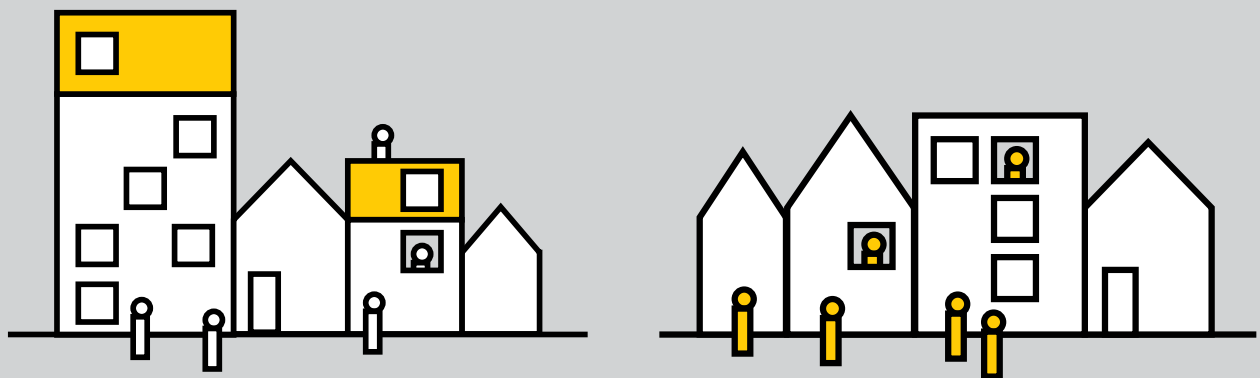


DENSIFICATION OF AMSTERDAM



How to improve quality of life and competitiveness



Onno de Vries

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Master Thesis
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Abstract

Amsterdam is growing fast, faster than the rest of the Netherlands. This leads to many challenges such as housing shortage and high pressure on space and amenities. For its competitiveness it is important that Amsterdam keeps developing. However, it is often considered to be full. This study will show that there is a lot of space unused in the city, and that by densification Amsterdam can be more attractive. It concludes that the agglomeration of Amsterdam has the potential to grow within its borders to an urban structure of 1.4 million inhabitants. The paradox of the compact city states that densification creates often benefits on the large scale, but negative effects on the small scale. This study will show how the densification can be implemented in a good way and how it can contribute to the quality of life. Quality of life is an important part of a city's competitiveness, therefore this study will deal with the spatial measures that are needed to achieve both. The final goal is to show how densification can improve the quality of life and competitiveness of Amsterdam, to create an even more vibrant city where people love to live and work.

Introduction

This is the master thesis of my study Urbanism at the Delft University of Technology. The topic is the densification of Amsterdam, and it deals with the question: How to improve quality of life and competitiveness. The thesis contains five parts. In the first part, I will introduce the problem, describe the location and define the research. The second part is the theoretical framework, where I will discuss the relation between the three main concepts of this thesis; densification, quality of life and competitiveness. After that I will continue in the third part with a densification study of Amsterdam. In part four I will show how the city should deal with the densification potentials. A vision will show how to adapt to the new situation. Another elaboration will show the best way for the implementation of new dwellings. Part five is the conclusion, where I discuss my recommendations for the development of Amsterdam. Finally I will reflect on the method and the process that I used.

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**PART
ONE**

PROJECT INTRODUCTION

The project will be introduced in this first part of the thesis. First, I will discuss the problem field, which is starting point of this study. This contains the current growth of Amsterdam, a debate on the development of the city and a theoretical discussion about the relation between competitiveness and quality of life. After this, the location will be described with basic statistics about dwellings and inhabitants. I will discuss the history of Amsterdam more detailed with four visions for the city that can be important for a densification study today. This serves as a necessary background, that is needed to define the research questions and a research approach. This approach shows the route I will take to find the answer to the questions. At the end of this first part I will discuss the societal and scientific relevance of the project.

Problem field

Amsterdam is becoming more and more popular, both for tourists and residents. As a result of this the city is crowded. In the eyes of some people too crowded. The crowded area reaches far beyond the city centre. The whole city it is busy; on the bicycle lanes, in the parks and even on the housing market. Many discussions have taken place in Amsterdam, asking if these developments are desirable and how to deal with them. The city is so popular that it cannot keep

up with the increasing demand for housing. Due to the booming economy and the great living environment, many people want to move to Amsterdam. On January 1st 2015, Amsterdam had 822.272 inhabitants (OIS Amsterdam, 2015). The population is now growing with 10.000 to 12.000 a year (Gemeente Amsterdam, 2016c). If the production of new dwellings continues, then there will be up to 900.000 inhabitants in 2025 and one million in 2030 (Gemeente

Amsterdam, 2016c). After 2020 the growth of Amsterdam will slow down, due to a negative domestic migration number. However, the city will keep growing slowly (OIS Amsterdam, 2015). It is important to keep in mind that these numbers are only for the municipality of Amsterdam.

The problem is, there are not enough dwellings to house all the people that want to live in Amsterdam. Therefore new space for housing is needed. Over the last century Amsterdam expanded a lot, resulting in a significant decline of the city's density. This is not desired anymore; instead the density should increase again. The municipality is already working on a compact city policy, this study builds further on that. There are two main reasons for the compact city; it will reduce the traffic and with that the pollution, and it will save space so that the countryside can be maintained as a natural landscape. When such a policy is executed properly it can lead to vibrant cities with a high quality of life. The shortage of dwellings in Amsterdam leads to problems on the housing market. The last few months, there were articles on this topic in the Dutch media every week. The biggest problems are the shortage of housing and the rising

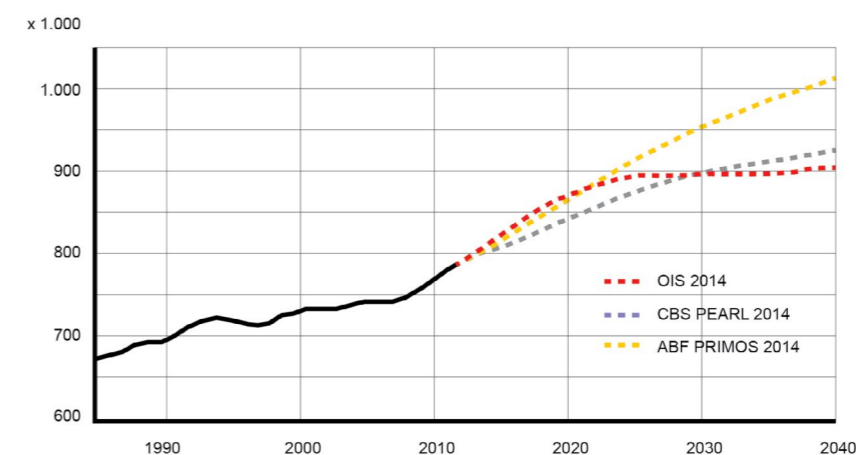


Image 1.1 Development of the population of Amsterdam (OIS Amsterdam, 2015)

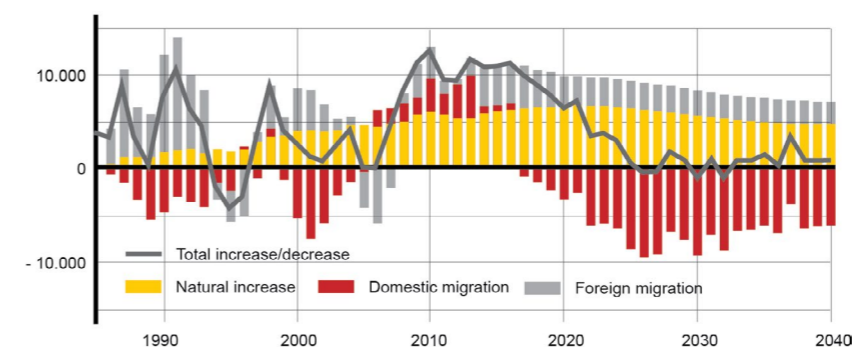


Image 1.2 Population development by year and cause (OIS Amsterdam, 2015)

prices, due to the high demand. Many people with a low income cannot afford to live in Amsterdam anymore. They get pushed out to the edges of the city or they even have to find affordable housing elsewhere in the region.

The municipality revealed recently plans for 50.000 new dwellings within the city in the next ten years (Gemeente Amsterdam, 2016c). This is a great effort, but still not enough. The municipality expects an increasing housing shortage from 2021 (Gemeente Amsterdam, 2016c). This makes it clear that new areas for housing are needed, but the space is limited (Damen, 2015). The few undeveloped locations that are left within the municipality have a high natural value. The surrounding municipalities have similar issues, and are often too far or disconnected from Amsterdam. According to the structure of

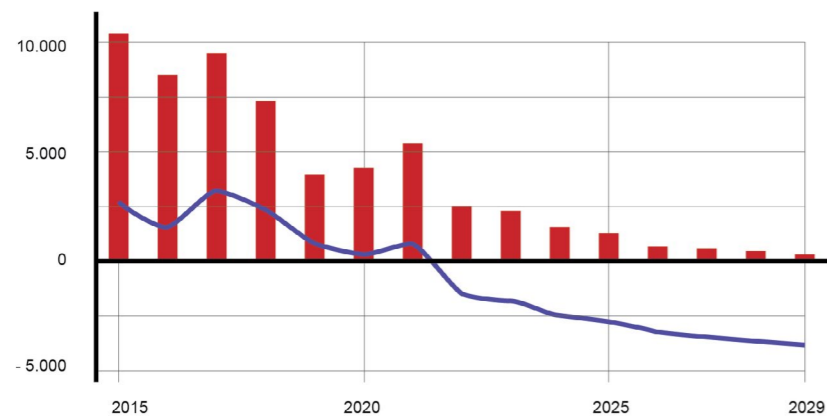


Image 1.3 Housing production and shortage of Amsterdam (Gemeente Amsterdam, 2016c)

Amsterdam, the municipality has the ambition to solve the issue by densification. This is one of the challenges they name. I think that there is a lot of potential for densification in the agglomeration of Amsterdam, even more than the municipality realises yet.

VIEWS ON THE DEVELOPMENT OF AMSTERDAM

The situation described before shows that Amsterdam is growing much faster than the rest of the Netherlands. One reaction to the growth of Amsterdam came from Zef Hemel (Professor urban and regional planning at the University of Amsterdam). His idea is to develop Amsterdam into a megacity of two million inhabitants (Obbink, 2015). Doubling the size of Amsterdam has a huge impact on the city and its structure and

for this reason it was received by many as something unrealistic and undesirable. Next to the impact on the city level, it will shift the spatial structure of the Netherlands from a polycentric to a monocentric model. This idea led to a discussion about the development of Amsterdam between Hemel, Ewald Engelen (Professor financial geography at the University of Amsterdam) and Friso de Zeeuw (Professor area development at the Technical University Delft).

The idea of Hemel's megacity did not only intend to accommodate all potential citizens, but aimed for a better global competitiveness. According to Hemel, Amsterdam needs to think big when it wants to keep up with other global cities. He bases his arguments on several researches stating that cities in the Netherlands are too small to compete on a global level (Hemel, 2015). In order to do so, the Netherlands should have one dense megacity, instead of the stretched Randstad area (Obbink, 2015). According to Saskia Sassen, these kind of cities are more likely to act as an important global centre (Sassen, 2001). Hemel says that the Netherlands should focus on keeping its talented people, by making the biggest city (Amsterdam) an attractive

place for them to work, socialise and recreate (Hemel, 2014). An important condition is that the city grows significant. According to Richard Florida big and dense cities are more likely to create innovative ideas and to attract new companies (Florida, 2002). Florida is an urban theorist, known for his book; *The Rise of the Creative Class*. He argues that talented workers are the key to economic competitiveness (Florida, 2000). Besides that, doubling the size of Amsterdam should also increase the city's productivity (Hemel, 2015). Luis Bettencourt did research on size and performance of cities, with the outcome that doubling the population of a city gives scale benefits of about fifteen percent (Bettencourt, Lobo, Helbing, Kühnert, & West, 2007).

Ewald Engelen argues that cities are often seen as investment objects by rich people, they want to make profit rather than good cities (Buiting, 2015). This leads to cities that become unaffordable for the average citizen, due to increasing taxes for collective amenities. On top of that Engelen states that 95 percent of a city is focused on every day economy, and not on the kind of economy that competes internationally (Buiting, 2015). Over a long period, especially the relative small North European

cities have been successful (Buiting, 2015). There is no need for a megacity. Engelen rather focuses on a livable city for the average citizen. Friso de Zeeuw adds that megacities bring problems such as segregation (Zeeuw, 2015). He takes London as an example; the working class is pushed out due to high housing prices. In the relative small cities in the Netherlands this process of segregation doesn't really take place.

QUALITY OF LIFE OR COMPETITIVENESS?

The origin of the discussion about Amsterdam is the disagreement whether the city should be developed with focus on quality of life or with focus on competitiveness. Hemel argues for a competitive Amsterdam that is able to keep up with other global cities. Engelen and

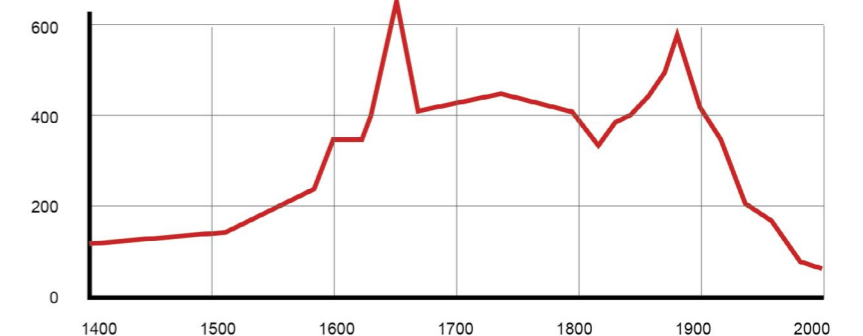


Image 1.4 Development of Amsterdam's density (Berghauser Pont & Haupt, 2011)

Zaandam
75.005 inhabitants
7,4 % of the population
33.629 dwellings
2,23 persons per dwelling

Noord
91.324 inhabitants
9,0 % of the population
41.557 dwellings
2,20 persons per dwelling

West
142.728 inhabitants
14,1 % of the population
76.990 dwellings
1,85 persons per dwelling

Centrum
86.418 inhabitants
8,5 % of the population
53.932 dwellings
1,60 persons per dwelling

Oost
128.690 inhabitants
12,7 % of the population
63.834 dwellings
2,02 persons per dwelling

Nieuw-West
146.700 inhabitants
14,5 % of the population
63.803 dwellings
2,30 persons per dwelling

Zuid
141.438 inhabitants
13,9 % of the population
78.238 dwellings
1,81 persons per dwelling

Duivendrecht
4.760 inhabitants
0,5 % of the population
2.322 dwellings
2,05 persons per dwelling

Diemen
25.930 inhabitants
2,5 % of the population
11.891 dwellings
2,18 persons per dwelling

Amstelveen
87.178 inhabitants
8,6 % of the population
43.087 dwellings
2,02 persons per dwelling

Zuidoost
84.567 inhabitants
8,3 % of the population
38.638 dwellings
2,19 persons per dwelling

Location

The area of study of this thesis is the agglomeration of Amsterdam, located in the Northern part of the Randstad in the Netherlands. Apart from the municipality of Amsterdam it includes the municipality of Amstelveen, the municipality of Diemen, the area Zaandam and the neighbourhood Duivendrecht. In total, the agglomeration has a little over one million inhabitants and contains a little over half a million dwellings, on average two person per dwelling.

Total
1.015.145 inhabitants
508.025 dwellings
2,00 persons per dwelling



Image 1.5 The agglomeration of Amsterdam

Urban planning history of Amsterdam

Over the years, the municipality of Amsterdam created several plans for the development of the city. I will discuss a few of them, which are important for the context of this densification study. The first one is the General Extension Plan (AUP) from 1935, the finger model of the city was introduced here. Another plan is the structure plan 'The city central', developed in 1985. This was the first plan that introduced densification. The third and most recent plan is the structure vision 2040. This plan is from 2011. As

an elaboration on this, the housing program for the coming years was published in 2016 in 'Koers 2025'.

AUP

The AUP is the plan with the biggest impact. By annexing two other municipalities, Amsterdam suddenly got twice as big and had enough space for a huge expansion (Jolles, Klusman, & Teunissen, 2003). The plan was made by Cornelis van Eesteren, who worked

according to the ideas of the functional city; light, air, space, and separation of functions. There were four functions distinguished; living, working, traffic and recreation. The last function got extra emphasis in the AUP, and was designed in a way that made it reachable by foot from every house (Jolles et al., 2003). To realize this principle a new model for the city was introduced; the finger model with its lobes and wedges. Lobes are the urban parts of the city that stretch out in the landscape. The wedges

are the parts where the landscape enters the city. Finally, it took until after the Second World War before this plan was implemented. Today this model is still leading for Amsterdam's development and most of the urban boundaries of the AUP are nowadays still there. To keep the existing qualities of the AUP, its characteristics should be taken in account during the process of densification.

THE CITY CENTRAL

In 1985 the municipality of Amsterdam published the structure plan 'The city central'. By this time, Amsterdam has reached its borders again (Jolles et al., 2003). Therefore, the main aim of this plan was to find new areas for housing development (Jolles et al., 2003). There were no possibilities for annexation of new land, so space had to be found within the existing borders of the municipality. Two strategies were used for development. The first

one was expanding on undeveloped land in the West and in the East; Nieuw-West and the Oostelijke Havenlanden and IJburg. The area of Waterland remained undeveloped, because the natural quality was considered too valuable. In Nieuw-West less houses were realised than planned due to restrictions of the environmental zones of Schiphol (Jolles et al., 2003). The second strategy was densification, according to the concept of the compact city; high density and mixed functions. Urban

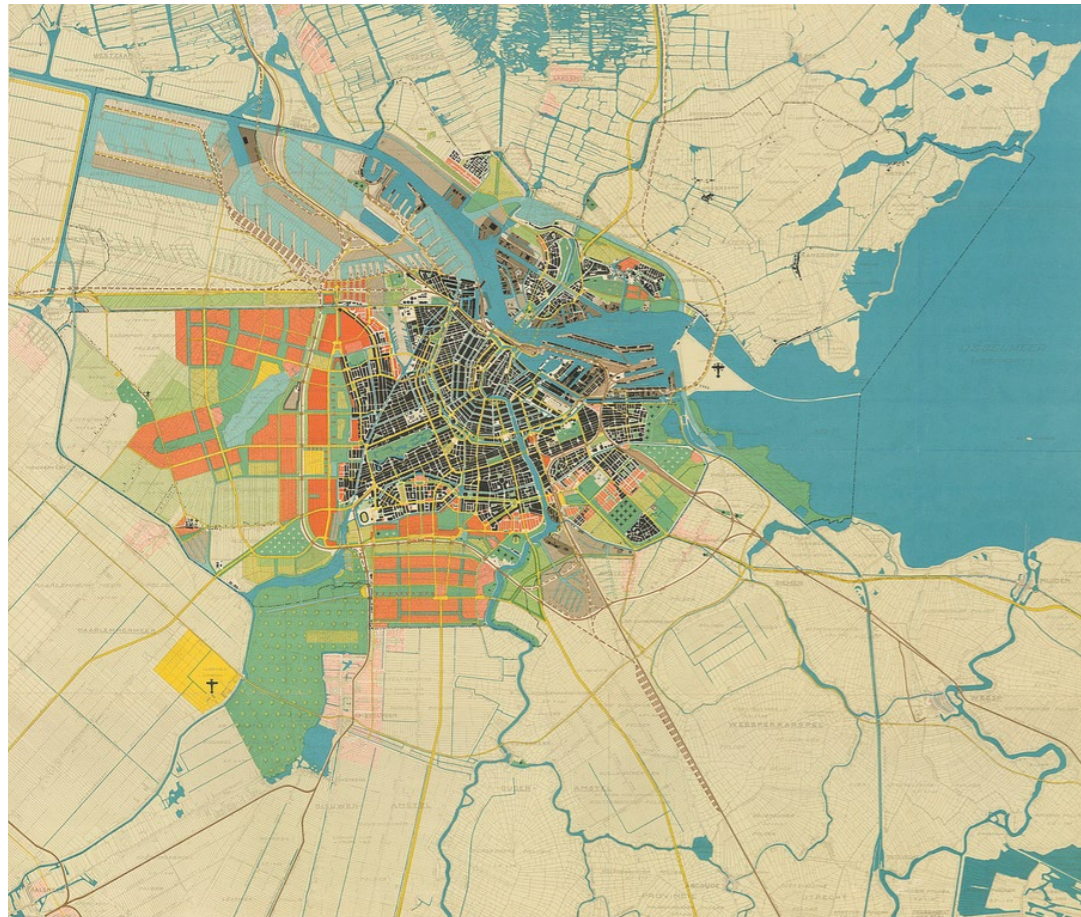


Image 1.6 AUP (Jolles, et al., 2003)

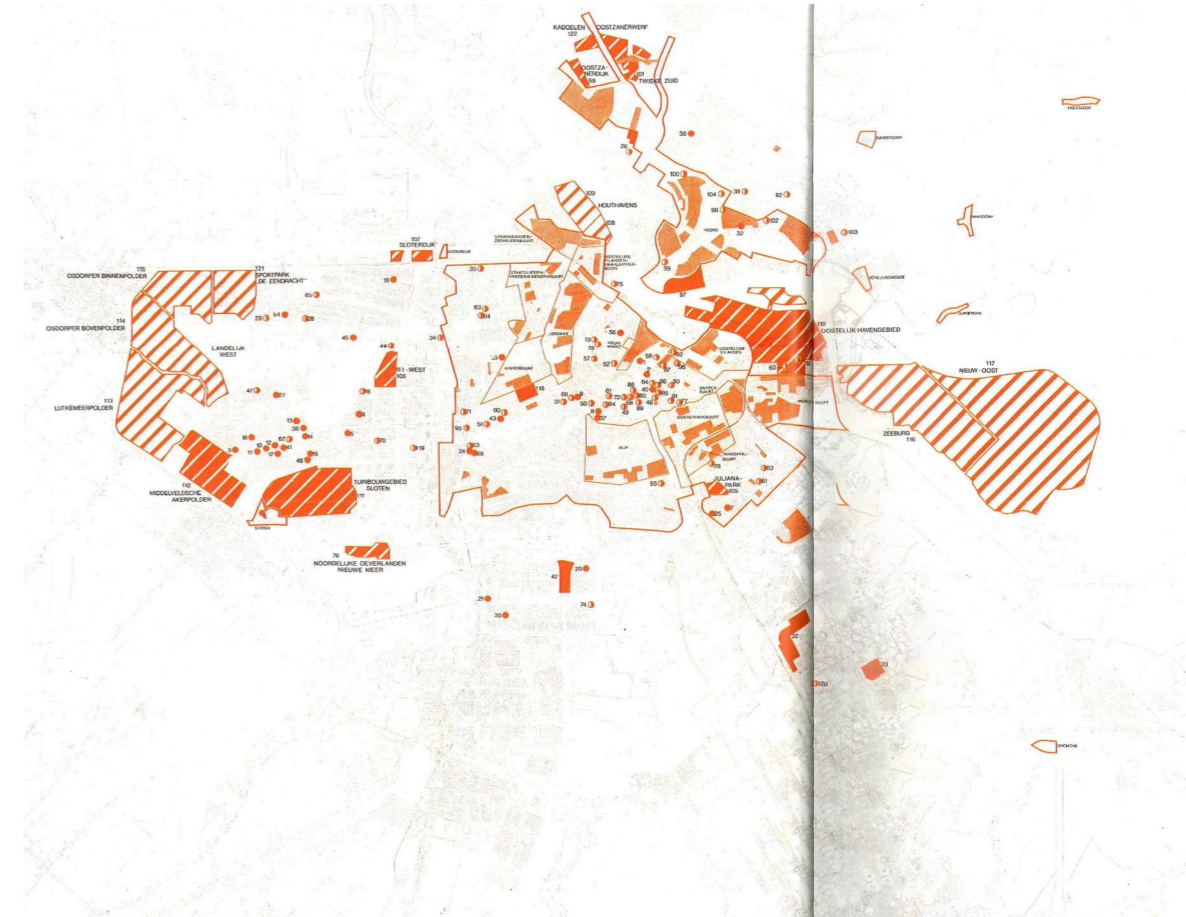


Image 1.7 Densification map from 'The City Central' (Jolles, et al., 2003)

renewal projects took place in the inner city, and the rest of the city focused on small scale densification. Next to these housing plans, there were plans to extend the metro system. Due to the resistance of the citizens against big scale interventions and projects it didn't succeed. Instead trams were used.

STRUCTUURVISIE AMSTERDAM 2040

The most recent plan for Amsterdam dates from 2011; 'structure vision Amsterdam 2040'. The subtitle of this document is 'Economically strong and sustainable', which shows its focus. The ambition is to maintain Amsterdam's important position in the world economy as well as, maintaining the quality of the living environment and making it future proof (Gemeente Amsterdam, 2011). This can

be summarised in the concepts competitiveness, quality of life and sustainability. The goal was translated into six challenges and four processes. Intensify land use is the first challenge, densification is a part of this. The ambition is to add 70.000 dwellings within the existing urban area. The other challenges are; a coherent public transport network, high quality of public space, attractive green and water, transformation to mixed functions, and more independency from fossil fuels (Gemeente Amsterdam, 2011).



Image 1.8 Structure vision Amsterdam 2040; extension of the city centre (left) and metropolitan landscape (Gemeente Amsterdam, 2011)

These challenges should be achieved by focussing on four processes. The first one is the expansion of the centre area. Second, improving the relation between landscape and city. The next process is the rediscovery of the waterfront. 'T IJ should play a central role in the city again. Last process, is enhancing the international character of the South corridor of the city, as the international business district of the Netherlands (Gemeente Amsterdam, 2011).

KOERS 2025

Due to the rapid growth of Amsterdam and the problems it causes on the housing market, Amsterdam realised that actions have to be taken. Therefore they published in January 2016 plans for 50.000 new dwellings within the city in the next ten years; Koers 2025 (Gemeente Amsterdam, 2016c). It also shows areas for future development; so called strategic areas. These strategic areas have a potential for another 20.000-

25.000 dwellings. This program is an elaboration of the housing plans of the structure vision 2040, were Amsterdam set the goal to create 70.000 dwellings.

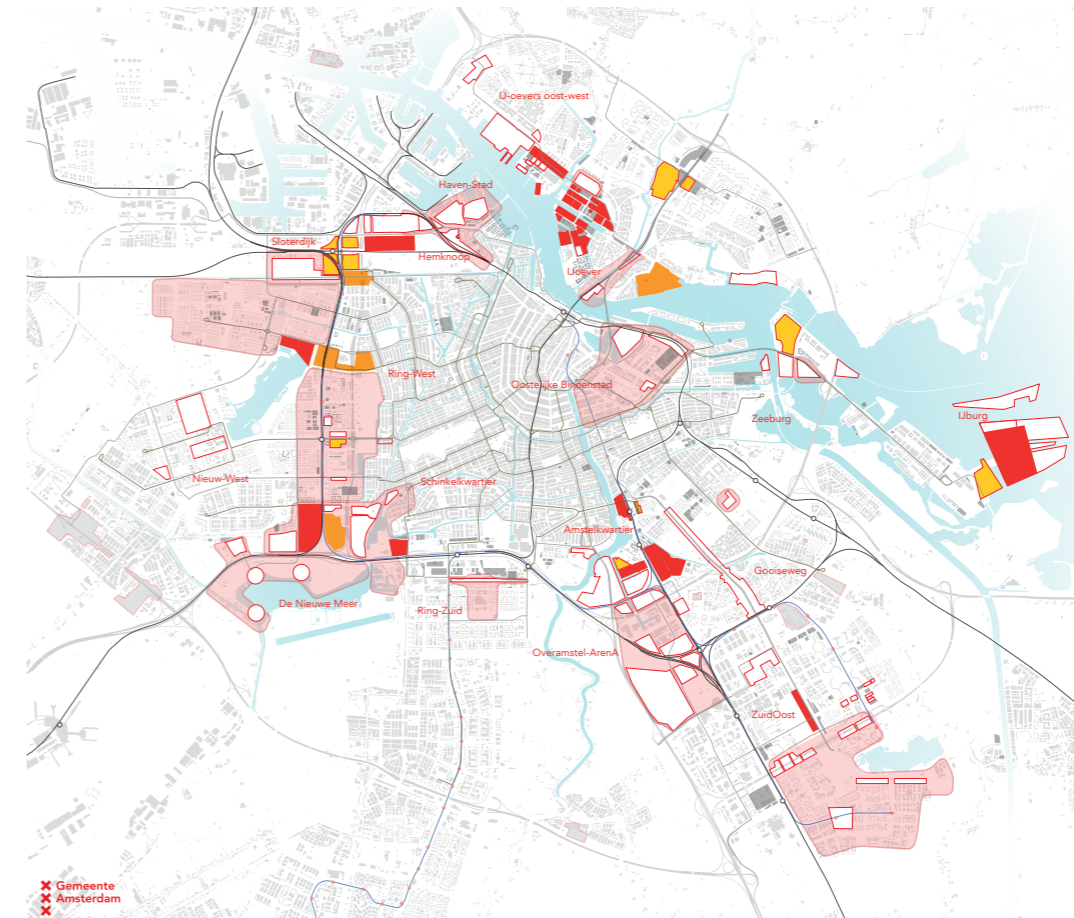


Image 1.9 Koers 2025 (Gemeente Amsterdam, 2016b)

Research questions

Research questions are needed to find answers to the previously mentioned problems. They will help to specify and structure the research. In the end they can be useful to evaluate the outcome of the sub studies of this thesis. There is one main research question and four sub research questions.

