LUNDS UNIVERSITET

Can we make it in time?

An analysis of wheelchair users' and elders' accessibility to public transportation and green spaces in Landskrona City

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Abstract

Mobility constitutes an important aspect in order to create quality of life, where a well working public transportation can decrease the level of stress and create more "flow" in the everyday life (Atkins 2009). However, not all individuals have the mobility prerequisites; for people with disabilities, the preconditions of movement are limited.

The purpose of this thesis is to examine the accessibility to public transportation and green spaces in Landskrona City for wheelchair users and elders with mobility impairments. This thesis bases in time-geography, which maps movements in time and space in one existential timeframe (Holm et al 1989: 14). However, time-geography is rather objective in its execution, which primarily examines the physical and material world. Therefore, in order to create as comprehensive research as possible, one must include subjective aspects of the built environment as well.

The first research question is addressed from an objective perspective, where I employ a quantitative approach. I use the research method *Network Analysis* within GIS, to calculate distance and time. In connection to the first research question, I also suggest changes in the built environment that could affect accessibility in time and space for people with disabilities positively. The second research question is addressed from a subjective perspective, where I employ a qualitative approach. In this research question, I discuss on a general level how wheelchairs users' and elders' movement in time and space can be explained by the *restrictions* and the *everyday life contexts* in time-geography. I further discuss how time-geography embraces the concept of *quality.*

The discussion of the first research question revealed that there are a number of areas concerning public transportation and green spaces that are considered to be physically inaccessible for wheelchairs users and elders with mobility impairments. However, there are additionally a number of alterations that can be made in order for the built environment to become more accessible. The discussion of the second research question resulted as a confirmation that time-geography lacks the subjective interpretation of movement in time and space. Neither the restrictions nor the everyday life contexts could explain certain movements in time and space that primarily was controlled by social and mental processes.

This thesis concludes that time-geography needs to be further developed in order to grasp social and mental processes that can determine how individuals use the urban setting. This thesis further argues that there is a need to value accessibility amongst people with disabilities in order for the society to be inclusive. The thesis concludes with suggestions for further research.

Key words: Accessibility; Disabilities; Public Transit; Time-geography; Green Spaces; GIS; Quantitative Approach; Qualitative Approach

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1. INTRODUCTION

To move from one location to another is an essential skill to ensure a person's mobility opportunities and quality of life. Transportation consequently constitutes an important component in order for individuals to be mobile, where it can allow proximity in time between activities that fills and characterizes each day. As the society appears to be perceived as more stressful, the individual also make demands on the decreasing of distance in time and space. Results of this demand in urban planning can be shown by the increase of faster modes of transportation through the usage of personal vehicles. However, this development has demonstrated to have a negative impact on the environment. Numerous societies today, such as the Swedish society, suggest that the accessibility to public transportation should be improved, and become a more attractive mode of transportation than the car. The purpose of promoting public transportation is mainly to minimize the negative effects on the environment caused by a car dependent society (Andersson et al. 2012: 9). Urban planning enables these means by allowing changes in the built environment, and produces the prerequisites for mobility. Hence, urban planning has the tools to produce, remove, enable and adjust the opportunity to create the prerequisites for developing life quality, where an accessible transportation network can decrease the level of stress and create more "flow" in the everyday life.

However, mobility and transportation could be restricted due to many different conditions. It could be related to economic circumstances; individuals that do not afford to use the public transit system or lack the economic conditions to own a car. It could also be due to physical restrictions, where one fifth of the Swedish population between the ages of 16-84 suffers from disabilities (Arnhof 2008: 7). Their mobility is partly depending upon the physical design of the built environment in order to possess the same accessibility options as other citizens (Boverket 2013a). Improving the accessibility in the built environment and public transportation for people with disabilities has been an active topic in the Western countries for some years. In Sweden, there have been modifications within the bus system in order to accommodate wheelchair users and elders with mobility impairments. These adjustments have been made to create functions that simplify the process of getting on and off the bus (Bromley et al. 2007: 229 and 233). Similar adjustments have been made in the metro system in Copenhagen, Denmark, where the boarding to the train is provided with a step-less entrance in order for people with disabilities to require as little assistance as possible (AngloINFO, n.d.). In Norway, there have been adjustments regarding the service of public transportation, where people with disabilities have the opportunity to access taxi-based door-to-door service (Lyche and Hervik 2001: 6), while there have been reductions in prices for using public transportation for people with disabilities in Germany (Kock 2004: 1390). However, studies regarding the accessibility to public transit systems in relation to time for people with disabilities are limited. When enhancing life quality through the alleviation of time, one must remember that people with disabilities, unlike their counterparts, might

perceive that the urban environment is not adapted to their needs and requests in time (Pagán-Rodríguez 2012: 839).

Accessibility in the built environment in relation to public transportation can be studied both objectively and subjectively. Objectively, one can study the physical shape of the e.g. a bus stop, 'good' or 'bad' surface material according to various classifications. Subjectively, one can examine the social and mental processes surrounding e.g. a bus stop, such as the feeling of safety. However, there is an uneven distribution regarding the objective and subjective perspective in urban planning circumstances. Social and mental processes are often overlooked in the planning of the urban setting, much because its difficulty to interpret it in the built environment. The objective and subjective aspects of the built environment should be seen as closely connected, since both affect how the urban setting is used. Therefore, one must include both aspects when observing the level of accessibility.

Movement in the urban setting can be studied through many perspectives. One way to examine it is through the perspective of *time-geography*, which tries to understand the interaction between physical objects in one timeframe based on restrictions in both time and space (Holm et al. 1989: 14). However, time-geography is a highly objective and makes primarily physical and material observations. Therefore, it is interesting to examine how this perspective explains subjective events that can occur in the built environment. It is also interesting to see how time-geography determines the level of quality, since the perception of quality and its value differs between individuals and could be perceived as rather subjective as well. "Quality" is an aspect that is often overlooked in terms of transportation amongst people with disabilities, resulting in inaccessible environments, limited range of supply and higher costs (by choosing taxi or personal vehicles).

1.1. Purpose and research questions

The purpose of this thesis is to examine accessibility to public transportation and green spaces in Landskrona city for wheelchair users and elders with mobility impairments.

Accessibility in urban planning can be studied from two different perspectives: the *objective*, physical world and the *subjective*, where social and mental processes also constitute an important aspect of the urban setting. The thesis will depart from time-geography (Hägerstrand 1970a and 1970b) and examine how this perspective embraces both objective and subjective aspects of time and space. Time-geography is a perspective that maps movement in time and space but mainly looks at the objective way of movement. However, subjective aspects, such as quality, are often overlooked. For people without disabilities, time is, in many cases, considered as more valuable than the quality of the journey. However, for people with disabilities, it is rather the opposite.

This thesis will investigate the journey from home (i.e. retirement homes) to bus stop, and from bus stop to green space (i.e. selected green areas). By implementing both objective and subjective aspects of the urban

environment, the thesis will investigate barriers that appear to have been overlooked in urban planning and time-geography.

The first research question will mainly be addressed from an objective perspective, where I employ a quantitative approach:

- *Which aspects in the built environment restrict accessibility in time to public transportation and green spaces for wheelchair users and elders with mobility impairments?*

In connection to the first research question, I will also discuss if the constraints can be solved through changes in the built environment.

The second research question will examine how movements can be explained through the *restrictions* and the *everyday life contexts* within time-geography. This research question differs from the first one since it will examine the social and mental processes behind each movement. Hence, the social processes are of great importance since they determine how the urban setting is used. In this research question, I will further discuss how the concept of quality is embraced by time-geography. This research question will be generally discussed and will be addressed from a subjective perspective, where I employ a qualitative approach:

- *In which ways do the restrictions and the everyday life contexts in time-geography explain the time and space use of wheelchair users and elders with mobility impairments subjectively?*

1.2. Demarcation

The thesis focuses on wheelchair users and elders with mobility impairments. This demarcation has been made primarily because of the marginalization of people with disabilities in the built environment. The study of time and space has not extensively been conducted in relation to people with functional impairments that are, in many cases, dependent on accessible environment in order to be mobile. However, disabilities can be expressed in various forms; not only relating to physical disabilities, but mental as well (Grönvik 2009: 1). This thesis has also chosen to focus on elders, since many suffer from mobility constraints due to aging. However, there are also those elders that are quite active and do not suffer from any disabilities. This specific group of elders is not taken into consideration in this thesis.

This thesis consists of a number of geographical demarcations. The study emanates from Landskrona City instead of the whole municipality. There are two reasons for this; firstly, conducting this study in the whole municipality would require extensive work, which would exceed the time and space given for this thesis. Therefore, focusing on a specific area can instead create a deeper understanding for time-geography in relation to people with mobility disabilities.

Moreover, this thesis has focused on certain target points. For example, I will investigate the journey from home to bus stop, and from bus stop to green space. The meaning of *home* in this thesis is *retirement homes*, which will constitute the point of departure to the selected green spaces. The numbers of retirement homes that are going to be examined are all ten in Landskrona City. It should be noted, not only elders suffer from mobility impairments. But, it is much more difficult to map younger wheelchair users. Hence, since elders in retirement homes often have mobility impairments, this thesis argues that retirement homes is a suitable point of departure.

I have chosen to examine five different green spaces in Landskrona City. These were chosen from the extensive comprehensive plan (*Swedish: Fördjupad översiktsplan*) because the municipality described them as focus areas that need to be easily accessed by the public (Landskrona 2013b: 36-39). I have chosen to not examine all green spaces in Landskrona City because of the limited time and space given for this thesis. I find it more interesting to examine the accessibility to the green spaces that are considered as focus areas since the municipality states that it should be accessible for all inhabitants in the city (Ibid: 36-39).

1.3. Disposition

In this introducing chapter, I have presented the purpose and aim, chosen research questions and demarcation. Chapter 2 presents the theories and concepts that make out the basis of this thesis, such as time-geography. In this chapter, I will also present the concept of disability, public transportation, the importance of green space amongst people with disabilities and the definition of quality.

Chapter 3 presents previous research that is relevant for this thesis; accessibility, both in the built environment and in public transportation, all in relation to people with disabilities and elders. I also present research regarding time-geography, and how it has been examined in relation to public transportation, how it embraces subjectivity and how the perspective has been implemented in relation to people with disabilities.

Chapter 4 presents the methods that have been used in order to answer the research questions, such as the quantitative and qualitative approaches (the use of GIS, observations and interviews) as well as the epistemology. In this chapter, I also present the case study, Landskrona City, and why Landskrona has been selected.

Chapter 5 presents the results from GIS and the observations. In this chapter, I present aspects in the built environment that restricts accessibility in time for wheelchair users and elders with mobility impairments, and which changes can be done in the built environment in order to overcome these restrictions.

Chapter 6 presents the analysis, where I present the research questions once more and discuss these. Hence, chapter 7 provides the conclusion, where the

results of the discussions are summarized. The reference list can be found in chapter 8 and the appendix in chapter 9.

2. THEORIES AND CONCEPTS

2.1. Time geography and its origin

The time-geography perspective was founded at Lund University by Torsten Hägerstrand during the mid-1960s, when Hägerstrand documented and mapped life-stories in order to gain a deeper understanding of migration patterns (Lenntorp 1999: 156). Time-geography examines the interaction between the individual and the environment and tries to understand the dynamics and the sum of all physical objects in one existential timeframe (Holm et al. 1989: 14). The core purpose of the time-geography concept is to relate how and why individuals, groups and institutions link to each other and move (or are moved) between locations (Ellegård and Svedin 2012: 20). The perspective also constitutes one of the cornerstones within transport research.

2.1.1. Restrictions

The time spatial dimension relies on the restrictions of handling time and space that might limit our actions. In other words, the individual in a specific timeframe can only exist in one place at the time, which limits the aptitude for mobility in space. This can be related to the central aspect of "activities". An activity is an action performed by an actor, where the action claims time and space. Time-geography also considers a passive activity to be an activity (Ellegård 1990: 59f; Hallin 1991: 199; Lenntorp 1999: 155).

However, three conceptual restrictions can limit an individual's ability to participate in activities or meetings in time and space (Raubal et al. 2004: 248). The time-geography perspective reduces certain traveling paths between various localizations determined primarily by *capability*, *coupling* and *authority restrictions*. The restrictions interact in many different ways, either directly and distinctly, or indirectly or not as clearly (Hägerstrand 1970a: 4:31; Westermark 2003: 93f; Sui 2012: 6).

The *capability restrictions* (*Swedish: kapacitetsrestriktioner*) limit the individual's physical capacities in relation to the resources they have available and how they conduct these in order to perform activities and projects. This constraint can be related to the individual's everyday life perceptions and intentions; what is possible and desirable about his or hers physical capabilities as well as his or hers accessibility to resources. The capability restrictions could also be visually demonstrated as a *prism* (see figure 1) (Hägerstrand 1970a: 4:18-21). Prisms demonstrate the delimitation of what can be physically reached by an individual during a given interval of time (Lenntorp 1976; Miller 1991: 287f). Prisms are a good way to demonstrate the use of time and space in relation to transportation. In figure 1 (seen on page 12), one can see that the gradient between prism A and B differs. This can be explained as following; the more the activities in the prisms lean toward space (prism B), the less time it takes to move. This could be because the individual uses a faster mode of transportation, such as a car; it is a resource that allows more efficient trading of time for space in

movement (Raubal et al. 2004: 248; Westermark 2003: 94). One central aspect within the capability restriction is the concept of range. The effective range an individual inhabits during the day is in fact much smaller than what it potentially could be, which is determined by the ability of movement. One example could be when the individual leaves the home; the purpose of leaving is generally to go to work or carry out errands. However, there are aspects of the day, which set limits to the potential range from the home, such as sleep, which lock the individual to the home at one specific time every day. "Sleep" is also a good example when describing the distance the individual can have from the home; the maximum distance the individual can move in space is limited to the point where the individual needs to turn around and return home to sleep; the more actions that need to be carried out outside the home, the smaller the range becomes, which limits the space for action.

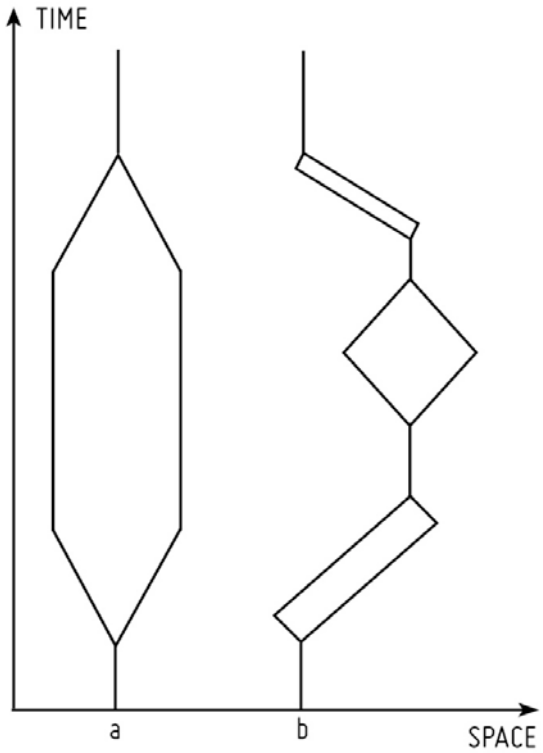


Figure 1*: Prisms can look differently depending on the movement in time and space. Prism (a) demonstrates, for example, the maximum range an individual can spend at a working place. In the prism, there can take place activities that do not obtain more time and space than where the lines of the prisms occur. Examples of such activities could involve work and activities that can occur during work, such as lunch and/or making inventories. Prism (b) demonstrates the divisions of prisms depending on the differentiation of various activities range in time and space (Hägerstrand 1970a: 4:20f).*

Coupling restrictions (*Swedish: kopplingsrestriktioner*) constitute the production, consumption and social interaction between individuals, tools, materials and signals, and how these are connected into interacting groups. It also involves factors, which affect where, when and for how long the interaction is carried out. The coupling restriction could be exemplified when attending to an important meeting. The core purpose of the restriction is that each individual is met by the requirement of attending to this meeting that takes place in a specific time and space in order to complete a task. Each participating individual and material are occupied in this meeting and are therefore limited in attending other activities. This type of coupling restriction can be categorized as *fixed activity*, which constitutes a form of activity that cannot easily be relocated or rescheduled in time and space. However, there are also *flexible activities* within the coupling restrictions, which are activities that, unlike fixed activities, can be relocated and rescheduled in time and space. Examples on these types of activities are shopping or dining (Hägerstrand 1970a: 4:21f; Westermark 2003: 94; Raubal et al. 2004: 248).

The last restriction, *authority restriction* (*Swedish: styrningsrestriktioner*), constitutes the guidance to various resources and activities in time and space, often determined by others conditions and rules. Hägerstrand states that authority restrictions could be implemented in smaller situations, such

as the distribution of home chores in families, to larger circumstances, such as power-holders control of systems that affect the everyday life of individuals. The most common example to present the authority constrain is how employers control employees' time and space by regulating the working hours, which fixes the activity of the employees. Other examples could be opening hours for shopping malls and public transit timetables, which control and create restrictions in the individuals' choice of activity (Raubal et al. 2004: 248; Westermark 2003: 94; Hägerstrand 1970a: 4:25f).

However, even the restrictions in the perspective of time-geography consists of constraints. The time-geographical ontology has been criticized as a perspective that only acknowledges the physical and material aspects of the world, which could also be put into the term of *physicalism*. According to Åquist (1992), physicalism is an approach in which the whole world fully can be described based on its physical theories and material realism. Therefore, social processes and mental events are not of interest in the time-geographical ontology; the events occurring in time and space are treated as concrete quantities. Even though there are two worlds that coexist (the mental world and the physical world), the perspective of time-geography only treat the latter world. According to Hägerstrand, the analysis must conduct the same descriptive dimensions that occur in the natural sciences in order for time and space to be evaluated. This approach excludes the mental barriers that occur in the society, which could have significant implications in the previously mentioned restrictions. The mental barriers in the society could be exemplified through e.g. fear of crime in the built environment. The individual does not face any physical or material barriers, but instead a mental one. This aspect is not taken into consideration in the perspective of time-geography, where Åquist states that the time-geographical perspective of time and space is both linear and dependent on a constant chronological sequence (Åquist 1992: 28ff; Hägerstrand 1970a: 4:15).

The restrictions can also be further analyzed in terms of where and whom they originate from, aspects that are of importance when examining disabilities in relation to time-geography. One aspect is the individuals' *everyday life perception* and *intentions*; the individual forms an awareness of what is possible and desirable in regards of activities and access to resources based on the physical and mental possibilities (Westermark 2003: 94). This can also be related to how time-geography is often perceived as a perspective with strong elements of physicalism, which does not take social processes into consideration. The awareness of restrictions in the built environment amongst people with disabilities can affect the choice of activities in time and space.

2.1.2. Time-geography and the everyday life

The perspective of time-geography can, in many ways, explain how time and space is divided in the everyday life. The construction of the society is fundamentally depending on the structure of the individuals' everyday life (Hägerstrand 1970a: 4:19f). The perspective could therefore work as a tool in order to understand how the society can make the everyday life of the public more efficient. In order to make it applicable into urban planning,

this thesis will focus on the needs of a specific social group that faces difficulties in both time efficiency and space use.

Even though all individuals in the world do not have the same resources in order to live life to its fullest, there is one resource that each and every day is evenly spread among all individuals; time. Apart from the only exception from this rule (which is the day an individual is born or dies), everybody gets 24 hours at his or hers disposal every day, and each minute is spent by an activity (Ellegård 1999: 168).

When individuals perform activities in their everyday life, they participate in the creation of different contexts. These performed activities are the fallout from the totality of activities performed by individuals in their geographical and social settings. The four contexts are grouped as follows: the first is the *everyday context.* The activities performed in an everyday context forms a continuous flow of activities during a given time period, e.g. during the course of a day. However, the everyday context does not consist of randomly emerging activities. There is a fundamental structure of the everyday context given by the individuals' regularity based on the physiologically necessary activities (such as meals and sleep) and by the demands of social schedules set by power-holders (such as working hours and shopping hours) (Ellegård 1999: 172f). One could exemplify the everyday context by the planning to reach a certain destination, such as work.

There are also *project contexts*, in which it is given a meaning to the activities that are related to individuals' goals. The activities performed in the project context could be specific long-term or short-term goals of one or more individuals. The project context is an arrangement of activities where many different types of activities are combined and related into a long- or short-term aim. An example of a long-term task is raising children. It consists of several different types of activities that must be carried out by individuals throughout the youth of their children. An example of a project context that can be considered as a short-term task is 'gardening'. Gardening also consists of various types of activities, such as buying seed, to dig and walk around in the garden (Ellegård 1999: 172f).

Many activities could also be carried out in a *social context*. It includes activities of all individuals, which means that each individual's activity is, in one way or another, intertwined with other individuals' activities. The number of people involved within the social context could increase depending on the arranged appointments in the course of the day. The number could also be limited if the individual lives in isolation from others. What signifies the social context is the given picture of the interaction between people in the everyday life, wherein they perform activities to satisfy their needs in order to live life. One example on an appearing social context is when visiting the dentist for dental care; the dentist is included in the activity of treating the teeth of the individual, and the individual visits the dentist in order to get treatment. The social context could also demonstrate the indication of how people adjust their everyday life to social constrains (Ellegård 1999: 173f).

The last context is the *geographical context*, which indicates that all activities take place (not only time) to perform (Ellegård 1999: 172). Describing and examining the relation between activity, location and movements of individuals constitute one of the cornerstones of the time-geographic framework. However, certain patterns may occur on an individual level within the geographical context, such as the connection between residence, workplace and proximity to friends, relatives and shopping. Still, there could be differences between geographical movement routines depending on one's prerequisites – it can be cumbersome to compare a household in Scandinavia to another one in central Africa (Ibid: 172ff).

2.1.3. Supply and distance

Supply and distance are interesting indicators to look upon in relation to time-geography. They are also indicators that are closely connected when determining the usage of time and space to reach a service. This thesis argues that when the supply is high, the shorter distances from the home are required to possess. However, this aspect should also be put into a geographical setting; an increase of supply must be made in relevant areas. For example, an increase of bus stops in Stockholm does not affect people living in Landskrona.

Time-geography maps the movement in time and space in regards of e.g. reaching chosen service. Even though a wide range of supply gives us choosing opportunities, it is still important that a part of this supply lies within a short distance. It is of significance that we must not consume too much time to travel to the target point or the chosen activity. If supply is high and is located within a short distance, it could generate a positive effect to the time and space usage, in terms that it enables time to be spent on other activities (Atkins 2009: 8).

