Welcome to the big city

A research into the effects of density for three case studies within Utrecht

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Source picture front page:
Wonderwoods (top right picture) (Source: Vastgoedmarkt)

CAB-Building (bottom picture) (Source: USINE)

Max towers (top left picture) (Source: Jebber)

Summary

Worldwide countries are undergoing increased urbanization, this creates for an increasing importance for spatial planners to deal with the effects of density. Utrecht undergoes this as well, where there is a renewed interest in increasing housing within the city to be able to support the increase in population, where new development plans are made which take place from 2015 to 2030 . With the plans being in development the aim of this research is to understand the possible effects increased density can have on the urban environment. For this research three case studies within Utrecht are researched which are all undergoing increased density. To understand the effects of density the concept of urban liveability is used to have an understanding of the effects of density on the areas. The research shows that density will have both positive and negative impacts on liveability. Where in the case studies negative impacts on health were found, mixed impacts are found on economic stability and positive impacts were found on the culture and environments of these areas. The research also shows uncertainty around the aspect of infrastructure which is heavily impacted by the increased density within two of the case studies. This comes with the conclusion that the researched areas within Utrecht have a limit when it comes to density, where at a certain point increased density can have a major negative impact on the urban liveability. However the design of the dense areas impacts both the positive and negative aspects of density. The research hereby shows some of the possible effects of increased density. Where the results create an increased understanding of the effects of density, and the importance of understanding the effects for future urban developments. However with the areas still being under development and that the research is a case study on one area it is still difficult to have a general statement on the effects of density on urban areas.

Key Words

Density, Urban Liveability, Urbanisation, Utrecht, Urban Development

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1. Introduction and problem definition

In 2017 the Netherlands experienced its biggest population growth in the last fifteen years, where it dealt with an increase of 100.000 inhabitants, and in the upcoming years a constant growth of 69.000 people per year is expected (Capital value, 2018, p.4). At the same time, the expected growth of people living in urban areas within Europe is increasing, which is shown on figure 1.1. The Netherlands is no exception to this as there is an expected urban growth of 950.000 people between the year 2015 and 2030 (CBS, 2016). This creates an increased demand for housing within urban areas, but this demand is outgrowing the supply (Capital value, 2018, p.5). With this rapid urbanisation it shows that cities have become increasingly important in the modern world (Nijhuis & Kourtit, 2013, p.296; Meadows et al., 2005; Wolff & Haase, 2019, p.12; see figure 1.1). It is increasingly important to understand the effects of urban densification as most of the human population will live in the cities. This rapid urbanisation has already transformed cities in a few noticeable ways. The biggest cities act as central points which attract socio-economic and technological development (Nijhuis & Kourtit, p.292, 2013). In the book from Meadows et al (2005), the discussion is about the possible limits of growth in the world. As is argued that the resources on earth are finite, and even though it might not be a problem right now this will become one. Although the book mostly places the growth in the context of sustainability, it still shows the importance urbanization has, as it is central to the effects worldwide growth of food production, urban populations, energy consumption, materials use, and several other forms of physical products of human activity on the planet (Meadows et al., 2005, p.5). The debate about growth and the finite supply in physical products needed for it are central in the urban densification debate, as urban growth can show the possible pressure it can have on urban areas. This creates challenges which spatial planning needs to deal with within the Netherlands. The interest of this research is based on the idea that space is limited, and with a surge in urbanisation, how will this affect the spatial areas in the Netherlands?

Utrecht, the fourth biggest city in the Netherlands, is one of the cities dealing with the problem of housing supply. This is why the spatial policy in 2016 was called:”Utrecht kiest voor gezonde groei” (Utrecht chooses healthy growth) (Gemeente Utrecht, 2016). This policy is based on the predictions that the city is becoming more popular and that Utrecht will have an increased population from 340.000 people in 2016 to 410.000 people in 2030 (Gemeente Utrecht, n.d.). Dealing with this increase in population the policy is focused with an increment in housing and an effective use of space. However, the policy also makes clear that health, quality of life and sustainability are of importance (Gemeente Utrecht, n.d.). This means more houses need to be built but the aspects referred above cannot be negatively affected. Utrecht must also deal with a more rigid way of planning, because it has a historic centre, it has little space for new buildings and the buildings have a specific height limit (Hekwolter of Hekhuis et al., 2017, p.9). The municipality of Utrecht wants to deal with the increasing housing demand inside the city, which means an increased density in areas such as the Cartesiusdriehoek, Beurskwartier and Lombokplein and the Merwedekanaalzone (Gemeente Utrecht, 2016, p. 22). The municipality acknowledges this and is dealing with an increased density in the city, while also focussing on general improvement of the urban spaces. This makes Utrecht an ideal case to research the possible positive

and negative effects of urban density. To research the effects of density, the concept of urban liveability will also be applied to the research as a concept which can help explain the effects of density on the urban space in Utrecht. While Utrecht is still in an early phase of development it is still of importance to research the area, as it can give an insight into the development of density, while also helps understanding how the citizens of Utrecht are involved in the plan. The thesis will follow the developments taken so far over the years up until the year of 2020. By the end of the research lots of the construction will still need to be taken, but in each area the construction has been started and the initial plans have been set up. Which gives for the opportunity to research the area.

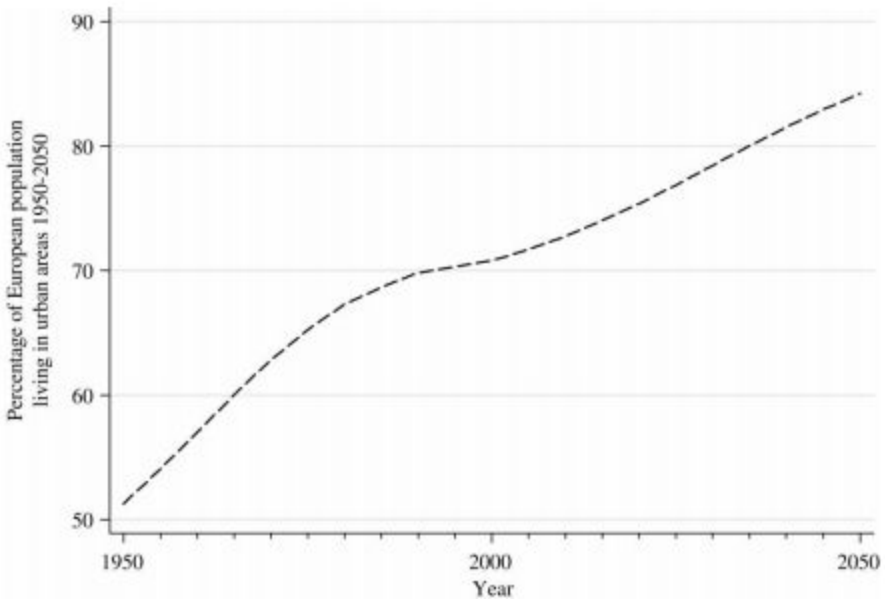

Figure 1.1: The projected percentage of population living in urban areas in Europe (from 1950 to 2050) (Source: Caragliu, Bo & Nijkamp, 2011).

1.1 Research Questions

To investigate this problem the main research question will be:

- In what way does the increasing urban density affect factors of urban liveability in the Merwedekanaalzone, Cartesiusdriehoek and the Beurskwartier and Lombokplein in Utrecht?

To answer this main question several sub-questions will also be answered. These are:

- In what way is urban density correlated to urban liveability?

It is important to understand the relation between urban density and urban liveability. This is to understand the relations between the two concepts and the possible alternating effects the two concepts have on each other.

- What are the changes to the areas of the Merwedekanaalzone, Cartesiusdriehoek and the Beurskwartier and Lombokplein with the new housing policies and what is the reasoning behind the choices made in the spatial development?

Utrecht is making these areas denser with an increase of housing, so it is of interest what these specific changes are. This question must be answered to understand what the effects of the increase in density are and to be able to understand the potential effects it could have on liveability. This question will be researched by evaluating the policies in practice in Utrecht that deal with housing such as 'Utrecht kiest voor gezonde groei' (Gemeente Utrecht, 2016).

- How have the urban development plans so far affected the urban liveability experienced in the Merwedekanaalzone, Cartesiusdriehoek and the Beurskwartier and Lombokplein?

To have an idea how density might affect the urban liveability, it is also necessary to research the people who are affected by the increase in density. By investigating people in the research areas as well as people involved in the spatial planning, you will get insight in the discussion of how urban density and urban liveability are correlated and what the impact of an increase in housing has on the specific areas within Utrecht.

1.2 Societal relevance

This research deals with the discussion about living in an increasingly dense city. Therefore density and liveability are both relevant/important topics to discuss. Density is of importance as worldwide more people start living in urban areas (Eremia, Toma & Sanduleac, 2017, p.13; Wolff & Haase, 2019, p.12) (see figure 1.1). That is why it is highly relevant to do research into dealing with density, to learn how to understand what the effects of density are. The second topic of liveability researches into understanding these effects. Nijkamp and Kourtit (2013, p.301) argue that this urbanized future in Europe creates for

possible challenges. If these challenges will not be made properly and on time, this can cause a degradation of the liveability.

This research will also look at Utrecht specifically and thus is able to evaluate and give advice on future policies of the municipality. It has in this way a direct societal impact as it evaluates the policy of Utrecht, in particular the housing policy in the Merwedekanaalzone, Cartesiusdriehoek and the Beurskwartier and Lombokplein on the basis of their liveability. The focus in this research will be thus on the effects of density on liveability. As planning can become increasingly difficult, this paper wants to improve the understanding of one of the challenges in modern day spatial planning. As it also has a focus on the human aspect and how liveability is perceived, this research can help understand how a city such as Utrecht can deal with liveability in the surge of housing demand.

1.3 Scientific relevance

Density is considered an essential concept to urban planning and deemed as it helps describe urban space, however the concept of density is often unquestioned and under researched (Perez, 2020, p.619-620). According to Perez (2020) it is of importance to understand the different dimensions of the concept of density, and understand the effects of density in different places and societies. McFarlane said that the most important question in the research of density is to observe "how density is differently produced, experienced, perceived, negotiated, and contested as people live in and move through the city" (McFarlane, 2016, p.631; Perez, 2020). Hence the question of how density affects the urban form and how this then is dealt with and experienced is of scientific interest.

Thus within more developed, highly urbanized countries, like the Netherlands, there is still a lack of research on re-modelling the urban form (Dempsey & Jenkins, 2010, p.120). Most of the studies on urban development and density have been done in the United States (Rudolf et al., 2018). This makes it of interest to do it in a European city, precisely because of a lack of research. It is also interesting by virtue of Kyttä et al. (2016) arguing that the effects of urban density are place specific. The risk with this is that Kyttä et al. (2016) expects that a direct universal pattern will not be found with a research of the effects of urban density. Still Kyttä et al. (2016) also argues for the importance of doing research to understand the relationship between density and liveability better. The uniqueness of Utrecht also makes it an interesting case, as it is a city which limits urban sprawl, has several limits on building sizes and has a constant growing number of citizens.

Marsal-Llacuna et al. (2015, p.616) compared the liveable city alongside sustainability as one of the main important research subjects within city planning at this moment. However, there is still a lack of research on liveability, even though finding a balance between an increasing residential density while maintaining a high liveability and maintaining a sustainable urban environment can be considered as one of the major challenges for the future of urban planning (Wolff & Haase, 2019, p.12). By doing this research, how to plan and distribute liveability while maintaining an increase in urban density will be researched and better understood.

2. Theoretical Framework

In this chapter a literature review has been done. This is of value to create a framework from which research can be done. By having a theoretical framework it is clear which areas must be researched and which concepts are up for discussion. This literature research is based on peer reviewed articles published in international scientific journals. A conceptual model has been used for the literature research to clearly demarcate the theory which will be used to do this research (see conceptual framework in chapter 2.5). A conceptual model is of importance to help show the demarcations in the literature as the literature is broad and not everything can be researched (Verschuren & Doorewaard, 2010, p.22).

This chapter is based on understanding the theoretical concepts around density and urban liveability. At the start of the chapter density will be explained and what the possible effects are of increased urban density. After this the concept of urban liveability will be explained. After both concepts are explained the connection between density and urban liveability will be shown. Following this the defining characteristics of urban liveability within the context of density will be explained. The chapter will end with a conceptual model which will help summarise the main themes discussed in this chapter.

2.1 Concept of urban densification

Urban density refers to an increase of population, increase in activities or an increase of buildings within the urban environment in a city, which then can result in a more intense use of the space in an urban area(Raman, 2010, p.65; Westerink et al., 2013). While the concept of density can be straightforward the effects it has on the intensity of space can still differ between different places, which means that the context is of importance when discussing the concept of urban density (Raman, 2010). According to Krehl et al. (2016, p.77), urban density within the city can be measured by looking at either the amount of people, jobs, buildings and dwelling units in an area. For example urban infill is a form of increased urban density where there is a growth of dwelling units or houses in a specific area, which is also expected to go together with an increase in the amount of people and jobs within the city. The layout and design can have a huge impact on the perceived density, because it affects the physical proximity and accessibility between people (Raman, 2010, p.65). This can create a complex description of density, where what can be considered density is affected by the surroundings. This is followed by the thought that population and building density might give an idea about the density in an area, however it gives limited insight about the density as different forms of density are experienced differently (Rapoport, 1977).

The growth and importance of cities and bigger urban agglomerations cause an augmented complexity for spatial planners in urban planning. Higher density results in an increased amount of accessibility to

services and facilities, which then also help facilitate the exchange of ideas and knowledge between individuals and firms which then causes for knowledge-intensive business services to be found in urban city centers (Bramley & Power, 2009, p.33-34; Krehl, 2016, p.2). Moreover, people are more likely to meet each other. The costs of (technical) infrastructure services also decreases as a larger group of people are able to use it over a smaller proximity (Krehl, 2016, p.2). Negative aspects often associated with urban density are that as cities grow more problems will be encountered with safety, water security, spatial coherence, heat, urban microclimate, rent and property prices, (traffic) congestion and fragmented governance (Nijhuis & Kourtit, p.292, 2013; Krehl, 2016, p.2).

2.1.1. Compact city model

While discussing urban density the compact city model is commonly used. This can be seen in the quote below by Westerink et al. (2013) which argues about the importance of the concept of density on the compact city model.

> "The compact city is inseparable from "density" and/ or intensity, since it strives for concentration of buildings, people and activities. Density is used as a measure for defining urbanity gradients: the denser, the more urban." (Westerink et al , 2013, p.476)

The concept of the compact city is a reaction to the suburbanization of cities, where the concept is a reaction to the suburbanisation of cities after the Second World War (Rogatka & Ramos Ribeiro, 2015, p.122). As car ownership grew and more people moved to cities, cities started expanding (Westerink et al., 2013, 475). The compact city deals with stopping this urban expansion. This is done by focusing on urban containment and the protection of the green environment outside of the city. Compact cities are primarily aimed to reduce car dependence and pollution and protect the open countryside (Howley, 2009, p.797). Within European cities, urban sprawl has been less common, partly because of historical factors. Cities in Europe are older and more compact, this means that they were built before cars were common and hence are not directly accustomed to major car use (Häußermann & Haila, 2005). This does not explain all, as certain policies have helped limit urban sprawl. Spatial planning in the Netherlands has promoted policies to build within the existing borders of the cities, which was to keep the city centre of main focus within cities, as the fear was that the city centre would decay because of the effects of urban sprawl (Dieleman & Wegener, 2004, p.319-320). Not only the Netherlands has supported denser cities, the European Commission has promoted the idea of the compact city model (Wolf & Haase, 2019).

Within the compact city model the countryside is seen as a clear border which should limit the urban area of expanding (Westerink et al., 2013, 475). The focal point of compact city development here is that there are several areas, such as brownfield sites of recycling spaces, where a lot of development is still possible. Instead of investing outside of the cities boundaries, investments are made in possible areas of development in the cities so that the urbanised land will be used optimally (Rogatka & Ramos Ribeiro, 2015, p. 122).

The compact city concept has several main goals which help define it and several factors which will be improved. The first one is a focus on dense and proximate development patterns, which means that land use within the city needs to be used effectively. From this logic the ambition is to improve accessibility towards services, roads and housing for citizens and to have a well-organised infrastructure. A second important issue within compact cities is the need for urban areas to be linked by public transport systems and to encourage cycling and walking, therefore making cities become less dependent on the use of cars. The lessening use of cars helps dealing with the lowering of emissions affecting climate change, which influences sustainability goals within the city. Another important factor of compact cities is ecological diversity and the protection of agriculture, which comes with having a focus on green environments within and outside of the city. These also have a focus on accessibility and diversity of local services and jobs, which affects the economic sector in the city. Lastly, mixed neighbourhoods are of relevance with effects such as social mixing, social cohesion and economic diversity. This would result into an increased amount of social interactions between people of different socioeconomic backgrounds (Haaland & Van Den Bosch., 2015, p.762; Westerink et al., 2013, p.474-475; Rogatka & Ramos Ribeiro, 2015, p. 122-123; Kotulla et al., 2019, p.3479; Arnberger, 2012, p.717). These goals could all be a result of higher density, as the respective increase created the opportunity to improve on these factors, but it is not necessarily interlinked. Not all cities will excel in all these five goals just by becoming more compact, but the idea is that by pursuing the ideals of a compact city, improvements in all these goals will be made possible because city development can provide a platform to improve.

The idea of the compact city comes with criticism as several researchers either put in doubt some of the positive effects, or show focus on some of the negative aspects of the compact city model. One of the more well known critics of the compact city is Neuman, who has argued that the compact city is generally applied as a cookie cutter approach (2005, p.20). Neuman pleads that specific local factors are of importance with how a city should apply an idea such as the compact city and that the positive and negative effects of a compact city have more to do with the specific city then necessarily the idea of making it more compact and that so far different arguments for the compact city have been based on several place specific studies which are not applicable to all cities (Neuman, 2005, p.22). Another important factor when discussing the effect of density on liveability is to discuss the compact city paradox. This paradox shows that for a city to be sustainable it is of importance to be more dense, which means that the functions and populations of a city are highly concentrated, however for a city to be liveabile it is of preference that the functions and population are dispersed at a lower density (Neuman, 2005; Mouratidis, 2018, p.2409) (figure 2.1). The main criticism being made by Neuman is that with the compact city the focus is on keeping an area sustainable, which affects the liveability negatively in the same area, as the focus shifts away from the people living in the area. Results in the research of Westerink et al. (2013) showed the effects of several European cities which applied spatial plans based on the compact city (p.492). The outcomes of these plans created new high density buildings, which resulted in a tradeoff of standards of quality of life. An example given is on the case study of The Hague region, where the increased density had an impact on transport within the area which caused an increased traffic congestion (Westerink et al., 2013, p. 491; McCrea & Waters, 2012, p.203-204). The infrastructure in the region of The Hague was not able to deal with the increasing density within the city, which then affected the liveability.

There are also several criticisms about adapting the compact city for practical use. It is disputable how much environmental benefits it delivers, there are several undesirable social costs and it is difficult to be able to successfully implement all the goals of the compact city (Westerink et al, 2013, p.477). The effects and success of the concept of the compact city then can be put to doubt, however it is still often used as an inspiration for cities which are dealing with an increase in housing demand. However the compact city is still motivated as being the most environmentally sustainable option for an urban form to deal with the housing demand. But the argument is that a compact urban environment such as the compact city results in lowering liveability, whereby suburban life is deemed as more liveable. This comes from research which noticed that people in suburban areas were more positive about the social and physical aspects of the environment than people living in urban areas (Kotulla et al., 2019, p.3479). Neuman calls this the compact city paradox, which can be seen in figure 2.1 (Neuman, 2005; Mouratidis, 2018, p.2409). While it is still unfair to call this as conclusive evidence, it is mostly a generalisation to show Neumans point of the compact city paradox. It does show the possible effects increased density can have on the environment, and the importance of acknowledging how liveability could be affected by density. But by looking at this figure (2.1) it is also important to keep in mind the several researchers which were positive about the effects of the compact city in relation to factors involving liveability. Acknowledging the effects of increased density by looking at the compact city it is also important to not forget that these effects can be very local, and that the effects of density can differ between areas (Neuman, 2005, p.22). The compact city paradox is a very general explanation of the dangers sometimes involved during increased density, but in reality the effects of density are more complex.

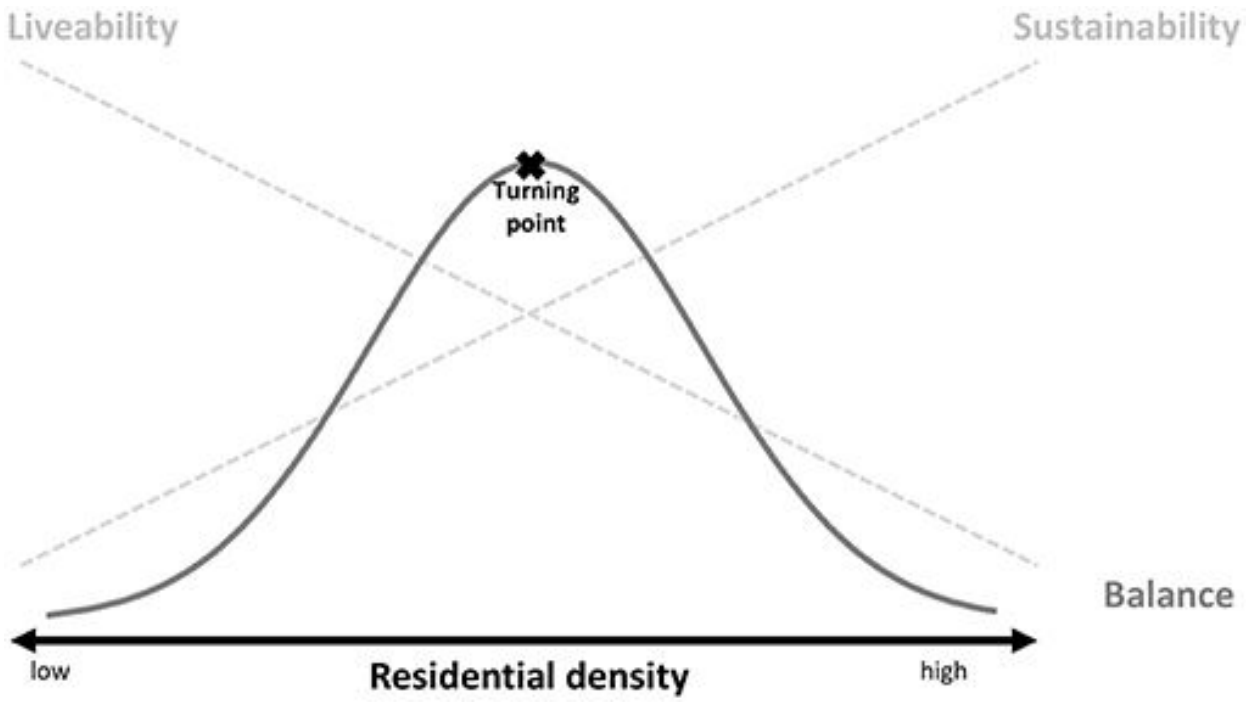

Figure 2.1: The balance of liveability and sustainability depending on residential density. (Source: Wolff & Haase, 2019)

2.2 Views on urban liveability

The concept of liveability can be hard to define as it is a broad concept which is used liberally. Applied definitions of liveability are based on a wide array of sources ranging from international rankings of liveability in cities to scientific research defining liveability and from national liveability indicators to community based projects based on liveability (Lowe et al, 2015, p.136). This makes the concept of liveability hard to define, as there are many different explanations of the concept which are applied in urban planning. This creates a certain fuzziness around the concept as there is not one clear definition, and what it means can be argued over (Kashef, 2016; Lloyd et al., 2016, p.244-245; Lau & Hashim, 2010, p.7). Considering the concept of liveability as a way of defining human life and human experience can explain why this concept is complex, as people will have several ways of explaining and understanding this. This fuzziness creates a discussion about how liveability should be applied within cities as there is not one correct way of applying this concept. The desired liveability also depends on the scale it is applied to, as the personal concept of liveability can differ from person to person, and it can have a different meaning for a collective as well (Chazal, 2010, p.587).Liveability itself can more be seen as a concept which contains different characteristics depending on the context as both Chazal (2010) and Kaal discussed about (2011). McArthur and Robin (2019) worded a simple critique on the liveability discourse, which is: “Why does liveability discourse persist in urban policy when, in practice, it is so difficult to achieve?” (p.2). Because of all the different situations the concept is applied to, the concept tends to change depending on the time and place it is used (Chazal, 2010, p.595). This causes that the concept of liveability is often used primarily as a form of discourse (McArthur & Robin, 2019, p.3). However, it is argued that it is still hard to deny the longevity of the use of the concept of liveability which does make it an important concept which needs to be examined and analyzed (McArthur & Robin, 2019, p.3).

While dealing with spatial planning the concept of liveability is often described as urban liveability (Namazi-Rad et al, 2016, p.7). The important distinction between liveability and urban liveability is the focus on city life, as urban liveability is about liveability within urban areas. Urban liveability could be described as making cities desirable places to live where the ambition is to rebuild the city to fulfill human needs and desires (McArthur & Robin, 2019, p.7). This means that a liveable city or region contributes to residents’ quality of life and well-being (Newton, 2012, p. 82; McCrea & Walters, 2012, p.192). Spatial planners still frequently use the concept of urban liveability to evaluate the social life in an area based on the physical environment (Namazi-Rad et al, 2016, p.7). However it is also argued that spatial planners use the concept because of the connotations it can give to a city, which then makes the city more attractive to people living outside of the city. If more people go to your city or want to live in your city, this can bring an economical competitive edge over other cities as an influx of new citizens can stimulate the economy (Giap, Thye & Aw, 2014, p.177). Because of all this it is important to contextualise a discussion about urban liveability as it will be unique to the place of research (Kaal, 2011, p.544). Ruth and Franklin (2014) expanded upon this by explaining how difficult it is to have a general applicable definition of liveability.

> "As urbanization and globalization lead to ever more diverse populations in cities, as their living conditions are ever more rapidly shaped by the emergence of new technologies and new environmental constraints, and as their needs, wants, and aspirations evolve, it is becoming increasingly challenging to provide generally acceptable and applicable definitions of livability." (Ruth & Franklin, 2014, p.22)

Going from the general definition of McArthur and Robin (2019) as urban liveability being described as the concept which is about making cities desirable places to be lived in, it is of importance to explain what this exactly means. Rather than describing urban liveability as a few specific unchanging attributes, Ruth and Franklin describe urban liveability as a description of a city to synchronise between everyday needs of residents, and the physical and biological environment supporting their existence (Ruth & Franklin, 2014). From this logic the concept of urban liveability can be divided into two categories, which have social and environmental influences (Lowe, Whitzman, Badland, Davern, Aye, Hes, ... & Giles-Corti, B. 2015, p.136). Newton (2012) also divided liveability in two categories naming the categories human wellbeing and urban environment quality. Just as the categories named by Ruth and Franklin (2014), one category has a focus on human well being and living while the other categories describes the physical and environmental attributes of liveability. For this research the category focussing on human well being and living is described as experienced liveability while the category describing physical and environmental attributes of liveability is described as built liveability. Experienced and built liveability are different ways of looking at the liveability in a specific area. Pacione would describe these two forms of liveability as the city on the ground and the city in the mind (Pacione, 1990). Built liveability is thus derived from the functions an area has, while experienced liveability is described by how the citizens experience the area (McCrea & Walters, 2012, p.192). These two concepts are used to help explain the complexity of urban liveability while staying true to the central concept of urban liveability which talks about the mutual effect urban environment and social life have on each other (Pacione, 1990, p.1; Ruth & Franklin, 2014). These two concepts will be individually explained, together with an explanation of a third definition of normative liveability which gives more depth into built and experienced liveability (Okulicz-Kozaryn, 2013).

2.2.1 Built liveability

Built liveability is a physical way of looking at liveability. It looks at what is needed in an environment to be considered liveable. For most people active within spatial planning, liveability is generally seen as something physical, as in that way active planning around liveability can be accomplished. With this liveability starts at the available resources which are then invested into the urban settlement (Valcárcel-Aguiar et al., 2019, p.3) This is understandable as spatial planners have more control over what is built then what people do in the built environment. Lloyd et al. (2016) explains how this affects the way spatial planners look at liveability.

> "...discussions of liveability in urban settings have focused on what is contained physically and what can be achieved through intervention in the physical space of a suburb or city. Therefore, governments, planners and designers have largely constructed community in terms of place and the physical organisation and design of space" (Lloyd et al., 2016, p.347)

Built liveability looks at liveability as something which can be measured. An increase in the general capita in an area of a lowering of time stuck in travel would both make an area more liveable. Built liveability is mostly used in city rankings as a seemingly objective way to decide which cities are the most liveable (Okulicz-Kozaryn, 2013, p.437). With this logic built liveability can be seen as the concepts of liveability which are more measurable and can be observed. These are the factors which describe the physical factors of an area. These factors thus are more likely to be affected by an increased density in an area. Where the experienced liveability is about the demands of the citizens, built liveability has a focus on needs. Needs within a liveable city include shelter, energy, water and food, waste management and assimilation,health and public safety, education and entertainment, social engagement, economic contributions and creativity (Ruth & Franklin, 2014, p.18). These are more physical factors which the municipality can actively plan. Health and public safety for example can be improved by making sure there are enough hospitals in the city for the possible demand. Another definition of liveability with a focus on built liveability describes liveability as the description of characteristics which make areas attractive places to live at. Hereby explaining that individual perspective and subjective evaluation of quality do take a part in this, the main focus is on the physical characteristics of the neighbourhood (Lau & Hashim, 2010, p.71). With the view on built liveability the thought can be that built liveability is the most important factor in defining urban liveability. Leyden et al. (2011, p.883) clarify this, by arguing that the way cities are built and maintained are an important way of improving quality of lives and that ensuring that people lead healthy lives with quality social connections is of concern to policy makers.

