Some of these issues that have been addressed can be alleviated by UGS. UGS according to Kabisch and Haase (2013) and also adopted by Haaland and Konijnendijk (2015) is all vegetation present in urban areas. Moreover, they stress the importance of all types of vegetation of all sizes but also both private and public to be of importance to alleviate environmental issues. As vegetation is able to impact (micro-) climates through evapotranspiration, creating shade, changing the albedo and influencing airflows (Erlwein and Pauleit, 2021, Martins et al., 2016, Ward and Grimmond, 2017). Whilst all vegetation can do one or more of the previous, the extent to which depends per type of vegetation. (Martins et al., 2016, Ward and Grimmond, 2017). Even though it is good to understand that the provision of UGS can mitigate some of the challenges posed by densification this falls beyond the scope of this research.

As this research focuses on the influence the urban greenspace has on social cohesion a slightly more nuanced definition of effective greenspace must be put forward. Therefore, the more anthropocentric view of Jennings and Bamkole (2019) – that stresses that the usability of greenspace and its ability to facilitate interactions is important for addressing social influences – could contribute to a more holistic understanding of the influences urban greenspace can have on humans and their societies. Jennings and Bamkole (2019), explain on p.452 that social cohesion: "often refers to interpersonal dynamics and/or collective efforts that may be used to assess quality of life. Social cohesion can also involve feelings of trust, belonging, acceptance, and connectedness which often relate to positive social interactions." Jenson (2010), Kondo et al. (2015) and Martins et al. (2016) add to this that improving social cohesion is done through facilitating interactions and stimulating activity. Which Leyden (2003) suggest can be done through the construction of pedestrian paths, Kuo et al. (1998) adds the importance of communality of such paths. Shariati and Guerette (2017) on the other hand advocate for improved social security to improve social cohesion. In the study by Jenson (2010) more indicators of social cohesion were found in European legislation or policy documents. Whilst most of these – especially those relating to socio-economic inequalities – are difficult to influence using urban design; others, such as: expectations of mobility, health and participation can be enabled or facilitated by urban design. The same holds true for interactions, activity and social security which can all be promoted through urban design. However, as equality and equitability play vital roles in many of the indicators, the notion by de Haas et al. (2021) – regarding the discovery that a better organization of public and private actors would help distribute the benefits of these greenspaces more equitable across communities – could contribute to improved social cohesion.

Designing for social cohesion

To create public spaces that enhance social cohesion design principles can be used; these translate lessons learned from other places or theory into actions to reach a desired goal in practice (Fu et al., 2016).

Lessons from Matiukhin and Anisimova (2021) for example, who based on surveys of residential courtyards in three Russian cities concluded that the openness and permeability of communal courtyards can influence the previously mentioned feelings of belongingness and social security. Their research shows that courtyards which are halfway or more, but not fully built-in; combined with little to no 'non-resident' access result in the strongest association of place, belonging and social security.

Or lessons from Kuo et al. (1998) who found that the amount of vegetation present attracts people to the outdoors which creates opportunities to meet people or engage in activities. This was done through interviewing 145 residents of 18 architecturally identical buildings in Chicago, but with different levels and types of vegetation at the foot of the buildings. However, they made no comments on what these types and levels of vegetation are.

Different ethnic groups use UGS differently, as Peters et al. (2010) found out through their observation and interviewing of over 618 users of urban parks in the Netherlands. With their study they found that the weather and day of the week was of lesser influence to native Dutchmen, whereas non-native people were more likely to meet-up with other people in the shade under trees, engaging in activities related to relaxation instead of activities such as walking or cycling. Moreover, these non-natives were more likely to do so in larger groups whereas Dutch people were most often seen in smaller groups, couples or by themselves. Therefore to cater to both of these groups available greenspace should facilitate both relaxation in the shade under trees and facilitate walking and cycling.

Moreover, concepts such as Situational Crime Prevention, which stresses the importance of urban design to create safe neighbourhoods (Shariati and Guerette, 2017) can be utilized to harbour social cohesion. The importance of safety was also put forward by Jacobs (1961) who argued that there

are three conditions for streets to be safe. The first being a clear difference between what spaces are public and which are private. Secondly, the buildings must allow people from inside to watch those outside and safeguard them; and lastly, there should be plentiful people on the streets to induce those inside to watch over them. However, it is also argued that if these conditions are not met (often the case in smaller towns or suburbs) gossiping and a strong sense of community often have the same effects (Jacobs, 1961).

Another factor that can influence social cohesion is the presence of kerb-side parked cars, by impacting safety through the reduced walkability of streets and visibility of its users which Jacobs (1961) stresses as important. Moreover, cities such as Groningen are pushing for clustered parking to replace kerb-side parking in order to improve accessibility/walkability and create greenspaces (Gemeente Groningen, 2021). Tasked by the National institute for public Health and the environment Alleman et al. (2005) advise cars to be parked away from streets to improve safety; but also to place them at a distance from the homes for safer streets and health benefits. Such a distance between a parked car and home could also directly influence the social cohesion through social interactions (Kaplan and Kaplan, 2003). However, Stubbs (2002) points out that clustered parking can disturb the cityscape and therefore measures to hide such parking spaces should be utilized.

To optimize the use of available space and make place for urban greenspace the concept of a layered city can be applied. This concept makes use of all three dimensions in its design to allow different uses to overlap each other without conflict. Examples of this include the project by D/O Architects (n.d.) near Seoul; or to a lesser extent de Citadel in Almere (de Portzamparc, n.d.). In both examples different functions are stacked on top of each other resulting in a more intense use of the available space. Whilst, one could argue that this would be a very intensive case of mixed-use planning (Manaugh and Kreider, 2013) the three dimensional aspect of layered cities (D/O Architects, n.d.) could however, support the argument that this is an inherently different concept.

How to measure density

There are multiple ways to measure density, whilst some methods require a lot of information others yield incomplete results.

Floor space index (FSI) is the ratio of built space on all floors of a plot in relation to the surface of the area (Godoy-Shimizu et al., 2021, Götze and Jehling, 2023, Patel, 2013). According to Patel (2013) this measure of density was introduced after the second world-war and is also known as floor space ratio (FSR) and floor area ratio (FAR) differing per country. A similar method is the ground space index (GSI) or coverage, here the ratio of building footprints is given as a share of the total plot area, (Alexander, 1993, Godoy-Shimizu et al., 2021). However, they mention that because less information is used compared to FSI – there is no need for number of floors – GSI can wrongfully suggest higher densities in low-rise neighbourhoods when compared to high-rise neighbourhoods.

A new method of measuring density is introduced by Patel (2013) a measure they named crowding. In this measure the number of people is ratioed against the floorspace, area occupied by streets, area occupied by parks, the number of jobs or the number of amenities present in the area. This relatively delivers the measures of: indoor crowding, street crowding, job crowding and amenity crowding. Whilst this does yield entirely different results than FSI it does require more information and calculation time.

Another measure of density is the plot factor (PF), this refers what share of a plot is buildable (Patel, 2013). However, this is often used in relation to other measures of density to make them more nuanced or compare them (Patel, 2013).

Conceptual Model

Figure 1 shows how redevelopment can change the buildings and UGS present in an area, and therefore the urban structure. Redevelopment during densification projects can be done using multiple development goals, in this case the increase of FSI by 35% and an increase in social cohesion. These tangible changes made to the urban structure during this redevelopment should impact the intangible factors of sense of belonging, social safety and the number of social interactions of the residents in a positive manner. As these are all indicators of social cohesion (Jenson, 2010), this should in turn lead to improved social cohesion as aimed for in the densification goals.