The first three sub questions will mainly be answered by literature research. Part two of this thesis, the theoretical framework, will discuss them. The first sub question, about quality of life, will be further elaborated in the design part. The last sub research question will be answered by design, in part three

and four of this thesis. Finally, the main research question will be answered in the conclusion. Hereby the sub questions will be used as input. Before I start answering the questions, I will discuss the concept of densification and why Amsterdam (and the Netherlands) should embrace it.

MAIN RESEARCH QUESTION

M HOW CAN DENSIFICATION ADD QUALITY OF LIFE TO AMSTERDAM AND CONTRIBUTE TO ITS COMPETITIVENESS?

SUB RESEARCH QUESTIONS

#1 WHAT IS QUALITY OF LIFE, AND HOW CAN IT BE IMPROVED BY DENSIFICATION IN CITIES?

#3 WHAT IS THE RELATIONSHIP BETWEEN QUALITY OF LIFE AND COMPETITIVENESS IN THE CONTEXT OF AMSTERDAM?

#2 WHAT IS COMPETITIVENESS, AND HOW CAN IT BE IMPROVED BY DENSIFICATION IN CITIES?

#4 HOW AND WHERE CAN AMSTERDAM BE DENSIFIED?

Image 1.10 Research questions

Research approach

As discussed before there are three views on the development of Amsterdam; the two contradicting views of Hemel and Engelen and de Zeeuw, and the one of the structure vision of Amsterdam. This study will add a fourth view. The views on the development of Amsterdam can be distinguished by two variables; the focus of development and the level of densification they want to achieve. The focus of development relates to the question if quality of life and competitiveness are compatible or

not. In image 1.11 you can see how each of the views are positioned according to these variables. The goal of this study is to find the maximum level of densification that still can guarantee quality of life. For the position of this study, I have to make two assumptions. First, quality of life and competitiveness are compatible and it is possible to combine them in one vision. This will be discussed in the theoretical framework. Second, the maximum level of densification in Amsterdam

will be somewhere between 70.000 (goal from the structure vision Amsterdam 2040) and 500.000 (needed for the two million scenario of Hemel) extra dwellings. This number will be the outcome of the research in part three of this thesis.

The research approach consist of a literature study and a design part. The first three sub research questions will be answered with literature. Each of them relates to one of the existing views on the development of Amsterdam. Together they will form the literature input for the design part of the thesis. In the design part, the fourth sub question will be answered as well as the main research question. Image 1.12 shows how the different questions and views relate to each other and how they will be used as input to answer the main question.

The first step is to get more understanding about the concepts quality of life and competitiveness. For this I will study several articles, scientific publications and point of views on these concepts. The focus will be on the spatial components, since this is needed for the second part of this research; the design part. Next to that the concepts will be linked with densification, to clarify the relation between them

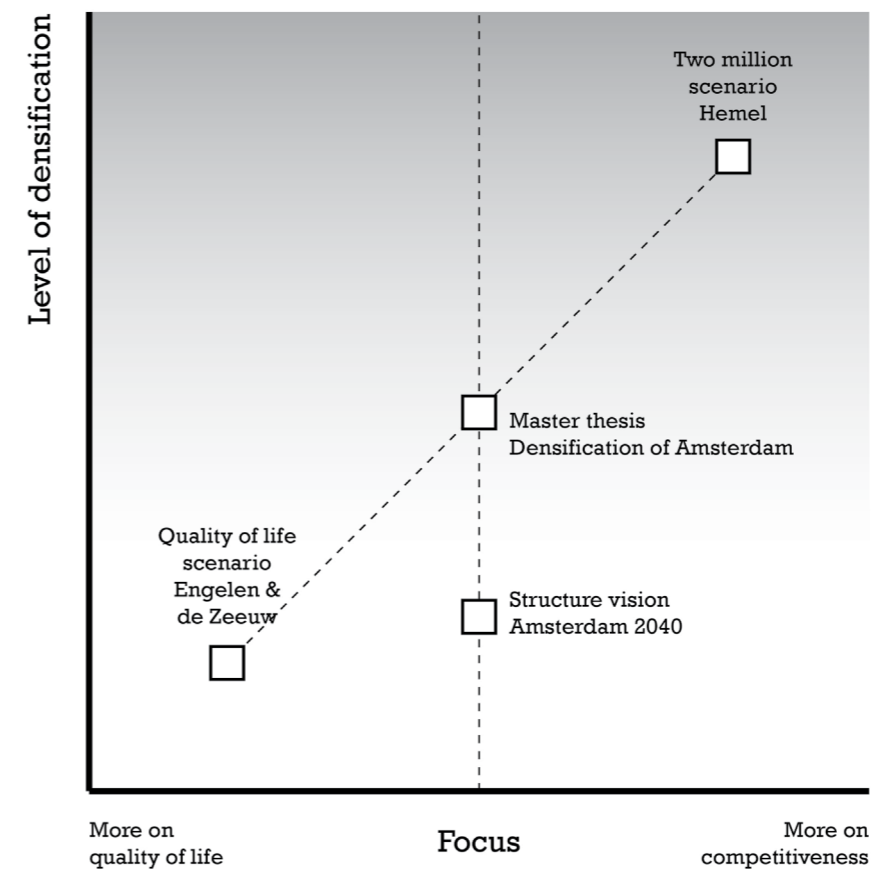


Image 1.11 Positioning of the thesis within the discussion

and the possible effects it can have. In the end that will explain how a compact city policy can improve the quality of life and competitiveness. The first two research questions can be answered with this. The third question focuses on the relation between quality of life and competitiveness. According to the discussion between Hemel, Engelen and De Zeeuw, and the view of the municipality of Amsterdam, this relation is not clear. I will discuss whether these concepts are compatible or not. Therefore, I will use literature that specifically deals with this relation and compare them. These three sub questions will form the basis of my study; the theoretical framework.

After the literature part, I will continue with the analysis of the densification potentials. The analysis uses an universal approach to identify densification potentials in cities. Amsterdam is used as an example in this study, but the same method is applicable for other cities. The method used for each step is described extensively, so that the approach can be applied somewhere else. At the end of this thesis I will reflect on the applicability of this approach in other contexts. For the densification approach, I will first analyse existing densification studies, to come to a selection of

strategies that can be used. Second step is the categorisation of the city structure in typologies. to see where the strategies might work best. Some strategies address the built environment of the city and other address the open spaces. Therefore typologies are needed for both. The next step is the identification of the densification potential in quantity and locations for each strategy. Each of them requires a different method. Due to limited time, I cannot analyse the whole agglomeration on a small scale. Therefore I will use data provided by the municipalities and the CBS. This gives a good approximation of the available densification potential for the whole agglomeration. However, for a more detailed and exact result an analysis on a smaller scale is needed. The analysis concludes in a map of the potential locations for densification in Amsterdam, and an estimation of the number of dwellings that can be added.

The final part is the design part. This will show my view on the development of Amsterdam and at the same time reacts to the other views. I will first discuss the scale effects of densification. Densification often has positive effects on the large scale, but negative effects on the small scale. This is called the paradox of the

compact city. I will discuss the effects of densification on different scales and the measures that should be taken to optimise the benefits and reduce the negative effects. Since the small scale is the critical part of densification, I will elaborate more on this. First I will discuss how to develop the agglomeration with these extra dwellings. This results in a development vision for Amsterdam. The final densification potential map from before will be used for this as input. This is an addition to the structure vision of Amsterdam. Next to this I will discuss how to implement the dwellings in a good way, so the quality of life will be maintain or even improved. To achieve this I created guidelines that should be used by the implementation on the small scale to tackle the paradox of the compact city. This is an elaboration on how quality of life and densification can collide and is thus part of research question one and the main question. In the end, I will react on the two million scenario of Hemel. The two million will not be reached with this densification approach. I will discuss here how Amsterdam should develop when it grows more than it can accommodate with densification, and how Amsterdam can reach the two million.

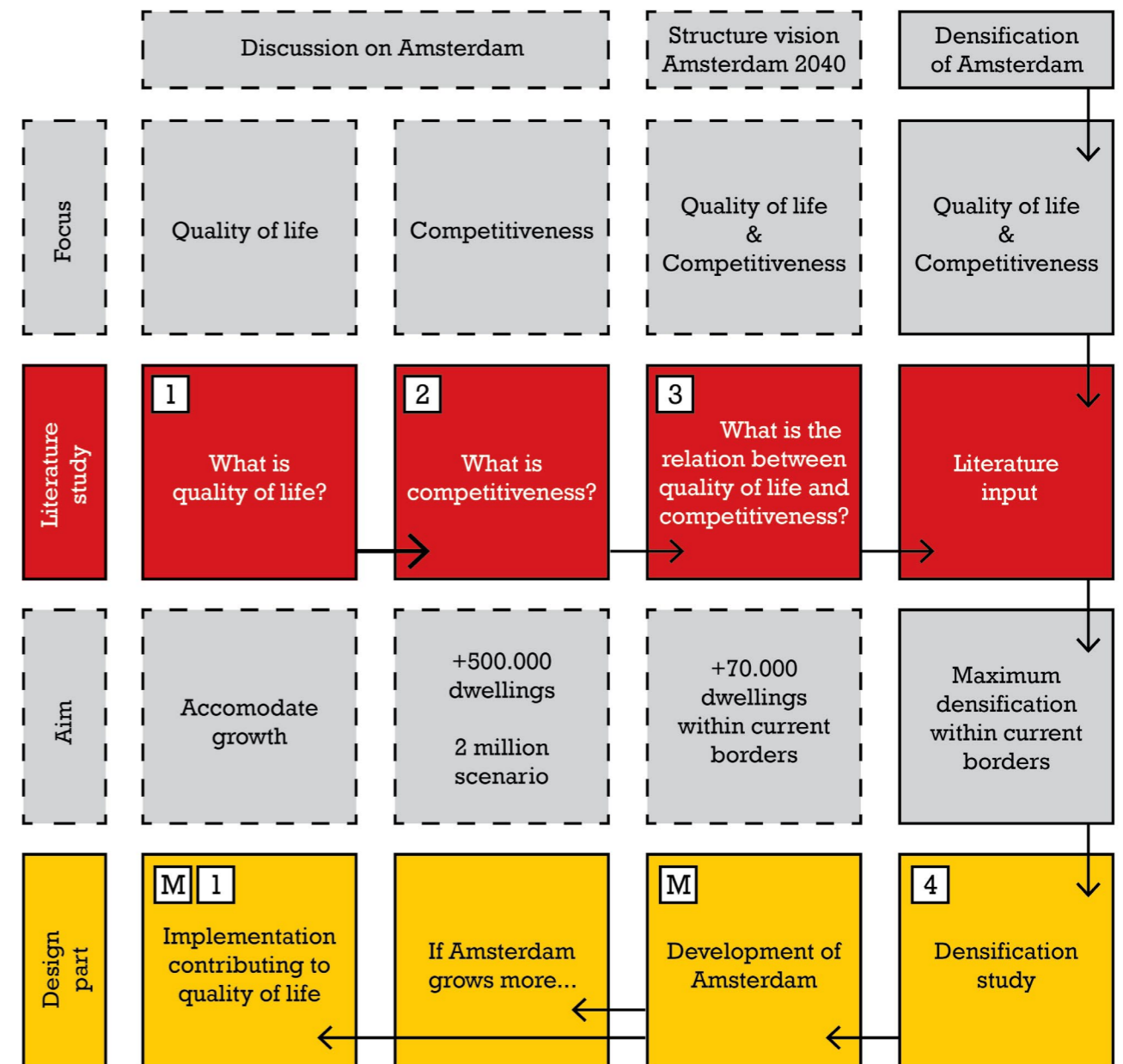


Image 1.12 Research approach

Societal & scientific relevance

A good thesis is relevant for society and science. I will explain here how this thesis contributes to societal issues and to the scientific body of knowledge.

The literature study on the relation between quality of life and competitiveness contributes to the scientific literature about this topic. It brings different studies together. Many articles are written on the relation, but there is no consensus yet about this. Therefore this study tries to create more clarity, by discussing the differences and similarities between the existing views. The study to the spatial components of the single concepts can also be useful for policy makers and other practitioners in spatial planning. Quality of life and competitiveness are frequently used concepts, but still remain abstract and vague. This study can create a better understanding on the spatial components that are needed to improve quality of competitiveness.

Another important contribution of this thesis is to show the importance and the potential of densification. It can help create more support for densification. The universal approach that helps to identify densification potentials is a tool that can make it is easier for cities to start a process of densification.

Policy makers in the Netherlands are often convinced that densification is the way for future city development. Still, it is a difficult thing to achieve. One of the main reasons for this is that citizens are often against densification projects. Nobody wants to have more people in their backyard. It is important to show that densification can also bring benefits. It can upgrade neighbourhoods and cities, and the limited open countryside can be preserved and used for recreation. On top of that, it can create a more sustainable way of living where there is less need for car use. It is important to show that a good implementation doesn't have to lead to compromises. That is the goal of this thesis.

Finally this study creates input for the discussion about the development of Amsterdam by providing new ideas and elaborating on existing ones. Two main lessons can be drawn from this study; there is a lot of space in the city, and using this space doesn't have to go at the expenses of the quality of life. The city is crowded, but it is not at its limits. With another organisation, it is possible to realise a significant amount of densification. Together with the right focus and creative local solutions, Amsterdam can be improved. The thesis also elaborates

on the existing discussion between Hemel, Engelen and De Zeeuw by making their ideas more spatial. By doing so the consequences of certain developments become clear for everyone. Especially for the citizens this makes it easier to understand the complex processes. In the end, they should be convinced, because the discussion is about their neighbourhood and their city.

**PART
TWO**

THEORETICAL FRAMEWORK

The theoretical framework discusses the main concepts of this thesis. It starts with explaining why densification is a good way for development by discussing the benefits it can bring. This is the first question that should be answered in this thesis. After that I will continue on the concepts quality of life and competitiveness, to answer research question one and two. First the meaning of those concepts will be explained, followed by their spatial components. These should be clear in order to use them in a spatial design. Next to that, I will also try to pin down how these concepts can be improved in the Netherlands and in Amsterdam. When the concepts of quality of life and competitiveness are clear I will try to connect them, to find out what their relation is, because there is no consensus about this. This should result in an answer to the question whether they are compatible or not. The theoretical framework concludes with an input for the rest of the thesis. This consists of the spatial components of the concepts and the conditions under which they are compatible.

Densification

Densification of cities is about increasing urban activity. This could be measured in many different ways (Urban Unlimited, 2002) like inhabitants, people movements or money flows. In this thesis I will focus mainly on numbers of buildings, and sometimes on inhabitants. I decided not to use any other densification numbers in this study (dwellings per hectare or the Floor Space Index), due to the arbitrary results it can lead to. Depending on where you draw the border of an area, its can differ a lot.

It is important to mention the scale when talking about densification. Sprawl on one scale can be expansion on another, image 2.1 shows this. For example, when you add dwelling in the green fingers of Amsterdam, it is densification on city scale, but expansion on a local scale. This should be interpreted as a clarification of densification and not as an excuse for expansion.

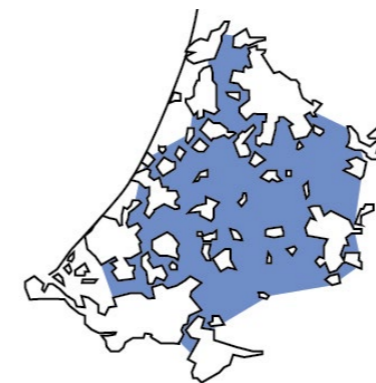


Image 2.1 Densification on different scales

There is a difference between what ReUrbA (a densification study on the south wing of the Randstad) calls generic and specific. Generic densification is about calculations and policy on the big scale. This can be useful for development visions, but in the end it should be elaborated further to specific densification to be able to really add quality. This relates to the earlier mentioned paradox of the compact city. Specific densification shows the exact location of the new dwellings, rather than a percentage or number for an area. This study tries to make the link between these two scales. When this doesn't happen densification can lead to a decreasing quality with negative associations as result (Urban Unlimited, 2002).

A last note on densification is that not only about adding new buildings. Densification is about making better use of the existing stock and the available space, so about efficiency of space. This

\ DENSIFICATION IS ABOUT EFFICIENT USE OF SPACE \

means that office, industry areas and green space can also be part of a densification study.

BENEFITS OF DENSIFICATION

There is an increasing global trend of people moving to cities. Also the big cities in the Netherlands are popular and grow faster than the rest, especially Amsterdam. This continuous growth needs to be accommodated, but the space for this is limited in the Randstad. It does not mean that there is no space, but it is often used for other purposes (Urban Unlimited, 2002), like recreation, agriculture and nature. These spaces cannot be turned into cities due to their importance, this is especially the case around big cities. Therefore it is better to develop cities by densification than by sprawl. Due to the rapid growth of big cities the housing market is stressed, as



we can see in Amsterdam. Prices are getting higher and it is more difficult for the middle class to find affordable housing (Dijke et al., 2010). Creating more dwellings in the city will make the housing market healthier. More offer will reduce the growth of housing prices.

Densification brings more people together on a smaller area. This leads to a higher density of services and amenities, which results in more pleasant living environments. It can especially add a lot of quality for the neighbourhoods outside of the centre. The level of amenities here are usually not so high. These extra inhabitants can bring a new

\ THE EARNINGS OF DENSIFICATION CAN BE INVESTED BACK INTO THE NEIGHBOURHOOD \

shop to the neighbourhood, it can create just enough support for that extra bus connection or can help with an investment in the quality of the local school. On top of that the earnings of the new housing can be invested back in the neighbourhood. This can improve the quality of public space or can be invested in the existing housing. At

the same time densification leads to less traffic because people live in general closer to their destinations, which is better for the environment.

At last densification contributes to the competitiveness of a city. This relation might be less obvious. The first reason for this is simple; a bigger, more diverse workforce attracts more companies. The second reason comes from writings of Richard Florida. He argues that a talented workforce is the key to competitiveness (Florida, 2000). This talent in combination with creativity can lead to innovation, which boosts the economy. According to Florida this process works best in dense cities, where

the talented workers meet by change in person (Florida, 2002). I will elaborate more on this relation later on. The following quote from Ivan Turok shows already the relation between densification, quality of life and competitiveness; the three main concepts of this thesis. *"The essential message is that social cohesion and high quality,*

compact built environments support and sustain competitiveness." (Turok, 2006, p. 4)

Next to these benefits, densification can also have a negative side; the paradox of the compact city. It is important to note this as well, to be able to prevent this from happening. Dense cities can create social conflicts. This is the main reason why citizens are usually not fond of densification. More people are living closer together, this means they get more in contact, which can turn out either positive or negative. It is to urban designers in the end, to design neighbourhoods in such a way that the positive contacts will dominate. Another negative effect is more traffic on the road on a local scale. The city structure should be able to adapt to this, so it doesn't lead to congestion and parking problems. Next to that densification can also cause more pollution, therefore it is important to keep the cities green. This means both green recreational spaces and a healthy sustainable environment are an important part of a densification strategy. By development on a local level, we have to make sure that densification creates vibrant lively neighbourhoods rather than overcrowded, stressed and polluted cities.

Competitiveness

The concept of competitiveness is very abstract, therefore it is discussed a lot in literature but the spatial translation is never really clear. Iain Begg, professor at the London School of Economics, wrote a clear summary on competitiveness; *"The vagueness of a concept open to multiple interpretations has led*

\ DUE TO AMSTERDAM'S CONNECTIVITY IT IS GLOBALLY MORE IMPORTANT THAN A CITY OF TEN MILLION IN CHINA \ (MEIJERS, 2015)

to confusion in the policy debate; but, if only because so many policy initiatives are undertaken in its name, it is important to appraise the different senses in which the term 'competitiveness' is used. At one level, it is equated, usually loosely, with the 'performance' of an economy, an absolute measure. At another, because it relates to competition, it implies a comparative element, with the implication that to be competitive, a city has to undercut its rivals or offer better value for money. In this sense, competitiveness is essentially about securing (or defending) market-share." (Begg, 1999, p. 796) This shows the vagueness and unclarity of the concept. Still I have to define it

somehow to be able to work with it. Therefore I defined competitiveness as the ability of a city to attract companies and workforce. When a city can offer a more pleasant environment than others, it is more likely to attract new companies and workers. Both aspects that Begg is talking about are included

in this description. The question is now how cities can attract new companies and workforce. In general, companies move to a certain city because of financial benefits and a good workforce. The workforce moves because of a better living environment and the presence of interesting companies. I will elaborate further on this later on.

In the Netherlands competitiveness is often about agglomeration benefits. Dutch cities are smaller than a lot of their competitors in other countries (OECD, 2014). Usually big cities have more benefits, like a bigger working force and more metropolitan functions and

amenities. These benefits are called agglomeration benefits. According to Bettencourt, doubling the size of a city creates scale benefits of around fifteen percent (Bettencourt et al., 2007). Since there is a lack of big cities in the Netherlands, there is a lack of agglomeration benefits. As a substitute, Dutch cities borrow these benefits from each other; this is called 'borrowed size' (E. J. Meijers, 2015). This is possible because it is one big agglomeration, the city are located close to each other and are well connected. The question is if borrowed size is a good strategy or if it is just an alternative for a big city that we are missing. There is no final answer to this discussion, since different studies proof both ideas. Hemel believes that borrowed size is just a bad alternative and therefore he argues for an Amsterdam with two million inhabitants.

SPATIAL DIMENSION

Recommendations on how to achieve or improve competitiveness are as abstract as the concept itself. I've tried to filter some spatial dimensions out of the literature, which I will discuss here.

One of the major things that is important for competitiveness

is quality of life. *“Improving the Quality of Living can help to make the Dutch regions more attractive for local residents and businesses as well as attract the personnel that companies need.”* (Lagas, Kuiper, Dongen, Rijn, & Amsterdam, 2014, p. 29) As I touched upon before, a pleasant living environment can attract new employees, which can attract new businesses. This relation between quality of life and competitiveness will be elaborated more later on.

The population size of a city is another dimension that matters (F. G. Oort, van, Meijers, Thissen, Hoogerbrugge, & Burger, 2015). The bigger the population the bigger and more diverse the workforce.. It creates more economic opportunities both for citizens and companies. For companies it is easier to find information, employers and other businesses. For citizens, there are more opportunities for education, services, amenities and recreation. Density multiplies this effect, because a dense city leads to a higher density of amenities (F. Oort, van, Meijers, Burger, Thissen, & Hoogerbrugge, 2015).

Richard Florida, is a professor and researcher on economic theory, and known for his book ‘the rise of

the creative class’. He argues that competition is about attracting talented people. Therefore cities should focus on talent and their demands instead of companies. These talents are highly mobile, which means they will move to the city they like the most. Companies will follow them afterwards. *“In the new economy, regions develop advantage based on their ability to quickly mobilize the best people, resources, and capabilities required to turn innovations into new business ideas and commercial products. The nexus of competitive advantage has thus shifted to those regions that can generate, retain, and attract the best talent.”* (Florida, 2000, p. 5) Cities can attract talented workers by aiming their strategies on a high quality of life for them. According to Florida this contains diverse recreational outdoor activities, many amenities and accessible water and nature. Furthermore,

**\ AMSTERDAM
IS SMALLER
AND LESS
DENSE THAN
MOST OF IT'S
COMPETITORS **
(VAN OORT, ET. AL., 2015)

vibrant mixed neighbourhoods with diverse lifestyles, where they can meet fellow talented workers. Overall it is openness and tolerance that they demand. Talented workers have limited free time and want to use it efficiently, therefore they demand the best quality culture, recreational and nature amenities (Florida, 2000).

Networks are important as well. Cities that are better embedded in networks are more competitive (E. Meijers, 2015). According to Evert Meijers, researcher on competitiveness at Technical University Delft, this is the reason that Amsterdam is globally more important than a ten-million-city in China. These networks can be both physical or non-physical. Physical networks are connections between cities like roads, railways, and airplane routes. The better accessible for companies and other cities, the more competitive (F. Oort, van et al., 2015). Non-physical networks are relationships between companies, cities and institutions. Better than connections with knowledge institutions is the presence of them. A high quality institution or university that is open a good imbedded in the city contributes to a competitive city (F. Oort, van et al., 2015). It can educate the local population

which leads to a better qualified workforce. As addition it often creates international networks. Due to collaborations with companies it can add value to product. Overall it will boost economic productivity and can lead to innovation.

These components are still very general and not useful for a development strategy. An interview with Evert Meijers led to some more practical things. The main recommendation was; be unique. Enhance the characteristics of a city and try not to turn it into a second London (E. Meijers, 2015). Amsterdam’s bicycle friendliness is unique. It is easy to do everything by bike in a safe way. Next to that, it is still possible to live for a reasonable price in the city with a high quality of life. On top of that there are almost no bad neighbourhoods and hardly any segregation. Amsterdam also has two good universities and a lot of culture, due to all the visiting tourists and businessmen. These aspects of Amsterdam should be enhanced. Meijers has net to that some recommendations to improve Amsterdam’s competitiveness. The city is not sustainable, especially in comparison to its competitors. KLM (the Royal Dutch Airlines) and the airport Schiphol are responsible for the great connectivity of Amsterdam, and should be a

top priority. Any change in the international value of this airport changes the competitiveness of Amsterdam. The last suggestion Meijers makes is that Amsterdam is missing a dynamic centre, like Manhattan. A neighbourhood with a metropolitan character can perhaps contribute to the competitiveness of Amsterdam (E. Meijers, 2015).

After comparing Amsterdam with its competitors, Platform 31 gave some recommendations as well. Amsterdam houses relatively a lot of foreign companies and the quality of the university is also higher than at its competitors. Improvements for Amsterdam are the size of the city, its density and a solution for congestions (F. G. Oort, van et al., 2015). These aspects are less developed in Amsterdam than in other cities.

Quality of life

Quality of life is an abstract concept as well, but many people have an idea about it and can tell you what can contribute to it. However, coming up with a definition is more difficult. Still there are many definitions. Machiel van Dorst, professor at TU Delft, made an overview of different definitions and usages of quality of life (Dorst, 2005). This study uses two of them. The first definition; *“Quality of life is the appreciation, or the lack of appreciation, of an individual for his or her living environment.”* (Dorst, 2005, p. 77) This quality is measured from the perspective of the citizens. The question is if they appreciate their environment. It is a subjective question and can be different for everyone. The second definition is often used in policies. *“The presumed quality of life is the level in which the environment meets the presumed conditions for apparent quality of life. Central are here the indicators that describe quality of life.”* (Dorst, 2005, p. 78) A lot of emphasis is put on the fact that this definition is presumed. Quality of life can only be determined afterwards, after implementing the policy (Dorst, 2005). Therefore indicators are used as guidelines to create a policy. These indicators are from the perspective of the policy maker.

The difference between the two definitions is the perspective from which the quality is perceived. It can be described as a bottom-up and top-down approach. A clear illustration of this are the quality of life rankings of Gallup-Healthways and the OECD (Organisation for Economic Co-operation and Development). The Gallup-Healthways Well-Being index is based on surveys, where they asked

\ A SUSTAINABLE QUALITY OF LIFE STRATEGY SHOULD ADDRESS EVERYONE’S QUALITY OF LIFE \

(FAINSTEIN, 2001)

people to assess their own quality of life. The OECD Better Life index is based on criteria that derived from their research. Without any further comparison of the methods they use, the differences of their top ten are already interesting. This shows that quality of life can be perceived very differently. Probably it is not only a cultural thing, but it differs for every individual. I won’t use any rankings in the rest of

this study, because the criteria are often arbitrary. These rankings just illustrate the differences between the two definitions clearly.

For this study I will use the definition of quality of life that is based on criteria. These criteria will be discussed later on. It is interesting to view the quality of life from the citizens perspective as well, because it about their city.

However, this can only be done after densification. Still, I will try to approach the quality of life from the citizens perspective in the criteria. Using surveys to find out how citizens perceive densification is another good option, but unfortunately this can’t be included in this thesis due a lack of time. This is a recommendation for further research.

As mentioned before, quality of life can be conceived different by every person. This also applies to cities. The quality of life in one city is different than the quality of life in another city. Look for example at Amsterdam and Rotterdam. The differences are caused by two things; the culture of the city and its residents, and the spatial characteristics of a city. It is difficult to specify exactly what makes the quality of life in Amsterdam different than the quality of life in Rotterdam, that will require a whole new study. However, these differences are important for a universal densification approach that deals with the quality of life. And should be considered when this approach will be reproduced.

As I mentioned before, Florida argues for a focus on the quality of life of the talented workforce in order to improve a city’s competitiveness. But is this the quality of life that all citizens desire? *“There is a problem with translating quality of life into quality of place (as Florida has done). Quality of life is an individualized concept, whereas quality of place suggests a consensus in a place regarding how quality of life strategies should be prioritized in terms of an overall development plan. How transferable are these ideas to non-high-technology places and to people in different occupations? Should they be implemented at the expense of basic social service priorities or*

job creation? Who truly benefits from such amenity strategies?” (Donald, 2001, p. 9) This argument introduces the justice aspect of the question. It is important to mention whose quality of life is aimed at. A sustainable quality of life strategy should address everyone’s (Fainstein, 2001). Therefore we should ensure that achieving competitiveness doesn’t harm the general quality of life. Meijers summarised this as following; quality of life is about keeping the middleclass in a city.