In the figure of Kashef built liveability was divided into two categories, these are natural systems (air and water quality, biodiversity, sustainability, etc.) and built systems (infrastructure, urban design, etc) (Kashef, 2016, see figure 2.3). Natural systems thus encompass the natural areas, areas which are not specifically built. Forest and water areas fit under this. This category could mostly be described as what the city looked like before people started building housing, thus the pre-existing nature cities are built around. That said within a city a lot of these natural systems are planned, built and preserved which all also fit within this category. Built systems are the specific cities which are built, thus the buildings and the infrastructure of the cities. Cities have a mix of these two systems, as the city centre would be mostly built and most cities also include forest areas (e.g. parks) and water areas (e.g. rivers).

2.2.2 Experienced liveability

Experienced liveability is more complex to measure than built liveability, because it depends on how people define liveability themselves and because it can be a reaction towards built liveability (Okulicz-Kozaryn, 2013, p.437). For example a built environment can provide job opportunities, however to create job opportunities several buildings were built which have negatively affected the green environment in the city and have caused air pollution. This would create an argument how truly liveable

this place is, but a citizen might see this change as a positive because of the job opportunities and because that person does not feel directly affected by the damaged environment. However this same person might suddenly hear about the air pollution and feel that the area is now considered unliveable even though nothing directly has changed. This means that experienced liveability is affected by the built environment but also by the perception, knowledge and priorities of individuals. Chazal explained this experienced liveability by summarizing it as: "A statement of desires related to contentment with life in a particular location of an individual or set of individuals" (Chazal, 2010, p.587). This means that the concept of urban liveability is open to individual interpretation and describes the way life in the city is perceived by the inhabitants of a city (Kashef, 2016, p.240). Experienced liveability focuses on the subjective aspect of liveability where the argument is that how people perceive the liveability in a city is what is more important. Experienced liveability can be dependent on neighbourhood satisfaction and how the physical and social characteristics of the neighbourhood meet the set expectations (Kotulla et al., 2019, p.3479). Experienced liveability is also a criticism of the thoughts behind built liveability as Okulicz-Kozaryn (2013) argues that a lot of descriptors of liveability are arbitrary concepts thought of by experts which do not reflect how residents feel (p.438-439). Thus the argument here is that even though a city could be considered liveable by experts, this does not mean that residents experience this.

To expand on the experience of residents Vine (2012) described measuring liveability as a science of everyday life. As the focus within measuring liveability is to focus on the daily functioning and social use of place (p.119) . This means that the research of liveability focuses on improving everyday life on a daily basis, as improved liveability will directly improve everyday life. With the focus on the everyday life Vine here also shows how liveability can be a very personal experience. Experienced liveability is very dependent on the day to day life of an individual and what someone can see as an improvement is not an improvement for someone else.

Experienced liveability means that the city is as liveable as the people living within the city perceive it to be liveable. Often when talking about the perspective of the inhabitants the desirable city is described (Ruth & Franklin, 2014, p.19). The social influences on the liveable city build upon the built environment. The built liveability is the base of the city and thus shows what is possible to do in the city, while the experienced liveability reacts to built liveability (see also figure 2.3). Thus experienced liveability is arguable about residential satisfaction, where an area is as liveable as how the residents experience the area to be satisfactory. Raman (2010) also agrees with the idea that the physical environment can have a direct effect on human behaviour, thus showing how built and experienced liveability have an effect on each other (p.66-67). However the focus on experienced liveability also describes the argument that experienced liveability is the more important factor in researching liveability. Where the idea is that the most important factor in defining liveability is the subjective and perceived evaluation of the neighbourhood (Permentier, Bolt & Van Ham, 2011, p.978; Okulicz-Kozaryn, 2013, p.437). Objective neighbourhood attributes and personal and household characteristics help define the liveability in an area but these factors are mostly indirectly affecting the experienced liveability according to this logic.

A main dilemma in the discussion about built and experienced liveability is that, in at least the Netherlands, the objective quality of the built environment has been improving over the years, however this is not always perceived this way. An example Kaal (2011) gives is that since the Second World War,

the quality of the countryside has improved, but the people living in the countryside have perceived it to have declined (p.536). The argument is that while the built environment may improve, the social world of these people has also grown, and now it is easier to compare to urban areas and feel that the rural areas the people live in are backwards in comparison. While this specific example is between rural and urban areas it does showcase that while the built environment may improve in an area, it does not mean the experienced liveability will improve, where in this case the perception of the area became negative while noticing that other areas were improving more. Thus experienced liveability can show how the city is perceived and what is wished for improvement within the city. The experienced liveability can also show mistakes that are made. An example which Ruth & Franklin (2014) have given is that an urban design which has a focus on privacy can result in a lack of community which then can threaten the safety of the local citizens (p. 20). This means that this specific urban design can have unintended consequences on the local environment.

In figure 2.2 a comic is shown which shows in an extreme way how the views of built and experienced liveability can clash, as what is considered very liveable by the government might clash with the views of the citizens. The comic also could be about city branding however, thus poking fun at cities which want to describe themselves as very liveable, but in experience are deemed far from liveable by the citizens. A more realistic example of this clash between views occurring would be that an improvement of the infrastructure can lessen traffic congestion for cars. However if a person does not notice this improvement, for example because this individual always uses the bike, the experienced liveability has not changed for this specific individual. This can show the difference where built liveability is mostly about a general improvement of liveability, experienced liveability is a very personal, subjective way of looking at liveability. Experienced liveability also shows that the objective measures which are used to define built liveability are not necessarily as objective as it seems, as the decision of what to improve and how to improve it is based on personal biases about what is and what is not considered an improvement for liveability. Both forms of liveability are important when dealing with the concept of liveability as it can show what is needed to improve or maintain liveability and what is considered liveability and wanted by the citizens. Liveability in itself is not something which can be fully measured simply because it has too many dimensions and different people will put emphasis on different assets of liveability. With liveability having a lot of dimensions it is of importance to have an understanding of them, if not the concept of liveability can become vague and hard to apply.

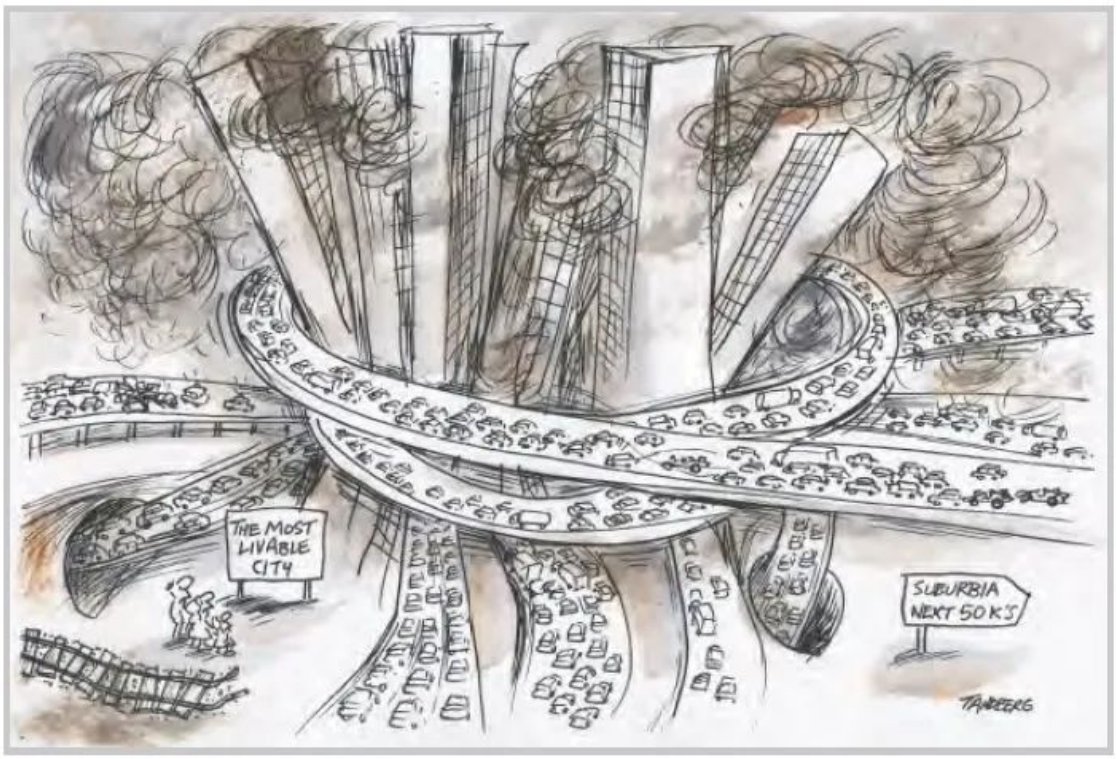

Figure 2.2: A critical comic drawing about the transport in liveable cities (Source: Ron Tandberg, 2014)

2.2.3 Normative liveability

Next to the built liveability and experienced liveability a third factor is brought up by Okulicz-Kozaryn, which is called normative liveability (2013, p.437-439). Normative liveability is used to describe the friction within the concept of liveability. This means that the concept is not something to be researched but to give understanding and dimensions to the concept of built- and experienced liveability. As the concept of liveability is based on several normative ideals shaped by society to describe what is wanted or considered an improvement for liveability. Thus experienced liveability is affected with this as the opinions of people can be partly shaped by the norms in society, of course each individual is differently affected. But it can especially shape built liveability, as normative liveability affects which concepts experts will consider liveable to start with. Normative liveability is thus of importance to consider in research about liveability as it can show how a concept such as liveability is shaped by the environment and by the normative ideals of society at the time. Thus it is also of importance to realise how research on liveability is very place specific, as ideals on liveability are shaped by the people living in these areas. Thus showing that liveability is a varying concept which tries to define wide-ranging needs by a large group of individuals, thus causing for the heterogeneous definition of liveability. Which is a definition which changes according to the specificity of the place and the views of the local citizens. Waitt and Knobel (2018, p.3164) also argue for the multiple dimensions the concept of liveability has. Where it is not a stable entity, but something which is affected by an array of human and non-human bodies, discourses, affects and emotions . This also shows that the concept of liveability is very space and time specific.

2.2.4 Applying built and experienced liveability

The figure of Kashef (2016) (see figure 2.3) explains the three steps explained in this chapter which influence liveability. The top of the figure shows the liveability conceptualisation, this is the step where spatial planners and the government think of ways to improve liveability and what is considered liveability. The second step is the direct actualisation, by applying their plans there will be a direct influence on the built liveability. After a change in the environment, the experienced liveability is impacted. This figure shows how changes in the environment can have effects on liveability.

The conclusion of the article of Lloyd et al (2016, p.351-352) is that when discussing urban liveability in policies, the social aspect is usually glossed over or simplified. By researching both built and experienced liveability, the social dimension and the dimension focusing on the policies will both be considered, thus giving more dimension and depth to the concept of urban liveability.

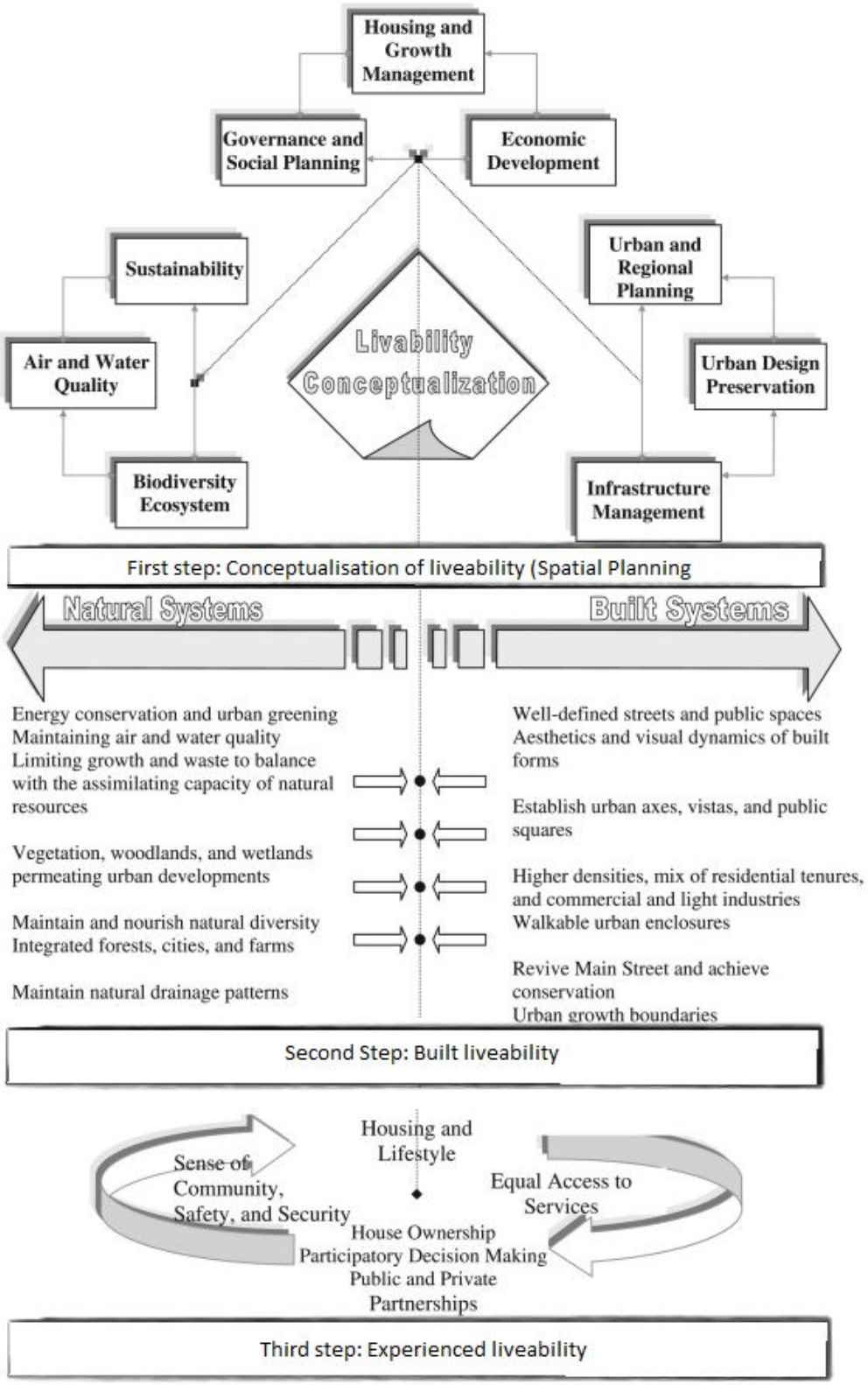

Figure 2.3: Defining urban liveability over several definitions from several disciplines (Source: Kashef, 2016: edited by author)

2.3 The relationship between the concepts of density and urban liveability

For the research it is of importance to look into how the two concepts of density and urban liveability are correlated, because the correlation between the concepts is of importance as the research is about the effects of density on urban liveability. Güneralp et al (2017) argues that it is hard to see the concepts of density and urban liveability separated. As density affects and shapes the environment, it has a huge influence on the urban liveability of these environments (p. 8949). Perini and Magliocco (2014) also argue that quality of life is directly influenced by the state of the urban environment (p.495). As European cities are in general more densely built, this also has a direct effect on the quality of life (Perini & Magliocco, 2014, p. 495). Nijkamp and Kourtit (2013) argue the same for a direct relationship between urban density and liveability where urban density has several positive and negative impacts on liveability. The argument is that an increased urban density affects and shapes the environment, which then affects urban liveability as urban liveability is about experiencing the environment. A change in the environment such as an increased density will therefore have a direct effect on urban liveability. An example giving is that urban density creates for an improved social capital and a nodal position in a central network (p.298). According to Howley et al. (2009) liveability aspects which are most negatively experienced in increasingly compact cities are environmental quality, perceptions of safety, accessibility considerations and neighbourly interaction and involvement (p.860). The reasons why these aspects were negatively experienced are because of litter, pollution and lack of greenery, noise and traffic congestion, lack of certain services and facilities such as open space, secure parking, good quality food shops and facilities for children (Howley et al. 2009, p.860).

Mouratadis (2019, p.270) argues that increased urban density does not have to negatively impact the well-being of the inhabitants as long as increased density is accompanied with mixed land uses, public transport, limited car traffic, access to green spaces, and social equity. Lehman (2016) adds to this that medium-rise compact cities based on European blocks have been a good example of mixing densities and different neighbourhoods. Hereby proclaiming that continuing working on these forms of urban blocks and developing it can create better options and opportunities for inner-city living and working. With this showing that evolutions in thinking within the urban form can cause opportunities in dense cities which means that an increased density does not have to come at a price of liveability. Both Lehman and Mouratidis do acknowledge the difficulty a higher density can have on maintaining or increasing the liveability in an urban area, however both argue that these are challenges which can be overcome.

While most articles suggest a direct correlation several researchers have some doubts about the direct effect of density on urban liveability. The article of Kÿtta at al. (2016) connects the topic of high density with liveability, but argues that the effects of density on social outcomes like urban liveability are moderated by context. This means that density can affect behaviour, but there is a difference between, for example, downtown areas and suburban areas. This means that the social context is important in

doing research into a topic about the effects of density on urban liveability. Howley argues that density itself does not affect liveability, but it can cause problems such as lack of environmental quality, noise, lack of community life, traffic and lack of services and facilities which will impact liveability if the neighbourhood is not properly designed (Howley et al., 2009, p.861). Howley here argues for density having an indirect effect on liveability, where the argument can be made that these design problems are caused because spatial planning has to deal with an increased density. Therefore arguing that to a certain degree there is an impact, but the influence of density on factors such as residential satisfaction, stability and the perceived quality of the neighbourhood environment are not much affected after the density in an area reaches a certain point and hereby only seeing the effect of an increased density on medium densities. Hence arguing that factors such as the building form have a bigger impact than density in areas with a high density (Arundel & Ronald, 2017, p.38). An example given for this is that research found out that the type of high-density neighbourhood in Amsterdam and the characteristics included in the urban form were more conclusive in understanding the future of the local sustainability and community outcomes than the level of density could. With this the research concluded doubt about how density itself has a direct positive effect on liveability (Arundel & Ronald, 2017,p.47).

There are thus different views which makes it difficult to have a clear conclusion on the effects of increased density affecting liveability, as several authors argue over the effect. So while most authors do agree that an increase in density affects the urban form and that the urban form itself helps define liveability, the direct correlation is sometimes still disputed. Thus, as Kytta (2016) argues, while researching about density affecting liveability it is important to focus also on the context, as it can not be assumed a direct correlation will be found, by also taking the context into consideration a clearer conclusion can be made. Thus by understanding how the increased density affected the urban environment and what the choices behind these decisions are, a clearer understanding of how the increased density affects urban liveability will be found.

2.4 Characteristics of urban liveability

With the two main views acknowledged of how urban liveability is perceived it is of importance to look into the discussion of how urban liveability is characterised, as by looking into the characteristics of urban liveability explaining the intricacies of the views will be more evident . A broad way of defining urban liveability is by describing it as a construct of concepts which are associated with assessing a cities environmental, social and economic conditions (Valcárcel-Aguiar (et al., 2018, p.1)). This shows the span of the concept of liveability and helps understand what defines liveability. With the broadness of these three categories it explains why liveability is a complex topic which is interpreted differently across research. The importance of having definitions of environmental, social and economical descriptions of liveability is to find a balance in researching liveability, where it is of importance that a research into the full urban liveability covers all three spectrums.

Several authors have put effort into having several characteristics to define liveability. An early description of the characteristics of liveability comes from Vuchic (1999, p.7) who defined liveability as “generally understood to encompass those elements of home, neighborhood, and metropolitan area

that contribute to safety, economic opportunities and welfare, health, convenience, mobility, and recreation". Thus with this arguing that the concept of liveability represents a set of characteristics which help define the attractiveness of an area as a desirable place to either live, work, invest or conduct business in (Giap, Thye, Aw, 2015, p.178). Thus showing liveability as the possibilities an area can give and the opportunities for activities it provides. Namazi-Rad (et al., 2016) divides liveability into several categories which are services, jobs, housing, neighbourhoods, entertainment and transport. These six categories were chosen to explain how citizens perceive liveability and perceive these categories. By researching how the six categories were perceived by the citizens, a general overview on the experienced liveability in the area could be given. Lowe (et al., 2015) also named several aspects which all impact the urban liveability according to different scientific researches into liveability. From most often named to least often named these were: crime and safety, transport, housing, employment and income, social cohesion and local democracy, public open space, leisure and culture, health and social services, natural environment, education and lastly food and other local goods. All these indicators are context dependent, this means that some factors are more important for one than others and that certain factors have more influence on specific target groups (Lowe et al., 2015, p. 139-140). But these characteristics also show how liveability is perceived and show a mix of characteristics dealing with built and experienced liveability.

Adam et al. (2017) made an overview of the main characteristics of urban liveability in a research about defining urban liveability by analysing research completed over the last two and a half decades. Adam et al. (2017) divided urban liveability into four categories which are stability, healthcare, infrastructure, and lastly culture and environment (See table 2.5). These four categories are broad and thus include several sub categories to explain urban liveability more specifically, however as urban liveability can be seen as a very context dependent concept, keeping it relatively broad can be of advantage as the concept of urban liveability can be partly defined by the research area.

Combining the four categories in the article of Adam et al. (2017) with the most named aspects in the article of Lowe and further added with concepts given by the other articles, gives a more concrete oversight of how liveability can be defined (see table 2.5). This leaves for four different categories which include several concrete examples of liveability. These four categories will be used to define liveability, as it can be used as a construct for qualitative research. All these categories are different and it is of importance to explain these categories by using the definitions of liveability written about in this chapter. That said as can be seen in the table below (table 2.5) there is some overlap between the four categories. These four categories will be described to write about all aspects of liveability but also by using the concepts of experienced and built liveability and with the perspective of density being a factor of importance influencing liveability.

2.4.1 Infrastructure

Valcárcel-Aguiar argued that this specific category of liveability has a focus on the physical dimension of liveability (2018, p.5). Of all the categories infrastructure is probably the one which is most directly controlled by the built environment as the focus of infrastructure is on housing and mobility in the area. Increased density causes for more housing, which means it is of importance that the houses are of quality. Transport is one factor which undergoes a lot of pressure in dense cities, as with more people, there will be more transport. An important question which involves cities undergoing increased density is how to make sure the infrastructure can handle the transport.

The design of the infrastructure in an area can have an effect on the general liveability in the area. High accessibility within the city is deemed to have a positive effect on liveability (Leyden et al., 2011; Mouratidis, 2018)). In general transport is argued to be of main concern in urban policy in creating a positive influence on liveability within urban areas. Where governments are motivated to shift away from a focus on private motor vehicles towards walking, cycling and public transport (Mouratidis, 2018). This shift is of importance as it positively improves health and sustainability in growing cities (Kotulla et al., 2019, p.14; Mouratidis, 2018; Stevenson et al., 2016, p. 2930). This shift towards transport outside of private motor vehicles is partly possible due to the density as the distances are shorter. The costs of (technical) infrastructure services also decreases as a larger group of people are able to use it over a smaller proximity (Krehl, 2016, p.2). A higher density changes how people travel as with an increase in density there is also an increase in transport by foot, bike and public transport, this is because of the decrease in trip distance and a general increase in the quality of public transport (Howley 2010; Krehl, 2016, p.75). This goes with an increase in physical activity which also improves health (Krehl, 2016, p.75). This phenomenon was shown in an article about short distance planning in smaller German cities. Where a focus on policies encouraging non-motorized travel and public transport does result in residents becoming less dependent on travelling by car and makes it more likely citizens will use the bike or walk (Hamiduddin, 2017).

However several restrictions on transport for private motor vehicles can also limit the experienced liveability as some citizens do deem it as a policy which restricts movement and freedom (Kotulla et al., 2019, p.14). With an increase in housing there is also pressure on the infrastructure in the area, which then can lead to traffic congestions and a lack of secure parking (Howley et al. 2009, p.860; Krehl et al., 2016, p.76; Nijhuis & Kourtit, p.292, 2013; Wolf & Haase, 2019). Howley et al. (2009) blames the lack of supporting infrastructure for the problems which have arisen in these areas. Arguing here that the mix between older more abandoned infrastructure and the new buildings did not mix well as it was not considered how to mix all of it. The conclusion taken here is that when dealing with the increase of residential densities steps have to be taken to make sure the liveability does not get negatively impacted. With a well designed plan density does not have to impact either liveability or sustainability.

Proximity in general is seen as the important factor which makes cities more liveable than suburban areas. Proximity to do (daily) activities and go to nearby facilities including local supply, jobs, co-working communities and local services and facilities are of huge importance to citizens (Kotulla, 2019, p.13-14).

This also results in a spatial advantage where there is a concentration of knowledge and people which result in more specific knowledge. (Kotulla, 2019, p.13-14; Nijkamp & Kourtit, 2013, p.297-298). To simplify this is that in an urban environment, everything is closer and different cities have different specific knowledge based economies which can help specific individuals educated for it. This means that the accessibility to these places is also of importance. If the infrastructure of the area does not support the needs of the citizens which use it, the advantage of proximity will become less noticeable.

Housing is of importance in satisfaction with the neighbourhood. The external and internal features of dwelling units in the city can be of huge importance in the residential turnover in the area. Because when the residences are deemed as not suited for the long term, this causes for residents to search for other places to live. A high residential turnover in general causes for less satisfaction with the area. While several reasons for moving out of the city can be found the small size of the residences seem to be the main reason (Kotulla, 2019, p.3480).

2.4.2 Culture and Environment

Culture and environment mostly is understood by what people are able to do in their free time within an area. Just as with social, health and food services, is that with a greater density an increased demand will exist for all these facilities. With the demand for all these facilities other parts of the environments are sometimes sacrificed. This includes the natural environment and general public open space. General open space can also include several possible leisure activities. Think hereby of sports and parks. Natural environment is green space but also more than just that. It will not be unnatural that there is less green space in the city, thus dense cities which want to remain liveable in general try to make the green space there is of high quality. Natural environments can also be increased heat in the cities or shadows which are general occurrences in denser cities.

Density creates for the average citizen a higher level of personal relationship satisfaction, this is because of a higher concentration of people, easy access to other areas and more facilities for socializing. Thus dense areas give opportunities for residents to interact with other people (Arundel & Ronald, 2017, p.36-37; Wood et al., 2010) and help stimulate and sustain larger and more active social networks (Mouratidis, 2019, p.267). Raman (2010) argues that the density of neighbourhoods will affect social relations within urban areas (p. 77-78). Where citizens in high density areas make less but stronger social relations, people in lower dense areas have wider relationships which are more informal. However Raman also argues that the layout of the neighbourhood has a bigger effect on these relationships than the density does. For a neighbourhood to increase positive social relationships between inhabitants spatial centrality and access to communal spaces are of importance (Raman, 2010, p. 77).

Another problem increased density can create is the idea of compensation which means that even though in a compact city everything is closer, there is also less recreation because of the density of the residents. This means that residents go further away for recreation which suits them, this speaks against the idea that dense cities help limit travelling (Haaland & Van Den Bosch, 2015, p.765). This can be disputed in a way as other writers argue that there is a higher level of cultural activities in dense areas

then in more rural areas (Howley, 2009). Where higher density is seen as having an increased amount of accessibility to services and facilities (Bramley & Power, 2009, p.33-34; Krehl, 2016, p.2). Examples such as mixed land use and the existence of parks and squares within dense, compact cities creates for a positive impact on the experienced liveability (Mouratidis, 2018). Kotulla argues that high-density development done well will increase dwelling and neighborhood satisfaction, which will also result in a lower residential turnover. This however is not something which works for every type of citizen, as households with school-aged children are still favourable towards more space and increased density will be detrimental in this case (Kotulla, 2019, p.15). That said compact urban forms can have more advantages for liveability factors as a higher amount of density is considered to contribute towards a higher level of personal relationship satisfaction. This is because of a higher concentration of people, easier access to other areas and more facilities for socializing with result into enable larger groups of social networks and a more active social life (Mouratidis, 2019, p.267) The general accessibility of dense areas to several institutions of local supply, jobs, co-working communities and local services and facilities is what makes living in urban areas attractive (Kotulla et al., 2019, p.13)

The natural environment is of importance when looking at the built environment in the city, as the natural environment can both be seen as a place for resources and thus provides the materials and energy for building the built environment (Valcárcel- Aguiar et al., 2019, p.4). But the consumption of natural materials and creating the built environment also has a negative effect on the natural space. The natural environment has to endure the density of the built environment where the natural environment is also affected by the agglomeration of activities and people inside the environment which keep using resources and energy provided by the natural environment (Valcárcel- Aguiar et al., 2019, p.4). There is an increased pressure on the environment which means that the environment will not be able to manage the buildings built around green areas which then reduce the quality of the area as the social carrying capacity is exceeded (Arnberger, 2012, p.717). In general development of new green space encompasses several difficulties in dense environments. An example given by Ng et al. (2012) who described that a mix of narrow pathways, high pedestrian flow, traffic constraints and high buildings, which cause for a lack of sun, makes it hard for a natural green environment to grow. These are just the above ground effects but the need for a large amount of cables and pipes also makes the ground less healthy (Haaland & Van Den Bosch 2015, p. 764). Cities in general tend to struggle with these environmental problems, as there tends to be a main focus on infrastructure. The focus on infrastructure causes a constant extension of the urban environment, which will be built on open spaces and brownfields, which result in pressuring the existing green and open space (Wolff & Haase, 2019). This shows the danger in expanding cities, as it leaves little space for green areas.