The other side effects more or better UGS can have on micro climates, climate resilience and/or personal health (Erlwein and Pauleit, 2021, Lee et al., 2020, Ward and Grimmond, 2017, Wellmann et al., 2020) fall outside the scope of this research.

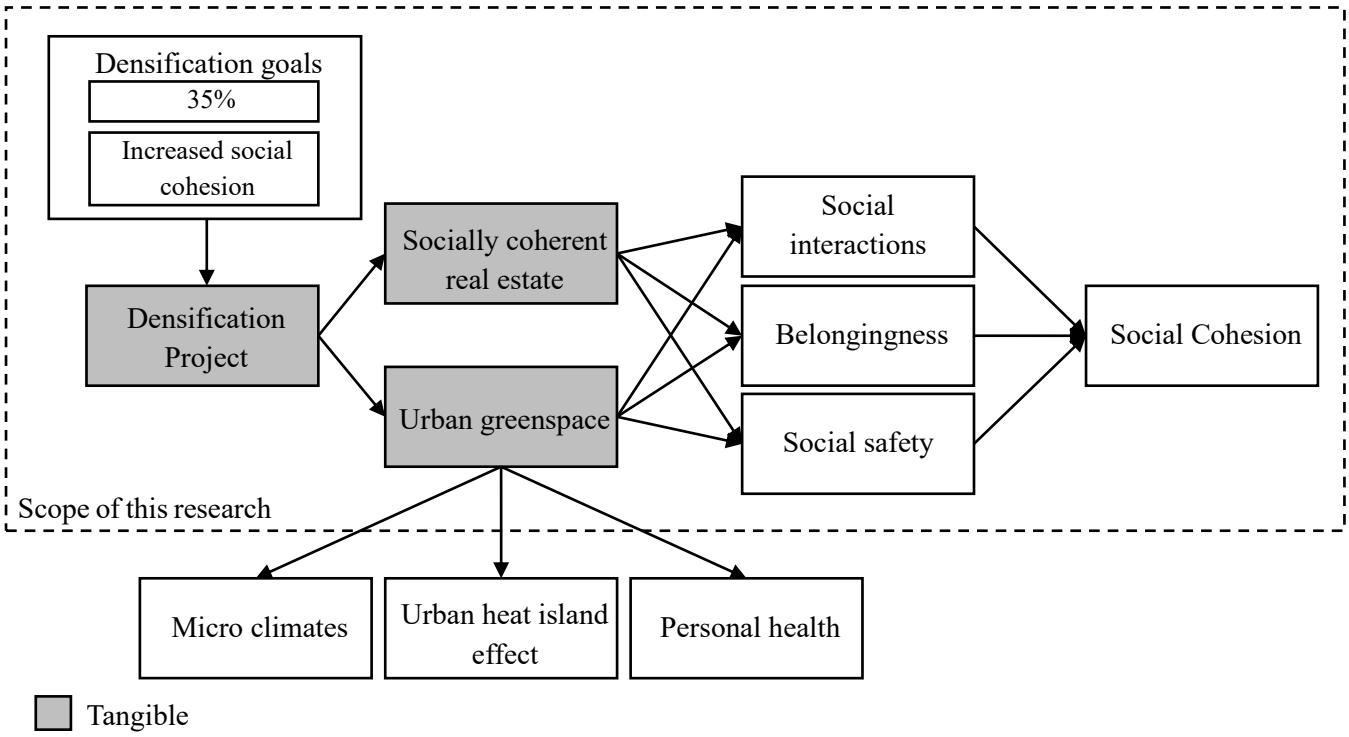


Figure 1 Conceptual model

Methodology

Research method

As this research aims to discover a way to increase density whilst improving social cohesion through providing urban greenspace in Dutch post-war neighbourhoods a few types of research are possible.

The first being qualitative research into the provision of UGS and peoples behaviour in these greenspaces focussing on social interactions, sense of belonging and safety. Here the strength of qualitative data collection – in being able to explain human behaviour – would be able to explain some of the intricacies of what types of UGS exactly can improve social cohesion (Tenny et al., 2023). However, it would be nearly impossible to collect sufficient data (be credible), which is also representative of the whole Dutch population and therefore transferable, let alone do the analysis. Therefore the conclusions that can be drawn from such a study would likely be incomplete and therefore superficial.

The Second method, Empirical research would refer to the studying and observing multiple densified post-war neighbourhoods to find out how UGS has improved social cohesion here (Patten, 2016). Whilst this would likely be able to explain the intricacies of this process better; it is a very resource intensive process, especially time intensive. However, also the challenges described for qualitative measures – regarding the selection of a sample/case studies – apply here.

Thirdly, conceptual studies, according to Jaakkola (2020) are constructed from theories, concepts and lessons learned from previous studies. This is partially what this research has done so far in collecting the design principles; here however, how these individual factors would come together to improve social cohesion can not be studied. Moreover, as Jaakkola (2020) mentions conceptual research often risks staying descriptive; therefore lacking the depth needed to explore how social cohesion can be improved through the provision of UGS.

A research method that can provide these in-depth insights without becoming too resource intensive is research-by-design (RBD); this method can be used to find best practices to complex or even wicked problems where numerous factors are involved, which are uncertain or hard to measure or to solve very case-specific challenges (Roggema, 2017). Both the quality of urban greenspace and social cohesion are hard to quantify and measure (Elbakidze et al., 2022, Haaland and Konijnendijk, 2015, Jenson, 2010). Moreover, the large number of actors typically present in neighbourhood redevelopment projects increase its complexity (Boelens and de Roo, 2016).

According to Roggema (2017) RBD is a research method consisting of multiple phases; the pre-design-, the design- and the post-design phase. The first of which is said to be about understanding, where the challenge at hand, but also the different venues of research are discovered and thoroughly researched. The second phase is all about iteration and rationalizing of choices, this part mainly revolves around making designs and therefore choices. During this designing phase many could-be scenarios are created, compared and reflected upon; finally leading to a set of synthesized and substantiated (design) choices. The third and final phase is mainly communicative, as here the results of the design phase – and its implications – are communicated to a larger audience.

During this first phase a case-study will be selected and analysed to explore what densification possibilities there are and what this means for the urban form. This is done as Wellmann et al. (2020) mention that the quality of urban greenspace benefits from a context-oriented approach. In the second phase designs are made and used as a tool to discover- and critically evaluate known options, make thoughtful decisions and therefore learn what options are available to use urban greenspace to improve social cohesion and how this shapes the urban form. Moreover, application of the theoretical knowledge,

gained from research, can help discover the intricacies and complexities of all different concepts and findings when translated to a real-life example. In the last phase the outcome of this research and thus of the design iterations is presented in a final design, this design is used to explain how the different principles work together to achieve improved social cohesion; and therefore conclude how to increased densities can improve social cohesion through providing urban greenspace in Dutch post-war neighbourhoods. Meaning that RBD makes it possible to critically evaluate and think through all different aspects of the design and how different parts of it work together or limit one another.

Design principles

This study does not aim to create a design that will be implemented to monitor its effectiveness; instead, to ensure the set goals are achieved certain design principles will be utilized. These have already been elaborated upon under 'Designing for social cohesion' but are summarized in table 1 below. These design principles are assumed to positively influence social cohesion based on literature. The study further investigates how these principles impact each other upon implementation and whether they can all be applied or choices have to be made.