When examining distances, one must take into consideration the willingness to walk; it is more likely that people are more prepared to walk to a destination if the distance is decreased. This is of importance when planning a new train station or bus stop. Therefore, if walking distance is increased and people have an alternative means of travel, there might be a decline of transit ridership (Guitérrez et al. 2013: 1089). One other aspect of significance when examining distances is localization. The location of a facility, such as a fire station or a transportation terminal, often dictates the success of the services to be provided (Farhan and Murray 2006: 279).

The distance threshold could also be viewed from an equity perspective depending on the citizens' prerequisites; if the same distance threshold is used for the entire population, some population groups may be ignored since they may perhaps move slower or require greater effort to walk, such as elders, children and people with disabilities. In a study which examined the accessibility to Metro stations in Madrid, Gutiérrez et al. presented that people with reduced mobility opportunities are more sensitive to the effect of distance to public transport stations (Guitérrez et al. 2013: 1088). Consequently, there is a need of shorter distances to public transportation if it should be considered to be accessible for all social groups in the society.

2.2. Defining disability

According to the World Health Organization (WHO), *disability* is defined as impairment in body function or structure, which can limit an individual's ability to execute a task and/or an action. WHO also states that disability is an umbrella term that covers both physical and mental impairments, which in turn can also create limitations in participation (WHO 2014).

However, it is important to distinguish disability from the injury or illness that has caused disabilities. Disabilities are not an attribute amongst the individual inhabiting it – it is merely describing a situation where the individual and its surrounding interact. Therefore, disability arises in the interaction between a person with disabilities and the surrounding environment (Altman 2014: 2). Hence, it is when the society adjusts itself to all the citizens' needs where the opportunity for equity and accessibility is created (Dammert 2013: 5).

In order to understand how society can increase life quality in relation to time, one must understand the inhabitants' requests and needs in the shape and structure of the built environment. According to Boverket, the Swedish National Board of Housing, urban planners must enable accessibility for all citizens in order for the society to be inclusive (Boverket 2013b). Improving accessibility to areas for wheelchair users has been an active remedial improvement amongst many Western countries, including Sweden. However, there still have to be made improvements amongst these action plans. One example could constitute the proximity to bus stops; since people with disabilities often have limited mobility opportunities, there has to consist a consciousness of proximity (to e.g. recreational activities or school) when deciding the position of a bus stop.

Elders are also a group in the society, which is highly dependent on an accessible urban structure in order to be included in the society. Many elders today suffer from reduced mobility opportunities due to age. Other physical functions, such as sight and hearing, are also bodily functions that could face reductions with age. Accessibility for elders should put great emphasis on the municipality in order to create an urban structure that is inclusive for all inhabitants. As mentioned previously, aging can cause more impairment that just limited mobility opportunities. Therefore, there is a need for adjustments in both hearing and sight in order for the elders to move comfortable in the built environment (Achuthan et al. 2010: 221f). This thesis will define disabilities as physical impairments that could affect the mobility in the urban setting negatively. However, this thesis will also define disability as a result of inaccessible environment, where the society and urban planners have an obligation to eliminate barriers and reduce inaccessible environments in the urban setting.

2.3. Public transportation

Mobility, or a person's ability to travel, constitutes one of the numerous factors that contribute to our quality of life. However, it is an attribute that is often taken for granted, where inaccessible environments in combination

with reduced physical mobility can cause a lack of freedom to public spaces. The loss of mobility can affect the quality of life negatively since it can also hinder the access to resources (Israel Schwarzlose et al. 2012: 2f). One other transportation factor that heightens the quality of life even more than public transportation is the usage of car. Unlike the public transit system, car users more often feel accessible to movement because they do not feel any restriction by e.g. timetables (Berge and Amundsen 2001: 25). The usage of cars has had a negative impact on urban planning, creating a car-dependent society that appears unsustainable in the long run. Additionally, even though it is more effective in relation to time (since it is a faster mode of transportation), there could occur problems that could cause constraints in its efficiency, such as congestions and queues. However, this depends on the geographical context; it is more common that congestions and queues occur in larger metropolises than smaller villages. Why many municipalities have chosen to promote the public transit systems as an alternative way of transportation instead of the car is mainly to increase the ecological sustainability in the municipalities. This is an approach that Landskrona municipality has chosen to assess in their new comprehensive plan (Landskrona municipality 2013a: 23f).

An indicator when measuring the performance of the public transit network is the ability to meet mobility needs efficiently. According to a government report, about 36% of the Swedish population move either by walking, cycling or use the public transit system (SOU 2003: 77). However, in order for the public transit system to become the first hand choice of transportation, it has to meet the needs of the public. The factors that affect the choice between public transportation and car use are the travelling time, reliability, comfort, safety, price and information. However, one of most important factor is also accessibility, such as physical access in a walking distance. Therefore, the transit service catchment area and its spatial coverage acquire an important aspect when determining the transit accessibility (SOU 2003: 77 and 25; Mamun et al. 2013: 145).

2.4. The importance of access to green space

It is commonly known that walks and other types of exercise contribute with wellbeing to the physical health. Science has also proven that proximity to green spaces promote walks and other forms of physical activity, but also has a positive impact on mental health (Johansson et al. 2009: 15). Access to green spaces constitutes an important factor in society today; it provides an aesthetic place for social and recreational opportunities as well as encourages physical activity, improves social ties and promotes mental and physical convalescence (Nutsford et al. 2012: 1006). Green spaces constitute a setting in which one can preserve and appreciate nature and a place to foster a variety of positive recreation experiences (Mowen et al. 2008: 1).

It is important that all inhabitants can easily access green spaces in order to carry out recreational activities. One simple definition of recreation is described by Knudson (1984: 23, see Phipps 1991: 2); *"Outdoor recreation is commonly referred to in terms of activities of a recreational nature conducted in the open air"*. However, it is not a must that recreational

activities must be pursued outdoors – they can also be practiced indoors (Phipps 1991: 2ff). However, I have chosen to not examine the meaning of recreation further, since this thesis primarily examines green spaces. Therefore, I have chosen to exclude aspects in the built environment that are considered to have a recreational value, but are not an actual green space.

Since it requires a greater effort to move to a green space for people with disabilities, the physical accessibility is valued. However, the physiological accessibility is also of value when reaching a green space. According to the Public Health Agency in Sweden (*Swedish: Svenska folkhälsoinstitutet*), insecurity is partly depended on the physical structure of the green space; there is a need for the green space to be accessible for people with disabilities in order for one to feel welcome (Svenska folkhälsoinstitutet 2003: 7ff).

2.5. The definition of quality

The word "quality" is derived from the Latin words *qualitas* (which means 'character' and 'attribute') and *qualis,* which mean that it is 'somehow conditioned'. Aristotle originally founded the word when he tried to find the antonym to the word "quantity". "Quality" bases upon, more or less, the objects permanent condition, its ability to provide certain phenomena, its sensory qualities (whether the object is hot, cold, sweet, sour etc.) and its external shape. However, over the past decades, the meaning of quality has changed into a concept that describes whether an object is considered to be good or bad (Liedman 2007: 27f). With time, the "quality" concept has culminated into a measuring instrument of value. This has caused that the term invites to a much lower degree of subjective interpretation (Brülde 2007: 176f). However, this does not mean that the subjectivity within quality is not of value. In fact, measuring the quality of life is highly subjective, since it involves personal experience, perceptions and beliefs, and attitudes concerning philosophical, cultural, psychological, political and financial aspects of the everyday life. Quality in the everyday life can be used as a way to describe an individuals' well being (Panagiotakos and Yfantopoulos 2011: 2). Hence, when measuring the quality of life, the subjectivity must be taken into account by following exemplification; a person's quality of life could be measured as high, but it does not mean that the life is of high moral standing or is aesthetically pleasing, but lives his or her life to those conditions that is considered good for the individual (Ibid: 190).

Determining quality through subjectivism could involve the principle of preference autonomy, i.e. one has to refer to a person's own preference for the determination of what is considered as either good or bad. The objectivistic perspective denies that there exist subjective values, i.e. that there are aspects that are considered as good and bad for us no matter how we personally value them (Brülde 2007: 190).

3. PREVIOUS RESEARCH

3.1. Accessibility in the urban environment

Creating accessibility to the built environment for all social groups has been a common goal within urban planning the past years (Demspey et al. 2001: 189). According to 2nd chapter, 3 § in the Swedish *Planning and Building Act* (hereafter called PBL) (SFS 2010:900), urban planning must promote a good living environment that is accessible and useful to all social groups. Public places and other areas must therefore be adjusted in a way that people with disabilities or reduced mobility can access the space and use it for its purpose (8 chapter 12 § in PBL).

Even though the law states that the built environment must be enabled for all social groups, it does not provide guidelines or strategies to accomplish accessibility. *Boverket* (*the Swedish National Board of Housing, Building and Planning*) is a central government authority, which handles authority-related responsibilities regarding the use of land, nature resources and urban planning (Boverket 2013c). The authority provides guidelines for urban planners regarding access to the urban setting for people with disabilities through both analyses and investigations. Examples of such analyses are *Enklare utan hinder* (2005) and *Tillgängliga platser* (2005), which demonstrate how physical barriers in the built environment can be built away in an effective way (Boverket 2005a: 9f; Boverket 2005b: 8).

However, the authority does also treat more subjective aspects regarding accessibility in the urban setting, and analyzes how the mental processes can create inaccessible surroundings in the built environment. Such analysis can be found in the publication *Plats för trygghet – inspiration för stadsutveckling* (Boverket 2010), where the authority examines and suggests concrete ideas on how to design environments that are perceived as safe. However, it is more oriented to the fear of crime and safety in the built environment towards men and women, and not to people suffering from disabilities. It should be emphasized that people with disabilities might experience safety and the fear of victimization in a different way compared to their counterparts, which is also important.

3.2. Accessibility to public transportation

Besides accessibility in the built environment, there have also been studies made regarding the public transit networks accessibility in relation to people with disabilities. The concept of the "whole-journey" perspective has been of importance in order to overcome barriers in the built environment in close proximity to bus and train stops. It observes the journey as an integrated process from starting point to endpoint. Each journey is more or less influenced by the number of options the individual is given, the movement and the resources in order to be mobile (Hallencreutz 2000: 6). One important aspect to consider is that people with mobility impairments or other cognitive disabilities need more time to board or exit a vehicle compared to an experienced traveler which is used to rapid changes in bus

lines. This could also be seen from an economic time value, where the value might differ depending on the purpose of the travel; travelers on a business journey is in the need of maximum time value, where long distances between switches is seen as inefficient, and could also create economic burdens in the long run (Bjerkemo 2012: 16).

One researcher that has implemented the "whole-journey" perspective in her research is Agneta Ståhl, professor in traffic engineering at Lund University. She has a specific focus on traffic environment for elders and people with disabilities in her research, where she has examined the accessibility in various traffic environments. The premise of her research has been the functional ability of elders and people with disabilities to participate in traffic. It has also been the requirements this social group has on the urban environment that needs to be met in order for the transport system to be accessible and useful (Lund University 2013). Her research is relevant to this thesis since it studies the accessibility of the urban environment and public transportation in relation to people with disabilities, both from an objective and a subjective perspective.

In *Providing Transportation for the Elderly and Handicapped in Sweden* (1991), Ståhl partly introduces the concern of long distances to public transportation in relation to elders and people with disabilities. Strategies to avoid long distances could be to e.g. locate the bus stops more strategically, such as closer to the entrances to various health facilities (Ståhl 1991: 12 and 17). Negative, subjective aspects that can be solved by changes in the built environment are partly presented in *Tillgänglighet, säkerhet och trygghet för äldre i den lokala miljön* (2007). It demonstrates how an increase of pedestrian crossings and a better separation between cars and bicycle routes and walkways can decrease the fear of being involved in an accident. This report also showed that the more accessible the urban setting became for the elders, the more were willing to use it (Ståhl and Iwarsson 2007: 8). The discussion regarding subjective aspects in traffic and urban environments can also be read in *Tillgänglighet, trygghet och andra subjektiva aspekter,* where Ståhl et al. (2008) conduct a discussion regarding how and whether subjective aspects can be solved in the built environment, since aspects such as "safety" are highly individual (Ståhl et al. 2008: 77-83). The research of Ståhl regarding access to public transportation can partly be related to the purpose of this thesis, even though she does not connect accessibility to a time-geographical framework.

3.3. Subjective aspects of time-geography

The perspective of time-geography has been applied as a research tool in various studies and has shown to be useful for different types of examinations. Studies within time-geography that relate to the purpose of this thesis have been made concerning individuals range in time and space in relation to accessibility to different services.

Holmgren and Reiter (1976) have examined shift workers' possibilities to utilize local and service orientated supplies. However, the study also examined the possibility of social contact between individuals that work in shift and daytime (Holmgren and Reiter 1976; Reiter 1976: 1f; Åquist 2002:

5f). However, the project did not study the subjectivity of the social contact in relation to time-geography. In *On the Formations of Biographies in Space-Time Environments,* Solveig Mårtensson (1979) examines the feasibility to implement daily programs (*Swedish: dagsprogram*) in actual surroundings – three Swedish municipalities – in relation to service supply and opening hours concerning actual journey times (Mårtensson 1979: 190f; Friberg 1990: 119f; Åquist 2002: 5f). She attempts to incorporate these aspects in a "quality of life" argument, where she tries to include subjective aspects in a time-space framework, but fails to do so. She states that it is rather difficult to incorporate social and mental processes in time-geography, and that she does not study the subjective components much further (Mårtensson 1979: 147). However, she states that subjective processes need to be developed within the time-geographical framework in order to plan urban environments more effectively. Therefore, Mårtensson suggests that the social processes need to be developed, and sees potential in mapping subjective aspects in a time-space perspective (Mårtensson 1979: 147; Friberg 1990: 119f).

Lenntorp (1976) has developed a time-geographical simulation model that examines individuals' physical range in time and space. The model replicates the possible individual courses in a specific setting, where aspects such as actual transport infrastructure have been taken into account (Lenntorp 1976; Åquist 2002: 5f).

Friberg (1990) has studied the organization of female life in relation to time-geography, where she points out that women often face constrains in both time and space since they combine paid work, house chores, family and leisure. Friberg concludes that the potential path area could face more constrains in both time and space compared to men, and that there is an inequality between the distribution of time and space between the genders (Friberg 1990; Åquist 2002: 5ff). These mentioned examinations do in some aspect touch upon the subjective processes that conflict with the perspective of time-geography, but does not examine the role of the subjective world since it is not the primarily focus of the mentioned studies.

3.4. Time-geography and public transportation

In *Choosing bus? A time-geographic study over the choice of conveyance by parents to young children in a suburb with good access to public transportation*, Sevelin (2013) constructs day-programs in order to examine the means of transportation in the perspectives of time-geography. His research explains the time-geographical reasons to why parents with small children tend to deselect public transportation even though it is well established in the suburb *Stenkällan* in Malmö (Sevelin 2013: 3-6). The research can also be connected to the purpose of this thesis since it examines the access to public transportation through the perspective of time-geography. Likewise, he studies a specific social group in the society, which are parents with smaller children. Sevelin further notes that there is a lack of subjective interpretation in the field of time-geography, also referring to the work of Åquist (1992). He does agree with Åquist that time-geography is a rather technical approach to observe the world. However, he does not focus on the lack of subjectivity in his research, and states that

there is a need of consciousness regarding that time-geography is merely descriptive and not a social theory (Sevelin 2013:14f).

3.5. Time-geography and people suffering from disabilities

There have been very few studies on how the perspective of time-geography can be applied on both accessibility in the urban environment and disability-related issues. Ohmori and Harata (2004) measured the evaluation of mobility-related social exclusion by examining the space-time accessibility of elders in terms of participation. The purpose of the examination was to suggest methods for analyzing space-time accessibility based on the restrictions of daily activity schedules, transport environments and activity opportunities (Ohmori and Harata 2004: 1f). The analysis was made based on a case study conducted in Akita city, Japan, where the study compared the activity participation under space-time constrains depending on if the elders either took the car or the bus to five different general hospitals (Ibid: 4). The study demonstrated that there is a requirement to evaluate the impacts of accessibility-enhancing strategies including both public transportation, but also an improvement in accessing the transportation itself. Hence, the study showed that the elders would gain more time and space if the mode of transportation was mainly the car. Conclusively, the authors state that time-geography has helped to map activity engagements under space-time constraints and how a poor public transit system can cause less movement in time and space, and hence, mobility-related social exclusion (Ibid: 7).

The purpose and execution of the time-geographical analysis in Akita city has shown to be the most similar to the purpose of this thesis. However, even if the analysis also touches upon the social processes of time-geography, it does not go further into depth of *what* is considered as social exclusion, and how it is perceived within time-geography. Hence, the analysis merely states that inaccessible public transportation can cause mobility-related exclusions (Ohmori and Harata 2004: 1f).

In *Vardagsliv och boendestöd – en studie om människor med psykiska funktionshinder,* Andersson (2009) examines the everyday life structure of individuals suffering from mental disabilities in a time-geographical framework. In her research, she exemplifies how the *capability restriction* can, in some ways, explain the use of the urban space if the individual suffer from mental disabilities (Andersson 2009: 160-170). This can partly be connected to subjective aspects in the urban setting. However, one notification must be made – Andersson's research primarily examines and emanates from people that suffer from mental illnesses. Therefore, this thesis argues that the author does not provide any concrete information on how the capability restriction embraces social processes in the built environment in relation to people that are *not* suffering from mental illnesses. Mental disabilities can affect the physical health in some ways as well, such as not having the energy, or the strength, to take the subway. One example that is given in the research is that one individual is sensitive towards taking public transportation and can become paralyzed (Andersson 2009: 160-170). Hence, this thesis argues that it is because of the mental illness that the physical restrictions occur.

3.6. Examining time-geography in a new way

Examining the urban environment and transportation and its accessibility through the perspective of time-geography is nothing new. This has been done previously, which can be presented in the works of Lenntorp (1976) and Sevelin (2013). Ohmori and Harata (2004) have also implemented the perspective of time-geography to transportation, but also in relation to people that suffer from disabilities. There have also been statements regarding the lack of subjective interpretation in the perspective, where Åquist (1992) states that the events occurring in time and space are treated as concrete quantities (Åquist 1992: 28ff). Åquist touches upon the subject that social and mental processes can cause restrictions in the urban setting. However, I have not yet found any research that concretely indicates where and when these restrictions occur in relation to people with disabilities, and how this can be explained in a time-geographical framework.

All of the previously mentioned researchers have examined aspects that can all be found in this thesis. What distinguishes my research from theirs is that I gather parts of existing research materials regarding public transportation, time-geography and physical disabilities, and present it in one, holistic thesis.

4. METHODOLOGY

This chapter will introduce the chosen methods in order for the given research questions to be answered. Before I begin to introduce the methods, I will present the case study where I have chosen to implement my examinations – Landskrona City. Moreover, I will also present the reason to why I have chosen Landskrona.

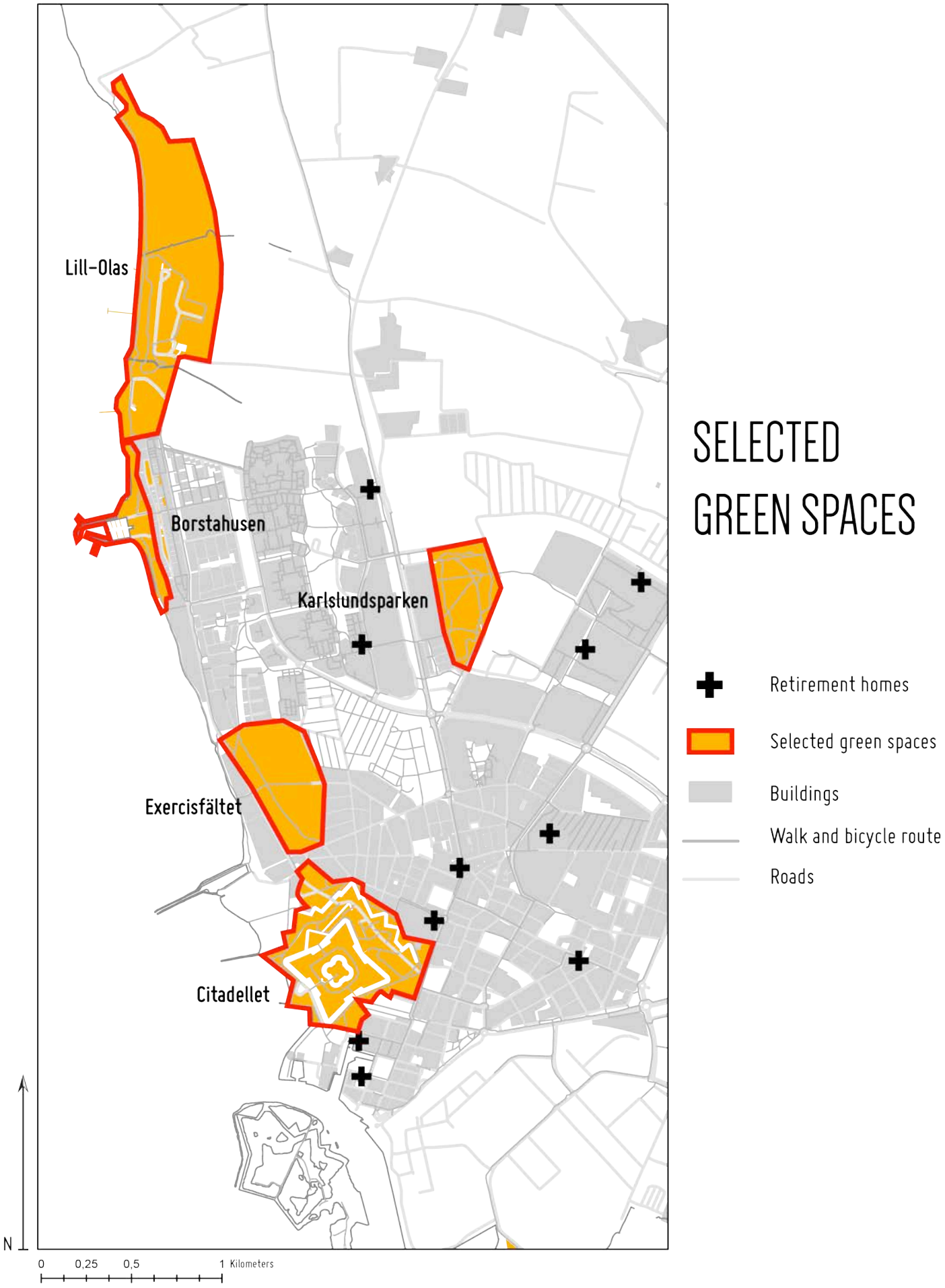
4.1. Case study: Landskrona City

4.1.1. Why Landskrona?

Landskrona is the sixth largest municipality with approximately 43,000 inhabitants located in the west part of Scania, Sweden. Its chief town is Landskrona City, which will constitute the focus area in this case study (SCB 2014). Enabling the society to people with physical impairments is an on-going work toward creating accessibility in Landskrona municipality. In 2009, Landskrona municipality developed a comprehensive plan of action (*Swedish: Övergripande åtgärdsplan*), presenting policies and strategies to enable access for people with disabilities. This plan states that all urban planning should seek to create access to the city, promote safety in streets, squares and green spaces (Landskrona 2009: 3). However, according to *Helsingborgs Dagblad*, Landskrona is the municipality in Scania that has the lowest level of accessible bus stops as of today. Only one third of all bus stops are accessible to people with disabilities and sight impairments. Two of three bus stops lack either the right height at the bus stops (where the height is supposed to be adjusted so the process of enter and egression is simplified for people with mobility impairments), as well as tactile ground (Pettersson 2014).