Experienced liveability can be influenced by the built liveability as the amount of green areas can have an impact on both the physical and the psychological health (Thompson et al., 2012; Wolsink, 2015; Kotulla et al., 2019, p.13). However Maas (et al., 2009b, p.594) argues that the perception of green space may motivate healthy living more than the actual green space. Which means that unsafe or low quality green spaces may have a negative affect and thus will be avoided by people. Thus arguing that while green space is important, it is also important to see how specific green space is perceived by people. This will be of considerable difficulty as Howley et al. (2009, p.860) names the environmental quality as being one of the aspects which is the worst experienced in dense areas. The access towards

green space and infrastructure is an important issue herein. A threat of urban densification can limit the green space in an area, or make the green space in an area harder to reach. This will especially affect people who put importance in the positive aspects of green design within the existing urban design. (Wolsink, 2015, p.1066).

With specific neighbourhood perception people living in the area are forming their opinion about the neighbourhood by mainly social characteristics and a limited amount of physical characteristics of the neighbourhood (Permentier, Bolt & Van Ham, 2011, p.981). Which means generally that people are mainly affected by what is experienced and what the people hear from within their social circle. One of the biggest factors in determining the satisfaction of the local community is safety, where the perceived safety had an impact on how far people are satisfied with their community (Ciorici & Dantzler, 2019, p. 1709).

2.4.3 Healthcare

Healthcare is described as the maintenance of both mental and physical health. As with stability the description of this factor is more about experienced liveability, however built liveability is of importance in describing the effects density has on health. Healthcare focuses on the local environment and the basic health of citizens living in the area and also the opportunities for the citizens to live healthy. This means that for liveability it is of importance that there are enough health and social services and enough food and other local goods. The difficulty with increased density is to make sure everyone has enough access to all these factors which ensure people live in good health. With increased density there will be an increased pressure on the available facilities. Frumkin (2012, p.212) explains health in spatial planning by using eight concepts which are: air pollution, heat, physical activity patterns, motor vehicle crashes, pedestrian injuries and fatalities, water quantity and quality, mental health and social capital. These concepts explain both the mental and physical health of the residents.

Increased density can have a positive environmental effect on liveability and the perception of it. Mouratidis (2018, p.2424), in a study done in Oslo, discovered that compact cities were more environmentally sustainable and seen as more liveable, compared to the suburban areas researched. . That said there is still discussion around the idea that dense cities are more liveable as can be seen in the quote below.

> “For a city to be sustainable, the argument goes, functions and population must be concentrated at higher densities. Yet for a city to be liveable, functions and population must be dispersed at lower densities” (Neuman, 2005, p.16; Wolff & Haase, 2019, p.2)

One aspect of dense cities which focuses on a mix between sustainability and liveability is the concept of socially inclusive green growth. This is a concept which claims to be sustainable while also creating liveable cities (Haase et al., 2017, p.42). However, the correlation between sustainable policies and liveability is not clear. Where cities which are deemed more liveable tend to have a bigger ecological footprint (Haase et al, 2017, p.42) (see figure 2.4). Sustainable policies in general are marketed together with the idea of greening, greening is the process of transforming neighbourhoods into more

environmentally friendly areas. This way of sustainable policy can be noticed clearly as it promotes green areas like parks and forms of green energy like solar energy. It is a more marketable way for sustainable policy (Haase et al 2017). The marketability is the basis of one of these problems, where the results can be socially exclusive towards low and moderate-income residents as the neighbourhoods become more expensive (Haase et al, 2017, p.45). This makes greening seemingly a form of gentrification. So while greening on the eye might seem like it could make an area more liveable, it is of importance to not ignore inclusiveness.

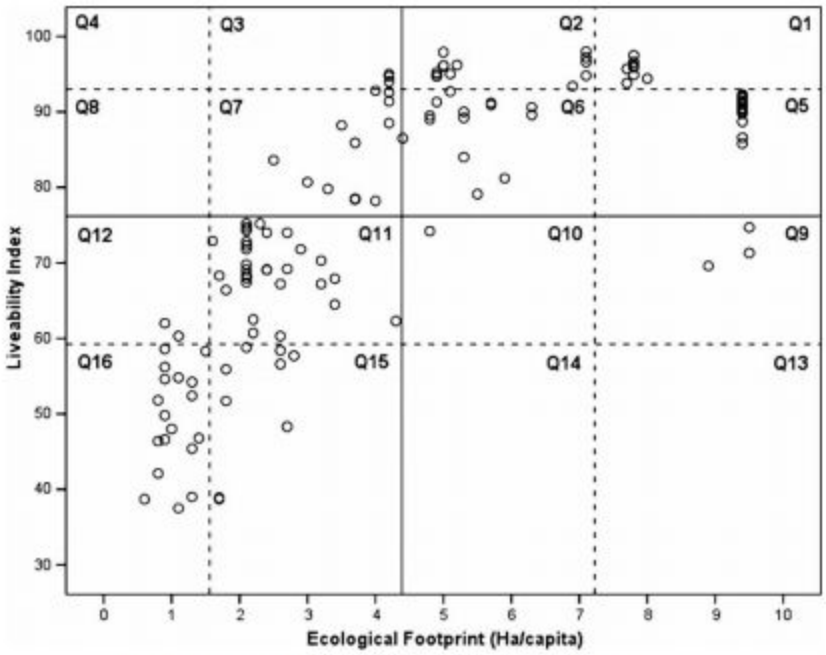

Figure 2: Liveability–sustainability nexus for cities in 2010

Figure 2.4: Cities comparison between a liveability index and the ecological footprint. (Source: Newton, 2012)

That said, green space is seen to have a general positive influence on issues of health. The positive effects on psychological health is that it makes people feel less lonely as it gives a chance for more social encounters and it strengthens the sense of community by place attachment, which also has an effect on people without providing for more social contacts (Maas et al., 2009b, p.594-595; Wolsink, 2015, p.1066). Green space also gives for the opportunity for more physical exercise which has a positive effect on physical health. This is done directly by stimulating exercise but it also provides psychological restoration and reduces stress levels (Thompson et al., 2012; Wolsink, 2015; Kotulla et al., 2019, p.13). With this Kotulla et al (2019, p.13) argues that accessibility to green areas in compact areas is the most important in improving the quality of living in the area. This means that green space can contribute to human health and well-being, which makes it an important subject within planning policies, especially policies dealing with urban densification (Lin, Meyers & Barnett, 2015, p.956).

High density can create several health risks as urban areas are generally accompanied by low air quality and a discomforting urban microclimate (Krehl et al., 2016, p.76). Several aspects of urban density are

also often negatively associated with health as problems with safety, water security, spatial coherence, heat and the urban microclimate are more common in urban environments (Nijhuis & Kourtit, p.292, 2013; Krehl, 2016, p.2). Next to these general, more physical health problems caused by high density, high density can also cause specific negative effects on the health of individual people. High density can be bad for personal growth, and social development and have a negative effect on the perceptions of safety and neighbourly interaction and involvement. Concerns of overcrowding, psychological-overload, personal anonymity and unsatisfactory social relations are cited as the reasons for these negative aspects (Arundel and Ronald 2017, p.36; Howley, 2009; Permentier, Bolt & Van Ham, 2011, p.980). In these articles the negative aspects of density on social communities is acknowledged, which goes in contrast to earlier named articles citing how density can have positive effects for social capital and sense of community. Which means that the connection between density and how it affects the social capital and sense of community is still disputed, as the results are often contradictory (Arundel & Ronald, 2017, p.36-37)

2.4.4 Stability

Stability is the concept which helps describe consistency in a neighbourhood, it focuses on the socio-economic aspects of liveability. This factor is of importance because it describes more than the other categories how liveability is experienced by citizens in the neighbourhood. Employment and income are included in these categories as it helps explain economic stability for people living in a neighbourhood. Changes in a neighbourhood can cause new jobs, or the loss of jobs which is of importance for people living in the area, and especially people who work in the same area. Common with increased density is that living in the neighbourhood becomes more expensive, which has an impact on the people living in the area. A constant neighbourhood is expected to promise job security and a constant income. Dense areas generally carry higher rent and property prices then suburban areas (Krehl et al., 2016, p.76). This could have negative effects for the citizens in the existing areas, as these prices could become higher over time. This would especially hurt the poorer population in the area, as these higher costs can create social inequity (Wolff & Haase, 2019). However there are also positive economic effects as the density allows for a higher use of the infrastructure which means that the cost of using it lessens for the nearby citizens, thus making the forms of infrastructure more accessible (Krehl et al., 2016, p.76).

Another positive effect is that the increased density of urban areas can help in the facilitation of an exchange of ideas and knowledge between both firms and individuals ((Bramley & Power, 2009, p.33-34; Krehl, 2016, p.2). This can create for example clusters of knowledge and a general intensity of knowledge in close proximity. This causes knowledge-intensive business services, which are in need for close proximities and the spill-over of knowledge to settle in urban centers (Krehl et al., 2016). Thus high densities can attract knowledge-intensive firms which both supply jobs for the citizens and can boost the economy within the area. Howley (2009) expanded upon this by saying that urban areas in comparison to more rural areas have more opportunities to and a higher quality of education and work. This means that because of the advantages of the proximity dense areas give, density helps in the facilitation of new job opportunities in the area. But Nijkamp and Kourtit (2013) also argue that the urbanized future creates challenges, where if these challenges will not be dealt with properly and on time, this can cause

a degradation of the liveability (p.301). When a city becomes less liveable Nijkamp and Kourtit argue this will impact the creative and innovative firms and talents mostly. A worsening liveability makes it harder to attract these talents and firms, which is a problem as these talents and firms can be considered as the primary driver for socio-economic development and for getting a competitive advantage for a city (Nijkamp & kourtit, 2013, p.301).

Next to the possible effects density can have on jobs in the area, economic stability can also help explain the experienced liveability of residents within neighbourhoods. Neighbourhood satisfaction and perception can help in understanding the experienced liveability as it also describes how citizens experience their surroundings. While the experienced liveability and neighbourhood satisfaction are not identical concepts, the concepts have similarities. Where the experienced liveability focuses on how citizens experience their changing environment, neighbourhood satisfaction also is about how social and physical characteristics in the neighbourhood meet the expectations of the residents (Ciorici & Dantzler, 2019, p. 1703). There is an overlap which helps explain the experienced liveability in a neighbourhood. Mouratidis (2018, p.2410-2411) added to this naming safety, quietness, neighbour ties, attractiveness and neighbourhood attachment as examples of characteristics to have a positive relationship on neighbourhood satisfaction. Leby and Hashim (2010, p.87) added that a desirable quality of equity, accessibility and participation have a positive effect on the well-being and development of the people living in the neighbourhoods. Mouratidis also named inequalities within the neighbourhood as a negative influence on how people evaluate the neighbourhood. If not everyone has access to the improvement, this creates an unequal liveability, this can cause inequity in the neighbourhood which has an impact on the experienced liveability (Leby & Hashim, 2010, p.87; Lloyd et al., 2016, p.345). An important reason why all these factors are of importance to the neighbourhood is that it influences the experience of the neighbourhood and this then has an effect on the community vitality (Ciorici & Dantzler, 2019,p.1703). Understanding the characteristics of the neighbourhood which have an influence on the overall experience for the residents and then implement arrangements which positively influence these wanted characteristics is of importance.

Below is a table which shows a summary of the main important terms and researches which were used in explaining the four characteristics used of urban liveability.

Culture and Environment	leisure and culture, natural environment, public open space, social cohesion and local democracy, food and other local goods, satisfaction (Adam et al., 2017; Howley , 2009; Lowe et al, 2015; McArthur and Robin, 2019; Newton, 2012)
Healthcare	crime and safety, health, wellbeing, education, quality of life, pollution, social capital and social services (Adam et al., 2017;Frumkin et al, 2012; Lowe et al, 2015; Nijkamp & Kourtit, 2013)
Infrastructure	Transport, housing, public open space (Adam et al., 2017; Kotulla, 2019; Lowe et al, 2015)
Stability	employment and income, cost of living, health, consolidation, social cohesion, economic sustainability (Adam et al., 2017; Howley, 2009; Lowe et al, 2015)

Table 2.5: Characteristics of urban liveability (Source: Author)

2.5 Conceptual model

The conceptual model summarises the theoretical discussion above in simple terms (see figure 2.6). The left side of the conceptual model is the starting point, where an increased density affects the urban environment, which can be both negative or positive depending on the context. By affecting the urban environment a change can happen in characteristics which help define urban liveability as based on the article of Adam et al. (2017). This means that the urban density affects these liveability characteristics of stability, healthcare, culture and environment and lastly infrastructure. A change in these can then affect the general urban liveability in the area and the views on the liveability in the area. The discussion about the possible effects of increased density on urban liveability is explained in chapter 2.3. To get a better understanding of the concept of liveability a view is also given through built- and experienced liveability. This is symbolised in the right part of the figure, where both views are considered. It is important to keep both views in mind when researching urban liveability as it can give a more comprehensive understanding of the effects of increased density on urban liveability. The discussion around increased density can be read in chapter 2.1, the discussions around the views of urban liveability can be read in chapter 2.2 and lastly the characteristics of urban liveability is discussed in chapter 2.4.

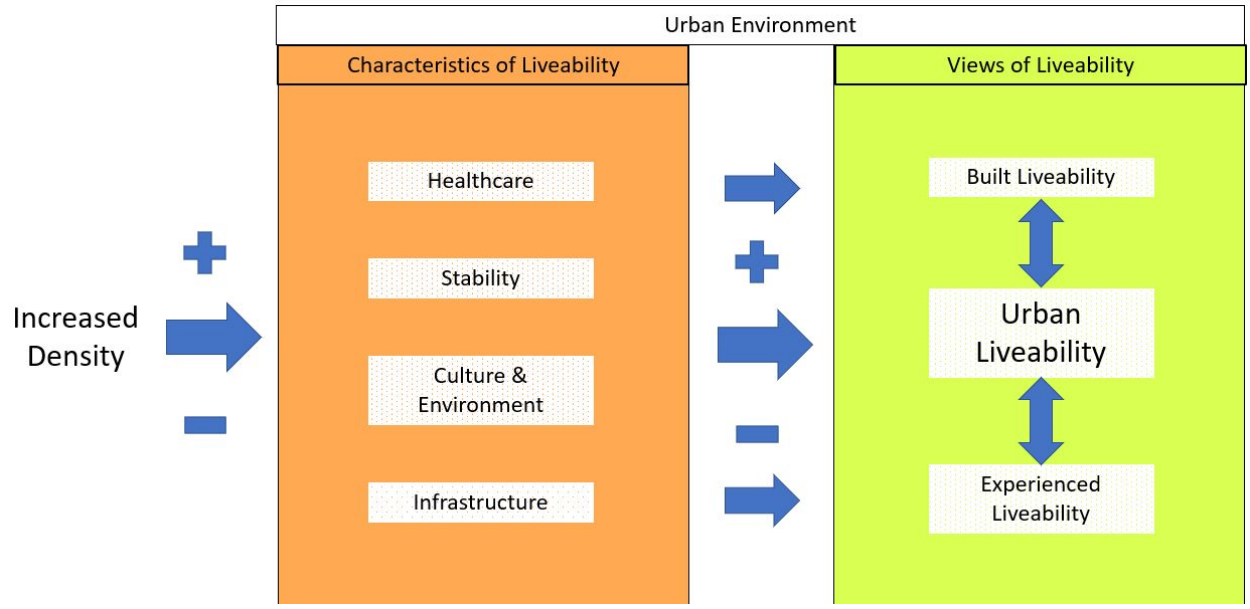

Figure 2.6: Conceptual Model (Source: Author)

3. Empirical Research Design

This chapter will explain the methodology which has been used for the research. This means that the several concepts in the theoretical framework will be applied to the methodology to create a method to do a research which will answer the research question. The method used in this research will be qualitative research, which means that the main form of research will be by expert interviews and open surveys

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3.1 Qualitative Research

The empirical research will be based on the theoretical chapter and the conceptual model, as the objective is to translate the concepts in such a way to make it possible to collect data, which will help answering the research question. The main goal of this research is to have a better understanding of the effects of increased density on the liveability of an area, thus the focus of the research is about understanding the effects and understanding what is happening in the case studies. The concept of liveability is hard to research on its own as it is open to several different interpretations. As a general guideline for the research built liveability will be researched by interviewing experts and analyzing policies about the research areas. The reasoning for this as built liveability is about the liveability of the environment and by interviewing the people who are behind the development of the environment it should become clear what the intentions of the development is. Experienced liveability will be researched by surveys as the experienced liveability will be understood by asking the residents of the research areas how the area is experienced. To do this, qualitative research will be used as it fits with the type of research question asked which is mainly explanatory, and it creates the possibility to create a deep discussion as it focuses on the why question (Baxter & Jack, 2008). The focus on explanatory research comes with an interpretative approach that will be used for the research, which helps describe the complexity often associated with explanatory research (Boeije, ‘t Hart & Hox, 2009, p73-75). Thus by doing this approach case studies will be used as case studies have the potential to deal with complex topics and help gain clear insight into the topic (Baxter & Jack, 2008, p.556). Both groups and individuals will be approached with the research, the goal is to understand what moves and motivates these specific actors, as understanding the actors helps to understand the effects that urban density has on urban liveability. By doing several interviews with different actors it will be possible to get a wide range of results, which gives a clearer picture and thus variations can be found (Boeije et al., 2009, p73-75). Enough interviews must be taken until a feeling of completion can be found where a new interview will not add much new information. In this research qualitative research includes data based on doing both interviews with experts and residents. The sample size will be different for experts and residents.

For the research methods multiple cases were used, this is to, as Flick (2002, p.227) argued, “increase the depth, scope and consistency in the methodological proceedings”. Thus is deemed as a methodological triangulation which thus helps create a better understanding of the results. By using several methods data triangulation is also used, this form of triangulation is where several different sources of data are analysed (Wilson, 2014, p.74). While triangulation brings criticism for giving the idea that there can be a definite description of the social world and for assuming that results from different forms of methods can be compared on an equal basis (Bryman, 2004, p.3). Using triangulation within research is still the most commonly used method in social sciences as it does bring depth, scope and consistency into research (Wilson, 2014, p.75).

3.2 Case Studies

As already acknowledged three case studies are used for the research. The importance of using case studies is that it can give complementary information to a theory or a concept (Eisenhardt, 1989, p.546). Case studies are useful for research as they help with answering ‘how? and ‘why?’ questions (Rowley, 2002, p.16; Baxter & Jack, 2008). Thus these case studies will help explore, describe and explain the concepts of liveability and density in real life cases. A main criticism of case studies is that the research is too context specific so that it is impossible to generalize the results and thus case studies are unable to contribute to scientific research and development (Flyvbjerg, 2006, p.3-4). However, as Flyvbjerg (2006) added, the case study can be used precisely because it deals with complex issues without the specific need to generalize it, as summarizing complex issues with the motivation to make the concepts easier to understand and applicable to further scientific use can lead to mistranslation and losing important aspects of the research. As Bryman (2016, p.71) argued “The crucial question is not whether the findings can be generalized to a wider universe but how well the researcher generates theory out of the findings”

Case studies are thus used as a way to explain and understand complex issues without losing the complexity of the topic itself. This is also the reason why, even though multiple cases are researched, this is not a comparative case study research. The case studies together help explain the concepts of increased urban density on the liveability of an area, but comparative research is not of use as the main ambition is to research the cases to understand the complexity and a focus on comparison might diminish this. By researching cases all specific to Utrecht the argument can be made that the cases add together to understand the situation within Utrecht. By researching more cases and thus having more results, more dimension can be given into the situation as the researcher is able understand the circumstances of the cases better, which gives a better understanding of the concepts and gives more robustness to the results which thus show when the concepts will or will not hold (Yin, 2009; Flyvbjerg, 2006).

While choosing the cases one important aspect is to choose cases which are still ongoing, as cases which are already in the past or over respondents are more likely to forget important details or feelings while the case is still happening (Boeije et al., 2009). Thus by doing research into cases which are still ongoing

a better understanding of the situation and thoughts of the respondents is obtained, which creates for more reliable results.

The reason why a clear demarcation of the areas is of importance in this research is to have a clear idea which areas need to be researched. Thus by demarcating an area the research becomes more manageable as it is clear what will be researched and what not (Verschuren & Doorewaard, 2010, p.22). Especially because of the residential surveys this is important, as it will show a clear demarcation of the areas, thus making sure that people living in the area will be found and recognised.

This research is demarcated by the municipal boundaries of Utrecht. In this research several areas will be researched (Merwedekanaalzone, Cartesiusdriehoek, Beurskwartier en Lombokplein). All these areas have their own specific demarcations as can be seen in figure 3.1 and 3.2. Because of the specific demarcation this research can be considered to have three specific case studies in which the researched areas within Utrecht are the cases. As the focus of the government is on urban infill it is expected that most of the new building plans are within Utrecht which makes for a relatively solid demarcation for the research. These three areas are all chosen because all the areas are undergoing significant changes, which will result in a massive increase in housing property in the areas. It is of import

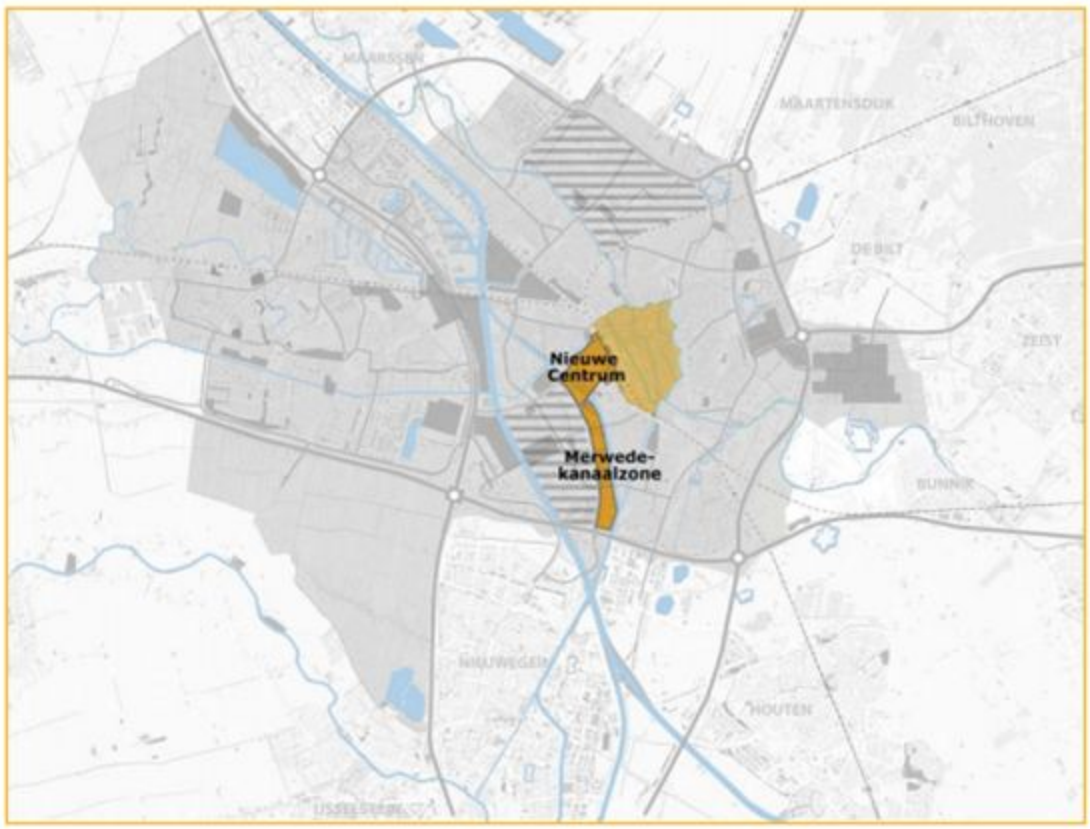

Figure 3.1: Location of the 'Nieuwe Centrum' (Beurskwartier and Lombokplein) and the 'Merwedekanaalzone' in Utrecht in relation to the city centre (Source: Gemeente Utrecht, 2016)

Figure 3.2: Location of the Cartesiusdriehoek in relation to the city centre (Source: Gemeente Utrecht, 2017)

3.3 Policy Research

To get an understanding of the actions which are taken by the municipality of Utrecht, it is important to read and analyse the policies that affect the researched areas. Policy research is of importance as it provides for information and context to the research area (Bowen, 2009, p.29; Srivastava & Thomson, 2009, p.74). Doing policy research also creates good preparation for the expert interviews, while also making sure that no information is overlooked, as policy analysis can create new insights and thus also new interview questions to be asked (Bowen, 2009, p. 30). Policy analysis is also of importance as it can help keep track of developments and changes over time, these changes can give insight into the projects (Yin, 2009). Lastly policy analysis is of importance as it can corroborate information found in the research. By doing only interviews, the possibility is open to mistakes, by doing both policy research and interviews it thus creates for more depth into the research which also comes with more reliable information (Angrosino & Mays de Pérez, 2000). There are flaws with policy research as the policies researched can come with insufficient details as the policies are not written for research, sometimes might not be accessible and lastly are open to biases as policies tend to support the principles of the organisation which has written them (Bowen, 2009, p.31-32). However these are flaws which do not

outweigh the advantages policy analysis can give. As policy analysis is cost-effective, detailed, efficient and provide for a large coverage of the topic (Bowen, 2009, p.31).

The policies which will be analysed are policies which deal with concepts written about in this research. Thus the policies are written about housing, construction and development within the three case areas. The policies will be local policies made by the municipality of Utrecht, and all the policies can be seen, next to the case study, in table 3.3. All these policies are publicly accessible.

Case studies	Policy Documents
Cartesiusdriehoek	● Koersdocument Cartesiusdriehoek ● Cartesiusdriehoek, fase 1
Merwedekanaalzone	● Merwedekanaalzone: Bouwen aan een gezonde stad ● Omgevingsvisie Merwedekanaalzone - Deel 2: uitwerking van de ruimtelijke agenda
Beurskwartier and Lombokplein	● Omgevingsvisie Beurskwartier en Lombokplein: naar een groter centrum

Table 3.3: The policies analysed for each case study. (Source: Author)

3.4 Expert interviews

One form of research will be expert interviews, this is a type of interview where people will be interviewed which have knowledge which is not available to everyone (Bogner, Littig & Menz, 2009, p. 18-19). For this interview a topic list will be used. This topic list will be based on the literature research done in chapter two (see chapter two: theoretical framework) (for the topic list see appendix X.X). Because of the use of a topic list this will be a semi-structured interview. This makes the goal of the research to create enough of a structure to focus on the main topic, but also acknowledges that it is of importance to create a dialogue to get information which goes further than the questions based on the theoretical chapter. This is of importance to deal with unexpected results and at the same time to have an interview which creates an environment where the interviewee is able to answer the questions on their own terms (May, 2002, p.123-124; Xu & Dumay, 2011, p.246-247). It is also of importance for the interviewer themselves to be prepared and thus is able to lead a productive interview based on the topic and themes of the topic list (Bogner et al., 2009, p.32). With the interview having an open structure for asking questions, it will be a problem if the interviewer can not talk about the topic in an adequate way. Being a semi-structured interview means that the interviewer needs to prepare well, as the interview is expected to be more than a casual conversation and go in depth on the topic while avoiding going down a question list as in a structured interview, so that a more open dialogue is created (Xu & Dumay, 2011, p.247).

It is expected that three types of information will be found from the expert interviews. The first one is technical knowledge, which means that the expert has a more specific knowledge about a subject than the average person. The second form is knowledge of the process, this knowledge is gained by the experience the expert has by being engaged in the specific field. Both these forms of knowledge means an expert will have more knowledge about the subject than a random individual (Bogner et al., 2009, p.52). The last form of knowledge is interpretative knowledge, this is not specific to just experts. This means that every person has their own subjective way of looking into a subject and thus can interpret things differently. This last form of knowledge makes it of importance to interview several different experts to get a more objective view on the obtained information (Bogner et al., 2009, p.52-53).

To find experts to interview is a challenge, as there are only a small number of experts to find, a matter of finding these experts and then also convincing them for an interview must be done (Bogner et al., 2009, p.104). It is possible that not all experts will have time or are willing to do an interview, and unlike interviews with residents, it is harder to find a new expert. As certain experts will be hard to reach, snowball sampling or network sampling will also be used, if not enough experts are found initially. This means that new experts will be found by asking already interviewed experts for advice where and how to find them (Boeije et al., 2009, p. 263-264). The goal is to find as many experts as possible for each case, while knowing there is a limit in how many willing experts can be found. The experts which were able to give interviews for this research can be seen in table 3.4.

The specific experts which will be interviewed are people which are involved with the policies which are affecting the three cases. The interviews are considered to be of cyclical natural meaning that interviews will be done until a certain form of information saturation will be achieved, where it is assumed new information will not be found anymore by new expert interviews (Boeije et al., 2009, p.259). The final goal is that by doing these interviews information will be found which will help answer the research questions given in the introduction.

With qualitative interviews it can be difficult to realise when a point of saturation is reached and how many experts must be interviewed (Fusch, & Ness, 2015, p.1408-1409). Data saturation is best reached by having either a lot of data or very detailed data. In the most desirable case both will be achieved. In these specific cases a lot of expert data will be hard to realise, so it is important that the data obtained is very detailed and rich. Thus also the reasoning for semi-structured interviews in this case which should offer the chance to gain a lot of data from the experts (Fusch, & Ness, 2015, p.1409).