Design Principle	Description	Source
Communal green	The presence of communal greenspace can boost social cohesion.	(Kuo et al., 1998)
Activity space	Activity spaces can positively impact social cohesion through facilitating interactions and stimulating activity.	(Jennings and Bamkole, 2019, Jenson, 2010, Kondo et al., 2015, Martins et al., 2016)
Kerb-side parking	Removing kerb-side parking can enhance social cohesion through more vibrant and accessible streets.	(Jacobs, 1961, Shariati and Guerette, 2017)
Courtyards	Courtyards that are largely, yet only partially, closed off but are conditionally permeable or impermeable for outsiders foster a sense of belonging and social security.	(Matiukhin and Anisimova, 2021)
Situational crime prevention	By designing spaces carefully safety can be created, this can be done through open lines-of-sight, ensuring proper lightning, facilitating waste disposal and preventing vandalism.	(Jacobs, 1961, Shariati and Guerette, 2017)
Layered-city	A way of using the same space twice or more by stacking functions on top of each other, this can help optimizing the utilization of limited space.	(D/O Architects, n.d., de Portzamparc, n.d.)

TABLE 1 DESIGN PRINCIPLES

Measuring density

To measure the change in density and therefore densification this research will make use of the Floor Space Index (FSI), as previously explained this is an index that measures what share of an area is made up of floorspace (Götze and Jehling, 2023). It is therefore calculated by dividing the total size of a selected area by the amount of floorspace – the surface of building footprints times the number of floors – in the area. Whilst other measures of density are available; such as plot factor, street- or indoor

crowding (Patel, 2013) these measures require very detailed information about the given plot and are therefore very resource exhaustive (Patel, 2013). A density measure more similar to FSI called the ground space index – or GSI – requires less information, but as a result can give incomplete information about actual changes in density as a decrease in GSI could still result in higher urban densities through increased building heights (Godoy-Shimizu et al., 2021). Patel (2013) argues that using FSI as a measure of increased density can have negative implications on liveability of neighbourhoods. Whilst their arguments hold true when solely using an increase in FSI as redevelopment goal the multifaceted goal of this study should ensure that these worries are addressed.

Case selection criteria

To perform a case study a plot of around 2500 m^2 will be selected. For the study it would be beneficial to have some prior knowledge about the site, for it to be accessible within reasonable time/distance from either my home or the University and lastly, for information to be accessible. As during the program Spatial Planning and Design most neighbourhood specific focus has been on neighbourhoods in Groningen; these are reasonably accessible and grey literature should be abundantly available for neighbourhoods in Groningen a post-war neighbourhood in Groningen will be selected, this is done according to case selection criteria.

Then the first criterion follows from the scope of this research which is the focus on post-war neighbourhoods, therefore a neighbourhood is sought out that was built between 1950 and 1980; the rebuilding period after the second world war (Jansen, 2000, Meding et al., 2020). According to Jansen (2000) the neighbourhoods that fit these two criteria are the following:

- Rivierenbuurt (1950)
- Kostverloren (1953)
- (de) Laanhuizen (1955)
- Corpus den Hoorn (1958)
- De Wijert Noord (1958)
- Coendersborg (1958)
- Selwerd (1963)
- (De) Paddepoel (1965)
- Vinkhuizen (1967)
- De Wijer Zuid (1963-1970)

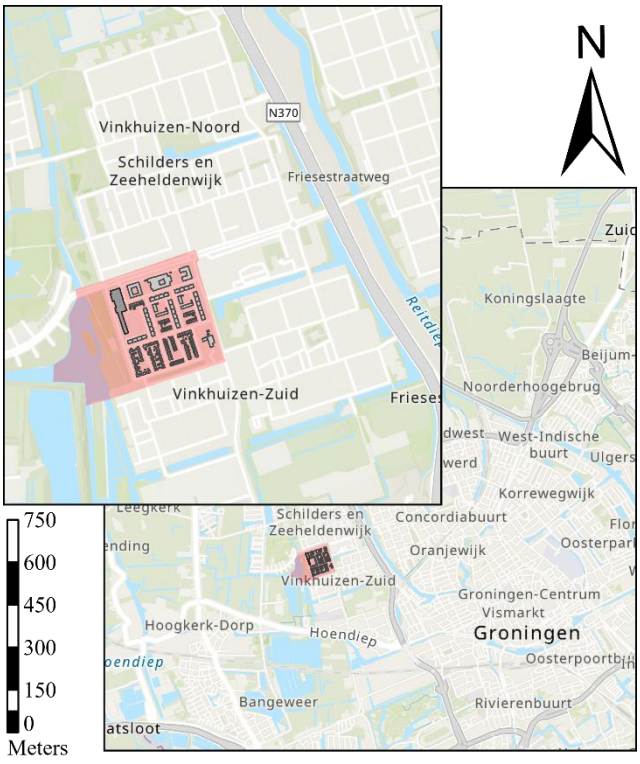
Jansen (2000) explains that especially Selwerd, Paddepoel and Vinkhuizen were planned from a quantity perspective; whereas in the earlier and last neighbourhoods the ‘wijkgedachte’ as introduced by Bos (1946, cited by Havinga et al., 2020) or socially coherent neighbourhoods were central. These are coincidentally also the three post-war neighbourhoods most often discussed during the programme. Whilst the social coherence was no longer the priority in Selwerd, Paddepoel and Vinkhuizen, the repetitional building pattern remained (Jansen, 2000). According to Lörzing and Harbers (2008) and Meding et al. (2020) these repetitional building patterns often comprising three to four floors are typical for post-war neighbourhoods. So are grid-structured streets with high car dependency meaning wide asphalt streets with a lot of on-street parking (Jansen, 2000, Meding et al., 2020). Therefore a suitable area will include these features.

Then another criterion follows from Gemeente Groningen (2021); who in the design guideline liveability of public space (Ontwerpleidraad Leefkwaliteit Openbare Ruimte in Dutch) aim to create greener streets. Therefore this last criterion is for a neighbourhood with little vegetation along the street.

As Havinga et al. (2020) mentioned post-war neighbourhoods that have not been refurbished are often in a state of disrepair. Therefore it could prove interesting to find a plot where either a part of the housing stock has been refurbished while other parts would still need this revitalization.

Multiple areas that fulfilled the criteria were found; after further research into these areas an article stating that parts of Vinkhuizen-west would be involved in a neighbourhood renewal project in the coming year was found (de Huismeesters, n.d.). Moreover, using this in the case study could prove interesting as the housing association has declared that due to their deteriorated state these homes have to be demolished; this is a scenario that, according to Havinga et al. (2020), could present itself increasingly often in the future.

From here large roads large roads and the body of water created the border of the plot; the Siersteen- and Diamantlaan on the north and east sides and the Dolomietstraat in the south. The exact extend of the selected plot can be seen in map 1.



MAP 1 SELECTED PLOT

Case analysis

This selected plot will be analysed in two parts, the first pertaining to desk research regarding its history and the present. For the current situation multiple parts will be studied; including the housing typologies, the UGS and its qualities, other amenities present, and the building ages.

The second part of the research will include a visit to the site, to gather new information that cannot be found online, confirm or reject certain assumptions and take pictures to illustrate points made in this research. This visit is done on May 7th between the hours of 11:45 and 12:30 on a sunny day during a school holiday.

Results

Understanding the problem

As previously mentioned the first step of RBD as described by Roggema (2017) revolves around the understanding of the problem. In the previous parts the challenge of densification and social cohesion have been addressed, here we will look delve into the site selected for our case study to gain a deeper understanding of the plot and its intricacies.