SPATIAL DIMENSION

For spatial dimension we look at criteria used for measuring the presumed quality of life. Dorst names quite a long list of criteria, including; parking facilities, green, density, liveliness, vandalism, social control, noise and proximity of amenities, shops and public transport (Dorst, 2005) These are common quality of life aspects used in policies. The appreciation that citizens have for their neighbourhood is more about feelings, rather than measurable aspects. Examples are; a pleasant well maintained neighbourhood, spacious and green, absence of nuisance or diversity (Dorst, 2005). Although these aspects are

Gallup-Healthways Well Being Index 2014		OECD Better Life Index 2015	
1	Panama	1	Australia
2	Costa Rica	2	Sweden
3	Puerto Rico	3	Norway
4	Switzerland	4	Switzerland
5	Belize	5	Denmark
6	Chile	6	Canada
7	Denmark	7	United States
8	Guatemala	8	New Zealand
9	Austria	9	Iceland
10	Mexico	10	Finland
17	The Netherlands	11	The Netherlands

Image 2.2 Quality of life rankings of Gallup-Healthways and OECD

more difficult to measure, a design should try to include them as well. As described before, a part of quality of life is about appreciation of the living environment, so these aspects are important. It can help with a good implementation of densification, that can add quality to a neighbourhood. At the moment many citizens still have bad associations with densification (Crookston, Clarke, & Averley, 1996), they think it will lead to cramped neighbourhoods. That has to be disapproved.

The quality of life in the Netherlands is rather high compared to other countries, but it should be maintained in a more sustainable way (CBS, 2014). This is one of the major challenges for the Netherlands. *“However, the resources required to realise this quality of life are not sustainable for future generations and also cause environmental problems within and outside their own country.”* (CBS, 2014, p. 1) PBL (Netherlands Environmental Assessment

\ THE QUALITY OF LIFE IN THE NETHERLANDS IS RATHER HIGH, BUT NOT SUSTAINABLE \

(CBS, 2014)

Agency) did research to the quality of life in the Netherlands. Their study resulted in a few recommendations. A larger area for recreation is necessary, especially in the Randstad. Nature areas as counterpart of cities also contribute to the quality of life and are needed more. The big cities can improve by working on the safety, air quality and noise reductions (Lagas et al., 2014). Apart from these recommendations, PBL compares each province of the Netherlands with the best areas in the European Union. For Noord-Holland improvements are possible on the

following topics; social cohesion, safety, housing environment, climate, natural hazards, nature and housing affordability.

To make sure that achieving competitiveness doesn't harm the quality of life, a few processes should be prevented from happening. The rise of housing prices should be limited (E. Meijers, 2015), like De Zeeuw mentioned in his view on Amsterdam. Megacities often show a division between rich and poor. The housing prices will rise and the middleclass will get pushed to the edges of the cities, because they cannot afford it anymore (Zeeuw, 2015). This is a form of segregation. Betsy Donald, associate professor at Queen's University in Kingston, Canada, names a few other processes that should be countered; high property values, housing shortages, traffic congestion, pollution and energy shortages (Donald, 2001).

Competitiveness vs. quality of life

The relation between earlier discussed concepts, quality of life and competitiveness, is not clear and leads to discussion. The question is if they are compatible or incompatible. A lot is written on this relation already, but still there is no consensus about this relation and seemingly contradicting conclusions are made. This thesis discusses eight studies to this relation. It discusses their arguments and tries to find the origin of the disagreement. Their conclusions might be very different, but surprisingly they often have the same arguments.

In existing literature the relation between competitiveness and quality of life is often described as compatible or incompatible. I would like to distinguish three types of relations; coexisting, conditional and conflicting. The first two belong to the compatible theme. Coexisting means that both competitiveness and quality of life can be achieved without harming each other. This relation is the one that the municipality of Amsterdam is using. Conditionally means; one of the two concept is needed to achieve the other. The last relation, conflicting, means that the two concepts have negative effects on each other. In this case it is not possible to pursue both concepts in one vision. This

relation can be illustrated by the discussion on the development of Amsterdam by the professors.

EXISTING STUDIES

The studies used for this research all have a slightly different focus, context or use different terms. Not all of them have the discussion on the relation between quality of life and competitiveness as their main aim. This might be one of the reasons why there is no clear consensus. I included The global city of Saskia Sassen in this research as well. It does not directly discuss the concepts of competitiveness and quality of life, but it deals with the same theme; the social impact of economic development (Sassen, 2001). To make the studies comparable, I will first clarify the differences. Image 2.3 gives an overview.

The terms used in the literature for the competitive aspect are broadly the same; competitiveness, attracting talent, globalisation and economic development. Florida (Florida, 2000) uses 'attracting talent'. He is talking about the new economy, which is a knowledge based economy. In this economy, he says, attracting talent is the key to economic competitive regions. *“The*

nexus of competitive advantage has thus shifted to those regions that can generate, retain, and attract the best talent.” (Florida, 2000, p. 5) Gibbs uses the general term 'economic development'. Next to that he uses the term 'economic competitiveness' as well, this is a goal of economic development strategies that is increasingly focused on (Gibbs, 1997). Sassen is talking about the consequences of globalisation. The process of globalisation creates an interconnected world, resulting in bigger markets. It means that similar companies on opposite sides of the world are active on the same market. This leads to an increasing amount of competition. So basically, the process of globalisation is the reason why cities need to focus more on their competitiveness.

Looking at the quality of life aspect, five terms are used; quality of life, quality of place, social cohesion, the social order and urban sustainability. The last one, used by Gibbs, is again a general term. According to him, urban sustainability consists of two aspects; social and environmental (Gibbs, 1997). Both aspects are part of quality of life. The quality of place of Florida is about amenities, lifestyle and environmental quality (Florida, 2000). This focuses on the presence of these qualities rather than the accessibility. There is a

Author	Terms used	Focus	Context	Conclusion	
Betsy Donald	Competitiveness	Quality of life	Compatibility	Canadian city regions	Conditional
Susan Fainstein	Competitiveness	Social cohesion	Justice	No specific context	Conflicting in practice, coexisting in theory
Richard Florida	Attracting talent	Quality of place	Economic	United States	Conditional
David Gibbs	Economic development	Urban sustainability	Contradictions	United Kingdom	Conflicting
Costanzo Ranci	Competitiveness	Social cohesion	Statistical data	West European cities	Coexisting
Robert Rogerson	Competitiveness	Quality of life	Rankings	United Kingdom	Conditional
Saskia Sassen	Globalisation	The social order	Process of globalisation	Global	Translatable as conflicting
Ivan Turok	City competitiveness	Social cohesion	Social cohesion	United Kingdom	Coexisting and conflicting

Image 2.3 Comparison of the literature

social aspect missing, an aspect of justice. Something that Fainstein (Fainstein, 2001), Ranci (Ranci, 2011) and Turok (Turok, 2006) talk about; social cohesion. *“It conflates different kinds of social phenomena and encompasses different aspects of the social fabric and ultimately the quality of life.”* (Turok, 2006, p. 5) Rogerson (Rogerson, 1999) and Sassen (Sassen, 2001) also discuss the social dimension more extensive, but use different terms.

Part of this social dimension are the concepts of equality, segregation and inclusiveness. They are discussed in relation to competitiveness (in Sassen’s case in relation to globalisation). An interesting observation is that out of these eight studies, most of them use a social term rather than quality of life. This shows already the importance of the social aspect. The different focuses of the studies shows the scope of the views on the

relation between competitiveness and quality of life. They do not only have a different perspective from which they view their research, they also use different information to come to their conclusions. Where all of them use existing literature, Ranci tries to find answers with statistical data and Rogerson uses city rankings to show relations between competitiveness and quality of life. Most contexts are the Western world. Sassen chooses the

global centres; New York, London and Tokyo for case studies, which seems logical. In her book she mentions other contexts as well, but she does not elaborate very detailed on them. Fainstein talks about the concept of justice, it would be interesting to study this concept in relation with competitiveness and quality of life in cities in the developing world. I think that this context can bring an new dimension to the topic.

Finally all the articles conclude with an answer to the question if competitiveness and quality of life are compatible or incompatible. I translated those conclusions to the three kinds of relations mentioned earlier; coexisting, conditional and conflicting. Sassen does not really give an answer to this question, since she did not take this relation as a starting point. She states that globalisation leads to inequality (Sassen, 2001), which could be

translated as a negative effect of the global economy on the social aspects of cities. Therefore, I called her conclusion conflicting. Gibbs clearly argues that it is a conflicting relation throughout his whole article. Turok concludes with a double answer and says more research needs to be done before conclusions can be drawn. *“Cohesion may have paradoxical or double-edged effects: in some ways helping and in other ways hindering competitiveness.”* (Turok, 2006, p. 18) Fainstein argues that these concepts can coexist in theory, but something must change to create gains for the ‘public at large rather than simply to individuals and firms’ (Fainstein, 2001). For now she calls the relation conflicting. Surprisingly, Ranci argues, as the only one, that there is no relation at all between competitiveness and quality of life. *“An increase in the level of global competitiveness of cities does not necessarily increase their*

level of inequality or inclusiveness. These two variables operate independently, giving rise to several possible combinations.” (Ranci, 2011, p. 13) The other articles conclude that these concepts are conditional. They argue that quality of life is an important part of competitiveness. *“Since the sources of the new economic growth are so various and finally perhaps so fickle, the possibilities are endless. But one central element is quality of life.”* (Rogerson, 1999, p. 14) The next paragraph will elaborate on the arguments used for each of the conclusions.

CONFLICTING

Competitive cities bring disadvantages such as crowdedness, which leads to stressed roads and transportation systems. Traffic jams, lack of parking, overcrowded public transport, pollution and a decreasing accessibility are consequences of this. These are examples of daily life irritation caused by economic development and competitiveness. This can be seen as a decline of the quality of life (Donald, 2001).

As mentioned earlier, there are disadvantages with a bigger impact on the quality of life than these. In

**\ THE QUALITY OF PLACE OF FLORIDA FOCUSES ON THE PRESENCE OF QUALITIES RATHER THAN THE ACCESIBILITY, AN ASPECT OF JUSTICE IS MISSING **

any big city, especially the global important cities (Fainstein, 2001), people have to deal with high property values. Often they cannot afford to live in the city centre anymore. Other phenomenon of global cities are housing shortage and gentrification (Turok, 2006). As a consequence the average inhabitant is pushed out of the city and has to live on the edges far away from the centre with all amenities. Sassen adds to these arguments that gentrification and poverty in cities are not a new phenomenon, but due to the process of globalisation they are increasing and more extreme (Sassen, 2001)

Gibbs argues that economic competition rather brings costs than benefits to the 'poor' people. *"The emphasis on local competitiveness and economic growth, with a reliance on trickle down effects to bring the benefits of this growth to poorer sections of the community, has failed: frequently the costs rather than the benefits of growth are most likely to trickle down. Moreover, implementing such strategies will continue to lead to the degradation and exploitation of the environment."* (Gibbs, 1997, p. 206) Fainstein adds to this that through the forces of competitiveness the low paid jobs are often cut. *"The argument is basically that global*

\ POVERTY AND GENTRIFICATION IN CITIES ARE NOT NEW, BUT ARE INCREASING DUE TO GLOBALISATION \

(SASSEN, 2001)

competitiveness forces firms to lower their costs through reducing the return to what Castells terms 'generic labor.'" (Fainstein, 2001, p. 885)

CONDITIONAL

Cities compete both for workers and companies. Companies used to be focused on economic factors for choosing their business location. *"Firms selected locations that provided low-cost land, cheap or highly productive physical labour, and a cost-conscious business climate."* (Donald, 2001, p. 4) This is what Florida describes as the old economy, one that focuses on production. In that economy, cities would for example compete with low tax rates (Donald, 2001). Quality of life is still important, but less than nowadays. People that do physical labour, the drivers of this

type of economy, are less mobile (Donald, 2001). This means that the need of competition for employees was smaller, or at least the scale on which competition took place was smaller. Most people worked where they lived.

Florida calls our current economy the new economy (Florida, 2000). An economy which is more based on knowledge. *"Talent is the critical factor of production in the new economy"* (Florida, 2002, p. 743). These talented people are more mobile than the drivers of the old economy. *"This skilled worker is also highly mobile and attracted to cities that offer certain attributes in terms of economic opportunity, quality of life, and diversity."* (Donald, 2001, p. 6) The importance of these skilled workers for the economy, their high mobility and the fact that we live in a globalized world are the ingredients for a highly competitive

economy with the skilled worker as the centre. This causes that the attraction of talent is one of the key elements of competition (Florida, 2002). As Donald said, the skilled worker is attracted by a few factors; economic opportunity, a good quality of life and diversity. Turok adds openness to these factors (Turok, 2006). The talented people want lively, chaotic, diverse and open cities. Where they can meet fellow knowledge workers and work on innovative ideas together.

According to these arguments the key to city competitiveness is talent. When cities want to secure their economic well being, they better invest in elements that are likely to attract talent. Quality of life is an important element here. So, this can be seen as a basic need for competitiveness. *"Quality-of-place is the missing piece of the puzzle. To compete successfully in the age of talent, regions must make quality-of-place a central element of their economic development efforts."* (Florida, 2000, p. 7)

Rogerson studied the use of city rankings in marketing. From this study he came up with a simple but clear observation; quality of life rankings are often used for city marketing reasons. This is not only to attract citizens, but also

to attract companies. *"There are many illustrations of the adoption of quality of life ratings as part of place promotion to attract this capital."* (Rogerson, 1999, p. 3) This shows again that quality of life is an important condition to attract companies, and thus for competitiveness.

COEXISTING

Then there is the third group; coexisting. This means that quality of life and competitiveness do not harm each other, so they could be implemented in one policy. Ranci

\ THE IMPORTANCE OF THE SKILLED WORKER, THEIR HIGH MOBILITY AND OUR GLOBALISED WORLD ARE THE INGREDIENTS FOR A HIGHLY COMPETITIVE ECONOMY \

(FLORIDA, 2002)

could not find any relation between competitiveness and social cohesion, which means they do not harm each other. He puts extra emphasis on the fact that there is no relation in the West European context. This means that in West European cities social equity is not dependent on the economic performance of that city (Ranci, 2011). Ranci argues that this is more dependent on the welfare system of the country.

Then there is the third group; coexisting. This means that quality of life and competitiveness do not harm each other, so they could be implemented in one policy. Ranci

It might be clear now that quality of life is good for competitiveness. If this is also true the other way around, then the relation between both concepts is coexisting. The arguments for this might be obvious, but it is good to realize that quality of life also benefits from competitiveness. *"A lack of economic success is likely to damage social cohesion since increased unemployment causes demoralisation and household stress, family breakdown, more lone parents, educational underperformance among children, ill-health among adults, weaker job search networks and entrenched worklessness and economic inactivity."* (Turok, 2006, p. 6). When investments in competitiveness lead to economic success, the whole city benefits from it. This will create more jobs, it might push the wages and it will

bring new amenities. In general this will improve many aspects of quality of life. This means that both competitiveness and quality of life can benefit from each other.

Fainstein argues that many cities show examples of inequality caused by a focus on economic development. However, she points out that this does not mean that it's impossible to create policies that combine both. *"In contemporary cities growth seems to be driving the tendency toward greater inequality. Nevertheless, it does not demonstrate that appropriate policy cannot produce both economic development and greater social welfare."* (Fainstein, 2001, p. 885) So in other words, she says that the concepts can coexist, we just need to come up with policies that can achieve this.

\ THE SOCIAL EQUITY IN WEST EUROPEAN CITIES IS DEPENDENT ON THE WELFARE SYSTEM, NOT ON BENEFITS FROM ECONOMIC PERFORMANCE \

(RANCI, 2011)

COMPATIBLE OR INCOMPATIBLE?

After discussing the different arguments, the contradiction between them is less than expected. The arguments for a conditional and coexisting relation between competitiveness and quality of life are not contradicting. They both conclude that the concepts are compatible. The difference is only that they see the compatibility different. The real disagreement is between the conflicting and the other two groups. This basically comes down to two issues; inequality due to competitiveness, and the question whose quality of life it is about.

The argument that social cohesion and competitiveness lead to inequality is mentioned by almost

all of the researchers. Interestingly, they all mention this issue, but draw different conclusion from it. Both Fainstein and Turok give a double sided conclusion, which makes it clear that this relation is interpretable in different ways. It can lead to gentrification, segregation, poverty and a widening gap between the top and bottom of society. However attention should be paid at the context. As Ranci mentioned, in West Europe, the competitiveness does not really influence the equity in a negative way (Ranci, 2011). This is because there is a certain amount of prosperity, and the welfare system helps the people that do not benefit from competitiveness. The problem of inequality due to competitiveness is much more urgent in less prosperous contexts. Therefore it would be interesting to do research on the relation between competitiveness and quality of life in the context of the developing world. I think that the concepts are contradicting is that context. Sassen makes an interesting observation here. *"My central point in the polarization argument is not that inequality is new, that the middle class has disappeared and that it is all due globalisation."* (Sassen, 2001, p. 361) She says Fordism created a bigger middle class, just the opposite of what globalisation

share of whatever there is to get' (Fainstein, 2001, p. 886)

\ DOES THE MUCH BIGGER GROUP OF COMMON CITIZENS HAVE THE SAME QUALITY OF LIFE AS THE TALENTED WORKERS? \

is doing. West Europe is globally seen part of the upper class, that is why the contradictions between competitiveness and quality of life are not so visible here. Still there is gentrification and a certain amount of segregation. I think Fainstein has a strong point. Although these phenomenon are caused by a competitive economy, this does not mean that competitiveness and quality of life can't be combined in one policy. We just have to face the challenges and create policies or strategies that can tackle these issues, and distribute the gains of competitiveness better over society. A strategy that gives a just outcome where *'everybody is getting a fair*

The second issue is about the question, whose quality of life is discussed. Florida says that in the new economy we should focus on talented workers, they are the engine of our innovative knowledge economy (Florida, 2000). Since they are highly mobile and due to globalisation, they will move where their quality of life is addressed best. This creates a very one sided focus of cities on the needs of talented people. An important question here is; do they have the same needs as the other people, a group much bigger as these talented workers. *"Other groups, who are not viewed as significant groups to be targeted in competition for capital, are in danger of being ignored in the discussions of what form of quality of life should be offered in a city."* (Rogerson, 1999, p. 13) Rogerson calls this privileged capital, this is the reason that is causing inequality. Inequality *"arises from the focus on competitiveness for capital as the path to urban growth and development."* (Rogerson, 1999, p. 11). So I would argue that urban development should not solely focus on competition and economic growth. It should be a combination of aspects that contribute to the city's competitiveness, and

to aspects of quality of life for everyone. Quality of life should not be seen as an important tool to achieve competitiveness, but as an important part of a healthy city. A city where competitiveness and quality of life are two ingredients of a healthy economy and a fair social structure.

Theory conclusions

Before moving on to the design part of the thesis, I will summarize the theoretical framework. This can be used as support for the design. The earlier mentioned recommendations can help with a good spatial implementation of competitiveness, quality of life and densification. I will shortly summarise them here.

Densification can lead to sustainable and vibrant cities. It can increase the level of amenities in neighbourhoods due to a bigger support base. Maybe it leads to a small decrease of open space, but the available open space can be upgraded to suite recreational purposes better. Money that is earned with densification can be invested in this open space as well as in the quality of existing housing. To make this succeed it is important to develop neighbourhoods in a way that cannot be experienced as cramped. Where good tailor made solutions should be implemented to reduce the local pollution and to increase the amount of green, so that the air quality won't decrease. When these development and their

consequences can be adapted in a good way, densification will create exciting neighbourhoods full of vibrant activities and people, that enjoy the quality of a highly urban environment.

To improve competitiveness a city should focus on its characteristics and uniqueness. By strengthening these, a city is able to distinguish itself from its competitors. For Amsterdam this is about its bicycle friendliness, good quality of life, affordable housing, no segregation and good connectivity. The size and density of cities contribute a little to its competitiveness. Furthermore it is about networks and knowledge, but overall the quality of life is most important of all. It should address everybody's quality of life, because in the end, quality of life is about keeping the middle class. Therefore the housing affordability is important. This can be maintained by creating enough dwellings and by keeping the production costs low, which cannot go at the expenses of the quality. Another recommendation for the improvement of the quality of life in

the Netherlands is; more nature and recreational areas. Cities should focus on the housing environment, improve the air quality and work on noise reduction. The aspects of quality of life that are important for a good implementation of a densification strategy, should be specified more thoroughly. This will be done in the design part.

For a strategy that aims at achieving both quality of life and competitiveness, there are two important lessons that can be learned from the literature. First, it is important the benefits of competitiveness are spread in a fair way over society. This way everybody benefits from it and it doesn't lead to inequality. Second lesson is that policies should address everyone's quality of life and not only the quality of life of talented workers. When these lessons are applied, quality of life and competitiveness can contribute to each other, resulting in sustainable cities where people want to live and work.

**PART
THREE**

DENSIFICATION STUDY

This part shows the universal approach for analysing densification potentials. It can be used for any city. In this case Amsterdam is used as an example. The approach helps in finding potentials in the city structure. It gives an overview of the possibilities, it is not a detailed plan. The outcome of the study is a map with areas and estimated numbers showing the potential. It can be used as input for a development vision. A method-box is included for each step. This makes it possible to reproduce the method in another city, and gives the opportunity to improve the approach.

The results of this study are quite optimistic. However, it only gives an overview of available data. It is quite likely that there is more potential when further research is done. Especially on the small scale is a lot of data missing. The outcome might not be very detailed, but it gives a good indication of the great potential for densification.

At the starting page of each strategy, there is a feasibility label integrated. These labels show with three indicators how feasible the strategy is. The three indicators are; costs, acceptance and complexity. The costs indicator is obvious; the more stars are filled the more expensive it is. Acceptance is about the expected support from society that a strategy might get. Three stars is ideal, it means that basically everyone will accept this kind of development. Third indicator is complexity, this is about ownerships and regulations.

Densification strategies

To find the potential for densification, five strategies are used. They can be categorised into two groups. The first group is about adding new building volumes. The strategies 'create', 'fill' and 'top-up' are part of this group. Second group

is about transforming the current structure or buildings. Re-use and re-structure are the two strategies in this group. Next to these strategies, there should be more focus on the optimisation of the use of space. This is not a strategy with

physical interventions, but more a recommendation. Cities can be organised in a more efficient way. Some functions can be combined for instance. If we manage to do that, it is possible to save space for housing or other functions.

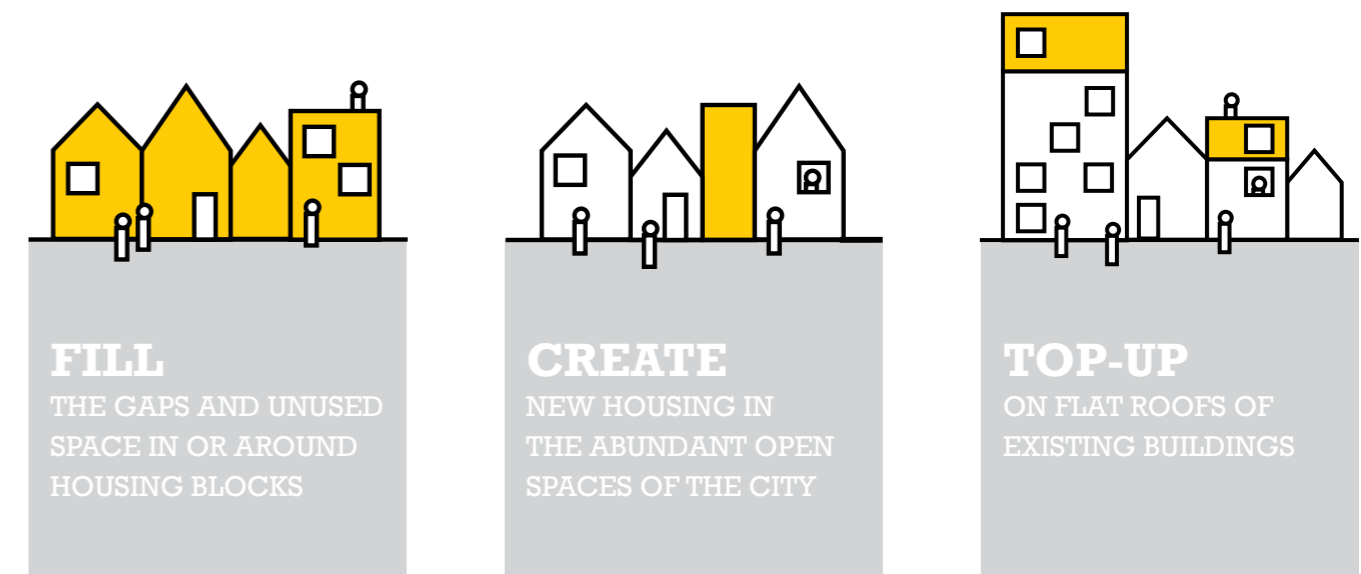


Image 3.1 Five densification strategies

METHOD

These five strategies are the result of analysing and combining other densification studies. The following studies were used; Verdichting Zuidvleugel (Urban Unlimited, 2003), ReUrbA verdichtingsalmanak (Urban Unlimited, 2002), Rotterdammers maken stad (Tillie et al., 2012), De stadsdoorsnede (Hartzema, 2011), Prachtig CompactNL (Dijke et al., 2010), Cities full of space (Uytenhaak, Melet, & Mensink, 2008). Most of them focus on Rotterdam, on Amsterdam are hardly any studies done yet.

Typologies of the built environment



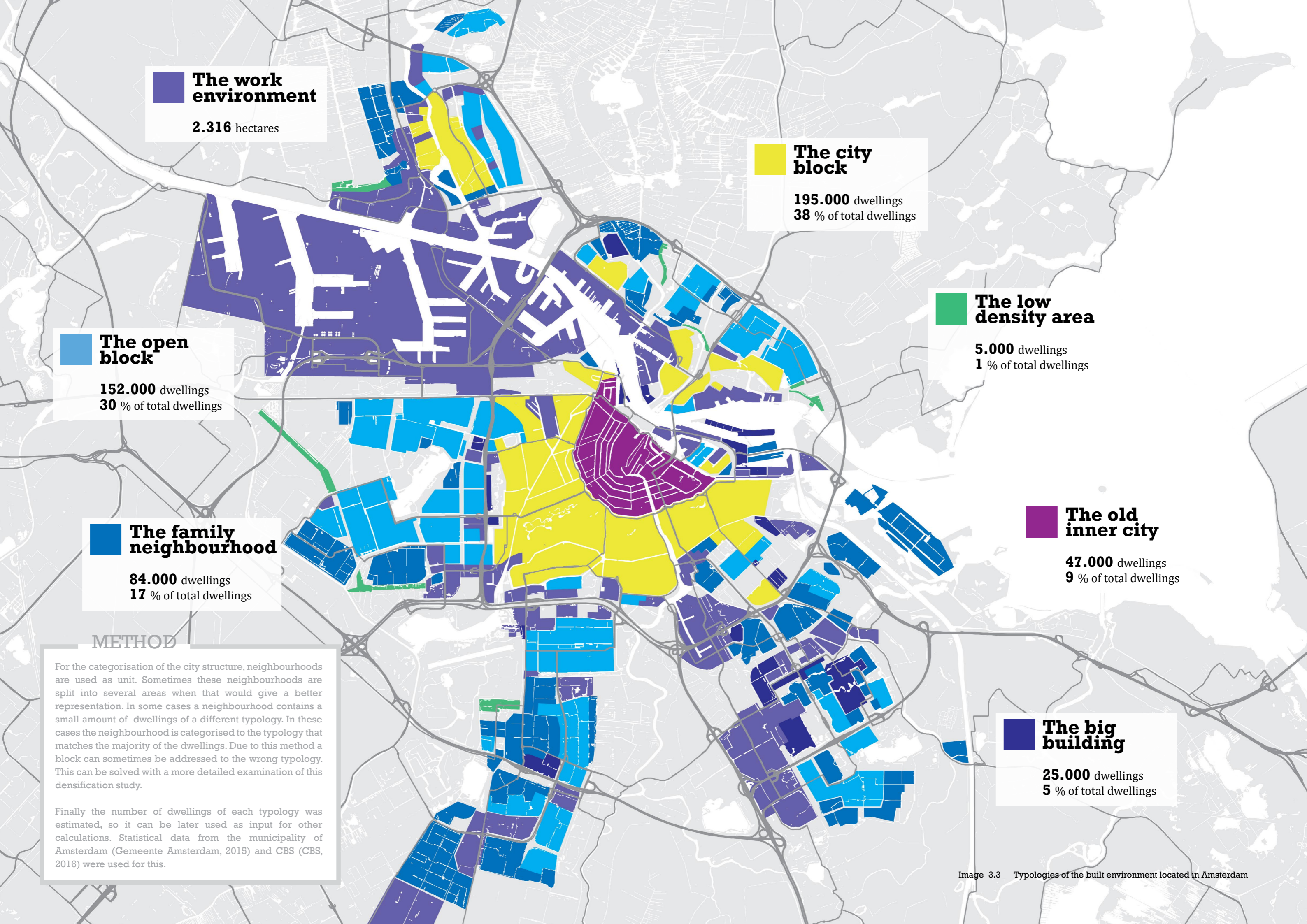
Not every strategy can be applied in every neighbourhood and in some neighbourhoods is more potential for a certain strategy. The difference between neighbourhoods that can and can't be densified is the spatial organisation of them. This study uses seven typologies of the built environment to categorise the differences between neighbourhoods. These typologies are based on the structure of Amsterdam. It might slightly differ between cities, but in general this can be used for other cities as well. The scheme on the left shows for each typology which types of neighbourhoods it consists of.