The interviews will be recorded and will be transcribed by the researcher. By doing this it is possible to exactly quote the experts. Quotes however will be translated, this is because most interviews will be taken in Dutch and this research is English. It will be the job of the researcher to make sure no information gets lost or changed in the translation (Boeije et al., 2009, p.148-149). The interviews will be analysed by the use of coding. Coding is used to organise the data so it can be easier analysed for the research, however the risk with coding is that it can close off possible results and thus reduce the open-endedness of possible results (Bryman, 2016, p,569). This means that the information obtained from the interviews will be put in several different categories based on the literature. Basing the categories on the literature is of importance as this will make the categories of relevance to the research

(Boeije et al., 2009, p. 268-269). Using coding itself is of importance as with a large amount of interviews a huge amount of data will be obtained which is difficult to analyse without approaching is in a systematic way (Boeije et al., 2009, p.268). While using coding it is of importance to be open for new results and possibilities which are not contained in concepts used now. This is to have the opportunity to find results which might differ from the theory used. Especially in this research this will be of importance as most theory used could be considered as sensitizing concepts. This means that there are not clearly defined definitions to the concepts used, the concepts are mostly a form of guidance and understanding (Bowen, 2006, p.13-14). Sensitizing concepts can be tested and improved upon, which means that if the used themes and concepts are considered lacking for this qualitative research, it is possible to add new themes and concepts to have a better understanding of the concepts and results. The different themes will make a code tree which will be shown in the appendix (figure 9.4). This code tree will be used as the backbone of the results chapter.

Case	Role of the expert	Date of interview	Anonymous name for the results chapter
Cartesiusdriehoek	Urban planner for the municipality of Utrecht	06-12-2019	Joris van Haaften
Cartesiusdriehoek	Urban planner for BGSV	09-03-2020	Judith de Koster
Cartesiusdriehoek	Architect for Mecanoo	10-03-2020	Otto Diesfeldt
Merwedekanaalzone	Urban planner for the municipality of Utrecht	03-12-2019	Léon Borlee
Merwedekanaalzone	Developer for Boelens de Gruyter	01-04-2020*	Elies Koot
Merwedekanaalzone	District consultant for the municipality of utrecht	03-12-2019	Loog Landaal
Beurskwartier and Lombokplein	Urban designer for the municipality of Utrecht	19-09-2019	Ashwin Karis
Beurskwartier and Lombokplein	Advisor on healthy environment for the municipality of Utrecht	19-09-2019	Ellen Peeters
Beurskwartier and Lombokplein	Reporter on the development of the central station area from bouwpututrecht	09-03-2020	Herbert Boland

Table 3.4: Summary of all the experts interviewed for the case studies

*This interview was done by skype as the corona measures started to take effect within the Netherlands

3.5 Qualitative Survey

The second form of qualitative research deals with local citizens, which will be giving qualitative surveys. It is important to survey the citizens living in these dense areas, to get information about their experience in the area, which will get an idea about experienced liveability. The citizens, more than the local authority, experience the effects of density on the way they live in the area. The goal is to find information which can add upon the ideas of the government to deal with the effects of density, and to have a better insight into the case studies. If decided that it is of interest, more expert interviews, after the resident interviews, can be taken to have a cyclical process which asks newly found information to interviewee until a saturation of information is found (Boeije et al., 2009, p. 259). For the residents a minimum of thirty surveys will be taken for each case as that should give enough results to get the information needed to get fair results from the population within the case areas.

To get information about the experienced liveability in Utrecht, residents living in the three case areas will be interviewed by using a qualitative survey. Surveys are used in this case instead of interviews, because surveys are able to get a lot of small information from a wide range of people (Driscoll, 2011, p.162-163). For the time limits and the scope of this research, surveys seem to be the best option in this case, as thus more residents are able to share the experience, thus making the results less skewed towards a few people. A qualitative survey is different from a normal survey as it does not focus on quantitative data, thus not focussing on frequencies or parameters of certain topics. But it researches the variation of how a group of people answer similar questions. Thus the objective of a qualitative survey is to understand the dimensions and the meaningful variations within a specific population, which in this case is the population of the three case areas (Jansen, 2010).

The objective of these surveys is to obtain knowledge of the specific experience and opinion of each resident. All these people have a specific experiential knowledge about living in the neighbourhood which cannot be found outside of it (Bogner, Littig & Menz, 2009, p. 18-19). To get this experiential knowledge the surveys will be based on open questions as this way it is believed that each resident has a straightforward way to explain the personal experience of living in the specific research area.

With qualitative surveys it is not expected that a point of saturation will be reached. It is more important to make sure that the population which Utrecht consists of is represented in the survey. Thus different people with different social backgrounds should be interviewed thus collecting information from the survey which represents the people living in the specific case areas (Jansen, 2010). Sampling of residents in this case is thus also with the purpose to find a right representation for the case area (Jansen, 2010). For the resident interviews it is of importance that people will be interviewed who have a residential place in the areas of interest. Outside of that there will not be a clear demarcation. This means that the only defining characteristic of the research units are the place of living, while the other characteristics are up for complete randomisation. However as the research will be done in Utrecht, and thus the people of Utrecht will be interviewed, it might be worthwhile that the characteristics match the general

population characteristics of Utrecht. However with the scope of this research that will be hard to accomplish.

To interview these residents it is expected that most theoretical terms will not be understood. Thus all terms must be translated into questions which are understandable while still getting the information needed for the research. The length of the survey should not be too long as participants are less likely to fill in a long survey (Driscoll, 2011, p.166). A maximum of five to ten minutes for a survey seems thus reasonable. The choice for the type of survey was chosen for online surveys, this is to get as many people as possible to fill in the questionnaire, without the need for meeting them. This was partly done because of the Corona crisis which was happening while sharing the surveys. The surveys were filled in between the months of May and June in the year 2020. The online surveys were both shared in online community groups about the researched neighbourhoods and were shared by a letter put on post to reach the addresses in the neighbourhoods. This was done to be able to reach the people who are affected by the increase in housing in the areas. This is of importance as the location is the defining characteristic needed to fill in the survey and if people outside of these areas filled in the survey this could create an answer not relating to the research question and thus create muddled answers from the surveys.

The survey will be based on the theoretical chapter with questions asking about the experience in the neighbourhood. The knowledge wanted is related to the neighbourhood the respondents reside in. and exists out of four parts. The first question is related to the neighbourhoods where the residents are asked if they live within the neighbourhoods of interests, which are Cartesiusdriehoek, Merwedekanaalzone and the Beurskwartier and Lombokplein, or in close proximity to the area, which is five minutes walking distance to the area. This was asked with the reason to make sure only people affected by the housing developments would answer the questions and to divide people into groups pertaining to the neighbourhoods. This last part was done so that the researcher had a clear view which answers fitted with which neighbourhood. The second part is about the specific demographics of the residents. This is important to get a good representation of the people living in the neighbourhood, which is essential to qualitative surveys as Jansen (2010) said. The questions within this part are based on neighbourhood surveys done by the municipality of Utrecht (Gemeente Utrecht, n.d.b), this is to make sure that the data found in this survey can be compared to date to check if it is representative. The third part and last part are about the experienced liveability, where questions are asked about how people are experiencing the neighbourhood and what the view is towards the new housing developments in the neighbourhood. Effort is made to write these answers in a neutral way to not steer the respondents into answers. This for example meant that the questions were focussed on general experience and not specific questions were asked for example specific to the categories discussed in the theory such as infrastructure. The reasoning towards this is to get answers towards what people consider the most important positive and negative factors in their neighbourhood. With the logic that if the infrastructure is leaving a positive or negative impression on the citizens, that the survey should reflect that with questions relating to the experience of living in the neighbourhoods. With specific questions in that case, answers would most likely be gotten for all categories, however people might have felt steered towards them as it is not something which the respondents would have thought about without the steering of the questions. It is also important to leave some of the questions open and

neutral in qualitative research as it can show holes in the theory, where answers might be gotten which are not covered by the theory used for the research.

The survey can be seen in the appendix (Table 9.2 & 9.3).

4. Case Results

In the results chapter the findings of the three forms of research will be shown for each area. The chapter opens with a general overview of the development in Utrecht presenting the context for the case studies. After the general overview the three case studies of the Cartesiusdriehoek, Merwedekanaalzone and Beurskwartier and Lombokplein will be written about. For each case study firstly a small overview of the recent developments of the case and the opinion of the residents will be given. This is followed by an overview of the findings from the research into each case. These findings are separated into built liveability which looks from the perspective of the spatial planning and then followed by an experienced liveability which comes from the perspective of the citizens. Each case will end with a general discussion which places the main discussion points and results from the cases into perspective.

The ambition of Utrecht in the oncoming years is called 'Healthy Urban Living'. The essence of the plan is that Utrecht as a city is growing, and this urban growth needs to be done in a way which is beneficial to the city. So as the name suggests, the ambition is to create a healthy way of living within an urban environment. This urban growth will be taken care of within the existing city boundaries (Gemeente Utrecht, 2016b, p.18). A change in how the municipality dealt with the growth is that it has become more important to predict and act on the growth before it happens. As the fear is that reacting to the market or the possible growth in population could be too late and cause accidents or problems within the city (Van Haaften, personal communication, 2019). Another reason why Utrecht deemed it as more important to be ahead of it is to save the green areas surrounding Utrecht. As without a spatial plan to deal with the growth the fear is that the urban growth of Utrecht would expand into the green area, instead of that happening plans are set up to deal with the urban growth by urban infill (Gemeente Utrecht, 2016: p.6; Van Haaften, personal communication, 2019). In 2017, 2018 and 2019 private companies will start the building of about 8.200 houses. These mainly exist of social rent (2.250 units and 1.450 student units) and medium-expensive private sector rental housing (2.400 units) (Gemeente Utrecht, 2017b). The central points of focus in these plans are health, sustainability and liveability. This means for big changes in the urban design of the city is that there will be a focus on travel. Which also implies that there is an improvement of the infrastructure in support of cyclists and pedestrians (Gemeente Utrecht, 2015a).

4.1 Merwedekanaalzone

The 'Merwedekanaalzone' has a density of 55 buildings on each hectare square meter. The goal of Utrecht is to increase this to 80 buildings for each hectare. This essentially means that for every two buildings one more building will be added (Gemeente Utrecht, 2016: p. 26). To be specific towards the housing supply, in march of 2018 there were 1579 residencies within this area. The goal is to add an extra 5000 housing units to the area which creates for a total of 6500 housing units, where the

investments in the housing will be tied to investing in the infrastructure (Gemeente Utrecht, 2019, p.7). With this growth there is a possibility that more housing will be built adding up to a maximum of 10.000 residencies, but this is dependent if the effects of the increase in housing is in line with the predictions (Gemeente Utrecht, 2019, p.16). The development of these plans started in 2016 and are expected to be fully finished around 2030 (Gemeente Utrecht, 2019, p.7). This redevelopment project will also include 1538 social renting housing of the total 5400 new residencies (Gemeente Utrecht, 2016).

Merwedekanaalzone is located to the south of the central train station (in figure 4.1 the central train station is named stationsgebied) and the city centre of Utrecht and in between Transwijk, Rivierenwijk, Dichterswijk and Kanaleneilend. This can be seen on the map of figure 4.1**,** where the area of development is demarcated by a red line. The map also includes yellow markings which stands for areas which are under development and orange marking which are realised developments. The recent developments within the Merwedekanaalzone have mainly had the focus on making the ground ready for construction. The area is different from most of the surrounding areas as it was made after the Second World War while the other nearby areas (e.g. Rivierenwijk, Lombok, Hoograven) are pre-Second World War suburbs (Gemeente Utrecht, 2020, p.28). In figure 4.2,4.3 and 4.4 pictures can be seen to get an impression of the Merwedekanaalzone.

For the general development plans in the Merwedekanaalzone, half of the 32 respondents have answered positively towards them and are excited about the future of the area. One respondent said: “We bought our current house knowing of these developments. I think it is good for the neighbourhood” (Respondent 24). Eight of the respondents were more mixed in the reactions, where there is understanding for the necessity of the growth but are not as positive towards the effects it could have on the area, where the fear is that these developments are too ambitious for the area it is in. One of their main complaints is that they wanted their opinion to have mattered before the government set up the plan. Lastly close to half of the respondents have been more pessimistic or negative about the growth. Their main fear is that the Merwedekanaalzone will become too busy, which will put too much pressure on the local area.

Figure 4.1: Map of the Merwedekanaalzone and the sub-areas within the Merwedekanaalzone (Source gemeente Utrecht, 2019)

Figure 4.2 Impression of the Merwedekanaalzone (Source: marco.broekman and OKRA, 2020)

Figure 4.3: Impression of the neighbourhood square (Source: marco.broekman and OKRA, 2020)

Figure 4.4: Overview picture of the Merwedekanaalzone as it is in 2020 (Source: Gemeente Utrecht, 2020)

4.1.1 Infrastructure of the Merwedekanaalzone

4.1.1.1 Results from the expert interviews and policy research

The main function of the spatial plan for the Merwedekanaalzone is housing, this means that of the Merwedekanaalzone, 85% of the area will be used for housing. This amount of housing is slightly above the average city district (Gemeente Utrecht, 2020, p.31; Landaal, personal communication, 2019). This fits with the ambition of the city which wants to deal with an increase in the population. The goal is to get mixed living, this means that the other 15% of the buildings will be non living (Gemeente Utrecht, 2020, p.108).

The area has also been chosen with the ambition that it will connect to the city, as right now the south western part of Utrecht still feels separate because of functional and spatial barriers. This means that both the infrastructure is not well connected as the infrastructural connection from east to west was never properly developed. When discussing the area being disconnected the aspect that the area is built after the Second World War is also of importance. This is because the neighbourhoods such as Rivierenwijk and Dichterswijk to the west of it were built before this war. This has caused a cultural separation between the areas (Gemeente Utrecht, 2020, p.26). With redevelopments in the infrastructure and housing these barriers are dealt with.

One aspect of connecting the housing with the neighbouring areas is that the height of the buildings need to suit the area. This means that the buildings on the side of the canal will be lower to make the transition between the neighbourhoods go smoother (Borlee, personal communication, 2019). There will be a few height accents but those will be evenly spread around the area (Gemeente Utrecht, 2020, p.51). That said the new area will on average be significantly larger than the surrounding areas as there is a focus on high-rise buildings, this will just be done in a gradual way, so that it is not jarring (Gemeente Utrecht, 2020, p.51)

To deal with these housing developments the infrastructure is of huge importance, as adding 4000 new housing will create an impact from the new pedestrians, cyclists and cars on the infrastructure in the area (Koot, personal communication, 2020; Gemeente Utrecht, 2020, p.13). The intent is to build a green and car free area, which is still well connected to the city as a result of intricate cycling and walking routes and enough and well connected public transport. This means the focus will shift from car focussed infrastructure to slow infrastructure (biking and walking) (Borlee, personal communication, 2019; Gemeente Utrecht, 2020, p.13 & 26). As of now the plan has 0.3 parking places for each residence, and none of these parking places are able to be bought for individuals (Koot, personal communication, 2020; Gemeente Utrecht, 2020). Parking itself will be done underground in support of the image of an outside area which is for people and not for cars (Gemeente Utrecht, 2020, p.25). This means more than half of the residents who will live here cannot expect to have a car in the area. This shows a shift from car dependency to a form of slow infrastructure which depends on cycling, pedestrians and travel by public transport. This also is with a focus on car sharing, which is called Mobility as a Service (MaaS). For this mobility hubs will be set up which exists out of travel services, a mobility shop and a digital

platform. This will be overseen by a travel director as this needs to be well organized so that the citizens in the area are not disadvantaged by the shift away from car ownership (Koot, personal communication, 2020; Gemeente Utrecht, 2020, p.62-63). Even though the inner area of the Merwedekanaalzone will be car free, this does not mean emergency transport and people with a handicap cannot go with their car inside the area, this will be possible. However, most car use will be focussed on the edge of the area (Borlee; Gemeente Utrecht, 2020, p.54 & p.84). The area will also have a central place for packages to be picked up from, as logistics is also limited by the car free area (Gemeente Utrecht, 2020, p.63)

As mentioned above with the development of the infrastructure the nearby neighbourhoods are considered. Thus creates the ambition to develop a green-blue network and a slow traffic network which spans the wider area (Borlee, personal communication, 2019). An example of the slow traffic network is that several bridges are built over the canal to the east of the area, which are built to deal with the traffic intensity gained from the new housing developments. These bridges are only for cyclists and pedestrians, not for cars (Gemeente Utrecht, 2020, p.58). Built to improve the connection to the nearby neighbourhood, which makes it easier to visit the other neighbourhoods and make use of the existing facilities there (Koot, personal communication, 2020). Moreover there is a need to implement paid parking in the nearby neighbourhoods, as the risk is that these areas will get overcrowded by cars of residents of the Merwedekanaalzone parking their cars in nearby areas (Koot, personal communication, 2020; Gemeente Utrecht, p.83). Involving the other neighbourhoods in the development of an area is not that common, but with the ambition of limiting cars in the area, this is of importance as it could cause negative spillover effects, if not dealt with ahead of time (Borlee, personal communication, 2019). A challenge will be that the surrounding areas are not built for these forms of biking, this means that these areas will also need to be changed so they can handle the focus on bike travel (Gemeente Utrecht, p.72). Another challenge is that the plan for bridges which has caused for some friction in the area next to it as the citizens are worried about the effects, however five bridges total over the whole area will be planned, which is less than originally planned, for the compensation the three existing bridges will be improved (Gemeente Utrecht, 2020, p.75).

4.1.1.2 Results from the surveys

As for the experience of the infrastructure several of the respondents were satisfied with the proximity to the city centre and the central placement of the area within Utrecht, while also being close to the highway. The public transport near the area is also noticed as a positive, especially the tram. This creates a feeling from the residents that everything within Utrecht is nearby. The main criticism is that some people wish the area was better connected to the historical city centre of Utrecht. Residents also think the area is too busy with cars and bikes, which are also occasionally driving too fast. In general there is a lot of traffic and there is not enough parking to handle all the cars and bikes in the area. People wish for more parking availability and are not happy with the paid parking coming, as they are happy with the free parking as it is now. The development has also caused for busier roads. While the work done has improved public transport, it also caused for frequently being unable to use the public transport because of the construction.

The plans on the infrastructure are generally met with a mixed response. Positive ones are excited about the improvements of the infrastructure between the Merwedekanaalzone and the city centre and some people are excited about the focus on less travel by car and a more focus on alternative travel. But one of the main points of contention for the residents in Rivierenwijk are the bridges which connect the Merwedekanaalzone and the Rivierenwijk which lies to the east of the area. People are worried about the effects these bridges will have on the neighbourhood as it will increase traffic towards the streets in the Rivierenwijk. The sentiment is that the traffic incoming from the cyclists will be too much for the area to handle. One person frequently sees accidents while cycling because it is already very busy, while others fear for a general increase in traffic both during the building and after when the new citizens live there, which could also be dangerous. The main sentiment is thus that in the plans there are too many bridges which will overflood the area with cyclists and thus break the nearby neighbourhood open. As of now the whole discussion about the bridges has caused agitation within the neighbourhood. This is also a dilemma in the spatial planning for the Merwedekanaalzone as seen in the quote below.

> "But I understand the remarks, A bridge with lots of pedestrians is added where first there was nothing. Especially for the citizens which will have it in front of their door. Of course there will be resistance, that is logical and that is part of spatial development. So it is important to listen to them, which is done. But on the other hand, you cannot remove it as it is important to deal with the traffic intensity, removing it makes the accessibility sub par." (Koot, personal communication, 2020)

Another criticism is that the infrastructure which has a focus on slow travel will not work out, as one interviewee said, this could work for students, but out of experience young families will need cars, and there is not enough parking. This goes together with a general cynicism about the ambition of the slow infrastructure. Mixed with this is worry about the parking, as the focus on a car free area will impact the nearby areas. Several people have been negative about the paid parking and other people are afraid there will not be enough parking spots. Many still need cars and the consequences of the focus on slow infrastructure are still uncertain within Utrecht where the worry is how feasible this ambition is. But some people living within the area are positive about the deemphasizing on parking spots in the area as this goes together with good sustainable policy.

> "Young twenty year olds can handle living without cars, but people in their thirties with children often want a car, and not a shared one. I expect in five or ten years that there will be far too little parking place for this zone. " (Respondent, 17)

Several of the respondents showed that the need for more housing is of importance and that the area of the Merwedekanaalzone is underused which makes it a great place for housing development. Where the argument is that the development of the area has already shown a general improvement to the location itself and the neighbouring areas such as Transwijk. Some people are worryful of the housing developments as there is a focus on high-rise buildings. The main preference from the residents is to have low-rise buildings with communal gardens. This comes together with a fear that there are too many buildings planned for the area. People are mixed on the look of the area where several argued that there is beautiful architecture in the area and that the housing is beautiful. However at the same

time several people were also critical of the amount of high-rise buildings and office spaces, which some of the respondents said that looks boring, ugly and impoverished and thus in need of renovation. Several people are thus also happy about the development as large parts of the area exists of industrial area. These developments should be able to make the area look more appealing, and also make it connect to the neighbouring areas in a way an industrial area does not. The construction developments in itself have mainly caused criticism for obstructing both the view of the area and the sun.

4.1.2 Culture and Environment of the Merwedekanaalzone

4.1.2.1 Results from expert interviews and policy research

To get the mixed lively district it is important to not have an imbalance of facilities, too much housing or office space could have a negative impact on the mixed district (Borlee, personal communication, 2019). One of the main goals in the area is called the lively district. This means that the area should not just be for housing, it needs to be an area with a huge function mix, where a lot of activities can be done (Gemeente Utrecht, 2020, p.91). An area that will have schools, childcare, health centres, supermarkets and facilities catering towards the hospitality industry (hotels, restaurants and coffeehouses) (Koot, personal communication, 2020). It is of importance that none of these functions are underrepresented, there needs to be the same level of social and shopping functions in this area as in other areas of Utrecht. Daily needs (defined as supermarkets, public transport and primary schools by Utrecht) will all be on walking distance, other non-daily activities are less important and nearby neighbourhoods can help with that, even though those will also be in the area (Borlee, personal communication, 2019; Gemeente Utrecht, 2020, p.83). The focus in shopping will be on daily products. This means that non essential stores are limited (Gemeente Utrecht, p.101). An extra focus will be on the hospitality industry which needs to be on par with the best areas of Utrecht (Borlee, personal communication, 2019). The goal is to create an atmosphere where people eat out occasionally. The argument is that more than ever places to eat are important in having a positive effect on the social environment, as it is used as a meeting place (Gemeente Utrecht, 2020, p.101-102). The services and facilities will thus have a focus on the local area.

The shape of the buildings are made in a way to deal with the street profile. This means that the height of the edifices differ so that the streets are not in constant darkness (Gemeente Utrecht, 2020, p.163). The difference in size of the buildings within the apartment blocks is also done to create a diversity, this is to get a human measure in the block (Gemeente Utrecht, 2020, p.87 & 163). The inside of each building block is provided with a communal green area (Gemeente Utrecht, 2020, p.164). The bottom level of the apartment blocks are of importance, as this can have an effect on the perception of safety in the area. If this part of the building is liveabile this improves the perception of safety. This will be done by for example giving an overview of the outside area, as people have a better understanding of the situation outside (Gemeente utrecht, 2020, p.163).

There will also be an extra focus on the creative industry, which should be above average in the area, this is because it fits with the idea of a car-free area (Borlee, personal communication, 2019). Everal new

or already existing cultural and creative businesses including Villa Jongerius, Mobach, Vechtclub XL, the Alchemist, the Stadstuin, Kanaal30 and Boulderhal Sterk. These businesses are important for the area as they define the identity. The goal is to strive for more creative businesses (Gemeente Utrecht, 2020, p.99). This can be done with initiatives from local people living in the area (Gemeente Utrecht, 2020, p.100). There will be investment into culture and existing creative companies will be kept. A house of culture will also be built (Gemeente Utrecht, 2020, p.108). Added to the creative industry, there will be art in the open space to amplify the attractiveness of the area (Gemeente Utrecht, 2020, p.100 & 158). With the focus on mixed living the ambition of the Merwedekanaalzone could be described with the quote below.

> "The Merwedekanaalzone is almost a city within a city" (Landaal, personal communication, 2019)

The focus will be on a several and diverse set of smaller functions and companies, which cater to the people living in the area. Larger scale functions are avoided as these could cause too much traffic from people outside of the area which could get in the way of living.(Gemeente Utrecht, 2020, p.91). Another goal with providing these different services in the area is to also support the social cohesion in the area. These services are not just for the people in the Merwedekanaalzone but also for the people in the adjacent neighbourhoods. This should create meeting places in the area and create the chance of use of the facilities, for more than just the people living in the Merwedekanaalzone (Borlee, personal communication, 2019). This is also partly the argument for the bridges in the area, which makes it easier to visit the shops in the nearby neighbourhoods, which the shopkeepers are excited about (Landaal, personal communication, 2019).

The Merwedekanaal will get several new activities which will include swimming, stand up paddling, sloops and other boat activities. Right now the channel is used mainly for rowing, fishing and for houseboats. Here it is of importance that rowing is of priority and the function of trainingswater can not be diminished. With the growth the use of the channel will only increase so it is of importance to make clear agreements with the involved parties. (Gemeente Utrecht, 2020, p.42 & 115). For playing outside the area will follow the norm of Utrecht for the younger kids (3% of the area for playing) (age 0-6 and age 6-12), however extra facilities will be put for kids from age 12-18 (basketball field for example) (Gemeente Utrecht, 2020, p.113). Sporting facilities are of importance as 84% of kids are members of a sporting association. However there is not much space for this so safe connections to (existing) places outside of the area are important (Gemeente Utrecht, 2020, p.115). Being able to move is still of importance that is why space is made for small walks (with the dog) and space for running or other sports. This is all part of the blue-green infrastructure in the area (Gemeente Utrecht, 2020, p.110)

Several local social services will be set up or given a place in the area which will have a focus on health, sustainability and behaviour. The focus on the local neighbourhood also has to do with young families, as the focus is on kids and the parents of kids (Gemeente Utrecht, 2020, p.91). The area is made so that it encourages people to meet other people. This does not mean that it needs to be a deep relationship, but it does mean that people recognize each other. This is done by having several facilities in the public space, squares and green in the communal gardens for each apartment block, community center and by

having a neighbourhood house for culture (Gemeente Utrecht, 2020, p.110). With the car free zone this should be stimulated as there is more open space for just cyclists and pedestrians, which should stimulate social contact and use of the public space (Koot, personal communication, 2020).

The design of the area is based on both the era before the Second World War and designs of buildings after that war. This is as the housing within the area itself is from after the Second World war, but the housing across the canal is from the era before (Gemeente Utrecht, 2020, p.52). The area will include several historical buildings, which will be easily accessible. These buildings need to help stimulate the liveability in the area (Gemeente Utrecht, 2020, p.39). Several are imbued with cultural history, several of these will still be kept as they are deemed to have historical value, however the functions of these buildings can or will change. Several of the structures in the area will also be kept (Gemeente Utrecht, 2020, p.36).

Because in the plan a lot of buildings are built, it is of importance to think about the green environment between the buildings. Since the start of the plan the green environment has been an important part. A lot of greening is essential especially in the open area between the buildings (Koot, personal communication, 2020). The norms of green area are set by the municipality, which is an average of 121 squared meter green per housing unit, are not possible to get in the Merwedekanaalzone. To deal with this it is of importance that high standards are set for the quality of green in the area, and that as much green is built as possible without losing on the amount of housing (Borlee, personal communication, 2019; Landaal, personal communication, 2019). To also deal with this, green infrastructure is built to existing green areas on the border of the municipality and to invest in the nearby park Transwijk (Borlee, personal communication, 2019). Next to the Merwedekanaal small parks will be added, this is in support of a green walking network (Borlee, personal communication, 2019). The main goal is to create green wherever possible. This means there will be green at the roofs, in the public and each building block will have a semi private garden (Koot, personal communication, 2020). Fifty percent of the roof of the edifices will be used for green, fifty percent used for solar panels (Koot, personal communication, 2020). There is always a discussion when focussing on green and on increased density, focussing on both can feel like a contradiction and does create cynicism. This cynicism can partly be true as when there is not enough money, the ambition of some projects can drop (Landaal, personal communication, 2019). Another example of how green will be added is by improving the connection to the nearby park Transwijk. This will go together with an improvement of the quality of the park which is important to deal with the increased use of the area given the increased density (Gemeente Utrecht, 2020, p.30; Van Haaften, personal communication, 2019).

4.1.2.2 Results from the surveys

People are happy about the generally small scale level of the local facilities, while calling the services in the area great and of high quality. There are lots of catering and recreational facilities and activities in and around the canal. Lastly there are also several facilities nearby which cater towards housing furniture and appliances. The only criticism is that there is a lack of facilities centered towards children

in the area. Residents would like more places for food and drinks while asking for some of the catering facilities to be improved. Another facility wanted is a new community centre as there is a lack of communal activities. Thus the most often named positive development would be the growth in new facilities for recreation, shops and the catering industry as a quarter of the respondents specifically cited this as a possible positive development. That said some people are afraid that with new people coming there will not be enough facilities for all citizens and that it will be too busy. Especially schools and sporting areas are cited as facilities which might be missing in the area.

> "It is getting too busy, too many residencies and people on a small area will cause for trouble. Now with Corona you see it even better how often people use the outdoor space" (Respondent 77)

The area around the Merwedeplantsoen is deemed to be very spatial while containing lots of green and water. Outside of this specific area a lot of people are happy with Park Transwijk, but did find their direct environment to be a bit too grey and could use more green while also lacking a bit of living space. The focus on an increase in green in the area is seen as a positive. This also goes together with the belief that the focus on green goes together with an improvement in sustainability. However there is some skepticism about the greening of an area which is undergoing increased density. Fearing that because of the construction a lot of green will be lost and this loss will not be sufficiently recovered.