I have chosen to examine Landskrona City in order to see how an inaccessible public transportation network can limit the access to green spaces for wheelchair users and elders with disabilities. However, this is not a thesis that just present criticism, but also provides suggestions on how inaccessible areas can be solved in order to enable access in time for people with disabilities.

Even if there is a wide range of green spaces in Landskrona city, this thesis will only study five of these. These green spaces are considered to be the current focus areas in the municipality that needs to be valued and developed. These green spaces are *Lill-Olas, Borstahusen, Exercisfältet, Citadellet* and *Karlslundsparken* (Ibid 2013: 37). The green spaces can be viewed in following map (map 1):



Map 1: *Map demonstrating the selected green spaces*

4.2. Quantitative and qualitative approaches

The interpretation of both quantitative and qualitative approaches is of interest in this thesis since it tries to capture both objective and subjective aspects of accessibility, time and quality. It is of importance to distinguish the choice of approach since it constitutes the basis for all of the research strategies mentioned in this thesis (Johansson-Lindfors 1993: 73; Bryman 1997: 152f; Eliasson 2006: 31).

Quantitative approach is most resembled with methods that collect empirical and quantifiable data that could be summarized in statistical forms, such as surveys (Venkatesh et al. 2013: 23). It also inhabits a deductive approach, which means that the scientific practice could be assumed based on general laws. Hence, this is an approach that is closely connected an objective perception of reality (Johansson-Lindfors 1993: 55). This thesis grasps research strategies that characterizes a quantitative approach by the usage of e.g. the program GIS (*Geographical Information System*). GIS is an organized set of computer hardware, software, geographical data etc., which is designed to capture, store, update, operate, examine and present any form of geographically referenced information (Khan and Khan 2013: 198f). The data used in this thesis is based on findings that concerns the built environment and presents these visually in order to analyze e.g. accessibility through an objective perspective. The objective perspective in this case constitutes the physical and material world that can be measured and studied independently from subjective perspectives and processes.

A qualitative approach is characterized by the social and subjective reality in which the researcher himself or herself participates. The researcher tries to capture individuals' actions and the meaning of them while he or she simultaneously tries to participate in the social reality (Venkatesh et al. 2013: 23). It inhabits an inductive approach, which means that the scientific practice is explained through a subjective perception of reality and derives conclusions for empirical findings (Johansson-Lindfors 1993: 58f). The thesis treats a qualitative approach when e.g. deriving the interviews and making empirical observations in Landskrona City; in order to grasp the concept of quality in the built environment, one has to make observations and analyze these based on the interviewees' social reality.

4.2.1. Interviews

The primary data constitutes partly the performed interviews. I have chosen to interview three persons that suffer from disabilities to help define the meaning of accessibility and quality (both objectively and subjectively) in relation to public transportation and time in Landskrona City. I came in contact with all of the interviewees through a local disability association in Landskrona. I chose to have interviews to get a deeper understanding of the social and mental processes that can occur when using the built environment. All three interviewees were representative for this study since they all have a connection to Landskrona (they either live there or have lived in the city), they all have used the public transit system and are all

users of the green spaces in the city. All of the interviewees requested to remain anonymous.

Interviewee 1

Interviewee 1 lives in Landskrona City and suffers from disabilities that restrict her mobility function. She uses several mobility aids in order to access to the urban environment. These are crutches, sticks and an electric wheelchair. During shorter walks, she tends to use either her crutches or her stick. For longer routes, she mainly uses her electric wheelchair. The interviewee has access to a personal vehicle that is adjusted for her disabilities, which also constitutes her main means of transportation. However, she became a car owner quite recently, and has therefore experience from the public transportation network in Landskrona since it was her main means of transportation previously. The interview took place in the interviewee's home.

Interviewee 2

Interviewee 2 also lives in Landskrona City. Like the abovementioned interviewee, she suffers from disabilities that restrict her mobility function. The most frequently used mobility aids are a walker and an electric wheelchair. During shorter walks, she mainly uses her walker. For longer walks, she uses her electric wheelchair. Since the interviewee does not have access to a personal vehicle, she is a frequent user of the public transportation network in Landskrona. The interview took place in the interviewee's home.

Interviewee 3

Interviewee 3 grew up and lived in Landskrona City. He suffers from disabilities that restrict his mobile function. The interviewee uses several mobility aids in order to be mobile. The most frequently used are a manual wheelchair and an electric scooter (a type of electric wheelchair that has a handlebar). During shorter routes, he tends to use his manual wheelchair, and during longer walks, he uses his electric scooter. His main means of transportation is through a personal vehicle. Since the electric scooter is restricted from being used on the buses, the train is the only public transportation conveyance that can be used (Skånetrafiken 2012: 5). The interview took place at a café in central Landskrona City.

The interview questions were semi-structured, which is sufficiently arranged to touch upon specific topics that is related to the focus of the study, while it also leaves space for the interviewees to present new meanings and approaches to the focus of the study. The semi-structured interview can be arranged in different sections; it departs from fully opened questions and as the interview progresses, it ends towards more structured and theoretically driven questions (Galletta 2013: 24).

The structure of the interview was based in four sections, where each section had a specific theme (all of the interview questions can be found in appendix 3). The first section asked general questions about the interviewee, if this person lives in Landskrona and how well he or she knows the city. The section also contained questions regarding how the weekdays and

weekends were structured (e.g. if they have any occupation), and what type of disability they suffer from. The second section inhabits questions that treat the built environment in Landskrona and the usage of green spaces. This section contained both general and specific questions regarding the built environment and green spaces. Through this combination, the interviewee makes notice of aspects regarding the built environment that could both treat objective aspects (such as physically inaccessible environments) and subjective aspects (such as mentally inaccessible environments). The third section discusses their personal perception of quality in the built environment. This section treats more subjective aspects of the environment, where the interviewees get the opportunity to reflect on the meaning of quality based on their own preferences. This aspect is of interest when determining the level of quality in the public transit network in Landskrona, since quality could be perceived differently depending on e.g. physical capabilities. The fourth section treats questions about public transportation, and whether the interviewees use the public transit network in Landskrona. This section also connects the questions regarding green space.

The outcome of the interviews have provided with a better knowledge regarding social and mental processes in the built environment in relation to people with disabilities. Aspects regarding the use of the urban setting, e.g. *when* the interviewees tend to use public transportation during the day, *how* they plan their journeys, and *what* they feel when they meet obstacles in the built environment have resulted in valuable information regarding how the urban setting is perceived subjectively.

4.2.2. Observations

Other data that is considered as primary are the information derived from the inventories made in Landskrona City. In order to present as comprehensive picture of the urban setting as possible, I chose to also approach the empirical findings subjectively, and not only objectively (i.e. through GIS). For instance, I could have chosen to determine the time it takes to walk from the retirement home to the closest bus stop only by using the given GIS data from Landskrona municipality. However, the result of the data would have been misleading, since there are factors in the built environment that should be taken into account because of its relevance in relation to people with disabilities. One of these factors could be exemplified as *cobblestones.* According to all interviewees; cobblestones lower the quality of the journey, since it is a very difficult surface material to walk on[1]. This is one example on issues in the built environment that can affect the quality of the journey. I was not aware of this concern, amongst other subjective issues connected to the built environment. I realized that the subjective aspects of the built environment are as important as the objective, since it is partly the social processes that determine how the individual uses the urban setting. Therefore, I saw the need of implementing the subjective aspect when making my calculations in GIS.

[1] Interviewee 1, interview 2014-04-01; Interviewee 2, interview 2014-04-03; Interviewee 3, interview

I chose to make four observations in Landskrona, where I have studied the accessibility both from an objective and subjective perspective. In Landskrona, there are a total of *ten retirement homes*. I have chosen to examine the accessibility in (and around) all retirement homes instead of just a few. This thesis argues that a "total investigation" gives a more comprehensive picture of the accessibility in the city in close connection to the retirement homes. The advantage of examining all retirement homes is that it gives a comprehensive image of the current accessibility situation in Landskrona City, which is valuable for further accessibility modifications. The disadvantage of examining all retirement homes has been that it has required a lot of effort and has been time consuming. However, the advantage of providing valuable data for further research outweighs the disadvantages of high workload.

4.3. Epistemological standpoint

There are two epistemological considerations that are grasped in this thesis that both are based in natural sciences and social sciences. *Positivism* in an epistemological approach based in facts and empirical studies where one emanate from objective information (Bryman 2008: 13; Halvorsen 1992: 14). In positivism, the science must be conducted in an *objective* way, which means that the data should be value free. According to the positivistic perspective, reality can only be true if it can be observed (Bryman 2008: 13; Bryman 1997: 24f).

The other epistemological consideration that has also been grasped in this thesis is the discipline of *hermeneutics.* The essential idea behind hermeneutics is that one seeks to understand the meaning with the analysis of text and/or information. This also means that the social context within the given information has to be entailed. Hence, the hermeneutics implies that the world is, and should, be perceived as subjective (Johansson-Lindfors 1994: 40-45; Bryman 2008: 532).

The epistemological standpoint of this thesis is of importance since it bases in two different approaches; this thesis inhabits both the epistemology of positivism and hermeneutics, as it perceives both objective and subjective data. The thesis treats objective information such as statistics and GIS-data, which constitutes the epistemology of positivism in the thesis. However, the thesis also discusses the quality of the route in which the wheelchair users and elders make use of. This part constitutes the epistemology of hermeneutics, since this matter is observed subjectively. The reason why I have chosen to assess two epistemological standpoints is that I believe that it provides a comprehensive picture of accessibility and gives the most accurate answers to my research questions.

One interesting aspects regarding the epistemology of positivism is the importance of that reality can only be true if it can be observed objectively (Bryman 2008: 13; Bryman 1997: 24f). I experienced the importance of observation during the inventories, where I found deviations in the given GIS-data from Landskrona municipality. Often, it consisted of missing routes. This is also an aspect that has to be taken into account regarding *secondary data*, which is information that a researcher has collected and

analyzed before through his or hers perspective (Johansson-Lindfors 1993: 117f).

Hence, in order to secure the validity and reliability of this thesis, I have chosen to complement the existing GIS-data with information derived from observations. This constitutes one of the main objectives to why I chose to make observations, since the GIS-data was not updated and needed complementary information.

4.4. GIS

GIS (*Geographical Information System*) is a good tool to use when determining the accessibility to both public transportation and green spaces, since it consists of research methods that can help answering the research questions (Khan and Khan 2013: 198f).

4.4.1. Data deviations

The data of this thesis concerns a number of elements within the built environment throughout Landskrona. The map could be visualized through the usage of *shapefiles*. It is a homogeneous collection of features that can have either point, multipoint, polyline or polygon shapes. It is a vector data storage format for accumulating location, shape and attributes of geographic features (Khan and Khan 2013: 198f).

Various shape files have been used in this examination. However, some of these have had deviations, such as the data concerning the walkways and bicycle routes. These deviations occur generally in the whole of Landskrona, where the majority of these concern undocumented routes. However, editing the whole walkway and bicycle route network in Landskrona requires extensive work, which cannot be done in the limited time that is given for this thesis since it is very time consuming. Therefore, the routes that are modified are those that are in the closest connection to the retirement homes, the public transit areas and the chosen green spaces (e.g. bus stops and train stations), retirement homes and the chosen green spaces. This data needs to be edited and modified in order for a *Network Analysis* to perform correctly. Network analysis (hereafter called NA), is a method within GIS that attempts to describe the structure and relationship between lines and nodes in a society (such as roads and destinations), where the NA, through a graph theory, applies quantitative techniques to produce a network (Shih 2006: 1031). This method is good to use when determining the fastest route to a destination, where such data can be found in many of the GPS-devices that exist today. Therefore, it is important for these roads and walkways to be corrected.

Other deviations that have occurred in the data are mainly found in the data consisting buildings and land use areas (data documented 2003-2013). The data have comprehensive deviations, such as undocumented areas of buildings and land use areas. These deviations can be found around all chosen green spaces. However, this loss of data does not affect the execution of NA, and therefore I have chosen not to correct them since it

requires a lot of time. The data consisting of coastlines also have deviations (data documented 2003-2012). However, this does not affect the execution of NA. These deviations can be seen in appendix 1 (see appendix list). All the mentioned data has been received from Landskrona municipality, and are projected through SWEREF99 13 30 (see chapter 8 for reference information regarding GIS-data).

In order to execute a NA, there is a need for submitting the speed in the attribute table. The walking speed for people with mobility impairments differs compared to people with no disabilities, and might suggest that people with mobility impairments move slower. This data was rather hard to find, but was eventually found through an examination made by the Swedish Rescue Service Agency (*Swedish: Räddningsverket*). However, this examination categorized speeds by which type of mobility aid the individuals where using; walking with mobility impairments, manual wheelchair or electric wheelchair. The speed was divided into lowest, highest and average speed. In this thesis, I have chosen to use the lowest and the average speed; lowest when the individuals encounter constrains in the built environment (such as problematic surface material) and average when the built environment is considered as accessible. Instead of choosing between the values, I have chosen to calculate the median value of the average and the lowest speed. This has resulted that the lowest speed is determined as 0,7 m/s, and the average speed is 1,36 m/s (Räddningsverket 2001: 55).

4.4.2. GIS: Research methods

In this thesis, NA will be of interest. NA is one of the most significant and persistent research and application methods within GIS. It rests on the theoretical foundation of the mathematical sub-disciplines of network theory and typology (Curtin 2007: 103). The network analysis is commonly used and implemented when analyzing transportation and communication networks. The implementation of NA in transportation studies has increased considerably over the past decade, and can be viewed in Internet-based services such as Google Maps (Ibid: 105).

The purpose of using NA is to analyze the fastest route to bus stops from retirement homes, and from bus stops to the green spaces. The analysis will also consider the quality of the street, since a low quality might decrease the speed for wheelchair users, and consequently increase the time between the destinations.

4.4.3. The quality of the journey – both objectively and subjectively

In order to distinguish the accessibility and the quality for people with disabilities in the built environment, I have used the guidelines provided in the book *Gator för alla – idéskrift om tillgänglighet för gående* (translated: *Streets for everyone – a conceptual study of accessibility for pedestrians*) by

SALAR[2] (1994). The purpose of the book is to enhance level of knowledge among decision makers, planners and builders regarding accessibility and quality of the built environment amongst people with disabilities (SALAR 1994: 3). SALAR describes ten different factors within the built environment that are of importance when creating accessibility for people with disabilities, and hence, that enhance the level of quality in the urban setting (Ibid: 27). These factors are also examined during the assessment of the mentioned green spaces in Landskrona: (1) *entrance surface,* (2) *pavements and walkways*, (3) *stairs*, (4) *ramps*, (5) *bus stops*, (6) *pedestrian crossings*, (7), *parking and docking*, (8) *way findings* and (9), *lightning and daylight.* Each factor consists of a number of requirements that need to be followed in order for the area to be perceived as accessible. I have compiled these into a checklist that can be viewed in the appendix list (see appendix 2).

The book consists of recommendations of adjustments that can be made physically in the built environment, which constitutes the objective aspect of accessibility. However, the book also mentions subjective aspects of the built environment, such as the removal of vegetation in order to create better visibility. This is to ensure that the pedestrians feel safe (SALAR 1994: 36). However, this thesis argues that social processes, such as the feeling of safety, are highly subjective and individual. Removing, adding or editing elements in the urban setting might remove negative social processes for some individuals, but not for all.

Also, the book lacks more profound information regarding subjective processes in relation to the built environment. Therefore, I decided to conduct interviews in order to better understand which social and mental processes may occur in the urban setting in relation to people with disabilities.

[2] SALAR: Swedish Association of Local Authorities and Regions (*Swedish; SKL; Svenska Kommuner och Landsting*)

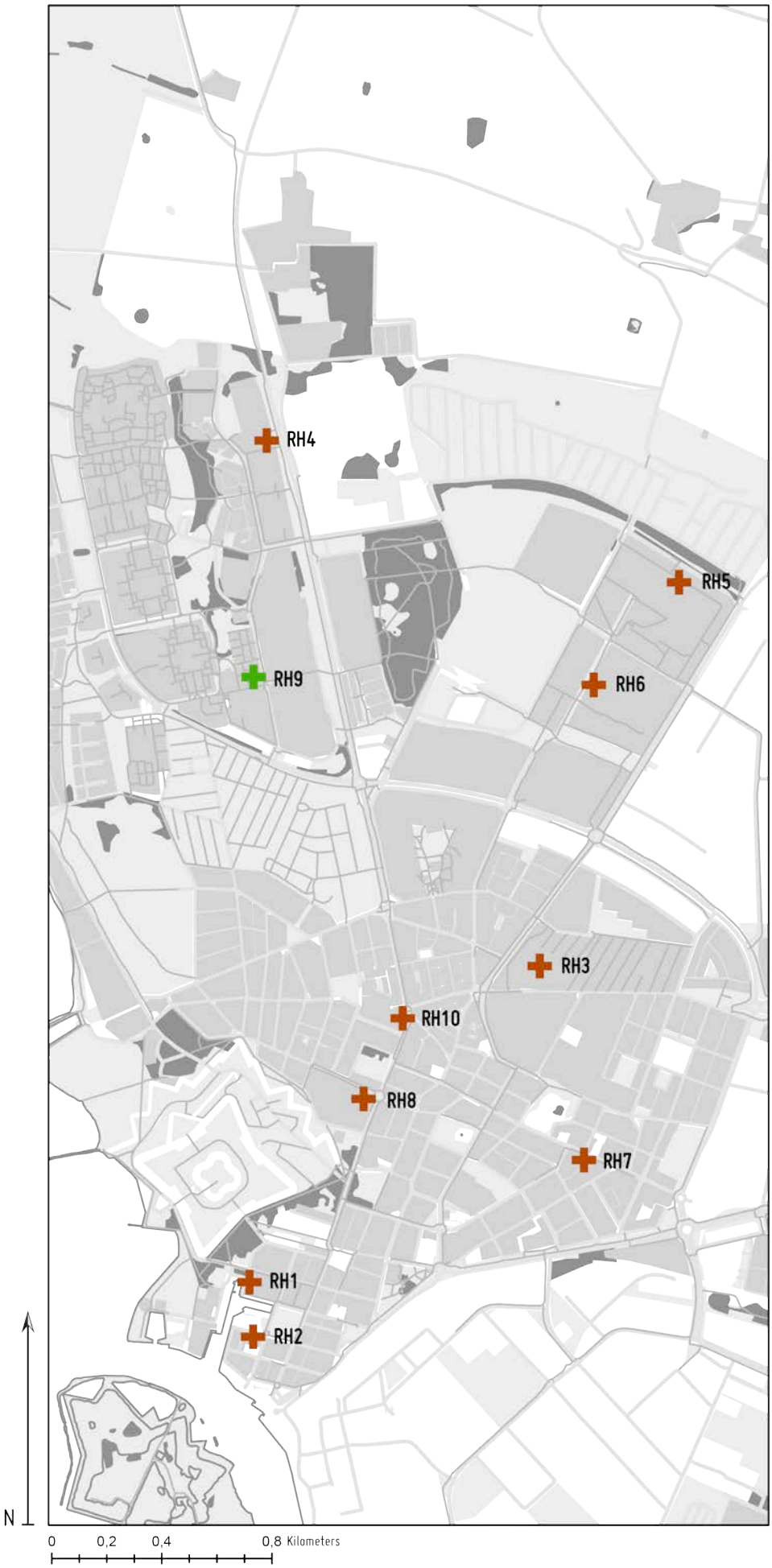
5. RESULTS

This section will present the results of the empirical findings and the GIS calculations, where I have studied the level of accessibility by observing the area surrounding the retirement homes, the bus stops and the green spaces based on the guidelines stated in *Gator för alla,* by SALAR (1994). Determining the physical accessibility between the retirement homes to the green spaces, one could see if there are any barriers that could affect the accessibility in time. This could also determine the use of time and space in a time-geographical perspective.

This chapter will present aspects in the built environment that restrict accessibility in time to public transportation and green spaces for wheelchair users and elders with mobility impairments. First, I will present the journeys *from* the retirement home *to* the closest bus stop. I have chosen to name all retirement homes as *RH1*, *RH2* etc., to make it simpler to keep the retirement homes in order.

In this chapter, I will also suggest changes in the built environment, which could enable accessibility in time for people with disabilities.