The dissection of the selected plot will start with a deep-dive intro the history of the area. This is done as the history of a place can be a strong influence for its future (Antrop, 2005, Hayden, 1994); through finding out about what historical context shaped a place and therefore where opportunities and challenges lie. Moreover, history can be a source of inspiration for future developments (Antrop, 2005). In a description of the surroundings of Hoogkerk in 1828 by a schoolteacher Vinkhuizen was named as a hamlet consisting of four farmhouses. (Mulder Jz, 1828). In the following figures (2-9) the metamorphosis of Vinkhuizen and its surroundings between 1850 and 2023 are shown.

Figure 2 Vinkhuizen in 1850 (Source: (Bureau van de Militaire Verkenningen, 1850))

Figure 3 Viknhuizen in 1875 (Source:(Bureau van de Militaire Verkenningen, 1875))

Figure 4 Vinkhuizen in 1900 (Source: (Bureau van de Militaire Verkenningen, 1900))

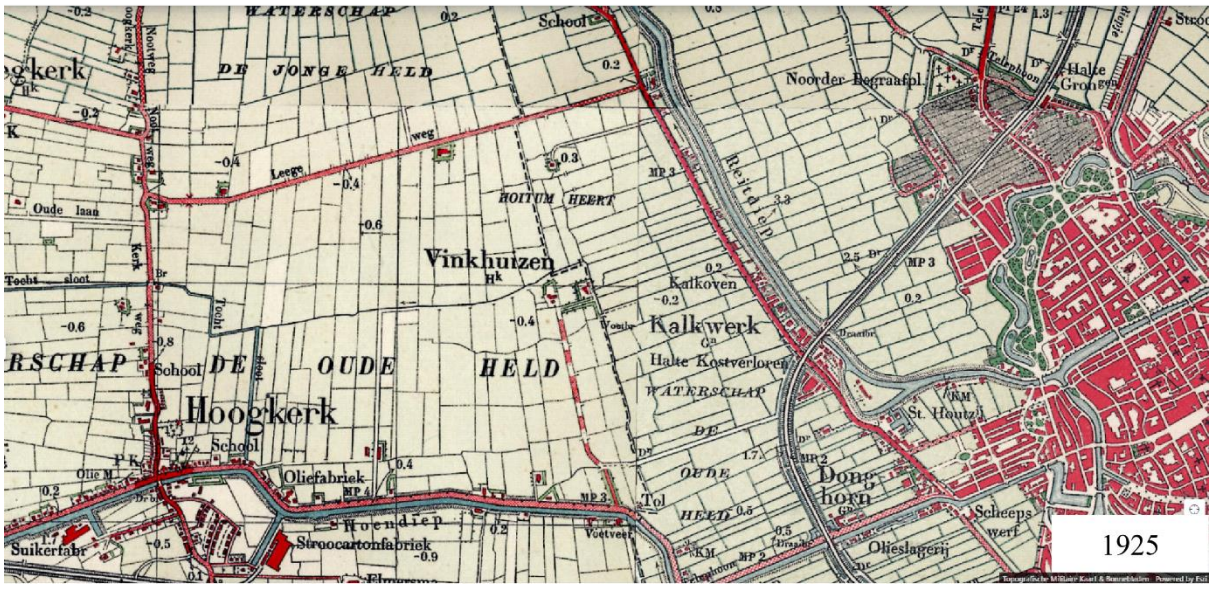


Figure 5 Vinkhuizen in 1925 (Source: (Bureau van de Militaire Verkenningen, 1925))

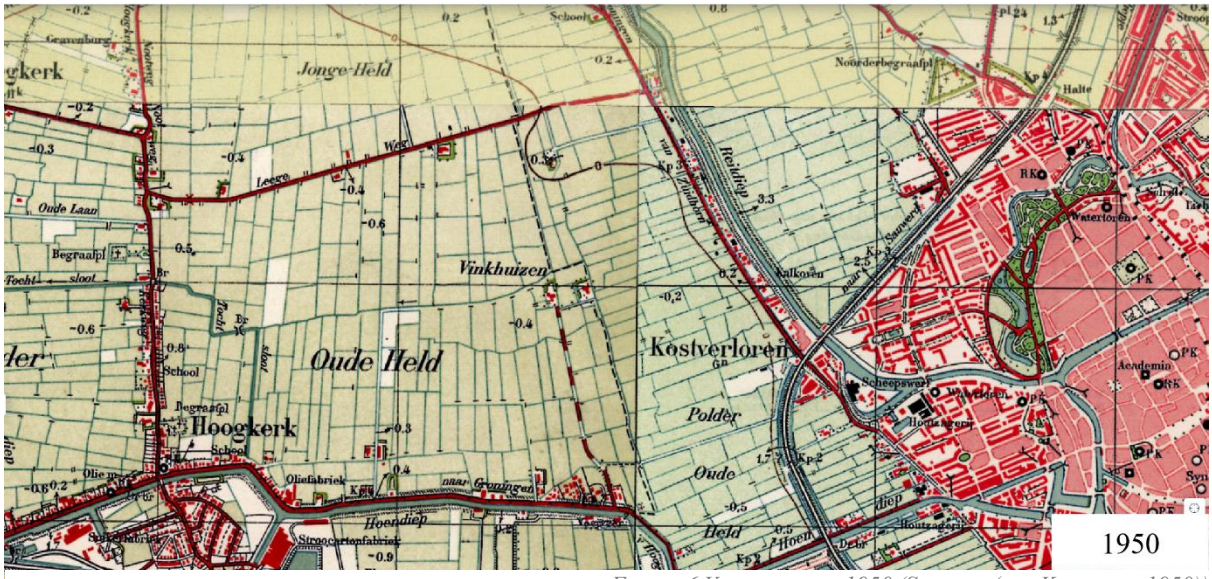


Figure 6 Vinkhuizen in 1950 (Source: (het Kadaster, 1950))

Figure 7 Vinkhuizen in 1975 (Source: (het Kadaster, 1975))

Figure 8 Vinkhuizen in 2000 (Source: (het Kadaster, 2000))