4.1.3 Healthcare of the Merwedekanaalzone

4.1.3.1 Results from expert interviews and policy research

There will be a Merwedepark which will give space, light and freedom to the area. It also should give an opportunity to do things as exercise, meet people and others (Gemeente Utrecht, 2020, p.39). The focus on having a more open environment for walking and cycling should also create a more social area, as it is easier to meet other people on the street (Gemeente Utrecht, 2020, p.26). The place is also next to the Merwedekanaal, which is an area suitable for recreation (e.g. running and canoeing). However new playing fields will not be made in the area. In the future playing fields will be made at the border of the city as there is space there (Koot, personal communication, 2020).

The motivation in the area is "green, unless" which means that an area would be green unless something else is needed (Gemeente Utrecht, 2020, p.121). Green areas are of importance, it stimulates moving and decreases stress. It also helps with climate sustainability, improves biodiversity and reduces noise. With the increasing density it is crucial to keep the balance between green and urban areas, thus green will be implemented as much as possible. Public space and most buildings will have green areas, and the existing green areas will be of high quality (Gemeente Utrecht, 2020, p.117). High quality is asked of the green infrastructure which means that it needs to add to the biodiversity and strengthen the natural values, it needs to handle recreative use and it needs to adapt to the climate (help cooling the area down and hold rainwater) (Gemeente Utrecht, 2020, p.122 & p.149). For the green the whole south west area of Utrecht will be used to reach the ambitions for a green area. This means that through

the area green infrastructures are made to make the green areas accessible to everyone. Transwijk and especially the park Transwijk are central in this as the park will get a qualitative upgrade. The green investments are also of importance to deal with heat island and to deal with the water from weather (Gemeente Utrecht, 2020, p.119). The heat island effect as projected right now could cause a temperature rise of seven degrees by 2040, thus a lot of green in public space is to lessen this effect, but there is no direct proof yet if this is the solution but we are working on it (Borlee, personal communication, 2019). For extreme rain there will also be a system which transports the water to park Transwijk (Borlee, personal communication, 2019).

The air quality might not be able to hold up to the standards set by the WHO because of the density. This will most likely be the case next at the Europalaan, which means sensitive destinations like child care or nursing homes will not be made within 300 meters of the suspected areas with lesser air quality (Gemeente Utrecht, p.128).

Buildings are made to handle health issues (big windows for enough sun, made in a way that limits annoyance by wind) (Gemeente Utrecht, 2020, p.127). The urban heat island effect is of concern, and to partly deal with this in buildings, green is used as a buffer (Koot, personal communication, 2020). The inner climate of the buildings is also made to be healthy and sustainable (Koot, personal communication, 2020). The buildings are made in a way to minimize noise. The source of noise is also dealt with by minimizing car use and using noise canceling asphalt. With this the set goal of maximum amount of noise seems possible. Only in some places near the Europalaan this is a risk, which means no housing can be built in these areas (Gemeente Utrecht, 2020, p.130). With the area being mixed living the noise needs to be below the limit. Thus this is a challenge, where each housing area will at least have one side which helps reduce noise to be under the noise limit (Gemeente Utrecht, 2020, p.133). To deal with sounds from cars, sound absorbing asphalt will also be used (Gemeente Utrecht, 2020, p.48).

According to the municipality of Utrecht, health is based on not just physical and mental well being, it is also based on the social and cultural circumstances (e.g. study and debts). Support needs to be there for all these people, so a network of professionals will be set up to deal with this (Gemeente Utrecht, 2020, p.92). Spread through the area will be several different forms of health facilities, which also help dealing with mental well-being (health center, youth aid, daytime activities, living rooms and living facilities for the elderly) (Gemeente Utrecht, p.108). The idea is also to stimulate social cohesion in the area. One way of doing this is by following the principles of the closed building block, which should stimulate people meeting each other within the closed building blocks (Borlee, personal communication, 2019). This added with the recreational services in the area should cause people to meet each other (Borlee, personal communication, 2019). The outside area needs to be safe and social, this is done by focussing on visibility, accessibility, simplicity and attractiveness (Gemeente Utrecht, 2020, p.156).

For sustainable development in the area a look was taken at the possibility of being both energy and climate neutral. Climate neutral is not possible according to the research and even energy neutral will be a tough challenge. Because of the housing demand there is no choice but to have a lot of high rise buildings. This for example causes a limit into the possibilities of solar energy (not much roof space and several buildings will be in the shadow). To be able to reach these climate goals would mean we cannot

reach the amount of buildings that are wanted in the area. Only with technological development and innovation it might be possible in the future (Borlee, personal communication, 2019). Added to the idea of sustainability is the idea of circular construction which will be applied during the construction (Koot, personal communication, 2020). One way to support sustainable living is by introducing the concept of the Merwede Lab, which focuses on dealing with issues about sustainability (Gemeente Utrecht, 2020, p.31)

4.1.3.2 Results from the surveys

The area right now is seen as mostly a quiet and calm neighbourhood which the citizens define as the main positive trait of the area, with the exception of some noise from the youth. Where people also cite that there is a friendly environment. Around the residential towers there are some different views where more people were complaining about criminality within the area. The main fear that the citizens have is that the housing will create for an area which will be a lot busier. Several people are citing noise complaints from the construction. A few of the citizens complained about litter on the streets which could be improved. Also noticeable is that a lot of the people used the area as of now for sporting. This includes canoeing and running.

There are not many criticisms or fears on issues on health within the area. Only one person was concerned about the effects of buildings which could cause heat islands. The main criticisms have been complaints about the construction nuisances. Several people also hoped that there would be more safety for nuisance and criminality in the new area.

4.1.4 Stability of the Merwedekanaalzone

4.1.4.1 Results from expert interviews and policy research

Through the years the Merwedekanaalzone has mainly been an industrial area, which was built shortly after the Second World War. Since the seventies and eighties the area has developed and several of the businesses have turned into office space. However the infrastructure of the area has caused the area to feel separated from the rest of the city. With improvements of the infrastructure this will be improved so the area is easier to reach. With the impulse of the newly built housing, the ambition is also to reliven the area, and make it more connected to the city (Gemeente Utrecht, 2020, p.25-28). One example of this is that park Transwijk, which is laying in a neighbourhood to the west of the Merwedekanaalzone, will be expanded upon. The plan is that the people from the Merwedekanaalzone will be able to use the park extensively. Which then could also help create more of a connection between the new citizens and the people already living in the surrounding area over there (Van Haaften, personal communication, 2019).

With the increase of new facilities and more people living in the area, the whole area will become more of a city district or a neighbourhood. This also means more people will live there, thus the area will become busier (Koot, personal communication, 2020). The municipality realises worries made by several people living closeby, who are concerned with the increasing density, where the fear is that it will overcrowd the area. However the counterargument is that this will not happen, the area will only

improve because more different facilities will be available, and this will keep more people satisfied (Karis, personal communication, 2019). The hope with some of these new facilities is that people living in surrounding neighbourhoods will come to the Merwedekanaalzone. This is to create an area which will be a meeting space for both people inside and outside the area (Borlee, personal communication, 2019).

The main friction and negative reaction comes from the side of the Rivierenwijk, which is mostly affected by the construction (Landaal, personal communication, 2019). With the construction lasting between ten and fifteen years, everything will be going gradually. “Sometimes with these reactions it feels as if the people see the picture and feel that all the new housing will be built in an instant, but that is not how this works, it is gradual” (Landaal, personal communication, 2019). In general a problem for a lot of people living in the surrounding area is that these plans will affect them. The main criticism heard is about the bridges built over the canal into the nearby neighbourhood, and it is understandable that people living in the areas of these newly built bridges might be pessimistic. A lot of people have seen that there will be three or four new bridges, and when they live in one of the streets where those bridges will end, this will cause a lot of cyclists cycling next to my house. Everyone is looking at what will happen in front of their house and at the back of their house and are thinking if they are happy with this. This is divided, some people will be curious but also people will be upset. But in a big neighbourhood most people will say we will experience it and thus the reaction evens out (Landaal, personal communication, 2019). For the people planning this is also difficult, as you can only see afterwards how these changes really affected the area (Landaal, personal communication, 2019).

> “Right now most people are worried, thus this causes for agitation. But to be honest, I never experienced it otherwise. It is the way it goes.” (Landaal, personal communication, 2019)

Getting people involved with a plan this big is very difficult. The more interests involved in a plan, the more difficult it becomes to be heard as a citizen (Landaal, personal communication, 2019). As the municipality it is essential to be clear in this, in which ways citizens can help. This still causes agitation when citizens are involved in discussing the project, but later realises it did not matter. It is of importance to keep citizens involved, especially when they can have influence (e.g. the design of the public space), but also be honest when they can not (e.g. the amount of housing units) (Landaal, personal communication, 2019).

Efforts are also put into implementing a mixed residential program, which should prevent that for example only rich people live there or that the area is only social housing (Koot, personal communication, 2020). The goal is to have a diverse set of people in the area, which means buildings are built for people in all prize categories. In specific numbers this means that there will be 30 percent social rent, 25 percent middle category and 45 percent will be free sector (Gemeente Utrecht, 2020, p.86).

For job opportunities the line set by the national government will be followed where it says that job opportunities need to grow alongside the growth of the population (Borlee, personal communication, 2019). This means that the companies and offices in the area right now will be kept, and with the growth more companies will come. The offices might be moved further to the roadside, and new offices most

likely will be built next to the road on the edge of the area. Flexibility in the size of the office space and renting is of importance, which means that companies need to be able to adjust to more or less space without much trouble (Gemeente Utrecht, 2020, p.101). Within this area there is a focus on creative jobs which fits with the identity of a car-free area (Borlee, personal communication, 2019). There is also a focus on the economy of sharing. This includes mobility such as sharing cars and bikes, renewable energy, (flexible) working spaces, tools but also includes the knowledge and skill of the citizens. The goal is to facilitate this economy of sharing with the citizens by using an online platform. This is a city wide ambition (Gemeente Utrecht, 2020, p.32).

4.1.4.2 Results from the surveys

People do feel that there is a community spirit in the neighbourhood, while still having a relatively diverse neighbourhood. Criticism comes sometimes where people notice an influx of yuppies (young urban professionals). Several of the citizens are excited about the possibility of the economical influence these developments can have on Utrecht. Where the hope is that the area will be able to bloom, which will create an economic impulse not just in the area but also in the neighbouring area. The mix of forms of residential development is also noted as a positive as it would be good for the diversity in the area. Another positive influence of the housing would be that it would improve the social environment. This is especially said by the people living in and around the MAX tower, which is one of the first residential towers built in the planning area.

Some are not positive about the future. A criticism on the growth of new buildings also focuses on new citizens, citing them as commuters, which do not care as much about the city, which causes a rift between the older citizens and might cause a general loss of identity. Worries for these developments in the area is that this could cause gentrification. Another fear is that the housing will end up not being affordable for starters. Which became an issue recently when the early prices were announced for the first new housing, making several people feel this is not affordable (DUIC, 2020).

4.1.5 Discussion

The main point of contention between the citizens and the spatial plan is the ambition behind the infrastructure. The infrastructure is of huge importance in the plan and has an ambitious plan to deal with the increased housing in the area. The municipality knew that to be able to build the housing needed to take care of the growth of Utrecht, it is impossible to give everyone parking spots in the area. Thus the shift went to slow infrastructure where a focus is on cycling, pedestrians and public transportation, which would work together with the focus on housing. However with this plan being new to Utrecht several of the civilians have shown some skepticism. While several understand the need for this and some are enthusiastic as slow infrastructure is more sustainable for the environment and promotes healthy behaviour. Several people also are afraid of the effect this will have. Already citing that the nearby cycling roads are busy, and thus are afraid this will overload it. One interesting aspect in this case is the need for the construction of bridges crossing the canal. This implication affects liveability over several aspects. The bridges were needing to deal with the increase of travel in the area because of the new citizens. The focus of the housing has been on creating a neighbourhood where the infrastructure is structured around cyclists, pedestrians and public transport. To be able to support this

enough bridges needed to be made for the cyclists and pedestrians so that the infrastructure would not be clogged. The nearby citizens are critical of these bridges as it will directly affect their neighbourhood with the fear that all the cyclists will cycle through the streets there which creates for a busier and more dangerous environment for them. This shows a general dilemma where the bridges are essential for the infrastructure plans for the Merwedekanaalzone itself, but the neighbourhood in the nearby environment is negatively affected by it.

A general positive of the housing is that an environment which is now considered to be mainly industrial terrain and not fitting with the nearby environment will be redeveloped. This gives the opportunity to transform the area in a way which fits more with the environment then it is now. This does not go without some complaints as people do not want high-rise buildings. But this is essential to meet the housing goals as building for example mainly terraced housing will not support this ambition. That the area puts in effort towards building housing in line with the history of both the area and neighbouring areas and creates accessibility for neighbouring areas to make use of the facilities also help with incorporating the area more in the neighbourhood.

One of the challenges is to create a mixed environment, which is tough as there is a noticeable focus on housing. As of now the focus next to housing, outside of essential facilities such as schools, healthcare and supermarkets, is on work, culture and food services. The main area as of now is industrial area, so the shift towards housing will be of huge difference. This shift is considered welcome by the neighbourhood, as this can help in creating the mixed environment wished for. All the new functions will be set on a smaller scale, this is to make sure that people outside of the neighbourhood do not massively go to the area for the facilities. This helps dealing with the possible flooding of the area, as the infrastructure and the facilities are built for the direct environment and not for more. The people are generally happy with both these developments. Several citizens already praised the existing small scale level of the local facilities which is also considered of high quality. The main facilities wished for are more activities for children within the area and more catering facilities. There are plans made for both as more catering facilities will come and the ambition of the area is to have enough facilities for kids from all ages in line with the standard of the municipality of Utrecht. This includes extra sporting facilities for kids from age 12-18 as sporting is of importance for kids. However with the density a lack of sporting facilities can be a danger. This means that instead of building new sporting facilities connections will be made to facilities outside of the area. While this could partly deal with the lack of sporting facilities this does create a danger of there not being sporting facilities within Utrecht for the new citizens. This could have major impacts on the health of the citizens in the area when they cannot perform the sports wished for.

Green within the area is deemed as of high importance, where green will be built whenever possible. This is partly possible due to the fact that the infrastructure is based on public transport, cyclists and pedestrians which can be built with a lot of green area. This is welcome to the citizens who wish for a lot of green within the area and the municipality sees green as essential to support healthy behaviour within the area. The only area in the neighbourhood where the residents are satisfied with the green in the environment is directly around the Merwede channel. In general more green in the other parts of the neighbourhood is wished while maintaining or improving the green around the channel. In general

factors of health within the area are a bit under pressure. Where parts of the area need to deal with noise, overheating and a bad air quality. This is also mixed with an area which as of now, seems not to be able to reach the sustainability goals set up by the municipality. This is especially a shame with new construction as more modern technology and knowledge is available to create more sustainable housing.

The main fear affecting the stability within the area and for people is that the increase of the new population will bring in a population which is different from the existing one. This means that it will be a new group of citizens with no connection to Utrecht and also are generally richer. This comes together with a small fear for gentrification. That said people are excited about the economical possibilities the new population could provide and some people are excited about the new population as it could bring a boost to the community. The plan for the municipality so far is to create housing for all economical classes which should help limit a problem such as gentrification. Outside of this some people are not happy with the increase in citizens as several of the citizens cite the quietness as being of huge appeal to the area. Thus an increase in citizens will create for busyness in an area which is now considered relatively calm and quiet. As the area is changing from an industrial terrain to what is considered a busy city district a lot of change will happen in the future of the area which most likely will have some impacts in the community. A summary of the main findings of this case can be found in table 4.5 below.

Liveability characteristic	Main findings from research
Infrastructure	- The traffic within the area causes pressure on certain parts of the neighbourhood. The fear is that the slow infrastructure introduced is not enough to handle the amount of population. - Mixed reaction on the idea of slow infrastructure. Several respondents are excited, but several see the car as essential.
Culture and environment	- It is good that the area is redeveloped as it is an industrial terrain. - New facilities for recreation and the food sector with an extra focus on new facilities for children conform to the wishes of residents within the area. - Residents wish for more green in the area, which is in line with the plans of the municipality
Healthcare	- Fear of not enough places for sports and exercise within the neighbourhood. - The area will deal with overheating, noise issues and problems dealing with bad air quality. - Difficulties as of now with reaching the sustainability goals set up by the municipality.
Stability	- The housing built in the area will be for all economical classes, but there is still fear from the residents for gentrification

Table 4.5: Summary of the main findings for each liveability characteristics (Source: Author)

4.2 Cartesiusdriehoek

Of the three case studies the Cartesiusdriehoek was the last one to be decided as a place for development. Originally there was doubt because of the possible high environmental effects building in the location could bring and because the position of the area, which is between two train tracks, causes challenges for the infrastructure and challenges for health (Gemeente Utrecht, 2016a, p.26). The second problem is that the owner of the area, which is Prorail, only recently made it available for development for the municipality of Utrecht (De Koster, personal communication, 2020). Plans for housing development were decided when the municipality wanted to facilitate more housing development. The municipality of Utrecht have planned to build about 2400 forms of residential housing (Nieuwbouw Utrecht, n.d.). The area itself is mainly a former industrial terrain, which most noticeably includes the CAB building. This building is cultural heritage as it is deemed both a reminder of the history of the Dutch national rail system, specifically to the company of the NS, and it is one of the last remaining buildings made by the famous Dutch architect Sybold van Ravesteyn (Gemeente Utrechtm 2017a, p 9-11). Outside of the CAB building, which will be renovated, everything will be newly built. The area will be transformed from an industrial area into a residential area (Gemeente Utrecht, 2017a, p.9). Specific themes which were put in consideration with the development of the area are enclave, inner city, encounter and health (De Koster, personal communication, 2020).

The location of the area can be seen on figure 3.2. The area is located in the northwestern part of Utrecht. The area itself includes several businesses, this includes several companies for leisure such as a pub, a coffeehouse and several music venues, which abide in the CAB-building. There are also several different bigger company buildings, which are PostNL, car damage company, Falck training centre and a Sligro branch (p.11). As of now the area is made ready for construction, but the construction of the apartments has not started yet (Van Haaften, personal communication, 2019). A plan has been made for the first phase of the area which will include the CAB building and the first apartments (next to the CAB building) (Gemeente Utrecht, 2019b). A figure showing the Cartesiusdriehoek as it is now and an impression of how it will look after the building developments can be seen in figure 4.6 and 4.7. Reasoning behind the spatial development of the area can be seen in the quote below.

> “Utrecht gave a consultation document which set up the thought of thinking within the context of Healthy Urban Living, which is an important factor within Utrecht. Finally the common denominator for us was, very simply, we want to make a part of the city where people grow old healthy and a place which is enjoyable to live at” (Diesfeldt, personal communication, 2020)

Most people in the area and nearby are excited about the future of the developments as sixteen out of the thirty seven respondents answered actively positive towards the idea of housing development in the area and are excited about the possibilities it can bring to the area. About ten of the respondents were mixed about the developments, where the importance is understood, but a common fear is that the quiet and peaceful environment will get lost. The three people which responded negatively towards housing development understand the need for housing, but wanted the housing development to be somewhere else.

Figure 4.6: View from above of the Cartesiusdriehoek as of 2020 (demarcated by the red broken line) (Source: Gemeente Utrecht, 2020)

Figure 4.7: Impression of the spatial plans of the Cartesiusdriehoek (Source: Gemeente Utrecht, 2020)

4.2.1 Infrastructure of the Cartesiusdriehoek

4.2.1.1 Results from expert interviews and policy research

The focus in the Cartesiusdriehoek is on housing, additionally the themes of work, social and commercial activities and culture will be of importance. This together creates the main focus which is urban living (Gemeente Utrecht, 2019b, p.35). However what arguably requires the main focus is dealing with the traffic in the area. There are several difficult factors which make dealing with the issues in traffic in the area both complex, difficult and important. The Cartesiusdriehoek is enclosed from the city centre by the train tracks and as of now the only way to get to the area is by the Cartesius road (Gemeente Utrecht, 2017a, p.11-13). The Cartesius road itself is one of the busiest roads in Utrecht and because of this the municipality wants to reduce the amount of traffic on these roads (Gemeente Utrecht, 2017a, p.15). Strict mobility concepts within the area are of importance as it is deemed that it is the only way to realise the increased housing. This means the importance of high quality public transport, great alternatives and a low car ownership are important to avoid a situation where the infrastructure in and around the area is exhausted and pushed to the limit (Van Haaften, personal communication, 2019). Dealing with the urban growth while trying to reduce the traffic on the only road connected to the area will be a challenge. To do this an importance is put on healthy urban growth, where a person living inside dense areas is more likely to use alternative forms of travel, such as cycling and walking, than a person living in the suburbs (Gemeente Utrecht, 2017a, p.15).

The first goal is to limit the amount of traffic on the Cartesius road, this will be achieved by removing some of the existing traffic strokes and by breaking the road open. This is done partly to motivate the motorists who only ride the road to go through Utrecht to take other roads, such as the nearby highway. This should result that the only automobilists on the road are the people whose main goal is to go to the area surrounding the Cartesius road (Van Haaften, personal communication, 2019, Gemeente Utrecht, 2017a, p.41). This way of thinking is also of importance on the types of facilities put in the area, as it is important that the facilities have a focus on local traffic and people inside the area (Van Haaften, personal communication, 2019).

The next ambition within the infrastructure is to limit the travel done by car and promote travel by bike and by foot, which is named as slow transport where the speed standard should be 30 kilometers per hour throughout the Cartesiusdriehoek (Gemeente Utrecht, 2017a, p.20). This includes having a car free area within the centre of the Cartesiusdriehoek (Gemeente Utrecht, 2017a, p.42). The only area freely accessible for car use within the Cartesiusdriehoek is the green loop encircling the area, where cars will have a car limit of 30 kilometers per hour (Gemeente Utrecht, 2017a, p.58). The housing built in the area will be coupled with a low parking standard and car use. The people who will be living here are not sure if they will have a place to have a car as less than half of the residencies in the area will have a chance of having a parking place for automobiles (Van Haaften, personal communication, 2019). This shows more of a shift away as the city becomes a place which is not suitable for extensive car use, as can be seen in the quote below.

> "You can not do everything with the car in the city, it will not work. The accessibility is very differently organised than in a sparsely extended city, which is more dominated by car use." (Van Haaften, personal communication, 2019)

With this limit of parking it is also important to think of the surrounding areas, the danger with this parking system is that people living here will park their cars in the surrounding areas. One solution to deal with this is by introducing paid parking in the surrounding neighbourhoods, which is necessary even if the citizens might not want it (Van Haaften, personal communication, 2019). To reach this the goal is to create an environment which can be considered a central urban area which will have paid parking, which is named an A2 zone. This should, according to Goudappel, lead to a decrease of 50% of the total amount of car trips (Gemeente Utrecht, 2017a, p.44). A danger with decreasing the use of cars in the area is that the surrounding areas will deal with some of the side effects. For example by limiting the parking in the area people will park outside of the area, to deal with this the neighbouring areas will also get paid parking (Gemeente Utrecht, 2017a, p.45). The paid parking is already official as the local council accepted the area becoming a central urban area with paid parking. This will be less expensive for citizens and visitors from social- and middlerent, as they pay 25 percent less of the parking expenses (Gemeente utrecht, 2019b, p41).

To reach the goals of becoming a healthy city the shift from car travel to alternatives is of high importance, and it is very important to create a high quality of alternative transportation and enough accessibility and opportunities for it (Van Haaften, personal communication, 2019). For public transportation in the area the bus and train will be of use. The area is next to a train station, named station Zuilen, which is well connected to the areas within the Randstad. This means that there is a direct connection to cities such as Rotterdam and Amsterdam. The station Zuilen will get an upgrade and a train connecting to the Randstad network will stop there more frequently and will stop there four times per hour. On the Cartesius road there is already a bus stop which can also be used by the new citizens, plus there is a second bus stop nearby (De Koster, personal communication, 2020; Gemeente Utrecht, 2017a, p.37).

Smart mobility is also an option to support healthy living. From smart vehicles and smart mobility services to energy producing infrastructure and communicative infrastructure (Gemeente Utrecht, 2017a, p.21). An example of smart services can be seen as a focus on car sharing. The concept of Mobility as a Service (MaaS) will be applied (Gemeente Utrecht, 2017a, p.45). This starts for example that the first building blocks will offer 16 shared renting cars to be used by the citizens. This will be with all forms of mobility where new citizens get a three year free introductory subscriptions to all forms of shared mobility (Gemeente Utrecht, 2019b, p.39). One way to stimulate the use of shared travel and renting of cars is to make sure that the places for rent are set up before people are living there. This is so the people who get an apartment there can already decide to start renting and actively decide to not have a car (Diesfeldt, personal communication, 2020).

One of the opportunities this area has is that it is both relatively close to the historical city centre of Utrecht as it is to the Leidsche Rijn centrum. This creates the opportunity for the people living here to

visit both areas with relative ease. However as of now there are still several obstacles which creates difficulties going to the areas. To go to the Leidsche Rijn centrum you need to cross the canal which is only possible from here by using the yellow bridge and the direct route to the centrum of Utrecht is blocked by the train tracks which forces people to take a detour which makes the centre feel further away (Van Haaften, personal communication, 2019; p.27). To improve the infrastructure for the cyclists, a tunnel will be made under the tracks to connect to the 2de Daalse Dijk and thus to the Amsterdamsestraatweg. This is to improve the connection to the city centre of Utrecht (Gemeente Utrecht, 2017b, p.37; Van Haaften, personal communication, 2019). Another important focus with the de-emphasizing on car travel is that all daily facilities, such as supermarkets, are on a walkable distance for all inhabitants (Van Haaften, personal communication, 2019). By improving the connection between the area and with the Amsterdamsestraatweg, which has lots of different facilities, this makes it more possible for people to have all daily used facilities near.

Another way to supplement the shift from car travel to cycling is to make sure that the place to stall your bicycles for citizens is easier to use. This will be done partly by shifting away from private storage places for bike stalling towards a central area within the apartment buildings for all inhabitants to park their bikes (De Koster, personal communication, 2020; Gemeente Utrecht, 2017a, p.43). The focus on communal parking is also with the idea that it could improve the social environment in an area. As it creates a new environment where people move from their apartment to a communal area where they can meet other people, instead of people leaving their house directly. This is to create the goal where people recognise the other people living in the apartment block. Another example where this idea is also put in the plans is that the distance between the buildings is not too substantial. This means that if someone looks outside the building that it should be possible to recognise the other people living near (Diesfeldt, personal communication, 2020). Outside of the stalling places for bikes there will be parking places for cars. The parking places which will be for cars and are for the residents will be placed inside the apartment buildings. For visitors two buildings for parking will be made available (Gemeente Utrecht, 2017a, p.41, Gemeente Utrecht, 2019b). One of these parking buildings will be built next to the CAB-building and the other next to train station Zuilen (Gemeente Utrecht, 2017a, p.63).

The housing itself will be a mix between high and low housing, from four layers to fifteen layers. The goal is to create an inner city area (Gemeente Utrecht, 2017a, p.27 & p.39). The layers next to the green areas will be on the lower side, which is about five layers. The buildings next to the tracks will be higher, about eight layers, with a few higher buildings of fifteen layers, which is about fifty meters high, incidentally mixed in (Van Haaften, personal communication, 2019). The height of these buildings is this high as the area is an enclave within the neighbourhood which means the transition from smaller buildings in nearby neighbourhoods to higher rise apartments will not be as jarring as it would be without the train tracks separating the area. The height for these buildings is also chosen as it can be used as a sound barrier, which will be important as the train tracks are extensively used and will cause a lot of noise. So the high rise buildings in this area will encircle the area to create an inside area which is low on noise, as this is possible as it does not need to think about transition from the nearby areas as it is enclosed by the train tracks (De Koster, personal communication, 2020).

The apartment blocks will have several demands set up. This includes for each apartment block at least five different types of buildings. This is to create more diversity, more atmosphere and to not have the feeling that the apartment block is one colossal building. Each block will have a communal garden, the buildings will be made with light colours to deal with heat stress, and each block needs to be at least fifteen percent open with green area (De Koster, personal communication, 2020).

4.2.1.2 Results from the surveys

The placement of the area is considered as being very close to the city centre while being well connected to the centre, which several of the people commented as being a main advantage of the area. Public transport is also beloved, especially the train station Zuilen, as it creates a well connected area. As the area is also close to the highway this creates for citizens in the area a lot of options when it comes to travel. However several people were still complaining about parking in the area, which there is not enough for both cyclists and automobilists.

The main criticism about the infrastructure is about the Cartesius road, which is considered very busy as it cannot handle the amount of cars who drive over the road. The Cartesius road is asked to be changed or redeveloped as the nuisance of the traffic in the area is bothering a lot of people. Where people ask for a redesign of the road to create more traffic safety and deal with both the busy road and with the automobilists who go past the speed limit. The Amsterdamsestraatweg further down also gets these complaints that there are too many cars, however for this area people also are critical of the many cyclists, which is also too much for the area. This means people are excited about developments pertaining to the infrastructure within the area, as residents hope that the Cartesius road will be improved. The citizens further hope for better connectivity between the surrounding neighbourhoods, such as Schepenbuurt, and hope that the bike road to the centrum will be improved. People also hope the area will be only for destination traffic. But the main criticism is that most people so far feel the traffic will only increase with the density, as both the cycling and motorways are already extensively used. Parking is another big worry for the citizens, as the fear is that there will not be enough parking, and the parking that will be there is paid parking.