The retirement homes are presented in following map (map 2):



OVERVIEW OF RETIREMENT HOMES

Retirement home where the route to closest bus stop is accessible in its execution for wheelchair users and elders with mobility imapirments

Retirement home where the route to closest bus stop is, in some way, inaccessible in its execution for wheelchair users and elders with mobility imapirments

Walk and bicycle route

Roads

Buildings

Green space

Forest

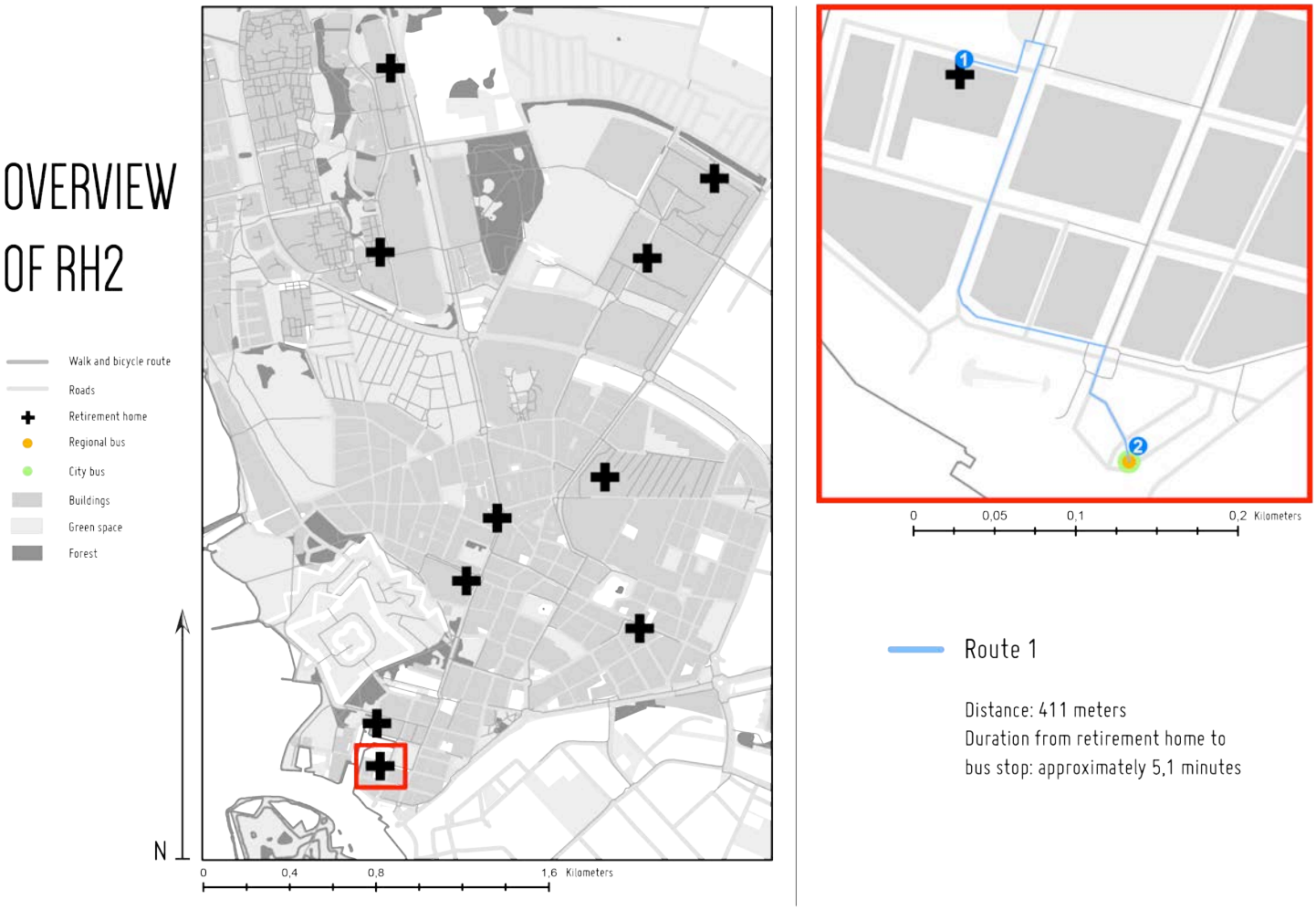
Map 2: *Map demonstrating the number of retirement homes that have an accessible/inaccessible route to closest bus stop for wheelchair users and elders with mobility impairments.*

5.1. From retirement homes to closest bus stops

This section will present aspects in the built environment that restricts accessibility in time in relation to wheelchair users and elders with mobility impairments. Note that the retirement homes will not be presented in order; I will categorize each deficiency in the built environment, and each retirement home that contains that specific deficiency will be presented in that category. There are two categories that will be presented: *Inaccessible bus stops and problematic surface material (5.1.1.)* and *deficient walkway (51.2.)*.

5.1.1. Inaccessible bus stops and problematic surface material

The majority of the retirement homes are located in central Landskrona, where one of them, *RH2* (retirement home 2), is situated along a harbor, which also faces the Town Hall. According to SALAR's recommendations, there must be a maximum 100 meter distance to public transit in order for the area to be accessible for people with disabilities (SALAR 1994: 29). RH2 constitutes one out of nine retirement homes that have more than 100 meters to a bus stop that is accessible for people with disabilities. The distance between RH2 to the closest bus stop is 411 meters (see map 3).



Map 3: *Map demonstrating the fastest route between RH2 and a bus stop, which is accessible for people with disabilities. Number (1) indicates the starting point, and number (2) indicates the endpoint.*

In a close proximity to RH2 is *RH1*. This retirement home inhabits the same concern as the previous retirement home; the closest accessible bus stop for people with disabilities lies in a 623 meter distance, which takes approximately 9,4 minutes to walk (defined as *Route 1*, see map 4). The time it takes to walk from the retirement home to the closest bus stop has been calculated based on the areas physical accessibility, which determines the length to closest bus stop, but the speed as well. One aspect that lowers the speed is troublesome surface material, such as cobblestones. Approximately 158 meters of this distance's surface contains cobblestone, a surface material that is considered as rather problematic:

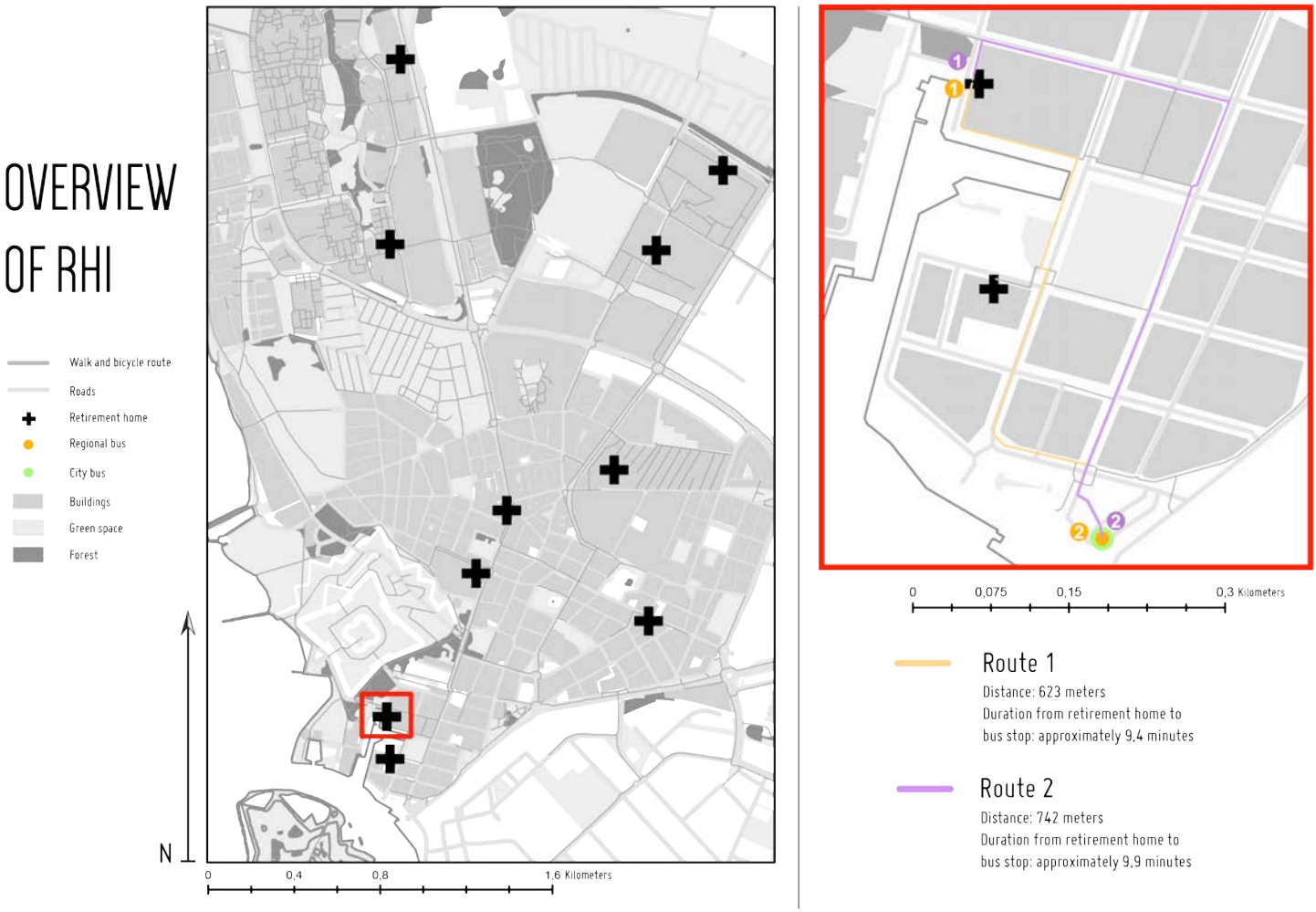
"My mother lived in the RH2 retirement home, and it very difficult to walk around in the area. It was very tough because of the cobblestones. You could not go over to the Town Hall because of it. I do not think that motorists are happy about the surface either." – (Interviewee 2).[3]

"Cobblestone is without doubt the toughest surface material. I have to really think about where I put every single step and where I place my stick so I do not get stuck between the stones and trip. I try to avoid cobblestones as much as I can." – (Interviewee 1).[4]

"A good pavement does not lean too much, it has an adequate width, and the surface material is good. But, what is a good surface material? It is certainly not cobblestones. It surface material should be flat so everyone can move easily and comfortably. Unfortunately, they too often place flat surface materials at outdoor cafes, so the outdoor furniture can stand firmly. It is rare that flat surface material is planned in pavements and walkways." – (Interviewee 3).[5]

Since it became evident that cobblestones were a problematic surface material for all of the interviewees, I chose to include this information when determining the walking speed. As aforementioned, this thesis applies two different speeds when calculating the time it takes to go from the starting point to the end point; 0,7 m/s is used when the wheelchair users and elders with mobility impairments face an inaccessible physical environment that can lower the walking speed (such as cobblestones), and 1,36 m/s when there are no physical barriers that restricts an average speed. If the interviews would not have been conducted, I would not have been able to make a distinction in speed, since the knowledge of cobblestones' problems would not have crossed my mind. I chose to implement a lower walking speed in those areas where cobblestones occur because it would provide a more accurate result.

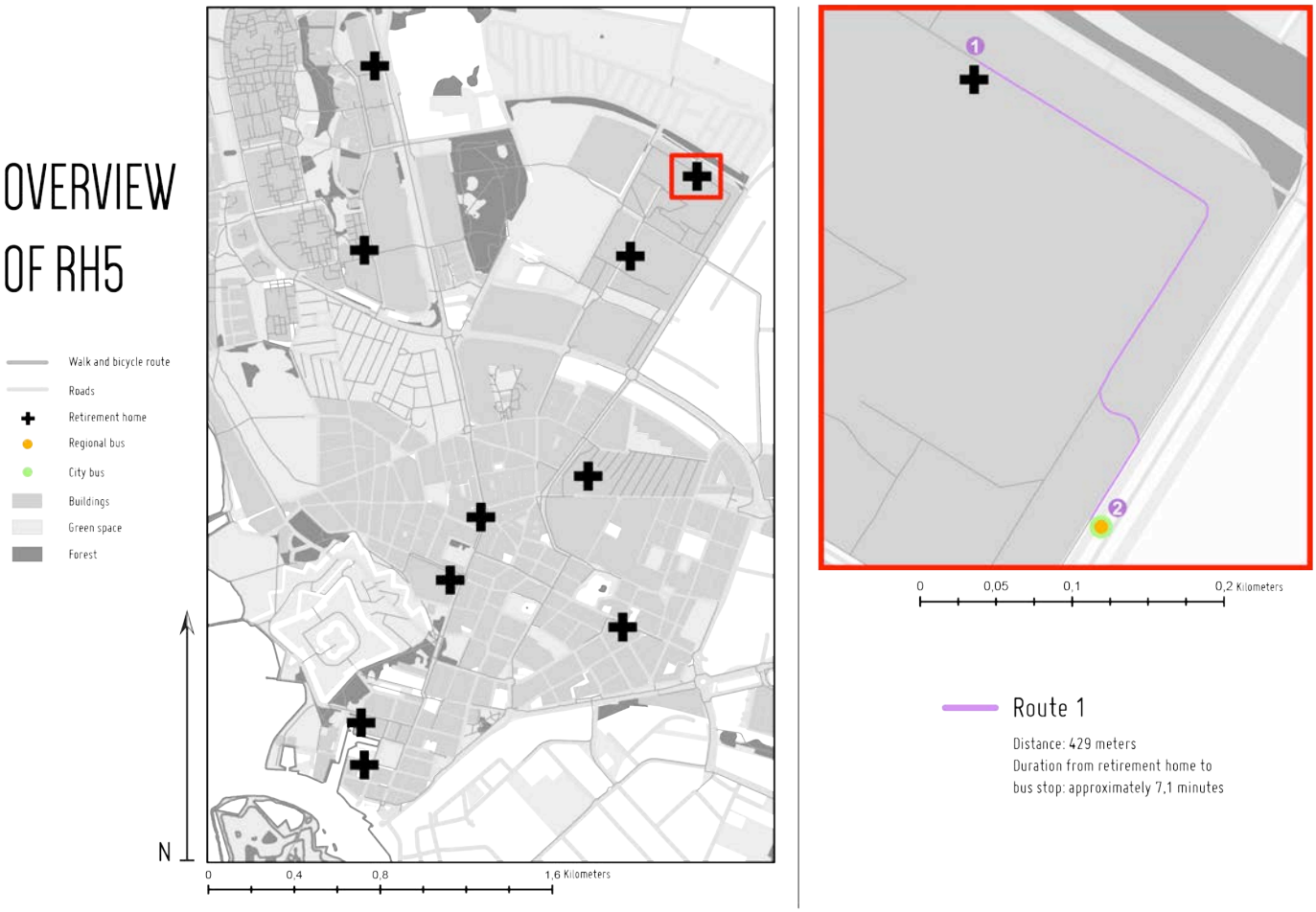
[3] Interviewee 2, interview 2014-04-03
[4] Interviewee 1, interview 2014-04-01
[5] Interviewee 3, interview 2014-04-03



Map 4: *Map demonstrating the fastest route between RH1 and a bus stop, which is accessible for people with disabilities. Two routes have been suggested in the case of RH1, where both (1) indicates the starting point, and (2) indicates the endpoint.*

Taking the problematic surface materials into consideration, I have chosen to demonstrate one other route that takes this aspect into consideration and offers an alternative route that does not contain as much cobblestones (*Route 2* in map 4). This distance is 742 meters long and takes approximately 9,9 minutes to walk for a wheelchair user or an elder with a mobility impairment. Even though the route is both longer in time and space, it does instead provide higher quality of the journey since it avoids problematic surface material.

Non-accessible bus stops can also be found in the case of *RH5, RH7* and *RH10*. The distance from RH5 to the closest bus stop is approximately 429 meters, which exceeds the recommended distance to public transportation with 329 meters. Even though the distance to the bus stop is rather long, the walkway is accessible according to SALAR's (1994: 36) recommendations. The number of minutes it takes to walk this distance has been calculated to 7,1 minutes. This route can be seen in map 5:



Map 5: *Map demonstrating the fastest route between RH5 and a bus stop, which is accessible for people with disabilities. Number (1) indicates the starting point, and number (2) indicates the endpoint.*

From RH7, the distance to the closest accessible bus stop is 313 meters, which takes approximately 5,1 minutes to walk (see map 6).
Lastly, the distance from RH10 to an accessible bus stop is about 371 meters. This distance takes approximately 4,5 minutes to walk (see map 7):

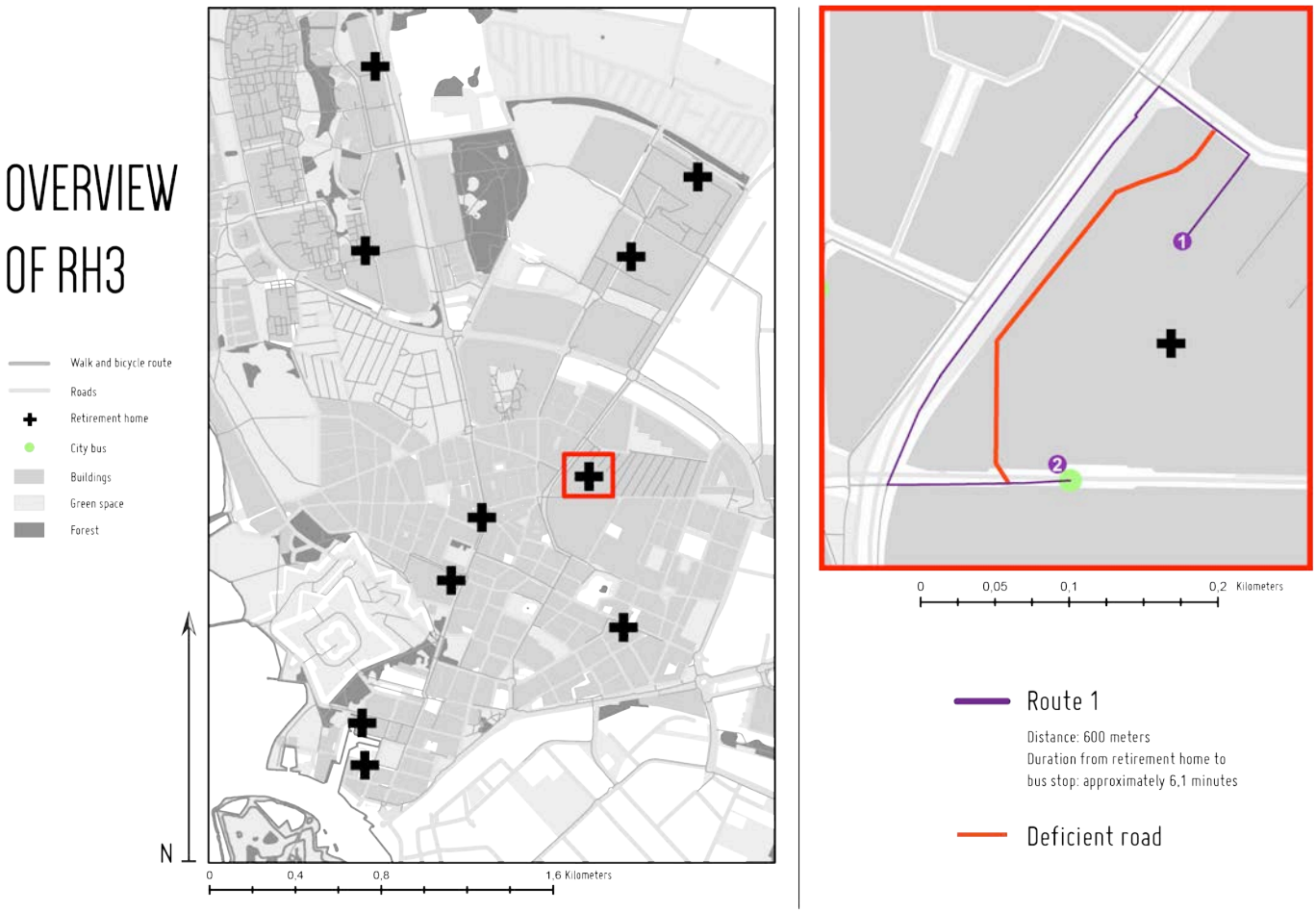
Map 6: *Map demonstrating the fastest route between RH7 and a bus stop, which is accessible for people with disabilities. Number (1) indicates the starting point, and (2) indicates the endpoint.*

Map 7: *Map demonstrating the fastest route between RH10 and a bus stop, which is accessible for people with disabilities. Two routes have been remonstrated in this map, where the (1) indicates the starting point, and (2) indicates the endpoint.*

The main obstacle in the case of RH5, RH7 and RH10 is the same compared to RH1 and RH2; the distance to the bus stops are over 100 meters. This is, according to SALAR's recommendations, considered as an inaccessible distance to public transportation (SALAR 1994: 29).

5.1.2. Deficient walkways

The first case of deficient walkways between retirement homes and bus stops can be found in *RH3*, situated in the east side of central Landskrona. The retirement home is located in a hospital area, where the area is quite accessible according to SALAR's (1994) recommendations. However, to access public transportation from the area could be considered as rather difficult; the individual needs to walk around the whole hospital area in order to reach a bus stop which is accessible for people with disabilities. According to the data that was received from Landskrona municipality, there is one walkway into the area (which is demonstrated as a red road in map 8). Nevertheless, after making observations in the area, I chose to remove this road from the NA. This because the road did not fulfill many of the basic recommendations in SALAR's list of accessibility in the built environment; the surface material was poorly maintained, it had physical barriers such as lampposts, it had high edges which requires much effort for wheelchair and walker users and the whole route was less than 1,8 wide (see picture 1 and picture 2).



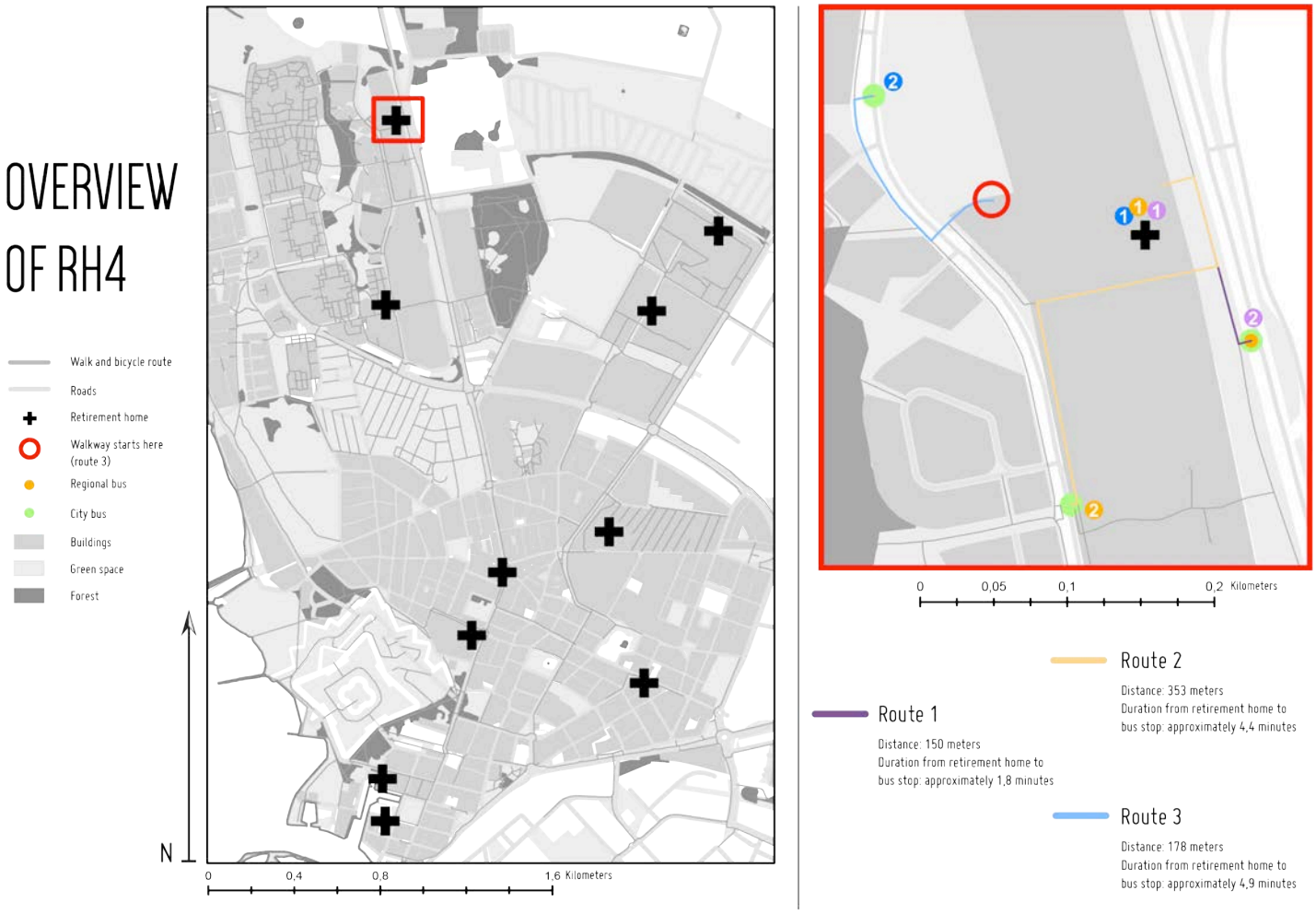
Map 8: *Map demonstrating the fastest route between RH3 and a bus stop, which is accessible for people with disabilities. This map also demonstrates the deficient road. Number (1) indicates the starting point, and (2) indicates the endpoint.*

If the walkway was better maintained and had a higher width, wheelchair users and elders with mobility impairments would not only access the public transportation more easily, it would also affect the use of time and space in a time-geographical perspective positively.