The majority of the city structure in Amsterdam consist of neighbourhoods with the city block and the open block typology. The typology 'the low density area' is almost non-existing in Amsterdam. Apart from that, this is not the desired place for densification. For these two reasons this typology is not included in this study to the densification potential of Amsterdam.

METHOD

To get to these typologies the city structure of Amsterdam was analysed. The typologies are based on the spatial organisation of the blocks within a neighbourhood and their possibilities for densification. The earlier mentioned strategies were guiding. Two sources were used for the analysis. A map showing the period of construction of each building in the Netherlands (Spaan, 2013) and 3D satellite images from Google Earth. Together they gave a clear view on the structure of each block.

Image 3.2 Typologies of the built environment



The work environment
2.316 hectares

The city block
195.000 dwellings
38 % of total dwellings

The low density area
5.000 dwellings
1 % of total dwellings

The open block
152.000 dwellings
30 % of total dwellings

The family neighbourhood
84.000 dwellings
17 % of total dwellings

The old inner city
47.000 dwellings
9 % of total dwellings

The big building
25.000 dwellings
5 % of total dwellings

METHOD

For the categorisation of the city structure, neighbourhoods are used as unit. Sometimes these neighbourhoods are split into several areas when that would give a better representation. In some cases a neighbourhood contains a small amount of dwellings of a different typology. In these cases the neighbourhood is categorised to the typology that matches the majority of the dwellings. Due to this method a block can sometimes be addressed to the wrong typology. This can be solved with a more detailed examination of this densification study.

Finally the number of dwellings of each typology was estimated, so it can be later used as input for other calculations. Statistical data from the municipality of Amsterdam (Gemeente Amsterdam, 2015) and CBS (CBS, 2016) were used for this.

Image 3.3 Typologies of the built environment located in Amsterdam

Typologies of the open space

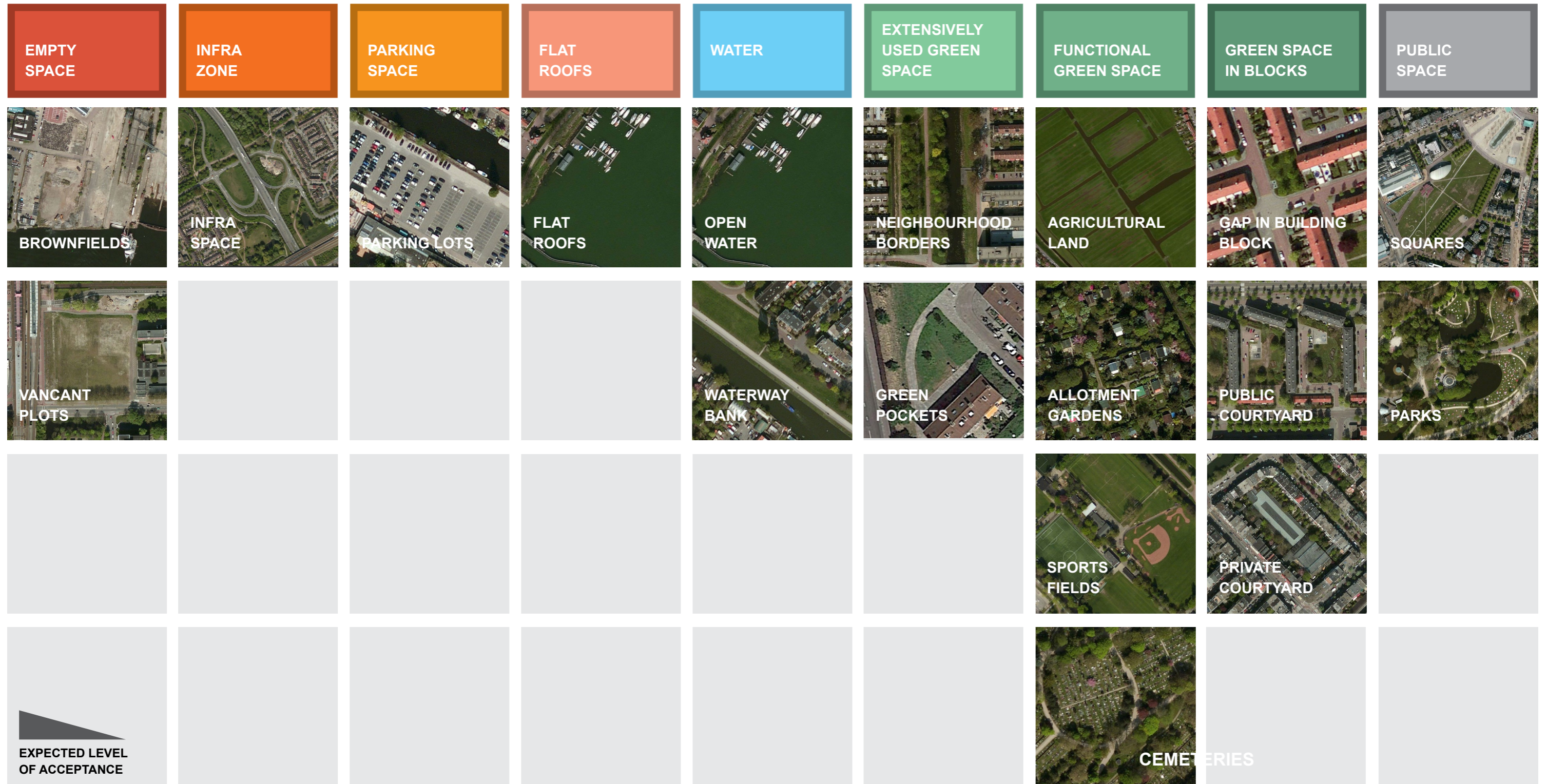


Image 3.4 Typologies of the open space

Some strategies focus on the potential of open space instead of the built environment. Therefore this study also categorised the open space, which resulted in nine typologies. These typologies are also based on Amsterdam and can slightly differ per city. But in general it can be used for other contexts as well. The open spaces are not mapped, because these are often many tiny spots. Due to limited data it is difficult to locate them and to show them on a map. These typologies are mainly used for the create strategy. Later on at the elaboration of this strategy, the potential open spaces will be located on maps as far as possible.

Not all of these space are usable or desirable to be used for densification. This is one of the criteria used to categorise the typologies. From left to right they are ranked according to the expected level of acceptance for when that specific space is used for densification. The typology public space (furthest right), will not be touched. The value and use is too important for the city. The other typologies will be discussed later on.

METHOD

First, all different types of open space were identified in Amsterdam. The definition of open space in this study is; space that is not developed with buildings or infrastructure. The open spaces were grouped according to densification possibilities or current use. For each typology an assumption was made about the expected level of acceptance. When these expectations were very different for spaces within one typology, then this typology was divided into two separate typologies. Satellite images of Google Earth were used for the identification of the open spaces.

The use of space in 2050

We will not live the same way in 2050 as today, because society changes continuously. During the next 34 years a lot will change. There is no doubt that this will also influence the way we use space. These developments are important to take into account for a densification study for 2050. What if we don't use cars anymore and everyone has a personal helicopter? This means there is no need for roads anymore. Something that will turn our ideas of the use of space totally upside down. There is no need to connect any building over land anymore. However, this example might be a bit too futuristic, some developments can have a big impact. The most important societal and technological developments that can influence densification will be discussed here.

We never know what will happen in the future. Still, we can look at current developments, project them on the future and speculate about what might be possible. The following developments should be considered with this thought in mind. If these developments set through what will the effect be on the potentials for densification? Some strategies will become more useful or get a bigger potential, others might become unrealistic.

SOCIETAL DEVELOPMENTS

That cities are popular and growing rapidly might be clear by now. For 2050 this can mean that cities are huge and space within them is even more scarce and valuable. This can boost the process of densification, because people will become aware of the urgency. It is also likely that more expensive solutions become feasible. If cities become too big and are badly planned, it can also lead to a new flow of suburbanisation as history has showed already.

Households are getting smaller and at the same time houses and the plots they are built on are getting bigger (Uytenhaak et al., 2008). According to Uytenhaak this led to an increased use of space per person with a factor twelve (!) over the last century (Uytenhaak et al., 2008). Due to a growing population in the Netherlands the use of space exploded over the last century. These developments have of course a big impact on the environment. In the United States a movement was founded that wants to reduce their ecological footprint, called 'the tiny housing movement'. Their idea is, as their name tells, to live in tiny houses in an environmental conscious way and save on housing costs (Anson, 2014). In the

Netherlands there are some people living according to these ideas, but it is a very small group. If this group gets bigger, densification will be an easy task. Then it is just about splitting dwellings. If people favour even bigger dwellings in 2050, there won't be much potential for densification.

SMART AND FLEXIBLE BUILDINGS

Buildings will become more intelligent due to internet, integrated sensors and processors. Installations, furniture, walls and natural light can easily be adjusted to specific personal needs. In combination with new materials and robotics, it can change the way we use buildings. It makes it possible to physically transform rooms and buildings (RLI, 2015). So, any room or building just be like home, your office or can have any other function. This leads to a smaller amount of rooms that are needed. In theory one room per person can be sufficient. Laws and ownership make the possibilities of this development difficult (RLI, 2015). According to RLI this does not stop urbanisation, because urbanisation creates economic agglomeration benefits and improves social meeting possibilities.

VIRTUAL REALITY AND TELEPRESENCE

At the moment there are already virtual reality glasses, that let you experience a virtual world as if you are there (Eurofiber, 2015). When your senses are connected to this and you can also smell and feel this other place, there is no need to physically be there anymore (RLI, 2015). A robot can represent you on the location where you want to be. It can talk for you an experience everything around him. This can be used for meetings, but also for holidays or research. The popularity of this develop is difficult to predict, people can experience it as unreal and prefer social interaction (Eurofiber, 2015). When this development sets through, it will probably lead to a big decrease of traffic.

AUTONOMOUS CARS

Cars contain more and more computers. In ten or twenty years the computers will be able to drive the car itself (RLI, 2015). Using many sensors, the internet and by communicating with other road users, the cars can move itself safely from A to B (RLI, 2015). It will be even safer than now, because the computer can make decisions in a split second and can overview all possibilities at the same time. By using real time traffic information, the car can take the fastest route. This doesn't only lead to shorter trips but the travel time can also be used in a more efficient way. On top of that, when cars can drive themselves, they can also park themselves. The passenger can be dropped off at its destination and afterwards the car will find a parking spot somewhere else in the city. This mean that less space is needed for parking in the city, this can be moved to the edges. In

the end, all these developments are likely to lead to a big increase of cars. If they a super sustainable this is not a problem. It will just get busier on the roads, but due to the driving computers the roads can be used much more efficient as well.

DRONES

When law and regulations are developed further and our environment is adjusted to drones, it is possible to let them deliver packages (RLI, 2015). It will release some pressure from the road, especially in cities it is getting more busy now with transport trucks and vans. Instead of roads, the air will be used for transport, which requires new rules (Eurofiber, 2015).

E-BIKES

This is nothing new at all, but can reduce local traffic a lot. There are

a few developments needed for a wider use of e-bike. The battery can be improved, as well as the amount of charging locations in the city. Finally the popularity and image that people have of the bike should turn in its favour. If these things change, then can the e-bike be a great replacement for short distance car trips.

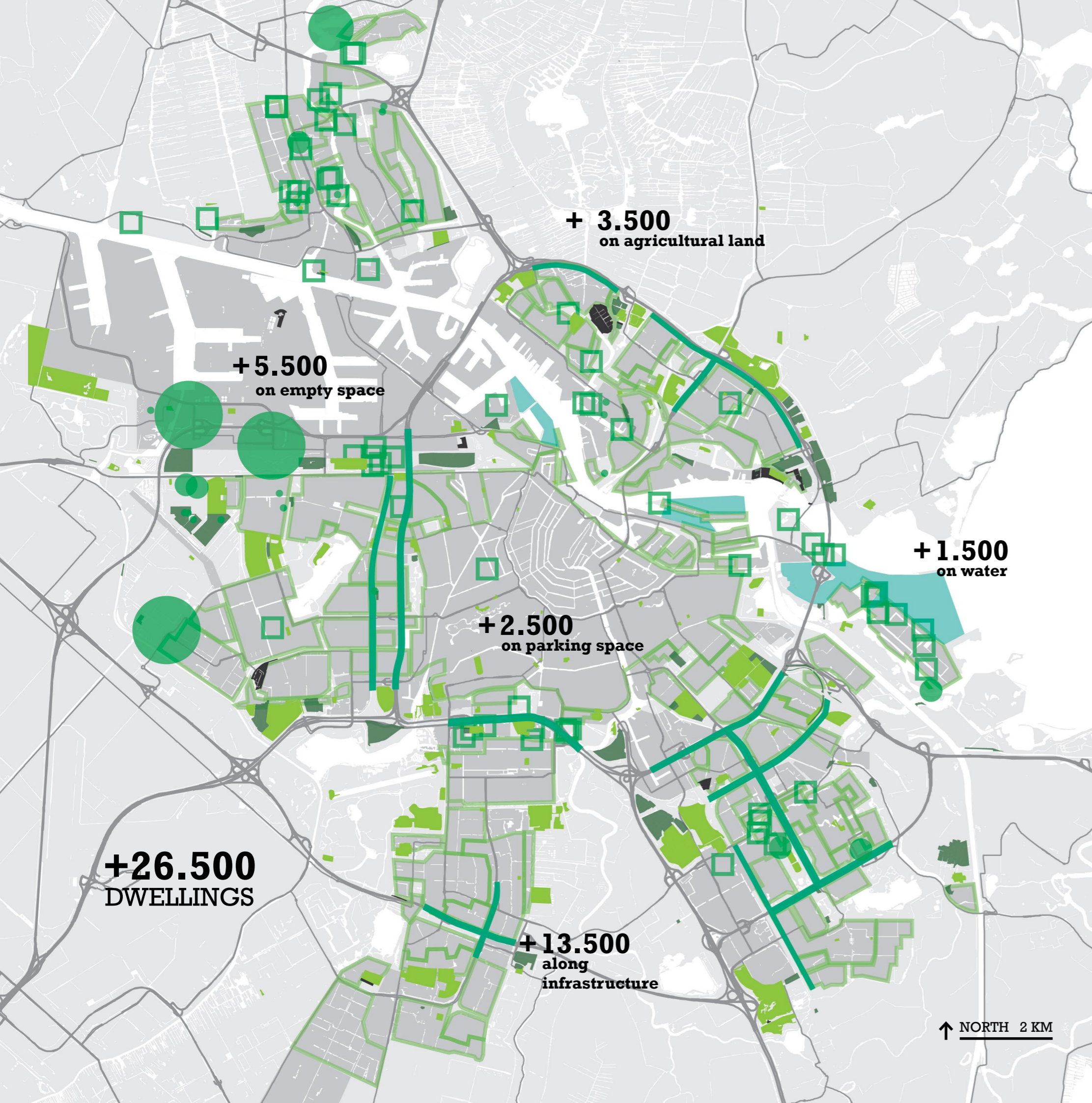
SHARING ECONOMY

In recent years the sharing economy grew fast. Some of these developments save space in the city, car sharing and Airbnb for example. It leads to less cars in the streets or housing as substitute for hotels or holiday homes. However, rules are needed, so that for instance Airbnb doesn't lead to a reduction of the actual housing capacity of a city.

Costs
✱ ✱ ✱

Acceptance
✱ ✱ ✱

Complexity
✱ ✱ ✱



Create strategy

The biggest potential for densification is expected in the open spaces of the city. This strategy addresses these spaces. Even though a city looks full, there are still many open spaces. Especially on the small scale, there is a lot of potential. Some of the spaces are still in use and some of them have a function. For these spaces it is important to first analyse its value, before it is considered as a potential densification location, because these open spaces contribute for a significant part to the quality of life of neighbourhoods. Developing them, can lead to discussion or opposition. The main reasons for this are often, blocked sights, decreasing level of green, increasing level of nuisance or just a matter of principles. These arguments should be considered in a design for these places. So that the added buildings do not harm the quality of life of the existing inhabitants, but rather improve it.

To find the potentials for these spaces, the earlier mentioned typologies will be used. Each typology has different concerns in addressing quality of life. Therefore for each of them a different method will be used to analyse its potential. The approach for each typology will be discussed separately on the next pages. Not all typologies or parts of typologies are suitable for densification, because they are too valuable for the quality of life. For this reason the typology of public space won't be discussed here. The typologies 'flat roofs' and 'green space in blocks' are addressed in the top-up and fill strategy.

- Agricultural land in the city
- Sport fields
- Allotment gardens
- Potential for dwellings on water
- Permanent empty plots
- Temporary empty plots
- Wide infra zone
- Neighbourhood borders

Image 3.5 Potential map for the create strategy

↑ NORTH 2 KM

EMPTY SPACE

Not all spaces in the city are in use. Some spaces are empty, and are just there without a function. Often they wait for their new destination, or for the economic recourses to be developed. The municipality holds a register with empty spaces in

the metropolitan area (Gemeente Amsterdam, 2016a). Citizens can initiate ideas for temporary use of these space. Some of them are also available on a permanent basis; land without any future plans. This land can be used for new dwellings.

METHOD

The register of the municipality is used for the quantification of this potential. Therefore an distinction is made between permanent and temporary available space. For the calculation a density of one hundred dwellings per hectare is used. It is important to note, that these spaces are the official registered empty spaces. Besides these there are probably also unused private spaces, that the municipality isn't informed about. Also these spaces can be used for housing, but there are no numbers available for this.

54,9 ha unused terrain available for permanent use¹
 x 100 dwellings per hectare
 5.490 extra dwellings

Sources:
¹OIS Amsterdam

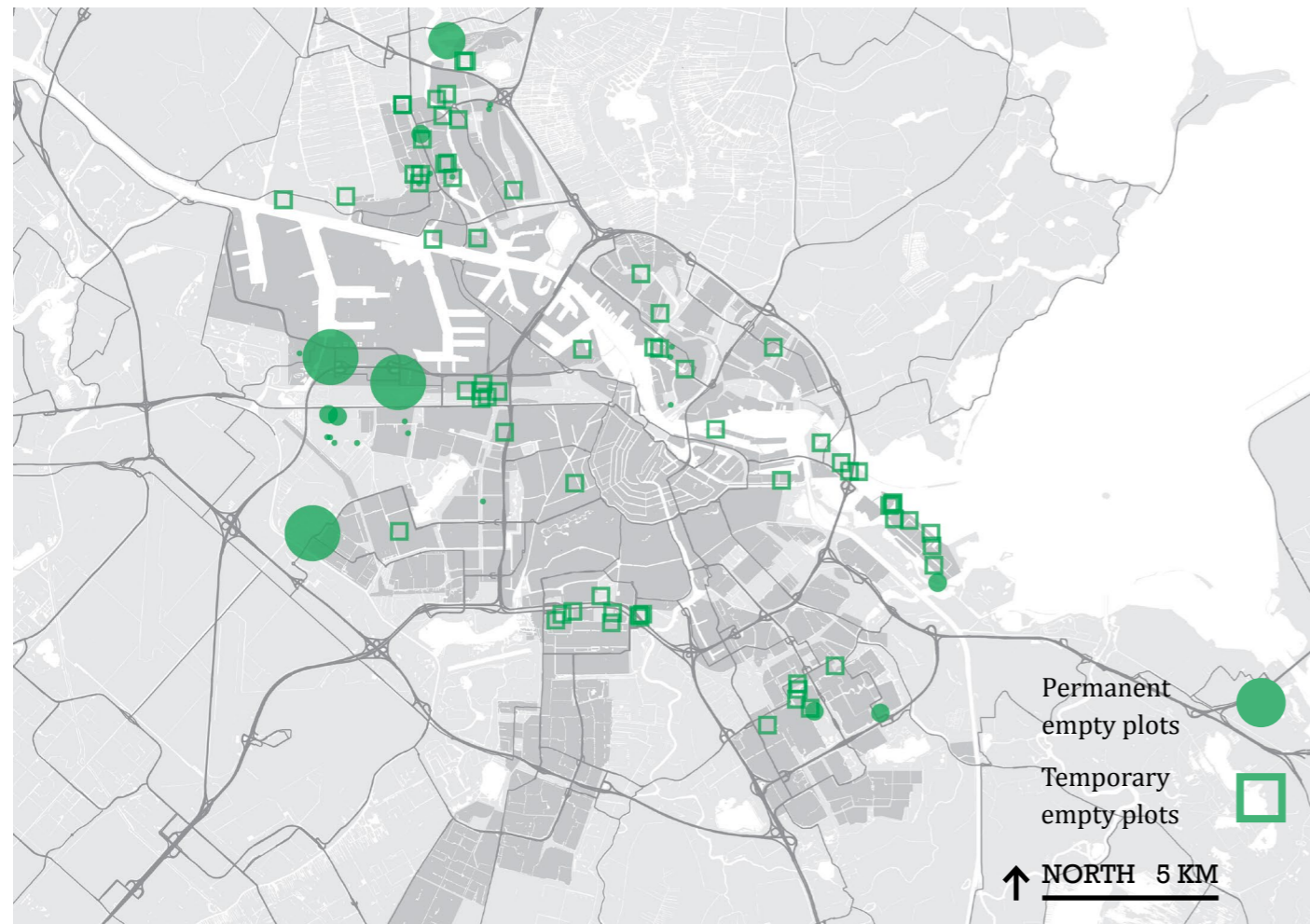


Image 3.6 Potential map for the empty space typology

INFRASTRUCTURE ZONE

Big infrastructure often have a buffer between them and the buildings. This distance is created, so the inhabitants of these blocks will be protected from noise pollution and bad air quality. When these disadvantages of living at these locations are solved, there is a huge potential. Due to developments of more silent and less polluted cars, and measurement to improve the air quality, these locations can be a good option. Development on

these locations wouldn't harm the existing quality of life at all, the focus here should be on the quality of the new dwellings. 'De tribune' is a good example of housing development on this infrastructural space. It is a 200 meter long apartment building, with 10-13 storey's, located on a small strip along the A10 highway in Amsterdam (NUL20, 2011). The highway-side contains the corridor

and also functions as a sound barrier, still light enters from this side. The other side is open and contains balconies, where you don't notice anything of the highway (NUL20, 2011).



Image 3.7 Potential map for the infrastructure zone typology

METHOD

First was analysed which highways and train tracks have space for this kind of development. For this selection, on average, there was a strip of 30 meters wide available. In most cases development is possible on both sides, in some cases only on one side. Not the total length of the lines identified is free for development, due to buildings, trees, parks and other functions. For this study we use the assumption that 50% can be developed. To get to a number for the potential of this strategy we will use 'De tribune' as a reference project. This project is unique in its size and program, which makes it unrealistic to copy it throughout the city. Therefore we will use a smaller version of 'de tribune' in this study; a 100 meter long, six storey high building (they can maybe even be higher). Placing five of these in one kilometre, leads to 375 dwellings per kilometre.

```

31,3 km of infra with space along both sides
x 2
-----
62,6 km
+ 8,9 km of infra with space along one side
-----
71,5 km
50% percentage that can be developed
-----
35,8 km to develop
x 375 dwellings per km
-----
13.425 extra dwellings

```



Image 3.8 The highway side of reference project 'de tribune' (gebouwdin.amsterdam.nl)

PARKING SPACE

Parking lots are a waste of space. They are not used 24 hours a day, and not for 100 percent. On top of that, these are unattractive places, especially the view on them. However, parking lots are often located on central location, close to centres or other destinations. Therefore these spaces can be interesting for development. Housing, public space or a

combination can upgrade the area. This shouldn't result in a decline of parking space when they are needed. Parking space can be easily integrated in the new developments; below, in or on top of new buildings for example. Due to the development of autonomous cars, the need of centrally located parking lots will reduce.

```

156.843 parking places in Amsterdam1
17% percentage parking lots of total parking places2
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26.663 places in parking lots in Amsterdam
x 12,5 m2 (size of a parking place)
-----
333.287 m2

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```

33,3 ha space for development
75% percentage that can be developed
-----
25,0 ha new housing
x 100 dwellings per hectare
-----

```

```

2.500 extra dwellings

```

Sources:

¹OIS Amsterdam

²Parkeren Nederland, 2002

METHOD

In Amsterdam were 156.843 parking spots in 2014 (Gemeente Amsterdam, 2015). There are no numbers available for parking lots, also not for their locations. In the Netherlands 17% of the parking spots were parking lots in 2002 (Dijken, 2002), this is the most recent number. In total this comes to 26.663 spots on parking lots in Amsterdam. Using the average size of a spot, it leads to 33,3 hectares of space. Not all this space is usable for development, therefore a correction factor is used of 75 percent.



Image 3.9 The open side of reference project 'de tribune' (gebouwdin.amsterdam.nl)

WATER

Amsterdam is a water city. The water is mainly used for transport and recreational purposes. There are some examples of housing development on water, but there is much more potential for this (Geus, 2015). One of these examples is IJburg, where they created land in the IJmeer to build a new residential area. This kind of development is very radical and could harm the identity of Amsterdam as a water city on the long run. It is important

that dwellings on water, are implemented in a way where the characteristics of Amsterdam and the open view over the water are not destroyed. A better example is 'Waterbuurt-west', a neighbourhood within IJburg. They realised 55 floating houses; a modern version of the houseboat. This project can be used as a reference. The density of these kind of neighbourhoods are low, so the open character of the water will be maintained.

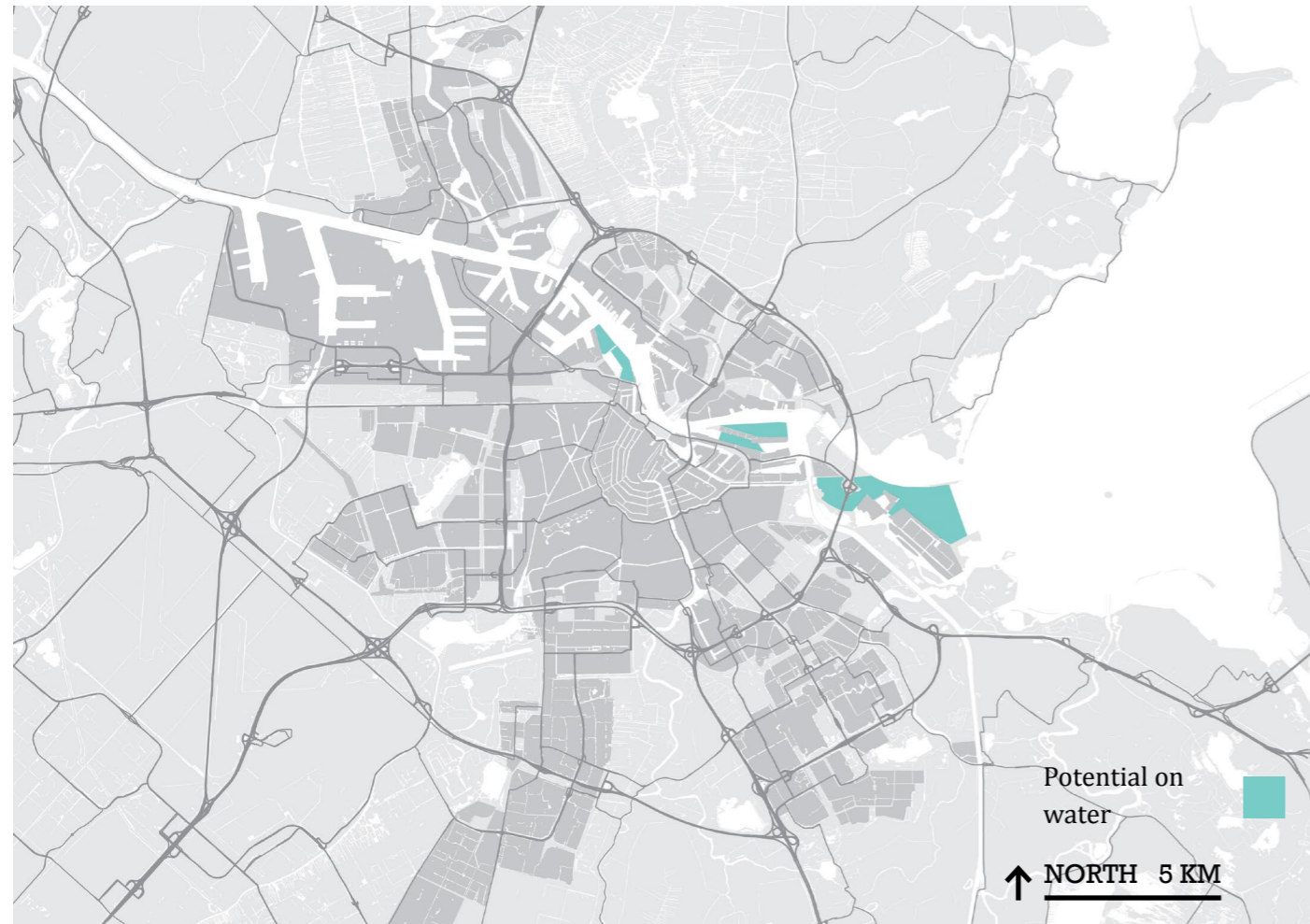


Image 3.10 Potential map for the water typology

METHOD

For this study several possible development locations around 't IJ and IJmeer are selected. Boat routes, recreational and nature areas are taken in account for this selection. For the open character; space for water recreation and views from the quays are important. These criteria should be elaborated in a design. Therefore is expected that only 20% of the potential locations can be developed, with a density of 20 dwellings per hectare.