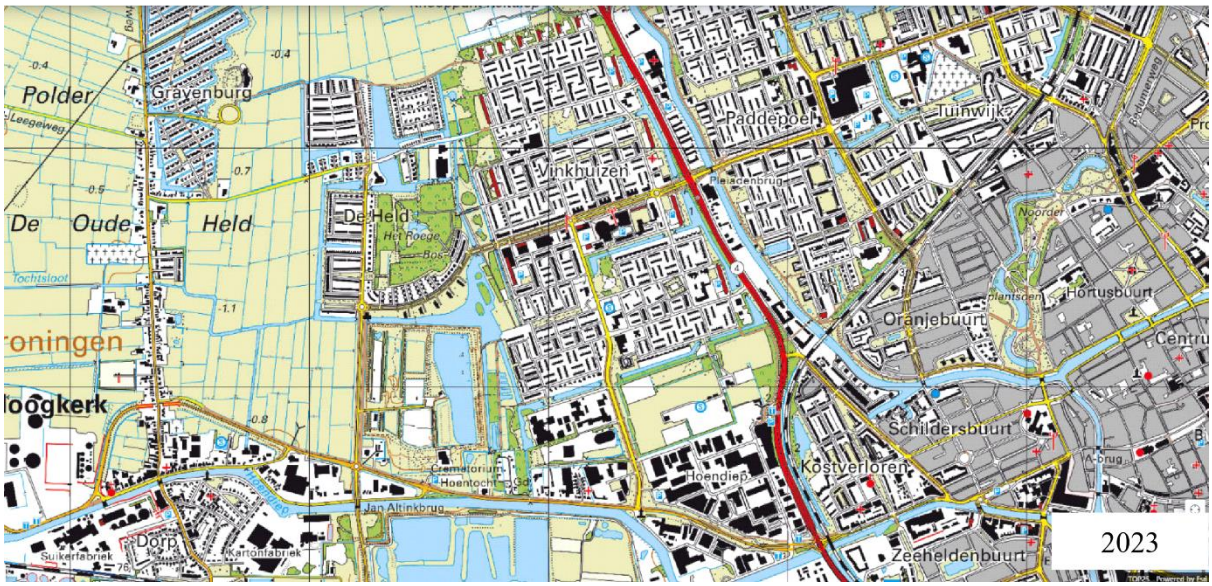
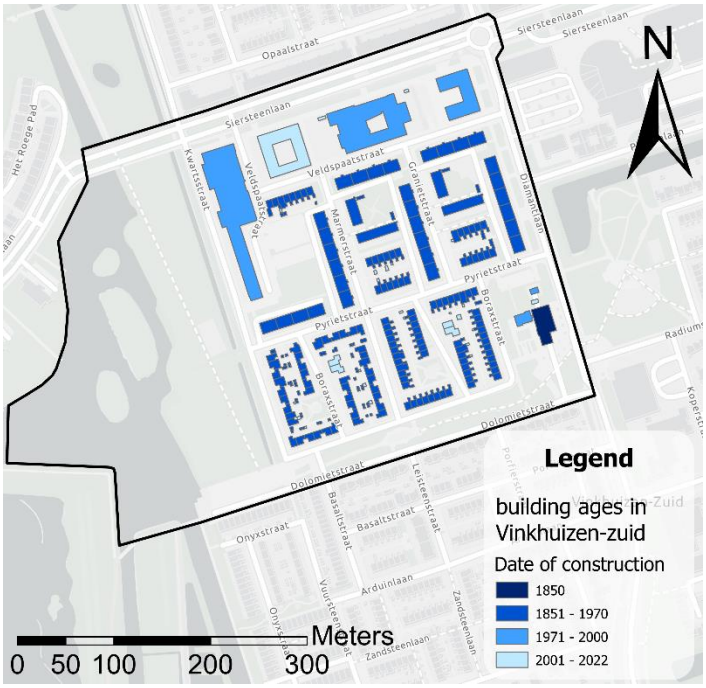


Figure 9 Vinkhuizen in 2023 (Source: (het Kadaster, 2023))

This analysis using Topotijdreis show that of the four original farmhouses, two disappear in the early 1900s and a third one disappears in the 1950s. After which – in the early 70s – the expansion of Groningen results in the construction of the Neighbourhood of Vinkhuizen. Herein the only farmhouse still standing is converted into community centre ‘t Vinkhuys visible in Figure 17.

The presence of this older farm home also becomes apparent when looking at the building ages in Map 2 where ‘t Vinkhuys can be found in the bottom-right corner. Moreover, parts of the area – especially in the north – have undergone re- or infill development after the construction of Vinkhuizen in 1970 (Lentis Erfgoed, n.d.), this becomes better visible in map 2.



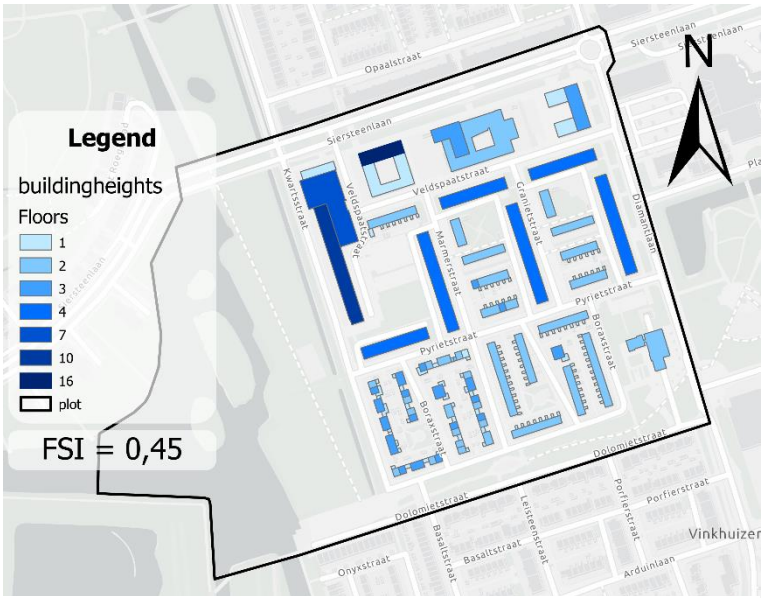
MAP 2 BUILDING AGES

Other buildings however, have stood since then but have degraded over the years, this degradation has led to a plan to demolish these homes as they are too expensive to repair (Veenstra, 2023). In this plan 56 single family homes will be demolished after which 52 single family homes and 37 apartments will be constructed (Vinkhuizen, 2024).

Today

Vinkhuizen is currently a neighbourhood with not only buildings from different time periods, but also many different types of buildings with many different functions. These functions include schools, day-care, an elderly home, a library, the previously mentioned community centre and even a fire- and police station. This diversity of functions can have a positive effect on social cohesion according to Mouratidis and Poortinga (2020). Some of the different typologies of buildings found in the area can be found in Figure 10 which illustrates that these range from single family homes to different types of multi-apartment structures.

This mixing of building typologies has resulted in an urban structure with a range of different building heights as can be seen in Map 3. Using these building footprints and their number of floors, the FSI can be calculated to be 0,45. This means that less than half of the space available on the plot is built up, even less when only looking at the ground level. This

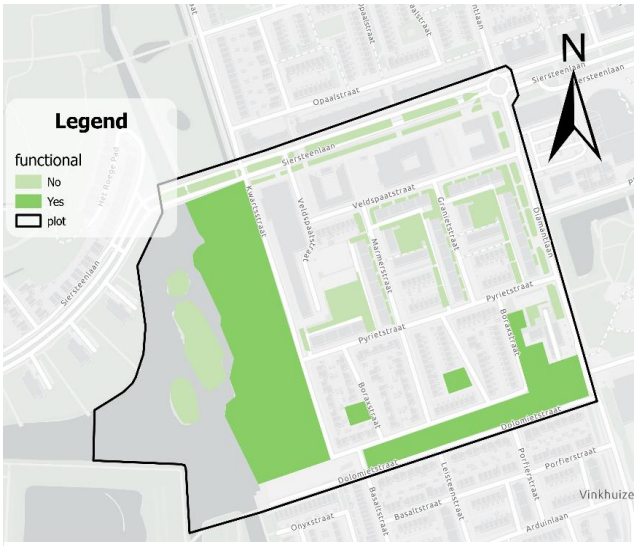


MAP 3 BUILDING HEIGHTS AND FSI

means that sufficient space should available for greenery. However, a share of the homes have private gardens that take up space for UGS in the public domain or usable UGS; the importance of which was explained by Jennings and Bamkole (2019).

Another important factor they mentioned was the usability of urban greenspace, however as can be seen in Map 4 much of the greenspace is currently not usable/functional; meaning it does not stimulate activity or interaction.

This information on the usability of the present UGS was discovered during the visit to the location. Where the presence of any activity space within the UGS would lead to the greenspace to be considered functional



MAP 4 FUNCTIONALITY OF URBAN GREENSPACE

FIGURE 10 BUILDING TYPOLOGIES

During this visit the number of elderly people with walkers and a shopping bag – walking towards or returning from a trip to the supermarket located directly to the right of the chosen plot – was notable. This discovery results in the need to emphasize the importance of good walkability and accessibility within the neighbourhood for this target audience (Takano et al., 2002) however, the accessibility of the shopping centre just across the busy street should also be considered.