Picture 1: *The walkway*

Picture 2: *The route's close connection to traffic*

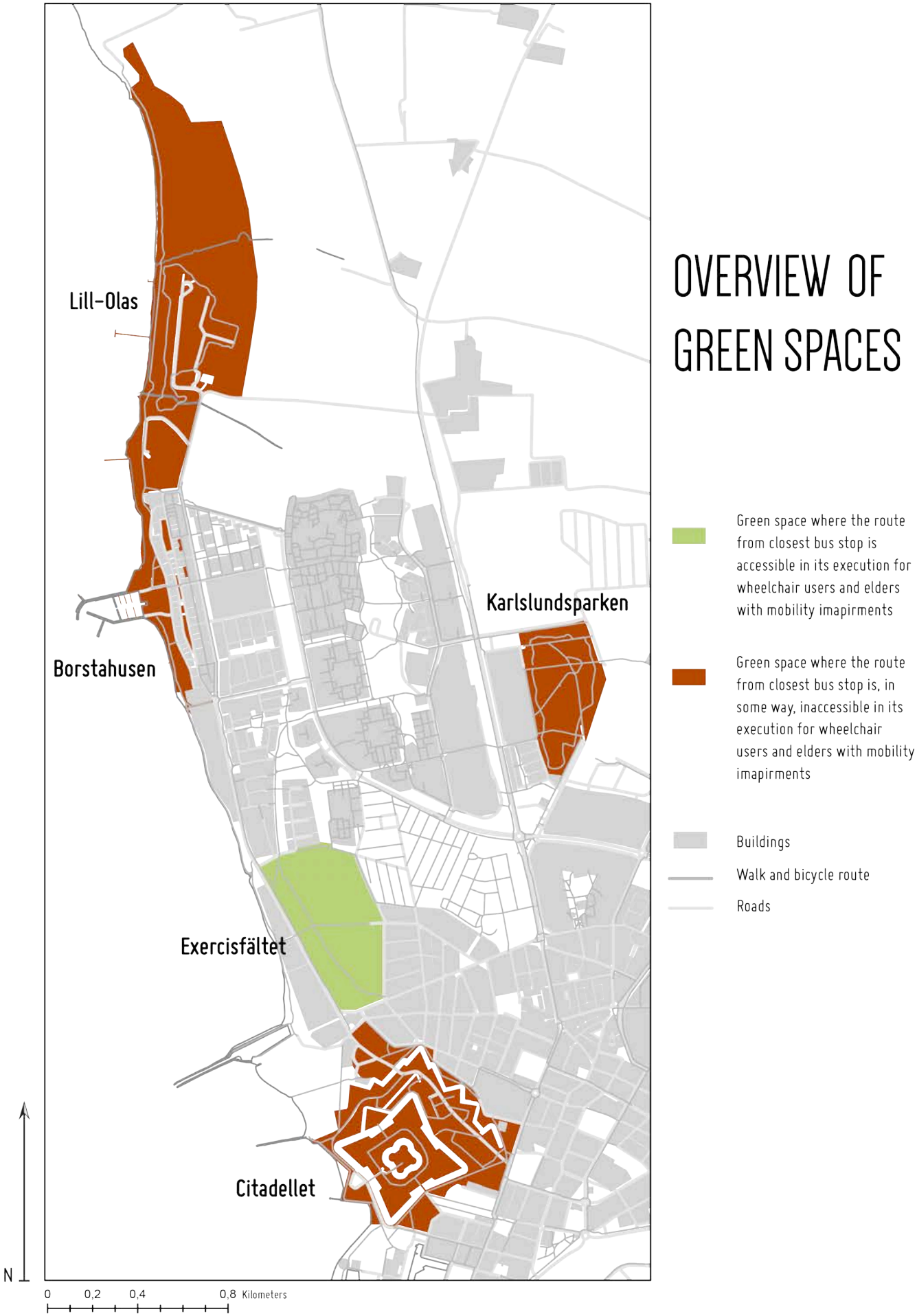
Another retirement home that consists of deficient walkways can be found in the area of *RH4*, which is located in a housing area and has access to three different bus stops. Two of these are city buses and one is a regional bus. The walkways in the area are considered as accessible according to the SALAR checklist. However, the main concern in this area is that the accessibility to the city buses is limited by the lack of walkways, and that each route is more than 100 meters when accessing the bus stop. This concern can mainly be found in route 3 (see map 9). The walkway lies within a distance of approximately 106 meters from the retirement home, in which the wheelchair users and elders with mobility impairments need to go through an entry and exit point for cars and trucks in order to access the walkway. This route is problematic since there is no safe separation from the traffic. One other alternative would be to locate, or relocate a city bus in the area where the regional bus is located. Even though the regional bus is located fairly close to RH4, it does not have the same frequency as city buses and has not the same type of routes as a city bus, which mainly travels inside the city area (Skånetrafiken 2013a: 5; Skånetrafiken 2013b: 2).



Map 9: *Map demonstrating the fastest route between RH4 and three bus stops, which are accessible for people with disabilities. Number (1) indicates the starting point, and number (2) indicates the endpoint. However, one must remember that route 3 consists of some deficiencies in its data; the walkway does not start until the individual moves approximately 106 meters from the retirement home, through an area which is not separated from the traffic.*

5.2. From bus stops to green spaces

In the following section, I will present the deviations that have been found between the green spaces and the closest bus stops in relation to people with disabilities. Map 10 demonstrates the selected green spaces and their accessibility:

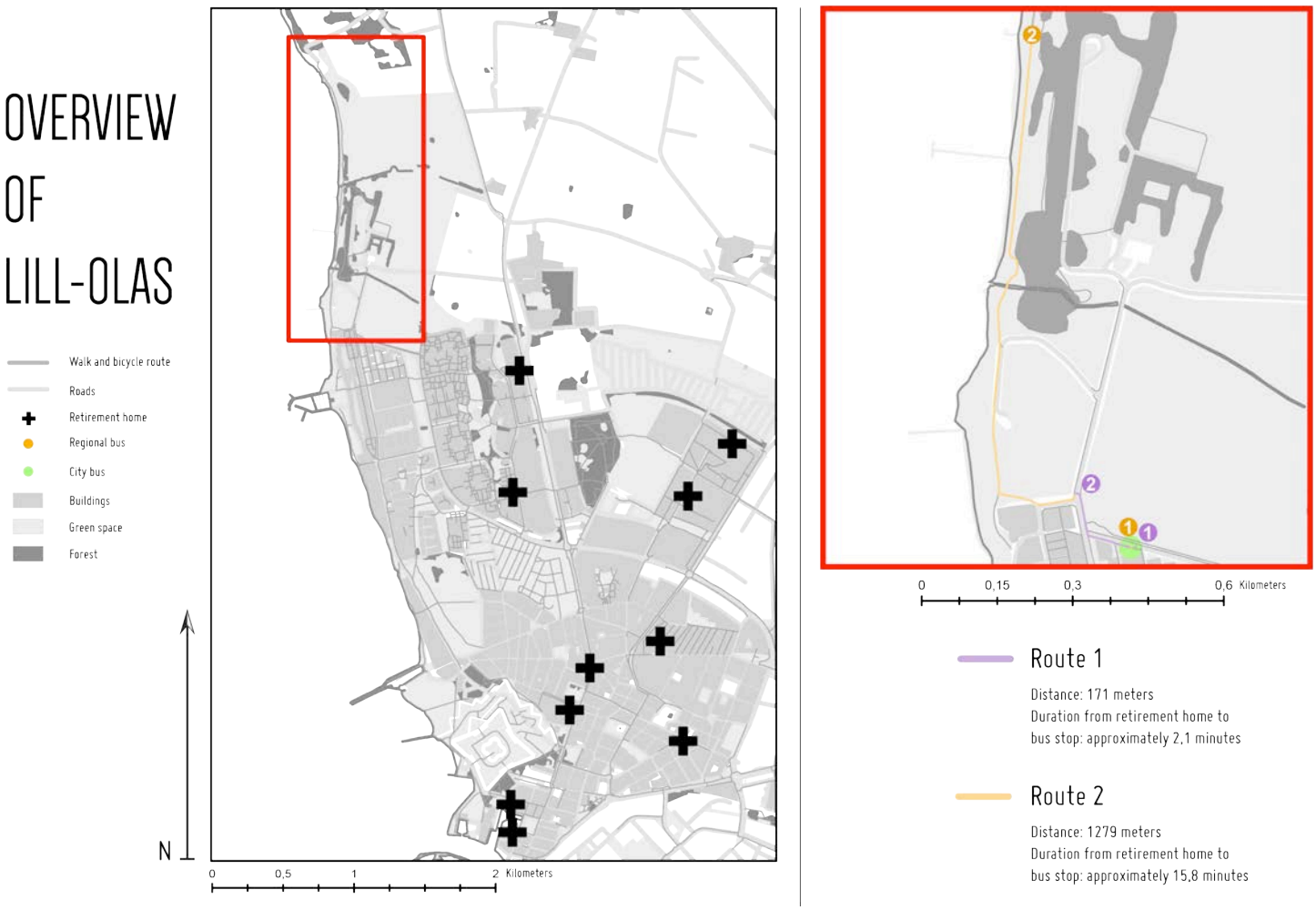


Map 10: *Map demonstrating the number of green spaces that have an accessible/inaccessible route from the closest bus stop for wheelchair users and elders with mobility impairments.*

5.2.1. Poor access to services (Lill-Olas)

Lill-Olas is one of the green spaces that are considered as focus areas in the new comprehensive plan of Landskrona municipality (Landskrona municipality 2013: 37). The area is located along the coast in the north part of Landskrona City. The green space of Lill-Olas is closely connected to the green space of Borstahusen. Lill-Olas can be found in map 11.

The position of the bus stop lies 171 meters from the beginning of the green space. This bus stop is the single closest to the green space as well. According to SALAR's measurements, it exceeds the recommended distance by 71 meters, since it is stated that the acceptable distance from starting point to recreational areas is maximum 100 meters (SALAR 1994: 29). The walkway from the bus stop to the green space is rather accessible according to the SALAR checklist, with both good surface materials, a 2,5 meter width, lights provided in the walkway and good visibility with no physical barriers in the way. The bus stop is also adjusted for people with mobility disabilities and sight impairments, with both contrasting surface materials and an elevation off the ground, which makes it easier to access and egress the bus.



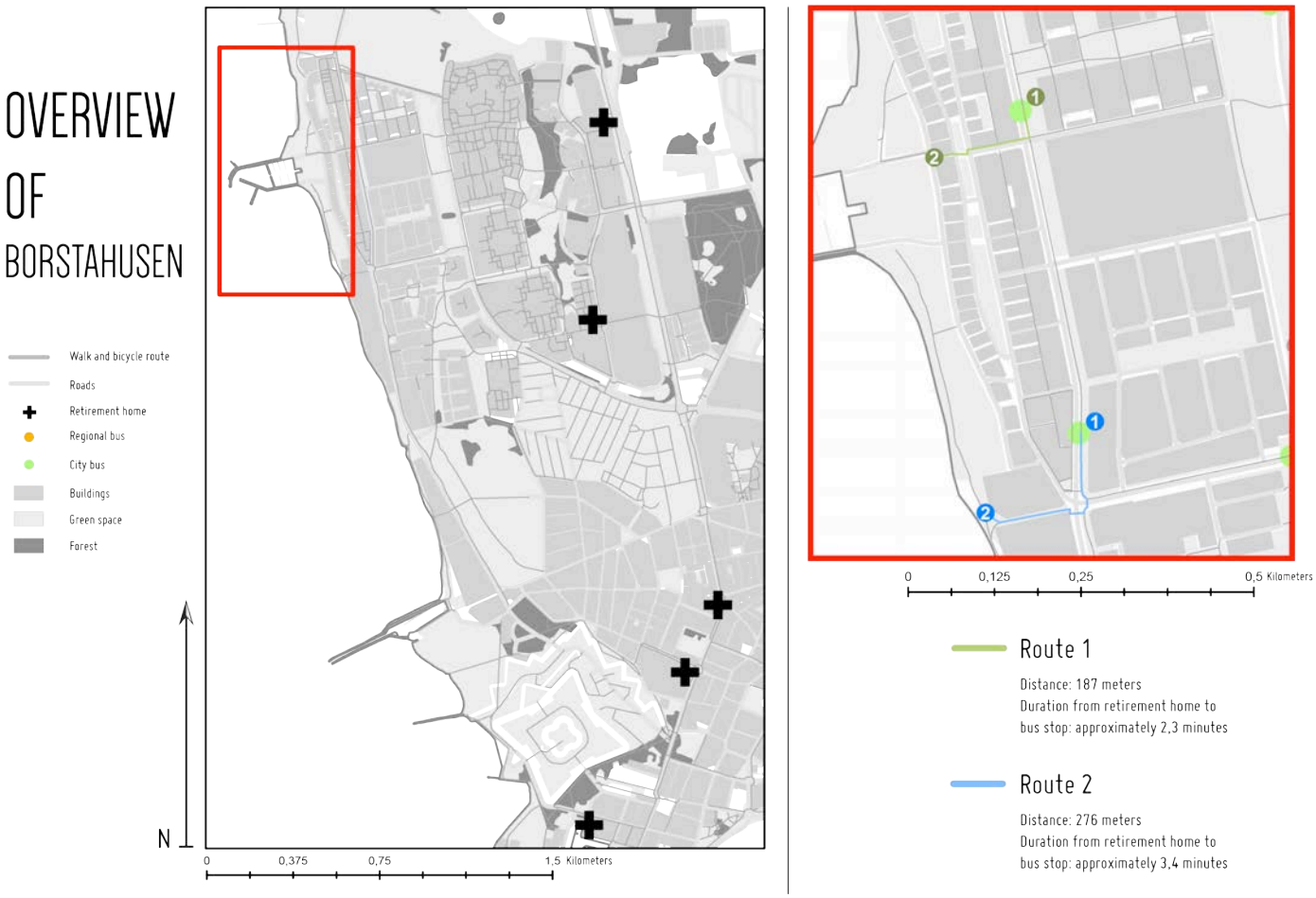
Map 11: *Map demonstrating the fastest route between a bus stop and Lill-Olas. Number (1) indicates the starting point, and number (2) indicates the endpoint. I have also chosen to demonstrate the distance in meters and time from the bus stop to the handicap dock.*

Since this thesis does not study the accessibility inside the green space but merely the access to it, the distance to the green space from the bus stop is only examined. However, I wanted to demonstrate the distance in both meters and time to the dock adjusted for people with disability from the bus stop. This is a distance that has been pointed out in one of the interviews;

"There is a dock in Lill-Olas that is adjusted for people with disabilities, and it is located in the north of the green space. There are no buses that travel to the dock, so I use my electric wheelchair. It takes approximately 30 minutes for me to travel from home to Lill-Olas with my wheelchair. It can be rather windy at times, but it works better than taking the bus." - (Interviewee 2)[6].

This distance can be observed as *Route 2* in map 11.

5.2.2 Inaccessible bus stops and narrow streets with problematic surface materials (Borstahusen and Citadellet)



Map 12: *Map demonstrating the fastest route between a bus stop and Borstahusen. There are two bus stops along Borstahusen, where number (1) indicates the starting point, and number (2) indicates the endpoint.*

[6] Interviewee 2, interview 2014-04-03

Borstahusen is another green space that the municipality has defined as a focus area. It lies along the coast and is closely connected to Lill-Olas, which is situated in the north of Borstahusen. Borstahusen is situated in a way that makes it difficult to decide where the green space begins and ends. One could argue that the green space begins where the bus stops; this is because of the recreational value the houses append in connection to the green space. However, as stated in the theories and concepts (chapter 2), I will only consider the actual green space that is situated close to the coast.

Picture 3: *Cobblestones and gravel along the route between the bus stop and Borstahusen.*

The accessibility to Borstahusen with public transportation is considered as good, as it fulfills many of SALAR's recommendations (see checklist in appendix list, named as appendix 2). I have demonstrated two routes that emanate from the two closest bus stops. These routes are demonstrated in map 12.

Picture 4: *Lack of pedestrian crossings along Route 1.*

It is visible that the distance exceeds the recommended distance of 100 meters according to SALAR's checklist (SALAR 1994: 29). The first route (indicated as a green line in map 12) constitutes of both narrow streets and problematic surface material in the end of the street, which is cobblestones. This problem has been taken into account earlier in urban planning circumstances in Landskrona, where the municipality states that they are aware of the areas old structure and its many narrow streets and pavements (Landskrona municipality 2006: 16). One other remark is that *Route 1* (see map 12) has lightning, but only in the crossings and not between the houses (see picture five). This is an important aspect to take into account, since poor lightning can cause negative social processes, such as the environment is perceived as non-safe (SALAR 1994: 36 and 41f). There is also a lack of benches in the area, which is important if people with

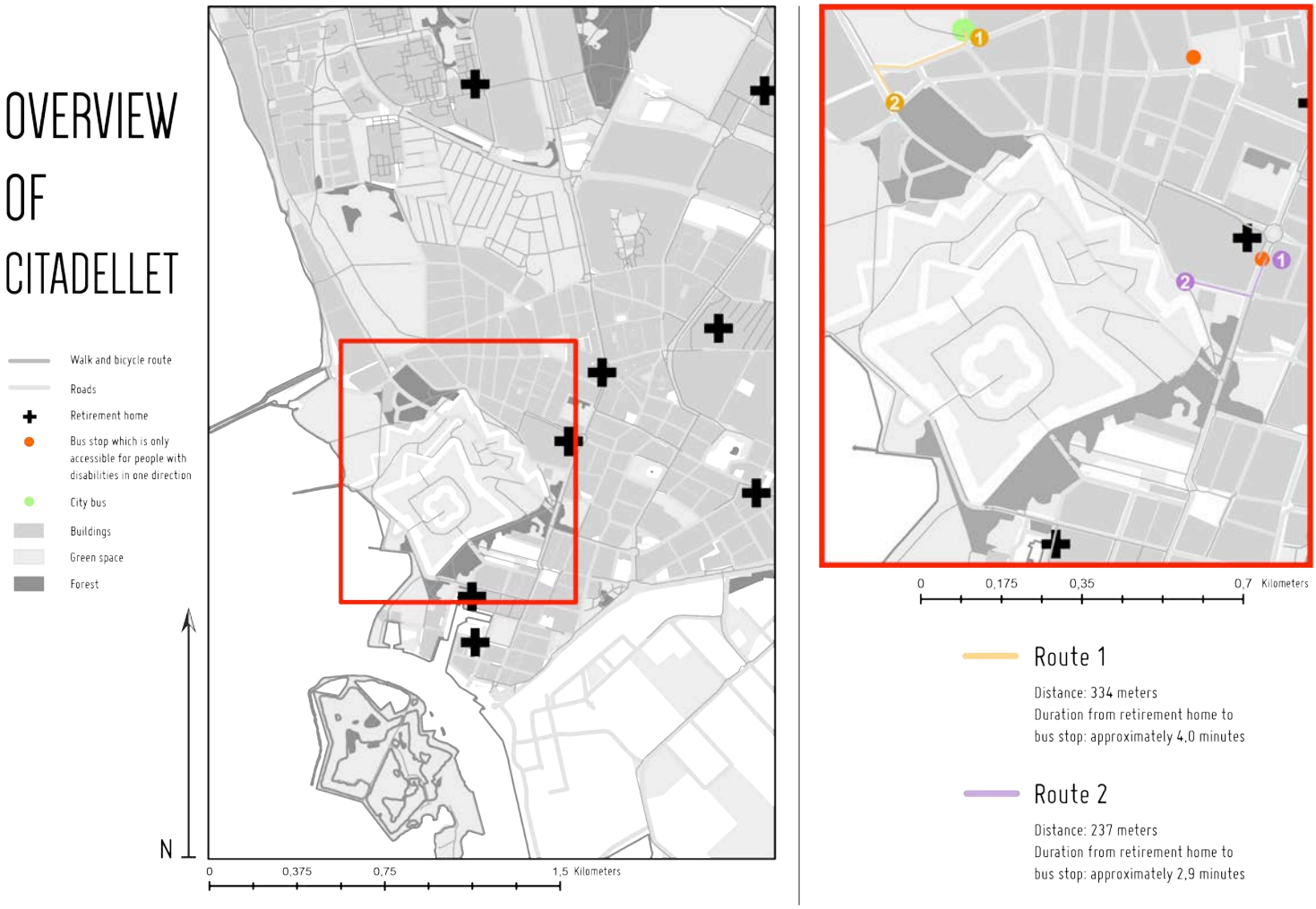
Picture 5: *Poor lightning between the house along Route 1.*

disabilities need to rest. There is also a lack of pedestrian crossings, which could be seen in pictures 3, 4 and 5.