335,5 ha water
 20% percentage that can be developed
 71,1 ha water to develop
 x 20 dwellings per hectare (waterbuurt-west)
 1.422 extra dwellings



Image 3.11 Reference project 'Waterbuurt-west' (arkenbouw.nl)

EXTENSIVELY USED GREEN SPACE

When looking at a map of an expansion neighbourhood, many islands are visible. The areas in between are often green strips without much function; some kind of leftover space. Therefore these borders between neighbourhoods have great potential. Another example of leftover space, is what in this study is called green pockets; small pieces of green with no specific use. It is just there. Although the potential these spaces have,

they should be treated with care, because it is often these spaces that make neighbourhoods pleasant. They create a more comfortable, open and green experience. Besides that they are often used for running, walking the dog or for children to play. Some of these spaces really don't have a function, but it is hard to judge that and locate them. A more extensive study should be done to the specific locations, therefore they won't be included in this study.

When the urgency for extra housing is still high after making use of the other potentials, then it could be an option.

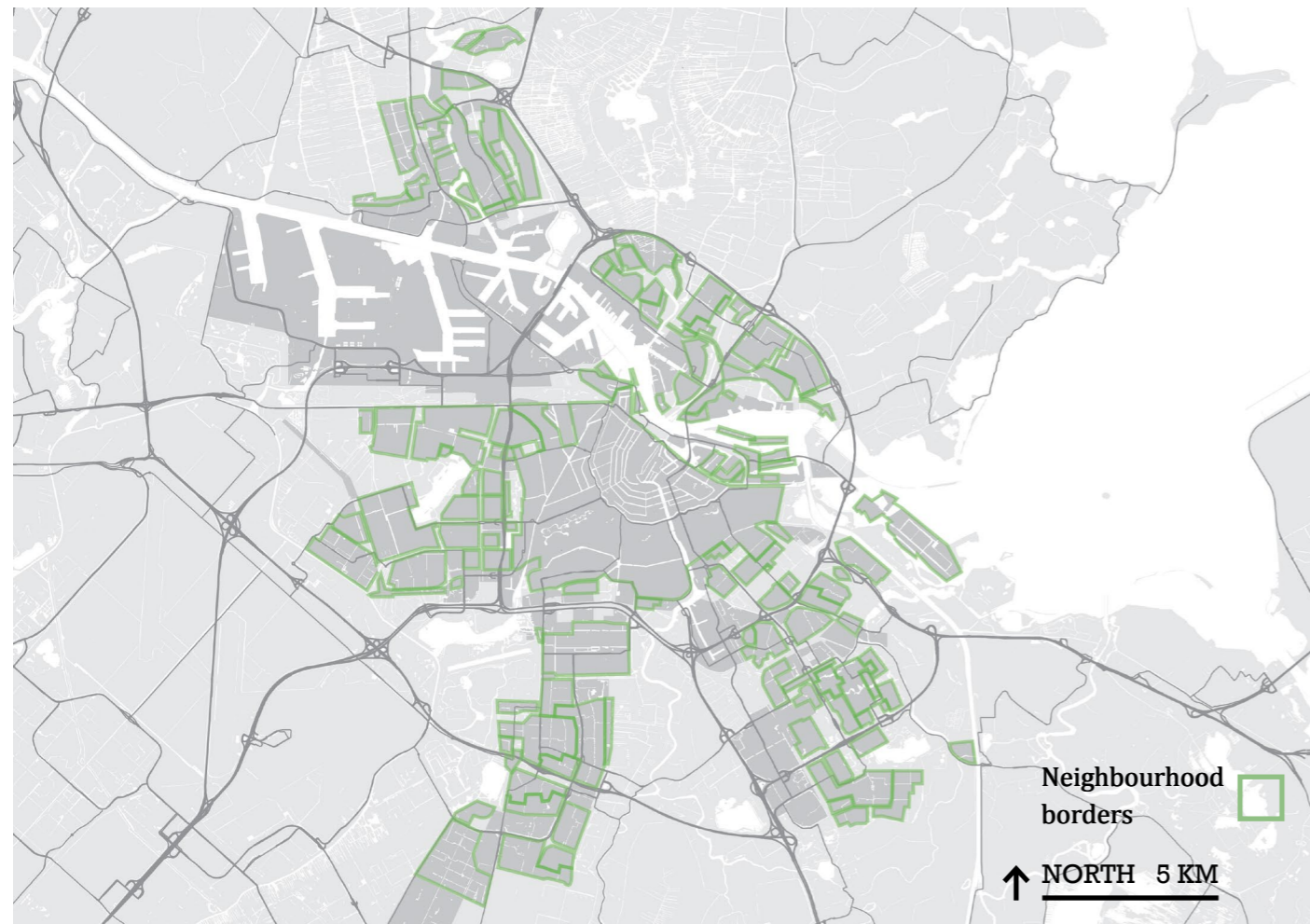


Image 3.12 Potential map for the 'extensively used green space' typology

FUNCTIONAL GREEN SPACE

Unlike previous typologies, the spaces of this typology do have a function. It could be either used for agriculture, recreation or cemeteries. In the Dutch context, it is a shame to use highly valuable land in the city for agriculture, because the space in cities is needed and

on the countryside there is plenty of agricultural land. There amount of agricultural land in the city is not much, but still 35 hectares. The borders between the land and adjacent neighbourhoods a critical point in the design, to prevent from any conflicts. The other functional

green spaces, shouldn't be used for densification. Recreational spaces, such as sport fields or allotment gardens, are too important for the quality of life. Developing cemeteries is unethical. This can be reconsidered when more housing is needed.

35,1 ha agricultural land in the city¹
 x 100 dwellings per hectare
 3.510 extra dwellings

Sources:
¹OIS Amsterdam

METHOD
 There is a total of 35 hectares of agricultural land in Amsterdam. This can be developed with a density of 100 dwellings per hectare.

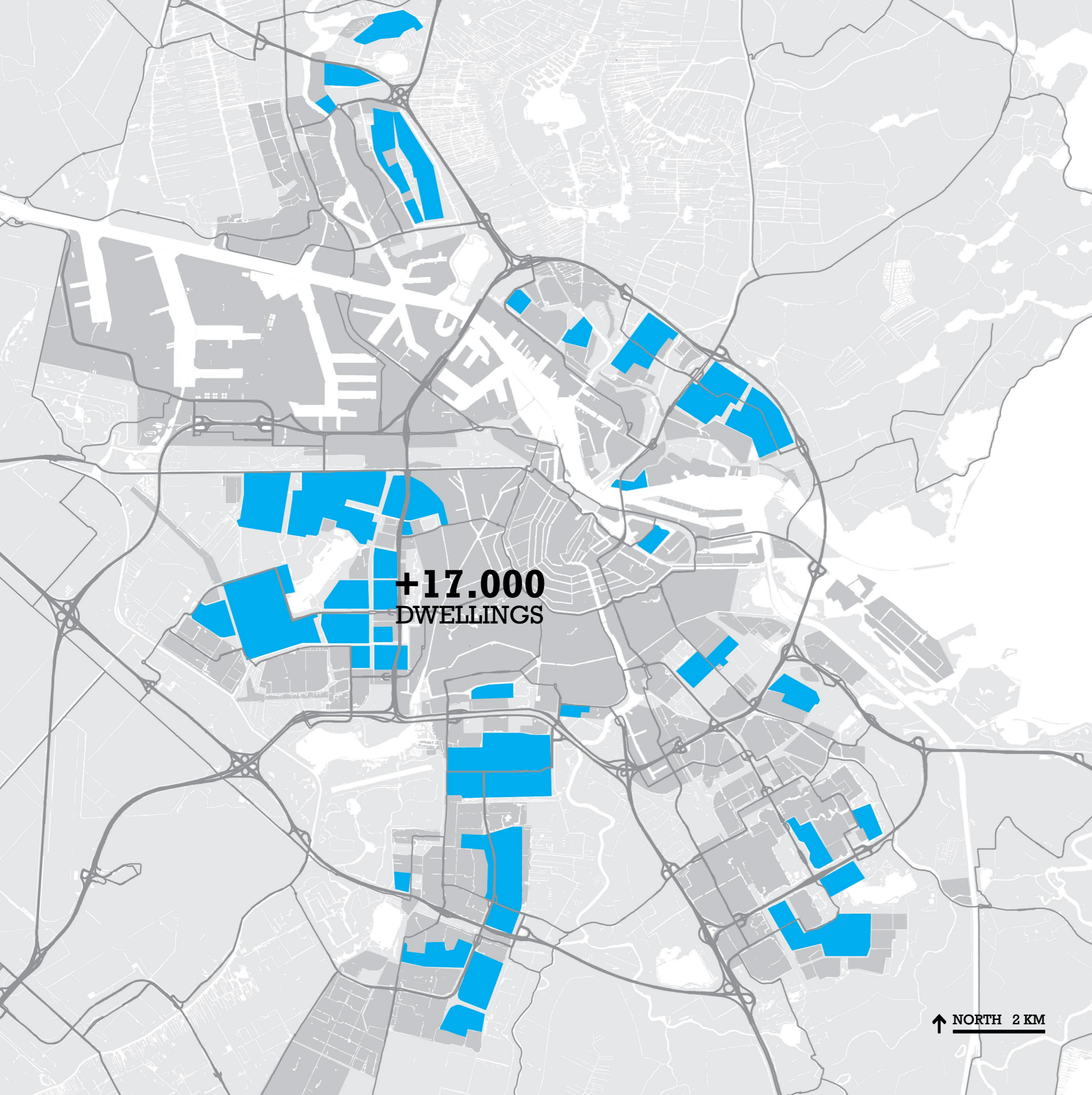


Image 3.13 Potential map for the 'functional green space' typology

Costs
 * * *

Acceptance
 * * *

Complexity
 * * *



**+17.000
 DWELLINGS**

Fill strategy

Next to the open spaces some strategies address characteristics of the built environment. So does the fill strategy. Some building blocks are not closed, they are open. These openings can be filled with new dwellings. It can be totally filled, or the ground floor can still contain an alley to enter the courtyard. This way the block is still accessible from outside, and can keep its public or semi-public function. The fill strategy can mainly be applied in the open block typology, but these openings can also occur in blocks of other typologies. Included in this strategy is the extension of a block, which means adding a volume at the head of a long shaped building block.

This strategy is the most difficult to implement, because it has the biggest impact on the existing dwellings. It can lead quickly to conflicts. Therefore the implementation here is everything, and can make or break this strategy. Creative solutions are needed to maintain existing sun hours, privacy and views. Apart from this, the development of the new dwellings will create nuisance for the neighbours. However, the money that is earned with this strategy can be used to upgrade the courtyard or the existing buildings.

Image 3.14 Potential map for the fill strategy

■ Open block typology

↑ NORTH 2 KM

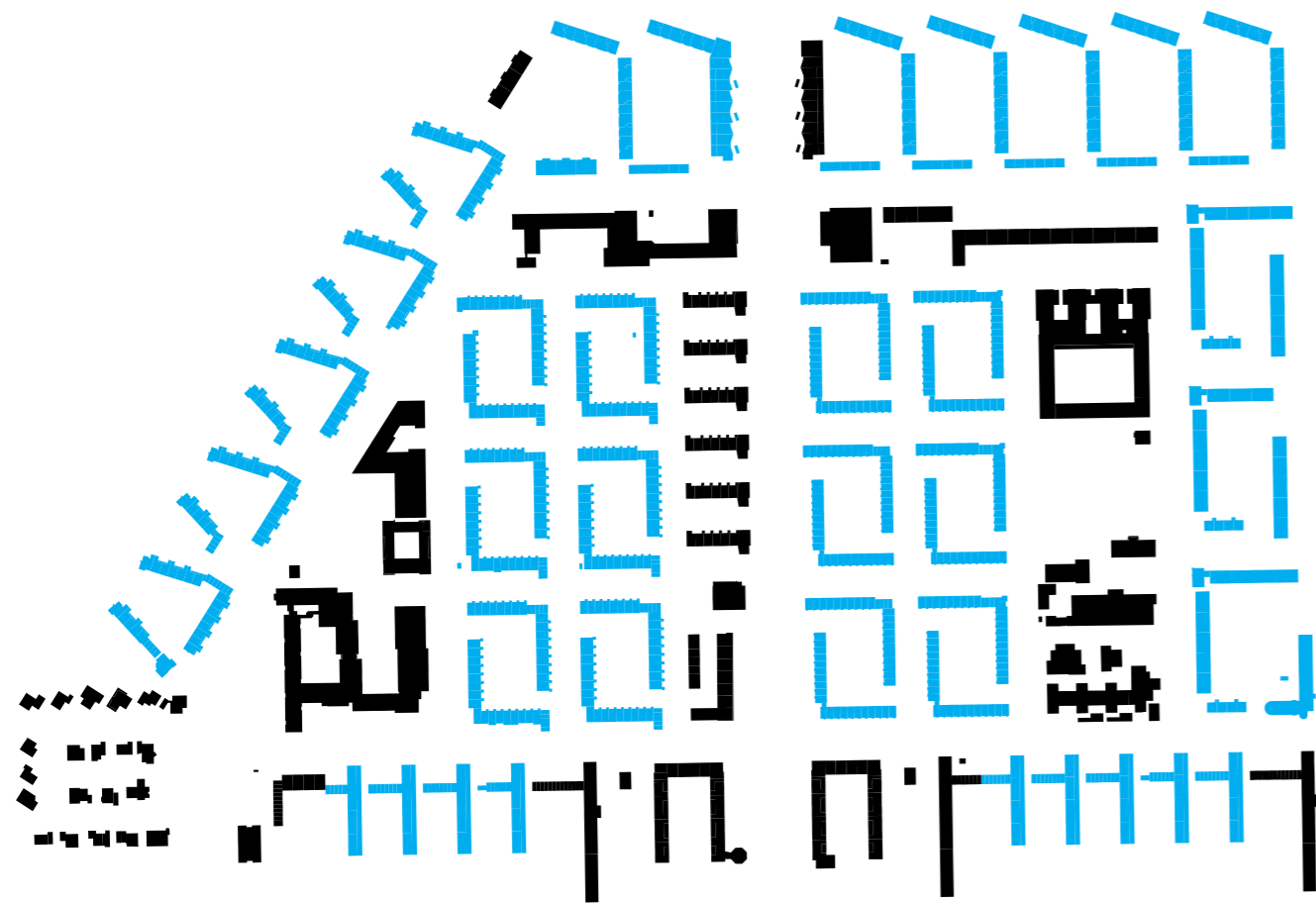


Image 3.15 Analysed neighbourhood with typical blocks for the open block typology

							total selection
blocks	7	12	5	9	3		
dwellings per block	66	41	21	32	112		
total dwellings	462	492	105	288	336	1683	
extra dwellings per block	7	7	3	8	13	38	
total extra dwellings	49	84	15	72	39	259	
% extra dwellings	10,6%	17,1%	14,3%	25,0%	11,6%	15,3%	

METHOD

For this strategy the potential of the open typology is analysed. Therefore two typical adjacent neighbourhoods with repeated housing blocks are chosen; Emmanuel van Meterenbuurt and Jacob Geelbuurt in Amsterdam Nieuw-West. In these neighbourhoods a few common blocks were selected, five blocks in this case. The number of dwellings in these blocks should cover a considerable amount of the total number of dwellings in that neighbourhood. The higher this amount the more representative the outcome.

Then, for each block the structure and characteristics were analysed, to find out possible places for new dwellings. With a quick design exercise, the existing structure of the blocks was copied to the open spaces in the block. This exercise just gives an idea about the potential. For the final implementation of new dwellings a more detailed analysis should be done on the effects it has on the quality of life. As a next step, the numbers of extra dwellings were calculated in an absolute way and as percentage. Finally the results can be added, and the potential of these two neighbourhoods can be calculated as a percentage. This percentage will be guiding and used as an average for the whole typology. When this is multiplied with the amount of dwellings in the typology, it shows the potential of this strategy.

The uncommon blocks of this neighbourhood are not considered in these steps. This will compensate for the deviation that is caused due to the fact that this neighbourhood is not 100% representative for all the neighbourhoods in this typology.

923 dwellings in Emmanuel van Meterenbuurt	
+ 1.365 dwellings in Jacob Geelbuurt	
<hr/>	2.288 total dwellings
259 extra dwellings in selection	
<hr/>	/2.288 total dwellings
	11,3 % extra dwellings in neighbourhood
153.761 dwellings in open block typology	
<hr/>	x 11,3% % extra dwellings
	17.375 total amount of extra dwellings

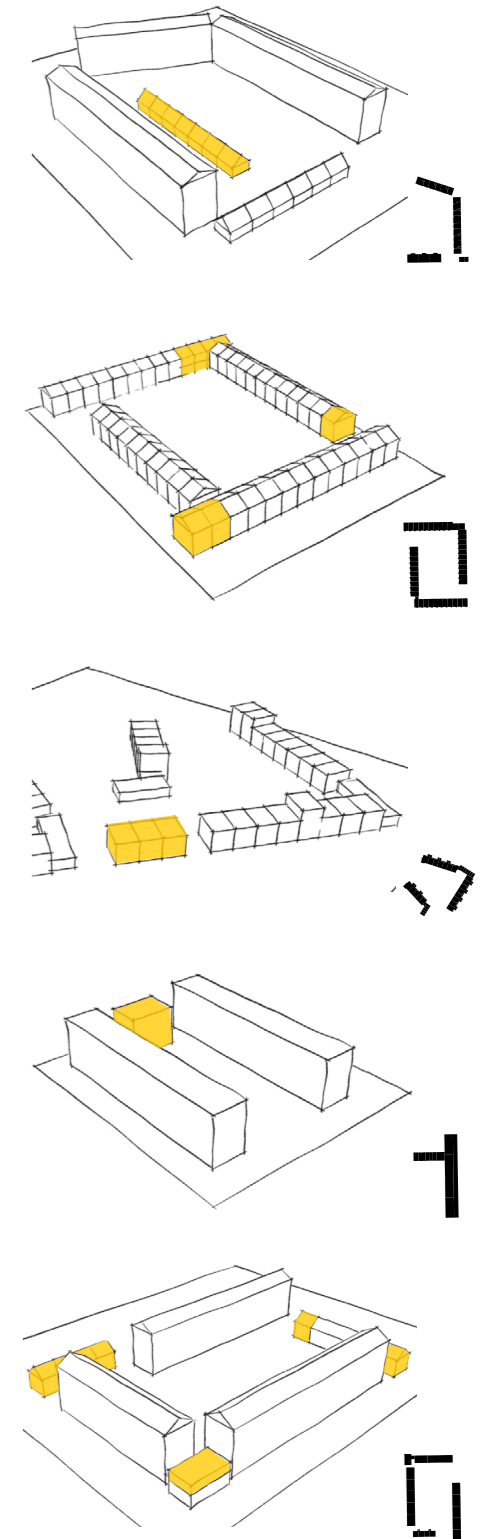
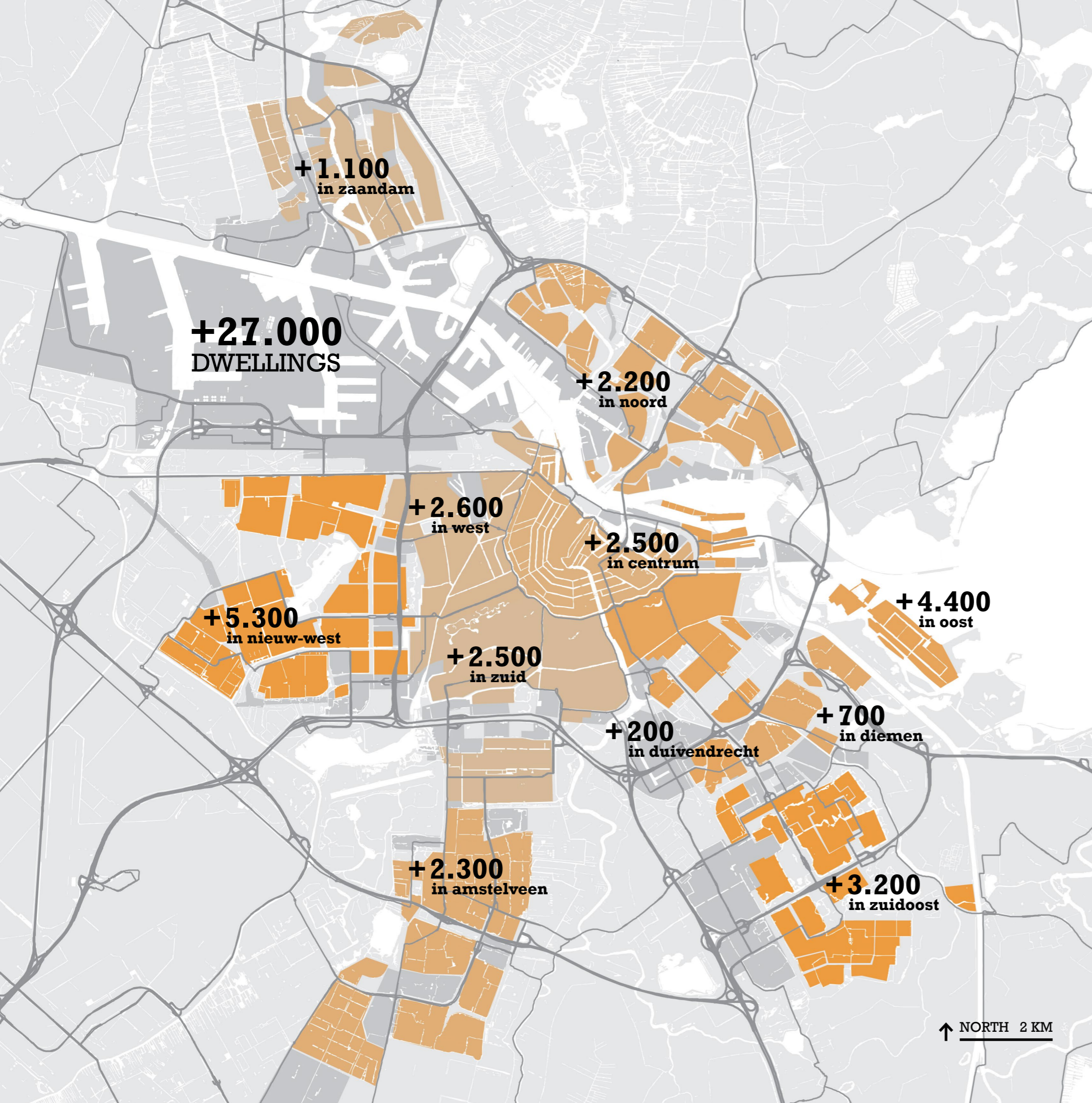


Image 3.16 Densification exercise for the fill strategy

Costs
* * *

Acceptance
* * *

Complexity
* * *



Top-up strategy

When there is no space for development on the ground anymore, we should think of other solutions. One is placing a new layer on top of existing buildings, called top-up. There are two criteria that decide if buildings are suitable for this strategy; it should have a flat roof and its structure should be able to bear to weight of the new dwellings. In practice this means most building built after 1950 with a steel or concrete structure, are strong enough (Tillie et al., 2012). After some calculation it turns out that this strategy has a huge potential. However, there are a lot of restrictions due to laws. And if it is legally possible, a lot of energy is needed to meet all other rules and requirements (NUL20, 2003). For one part this has to do with privacy. You cannot simply add a layer on every building, because there are people living below that value their privacy on the balcony or in the garden. Therefore this strategy is only usable for apartment buildings. One last thing, the new dwellings should be accessible from the street. Often the staircase can be extended by one floor, but not always. In these cases it takes creative solutions to make the dwellings accessible.

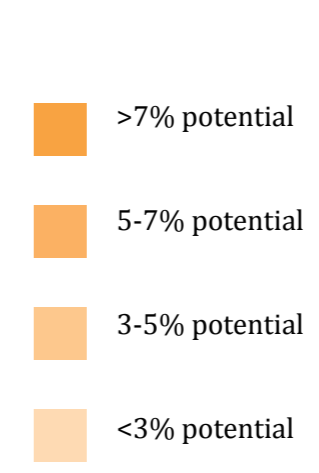


Image 3.17 Potential map for the top-up strategy

↑ NORTH 2 KM

17.507 dwellings in the centre of Rotterdam¹
80,2% percentage built after 1945¹
 14.041 dwellings
97,9% percentage multi-family housing¹
 13.746 dwellings

1.520 extra dwellings with top-up strategy in the centre of Rotterdam²
/13.746
 11,1% of the multi-family housing built after 1945 can be topped-up

Centrum	West	Nieuw-west	Zuid
53.932	76.990	63.803	78.238
23.913	23.948	63.441	23.094
<u>95%</u>	<u>99%</u>	<u>75%</u>	<u>96%</u>
22.717	23.709	47.581	22.170
<u>11,1%</u>	<u>11,1%</u>	<u>11,1%</u>	<u>11,1%</u>
2.522	2.632	5.281	2.461

Oost	Noord	Zuidoost	Amstelveen
63.834	41.557	38.638	43.087
43.190	29.857	38.428	39.568
<u>92%</u>	<u>67%</u>	<u>76%</u>	<u>52%</u>
39.735	20.004	29.205	20.575
<u>11,1%</u>	<u>11,1%</u>	<u>11,1%</u>	<u>11,1%</u>
4.411	2.220	3.242	2.284

Diemen	Zaandam	Duivendrecht
11.891	33.629	2.322
10.940*	26.631	2.136*
<u>57%</u>	<u>37%</u>	<u>65%</u>
6.236	9.853	1.389
<u>11,1%</u>	<u>11,1%</u>	<u>11,1%</u>
692	1.094	154

extra dwellings

2.522 Centrum
 2.632 West
 5.281 Nieuw-west
 2.461 Zuid
 4.411 Oost
 2.220 Noord
 3.242 Zuidoost
 2.284 Amstelveen
 692 Diemen
 1.094 Zaandam
 + 154 Duivendrecht

26.993 Total amount of extra dwellings

number of dwellings³⁴⁵⁶
 dwellings built after 1945³⁴⁵
 percentage multi-family housing⁶

percentage that can be topped up
 extra dwellings

*same percentage used as Amstelveen
 due to missing data.

Sources:

- ¹Rotterdam buurtmonitor
- ²Rotterdamers maken stad
- ³OIS Amsterdam
- ⁴Amstelveen buurtmonitor
- ⁵Zaanstad in cijfers
- ⁶CBS in uw buurt

METHOD

For this strategy another study is used; 'Rotterdamers maken stad', a densification study for the centre of Rotterdam. This study consist of seven strategies, both for densification and for adding extra green to the city. One of the strategies is topping-up. To be able to top-up buildings there are three conditions, which I mentioned already before. The building should have a flat roof, be built after 1950 with a steel or concrete structure. Data for these specific conditions are not available, therefore other data is used in this study to approach a similar outcome.

'Rotterdamers maken stad' found a potential of 1520 extra dwellings for the centre of Rotterdam, which has 17.507 dwellings in total. These numbers will be used, but cannot simply be transferred. The centre of Rotterdam has different characteristics then the agglomeration of Amsterdam. The centre of Rotterdam contains a bigger share of post-war buildings (built after 1945) and also of multi-family housing. Therefore we will look at the potential of extra dwellings as a percentage of multi-family housing built after 1945. Eventually, these dwellings are most likely to be suitable for a top-up strategy. The difference between the several districts in Amsterdam can also be substantial. For this reason each district is analysed separately.