The housing in the area is considered distinctive which helps create for a beautiful environment. However some people complained about the bad quality of the buildings which are not noise proof. Some people also complain about the problems gotten from the new construction work, which causes nuisances. That said people are happy with the new plans as the focus is on new housing, where some people argued that most housing in the area is too old to be renovated. Furthermore people hope for a good connection between housing and green and that the housing itself is not too high.

While the area is under construction as of now most people experience the negative effects of having construction in the area. The traffic has increased so far both on the Cartesius road as on the Amsterdamsestraatweg. This increase in traffic goes together with the fear from most people that the increased density will cause only more traffic. This also goes for the cycling paths which are already

deemed small and this could worsen. The construction also has caused some damage to nearby houses and with the construction the roads are sometimes closed.

4.2.2 Culture and Environment of the Cartesiusdriehoek

4.2.2.1 Results from expert interviews and policy research

As the area has long been used as an industrial area, green was historically never of much importance (Van Haaften, personal communication, 2019). As of now the area has no public green spaces, the only green spaces are fallow areas covered with grass (Gemeente Utrecht, 2017a, p.15). With the shift from industrial area to an area made for living this has changed and a greener area has become more of importance (Gemeente Utrecht, 2017a, p.27). About 30% of the area will be green space, but that number is a minimum as the area needs to be as green as possible (De Koster, personal communication, 2020; Gemeente Utrecht, 2017a, p.48). With green space being of such importance, layers of green are added throughout the area. The areas for public space are built up from the apartment to outside to have several layers of open environment. As there will be private green areas on the balcony and outside, from which you can walk to the communal garden in the apartment blocks and from which then you can walk outside to the park area (De Koster, personal communication, 2020). Every building block will have a communal private garden for the people living in that building block. This garden is to be set up to the wishes of the inhabitants, with the rules that each garden needs to have a playground area for kids, and needs to mainly exist out of green area (De Koster, personal communication, 2020). The green is also of importance to deal with water excess (Gemeente Utrecht, 2017a, p.61; Van Haaften, personal communication, 2019). The communal area can be used for small initiatives and events and so can the park be used for bigger events as it is public space open to all. The reason why this is partly left open is because you cannot know who will live in the area, and it is of preference that the area is shaped in the favour of the new citizens (Diesfeldt, personal communication, 2020).

The full Cartesiusdriehoek will be surrounded by a green loop, where the area around the residential area also needs to be parklike (Gemeente Utrecht, 2017a, p.35). The Cartesius park will be created in the central space within the planning area, which will stretch from the CAB building until the apartment complexes on the other side. This is also to give the CAB building a central placement in the area, as everyone will be able to see it. Which is important as it is the main bearer for the identity in the area (De Koster, personal communication, 2020). The Cartesiuspark will have a square which will be a mix between green area and industrial inspired hardening. There will be places for sitting on the square and there will be a possibility for sports and playground equipment (De Koster, personal communication, 2020; Gemeente Utrecht, 2017a, p.59). The square will transition into the park. The park itself will be mainly green area, with several hardened pathways for infrastructure. The park is open for everyone to use and also open for sporting activities (Gemeente Utrecht, 2017a, p.59). One reason why it is possible to create a green environment while still undergoing increased density is the de-emphasizing on car travel. This creates the opportunity to create a green area between all the apartment blocks where cars are not able to go, as cars are only able to get to the area by driving around a green circle surrounding the area (Van Haaften, personal communication, 2019).

For facilities in the area the focus will be on essential facilities, which are deemed to be primary schools, medical facilities and a possible sporthall. For commercial facilities the goal is to add to the local area. The Amsterdamsestraatweg already supplies for a lot of commercial facilities which will be able to receive several of the new citizens (Gemeente Utrecht, 2017a, p.33). With the Amsterdamsestraatweg covering a lot of facilities it is also important to add to these facilities and not copy them. An example for this is that the Cartesiusdriehoek can have one supermarket the same, for example the Albert Heijn, but this will mean there will also be place for a different biological supermarket in the area (De Koster, personal communication, 2020). It is important to create a local environment unique to the nearby neighbourhoods which will be done by having retail and catering which have a focus on sustainable, local and biological products (Gemeente Utrecht, 2017a, p.33). Other shops and activities focused on a local scale are also welcome, but activities for a bigger scale are not feasible (Gemeente Utrecht, 2017a, p.33). This area can not have too many facilities which will attract people from outside the area. The facilities in the area should be at most be for the local level and be for people living in the city of Utrecht, but it should not be of any higher scale, as it will give too much traffic (Van Haaften, personal communication, 2019; De Koster, personal communication, 2020). The main idea with the built facilities in the area is that it covers the essential needs by the inhabitants and the other facilities should also add to the surrounding neighbourhoods, as the Amsterdamsestraatweg already has a lot of facilities (De Koster, personal communication, 2020).

Alongside the facilities the character of the environment is also of importance to the environment. The character of the environment will be built upon the history of the area, which are the existing companies and the heritage of the remnants of the train use. However the area is flexible enough to also focus on the characteristics of the healthy urban environment wished by the municipality of Utrecht (Gemeente Utrecht, 2017a, p.26). The idea is to transform the CAB building in a similar way to areas such as the tram depot De Hallen in Amsterdam and the Fenix Food Factory in Rotterdam. Which means that the building should keep the design and history, as the building is important heritage for Utrecht and the Netherlands, however the use of the building will change and will be filled with several recreational facilities. The main discussion with this is to find the right balance between implementing new facilities while keeping the heritage of the building (Van Haaften, personal communication, 2019). The CAB building is the first building people will see from outside of the neighbourhood which means it is the building that is considered the entrance to the area (Diesfeldt, personal communication, 2020). For the facilities in the CAB building the opinion of citizens is taken into consideration, this is so the functions of the building will be able to speak to all types of target audiences (De Koster, personal communication, 2020). Above the CAB building apartments will also be put. This is to create more of an active environment around the building, because of housing needs and for commercial purposes (Diesfeldt, personal communication, 2020). The CAB building is deemed essential to characterising the area as one of the interviewees said in the quote below.

> ".. we see this building as the living room of the neighbourhood (Diesfeldt, personal communication, 2020)"

4.2.2.2 Results from the surveys

People often use the area for recreation and spending time with neighbours. The neighbourhood is said to have lots of facilities where all essential facilities are nearby, this also includes lots of catering facilities and shops. Being on the outskirts of the city of Utrecht, there are also several more unique facilities in the neighbourhood which are facilitated in the CAB-building which creates for some variation to the other facilities nearby. That said not everyone is satisfied as several people still argue that there is a lack of nearby facilities and shops, and the facilities and shops which do exist are of low quality. Several of the people also complained that there is a lack of diversity in the available food facilities, where most food facilities are snack bars.

Next to the facilities the neighbourhoods are considered to have a friendly atmosphere and are deemed as being calm and quiet, especially for the big city. The only people coming here are people with a purpose, which means mostly the citizens living in the neighbourhood visit it which also support the feeling of having a more folksy neighbourhood. While most people are positive about the atmosphere in the neighbourhood, some of the respondents complained about there actually not being much social cohesion and that there are several antisocial neighbours.

Outside of this some of the residents did consider the neighbourhoods to be green and close to the Julianapark which helps with making the area more green. Right now the area is still very spacious and has freedom of movement with an unobstructed view. However, where some people complimented the area for being green, about a quarter of the people in the neighbourhood say there is not enough green and want more green in the area.

For the developments of the Cartesius driehoek the citizens see it as having a positive impulse on the wider area. With the plans for new shops and restaurants there will be more to do in the area and there will be a wider range of choice for activities in the area. People also hope that these new citizens can have an economic impulse on the Amsterdamsestraatweg. Several of the citizens see these developments as creating more life and activity within the area. Especially as the development area right now is mostly an industrial area, which means that the new housing will be an improvement. Furthermore people hope for more green areas, especially a park. While more sporting areas are wished for too. Some of the people do lament the loss of open space in the area.

4.2.3 Healthcare of the Cartesiusdriehoek

4.2.3.1 Results from expert interviews and policy research

One of the three points of a healthy future is healthy people (Gemeente Utrecht, 2017a, p.21). The main idea of the healthy future concept is that healthy people cause a healthy city and that by creating a healthy environment, people will be able to live healthier (Gemeente Utrecht, 2017a, p.21). This means that there is a back and forth between the healthy environment and a healthy lifestyle by the people living in it. It is important to create a good social environment with the citizens. That is why the focus is on building the area from the bottom-up. It is of importance that people bond with each other and the area to create a shared environment and ownership of the neighbourhood (Gemeente Utrecht, 2017a, p.35). The private gardens are also a way to create a social area for each building block, this is to stimulate the social aspect in the community (Gemeente Utrecht, 2017a, p.61). People living in the nearby areas also asked for more places where there is the possibility to meet people. In the new area this is created with the CAB-building and the new park, but also a health centrum could support this (De Koster, personal communication, 2020). It is important to help create social environments in the city as spatial planners, as in urban areas social networks happen less naturally then in rural areas (Diesfeldt, personal communication, 2020). People need to be able to interact and meet within the area (Gemeente Utrecht, 2017a, p.27). The area will be an enclave which means the area is able to be independent of the other areas, it will still be connected to the nearby environment of course (Gemeente Utrecht, 2017a, p.29)

The open green areas and the lack of cars also creates an area which would challenge people to exercise or at least gives people the chance for it. The focus on slow travel in the area also makes it more likely that people in the neighbourhood use the bike more often for daily activities such as shopping for groceries. This creates an area which supports healthy movement (De Koster, personal communication, 2020). There are also plans to stimulate health within the buildings, for example trying to make the stairs more prominent and attractive which would cause people to take those instead of an elevator (De Koster, personal communication, 2020). In conclusion there is a focus on green and mobility to make the area and the people in the area more healthy (Gemeente Utrecht, 2017a, p.29).

An opportunity within the area is that because most buildings will be newly constructed it is a lot more possible to become energy neutral in the area. The area itself has an existing heat network which will help make housing more sustainable. This heat network can be improved upon to create more sustainability in the energy use. Using heat and cold storage under ground is also a possibility (Gemeente Utrecht, 2017a, p.49). The CAB building will have some difficulties becoming energy efficient as it is an older building. The building still has several technical limitations which cause a loss of energy (Diesfeldt, personal communication, 2020). The area supports new innovation for sustainability. The plan so far does not go further into detail for sustainability as the thought would be that the innovation in technology for sustainability develops in such a pace that planning for sustainability with the knowledge of know will be dated when the plans are happening. The ambition is written down which is

to become energy neutral and a tender is written which was sended to parties of interest to think of solutions to deal with the energy issue (De Koster, personal communication, 2020).

One difficulty within the area is that because of the nearby train tracks, noise disturbance is an important issue in this area. To deal with this a tactical placing of the building block should dim the noise. Within the building itself effort will be made so that the noise does not go through and disturb the inhabitants. If this is not sufficient sound screens will be put to deal with the noise. For the municipality each residency must have a noise free facade. This is not completely the case with the projections (Gemeente Utrecht, 2017a, p.47). In general the intention is to get under the noise limit set by the national government. There are only a few areas where there are still challenges set to get under the noise limit. These are mostly at the top of the buildings which are close to the train tracks and the road. The cars also give noise disturbances but with the changes made at the road the hope is that this will lower. But the way it is built, the inside area of the Cartesiusdriehoek will have no noise because of the demarcations set by the sound screens and the buildings (Van Haaften, personal communication, 2019). Other issues of physical health are dealt with by adding a large amount of green and a low amount of concrete hardening in the area. Which will help deal with a problem such as heat stress and water excess (Gemeente Utrecht, 2017a, p.59). With the focus on slow travel the air quality should also improve and be up to the set conditions (Gemeente Utrecht, 2017a, p.47). With this focus on slow infrastructure precautions are also set so that emergency services can reach every place in the area, as this is a necessary precaution (De Koster, personal communication, 2020).

4.2.3.2 Results from the surveys

With the neighbourhood being close and having an active neighbourhood it helps create a form of social control, which creates an environment which feels more comfortable and without many nuisances. The reason why this is important within the neighbourhood is because of several complaints about criminal activity. Outside of these factors there are more factors dealing with physical health. There are several negative aspects about the environment, the most often named problem are the noise complaints, which comes from the housing with a close proximity to both the train tracks and the road. With the developments ongoing people have been complaining mainly about noise and nuisances from the construction. This is coupled with a fear that the noise complaints will not go away as more citizens are coming to live here and the construction will still last for several years. Outside of the noise complaints a few of the citizens have complained about the bad air in the neighbourhood and about litter. People generally ask for these problems to be dealt with, including asking for underground waste facilities which will help deal with litter.

4.2.4 Stability of the Cartesiusdriehoek

4.2.4.1 Results from expert interviews and policy research

With a focus on a healthy future, a healthy economy is also named essential (Gemeente Utrecht, 2017a, p.21). The area will undergo a lot of change as it changes from a location built for an industrial environment to a neighbourhood focussed on housing. The Cartesiusdriehoek itself will be a mix of all types of people from different economic backgrounds, which means there will be a mix between cheap and expensive buildings (De Koster, personal communication, 2020). Most of the current business buildings will disappear as the area will change from a business park to a mixed living area. The focus for new business will be on a lower scale, general new jobs and business will have a place in the area which will cater more towards the city and will exist more of cultural and recreational activities. (Gemeente Utrecht, 2017a, p.33). This will supply people living in the area with job opportunities as work in the area is deemed as an important issue (Gemeente Utrecht, 2019b, p.35).

More than physical change it is also important to create a mental transformation. The area itself, outside of the CAB-building, has not much of an identity yet. By facilitating initiatives by future and local citizens or involved entrepreneurs the goal is create and strengthen an identity in the area. As a developper you focus on the physical environment, and even though there are ideas on how to influence and stimulate social and healthy behaviour, the developer has no control over it (Diesfeldt, personal communication, 2020). The idea is that by involving citizens in the project a certain form of bonding, involvement, animation and ownership is created between the location and the citizens. With this bottom-up participation the ambition is to create the identity of the Cartesiusdriehoek with the citizens(Gemeente Utrecht, 2017a, p.70). The main points gotten from talks with representatives of the neighbourhood is that a lively area is wanted with an own personality, which also connects to the nearby neighbourhoods (De Koster, personal communication, 2020). A challenge with this change is that the nearby neighbourhoods will still have the identity of areas which were made to cater towards the industrial identity of the area. This might cause a rift between this neighbourhood and the existing surrounding neighbourhoods. The hope is that the new recreational and cultural activities in this neighbourhood will help diminish this difference as the people living nearby also use this (Van Haaften, personal communication, 2019). The bike tunnel connecting to the nearby neighbourhood of the Second Daalse Buurt is also made with the idea to connect to the surrounding area. As the tunnel goes both ways this means that the residents of the Cartesiusdriehoek can use the tunnel to have an easier accessibility towards the citizens in the nearby neighbourhood of the Second Daalse Buurt, but also the other way around. The residents of the Second Daalse Buurt will be able to use, for example, the park or the health centrum of the Cartesiusdriehoek. In this way the surrounding neighbours will notice the effect of the newly built environment. The goal is to create an interplay between this neighbourhood and the existing ones (De Koster, personal communication, 2020).

Discussions have been made with citizens about their preferences with regards to the developments. This included inviting stakeholders from the surrounding areas which would represent their neighbourhood (De Koster, personal communication, 2020). For example people living close to the

tracks were critical of the height of the new buildings, in those cases we lowered the buildings from eight layers to five layers. But the impact of a new neighbourhood will have a huge impact on the surroundings, this caused for example that we had no choice but to implement paid parking, otherwise the pressure of parking would be too high in the area. Not all citizens might enjoy this but in this case there is no other choice (Van Haaften, personal communication, 2019). This sentiment is also reflected in the quote below.

> "In general you can not always live up to the preferences of the citizens. If you ask most people what type of house they would like to live in, most likely they will answer with a terraced house. However, to deal with the housing demand it is not possible to give people this." (Diesfeldt, personal communication, 2020)

One way to deal with preferences for new citizens is to keep space in the plan open for citizens to elaborate on some of the developments in the area. One example of this would be the collective gardens in the apartment blocks which are open for the public to develop in their own interpretation. This is to make the process of development more bottom-up instead of that the municipality of Utrecht decides everything (Van Haaften, personal communication, 2019).

4.2.4.2 Results from the surveys

According to several people the area is deemed as a good mix between people who have been living in Utrecht for years and new starters. It creates for a nice diversity of citizens where everyone still knows each other. That said not everyone agrees as some people complain about new neighbours having a negative impact on the neighbourhood, which has a negative effect on the social cohesion of the community. Improvements asked for within the area focus on tolerance and social cohesion within the neighbourhood. But with the developments of the area there will be a large amount of new people coming to the neighbourhood, and people are fearful if the area can handle this and what kind of effect it will have on the social cohesion of the neighbourhoods. Possibly even resulting in a general degradation of the area. At the same time people have mixed feelings about it as some people are excited about more young people, and feel that the new developments will create an improved mix of residents. And where some people are afraid it could affect the social cohesion, as the argument is that there will be too many people living in a small environment, other people see it more as an additional new community which will be added to the neighbourhood. The construction itself so far has not helped the social cohesion as the construction work creates for a bit of agitation within the area. But at the same time the citizens are kept informed with the construction, which helps dealing with the nuisances.

Outside of the discussion on effects of the new residents on the social cohesion, there have been people discussing the price of the new housing. Several people are foreseeing a rise in the worth of the housing within the area. This comes with some complaints as people think that the area will become too expensive.

4.3.5 Discussion

The infrastructure of the location creates for complexity, as the Cartesius road has a noticeable impact on the neighbourhoods. As of now the Cartesius road is deemed as being a busy road. This is both acknowledged by the municipality and by the residents. This is a vital point while talking about the infrastructure in the plan. Most respondents are satisfied with the plans to make this road less busy. The main problem still is that there will be an increase of people living in the area, and even though the focus is on changing from travel by independently owned automobiles to alternative forms of travel, there will still be a significant amount of new respondents who will be able to travel by car. This creates for fear that the actions taken are not enough. As the Cartesius road could still be flooded and people are asking what the effects will be on the parking spots. Several people are not satisfied tha paid parking will come, this comes with the fear that even though there is paid parking, there will still be a lot of parked cars in the nearby neighbourhoods, as there is not enough space for parking. With slow travel there are also worries that the bicycle paths as of now are too small. With the developments the infrastructure for travel by bicycle will be improved and several alternatives bicycle paths will be given which should be able to deal with some of the pressure more residents will have on the infrastructure. With that said the area is still under construction where the building has started in phase one of the plan. This means that if the increase in residents shows that the infrastructure can not handle it, plans could still be changed. That or the area will settle with a plan with space for less residents, so that the infrastructure is not overwhelmed.

When it comes to housing most of the residents are happy with the choice for new housing in the area instead of for example renovating, as a lot of the housing is considered old. For the new housing people hope that it will fit with the environment, as the housing in the area is deemed to have an unique character. The plan is that the area will be built from the historical parts of the area, but also with a focus on new forms of housing and high-rise buildings. This can create some criticism as the question would be how far it will fit with the environment. But because the Cartesiusdriehoek is separated from the nearby neighbourhoods by train tracks and a road, this also can give some space where the clash might not be as noticeable.

The location for the area creates several opportunities as the neighbourhood is in close proximity to different locations which contain a large amount of facilities, such as the city centre of Utrecht, Amsterdamsestraatweg and the centre of Leidsche Rijn. With the improved infrastructure it might become easier to visit these areas. This means the choice is also to focus on essential facilities in the area mixed with recreational facilities which are unique to the area. This seems to the satisfaction of the nearby residents. The general consensus is that there are already a lot of recreational and food facilities nearby, but there could be more diversity, so this aligns with the plans of the municipality. The developments at the CAB-building especially deal with this as it is deemed to be central for recreation and food facilities within the area. Several people are enthusiastic about the facilities here as they are considered distinct. The CAB-building in general is distinctive in this as it needs to become the face of the area which connects the new housing developments with the bigger neighbourhood, both historically and culturally. With the increase of residents to the area this could also have some impact on

the social environment within the bigger neighbourhood. In general people say that there is a good neighbourly atmosphere in the area, which could be impacted with the new citizens. With the area being deemed an enclave these effects could partly be diminished, as the area is thus partly separated from the surrounding neighbourhoods.

With the oncoming increase of residents one aspect which seems to be affected is the general social cohesion in the bigger area. The focus on the plans is to have a mix of residents which means people from different kinds of economical backgrounds. However several of the residents have been complaining about the new residents and this could cause more problems. The residents in the area as of now are mostly people who have been living there for a long time, signifying themselves as typical people from Utrecht. While several people are happy with the new residents some people are thus more critical. But this does seem to be the biggest challenge in the social aspect is to find a way to make the new area fit with the surrounding areas. As the surrounding community is relatively close this can be of a challenge and with the new citizens being motivated to help with creating an own social environment where it is stimulated for people to meet each other, this does not directly mean that the different social environments will mesh.

A lot of people were critical of the green area in the neighbourhood. With the new housing development a lot of focus is put on creating more green space (e.g. an addition of a park). Thus this should partly deal with some of the criticism of the lack of green area in the direct environment. One main concern in the area is that there is not much place for sporting activities. Several of the sporting activities can be done in the park, but there is no place for sporting fields. The green in the area is also made to deal with problems such as heat stress and water excess, which are common problems in densely populated areas. Other health issues the area is dealing with are several issues with noise, which comes from the train tracks, the motorway and the construction going on which creates a nuisance for the residents. The municipality will try to deal with this by building some sound barriers at the edge of the area, which are meant to block the noise. The high-rise buildings will also deal with limiting the noise in the area, this is to create a noise proof inner area in the neighbourhood. This does mean that some of these high-rise buildings will deal with a bit of noise, but every residency will have at least one noise free side. Sustainability is not fully covered as the goals to become energy neutral are deemed to be dependent on technological innovation. With building new buildings it is easier to make the area energy efficient, which is harder to do while renovation. How sustainable the area will become is still to be seen. A table of the main findings of the Cartesiusdriehoek can be seen in table 4.8 below.

Liveability characteristic	Main findings from research
Infrastructure	- The busy Cartesiusroad will undergo change and will become smaller. This to the satisfaction of the residents. - As of now the area is very busy for both cars and bicycles, which creates for fear the slow infrastructure will still create for dangerous situations - People are unhappy with the new introduced paid parking - The housing in the area is of poor quality, which means the choice for completely new housing is considered the right choice by some respondents.
Culture and environment	- The area has several unique facilities, which the plans will expand upon. - Citizens are happy with the increase of local facilities - Opinions about new citizens are mixed. Where some people are saying it gives an impulse there is also a group of people saying that the new population does not fit along with the existing community.
Healthcare	- Area is dealing with noise issues from the train area, which creates for housing which is not soundproof. - The area does not have space for new sporting facilities, but does have space for new green spaces which can be exercised on.
Stability	- The area is occasionally named as having a good mix between people from different kinds of backgrounds.

Table 4.8 Summary of the main findings for each liveability characteristics (Source: Author)

4.3 Beurskwartier and Lombokplein

The main plan for the areas of the Beurskwartier and Lombokplein is that it will become the western counterpart of the historic city centre, therefore it is sometimes also named the new centrum by the municipality (Gemeente Utrecht, 2016b,). This area exists in four sub areas which can be seen on figure 4.9. These are Kop van Lombok, Graadt van Roggenweg, Beurskwartier and the Jaarbeurs, in total about 3500 residences will be built in these areas. The main development will be in the Beurskwartier, which will have 3000 new buildings before 2023 and the Lombokplein which will have a focus on the transformation to a living and work area (Gemeente Utrecht, 2016). Central to the plan is the area of the Beurskwartier, which is seen as a continuation of the development plans of the central station of Utrecht. The central train station itself is partly positioned in the Beurskwartier. Where the development of the central station focussed on commercial development the new plans will add to the area with residential development. The main focus in the Lombokplein area is on restoring, which will be mainly done by bringing water back to the area. So not a focus on building but improving the existing area. The last place within the area is the Jaarbeurs square, which is not planned out in depth yet within the spatial plans (Gemeente Utrecht, 2018a). An overview of how the area looks as of 2020 and an impression of how the area will look can be seen on figure 4.10 and figure 4.11.

Figure 4.9: Sub areas of the Beurskwartier and Lombokplein (Source: Gemeente Utrecht 2016)

The general sentiment within the area is that the people are positive towards the developments within the Beurskwartier and Lombokplein. About half of the thirty respondents have said to be happy about the spatial development in the area. That said a significant amount is mixed. About one third of the people living in the area still have some doubts about the developments or think that aspects of the plans are clear. However, they also see the importance of it, as housing development is important, and see several positive aspects. Only three of the respondents have stated to be against the housing developments in the area.

Figure 4.10: Overview picture of the Beurskwartier and Lombokplein before construction (Source: Gemeente Utrecht, 2020)

Figure 4.11: 3D-projection of the developments within the Beurskwartier and Lombokplein (Source: Gemeente Utrecht, 2020)

4.3.1 Infrastructure of the Beurskwartier and Lombokplein

4.3.1.1 Results from expert interviews and policy research

The very first aspect when developing the Beurskwartier and Lombokplein is the decision for how many housing could be built (Peeters, personal communication, 2019). In the Lombokplein three building blocks will be built, of which the buildings will have about five to six layers each (Karis, personal communication, 2019). For the Beurskwartier more residency will be built to meet up with the goal of building 3000 residencies (Gemeente Utrecht, 2016). Every building block will be independent and have its own quality (Gemeente Utrecht, 2018b, p.44). The goal is to make housing for all people from different economic backgrounds, there needs to be a place for everyone. Within the economic backgrounds it is also of importance to create diversity of choice which means that there will be both small and large social rent housing (Gemeente Utrecht, 2018b, p. 60). It is also of importance that elderly and handicapped will have all the availability they need (Gemeente Utrecht, 2018b, p.60). The main challenges named by the municipality with the building blocks is creating apartments for families and the mix between living and work (Gemeente Utrecht, 2018b, p.68).

The building blocks built in the Beurskwartier will incorporate buildings located in the Croeselaan. This will be done only partly as it is tough to build on top of them as the state of the buildings are not fit for expanding. The solution to this is that the existing buildings will be used as entrances to apartment blocks (Gemeente Utrecht, 2018b, p.44). This is done to keep the historical value, while still having new apartments. The building blocks through the Beurskwartier and Lombokplein will have a focus on closed building blocks, which means that there is a clear difference between public and private. This should promote safety, help improve logistics and help dealing with noise disturbances (Gemeente Utrecht, 2018b, p.68). The building blocks are built in such a way that the buildings will have a noise free side. This is of importance with the high amount of noise of the area caused by the active city street and public transport (Peeters, personal communication, 2019). That is why the buildings are built in such a manner that there is always one noise free side (Peeters, personal communication, 2019).

The dense built of the full area will be partly possible because of the placement next to the train station which means it is more feasible that people living there will be able to get around by public transport and that people will try to live there because of the public transport (Gemeente Utrecht, 2018b, p.67 & p.116). Developments to the infrastructure also include a change to the Graadt van Roggenweg which will become smaller, as it will become a two by one road, with more attention for cycling and walking on the roads next to it. A roundabout will also be added to the road, this is done to create a clearer and safer area (Gemeente Utrecht, 2018b, p.48). For the infrastructure there is also hope on technological innovation such as, electrical cars and self riding transport, where a focus on smart transport is put in the spatial vision of the municipality (Gemeente Utrecht, 2018, p. 120).

There is also a connection between places outside and inside the city centrum. The idea is that a green route will be made which will make it more interesting and practical to go to the city centre by bicycle or by walking. This green route will connect with several parks in the city (Moreelsepark & the new parks to

be made in the Beurskwartier) (Gemeente Utrecht, 2018b, p.36-38 & p.107). This green route goes together with a focus on transport by cycling and walking (Gemeente Utrecht, 2018b, p.118). Mobility as a service (MaaS) is deemed as an important part of the transport agenda. It is a program which helps decide what the best option for transport is for individuals at a moment (Gemeente Utrecht, 2018b, p.124). With the increase in transport by bike several cycle parking places will be added both public and private (Gemeente Utrecht, 2018b, p.121). But the infrastructure is a very tough challenge while dealing with density as can be seen on the quote below.

> "It can be hard to predict what will happen to a city undergoing increased density. I think the city is very resilient but with this increased density cars will have a problem flowing through the area (Karis, personal communication, 2019)."

4.3.1.2 Results from the surveys

Most people do understand the need for housing as there is a housing shortage and so far are satisfied with the developments. The renovation is also welcome in the Lombokplein as this is needed. Several feel that the housing developments could also have a positive effect on the driving in the area, as it could become calmer. The developments on the infrastructure also support this, where people are glad about the focus on limiting car use. In general people were also positive about the design of the buildings, being satisfied with the new apartment complexes, and citing that the area has several beautiful buildings in general. People are also enjoying the improvements on the Jaarbeurs square. One of the complaints is that the general quality of the buildings throughout the whole area are a bit too noisy. For the developments people are a bit worried about too many high-rise buildings, and if the style of the new buildings fit within the area. The general sentiment seems that people hope the new building developments will fit within the area.

If there is one huge positive about the environment it is the central placement, which half the respondents cited as a positive point of the area. The area is close to the city centre and close to Utrecht Central station. This means that people living in the area do not need cars as much to reach their destinations. When the car is used, it is also fairly easy to leave Utrecht as the connection to the highway is favourable. With the central placement in both the city and country it makes sense that this place will have an increase in functions. The main criticism is about the traffic within the area. There is lots of traffic which creates sometimes for a dangerous environment. A lot of people were critical of the cars driving over the road who drive recklessly and are dangerous. Examples people asked for improvement are for example more alternative cycling roads to the city, as there is only one cycling route which is sometimes dangerously busy as it is now. To deal with the cars people ask for car free areas, and a speed limit. Another problem dealing with the traffic is that as of now there are not enough parking spots within the area for both bicycles and cars. Where a lot of the bicycles are parked in front of the housing. The lack of parking causes people, for example, to ask for more private parking spaces.