FIGURE 11 ODDLY PLACED PLANTERS

Another finding made at the time were the oddly placed planters breaking up the sidewalks (Fig. 11) diminishing their usability by blocking the middle part. This is in direct contradiction to the point made earlier on about the importance of accessibility and walkability, especially for the elderly.

The predominance of on-street parking is one of the other notable discoveries made at the time Fig. (12). Whilst this can function as a traffic calming measure, such high numbers of parked cars can have negative impacts on social security and -cohesion (Jacobs, 1961, Shariati and Guerette, 2017).

FIGURE 12
KERB-SIDE PARKING

The last finding to be discussed from the site visit to be discussed pertains the use of activity spaces and the amount of greenspace overall. As previously mentioned a lot of the UGS is just merely patches of green without a social function, however, during the go round at the site the areas which would be coined, green activity spaces, were underutilized. The three play grounds were not used, nor were the sports facilities, open fields or other hang-out spots. Of all the benches present along the multiple walkways only one was seen occupied one. However, whilst previously mentioning that the play grounds were not being used this only applies to the public playgrounds, as there were children – on more than one occasion – seen entering the schoolyards to use the equipment present.

This underutilization could stem from the fact that at the time people might be inside having lunch; or because of the school holiday be away on vacation.

Table 2 gives an overview of the leisure facilities found in the area.

What is present?	**For who is this relevant?**	**Greenspace present?**	**Fig.**
Playground with low structures	Young children	Surroundings	13
Playground with high structures	Older children	Surroundings	14
Well-paved paths with benches	Adults & Elderly	Surroundings	15
Sporting facilities	Teens, Adults & Elderly	Yes/Surroundings	16
Community building	Children, Adults & Elderly	No	17
Open fields suitable for leisure	Teens & Adults	Yes	18
Large bush/shrubs	Older children	Yes	19
Dock/waterside hang-out	Children & Teens	No	20
Schoolyard playground equipment	Children	No	21

TABLE 2 LEISURE FACILITIES

Figure 13 Playground with low structures

Figure 14 Playground with high structures

Figure 15 Well-paved paths and benches

Figure 16 Sporting facilities

Figure 17 Community building

Figure 18 Open fields suitable for leisure

Figure 19 Large bush/shrubs

Figure 20 Dock/waterside hang-out

Figure 21 Schoolyard playground equipment

From this analysis we can conclude that there surely are densification possibilities present in the area, especially with the planned demolition. However, the current state of walkability and car-dominance present a challenge to social cohesion through limited walkability and diminished social safety. Yet there are many different functions present in the area which can positively improve social cohesion. Moreover, the many different sports facilities and other activity spaces also contribute to improved social cohesion. Therefore, during the design phase, improved walkability, social security and density combined with the preservation or increase in quality and quantity of green activity spaces should be focussed on .

Making choices

After this analysing phase the design phase can start, herein the goal was to implement as many of the design principles as possible into the area whilst increasing the FSI by at least 35%. With a special focus on walkability, social security and green activity spaces.

The first design choice to be made regards what parts of the existing urban structure will remain and which parts will not. Therefore, as can be seen in figure 22 the different amenities were identified and due to their functions, contribution to social cohesion (Mouratidis and Poortinga, 2020) and building ages these were selected to be kept in any new designs.

In all designs the creation of permeable courtyards was taken as a key feature of the built-environment. For the first sketch the densification mainly referred to the infill of open space and redevelopment of the homes that were set out for demolition. However, this would need very high buildings to reach the densification goal.

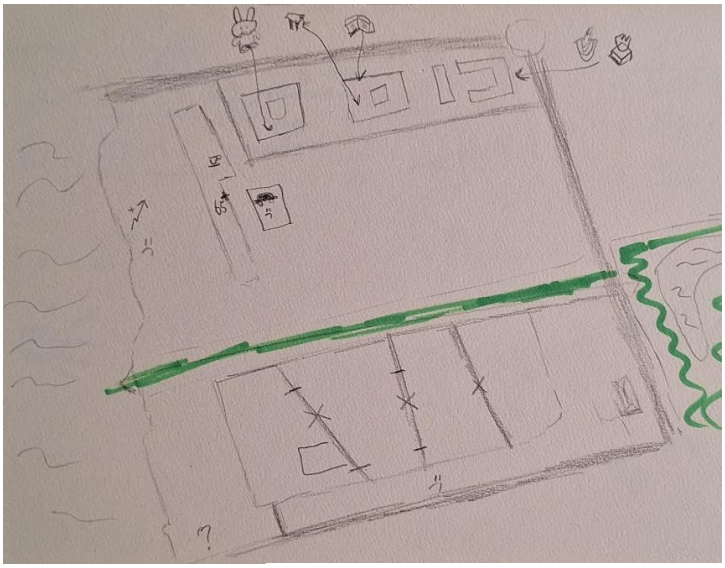


FIGURE 22 IDENTIFYING AMENITIES

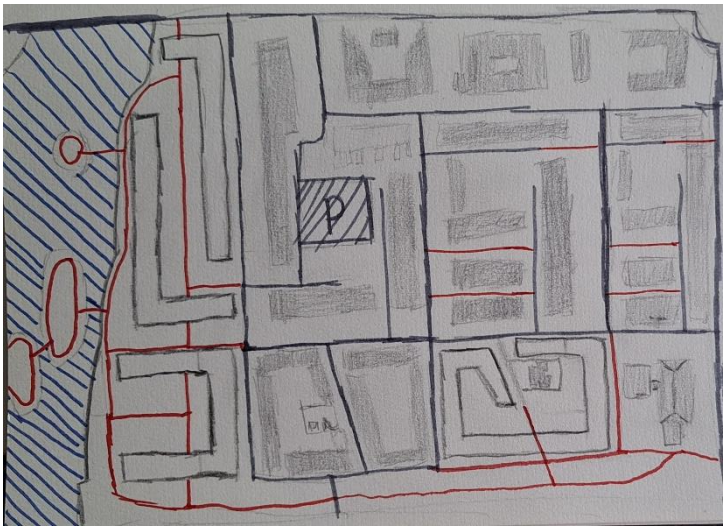


FIGURE 23 SKETCH

MAP 5 PARCEL DIVISION (SOURCE: (HET KADASTER, 2024, HET KADASTER, 2023))

Afterwards, data on plots building and ownership plots (het Kadaster, 2024) pointed out that of the more outdated buildings share the same owner; which can also be seen in Map 5. This information makes situations in which buildings have to be demolished more feasible as there are less owners present to be involved in discussions.

More designs were made, with each new design taking lessons from the previous. These designs can be found in figures 24-26. As can be seen in figure 25 after the first two designs the resident-owned single-family homes returned in the sketches as proper motivation to demolish these was lacking. Moreover, since these are privately owned/owner-occupied the process to redevelop here will be significantly harder and more costly when compared to the rest of the neighbourhood. Therefore the decision was made to keep these in the final design.

FIGURE 24 SKETCH

FIGURE 25 SKETCH

At the same time accessibility patterns within the neighbourhood were identified. Firstly, connecting the different parts of the neighbourhood to the park and shops to the right of the chosen plot. Secondly, connecting different parts of the neighbourhood with the amenities in the neighbourhood. Lastly keeping the urban fabric permeable and therefore the courtyards accessible and traversable (figures 25 & 26). Moreover, maintaining the open sightlines within the plot was another challenge to be addressed. These latter two could be combined, to create a porous urban fabric meaning that the openings in buildings to maintain the porosity and accessibility of the urban fabric can also be used to maintain open sightlines (figure 27).