POTENTIEELKAART, 2040

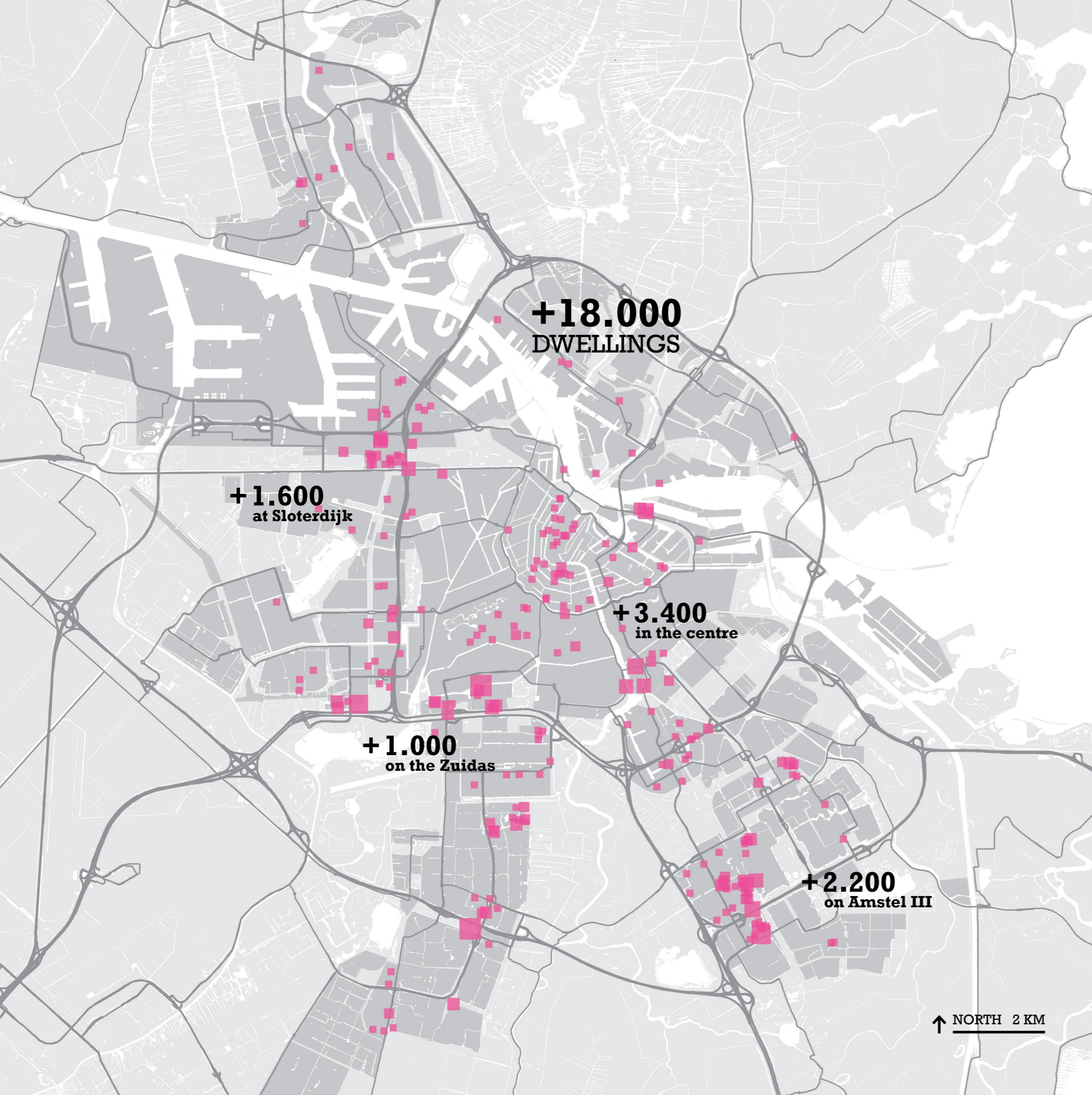


Image 3.18 Reference study 'Rotterdamers maken stad' (Tillie, et al., 2012)

Costs
 ✱ ✱ ✱

Acceptance
 ✱ ✱ ✱

Complexity
 ✱ ✱ ✱



Re-use strategy

The re-use strategy is about turning vacancy into new dwellings. These places are empty now, and that is a shame. There are three different types of vacancy; office space, industrial space and housing. The office vacancy is the biggest, in March 2015 there was 1.320.600 m² unused (Gemeente Amsterdam, 2016d). Image 3.20 shows a good example of this strategy, the former office buildings of newspapers Het Parool and Trouw, are re-used for student housing. If all of the vacancy can be turned into housing, it would create a big potential. Unfortunately not all vacant spaces are suitable for housing. The office market needs space to grow and opportunities to move. Therefore it is good to have some vacancy. Another issue is that some vacancy is located on places that are unattractive for housing, in Westpoort for instance or at Amstel III. These locations cannot deliver the quality that is desired of a residential area. The vacancy on these locations can maybe be used for new housing concepts like living-working units. Another option for these areas with a lot of vacancy is reorganisation and re-structuring into a new neighbourhood. The next strategy will discuss this.

Even due to the fact that the pressure on the housing market in Amsterdam is high, according to the CBS there is a surprisingly high housing vacancy (Groen, Mateboer, & Daalen, 2014). Partly this is short-term vacancy, due to



↑ NORTH 2 KM

Image 3.19 Potential map for the re-use strategy

moving, construction work or in some cases it is a second home. Still, the other part is long-term vacancy. In Amsterdam this was 3% in July 2013, a little higher than the average (2,5%) in the Netherlands (Groen et al., 2014). In June 2015, CBS published another article on this issue. It says that half of the long-term vacant housing is still in use or anyway not available for new residents. Which they found out for instance by checking the electricity use. However, finally 53,6% of the long-term vacant housing is available for new residents (CBS, 2015). This results in 8.000 new dwellings. Part of this vacancy is empty space above shops. Only in the Kalverstraat and the Nieuwendijk are already 360 storeys empty. This creates a potential that is very easy to realise. These dwellings should just be prepared for new inhabitants. For this reason, this is an of the first steps that should be taken in a densification strategy.

METHOD

The number of vacant office space comes from the 'kantorenloods' of the municipality of Amsterdam (Gemeente Amsterdam, 2016d). It gives an overview of vacant offices bigger than 1000 m² in the metropolitan region Amsterdam. This means that offices smaller than 1000 m² are not included in this study. It is likely that also this segment contains vacancy. On the other hand vacancy in some areas are not suitable for housing, so that compensates. For the vacant industrial space is 'Amsterdam's concept transformation strategy 2014-2018' used. It mentions that there was 480.000 m² unused in the beginning of 2013 (Voort, 2013). These numbers are translated directly into a number of dwellings of 100 m² each. It is not taken into account that some vacant building might be completely replaced. In that case, it might be possible that more dwellings can be realised.

The potential of 8.000 vacant dwellings, will not be added to the final number of potential for this strategy. Of course this is densification, because there will be more people living in the city. However, the dwellings are already existing. So it isn't densification in the sense of extra dwellings and that's how it is measured in this study. The percentage of long-term vacant housing that is available for new residents, is actually for the Netherlands. This will be used for Amsterdam as well, because there isn't any other data.

1.320.600 m² office vacancy¹
 + 480.000 m² industrial space²
 1.800.600 m² total vacancy
 /100 size of a dwelling
 18.006 extra dwellings

Sources:

¹Kantorenloods Amsterdam

²Transformatiestrategy Amsterdam 2014-2018

508.025 dwellings in the agglomeration of Amsterdam¹
 3% percentage long term vacancy in Amsterdam²

15.241
 53,6% percentage of available for new residents²

8.169 dwellings available

Sources:

¹OIS Amsterdam

²CBS

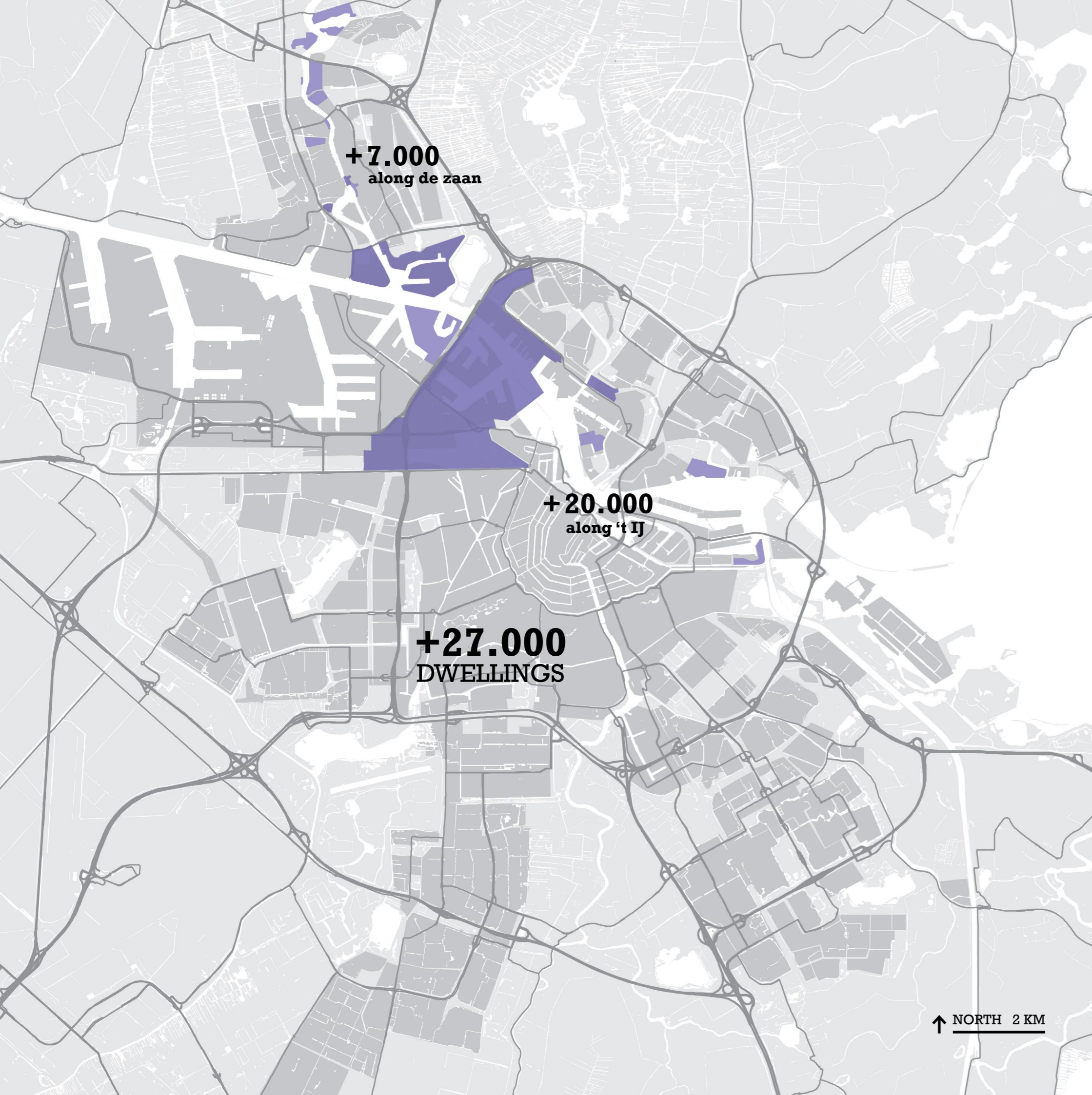
Image 3.20 Former offices of Het parool and Trouw are turned into student housing (duurzaamgebouwd.nl)



Costs
* * *

Acceptance
* * *

Complexity
* * *



Re-structure strategy

Some central areas in the city are great locations for housing development. Unfortunately, they are already occupied with industry, logistics or office functions. This strategy aims to re-structure these locations into residential areas. Since these areas are currently in use, the potentials are only conditionally. Image 3.22 shows Westerdokseiland, a great example of a former harbour area that is turned into a residential neighbourhood. This is one of the areas in Amsterdam with the highest density.

Especially the harbour areas around 't IJ and de Zaan can be turned into interesting neighbourhoods. The municipality of Amsterdam did already a study to the possibilities for transformation of the Coen- and Vlohaven area in the 'Transformation strategy Harbour-City' (Gemeente Amsterdam, 2013). The decision for the start of this transformation will be made in 2025, and are dependent on the uncertain developments of the housing market and the harbour. A few factors are influencing this decision. Currently the harbour area Westpoort only uses 77 of its 125 million tons capacity, so there is space to adapt and relocate (Gemeente Amsterdam, 2013). The harbour is working on the intensification of their activities, at the same time they want to work on the energy transition. At the moment, there is a lot of industry focus on fossil fuels. The energy transition

Image 3.21 Potential map for the re-structure strategy

- Harbour transformation areas currently studied
- Harbour transformation areas future potential

can lead to reorganisations and perhaps to some space for housing development. Besides that, elsewhere in the city there is also enough space in industry areas, to relocate activities (Gemeente Amsterdam, 2013). Non-water-related industries can be relocated to these areas. The fact that there is space for relocation, has a positive effect on the likeliness of the transformation strategy. On the other hand is the harbour growing for which it needs space. Therefore, there are already ideas to expand the harbour to the West. The transformation strategy would create lots of new housing possibilities, but it is quite a radical and expensive strategy, due to the relocation of harbour activities. As said before, the harbour and population development will decide whether this strategy is feasible.

Next to the plan of Amsterdam, the municipality of Zaanstad is also working on the transformation of harbour areas, around de Zaan. On a few designated locations, plans are already made for the first steps (Gemeente Zaanstad, 2011). This will be a long term process, but the start is there. If the conditions are in favour, there are plenty of other areas waiting for restructuring as well.

METHOD

The transformation strategies of both municipalities are guiding for the potential of this strategy. According to them, there is a potential of 20.000 new dwellings in the Coen- and Vlohaven area, and 7.000 new dwellings around de Zaan. The other areas that could be restructured in the future are selected due the fact that these are industry areas along 't IJ and de Zaan without any development plans yet.

20.000	extra dwellings around 't IJ ¹
+7.000	extra dwellings around de Zaan ²

27.000	total extra dwellings
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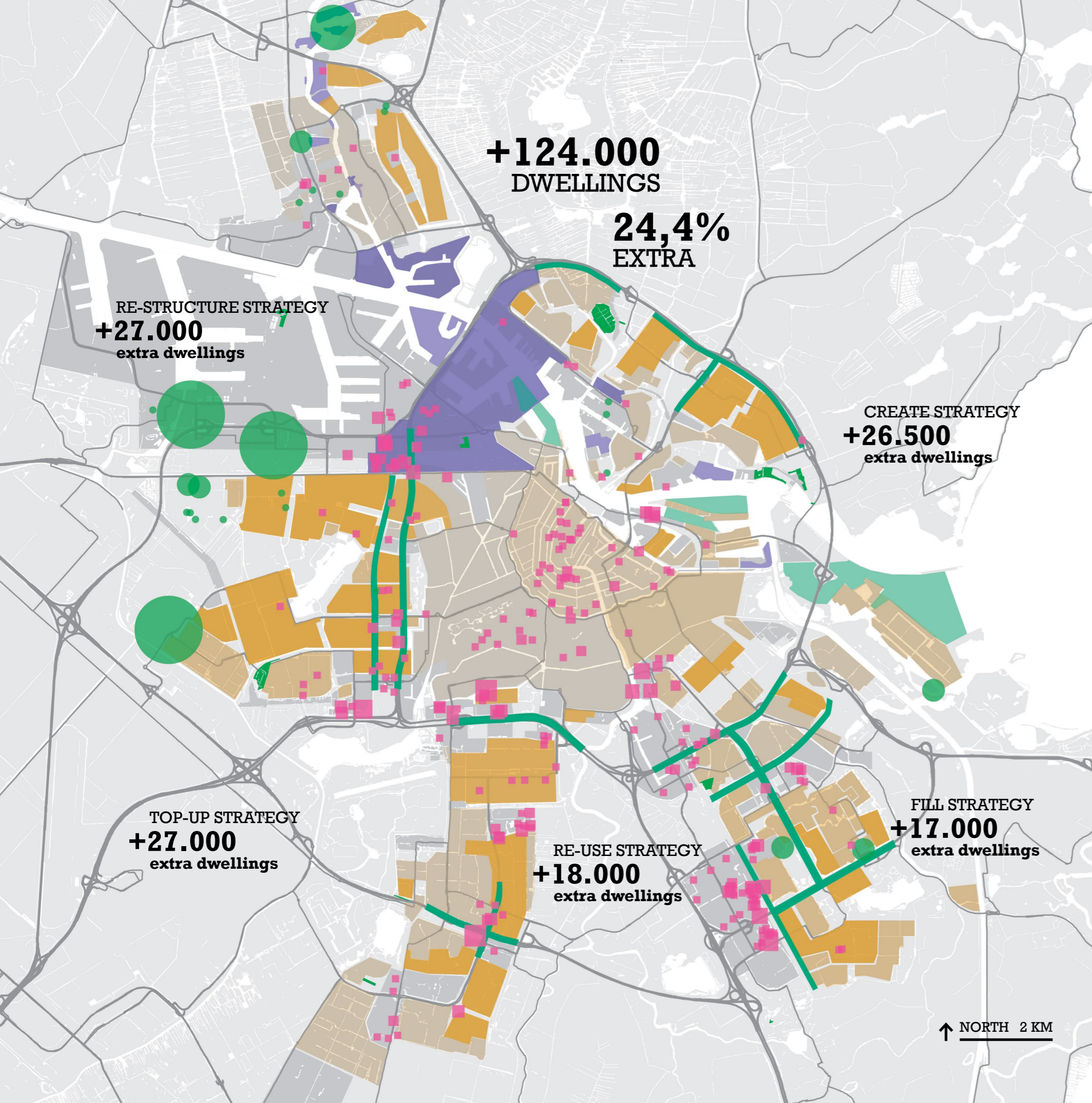
Sources:

¹Transformatiestrategie Haven-Stad

²Ontwikkelingsplan Zaan/IJ

Image 3.22 Former harbour area Westerdokseiland re-structured into residential neighbourhood (jsa-rotterdam.nl)





Final potential map

The final potential of all strategies combined is shown on the left, each strategy has a different colour. To give an clear overview, not all potentials are mapped here. For some strategies it was needed to select only the biggest potentials in order to keep the map readable. More detailed information can be found on previous maps.

The fill and top-up strategy show the potential for dwellings that can be added in a neighbourhood, but don't show the exact locations of these potentials. The neighbourhoods should be analysed better for that. For this reason they are combined, and show the neighbourhoods in which the most potential can be found. The other strategies show more precisely the location of the potentials.

Most of the potential can be found outside of the ring. Within the ring, it's only the re-use of vacancy that can create new dwellings. This is due to the fact that the densities are already high here, it leaves basically no space for more densification. The ring zone contains quite a lot of potential of different strategies. This zone can be important for densification, due to its potential and location. The waterfront of 't IJ can developed more as well, especially because there is not so much residential areas here yet. Especially these areas can create special living environments. In the expansion areas of the city (the fingers), there is a lot of potential for the fill and top-up strategy. Due to the characteristics each of the fingers has its own focus. Nieuw-west should focus on the create strategy and the empty spaces. Zuidoost has more potential along its infrastructure and with the re-use strategy. The potentials of Amstelveen and Zaandam are a bit less. Still Zaandam has some chance in re-structuring the former harbour areas.

- Potential create strategy
- Potential fill and top-up strategy
- Potential re-use strategy
- Potential re-structure strategy

Image 3.23 Final potential map

**PART
FOUR**

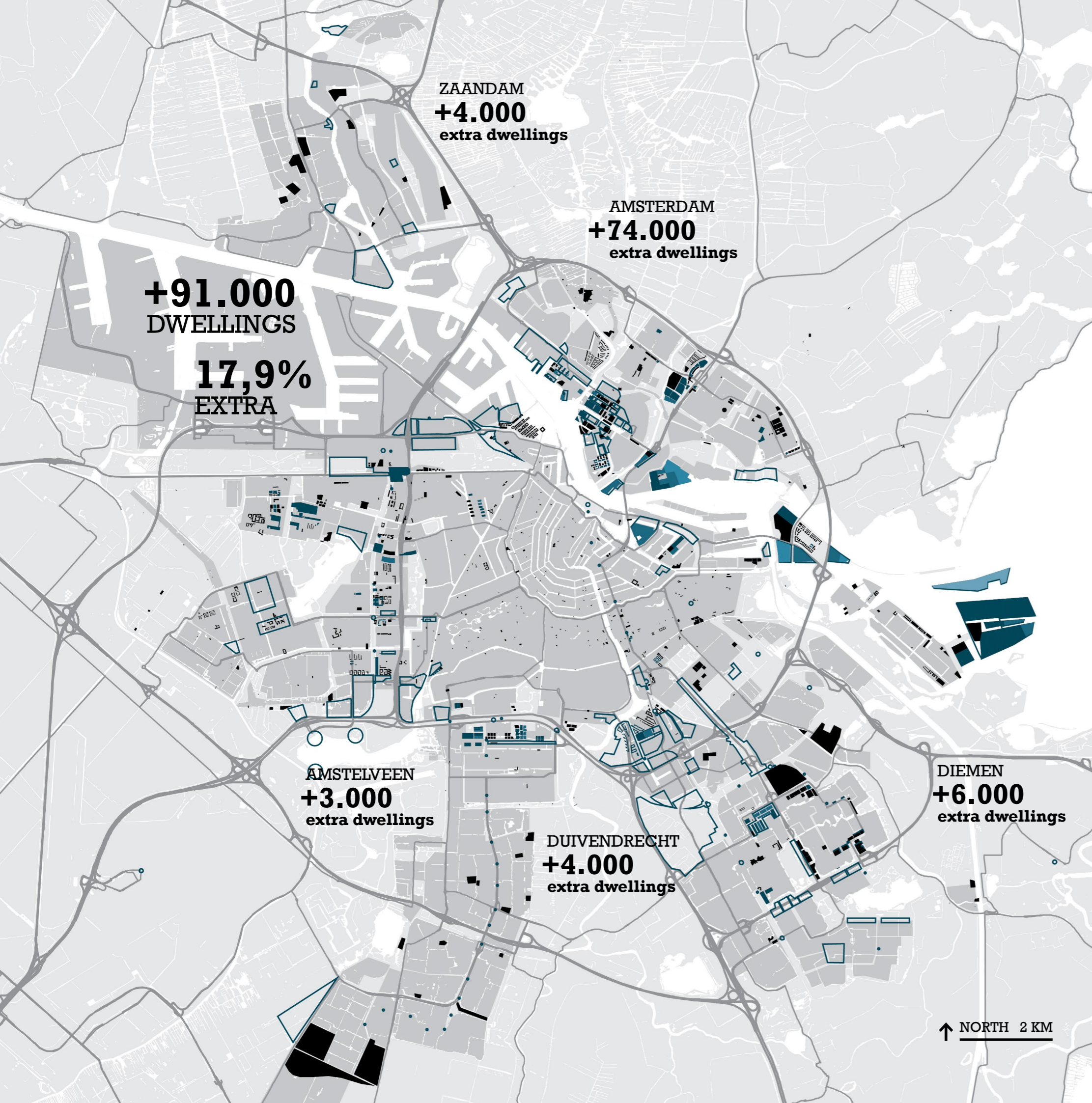
DEVELOPMENT OF AMSTERDAM

This part will discuss how Amsterdam should develop, to be able to adapt to the previously analysed densification potentials. Next to these potentials, there are already housing plans from the municipalities. These will first be compared with the outcome of the densification study to find the total capacity for future housing in the agglomeration. After this, the effects of densification are discussed. The effects are different on each scale level and require therefore different measures to maximise the benefits and tackle the threats. This thesis elaborates more on the lower scale levels, since this is the most critical part of densification. On city scale, a development vision is created to show how Amsterdam should develop to improve its competitiveness and to adapt to the new situation. On the neighbourhood scale, guidelines will help with a way of implementation of new dwelling that can keep the existing quality of life. It will show for two location in Amsterdam how the paradox of the compact city can be tackled and how densification can add quality of life. Finally this part of the thesis concludes with an elaboration on how the city can develop after the suggested densification. This will react on the two million scenario of Hemel.

\ HOW SHOULD AMSTERDAM DEAL WITH THESE DENSIFICATION POTENTIALS, AND DEVELOP TOWARDS 2050? \

Image 4.1 Fons Alkemade's idea for a connection to Noord (parool.nl)





Housing plans municipality

These are the housing plans of the different municipalities in the agglomeration of Amsterdam. For the municipality of Amsterdam this is the Koers 2025 completed with other housing plans from their database 'Dashboard Woningbouwplannen' (Gemeente Amsterdam, 2016b). The numbers for the other areas are from a research to the plan capacity of the province Noord-Holland (RIGO, 2015).

In total there are 91.000 dwellings planned. With an average of two persons per dwelling, these dwellings can house 182.000 new inhabitants. This is a huge amount, an extra 17,9 percent compared to the existing situation. Most of the new dwellings (74.000) will be realised in Amsterdam. Within Amsterdam the majority of the new housing is located in two areas; around the South and West side of the ring and along the waterfront of 't IJ. This contributes to three of the processes of the structure vision Amsterdam 2040; the rediscovery of the waterfront, the expansion of the centre, and the internationalisation of the South axis.

Image 4.2 Housing plans of the municipalities



Total new housing capacity

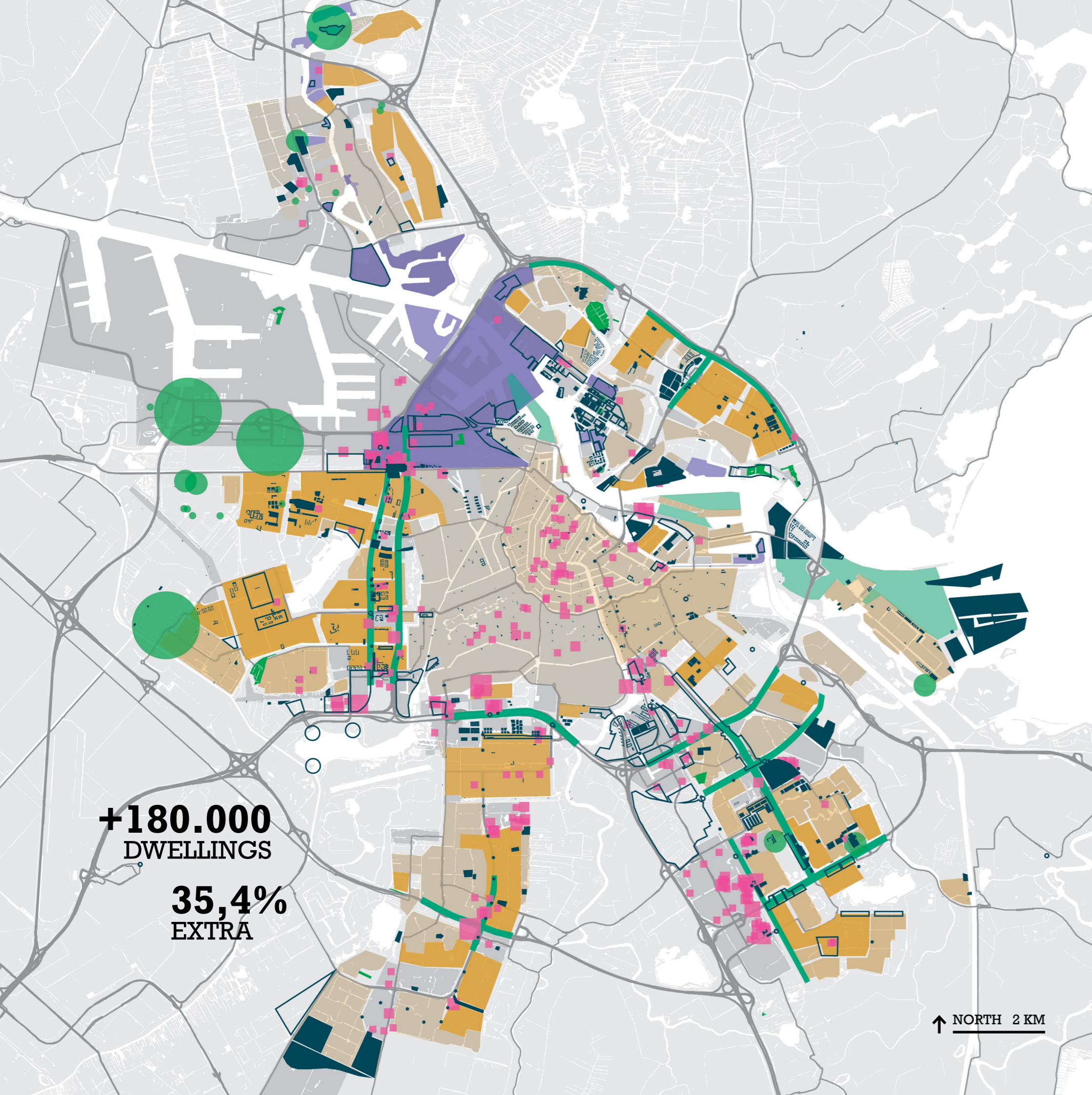
This map is a combination of the earlier showed potential map and the previous map about the housing plans. It gives an overview of all possible future housing development. There is probably an overlap between the potentials of the densification study and the plans of the municipalities. For this reason the numbers of both maps cannot simply be multiplied, that would give a too optimistic view. Anyway, the two maps look quite different, which means that the overlap is not too big. Therefore I assume that more or less 25 percent of the potentials of the densification study are already addressed with housing plans by the municipalities. This results in a densification potential of 90.000 dwellings and plans for another 90.000 dwellings. So, in total there is space for 180.000 new dwellings, housing 360.000 new inhabitants. That is an increase of 35,4 percent, leading to an agglomeration of 1.375.000 inhabitants. Even a city like Amsterdam, which is known as a compact city, shows that it has a huge potential for densification. The main focus areas for densification in Amsterdam are the areas around the West and South side of the ring and the waterfront. These are the same areas where the main focus of the municipality is.

+180.000 DWELLINGS
35,4% EXTRA

- Potential create strategy
- Potential fill and top-up strategy
- Potential re-use strategy
- Potential re-structure strategy
- Housing plans municipalities
- Strategic space for new plans

↑ NORTH 2 KM

Image 4.3 Total new housing capacity, combining the plans and potentials



Scale effects

As many urban issues, densification cannot only be viewed on one scale. Densification on city level has effects on many other scale levels, both positive and negative. With this in mind, measures can be aimed more effectively, to maximise the benefits and reduce the potential threats of densification. Densification often seem to bring benefits on the large scale, and threats on the small scale (Roo, 2011). This is what is called the paradox of the compact city. It shows that the small scale is the critical part of densification. For this reason, more emphasis will be put on the small scale in the elaboration of this densification study.

The effects of densification on a local scale are the changes for a housing block or an individual house. This can for example be a benefit like upgrading the housing quality with the earnings of densification, or a threat like the impact on privacy or views. These are all individual benefits or threats, and can differ for everyone. Therefore it is important to analyse the issues on every single location. To avoid the negative effects, there are guidelines needed for the urban and architectural design of densification projects. These guidelines will be discussed later on.

On the neighbourhood scale there are benefits like more amenities. One can think of schools, medical services, public transport connections and retail. Next to that densification can lead to crowdedness, more pollution and the disappearance of green. The guidelines mentioned before can also be of use on this scale. It can help with finding the right locations for new dwellings and functions. This can be used for the neighbourhood's master plan or by the municipality for a more official land use plan.