How the municipality is dealing with the infrastructure does cause for discussion. There is already a lack of parking places, and with the developments this seems to worsen. Several people also argue that

people will need cars for jobs, and it seems difficult to create enough space for everyone who needs a car. Secondly this density on a small area creates for extensive use of the already heavily used roads, both for cyclists and automobilists. The developments in the area right now caused several issues for people, mainly traffic redirections where roads are closed.

4.3.2 Culture and Environment of the Beurskwartier and Lombokplein

4.3.2.1 Results from expert interviews and policy research

The municipality of Utrecht looks into what makes people content and comfortable in an area. The intensity of the density, the amount of green and water and the design of the architecture all have an effect on this (Peeters, personal communication, 2019). The goal is to specifically make the Lombokplein more green than it is now, by at least fifty percent (Karis, personal communication, 2019). The plan in general has a focus on restructuring the city which means that the Leidsche Rijn will be extended, the nearby road, Graadt van Roggenweg, will be made green and there will be a newly added park and green courtyards in the area (Karis, personal communication, 2019). The courtyards are made mainly for the citizens living in the apartment blocks which the courtyards will be part of (Peeters, personal communication, 2019; Gemeente Utrecht, 2018b, p.39). All building blocks will border either a park or a place focussed on having a green environment (Gemeente Utrecht, 2018b, p.105). The choice has been made for robust green which means a focus on big trees which need a lot of space (Gemeente Utrecht, 2018b, p.109). Utrecht in general does not have many big parks as it was always built very compactly, which means creating green in areas is of importance (Karis, personal communication, 2019). Each project starts with a look how it can help with dealing with the housing demand in the area. The second thing involved with these plans is the decision that there needs to be enough green to support factors such as liveability and climate sustainability. Several different forms of sustainability are implemented as there is a focus on becoming energy neutral (Gemeente Utrecht, 2018b, p90-94). Housing is important but it should not go to cost of everything, plans for more concrete areas also have the goal to make the area more green (Peeters, personal communication, 2019).

The increased density also gives opportunities for new services in the area because an increase in population within the city creates for a bigger support base for different services (Karis, personal communication, 2019). The services need to add to the environment. Close to the area is a shopping mall which means there is less need for more shops, and there are also already supermarkets nearby (Peeters, personal communication, 2019, Gemeente Utrecht, 2018b). The focus on new services will be on recreational and creative services and a community center room. Creative services are especially of importance as it is not given a space as of now in the city, and with the low rent for these services space is given here (Karis, personal communication, 2019). The area will also have a mix between functions for a higher scale in the Jaarbeursplein which are functions catering towards the city and outside of it, and lower scale functions in Lombok which are meant mainly for the local population (Ahswin Karis, personal communication, 2019). The Jaarbeurs will have several high scale city services which will include an already existing cinema, a playlab, several hotels and more catering services (Peeters, personal communication, 2019; Gemeente Utrecht, 2018b, p.36). It will also include small scale functions which

are specifically made with the residents in mind and which are not meant to compete with the shopping centre of Hoog Catherijne. These are for example hairdressers, small coffee shops, other small businesses and maybe a high school (Karis, personal communication, 2019). Following the ambition of healthcare there is a focus on healthy food restaurants above fast food (Gemeente Utrecht, 2018b, p.114). With the busy streets nearby facilities catered to children, such as day-care and primary schools, are purposely not put in the area. As we do not expect many families to come here in this area this should not be a problem (Peeters, personal communication, 2019). But if the need is there this might change, we follow the need with planning this. Also there are nearby schools which can be expanded upon already (Karis, personal communication, 2019).

With the space being shared by more people, creative solutions to some challenges are of importance, for example roofs could be utilised (Peeters, personal communication, 2019). But it also means that sometimes space needs to be simplified. We can not facilitate everything it would cause for problems. For example primary school could be built downstairs within some of the apartment blocks, but this would cause side effects such as that the nearby apartments will now have noise complaints (Karis, personal communication, 2019).

4.3.2.2 Results from the surveys

With the area being so central in Utrecht, a significant number of people do the daily activities within the area in comparison to the Merwedekanaalzone and the Cartesiusdriehoek. Several recreational activities are done such as shopping, visiting the nearby park, visiting bars and restaurants and visiting the music facilities within the area. Added to this is that several people work within the area, which shows that the area facilitates mixed living. That there is a significant amount of activities done in the area is also reflected by the citizens, which are positive about the wide range of activities and facilities within the area. The area being close to Hoog Catherijne, which is the shopping mall next to the train station, adds to this wide choice of shops and services. People have also said that the facilities in the area have only improved and citing the new facilities as better than the old ones. One person also cited that the addition of the mosque in the area also had a positive impact on the muslim community, this includes having a place to organise festivities for the muslim community. In general these facilities are partly cited as causing for a friendlier environment. Where the second most common named positive point of the area is the atmosphere, which is seen as very friendly and lively. One of the criticisms about the area is that the area around the residential tower is mainly a construction zone. This will change over time with the spatial plans, but as of now it has a negative impact on the public space there.

Next to this some people were positive about the greenness of the area, however this was in contention as an equal number of people argued there was a lack of green within the area. More green in the area was also the most popular answer to how the environment could be improved. As several improvements to the natural environment are welcome, for example people are pleased with the canal being extended through the area to help create a greener environment. Criticism about the lack of green was also made by one of the interviewees.

> "The effects I have already noticed where the green in the area is disappearing. I know there are plans to create green spaces but around the station it still seems very minimal." (Boland, personal communication, 2020).

More specific to the plan, people are satisfied with the increase in diverse facilities, most noticeably more diversity in food facilities, and especially with the chance for new initiatives within the area. The argument is that the manner in which the area is developing, there will be a better use of space as the focus shifts more from traffic to living. Several people are also excited about the increase of green spaces within the area. However at the same time people feel the area is already very busy as it is, and these new developments will make it considerably worse. There is not enough space for the ambition of the housing plan and with these developments people are afraid the balance between housing and recreation will shift too much towards housing.

4.3.3 Healthcare of the Beurskwartier and Lombokplein

4.3.3.1 Results from expert interviews and policy research

Healthcare is deemed to be one of the main focal points of the area (, as the area itself needs to be built in a way which stimulates healthy behaviour (Karis, personal communication, 2019; Peeters, personal communication, 2019). Physical health is promoted with the focus on cycling and walking. The infrastructure will be more focussed on healthy alternatives for cars, which is accomplished by creating recreational routes for both walking and cycling (Gemeente Utrecht, 2018b, p.112). Physical health will also focus on individual sporting, as there is not much space for big sporting fields, such as hockey and football. One possibility for an accomodation for these sports will be on the roofs (Gemeente Utrecht, 2018b, p.65). Right now the Merwede is used a lot for rowing. Most likely it will get busier thanks to the repair of Leidsche Rijn and the possible use of water taxis.

As of now there are no new sporting fields planned and there is still a demand for 400 more square meters of green. One way to manage this is with the idea of the ring park. There is a lot of green outside of the city and by building a good infrastructure connecting those green areas together and with the city it would motivate people to go to those areas for green. However for health it is of significance to have green in the neighborhood. As visiting those areas still takes time, you cannot take a simple walk to it. And for the health conditions in an area trees can give shade and more green in the area creates for a cooler area, without green a neighbourhood becomes too hot (Peeters, personal communication, 2019).

As already acknowledged, the building blocks are built in such a way that the buildings will have a noise free side (Peeters, personal communication, 2019; Gemeente Utrecht 2018b, p.101). Other than dealing with noise issues, one of the main struggles in the area will be to deal with both the effects of heat islands and flooding. This will be tried to be fixed by making the rainwater infiltrate the soil. The goal is to keep the rainwater around for longer in the ground so that this can combat the heat, and by focussing on soil which can keep the water the water will not stay around in the streets. Thus the plan is to only cement concrete where it is needed (Gemeente utrecht, 2018b, p.95). Different ways for water

buffering will also be applied on the roof, this includes with the greening of roofs of buildings which are twenty five meters and lower (Gemeente Utrecht, 2018b, p.96). Air quality will be kept by following at first the limits set by the national government, but with the ambition of the municipality to improve the air quality over the years (Gemeente Utrecht, 2018b, p.102).

It is important to improve social connections already existing within the neighbourhood. This is an additional challenge with all the different forms of housing, spanning several economic classes. The Beurskwartier and Lombokplein itself needs to be built in a way which helps promote this interaction (Peeters, personal communication, 2019). Transition zones between private and public will be made. This is important as that is the place where you will see your neighbours, which creates the opportunity for encounters with neighbours. Social contacts are also actively promoting social contacts by having meeting rooms in the apartment blocks (Gemeente Utrecht, 2018b, p.111). A community centre room will be introduced (Karis, personal communication, 2019; Gemeente Utrecht, 2018b, p.61). This is also a place for people who want to have more social contacts. Outside of this the parks will also help as a place where people will go so the parks will be made sure that they have enough sun (Karis, personal communication, 2019; Gemeente Utrecht, 2018b, p.108). To help with this a local social neighbourhood team will be set up to stimulate social connections within this neighbourhood (Gemeente Utrecht, 2018b, p.61). There will also be a new general practice and a homeless shelter (Gemeente Utrecht, 2018b, p.61).

4.3.3.2 Results from the surveys

In general there is a lot of criticism about aspects of health in the area. As talked about earlier, dangerous driving is seen as a common aspect to the area.. Added to this there are frequent complaints about noise disturbances, drug use, homeless people in the streets, criminal activity such as drug dealing and cars and theft of bikes and there is a lot of litter in the area. Added to this are people complaining that there are too many people in the area itself. These negatives cause people to ask for several improvements to deal with these problems. Most often the respondents asked for more law enforcement within the area, with the hope this could solve most of the problems. So far changes noticed to the area have mainly worsened or possibly caused some of these problems. As one of the respondents said that the addition of underground containtes caused more litter on the streets, and with the construction several people have had noise complaints.

4.3.4 Stability of the Beurskwartier and Lombokplein

4.3.4.1 Results from expert interviews and policy research

The new buildings in the Beurskwartier are meant to attract every type of income (Gemeente Utrecht, 2018b, p.60 & p.111). The high diversity of activities, types of buildings and also different people of different economic classes is deemed essential for high urban areas. There needs to be a place for everyone otherwise it is not a true city centre (Gemeente Utrecht, 2018b, p.18). In the interviews it is also argued that another form which could stimulate stability is that the increase of different types of

buildings, for several different forms of economical classes is that people can move to other apartments or houses within the area if the place they live right now does not fit anymore (Peeters, personal communication, 2019).

The area is considered a mixed area which will include both living and working areas (gemeente Utrecht, 2018b, p.44). The area itself needs to be flexible while still in development, as flexibility is important to attract companies. Places are reserved for companies to settle in the area. Attracting these companies is essential as it brings along work. If people are able to work in the area this fulfills the wish to create a mixed living area, and it creates stability as residents are able to find work within the area (Gemeente Utrecht, 2018b, p.62-63)

It is considered crucial to have the citizens involved in the planning process. The gardens inside the buildings will be designed with the wishes of the inhabitants in mind, that a garden is made which fits with the people living there (Peeters, personal communication, 2019). In general the motivation is to plan what is important and what can be left open, we let open for the inhabitants who live there (Karis, personal communication, 2019). This is still complicated as what is wished for by one person does not mean another person wants the same. The area will not be able to support all forms of lifestyles, thus the goal becomes to make as many residents satisfied (Peeters, personal communication, 2019). With a lot of people living in the area and being active in the area, the environment will become more active and it will feel like a true extension of the city centre (Gemeente Utrecht, 2018b, p. 67).

4.3.4.2 Results from the surveys

The area itself is deemed very multicultural, to the delight of the respondents. There are lots of people and several people cited to have good contacts and that there is a friendly atmosphere. However not everyone agreed arguing that there is little social cohesion within the area. An example of the last one was one person saying that within the area there is an “island” of highly educated people with kids, which does not interact much outside of the area. Several other people though criticised the opposite and said that there is too much social rent in the area.

People are getting more worried about the housing prices in the area, where it is noticed that the prices are rising. One of the respondents specifically cited that they have started noticing forms of gentrification, where social rent transformed into private rent and pay. With the new plans people worry that this will worsen and it will push out people who already have trouble affording the housing in the area. The housing must be affordable, but it looks as if it will be mostly expensive and people find it a shame not more social rent is coming. Several people also feel the opposite saying that these new developments creates an opportunity for more people to live in the city centre in an affordable manner. One of the people I interviewed noticed the problems with affordability too in the area.

> “Because of high rents in the area people are not staying around for long. You see more people are moving to other regional cities which are affordable. Social rent is a lot cheaper, and it is good Utrecht tries to make every house still affordable but this is a challenge.” (Herbert Boland)

4.3.5 Discussion

With the development of the new housing comes together with an improvement of the quality of the environment, which is good. Most people are excited about the new housing and wish that the new housing developments are well incorporated with the environment. The main complaints are about the infrastructure. It is already under a lot of pressure, where people frequently cite dangerous driving within the area and a lack of parking. With the increase of housing people fear this will get worse and enough parking must be done to handle the increase. However a lot of people also see the possibilities with dealing with the infrastructure where more could be done to make sure the traffic in the area is less dangerous.

One issue of interest are the economical classes within the area. As there is a seemingly clash where the municipality wants to create an area with a lot of mixed economic classes, in experience this has been felt differently. The experience is that when there was a mix in economical classes the people were critical of the other class. Where people are complaining about the richer people forming an island within the area or other people complaining about the large amount of social housing. You can see that the municipality acknowledges these problems and has the ambition to build an environment which stimulates improving social connections between all the residents living in the area. But the main complaint comes from people feeling that the rent and prices within the area is increasing. This could be increased with the new construction and make it more difficult for some of the citizens living in the area now to maintain their residencies. This creates for one of the main worries for this area, which is that the plans for social rent and lower income housing will not solve the problems of a higher housing pricing within the area which makes it more difficult for the lower income people to keep their housing, and that the plans for social housing are not enough.

One of the main issues where the development plans and the citizens differ is in the issue to deal with aspects of health. Within the area several people complain about noise disturbances, drug use, homeless people in the streets, criminal activity (drug dealing and cars and bikes are stolen) and litter, however the plans themself do not mention dealing with most of these problems. The aspects which are named, such as noise, heat and flooding are dealt with partly, but there are still uncertainties for these aspects which means problems could still happen with this. This could result in problems as it is uncertain how the increased density will affect these problems.

One aspect of the area which differs from the other two areas is that there is already a huge availability for lots of different services and shops. This is because it is close to the city centre and the shopping mall of Hoog Catherijne. These facilities will be expanded with more local facilities of the Lombokplein which creates for a diverse set of shops within the area. This means that the area itself can focus on more niche shops and facilities and can focus on local needs. With this also comes a possibility to focus on more green, as there are already a lot of facilities for the citizens. This means that the area does not seem the huge need of it, and the citizens are already in praise for the depth, quality and amount of facilities. The worry is that not enough green will be added, but with the plan of the municipality to add green wherever possible the plan seems to work in favour for the citizens.

The last fear of the citizens is that there will be an overload of new people and the area will be too busy. By several people the area is already deemed as heavily populated and thus busy. This is not necessarily a negative, several of the respondents enjoy the busyness as it is now. But this can still be something to watch out for. With more busyness, comes more pressure on the use of the area and the facilities used now might become overwhelmed too. While it is also true that the big shopping mall in the area can deal with this, the shopping mall also attracts people over a large scale. As of now it seems still difficult to predict how much new inhabitants the area will be able to handle as of now, which is important to oversee over the next years of construction. An overview of the main findings from this case study can be seen below in table 4.12.

Liveability characteristic	Main findings from research
Infrastructure	- Traffic in the area is often dangerous. The spatial plans will improve the infrastructure dealing with some of the dangerous driving, but the new amount of people could create more dangerous traffic. - The train station creates for a great public transport network for the citizens
Culture and environment	- With the shopping mall in the area it is expected that there will be enough shopping for all citizens. - The focus on new and local facilities adds to the environment. - As there is already a focus on shopping and facilities within the area, there is more opportunity for green spaces within the spatial development. Which has the support of the citizens.
Healthcare	- Complains about litter, nuisances, drug use and criminality are abundant and are not discussed in the future spatial plans - Uncertainty about the effects of heat, noise and flooding for the areas with the developments
Stability	- Different economic groups have criticism on eachother, which goes along with a genuine fear for gentrification within the area. - Within the plans there is a focus on creating housing for all economic groups

Table 4.12: Summary of the main findings for each liveability characteristics (Source: Author)

5. Discussion and analysis

Within the areas a clear focus on increased urban density can be seen. Where both an increase in buildings and population help for an increased intensity in the use of space (Raman, 2010). The housing development is arguably following the ideals of the compact city as the focus is on housing within the city borders. Where one reason for this is to protect the green environment surrounding the city which is a common ideal within compact city development (Howley, 2009). The focus on building on brownfield developments is also common within compact cities (Rogatka & Ramos Ribeiro, 2015). This can be seen in this plan as both the Merwedekanaalzone and Cartesiusdriehoek have several brownfields within the area, which is the reason in the first place why these areas were chosen to be redeveloped. Within the compact city model the countryside is seen as a clear border which should limit the urban area of expanding (Westerink et al., 2013, 475). The focal point of compact city development here is that there are several areas, such as brownfield sites of recycling spaces, where a lot of development is still possible. So instead of investing outside of the cities boundaries, investments are made in possible areas of development in the cities so that the urbanised land will be used optimally (Rogatka & Ramos Ribeiro, 2015, p. 122).

All of these areas are dealing with how to plan within the areas while maintaining a high amount of liveability, this is under the theme of 'Healthy Urban Living' (Gemeente Utrecht, 2016b). This shows the main theme of the spatial planning within the area which is that an increase in housing is essential to deal with the growth of the urban population in Utrecht, but it must not come to affect the general liveability within the area. This motivation can partly show the possible limits of growth in the context of liveability. Where the argument is that there is a limit to the amount of growth an urban city can handle, as Meadows argued about (2005). Within Utrecht this can be shown too and one way to deal with this growth without negatively impacting aspects of liveability is by way of improving the layout and design within the areas. As Raman (2010) argued that this should be able to have an effect on at least the perception of density as the layout and design affect the physical proximity and accessibility within the city.

Impact of increased density on the infrastructure: Within Utrecht examples where the layout of the area is adjusted can be found in the plans for dealing with the infrastructure. Both the Merwedekanaalzone and the Cartesiusdriehoek have a similar focus within this. Where in both areas the environment is transformed to create a car free zone which comes with infrastructure with a focus on public transport, cyclists and on pedestrians. The Beurskwartier and Lombokplein also deal with the infrastructure but not in such an intense car free way as the other areas. This is partly because of the well connected public infrastructure within the area in comparison towards the other two places. This idea is based on the fact that the infrastructure within the areas will not be able to handle a large amount of cars, where one car per household is too much. This is in line with the argument of Häußermann and Haila (2005) that the European city was never built for extensive car use. It means that for these areas the only possible way for the area to handle the amount of new people is by changing the infrastructure in a way which gives for a possibility to have increased density without overflowing

the area with cars, which commonly happens as density frequently causes for traffic congestions (Nijhuis & Kourtit, 2013; Krehl, 2016). The focus on alternatives for car use is central in the compact city. The two main reason in theory are to improve the accessibility in the city as the space must be well organised so it can be used effectively and the second reason is to deal with lowering emissions within the urban areas which affect climate change (Haaland & Van Den Bosch., 2015, p.762; Westerink et al., 2013, p.474-475; Rogatka & Ramos Ribeiro, 2015, p. 122-123; Kotulla et al., 2019, p.3479; Arnberger, 2012, p.717). While for Utrecht both are of importance the main reason for the de-emphasizing on car use is the first reason as the infrastructure within Utrecht will not be able to handle the increase in car use. This seems in line with the criticism of the idea of the compact city where the compact city both give opportunities to become more sustainable, but this tends to come at a cost of liveability (Neuman, 2005; Mouratidis, 2018). Where the increase of population lends to a more environmentally friendly infrastructure, it is also needed because if the infrastructure was not changed, the infrastructure will endure serious traffic congestions which have a negative impact on the liveability in the area.

According to the citizens in all areas, the infrastructure is already enduring a lot of pressure. The main complaint about the infrastructure comes from a general complaint about the increase in population in the area. Citizens from the area around the Merwedekanaalzone have criticisms as the argument is that the area is already busy when it comes to cyclists. The fear in the area is that the increase in the population is too much for the infrastructure to deal with, which will directly affect the neighbouring communities. As in the specific plan of the Merwedekanaalzone bridges are built over the canal to help deal with the pressure of the traffic, which will then affect the nearby areas. Within these areas there are already complaints about the pressure of traffic in the area. This shows a complaint of Howley et al. (2009) where one big reason which causes problems in infrastructure is difficulties in mixing older infrastructure with newly developed infrastructure. Where new developments in the Merwedekanaalzone affect the nearby environments which are not undergoing redevelopments. The Cartesiusroad is undergoing a very similar process, with a focus on slow infrastructure. The difference is that the surrounding areas are more supporting of this change. One possible reason for this is that within the Cartesiusdriehoek the developments are happening in an area with a busy car road, and with these developments the heavy traffic of this road will be minimized. Several of the citizens still share the fear of the area becoming overcrowded with traffic, as there are doubts in how far the area will be able to handle it. But several of the citizens also see the opportunities as the car traffic might lessen. This focus on slow infrastructure is possible because of the density which makes it for governments easier to shift to walking, cycling and public transport as the main focus for travel (Kotulla et al., 2019; Stevenson et al., 2016). Where the argument is that the distances are shorter which means car travel is not as important within the city (Krehl, 2016). While several citizens fear that the car is too essential for a large group of people, in the article of Hamiduddin (2017) a focus on policies stimulating alternatives for travel by car did show that residents become less dependent on car travel. This is followed with the idea for an increased focus on shared transport. This means giving the citizens opportunities to rent vehicles within the area, which thus includes cars. This fits with the idea of the compact city as Krehl (2016) argued that the costs of services for infrastructure will decrease as more people will use the infrastructure in a smaller proximity. But these restrictions on car travel also show the criticisms of Kotulla et al. (2019), where people are critical of the increased density because it could restrict movement and freedom.

Dealing with limiting car traffic comes together with the need for paid parking. This is to stop people from the car free areas to park cars in the neighbouring areas. This can be seen as something important as a lack of secure parking is common in denser areas (Howley et al. 2009, p.860; Krehl et al., 2016, p.76; Nijhuis & Kourtit, p.292, 2013; Wolf & Haase, 2019). This will be newly introduced in the areas of the Merwedekanaalzone and the Cartesiusdriehoek and the surrounding areas, to the complaints of the citizens. But the municipality sees no other option as otherwise the cars will be parked outside of the development areas, which creates a parking shortage. The Beurskwartier and Lombokplein deal with these developments differently, simply because the area does not have the same focus on slow infrastructure. The area has a better connected public transport than the other areas, and the infrastructure itself will be improved. However the infrastructure as it is, comes with criticism. The area is plagued with dangerous driving and similar to the other two research areas, the citizens are complaining that the area is already busy.

One contradiction found within some of the plans was the focus on creating housing for households with families. This seems contradictory with the theory where households with kids are often seen to be the exact type of household which tends to hold on to extensive car use (Kotulla, 2019). This will thus create challenges for the plans of slow infrastructure. This is not the only difficulty for these households as school-aged children are more favourable to areas with more space (Kotulla, 2019). The development within these areas rarely focus on creating both an area with lots of free space with extensive car use. According to the municipality this is not possible to reach the housing ambition set up by the municipality. This can create some difficulties for family households who live in the area.

These criticisms on the infrastructure come with one of the most named positives in all the researched areas, especially the area of the Beurskwartier and Lombokplein. That is that all the areas are in general close proximity to all different types of facilities and places. in the Beurskwartier and Lombokplein it is not uncommon for people to have their social life, work and shopping within the area. Proximity is often named as the great advantage urban cities have over rural areas (Kotulla et al., 2019; Leyden et al., 2011), which is in line with the findings in all the researched areas.

Impact of increased density on the culture and environment: The high proximity which is named in all three cases causes for one of the main advantages of dense cities and should stimulate a higher level of personal relationship satisfaction. This is because of the close proximity to all types of facilities and public space which can be used for socializing and sustaining social networks (Arundel & Ronald, 2017, p.36-37; Mouratidis, 2019, p.267; Wood et al., 2010). All of the areas will have new facilities in the area, where the focus within the Merwedekanaalzone and Cartesiusdriehoek is that these new facilities are also meant for neighbouring areas. This could help stimulate the social networks between the areas. This can be noticed with the focus on communal green space within all areas. One reason why both the Merwedekanaalzone and the Cartesiusdriehoek have a plan which has a focus on slow infrastructure is that it allows for space which is used to create green communal space between the building blocks in the area. This is shown by one big communal green space in the middle of both areas. The Beurskwartier and Lombokplein also have this in the plans where the building blocks themselves will be given small communal green spaces for the residents.

The only criticism to this idea is that increased density also can have an effect on the built social networks within the neighbourhood community. Within the plans the increasing density seems to have a two fold effect on the neighbourhoods, where an increased density creates for higher pricing in the areas which creates for residential turnover and there is an influx of new citizens in the neighbourhood which is seen as negative by some of the residents. All three areas in some way are dealing with problems of this but especially within the Beurskwartier and Lombokplein there are residents which complain about other citizens and several residents have fear that the new housing will stimulate an increase in the pricing of the area. Which could cause problems not dissimilar to gentrification.It is important to acknowledge with this that for each neighbourhood there are also positive remarks about the new citizens, this makes it difficult to have a strong conclusion on the effects of new citizen influx on the neighbourhood community.

As already mentioned a lot of the housing developments are being done in brownfield areas and industrial areas. Within the Merwedekanaalzone people are satisfied with the developments as it is seen as an opportunity to transform the area into a neighbourhood which is more befitting of the surrounding neighbourhoods. The main criticism is that the new high-rise buildings is not wished for by the citizens. This is especially noted by citizens from the Merwedekanaalzone. The municipality remarks that there is no choice but to build high-rise buildings as it is the only option to reach the housing needed for the increase in population over the next years. The perception of these buildings can affect the experienced liveability, the argument is that social characteristics are more important in affecting the experienced liveability (Coirici & Dantzler, 2019; Permentier, Bolt & Van Ham, 2011). The main criticism on high-rise buildings seems not to follow this logic, however after more high-rise buildings are built, it will be of interest to see if the residents are still critical of it.

In general the residents are positive towards the new construction of the culture and environment within the areas. The new developments bring new forms of recreation and general new facilities to the neighbourhood. Within all areas there is a focus on local facilities which is the reason that it adds new forms of facilities to the neighbourhoods and that it does not create an increased traffic to the neighbourhoods from people outside Utrecht visiting the facilities. Especially for the Merwedekanaalzone the idea of more facilities is welcome as people are critical of the amount of recreational facilities within the neighbourhood. The residents from Beurskwartier and Lombokplein and Cartesiusroad are already satisfied with the amount of facilities but are critical of the quality. New high quality facilities are thus of importance within the neighbourhoods. An increase in new recreation and facilities is considered a big advantage within more compact neighbourhoods and that seems also to be applicable here (Bramley & Power, 2009; Howley, 2009; Kotulla, 2019; Krehl, 2016; Mouratidis, 2018). The only danger for the future is that the facilities which exist might not be enough to supply the population when the population keeps growing and there is not enough space for the construction of new facilities.

Next to the facilities the public open space is an important asset to defining the culture and environment in the areas. The green environment within increasingly dense cities is generally undergoing a significant amount of pressure. Both because there is less space within the city for green with the increased

construction but also because of the increase in population, there is a more intensive use of the green area, which can result in a lowered quality of green area (Arnberger, 2012; Valcárcel- Aguiar et al., 2019). This is partly reflected by these cases, but with the municipality the importance is on as much green space as possible. Which should partly deal with the problem of lack of green because of increased density. The importance of green within the plans is also mirrored by the reasoning behind the spatial development partaking within the city borders. The reason is to maintain the green outside of the city, which is an important factor within the compact city ideology (Rogatka & Ramos Ribeiro, 2015). The developments in the plan have a focus on green within the area, all plans have the motivation to make green wherever possible. This comes with new parks added in all research areas and green areas within the building blocks. While these developments seem positive towards green in the area two difficulties can arise by this. The first one is the quality of green spaces. The municipality of Utrecht underlines the importance of high quality green, but with the predicted extensive use of the green can have a negative impact on the quality of the green in the area (Arnberger, 2012). The second aspect has to do with that creating and maintaining these green areas, which will cost money. This can result in a form of exclusiveness created by green areas, where maintaining the green areas will create a higher cost of living in these areas (Haase et al, 2017). Where several citizens already were complaining about an increased cost of living, this is a significant worry with the developments.