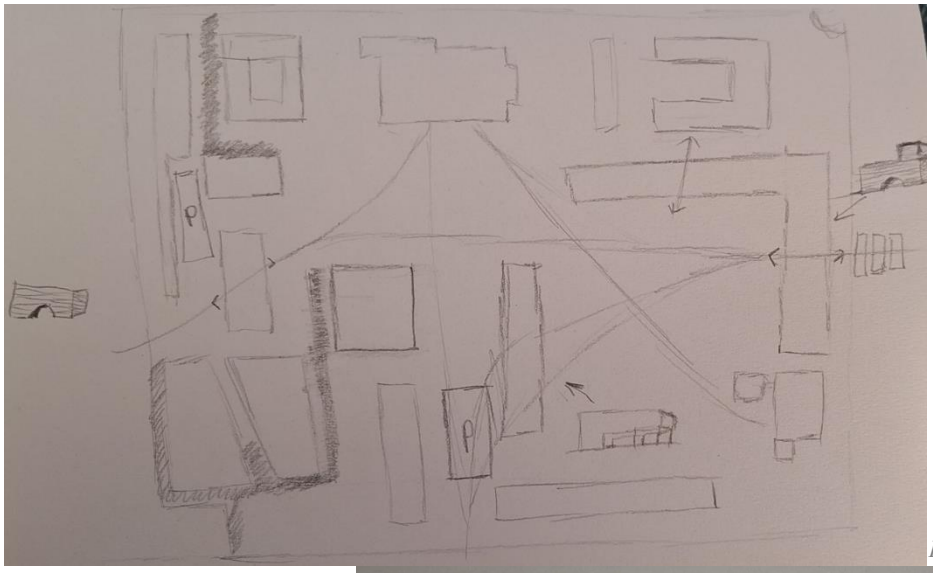


FIGURE 26 SKETCH

FIGURE 27 LINES OF SIGHT

As can be seen in figure 24 in this sketch possible parking locations were sought too; this as the literature explained the benefits of reducing kerb-side parking(Jacobs, 1961, Shariati and Guerette, 2017). The challenge in the design was therefore to find sufficiently large open spaces that would provide sufficient space to park cars while limiting the need for car-accessible streets to break up the entire plot.

Moreover, from the literature the lesson was learned that a culmination of parked cars can have negative advantages on the social security too (Shariati and Guerette, 2017), therefore the design illustrated in figure 28 will be used to obscure parked cars. A semi-underground car-park will be utilized to hide both the cars and the parking structure. The choice for semi-underground parking as opposed to fully underground stems from the high costs of underground parking structures. However, the semi-underground structure maintains the benefit that the space can be used twice.

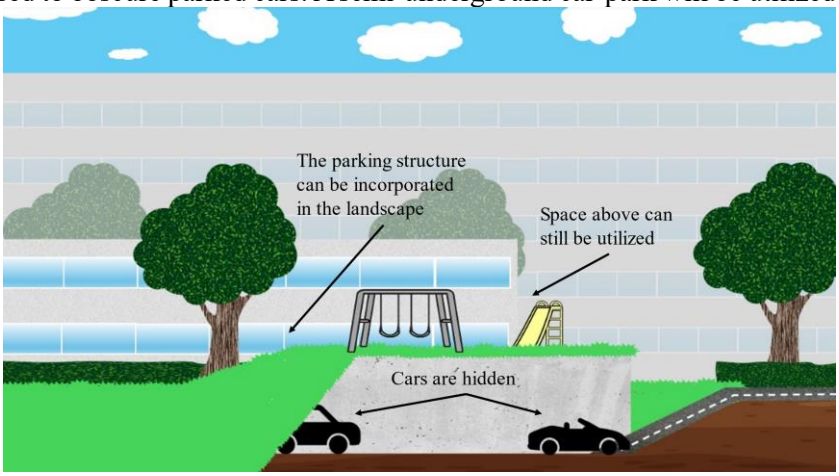
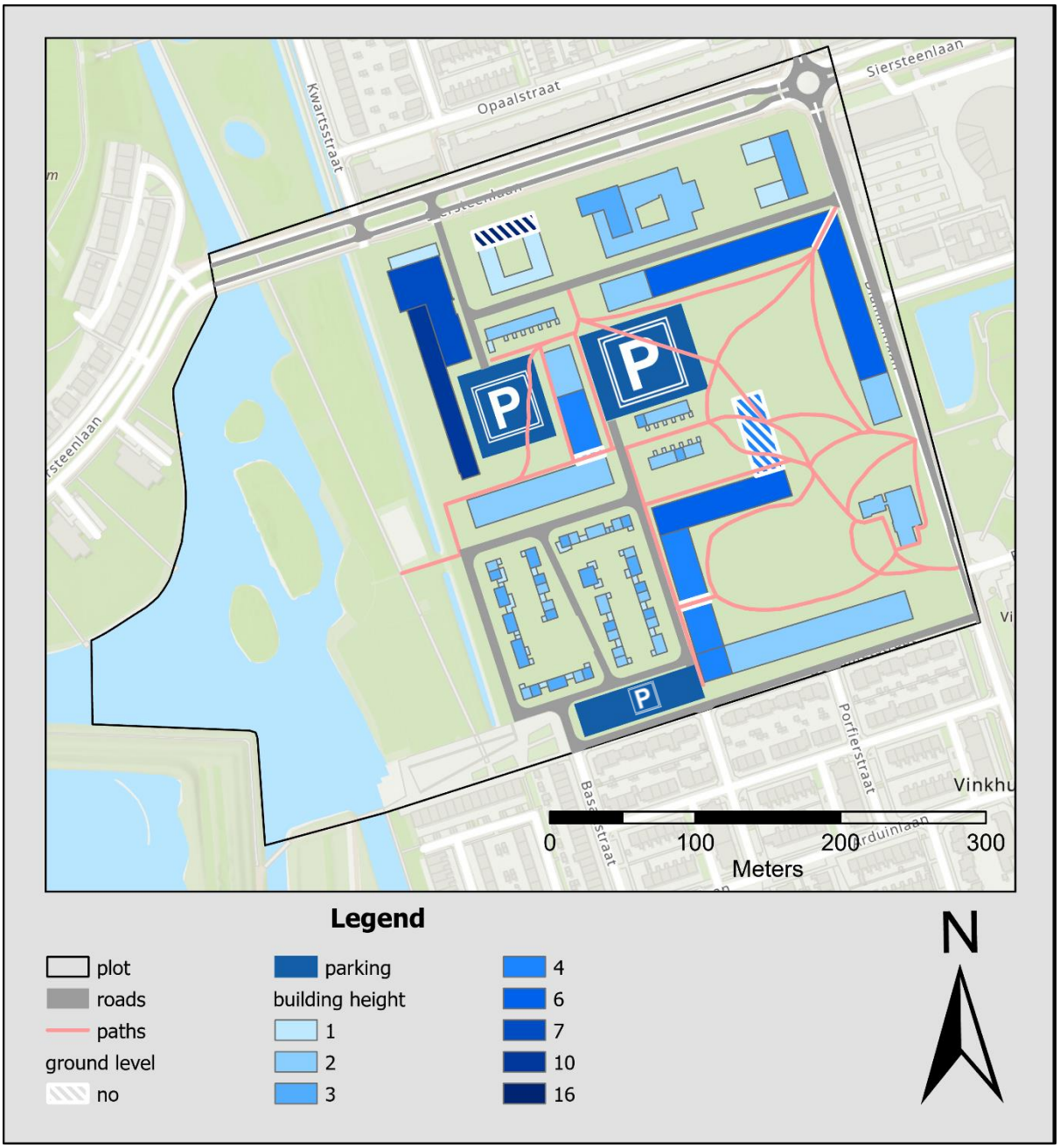


FIGURE 28 SEMI-UNDERGROUND PARKING

Securigreen

All the previous thoughts and sketches have been combined into the Securigreen plan; in this design factors ensuring social security and urban greenspace go hand in hand to achieve optimal social cohesion. In securigreen open lines of sight, the construction of courtyards and centralized parking are key ways to ensure social security. At the same time different activity spaces are allocated within UGS to stimulate activity and interaction; to achieve the same goal, well-paved paths (with plentiful street furniture) that aim to make the whole site walkable and accessible to all generations are incorporated. This design will be further explained upon and discussed in the following discussion.