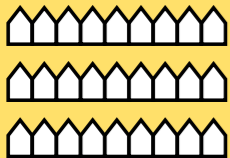



When zooming out to the city scale, the threats are all based on the fact that it is getting more crowded. This can lead to congestion on the streets and a higher pressure on public space. Some streets and city parks reach already the limits of their capacity, like Westerpark, Vondelpark and the Van Woustraat. To prevent these threats from happening an additional development vision is needed to the existing structure vision Amsterdam 2040. This additional vision should be a long term plan on how to adapt the city to the new situation with more inhabitants. Extra focus should be put on a mobility plan, which analyses the capacity of the roads and public transport lines to see

where upgrades are needed. There may even be a tipping point where the present public transport system (consisting of a large number of bus and tram lines and a small number of metro lines) will not be capable to deal with increasing use. The development vision will be elaborated in this study. The mobility plan should be developed by people that are specialised in this.

The threat on a regional scale is an even bigger focus on the centre of the region. As a result the surrounding towns or cities can lose functions and become nothing more than quiet residential areas. Also on this scale is a development vision needed to deal with this new situation. On the other hand, the benefits on this scale are great; less traffic and pollution, and preservation of the natural landscape.

Finally the densification of Amsterdam has an impact on the whole country; potentially a large impact. The benefits and threats are similar to the ones at the regional scale. It mainly preserves the open landscape and creates a more competitive country. To maximalise these benefits dense cities should be the standard, and all future development should be

within city borders. Therefore there is need for a national compact city policy. A potential threat is that the relations between the cities will change, some will get bigger and thus more important. If Amsterdam for example really grows to a two million city, the Netherlands might become mono-centric orientated. Whether this is desired or not should be decided upon on national level. To have some guidance in these kind of decisions, there is a national spatial concept for urban development needed. Both of these measures are dealing with issues of national importance, and should therefore be addressed on a national level. Therefore it is a task for the national government and could be executed in their upcoming National environmental planning strategy.

	POTENTIAL BENEFITS	POTENTIAL THREATS	MEASURES NEEDED	SHOULD BE ADDRESSED IN
LOCAL 	Upgrade public space and housing	Decline individual quality of life (e.g. privacy, views, parking space)	Guidelines for implementation	Urban/ Architectural design
NEIGHBOURHOOD 	More amenities (e.g. shops, public transport, recreation, schools)	Crowdedness More pollution Disappearance of green	Guidelines for implementation	Masterplan neighbourhood Land use plan
CITY 	Healthier housing market New interesting innercity housing areas More competitiveness	Crowdedness Congestion Higher pressure on public space	Additional long term development vision based on extra densification Mobility plan	Structure vision Amsterdam 2040
REGION 	Less traffic and pollution Preservation of the natural landscape Surroundings benefit from growing centre	Surrounding towns lose functions Higher pressure on (recreational) facilities	Additional long term development vision based on extra densification	Development vision Metropolitan Region Amsterdam
NATIONAL 	Less traffic and pollution Preservation of the natural landscape More competitiveness	Widening gap between demographically and economically growing and shrinking areas	Nationwide compact city policy with an universal approach National spatial concept for urban development (e.g. polycentric vs. monocentric)	National environmental planning strategy

Development vision

The densification study showed a great potential for the agglomeration of Amsterdam, resulting in a city of almost 1,4 million inhabitants. The extra dwellings cannot simply be realised without changing the city. There are some conditions for a good adaptation of the new situation. Next to these conditions it is important to have a vision for the development of the city, and principles according to this vision. This can help in prioritising on certain potentials. The conditions and principles that I discuss here are an addition to the structure vision Amsterdam 2040. Next to this vision, a mobility plan needed which addresses the people and traffic flows in the city. These flows will increase significant and need to be reorganised, because some of the infrastructure reaches already its limits.

LOCKED CITY CENTRE

As we saw before, there are not many possibilities for new housing in the city centre. This is due to the fact that the inner city is protected with UNESCO world heritage status, and the rest of the centre has already a high density and no space for more densification. These two facts lead to a locked city centre, where no real developments can take place. This non-dynamic city centre is in big contrast with the rest of the city. When the centre cannot follow the growth of the city, it can slow down the performance of the city. Therefore it is important that the centre of the city expands in the direction of the ring.

NEW URBAN CENTRES

In the context of this expansion of the centre, five locations are selected that can function as new urban centres. These are locations that currently aren't residential areas, but open space, office or industry areas. According to the densification study, there is a lot of potential on these locations. Due to fact that there is currently no existing housing, there are almost no restrictions. This creates a great opportunity for mixed neighbourhoods with a high density, that can function as a centre for work and living. The location of these five areas contribute to the possibility as a new centre. They are all located around the ring road of Amsterdam. This makes them good accessible and doesn't lead to congestion in the existing city. On top of that they are located in

between the parts of the fingers with the highest densification potential, and the inner city. So, they can be used as a centre with amenities for the fingers of the city. These amenities can't always be located in the fingers itself due to limited space, but they are still needed due to more inhabitants.

CONNECTION TO ZAANDAM

Zaandam is not part of the city of Amsterdam, this becomes very clear on a map where only residential areas are highlighted. It is close to Amsterdam, but still a separate village. This is due to the harbour activity that divides them, and due to its connectivity; mainly by car and train. Because it is a separate village, it has the same value as for example Purmerend.

People that live there don't feel part of Amsterdam and won't use Amsterdam's amenities on a daily basis. If Zaandam is connected to Amsterdam as a fifth finger, this can change. Apart from the big area next to the inner city that could be developed, it also adds the 33.000 existing dwellings of Zaandam to the agglomeration of Amsterdam.

REDEVELOPMENT OF THE WATERFRONT

This connection to Zaandam is one of the examples of the great potential of the waterfront. As discussed in the densification study, many harbour areas can be transformed into residential areas. This would result in very interesting living environments, much more interesting than most

of the other potentials. Therefore a lot of research should be done to the possibilities of replacing the existing harbour activities. If the majority of the areas around 't IJ can be transformed, a whole new waterfront can be developed, from the new developments on IJburg to the Hembrugterrein in Zaandam. This could even be extended to the harbour areas around de Zaan. The first step are already taken by developing the central part of the waterfront, on the north bank opposite of the inner city.

NORTHERN EXPANSION OF THE PUBLIC TRANSPORT SYSTEM

In order to make Zaandam part of the agglomeration of Amsterdam it is important that it is connected to Amsterdam's public transport



Image 4.5 Principles for the development of Amsterdam

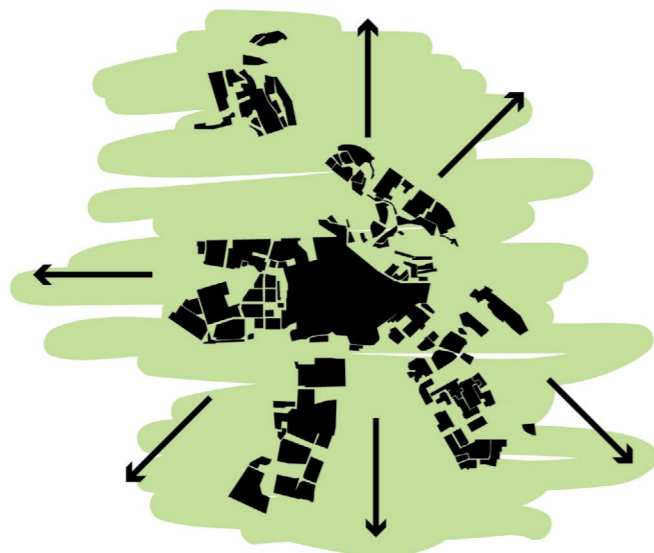
network. The existing train connection is not enough. To make the developments along the waterfront a success, this area should also be better integrated in the transport system. At the moment there is no tram or metro lines in the North part of the city. Soon there will be one metro line, 'de Noord-Zuid Lijn', which connects North with the inner city and the Zuidas. However, this doesn't cover all development areas. Therefore the accessibility of the Northern part of the city should be improved. This should contain at least of a public transport connection to Zaandam crossing the development areas. Next to that there are one or two more connections needed for crossing 't IJ. This can be either a public transport connection, or a cyclist and pedestrian connection. I see potential in a bridge for cyclist

and pedestrians between the Houhavens and NDSM. This can be an icon for the city and helps with the development and attractiveness of the surrounding harbour areas. As a result it can promote Amsterdam even more, which will contribute to its competitiveness as well.

THE COUNTRYSIDE AS BACKYARD

With all these new inhabitants, it will be more busy in the city. This is not only visible in the urban parts, but also in the open spaces of the city. The need for recreational and more quiet areas will only be more important than before, but the pressure on them will be higher. Therefore the focus of recreational activity should shift more to the edges of the city and the surrounding

countryside. Amsterdam is surrounded by a big green peaceful countryside, especially in the North. This should be used more than it is now. Therefore some improvements can be made in the recreational infrastructure. Part of this are cycle paths from the city to far in the country side, but also hiking paths and some recreational destinations. On ten to fifteen kilometres from the inner city there is a dike ring all around Amsterdam, which used to be the defence line of the city, containing many fortifications. This is a common cycle distance, and could therefore be a great destination for day trips. The defence line can also be reached by train via several stations that are located on this line; from where cycle and walking routes start as well.



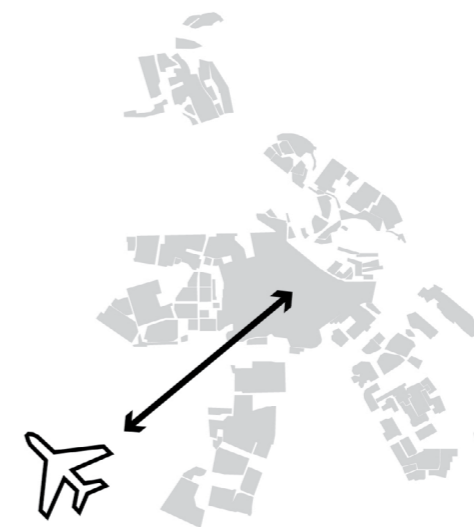
NEW CITY PARKS

Apart from the countryside as recreational area, there is also need for recreation closer to home. The city parks are already quite full, and will be even more after densification. Therefore there is need for more city parks, this is a difficult task due to the limited space. The green wedges that enter the city between its fingers, can help out. These wedges often consist of grassland or agricultural land, that can be experienced by citizens, but it is not possible to enter these areas and used them. When the parts of these wedges that are the closest to the inner city, are opened for citizens to recreate, it can create new city parks. This doesn't have to be a fully designed park like het Vondelpark. Just opening up these green areas for recreation can already add a lot of value.

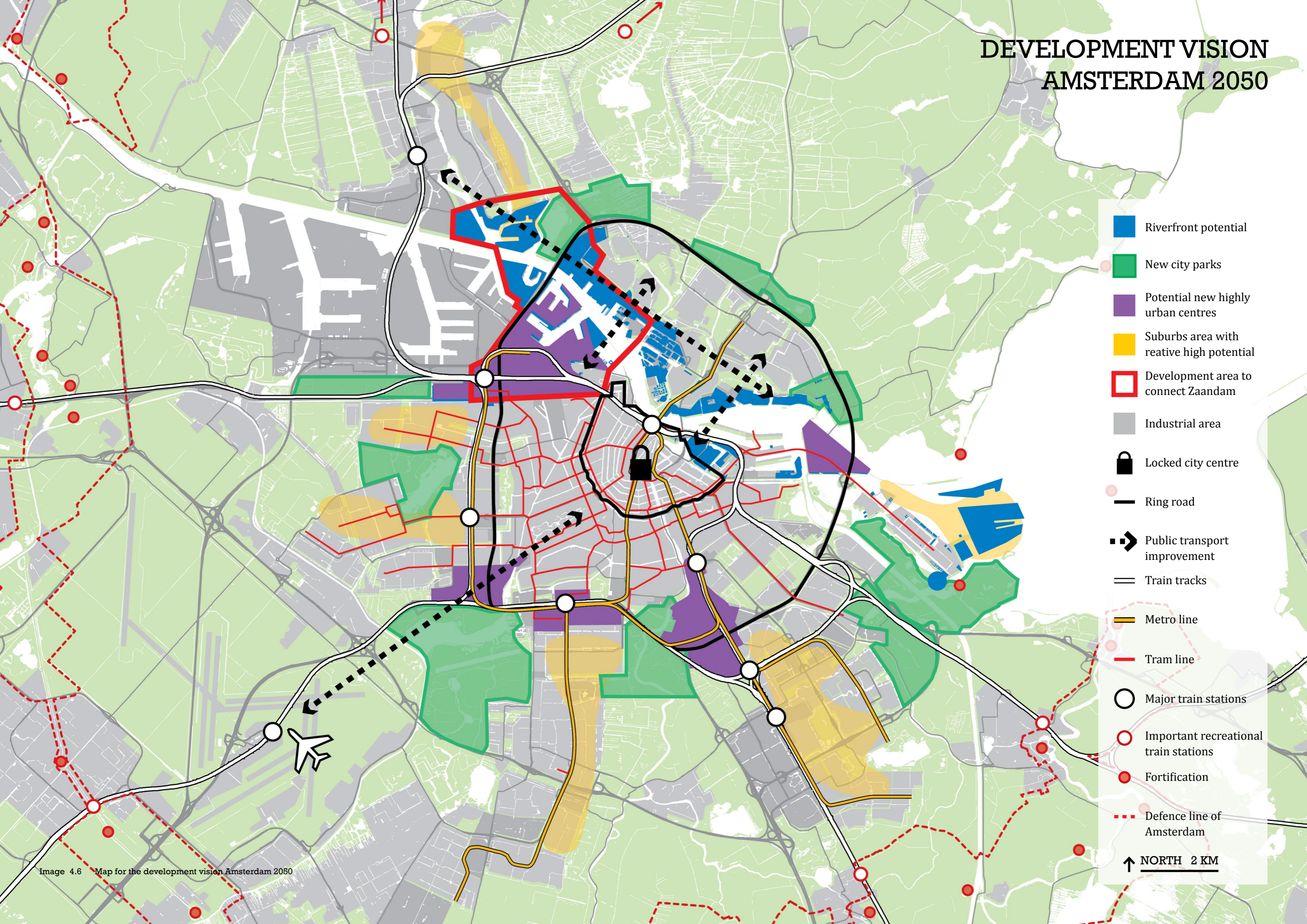


CONNECTION TO SCHIPHOL

Finally the connection to Schiphol can be improved. The connection between the airport and the city is already quite good, especially in comparison to other cities. There are fast connections to the major train stations of the city. However, people still have to travel to their destination from there. When Schiphol is integrated in the public transport system of the city, it can reduce the travel time in some cases by half. It will be a great addition to the connectivity of Amsterdam, and contributes as well to its competitiveness.



DEVELOPMENT VISION AMSTERDAM 2050

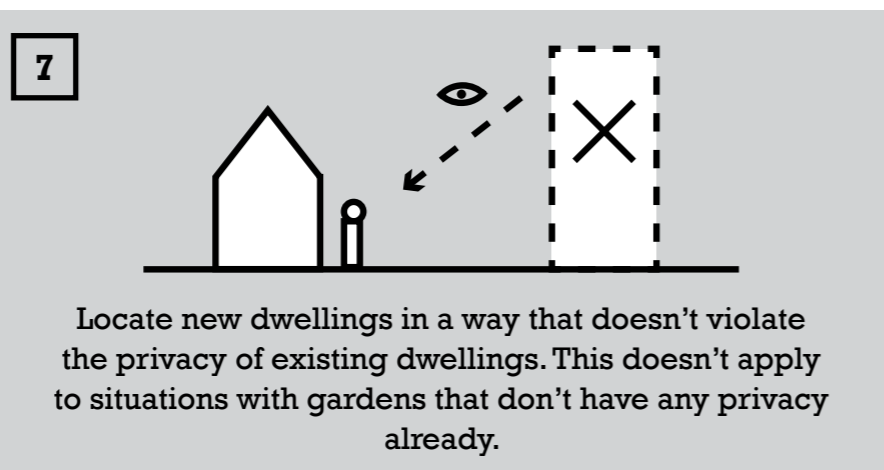
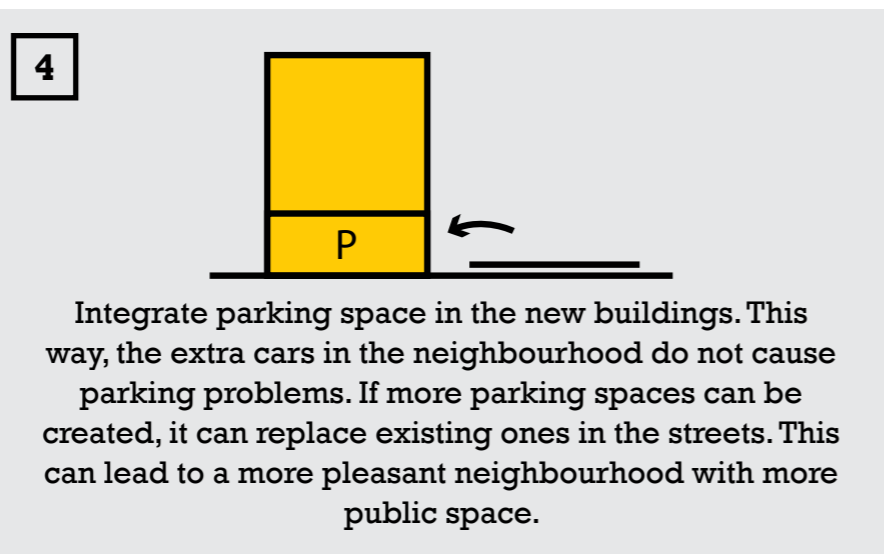
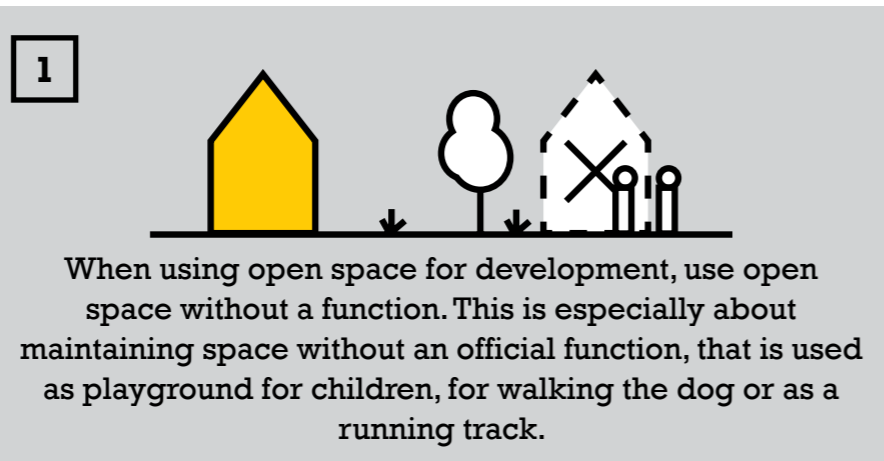


- Riverfront potential
- New city parks
- Potential new highly urban centres
- Suburbs area with relative high potential
- Development area to connect Zaandam
- Industrial area
- Locked city centre
- Ring road
- Public transport improvement
- Train tracks
- Metro line
- Tram line
- Major train stations
- Important recreational train stations
- Fortification
- Defence line of Amsterdam
-

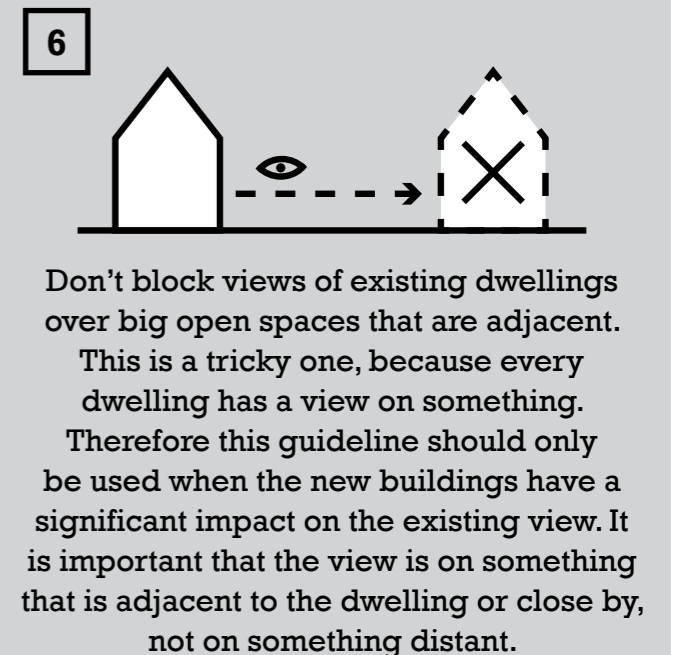
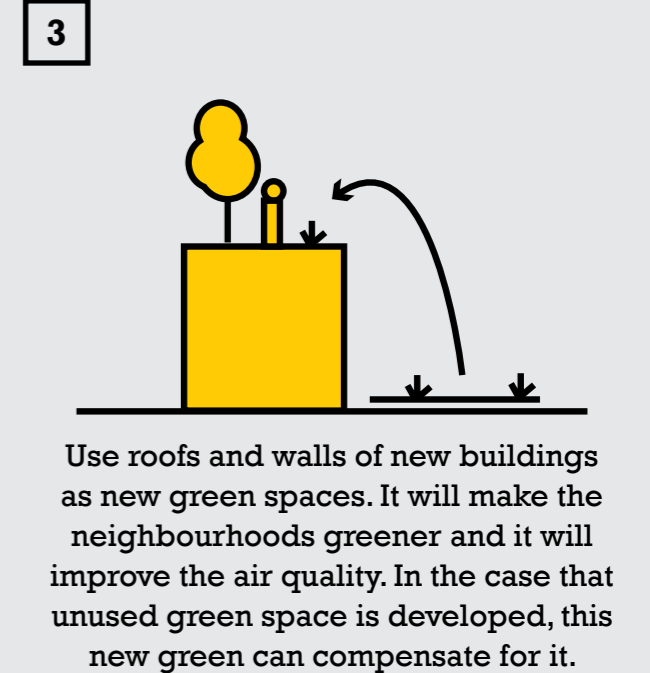
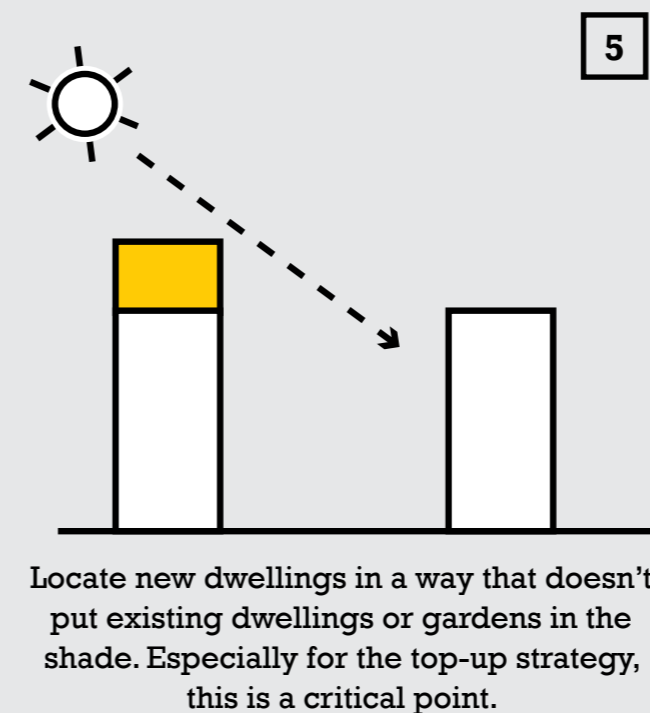
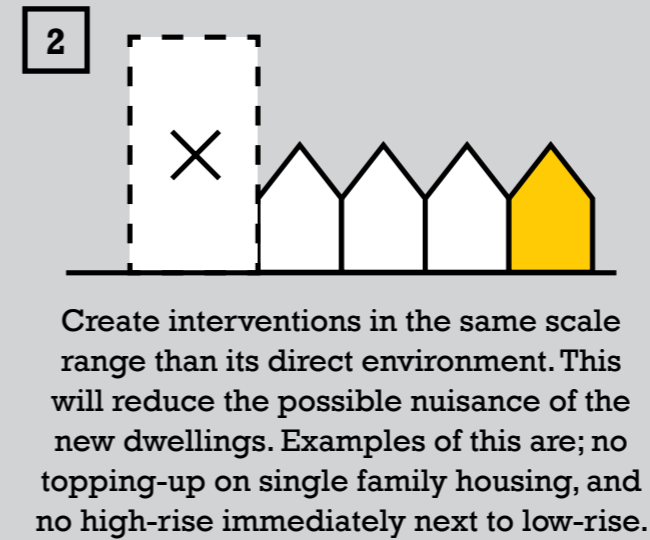
Image 4.6 Map for the development vision Amsterdam 2050

Implementation of densification

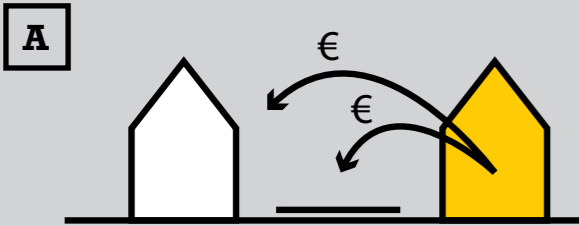
As mentioned in the densification study, the selected potentials do not guarantee a good implementation. I mean an implementation that doesn't harm the existing quality of life, but instead adds quality to the neighbourhood. I will explain this in two parts. First I will discuss how the existing qualities can be maintained after densification. This results in seven guidelines, which should be used for the final design of the implementation. These are guidelines, and cannot be realised in every situation. Sometimes it is better to ignore one of them, in order to achieve the others. In the second part I will explain how densification can add quality of life to the neighbourhood. In the end, this will be illustrated with two examples on how the guidelines work in an existing situation in Amsterdam. One example is the Jacob Geelbuurt in Nieuw-west, the other one is the G-buurt West in Zuidoost. It is interesting to see that they both require a different way of densification, due to their structure. In Nieuw-west it is more refined. The example in Zuidoost shows some potential that was not identified in the densification study. This makes clear that more potentials on the small scale are not identified yet with the previous study. A further examination is needed for that.



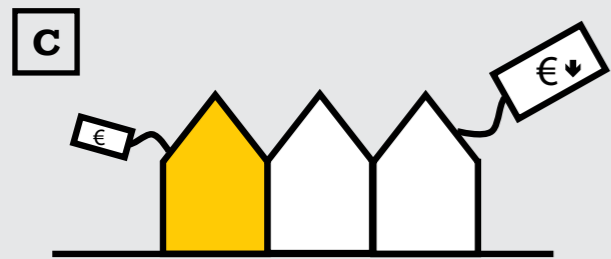
GUIDELINES FOR IMPLEMENTATION



BENEFITS FOR THE NEIGHBOURHOOD

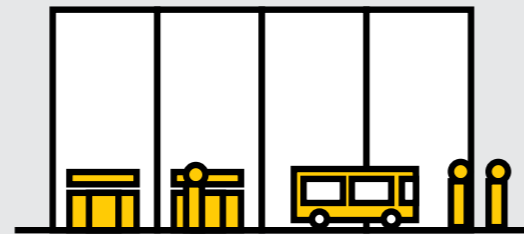


The money that is earned by selling the new dwellings can be invested in the neighbourhood. It can be used to upgrade public space and for some shared facilities, like a football field or a barbeque spot. Next to that, the earning can for instance be used to improve existing dwellings with better insulation, or to invest in solar panels for the neighbourhood.



New affordable housing can be added by densification. This makes it possible for everyone to live in Amsterdam. Next to that there are more houses offered in Amsterdam, resulting in a reduction of the increasing housing prices. Both effects contribute to a healthier housing market.

B



Densification leads to more people in a neighbourhood. The more people there are, the more facilities are needed. It will create a better support base for new shops, because it's likely that they become more profitable. Apart from shops, it can also bring other amenities to a neighbourhood, like a primary

D



After all, due to densification the big open country side can be preserved. It can function as the city's backyard, especially in big cities this can be valuable for recreational purposes.