There are also aspects regarding the bus stops themselves that make Borstahusen rather inaccessible; only the bus stops in one of the directions are adjusted for people with disabilities. Hence, there is a risk that not all buses from the retirement homes stop at an adjusted bus stop. Two out of ten retirement homes travel in a way that the travelers get off the bus at a bus stop that is not adjusted for people with disabilities. Hence, this affects the use of time and space for the wheelchair users and elders negatively. If the individuals are travelling from *RH3* and *RH5*, they need to get off at the bus stop *Landskrona Bankvägen*, and walk approximately 5,8 minutes to Borstahusen (Skånetrafiken 2013b: 2f; Skånetrafiken 2013c: 2f; Skånetrafiken 2013d: 2f; Skånetrafiken 2013e: 2f; Skånetrafiken 2013f: 2f). This is the same bus stop when reaching Lill-Olas. This data was derived from Skånetrafiken and the time when the journey starts is around 12.00 (+/- one hour) (see map 13):

Map 13: *Map demonstrating the bus route from RH3 and RH5, and how these do not stop at a bus stop, which is accessible for people with disabilities. It also shows that the travelers from RH3 need to change bus at least once, and that the travelers from RH5 need to change bus twice. These changes are made on bus stops that are accessible for people with disabilities.*

Citadellet area is located in the central parts of Landskrona city, and has several entrances so one can access the green space. However, there are only two bus stops that are accessible for wheelchair users with the lowest distance to Citadellet. One of these is situated close to the green space of Exercisfältet, and the other one is situated on the east side of the green space.



Map 14: *Map demonstrating the fastest route between a bus stop and Citadellet. Number (1) indicates the starting point, and number (2) indicates the endpoint.*

According to SALAR's recommendation for an accessible environment, both routes exceed the recommended distances to green space. Route 1 (see map 14), has an approximately 334 meter walking distance to Citadellet, and takes 4,0 minutes to walk. Route 2 (see map 14) has a distance of 237 meters, and takes approximately 2,9 minutes to walk.

However, there is a problem with Route 2. One of the closest bus stops (which his called *Landskrona Artillerigatan*) is only accessible in one direction. If the bus arrives from the north, one must get off on a bus stop, which is accessible for people with disabilities. However, if the bus arrives from the south, the travelers need to get off at the bus stop *Landskrona Skeppsbron*, which is situated approximately 786 meters as the closest distance. A number of retirement homes are affected negatively by this;

RH5, RH6, RH7. The fastest way to access Citadellet from these retirement homes is by taking the bus that unfortunately stops at an inaccessible bus stop for wheelchair users and elders. Therefore, the travelers need to travel a longer route that could affect their time-geographical framework negatively. The following calculations (seen in table 1) present the difference in time if *Landskrona Artillerigatan* would be accessible for people with disabilities if the journey emanates from each retirement home. This calculation is based on the derived information from the NA and from Skånetrafiken (Skånetrafiken 2014):

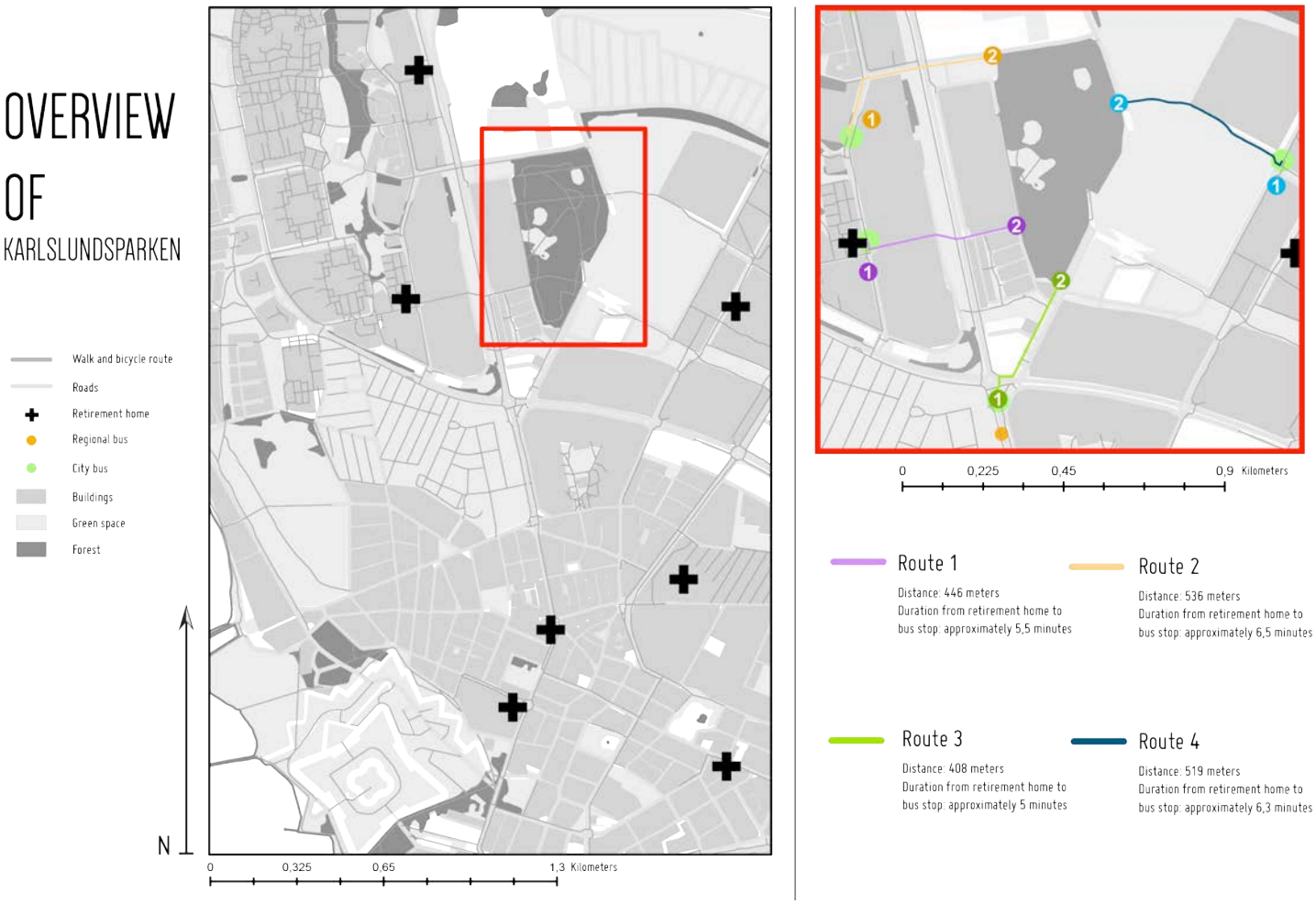
	RH5	RH6	RH7
If *Landskrona Artillerigatan* would be accessible:	12,3 min	24 min	29,3 min
Current situation:	37,3 min	37 min	31,3 min
Difference in time:	25 min	13 min	2 min

Table 1: *Table demonstrating the difference in time if both bus stops on "Landskrona Artillerigatan" would have been accessible for people with disabilities*

5.2.3. Overgrown vegetation and negative social processes (Karlslundsparken)

As for Lill-Olas and Borstahusen, there is more than 100 meters between public transportation and *Karlslundsparken*. Wheelchair users and elders can reach Karlslundsparken from two different bus stops. The shortest of these is approximately 408 meters long and takes 5 minutes to transport (indicated as *Route 3* in map 15). The second fastest distance is approximately 446 meters long and takes 5,5 minutes to walk (indicated as *Route 1* in map 15). Route 2 is the third shortest distance, which is 536 meters long and takes 6,5 minutes to walk.

I have chosen to also suggest a fourth route, which is the longest of them. The distance is approximately 536 meters and takes 6,5 to walk (indicated as *Route 2* in map 15).



Map 15: *Map demonstrating the fastest route between a bus stop and Karlslundsparken. Four routes are demonstrated in this map; number (1) indicates the starting point, and number (2) indicates the endpoint. I have also chosen to demonstrate a route, which could create negative social and mental processes. This route is demonstrated as Route 4 in the map.*

Besides that all given routes exceed the recommended distance to green space and recreational area, the routes fulfill almost all recommendations for an accessible urban environment according to SALAR. However, one route is interesting from a subjective perspective; *Route 3* is approximately 2,5 meter wide, the area is lit up during evenings and nights, it has access to benches and has no other physical barriers that might hinder the accessibility to the green space. However, the route becomes rather inaccessible because of its overgrown vegetation that hinders clear visibility. The overgrown vegetation is consistent during the whole route, from the bus stop to the green space area (see picture 6, 7, 8, 9):

Picture 6: *Overgrown vegetation on the right side of the walkway.*

Picture 7: *The overgrown vegetation can contribute to poor visibility, something that could affect social processes negatively.*

Picture 8: *The overgrown vegetation switches to the left side of the walkway.*

Picture 9: *One views less of the vegetation the closer the individual reaches Karlslundsparken.*

To clarify once more, according to SALAR's recommendations, overgrown vegetation could be a factor that triggers negative social processes since it hinders visibility in the urban setting. Hence, this can contribute to an environment that is perceived as unsafe (SALAR 1994: 36 and 41f) This has been a problem earlier in the area; Landskrona municipality states that there is a need to remove obstacles such as overgrown trees and bushes and drooping branches (Landskrona municipality 2006: 22f).

These negative social processes can cause restrictions and limitations in the usage of the walkway. Therefore, individuals might take an alternative route that has better visibility over the urban setting than this walkway. Hence, this can have a negative impact in how the individuals divide their time and space on activities, where one activity is to walk to Karlslundsparken. Because of the limitation, the individual puts unnecessary movement in time and space to access the green area by foot.

5.2.4. The most accessible green space from a bus stop (Exercisfältet)

In relation to public transportation, Exercisfältet is the most accessible green space area in Landskrona City. It has three bus stops, where all three of the bus stops are accessible for wheelchair users and elders with mobility impairments. It is also less than 100 meters walking distance between the bus stops and the recreational area, which differs from the aforementioned routes earlier in this thesis (see map 16). The only inaccessibility issue that was found based on the recommendations given by SALAR, was that none of the bus stops have a weather cover. However, this is an aspect that has to be discussed whether it is possible or not in the built environment; the street have to have the room in order for a weather cover to be installed. However, SALAR also states that this is a matter of *service*, and not whether if the bus stop becomes more accessible with or without the weather cover (SALAR 1994: 63). The bus stop *Landskrona Exercisgatan* is one example of a bus stop where it arguably would be difficult to install a weather cover since the street is not wide enough for people to pass the bus stop safely without entering the street. This can be seen in picture 10:

Map 16: *Map demonstrating the fastest route between a bus stop and the green space, which is accessible for people with disabilities to Exercisfältet. Three bus stops have been demonstrated, and each bus stop (and its routes to the green space) fulfills SALAR's recommendations. Number (1) indicates the starting point, and number (2) indicates the endpoint.*

Picture 10: *Bus stop: Landskrona Exercisgatan. Here, one can see that the walkway is quite narrow for a weather cover to be installed.*

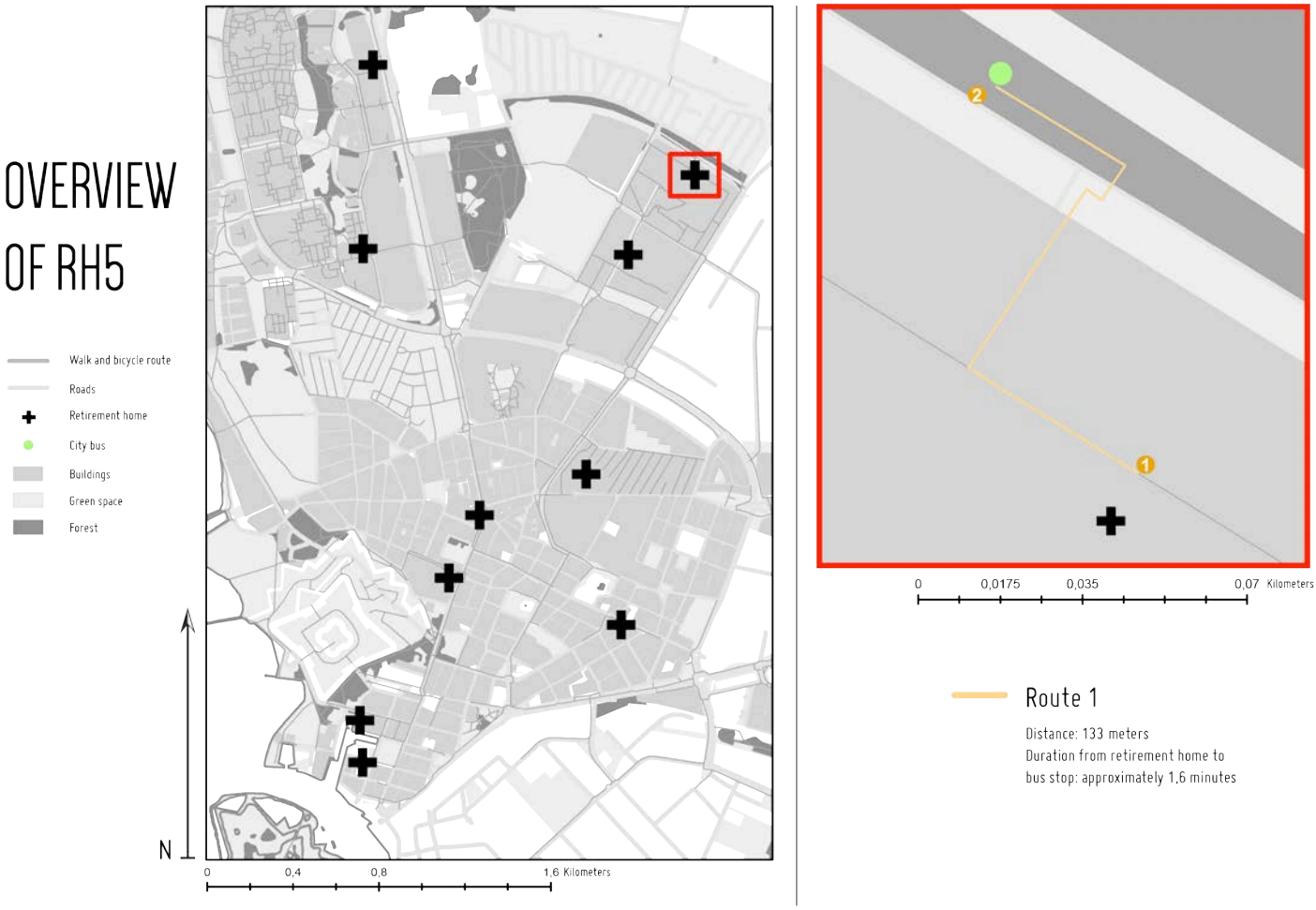
5.3. Which aspects in the built environment restrict accessibility in time to public transportation and green spaces for wheelchair users and elders with mobility impairments?

The results from the empirical observations and the calculations in GIS have shown that wheelchair users and elders with mobility impairments face a number of restrictions in time due to an inaccessible environment. The most common inaccessibility according to SALAR's recommendations is too long walking distances between the retirement homes and closest accessible bus stop, and from an accessible bus stop to the selected green spaces (SALAR 1994: 29). Other restrictions that were found are bus stops that are not adjusted for people with disabilities. Only one third of the bus stops are adjusted for people with disabilities in Landskrona City. This is a problem that has been brought up previously in media, stating that Landskrona is the municipality that has the most inaccessible bus stops in Scania (Pettersson 2014).

5.3.1. Make inaccessible bus stops accessible

One solution that could enhance the accessibility in time is to make all bus stops accessible for people with disabilities. This would not only create a greater range of options for the travelers, but it would also decrease the current distances to reach an accessible bus stop. As aforementioned, this thesis argues that when the supply is high, the distances decrease as well. Positive effects that could be derived from an increased supply of accessible

bus stops is that people with disabilities might become more willing to use public transportation (SOU 2003: 77 and 25; Mamun et al. 2013: 145). An increased supply of accessible bus stops could also increase the range in physical time and space for people with disabilities, where the selected green spaces become more accessible. *RH5* demonstrates how long it would take if the individual had the opportunity to access the nearest bus stop (see map 17):



Map 17: *Map demonstrating the fastest route is the bus stop closest to RH5 would have been accessible for people with disabilities. The (1) indicates the starting point, and (2) indicates the endpoint.*

Today, the wheelchair users and the elders living in RH5 need to walk approximately 429 meters to the closest accessible bus stop. The time to get there is about 7,1 minutes. However, there exist a bus stop rather closely located to RH5, which is called Landskrona Gläntan. If this would have been accessible for people with disabilities, people living in RH5 would only need to walk 133 meters and it would take about 1,6 minutes. The differentiation of this calculation would result in that the individual saves both space (about 296 meters) and time (about 5,5 minutes).

There are more bus stops that could affect the usage of time and space positively if they would have been accessible for people with disabilities. This could be exemplified when reaching the green space of *Citadellet*. The

closest bus stop to Citadellet (both in distance and in time) is *Landskrona Artillerigatan*. However, the problem with *Landskrona Artillerigatan* is that the bus stop is only accessible for people with disabilities in one of the directions; if the bus arrives from the south, the travelers would get off on a bus stop that is not adjusted for people with disabilities. However, if the inaccessible bus stop had been accessible, travelers from RH5, RH6 and RH7 would enable time and space in a time-geographical framework:

	RH5	RH6	RH7
If *Landskrona Artillerigatan* would be accessible:	12,3 min	24 min	29,3 min
Current situation:	37,3 min	37 min	31,3 min
Difference in time:	25 min	13 min	2 min

Table 1: *Table demonstrating the difference in time if both bus stops on "Landskrona Artillerigatan" would have been accessible for people with disabilities*

Again, one can see that the travelers from *RH5* would enable more time and space if the current bus stops were accessible for people with disabilities, where the travelers would gain 25 minutes if one of the bus stops on *Landskrona Artillerigatan* would have been accessible. The journey time with the bus would only take 3 minutes, and there would not be any change of buses during its route. However, the current situation demands the traveler to change bus *three times* in order to reach Citadellet. This also lowers the quality of the journey, since one of the interviewees stated that it is more likely that she waits until there is a bus that has no changes in the route since it requires more physical effort from her[7]. Consequently, this thesis argues that the more changes in the bus route the individual has to make, the more does it decrease the quality of the journey.

In the case of *RH7,* one can see that there would barely be any difference in time if *Landskrona Artillerigatan* had been accessible for people with disabilities (see table 1). However, one thing that would change is the walking distance from RH7 to closest bus stop, which would decrease from 313 meters to 135 meters. Furthermore, in the case of RH6, there is a difference of 13 minutes in time if *Landskrona Artillerigatan* would have been adjusted for wheelchair users and elders with mobility impairments. However, the case of RH6 will be further discussed in the section "Relocate bus stops", since the main issue of the accessibility in time does not concern the adjustment of bus stops, but the localization of it.

One other retirement home that would benefit from an adjustment in current bus stops is RH10. If all bus stops in Landskrona City were accessible for people with disabilities, travelers would only have to walk 57 meters to the closest bus stop compared to the current distances; 385 meters and/or 462 meters. The difference in distances is due to that one of the bus stops is still inaccessible for people with disabilities.

[7] Interviewee 2, interview 2014-04-03

Other areas that would benefit from adjustments in current bus stops are two bus stops that lie closest to *Borstahusen*. As aforementioned, the accessibility to Borstahusen is restricted for those travelers that emanate from *RH3* and *RH5* (see map 13). It is important that the municipality adjusts these bus stops in order for people with disabilites to properly access the green space.

5.3.2. Relocate bus stops

As mentioned earlier, one can see that the travelers would gain 13 minutes if *Landskrona Artillerigatan* would have been accessible for people with disabilities if they would emanate from *RH6* (see table 1). However, the issue is more concerning the localization of the bus stops; in order for wheelchair users and elders with mobility impairments to access the bus stop more easily, it is necessary for it to be localized in close connection to the retirement home. The current distances to the closest, accessible bus stop is 344 meters and takes approximately 4,2 minutes to walk from the retirement home. The distance needs to be minimized so the travelers do not need to walk more than 100 meters in order to reach an accessible bus stop.

Similar adjustments could be made in the case of *RH4*, where the travelers would gain more time and space in a time-geographical framework if a city bus stop would be relocated. This thesis argues that the bus stop should be located in close proximity to the current regional bus stop (see map 9). However, one must still have in mind that the current regional bus stop location lies in a distance that is more than 100 meters, which is the recommended distance for people with disabilities according to SALAR (SALAR 1994: 29). Therefore, one suggestion is to locate both the city bus stop and regional bus stop in a distance, which does not exceed 100 meters.

One other area that could benefit from a relocation of the bus stops is *Karlslundsparken*. This thesis argues that it is of importance that this green space is accessible for people with disabilities who choose to commute. Today, the shortest distance from a bus stop, which is accessible for people with disabilities, is approximately 408 meters. It is of importance to relocate the bus stops, because Karlslundsparken has been mentioned as a focus area amongst the various green spaces in Landskrona City. Moreover, the municipality states that the focus areas should be easily accessed by the public (Landskrona 2013b: 36-39).

5.3.4. Legal restrictions when adjusting cobblestones

One aspect that is rather difficult to adjust in the built environment is the cobblestone, which is defined as problematic surface material. However, adjusting walkways that consist of cobblestones could be difficult since it has a cultural and historical value (Boverket 2013d). Therefore, it is rather challenging to suggest a solution to a more comfortable surface material, since there are legal restrictions regarding these kinds of adjustments.

During the interviews, I realized the difficulty of walking on cobblestones if an individual suffers from mobility impairments. Even if people with

mobility disabilities can walk on cobblestones, it is not the surface material the individuals prefer to walk on.[8] Therefore, this thesis argues that cobblestones affect the quality of the journey for wheelchair users and elders with mobility disabilities negatively. One way to make it easier for the travelers that emanate from an area that consists of cobblestones (*RH1* and *RH2*) is to locate the bus stops so the people with disabilities would not need to move more than 100 meters. Another area where the built environment has a cultural and historical value are some streets in the area of *Borstahusen.* As mentioned earlier, the streets are quite narrow due to the areas old structure (Landskrona municipality 2006: 16). Because of the areas historical value, there are legal restrictions that could hinder some changes in the built environment, such as adjusting the width in the walkways. Therefore, it is important to find other tools to implement in order for people with disabilities to access the green space.