Impact of increased density on the stability: The economical advantage of increased density is not as clear within these developments, but increased density does help with facilitating the exchange of ideas and knowledge between individuals and firms which creates for knowledge-intensive business services to be found within the urban city center (Bramley & Power, 2009, p.33-34; Krehl, 2016, p.2). While this can be a positive aspect of the increased density it does not change the possible negative effects on the people living within the area. As increased density oftenly also causes for higher pricing within the area (Wolff & Haase, 2019). This has already been noticed by people living within all areas, especially within the area of Beurskwartier and Lombokplein. This is a danger where increased density can cause a rift between the economical classes. While the municipality of Utrecht has plans to make sure that there will be housing available for all residents, there is some reason to worry, and several respondents have shown this fear of increasingly expensive housing. An example of this perceived inequality can be seen in the area of the Beurskwartier and Lombokplein. Where respondents were critical of what was called ‘islands’ of people. Where people were both complaining about a group of housing of higher income which isolated itself from the rest of the area, and people complaining about too much social rent within the neighbourhood. This shows a sign of perceived inequality which is a danger of the communities vitaly according to Ciorici and Dantzler (2019). It is important to be able to avoid this perceived inequality while developing the areas. However there are also positive economic effects as the density allows for a higher use of the infrastructure which means that the cost of using it lessens for the nearby citizens, thus making the forms of infrastructure more accessible (Krehl et al., 2016, p.76). This is shown with the concept of Mobility as a Service (MaaS). For the first three years all citizens are given this service which is meant to rent cars and bicycles within the area.

A second aspect which comes with increased density is a general improvement into the economic opportunities within the city. Denser areas tend to come with more job opportunities, and the increased density within the area seemingly is creating more job opportunities within the city (Howley, 2009).

Examples for this is the increase in facilities comes with jobs within the facilities. It also is able to stimulate recreational services, including more specific, unique services which tend to only be for a small group of people. Examples within the areas is a general boost on cultural aspects of the city where people living in the area were able to have jobs. The Merwedekanaalzone for example comes with new jobs with an extra focus on the cultural sector and the Cartesiusdriehoek will facilitate initiatives by local citizens and entrepreneurs. This is in line with the logic of Howley (2009) that high density areas create supply for more job opportunities

Effects of healthcare on density: When it comes to physical health within the area, there are some possible dangers for the areas. Several of these are specifically named by Frumkin as common examples of health within spatial planning. Where the problems are that either housing is built in areas which are undergoing problems because of a need for housing, an example for this would be noise problems. Examples of this are the train tracks in the area of the Cartesiusdriehoek which create noise problems which affect apartments within the building blocks. There are also problems which are caused or worsened by an increase in density, with this example problems of air pollution, heat, and traffic problems are often named (Frumkin, 2012; Nijhuis & Kourtit, p.292, 2013; Krehl, 2016). This is shown with the ambition of creating green areas on the rooftops of the buildings within all research areas. This is to deal with heat pressure, but still only partly deals with the problem. Where in the Merwedekanaalzone a rise of seven degrees is expected by the end of 2040. This shows that increased density does not always come with high quality aspects when it comes to healthcare. Another important factor which affects health is the increased pressure on places for sports. Where there is still a seemingly decent amount of green areas, which can be used for exercise. From the interviews it seemed that there is no place for new sporting fields. With an increased pressure on sporting fields and sporting activities, this can result into an increased pressure on the physical health of the residents as there are less opportunities to play sports. This is important as sports are seen as important in providing psychological restoration and reduces stress levels (Thompson et al., 2012; Wolsink, 2015; Kotulla et al., 2019, p.13)

Another aspect of healthcare is mental health. Mental health and social capital are often named with this (Frumkin, 2012). With the focus on implementing green policies this should have a positive effect on the health of the residents as green space is seen to be able to stimulate social encounters, strengthens the sense of community and strengthens the place attachment (Maas et al., 2009b, p.594-595; Wolsink, 2015, p.1066). The focus within the spatial plans on this specific development seems in line with the logic of implementing green areas. With the focus on meeting and socializing within the plans does not come unfounded as within urban areas people are more likely to meet each other (Krehl, 2016).

The need for creating communal space seems to have a possible positive aspect on mental health but another aspect of increased density is an increase of population. Aspects of an increased population can result into overcrowding, psychological-overload, personal anonymity and unsatisfactory social relations are cited as the reasons for these negative aspects (Arundel and Ronald 2017, p.36; Howley, 2009; Permentier, Bolt & Van Ham, 2011, p.980). Within the area several people were worried about the growth citing that more citizens could result in overcrowding. This is most noticeably seen within the Merwedekanaalzone where people in the neighbourhood of the Rivierenwijk are protesting against the bridges which will be built over the canals. These bridges are built to make sure the infrastructure can

handle the increase in citizens. But citizens in the Rivierenwijk as of now think the area is already extensively used for cycling and with the building of these bridges, it will become too busy. This would affect the communal area of the citizens living in these areas. However it is also important to acknowledge that not all residents agree and some cited the relatively high density as a positive. Within some of the neighbourhoods the areas can be seen as less densely populated in comparison to Utrecht. This means that it is also possible that the perception is what affects this too, where people who are more used to more highly populated areas are more welcoming to the increase of population. While people who live in the less populated areas of Utrecht are more worried about the increase in population.

While one of the main reasons for the implementation of a compact city policy is sustainability in the practice of Utrecht it can be seen that increased density does not necessarily create a sustainable environment. As none of the researched areas so far seem to be energy neutral and are dependent on technological innovation to become it. This is difficult as technological innovation is still creating an environment which might only become sustainable in the future. This fits with what Westerink (2013) said when it is put in doubt in how far dense cities help improve sustainability. That said the research itself does not go in deep enough into this topic of sustainability to know if this area in comparison is still above average when it comes to energy efficiency and being energy neutral. But examples given of the difficulties found for creating sustainability within the area is the density. Several of the roofs in the research areas are being used for solar energy which helps become energy efficient, however several of the roofs need to have green areas to deal with problems of health. Several more actions are taken to become sustainable such as circular construction and with new construction heat networks can be set up which creates for more sustainable energy sources. But as of now the ambition of becoming energy neutral is not reached yet.

6. Conclusion

The ambition of this thesis is to look into the increase of density in cities and what the lasting effects of this increased density will be. With the urban population growing world wide and creating for rapid urbanization across the globe, the effects of density become more important to research (Nijhuis & Kourtit, 2013, p.296; Meadows et al., 2005; Wolff & Haase, 2019, p.12). Urban density becomes more important as it can reflect the limitation and the importance of sustainability as there is a finite area which people can live in and a finite supply of energy and materials to be consumed (Meadows et al., 2005, p.5). The understanding of the effects of density can help understand where these limits are. For this thesis specifically a look was giving into urban liveability. Urban liveability was chosen for the research as the concept of urban density shapes the environment, urban liveability is chosen as it reflects how people live in these environments. Thus urban liveability helps understand the changes which have happened in an urban environment undergoing increased density.

The main question this research tried to answer to understand the effects of urban density is: **In what way does the increasing urban density affect factors of urban liveability in the Merwedekanaalzone, Cartesiusdriehoek and the Beurskwartier and Lombokplein in Utrecht?**

All three areas of the Merwedekanaalzone, Cartesiusdriehoek and the Beurskwartier and Lombokplein have the same objective, and that is to help deal with the demand of the housing market. As there are differences between the three areas this means there is not one homogenic way this was dealt with, but all development went according to the ideal of healthy urban living. This in essence means that there is a focus on new housing where the growth in housing needs to be able to support a healthy lifestyle. But the way this ideal is elaborated on within the three spatial plans differs, as each area brings unique characteristics which creates different wishes for the plan and as different people are involved in the development of the plan this causes for differences though. However, the area of the Merwedekanaalzone and Cartesiusdriehoek have several similarities. Both areas are former industrial areas, which as of now are mainly unused and have several brownfields within the area. This can be seen in the plans too which are similar in the way both plans focus on creating a car free inner area with a focus on green space. The area of the Beurskwartier and Lombokplein differs from these areas in this way as it is not an industrial area, and the area itself is surrounded by a busier, more urbanized area. This also explains why the plans within the areas are more different than the other areas. The similarities can be found between all three areas as the areas were decided by the municipality of Utrecht to have capacity to be able to support the development of the housing within Utrecht.

Initially it is of interest to look into how increased density comes back in the policies of the three areas. Looking at the policies it is clear that in all the plans for spatial development suit the concept of the compact city. From the focus on brownfield development in the Merwedekanaalzone and Cartesiusdriehoek, to a plan for a well-organized infrastructure which supports non-car travel, to a focus on green and to a focus on mixed living. These aspects are all common in compact city policies and can also be found in the policies of these three areas. (Haaland & Van Den Bosch., 2015, p.762; Westerink et

al., 2013, p.474-475; Rogatka & Ramos Ribeiro, 2015, p. 122-123; Kotulla et al., 2019, p.3479; Arnberger, 2012, p.717).

Looking into these three cases by using four different factors which help describe liveability creates for some results which help understand how density affects urban liveability. This should help answer the questions asked above. As can be seen in the results the four factors of urban liveability are all differently affected by increased density.

Of the aspects of urban liveability infrastructure might be the most clearly affected factor with the effects of increased density. This is as infrastructure is directly affected by the housing policy, a clear focus within the spatial plans was put in dealing with the infrastructure. In each of the areas a realisation was made that with the ambition of the housing plans the infrastructure of the areas needed to change. This is mainly done with the idea of slow infrastructure which focuses on changing the infrastructure with a focus on car travel to alternative forms of transport. If this is not done the areas were deemed too busy for travel and transportation with the amount of new housing. Several people still have doubts about the new plans which change from it will not work as people, especially families, need cars so it is still not enough as the areas will be too busy. While it is difficult to predict the effectiveness of the plans it does show how increased density can negatively affect the infrastructure. At the same time because of increased density the ambition of a plan with the focus on slow infrastructure seems more feasible. This is in line with the idea that the compact city is sustainable, as with the compactness people are less in need of using the car to travel. One other critical point from the increase in housing is that it means a lot if high-rise buildings will come to the area. While most people from the neighbourhoods are not in favour of this, it is simply deemed impossible from the municipality to avoid this. The only neighbourhood which seemed neutral towards high-rise buildings is Beurskwartier and Lombokplein. This is the only neighbourhood where several high-rise buildings are common, which could explain the difference.

While the concept of infrastructure is complex as the depth of the positives and the negative effects of the plans can be unclear still, a concept such as health and stability seem under more pressure. While within the plans there is a clear focus on creating an environment for people from all social incomes it is difficult not to be critical of it. As several of the respondents are a bit critical and complained about rising housing prices, this comes mixed with early reports showing expensive pricing for the new housing in the area. As the rent and property price of housing within dense environments are generally seen as higher this can show a negative aspect of density on urban liveability (Nijhuis & Kourtit, p.292, 2013; Krehl, 2016, p.2).

Health seems the most negatively affected by increased density, where areas become busier which also results in noise and increased heath. This is mixed with areas which, as of now, are not able to reach the sustainability goals set up by the municipality. Showing signs that density has a negative impact on urban health. One aspect of urban health and the environment which is seemingly more optimistic is the green area. Urban areas are not known necessarily for being green and with increased density this can be expected to worsen as the social carrying capacity of the green environments is exceeded (Arnberger, 2012). But with the huge focus on green environment it seems as it is the opposite case in these plans.

This seems as a reaction to the idea that increased density limits green space, to avoid a lack of green space the plans deem it as important to implement green area wherever possible. Of course there is still some doubt to these plans as it is not clear if the green areas can handle the amount of population, and it is also unclear how far the plans of the green environment are actualised, as one of the interviewees said that with these plans the plans for green are some of the first to get dropped the moment the construction starts.

In general the areas seem to have a positive impact on the culture and environment within the area. Where people within the Merwedekanaalzone and Cartesiusdriehoek had several compliments about the design of the area, which was meant to fit in design wise with the surrounding neighbourhoods. The main positive point from increased density seems to be the increase of facilities. With more people living in an area, there seems more opportunities for all new types of facilities. This comes with an increase in recreational facilities and a lot of new food services. But this also means more social facilities which could have a positive impact on the general health of the population of both the direct neighbourhoods and the surrounding area.

With the results it feels unfair to call increased density as having a general negative impact on urban liveability (Wolff & Haase, 2019). From these results it seems more in line with what Howley argued for that density does not need to negatively impact urban liveability as long as it is well designed (2009). That said there is a limit as can be seen in these plans. The plans on infrastructure showed a need for a redesign of the infrastructure, as with the new residents it was impossible to create space for travelling by car. The infrastructure can show in that way very clearly the debates around increased density on urban liveability. Where it shows the limits, as only so many people can live in an area before the area becomes overcrowded. But it also shows the opportunity, where the plans for a slow infrastructure are most likely only feasible within dense urban environments, which is also argued by Krehl (2016). Increased density does not need to have a negative impact on urban liveability, it brings new opportunities, but there are limits to the environment and increasing the density of an area most likely will bring some negative effects to urban liveability.

6.1 Future research recommendations

With this research it is difficult to give a conclusion which can be applied generally, as it is a case study limited to the area of Utrecht. This means that while it gives insight into the topics discussed, it does not mean that these results inherently help with discussing this topic in the context of general spatial planning, especially when it comes to urban areas which are very different to Utrecht. But with an ongoing growth in the urban population projected for the next thirty years, not just in Utrecht but also worldwide, (Caragliu, Bo & Nijkamp, 2011, p.66) fully understanding the concept and effects of density becomes more important. As density is a concept which is essential to understanding urban areas, it will become more important for spatial planning to manage the effects and plan density. This means that the dimensions of density need to be understood. With the concept being under researched the suggestion is for more case studies from diverse places. Several different areas which are planning to deal with its density and especially areas undergoing increased density are of importance to be researched. A look can for example be given to cities such as New York, Nairobi or Beijing which are all

arguably very different cities to Utrecht and from each other, and all these cities deal with effects of density. But research to cities closer in design to Utrecht would also be of interest, where European cities such as Amsterdam, Brussels, Dublin or Stockholm can be of interest for research. While researching effects of density it is of importance to focus on cities which are undergoing spatial development with a focus on urban consolidation. Within this research that is the case, when it is not the case the question is in how far the urban developments can be considered increasing the density of the city, which would need to be argued for.

With the research about the effects of density the concept of liveability has been used. This concept helps to get a broad understanding about the effects of density, but within the characteristics of liveability it was difficult to do an in depth analysis of each individual characteristic. This was as this research was with limited resources and had a limited time period. Interest would be into more in depth research in the individual aspects of liveability within the context of increasing urbanization. An example for a possible study for this could be a comparative case study research into the effects of aspects of health between different urban areas. Or a more concrete research into aspects of the infrastructure within a city, and hereby understanding which aspects or areas of the infrastructure creates complications and which are effective or efficient. With more understanding of the effects of density wanted, more research into specific aspects of urban areas undergoing increased density is of interest. The characteristics of liveability is not the only aspect which could undergo deeper research, experiences by specific groups of people are also of interest. Examples for this is search into the experience of the effects of density on urban liveability on people from different age groups of people from different incomes. This is because it can still be unclear why and how different residents are affected by effects of increased density.

Other possible research based on results found from this research would be to research into the effects of the construction, as increased density comes together with years of construction. This is of interest to dive more into as this research found out several people were bothered by noise, general nuisances and limitations within the infrastructure. This aspect of density is not often discussed, but with constructions lasting for ten to fifteen years within these areas, it seems deeply rooted into how the areas are perceived over the next fifteen years, and will shape the experience of citizens living there.

Lastly it seems interesting to research the areas of subject in this thesis again in several years, after the development of the new housing is finished. This is to be able to get an understanding of the impact the spatial plans ended up having on the environment.

7. Reflection

One difficulty and mistake of this research is that the research was originally set up with the idea that the plans and construction were further finished then was in reality. For most of these areas the first few buildings were set up and people have moved in, but this is still on the minimal side for research. Because of this, it is harder to look into effects of increased density. That said it is still believed that there is still benefit from doing research into density rather early into the development, as it can be easier researched into how the people thought about the plans before the plans are realised. This is so that the emotions and thoughts are all recent instead of doing research after the developments where people might have forgotten how they reacted to the plans and after the implementation of the plan there is also a risk that the population changed significantly during the construction. But the relatively early stage most of the construction makes it extremely difficult to have clear conclusions on the effects of density.

Another regret in the research is that the concept of stability was not fully reflected in the question list for the expert interviews, where more questions should have been asked about the economical impact of the housing and how the plans implement the different forms of housing for the people from different economic backgrounds. Because this has not been done, it caused a lack of depth into the reasoning and reality behind the plans. While there is still depth to be found in the policies, this can still miss on some depth which could have been gotten from the expert interviews.

One other aspect which in hindsight could have been better was some of the wording in the first part of the survey. The quantitative data gotten from the surveys, which is meant to compare to the general population, was sometimes off. This can be because in truth the respondents happened to be different from the general population. But in some cases, such as the ethnical background of the respondents, it was noticeable that all respondents answered by saying Dutch. Well this is expected for a research in the Netherlands, this was significantly different from the population surveys done by the municipality of Utrecht. Another reasoning for this specific discrepancy is that the survey was fully made in Dutch. While the original idea was to do a survey in both Dutch and English, the decision was made to do it fully in Dutch as the survey used videos in dutch. These videos were deemed essential as it provided the respondents with information about the research area which was deemed to be needed to be able to fill in the survey in depth. Future research into similar topics could then improve by partly having a better focus on making sure the survey is representative of the population as there is some doubt in how far the survey done in this research is truly representative. Because of this it is difficult to truly translate this quantitative data to check if the surveys were representative of the population, sometimes which will need to be done in further research. A second reason why this was difficult to do is as the areas research in the thesis are not officially defined areas by the municipality of Utrecht yet. This creates that the comparative data gotten does not match the data of the tested population.

Lastly in hindsight trying to get an understanding of the effects of density by using the full spectrum of urban liveability brings complexities, as urban liveability can be a very broad concept. The concept of

urban liveability can be used for this type of research, but the scope of this research became too big to be reasonably researched under the limited time and resources. In hindsight a focus on only one aspect of urban liveability would have given more insight into the effects of density.

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9. Appendix

9.1 Topic list expert interviews

To start the main interview introductory questions will be asked. These questions are meant to introduce the main topic of the interview and thus start the main conversation. These questions do not have to be fully in depth yet, but are a means to kickstart the interview to get the information wished for (Xu & Dumay, 2011, p.250). The topic list is mainly used as a guidance to ask all important questions, but the asking of follow up questions is encouraged.

Important beforehand		- Ask if I can record it - Ask if it is acceptable to use the name of the expert in the research - Explain about the research
Introductory questions	Questions to understand what the expert knows	- Ask what the person does - Ask what the person knows about the topic - How are they involved in the project?
	Ask about the specific plan	- What are the main ideas behind the housing policy in the area? - How is the development going? - Any problems/difficulties? - How have the inhabitants reacted to the planning?
Specific liveability questions	Infrastructure	- How will the infrastructure change to take care of the new demand with the increase of citizens? - What is the main thought behind these changes in infrastructure? - Will the public transport in the area be changed to take care of the increase of citizens? In what way or why not? - What is the main idea behind the housing plan?/ How will the amount of housing be built for the projected population?
	Stability*	- What impact did spatial development have on the citizens? - How did they react/interact?

		- What has changed most noticeably for them?
	Healthcare	- With the increase of citizens living in the area, are the forms of healthcare enough to take care of everyone adequately?/ Are all essential facilities (supermarkets, primary schools, hospitals) in the area? - Are there places for exercise in the area? - How much compared to other places in Utrecht?
	Culture & Environment	- Did the direct environment endured changes because of the new housing policy? - How hass the environment changed to make it more liveable/appealing/enjoyable for the citizens? - What has been done for entertainment within the area? - How much space will be available for green space?/How is green space involved within the housing policy? - Are there new facilities introduced in the area? - If yes which ones and why these?/if no why not?
Ending questions/debriefing		- Anything else I forgot to ask of interest? - Thanks for answering my questions!

Table 9.1: topic list of the expert interviews (Source: author)

* While the expert interviews were being taken the questions about stability were not fully based on socio-economic stability, as the importance of economic stability was only realised afterwards. As can be seen the questions asked above focus mostly on a general experience in how citizens reacted. During the expert interviews the topic of economic stability still was discussed about and during the policy analysis the importance of economic stability was realised. This still creates for some missing information in the expert interviews when it comes to economic stability and for this researcher to have a few missing spots in the information of the thesis.

9.2 Qualitative survey

The questions for the layperson interviews are based on McCrea and Walters (2012,p.195-196). McCrea and Walters have researched urban densification and chose to interview laypersons for the research,

thus making their interview questions a good basis for this research. As it is not the exact same research several changes in questioning will be made to support the goal to find out about experienced urban liveability in the areas. Of note is that the questions were asked in dutch, but for clarity sake both a dutch and english version of the survey is shown below. A link to the online questionnaire can also be found underneath the surveys below. For each case study the Cartesiusdriehoek had 37 respondents, the Merwedekanaalzone had 32 respondents and Beurskwartier and Lombokplein had 30 respondents.

Deel 1: Vragen met criteria om inwoners te vinden die in de onderzoeksgebieden wonen	
In welke wijk woont u? Als de optie waar u woont er niet bijstaat valt u buiten de doelgroep en dan hoeft u de enquête niet in te vullen.	- Binnenstad - Noordwest (Subwijken: Pijlsweerd, Ondiep, 2e Daalsebuurt, Zuilen) - West (Subwijken: Oog in Al, Welgelegen, Lombok, Leidseweg, Nieuw Engeland, Schepenbuurt - Zuidwest (Subwijken: Dichterswijk, Rivierenwijk, Transwijk, Kanaleneiland) - Zuid (Subwijken: Lunetten, Oud Hoograven, Tolsteeg, Nieuw Hoograven, Bokkenbuurt
En in welke subwijk woont u?	- Binnenstad - Pijlsweerd - Ondiep - 2e Daalsebuurt - Zuilen-west - Zuilen-noord & -oost - Oog in Al, Welgelegen - Lombok - Leidseweg - Nieuw Engeland - Schepenbuurt - Dichterswijk, Rivierenwijk - Transwijk - Kanaleneiland - Lunetten - Oud Hoograven, Tolsteeg - Nieuw Hoograven, Bokkenbuurt
In welk gebied woont u of bij welk gebied woont in de buurt?	- Merwedekanaalzone - Beurskwartier & Lombokplein - Cartesiusdriehoek
Deel 2: Algemene Vragen	
Wat is uw geslacht?	- Man - Vrouw

	- Anders (specificeer)
Wat is uw leeftijd?	- 0-17 - 18-26 - 27-34 - 35-44 - 45-54 - 55-64 - 65-74 - 75 jaar en ouder
Wat is uw nationaliteit? (Meerdere antwoorden mogelijk)	- Nederlands - Marokaans - Turks - Surinaams/Antialliaans - Pools - Anders (specificeer)
Wat is uw hoogst gehaalde opleidingsniveau?	- Basisonderwijs - Middelbare school - MBO - HBO - WO - Anders (specificeer)
Wat is het geschatte gemiddelde inkomen per jaar van uw huishouden?	Open vraag
Wat is uw burgerlijke staat?	- Alleenstaand - Eenoudergezin - Koppel - Koppel met kinderen - Anders (specificeer)
Wat voor type huis woont u?	- Appartement - Tussenwoning - Hoekwoning - Tweeondereenkap woning - Vrijstaande woning - Anders (specificeer)
Hoeveel jaar woont u in uw huidige woning?	Open vraag
Hoeveel jaar bent u nog van plan om hier te blijven te wonen?	Open vraag
Deel 3: Open vragen wonen in de wijk	

Wat vindt u positieve punten van wonen in uw wijk?
Wat vindt u negatieve punten van wonen in uw wijk?
Wat zijn wekelijkse activiteiten die u in uw wijk doet?
Is er een aspect binnen uw wijk dat u denkt dat verbeterd kan worden, en zo ja, wat zou dat zijn?
Wat is uw mening tegenover een groei aan nieuwe woningen in uw wijk of bij uw wijk in de buurt?
Heeft u verandering in de bouw van de omgeving van uw buurt meegemaakt en zo ja hoe staat u tegenover deze veranderingen?
Deel 4: Open vragen onderzoeksgebieden (De vragen gaan over de Merwedekanaalzone, Beurskwartier and Lombokplein or Cartesiusdriehoek afhankelijk van de antwoorden op de vragen in deel 1 van de enquête. Een video over één van de drie gebieden kan ook gezien worden, afhankelijk van de antwoorden op deel 1 van de enquête.
Hoeveel weet u over de gebiedsontwikkelingen?
Hoe staat u tegenover deze ontwikkelingen?
Wat merkt u van deze gebiedsontwikkelingen?
Verwacht u in de toekomst problemen bij deze gebiedsontwikkelingen en wat zouden deze problemen zijn?
Ziet u voor uw wijk kansen bij deze gebiedsontwikkelingen en wat zouden deze kansen zijn?
Einde enquete, nog opmerkingen?

Table 9.2 : Survey of the research in dutch (Source: author)

Section 1: Questions with criteria in finding people living within the research area	
In which district do you live? If your option is not included, then you do not fall within the criteria of the survey and there is no need to fill it in.	- Binnenstad - Noordwest (Subwijken: Pijlsweerd, Ondiep, 2e Daalsebuurt, Zuilen) - West (Subwijken: Oog in Al, Welgelegen, Lombok, Leidseweg, Nieuw Engeland, Schepenbuurt - Zuidwest (Subwijken: Dichterswijk, Rivierenwijk, Transwijk, Kanaleneiland) - Zuid (Subwijken: Lunetten, Oud Hoograven, Tolsteeg, Nieuw Hoograven, Bokkenbuurt
In which suburb do you live?	- Binnenstad - Pijlsweerd

	- Ondiep - 2e Daalsebuurt - Zuilen-west - Zuilen-noord & -oost - Oog in Al, Welgelegen - Lombok - Leidseweg - Nieuw Engeland - Schepenbuurt - Dichterswijk, Rivierenwijk - Transwijk - Kanaleneiland - Lunetten - Oud Hoograven, Tolsteeg - Nieuw Hoograven, Bokkenbuurt
In which area do you live or live close too?	- Merwedekanaalzone - Beurskwartier & Lombokplein - Cartesiusdriehoek
Section 2: General Questions	
What is your gender?	- Man - Woman - Other (specify)
What is your age?	- 0-17 - 18-26 - 27-34 - 35-44 - 45-54 - 55-64 - 65-74 - 75 year or older
What is your nationality? (More answers are possible)	- Dutch - Marocan - Turkish - Surinam/Antilian - Polish - Other (Specify)
What is your highest reached level of education?	- Primary school - Secondary school - MBO - HBO - WO

	- Other(Specify)
What is your household's estimated average annual income?	Open question
What's your marital status?	- Single - Single-parent family - Link - Couple with children - Other(specify)
What type of house do you live in?	- Apartment - Terraced house - Corner house - Semi-detached house - Detached house - Other(specify)
How many years have you lived in your current home?	Open question
How many more years do you plan on living here?	Open question
Section 3: Open questions living in the neighbourhood	
What do you think are positive aspects of living in your neighbourhood?	
What do you think are negative aspects of living in your neighbourhood?	
What are the weekly activities you do in your neighbourhood?	
Is there any aspect of your neighbourhood that you think could be improved, and if so, what would it be?	
What is your opinion of a growth in new housing in your neighbourhood or nearby?	
Have you experienced changes in the construction of your neighbourhood and, if so, what is your opinion of these changes?	
Section 4: Open questions research areas (Specific to either the Merwedekanaalzone, Beurskwartier and Lombokplein or Cartesiusdriehoek depending on the answers given in the first section of the survey. A video is shown accordingly, which is also specific to the one of the three areas, dependent on answers giving in section one)	
How much do you know about these area developments?	

How do you feel about these developments?
What do you notice about these area developments?
Do you expect problems with these area developments in the future and what would these problems be?
Do you see opportunities for your neighbourhood with these area developments and what would these opportunities be?
End of the survey, any remarks?

Table 9.3: Survey of the research in english (Source: Author)

Link to the survey given to the residents of the areas.
Link: https://forms.gle/3r4hu1iWCRmz7NVG9

All the videos below can be found on YouTube. The title of the video is given for the possibility of the link expiring. All videos are made by actors involved in the spatial planning process.

Video for the Merwedekanaalzone: *Wonen, werken en verblijven in Merwedekanaalzone (Living, working and staying the the Merwedekanaalzone).* Made by the Municipality of Utrecht
(source: https://www.youtube.com/watch?v=tRrEVEXBci4&feature=emb_title)

Video for the Beurskwartier and Lombokplein: *Omgevingsvisie Beurskwartier en Lombokplein (Spatial plan Beurskwartier and Lombokplein).* Made by the Municipality of Utrecht
(source: https://www.youtube.com/watch?v=E2FjboicFsU&feature=emb_title)

Video for the Cartesiusdriehoek: *Cartesius Triangle.* Made by Ballast Nedam
(Source: https://www.youtube.com/watch?v=E2FjboicFsU&feature=emb_title)

9.3 Code tree

Below is a figure of the codetree used in the analysing of the interviews. As can be seen the aspects of liveability are divided into the four acknowledged categories of culture and environment, healthcare, infrastructure and stability. Along with this several other categories were created. The category of recent developments were created to have an overview of the recent developments, this is of importance as the construction is still ongoing. The category of interviewee relationship to the area was made to be used to have a clear understanding of the involvement of the experts to the area. This was used to create table 3.4. The categories of urban and built liveability were created for general statements about how the experts described liveability themselves, for if experts would talk about concepts of liveability which did not fit within the context of urban density and for the chance aspects of the development described in the interview did not fit under one of the four categories of urban

liveability used in the thesis. Lastly the category of other has been used for the chance something of interest in the interview would come up which does not fit in one of the categories used in the codetree.

Name	Files	References
Culture & Environment	3	18
Health	3	12
Infrastructure	3	17
Interviewee Relationship to area	2	3
Other	1	1
Recent Developments	2	4
Stability	3	15
Urban Liveability	0	0
Built Liveability	3	14
Experienced Liveability	1	1

Figure 9.4: Codetree used in analysing the expert interviews. (Source: Author)