Image 4.8 Benefits of densification for the neighbourhood

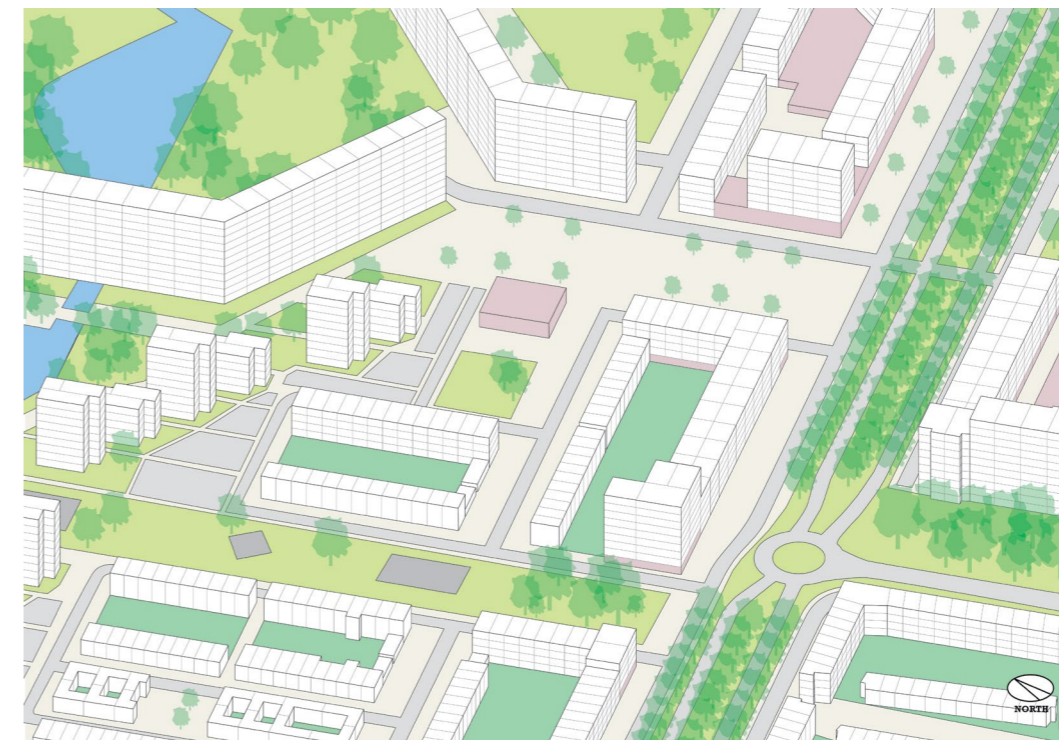
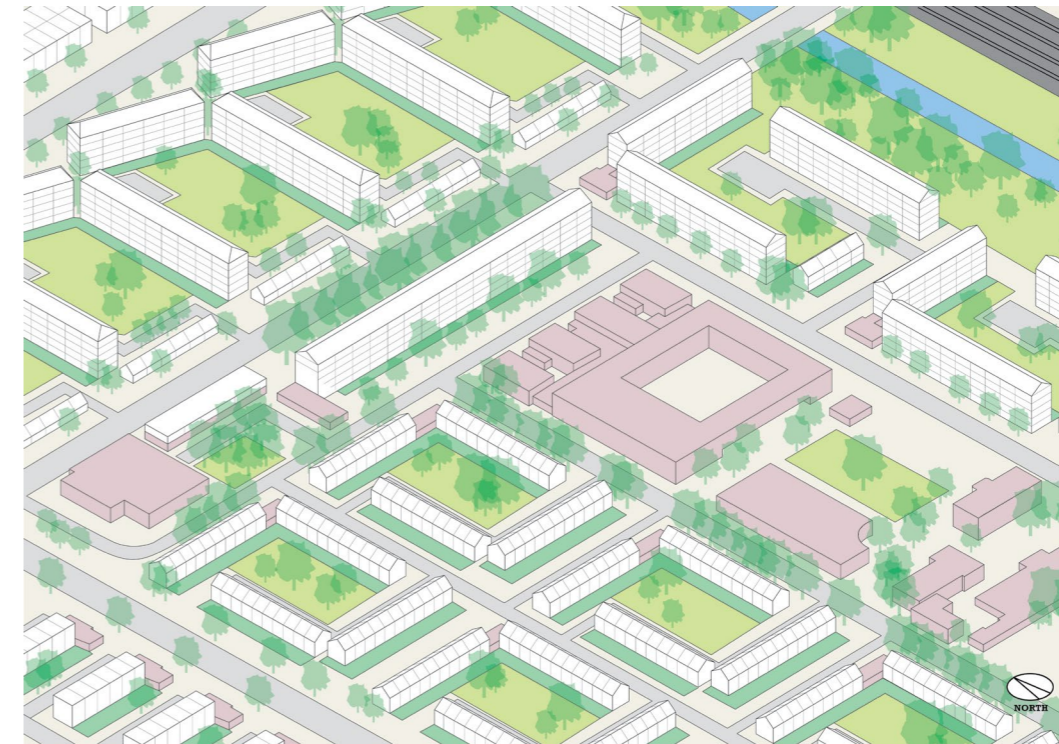


Image 4.9 Existing situation of the Jacob Geelbuurt (Above) and the G- buurt West

EXISTING SITUATION

←
LEGEND FOR THE NEXT PAGE ↓

✓
Possible location for densification

✗
Undesired location for densification

+

A benefit of densification for the neighbourhood

A

Letter that refers to the benefit for the neighbourhood it creates

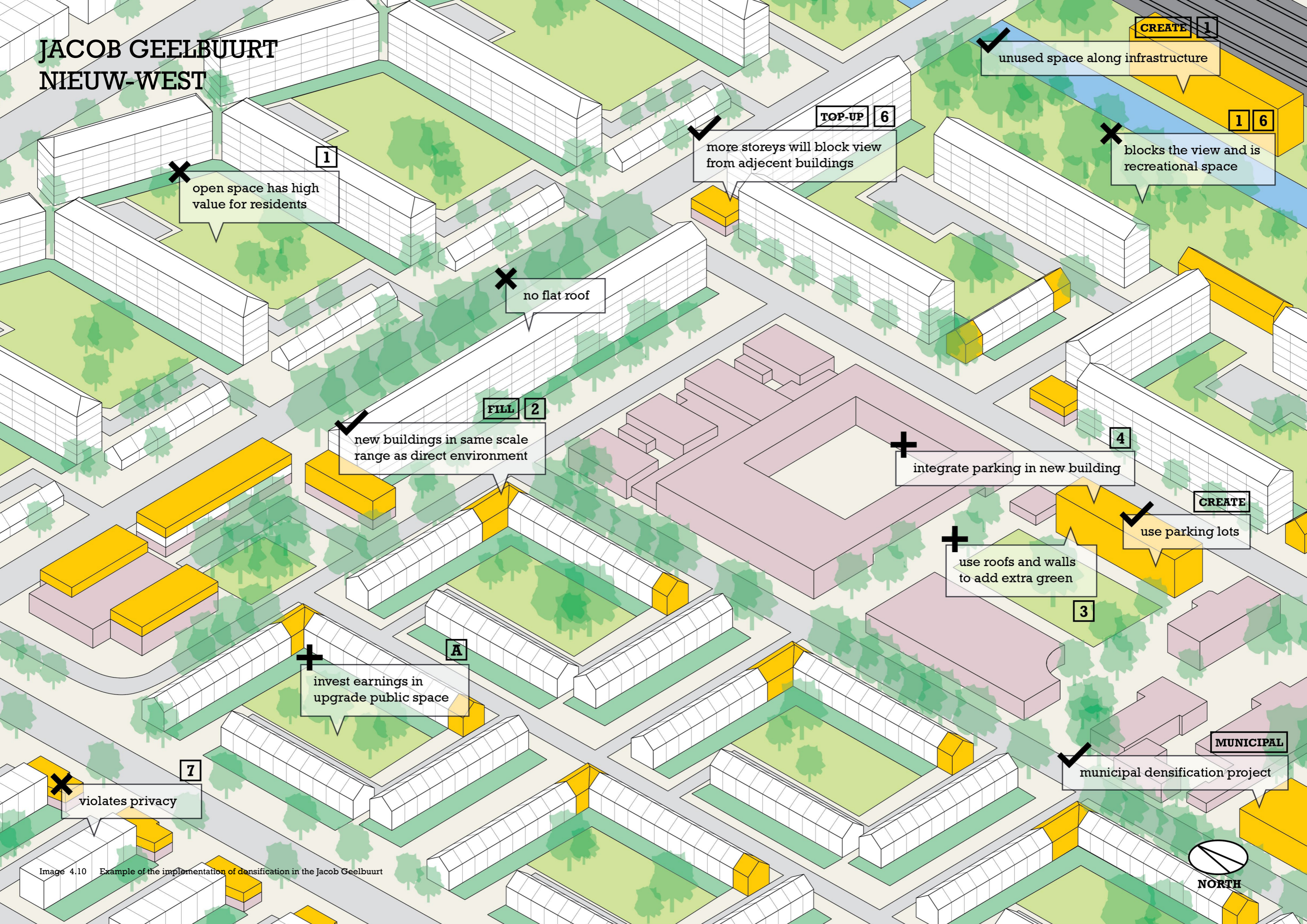
1

Number of the guideline that is applied

FILL

Strategy from the densification study that is used

JACOB GEELBUURT NIEUW-WEST



1
✗ open space has high value for residents

✗ no flat roof

✓
FILL 2
new buildings in same scale range as direct environment

✗
A
invest earnings in upgrade public space

✓
TOP-UP 6
more storeys will block view from adjacent buildings

✓
CREATE 1
unused space along infrastructure

✗
1 6
blocks the view and is recreational space

✗
4
integrate parking in new building

✗
3
use roofs and walls to add extra green

✓
CREATE
use parking lots

✓
MUNICIPAL
municipal densification project

✗
7
violates privacy



Image 4.10 Example of the implementation of densification in the Jacob Geelbuurt

G-BUURT WEST ZUIDOOST

6
keep existing views

CREATE 1
huge public square without a function

TOP-UP
roof with top-up potential, not harming any guideline

B
more support for amenities

CREATE 1
unused field of grass

A
invest earnings in upgrade public square

3
compensate and add extra green

CREATE
make use of parking lots

5
blocks the sun

4
integrate parking in new building

1
open space has a recreational function

no flat roof

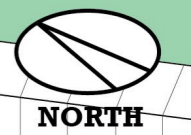


Image 4.11 Example of the implementation of densification in the G-buurt west

If Amsterdam grows more...

When all mentioned densification potentials are realised, the agglomeration of Amsterdam will have a capacity of 688.000 dwellings. This should be enough to solve the existing housing shortage, and might even be enough to accommodate some extra growth. Amsterdam will then be a city of approximately 1.375.000 inhabitants. But what if Amsterdam becomes so popular due to these developments that it causes a new population boom? Or what if Amsterdam really needs two million inhabitants in order to be able to maintain its global competitive position? In this chapter I will explore the possibilities beyond the discussed densification plans. For this I will aim at creating a city of two million inhabitants, like Hemel suggested. Therefore another 625.000 inhabitants are needed, which equals 312.000 dwellings.

In this case the first step would be re-using the densification study. The new situation has probably new opportunities for densification, although it might not be as much as now. Another option is to do the same study with less focus on quality of life. It is difficult what less means in this case and where a line should be drawn of what is still acceptable. This might create quite some new dwellings but still

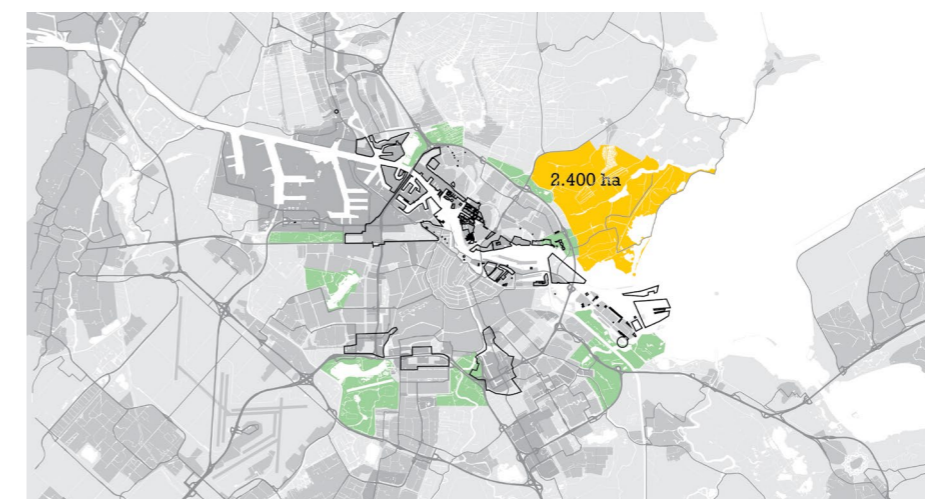
it doesn't get near the two million inhabitants. A second idea is to demolish parts of the city with a low density and replace them with high density neighbourhoods. A quick calculation learns that half of the areas outside the centre should be demolished and replaced in order to reach the two million. This is a very radical idea, but it can lead to a city of two million. Anyway, this is not desirable. Another unlikely way to reach the two million, is to convince everyone of living according the rules of the tiny housing movement, and split all dwellings in two.

Finally there is one way left to reach the two million; expansion. This is also undesirable, but somehow the most realistic option. Another 312.000 dwellings are needed to reach this goal. This comes down to 3.100 hectares of new land that should be developed with a density of 100 dwellings per hectare. Let's see what the possibilities are.



WESTPOORT

The harbour can be developed and turned into a living area. This can create a very interesting district, that is a real addition to Amsterdam. The harbour activity has to be replaced for that, this can partly be located in IJmuiden and the rest could move to Rotterdam, where there is space enough. The downside is that this would harm the economy of Amsterdam a lot.



WATERLAND

Waterland is one of the last areas within the borders of Amsterdam that is still undeveloped, which is for a reason. This area has a great natural value and contains a national landscape; 'Laag Holland'. It is used as a recreational area by many residents of Amsterdam. Developing this area, wouldn't create enough dwellings to reach the two million.



ALMERE

Plans for a connection to Almere are included in the structure vision 2040 as an option. A metro line that crosses the IJmeer would make Almere part of Amsterdam. The areas along this metro line could be developed, including a new extension of IJburg.

Image 4.12 Expansion possibilities for Amsterdam



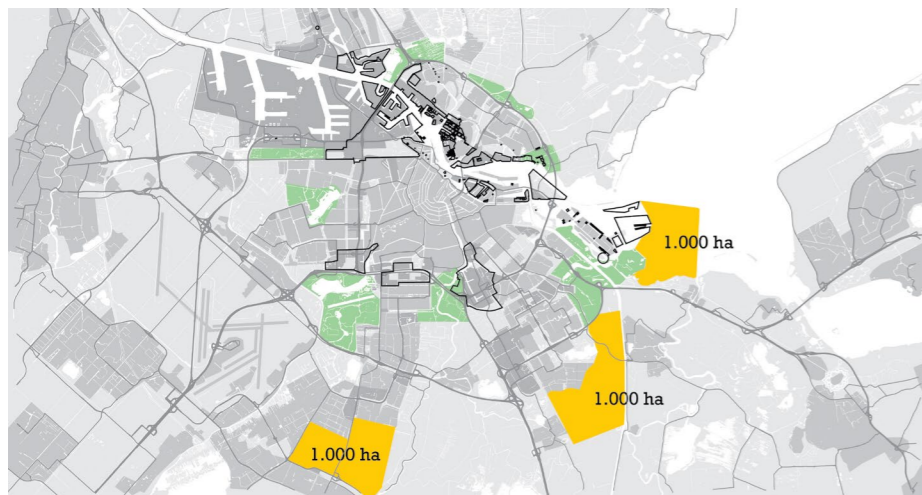
HAARLEM

Another option is to connect Haarlem to Amsterdam. Therefore the area north of Schiphol has to be developed. This might be complex due to the sound barriers of the airport, which limits housing development in this area.



SCHIPHOL

Instead of causing restrictions for housing development, Schiphol could be moved elsewhere. In this case, the area of Schiphol can be developed as part of Amsterdam. The airport could be replaced by the North Sea or by Lelystad. Both plans have been suggested once.



EXTENDING THE FINGERS

The areas in between the fingers of the city model consist of green wedges, with important value for the city. Therefore the only option within this model is to extend the fingers. Due to space limitations and other green areas this is only possible on the south side of the city. The downside is that this creates a very stretched city.

**PART
FIVE**

CONCLUSIONS

Conclusion

In the conclusion, I will answer each of the sub research questions. Together they provide the answer for the main research question: How can densification add quality of life to Amsterdam and contribute to its competitiveness?

1. WHAT IS QUALITY OF LIFE, AND HOW CAN IT BE IMPROVED BY DENSIFICATION IN CITIES?

There is not one single definition for quality of life. The term is used in many different ways. This thesis uses two definitions, one from the perspective of the citizens and one from the perspective of the policymakers. Quality of life from the citizens' perspective is about the appreciation of a citizen for its environment. This is a personal view and it differs from person to person. Quality of life from a policymaker's perspective is about measurable criteria. Hereby, quality of life needs to be assessable, to see if the policy was successful. The citizen, around whom quality of life should be centred, is not involved in this process. Thus, it is a top-down approach.

The relation between quality of life and densification, is often associated negative. Dense cities

seem crowded, cramped, polluted and noisy. Therefore a good implementation is necessary. Without a good implementation, densification cannot improve the quality of life but will only harm it. For a good implementation it is important that valuable open spaces in the city will be maintained. The scale of interventions should be in the range of the scale of existing buildings. The amount of green and parking space per person should be maintained. Finally the consequences of densification on the sun hours, view and privacy of existing dwellings are important in locating new ones.

When densification is implemented in this way, it can bring great contributions to a city. Most important is that the countryside will be preserved and can be used for recreation. Densification brings money to the city, this money can be invested in the quality of life of that city. This can be done in various ways, such as upgrading public space, improving housing quality or investing in solar panels for citizens. Another benefit of densification is that it creates dense neighbourhoods, and these have in general a higher level of amenities. Simply, because there are more people to support them. These amenities can for instance be shops,

but also bus lines or school. Finally it can help creating a healthier housing market. By adding extra houses the total supply will be bigger, which might have an positive influence on the increasing prices.

2. WHAT IS COMPETITIVENESS, AND HOW CAN IT BE IMPROVED BY DENSIFICATION IN CITIES?

Competitiveness is a very broad and abstract concept, which leads to several interpretations and uses. What they have in common is that they are all about the economic performance (of a city), and that it includes a comparative element. The economic performance can be measured in several way, all not very spatial. The ability of a city to attract companies and employees, is a way to measure the economic performance that can best translated in spatial consequences. Therefore this is used as a definition of competitiveness in this study. Because attracting employees is part of the definition, quality of life is part of competitiveness as well.

The main reason why densification contributes to competitiveness, is because it creates dense structures. Dense structures create more agglomeration benefits; benefits

of being closer to other services, workers and companies. Another benefit of dense structures is that there are more people and they are closer to each other. This creates a bigger labour market and leads to more interaction between people. These interactions create networks of people, with ideas and innovations, leading to economic performance. It means that denser cities are more likely to be competitive. There is one threat on the horizon, focusing too much on competitiveness can lead to a decline of quality of life. Which again has its consequences for the competitiveness, this creates a vicious circle. Too much focus on competitiveness means too much densification is this case.

3. WHAT IS THE RELATIONSHIP BETWEEN QUALITY OF LIFE AND COMPETITIVENESS IN THE CONTEXT OF AMSTERDAM?

Quality of life is a part of competitiveness. Competitiveness is not a part of quality of life. This makes the relation between them complex. It means that quality of life is needed to achieve both concepts, while competitiveness is only needed to achieve one. Thus, the focus on quality of life is more important.

Quality of life seems conflicting with competitiveness, due to the inequalities it can result in. For example, public money of cities is often invested in the competitiveness of the city, but only creates benefits for a privileged group. However, this does not mean that quality of life and competitiveness are incompatible. They can be a combined goal of one policy. There are just two conditions. The first condition is that the benefits of competitiveness are fairly spread over society. In a way that everybody benefits, and it doesn't lead to inequalities. Second condition is that policies should address everyone's quality of life, and not only the quality of life of the contributors to competitiveness. When these conditions are taken into account it is possible that quality of life and competitiveness contribute to each other.

4. HOW AND WHERE CAN AMSTERDAM BE DENSIFIED?

Five strategies for densification are used in this thesis. Three address the potential of the open space, the other two address the potential of the built environment. The strategies are described below.

- > Create new housing in the abundant open spaces of the city
- > Fill the gaps and unused space in or around housing blocks
- > Top-up on flat roofs of existing buildings
- > Re-use vacant space or buildings for housing
- > Re-structure abundant industry and office areas into mixed neighbourhoods

The total potentials of all these strategies can be found in the map on page 80. Most of the potentials are located in two areas; the area around the South and West part of the ring, and the area around the waterfront. The housing plans of the municipalities are all located within the city. The map of the housing plans is shown on page 86. The final potential for new housing in the result of combining both maps, this can be seen on page 88. The total potential is 180.000 new dwellings. Those dwellings can house 360.000 people, which results in a agglomeration of 1,4 million inhabitants. This densification study focuses on the large scale, therefore some potentials on the small scale are not identified. A further examination is necessary on the neighbourhood level to finalise plans for densification.

M. HOW CAN DENSIFICATION ADD QUALITY OF LIFE TO AMSTERDAM AND CONTRIBUTE TO ITS COMPETITIVENESS?

The previous questions answer how a city can improve its quality of life and competitiveness by densification, but what does this specifically mean for Amsterdam?

For its competitiveness it is important that Amsterdam becomes bigger and denser. This creates a larger workforce, more amenities and a higher chance for people to meet and work together on creative ideas. These aspects are attractive for both employees and employers. As shown in the development vision on page 98, the centre of the city should follow the growth of the city and expand towards the ring. There are five central areas around the ring that should be prioritised for development, these areas have great potential due to their location and little restrictions. Each of these areas can function as a centre with different characteristics and functions. The area around 't IJ can be developed into interesting new living environments, that are not existing in Amsterdam yet. This will strengthen the image as a water city. To make the city bigger it is important that Zaandam will be integrated in the city and that

the connections to the northern part are improved. For a better connectivity should Schiphol be integrated in the metro network. Besides these improvements, Amsterdam should watch out for increasing traffic flows and a higher pressure on public space. This can be addressed in a new mobility plan, containing upgrades of certain streets and public transport lines. A final contribution to Amsterdam's competitiveness is strengthening its unique character, part of that is the possibility to live with a great quality of life for a reasonable price.

Densification can also contribute to the quality of life of Amsterdam. The income it creates should be invested to improve the city. Next to that densification will preserve the countryside; the counterpart of the city. When the recreational infrastructure within the surrounding countryside will be improved, it can become a valuable backyard of the city. The amount of green and recreation possibilities in the city should be improved as well. Therefore new city parks can be developed at the top of the green wedges. Another benefit is a higher level of amenities. Finally densification can add new affordable dwellings to the city, which might solve the problem on the housing market. This can

reduce the rising housing prices in Amsterdam and make it affordable for everyone.

Densification also creates threats for Amsterdam. In order to ensure that it contributes to the quality of life, it is essential that these threats are tackled. Therefore Amsterdam should use the guidelines from page 100 for the implementation of new dwellings. Those guidelines state that development should only take place on open space that has no function. This way valuable open space can keep their function. The new developments should have the same scale as the existing dwellings, to avoid extreme changes in the local urban environment. Next to that it is important that the level of green and the amount of parking lots will increase equally to the increase of residents. Finally the existing privacy, views and sun hours should be taken into account when planning densification projects. When development is focused too much on economic development and competitiveness, it can lead to a decrease in quality of life. This should be avoided with two rules. First, the benefits of economic development should be spread fair over all citizens. Second rule is that quality of life measures should address everyone's quality of life.

Recommendations

1

Make use of the great potential for densification in Amsterdam. These potentials and their consequences should be assessed more thoroughly, to determine which of them can be used best.

2

Expand the centre according to growth of the city. There are five locations with a good location and little restrictions, these can function as new urban centres. They can be found on page 98.

3

Integrate the Northern part of the city better and develop it further. A connection to Zaandam can enlarge the agglomeration and the development of industry and harbour areas around 't IJ can create new interesting neighbourhoods.

4

Upgrades in the infrastructure and public transport network are needed, due to the high pressure on them. The exact upgrades should be assessed in a mobility plan. The public transport network should at least be extended with a metro line to Schiphol and a fast connection over Noord to Zaandam.

5

Strengthen Amsterdam's unique character, to differentiate itself from its competitors and improve the competitiveness.

6

Invest the earnings of densification projects back into the neighbourhood. This way the existing neighbourhood can benefit from it as well.

7

Create more recreational space by opening up the green wedges of the city and turn them into new city parks. Besides that, the accessibility and facilities of the countryside should be improved.

8

Add affordable housing to the city, so it will remain to stay a city for everyone. One of the strong points of Amsterdam in comparison with its competitors.

9

Don't use space that has a function or a value, even when it is a small function like a field to stroll with your dog. These spaces are important for the quality of life of a neighbourhood.

10

Keep interventions in the same scale range as the direct environment, to reduce the impact on existing neighbourhoods.

11

Compensate the amount of green and parking spots that is sacrificed for densification, so that the level remains the same. Next to that, should new green and parking spots be added for the developments.

12

Pay attention to individual values of the current residents during the implementation of the densification. This contains privacy, sun hours and views.

13

Spread benefits of economic development fairly over the city and society. This also means that quality of life measures should address everyone's quality of life.

Reflection

This thesis contains three products. The first is a study to the relation between quality of life and competitiveness. Second product is a densification study on Amsterdam. And finally a plan for the development of Amsterdam, with the densification study as input. This development plan focuses on an implementation that improves the quality of life and the competitiveness of Amsterdam. At the start of the thesis, I intended to make a connection between the densification of Amsterdam and the national environmental planning strategy (Nationale omgevingsvisie). Throughout the study the focus shifted towards the densification study, because I found out that this requires a further elaboration. Without an elaboration on the relation between densification and quality of life, the whole study didn't make much sense. I had to tackle the paradox of the complex city. Therefore I decided to work on this and elaborate the densification study on the small scale instead of the scale of the national environmental planning strategy.

The method used for the densification study was complex. I struggled with the fact that I studied the potentials of densification on a big scale, but the potentials itself

were located on a small scale. Because of the limited time, I had to come up with a method that could easily identify all potentials for densification. Abstraction and generalisation were important for this method. This was the point I struggled with and I tried to figure out how abstract a situation can be made, that the outcome is still relevant and makes sense. A clear arrangement of the possible strategies, approaches and available data helped me. By working in a systematic way, I was able to structure the steps and keep an overview of the connections between the small and big scale. The realisation that the study is based on assumptions helped a lot. The goal is to give an estimation of the densification possibilities, not a detailed plan of every single dwelling that can be added. After realising this I could work more freely and creative on the analysis of these potentials.

In the end, I choose to work with data as input for the analysis. A problem of working with data, is that not all needed data is available or specific enough. Therefore, I had to use sometime a more creative method, to analyse the potential. The outcome of the study gave an idea of where the biggest potentials for densification in Amsterdam are.

For the final localisation of new dwellings a more detailed analysis is needed, but for a develop vision this is sufficient. Especially for the create strategy there is more potential on the small scale. The outcome of some other strategies might be too optimistic, because it was difficult to include their feasibility. However, it shows what is initially possible. If it turns out that a big part of the potentials cannot be realised, then there should be investigations on possible change of restricting laws and regulations or on how to improve the financial feasibility.

During the process it became clear that the systematic approach I developed, could be used in other contexts as well. Therefore, I started to keep track of the methods I used for each single step. This way the study can be reproduced for other cities. The approach is based on the structure of Amsterdam. Although the structure of Amsterdam is different from other city structures, the potential strategies for densification and the typologies of the city structure are similar. These might differ a bit, in that case it is possible to adjust the approach. The data used for this study is common municipal data and that is probably available for any city. If it is not available or if more suitable

data is available, the densification approach can be adapted to that.

At one point, it seemed that the densification study would be the major product of this thesis, because it was so time consuming. Just in time, the right progress was made, so that I could focus on the next step. A development plan for Amsterdam was a logical next step. Only showing the potentials of densification wouldn't be enough, because the densification has consequences for the city and those should be addressed. The development plan is a vision, that shows how the city should develop to be able to adapt to the new inhabitants and dwellings.

At this point, the relation with the literature research, was still unclear. The goal from the beginning was to show how densification can improve quality of life and competitiveness. I did research on the mentioned concepts, but they were very abstract and it was difficult to relate them with the design. It only gave vague guidelines that could be interpreted in various ways. This didn't give me any directions on how to develop the design further. Reviewing and structuring the aspects that I found already helped me to find the missing links. The links connected the literature and

the concepts of quality of life and competitiveness to the design.

I had to show how densification can improve the quality of life and competitiveness of Amsterdam. The vision showed as much as possible how the competitiveness can be improved. The concept of competitiveness remains very abstract, and cannot clearly be shown in a spatial design. However, the quality of life is a big part of it, so my research focused more on that. The task that rested was how densification can improve the quality of life. This was the issue of the paradox of the compact city that needed to be tackled, which should be done on the small scale. I had to show how densification should be implemented on this scale. Interestingly, this confirmed my findings of the densification study. Where I discovered that the success of a densification plan is determined by the implementation on the small scale. For the consequences of densification on the quality of life, I translated the general criteria of quality of life into more specific criteria that can be used for a design. With the help of additional literature and my own interpretations on the issue, I created guidelines for the implementation.

These guidelines should be used for the urban design of the neighbourhoods. They are called guidelines because it is not possible to guarantee the principles. Sometimes it is needed to harm the quality of life of a small group in order to reach a higher goal. In this case the small group should be compensated for this. Still the aim is to realise as many guidelines as possible. It might seem very optimistic or maybe even unrealistic that this is possible. Therefore I made a possible elaboration of two neighbourhoods on how these guidelines can be used in the selection of locations for new dwellings. At first, I wanted to show this as a principle on a compilation of typical city structures of Amsterdam. This would not create any discussion about a specific location, but only about the densification and the guidelines. Anyway, this self created compilation could be shaped in a way that would be perfect for densification, which would give a unrealistic image. Therefore I decided to pick two existing areas, and show how new dwellings could be implemented. Both locations are in the extension areas of Amsterdam since the potentials are high there. The example in Zuidoost shows that there is more potential than analysed in the densification

study. This confirms that a more detailed analysis is needed to track down all potential on the small scale, especially for the create strategy. Next to that, it should be analysed more thoroughly how the neighbourhood functions, to make sure that the proposed way of densification is the best option.

In the end I discuss the options if Amsterdam grows beyond 1,4 million inhabitants. This is a quick sketch of the possible options, most of them are quite radical. It shows that after this densification study a new view should be developed on how to develop the city further. Expansion seems to be the most likely and realistic option. The elaboration of this focuses on a two million city. I basically choose this goal to react to Hemel's idea, not because this is a likely scenario.

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