5.3.5. Crossings

One other restriction in the built environment that was mentioned is deficient roads. One example is when travelers want to access a bus stop that lies in the area of *RH3*, which also is a hospital area. This thesis suggests that if planners constructed a crossing from the bus stop *Landskrona Lasarettet Norra* (seen in map 8)*,* the use of time and space would decrease for wheelchair users and elders with mobility impairments. This is also important since accessibility to the hospital area (and hence, the retirement home) would increase. The travelers would therefore only need to walk a slightly more than 100 meters instead of 600 meters to the closest bus stop. Picture 11 shows where I suggest a crossing:

[8] Interviewee 1, interview 2014-04-01

Picture 11: *Picture taken from opposite bus stop. If a pedestrian crossing were constructed here, the travelers would spend less time walking around the area to access the retirement home.*

The green space of *Borstahusen* would also benefit from more crossings. Examples could be seen in the picture 3, 4 and 5. However, due to the area's old and historical structure, the implementation of crossings can be difficult if it affects the areas value negatively, an aspect that also has to be taken into account in order to preserve the area's historical value.

5.3.6. Solving negative social processes

Making adjustments in the built environment that could solve negative, social processes is rather difficult, since it is a rather subjective way of seeing the urban setting. However, this thesis argues that there can be made some adjustments in the built environment that could decrease the development of negative, social processes, mainly in the area of *Karlslundsparken*. The results demonstrated a route that consists of overgrown vegetation seen in figure 14. This contributes to poor visibility, which also has been brought up by the municipality earlier (Landskrona municipality 2006: 22f). One other distance that can create negative social processes is the poor lightning between one of the bus stops in *Borstahusen* (indicated as *Route 1* in map 11) According to SALAR's recommendations, poor visibility can decrease the feeling of safety (SALAR 1994: 36 and 41f). Adjustment that planners can make is to minimize the overgrown vegetation and create better lightning in order to enhance visibility. This can decrease the negative social processes since the individuals can see the environment in which they move within, which further can generate a more frequent use of the urban space. However, it must be noted that adding, or removing, elements in the urban setting does not guarantee that everyone feel more safe. This thesis argues that "safety", amongst other subjective processes, is highly individual.

Another issue that must be stressed that, in some ways, also involves social processes regarding the access in built environment is the poor access to services in Lill-Olas. After having conducted the interviews, I felt that this is an issue, even though it has not been the scope of this thesis research.

Along the coast in Lill-Olas, there is a handicap dock in which people with disabilities can use when performing recreational activities. However, this handicap dock is located almost 1,3 kilometers from the closest bus stop (see map 11). This is a rather inaccessible distance, since people with functional impairments have a harder time to move long distances. People that do not have an electric wheelchair, or a car, might face the risk to be socially excluded from services that are provided primarily for them. Hence, this can create negative social processes in terms of that people with disabilities do not feel that they have the ability to experience the city's services as their counterparts. Therefore, it is important for planners to develop better traveling routes in order for people with disabilities to access the green space and all of its services in order for them to feel socially included. In the case of the two interviewees, none of them use the bus in order to access the area, since it stops too far from the handicap dock in order for them to manage the walking distance. Fortunately for them, they both have electric wheelchairs, which means that they do not need to make a greater bodily effort in order to reach the handicap dock from their homes[9].

[9] Interviewee 1, interview 2014-04-01; Interviewee 2, interview 2014-04-03

6. ANALYSIS

6.1. How can these restrictions explain the time and space use of wheelchair users and elders with mobility impairments in Landskrona City?

In order to answer the second research question, I have chosen to apply a more general discussion regarding how the perspective of time-geography can explain the movement in time and space amongst wheelchair users and elders with mobility impairments in Landskrona City in a subjective way. It is interesting to examine which aspects of time-geography that hinders people with disabilities to move freely. In following sections, I will discuss how the time-geographical *restrictions* explain the movement in time and space subjectively. This part will be partly connected to the results in the previous research question.

6.1.1. Capability restriction

As mentioned earlier in this thesis, *capability restrictions* in time-geography limit an individual's physical ability to access resources in order to perform activities (Hägerstrand 1970a: 4:18-21). The capability restrictions can be seen in many of the mentioned constraints in the results; however, I have chosen to apply a more broad discussion regarding the restrictions and their connection to time-geography. The restrictions have been categorized into different sections.

The limitation in accessing public transportation affects the ability of movement negatively. The more actions that need to be carried out outside the home, the smaller the range becomes, which limits the space for action (Hägerstrand 1970a: 4:18-21). One such action/activity is reaching the bus stop. One of the most common constraints in the built environment in relation to the retirement homes is individuals that do not have the functional prerequisites to walk more than 100 meters. This can be seen as a capability restriction since the individuals face physical restrictions when accessing resources in order to carry out activities. The same thing can be seen in regards to accessing bus stops in Landskrona City; as long as they remain unadjusted, there is a physical constraint for people with disabilities.

As mentioned in the empirical results findings and the results, one could overcome some barriers in time by making more bus stops accessible for people with disabilities. Moreover, this would also solve many of the capability restrictions which people with disability face when taking public transportation to the mentioned green spaces in Landskrona City. Other effects that occur by making inaccessible bus stops accessible, is that the supply increases. Hence, as mentioned earlier in the chapter containing theories and concepts, this paper argues that when supply increases, the distances decrease. Enabling more bus stops is one simple step to create more prerequisites for movement in time and space for people with disabilities.

Cobblestones are also one constraint in the built environment that could be explained through capability restrictions. This problem can mainly be found in the area of *RH1* and *RH2* (page 35-37). Solving constrains, such as cobblestones, is rather difficult. The individual faces both a capability restriction and an authority restriction; the capability restriction emerges since it is physically difficult to walk on cobblestones for people with mobility disabilities. However, the individual also faces an authority restriction, since there are legal restrictions regarding adjustments in, and around, cobblestones (Boverket 2013d). The authority restrictions, which constitute the guidance to various resources in time and space, are often determined by other conditions and rules (Raubal et al. 2004: 248; Westermark 2003: 94; Hägerstrand 1970a: 4:25f). Therefore, in order for the capability restriction to be solved, the authority restriction must be managed first.

The case of cobblestones is one of those constraints in the built environment that faces more than one restriction. Hence, the interaction between two restrictions agrees with one of Hägerstrand's statements, namely that restrictions within time-geography may interrelate and affect each other (Hägerstrand 1970a: 4:31). It is important to find ways to overcome the concern of cobblestones, since it has been shown to affect the quality of the journey negatively. However, the quality aspect is not treated in the capability restriction, which could be seen as rather deficient when examining subjective matters in the urban setting.

Other constraints in the built environment that can be connected to the capability restriction are the lack of crossings in the area of *Borstahusen* (page 47f) and RH3 (page 42f and 59f). One way to solve the capability restriction is to create crossings in these areas. However, one notification must be made; adding crossings can affect the movement in time and space for people that do not suffer from disabilities positively as well.

6.1.2. Coupling restriction

As mentioned earlier in this thesis, the *coupling restrictions* constitute the production, consumption and social interaction between individuals, tools, materials and signals, and how these are connected into interacting groups. It also involves aspects that affect where, when and for how long the interaction is carried out. The coupling restriction can also be categorized in to *fixed* and *flexible activities* as well, where the fixed activity constitutes a form of activity that cannot be easily relocated or rescheduled. The flexible activity constitutes the opposite, where the activities can be relocated or rescheduled (Hägerstrand 1970a: 4:21f; Westermark 2003: 94; Raubal et al. 2004: 248).

The coupling restrictions can be seen *when* the individuals are planning to take the bus. According to one of the interviewees, because of her disability and that she needs to take her mobility aids with her, she tends to take the bus that requires the least changes in order to reach the endpoint. According to the interviewee, she preferred to adjust to those buses that have the least changes, even though they might not depart as frequently. She also states

that she thinks that it gives more quality to the trip when she changes bus less times[10]. In a time-geographical perspective, this also indicates that the interviewee has more fixed activities than flexible. This can be exemplified when taking the bus to *Lill-Olas* from *RH4*; if the decision of departing from the home to Lill-Olas is made at 12.00 the individual that suffers from disabilities is more willing to wait for the bus that only requires one change rather than those departures that require two changes. The time in which the first bus departures (the bus that has two stops) is 12.14 and takes 31 minutes. The second bus, which only has one change, departs 12.29 and takes 36 minutes. The difference in time is 15 minutes, where the 15 minutes becomes a fixed activity for the individual, since he or she waits in the home until having to leave in order to catch the bus (Skånetrafiken 2013b: 2ff; Skånetrafiken 2013e: 2ff).

Although the individual does this to ensure the quality of the journey, it is on the cost of a decreased range in time and space in a time-geographical perspective. These types of decisions are, however, difficult to explain through the time-geographical perspective; why wait to take the bus that departure less often when you can ensure a wide range of movement in time and space and take more buses? This is a rather subjective aspect of how the choices are made, and is accordingly difficult to explain through the perspective of time-geography. The aspect of quality will be further discussed later on in this thesis.

How can the coupling restriction be solved? As regarding cobblestones and capability restriction, this concern constitutes of two time-geographical restrictions. First, the authority restriction must be solved. The authority restriction in this case constitutes the regulations regarding the timetables and the route in which the bus travels, which can only be determined by power-holders. The change that needs to be made in this case is to increase the number of departures that do not have as many changes in the routes between the starting point and the end point. When this restriction is solved, the individual that suffers from disabilities inhabits less time spent on fixed activities (such as sitting home and waiting for the bus), and can therefore also overcome the coupling restriction. Again, one can see that there is more than one time-geographical restriction that needs to be solved (Hägerstrand 1970a: 4:31).

The coupling restrictions could also be connected to one of the statements of the interviewee, namely that she tended to not use public transportation during rush hours, since it might be crowded on the bus[11]. This can be connected to the coupling restriction by the constraint of attending to places in a specific time; each individual is met by the requirement of attending to a setting that takes place in a specific time and space in order to complete a task (Hägerstrand 1970a: 4:21f; Westermark 2003: 94; Raubal et al. 2004: 248). The issue with not being able to take the bus during rush hours can be seen from both an objective and subjective perspective. Objectively, the individual might not have the requirements for transportation to a specific place in time and space due to lack of space in the bus. Yet, the interviewee

[10] Interviewee 2, interview 2014-04-03

[11] Interviewee 2, interview 2014-04-03

states that it can be possible if people make room[12]. Hence, this can also be seen from a subjective perspective, where social and mental processes restricts the individual to access the bus in order to avoid stressful environments such as rush hours. Therefore, the individual chooses to not use the public transportation network even if it might be possible. This is a restriction that could be seen as rather subjective since there are no physical barriers that hinder the individual to use the public transportation service during mornings and afternoons. Hence, since this problem has a subjective character, it is rather difficult to suggest solutions to overcoming this coupling restriction.

6.1.3. Authority restriction

The last restriction, *authority restriction* (*Swedish: styrningsrestriktioner*), constitutes the guidance to various resources and activities in time and space, often determined by others conditions and rules (Raubal et al. 2004: 248; Westermark 2003: 94; Hägerstrand 1970a: 4:25f). The authority restriction has been discussed in relation to cobblestones and how adjustments of the surface material can face legal restrictions. However, the authority restriction can also be found in the discussion regarding bus routes and timetables (which have been discussed as a coupling restriction); it is the authorities and power-holders that decide the structure of the route and the timetables.

However, one can also find the authority restriction in the localization of the bus stops; there are power-holders that determine the conditions and rules regarding where the buses go and where they stop. Hence, the power-holders control and create restrictions in the individuals' choice of activity (Raubal et al. 2004: 248; Westermark 2003: 94; Hägerstrand 1970a: 4:25f). Hence, this can be related to that the interviewees and other people that suffer from disabilities which do not have prerequisites to access the handicap dock in Lill-Olas. This is a matter that has to be taken care of by the authorities in order to enable access to services and the built environment of Lill-Olas. It is also because of the authority restriction that the emergence of the capability restrictions occur; since the service (and some of the bus stops) are localized in a far distance, wheelchair users and elders with mobility impairments face constraints in mobility, since they do not have the physical prerequisites to move longer distances than 100 meters (SALAR 1994: 29).

6.1.4. What about the social processes?

As has been stated throughout this thesis, none of these restrictions can explain the social processes that might occur in *Route 4* to *Karlslundsparken*, and how this affects the movement in time and space (see map 15). It is important to stress this aspect in connection to time-geography, since it does not embrace the social processes that could hinder the use of the urban setting. Because of the poor visibility, people might feel uncomfortable and unsafe while walking this distance to Karlslundsparken.

[12] Interviewee 2, interview 2014-04-03

The same concern can be found in *Route 1* in *Borstahusen*, where there also can occur negative social processes due to poor lightning (see map 11). Objectively, there are no physical barriers that hinder the individuals to use it. However, one could say that the lack of light and the overgrown vegetation constitute barriers that can be added, or removed, in order for the urban setting to feel safe. But, "safety" is an aspect that is perceived as highly subjective and could differ between individuals. If it were that simple to remove, add or adjust physical elements in the built environment that could affect social processes positively, the time-geographical perspective would be applicable also in subjective matters.

Therefore, this paper argues that subjective aspects cannot be explained by either the capability, the coupling or the authority restriction in time-geography. All of the restrictions within time-geography treat the aspects within the urban setting that is physical; the capability restriction treats people's *physical* ability to access resources (Hägerstrand 1970a: 4:18-21). The coupling restriction does treat the social interaction between individuals during a specific timeframe (Hägerstrand 1970a: 4:21f; Westermark 2003: 94; Raubal et al. 2004: 248). However, it does not study the social interaction itself, but merely the physical process that leads to a social interaction and how it is carried out. Hence, it does not explain the social and mental processes and feelings during the interaction. The authority restriction also bases in an objective interpretation, which describes the guidance to resources primarily determined by others (Raubal et al. 2004: 248; Westermark 2003: 94; Hägerstrand 1970a: 4:25f).

In this case, time-geography could be seen as rather deficient in its execution. It leaves out the subjective world, which is as important as the physical and objective ones in order to understand movements in the urban setting. This makes it difficult to suggest any adjustments in the built environment in which the time-geographical restrictions can be solved.

6.2. How do the everyday life contexts explain the time and space use of wheelchair users and elders with mobility impairments?

As mentioned earlier, Hägerstrand states that the construction of the society is fundamentally dependent on the structure of the individuals' everyday life (Hägerstrand 1970a: 4:19f). However, seeing the results of the empirical findings and the interviews, I witnessed the opposite; the structure of the everyday life for people with disabilities is highly dependent on the construction of the society. One interesting aspect is how the social context constitutes an important factor when determining the accessibility to the urban setting. A conclusion that was derived during the interviews was that the interviewees' lives are highly dependent on planning. Consequently, this implicates on all mentioned contexts that have a connection to time-geography, and these are the *everyday-,* the *project-* and the *social context*. The *geographical context* is not taken into account in this analysis since it has no relevance when answering any of the research questions.

The *everyday context* constituted the acknowledgement of the activity process of an individual during a shorter time period, which could be a day or some days in a row (Ellegård 1999: 172f). All of the interviewees' everyday contexts were different depending on e.g. age and whether they were capable to work. Ellegård states that the everyday context does not consist of random emerging activities, but could be highly structured by e.g. physiological necessities and social demands (Ibid: 172f). Interviewee 1's everyday context was highly structured by work. It was both based on physiological necessities of her own and her family, as well as the demands set by power-holders, such as her working hours[13]. Interviewee 2 was not in a working age and therefore had much spare time. However, she was still highly dependent on structure and planning due to her disability. This aspect is apparent when planning a journey through the public transit system; to avoid changing buses in order to reach a destination, she waited for the bus that departs once in an hour[14].

One could also exemplify commuting in relation to *project contexts.* The bus trip constitutes a sub-project in the main project of visiting the dentist (Ellegård 1999: 172f). However, the sub-project for people with disabilities could actually make out a great project in reaching a destination comfortably. The issue of using the public transportation network is that it is adjusted to a population that is younger and can handle stress, and hence, becomes merely a smaller project with little reflection on its purpose. However, for people with disabilities, commuting becomes a project that can be perceived as rather big, and requires much planning and reflection.[15] Ellegård states that one can grade the projects by how long time they take; either it is "short-term" or "long-term" tasks (Ibid: 172f). However, this gradation is deficient in relation to people with disabilities; the planning and the ability to perform a trip takes longer time compared to people with no disabilities. The interviews have showed that planning and structure of the everyday- and project contexts is a necessity in order to live life as comfortable as possible. Hence, this paper argues that the everyday- and the project context can differ depending on mobility ability, which can be concluded based on the given interviews.

The most interesting observation from the interviews was the importance of the *social context*, and how it actually can differ depending on physical abilities. Ellegård states that the social context is based upon how individuals' activities are, in one way or another, intertwined with other individuals' activities. The interaction with other individuals could depend on the arranged activities during a course of the day. However, it could also be limited if the individual lives in isolation from others (Ellegård 1999: 173f).

This is an interesting aspect to examine in relation to public transportation and people suffering from mobility impairments, since the social context could be limited; not because the individual chooses to life his or her life

[13] Interviewee 2, interview 2014-04-01

[14] Interviewee 2, interview 2014-04-03

[15] Interviewee 1, interview 2014-04-01; Interviewee 2, interview 2014-04-03

like this, but because the individual might have restricted access physically to a certain place:

"The bus is not accessible for me at all. Since I use an electric scooter[16]*, it does not give me permission to use the buses in Landskrona or Skåne. So even though I would consider using public transportation, I do not have the permission. These electric scooters are the only mobility aid that is not allowed on the bus."* – (Interviewee 3)[17]

Here, the individual is automatically restricted the opportunity to access the resource of public transportation because of the aid in which the individual needs in order to be mobile. Hence, the individual would not only face restrictions regarding range in physical space, but also restriction in social interaction.

Even though social and mental barriers are not defined by time-geography, it becomes barriers, which restrict people from using the urban space:

"It is quite complicated to take the bus and/or the train. It sometimes goes too fast and then I might get stressed and upset. I do not want to make myself upset, and because of this, I avoid public transportation. It takes a lot of my strength and energy (…). Then you could feel glances from people that might feel sorry for you, or they might think of something else when they look at me. It makes me feel uncomfortable." – (Interviewee 1)[18]

This type of inaccessibility can also affect the social context. One other thing that signifies the social context is the interaction between people in the everyday life. In one of the interviews, it was mentioned that it can occur a social constrain when socializing with people that do not suffer from any disabilities. The interviewee wanted to participate in a journey to another city together with other her co-workers. The other travelers that do not suffer from disabilities might see the need to adjust their journey to the individual that has other prerequisites in order to overcome social constrains. However, the interviewee explained that the individual suffering from disabilities might avoid this type of social constrains since she does not want to be 'an annoyance' to anyone:

"There is this library fair in Gothenburg once a year. I would love to go since I work in a library. My boss would say 'yes, go there', but how would I get there? Okay, let's say I would take the train, but none of my colleagues have disabilities, and no one would wait for me since they might miss a lot by waiting for me. It's a huge fair; I cannot get around there without sitting in a wheelchair. Even if I want to go, I don't because I do not want to be a nuisance to anyone either. In this way I feel rather restricted socially." – (Interviewee 1)[19]

[16] (Skånetrafiken 2012: 5).
[17] Interviewee 3, interview 2014-04-03
[18] Interviewee 1, interview 2014-04-01
[19] Interviewee 1, interview 2014-04-01

This aspect is important to enlighten since the perspective of time-geography cannot explain it. Theoretically, the woman could travel to the library fair in Gothenburg, but avoids this mainly because she does not want to travel alone. Moreover, Hägerstrand himself states that the social and mental processes are excluded within the time-geography perspective (Åquist 1992: 28ff; Hägerstrand 1970a: 4:15; Hägerstrand 1970b: 8ff). This aspect also has to be taken into account within the field of urban planning, since it has shown that social and mental processes can cause barriers in the urban setting.

6.3. Quality within time-geography

Quality has been mentioned several times in this thesis in regards to the built environment. However, it has not yet been found how quality is embraced within the perspective of time-geography.

Quality is a factor that could be cumbersome to study in relation to time-geography, much because that the perspective is primarily examining physical and material aspects of the world. The level of quality is mainly determined subjectively depending on the observers' requirements and thought of what is considered as high, or low, quality in the built environment. One quality factor that is closely connected to accessibility is the range of choices; the possibility to choose amongst options regardless of physical construction in the urban environment is also considered as accessibility (Banister 2011: 950 and 954f). This is one of the greater issues regarding public transportation in Landskrona City; only one third of the bus stops in Landskrona City are adjusted for people with disabilities (Pettersson 2014). This indicates that wheelchair users and elders with mobility impairments have fewer options to choose amongst, which lowers both the accessibility and, hence, the quality. When determining how the time and space is used in a time-geographical frame, neither the restrictions nor the everyday life contexts treat the quality of the supply and its accessibility. These aspects of time-geography observe and define the objective decision behind each movement in time and space. Hence, it does not define the quality of the movement, whether the journey consists of cobblestones or other factors that might implicate how space and reality is perceived subjectively. Therefore, this thesis argues that time-geography lacks the ability to define quality in its execution, since it mainly treats objective aspects of the urban setting.