Map 6

Discussion

The answer to the first subsidiary question or: “what spatial conditions can influence social cohesion?” pertains to the found challenges and opportunities in the existing neighbourhood; the second question refers to the found design principles to improve social cohesion. The answer to the third entails how these design principles work together and influence each other to create optimal socially coherent greenspaces. These applied measures, their implementation and their effects on one another but also on social cohesion will be discussed below.

To achieve the densification goal three apartment buildings are constructed. This design has led to a FSI of 0,63 (previous = 0,45) meaning the densification goal of a 35% increase has been met. These apartment buildings are placed in a way to create partially closed of courtyards. These courtyards are, as Matiukhin and Anisimova (2021) proposed, surrounded half-way or more yet not fully by buildings. Another quality courtyards should have to foster the feelings of belonging and sense of community and therefore improve social cohesion is the semi-permeability (Matiukhin and Anisimova, 2021). This is a way of allowing for the travel through spaces without making them too busy. In this design this is achieved by making it possible for people to pass through the courtyards on foot or bicycle. As mentioned, this also has a positive influence on the social security through the provision of sight lines (see figure 27). Meaning social supervision over the courtyards is possible from more places. This needed visibility is also the motivation behind making two large courtyards as opposed to many smaller ones.

An example of this is the elevated northern most part of the southern apartment building (see map 6), meaning that it only contains floors 3-6. This is done to maintain the open line-of-sight from large parts of the courtyard towards the community centre. These sightlines are according to (Shariati and Guerette, 2017) vital in ensuring social security and the safety of those traversing the courtyards.

At the other places where the movement of people through buildings is allowed this is done to permit access to the courtyards. In these courtyards paths are present that connect the most important amenities; to ensure they can be used for both leisure and connectivity purposes they are winding yet intertwined. Their winding nature resembles the principle used by Frederick Law Olmsted to improve their leisurely value (Maddux, 2023); here however they still serve a mobility function by connecting the different amenities.

This duality of leisure and purpose should ensure a certain level of use at most times to improve social safety Shariati and Guerette (2017). According to Matiukhin and Anisimova (2021) the use of arches in the buildings to access the courtyards will deter some outsiders; they reason this creates a sense of belonging and community. In the eyes of Jacobs (1961) this reduction of people on the street could diminish the safety in the courtyards; however, she does recognize the positive impact extra eyes on the street – from the people living in the apartments – and the lack of cars could have on the social security and therefore social cohesion.

This design focusses on walk- and cyclability, therefore cars cannot get everywhere in the area and are parked in three areas (see map 6). These hidden (see figure 2) and clustered parking spaces will have the benefits to social safety (Jacobs, 1961, Shariati and Guerette, 2017) and social interaction (Kaplan and Kaplan, 2003) whilst limiting the disturbance on the cityscape as addressed by Stubbs (2002). At the same time the accessibility limitations imposed on motorized vehicles help create safer and more walkable streets (Alleman et al., 2005, Gemeente Groningen, 2021).

The choice to maintain the greenspace along the waterfront was made because of the qualities it fostered. There is plenty of space stimulating activity in the forms of: a tennis court, football pitches and walking paths; moreover, the large open areas allowing for leisure are another reason to maintain this high quality greenspace. These qualities – the stimulation of activity and facilitation of interaction

– are also qualities the greenspaces in the courtyards must foster. Moreover these greenspaces should allow for people to wander and enjoy their surroundings, therefore this should be visually pleasing. But, as mentioned by Peters et al. (2010) should also provide the opportunity to sit down in the shade to foster inclusivity. Moreover, along the walking paths plenty of seating should be provided in order to ensure accessibility even for the oldest generations.

Conclusions

From the study and resulting design, urban greenspace seems to be able to play a role in boosting social cohesion after densification projects in post-war neighbourhoods. Starting, with the fact that densification can create room for more urban greenspace. This greenspace can then be designed in such a way that it stimulates social cohesion through facilitating activity, leisure and social interaction.

Furthermore it was found that from the used design principles, the creation of open sight lines, and therefore social security can go hand in hand. Moreover, the focus on walkability and thus the limitations imposed on motorized transport and its parking did not only have its own benefits but also contributed to safer streets and created sight lines which in turn contribute to social security. The creation of activity spaces was also combinable with the provision of green in the public domain. The creation of courtyards on the other hand, negatively impacted the sightlines and accessibility in the area as buildings were often in the way. However, this was solved using a solution to mitigate both whilst also addressing the needed permeability and privateness of the courtyards. At this last point however, conflict arose too; where there is a certain amount of people traversing the courtyards needed to ensure social safety, outsiders should – to an extend – be repelled to create the needed sense of belonging. Therefore we can conclude that if careful considerations are made and the interaction of different design principles carefully studied and their pros and cons are weighed properly, these can contribute to improved social cohesion.

However, it should be noted that the role the built-environment can play in this should not be overlooked. The construction of semi-private and partially permeable courtyards, limiting kerb-side parking and ensuring social security for example; these are all methods used in this study that are not (solely) interventions made in the urban greenspace.
Therefore when redeveloping post-war neighbourhoods anywhere in the world, social cohesion benefits most from a holistic view of the whole urban structure.

Limitations and further research

For this research a missing part of literature was the needs of different generations in UGS. Therefore

The literary basis of this thesis stems mainly from western literature, therefore for other parts of the world the outcomes of this research, in similar types of neighbourhoods might be less or not at all applicable. On the other hand, Zhang (2017) describes the Japanese strategy to post-war housing provision to be rather similar in nature to the western-European way. Therefore, this- and future research could benefit from more insight into the differences and similarities in post-war developments in different regions.

Another issue this research might encounter when trying to apply these understandings to the real world are the challenges introduced by the case-study. Whilst the case study was carefully selected to include typical qualities of post-war neighbourhoods, it must not be forgotten that each place is unique in its own way. Therefore, as this research has aimed to understand how social cohesion can be influenced by UGS in any randomly selected post-war neighbourhood; this uniqueness will have an impact on the applicability of the findings on some neighbourhoods.

Therefore, it might prove fruitful to conduct this same study using different case studies to see if – and possibly how – these produce other outcomes or lessons.

Moreover, much of the literature used for this study comes from scientifical niches. Therefore there are little to no other researches to compare these to and therefore investigate the validity of outcomes. This can severely affect the reliability of the findings done in this report as these cannot be verified in all instances. Revisiting this research in a few years to compare the literature with the literature available then, or comparing the developments proposed here with redeveloped post-war neighbourhoods, could produce interesting insights.

Lastly, a limitation this research has that produces a paradox refers to the involvement of citizens. The opinion of citizens was not used to see what the needs of communities are; nor was it used to evaluate designs with. Whilst adding this could give a better insight into the needs of a community this would also reduce the applicability of the results to other neighbourhoods. That is if a sample is used that is not representative of all inhabitants/communities of all post-war neighbourhoods. However, collecting such a sample – if possible – would be too resource-intensive for this research.

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