The opportunity of choice in relation to transportation could also create prerequisites for increased social welfare, mainly regarding public transportation. However, in order for the public to engage in a public transit network, there must be reductions in the travel time. In fact, many individuals are willing to pay some more money if the travelling time is decreased and the frequency is increased (Banister 2011: 955; Metz 2008: 322). However, this has been shown to differ from people that suffer from mobility impairments during the interviews. As mentioned earlier, one of the interviewees tend to wait until there is a buss that has less changes to the endpoint. She does this in order to secure the quality of the journey, and prioritize this higher than making to the endpoint in the fastest possible

way[20]. Even though the interviewee has the prerequisites to take a bus that might require three changes in order to reach the endpoint, she tends not to. Instead, the interviewee takes another bus that might take longer time but has fewer stops. In a time-geographical perspective, this constraint cannot be explained by any restriction or any of the everyday life contexts. However, this type of decision affects the movement in time and space. Therefore, it is of importance that this matter is seen to as well. This type of movement is exemplified in a prism (see figure 2):

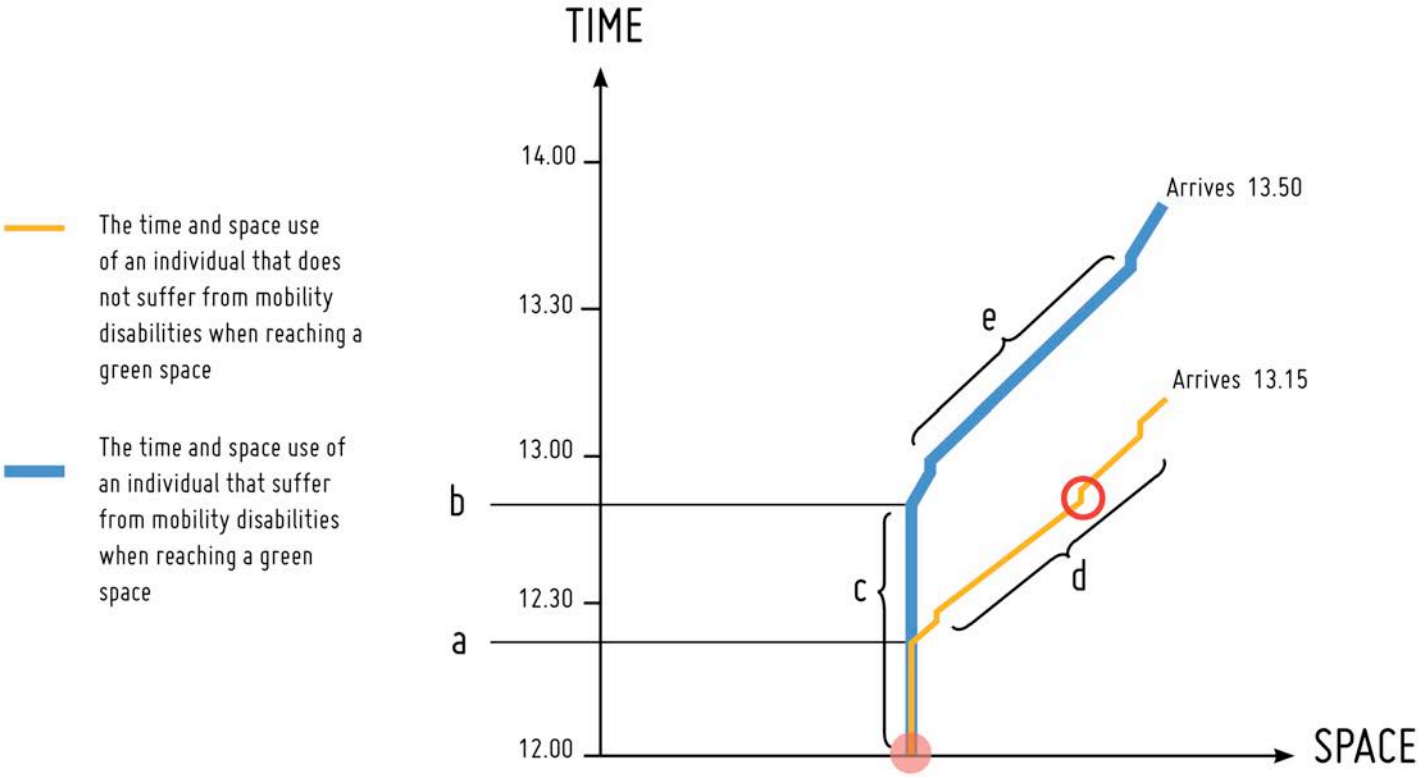


Figure 2: This prism demonstrates the time and space use of an individual that does not suffer from disabilities, and from an individual that do not suffer from any disabilities. The description of what each letter indicates can be read in the text below.

The prism in figure 2 shows how the interviewee divides her time and space based on when the buses departs. The red dot indicates that the decision of going out to e.g. a green space is made at 12.00. However, the individuals must wait until the next bus depart, which is 12.30. The orange line, which indicates an individual that does not suffer from any disabilities, leaves the home approximately 12.25 (a) in order to walk to the bus stop in time for the departure at 12.30. The blue line indicates the interviewee that suffers from mobility impairments. The interviewee stated that she would rather wait until there is a bus that does not have any changes in its route. Therefore, she leaves the home at approximately 12.50 in order to make it to the departure at 13.00 (b). The interesting aspect in this prism is the letter (c); it not only indicates that the individuals are pursuing a fixed activity, but it further indicates that the interviewee makes an active choice to stay home and wait until next bus departures because she do not want to change

[20] Interviewee 2, interview 2014-04-03

buses[21]. The interviewee's bus journey can be seen in (e), which is a straight, gradient line with no interruptions. Compared to the other individual's bus journey (d), one can see that there is one interruption, where the individual has to change bus in order to reach the green space. The change of bus is indicated as a red circle.

In this prism, time-geography cannot explain why the interviewee chooses to wait for a whole hour in order to take a bus that minimizes the interviewee's range in time and space. It is because that the interviewee wants to secure the quality of the trip. As discussed earlier, "quality" is an aspect that is rather subjective in its interpretation, and is therefore not explained by time-geography.

It should be stressed that time-geography merely maps the *efficiency* of the trip (i.e. the speed and time it takes from start point to end point). Therefore, I regard time-geography as being a good tool to use for planners who want to adjust the localization of e.g. bus stops, in order for the public to create more "flow" and avoid waiting time at a station (if a change of buses/trains is necessary). Hence, efficiency in transportation can also create the prerequisites for journeys that could be considered as quality filled.

Another subjective aspect in the urban setting that has been brought up in this thesis regards the feeling of safety. It is an important factor that needs to be taken into consideration in order for the urban setting to be accessible in a subjective way as well. These types of observations are difficult to connect to the perspective of time-geography, since the perception of what is considered as "safe" can differ depending on who is observing. This thesis argues that these types of observations are rather subjective and inhabits social processes that do not have a close connection to the perspective of time-geography (which mainly treats the physical and material world) (Åquist 1992: 28ff; Hägerstrand 1970a: 4:15).

Safety is an aspect that is interesting to observe in relation to urban planning, where planners can shape, or loosen up, mental barriers that occur in the environment. The words *security* and *safety* are two words that are often perceived as similar, but this thesis argues that there has to be a distinction; *security* is considered to be the process of delaying, preventing or in other ways protecting against external and/or internal dangers that threats or weaken, hinder or destroy an individual's "steady state" (which mainly constitutes the feeling of control and tranquility). *Safety* involves the contributions to maintain the "steady state" of a social and physical structure or setting and connotes stability over time, permanence of function and consistency of structure. This distinction is of importance in this thesis because that *security* can be perceived as a physical process; it is more about the how the physical structures of a setting affect the risk of unsafe events, while *safety* is more perceived as a social process; it is more about the personal understanding of the setting (Oakes 2009).

This thesis argues that time-geography primarily embraces the aspect of *security*, since it is more objectively orientated. Examples on how one can

[21] Interviewee 2, interview 2014-04-03

increase *security* in an area are to make changes in the built environment, such as provide better lightning and remove overgrown vegetation (SALAR 1994: 36 and 41f). Consequently, the word that is the most suitable to use in a subjective context is *safety*.

7. CONCLUSION

The first research question was *"Which aspects in the built environment restrict accessibility in time to public transportation and green spaces for wheelchair users and elders with mobility impairments?"*. It was primarily addressed from an objective perspective, where I employed a quantitative approach. However, I also chose to incorporate aspects that were derived from observations and interviews that could affect how people with disabilities assess the built environment, such as cobblestones. This was made primarily to present a more accurate result regarding the duration (since cobblestones lower the walking speed for people with mobility disabilities). The result demonstrated that there are a number of routes from the retirement homes to public transportation and green spaces that are considered to be inaccessible for people with disabilities. Amongst these were e.g. inaccessible bus stops, long distances and routes with poor visibility. The last mentioned constraint can develop negative, social processes, which might affect the use of the space negatively, even if it is considered as physically accessible. All of the mentioned constraints in the built environment affect the use of time and space for people with disability negatively.

In connection to the first research question, I have also suggested changes in the built environment that could affect the use of time and space positively. For instance, to make inaccessible bus stops accessible, relocate bus stops and to remove overgrown vegetation and add better lightning. However, it must be noted that negative social processes are personally interpreted and hence differ between individuals – not all changes in the built environment guarantee that all individuals feel safe, due to its subjectivity. Thus, this thesis argues that subjective aspects are rather difficult to explain in a time-geographical perspective, which also makes time-geography incomplete in its execution.

The second research question was *"In which ways do the restrictions and the everyday life contexts in time-geography explain the time and space use of wheelchair users and elders with mobility impairments subjectively?"*. The discussions demonstrated that many of the restrictions within time-geography could explain wheelchair users and elders movement in time and space, mainly connected to the previous results. The result of this research question also showed that many of the restrictions within time-geography could be solved by changes in the built environment. This also affects the time and space use positively. However, there are subjective aspects that cannot be explained by the capability, the coupling or the authority restriction. Hence, this makes it also difficult to suggest accurate changes in order for them to be solved.

Regarding the everyday life contexts, it became evident that time-geography does not include the subjective aspects in relation to people with disabilities. This is exemplified in the social context, when one of the interviewee does not participate in an event because she does not want to travel alone. As a conclusion, this thesis argues that social processes often control how the

individual moves in time and space, especially in relation to people with disabilities. This does affect the everyday life contexts, but fails to be explained within the time-geographical perspective.

In connection to the second research question, I also discussed how the concept of "quality" is embraced within time-geography. This was exemplified in a prism demonstrating the movement within time and space if the individual values quality. It showed that people with disabilities assess more fixed activities. This is based on one of the interviewee's statements, where she tended to wait until there is a bus that travels to the endpoint and consists of no changes.[22] The interviewee did this to ensure the quality of the journey. The discussion also stated that "quality" is an aspect that cannot be defined by time-geography, mainly because it is considered to be rather subjective.

Conclusively, I want to stress the issue of an inaccessible environment in relation to people with disabilities. Even though many municipalities and societies today advocate an accessible environment, many tend to forget the very details that can affect how people move in the environment, both objectively and subjectively. This thesis has strived to demonstrate the details in the built environment that are of importance in order for the urban setting to be inclusive. There is a need to develop the subjective understanding in the built environment as well. This matters since it is as important as the physical and material world. In fact, it is the social processes that often determine how individuals move in space and time.

One way to enhance the understanding for how people with disabilities move in time and space is to incorporate them in the planning process. This would also benefit and enhance the knowledge of accessibility amongst planners, both objectively and subjectively. One method could be to make interviews, or surveys, as a routine in the planning process. Planners could also make "accessibility tours", which has the same structure as "safety tours"[23], but with a specific focus on people with disabilities. Hence, it is of importance that Landskrona municipality creates a more accessible environment for people with disabilities, since it has been notified that the city needs to work on its physical accessibility (Pettersson 2014).

Further research

This thesis also argues that time-geography is a useful tool to assess when determining movements in time and space, also for people with disabilities, mainly from an objective perspective. However, there is a need to further develop time-geography in order for it to be properly assessed in the urban setting, mainly from a subjective perspective.

Developing the interpretation regarding subjective aspects within time-geography is one suggestion of further research. The reason why it is important to develop time-geography is to make it more applicable as a research method in urban planning. Another suggestion on further research

[22] Interviewee 2, interview 2014-04-03

[23] Tours that have a main focus on the safety of the environment (Landskrona, n.d.)

is to measure the actual time it takes to travel from the start point to the endpoint, where the actual bus journey is also included within the time-geographical framework. I tried to do this when measuring the accessibility from certain retirement homes (*RH5, RH6, RH7*, seen in table 1, page 55). This type of research was not going to be a focus in this thesis, and was therefore excluded. However, it is an interesting research topic to employ in order to observe the actual time difference of accessing green spaces, using the public transit system. Depending on whether the traveller has disabilities or not, the time difference of the journey might differ a lot.

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8.3. Municipal documents

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8.4. Interviews

Interview 1: Interviewee 1, interviewed by: Saba Shahriari (2014-04-01)

Interview 2: Interviewee 2, interviewed by: Saba Shahriari (2014-04-03)

Interview 3: Interviewee 3, interviewed by: Saba Shahriari (2014-04-03)

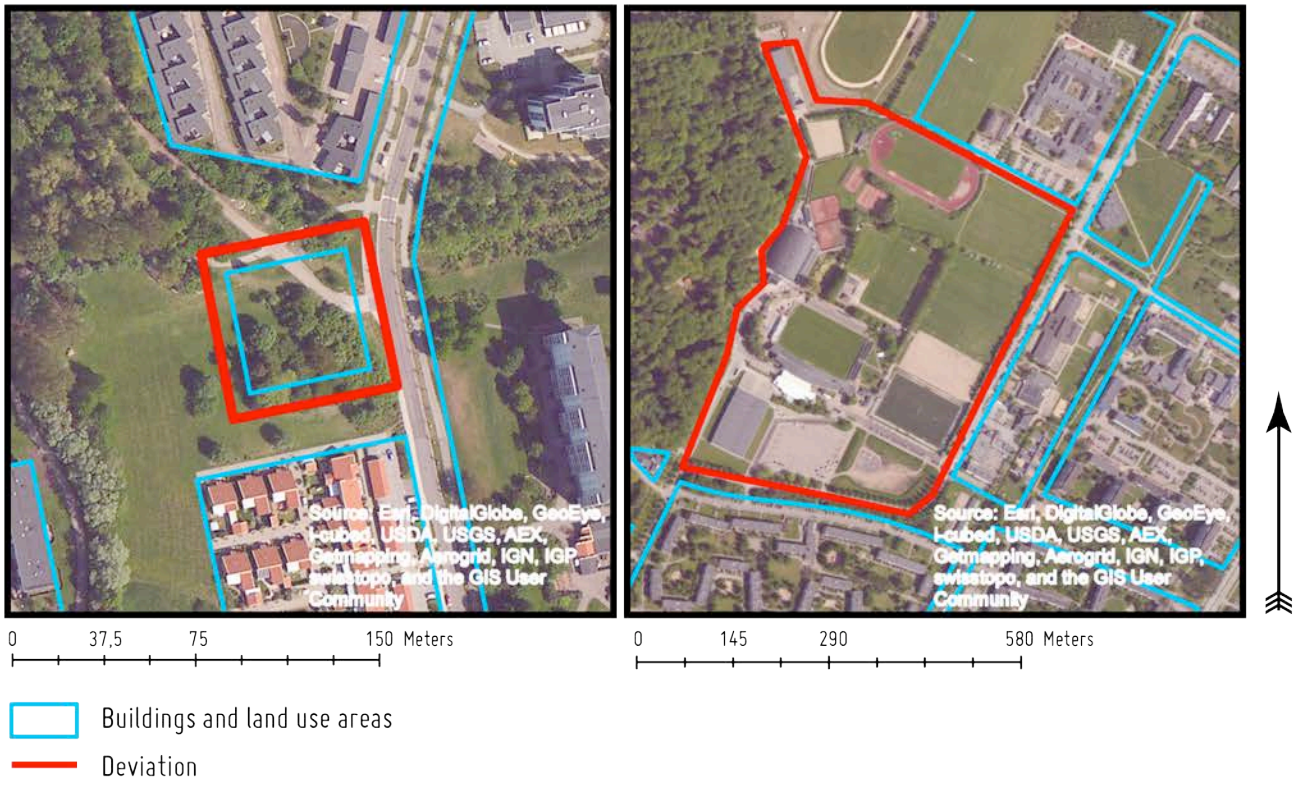
8.5. Other sources

All GIS-data that have been used in order to construct maps have been received from the Map and Measurement unit in Landskrona municipality. All files are projected in SWEREF99 13 30.

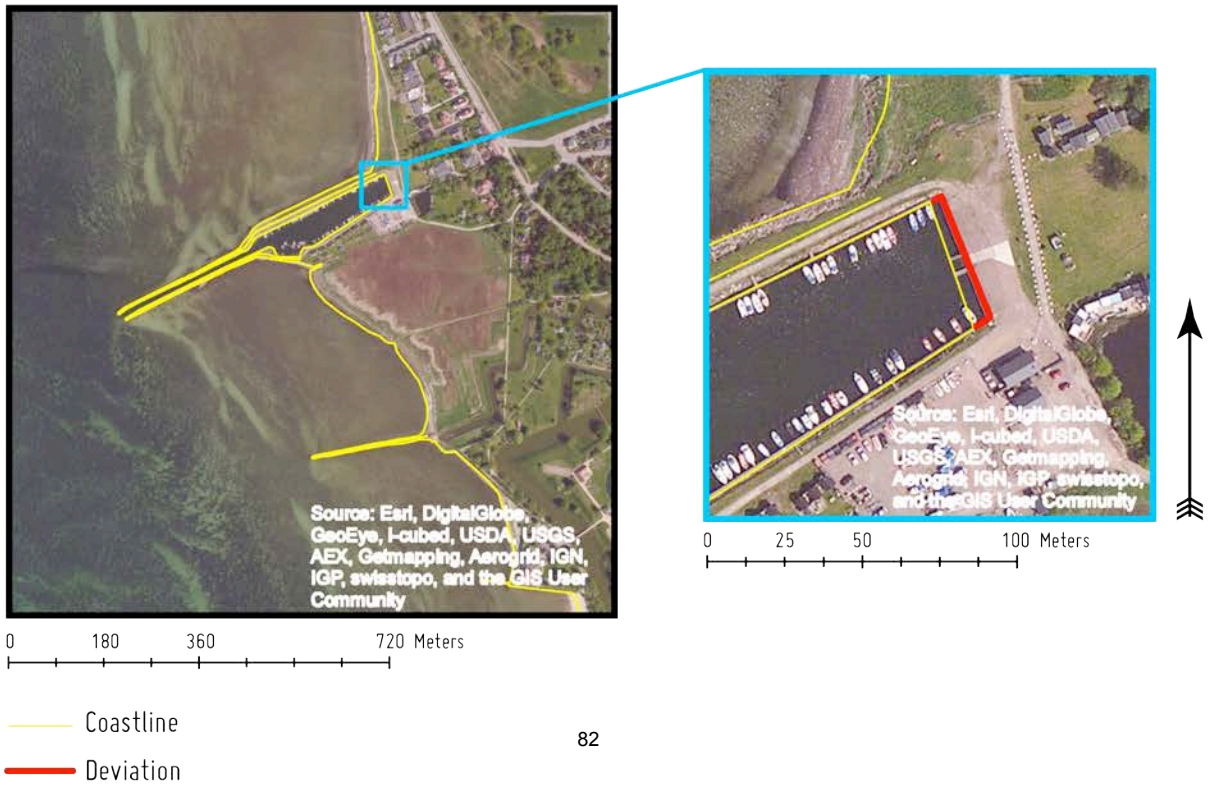
9. APPENDIX

Appendix 1

Building and land use areas: data deviations



Coastline: data deviations



Appendix 2: Checklist for accessibility in the built environment in relation to people with disabilities

1. Entrence surface	YES	NO	COMMENTS:
Flat connection between entrance and walking surface:			
Clearly marked out entrance:			
Surface material:			
2. Pavements and walkways	**YES**	**NO**	COMMENTS:
Walkway width (2,5 m is good, 1,8 at least):			
Inclination (2,5 % vs. 5 %):			
Alternative arrangements i.c.o stair?			
Lampposts and poles placed in walkway?:			
Contrasting surface between walkway and bicycle?:			
Walkway connected with road, contrasting surface?:			
100 m to public transit alt. recreation?:			
Edge support (kantstöd) alt. contrasting surface:			
Surface material in the walkway:			
Access to bench (place for wheelchair users?):			
Guide paths (marked out danger i.c.o, railing close to the ground, contrasting surface materials?):			
Any barriers in the way?:			
Wells? Are the openings covered (10-20 mm max):			
Symbols on the surface:			
3. Stairs	**YES**	**NO**	COMMENTS:
Rest landings i.c.o stairs (at least 1,2 meters):			
Ramp for wheelchair/walker users?:			
Handrails for people with sight impairments?:			
4. Ramp	**YES**	**NO**	COMMENTS:
1,3 m wide, maximum 5 % inclination			
Landing surface (at least 2 m long, max 2% inclin.):			
Contrasting surface material (beginning, end)?:			

5. Bus stop	YES	NO	COMMENTS:
Does the bus stop have weather cover?:			
Visible bus stop sign?:			
Time table (1,5-1,7 m and area map)?:			
Separated from surrounding surface (edge support, contrasting surface materials?):			
Where are cycling paths localized? Behind? Front?:			
Is sight in any way concealed, by e.g. vegetation?:			
Bench:			
Is the bus station properly separated from traffic?:			
Contrasting surface materials for sight impairments:			
6. Pedestrian crossings	**YES**	**NO**	COMMENTS:
Is the crossing considered as accessible?:			
Is there any built-in ramp?:			
Is there a small edge support (40 mm)?:			
Is the crossing marked out properly?:			
Does the crossing have a handrail?:			
Is there any aucustic signals?			
Botton box 0,8 m from the ground?			
How much is the green-time in relation to cars waiting?:			
7. Parking and docking	**YES**	**NO**	COMMENTS:
One meter maneuver in parking spot?:			
10 meters from parking spot and end-point?:			
Are there edge supporters on the parking spot?:			
8. Way findings	**YES**	**NO**	COMMENTS:
Is the street names places on a 1,8-2,0 m distance from street level?:			
Are the street signs readable (e.g. thick lines)?:			
Are the signs also written in Braille?:			

9. Lightning and day light	YES	NO	COMMENTS:
In case of stairs, are they provided with light?:			
Are inforamtion spots (such as time tables, maps and road signs) provided with light?:			
Are bus stops and pedestrian crossings provided with light?			
Separated from surrounding surface (edge support, contrasting surface materials?):			

Appendix 3: Interview questions

- Do you live in Landskrona?
  - (YES) For how long?
  - (NO) In which ways do you know Landskrona?
- For how long have you had disabilities?
- How is you weekday structured?
- How is you weekends structured?

- How do you perceive the built environment in Landskrona in relation to your disability?
- Do you use any green spaces in Landskrona?
  - (YES) Which ones?
  - (NO) Why?
- Do you go to Lill-Olas, Borstahusen, Exercisfältet, Citadellet area and/or Karlslundsparken?
  - (YES to all) What do you think is good/bad with the mentioned green spaces?
  - (YES to some) Is there a reason why you do not use the other mentioned green spaces? What do you think of the mentioned green spaces that you use?
  - (NO) Is there a reason why you do not use the mentioned green spaces?

- What is quality for you?
  - What do you think it means?
- What do you think is high and low quality in the built environment?
- Do you ever feel uncomfortable in any environment due to your disability, and because of this avoid this area even though it should be accessible for you as well?

- Do you use any public transportation today?
  - (YES) What type of public transportation?
  - (NO) Why?
- If you use public transportation:
  - What is your general image of the buses and the bus stops in Landskrona?
  - Are there aspects that make you feel uncomfortable when using public transportation?
    - If so, which are these?
  - Are there times during the day where you avoid using public transportation?
- Do you use public transportation in order to reach Lill-Olas, Borstahusen, Exercisfältet, Citadellet area and/or Karlslundsparken?
  - (YES to all) Which of the mentioned green spaces do you feel are the easiest to travel to? Which ones are difficult?
  - (YES to some) Why do you only travel with public transportation to some of the mentioned green spaces?
  - (NO) Is there any reason to why you do not travel with public transportation to the mentioned green spaces?
